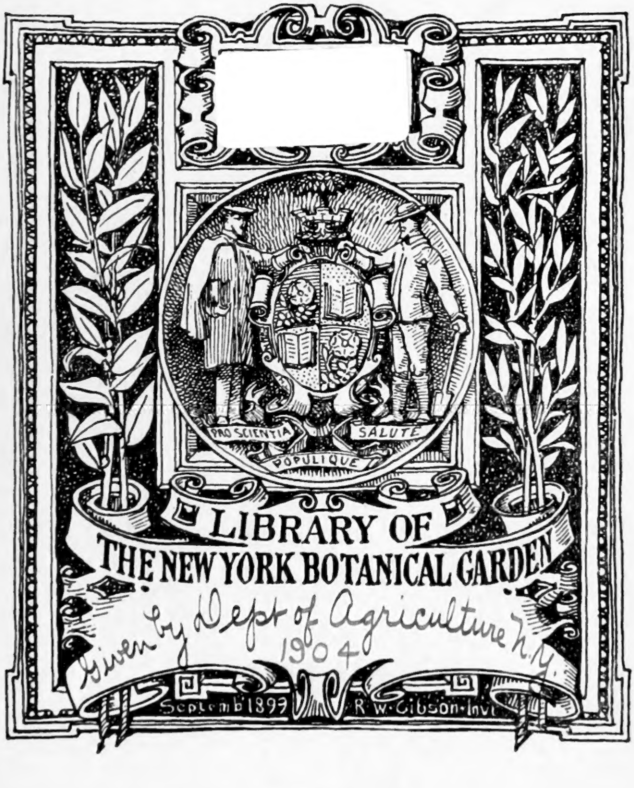
PRO SCIENTIA
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State of New York — Department of Agriculture.

EIGHTH ANNUAL REPORT

OF THE

NEW YORK WEATHER BUREAU

1896.

Under the Department of Agriculture and in Co-operation with the U. S. Weather Bureau.

CREATED AND ORGANIZED UNDER THE LAWS OF THE STATE OF NEW YORK — (CHAPTER 148, LAWS OF 1889.)

REORGANIZED AND PLACED UNDER THE DEPARTMENT OF AGRICULTURE — (CHAPTER 338, LAWS OF 1893.)

CENTRAL OFFICE AT CORNELL UNIVERSITY, ITHACA, N. Y.

TRANSMITTED TO THE LEGISLATURE JANUARY 15, 1897.

WYNKOOP HALLENBECK CRAWFORD CO.,
STATE PRINTERS.
NEW YORK AND ALBANY,
1897.

STATE OF NEW YORK.

No. 11.

IN ASSEMBLY,

JANUARY 15, 1897.

EIGHTH ANNUAL REPORT

OF THE

Director of the State Weather Bureau.

STATE OF NEW YORK:

DEPARTMENT OF AGRICULTURE,
ALBANY, *January* 15, 1897.

To the Honorable the Legislature of the State of New York:

In accordance with the provisions of the statutes relating thereto, I have the honor to herewith transmit the Eighth Annual Report of the Director of the State Weather Bureau.

CHARLES A. WIETING,
Commissioner of Agriculture.

TABLE OF CONTENTS.

PART I.

REPORT OF THE DIRECTOR

OF THE

New York Weather Bureau.

REPORT.

Ithaca, N. Y., *January* 1, 1897.

To the Honorable the Commissioner of Agriculture of the State of New York:

Sir.— I have the honor of transmitting to you an account of the operations of the New York Weather Bureau during the past year, together with a financial statement, summaries of weather and crop conditions, and a report on the climate of the State.

The routine work at the central office has been carried on efficiently and without breaks. The clerical employes of the State are the same as in previous years; and the National Weather Bureau has continued the detail of Mr. R. M. Hardinge as assistant to the director, which place he has occupied since 1890.

The maintenance of extensive systems of meteorological, crop and forecast-display stations has necessarily occupied nearly all the time of our clerical force; a fact which is to be regretted in view of the pressing need which exists for climatological investigation and experimental work in meteorology. The service now comprises 112 well distributed meteorological stations, 81 of which are equipped with thermometers and rain-gauges and 31 with rain-gauges only. Daily readings of self-registering maximum and minimum thermometers are made at all regular stations; and in addition, about one-half the number report the temperature at 7 a. m., 2 p. m. and 9 p. m., which method gives a valuable check on the daily averages as obtained from the maximum and minimum readings. Observations of wind, cloudiness and miscellaneous phenomena are included in the scheme of daily records throughout the State. The precipitation is registered at the close of each day, and also, when practicable, after each storm, with notes of the time of beginning and ending of rainfall.

Twelve new stations have been equipped with thermometers and rain-gauges this year, as follows: Canajoharie, Montgomery county; Catskill, Greene county; Dryden, Tompkins county; Elka Park, Greene county; Franklinville, Cattaraugus county; Little Falls, Herkimer county; Lockport, Niagara county; Lake George, Warren county; North Lake, Herkimer county; Primrose, Westchester county; St. Johnsville, Montgomery county; Straits Corners, Tioga county. In addition to these, the former special rainfall stations at Bolivar, Allegany county, and Ridgeway, Orleans county, have been provided with thermometers.

Special rainfall stations have been established at Niagara Falls, Niagara county, at Watkins, Schuyler county, and at the Intake Reservoir near Little Falls, Herkimer county.

The State is fortunate in securing the co-operation of voluntary observers at three points of the Mohawk valley and at the Adirondack station, North Lake, in view of the difficulty hitherto experienced in obtaining observations from these sections of the State.

Owing to a change of residence of observers, or to other causes, four regular stations have been discontinued this year, namely: Hamilton, Madison county; Turin, Lewis county; Malone, Franklin county; and Varysburg, Wyoming county. The rainfall stations, Ellis and Attica, have also ceased to report to the central office.

Fifty-five thermometers and twenty rain-gauges, purchased from the State appropriation, have been issued to new stations, or to replace those rendered unserviceable by accidents. All State property is issued to observers on the agreement that a full account shall be rendered of any breakage or injury which may occur.

A tabulated summary of the observations at all stations is published each month, together with a general review of weather conditions and charts showing the average temperature and distribution of rainfall over the State. An edition of 800 copies of the monthly review is published; and of the more complete annual review, 1,000 copies.

A weather-crop bulletin was issued on Tuesday of each week during the farming season, or from April 25th to September 26th. The list of correspondents contributing information to the bulletin includes ninety persons, representing forty important agricultural counties; so that a full and adequate account of agricultural interests, as affected by current weather, is presented week by week. In addition to the reports of observers and an editorial résume of general crop conditions, the bulletin also gives a brief review of the effect of current weather upon staple crops in other parts of the United States.

The crop-bulletin, which as a rule is furnished only upon application, is now mailed to over 700 addresses; and further, is given a very general circulation through the newspapers of the State, more than 100 of which publish it wholly or in part.

Display Stations.—A thoroughly organized system under supervision of the central office now distributes the daily weather forecasts to 700 cities and villages located in all the important commercial and agricultural regions of New York. The number of stations receiving the telegraphic forecasts from Washington directly is about 100; but arrangements have been made whereby the messages are forwarded, in many cases by telephone, to neighboring points where the warnings are given publicity by flag or whistle signals.

Two years ago a very efficient and inexpensive plan of forecast distribution was generally adopted by the State weather services, whereby a number of selected telegraph stations print the forecasts immediately after their receipt, by means of a rubber-stamping outfit, and forward them by rail or stage routes to the postmasters of neighboring farming communities. At these sub-stations the bulletins are posted conspicuously, or are displayed by flag signals. In New York there are now thirty-five distributing centers which communicate the warnings daily to 570 villages.

Work at the Central Office.— In addition to the usual observations of a voluntary station, continuous records are kept at this office of temperature, rainfall, the direction of the wind and its velocity in vertical and horizontal directions, also of the duration of sunshine, the humidity of the air and amount of evaporation. An account of the instruments which automatically record these elements will be found in section V. Much of this apparatus is complicated, requiring constant supervision and frequent adjustment. Modifications of the original designs of the makers have been found necessary in some cases, and such work has been carried on under personal supervision in the shop of the College of Engineering. It is hoped to publish hourly values from the records of the several instruments during the coming year if time can be spared from the routine work of the service.

A large number of requests for special data have been received this year from State and municipal boards and for individual use.

The information called for has been gratuitously furnished in so far as it was obtainable from our records. In this and other directions the correspondence of our office is very large, and much of it is of a character requiring special research. More than 40,000 pieces of mail matter are sent out from our office annually, generally under the frank of the U. S. Weather Bureau.

The routine work of the central office includes the examination and repair of instruments issued to voluntary stations; the critical examination and reduction of reports rendered monthly by more than 100 observers; the preparation of tables and charts for publication, beside the extensive system of observations carried on here. In order to accomplish these necessary duties we have been obliged to restrict our field of work, especially in the direction of climatic investigation to a degree which I regret; but larger results cannot be expected unless another assistant can be employed for at least half of the year.

It was hoped that a monograph on the climate of New York, which was published in our annual report for 1893, might be reissued in a thoroughly revised form by the incorporation of the large mass of data recently accumulated from all parts of the State; but lack of time has made any material progress in this direction impossible. Meanwhile, a very large demand has nearly exhausted the first edition; and, in view of the urgent requests for the report which come to us almost daily, it is deemed necessary to reissue it at once, as a portion of the present annual report, although without the desired revision.

A consideration of the character of requests for the data contained in this monograph is instructive, as showing the variety of interests which are practically affected by weather and climatic conditions, beside confirming views which I have previously expressed as to the proper functions of a State weather service. Among the applicants for information are to be mentioned, firstly, the agricultural experiment stations, whose recently awakened interest in soil temperature and the movements of ground water, as subjects of practical importance to the farmer, calls for meteorological data upon which these elements are dependent. The interest of farmers in these questions is also evidenced by the fact that they contribute a large proportion of the most valuable reports received by this Bureau.

Secondly, frequent requests for information are received from the large class of persons interested in medical climatology, including State and municipal boards of health as well as private practitioners, and invalids with whom climate is a matter of primary importance in the selection of a place of residence. The remarkable diversity of climatic conditions to be found within the limits of this State, which will be referred to with more detail further on, renders it of more than usual importance that the peculiar characterictics of each region shall be fully determined and made accessible to the public.

Our data is also very frequently called for by engineers, in nearly all branches of their profession, but especially by those having in charge the supervision of State canals and waterways and the water supply and drainage of cities. City engineers have rendered this Bureau valuable aid in the establishment of voluntary stations, and (as in the case of the engineer at Little Falls) have entered on lines of special investigation promising to be of mutual benefit.

In addition to the above, our records are in constant demand in the law courts of the State, for cases involving, often, large sums for damages to individuals, corporations and cities; also, railway companies in the settlement of their disputes for injury to perishable material in transit over their lines; questions of inundation of lands by excessive rainfalls, or affecting the rights of cities to distract water from the lakes and streams of the State; various cases of disputes between riparian owners; damages to individuals during high winds; matter pertaining to the insurance of buildings, and injuries to stock or other property on account of fire, as affected by the direction and intensity of the wind; claims upon town and city treasuries for injuries caused by slippery sidewalks, etc.

Lastly, the climatology of New York is found to be a valuable aid in teaching the subjects of meteorology and physical geography in the colleges and high schools of the State, in accordance with the growing tendency to seek illustrations of scientific facts in fields familiar to the observation of the student.

The urgent demand for more definite information regarding our climate than has been obtainable hitherto, is due, in a measure, to the remarkable diversity of meteorological conditions existing within this State. In the first place, we find the distinctive bracing influences of mountainous regions among the Adirondack and Catskill ranges, and on the spurs of the Alleganies in southern New York; while the shelter thus afforded to broad lowland districts renders it possible to cultivate successfully varieties of fruits and other crops which are generally raised only in more southern latitudes. The fact that our central and southern counties are subject to the tempering effects both of the ocean and the great lakes, is perhaps of even greater importance; for not only is the climate of these regions thus rendered more equable throughout the year, but also in case of severe cold waves in winter it is shown on page 370, section VI, that in western New

York the temperature is often maintained at a point fifteen to twenty degrees higher than occurs on the same parallel to the westward of Lake Ontario. The winters become much more rigorous in northern New York, where the air is, however, considerably dryer, the relative humidity in the Champlain Valley being lower than in any other section. The contrast of climate between this region and that of the Atlantic coast is very marked; an average difference of more than sixteen degrees obtaining between the northern border and eastern Long Island in winter.

Divergencies even greater than the above are found in the distribution of rainfall, which however, occurs according to laws which are characteristic of the various climatic regions. The maximum precipitation over the central highlands, occurs in midsummer; on the greater part of Long Island in winter; while between these extreme epochs there is a definite gradation over the intervening territory. A remarkable uniformity of rainfall throughout the year is a characteristic of much of the Great Lake region. The total amount of precipitation for an average year also varies widely in different localities; the normal values at stations of Niagara county falling below thirty inches, while at some stations of the Mohawk and Hudson valleys and the coast region the total is fifty inches or more.

The distribution of clouds over the State has been considered as fully as practicable, but this subject still urgently demands wider observation and study. An observer stationed high above the earth would frequently see the cloud formation beginning over the Great Lakes, and thence spreading across much of central and western New York and the St. Lawrence valley; but shading off toward the southeast, and to a considerable degree, disappearing near the coast. Under other and less frequent conditions, another class of atmospheric movements obtain, the ocean being the source of cloud formation; and there are also additional local variations and developments in the general cloud-drift which have an important climatic value.

Thunder storms have been studied and their frequency and characteristic manner of progression in the various regions are now known with a fair degree of accuracy. The study of these storms perhaps bears most practically upon the distribution of rainfall, since, fortunately, this State has so far been quite free from disastrous local storms, or tornadoes. It is desirable, however, to amplify the study of thunder storms on account of their direct effect upon many industries, especially the preservation of milk, and in the complex operations of brewing.

RESUME OF THE CROP SEASON, 1895-1896.

A noticeable feature of the winter of 1895-'96 was the warm period during the latter part of December. Considerable plowing was done during Christmas week; winter grains made visible growth, and buds started on the trees. On the other hand, March was particularly a cool and stormy month; more snow falling in the southeastern counties during the latter portion of March than during the preceding winter. Wheat, rye, grasses, and at the beginning, fruit also, seemed to have passed through the winter in good condition, but in the southeast it was thought that peaches were winter-killed. The results of the season demonstrated that this was true, not only of peaches in the southeast, but of peaches and small fruit-trees generally in other portions of the state. Apples and berries, however, yielded finely, and grapes developed well.

The crop season opened about the 12th of April, prior to which date the weather was cold, and snow was still on the ground in the northern counties. At the beginning, the season was considered to be about ten days late, but unusually warm spring-like weather, beginning on the 12th and lasting until the 21st, brought the frost out of the ground, dried the soil and fitted it for working, so that throughout the warmer sections farming operations were under way by the 15th. Plowing and seeding had become general by the 20th; vegetation had started rapidly, trees were budding, early gardens were being made in the southeast, and hops were uncovered in Madison county. Dry, cool weather followed, with frosts on the 23d and 24th, which formed ice in many placcs, but did little or no damage to vegetation. The rainfall for the month had been light, and while crops in the ground were beginning to feel the drouth, the fine weather permitted spring work to be rushed; and at the close of the month the greater part of the oats, spring wheat and barley had been sown and many early potatoes were planted. Gardening had progressed satisfactorily, early vegetables being already up in the southeast. Maple-sugaring began early in the month, but progressed slowly until the warm period, making an unusually short season.

The warm, dry weather which prevailed from the 1st until about the 25th of May, while very favorable for plowing, planting and seeding, resulted in quite a serious drouth, injurious to growing crops; meadows and pastures being the chief sufferers; while winter wheat and rye were also somewhat affected. Work progressed rapidly, and usually was about ten days ahead of the season. Plowing for corn was general at the beginning of the month, and a limited amount had been planted. Hop-pole setting was completed and peppermint roots were set out.

On Long Island, early asparagus was in the market at this time. By the 10th wheat and oats were sown in most cases, and many potatoes had been planted. Fruits were in full bloom. Apples bloomed profusely; pears, plums, quinces, cherries, etc., rather lightly, while peaches seemed to have been killed by the February freeze. The copious and general rains of the 26th and 28th terminated the drouth which had prevailed up to that time, but the rains came too late to insure a good hay crop, and at the close of the month farmers were generally sowing fodder crops. Delayed plowing and planting started with renewed vigor after the rains, and soon after nearly all of the corn and potatoes were planted and growing rapidly. At the close of May bean planting was also well under way, tobacco setting had been commenced, and a fine crop of strawberries was in market. Hops were thriving, and were considered to be ten days ahead of the usual stage of growth. A light frost occurred on the 20th, but caused no damage.

The early days of June were dry, but the rainfall of the 6th and 10th was copious, and generally sufficient, excepting in some northern sections, the weather also being favorable for farming interests in other respects during June. By the 20th, early haying was general, but with discouraging results. Wheat and other grains made good progress, oats especially promising a good yield. Garden truck was kept rather backward by cool nights.

A drouth was threatening at the beginning of July, but copious showers began on the 4th, and were frequent during the remainder of the month. Phenomenally heavy rains occurred in the southeast on the 9th, and in the western section on the 20th. The weather continued rather cool through the first ten days, after which higher temperature brought vegetation rapidly forward. In the first week some winter wheat and rye were cut, and oats headed. Much of the barley had been cut by the 18th, and on the 30th the oats harvest was commenced. Hops were in blossom by the 10th, and with tobacco and corn, made very satisfactory growth. Grapes and apples continued to thrive. The army worm made its appearance the first week in July, and by the 15th, its ravages were general throughout the state, although many localities escaped them entirely. Great destruction was wrought to green crops, and more especially to oats. The pests began to disappear about the 25th.

Most unusually hot, muggy weather characterized the first half of August; and while late garden truck, corn, buckwheat, pastures and after-feed on meadows made wonderful growth during this period, harvesting was much delayed, especially in the southwest, where light showers occurred almost daily, so that the fine oat crop threatened to become over-ripe before it could be cut, or after cutting became damaged in shock. Some rust also developed in oats, and there began to be much complaint of rot and blight among potatoes. During the first week corn was commonly in tassel and laid by; hops were nearly out of the burr and fruiting finely, and tobacco was very promising. Much fall plowing, also, was done during the first week, the soil being in fine condition. In some section of the southeast the oat crop was damaged 20 to 30 per cent. by the army worm, which, however, ceased its ravages entirely before the middle of the month.

The latter part of August was much cooler than the first half, and was generally favorable for completing the harvests; but drouth in some northern and central counties somewhat delayed fall plowing. During the third week the second hay crop was partially secured, with prospects of its going far toward making up the deficiency in feed caused by the extremely light first crop; and it was often stated that the second cutting of clover was better than the first. Hops were being picked at this time, and much tobacco was housed. Apple trees were reported to be breaking with their load of fruit, which was, moreover, of excellent quality. Potato blight increased, and the prospects of this crop began to decline. Corn made excellent growth, and cutting began about the 25th, which was said by some farmers to be the earliest date for this harvest since 1854. Dairy products were on the increase, owing to the improvement in pastures.

Fall plowing was delayed considerably by drouth, until the general rains of September 5th. During the first week hop picking was finished in many localities, giving a berry of very good quality; but the yield was rather smaller than usual. The weather continued warm and fine throughout the month, enabling farmers to finish haying and late harvests, and to complete fall seeding under very favorable conditions. The sowing of winter grains was in many cases finished by the 10th, beans were gathered during the first week, and much buckwheat was cut by the middle of September, proving to be well filled and a good crop generally. Potatoes were gathered during the second week; the crop showing a continued depreciation from blight and rotting. Apple picking became general about the 20th, giving so large a yield that a market was found with difficulty. The first killing frost occurred on the 23d, but was severe in only a few localities. A West India cyclone which passed over western New York on the 30th was accompanied by violent winds in that section of the State, and large quantities of apples which had not yet been gathered were blown to the ground and damaged.

The first severe general killing frosts occurred on October 9th, but by that time crops were secured beyond injury.

Respectfully submitted,

E. A. FUERTES,

Director.

PART II.

FINANCIAL STATEMENT.

NEW YORK STATE WEATHER BUREAU — FINANCIAL STATEMENT FOR THE FISCAL YEAR 1895–1896.

Date.		Order Number.	TO WHOM ISSUED.	For what purpose.	Amounts.	Total.
1895.						
October	9	96	Gregory & Apgar	Binding six volumes reports	$6 00	
	9	96	Gregory & Apgar	Printing August report	65 10	$71 10
	19	97	Crosscup & West Engraving Co	September charts		28 50
	21	98	Andrus & Church	Office supplies		25
	30	99	R. M. Hardinge	Expenses, State Weather Service Convention		52 45
	31	100	E. T. Turner	Services for October		100 00
	31	101	W. O. Kerr	Services and expenses, October		108 05
November	4	*102	J. Tonnelot (through Tice & Lynch)	Instruments	*	*37 80
	6	103	Gregory & Apgar	Printing September report		65 10
	19	104	Crosscup & West Engraving Co	October charts		28 50
	19	105	Andrus & Church	Office supplies		40
December	2	106	E. T. Turner	Services and expenses, November		102 50
	2	107	W. O. Kerr	Services and expenses, November		105 48
	13	108	Gregory & Apgar	Printing October report		65 10
	18	109	Crosscup & West Engraving Co	November charts		28 50
	20	110	Andrus & Church	One Moore's Meteorology		3 50
	31	111	New York & Pennsylvania Tel. & Tel. Co	Telephone service, four months		18 00
	31	112	E. T. Turner	Services for December		100 00
	31	113	W. O. Kerr	Services and expenses, December		112 80
1896.						
January	2	1	Andrus & Church	One account book		1 50
	9	2	Gregory & Apgar	Printing November report		65 10
February	4	3	E. T. Turner	Services for January		100 00
	4	4	W. O. Kerr	Services and expenses, January		101 55
	18	5	Andrus & Church	One book, "The Soil"		65
March	3	6	E. T. Turner	Services for February		100 00
	3	7	W. O. Kerr	Services and expenses, February		112 60
	13	8	Crosscup & West Engraving Co	December and annual charts		80 04
	26	9	Andrus & Church	Office supplies		5 25
	30	10	Andrus & Church	Record forms		4 75
	31	11	New York & Pennsylvania Tel. & Tel. Co	Telephone, three months		13 50
	31	12	E. T. Turner	Services and expenses, March		105 00
	31	13	W. O. Kerr	Services and expenses, March		102 20
April	2	14	W. O. Kerr	Expressage		1 60

*Order not filled.

	3	15	Crosscup & West Engraving Co	January charts	28 50
	7	16	Henry J. Green	Instruments	270 50
	9	17	Gregory & Apgar	December report and annual supplement	119 38
	22	18	Philadelphia Photo-Engraving Co	February charts	28 50
	25	19	Andrus & Church	Office supplies	1 62
	28	20	Gregory & Apgar	Printing January report	65 10
	28	21	Priest & Benjamin	Printing crop bulletin vol. VIII, No. 1	8 25
	30	22	Philadelphia Photo-Engraving Co	March charts	28 50
	30	23	E. T. Turner	Services and expenses, April	105 67
May	4	24	W. O. Kerr	Services and expenses, April	113 10
	5	25	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 2	8 25
	12	26	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 3	8 25
	19	27	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 4	8 25
	21	28	Philadelphia Photo-Engraving Co	Three thousand Record forms	33 24
	22	29	Gregory & Apgar	Printing February report	65 10
	23	30	W. E. Mott	Services during May	52 00
	26	31	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 5	8 25
	27	32	Priest & Benjamin	Printing mailing list	11 50
June	2	33	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 6	8 25
	5	34	W. O Kerr	Services and expenses, May	120 70
	9	35	Priest & Benjamin	Printing crop bulletin, vol. VIII No. 7	8 25
	16	36	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 8	8 25
	23	37	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 9	8 25
	25	38	Philadelphia Photo-Engraving Co.	April charts	28 50
	26	39	Gregory & Apgar	Printing March report	65 10
	30	40	Andrus & Church	Office supplies	25
	30	41	New York & Pennsylvania Tel. & Tel. Co	Telephone, three months	13 50
	30	42	Priest & Benjamin	Printing crop bulletin, vol. VIII No. 10	8 25
July	1	43	W. E. Mott	Services during June	33 33
	2	44	W. O. Kerr	Services and expenses, June	113 90
	2	45	Priest & Benjamin	Printing foreign mail list	1 00
	6	46	Andrus & Church	Office supplies	20
	7	47	Priest & Benjamin	Printing crop bulletin, vol, VIII, No. 11	8 25
	11	48	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 12	8 25
	21	49	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 13	8 25
	22	50	Priest & Benjamin	Printing circular letter	3 00
	28	51	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 14	8 25
	29	52	Gregory & Apgar	Printing April report	65 10
August	1	53	W. E. Mott	Services for July	100 00
	1	54	George Small	Labor and stock for office	31 34
	3	55	W. O. Kerr	Services and expenses, July	110 95
	4	56	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 15	8 25
	5	57	Philadelphia Photo-Engraving Co.	May charts	28 50
	8	58	Andrus & Church	Two index record files	70
	11	59	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 16	8 25
	17	60	Philadelphia Photo-Engraving Co.	June charts	28 50
	18	61	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 17	8 25
	21	62	Gregory & Apgar	Printing May report	65 10
	28	63	Andrus & Church	Office supplies	1 00
	28	64	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 18	8 25

FINANCIAL STATEMENT FOR THE FISCAL YEAR 1895–96.—(*Concluded*).

Date.		Order number.	TO WHOM ISSUED.	For what purpose.	Amounts.	Total.
1896.						
September	1	65	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 19	....	$8 25
	1	66	W. E. Mott	Services for August	....	100 00
	1	67	E. T. Turner	Services for August	....	100 00
	1	68	The Bool Co	Office furnishings	....	16 64
	1	69	W O. Kerr	Services and expenses, August	....	118 68
	4	70	Andrus & Church	Office supplies	....	45
	8	71	Priest & Benjamin	Printing crop bulletin vol VIII, No. 20	....	8 25
	10	72	Philadelphia Photo-Engraving Co	July charts	....	28 50
	15	73	Gregory & Apgar	Printing June report	....	65 10
	15	74	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 21	....	8 25
	18	75	New York & Pennsylvania Tel. & Tel. Co	Telephone service, three months	....	13 50
	22	76	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 22	....	8 25
	25	77	Philadelphia Photo-Engraving Co	August charts	....	28 50
	28	78	Andrus & Church	Office supplies	....	2 00
	29	79	Priest & Benjamin	Printing crop bulletin, vol. VIII, No. 23	....	8 25
	30	80	E. T. Turner	Services for September	....	100 00
	30	81	W. O. Kerr	Services and expenses, September	....	110 95
	30	82	Gregory & Apgar	Printing July report	....	65 10
Total expenses incurred					....	$4,494 32
Disbursements on orders issued prior to October 1, 1895					....	5 25
Unexpended balance October 1, 1896					....	3,409 66
Unexpended balance October 3, 1895					$3,342 93	....
Legislative appropriation, session of 1896					4,500 00	....
Accounts pending audit October 1, 1896					28 50	....
Orders issued pending fulfillment October 1, 1896					37 80	....
					$7,909 23	$7,909 23

PART III.

METEOROLOGICAL REPORTS FOR EACH MONTH, 1896.

Meteorological Summary for January, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fah.) for the State of New York during January was 30.18 inches, being the highest value yet recorded by this Bureau. The highest barometer was 30.68 inches at Number Four on the 6th, and the lowest was 29.64 inches at Albany on the 3d, and at Erie and Buffalo on the 24th. The mean pressure was highest in eastern New York, and lowest in the Lake Region. The average pressure at six stations of the National Bureau was 0.08 inches above the normal, excesses occurring at all stations.

The mean temperature of the State, as derived from the records of sixty-nine stations, was 20.2 degrees; the highest local monthly mean being 28.2 degrees at Brooklyn, while the lowest was 11.7 degrees at Saranac lake. The highest general daily mean was 34 degrees on the 25th; the lowest being 7 degrees below zero on the 6th, which is the lowest value which has occurred since this Bureau was established in 1889. The maximum temperature reported was 53 degrees at Madison barracks on the 24th, and the minimum was 32 degrees below zero at Lowville and at Hamilton on the 6th.—— The mean monthly range of temperature was 58 degrees; the greatest range, 74 degrees, occurring at Canton, and the least, 39 degrees, at Appleton. The mean daily range was 15 degrees, the greatest daily range being 45 degrees at West Point on the 4th, and the least 0 degrees at Gloversville and Buffalo on the 25th.—— The mean temperatures for the various sections of the State were as follows: The Western plateau, 23.2 degrees; the Eastern plateau, 19.8 degrees; the Northern plateau, 14.7 degrees; the Atlantic coast, 27.2 degrees; the Hudson valley, 21.1 degrees; the Mohawk valley, 20.6 degrees; the Champlain valley, 16.0 degrees; the St. Lawrence valley, 13.4 degrees; the Great Lake region, 23.1 degrees; the Central Lake region, 22.9 degrees.—— The average of the mean temperatures at twenty-seven stations possessing records for previous years was 2.7 degrees below the normal value; deficiencies occurring at all stations excepting Angelica, Buffalo, Humphrey and Waverly. The deficiency of temperature was greatest in eastern and northern New York.

The mean relative humidity for the State was 79 per cent. The mean dew point was 18 degrees.

The average precipitation was 1.85 inches, as derived from the records of eighty-nine stations. The greatest general precipitation ranged from 2 to 4 inches in western New York and the western Adirondacks; the least being under one inch along the eastern border of the State. The maximum local amount was 4.42 inches at Turin, and the least was 0.75 inches at Easton.—— A list of the heaviest rates of precipitation will be found in the table of meteorological data. A moderate and quite general snowfall occurred on the 7th, 9th and 15th, and heavy rain, turning to snow, occurred on the 24th, the maximum amounts falling in western New York and on the coast.—— The average snowfall for the State was 12.2 inches, as derived from the reports of sixty-one well-distributed stations. The total amount was about 12 inches over the Eastern and Western plateaus, 20 inches on the Northern plateau, 8 inches in the Hudson valley, 15 inches in the St. Lawrence valley and Great Lake region, and 10 inches in the Central Lake region. The greatest local snowfall was 40.0 inches at Turin.—— The average precipitation at twenty-nine stations possessing records for previous years was 1 inch below the normal amount; deficiencies occurring at all stations excepting Plattsburg, Potsdam, Buffalo, Fort Niagara and Rochester. The amounts were the least shown for January by the records of Port Jervis, covering 13 years; Setauket, 11 years; Albany, 23 years; Honeymead Brook, 16 years; Boyds Corners, 26 years, and North Hammond, 19 years.

The average number of days on which the precipitation amounted to 0.01 inches or more, was 10.1; the number being above this average in western New York and below it in the eastern section. The average number of clear days was 7.0; of partly cloudy days, 8.9; and of cloudy days, 15.1; giving an average cloudiness of 51 per cent. The maximum cloudiness obtained in western and northern New York.

The prevailing wind direction was from the northwest. The average total wind travel at six stations of the National Bureau was 7,788 miles; being below the usual values at all stations excepting New York city. The maximum velocity recorded at the above stations was 48 miles at Buffalo on the 1st, and at New York city on the 24th.

Hail fell on the 3d, 23d, 24th and 29th, and sleet on the 3d, 18th, 19th, 23d, 24th, 25th, 29th and 31st.

Solar halos were observed on the 17th and 28th, and lunar halos on the 2d and 22d.

The weather of January was generally pleasant, with more sunshine and less rain and snow than usually obtain in the winter months. The average temperature was below the normal, a deficiency occurring throughout the period from the 2d to the

17th and an excess over the normal on nearly every day thereafter. The 6th was the coldest day which has occurred since this Bureau was established in 1889, and probably for a much longer period. The deficiency of precipitation was most marked in southeastern New York, and ground water was reported as very low in several localities of that section. The ground was generally free from snow through the second decade and toward the close of the month; only ten days of thin sleighing being reported from Malone, while in the Great Lake region the duration was rather longer. Lakes and streams which were open during the warm period late in December, were frozen about the close of the first week, and a heavy ice harvest had been completed along the Hudson river and in other localities, before the warmer weather of the latter half of the month. Less than the usual wind travel was reported from the western and inland stations, the maximum velocity being reached along the seacoast.

Eight areas of high pressure (approximately) passed eastward over the vicinity of this State in January, the respective dates being the 2d, 6th to 8th, 11th, 15th, 18th, 23d, 28th and 31st. After the 2d of the month a nearly permanent high pressure system became established over western British America, and the drifting anticyclonic areas generally originated in that region. Depressions of temperature accompanied all of these areas, but the only notable cold wave attended the second area, which traversed nearly the entire United States between the 3d and 7th.

The low-pressure areas, nine in number, in most cases developed over the southern and central States, or over the ocean, and generally passed in the vicinity of New York. Depressions passed north of the State on the 1st, 3d and 13th; along the coast on the

10th, 17th and 25th; and over the State on the 9th, 19th and 25th. The maximum wind velocities accompanied the coast storms, while heavy rains, changing to sleet and snow occurred during the passage of the eighth area from the central valleys over New York. The precipitation due to the remaining storms was in most cases light.

The rapid fall of temperature during the storm of the 24th caused a deposition of ice upon tree branches, and some damage to fruit prospects may have resulted, especially near the lakes.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	County.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point, (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												23.2	51	29
Alfred	Allegany	1824									21.6	21 5	45	29
Angelica	"	1340									22.2	22.1	43	29
Friendship	"	1550	30.20	39.64	6	29.68	24	0.96			23.3	23.2	45	29
Humphrey	Cattaraugus	1950									24.0	24.0	44	16
Arkwright	Chautauqua	1260										‡24.0	40	*b*
Jamestown	"	1328										25.6	46	29
Elmira	Chemung	863										24.6	45	29
Avon	Livingston	585										21.8	40	18
Mt. Morris	"	525										24 9	45	29
Victor	Ontario											22.4	41	18
Wedgewood	Schuyler	1350									21.0	22.0	51	29
Addison	Steuben	1000							80	19	24.9	24.8	47	29
South Canisteo	Steuben	1480									23.2	23.6	47	29
Arcade	Wyoming	1557									21.8	21 4	42	18
Varysburg	"											21.8	47	17
Eastern Plateau												19.8	49	27
Binghamton	Broome	870									21.6	21.0	44	29
Oxford	Chenango	550										20 1	40	*c*
Cortland	Cortland	1120										20.0	40	29
Bloomville	Delaware	1550									19.0	18.1	48	27
South Kortright	"	1700										17.9	49	25
Brookfield	Madison	1350									18.1	*18 1		
Hamilton	Madison	1127										17.3	40	*d*
Middletown	Orange	660										21.3	42	*e*
Port Jervis	"	470										21.8	41	25
Cooperstown	Otsego	1300									17.3	17.0	36	2
New Lisbon	"	1234									18 4	17 2	37	*f*
Oneonta	"	1100									22.5	21.9	42	29
Perry City	Schuyler	1038									21.4	20.7	40	29
Waverly	Tioga	825									23 3	23 6	48	29
Mohonk Lake	Ulster	1600									20.3	20.3	41	3
Northern Plateau												14.7	39	3
Saranac Lake	Franklin											11 7	36	24
Gloversville	Fulton	802									16.9	16 6	39	3
Lowville	Lewis	900										15.4	37	25
Number Four	Lewis	1571	30.19	30 68	6	29 74	3	0.94				15.2	34	*g*
Turin	"	1240										14.2	35	25
Remsen	Oneida													
Atlantic Coast												27.2	47	25
Brooklyn	Kings	107										28.2	45	*h*
Manhattan Beach	Kings													
New York City	New York	314	30.19	30.55	6	29.69	24	0.86	75	20		28.0	47	5
Willets Point	Queens											26.6	45	
Brentwood	Suffolk	75											44	2
Setauket	Suffolk	40							72	20	28.0	27.8	46	3
Bedford	Westchester	290										25.5	46	

FOR JANUARY, 1896.

TURE — (IN DEGREES FAH.)								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snow fall.	Prevailing direction of wind.
														h. m.			
—24	6	57	14	44	*t*	2	24	6.2	7.9	16.9	11.3	2.30	1.65	......	24	......	....
—13	6	57	14	34	16	4	20	3	11	17	17	2.51	0 84	......	24	13.8	S. W.
—22	6	65	14	41	16	3	31	4	9	18	13	2.34	0.68	......	24	13 0	W.
—23	6	68	17	44	16	7	*aa*	4	6	21	12	2.03	0.60	......	24	10.3	W.
— 7	6	51	13	35	16	3	20	3	6	22	12	2 43	0.83	......	24	17.0	S. W.
— 2	6	42	10	22	3	3	*ab*	....	....	....	......	......	......	......	......	......	....
— 3	6	49	13	31	16	5	26	3	9	19	13	3.08	0.70	......	24	18.0	N. W.
— 5	6	50	11	27	29	2	24	6	11	4	4	1.56	9.50	......	24	5.5	S. E.
—13	6	53	11	32	16	2	24	3	13	15	7	1.97	1.04	......	24	......	....
—10	6	55	17	31	10	7	*ac*	24	5	2	9	2.50	1.00	......	15	6.0	W.
—14	6	55	15	31	7	4	24	6	11	24	15	1.82	0.60	......	7	18.2	W.
—11	6	62	16	35	29	4	*ad*	5	15	11	12	1.72	0.90	......	24	8.8	S. W.
—12	6	59	15	34	29	3	20	13	7	11	10	1.47	0.84	20.00	24	3.6	S. W.
—15	6	62	16	35	16	6	25	9	4	18	9	2.76	1.18	......	24	16 3	W.
—20	6	62	14	31	16	5	*aa*	1	7	23	13	2.35	0.87	......	24	11.5	....
—24	6	71	17	44	17	5	1	3	6	22	12	3.52	1.65	......	24	12.5	....
—32	6	61	17	42	16	2	*ae*	8.8	10.0	12.2	9.5	1.63	1.04	......	24	......	....
—14	6	58	16	32	29	4	26	....	....	....	......	......	......	......	......	......	....
—21	6	61	20	34	12	9	19	7	9	15	13	1.99	0.39	......	24	14.5	N. W.
—23	6	63	14	30	29	4	*af*	17	9	5	14	1.86	0.66	......	24	......	....
—23	6	71	19	36	12	6	19	11	4	16	10	2.26	1.01	5.00	3	8.5	W.
—30	6	79	22	38	*u*	8	*bb*	....	....	....	......	......	......	......	......	......	....
....	....	...	....	....	....	....	....	9	17	5	6	1.50	0.40	......	13	15.0	S. W.
—32	6	72	20	37	*v*	5	*bc*	6	9	16	14	1.38	0.25	......	19	12.1	S W.
— 8	6	50	14	25	11	2	27	11	9	11	5	1.89	1.04	......	24	8.5	N. W.
— 7	8	48	15	28	12	5	19	10	14	7	6	1.65	0.62	......	24	7.0	N. W.
—21	6	57	14	41	12	2	1	14	4	13	7	1.48	0.33	.....	7-24	12.0	S.
—26	6	63	18	38	12	5	*bd*	5	13	13	11	0.86	0 19	13.00	7	13.5	S.
—16	6	58	17	35	12	5	1	....	....	....	......	......	......	......	......	......	....
—20	6	60	17	33	29	5	25	1	11	19	10	1.68	0.44	......	24	10.9	N. W.
—12	6	60	18	42	16	2	21	4	10	17	11	1.66	0.71	......	24	9 2	S.
— 14	6	55	13	24	39	4	*h*	10	11	10	7	1.49	0.80	24.00	24-25	7.0	N. W.
—32	6	65	15	38	16	0	25	5.6	9.0	16.4	13.2	2.47	1.30	......	3	......	....
—31	5	67	19	36	*w*	5	24	7	8	16	17	1.11	0.22	......	25	18 4	N.
—20	6	59	14	29	12	0	25	8	4	19	13	1.47	0.30	......	9	13.9	N. E.
—32	6	69	18	38	16	4	20	3	16	12	12	2.32	1.00	......	24	23 0	W.
—31	6	65	12	27	29	3	25	4	10	17	12	3.04	0.82	......	1	28.2	E.
—29	6	64	14	25	16	2	19	6	7	18	12	4 42	1.30	......	3	40.1	S.
....	....	....	....	....	....	....	....	....	...	....	......	......	......	......	......	......	....
— 7	6	48	13	33	12	3	*be*	13.6	8.6	8.8	5.0	1.54	......	......	......	......	....
— 0	6	45	11	20	2	3	1	15	10	6	5	1.54	0.95	8.00	24	5.0	W.
....	....	...	....	....	....	...	..	16	8	7	5	2.50	0.90	......	10	19.0	N. E.
— 3	6	50	12	22	2	3	19	12	8	11	6	1.25	0.93	......	24	3.0	N W.
— 1	*r*	46	14	25	4	6	24	....	....	....	2	1.10	0.75	......	24	T.	N. W.
— 3	6	47	....	...	....	...	....	....	....	....	......	......	......	......	......	......	....
— 1	6	47	10	24	12	4	25	13	8	10	6	1.48	1.04	......	24	4.5	N.
— 7	6	53	19	33	12	4	25	12	9	10	6	1.40	0.69	14.00	24	6.8	N. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Hudson Valley												21.1	49	3
Albany	Albany	85	30.22	30.62	6	29.64	3	0.98	83	15		20 0	40	3
Lebanon Springs	Columbia	930										18.8	38	*j*
Honeymead Brook	Dutchess	450									21.0	20 6	43	3
Poughkeepsie	Dutchess	180										21.0	44	3
Wappingers Falls	"											22 4	42	2
West Point	Orange	167										22 8	49	3
Carmel	Putnam	500										21.9	42	25
Mohawk Valley												20.6	48	20
Rome	Oneida	445										20.6	48	20
Utica	"													
Champlain Valley												16.0	39	26
Plattsburgh B'ks.	Clinton	125										14 4	37	*k*
Saratoga Springs	Saratoga													
Glens Falls	Warren	340									18 0	17.7	39	26
St. Lawrence Val.												13.4	53	24
Malone	Franklin	810									12.1	12.2	33	*m*
Madison Barracks	Jefferson	266										16.1	53	24
Watertown	Jefferson	486												
Canton	St. Lawrence.	304									13.9	13.2	36	*n*
Massena	"													
‡North Hammond.	St. Lawrence.	300									15.3	*15.3		
Ogdensburg	"	258										13.2	41	3
Potsdam	"	300									11.5	11.2	34	26
Great Lakes												23.4	48	12
Dunkirk	Chautauqua	590												
Westfield	"								87	23		27.7	48	12
Buffalo	Erie	690	30 16	30.57	15	29.64	24	0.93	78	19		25.0	40	2
Pittsford	Monroe												40	*p*
Rochester	"	621	30.16	30 57	6	29.70	24	0.87	81	18		23 0	40	29
Appleton	Niagara											24.3	59	*n*
Fort Niagara	Niagara	263										24.4	40	3
Baldwinsville	Onondaga	390									21.6	19.5	39	*q*
Syracuse	"													
Oswego	Oswego	304	30.17	30.64	6	29.71	3	0.93	84	17		21.0	40	2
Palermo	Oswego	460									18 8	18.4	37	2
Lyons	Wayne	407									24.4	24.2	40	*p*
Erie, Pa	Erie	681	30.17	30 58	15	29.64	24	0.94	77	21		27 0	46	29
Central Lakes												22.9	42	29
Fleming	Cavuga	1000									23.0	22.8	42	29
Watkins	Schuyler	737												
Romulus	Seneca	719							79	16		23.2	42	29
Ithaca	Tompkins	810	30 17	30 61	6	29.66	3	0.95	77	16	23.2	22.8	42	29
Mean	....		30.18	30.68	3	29.64	*a*	0.93	79	18		20.2	53	24

* Mean of the tri daily observations. ‡ Mean of the maximum and minimum by the Draper
the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.
four hours. § Rainfall on the 26th–27th estimated from record of adjacent stations.

(*a*) 3. 24; (*b*) 18, 29; (*c*) 21, 25, 29; (*d*) 3, 25; (*e*) 1, 2, 25; (*f*) 3, 24, 25, 29; (*g*) 23, 25; (*h*) 25, 26; (*i*)
(*t*) 16, 17; (*u*) 18, 27; (*v*) 2, 12; (*w*) 3, 23; (*x*) 12, 16; (*y*) 29, 31; (*z*) 16, 29; (*aa*) 13, 24; (*ab*) 1, 5; (*ac*)
(*cc*) 20, 25, 26; (*cd*) 19, 20, 25.

FOR JANUARY — (*Concluded*).

TURE—(IN DEGREES FAHR.).								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
—18	6	55	16	45	4	3	25	10.0	9.8	11.2	6.6	1.04	0 69	......	24	......	....
—14	6	56	13	34	12	3	25	7	11	13	8	0 98	0.27	......	9	7.1	N.
—18	6	56	16	32	16	5	25	7	9	15	8	0.87	0.28	......	24	11 5	N. W.
—18	6	61	15	32	12	5	*h*	6	14	11	5	0 91	0.48	12.00	24	5 3	N.
—10	6	54	18	34	*x*	4	25	13	9	9	5	0.88	0.32	......	24	6.8	N.
—10	6	52	17	41	12	6	*bf*	11	10	10	7	1.36	0.38	19.00	24	9.5	W.
—9	6	58	17	45	4	6	1		....	....	8	1 19	......	......	.....	3.9	N. W.
—9	6	51	14	26	17	6	13	16	6	9	5	1.10	0.69	......	24	4 2	....
—17	5	65	16	34	3	6	1	....	....	....	18.0	2.17	0.26	......	18	......	....
—17	5	65	16	34	3	6	1	....	....	....	18	2.17	0.26	......	18	......	....
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—20	6	55	14	37	4	3	25	8.0	5.0	18.0	6.0	1.56	0 70	......	25	......	....
—20	6	57	14	37	4	6	19	....	....	....	5	2.05	0.70	......	25	12.9	S. E.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—14	6	53	14	25	12	3	25	8	5	18	7	1.08	0.28	......	24-25	7.5	E.
—27	6	63	16	40	16	3	1	6.0	11 2	13.8	8 0	1.51	0 50	7.00	24	......	....
—27	6	60	12	26	4	3	1	5	5	21	13	1.34	0 28	......	26	13.4	N. E.
—21	6	74	20	40	16	7	5	....	....	....	6	1.05	0.36	......	12	13 4	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—26	5	62	17	33	31	1	*be*	7	11	13	......	2 25	......	......	......	22 5	N. E.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
....	....	....		....	....	....	....	3	7	21	9	1.06	0 40	......	24	11.8	N.
—23	6	64	17	35	3	6	18	6	20	5	8	1.09	0.20	19.00	8	10.9	N. E.
—23	6	57	15	28	16	4	1	6	9	16	5	1.80	0.50	7.00	24	18.0	S. W.
—30	6	51	12	36	4	0	25	2.3	8.1	20.6	14.2	2 72	1.88	......	24	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
3	*s*	45	16	36	4	3	*ad*	....	....	....	8	2.00	0 55	......	24	9.0	S. W.
—4	6	46	9	18	23	0	25	0	7	24	16	3.28	1.69	......	24	......	N. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—10	6	50	10	25	16	2	13	1	15	15	22	3.38	0.65	......	24	22.5	W.
0	6	39	10	24	3	2	23	0	6	25	14	3.10	1.88	......	24	13.7	E.
—2	6	42	11	23	16	4	8	....	....	....	6	2.80	......	......	......	3.0	N. E.
—22	5	61	16	32	5	6	*be*	9	5	17	15	3.53	0.50	......	4	25.0	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—20	6	60	9	25	16	1	19	1	4	26	19	2.04	0.54	......	24	14.5	S. E.
—30	6	67	13	29	31	3	*cc*	2	9	20	15	2.00	0 50	2.45	14	11.2	S E.
—14	6	54	11	24	*y*	3	*cd*	1	13	16	13	3.57	1.14	......	24	21.0	W.
— 2	5	44	10	25	2	3	13	4	5	22	14	1.52	0.42	......	24	......	W.
—15	6	57	13	24	29	2	20	2.7	10.7	17.6	9.0	1.87	0 80	18.00	24	......	....
—14	6	56	12	26	29	4	20	1	15	15	8	1.80	0 30	9.00	24	18.0	S.NW
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—15	6	57	14	29	*z*	5	20	6	6	19	6	2.34	......	......	......	8 0	S.
—15	6	57	12	29	29	5	20	1	11	19	13	1.46	0.80	18.0	26	6.9	S E.
—32	6	58	15	45	4	0	25	7.0	8.9	15.1	10.1	1.88	1.88	......	24	12.2	N. W.

thermograph. || Report received too late to be used in computing means. The means from
†Blank indicates that the duration is not shown in the original records, but is within twenty-

3, 8, 26; (*j*) 18, 25; (*k*) 1, 26; (*m*) 2, 3, 12, 25; (*n*) 2, 3; (*p*) 2, 3, 29; (*q*) 2, 3, 25; (*r*) 5, 6; (*s*) 6, 7; 19, 21; (*ad*) 20, 25; (*ae*) 1, 21, 27; (*af*) 10, 20; (*bb*) 19, 25; (*bc*) 1, 20; (*bd*) 1 ; (*be*) 1, 19; (*bf*) 10, 25;

DAILY AND MONTHLY MEAN

STATION.	1	2	3	4	5		7	8	9	10	11	12	13	14
Western Plateau...	20	22	25	10	2	—2	13	14	24	22	22	28	20	20
Alfred	19	36	36	13	8	9	21	19	28	24	22	38	21	24
	14	15	12	—2	-10	-18	2	5	16	14	13	18	15	14
Angelica	22	39	35	14	5	7	22	22	29	24	27	39	23	21
	16	16	14	0	-12	22	5	8	22	16	15	21	17	16
Friendship	22	39	41	15	9	11	24	23	33	28	28	37	24	24
	13	15	9	—2	—6	-23	6	6	21	18	16	20	17	16
Humphrey	19	37	34	16	8	8	29	25	29	26	25	36	23	23
	13	16	13	—1	—5	—7	8	9	19	16	16	21	15	14
Arkwright	18	36	35	13	6	11	25	23	29	26	32	32	20	20
	15	17	13	6	3	—2	10	10	21	21	20	20	16	14
Jamestown	23	37	37	t3	14	15	23	28	31	28	30	38	24	26
	16	17	13	0	0	—3	13	13	23	21	20	20	17	16
Elmira	26	40	38	12	12	8	20	18	24	25	24	40	28	28
	19	20	19	7	—3	—5	4	11	15	20	17	28	19	20
Avon	23	37	22	13	7	3	20	19	30	24	29	36	22	23
	18	10	18	5	—2	-13	6	9	13	18	16	19	18	11
Mt. Morris	27	42	40	30	10	10	24	20	44	42	30	41	32	29
	19	17	16	15	—1	-10	3	10	18	11	16	19	19	17
Victor	24	40	39	20	10	1	24	18	24	34	28	39	23	24
	18	20	17	9	—9	-14	—7	8	12	18	15	15	16	12
Wedgewood	24	36	37	15	11	15	17	24	25	27	24	38	26	25
	15	14	12	1	—7	-11	—1	5	11	14	12	15	16	15
Addison	35	41	41	20	13	8	22	20	28	29	25	40	28	27
	20	17	17	5	—3	-12	4	10	12	19	18	20	20	21
South Canisteo	23	41	38	16	11	4	20	17	31	24	29	41	28	25
	15	17	16	1	—5	-15	2	7	16	15	14	18	18	16
Arcade	20	36	34	11	1	6	24	20	29	24	29	34	20	21
	10	15	11	0	-13	-20	0	4	20	15	15	18	15	14
Varysburgh	20	38	27	17	16	7	22	21	31	23	27	36	20	23
	15	9	12	3	-21	-24	5	3	21	8	11	19	15	14
Eastern Plateau...	24	26	27	13	4	—8	2	2	12	15	11	18	22	20
Binghamton	30	38	37	16	8	0	13	14	21	22	20	36	35	30
	20	12	16	8	—8	-14	—4	—4	12	4	0	10	13	13
Oxford	28	37	38	20	15	—2	13	15	22	25	24	34	32	30
	18	13	17	5	—4	-21	—8	-14	2	3	—3	0	16	12
Cortland	24	36	38	20	8	.1	11	13	20	19	20	33	32	20
	19	15	18	8	—1	-23	-15	—8	10	15	8	10	19	15
Bloomville	26	36	35	15	9	1	12	13	20	24	17	31	29	25
	19	16	19	3	—6	-23	-10	-14	—3	—2	—6	—5	16	11
South Kortright	25	36	37	15	9	7	14	10	20	24	15	32	27	44
	16	13	12	4	—6	-30	0	-15	4	—4	—8	—2	—7	11
Brookfield	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hamilton	24	37	.40	22	12	0	9	11	16	22	19	31	29	22
	19	0	11	4	-11	-32	-16	-21	5	3	—7	—6	14	8
Middletown	42	42	38	21	11	9	6	10	11	28	30	31	29	29
	31	32	21	10	—2	—8	—2	—5	5	6	5	10	17	16
Port Jervis	29	35	40	17	13	10	7	17	17	30	27	30	28	29
	24	15	23	13	4	—6	—1	—7	7	3	7	2	12	12
Cooperstown	23	36	33	17	7	—4	4	10	12	16	15	31	28	22
	21	17	17	7	-10	-21	—7	-12	3	2	—2	-10	16	14
New Lisbon	24	36	37	15	8	—1	9	8	18	24	16	30	29	22
	19	14	15	5	—9	-26	-12	-15	5	0	—8	—8	16	11
Oneonta	27	41	41	20	11	4	15	14	25	26	21	35	32	27
	22	19	18	8	—2	-16	—6	—7	7	9	0	0	22	18
Perry City	26	36	35	16	8	0	18	17	25	23	25	37	29	24
	16	12	16	2	—4	-20	—2	2	11	10	10	15	18	14
Waverly	28	39	36	28	16	10	18	24	24	32	26	37	26	30
	19	13	22	17	—4	-12	0	9	15	18	15	13	14	12
Mohonk Lake	28	34	41	20	13	0	6	12	15	28	25	27	27	28
	22	18	19	8	0	-14	—8	—4	3	—2	5	7	17	16
Northern Plateau	22	24	20	2	-12	-17	—4	—4	10	12	9	14	20	16
Saranac Lake	24	34	28	—2	-10	—6	1	11	14	22	28	30	20	18
	18	18	—8	-21	-31	-30	-19	-16	4	—5	0	17	12	5
Gloversville	29	33	39	17	5	—6	4	8	15	23	19	22	25	22
	21	18	17	4	-11	-20	-10	-11	4	7	—2	—7	17	12

Temperature for January, 1896.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
16	18	25	29	32	30	30	26	30	34	34	29	20	26	31	34	30	23.2
22	34	36	38	36	32	32	30	35	36	37	30	25	32	45	38	35	21.5
2	1	13	16	28	28	24	20	24	30	30	24	13	16	19	28	26	
20	34	37	38	37	34	32	30	36	38	35	32	28	25	43	37	38	22 1
2	—7	9	8	28	30	26	21	25	32	29	22	16	17	12	30	35	
24	38	37	41	39	36	35	34	38	40	39	34	28	35	45	41	40	23.2
6	—6	8	9	31	18	27	21	23	33	31	26	16	17	16	31	27	
21	44	39	38	39	33	33	35	35	38	36	31	26	39	43	38	36	24.0
14	9	19	23	30	30	25	19	29	32	30	25	16	17	24	30	28	
24	32	34	40	35	34	32	31	37	39	37	30	24	29	40	38	39	24 0
16	14	24	29	26	25	27	20	25	34	30	24	16	21	26	33	32	
24	38	38	40	36	36	34	36	39	43	39	31	30	36	46	39	45	25.6
12	7	10	24	29	28	28	20	32	37	31	26	12	19	24	33	33	
25	25	33	36	39	35	36	32	34	38	41	37	28	32	45	40	37	24.6
15	4	14	14	35	28	29	24	20	36	36	31	19	22	18	28	21	
22	32	32	40	34	33	34	28	38	32	36	.....	23	28	39	34	33	21.3
13	0	23	31	30	30	30	19	16	30	32	.....	14	19	13	27	11	
28	25	30	42	37	35	36	34	37	35	40	40	28	40	45	42	44	24.9
14	10	4	18	30	23	29	19	21	11	31	20	15	27	21	20	22	
23	34	37	41	35	38	35	28	37	33	38	33	28	29	39	37	33	22.4
14	4	20	18	26	28	28	14	12	29	32	28	13	14	24	26	14	
21	33	36	43	35	30	32	32	31	36	36	33	26	32	51	37	33	22.0
9	5	20	18	29	26	26	14	17	29	32	26	11	15	16	22	13	
25	35	36	39	37	34	35	34	36	38	41	38	33	36	47	39	37	24.0
11	2	12	13	33	31	30	24	24	32	34	30	17	16	13	28	22	
32	37	36	44	40	36	36	39	35	38	40	34	28	36	47	42	38	23.6
7	2	12	12	32	29	28	21	20	29	34	27	14	13	13	34	20	
20	33	33	42	37	34	31	29	35	37	36	30	24	31	40	36	38	21.4
6	2	18	19	27	27	25	20	26	32	29	23	13	17	16	28	25	
25	37	47	41	34	35	33	30	37	39	38	32	29	35	45	40	37	21.8
1	-5	3	24	25	25	25	23	24	31	31	24	10	14	13	27	23	
16	16	24	22	30	28	29	24	21	31	36	32	24	21	24	27	21	19.8
20	33	33	36	36	31	34	32	35	40	39	34	30	29	44	34	36	21.0
9	8	9	5	28	26	26	13	18	30	32	30	18	15	12	25	20	
27	32	35	38	35	36	40	36	37	37	40	37	32	32	40	35	32	20.1
8	6	7	7	26	24	23	21	4	25	30	25	15	13	7	20	11	
21	31	34	36	33	29	34	34	33	35	36	36	29	24	40	33	30	20.0
10	10	14	9	26	25	27	22	12	27	30	28	15	14	10	25	5	
20	28	34	35	33	36	34	30	35	40	48	35	29	24	38	33	32	18.1
8	-5	11	5	27	25	24	10	0	28	32	27	12	15	6	17	9	
20	29	35	37	33	37	33	29	34	37	38	36	49	22	38	35	33	17 9
9	-5	12	-1	25	22	22	9	0	25	30	25	11	10	11	19	7	
...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	*18.1
..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
19	30	35	39	39	30	34	30	33	37	40	34	27	24	38	30	30	17 3
10	4	17	4	28	25	25	9	0	26	32	27	12	9	9	15	-1	
29	27	32	34	33	31	33	36	31	31	42	.....	30	33	30	31	31	21.3
14	9	11	16	27	25	17	15	15	17	33	.....	28	19	10	12	17	
25	28	32	36	32	30	35	35	31	35	41	39	30	36	40	39	32	21.8
15	2	10	16	28	25	22	25	13	26	33	33	22	18	14	21	16	
17	30	32	31	31	31	34	29	26	34	35	33	28	18	24	32	23	17.0
12	4	17	10	22	21	24	15	4	24	32	28	12	10	14	15	6	
18	28	33	35	32	30	33	29	35	37	37	34	28	23	37	31	30	17.2
10	1	8	5	26	23	24	14	2	25	32	28	13	11	7	21	0	
23	32	35	37	35	38	38	34	36	39	41	39	33	26	42	36	....	21.9
15	6	21	12	27	26	28	18	8	22	34	31	17	17	13	21	13	
22	31	36	39	37	33	34	32	39	36	38	34	28	29	40	36	36	20.7
6	0	18	9	30	27	28	10	9	29	33	28	13	8	7	23	8	
29	39	41	43	38	32	30	34	35	38	39	37	30	39	48	38	38	23.6
7	-3	7	8	31	28	28	18	13	31	35	29	16	17	10	27	15	
30	24	32	32	30	27	32	32	32	32	34	34	34	36	32	34	28	20.3
14	6	18	20	24	21	22	18	16	24	30	30	18	18	8	24	12	
8	12	24	26	26	25	26	18	17	31	34	28	15	10	13	19	14	14 7
12	30	25	31	27	27	29	23	33	36	35	32	13	12	21	24	28	11.7
-3	0	18	17	17	17	19	—5	—3	31	29	13	0	-10	0	—5	—5	
18	20	34	33	27	30	32	30	28	34	34	34	29	20	20	34	24	16.6
10	—3	9	14	24	22	22	16	2	24	34	29	13	12	4	18	2	

TEMPERATURE — JANUARY, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
North. Plat. (con'd)														
Lowville	24	33	34	20	2	—6	7	7	18	16	14	29	30	19
	18	15	20	—6	-23	-32	-20	-19	2	1	—7	—3	17	18
Number Four	22	30	20	15	—6	—7	7	5	15	25	18	26	26	20
	16	15	14	—7	-22	-31	—7	-13	5	5	—1	2	14	12
Turin	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Remsen	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic Coast	29	32	34	20	12	4	11	12	18	26	24	24	26	24
Brooklyn	31	44	43	23	18	12	18	19	25	31	32	37	35	32
	28	24	29	14	8	0	6	8	14	19	22	18	26	24
Manhattan Beach	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New York city	28	44	44	21	16	10	18	17	26	29	32	38	32	31
	26	22	27	15	7	—3	3	4	12	16	20	21	26	22
Willet's Point	33	45	42	34	21	10	19	19	25	33	29	37	31	33
	21	21	18	9	—1	—1	7	7	16	21	14	17	19	21
Brentwood	35	44	43	24	15	10	18	18	26	29	31	37	32	32
	22	12	24	18	6	—3	4	8	9	22	17	0	2	9
Setauket	35	43	46	27	18	11	23	21	25	30	31	39	32	30
	29	22	27	16	11	—1	7	11	16	24	23	15	26	20
Bedford	33	40	46	26	20	12	13	22	22	36	31	35	35	34
	25	20	26	13	6	—7	—1	1	6	15	14	2	11	8
Hudson Valley	28	28	32	16	11	—4	1	3	11	21	8	14	22	20
Albany	32	39	40	17	13	2	6	11	18	28	19	30	31	29
	26	22	24	11	—1	-14	—6	—2	5	16	7	—4	21	13
Lebanon Springs	28	36	36	20	12	—5	8	7	21	26	16	24	29	26
	20	15	20	3	—3	-18	-11	-14	—3	14	—2	7	16	6
Honeymead Brook	31	35	43	21	17	0	9	8	21	25	19	30	30	31
	22	17	21	13	2	-18	—5	—2	5	17	2	—2	15	8
Poughkeepsie	33	36	44	24	22	10	14	14	17	27	22	27	30	32
	26	18	27	2	5	-10	—4	—5	4	14	—1	—7	5	5
Wappingers Falls	32	42	40	25	20	0	8	11	18	30	25	33	32	34
	22	20	24	11	5	-10	—3	—9	5	24	0	—8	12	8
West Point	35	31	49	47	34	15	—1	10	13	23	28	20	34	33
	29	13	22	2	5	—9	—8	2	3	8	11	2	10	16
Carmel	30	37	41	18	12	4	10	10	20	28	20	30	26	28
	20	25	23	11	5	—9	—2	0	8	14	8	8	20	11
Mohawk Valley	25	32	12	4	—4	—5	4	6	15	17	14	21	25	20
Rome	28	38	29	12	11	1	12	10	20	22	20	29	31	31
	22	26	—5	—3	-17	-11	—3	1	10	12	8	13	19	10
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	30	27	30	14	—2	—8	—8	—3	9	14	7	7	22	22
Plattsb'gh Bar'a'ks	37	30	36	36	5	4	—7	—1	10	19	13	12	29	26
	24	23	25	—1	-15	-20	-18	-10	—8	7	0	0	11	19
Saratoga Springs	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	35	33	35	15	7	—3	4	10	29	27	12	21	28	30
	24	20	22	5	—7	-14	-10	-10	5	6	4	—4	20	14
St. Lawrence Val	26	28	23	0	-15	-14	—6	1	10	7	9	16	21	17
Malone	24	33	33	14	-12	-15	—3	3	12	10	11	33	31	20
	21	20	14	-12	-21	-27	-18	-10	1	4	2	11	17	10
Madison Barracks	32	35	36	23	—7	—2	8	10	25	13	16	38	24	26
	21	16	23	—2	-14	-21	-14	-12	6	—4	4	7	10	11
Watertown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Canton	29	36	36	9	-11	—1	9	16	15	15	15	33	26	28
	25	22	9	-19	-26	-14	-14	7	4	—4	4	4	16	8
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ogdensburg	38	36	41	10	—8	—2	0	10	15	24	20	33	28	23
	24	22	6	-12	-20	-23	11	—5	8	8	5	5	15	10

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
15	30	33	36	31	29	32	30	33	36	47	33	28	23	27	29	27	15.4
-6	-8	15	23	25	25	25	14	-3	28	32	28	8	2	3	13	2	
19	21	31	33	31	28	29	27	34	23	34	31	26	17	28	24	31	15.2
-6	5	20	24	25	24	24	16	12	25	31	25	5	1	1	14	6	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	14.2
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
...	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....
24	22	29	34	30	39	30	32	32	36	38	36	31	30	32	34	31	27.2
30	31	36	39	34	34	35	39	39	40	45	45	35	38	40	42	40	28.2
23	16	25	30	29	27	26	32	28	33	38	34	27	24	26	25	25	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
28	34	36	39	32	33	36	39	35	42	47	43	33	37	40	40	39	28.0
22	17	27	31	29	27	27	32	27	30	33	33	25	23	28	33	24	
31	32	36	39	34	32	34	39	36	40	43	37	38	39	41	38	37	26.6
16	16	22	26	26	25	25	27	27	34	32	24	24	23	24	24	24	
30	32	38	41	.....	35	38	40	40	42	.....	.....	.....	.....	.....	.....	....	
14	2	12	21	.....	18	24	1	24	21	.....	.....	.....	.....	.....	.....	....	.....
28	31	37	36	86	32	35	37	36	41	40	40	36	37	39	39	36	27.8
-21	19	24	29	26	26	26	26	28	31	36	33	28	26	23	27	26	
35	33	42	46	35	39	34	44	40	39	38	46	38	43	43	44	42	25.5
12	3	12	25	24	25	22	24	17	28	34	32	25	20	16	22	18	
16	14	22	26	28	28	28	26	23	31	36	34	26	25	23	28	24	21.1
22	26	35	33	30	32	31	32	28	37	37	38	28	26	25	37	25	20.0
10	1	14	12	24	24	26	22	6	18	34	32	18	17	8	20	14	
17	26	36	38	32	30	32	31	32	36	38	37	32	30	34	31	34	18.8
3	-6	9	22	22	20	22	20	9	24	3	29	12	4	24	22	16	
21	24	35	35	35	31	35	30	35	39	38	37	31	29	32	36	27	20 6
3	1	12	16	27	25	22	18	9	26	33	32	22	20	10	19	14	
26	29	33	36	34	32	34	34	34	40	37	37	35	35	37	40	30	21.0
0	-5	8	15	23	23	21	17	11	28	33	31	23	21	11	17	16	
25	27	33	35	39	35	38	35	37	40	40	41	36	35	34	40	38	22.4
3	-5	8	25	25	25	20	18	11	28	34	33	20	22	12	20	18	
31	34	30	31	34	34	35	35	36	35	41	40	40	35	35	38	38	22 8
20	6	10	12	22	25	23	24	18	18	32	32	30	22	10	15	18	
24	27	35	37	35	32	37	35	36	38	42	40	32	32	38	36	33	21.9
8	6	9	20	22	19	22	19	18	28	29	24	22	19	14	21	15	
15	24	30	32	35	40	25	23	26	32	34	33	19	17	26	20	18	20.6
20	32	38	38	46	48	38	34	38	36	38	44	26	22	35	36	25	20.6
10	15	23	26	24	33	12	12	15	29	30	22	12	12	11	4	11	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
...	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....
15	9	20	20	22	22	24	26	20	22	30	35	28	14	4	16	12	16.0
25	16	28	20	21	23	30	31	28	24	31	37	25	24	7	15	20	14.4
13	4	10	11	15	11	11	21	16	15	20	30	22	0	-8	5	0	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	....	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....
20	19	30	31	31	33	31	30	27	35	37	39	33	23	18	30	24	17.7
3	-4	15	21	21	22	24	21	8	15	34	33	23	7	2	15	5	
6	12	19	20	17	20	28	18	12	25	30	29	20	6	8	14	9	13.4
12	17	25	22	19	26	30	26	22	32	33	31	28	10	10	17	17	12.2
4	1	11	12	16	9	26	14	7	16	25	28	5	-5	-4	6	0	
17	28	26	34	28	33	39	22	18	53	46	35	26	24	33	31	36	16.0
0	-12	7	12	17	19	28	4	2	14	22	26	3	4	5	10	0	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....
11	27	28	24	22	29	35	28	23	29	32	34	27	17	11	22	17	13.2
-9	9	14	15	18	12	18	12	-4	18	26	27	8	-14	-7	-1	-16	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....
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...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	
14	28	30	23	22	30	35	26	25	28	36	34	24	15	14	30	23	14.2
3	-3	12	17	-5	17	18	11	8	16	25	14	4	-2	3	6	3	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val. (Con).														
Potsdam	28	33	23	5	-12	-13	—3	7	13	13	14	33	26	25
	24	21	7	-14	-19	-23	-18	-13	5	3	1	7	15	9
Great Lakes	24	30	25	12	3	—2	10	15	22	22	24	30	22	22
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	24	45	40	42	12	22	35	38	40	22	35	48	25	26
	18	21	15	6	5	3	3	15	25	18	18	29	19	20
Buffalo	27	40	31	12	9	9	23	21	30	24	29	38	20	24
	21	23	16	7	1	—4	5	12	19	21	19	21	17	17
Pittsford	26	40	40	19	....	....	....	....	....	25	35	39	27	24
	19	20	15	4	....	....	....	....	....	19	17	21	18	18
Rochester	25	39	24	12	6	0	20	16	29	23	25	37	19	22
	19	20	16	7	—2	-10	—5	10	15	19	17	21	17	17
Appleton	27	39	39	19	11	6	20	18	31	25	29	36	25	26
	21	22	15	8	1	0	1	13	15	21	19	18	18	18
Fort Niagara	36	34	40	20	12	12	22	20	29	26	29	38	26	25
	20	22	18	9	2	—2	1	16	16	19	20	16	17	14
Baldwinsville	27	39	39	2	10	—7	7	15	19	22	29	37	23	24
	21	25	8	—4	-22	-20	0	5	8	14	10	19	17	10
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oswego	29	40	29	11	2	—5	10	12	19	18	22	36	21	25
	22	21	21	7	—2	-20	—7	5	9	15	15	13	19	18
Palermo	27	37	35	18	9	—5	8	10	17	18	21	34	32	22
	20	19	18	6	-12	-30	-12	0	8	6	12	10	18	18
Lyons	28	40	40	17	10	—3	19	19	30	24	26	38	26	25
	21	22	17	9	—4	-14	—4	11	16	20	21	23	20	20
Erie, Pennsylvania	22	39	22	12	12	16	32	24	23	31	31	40	22	25
	17	14	16	4	2	4	15	19	24	22	21	22	19	19
Central Lakes	24	28	28	14	4	—8	8	10	19	20	18	27	24	21
Fleming	27	38	39	20	9	0	17	17	24	25	23	35	27	24
	21	19	18	6	—1	-14	—1	3	13	16	15	18	18	16
Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Romulus	27	39	39	21	10	—1	19	16	28	24	22	39	32	25
	21	17	19	8	—1	-15	—1	2	13	16	16	18	17	17
Ithaca	27	40	39	18	9	1	16	14	24	23	21	34	29	25
	21	18	18	7	—2	-15	—1	4	13	15	14	19	21	17
Mean	24	28	21	9	0	—7	3	6	15	18	15	20	22	20

*Mean of tri-daily observations. ‡Max. and Min. by the Draper Thermo-

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
13	27	27	22	20	20	34	23	20	28	33	34	23	8	20	15	19	11.2
6	—1	13	13	15	9	17	7	—1	10	17	23	3	—4	—3	4	—5	
20	22	29	28	32	32	31	24	26	33	34	30	22	22	28	30	26	23.4
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....
27	34	37	41	47	37	35	40	39	44	35	39	29	33	45	44	44	27.7
11	11	16	26	28	34	31	22	4	32	32	27	13	23	22	33	33	
23	32	34	38	34	35	34	30	38	36	33	31	28	32	37	38	39	25.0
20	16	27	29	28	26	29	22	20	32	33	29	19	24	26	32	26	
22	35	34	38	35	35	36	34	36	38	29	36	28	26	40	31	35	
12	10	28	27	30	30	27	19	15	28	32	25	15	15	14	26	16	.....
21	35	33	38	34	34	34	29	36	33	36	31	25	27	40	36	34	23.0
14	10	29	27	31	28	28	24	20	30	33	28	15	30	17	28	20	
25	33	32	36	32	36	36	29	34	33	36	33	27	32	35	35	30	24.3
18	12	28	27	28	28	27	22	20	31	32	26	19	20	19	25	22	
27	34	33	34	34	27	35	31	34	35	33	34	30	34	30	35	35	24.4
20	11	27	26	22	26	27	21	19	29	28	29	19	29	19	20	23	
21	30	34	36	33	34	35	30	30	35	39	34	30	23	23	30	33	19 5
7	8	22	23	27	26	13	12	13	28	28	16	13	12	17	3	4	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	
22	34	31	35	31	30	35	25	31	34	37	33	32	16	32	27	26	21.0
16	9	24	26	30	28	29	18	18	29	32	30	16	11	12	22	8	
21	26	31	34	35	30	35	29	30	35	35	33	30	16	30	26	25	18.4
10	5	15	24	27	27	27	12	8	28	32	30	10	11	9	16	—4	
24	33	35	38	35	35	38	28	36	35	38	37	30	27	40	35	37	24.2
19	16	28	28	32	32	30	20	15	29	35	28	18	16	16	25	13	
26	35	34	39	34	37	35	30	41	43	38	32	31	34	46	44	43	27.0
20	16	20	30	29	29	30	21	27	33	32	28	23	22	22	34	31	
18	22	31	28	32	31	32	25	27	33	36	32	22	21	29	30	24	22.9
22	33	38	40	36	33	34	31	36	37	38	35	30	24	42	32	34	22.8
14	12	27	22	30	29	29	20	20	22	33	28	16	16	16	24	12	
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	
24	34	36	38	38	34	34	32	35	37	38	36	31	31	42	35	34	23.2
12	11	25	20	20	29	28	18	20	32	32	29	11	14	19	24	12	
23	32	36	40	35	31	35	31	34	36	39	36	30	26	42	35	35	22.8
15	10	22	13	31	29	30	19	18	33	35	30	18	15	13	28	14	
16	17	25	22	29	29	28	24	33	31	34	22	23	19	22	25	21	20.2

graph. † Mean includes values of adjacent stations for the blank dates.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.05	T.	0.09	0.12	0.06	0.02	0.12	0.02	0.17	0.01	0.01	T.	0.02	.14
Alfred			.20	.15	04		.10	.01	.30	.01			.02	.35
Angelica			.20	.12	.03		.10		.12	.04			T.	.20
Bolivar			.07	15		.02	.09		.26				.01	.02
Friendship	.11		.25	.12	.07		.10	T.	.22	T.			T.	.15
Humphrey			.26	.35			.03		.20					0.5
Little Valley														
Cherry Creek	.13		.23	.52	.46	.10	.10	.03	.26				.02	.24
Jamestown	.15		.25	.30	.35		T.		.25	.10			T.	.25
Elmira			T.						.46					T.
Pine City			.02	.03	04			.13	.23	T			T.	
Akron	T.		T.	T.	T.	T.	T.	.23	T.	T.	.18		T.	.03
Avon	.02				T.		.11		.13	T.			T.	T.
Mt. Morris	.05			.20			.50			.05				1 00
Victor	.10			.10	.05		.60	T.	T.	T.	T.	.05	.15	.20
Tyrone							.06		.19					
Wedgewood			.02	.02	T.		.10	.02	.20				T.	01
Addison			.02	.04	T.		.10		13	T.				T.
Atlanta						.24						.04		
Haskinville			.13	.05	.04		.12	.08	.14	.02				.02
South Canisteo			.09	.10	T.		.11		.15	T.	T.	T.	T.	.15
Arcade	.01	T.	.11	.18	.10		.13	T.	.21	T.		T.	•05	.11
Attica														
Varysburgh	.46	.10	T.	.12	.09	T.	.10	T.	.14				.23	.11
Eastern Plateau	T.	0.01	0.10	0.04	0.02	T.	0.14	0 02	0.19	0.01	T.	T.	0.03	0.03
Binghamton														
Chenango Forks														
Oxford	T.		.20	.05	T.	T.	.20	.15	.25	.05	T.	.05	.05	T.
Cortland			.04	.02		.05	.25	.02	.21	.08			.03	09
Bloomville	.02		1.01	.07			.22		.12					.14
Deposit		.20					.20	.20	.30					
South Kortright														
Brookfield			.10				.20						.40	
Hamilton				.10	-20		.20		.22	.05			.02	.12
Apulia														
Middletown				.05			.10		.40					
Port Jervis			.02				.15		.13					
Warwick			T.				.05		.12					
Cooperstown			.10				.33		.22					.02
New Lisbon			.08	.02			.19		.10				T.	
Oneonta														
Perry City				.21	.07		.33		.22					.10
Newark Valley			T.				.30		.05			T		T.
Waverly			.03	.02	T.		.10		.25		T.	T.		.03
Ellis														
Mohonk Lake							.17		*	†.07				
Northern Plateau	0 29	0.01	0.32	T.	0.00	0.00	0.24	T.	0.22	0.01	0.00	0.08	0.06	0.05
West Chazy														
Elizabethtown														
Saranac Lake	.04	.07	.09				.09	.03	.05			.03	.05	.01
Gloversville	.03		.03	T.			.21	T.	.30	.06		.05	T.	.07
Lowville	.30		.25				.14		.14			.03	.08	.04
Number Four	.82		.25				.20		.28			*	†.58	.13
Turin	.55		1.30				.57		.28			.31	.19	T.
Remsen														
Kings Station							.20		.20					
Coast Region	0.00	0.00	T.	T.	0.00	0.00	0.08	0.17	0.21	0.16	0.00	0.00	0.00	T.
Brooklyn							.10	.10	.25					T.
Manhattan Beach								.80		.90				
New York City			T.				.06	.02	.18	T.				

TATION FOR JANUARY, 1896 — INCHES.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.03	T.	T.	0.02	0.17	0.02	0.01	T.	0.26	0.88	0 03	0 01	0.01	T.	0.00	T.	0.03	2 31
.02	....	....	.01	.08	T.	....	....	.35	.81	T.	.01	.03	....	....	T.	02	2 51
.12	....	....	.08	.28	T.	....	....	.25	.68	T.	T.	....	....	....	....	.12	2.34
.02	....	....	....	.21	....	....	....	30	.80	....	....	....	....	....	....	....	1.95
.01	....	....	T.	.18	.02	T.	....	.20	.60	T.	T.	T.	....	....	T.	T.	2.03
T.	....	....	.18	.12	.04	....	....	.25	.83	....	.02	....	....	....	....	.10	2.43
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.10	....	....	T	.25	....	.02	....	.21	.70	.09	.10	.04	....	....	....	T.	3.60
.15	....	....	T.	.05	T.	....	....	.43	.70	.05	.05	....	....	....	....	T.	3 08
....	....	....	....	.35	....	....	....	.25	.50	....	....	....	....	....	....	T.	1 56
....	....	....	....	.23	....	.07	T.	T.	1.07	....	T.	....	....	....	....	T.	1.82
....	....	T.	.05	.22	....	....	....	.42	1.88	.07	T.	....	....	....	....	T.	3 08
T.	....	..	....	.18	....	....	....	.46	1.04	.03	....	....	....	....	....	T.	1 97
....	....	....	.05	....	....	....	....	.50	.20	....	....	....	....	....	.05	....	2.60
.10	T.	....	.10	.05	T.	.10	....	....	.10	.05	.02	.05	T.	....	....	T.	1.82
....	....	....	....	.18	....	....	....	....	1.01	....	....	....	....	....	....	.23	1.67
T.	....	....	....	.25	.05	T.	....	.10	.90	.02	T.	....	T.	....	....	.02	1.72
T.	....	....	....	.13	.02	....	....	.15	.84	.02	T.	....	....	....	T.	.02	1.47
....	....	....	....	....	.22	....	....	.35	1.28	....	....	....	....	....	....	....	2.13
.02	....	....	....	.2 5	.02	....	....	.23	.85	.06	....	....	.03	....	....	....	2.06
T.	....	....	T.	.13	....	....	....	.76	1.18	T.	T.	....	....	....	T.	.15	2.76
T.	....	....	.03	.22	T.	....	....	.25	.87	.08	T.	T.	....	....	....	T.	2.35
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
T.	....	....	T.	.30	T.	....	....	.11	1.65	.11	T.	....	....	....	....	T.	3.52
T.	0.00	0.00	0.00	0.19	0.02	0.02	0.00	0.02	0.43	0.04	T.	T.	0.02	0.00	T.	0.07	1.54
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....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
T.	....	....	....	.25	.15	T.	....	....	.39	.15	T.	T.	.05	....	....	....	1.99
T.	....	....	....	.20	.04	....	....	....	.66	.12	....	.05	....	....	....	T.	1 86
....	....	....	....	.14	....	....	....	....	.08	.02	....	....	....	....	....	.41	2.26
....	....	....	....	.25	.15	....	....	....	....	....	....	....	....	....	....	....	1.30
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.30	....	.30	....	....	....	....	....	....	.20	....	T.	T.	1.50
.02	....	....	....	.25	.01	....	....	....	.12	.05	.01	.01	....	....	....	T.	1.38
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.30	....	....	....	....	1.04	....	....	....	....	....	....	T.	1.89
....	....	....	....	.14	....	....	....	....	.62	....	....	....	....	....	....	.49	1.55
....	....	....	....	.04	....	....	....	....	.76	T.	T	....	....	....	....	T.	0.97
....	....	....	....	.28	....	....	....	....	.33	.20	....	....	....	....	....	....	1.48
.03	....	....	....	.14	.03	....	....	....	.13	.08	.03	....	.03	....	....	....	0.86
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.08	T.	....	....	.10	.44	....	....	....	.08	....	....	.05	1.68
....	....	....	....	.20	T.	....	....	T.	.75	T.	....	....	....	....	....	....	1.30
....	....	....	....	.20	....	.02	....	.25	.71	....	T.	....	....	....	....	.05	1.66
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
...	....	....	....	.10	....	....	....	....	*	†1.15	....	....	....	....	....	....	1.49
0.00	T.	0.00	T.	0.25	0.04	0 01	0.01	0.00	0.33	0.15	0.07	0.02	0.03	T.	T.	0.01	2.25
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.06	.05	.05	....	....	.06	.22	.08	.05	....	....	....	.08	1.11
....	T.	....	....	.25	.08	.02	T.	....	.14	.17	.06	....	T.	....	....	T.	1.47
....	....	....	....	.16	....	....	....	....	1.00	.06	.10	....	.02	....	....	....	2,32
....	....	....	....	.20	.08	....	....	....	.22	*	† 24	.04	....	....	....	....	3.04
...	....	....	T.	.52	T.	T.	.06	....	.35	.08	.03	....	.18	T.	T.	T.	4 42
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.30	....	....	....	....	.20	.20	....	....	....	....	....	....	1.15
0.00	0.00	0.00	0.00	0.80	T.	0.00	0.00	0.00	0 76	0.07	0.00	0.00	0.00	0.00	0.00	T.	1.54
....	....	....	....	.14	....	....	....	....	.95	....	....	....	....	....	....	....	1.54
....	....	....	....	.20	....	....	....	....	.20	.40	....	....	....	....	....	....	2.50
....	....	....	....	.04	.02	....	....	....	.93	....	....	....	....	....	....	T.	1.25

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Coast Region (Con.)														
Willet's Point	....	....	....	....	....	....	T.	....	.35	....	....	....	....	....
Brentwood	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Seatauket	....	....	.02	T.	....	....	.18	T.	.12	.08	....	....	....	....
Bedford	....	....	....	T.	....	....	.15	.10	.38	....	....	....	....	....
Hudson Valley	T.	T.	T.	T.	0.00	T.	0.21	T.	0.17	0.05	0.01	T.	0.00	T.
Albany	....	T.	T.	T.	....	T.	.26	T.	.27	.10	.01	T.	....	T.
Lebanon Springs	....	....	.02	T.	....	....	.23	....	.08	.14	T.	....	....	T.
Honeymead Brook	....	....	....	....	....	....	.20	T.	.15	.05	....	T.	....	....
Poughkeepsie	....	....	....	....	....	....	.18	....	*	†.23	T.	T.	....	....
Wappingers's Falls	T.	....	T.	....	....	....	.18	.05	.30	.09	.05	T.	....	....
West Point	....	....	....	....	....	....	*	†.22	*	†.10	....	....	....	....
Boyds Corners	....	....	....	....	....	....	.18	....	.15	....	....	....	....	....
Carmel	....	....	....	....	....	....	.18	....	.17	....	....	....	....	....
Southeast Reserv'ir	....	....	....	....	....	....	.28	....	.22	....	....	....	....	....
Eagle Mills	*	*	*	*	*	*	*	*	*	*	*	*	*	†.10
Marlborough	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	....	....	....	....	....	....	.18	28	....	....	....	....	....	....
Mohawk Valley	0.00	0.14	0.09	0.03	0.00	0.00	0.18	0.38	0.10	0.00	0.00	0.12	0.13	0.06
Rome	....	.14	.09	.03	....	....	.18	.08	.10	....	....	.12	.13	.06
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.35	0.05	0.00	0.00	T.	T.
Plattsburgh Bar'ks	....	....	....	....	....	....	T.	....	.65	....	....	....	....	....
Saratoga Springs	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	....	....	....	....	....	....	.15	....	.15	.10	....	....	T.	T.
St. Lawrence Valley	0.02	T.	0.03	T.	0 00	T.	0.05	0.06	0.04	0 04	0.01	0.16	0,19	0.04
Malone	.13	T.	.06	.02	....	....	,04	....	.09	T.	....	.03	....	.10
Madison Barracks	....	....	....	....	....	....	.15	.06	....	....	....	.36	....	....
Watertown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Canton	....	....	*	*	*	*	*	*	*	*	*	†.40	1.10	....
DeKalb Junction	....	....	.05	....	....	....	T.	.04	.03	....	....	.07	.05	.02
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
‖North Hammond	....	....	....	....	....	....	.03	....	.08	....	....	....	.05	....
Ogdensburg	T.	....	.05	....	....	T.	.05	.20	.10	T.	.05	.05	....	.10
Potsdam	....	....	....	....	....	....	....	....	....	.20	....	.30	....	....
Great Lakes	0.04	T.	0.10	0.16	0.08	0 04	0.16	0.07	0.11	0.01	T.	0.01	0 03	0.13
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	.50	....	.28	....	....	....	T.	....	T.	....	....	....	.12	T.
Buffalo	T.	T.	.12	T.	.02	T.	.13	.01	.13	T.	T.	T.	.01	.01
Adams Centre	....	....	....	....	....	....	....	....	....	....	....	....	....	....
‡Pittsford	....	....	.12	.07	....	....	....	....	....	....	....	....	T.	T.
Rochester	.05	....	.12	.42	.16	.02	.35	.08	.21	.06	T.	T.	.03	.06
Scottsville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Appleton	T.	....	.03	.06	.03	....	.12	.02	.12	T.	....	T.	T.	T.
Fort Niagara	....	....	T.	T.	T.	T.	....	.30	.06	T.	....	T.	....	T.
Baldwinsville	....	T.	.40	.50	....	.10	.30	....	.20	....	T.	....	.10	30
Skaneateles	....	....	....	.20	....	....	.11	....	.08	.06	....	.08	.10	.07
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridgeway	....	....	T.	.25	.11	....	.13	T.	.11	....	....	....	....	.01
Demster	....	....	.08	....	.13	....	.16	....	....	....	....	....	....	.40
Fulton	....	....	....	60	.03	.30	.40	....	.10	....	.01	....	.01	.04
Oswego	T.	T.	.08	T.	.10	08	.12	.10	.09	T.	T.	.02	T.	40
Palermo	....	....	.03	.02	.10	T.	.06	.03	.10	....	....	.08	T.	.50
‖ Phœnix	....	....	....	T.	.25	.03	T.	.18	T.	.08	....	....	....	.08
Lyons	T.	T.	.20	.10	.20	.10	40	.40	.10	....	....	T.	....	T.
Rose	....	....	T.	.25	.20	T.	.10	.05	.20	T.	....	02	02	.20
Erie, Pennsylvania	.07	....	.13	.07	.05	T.	.01	....	.12	T.	....	T.	.06	.04

TATION FOR JANUARY — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
....	....	....	....	T.	....	....	....	....	.75	....	....	....	....	....	....	....	1.10
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.04	T.	....	....	....	1.04	T.	....	....	....	....	....	T.	1 48
....	....	....	....	.05	....	....	....	....	.69	.03	....	....	....	....	....	T.	1 40
0.00	0.00	0.00	0.00	0.10	T.	T.	T.	0.00	0.40	0,03	0.02	0.01	0.00	0.00	0.00	T	1.07
....	....	....	....	.09	T.	T.	T.	....	.12	.08	.05	....	....	....	....	....	0 98
....	....	....	....	.06	....	....	....	....	.28	.02	.04	....	....	....	....	....	0.87
....	....	....	....	.03	....	....	T.	....	.48	....	....	....	....	....	....	....	0.91
....	....	....	....	*	†.06	....	....	....	.32	.09	....	....	....	....	....	T.	0.88
....	....	....	....	.20	.05	....	....	....	.38	.06	....	T.	....	....	....	T.	1.36
....	....	....	....	*	†.07	....	....	....	*	*	†.80	....	....	....	....	....	1.19
....	....	....	....	.05	....	....	....	....	.57	.07	.07	....	....	....	....	....	1.09
....	....	....	....	.06	....	....	....	....	.69	....	....	....	....	....	....	....	1.10
....	....	....	....	.05	....	....	....	....	.75	....	....	....	....	....	....	....	1.30
....	....	....	....	.20	....	....	....	....	*	*	*	†1.00	....	....	....	....	1.30
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
....	....	....	....	.17	....	....	....	....	....	T.	T.	.14	....	....	....	....	0.75
0.00	0.00	0.00	0.26	0.12	0.04	0.00	0.00	0.21	0.15	0.12	0.07	0.06	0.00	0.00	0.00	0.23	2.17
...	....	....	.26	.12	.04	....	....	.21	.15	.12	.07	.06	....	....	....	.22	2.17
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	T.	0.00	0.10	0.12	0.00	0.28	0.35	0.02	0.14	0.02	0.00	0.00	0.00	0.00	0.00	1.56
....	....	T.	....	T.	.25	....	.40	.70	.05	....	T.	....	....	....	....	....	2.05
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.20	....	....	.15	....	....	.28	.05	....	....	....	....	....	1.08
T.	T.	0.00	0.08	0.07	0.09	0.03	0.01	0.00	0.26	0.11	0.18	0.02	0.00	0.01	T.	0.00	1.49
T.	...	....	T.	.09	....	.11	....	....	.10	.20	.28	.09	....	T	....	....	1.34
....	....	...	.30	.16	....	....	....	....	....	.02	....	....	....	....	....	....	1.05
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	*	*	*	*	†.25	....	....	.20	.30	T.	....	....	....	....	....	2.25
T.	T.	....	.01	.11	.02	.04	....	....	.69	.02	.20	....	....	.05	....	....	1.40
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
....	01	....	....	.80	....	....	....	....	.40	.10	.04	....	....	.05	....	....	1.06
T.	T.	....	.10	T.	.02	T.	.05	....	.10	*	†.20	....	....	T.	.02	....	1.09
....	....	....	....	....	.40	....	....	....	.50	....	.40	....	....	...	....	....	1.80
0.03	T.	T.	0.07	0.20	0.03	T.	T.	0.19	0.82	0.13	0.05	0.02	0.03	T.	0.01	0.11	2.70
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
...	....	....	.31	....	....	....	....	.07	.55	.11	.06	....	....	....	....	T.	2 00
.01	....	....	.05	.26	.12	T.	....	.42	1.69	.23	.06	T.	T.	T.	T.	.01	3.28
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.25	....	....	....	.65	.74	T.	.03	....	....	T.	....	.05	....
.08	T.	T.	.03	.23	.04	T.	.01	.49	.65	.09	.04	T.	.11	....	T.	.05	3.38
T.	....	....	.08	.13	....	....	T.	.45	1.88	.12	.02	....	.01	....	T.	.03	3.10
....	....	....	*	†.26	....	....	....	*	*	†2.18	T.	....	....	....	....	T.	2.80
T.	....	....	.20	.20	.10	T.	T.	.36	.27	.03	.10	....	....	....	....	.37	3.53
.03	....	....	.05	.26	....	....	....	.12	.62	.06	.04	.03	.08	....	....	.09	2.08
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	T.	.17	....	....	....	T.	1.87	.32	.03	....	....	....	....	T.	3.00
....	....	....	....	.06	....	.04	....	....	.17	.35	.22	....	....	....	....	....	1.61
....	....	....	....	.55	.08	....	....	.09	.80	.03	.04	.01	.01	....	.08	.75	3.93
T.	....	....	.01	.20	.03	.02	T.	.02	.54	.09	.09	.01	T.	....	.01	.03	2.04
....	....	....	.08	.25	.05	....	....	T.	.30	.31	.06	....	....	....	....	.03	2.00
....	....	....	....	.34	.10	.06	....	....	.33	....	....	.07	T.	....	....	....	1 52
.34	....	....	.10	T.	....	....	....	.03	1.14	....	....	.20	....	....	....	.30	3 57
.10	....	....	.03	.25	.03	.01	....	.10	.66	.12	.01	....	.25	....	T.	.03	2.63
....	....	....	.15	.19	....	....	....	.09	.42	.04	.05	T.	....	....	T.	.03	1.52

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Central Lakes	0.02	0.02	0.08	0.06	0.06	0.02	0.15	0.02	0.07	0.02	T.	T.	0.14	T.
Fleming	.10	.10	.30	.20	.20	.....	.....		.....	.....	.....	.....	.....	....
Sherwood..........	.....	.....	.....	.....	.....	.04	.....	.05	.....	.10	....	.....	.15	.02
Watkins	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Romulus...........	.....	....	T.	T.	.....	.....	.46	.....	.23	.....	....	.....	.40	....
Ithaca	.....	.....	.....	.05	.05	.05	.15	05	.06	T.	T.	T.	T.	T.
Penn Yan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Average	0.04	0.02	0.08	0 04	0 03	0 01	0.14	0.04	0.16	0.04	T.	0.04	0 06	0.04

* Amount included in next measurement. † Not used in computing the averages. ‡ Record for

TATION FOR JANUARY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.08	0.00	T.	0.06	0.18	0.02	0 00	0.00	0.12	0.54	0.04	T.	T.	0.00	T.	T.	0.12	1.86
.30	....	....	....	.30	.....	.....	.....	....	.30	....	T.	.....	....	.....	T.	.....	1.80
...	....	....	.25	.....	.04	.....	.....	.30	.28	.11	.....	.....	.....	.....	....	.48	1.82
....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
T.	....	T.	.....	.30	T.	.....	.....	.18	.77	T.	T.	.....	.....	.....	.....	.....	2.34
.03	....	....	.....	.13	.02	.....	.....	T.	.80	.04	T.	.02	.....	T.	T.	.01	1.46
....	....	....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....
0.01	T.	T.	0.05	0.15	0.04	0.01	0 03	0.12	0.50	0.09	0.04	0.01	0.01	T.	T.	0.06	1.85

the month incomplete. || Reports too late to be used in computing the averages. T = Trace.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAH.).									
		Normal for the month of January.	Length of record, years.	Record begins.	Record ends.	Mean for January, 1896.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR JANUARY. Highest.	Year.	Lowest.	Year.
Western Plateau		23.4				23.6	+0.2				
Angelica	Allegany	21.4	13	1855	1896	22.1	+0.7	81.9	1890	12 0	1857
Humphrey	Cattaraugus	23.4	13	1884	1896	24.0	+0.6	34.2	1890	15.9	1893
Elmira	Chemung	25.3	18	1851	1896	24.6	—0.7	35.6	1890	13.5	1857
Eastern Plateau		22.3				19.6	—2 7				
Oxford	Chenango	22.7	29	1828	1896	20.1	—2.6	29.6	1828	13.5	1856
Cortland	Cortland	22.8	33	1829	1896	20.0	—2.8	30.3	1843	9.3	1857
Hamilton	Madison	22.4	20	1827	1896	17 3	—5.1	30.2	1848	15.6	1844
Cooperstown	Otsego	20.2	43	1854	1896	17.0	—3.2	31.6	1880	10.3	1857
Waverly	Tioga	23.2	14	1883	1896	23.6	+0.4	33.5	1890	17.2	1893
Northern Plateau		19.1				15.4	—3.7				
Lowville	Lewis	19.1	30	1827	1896	15.4	—3.7	28.9	1843	5.4	1857
Atlantic Coast		30.4				27.9	—2.5				
New York City	New York	30.4	26	1871	1896	28.0	—2.3	40.0	1890	23.3	1893
Setauket	Suffolk	30.4	11	1886	1896	27.8	—2.6	38.8	1890	22.5	1893
Hudson Valley		24.5				21.1	—3.4				
Albany	Albany	23.0	23	1874	1896	20.0	—3.0	30.8	1880	14.6	1875
Honeymead Brook	Dutchess	23.8	16	1881	1896	20.6	—2.2	32.4	1890	15.8	1893
West Point	Orange	27.7	67	1826	1896	22.8	—4 9	40.1	1870	19.1	'44,'57
Champlain Valley		17 0				14.4	—2.6				
Plattsburgh Barracks	Clinton	17.0	43	1839	1896	14.4	—2.6	27.4	1880	9.7	'75,'84
St. Lawrence Valley		18.3				14.0	—4.3				
Madison Barracks	Jefferson	19.7	38	1839	1896	16.1	—3.6	32.2	1880	10.4	1888
Canton	St. Lawrence	16.9	34	1862	1896	13.2	—3.7	29.3	1880	7.2	1875
North Hammond	"	18.6	18	1867	1896	15.3	—3.3	27.4	1889	6.7	1875
Potsdam	"	18.0	28	1828	1896	11.2	—6.8	27.6	1843	8.2	1893
Great Lakes		24.3				22.6	—1 7				
Buffalo	Erie	24.4	26	1871	1896	25.0	+0.6	36.8	1880	16.8	1893
Rochester	Monroe	24.0	26	1871	1896	23.0	—1.0	36.5	1880	17.0	1893
Fort Niagara	Niagara	25 8	41	1842	1896	24.4	—1 4	36.4	1880	18.7	1875
Baldwinsville	Onondaga	22.2	21	1854	1896	19.5	—2.7	30.2	1858	13.2	1857
Oswego	Oswego	24.1	26	1871	1896	21.0	—3.1	36.2	1880	15.4	1888
Palermo	"	22.2	43	1854	1896	18.4	—3.8	29.4	*	11.6	1888
Erie, Pennsylvania	Erie	27.1	23	1874	1896	27.0	—0.1	40.0	1880	18.0	1893
Central Lakes		24.2				22.8	—1.4				
Ithaca	Tompkins	24.2	18	1879	1896	22.8	—1.4	34.7	1880	17.5	1893
Average departure							—1.4				

* 1863, '80, '92.

AND PRECIPITATION — JANUARY.

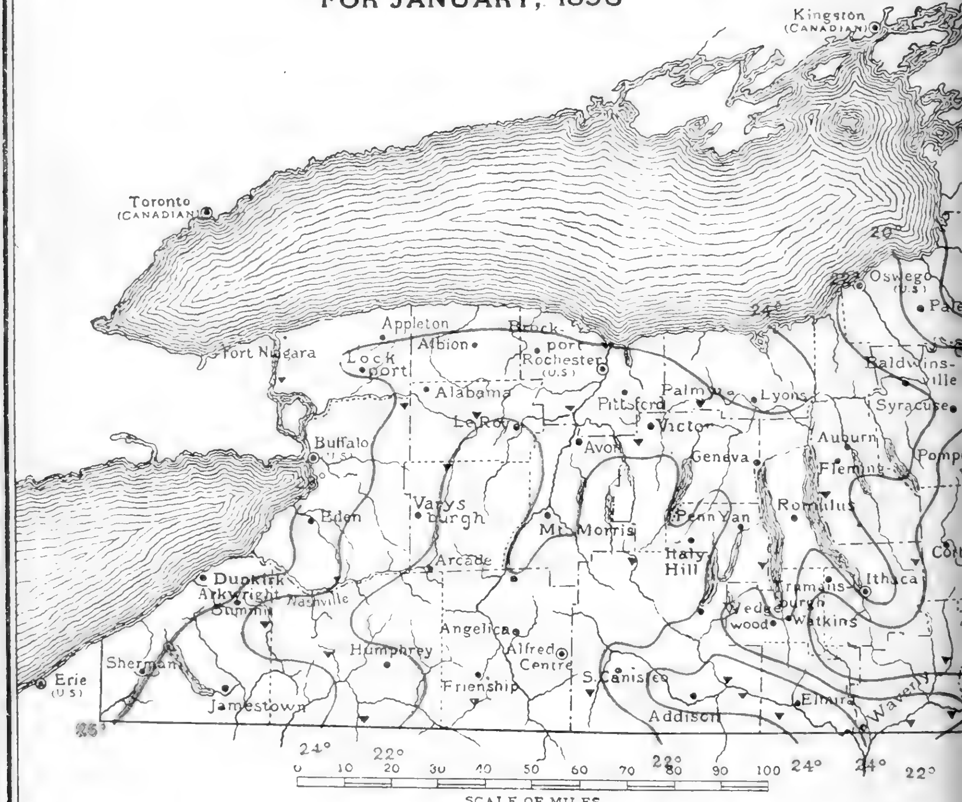
STATION.	COUNTY.	PRECIPITATION — (INCHES).									
		Average for the month of January.	Length of record, years.	Record begins.	Record ends.	Total for January, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR JANUARY. GREATEST. Amount.	GREATEST. Year.	LEAST. Amount.	LEAST. Year.
Western Plateau	....	2.77	....	....	....	2.11	—0.66	......	......	......	......
Angelica	Allegany	2.9	12	1856	1896	2.34	—0.58	4.45	1894	1.86	1891
Humphrey	Cattaraugus	3.15	13	1884	1896	2.43	—0.72	5.02	1890	1.82	1891
Elmira	Chemung	2.23	15	1854	1896	1.56	—0.67	4.72	1856	0.62	1893
Eastern Plateau	....	2.67	....	....	....	1.65	—1.02	......	......	......	......
Oxford	Chenango	2.54	26	1829	1896	1.99	—0.55	5.11	1836	0.92	1834
Cortland	Cortland	2.68	17	1851	1896	1.86	—0 82	5.02	1863	1.30	1851
Hamilton	Madison	2.22	20	1827	1896	1.38	—0.84	4.57	1836	1.18	1849
Cooperstown	Otsego	2.58	43	1854	1896	1.48	—1.10	5.54	1891	0.32	1860
Port Jervis	Orange	3.68	13	1880	1896	1.55	—2.13	7.02	1891	1.55	1896
Waverly	Tioga	2.33	15	1882	1896	1.66	—0.67	3.99	1892	1.20	1887
Northern Plateau	....	2.51	....	....	....	2.32	—0.19	......	......	......	......
Lowville	Lewis	2.51	31	1827	1896	2.32	—0.19	4.81	1855	0.55	1842
Atlantic Coast	....	4.12	....	....	....	1.36	—2.76	......	......	......	......
New York City	New York	3.93	26	1871	1896	1.25	—2.68	6.15	1882	1.15	1871
Setauket	Suffolk	4.31	11	1886	1896	1.48	—2.83	6.29	1891	1.48	1896
Hudson Valley	....	3.44	....	....	...	1.01	—2.43	......	......	......	......
Albany	Albany	2.81	23	1874	1896	0.98	—1.83	6.12	1891	0.98	1896
Honeymead Brook	Dutchess	3.31	16	1881	1896	0.91	—2.40	6.89	1891	0.91	1896
Poughkeepsie	"	3.26	21	1830	1896	0.88	—2.38	6.65	1891	0.45	1849
West Point	Orange	3.60	49	1840	1896	1.19	—2.41	9.95	1841	0.82	1851
Boyds Corners	Putnam	4.20	25	1870	1896	1.09	—3.11	9.76	1891	1.09	1896
Champlain Valley	....	1.80	....	....	....	2.05	+0.25	......	......	......	......
Plattsburgh Barracks	Clinton	1.80	38	1840	1896	2.05	+0.25	4.30	1892	0.59	1888
St. Lawrence Valley	....	2.13	....	....	....	1.31	—0.82	......	......	......	......
Malone	Franklin	1.70	16	1830	1896	1.34	—0.36	......	......	......	......
Madison Barracks	Jefferson	2.26	36	1840	1896	1.05	—1.21	4.71	1874	0.20	1888
North Hammond	St. Lawrence	2.83	19	1866	1896	1.06	—1.77	5.94	1870	1.06	1896
Potsdam	"	1.74	27	1828	1896	1.80	+0.06	4.50	1895	0.36	1836
Great Lakes	....	2 78	....	....	....	2.50	—0 28	......	......	......	......
Buffalo	Erie	2.92	26	1871	1896	3.28	+0.36	5.61	1874	1.16	1871
Rochester	Monroe	3.15	26	1871	1896	3.38	+0 23	8.05	1878	0.94	1883
Fort Niagara	Niagara	2.00	38	1842	1896	2.80	+0.80	5.61	1843	0.53	1879
Oswego	Oswego	2.94	26	1871	1896	2 04	—0 90	6 49	1884	0.92	1887
Palermo	"	2.46	37	1860	1896	2.00	—0.46	6.50	1874	0.16	1884
Erie, Pennsylvania	Erie	3 24	23	1874	1896	1.52	—1.72	6 20	1878	1.41	1878
Central Lakes	....	2.21	....	....	....	1.46	—0.75	......	......	......	......
Ithaca	Tompkins	2.21	18	1879	1896	1.46	—0.75	3.78	1892	0.57	1879
Average departure	....	......	...	....	...	....	—1 00	......	......	......	......

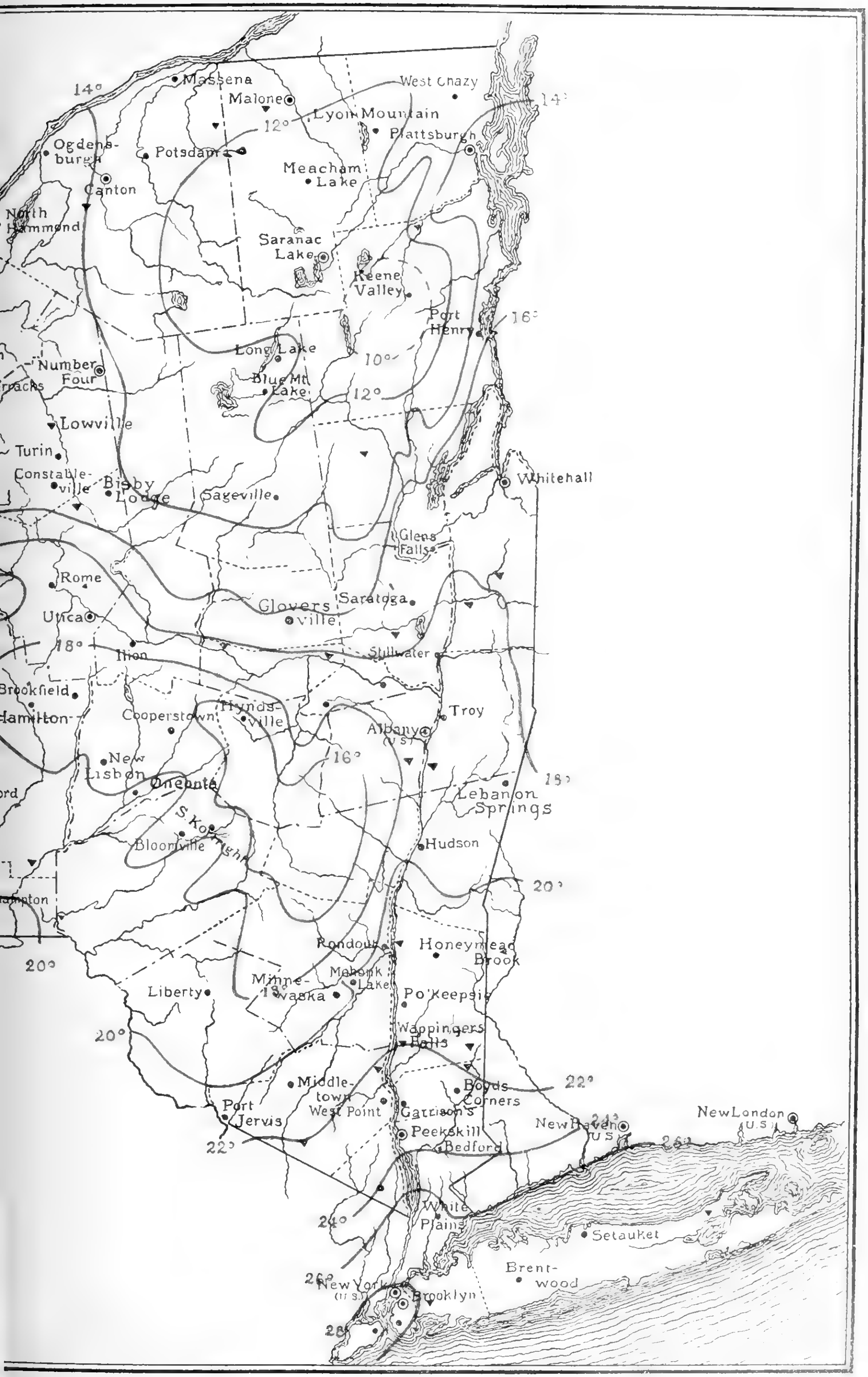
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JANUARY, 1896





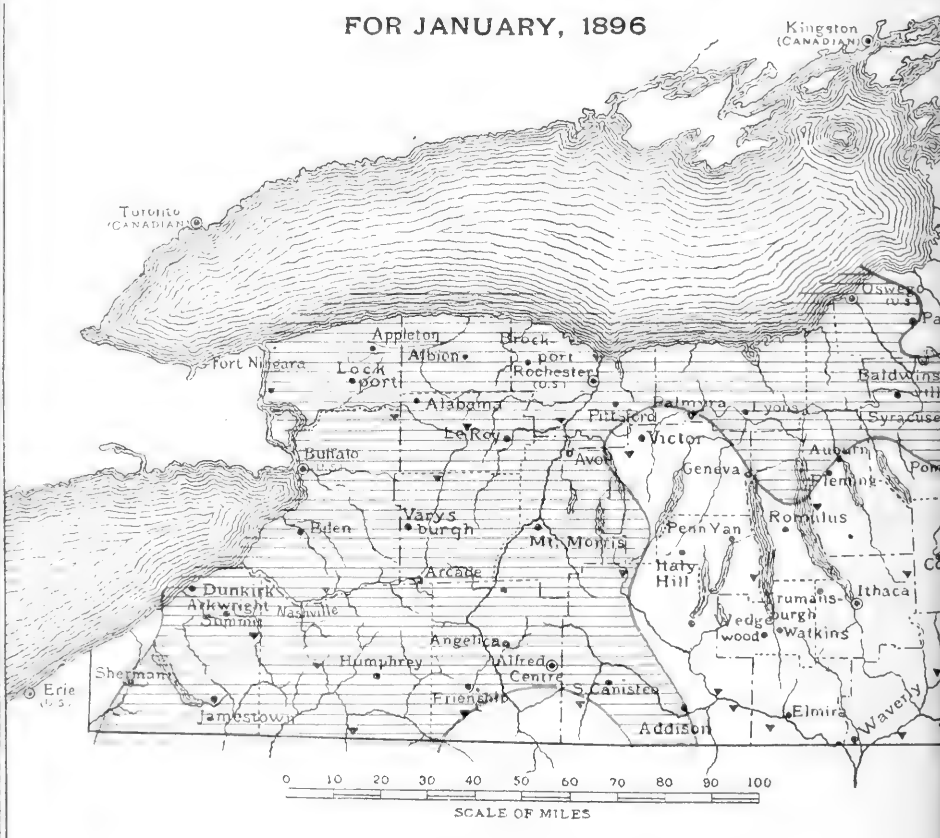
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Blue Mt. Lake
Number Four
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Utica
Saratoga
Gloversville
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
S. Kortright
Bloomville
Lebanon Springs
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
West Point
Garrison's
Boyds Corners
Port Jervis
Peekskill
Bedford
New Haven U.S.
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
10°
12°
14°
16°
18°
20°
22°
24°
26°
28°

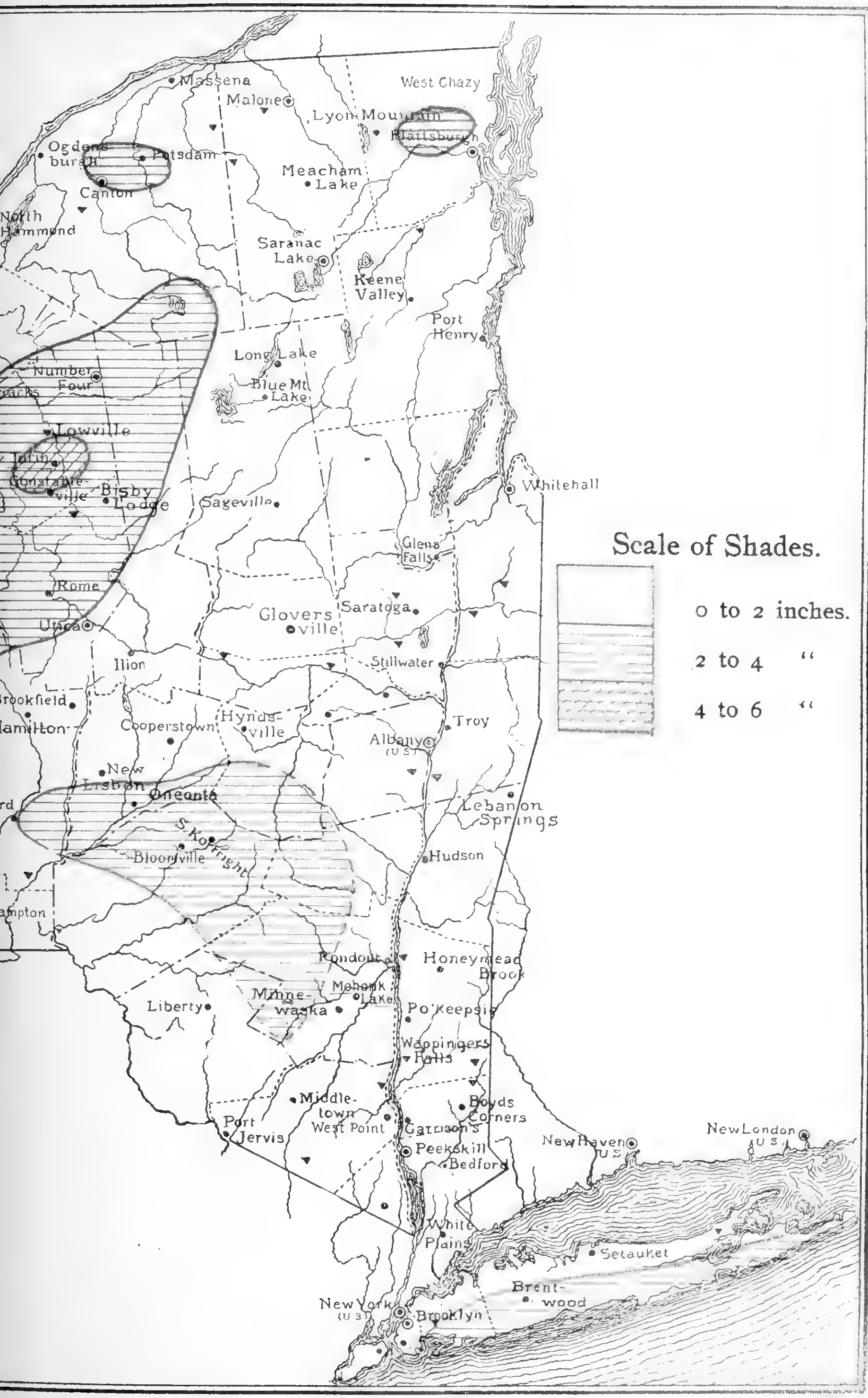
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JANUARY, 1896




Massena
Malone
West Chazy
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Ogdensburgh
Potsdam
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Keene Valley
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Liberty
Po'keepsie
Wappingers Falls
Middletown
West Point
Garrison's
Boyds Corners
Port Jervis
Peekskill
Bedford
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "

Meteorological Summary for February, 1896.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during February, was 29.90 inches. The highest barometer was 30.70 inches at Ithaca on the 17th, and the lowest was 28.70 inches at New York city on the 6th. The average pressure was highest in southwestern New York, and lowest near Lake Ontario. The average barometer for the month at six stations of the National Bureau was 0.19 inches below the normal.

The mean temperature of the State, as derived from the records of 71 stations, was 22.8 degrees; the highest local monthly mean being 31.3 degrees at Setauket, and the lowest 13.9 degrees at Potsdam. The highest general daily mean was 40 degrees on the 29th, and the lowest was 8 degrees below zero on the 17th. The maximum temperature reported was 63 degrees at Erie on the 28th, and the minimum, 43 degrees below zero at Canton on the 17th. The mean monthly range of temperature was 69 degrees, which exceeded the greatest value previously recorded by this Bureau by 8 degrees. The greatest monthly range was 94 degrees at Canton and Saranac Lake, and the least was 50 degrees at Fort Niagara. The mean daily range was 16 degrees; the greatest daily range being 50 degrees at Saranac Lake on the 18th, and the least 0 degrees at North Hammond on the 29th. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 24.4 degrees; the Eastern Plateau, 23.4 degrees; the Northern Plateau, 18.1 degrees; the Atlantic Coast, 30.5 degrees; the Hudson Valley, 26.2 degrees; the Mohawk Valley, 20.4 degrees; the Champlain Valley, 18.4 degrees; the St. Lawrence Valley, 16.5 degrees; the Great Lake Region, 24.9 degrees; the Central Lake Region, 24.9

degrees. The average of the mean temperatures at 27 stations possessing records for previous years was 0.5 degrees below the normal; excesses generally obtaining in southern New York and deficiencies in the northern section.

The mean relative humidity was 79 per cent. The mean dew point was 20 degrees.

The average precipitation for the State was 5.52 inches, as derived from the records of 92 stations. The greatest general precipitation exceeded 6 inches over considerable areas of northern and southeastern New York, while the least amount, ranging from 2 to 4 inches, obtained over portions of the central and western sections of the State. The maximum local amount was 9.51 inches at Bedford, the minimum being 2.50 inches at Atlanta. A list of the greatest local rates of precipitation will be found in the table of meteorological data. The heaviest rain and snow storms occurred as follows: On the 1st, general; on the 3d, heavy in the east, lighter in the northern section; on the 6th, the maximum for the month, very heavy in the southeast; on the 9th, general; on the 13th, heavy in northern New York; on the 19th and 20th, heavy in northeastern sections; on the 30th, very heavy on the coast, lightest in western New York. The average total snowfall, as reported by 62 widely distributed stations, was 25.3 inches. The amounts for the various regions were approximately as follows: The Western Plateau and Champlain Valley, 35 inches; the Northern Plateau and St. Lawrence Valley, 40-45 inches; the Central Lakes and Eastern Plateau, 20 inches; the Great Lakes, 30 inches; the Hudson Valley, 15 inches; the Coast Region, 8 inches. The average precipitation at 29 stations possessing records for previous years, was 2.24 inches above the normal; excesses occurring at all stations. The amounts were the greatest observed for February at the following stations, whose records cover the periods specified: Elmira, 16 years; Cooperstown, 43 years; Port Jervis, 13 years; Waverly, 15 years; Boyds Corners, 26 years; Plattsburg Barracks, 38 years; Madison Barracks, 36 years; Oswego, 26 years; Ithaca, 18 years.

The average number of days on which the precipitation amounted to 0.01 inches or more was 14.2; the rain-frequency in northern New York and the Great Lake Regions considerably exceeding that over other sections. The average number of clear days was 6.7; of partly cloudy days, 8.4; and of cloudy days, 13.9; giving an average cloudiness of 57 per cent. for the State. The greatest cloudiness obtained over northern New York and the Great Lake Region.

The prevailing direction of the wind was from the west. The average total wind travel at 6 stations of the National Bureau was 10,147 miles; the totals being generally above the usual values in both the Coast and Great Lake Region. The maximum velocity recorded at the above stations was 65 miles per hour at New York on the 7th.

Lightning was observed in southeastern New York on the 6th, and a sharp thunderstorm also occurred in that section on the 28th.

Hail fell on the 3d, 4th, 6th, 13th, 23d, 24th; and sleet fell on the 1st, 3d, 4th, 6th and 29th.

Lunar halos were observed on the 27th and 28th.

The weather of February presented many exceptional features, the most prominent being, firstly, an abnormally low mean pressure over the State, and also, on the 6th, the lowest actual barometer recorded in Central New York for 18 years or more; secondly, an excessive precipitation both of rain and snow, breaking many records of 20 to 43 years in extent for the month; and thirdly, as regards temperature, the minima of the 17th in northern New York reached very nearly the lowest values ever observed in this State, while the average temperature of the day was the lowest yet recorded by this Bureau.

The first half of the month was marked by frequent storms of rain, snow and wind, the temperature throughout the period being above the normal. During the second half of February brighter and cold weather prevailed, the deficiency of temperature very nearly balancing the excess of the first period. The closing days of the month, however, were mild and springlike, the snow disappearing rapidly in all sections, causing ice jambs and freshets in the southern rivers.

Twelve low pressure areas passed eastward in the vicinity of the State during the month; a number considerably in excess of the usual storm frequency for February. These disturbances were generally strongly developed, bringing high winds and a large precipitation, especially during the first half and at the close of the month. Storm centres passed to the north of our borders on the 1st, 5th, 10th, 24th and 28th, on all of which dates the temperature was above the normal. Severe storms moved along the coast on the 6th and 9th, and a third of lesser strength on the 29th; while on the 13th, 15th, 19th and 24th depressions passed centrally within the borders of the State. The period from the 6th to the 13th was an exceptionally stormy one, beginning with the hurricane and heavy rain due to the coast storm of the 6th. This was closely followed by the cyclone of the 9th, which took a course nearly identical with the preceding, bringing heavy snow and continued high wind; and succeeding this, storms passing over Canada on the 11th and over southeastern New York on the 13th prolonged the gales and snowfall. Traffic was seriously impeded in all parts of the State during this period, and in some sections of northern New York and along the lakes, railways were blocked by snowdrifts for several days.

The number of well defined high pressure areas which influenced our weather in February was five, their maximum pressures in this vicinity occurring on the 3d, 8th, 17th, 21st, 25th to 26th. The first and second highs were not strongly developed, but the latter brought a considerable depression of temperature, with fair weather on the 4th and 5th. The third anticyclone originated in the extreme northwest on the 12th, and while remaining nearly stationary for three days gained rapidly in intensity. On the 16th it spread along the Canadian border, attended by intense cold, which was felt in New York on the morning of the 17th. This area then moved to the northeastern coast, and the weather became rapidly warmer with the advance of the severe cyclone of the 19th. Both the fourth and fifth anticyclones brought considerable depressions of temperature on the 21st and 25th to 26th, but each was succeeded by a sharp rise due to approaching storm areas; and the month closed with a temperature about 15 degrees above the normal.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												24.4	61	28
Alfred	Allegany	1824									21.7	22.4	53	28
Angelica	"	1340									23.2	23.5	54	28
Friendship	"	1550	29.94	30.67	17	29.01	6	1.66			23.9	25.2	57	28
Humphrey	Cattaraugus	1950									24.1	24.2	59	28
Arkwright	Chautauqua	1260										‡23.0	53	28
Jamestown	"	1328										25.8	61	28
Elmira	Chemung	863										27.2	55	28
Avon	Livingston	585										24.8	52	28
Mt. Morris	"	525										26.6	54	28
Victor	Ontario											24.8	54	28
Wedgewood	Schuyler	1350									21.6	22.6	49	28
Addison	Steuben	1000							80	24	26.3	26.2	54	28
South Canisteo	Steuben	1480							80	18	22.9	24.2	51	28
Arcade	Wyoming	1557									21.3	21 8	54	28
Varysburg	"											24.0	53	28
Eastern Plateau												23.4	54	28
Binghamton	Broome	870									24.4	24.8	50	28
Oxford	Chenango	550										23.7	48	28
Cortland	Cortland	1120										22.2	47	*a*
Bloomville	Delaware	1550									23.3	23.2	48	28
South Kortright	"	1700										23.3	51	28
Brookfield	Madison	1350									21.7	23.2	45	28
Hamilton	Madison	1127										21.2	48	28
Middletown	Orange	660										22.5	49	29
Port Jervis	"	470										26.0	50	29
Cooperstown	Otsego	1300									21.2	20.7	50	28
New Lisbon	"	1234									21.8	21.2	50	28
Oneonta	"	1100									25.5	26.0	53	28
Perry City	Schuyler	1038									22.8	22.8	50	28
Waverly	Tioga	825									25.5	26.2	54	28
Mohonk Lake	Ulster	1600									23.7	23.8	48	29
Northern Plateau												18.1	56	28
Saranac Lake	Franklin											15.1	56	28
Gloversville	Fulton	802									20.6	20.1	44	29
Lowville	Lewis	1571										18.8	46	28
Number Four	"	1240	29.91	30.65	17	28.85	6	1.80				17.5	51	28
Turin	"											18.8	43	*a*
Atlantic Coast												30.5	56	*b*
Brooklyn	Kings	107										31.0	54	15
Manhattan Beach	"													
New York City	New York	314	29.90	30.51	17	28.70	6	1.81	75	22		30.0	56	6
Willets Point	Queens											30.4	56	27
Brentwood	Suffolk	75											54	29
Setauket	Suffolk	40							74	23	31.2	31.3	56	6
Bedford	Westchester	290										29.9	53	*c*
Hudson Valley												26.2	59	6
Albany	Albany	85	29.90	30.62	17	28.74	66	1.88	82	20		25.0	51	6

FOR FEBRUARY, 1896.

TURE—(IN DEGREES FAH.).								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	†Duration.	Date.	Total snow fall.	Prevailing direction of wind.
														h. m.			
—24	17	70	16	43	18	2	5	6.9	8.6	13.5	14.7	4.40	2.20	......	6	......	......
—18	17	71	16	37	16	6	6	4	11	14	20	3.28	1.00	......	9	29.1	W.
—20	18	74	16	43	18	6	*k*	5	10	14	15	4.16	1.10	......	9	30.5	......
—14	18	71	17	41	18	5	6	4	6	19	14	3.23	1.00	......	9	22.8	W.
—16	17	75	16	33	18	5	*m*	2	8	19	18	4.83	1.01	......	11	38.5	S. W.
—14	17	67	14	31	18	3	6	....	....	....	......	......	......	......	......	......	......
—15	17	76	16	37	18	7	*n*	3	9	17	15	5.57	1.00	8.00	9	41.0	N. W.
—10	17	65	13	29	18	3	24	10	3	16	10	3.40	1.76	......	6	7.2	S. E.
—16	17	68	17	40	18	7	8	....	....	....	......	......	......	......	......	......	......
—12	18	66	17	41	18	4	8	22	7	0	9	5.35	2.00	7.00	6	25.0	N.
—14	17	68	16	34	18	3	6	9	10	10	15	4.72	1.00	......	9	35.8	W.
—17	17	66	18	35	22	5	6	4	17	8	15	5.02	1.97	......	6	26.2	S. W.
—13	17	67	17	41	16	6	6	13	5	11	12	3.18	1.40	18.00	6	15.4	W.
—17	18	68	20	39	15	8	*p*	6	4	19	13	5.62	2.20	......	6	33.9	N. W.
—18	17	72	16	32	18	5	*q*	3	7	19	16	3.86	1.00	......	6	32.5	......
—24	17	77	18	39	18	2	5	5	14	10	19	4.93	1.10	......	6	35.3	......
—32	18	69	18	46	18	1	29	5.2	9.6	14.2	12.5	4.94	2.55	......	6	......	......
—19	17	69	16	37	16	4	8	5	10	14	11	4.28	1.10	10.30	29	16.5	N. W.
—25	17	73	21	46	18	9	29	3	11	15	17	4.97	1.04	......	6	16.7	W.
—23	17	70	18	36	16	5	*r*	13	10	6	15	4.50	1.07	......	6	......	N. W.
—23	17	71	18	34	18	6	6	1	8	20	11	3.64	0.90	13.00	4	2.8	W.
—21	17	72	20	41	13	8	20	....	....	....	8	4.81	1.18	......	29	......	......
—32	18	77	20	44	18	9	1	4	12	13	14	5.69	1.21	......	6	28.0	S. W.
—29	17	77	19	45	18	6	9	6	6	17	17	3.02	0.70	......	29	12.0	S. W.
—10	17	59	13	28	28	2	2	7	14	8	9	7.00	......	......	......	20 0	......
—11	17	60	14	28	15	7	*s*	4	13	12	12	6.51	2.55	......	6	14.5	......
—23	17	73	16	45	16	1	29	10	5	14	16	5.36	1.75	......	29	23.0	W.
—26	17	76	18	43	16	6	21	2	9	18	12	4.31	1.23	......	29	20.0	S. W.
—17	17	70	18	42	16	5	21	....	....	....	10	7.44	2 03	......	6	......	......
—20	17	70	18	38	18	6	6	3	8	18	17	3.58	1.06	......	6	21.3	S. W.
—17	17	71	19	41	16	8	*t*	3	11	15	13	4.07	1.55	......	6	12.2	W.
—13	*e*	61	17	40	16	6	*u*	6	8	15	6	4.99	......	......	......	22.0	N.
—38	16	79	18	50	18	2	9	4.0	9.2	15.8	18 2	6.39	1.55	......	29	......	......
—38	16	94	20	50	18	3	5	4	10	15	16	4.28	0.87	......	6	40.2	W.
—25	17	69	17	44	16	4	9	8	3	18	19	5.90	1.55	......	29	29.4	N. E.
—31	*e*	77	19	45	18	3	8	3	14	12	17	4.37	1.04	......	6	29.0	W.
—30	17	81	19	47	16	2	9	1	9	19	21	7.93	1.18	......	13	66.0	S. W
—29	17	72	16	35	18	5	*v*	4	10	15	18	9.11	1.20	......	11	77.7	S.
—8	17	60	16	37	16	4	*u*	9.6	8.6	10.8	11.5	6.63	3.98	17.30	29	......	......
—3	17	57	13	26	15	4	*u*	9	9	11	13	6.19	2.10	14.00	6	8.5	W.
....	....	....	....	....	....	....	....	12	8	9	11	4.12	2.08	......	7	6.6	NE.NW
—6	17	62	16	37	16	5	5	9	8	12	13	5.50	1.63	......	6	8.8	W.
—4	16	60	17	35	16	5	*w*	....	....	....	9	7.98	2.95	......	6	0.7	N. W.
—5	17	59	....	....	....	....	....	....	....	....	......	......	......	......	......	......	......
—5	17	61	14	27	16	4	5	9	8	12	10	6.46	2.36	......	29	7.0	W.
—8	17	61	18	34	18	8	*x*	9	10	10	13	9.51	3.98	17.30	29	17. 7	W.
—21	17	67	17	44	16	5	29	7.2	8.8	13.0	13.0	5.53	2.71	23.00	6–7	......	......
—16	17	67	16	44	16	5	29	7	8	14	15	4.03	1.89	......	29	15.3	......

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	County	Elevation, feet.	Mean.	Highest.	Date	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observation.	Mean of maximum and minimum.	Highest	Date.
Hudson Val. (Con.)														
Lebanon Springs	Columbia	930										24 6	50	29
Honeymead Brook	Dutchess	450									25.8	25.2	54	29
Poughkeepsie	Dutchess	170										27.2	54	29
Wappinger's Falls	"											28 2	59	5
West Point	Orange	167										26.4	53	7
Carmel	Putnam	500										26.8	52	29
Mohawk Valley												20 4	43	24
Rome	Oneida	445										20.4	43	24
Utica	"													
Champlain Valley												18.4	44	*a*
Plattsburgh Bar'k	Clinton	125										16 0	43	29
Saratoga Springs,	Saratoga													
Glens Falls	Warren	340									21.3	20.8	44	*a*
St. Lawrence Val.												16.5	55	28
Malone	Franklin	810									15.4	15.3	55	28
Madison Barracks,	Jefferson	266										19.7	51	28
Watertown	Jefferson	486												
Canton	St. Lawrence.	304									16.6	15.4	51	28
Massena	"													
North Hammond.	St. Lawrence.	300									17.7	17.2	50	28
Ogdensburgh	"	258									17 6	17.3	50	28
Potsdam	"	300									14.4	13.9	45	*a*
Great Lakes												2.9	63	28
Dunkirk	Chautauqua	590												
Westfield	"											28.0	62	28
Buffalo	Erie	690	29.90	30.66	17	29.38	19	1.28	79	20		25.0	58	28
Pittsford	Monroe										25.4	25.2	54	28
Rochester	"	621	29.89	30.64	17	28.95	6	1.69	80	19		25.0	56	28
Appleton	Niagara											24.9	53	28
Fort Niagara	"	263										24.8	45	28
Baldwinsville	Onondaga	390									23.8	23.1	50	28
Syracuse	Onondaga													
Oswego	Oswego	304	29.87	30.68	17	28.87	6	1.81	85	19		23.0	47	28
Palermo	"	460									21.2	21.0	47	28
Lyons Falls	Wayne	407									25.5	25.8	50	28
Erie, Pa.	Erie	681	29 93	30.64	17	29.12	6	1.52	80	20		28.0	63	28
Central Lakes												24 9	51	*d*
Fleming	Cayuga	1000									24.4	24.6	50	*a*
Watkins	Schuyler	737												
Romulus	Seneca	719							80	17		24.9	51	28
Ithaca	Tompkins	810	29 90	30.70	17	28 78	6	1.92	77	19	24.8	25 3	5 1	15
Mean			29.90	30.70	17	28.70	6	1.71	79	20		22.8	63	28

* Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.

(*a*) 28, 29; (*b*) 6, 27, 29; (*c*) 23, 29; (*d*) 15, 28; (*e*) 17, 18; (*f*) 18, 19; (*g*) 16, 17; (*h*) 18, 22; (*i*) 15, (*u*) 5, 9; (*v*) 5, 8; (*w*) 3, 4; (*x*) 3, 5, 9; (*y*) 18, 19; (*aa*) 6, 7; (*ab*) 8, 15; (*ac*) 6, 13, (*ad*) 6, 7, 8, 9;

FOR FEBRUARY — (*Continued*).

TURE — (IN DEGREES FAH.).								SKY			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration. h. m.	Date.	Total snowfall.	Prevailing direction of wind.
—21	17	71	18	39	18	6	9	1	12	16	13	4.92	1.58	......	29	14.0	N. W.
—13	17	67	17	39	16	6	9	5	11	13	14	5.47	1.86	23.00	6	15.0	N.
—11	17	65	18	32	19	8	.9	10	7	12	11	5.98	1.90	......	29	22.5	N.
—12	17	71	18	34	16	6	9	7	13	9	17	5.19	2.05	20.00	6	25.0	W.
—11	18	64	18	34	16	7	4	....	....	....	9	4.46	2.40	......	6–7	......	W.
—10	17	62	14	29	15	6	11	13	2	14	12	7.69	2.71	23.00	6–7	13.0	....
—19	16	62	14	44	16	2	*y*	....	....	....	22.0	7.59	1.00	......	6–13	......	....
—19	16	62	14	44	16	2	*y*	....	....	....	22	7.59	1.00	......	6–13	......	....
—25	*f*	68	18	38	25	4	9	10.0	6.0	13.0	10.5	5.81	1.83	......	29	......	....
—25	*f*	68	18	38	25	5	*aa*	....	....	....	9	6.21	1.35	......	7	43.2	S. E.
—16	*e*	60	17	29	22	4	9	10.0	6.0	13	12	5.41	1.83	......	29	26.8	N.
—43	17	85	18	44	18	0	29	6.8	6.4	15.8	13.4	5.02	1.53	18.00	6	......	....
—29	17	84	16	31	28	5	7	4	7	18	21	6.47	0.8	......	7	56.7	W.
—40	17	91	20	44	18	8	*ab*	....	....	....	10	5.30	1.46	......	6	42.0	S. W.
—43	17	94	20	38	18	4	*aa*	8	5	16	11	5.45	1.53	18.00	6	35.5	N. E.
—36	17	86	16	34	*h*	0	29	5	5	19	15	3.20	0.70	......	6	7.4	N. W.
—28	17	78	19	33	25	6	*ac*	6	9	14	......	......	......	......	......	28.2	S W.
—31	17	76	20	41	19	6	*ac*	11	6	12	10	4.66	1.40	......	11	41.0	N. E.
—24	17	66	14	36	*i*	2	7	4.9	7.7	16.4	16.1	4.54	1.47	......	6	......	....
—12	17	74	13	27	*j*	6	6	10	9	10	9	4.65	1.24	......	9	......	S W.
— 9	17	67	12	31	18	4	*k*	0	11	18	19	5.02	1.20	......	6	33.4	N. W.
—12	17	66	16	33	18	2	7	9	6	14	15	4.29	1.18	......	6	......	W
— 8	17	64	13	28	18	4	7	4	12	13	23	5.37	1.15	......	6	39.0	N. W.
—12	18	65	13	36	18	4	7	3	7	19	17	3.25	1.14	......	6	17.7	S. W.
— 5	*e*	50	15	29	18	7	*ad*	....	....	....	11	2.71	1 08	......	6	16.5	N. E.
—20	*g*	70	16	36	15	6	23	7	6	16	20	6.39	1.02	......	6	32.0	....
—1$	17	65	12	29	18	4	7	3	5	21	21	4.90	1.47	......	6	20.3	S. W.
—24	17	71	14	33	18	3	11	4	4	21	9	5.13	1.42	......	7	35.0	S. W.
—13	17	63	14	32	18	4	*aa*	4	9	16	14	4.28	0 90	......	6–9	18.0	N. W.
— 7	17	70	15	32	27	4	8	....	....	....	19	3 96	1.03	......	6	......	W.
—18	17	68	15	40	16	5	*bb*	6.0	10.7	12.3	10.0	4.19	1.65	21.30	6	......	......
—17	17	67	16	40	16	6	*bc*	0	18	11	9	4.29	1.07	14.00	6	25.0	N. W.
—17	17	68	15	29	15	5	6	16	1	12	7	3.66	1.14	......	6	8.7	W.
—18	17	69	15	34	18	5	*v*	2	13	14	14	4.61	1.65	21.30	6	21.6	S. E.
—43	17	69	16	50	18	0	29	6.7	8.4	13.9	14.2	5.50	3.98	17.30	29	25.3	W.

thermograph. ‖ Report received too late to be used in computing means The means from
† Blank indicates that the duration is not shown in the original records, but it is within 24 hours.

18; (*j*) 16, 27; (*k*) 7, 9; (*m*) 7, 14; (*n*) 6, 8; (*p*) 6, 20; (*q*) 14, 20; (*r*) 8, 9; (*s*) 4, 5, 11; (*t*) 1, 5, 8.
(*bb*) 5, 6, 8; (*bc*) 6, 21.

TEMPERATURE — FEBRUARY, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	38	30	26	33	34	34	30	29	26	26	23	18	28	22
Alfred	45	38	27	34	36	36	30	29	24	28	32	23	37	22
	33	20	19	27	27	30	24	21	18	18	16	6	17	13
Angelica	44	38	29	38	44	41	32	32	29	30	29	25	39	28
	35	22	21	29	28	30	26	25	23	19	17	12	21	16
Friendship	46	40	33	41	40	36	32	34	28	32	34	26	40	26
	34	24	22	30	31	31	26	24	19	19	16	8	20	14
Humphrey	44	39	29	36	39	36	30	32	27	32	26	34	37	23
	32	24	22	28	30	30	25	23	19	22	14	7	19	18
Arkwright	42	33	32	37	38	34	31	30	29	32	30	24	37	22
	23	24	23	21	28	31	25	28	18	20	14	10	20	18
Jamestown	46	36	35	41	43	38	36	32	31	37	32	26	40	27
	35	27	26	32	30	31	26	25	21	20	18	9	20	19
Elmira	46	34	34	42	39	44	37	37	32	37	27	34	40	33
	33	26	22	31	33	33	30	30	23	26	21	14	20	21
Avon	43	35	28	40	45	.....	.....	30	.....	.....	34	25	37	31
	31	26	19	28	30	.....	.....	23	.....	.....	17	11	19	19
Mount Morris	47	44	34	42	44	42	37	35	33	33	29	30	38	34
	21	25	20	29	28	31	30	31	21	20	16	10	17	14
Victor	45	39	28	41	42	34	32	33	35	34	35	25	39	30
	33	24	18	27	30	31	28	24	23	19	12	12	19	18
Wedgewood	41	39	25	32	35	35	33	34	35	34	30	33	35	28
	30	17	17	22	27	30	24	23	17	16	13	7	16	14
Addison	45	43	31	37	41	39	36	36	31	35	30	27	38	39
	33	25	21	25	29	33	28	28	22	21	18	9	18	19
South Canisteo	50	39	28	36	42	39	36	36	36	37	31	27	39	35
	33	20	18	26	25	31	27	23	20	19	17	7	17	12
Arcade	43	35	32	42	40	35	31	29	28	30	30	22	37	20
	34	17	18	28	27	29	24	22	18	18	10	8	18	15
Varysburgh	45	37	33	89	31	35	35	30	31	31	31	31	38	38
	34	21	19	30	29	30	25	23	19	19	10	9	19	16
Eastern Plateau	32	29	22	28	32	36	34	30	28	26	24	18	24	26
Binghamton	40	41	33	34	38	45	40	32	35	32	34	22	38	29
	32	22	20	25	30	33	29	28	23	19	18	10	16	20
Oxford	37	38	32	40	39	40	40	37	32	37	32	34	34	37
	26	18	14	22	28	30	25	24	21	11	15	8	13	17
Cortland	40	40	26	33	36	39	43	30	28	32	32	21	33	36
	28	20	15	21	26	28	25	25	23	17	20	11	13	17
Bloomville	40	39	34	39	38	42	40	34	31	34	31	25	38	37
	27	17	14	23	30	26	27	26	23	15	12	6	8	17
South Kortright	40	39	32	38	41	44	41	34	32	33	31	24	49	39
	24	19	12	18	26	30	31	24	19	14	13	8	8	15
Brookfield	43	34	32	34	39	43	42	42	43	32	26	34	41	39
	34	20	16	20	21	26	24	24	25	20	8	16	20	23
Hamilton	37	37	27	33	35	42	40	32	27	30	30	23	33	35
	27	18	9	19	29	30	25	24	21	15	15	11	7	15
Middletown	24	18	20	24	34	36	39	40	36	34	30	25	28	33
	18	16	13	16	18	30	30	30	24	22	22	15	15	16
Port Jervis	34	40	31	31	36	45	40	38	34	35	30	28	30	38
	26	30	20	24	29	33	32	30	24	26	23	14	17	22
Cooperstown	39	39	24	34	35	38	38	31	27	31	24	20	29	29
	20	18	15	18	25	32	29	27	23	16	15	12	13	15
New Lisbon	36	38	26	34	35	41	40	31	28	29	32	22	34	26
	26	18	11	20	28	30	27	25	21	15	13	9	8	16
Oneonta	43	43	28	38	40	44	43	36	31	34	37	28	40	41
	29	21	16	22	30	32	29	29	25	20	17	14	15	20
Perry City	42	38	30	41	41	39	33	33	30	35	28	25	40	30
	34	17	16	22	25	33	26	25	19	17	10	8	15	16
Waverly	41	41	29	39	38	42	38	36	34	39	34	36	38	34
	33	22	20	24	30	33	28	28	25	21	18	11	16	15
Mohonk Lake	38	40	26	30	32	42	44	38	29	34	29	29	36	37
	20	22	14	18	26	28	28	26	23	18	17	13	14	19
Northern Plateau	28	22	13	25	30	34	32	26	20	18	20	14	18	18
Sarnac Lake	36	19	19	33	33	38	32	27	19	28	24	20	18	22
	19	−1	4	15	30	30	23	17	12	12	7	4	8	4
Gloversville	33	37	23	29	33	39	40	33	25	29	29	22	26	29
	17	18	8	19	27	31	28	23	21	14	17	14	15	12

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Monthly mean.
30	10	-5	6	16	8	8	20	33	30	15	21	35	46	36	24.4
44	28	5	20	20	8	12	31	40	38	20	31	46	53	42	
13	-9	-18	-11	6	-2	0	6	24	20	6	8	21	38	27	22.4
44	27	2	23	15	10	12	30	39	40	21	33	48	54	42	
12	-8	-16	-20	6	-1	2	6	22	21	5	5	23	37	29	23.5
44	28	6	27	25	10	15	30	42	39	29	35	52	57	46	
14	-6	-13	-14	7	0	4	8	26	29	7	9	24	37	29	25.2
44	26	17	23	19	15	15	34	37	36	21	33	52	59	47	
19	-5	-16	-6	6	-3	1	7	23	20	10	7	21	40	28	24.2
42	20	3	26	20	10	13	25	35	32	17	30	47	53	43	
20	-4	-14	-5	10	0	0	8	23	17	5	3	25	43	25	23.0
48	22	6	28	24	9	18	32	38	40	26	36	54	61	42	
20	-3	-15	-9	9	0	2	7	26	19	5	16	26	42	27	25.8
51	15	1	23	28	18	17	38	44	40	19	33	44	55	38	
30	-4	-10	-6	15	6	6	10	34	37	10	15	25	37	33	27.2
40	28	4	25	29	19	14	31	41	40	34	35	45	52	47	
25	-1	-16	-15	13	8	5	9	24	25	9	6	21	38	30	24.8
33	23	3	29	30	20	18	40	45	41	29	42	47	54	46	
15	0	-10	-13	10	8	5	20	21	24	19	21	22	35	30	26.6
43	26	2	23	30	10	12	35	43	37	18	37	48	54	45	
16	0	-14	-11	10	-3	7	10	24	20	10	7	19	40	30	24.8
45	22	4	17	26	14	13	40	43	43	19	32	40	49	43	
12	-6	-17	-11	8	2	2	5	22	17	4	3	19	32	30	22.6
50	38	4	23	27	15	17	35	41	43	27	35	47	54	44	
16	-3	-13	-12	11	4	5	9	27	27	10	9	25	34	34	26.2
48	30	3	18	24	9	15	34	45	42	21	40	46	51	45	
9	-5	-15	-17	8	1	2	5	23	21	3	3	20	35	29	24.2
42	19	0	24	20	5	8	27	38	34	15	31	46	54	43	
18	-10	-18	-8	5	0	0	5	20	15	1	6	22	39	27	21.8
44	21	14	23	24	11	15	33	45	36	17	35	49	53	39	
20	-6	-24	-16	4	5	3	7	33	15	4	3	23	36	29	24.0
30	16	-10	1	18	12	12	18	29	32	15	12	28	38	40	23.4
48	37	0	21	28	13	13	31	44	41	25	23	41	50	47	
12	0	-19	-12	15	7	7	9	19	25	8	6	21	30	35	24.8
44	40	5	26	28	22	20	29	38	42	24	27	41	48	42	
6	2	-25	-20	7	5	5	15	22	20	5	-2	17	28	33	23.7
44	36	0	18	23	13	11	29	42	38	29	25	38	47	47	
11	0	-23	-19	-12	6	5	5	10	28	7	-2	18	31	30	22.2
43	37	-2	20	25	17	14	26	42	39	24	22	35	48	43	
16	9	-23	-14	10	5	7	9	12	23	4	-2	17	32	36	23.2
44	31	0	21	20	11	13	25	43	49	28	25	37	51	48	
12	-2	-21	-15	8	3	4	4	15	25	2	0	16	28	39	23.3
41	20	-10	12	31	34	33	38	37	26	28	25	37	45	43	
20	-16	-30	-32	1	8	5	12	13	0	6	10	19	30	33	23.2
42	32	-5	21	24	18	12	30	40	37	25	20	37	48	45	
10	-5	-29	-24	6	5	5	4	13	25	1	-3	17	26	31	21.2
43	24	3	14	32	22	26	26	43	39	20	21	36	48	49	
19	20	-10	-8	10	6	7	11	18	26	15	8	9	20	26	22.5
44	27	9	17	36	22	18	32	42	48	25	22	39	45	50	
16	14	-11	-7	12	8	9	9	16	35	12	8	17	23	39	26.0
41	35	-7	7	27	17	10	22	39	37	23	15	32	50	41	
16	-10	-23	-22	4	6	6	8	15	23	1	0	14	20	40	20.7
42	35	-6	19	27	16	11	27	39	38	24	20	36	50	47	
13	-8	-26	-22	5	5	5	6	10	24	3	-5	17	27	35	21.2
47	39	3	27	31	19	15	32	40	43	17	25	41	53	51	
20	-3	-17	-13	14	9	10	11	20	26	9	3	20	34	37	26.0
44	20	-4	21	25	17	17	30	41	37	19	35	40	50	43	
15	-4	-20	-17	10	5	4	6	21	19	1	-1	20	31	30	22.8
50	35	12	25	27	15	20	37	45	47	27	29	46	54	46	
15	-6	-17	-11	13	6	5	4	22	27	10	6	20	33	35	26.2
43	43	3	17	26	17	19	28	41	43	30	15	32	44	48	
17	3	-13	-13	10	5	7	6	23	29	8	3	14	24	38	23.8
21	3	-18	-2	16	10	2	12	25	23	4	6	22	36	40	17.9
83	5	-2	20	25	15	10	26	36	31	10	20	38	56	44	
-6	-38	-35	-30	9	-5	-10	7	26	-7	-18	-8	8	28	38	15.1
42	34	-4	14	25	19	12	25	38	37	25	15	29	41	44	
18	-10	-25	-24	6	8	3	5	11	25	4	-6	9	16	37	20.1

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
N. Plateau (Con'd).														
Lowville	39	38	23	33	35	38	40	29	26	29	30	18	28	30
	23	43	0	21	29	31	29	20	17	12	18	8	8	9
Number Four	35	34	26	32	32	37	36	27	22	15	25	15	30	31
	25	17	1	20	27	29	25	22	20	7	14	7	7	6
Turin	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic Coast	36	38	28	30	34	44	40	36	32	32	30	26	33	33
Brooklyn	39	13	31	34	36	53	42	41	35	38	34	32	41	38
	32	35	26	24	32	34	37	32	31	27	27	20	25	27
Manhattan Beach	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New York City	40	45	33	33	36	56	42	43	34	38	36	31	45	41
	29	30	24	26	31	33	34	31	28	27	26	19	24	26
Willet's Point	45	43	31	33	39	55	25	44	36	40	36	32	44	38
	30	26	26	28	32	37	31	29	28	30	20	20	26	26
Brentwood	....	....	....	....	....	....	....	44	39	41	39	32	44	36
	....	....	....	....	....	....	....	24	26	24	25	19	14	24
Setauket	44	44	32	33	36	56	46	42	39	37	39	31	48	43
	30	32	25	27	32	34	36	33	29	26	29	21	24	27
Bedford	37	44	30	37	38	51	48	43	35	40	35	34	40	42
	27	30	22	25	30	34	34	31	27	23	25	17	19	24
Hudson Valley	29	33	24	27	34	41	40	35	30	28	28	22	26	28
Albany	36	40	25	30	38	51	43	39	31	35	32	25	29	35
	19	20	16	18	28	32	35	31	24	20	22	18	19	18
Lebanon Springs	36	37	28	34	38	42	42	36	30	33	31	25	35	37
	22	12	10	24	28	32	32	27	24	16	20	15	18	16
Honeymead Brook	35	38	29	35	40	47	45	37	33	34	34	26	36	34
	23	24	13	20	30	34	33	30	27	20	22	12	12	18
Poughkeepsie	37	47	31	31	38	51	44	44	34	41	35	34	33	40
	23	29	19	21	28	32	35	29	26	22	23	12	13	24
Wappingers Falls	35	42	28	36	46	59	52	42	33	38	36	33	32	32
	25	28	18	21	29	36	33	32	27	22	21	16	16	16
West Point	32	45	41	27	32	41	53	46	42	34	36	35	50	41
	18	28	20	20	23	30	37	31	26	23	27	11	19	23
Carmel	42	39	31	36	40	50	44	39	36	36	32	29	35	34
	25	32	24	26	28	35	32	28	22	23	26	17	19	17
Mohawk Valley	30	21	20	28	33	35	26	29	22	26	22	23	22	24
Rome	35	30	25	31	36	40	30	35	30	35	32	35	32	30
	26	12	16	25	30	30	22	23	15	18	13	11	13	18
Champlain Valley	22	28	17	19	28	34	36	38	26	20	26	22	18	20
Plattsburgh Bar'ks	27	38	28	16	31	35	37	38	32	21	31	32	26	23
	1	26	4	6	15	30	32	28	20	15	20	14	5	12
Saratoga Springs	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	35	31	26	36	37	42	40	38	28	30	31	28	27	31
	25	19	10	17	28	30	34	26	24	14	20	16	17	11
St. Lawrence Valley	25	22	12	20	32	34	30	27	19	22	24	14	14	14
Malone	38	37	13	22	35	37	33	32	21	26	26	17	17	18
	9	13	3	9	22	31	28	20	12	9	18	5	5	8
Madison Barrracks	39	27	29	40	42	36	34	39	31	43	33	24	26	27
	15	17	8	13	32	25	22	21	8	27	18	7	9	11
Watertown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Canton	39	34	17	24	40	36	34	32	33	34	32	22	18	24
	9	5	—1	11	29	32	30	23	15	6	16	6	11	4
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	36	30	24	30	38	38	34	32	24	28	28	24	20	20
	16	12	8	14	20	32	32	24	16	12	24	8	10	8
Ogdensburg	37	35	19	24	39	38	38	36	32	30	34	20	17	26
	8	13	5	14	22	32	28	24	15	10	18	8	11	8
Potsdam	44	34	17	23	39	36	31	35	28	31	24	20	14	20
	10	9	—1	10	20	30	14	13	8	9	8	7	8	—8

MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Monthly mean.
34	34	—8	16	23	18	9	25	38	36	19	20	31	46	43	18.8
12	-10	-31	-31	9	8	-11	—1	12	19	—5	-10	10	26	33	
31	28	—8	19	18	15	6	21	34	34	10	24	34	51	45	17.5
11	-19	-30	-22	8	5	-7	-11	7	9	—8	-11	12	26	38	
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
38	25	4	16	28	16	18	24	38	42	26	18	30	39	49	30.5
54	31	13	28	38	21	24	36	51	52	39	27	37	49	52	31.0
28	18	—3	4	20	11	12	14	28	38	19	15	22	29	43	
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
52	42	12	27	39	19	21	34	49	49	34	25	41	50	54	30.0
28	5	—6	2	16	10	11	14	27	34	13	13	20	31	45	
54	31	19	27	40	21	23	36	52	51	28	24	56	53	54	30.4
28	—4	—3	7	12	11	14	15	26	25	13	14	23	27	36	
53	47	13	26	39	19	22	35	48	50	39	28	38	49	54	28.0
18	13	—5	3	19	10	12	13	22	34	15	3	19	18	45	
49	42	15	27	39	25	24	32	49	51	38	24	34	53	55	31.3
27	15	—5	7	22	13	14	15	28	37	18	13	23	29	49	
50	45	14	33	38	24	25	35	53	51	38	20	41	51	53	29.9
23	13	—8	—1	15	8	11	11	24	37	16	8	16	24	44	
30	22	—2	3	18	18	14	17	32	38	22	15	26	36	46	26.2
44	38	—0	12	32	22	16	30	45	45	28	22	34	46	45	25.0
18	—6	-16	-12	7	13	9	7	17	28	9	6	20	33	40	
40	40	9	23	32	24	14	27	44	42	30	23	35	48	50	24.6
16	6	-21	-16	10	12	4	0	35	30	9	—6	14	26	43	
42	40	1	19	31	20	20	28	42	46	31	23	33	46	54	25.2
14	1	-13	—8	7	8	7	—3	19	31	10	5	15	29	45	
45	40	11	19	35	21	26	34	43	48	34	19	38	47	54	27.2
19	9	-11	—8	3	10	6	4	23	32	11	8	16	25	38	
48	42	8	18	38	32	26	32	45	50	26	32	49	46	50	28.2
17	8	-12	—8	5	5	10	10	25	31	15	18	25	26	40	
35	51	23	—1	18	35	21	20	33	48	48	26	24	38	52	26.4
20	17	-10	-11	—4	9	10	11	10	27	22	8	10	21	30	
49	20	2	14	34	19	19	28	48	46	25	20	39	50	52	26.8
20	8	-10	—3	12	10	11	11	25	26	14	9	15	25	41	
22	3	—6	11	11	12	1	18	34	24	16	11	27	34	32	20.4
40	25	5	12	12	21	18	26	42	43	28	23	34	38	35	20.4
4	-19	-18	10	10	4	6	10	25	4	4	10	20	31	30	
19	4	-10	-10	4	16	12	5	20	32	14	1	12	24	38	18.4
27	11	—6	—7	-12	26	22	12	30	40	37	12	18	31	43	16.0
6	—5	-23	-25	-25	8	1	—3	5	22	—1	-10	—3	1	31	
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
34	13	7	7	26	21	21	20	36	40	20	20	31	44	44	20.8
11	—3	-16	-16	0	7	3	—9	12	25	3	—4	5	17	31	
10	—6	-21	-12	12	14	3	12	29	24	6	8	20	37	40	16.5
10	—3	-15	5	27	21	12	23	36	34	12	15	26	55	47	
—3	-15	-29	-21	5	8	—6	—3	23	12	—8	—1	3	24	24	15.3
24	7	—2	12	22	20	26	28	36	40	17	31	44	51	50	
17	—4	-40	-32	4	2	-12	6	20	15	—6	—2	12	31	33	19.7
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
15	0	—6	0	33	19	13	27	36	38	11	20	32	51	45	15.4
0	-25	-43	-38	-11	11	-10	—6	21	9	—7	—4	7	15	35	
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
18	2	-10	4	28	18	10	28	34	34	16	20	38	50	40	
2	-24	-36	-30	—4	10	—6	—6	28	16	—6	—2	14	26	40	17.2
16	15	—5	5	21	21	15	26	38	40	20	16	31	50	48	
6	-16	-28	-24	—7	6	—8	—6	20	13	13	—4	6	32	32	17.3
13	0	-10	—3	29	20	11	24	36	35	18	15	27	45	45	
—2	-22	-31	-24	-12	9	—8	—4	23	10	—7	—5	2	16	33	13.9

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes	37	30	25	32	35	36	30	30	26	28	24	19	26	24
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	48	37	35	43	41	45	34	33	30	35	38	34	40	29
	37	27	26	34	30	32	28	26	22	24	17	11	20	21
Buffalo	42	35	33	39	38	37	33	32	27	36	32	23	37	27
	34	26	22	30	30	32	29	27	23	23	15	13	20	16
Pittsford	45	40	32	39	42	37	31	35	34	34	35	26	37	30
	34	21	19	27	32	32	29	29	20	22	16	13	20	19
Rochester	42	36	28	37	42	38	33	30	29	34	35	22	37	27
	33	25	20	26	32	32	29	26	20	20	13	13	20	19
Appleton	40	38	28	37	38	36	35	33	29	35	31	25	31	29
	28	23	22	27	29	30	31	25	24	24	19	15	20	21
Fort Niagara	34	38	30	39	39	36	34	33	29	34	34	26	31	29
	22	27	22	22	29	29	27	26	22	22	13	9	21	18
Baldwinsville	42	37	27	36	41	40	30	34	32	34	33	25	31	32
	29	15	15	23	31	31	24	27	18	21	14	15	18	19
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oswego	42	31	27	33	38	40	34	32	26	34	24	23	32	29
	25	25	16	22	31	33	30	26	20	20	20	17	19	18
Palermo	38	36	27	33	37	40	32	31	25	31	21	21	30	27
	23	20	11	22	20	32	29	22	17	17	18	15	18	15
Lyons	45	38	28	40	41	38	35	35	29	35	32	24	37	32
	35	24	18	24	34	34	31	28	20	22	16	16	20	22
Erie, Pennsylvania	52	37	40	40	42	39	26	31	37	38	29	25	45	29
	38	29	27	26	29	33	29	27	24	23	21	11	21	21
Central Lake	38	32	24	28	34	36	32	30	25	26	24	18	28	26
Fleming	41	41	32	36	38	39	35	32	30	31	32	24	35	37
	33	20	20	18	31	33	27	25	19	18	12	12	18	18
Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Romulus	42	43	28	31	39	38	35	33	30	34	33	20	37	30
	32	21	19	24	30	33	29	27	19	19	15	13	19	19
Ithaca	44	42	27	35	37	44	36	33	30	34	33	24	39	31
	34	24	21	24	32	34	30	28	21	20	19	14	18	20
Mean	32	28	21	27	32	36	33	30	25	25	24	19	24	24

‡ Maximum and minimum by the Draper thermograph. † Mean includes

MAXIMA AND MINIMA FOR THE STATIONS—(*Concluded*).

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Monthly mean.
29	6	— 4	8	19	12	11	22	33	28	15	22	34	44	36	24.9
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
45	22	1	29	30	11	14	33	40	38	25	35	52	62	39	28.0
22	—5	-12	10	8	4	5	10	30	30	8	21	25	36	27	
40	15	—1	26	20	11	15	30	39	35	20	34	55	58	35	25.0
16	—4	—9	—5	12	6	5	11	30	17	8	22	27	36	26	
44	17	5	23	28	13	15	32	42	36	29	37	44	54	48	25.2
15	—5	-12	-10	13	4	7	12	12	20	9	13	23	40	30	
42	16	2	22	26	14	14	31	41	36	20	34	47	56	36	25.0
16	—4	—8	—6	13	8	7	11	29	19	9	10	22	37	32	
39	24	9	24	27	19	15	29	39	37	20	36	40	53	38	24.9
22	—2	—6	-12	13	9	8	11	27	20	9	12	22	33	28	
40	20	13	24	25	24	25	30	38	38	24	35	43	45	44	24.8
21	—1	—5	—5	12	9	8	10	27	22	9	13	22	30	26	
41	15	—3	20	29	17	15	36	40	36	25	22	40	50	45	23.1
5	-20	-20	-14	11	9	8	12	34	6	5	13	21	30	32	
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
38	10	—4	14	24	17	20	31	41	36	15	21	36	47	37	23.0
12	—4	-18	-15	14	11	4	14	21	23	5	8	19	32	33	
37	13	0	13	27	16	13	26	38	36	21	16	33	47	43	21.0
13	—9	-24	-20	8	9	4	12	12	21	4	6	17	29	34	
45	17	4	23	30	16	17	32	44	38	23	34	40	50	46	25.8
15	—4	-13	—9	15	10	10	15	29	22	8	12	24	39	33	
48	17	5	30	22	10	18	37	43	40	25	40	59	63	32	28.0
24	5	—7	—2	9	4	4	10	32	25	9	20	27	38	28	
33	12	—8	6	21	12	10	21	34	32	16	18	30	43	40	24.9
43	36	—1	20	28	18	12	34	41	39	24	29	42	50	50	24.6
20	—4	-17	—7	15	7	6	6	29	22	7	5	19	36	33	
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	......
47	20	2	21	30	15	15	33	42	40	26	32	41	51	47	24.9
18	—1	-17	—7	14	8	7	11	27	23	9	8	20	24	31	
51	25	0	21	25	15	15	33	44	41	24	30	41	50	46	25.3
18	0	-18	-13	14	8	7	9	24	24	8	6	20	37	32	
26	10	—8	3	16	13	10	17	31	30	15	14	26	38	40	22.8

values of adjacent stations for the blank dates.

DAILY AND MONTHLY PRECIPITA

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.25	0.01	0.24	0.14	0.01	1.10	0.24	0.01	0.72	0.11	0.22	0.02	0.24	0.09
Alfred	.15	....	.20	.12	.01	.51	.20	....	1.00	.02	.40	....	01	.03
Angelica	.34	.04	.25	.08	....	.82	.25	....	1 10	.15	.20	.10	.24	.12
Bolivar	.26	....	.31	.02	....	.79	.04	....	.60	....	.19	....	.26	.06
Friendship	.13	....	.14	.05	....	.62	.33	....	1.00	.03	.30	....	.18	.10
Humphrey	.14	....	.46	.01	..	.53	.31	.01	.41	.07	1.01		.52	.40
Little Valley	....	....	...	....	....	....	....	....	....	....	....	....		....
Cherry Creek	.24	.17	.53	.07	....	.75	.56	.10	.70	.14	.21	.09	58	.20
Jamestown	.14	....	.75	.05	....	.58	.50	T.	1.00	.10	.70	.10	.55	.40
Elmira	.08	....	.04	.19	.03	1.76	.26	....	.48	....	....	....	.03	....
Pine City	.31	....	.06	.26	....	1.39	.44	....	.61	.06	....	.05	T.	....
Akron	.52	....	T.	....	T.	....	....	....	.18	.93	.05	T.	.70	.03
‡Avon	.53	....	.15	.07	....	....	....	...	....	....	...	....	.23	.03
Mt. Morris	....	....	.10	.45	....	2.00	....	....	1.60	....	....	....	.35	.10
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	.23	T.	.10	.10	.02	1.97	.10	....	.90	10	.20	....	.10	.02
Addison	.15	T.	.12	.23	.01	1.40	.06	....	.64	T.	.05	T.	T.	.01
Atlanta	....	....	....	.64	....	1.05	.13	...	....	.09	....	....	....	....
Haskinville	.24	....	.24	.15	.05	1.35	.20	.05	.50	....	.20	....	.08	.04
South Canisteo	.08	....	.45	.05	....	2.20	.03	T.	1.20	.15	.05	....	.10	T.
Arcade	.50	T.	.38	T.	....	1.00	.28	T.	.55	.04	.24	T.	30	.05
Attica	....	....	....	....	....	..	....	....	....	....	....	....	....	....
Varysburgh	.80	.15	.24	.04	....	1.10	.64	....	.47	.05	.07	....	35	.11
Eastern Plateau	0.44	0.01	0.34	0.21	0.04	1.16	0.12	0.02	0 53	0.10	0.04	0.06	0.21	0.06
Binghamton	.68	T.	.30	.10	....	.80	.30	....	.50	.05	T.	....	.05	.10
Chenango Forks	....	....	....	....	....	....	....	....	....	....		....	...	....
Oxford	.70	.08	.25	.17	.08	1.04	.43	T.	.50	.10	....	....	.05	.13
Cortland	.75	....	.29	.10	.01	1.07	.21	....	....	.78	.05	....	T.	.07
Bloomville	.60	....	.20	.90	....	.50	....	....	.12	....	.30	....	.15	.05
Deposit	.50	....	....	.35	.20	.25	.10	....	.70	.10	...	.50	....	....
South Kortright	1.28	...	*	†.29	....	1.03	....	....	.61	....	....	...	....	....
Brookfield	.51	.05	.60	.40	T.	1.21	T.	.40	.60	.40	....	...	.10	.20
Hamilton	.25	T.	.22	.20	T.	.65	T.	T.	.30	.15	....	.01	.08	.05
Apulia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	.30	....	.50	....	*	†3.80	....	....	*	*	†.60	....	1.20	T.
Port Jervis	.02	....	....	.42	.13	2.55	....	....	.68	....	.06	.32	....	....
Warwick	.35	....	.37	.20	.08	1.65	.05	....	.40	....	....	....	.25	....
Cooperstown	.30	.10	.35	.12	.10	1.00	.05	....	.58	....	.02	....	.65	.02
New Lisbon	.31	....	.22	.19	....	89	.50	...	.37	....	....	....	.40	.01
Oneonta	....	....	1.17	....	....	2.03	....	....	.97	....	.18	.34	....	.41
Perry City	.11	T.	.27	.03	T.	1.06	.05	T.	.92	.05	.08	....	.07	.08
Newark Valley	.64	....	.56	T.	....	1.25	.20	....	.60	....	....	....	.20	....
Waverly	.26	....	.18	.15	T.	1.55	.08	....	.60	....	....	....	.10	T.
Ellis	....	....	....	....	....	....	....	....	...	....	....	....	...	....
Mohonk Lake	*	*	*	*	*	†3.95	....	....	.51	....	....	....	.50	....
Northern Plateau	0.43	0.20	0.08	0.30	0.04	0.97	0.44	T.	0.68	0.07	0.36	0.01	0.60	0.17
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....		....
Elizabethtown	....	....	....	....	....	....	....	....	....	...	....	....	....	....
Saranac Lake	.24	.01	T.	.05	T.	.87	.21	....	.46	.04	.17	....	.60	.11
Gloversville	.55	.14	.10	.28	.17	1.15	.32	T.	.79	.10	.02	....	.48	.03
Lowville	.15	.25	...	.20	....	1.04	.95	.02	.46	07	.30	.07	.24	.16
Number Four	*	†.54	....	.49	....	*	†1.96	....	.82	*	†.52	....	1.18	.10
Turin	.85	.61	.25	.55	....	.48	.70	T.	.85	.13	1.20	T.	.80	.62
Remsen	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kings Station	.35	....	.15	.25	.05	1.30	...	....	.70	....	.10	....	.30	....
Atlantic Coast	0.26	T.	0.28	0.14	0.18	2.10	0.37	0.00	0.40	0.04	T.	0.00	0.35	0.02
Brooklyn	.13	....	.25	....	.25	2.10	.06	....	.50	....	....	....	.65	....
Manhattan Beach	.06	....	.26	.21	....	.72	2.08	....	.10	.24	....	....	....	....
New York City	.25	....	.38	.19	.16	1.63	.02	....	.42	....	....	....	.60	.03
Willet's Point	.40	.02	.02	.03	.45	2.95	...	....	.45	....	....	....	....	....
Brentwood	....	....	....	...	....	....	....	....	....	....	....	....	....	....
Setauket	.31	T.	.43	.16	.11	2.00	T.	....	.47	....	....	....	.42	.09
Bedford	.44	....	.32	.23	.08	3.17	.04	....	.44	....	T.	....	.44	.03

TION FOR FEBRUARY 1896 — (INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total.
0.06	0.03	0.02	T.	0.05	0.66	0.02	0.00	0 03	0.02	0.02	0.14	0.01	T.	0.23	4.14
05	04	.....	..	.02	.02	.04	.....	T.	.01	.01	.20	....	....	.24	3.28
T.	.04	.....	.....	.....	T.	T.	.....	T.	.....	....	.18	....	....	.25	4.16
.07	.....	.....	.....	05	.02	.....	.....	.03	.01	....	.14	....	....	.08	2.93
T	.10	.....	T.	.07	.....	T.	.....	T.	T.	....	.14	....	....	.03	3.23
.18	.....	.....	.....	.20	.....	.10	.....	.08	.08	....	.20	....	....	.12	4.83
..	....	.....	.....	.....	.....	....	.....	.....	.....	....	....	....	....	....	....
.06	.13	.....	T.	.11	.28	.09	.....	.27	.08	...	.26	....	....	T.	5.62
.10	....	.....	T.	.15	.05	.15	.....	.10	T.	....	.15	....	....	....	5.57
....	T.	.....		T.	.....	.....	.....	.....	.....	....	.15	....	....	.38	3.40
...	T.	.....	.....	.....		.....	.....	.....	.....	T.	T.	.18	T.	.68	4.04
....	T.	.31	T.	T.	.....	.02	.....	.....	T.	.28	T.	....	....	....	3.02
....	10	.....	.....	.....	.....	.....	.....	T.	T.	....	.11	....	....	T.	....
.15	.....	.....	.....	.....	.50	.....	.....	.....	T.	....	....	....	....	.10	5 35
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....	4.72
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	...	...	...	....	....
....	.10	.....	.....	.10	.....	.....	.....	.....	T.	....	.40	....	....	.58	5.02
...	.01	.....	.....	T.	.....	.....	.....	T.	T.	....	.10	....	....	.40	3.18
.14	.....	.....	.....	.....	.15	.....	.....	.....	.....	....	....	....	....	.30	2.50
....	.04	.....	.....	.....	.....	.....	.....	.01	.....	....	.13	....	....	.13	3,41
T.	T.	.....	.....	.10	T.	T.	.....	T.	.06	T.	.10	....	....	1.00	5.62
.14	02	.....		.10	02	T.	.....	.03	.01	T.	.20	....	....	T.	3.86
...	..	.....	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....	....
.28	.03	....	.....	.10	.08	T.	.....	.06	.07	....	.29	....	....	T.	4.93
0.01	T.	0.00	T.	0.07	0.01	T.	T.	0 04	0.02	T.	0.13	0.01	0.09	0.79	4.83
....	T.	.....	.....	T.	.....	T.	.....	T.	T.	T.	.30	...	....	1.10	4.28
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	..	....	....	....	....
...	...	.....	.....	.10	05	T.	.....	.17	.03	....	.10	....	....	1 00	4 97
.02	.....	.....	.....	.18	.10	.....	.....	.....	.....	.02	.22	....	....	.63	4.50
....	....	.....	.....	.....	.....	.....	.....	.....	.08	....	...	...	.10	.64	3.64
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.10	.20	....	.25	3.25
...	.....	.....	.....	.33	.....	.....	.....	.09	.....	....	....	...	....	1.18	4.81
.05	.....	.....	.....	.16	.....	.....	.....	.....	.....	....	....	....	.38	.69	5.69
....	.02	.....	.....	10	.01	T.	T.	.20	.05	....	.02	....	....	.60	3.02
...	.....	.....	.....	.....	...	.....	.....	.....	.....	....	....	....	....	....	...
...	.....	.....	T.	.20	.....	.....	.....	.....	T.	....	.40	....	....	...	7.00
....	.....	.....	.....	.13	.....	.....	.....	.....	.....	....	.15	*	†1.52	.53	6.51
....	.....	.....	.....	.05	.....	.....	.....	.....	.....	....	.05	....	...	1.52	4.97
.08	.....	.....	.....	.....	.02	.....	.....	.16	.....	....	.06	....	....	1.75	5.36
....	.....	.....	.....	.02	.....	.....	.....	.15	...	....	.02	....	....	1.23	4.31
...	.....	.....	.....	.....	.....	.....	.....	.....	.21	....	.07	....	1.07	.9[illegible]	7.44
...	.07	.....	.....	.04	.03	.05	.....	.....	T.	.06	.30	....	....	.31	3.58
...	.....	.....	T.	T.	T.	...	.....	.....	T.	....	.23	....	...	.87	4.55
.02	...	.....	.....	.03	T.	.....	.....	.....	.....	T.	.30	....	.05	.75	4.07
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....	....
...	.....	...	.....	..	.....	.....	.....	.....	.....	....	.03	....	....	....	4.99
0.20	0 13	0.00	0 60	0.30	0 09	T.	0.04	0.13	0.01	0.00	0.02	0.00	0.06	0.89	6 36
...	.....	....	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....	....
.44	T.	.....	.....	.10	.10	.....	.....	.08	T.	....	....	....	.23	.57	4.28
.02	....		....	.02	.03	T.	.01	.12	T.	....	.02	....	....	1.55	5.90
.30	.....	.....	.....	.17	.04	.....	.....	.13	.....	....	....	....	....	.18	4.73
....	.79	.....	.....	.60	*	† 36	.20	16	.....	....	.03	....	....	.18	7.93
.45	.....	.....	.....	40	30	.....	.....	.29	.07	....	.10	....	....	.46	9.11
..	.....	.....	.....	.....	....	.....	.....	.....	.....	....	....	....	....	....	....
...	.....	.....	.....	.50	....	.....	.....	.....	.....	....	....	....	.10	2.40	6.20
0.00	0.02	0.00	T.	0.07	0.00	0·00	0.00	T.	T.	T.	0.10	0.04	0.28	1.98	6.63
...	T	.....	T.	.10	.....	.....	.....	.....	T.	....	.25	.....	....	1.90	6.19
...	.05	.....	.....	.05	....		.....	.....	.....	....	....	.25	....	.15	4.12
...	.05	.....	T.	.07	.....	.....	.....	T.	T.	...	.17	T.	....	1.53	5.50
....	T.	....	.....	T.	.....	.....	.....	.....	.....	....	T.	....	1.70	1.96	7.98
....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....	....	....	....	....
....	.03	.....	T.	T.	.....	.....	.....	.....	.....	T.	.08	...	....	2.36	6.46
....	.02	.....	.....	.20	.....	.....	.....	T.	.....	....	.12	....	....	3 98	9.51

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Hudson Valley....	0.42	T.	0.22	0.26	0.07	1.38	0.10	T.	0.53	0 05	0.02	?	0.36	0.09
Albany	.33	.02	.08	.39	.05	.27	.02	T.	.62	.02	.02	....	.09	T.
Lebanon Springs..	.50	....	.08	.17	.11	.82	.68	T.	.40	.10	.05	*	†.22	....
Honeymead Brook	.34	....	.30	.12	.12	1.86	....	....	.27	.21	.03	....	.60	T.
Poughkeepsie	.46	....	.54	.17	T.	1.46	.03	....	.62	....	....	....	.55	T.
Wappinger's Falls	.25	....	.60	.16	.18	2.05	....	....	.70	.06	.10	*	†.24	.08
West Point........	*	†.45	....	*	†.28	*	‡2.40	....	*	†.24	T.	....	....	.72
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	.46	....	*	*	†.59	*	‡2.71	....	.56	....	....	....	.59	....
So. East Reservoir	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	1.00	....	....	.60	.04	2 50	....	....	.50	....	....	....	.40	....
Marlborough	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton............	....	....	.18	.20	....	74	....	....	.57	....	...	....	.30	....
Mohawk Valley ...	0.26	0.00	0.29	0.27	0.31	1.00	0.26	0.25	0.50	0.10	0.20	0.29	1.00	0.05
Rome	26	....	.29	.27	.31	1.00	.26	.25	.50	.10	.20	.2	1.00	.05
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	0.25	0.25	0.00	0.20	0.05	0 39	0.71	T.	0.40	0.38	0.00	0.00	0.09	0.64
Plattsb'h Barracks	....	.50	....	T.	.10	T.	1.35	T.	T.	.76	....	....	T.	1.20
Saratoga Springs..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	.50	....	....	.41	....	.78	.07	....	.80	....	....	....	.18	.08
St. Lawrence Val'y	0.26	0.07	0.00	0.09	0.06	1 06	0.47	0.05	0.58	0.03	0.34	0.07	0.41	0.32
Malone	.16	.21	....	.10	.09	.30	.86	.27	.47	.17	.80	.40	.48	.52
Madison Barracks.	....	.16	....	.03	....	1.46	.50	....	.85	....	.26	....	...	1.20
Watertown	....	....	....	....	....	....	....	....	--	....	....	....	....	....
Canton	.42	....	....	.20	....	1.53	.40	....	.60	....	.30	....	.60	T.
DeKalb Junction .	.41	....	....	.05	....	1.25	.70	....	.28	....	.24	....	.18	.19
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond..	.30	....	....	.15	.25	.70	.36	....	.50	T.	.10	....	.40	....
Ogdensburgh	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Potsdam	*	†.32	....	....	....	1.14	....	*	*	*	†1.40	....	.80	....
Great Lakes	0.35	0.03	0.20	0.06	0.06	0.92	0.47	0.09	0.62	0.12	0.07	0.10	0.35	0.16
Dunkirk...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield..........	....	....	.82	T.	....	.90	....	1.05	1.24	T.	.04	.12	.21	....
Buffalo	.45	T.	.31	.06	.04	1.20	.25	T.	.77	.03	T.	T.	.89	.11
Adams Centre	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pittsford	.55	....	.10	T.	....	1.18	....	....	.76	.20	T.	....	.26	.36
Rochester	.55	T.	.09	.13	.03	1.15	.28	.01	1.00	.20	.01	.04	.36	.28
Scottsville	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Appleton	.29	....	.03	.05	....	1.14	.12	T.	.50	.02	T.	T.	.47	.02
Fort Niagara	T.	.17	.30	T.	....	1.08	....	....	38	T	T.	T.	.10	.08
Baldwinsville.....	.42	....	.30	.10	.43	1.02	.20	T.	.80	T.	.20	.20	.20	.10
Skaneateles	.21	....	.25	....	.03	.60	.30	....	.70	....	.02	.03	.40	.27
Syracuse	..	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridgeway	.40	....	.02	T.	T.	.93	.25	....	.21	.05	.01	T.	.26	.03
Demster...........	.53	....	....	....	....	1.20	.70	.02	....	.40	.04	.54	.07	.06
Fulton	.50	....	.20	....	.03	.50	1.40	.10	.90	.10	.60	.20	.50	.30
Oswego	.32	.03	.10	.08	T.	1.47	.83	T.	.55	.04	.08	T.	.51	.12
Palermo	.28	....	.08	.14	.03	.10	1.42	.10	.30	.30	.07	.20	.30	.13
Phœnix	.32	.28	....	.12	.06	.37	1.50	....	.17	.53	.05	.23	.20	.50
Lyons	.07	T.	....	.20	.25	.90	....	.20	.90	....	....	T.	....	.15
Rose...............	.96	....	.08	.03	....	.92	.72	....	.70	.03	T.	.12	.32	.22
Erie, Penna.......	.11	....	.68	.03	.03	1.03	.07	.02	.60	.06	.02	....	.93	.06
Cetnral Lakes.....	0.40	T.	0.22	T.	0.06	1.22	0.17	0.03	0.57	T.	0.03	0.00	0.30	T.
Fleming	.31	T.	.20	T.	....	1.07	.40	....	.80	....	....	....	.60	....
Sherwood	....	....	.27	....	.25	1.00	.05	.13	.67	....	.10	....	.30	....
Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Romulus...........	.79	....	.21	...	T.	1.14	.20	....	..	....	...	....	.14	....
Ithaca	.50	.01	.22	T.	....	1.65	.04	T.	.82	T.	.03	....	.17	T.
Penn Yan.........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average......	0.33	0.06	0.19	0.17	0.09	1.13	0.34	0.04	0.55	0.10	0.13	0.06	0.39	0.16

* Amount included in next measurement. † Not used in computing the averages. ‡ Record

TATION FOR FEBRUARY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total.
0.00	0.04	0.01	T.	0.09	0.06	T.	T.	00.1	0.01	0.00	0.04	0.01	T.	1.59	5.95
....	T.	....	....	.20	.02	....	....	T.	....	....	.01	T.	....	1.89	4.03
....	T.	....	....	.20	T.	....	T.	.01	....	....	T.	....	....	1.58	4.92
....	T.	....	.T	.05	....	.02	.01	....	....	....	.04	....	....	1.50	5.47
....	.07	.07	....	.02	....	....	....	T.	....	....	.09	....	T.	1.90	5.98
....	.18	....	T.	.15	.05	....	....	.04	....	....	.10	....	....	1.25	6.19
....	.08	....	....	*	†.18	....	....	....	.05	....	....	.06	....	....	4.46
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8.41
....	....	....	....	.06	....	....	....	.04	....	....	.12	....	....	2.56	7.69
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7.18
....	....	....	....	.05	....	....	....	.04	....	....	....	....	....	1.40	6.53
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	.38	....	....	....	....	....	....	....	....	2.24	4.61
0.30	0.00	0.00	0.00	0.28	0.08	0.20	0.00	0.30	0.00	0.05	0.00	0.00	0.55	1.05	7.59
.30	....	....	....	.28	.08	.20	....	.30	....	.05	....	....	.25	1.05	7.59
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
T.	0.50	0.00	0.00	0.00	0.88	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	1.04	5.81
T.	1.00	....	....	....	1.00	....	....	....	.05	....	....	....	....	.25	6.21
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	.76	....	....	....	....	....	....	....	....	1.83	5.41
0.34	0.01	0.00	0.00	0.03	0.19	0.04	0.05	0.20	0.01	0.00	T.	0.00	0.00	0.08	4.82
.54	.07	....	....	....	.36	.12	.10	.21	.06	....	....	....	....	.18	6.47
.24	....	....	....	....	....	....	.18	.42	....	....	....	....	....	....	5.30
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.50	....	....	....	.10	.40	....	....	....	....	....	....	....	....	.20	5.45
.15	....	....	....	....	.18	....	.07	.06	.02	....	....	....	....	.03	3.81
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.20	....	....	....	.03	....	.10	.04	.01	T.	....	.02	....	....	.04	3.20
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.40	....	....	....	*	†.10	....	....	.50	....	....	....	....	....	....	4.66
0.18	0.08	0.02	T.	0.03	0.21	0.08	0.01	0.08	0.01	0.01	0.13	T.	0.02	0.20	4.64
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.11	....	....	....	.16	....	....	....	....	....	....	4.65
.38	.03	.01	....	.11	.16	T.	....	.04	.01	T.	.14	T.	.03	T.	5.02
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.T	.09	.04	....	.02	.04	.08	....	....	.01	....	.32	....	....	.28	4.29
.09	.32	.15	....	.01	.11	.10	....	.01	.01	T.	.36	....	....	.08	5.37
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.17	T.	.03	....	.06	.04	.02	....	.02	....	....	.26	....	....	.01	3.25
.30	.04	....	....	.03	T.	.03	....	T.	....	....	.20	....	....	....	2.71
.30	T.	....	....	.05	.40	.40	....	.07	....	.05	.20	....	.22	.73	6.39
.20	....	.02	....	.02	.04	.08	....	.02	....	.03	.05	....	....	.57	3.84
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.31	.10	.03	....	.05	.13	.06	....	.01	....	....	.10	....	....	T.	2.95
.36	....	....	....	....	.16	....	....	.38	....	....	.12	....	....	.18	4.76
.01	.04	....	....	....	1.20	.30	.05	.30	.06	....	....	....	....	.06	7.35
.22	.06	.01	....	.01	.15	.01	T.	.11	.01	T.	.08	....	....	.11	4.90
.40	.03	....	....	....	.83	....	....	.20	....	....	.12	....	....	.10	5.13
.06	.18	....	....	T.	T.	.25	.06	....	.05	....	T.	....	T.	.30	5.23
.21	.20	....	....	T.	.20	....	....	.03	....	.10	....	....	.07	.80	4.28
.05	.15	....	....	.03	.10	.05	....	.01	....	T.	.20	....	....	.18	4.87
.09	.07	....	.01	.05	.03	T.	T.	.06	T.	....	.02	....	....	....	3.97
T.	T.	0.00	0.00	0.01	0.05	0.04	0.00	0.00	T.	T.	0.36	0.00	0.17	0.75	4.41
....	....	....	....	T.	....	....	....	....	....	....	.50	....	....	.44	4.29
....	....	....	....	....	.14	.17	....	....	....	....	....	....	.66	1.35	5.09
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
T.	T.	....	....	....	T.	....	....	....	....	....	.74	....	....	.44	3.66
T.	.02	....	....	.05	.07	T.	....	....	T.	T.	.20	....	.03	.80	4.61
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.11	0.08	T.	T.	0.09	0.16	0.04	0.01	0.08	0.01	0.01	0.09	0.01	0.12	0.86	5.52

for the month incomplete. † Reports too late to be used in computing the averages. T=Trace.

STATISTICS OF TEMPERATURE

STATIONS.	COUNTY.	Temperature (Degrees Fahr.).									
		Normal for the month of February.	Length of record, years.	Record begins.	Record ends.	Mean for February, 1896.	Departure from the normal.	Extremes of monthly mean temperature for February.			
								Highest.	Year.	Lowest.	Year.
Western Plateau	.....	24.1	...	.....	.....	24.9	+0.8	....	.....	....	.....
Angelica	Allegany	22.1	14	1855	1896	23.5	+1.4	33.6	1857	13.2	1895
Humphrey	Cattaraugus	23.5	13	1884	1896	24.2	+0.7	33.2	1890	14.3	1885
Elmira	Chemung	26.8	19	1851	1896	27.2	+0.4	34.6	1890	16.2	1856
Eastern Plateau	.....	22.6	...	.....	.....	22.6	+0.2	....	.....	....	.....
Oxford	Chenango	23.0	29	1828	1896	23.7	+0.7	29.6	1828	13.5	1856
Cortland	Cortland	22.2	20	1829	1896	22.2	0.0	30.4	1842	13.8	1838
Hamilton	Madison	22.4	20	1827	1896	21.2	—1.2	32.6	1828	14.0	1836
Cooperstown	Otsego	20.9	43	1854	1896	20.7	—0.2	31.7	1857	10.5	1885
Waverly	Tioga	24.5	14	1883	1896	26.2	+1.7	32.1	1890	14.8	1885
Northern Plateau	.....	20.3	...	.....	.....	18.8	—1.5	....	.....	....	.....
Lowville	Lewis	20.3	30	1827	1896	18.8	—1.5	31.1	1828	13.4	'43-'95
Atlantic Coast	.....	30.9	...	.....	.....	30.6	—0.3	....	.....	....	.....
New York city	New York	31.3	26	1871	1896	30.0	—1.3	40.0	1890	23.1	1885
Setauket	Suffolk	30.5	11	1886	1896	31.3	+0.8	37.6	1890	24.4	1895
Hudson Valley	.....	25.9	...	.....	.....	25.5	—0.4	....	.....	....	.....
Albany	Albany	24.4	23	1874	1896	25.0	+0.6	33.0	1884	14.7	1885
Honeymead Brook	Dutchess	24.9	16	1881	1896	25.2	+0.3	32.6	1890	15.9	1885
West Point	Orange	28.5	68	1826	1896	26.4	—2.1	....	.....	....	.....
Champlain Valley	.....	18.5	...	.....	.....	16.0	—2.5	....	.....	....	.....
Plattsburgh Barracks	Clinton	18.5	43	1839	1896	16.0	—2.5	26.4	1840	7.2	1885
St. Lawrence Valley	.....	18.7	...	.....	.....	16.5	—2.2	....	.....	....	.....
Madison Barracks	Jefferson	20.7	39	1839	1896	19.7	—1.0	30.7	1840	10.1	1875
Canton	St. Lawrence	18.0	34	1862	1896	15.4	—2.6	26.5	1877	6.4	1875
North Hammond	"	18.1	18	1867	1896	17.2	—0.9	26.1	1891	10.4	1875
Potsdam	"	18.1	29	1828	1896	13.9	—4.2	28.9	1828	9.5	1838
Great Lakes	.....	24.8	...	.....	.....	24.3	—0.5	....	.....	....	.....
Buffalo	Erie	24.5	26	1871	1896	25.0	+0.5	32.6	1882	12.8	1875
Rochester	Monroe	24.5	26	1871	1896	25.0	+0.5	32.7	1882	13.7	1885
Fort Niagara	Niagara	26.1	40	1842	1896	24.8	—1.3	32.5	'77-'80	13.5	1885
Baldwinsville	Onondaga	24.1	20	1854	1896	23.1	—1.0	29.9	'89-'91	16.8	1855
Oswego	Oswego	24.5	26	1871	1896	23.0	—1.5	32.4	1882	12.9	1885
Palermo	"	22.3	43	1854	1896	21.0	—1.3	28.0	1891	9.8	1885
Erie, Pennsylvania	Erie	27.3	23	1874	1896	28.0	+0.7	36.0	1882	16.0	1875
Central Lakes	.....	25.2	...	.....	.....	25.3	+0.1	....	.....	....	.....
Ithaca	Tompkins	25.2	18	1879	1896	25.3	+0.1	32.7	1891	15.3	1885
Average departure	.....	...	...	.....	.....	.	—0.5	....	.....	....	.....

AND PRECIPITATION — FEBRUARY.

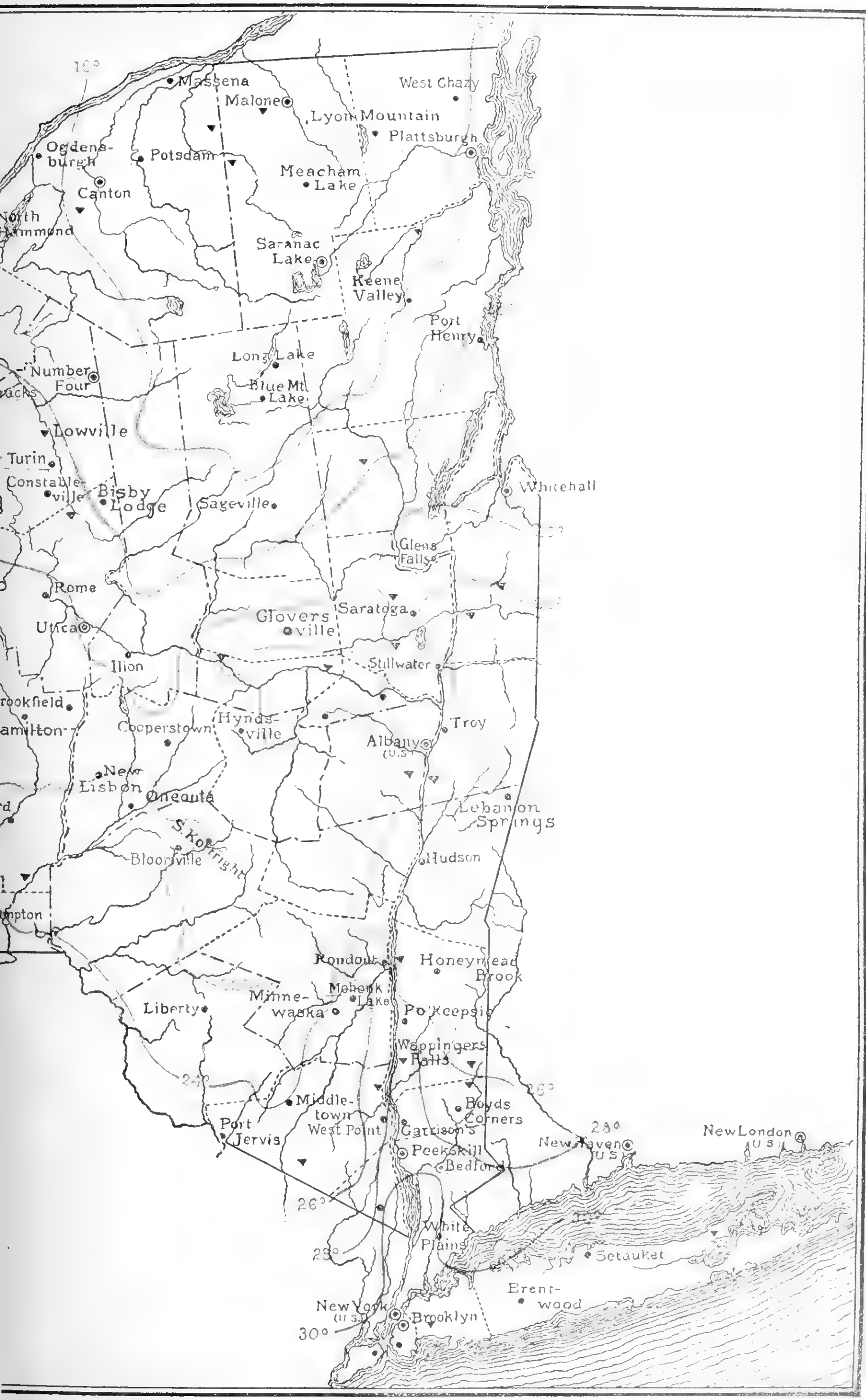
STATION.	COUNTY.	PRECIPITATION — (INCHES.) Average for the month of February.	Length of record, years.	Record begins.	Record ends.	Total for February, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR FEBRUARY. GREATEST. Amount.	Year.	LEAST. Amount.	Year.
Western Plateau	....	2.29	...	......	......	4.13	+1.84	.....	.....	.....	......
Angelica	Allegany	1.81	14	1856	1896	4.16	+2.35	4.37	1893	0.10	1875
Humphrey	Cattaraugus	3.29	13	1884	1896	4.83	+1.54	7.30	1887	1.03	1889
Elmira	Chemung	1.78	16	1854	1896	3.40	+1.62	3.40	1896	0.25	1856
Eastern Plateau	....	2.02	...	......	......	4.74	+2.12	.....	.....	.....	......
Oxford	Chenango	2.29	26	1829	1896	4.97	+2.68	5.81	1832	0.21	1844
Cortland	Cortland	2.74	17	1851	1896	4.50	+1.76	5.77	1851	0.97	1895
Hamilton	Madison	2.74	20	1827	1896	3.02	+0.28	5.84	1833	0.65	1849
Cooperstown	Otsego	2.36	43	1854	1896	5.36	+3.00	5.36	1896	0.60	1856
Port Jervis	Orange	3.56	13	1880	1896	6.51	+2.95	6.51	1896	1.12	1896
Waverly	Tioga	2.05	15	1882	1896	4.07	+2.02	4.07	1896	0.75	1882
Northern Plateau	....	2.66	...	......	......	4.73	+2.07	.....	.....	.....	......
Lowville	Lewis	2.66	31	1327	1896	4.73	+2.07	5.71	1831	0.29	1841
Atlantic Coast	....	4.12	...	......	......	5.98	+1.86	.....	.....	.....	......
New York City	New York	3.87	26	1871	1896	5.50	+1.63	7.81	1893	0.82	1895
Setauket	Suffolk	4.37	11	1886	1896	6.46	+2 09	7.11	1893	0.91	1895
Hudson Valley	....	3.23	...	......	......	5.67	+2.44	.....	.....	.....	......
Albany	Albany	2.72	23	1874	1896	4.03	+1.31	4.63	1893	0.36	1877
Honeymead Brook	Duchess	3.07	16	1881	1896	5.47	+2.40	7.43	1893	1.21	1892
Poughkeepsie	"	2.61	21	1830	1896	5.98	+3.37	6.78	1893	0.75	1841
West Point	Orange	3.43	50	1840	1896	4.46	+1.03	7.29	1893	0.63	1856
Boyds Corners	Putnam	4.32	26	1870	1896	8.41	+4.09	8.41	1896	0.80	1877
Champlain Valley	....	1.55	...	......	......	6 21	+4 66	.....	.....	.....	......
Plattsburgh Barracks	Clinton	1.55	38	1840	1896	6.21	+4.6	6.21	1896	0.20	'40,'88
St. Lawrence Valley	....	2.25	.	......	......	4.91	+2.66	.....	.....	.....	......
Malone	Franklin	2.84	16	1830	1896	6.47	+3.63	.....	.....	.....	......
Madison Barracks	Jefferson	1.90	36	1840	1896	5.30	+3.40	5.30	1896	0.30	1873
North Hammond	St. Lawrence	2.46	19	1866	1896	3.20	+0.74	4.96	1876	0.92	1894
Potsdam	"	1.81	28	1828	1896	4.66	+2.85	6.42	1890	0.03	1830
Great Lakes	....	2.67	...	......	......	4.52	+1 85	.....	.....	.....	......
Buffalo	Erie	2.92	26	1871	1896	5.02	+2.10	5.51	1887	0.46	1877
Rochester	Monroe	2.83	26	1871	1896	5.37	+2.54	5.40	1876	0.46	1877
Fort Niagara	Niagara	1.99	38	1842	1896	2.71	+0.72	4.12	1887	0.31	1877
Oswego	Oswego	2 64	26	187	1896	4.90	+2.26	4.91	1896	0.22	1877
Palermo	"	2.34	37	1860	1896	5.13	+2.79	7.20	1866	0 10	1877
Erie, Pennsylvania	Erie	3 30	23	1874	1896	3.97	+0.67	8.50	1887	0.33	1877
Central Lakes	....	2.16	...	......	......	4.01	+2.45	.....	.....	.....	......
Ithaca	Tompkins	2.16	18	1879	1895	4.61	+2.45	4.61	1896	0.63	1886
Average departure	....	...	...	......	......	.....	+2.24	.....	......	.....	......

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR FEBRUARY, 1896

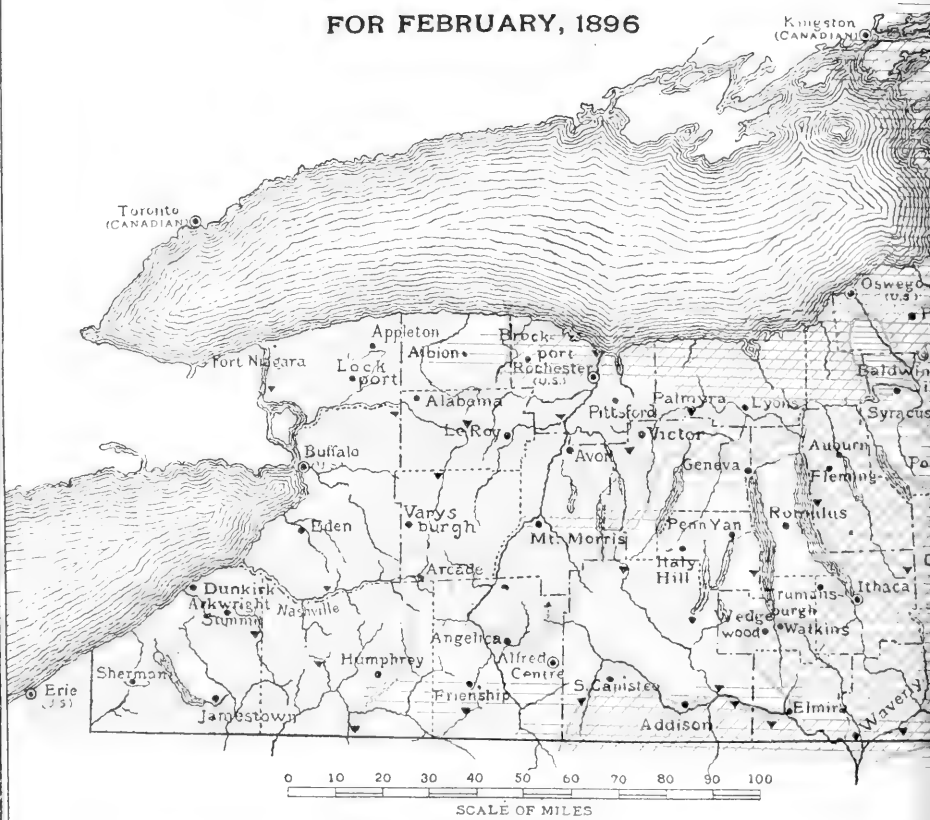

16°
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
Saranac Lake
Keene Valley
Port Henry
Long Lake
Blue Mt Lake
Number Four
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Hyndsville
Cooperstown
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
24°
26°
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
28°
New Haven (U.S.)
New London (U.S.)
26°
White Plains
28°
Setauket
Brentwood
New York (U.S.)
Brooklyn
30°

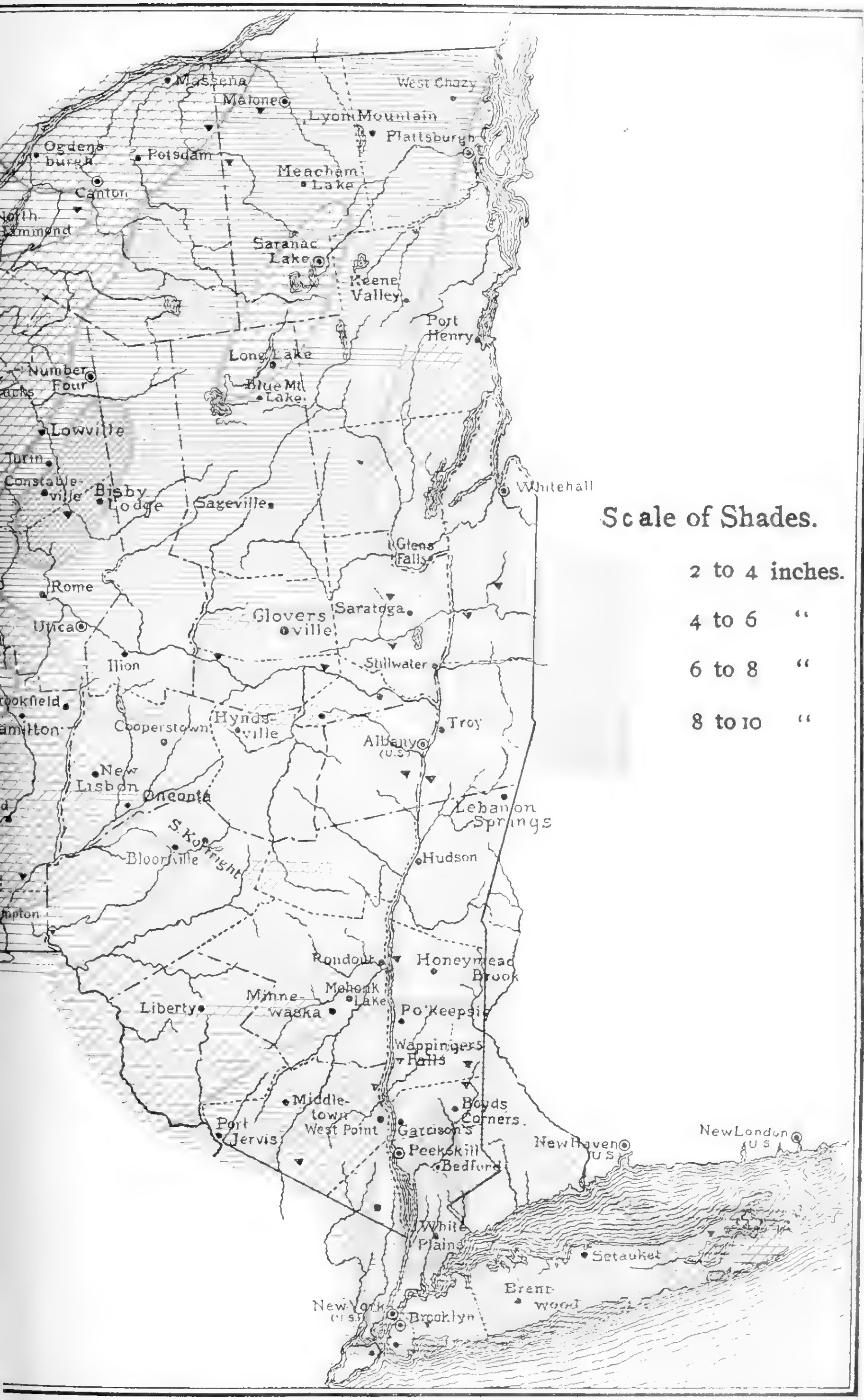
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR FEBRUARY, 1896




Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Utica
Saratoga
Glovers ville
Ilion
Stillwater
Hyndsville
Cooperstown
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'Keepsie
Wappingers Falls
Middletown
West Point
Boyds Corners
Garrison's
Port Jervis
Peekskill
Bedford
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
2 to 4 inches.
4 to 6 "
6 to 8 "
8 to 10 "

Meteorological Summary for March, 1896

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during March was 30.02 inches. The highest barometer was 30.71 inches at Friendship on the 24th, and the lowest was 29.12 inches at New York city on the 11th, this being the lowest pressure for the month of March reported to this Bureau since its establishment in 1889. The average pressure at six stations of the National Bureau was about normal, the pressure in the western portion being generally in excess, and deficient in the eastern section.

The mean temperature of the State, as derived from the records of 72 stations, was 24.9 degrees, which is the lowest March value during the period covered by the operations of this service, and the lowest recorded, at stations having a longer record, since 1885, in which year the average of the March means was about four degrees lower than that of March this year. The highest local monthly mean was 33.6 degrees at Brooklyn, and the lowest was 17.7 degrees at Saranac Lake. The highest general daily mean was 43 degrees on the 30th, and the lowest was 12 degrees on the 13th. The maximum temperature reported was 77 degrees at Jamestown on the 29th, and the minimum was 20 degrees below zero at Canton on the 24th. The mean monthly range of temperature was 59 degrees, the greatest range, 77 degrees, occurring at Jamestown, and the least, 45 degrees, at Setauket. The mean daily range was 18 degrees, the greatest local daily range being 49 degrees at South Kortright on the 18th, and at Angelica on the 21st, and the least, 0 degrees at Avon on the 9th.

The mean temperatures of the various sections of the State were as follows: The Western Plateau, 24.5 degrees; the Eastern Plateau, 24.5 degrees; the Northern Plateau, 19.9 degrees; the Atlantic Coast, 32.4 degrees; the Hudson Valley, 28.1 degrees; the Mohawk Valley, 24.2 degrees; the Champlain Valley, 23.2 degrees; the St. Lawrence Valley, 21.4 degrees; the Great Lake Region, 25.4 degrees; the Central Lake Region, 25.1 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 5.4 degrees below the normal value, deficiencies occurring in all sections, the greatest being over the Northern and Eastern Plateaus and the least at Coast stations.

The mean relative humidity for the State was 76 per cent. The mean dew point was 20 degrees.

The average precipitation for the State was 4.92 inches, as derived from the records of 89 stations. The distribution of rain and snow over the State was comparatively uniform, excesses occurring in all regions but being heaviest in southeastern sections. The maximum local precipitation was 12.02 inches at West Point, and the least 1.55 inches at Mt. Morris. A list of the heaviest rates of precipitation is shown in the table of meteorological data. The average snowfall for the State was 25.5 inches, as derived from the reports of 59 stations. The greatest local snowfall was 50.4 inches at Number Four, Lewis county.

The average precipitation at 27 stations possessing records covering a period of ten years or more, was 2.02 inches above the normal amount, excesses occurring at all stations excepting Madison Barracks. The amounts were greatest for March during the period covered by the records at the following stations: Angelica, 10 years; Oxford, 26 years; Port Jervis, 13 years;

Honeymead Brook, 16 years; Poughkeepsie, 21 years; West Point, 49 years; Boyds Corners, 26 years; and Ithaca, 18 years.

The average number of days on which the precipitation amounted to 0.01 inches or more was 12.6, the St. Lawrence Valley and Central Lake regions having the least number of rainy days and the Northern Plateau the greatest number.

The average number of clear days was 9.9, of partly cloudy days 9.2, and of cloudy days 11.9, giving an average cloudiness for the State of 54 per cent. The maximum cloudiness prevailed over the northern, central and eastern portions of the State.

The prevailing wind direction was from the northwest. The average wind travel at six stations of the National Bureau was 10.981 miles, the movement at Rochester being below the average; and at Albany, Buffalo and New York considerably in excess of the average for previous years. The maximum velocity recorded was 72 miles per hour at New York city, on the 4th.

Hail fell on the 12th, 16th, 19th and 30th. Sleet occurred on the 2d and 16th. Thunderstorms occurred on the 2d, 6th, 7th, 9th, 15th, 16th, 19th and 30th.

Solar halos were observed on the 6th, 14th, 15th, 18th, 21st, 22d, 25th and 30th. Lunar halos were observed on the 21st, 24th and 25th. Auroras were observed on the 3d, 4th, 12th, 14th, 30th and 31st.

March, 1896, ranks with February as a rough and windy month, presenting in its general features a series of seven strongly developed storms, bringing brief warm waves and heavy precipitation, alternating with longer periods of fair cold weather and high westerly winds. The average temperature was thus much below the normal.

The most frequent snow and rain storms and the maximum cloudiness obtained from the 1st to the 11th, after which time anticyclonic conditions and brighter but windy weather prevailed. Heavy freshets due to the melting of the heavy snowfall of March, and that which had accumulated through the wooded uplands in February, occurred several times during the month, causing much damage to property along the banks of the Genesee, Hudson and other river systems.

Nine areas of low pressure, or about the usual number for March, passed in the vicinity of New York during the month. Three well-developed storms passed centrally within the limits of the State on the 1st, 7th and 19th; the first and second of the series bringing high winds and heavy rain turning to snow, while the snowfall accompanying the third storm was the heaviest of the season, and was badly drifted by westerly gales. A cyclone which passed northward along the coast on the 11th developed the lowest pressure of March in that region, and during its passage a severe blizzard was felt throughout the State. Three energetic depressions of a third class passed centrally over eastern Canada on the 22d, 26th and 30th, bringing moderate rains for the State at large, high winds and warmer weather, especially on the 30th, which was much the warmest day of the month. The above includes the principal cyclones of March, but in addition two broad and less sharply defined low areas appeared over the Central States and Lake Region on the 10th and 16th, the former bringing a moderate and the latter a heavy snowfall in this State.

The high pressure systems, nine in number, generally took a northerly course toward the Atlantic coast, so that their maximum pressures were felt in the vicinity of New York. The dates of nearest approach were the 4th, 10th, 13th, 18th, 20th and 21st, 24th, 27th to 28th, 30th and 31st. The maximum pressure and coldest weather were due to the first, third and sixth of the series, all of which followed the passage of severe cyclonic storms, thus giving steep pressure gradients and very high westerly winds.

Snow melted rapidly during the warm waves of the 7th, 19th and 22d, but notwithstanding, the greater part of the State was well covered until near the close of the month, and even then much remained in northern New York, and in the wooded highlands of other sections, frequently making it difficult to carry on the maple sugar harvest.

Robins commonly made their appearance between the 26th and 30th, and blue birds were also seen at a few southern stations on the latter date.

Wedgwood reported a heavy deposition of ice upon tree branches on the 1st.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA-			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												24.2	77	29
Alfred	Allegany	1824									21.6	21.9	57	31
Angelica	"	1340									23.3	23 3	58	29
Friendship	"	1550	30.08	30.71	24	29.39	19	1.32			23.3	24.4	60	31
Humphrey	Cattaraugus	1950									24.6	24 9	62	31
Arkwright	Chautauqua	1260										†24 4	58	29
Jamestown	"	1328										26.6	77	29
‖Elmira	Chemung	863										28.2	65	30
Avon	Livingston	585										24.4	59	29
Mt. Morris	"	525										26.7	62	30
Victor	Ontario	..										25.2	58	29
Wedgewood	Schuyler	1350									23.2	23.9	64	30
Addison	Steuben	1006							76	20	25.8	25.4	64	30
South Canisteo	Steuben	1480							72	16	23 1	23 4	59	30
Arcade	Wyoming	1557									21 4	21 4	56	29
Varysburg	"											23.2	61	31
Eastern Plateau												24.5	70	30
Binghamton	Broome	870									24.7	24 4	59	30
Oxford	Chenango	550										24 6	55	30
Cortland	Cortland	1120										23.2	56	31
Bloomville	Delaware	1550									22.7	22.4	52	30
South Kortright	"	1700										24.6	59	26
Brookfield	Madison	1350									23.6	24 8	54	31
Hamilton	Madison	1127										21.6	56	30
Middletown	Orange	660										27 4	58	31
Port Jervis	"	470*										28.4	61	*a*
Cooperstown	Otsego	1300									22.7	22 3	52	30
New Lisbon	"	1234									22 0	21.7	53	30
Oneonta	"	1100									25.7	27.3	70	30
Perry City	Schuyler	1038									22 0	22 0	54	30
Waverly	Tioga	825									26.2	26.4	64	30
Mohonk Lake	Ulster	1245									25.7	26.3	54	31
Northern Plateau												19 9	54	30
Saranac Lake	Franklin											17.7	54	30
Gloversville	Fulton	802									22.5	22.8	49	30
Lowville	Lewis	1240										21.0	49	30
Number Four	"	1571	29.94	30.57	24	29.31	12	1.26				18.6	46	30
Turin	"											19.5	47	30
Atlantic Coast												32.4	65	31
Brooklyn	Kings	107										33.6	65	31
Manhattan Beach	"													
New York City	New York	314	29 98	30.56	14	29.12	11	1.44	71	23		32 0	62	31
Willets Point	Queens											31.3	63	31
Brentwood	Suffolk	75									32.0	32.4	64	31
Setauket	Suffolk	40							70	23	32.0	33.1	60	31
Bedford	Westchester	290										31.8	62	31

FOR MARCH, 1896.

TURE—(IN DEGREES FAH.)								SKY.			PRECIPITATION—(INCHES.)						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudly days.	Number of cloudy days.	Number of days on which 0.01 or more in. fell	Total.	Greatest.	† Duration.	Date.	Total snow fall	
														h. m.			
-11	24	64	20	49	21	0	9	12.0	9.6	9 4	12.6	3.58	2.00	......	19	......	....
—6	24	63	19	37	6	4	8	8	10	13	15	4.33	1.18	23.00	19	32.7	N. W.
—6	24	64	21	49	21	5	*aa*	9	12	10	15	4.21	1.10	......	19	28.5	....
—7	24	67	23	48	21	10	8	9	11	11	12	3.45	1.00	......	19	23.4	W.
3	13	59	19	36	21	5	18	9	8	14	15	3.33	0.95	......	19	30.3	S. W.
5	*e*	53	15	28	6	4	2	....	....	....	......	......	......	......	......	......	....
0	5	77	18	37	29	5	8	8	15	8	13	5.21	1 40	......	20	36.0	N. W.
0	14	65	17	35	21	4	11	15	2	14	11	3.22	1.31	.....	19	15.8	N. W.
—2	24	61	18	41	21	0	9	9	13	9	......	3 23	0.73	......	1	......	....
9	*f*	62	22	43	21	9	12	28	3	0	6	1 92	1.19	......	19	13.0	N.
3	13	55	19	35	*m*	6	*bb*	16	10	5	......	......	......	......	......	......	W.
—3	13	67	20	39	24	8	11	8	16	7	15	3.43	1.00	......	19	24.5	N. W.
—8	13	72	20	43	21	8	*cc*	16	6	9	11	3.05	1 55	......	19	24.0	N. W.
-11	24	70	23	40	*n*	7	8	19	2	10	9	3.71	2.00	......	19	27.1	N. W.
—2	24	58	18	42	6	4	*dd*	7	9	15	18	3.50	0.70	......	1	30.6	....
-10	13	71	24	46	6	7	8	10	10	11	14	3.95	0 82	......	7	29.4	....
-15	*f*	65	20	49	18	1	*ee*	10.0	8.4	12.6	12.5	5.04	4.00	......	1	......	....
-10	14	69	19	37	18	6	1	8	10	13	14	4.68	0.78	......	7	21.2	N. W.
-11	14	66	24	45	18	9	1	6	16	9	16	5.56	1.05	......	19	28.3	N. W.
—8	14	64	18	36	*q*	5	1	16	8	7	17	4.54	1.37	......	19	......	W.
-14	14	66	21	38	14	8	*bb*	14	4	13	10	2.84	1.04	......	19	......	W.
-11	14	70	25	49	18	7	3	....	....	....	7	3.76	1.56	......	19	......	....
0	13	54	18	30	26	8	3	9	10	12	10	4.23	1.10	......	19	32.0	N. W.
-10	24	66	21	35	*r*	8	3	9	9	13	15	3.52	0.98	......	19	11.5	N. W.
1	24	57	16	26	7	1	20	11	8	12	9	8.09	2.60	22.00	1	27.0	W.
—5	14	66	19	38	25	1	11	11	8	12	10	6.60	1.88	......	19	24.0	N. W.
—8	24	60	17	35	25	3	11	10	8	13	15	4.74	1.00	......	13	26.5	W.
-15	14	68	21	41	18	7	*ff*	8	7	16	15	3.96	0.94	......	19	28.2	N. W.
—2	24	72	21	39	18	7	8	....	....	....	10	4.79	0.90	......	19	......	....
—9	24	63	21	38	6	5	4	6	6	19	15	2.70	1.19	......	19	26.8	N. W.
-15	13	79	22	43	*s*	5	1	8	13	10	18	3.40	1.41	......	19	20.8	N. W.
2	24	52	17	32	20	8	8	14	2	15	8	11.07	4.00	......	1	33.0	N. W.
-19	23	60	19	45	24	6	*gg*	7.4	11.2	12.4	15.2	5.39	1.59	......	19	......	....
-19	23	73	24	45	24	7	29	9	11	11	17	4.31	1.22	......	19	35.0	W.
—8	24	57	17	36	25	6	9	11	5	15	16	6.59	1.50	......	19	32.7	W.
-11	24	60	19	41	24	6	12	5	17	9	14	4.88	1.46	......	19	27.0	W.
-12	24	58	20	43	6	6	9	2	13	16	14	6.55	1.59	......	19	50 4	N. W.
—3	*g*	50	16	27	25	6	3	10	10	11	15	4.63	1.56	......	19	37.9	N.
5	25	51	17	?9	25	3	11	14.8	5.9	10.3	13.4	5 54	1.90	......	16	......	....
14	12	51	16	29	30	5	23	15	3	13	18	6.14	1.80	......	16	40.0	W.
...	....	....	....	....	....	....	....	18	3	10	9	4.48	1.55	......	1	16.5	N. W.
13	*h*	49	14	25	5	7	10	12	10	9	17	6.13	1.90	......	16	28.5	N. W.
15	*i*	48	16	32	26	5	10	....	.	....	11	7.41	1.85	......	1	26.5	N. W.
5	25	59	20	39	25	5	11	19	3	9	8	2 82	1.00	......	29	15.2	N. W.
15	14	45	14	25	*f*	3	11	13	7	11	14	4.81	1.00	16.00	29	14.0	W.
7	14	55	20	38	18	8	10	12	9	10	17	7.03	1.35	16.00	19	24.9	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Hudson Valley												28.1	63	31
Albany	Albany	85	30.00	30.66	24	29.23	19	1.43	80	21		27.0	58	31
Lebanon Springs	Columbia	930										25.7	50	*b*
Honeymead Brook	Dutchess	450									27.4	26.4	57	31
Poughkeepsie	Dutchess	180										28.4	63	31
Wappinger's Falls	"											31.2	60	31
West Point	Orange	167										29.5	54	1
Carmel	Putnam	500										28.6	58	31
Mohawk Valley												24.2	51	31
Rome	Oneida	445										24.2	51	31
Utica	"													
Champlain Valley												23.2	58	31
Plattsb'h Barracks	Clinton	125										21.5	48	31
Saratoga Springs	Saratoga													
Glens Falls	Warren	340									24.6	24.8	58	31
St. Lawrence Vall'y												21.4	60	30
Malone	Franklin	810									19.5	19 6	54	30
Madison Barracks	Jefferson	266										23.1	55	30
Watertown	Jefferson	486										24.7	60	30
Canton	St. Lawrence	304									21.0	19.6	51	29
Massena	"													
North Hammond	St. Lawrence	300									21 4	21.6	50	*c*
Ogdensburg	"	258									22.2	22.5	51	30
Potsdam	"	300									19.4	19.1	47	30
Great Lakes												25.4	68	29
Dunkirk	Chautauqua	590												
Westfield	"								88	22		26.7	68	29
Buffalo	Erie	690	30.06	30.66	24	29.41	19	1.25	78	19		25.0	59	29
Pittsford	Monroe										25.6	25.0	58	29
Rochester	"	621	30.03	30.64	24	29.36	19	1.28	73	17		25.0	61	29
Appleton	Niagara											26.1	60	29
Fort Niagara	"	263										26.4	61	29
Baldwinsville	Onondaga	390									25.6	24.1	52	*d*
Syracuse	Onondaga													
Oswego	Oswego	304	30.01	30.67	24	29.28	19	1.39	76	19		24 0	50	30
Palermo	"	460									23.4	22.6	49	31
Lyons	Wayne	407									26.4	26.2	53	*a*
Erie, Pennsylvania	Erie	681	30.07	30.63	24	29.44	19	1.19	79	21		28.0	67	29
Central Lakes												25.1	60	30
Fleming	Cayuga	1000									25.0	24.8	57	30
Watkins	Schuyler	737												
Romulus	Seneca	719							76	16		25.2	60	30
Ithaca	Tompkins	810	30.03	30.66	24	29 28	19	1.38	74	17	25.4	25.2	57	31
Mean		...	30.02	30.71	24	29 12	11	1.33	76	20		24 8	77	29

(*a*) 30, 31; (*b*) 1, 30, 31; (*c*) 25, 29, 30; (*d*) 29, 31; (*e*) 4, 5; (*f*) 13, 14; (*g*) 15, 24; (*h*) 13, 24; (*i*) 12, 22, 24; (*w*) 21, 28; (*x*) 21, 24, 25; (*aa*) 8, 11; (*bb*) 3, 8; (*cc*) 8, 9; (*dd*) 3, 20; (*ee*) 11, 20; (*ff*)
* Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper
tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.
four hours.

FOR MARCH, 1896 — (*Concluded*).

TURE—(IN DEGREES FAHR.).								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
–10	14	59	19	44	18	6	*hh*	11.8	7.5	11.7	13.4	6.88	3.80	......	1	......	....
—3	14	61	16	30	14	6	12	11	9	11	15	4.66	1.12	......	19	23.8	W.
—8	14	58	19	35	18	7	*jj*	11	6	14	12	5.22	2.26	11.30	19	21.5	N. W.
–10	14	67	18	37	18	7	*kk*	9	11	11	14	5.34	1.27	15.00	19	17.4	N.
—7	14	70	22	43	18	10	11	12	7	12	11	6.20	1.97	......	19	23 0	N. W.
3	*k*	57	21	44	18	6	3	13	9	9	15	7.84	1.72	17.00	19	33.0	W.
7	24	47	18	33	27	7	11	....	....	....	14	12.02	3.80	......	1	......	N. W.
7	25	51	17	34	25	7	23	15	3	13	13	6.90	1.76	14.00	19	18.0	....
—4	23	55	19	33	26	9	28	....	....	....	14.0	4.74	0.68	......	6	......	....
—4	23	55	19	33	26	9	28	....	....	....	14	4.74	0.68	......	6	......	....
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—8	14	58	17	47	23	7	20	5.0	10.0	16 0	13.0	6.52	2.40	.. ...	19–20	......	....
—5	*f*	53	16	47	23	7	20	....	....	....	12	?	1.25	12.00	2	28.4	S. E.
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—8	14	66	18	36	15	8	*ll*	5	10	16	12	6.52	2.40	......	19–20	32.0	N. W.
–13	24	63	20	45	24	2	12	11.0	9.0	11.0	10 2	3.93	1.69	......	20	......	....
–10	24	64	16	39	25	2	12	8	13	10	14	4.75	0.71	21.00	20	29.3	W.
—7	24	62	19	33	28	6	19	....	....	....	5	1.96	0.62	......	26	14.0	S. W.
—5	24	65	24	43	24	5	1	7	16	8	13	5.23	1.69	......	20	......	S. W.
–20	24	71	21	45	24	6	12	10	8	13	10	4.49	0.96	18.00	1	28.0	S. W.
...	....	....	....	....	....	....	....	....	...	...	......	......	......	......	......	......	....
—8	24	58	18	40	25		8	7	10	14	10	3.34	1.17	......	1	12.5	W.
—8	24	59	20	33	*v*	8	19	16	5	10	......	......	......	......	....	18.2	S. W.
–13	24	60	19	35	24	5	12	18	2	11	9	3 81	......	......	......	24.0	S. W.
–10	24	56	15	35	*w*	2	2	10.2	9.4	11.4	12.0	4.02	1.20	......	11–19	......	....
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
0	13	68	18	35	21	6	*mm*	19	2	10	7	2.58	0.71	......	6	......	E.
5	13	54	14	30	6	5	19	6	16	9	12	3.61	0.91	......	26	13.4	W.
3	24	55	16	33	21	6	3	9	10	12	13	4.84	1.12	......	12	......	W.
4	13	57	15	31	21	5	19	14	6	11	21	6.32	1.11	......	12	45.1	W.
8	14	52	14	29	*m*	3	19	10	8	13	9	2.65	0.80	......	7	11 5	N. W.
4	13	57	15	29	20	5	18	....	....	....	9	2.54	......	......	......	......	N.
—3	23	54	19	32	26	10	8	16	3	12	12	4.52	1.09	......	28	30.3	....
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
3	24	47	13	28	21	2	2	6	10	15	15	4.79	1.09	......	19	18.2	N. W.
10	24	59	16	30	24	4	*nn*	7	13	11	11	3.67	1 00	......	19	28.0	S. W.
3	24	50	14	26	21	5	9	10	13	8	12	5 25	1.20	......	11–19	42.0	N. W.
8	24	59	15	35	28	4	10	5	13	13	11	3.41	0.96	......	26	......	W.
—3	24	58	16	36	21	5	*bb*	7.0	11.7	12.3	10.7	4.39	1.54	6.50	19	......	....
2	24	55	17	30	21	7	8	3	18	10	7	3.95	1.30	11.00	19	31.0	N. W.
...	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
2	24	58	16	27	*x*	6	4	8	7	16	10	4.47	1.54	6.50	19	24.0	N. W.
—3	24	60	16	36	21	5	*bb*	10	10	11	15	4.75	1.33	17.00	19	27.4	W.
–19	23	59	18	49	*q*	0	9	9.9	9.2	11.9	12.6	5.02	4.00	......	1	25.5	N. W.

13, 24; (*k*) 18, 24; (*l*) 24, 25; (*m*) 21, 25; (*n*) 6, 21; (*q*) 18, 21; (*r*) 18, 25; (*s*) 13, 18; (*t*) 20, 31; (*v*) 21, 3, 11; (*gq*) 3, 9, 12; (*hh*) 3, 6; (*ii*) 7, 11; (*kk*) 2, 27; (*ll*) 1, 9, 12, 19; (*mm*) 3, 8, 11; (*nn*) 9, 12.
Thermograph. ‖ Report received too late to be used in computing means. The means from the
† Blank indicates that the duration is not shown in the original records, but is within twenty-

TEMPERATURE — MARCH, 1896, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	29	20	14	12	17	29	34	25	24	24	20	13	10	13
Alfred	32	21	20	15	30	47	39	24	26	32	21	13	14	20
	20	10	6	4	4	10	23	19	13	10	12	7	—2	0.0
Angelica	34	29	17	13	26	47	40	25	26	30	21	16	16	25
	27	13	7	6	2	7	25	20	19	14	16	7	0	3
Friendship	36	24	22	25	33	51	43	30	29	32	27	20	17	24
	24	12	3	2	1	10	24	20	13	14	14	9	—2	3
Humphrey	34	21	17	16	37	45	45	24	30	39	23	15	17	23
	21	13	7	7	4	14	22	14	17	15	12	7	3	9
Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	35	25	19	22	32	46	43	25	27	33	29	18	12	24
	22	15	9	7	0	32	25	20	18	21	17	6	4	10
Elmira	40	25	20	23	32	50	45	30	34	41	26	22	24	27
	31	19	13	12	12	19	32	24	22	23	22	13	4	0
Avon	33	28	20	16	23	43	41	30	28	30	23	19	18	23
	28	18	12	8	8	10	28	23	28	19	18	12	0	0
Mount Morris	37	36	32	20	32	42	43	32	33	33	31	20	23	22
	13	14	12	9	10	18	29	18	19	17	12	11	0	0
Victor	42	24	16	20	35	43	41	29	29	31	26	16	21	25
	17	15	10	9	10	13	28	23	19	17	16	7	3	4
Wedgewood	33	25	23	16	31	40	39	31	29	33	21	16	25	27
	23	12	8	6	5	13	25	20	17	15	13	6	—3	3
Addison	38	29	22	19	31	48	43	32	30	30	27	21	25	27
	28	17	12	9	10	12	28	24	22	19	17	9	—8	—5
South Canisteo	35	21	20	18	26	49	44	28	31	33	25	17	31	26
	24	13	8	8	6	9	26	21	16	13	15	7	—8	—5
Arcade	32	18	9	11	21	48	39	23	24	27	17	11	15	20
	18	8	5	1	1	6	23	18	16	15	10	5	2	7
Varysburgh	32	32	18	18	30	50	44	27	30	29	20	17	19	26
	19	10	6	0	—3	4	25	20	19	10	12	6	-10	—9
Eastern Plateau	34	22	16	12	17	25	34	26	24	24	22	15	10	10
Binghamton	35	30	20	16	25	43	43	27	25	31	30	20	18	22
	29	15	13	7	10	13	28	17	18	18	20	10	—4	-10
Oxford	37	32	24	20	30	42	40	35	33	37	29	26	30	28
	28	15	10	5	7	5	25	22	18	11	18	9	— 4	-11
Cortland	31	29	20	16	23	40	41	30	25	30	26	21	17	22
	26	16	10	8	8	7	30	21	18	17	19	9	—1	—8
Bloomville	44	29	17	16	23	41	39	28	26	32	31	19	21	24
	27	13	9	2	5	7	26	20	16	14	6	7	—5	-14
South Kortright	43	32	13	14	24	44	40	30	27	35	28	23	19	26
	28	12	6	0	3	4	22	18	14	10	11	9	—3	-11
Brookfield	36	26	20	18	29	37	40	28	29	34	32	21	22	29
	26	12	12	1	5	9	28	18	19	20	18	7	0	11
Hamilton	37	25	16	15	22	37	41	30	25	30	24	19	20	21
	25	13	8	—8	—9	7	26	14	15	4	14	7	0	—3
Middletown	43	28	28	25	36	40	46	35	46	35	28	23	24	26
	38	22	15	11	12	15	20	30	25	22	20	14	5	5
Port Jervis	41	28	26	27	35	44	49	36	34	34	28	24	26	28
	35	25	16	12	13	18	32	30	24	22	27	11	—1	—5
Cooperstown	40	27	15	12	18	35	40	28	25	30	21	18	19	22
	27	13	10	2	3	10	26	20	16	10	18	8	2	0
New Lisbon	41	28	15	14	22	41	41	28	26	31	24	18	19	21
	26	14	8	3	5	5	26	20	15	13	17	8	—3	-15
Oneonta	43	35	23	22	27	46	46	32	29	35	30	24	25	25
	30	16	12	7	9	11	30	25	20	19	19	12	5	1
Perry City	35	25	18	13	23	43	39	29	29	28	24	17	20	23
	25	11	9	8	8	5	25	22	18	15	12	7	—7	—7
Waverly	35	30	23	23	31	45	43	33	31	33	30	21	28	30
	30	17	12	11	13	11	31	26	22	17	21	10	-15	-10
Mohonk Lake	48	33	24	28	36	36	41	31	29	29	28	22	22	25
	30	17	14	12	12	16	27	23	19	17	16	10	4	7
Northern Plateau	34	18	11	6	9	21	31	22	16	12	14	9	6	6
Saranac Lake	46	20	15	9	18	38	38	23	18	25	20	12	12	18
	16	7	—5	—2	—2	7	23	11	—7	—8	4	—4	-17	-15
Gloversville	45	29	22	18	21	32	36	29	24	28	25	19	19	24
	29	15	12	5	7	11	28	19	18	9	16	10	4	—2

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
18	21	23	30	33	22	23	27	17	15	31	32	19	29	48	48	44	24.5
22	28	31	38	41	20	39	42	24	27	38	45	25	40	53	55	57	21.9
0	7	13	13	26	12	8	8	....	—6	14	15	10	11	36	35	31	
29	30	33	43	40	29	44	35	24	30	47	42	25	44	58	56	57	23.3
9	9	8	13	28	13	—5	15	5	—6	20	18	13	9	37	36	25	
32	31	35	43	43	34	44	43	25	34	48	45	31	50	59	58	60	24.4
11	8	6	13	28	14	—4	16	8	—7	18	19	13	11	39	38	29	
26	32	35	33	39	29	43	40	30	34	52	45	28	46	60	59	62	24.9
12	13	13	28	27	12	7	17	9	4	20	16	10	16	35	40	31	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	24.4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
30	34	33	40	40	32	39	42	26	30	50	47	26	50	77	56	60	26.6
14	9	11	27	30	14	10	22	15	5	23	18	15	18	40	41	31	
32	28	38	40	40	26	50	41	23	27	42	45	32	52	58	65	60	28.2
15	17	21	12	28	19	15	19	13	5	23	25	13	21	40	42	36	
35	33	31	43	....	32	42	42	25	28	47	44	24	38	59	57	54	24.4
7	12	13	22	....	15	1	17	5	—2	13	21	13	13	31	36	30	
32	36	37	48	39	33	48	35	44	33	52	43	31	46	58	62	61	26.7
6	10	15	20	29	15	5	10	9	3	19	21	11	15	35	38	36	
38	34	33	44	40	29	45	42	25	28	45	46	26	39	58	55	56	25.2
9	16	13	22	26	11	10	13	7	4	10	20	11	15	35	37	30	
22	32	36	41	42	31	37	40	24	39	38	42	28	39	48	64	60	23.9
9	12	16	16	25	10	8	10	5	0	13	13	8	13	34	38	32	
26	30	36	41	40	35	44	42	23	29	41	45	31	45	53	64	59	25.4
6	14	14	9	27	18	1	18	5	—3	15	26	14	15	34	37	27	
24	35	38	45	42	22	44	37	28	26	47	48	27	42	55	59	56	23.4
7	7	15	8	23	14	4	12	—2	—11	12	20	11	8	34	35	25	
30	28	29	45	38	13	41	33	24	28	50	44	21	43	56	52	53	21.4
10	4	13	15	26	9	6	14	5	—2	16	13	9	10	38	39	28	
31	39	36	45	36	28	45	43	23	32	51	47	27	47	59	57	61	23.2
0	—1	11	13	28	10	0	13	4	—2	13	16	8	8	38	35	30	
16	24	26	24	36	26	24	31	17	10	25	36	21	27	38	46	42	24.5
24	28	32	43	48	40	38	42	22	25	40	48	24	45	49	59	56	24.4
4	20	11	6	28	10	8	18	8	0	12	22	13	15	37	38	29	
32	35	40	47	48	40	42	45	27	30	42	50	26	40	45	55	53	24.6
4	18	18	2	24	10	10	20	3	—7	5	23	12	9	27	34	25	
26	30	33	42	42	33	36	40	23	23	40	40	23	38	45	55	56	23.2
6	18	16	6	26	14	0	17	5	—5	13	32	11	9	34	33	25	
28	35	31	42	45	39	36	40	25	22	37	47	23	38	45	52	50	22.4
2	20	5	—8	28	18	10	17	5	—7	5	22	11	16	34	33	28	
31	35	34	43	49	46	47	45	27	26	51	59	39	39	45	55	51	24.6
0	11	17	—6	23	12	8	24	8	—6	21	30	10	14	27	38	25	
28	25	34	43	44	38	39	37	40	22	30	50	30	42	43	52	54	24.8
10	3	12	23	28	18	15	12	16	4	8	20	20	20	27	34	34	
24	33	34	40	44	35	35	36	24	22	37	47	31	40	43	56	55	21.6
7	15	18	5	24	14	10	20	2	—10	2	17	9	12	21	36	25	
26	31	35	38	46	29	38	46	24	19	38	47	26	32	40	53	58	27.4
16	21	24	16	22	28	15	22	19	1	17	24	17	20	28	32	37	
25	29	38	45	50	34	41	51	32	30	42	51	36	49	40	61	61	28.4
5	22	25	8	28	22	13	25	17	0	4	30	19	13	30	36	31	
24	26	30	38	39	35	35	38	19	21	40	49	25	36	49	52	50	22.3
10	18	18	5	25	14	14	19	4	—8	5	25	11	15	25	32	30	
23	29	34	38	46	38	33	38	21	25	39	48	23	39	46	53	51	21.7
3	18	15	—3	25	13	4	16	2	—12	3	23	10	11	26	33	25	
29	33	36	44	50	44	49	44	29	30	49	54	27	45	50	70	58	27.3
9	20	21	5	27	17	13	21	10	—2	11	22	14	20	33	38	29	
30	33	32	44	43	32	38	38	24	20	41	45	25	40	51	54	53	22.0
8	1	15	9	26	10	5	6	0	—9	5	17	10	9	31	32	26	
27	37	39	45	46	35	40	45	28	36	40	48	30	45	52	64	62	26.4
1	20	19	2	29	17	5	21	8	—3	12	25	15	15	37	39	26	
23	27	39	38	45	46	38	45	33	22	36	44	33	39	39	48	54	26.3
11	17	21	18	25	14	12	27	11	2	12	28	15	17	29	34	32	
12	22	24	28	31	21	21	25	7	8	24	30	16	24	34	41	35	19.9
32	29	33	39	42	18	37	38	12	32	49	44	20	37	43	54	44	17.7
3	15	11	20	17	—6	11	—5	—19	—13	25	4	4	15	36	31	16	
22	28	34	37	40	40	32	39	23	23	36	44	27	36	37	49	48	22.8
4	17	19	15	25	17	10	18	5	—8	0	25	11	17	26	34	31	

TEMPERATURE — MARCH 1896, SHOWING DAILY MEANS FOR THE

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
North. Plat. (Con.)														
Lowville.........	40	29	16	15	18	37	39	29	21	28	22	13	15	20
	29	13	9	1	2	6	28	19	16	0	0	7	—2	—9
Number Four.....	43	26	14	9	16	42	37	25	18	22	26	15	14	18
	25	8	6	—3	—2	—1	24	14	12	—5	1	4	—2	—8
Turin..........	42	26	14	10	15	33	35	26	21	21	20	13	18	19
	25	9	8	—1	0	8	25	16	14	1	4	5	2	—2
Atlantic Coast....	41	28	24	22	29	35	42	34	32	29	29	23	21	23
Brooklyn.........	47	32	32	30	42	44	52	41	41	35	33	32	30	34
	27	19	17	18	25	34	31	27	28	29	22	14	15	18
Manhattan Beach.	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New York City...	46	34	29	28	39	46	51	37	37	33	34	28	28	30
	34	21	19	17	14	24	33	28	26	26	24	19	13	14
Willet's Point....	45	30	30	30	40	45	50	40	38	32	32	28	28	30
	25	19	17	17	20	25	31	27	26	27	20	15	15	16
Brentwood........	51	37	31	28	41	46	58	46	39	35	34	28	28	....
	35	22	20	19	18	23	33	28	25	24	29	17	9	....
Setauket.........	54	37	29	33	33	43	47	40	36	32	33	30	26	29
	36	26	22	19	19	25	35	31	28	27	30	21	16	15
Bedford..........	53	39	31	14	38	46	49	40	37	31	33	28	30	33
	37	23	19	14	16	23	31	29	25	23	24	18	10	7
Hudson Valley...	43	28	22	20	22	29	38	33	29	27	26	21	14	13
Albany...........	50	29	25	21	26	35	44	35	30	34	30	22	26	27
	29	20	14	10	12	17	34	24	23	20	17	16	6	—3
Lebanon Springs	50	32	23	19	24	38	39	33	38	34	29	22	24	25
	38	17	11	6	7	14	32	22	17	14	22	12	0	—8
Honeymead Brook	46	27	24	25	30	37	41	36	35	34	32	28	25	26
	31	20	16	9	12	17	31	27	22	17	19	13	—5	-10
Poughkeepsie....	54	34	31	33	36	46	49	40	38	32	30	27	26	30
	34	23	20	12	16	18	32	28	23	21	20	16	—4	—7
Wappingers Falls.	54	46	28	30	34	46	49	48	40	35	32	31	36	28
	39	18	22	18	18	20	32	30	26	22	22	18	8	4
West Point.......	54	45	33	31	33	40	41	49	34	35	31	33	27	28
	41	24	18	15	10	12	24	31	26	23	24	20	9	10
Carmel...........	45	31	29	30	31	40	45	36	32	33	34	27	25	26
	37	22	16	14	12	19	33	20	22	20	19	14	10	8
Mohawk Valley...	28	18	14	11	15	26	30	24	18	20	20	15	15	20
Rome.............	37	25	23	16	24	35	35	31	30	28	30	25	30	27
	18	10	4	6	6	17	25	17	6	11	11	5	0	12
Utica............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	40	32	22	16	14	18	32	31	23	18	16	16	12	9
Platts. Barracks.	43	47	27	20	17	27	34	40	29	21	21	19	15	23
	35	25	15	5	5	10	21	28	16	10	6	8	5	4
Saratoga Springs.	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls.......	44	36	31	26	25	25	40	33	28	29	23	23	29	18
	36	20	15	15	9	11	31	23	20	11	14	15	—2	—8
St. Lawrence Val.	33	21	16	9	15	20	33	24	19	14	10	11	7	12
Malone...........	44	33	17	15	17	33	39	28	15	15	13	8	10	17
	33	10	10	—3	2	9	28	15	12	4	—1	6	1	1
Madison Barracks	39	22	18	21	34	40	37	34	27	28	19	21	17	30
	32	12	10	5	4	13	29	21	19	8	6	9	2	1
Watertown.......	35	26	31	22	39	41	42	32	31	32	24	18	23	30
	30	14	10	3	4	9	28	18	17	4	8	8	—2	—2
Canton..........	42	29	23	14	21	31	39	30	23	20	16	14	16	22
	29	12	9	1	1	3	27	18	11	1	—1	8	—5	—4
Massena.........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond.	36	28	20	18	34	32	38	28	28	28	12	12	16	18
	28	10	10	2	2	10	28	22	16	8	4	4	—2	2
Ogdensburg......	45	34	30	19	25	30	38	45	25	23	20	18	16	22
	27	10	10	0	0	12	26	36	12	5	5	5	—1	4
Potsdam.........	40	31	20	15	20	28	38	28	21	19	13	12	14	21
	27	10	9	—2	2	5	25	17	12	5	—2	7	—2	0

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
26	32	30	36	36	33	35	37	21	30	38	44	29	37	44	49	43	21.0
—3	11	18	21	27	14	12	20	—5	-11	6	29	6	12	22	34	29	
25	29	28	35	36	34	29	35	20	20	38	40	20	34	45	46	42	18.6
—6	15	16	16	25	12	0	15	—5	-12	9	18	4	7	25	35	25	
20	25	30	37	36	32	29	36	18	22	34	37	20	33	38	47	45	19.5
—3	15	16	19	26	14	12	17	3	—3	7	19	5	16	25	34	27	
25	30	32	31	41	34	31	40	28	22	29	44	30	36	41	44	49	32.4
32	34	42	41	48	40	44	49	30	35	45	53	37	50	51	63	65	33.6
21	28	28	26	34	30	20	32	25	16	20	35	23	27	34	34	41	
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....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
30	34	37	40	53	41	39	47	29	29	40	53	32	42	53	58	62	32 0
21	26	27	26	33	22	20	33	19	13	21	30	22	27	35	55	44	
32	33	33	41	50	32	42	50	34	29	42	55	37	47	50	50	63	31.3
22	27	19	22	35	20	21	27	16	15	21	23	24	29	34	32	36	
32	35	....	44	54	48	42	49	40	28	44	60	38	46	48	55	64	32 4
11	27	....	11	25	25	18	30	26	14	5	32	20	20	21	32	30	
30	34	36	42	52	50	41	46	36	30	42	58	43	46	50	46	60	33.1
20	26	29	22	33	25	21	32	25	19	18	34	24	27	34	35	35	
37	35	40	50	49	48	44	51	35	31	42	57	44	50	48	55	62	31.8
10	25	25	12	28	23	16	29	19	10	8	32	20	22	30	36	30	
19	26	29	26	36	32	25	36	22	12	22	38	28	32	36	42	44	28.1
26	30	37	39	46	42	38	44	20	24	39	46	27	43	43	52	58	
7	22	24	12	29	21	16	24	10	4	10	27	18	23	30	35	38	27.0
26	31	37	43	45	37	36	43	31	24	39	47	43	46	38	50	50	
4	21	22	8	21	18	11	28	7	—6	5	31	14	18	25	35	30	25.7
33	33	35	43	46	36	37	46	25	21	39	51	27	39	40	51	57	
5	20	21	6	29	20	5	28	10	0	3	31	20	18	29	35	30	26.4
29	28	41	43	49	47	40	51	29	24	41	52	33	45	41	51	63	
8	16	18	0	29	18	11	27	15	—1	2	21	22	21	31	31	26	28.4
34	32	44	47	49	50	42	50	36	25	46	55	47	45	42	56	60	
10	22	18	3	31	30	15	25	5	3	5	32	22	22	30	34	28	31.2
31	30	31	42	39	49	37	44	52	25	28	41	53	34	49	43	51	
13	20	19	16	19	33	17	20	21	7	8	19	20	22	28	35	32	29.5
29	38	40	45	48	33	37	48	25	20	41	50	28	46	45	49	58	
17	20	22	12	27	17	14	29	18	8	7	33	15	24	32	33	32	28.6
24	28	24	37	28	18	31	24	12	20	34	28	26	32	36	38	38	24.2
30	35	37	48	36	29	37	40	29	30	40	45	35	36	43	50	51	24.2
18	20	10	26	20	6	25	8	—4	10	28	12	16	27	30	26	25	
....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....
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12	20	24	28	28	28	20	27	19	6	15	32	26	22	26	38	44	23.2
20	23	25	39	35	33	28	33	46	8	20	36	41	26	30	38	48	21.5
2	7	11	23	22	26	9	20	—1	—5	—5	17	11	10	15	30	35	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
32	30	38	39	35	35	37	43	23	25	36	46	35	36	40	50	58	24.8
—4	19	21	10	27	19	5	13	9	—3	9	30	17	17	21	34	33	
17	20	27	30	30	21	20	24	9	8	27	31	16	24	35	43	38	21.4
21	25	27	34	32	31	35	37	10	18	49	43	24	30	45	54	42	19 6
2	10	18	22	24	13	7	10	—3	-10	10	24	5	10	21	36	30	
33	34	41	36	33	27	34	29	21	25	42	41	25	46	50	55	51	23.1
1	10	19	12	27	16	4	14	2	—7	13	23	8	13	25	34	36	
42	40	42	44	36	32	41	40	31	38	42	40	28	49	54	60	54	24.7
4	6	10	22	26	17	6	18	2	—5	12	22	8	10	22	34	30	
30	23	36	42	34	31	38	38	12	25	44	41	25	32	51	48	43	19.6
—2	11	19	19	27	7	—3	6	-12	-20	5	19	6	5	19	35	30	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
32	32	34	36	36	24	34	34	26	24	50	40	28	34	50	50	48	21.6
8	14	22	28	24	10	4	10	0	—8	10	20	8	12	20	34	32	
26	30	35	37	37	41	35	45	19	25	42	44	30	38	48	51	43	22.5
4	14	18	22	29	11	2	12	3	—8	12	18	5	15	22	32	32	
25	21	31	36	35	19	34	37	21	22	43	42	25	38	46	47	41	19.1
3	7	19	24	15	13	4	8	—6	-13	9	18	5	10	16	35	21	

TEMPERATURE — MARCH, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes	23	20	17	15	18	27	34	26	24	23	19	14	12	16
Dunkirk	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Westfield	40	25	18	19	22	45	54	28	29	29	20	17	19	24
	23	17	12	10	5	15	26	22	17	20	14	8	0	12
Buffalo	31	22	17	16	22	44	43	29	28	26	21	15	16	23
	21	14	12	11	10	14	28	20	20	19	12	9	5	9
Pittsford	31	25	20	20	25	42	41	31	28	30	23	17	13	25
	20	14	14	12	10	15	29	24	20	17	16	10	5	6
Rochester	32	20	20	18	26	43	41	28	27	28	24	16	17	23
	18	15	14	11	13	16	28	23	21	19	16	7	4	6
Appleton	34	23	19	18	26	34	36	31	30	28	23	17	21	27
	22	17	15	13	14	13	30	25	23	18	17	12	10	8
Fort Niagara	30	35	21	19	25	33	35	29	30	27	23	20	19	22
	20	16	14	12	14	15	29	14	23	20	15	10	4	10
Baldwinsville	34	27	22	19	26	36	40	31	29	29	28	21	21	25
	19	12	11	8	9	15	26	21	12	12	11	6	7	10
Syracuse	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Oswego	34	19	23	20	30	37	40	28	26	25	21	18	20	23
	26	17	14	8	12	16	28	22	21	16	13	8	6	7
Palermo	34	24	19	18	24	35	37	29	24	28	24	14	18	23
	24	15	13	8	8	6	28	20	20	8	9	10	6	5
Lyons	35	22	22	19	25	42	42	32	28	29	25	18	20	25
	24	15	14	13	13	17	30	25	23	21	16	11	9	11
Erie, Pennsylvania	35	28	26	25	28	48	37	28	31	27	24	18	21	24
	24	22	14	12	12	20	28	23	20	23	18	9	8	11
Central Lakes	30	21	16	14	18	28	36	28	24	26	20	14	12	13
Fleming	34	27	20	17	24	42	43	31	26	33	24	19	20	24
	25	13	12	9	9	13	28	24	18	17	15	8	5	6
Watkins	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Romulus	35	28	20	17	26	41	42	32	29	32	24	17	21	19
	26	15	13	11	9	15	30	23	20	21	14	10	6	8
Ithaca	34	26	18	18	24	44	44	30	28	30	26	17	20	24
	26	15	13	12	13	12	30	25	22	20	16	11	3	—1
Mean	34	23	17	14	17	26	34	27	23	22	20	15	12	14

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
21	22	26	33	31	22	28	28	17	18	35	32	21	31	47	44	43	25.4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
32	28	33	41	44	30	44	45	24	29	51	53	27	52	68	60	58	
13	6	11	29	27	12	9	22	15	9	23	20	17	18	40	40	38	26.7
28	26	32	40	34	26	42	44	23	28	52	46	25	45	59	47	57	
15	11	14	26	29	14	12	18	14	12	26	20	14	22	39	35	34	25.0
30	30	33	42	35	21	42	43	22	27	47	44	26	38	58	53	56	
12	16	18	24	29	12	9	14	6	3	17	20	13	16	38	37	36	25.0
28	29	33	41	34	28	42	43	22	27	48	42	26	40	61	54	56	
12	21	18	25	29	12	11	13	11	6	21	19	14	20	36	41	36	25.0
30	28	36	39	33	31	40	42	25	31	49	45	30	40	60	48	49	
12	19	24	26	30	17	11	19	14	11	20	22	15	18	33	33	31	26.1
30	28	31	34	32	41	44	32	29	50	49	39	31	41	61	55	53	
15	20	16	29	16	12	21	16	14	22	38	22	14	21	33	33	35	26.4
33	35	35	44	36	33	40	37	24	27	44	43	26	41	52	51	52	
13	16	21	21	19	9	14	6	—2	4	24	11	12	18	31	31	27	24.1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
24	27	32	41	34	25	43	36	18	23	42	40	30	37	47	50	44	
14	16	23	22	28	17	15	23	11	3	15	23	14	23	32	37	32	24 0
25	29	30	40	39	33	34	38	18	20	41	41	24	37	47	48	49	
11	5	20	16	28	17	16	18	4	-10	13	23	11	12	32	35	25	22.6
30	30	34	44	37	32	40	37	21	24	45	42	24	40	52	53	53	
17	18	22	27	29	15	14	17	12	3	20	21	15	21	37	40	34	26.2
29	31	37	43	36	26	45	38	25	31	55	48	30	58	67	53	55	
17	10	17	30	30	17	16	24	15	8	27	22	19	23	47	41	39	28.0
19	22	26	31	33	23	24	28	15	14	28	31	19	28	43	48	45	25.1
29	30	.33	43	35	33	38	40	24	27	41	41	24	43	50	57	54	24.8
11	15	17	22	28	12	8	11	8	2	17	19	12	15	35	41	35	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
25	30	35	43	37	33	39	40	22	29	40	42	26	38	51	60	58	
12	12	19	22	28	14	12	14	6	2	13	26	12	18	35	35	34	25.2
25	27	34	42	39	32	40	44	23	26	42	46	28	42	50	56	57	
11	17	20	14	29	15	4	17	9	—3	15	20	14	14	38	41	31	25.2
19	24	26	30	33	25	25	29	16	13	27	33	22	28	38	43	42	24.9

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau ..	0.30	0 07	0.01	T.	T.	0.07	0.40	0.08	0.07	0.05	0.27	0.18	0.02	0.04
Alfred	.16	.15	T.	.01	....	T.	.88	.15	.25	.05	.50	.17	....	T.
Angelica	.20	.25	.08	....	....	T.	.64	.10	....	.10	.36	.22	....	T.
Bolivar	.75	.04	....	....	....	....	.65	.04	.03	.04	.12	.40	....	.04
Friendship	.48	.12	.01	....	....	T.	.46	.10	T.	T.	.33	.28	T.	T.
Humphrey	.10	.20	....	....	....	.15	.18	.16	....	.06	.30	.08	.18	....
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	.26	.13	.09	....	....	.09	.69	.16	.11	.10	.21	.38	.07	.08
Jamestown	.20	.20	.05	....	....	.30	.60	.30	.20	.10	.30	.20	....	....
Elmira	.40	....	....	....	....	.18	....	T.	....	....	.36	.47	....	....
Pine City	T.	T.	T.	....	....	.50	T.	T.	T	*	†1.15	T.	T.	T.
Akron	.46	T.	....	....	T.	*	† .85	T.	.04	.03	.09	T.	T.	.21
Avon	.73	T.	....	T.	....	T.	.59	....	....	T.	.40	.18	....	....
Mt. Morris	....	....	....	....	....	....	.05	....	....	.03	.50	....	....	....
Lockport	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	.32	.05	T.	T.	....	....	.32	.10	....	.05	.50	.10	....	....
Addison	.20	T,	....	....	....	....	.18	T.	T.	.04	.28	.38	....	....
Atlanta	....	T.	....	....	....	....	....	....	.60	....	....	....	....	.45
Haskinville	.30	.02	....	....	....	....	.50	04	.02	.03	.12	.15	.10	....
South Canisteo	T.	.08	....	....	....	....	.40	T.	T.	.10	.50	T.	....	....
Arcade	.70	.11	.05	....	....	T.	.28	.22	.02	.10	.15	.09	.03	0.5
Attica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Varysburgh	.43	.06	T.	T.	....	....	.82	.07	.09	T.	.22	.28	....	T.
Eastern Plateau	0.81	0.15	0.04	0.01	0.00	0.07	0.28	0.10	0.05	T.	0.41	0.25	T.	T.
Binghamton	.75	T.	.05	T.	....	....	.78	.10	.10	T.	.40	.30	....	....
Chenango Forks	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oxford	.87	.15	.05	....	....	....	.58	.25	-20	T.	....	.80	....	....
Cortland	*	† .96	.05	....	....	.10	.04	*	†.63	....	.19	.34	.02	....
Bloomville	.25	.10	.09	....	....	....	.30	.26	....	....	....	....	....	....
Deposit	....	.05	.10	....	....	....	....	.15	....	....	.10	.90	....	....
South Kortright	*	† .35	....	....	....	.33	....	....	....	....	*	†.74	....	....
Brookfield	.20	.60	....	....	....	....	.28	.50	.30	....	.40	.60	....	....
Hamilton	.50	.10	.05	....	....	....	.41	.10	.05	....	.15	.10	....	....
Apulia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	2.60	0.40	....	....	....	....	....	T.	....	....	.70	....	....	....
Port Jervis	.47	....	....	....	....	....	....	.32	....	....	.69	....	....	....
Warwick	.54	.15	....	....	....	....	.18	T.	T.	....	.65	....	....	....
Cooperstown	.27	.10	,05	....	....	....	.62	.04	.05	....	.75	....	....	....
New Lisbon	.41	.33	.05	....	....	....	.55	....	....	....	.18	.14	....	....
Oneonta	.20	....	....	....	....	.88	....	....	.08	....	.87	....	....	....
Perry City	.05	.19	.15	.14	....	....	.30	T.	.04	T.	.30	.60	....	....
Newark Valley	.75	....	T.	T.	....	....	.52	T.	T.	.02	.60	.10	....	....
Waverly	.40	.05	.01	T.	....	....	.02	.02	.01	.05	.58	.10	....	T.
Ellis	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	4.70	.18	....	....	....	....	.45	....	....	....	*	†1.50	....	....
Northern Plateau ..	0 64	0.12	0.02	T.	0.00	0.02	0.45	0.23	0.02	0.00	0.30	0.45	0.12	0.11
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Saranac Lake	.15	.20	.05	T.	....	.10	.19	.08	T.	....	.58	.11	T.	T.
Gloversville	1.16	.15	T.	....	....	T.	.87	.08	T.	....	.46	.62	....	.02
Lowville	.71	.05	....	....	....	....	.50	.20	....	....	.06	.32	....	.03
Number Four	*	† .56	....	....	....	....	.35	.80	....	....	....	....	.60	.30
Turin	.24	.16	....	....	....	T.	.33	.16	.12	....	*	†.31	.11	.31
Kings Station	.95	.05	.10	....	....	....	.45	.05	....	....	.40	1.20	....	....
Atlantic Coast	0.66	0.38	0.00	0.00	0.00	0.00	0.20	T.	0.00	0.01	0.39	0.09	0.00	?
Brooklyn	.19	.87	....	....	....	....	.27	T.	....	T	.40	.20	....	....
Manhattan Beach	1.55	.06	....	....	....	....	*	† .10	....	....	.05	.20	....	....
New York City	.13	.92	....	....	....	....	.12	T.	....	.01	.56	.07	....	....

TATION FOR MARCH, 1896 — (INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.06	0.04	0.01	0.06	0.92	0.27	T.	0.01	T.	0.00	0.00	0.27	0.01	0.01	0.16	0.03	0.00	3.52
.05	.05	T.	T.	1.18	.30	....	....	....	....	....	.29	....	....	.14	....	....	4.33
.05	T.	.02	....	1.10	.30	....	....	T.	....	....	.52	....	.22	T.	.05	....	4.21
.10	....	....	....	1.03	....	....	....	....	....	....	.31	....	....	.18	.06	....	3.79
.08	T.	....	....	1.00	.22	....	T.	....	....	....	.25	T.	....	.12	T.	....	3.45
.10	.02	....	....	.95	.37	....	....	....	....	....	.37	....	....	.11	....	....	3.33
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.06	T.	.04	....	.66	.36	.05	.06	T.	....	....	.62	.07	....	....	....	....	4.29
T.	....	T.	....	.50	1.40	....	....	....	....	....	.55	....	T.	.31	....	....	5.21
.09	.06	....	....	1.31	.08	....	....	....	....	....	.14	....	....	.13	....	....	3.22
.11	.20	T.	1.20	T.	....	....	....	....	....	....	....	....	....	....	....	....	3.16
T.	T.	....	....	.58	.52	....	....	T.	....	....	T.	T.	T.	1.07	.10	....	3.95
T.	....	....	....	.52	.14	....	T.	....	....	....	.41	....	....	.26	T.	....	3 23
....	....	....	....	1.19	.10	....	....	....	....	....	.05	....	....	....	....	....	1.92
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....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.20	.20	....	....	1.00	.10	....	....	....	....	....	.16	.05	....	.26	.02	....	3.43
.12	.10	T.	....	1.55	.05	....	T.	T.	....	....	.10	.	....	.05	....	....	3.05
....	....	....	....	1.05	.20	....	....	....	....	....	....	....	....	.11	....	....	2.41
.03	....	.04	....	.80	.10	....	....	....	....	....	.12	....	....	.16	....	....	2.43
.15	.08	....	T.	2.00	T.	....	T.	....	....	....	.25	....	....	.15	....	....	3.71
T.	T.	T.	....	.65	.50	....	.05	....	....	....	.40	.01	....	.01	.08	....	3.50
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	T.	....	....	.42	.45	....	.06	T.	....	....	.65	.10	....	T.	.30	....	3.95
0.15	0.29	0.01	0.01	1.18	0.10	0.06	0 10	0.02	0.00	0.00	0.20	0.02	0.03	0.38	0.09	0.00	.88
.15	.40	....	....	.60	.40	....	....	.05	....	....	.19	....	....	.41	....	....	4.68
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.10	.18	.05	....	1.05	.25	....	....	T.	....	....	.23	05	....	.45	1.30	....	5.56
T.	.17	....	....	1.37	.12	....	....	....	....	....	.22	.07	....	*	†.26	....	4.54
.20	.15	....	....	1.04	....	....	....	....	....	....	.20	....	....	.25	....	....	2.84
.10	.50	....	.10	....	....	1.00	....	....	....	....	....	.10	.50	....	....	....	3.60
.17	....	....	....	1.56	....	....	....	....	....	....	....	....	....	.61	....	....	3.76
....	....	....	....	1.10	.20	....	....	....	....	....	.05	T.	....	....	....	....	4.23
T.	.05	.02	....	.98	.10	....	....	....	....	....	.33	.10	....	.48	....	....	3.52
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	1.30	....	....	1.10	....	....	.84	T.	....	....	.25	....	....	.80	.10	....	8.09
.50	.57	....	....	1.88	....	....	.99	.15	....	....	.24	....	....	.79	....	....	6.60
.28	.60	....	....	1.31	....	....	.10	.05	....	....	.25	....	....	.75	....	....	4.86
.20	.38	....	....	1.00	.25	.02	....	....	....	....	.35	....	....	.46	.20	....	4.74
.10	.15	.04	....	.94	.09	....	....	T.	....	....	.27	.02	....	.46	.23	....	3.96
.35	.17	....	....	.90	.17	....	....	....	....	....	.61	....	....	.56	....	....	4.79
.10	.10	....	....	1.19	.16	....	T.	....	....	....	.21	....	....	.14	.03	....	3.70
.25	.10	....	....	1.10	.10	....	T.	....	....	....	.14	....	....	.30	T.	....	3.98
.10	.06	.01	....	1.41	.04	....	T.	.06	....	....	.12	....	....	.32	.04	....	3.40
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
*	†1.28	....	....	2.33	....	....	....	.07	....	....	....	....	....	....	.56	....	11.07
0.08	0.20	0.02	0.01	1.36	0.48	T.	0.06	0.00	0.00	0.02	0.51	0.03	T.	0.31	0.07	0.00	5.56
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.16	T.	0.5	1.22	.35	.02	T.	....	....	.10	.84	.05	T.	.06	....	....	4.31
.06	.36	.13	T.	1.50	.11	....	.10	....	....	....	.30	T.	....	.52	.15	....	6.59
....	....	....	....	1.46	.46	....	.11	....	....	....	.56	.13	....	.25	.04	....	4.88
....	.25	T.	....	1.59	1.00	....	.15	....	....	....	.83	....	....	.12	....	....	6.55
.14	.08	....	....	1.56	.30	....	T.	....	....	....	.28	T.	....	.18	.06	....	4.63
.25	.35	....	....	.80	.65	....	....	....	....	....	.25	....	....	.75	.15	....	6.40
0.24	1.56	0.11	0.04	0.60	0.14	0.00	0.04	0.29	0.09	0.00	0.04	0.01	0.01	0.93	0.07	0.00	5.55
.40	1.80	T.	....	.51	....	....	.03	.04	.10	....	.09	T.	....	.76	.12	....	6.14
*	*	†.48	....	.20	.95	....	*	†.03	.30	....	....	.02	....	.54	....	....	4.48
.20	1.90	.26	....	.54	T.	....	.04	.25	.16	....	.04	.02	....	.87	.04	....	6.13

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlan. Coast (Con.)														
Willet's Point	1.85	....	....	....	....	....	....	....	....	....	.45	....	....	*
Brentwood	....	.02	....	....	....	....	.30	....	....	....	.20	....	....	....
Seatauket	.28	.09	....	....	....	....	.27	....	....	.02	.73	.03	....	....
Bedford	.64	.69	....	....	....	....	.21	....	....	.02	.34	.14	....	....
Hudson Valley	0.86	0.10	0.07	0.01	0.00	0.04	0.35	0.02	T.	T.	0.15	0.59	?	T.
Albany	.44	.08	.02	....	....	....	.45	T.	T.	....	.36	.65	....	....
Lebanon Springs	....	.24	....	....	....	....	.35	T.	T.	....	....	.50	....	T.
Honeymead Brook	.55	.14	....	....	....	....	.55	....	....	....	.20	.18	....	....
Poughkeepsie	.43	.12	....	....	....	....	.51	....	....	T.	*	†.43	....	....
Wappingers Falls	.75	.28	T.	....	....	.35	T.	T.	....	T.	.50	.58	....	....
West Point	3.80	....	.35	....	....	....	.03	.15	....	....	T.	*	†.75	....
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	1.08	.10	....	....	....	....	.26	T.	....	....	....	.63	....	....
Southeast Reserv'ir	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	....	....	....	....	....	....	.55	....	....	....	....	1.00	....	....
Marlborough	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	.67	....	.28	....	....	....	.49	....	....	....	*	†1 11	....	....
Mohawk Valley	0.20	0.00	0.00	0.00	0.00	0.68	0.30	0.00	0.00	0.00	0.55	0.09	0.00	0.00
Rome	.20	....	....	....	....	.68	.30	....	....	....	.55	.09	....	....
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	0.75	0.22	0.80	?	0.25	T.	0.42	0.12	0.00	0.00	?	?	0.00	0.00
‡Platts. Barracks	*	†1.25	*	†.40	.50	T.	.20	.25	....	....	?	?	....	....
Saratoga Springs	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	.75	.22	.80	....	....	....	.63	....	....	....	*	†1.14	....	....
St. Lawrence Valley	0.72	0.14	0.05	0.00	0.00	0.00	0.22	0.03	0.00	0.00	0.01	0 22	0.01	T.
Malone	.63	.12	.26	....	....	....	.56	.08	....	....	T.	.61	.09	....
Madison Barracks	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Watertown	1.10	.05	.05	....	....	....	.17	.01	....	....	*	†.41	....	....
Canton	.96	.20	....	....	....	....	.28	.10	....	....	*	†.50	....	....
DeKalb Junction	.99	.07	....	....	....	....	.38	....	....	....	....	.11	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	1.17	.01	.01	....	....	....	T.	T.	....	....	.03	.10	....	T.
Ogdensburg	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Potsdam	.17	.30	....	....	....	....	.15	....	....	....	....	.30	....	....
Great Lakes	0.40	0.08	0.01	T.	T.	0.11	0.50	0.05	0.09	0.02	0.27	0 51	0.01	0.04
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	....	....	....	....	....	.71	.48	....	....	.10	.12	T.	....	....
Buffalo	.08	.04	T.	T.	....	.10	.79	T.	T.	.02	.06	.09	T.	T.
Adams Centre	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pittsford	.14	.18	T.	T.	....	.03	.56	.05	.56	.01	.18	1.12	....	....
Rochester	.47	.19	.02	.03	....	.02	.55	.06	.59	.02	.24	1.11	....	....
Scottsville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Appleton	.29	T.	....	....	....	.13	80	T.	T.	T.	.12	.17	....	T.
Fort Niagara	.16	T.	....	....	....	*	†.85	....	T.	T.	.10	.05	....	....
Baldwinsville	.36	.30	....	T.	....	.08	....	.16	.05	....	.50	.10	....	T.
Skaneateles	1.12	.05	.03	....	....	....	.45	.07	.09	.03	.35	.41	....	....
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridgeway	.25	.02	....	....	....	T.	.58	.01	....	....	.15	.06	.03	....
Demster	.88	....	....	....	....	....	.40	....	....	....	....	.20	....	....
Fulton	.34	....	....	....	....	....	.43	T.	....	....	.40	.30	.30	.20
Oswego	1.04	.02	.01	....	....	T.	.62	T.	T.	....	.06	.25	.18	14
Palermo	.18	.06	.03	....	....	....	.48	T.	....	....	.40	.60	....	.43
‖ Phœnix	.86	.13	13	....	....	....	.53	.26	....	....	....	.71	....	....
Lyons	....	.30	T.	T.	T.	.25	....	40	....	....	1.20	.10	....	T.
Rose	97	.10	T.	....	....	....	.61	.05	T.	.01	.10	.30	....	T.
Erie, Pennsylvania	.02	T.	T.	....	....	.21	.65	.01	T.	.04	.40	.22	....	T.
Central Lakes	0.29	0.12	T.	T.	0.00	0.00	0.42	0.16	0.11	T.	0.43	0.59	T.	T.
Fleming	.45	.40	....	....	....	....	T.	....	.40	....	....	.60	....	....

TATION FOR MARCH — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
†.75	1.76	....	.25	.82	....	....	....	.28	....	....	.05	....	.05	1.15	....	....	7.41
*	†.80	....	....	....	....	....	.10	.40	....	....	....	....	....	1.00	....	....	2.82
.21	1.00	.94	....	.76	T.	....	T.	.20	.03	....	T.	....	....	1.00	.15	....	4.81
.16	1.34	.37	....	1.35	....	....	.06	.19	.04	....	.10	.01	....	1.21	.16	....	7.03
0.11	0.42	0.52	0.00	1.35	0.48	0.00	0.02	0.07	?	0.00	0.14	0.05	0.06	0.52	0.31	T.	6.14
.10	.35	.31	....	1.12	.10	....	T.	.01	....	....	.03	T.	....	.50	.14	T.	4.66
.02	....	.62	....	1.26	0.27	....	T.	.10	....	....	.32	....	....	.41	.13	....	5.22
.20	.60	.40	....	1.27	....	....	....	.10	....	....	.15	.02	....	.96	.02	....	5.34
*	†.72	.63	....	1.97	....	....	T.	.14	....	....	....	.17	....	1.03	.05	....	6.20
.35	1 05	.15	....	1.72	.24	....	.15	.08	....	....	.30	....	....	1.28	.06	....	7 84
....	*	†1.62	....	....	3.70	....	....	*	†.18	....	.07	.22	....	....	1.15	....	12.02
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8.30
....	....	1.55	....	1.76	....	....	T.	.14	....	....	.12	....	....	....	1.26	....	6.90
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6 80
.20	.30	.50	....	.45	....	....	....	....	....	....	....	....	.50	.10	....	....	2.60
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.63	....	....	.64	....	....	....	....	....	....	.31	....	....	.39	....	....	4.52
0.08	0.14	0.00	0.60	0.66	0.00	0.10	0.00	0.00	0.00	0.10	0.48	0.00	0.68	0.08	0.00	0.00	4.74
.08	.14	....	0	.66	....	.10	....	....	....	.10	.48	....	.68	.08	....	....	4.74
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.20	0.30	0.00	1.35	0.45	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.38	0.16	0.00	6 52
....	*	†1.00	....	.50	.70	....	....	....	....	....	....	....	....	.05	.10	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.20	.30	....	2.20	.20	....	....	....	....	....	.15	....	....	.70	.23	....	6.52
T.	T.	0.15	0.05	0.41	0.69	0.00	0.09	0.00	0.00	0.00	0.65	0.08	0.00	0.18	0.00	0.00	3.84
....	T.	.23	....	.57	.71	....	.06	....	....	....	.62	.12	....	.09	....	....	4.75
....	....	....	....	.50	.56	....	....	....	....	....	.62	.16	....	.12	....	....	1.96
....	....	.03	.01	....	1.69	....	.18	....	....	....	.91	.25	....	.37	....	....	5.23
....	....	.15	....	.93	.60	....	....	....	....	....	.47	....	....	.30	....	....	4.49
....	....	.01	.02	.45	.57	....	.09	....	....	....	.61	....	....	....	....	....	3.30
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.02	....	.60	.30	....	....	....	....	....	....	....	.70	....	....	.40	....	....	3.34
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	*	†1.80	....	.30	....	....	....	.61	....	.18	....	....	....	3.81
0.01	0.01	T.	0 02	0.66	0.42	0.00	0.01	T.	0.00	T.	0.52	T.	0.14	0.30	0.03	0.00	4.00
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.32	....	....	....	....	....	....	.40	....	.45	....	....	....	2.58
T.	T.	T.	T.	.24	.70	....	T.	T.	....	T.	.91	T.	....	.54	.04	....	3.61
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.50	.54	....	....	....	....	....	.45	....	....	.52	....	....	4.84
.01	.01	.02	....	.75	1.05	....	....	....	....	....	.52	.01	....	.56	.08	....	6.32
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	T.	....	....	.24	.12	....	....	T.	....	....	.43	....	....	.35	....	....	2.65
....	....	....	*	†.40	....	....	....	....	....	....	.34	....	....	.64	....	....	2 54
T.	T.	....	....	1.00	.50	....	....	....	....	....	.40	....	1.09	.04	....	....	4 52
.06	09	....	....	1.08	.81	....	....	....	....	....	.50	.04	.12	....	.28	....	5.56
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	.14	....	....	T.	....	....	36	....	....	.40	T.	....	2.00
....	....	....	....	.25	.90	....	....	....	....	....	.90	....	....	....	....	....	3.53
T.	....	....	....	1.90	.20	....	....	....	....	....	.47	.20	....	....	....	....	4.74
T.	T.	.01	....	1.09	.07	....	.11	....	....	....	.62	T.	....	.55	.02	....	4.79
T.	T.	....	....	1.60	.30	....	T.	....	....	....	.10	....	....	.09	....	....	3.67
....	....	....	....	.78	1.60	.12	.05	....	....	....	....	.45	....	.64	....	....	6.26
T.	....	....	.30	1.20	.70	....	....	....	....	.02	.40	....	.36	.02	....	....	5.25
.06	....	....	....	.80	.40	....	.04	.1	....	....	.51	T.	....	.75	.03	....	4.73
T.	T.	T.	....	.72	.08	....	....	T.	T.	....	.96	....	....	.10	T.	....	3.41
.01	0.03	0.00	0.16	1.34	0.24	0.02	0.01	T.	0.00	0.09	0.36	0.00	0.02	0.24	0.02	0.00	4.50
T.	....	....	....	1.30	.40	....	....	....	....	....	.40	....	....	....	....	....	3.95

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cent. Lakes (Con).														
Sherwood	.....	.....	.....	.....	.....	.....	.70	.50	.....	.....	0 10	.25	.....	....
Watkins	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Romulus	.02	08	.04	T.	.....	.....	.44	12	T.	.....	.22	.72	.....	....
Ithaca	.70	.03	.01	.02	.....	.....	.55	T.	.03	T.	.50	.80	T.	T.
Penn Yan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Average	0.56	0.14	0.10	T.	0.02	0.10	0.35	0.08	0.03	0.01	0 31	0.04	0.02	0.02

‡ Record for the month incomplete.

TATION FOR MARCH — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
....	....	....	.65	.80	.03	.09	.05	.....	.....	.....	.50	.....	.10	.18	.....	.....	4.85
....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
....	T.	....	.....	1.54	.43	.....	.....	.....	.....	.....	.34	.....	.....	.60	.....	.....	4.47
.05	.12	....	.....	1.33	.12	.....	T.	T.	.....	....	.20	.....	.08	.19	.10	.....	4.75
....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.07	0.29	0.11	0,16	0.98	0.33	0.02	0.03	0.04	0.01	0.01	0.32	0.02	0.10	0.35	0.08	T.	4.92

|| Received too late to be included in the averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees (Fahr.).						Extremes of Monthly Mean Temperature for March.			
		Normal for the month of March.	Length of record, years.	Record begins.	Record ends.	Mean for March, 1896.	Departure from the normal.	Highest.	Year.	Lowest.	Year.
Western Plateau	....	29.9	..	......	......	24.1	—4 0	...	......	....	......
Angelica	Allegany	28 2	13	1855	1896	23.3	—4.9	38.0	1894	21.4	1872
Humphrey	Cattaragus	28.1	13	1884	1896	24.9	—3.2	38.5	1894	18.0	1885
‖Elmira	Chemung	33.4	17	1851	1896	28.2	—5.2	41.7	1894	24 8	1856
Eastern Plateau	....	29.9	..	......	......	27.6	—6.3	....	......	....	......
Oxford	Chenango	31.2	29	1828	1896	24.6	—6.6	38.2	1831	19.7	1843
Cortland	Cortland	29.9	33	1829	1896	23 2	—6.7	38.4	1842	20 5	1856
Hamilton	Madison	30.9	20	1827	1896	21.6	—9.3	37.2	1831	20.4	1843
Cooperstown	Otsego	27.4	43	1854	1896	22.3	—5.1	37.2	1871	18 3	1885
Waverly	Tioga	30.2	14	1883	1896	26.4	—3.8	40.4	1894	21.8	1885
Northern Plateau	....	29.3	..	......	......	21 0	—8.3	....	......	....	......
Lowville	Lewis	29.3	30	1827	1896	21.0	—8.3	36.9	1871	19.7	1892
Atlantic Coast	....	35 8	..	......	......	32.6	—3.3	....	......	....	......
New York City	New York	36.5	26	1871	1896	32.0	—4 5	44.0	1894	28.9	1872
Setauket	Suffolk	35.2	11	1886	1896	33.1	—2.1	41.8	1894	30.6	1888
Hudson Valley	....	33.0	..	......	......	27.6	—5.3	....	......	....	......
Albany	Albany	31.7	23	1874	1896	27.0	—4.7	40.0	1894	23.1	1885
Honeymead Brook	Dutchess	31.4	16	1881	1896	26.4	—5.0	39.1	1894	24.4	1885
West Point	Orange	35.8	69	1826	1896	29.5	—6.3	....	......	....	......
Champlain Valley	....	27.2	..	......	......	21.5	—5.7	...	...	....	......
Plattsb'gh Barracks	Clinton	27.2	43	1839	1896	21.5	—5.7	35.0	1871	16.9	1885
St. Lawrence Valley	....	26.4	..	......	......	20.8	—5.6	....	......	....	......
Madison Barracks	Jefferson	28.5	38	1839	1896	23.1	—5.4	38.3	1894	15.2	1872
Canton	St. Lawrence	21.7	34	1862	1896	19.6	—2.1	35.0	1871	16.2	1885
North Hammond	"	26.8	18	1867	1896	21.6	—5.2	36.6	1894	16.7	1872
Potsdam	"	28.7	29	1828	1896	19.1	—9.6	35.4	1831	19.1	1896
Great Lakes	....	30 3	..	......		25.0	—5 2	....	......	....	......
Buffalo	Erie	30.3	26	1871	1896	25.0	—5.3	40.9	1871	19.7	1885
Rochester	Monroe	30.4	26	1871	1896	25.0	—5.4	40.1	1878	20.0	1885
Fort Niagara	Niagara	31.8	40	1842	1896	26.4	—5 4	40.6	1894	21.5	1885
Baldwinsville	Onondaga	29 4	20	1854	1896	24.1	—5.3	36.9	1894	24 1	1896
Oswego	Oswego	29.9	26	1871	1896	25.0	—5.9	41.9	1878	18.7	1885
Palmero	"	27 6	43	1854	1896	22.6	—5.0	37.2	1894	17.1	1885
Erie, Pennsylvania	Erie	32.4	23	1874	1896	28.0	—4.4	42.0	1878	25.0	1885
Central Lakes	....	30.3	..	......	....	25.2	—5.1	....	......	....	......
Ithaca	Tompkins	30.3	18	1879	1896	25.2	—5.1	40.3	1894	21.4	1885
Average departure.	....	....	..	......	......	....	—5.4	....	......	....	......

‖ Received too late to be used in computing the average

AND PRECIPITATION — MARCH.

STATION.	COUNTY.	PRECIPITATION — (INCHES). Average for the month of March.	Length of record, years.	Record begins.	Record ends.	Total for March, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR MARCH. GREATEST. Amount.	GREATEST. Year.	LEAST. Amount.	LEAST. Year.
Western Plateau	....	2.48	..	......	......	3.77	+1.14	...	......	...	......
Angelica	Allegany	2.73	10	1872	1896	4.21	+1.48	4.21	1896	1.38	1872
Humphrey	Cattaraugus	2.52	13	1884	1896	3.33	+0.81	3.50	1884	1.39	1885
‖Elmira	Chemung	2.18	16	1852	1895	3.22	+1.04	5.99	1860	0.25	1889
Eastern Plateau	....	2.59	..	......	......	4.73	+2.14	....	......	....	......
Oxford	Chenango	2.28	26	1829	1896	5.56	+3.28	5.56	1896	0.54	1836
Cortland	Cortland	2.78	17	1851	1896	4.54	+1.76	4.92	1862	1.36	1895
Hamilton	Madison	2.34	20	1827	1896	3.52	+1.18	5.51	1830	0.52	1831
Cooperstown	Otsego	2.64	43	1854	1896	4.74	+2.10	5.29	1871	0.55	1885
Port Jervis	Orange	3.24	13	1880	1896	6.60	+3.36	6.60	1896	1.18	1885
Waverly	Tioga	2.24	14	1883	1896	3.40	+1.16	4.37	1884	0.33	1885
Northern Plateau	....	2.26	..	......	......	4.88	+2.62	....	......	....	......
Lowville	Lewis	2.26	32	1827	1896	4.88	+2.62	5.11	1871	0.30	1827
Atlantic Coast	....	4.18	..	......	......	5.47	+1.28	....	......	....	......
New York city	New York	4.07	26	1871	1896	6.13	+2.06	7.90	1876	1.19	1885
Setauket	Suffolk	4.30	11	1886	1896	4.81	+0.51	7.32	1888	1.34	1894
Hudson Valley	....	3.29	..	......	......	7.30	+4.01	....	......	....	......
Albany	Albany	2.75	23	1874	1896	4.66	+1.91	5.62	1888	0.62	1885
Honeymead Brook	Dutchess	2.79	16	1881	1896	5.34	+2.55	5.34	1896	1.05	1885
Poughkeepsie	"	3.08	21	1830	1896	6.20	+3.12	6.20	1896	0.87	1836
West Point	Orange	3.69	49	1840	1899	12.02	+8.33	12.02	1896	0.75	1842
Boyds Corners	Putnam	4.14	26	1870	1896	8.30	+4.16	8.30	1896	1.29	1885
Champlain Valley	....	2.01	..	......	......	....	......	....	......	....	......
‡Plattsburgh Barr'ks.	Clinton	2.01	38	1840	1895	....	......	5.05	1840	0.28	1850
St. Lawrence Valley	....	2.52	..	......	......	3.46	+0.94	....	......	....	......
Malone	Franklin	2.68	17	1830	1896	4.75	+2.07	....	......	....	......
Madison Barracks	Jefferson	2.35	36	1840	1896	1.96	—0.39	5.60	1873	0.70	1889
North Hammond	St. Lawrence	3.26	18	1866	1896	3.34	+0.08	5.56	1873	0.98	1893
Potsdam	"	1.81	28	1828	1896	3.81	+2.00	4.40	1890	0.40	1836
Great Lakes	....	2.53	..	......	......	4.06	+1.53	....	......	....	......
Buffalo	Erie	2.60	26	1871	1896	3.61	+1.01	5.54	1873	1.08	'74,'83
Rochester	Monroe	3.00	26	1871	1896	6.32	+3.32	7.02	1873	0.94	1887
Fort Niagara	Niagara	2.08	38	1842	1896	2.54	+0.46	4.14	1862	0.37	1851
Oswego	Oswego	2.71	26	1871	1896	4.79	+2.08	5.08	1881	0.48	1885
Palermo	"	1.97	37	1860	1896	3.67	+1.70	6.10	1873	0.63	1885
Erie, Pa	Erie	2.80	23	1874	1896	3.41	+0.61	5.41	1878	1.09	1874
Central Lakes	....	2.28	..	......	......	4.75	+2.47	....	......	....	......
Ithaca	Tompkins	2.28	18	1879	1896	4.75	+2.47	4.75	1896	0.49	1885
Average departure.	....	....	..	......	......	....	+2.02	....	......	....	......

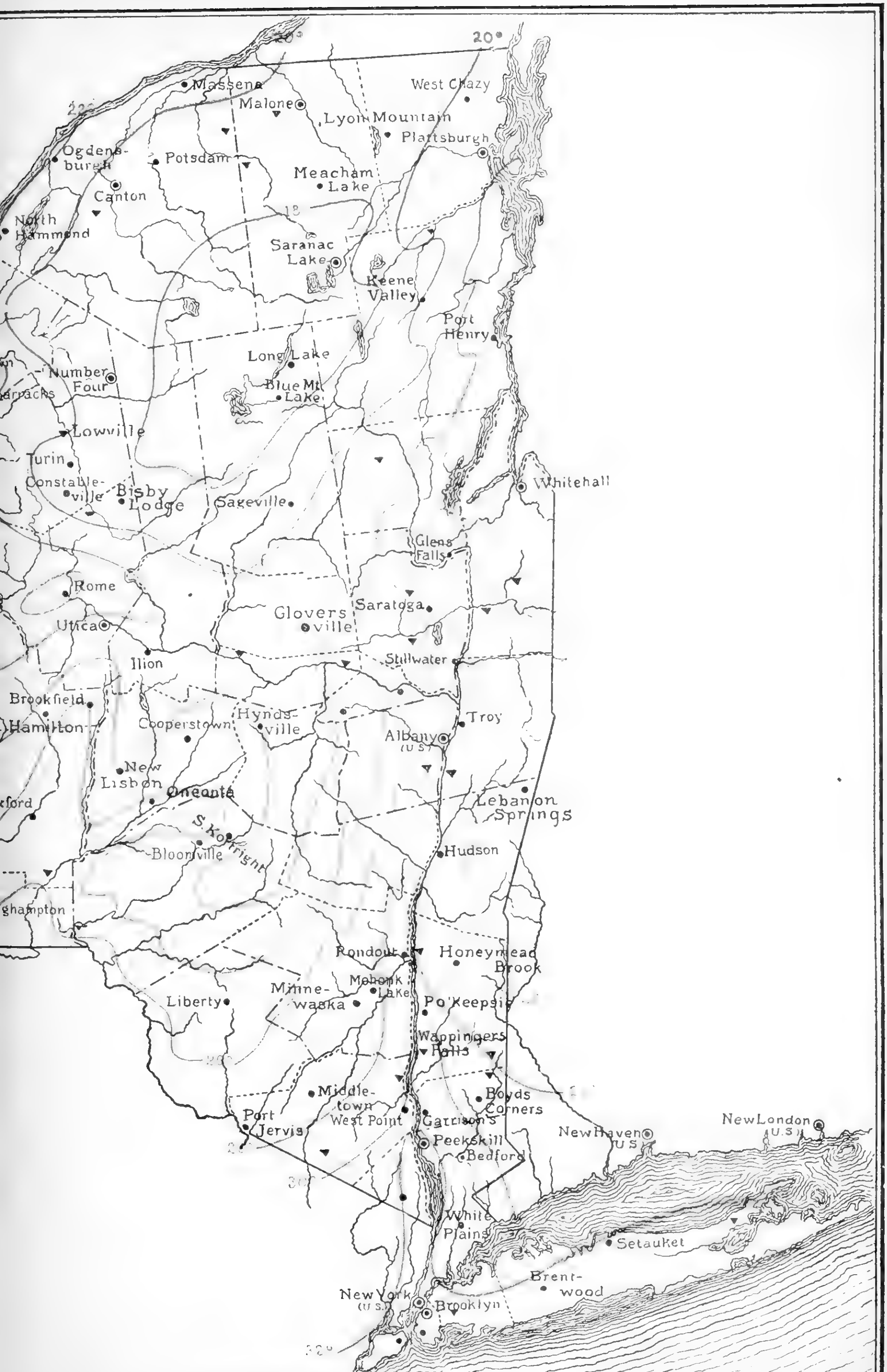
for the month. ‡ Record for the month incomplete.

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR MARCH, 1896



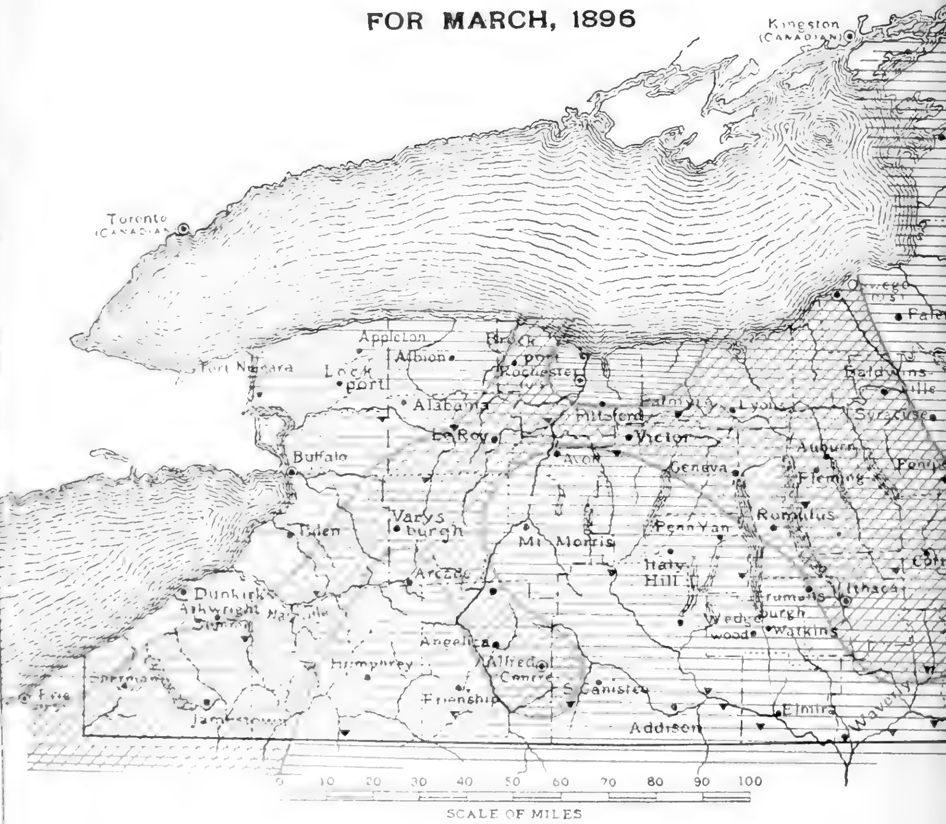
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Gloversville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Binghampton
Rondout
Honeymead Brook
Liberty
Minnewaska
Mohonk Lake
Po'keepsie
Wappingers Falls
Boyds Corners
Middletown
West Point
Garrison's
Port Jervis
Peekskill
Bedford
New Haven U.S.
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

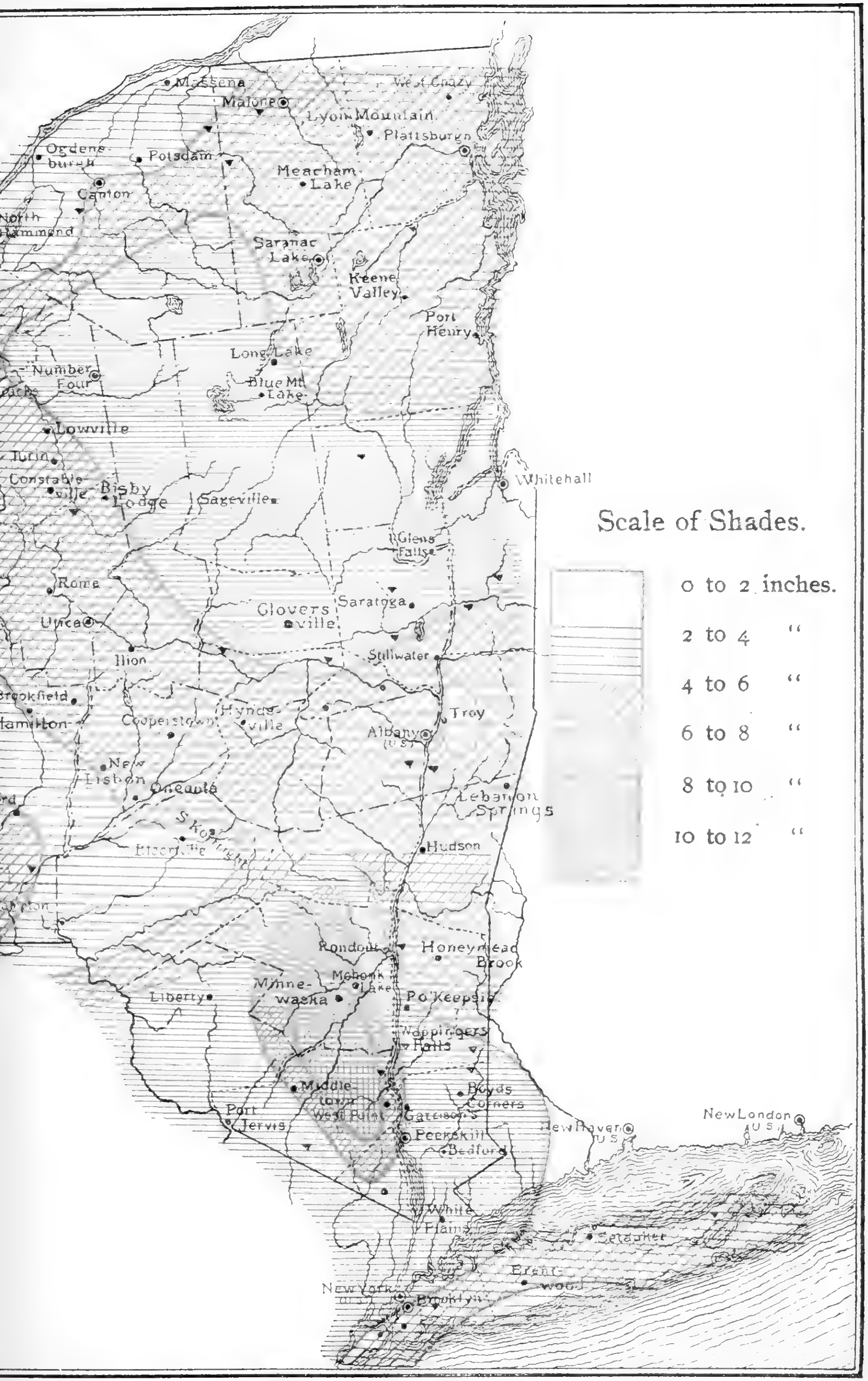
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR MARCH, 1896




Massena
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Ogdensburgh
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Canton
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Liberty
Po'Keepsie
Wappingers Falls
Middletown
West Point
Boyds Corners
Port Jervis
Garrisons
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
6 to 8 "
8 to 10 "
10 to 12 "

Meteorological Summary for April, 1896.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during April was 30.10 inches. The highest barometer was 30.62 inches at Buffalo and at Erie, Pa., on the 8th, and the lowest was 29.56 inches at Number Four, Lewis county, on the 3d. The average pressure at six stations of the National Bureau was 0.10 inches above the normal value, the departures being greatest at eastern stations.

The mean temperature for the State, as derived from the records of 74 stations, was 48.0 degrees, which is the highest April value for the State during the past seven years, and the highest at the following stations during the period covered by their records: Angelica, 14 years; Humphrey, 13 years; Elmira, 18 years; Waverly, 14 years; Baldwinsville, 20 years; Ithaca, 18 years. The highest local monthly mean was 54.2 degrees at Elmira, and the lowest was 40.2 degrees at Saranac Lake. The highest general daily mean was 68 degrees on the 17th, and the lowest was 25 degrees on the 3d and 4th. The maximum temperature reported was 93 degrees at West Point on the 19th, and the lowest was 8 degrees at Bolivar on the 5th. The mean monthly range of temperature was 66 degrees, the greatest range, 76 degrees, occurring at Angelica and Bolivar, and the least, 57 degrees, at Manhattan Beach. The mean daily range of temperature was 21 degrees, the greatest local daily range being 50 degrees at South Kortright on the 15th, and the least 3 degrees at Buffalo on the 10th.

The mean temperature of the various sections of the State were as follows: The Western Plateau, 49.5 degrees; the Eastern Plateau, 48.6 degrees; the Northern Plateau, 43.3 degrees; the Atlantic Coast, 49.4 degrees; the Hudson Valley 49.9 degrees; the Mohawk Valley, 48.5 degrees; the Champlain Valley, 45.2 degrees; the St. Lawrence Valley, 45.8 degrees; the Great Lakes, 49.0 degrees; the Central Lakes, 50.7 degrees. The average of the mean temperatures at 27 stations possessing records for previous years was 4.5 degrees above the normal value, the departures being greatest over the Western Plateau, Central and Great Lake Regions, and least over the Northern Plateau and Atlantic Coast.

The mean relative humidity was 73 per cent. The mean dew point was 40 degrees.

The average precipitation for the State was 1.22 inches, as derived from the records of 91 stations. The distribution of the rainfall over the State was quite uniform, deficiencies obtaining in all regions. The maximum local precipitation was 2.90 inches at Romulus, Seneca county, and the least was 0.39 inches at Newark Valley, Tioga county. The average snowfall for the State was 3.3 inches, the greatest local snowfall, 11.5 inches, occurring at Malone. The average precipitation at 29 stations possessing records covering a period of ten years or more, was 1.40 inches below the normal amount.

The average number of days on which the precipitation amounted to 0.01 inches or more was 6.9; the average number of clear days was 11.4, of partly cloudy days, 10.4, and of cloudy days, 8.2, giving an average cloudiness for the State of 48 per cent.

The prevailing wind direction was from the southwest. The average wind travel at six stations of the National Bureau was

7,780 miles, the movement being in excess of the average for April at all stations excepting Rochester. The maximum velocity recorded was 54 miles per hour at Buffalo on the 2d.

Thunder storms were reported for the following dates: 12th at Jamestown, 17th general over the State, 18th at a few isolated and widely separated stations, 19th general, 20th at stations in the Western Plateau, 21st general, 22d at New Lisbon and Brooklyn, 25th at Bloomville, 28th southeast of Bloomville.

Light frost was general over the State on the 23d and in the northern regions on the 30th. Bedford and Binghamton reported killing frost on the 23d.

Hail fell on the 2d, 17th, 20th and 25th, and sleet occurred on the 2d, 4th and 6th.

Solar halos were observed on the 14th, 20th, 24th, 25th, 26th and 27th. Lunar halos were observed on the 23d and 26th. Auroras were observed on the 4th, 22d and 24th.

But three well defined cyclonic storms passed in the vicinity of New York, the number being considerably less than the average frequency for April. The general action of the cyclonic movements was to diminish in energy, spread and dissipate in their progress eastward, accompanied by very moderate precipitation in New York. The first storm occurred on the 1st-2d, passing north of New York and developing considerable energy over the New England coast and causing heavy rainfall in that region. On the 14th a storm passed centrally well north of New York, accompanied by general but moderate rain in the St. Lawrence valley. The third storm passed centrally over northern New York on the 21st, bringing general and the heaviest rainfall of the month in this State on the 21st-22d.

The high pressure areas, like the lows, were few and of moderate intensity, the most marked being that of the 7th-8th lying over the lakes, spreading thence southeasterly to the coast on the 9th-10th. The maximum pressure in New York occurred on the 8th. On the 23d an anticyclone passed centrally over Pennsylvania, moving eastward and remaining off the New England coast for several days, accompanied by a decided fall in temperature, causing general light frosts throughout New York on the 23d.

The remarkable features of the month were the deficient rainfall and the high monthly mean temperature. The mean temperature of the first decade of the month was about 5 degrees below the normal; this period was followed by a rapid rise and protracted high temperature, giving for the second decade a mean about 15 degrees above the normal. The fall in temperature accompanying the anticyclone of the 23d reached about the normal for this date, but the remainder of the month was warmer than usual, and the mean temperature of the last ten days of the month was about 5 degrees above the normal for the season.

Notes.—Jamestown, ice disappeared from Chautauqua lake on the 15th. North Hammond, ice breaking up in the St. Lawrence on the 11th; navigation opened on the 16th. Glens Falls, Hudson river at high water mark on the 17th-18th. Saranac lake, snow disappeared from clearings soon after the 5th. Turin, 15th, many snow drifts 3 feet deep, thawing rapidly, streams high; 19th, only traces of snow remaining, hepatica in bloom. Wappingers Falls, swallows appeared on the 17th. Waverly, 14th, apple buds started. Wedgewood, 25th, swallows appeared. Humphreys, 6th, wild geese flying north; 14th, blue-birds appeared; 18th, fruit and forest buds swelling. Brentwood, peaches in bloom on the 25th; pears in bloom on the 30th. Cooperstown, since 1854, only 1870, 1878 and 1886 have given as high mean temperature for April, and 1863, 1866, 1872 and 1884 less rainfall. Honeymead Brook, maximum temperature (87 degrees) for April in 16 years. New York city, maximum temperature (90 degrees) for April, dating from beginning of record in 1871. On the 18th ice went out of Lake Champlain and navigation opened on the 20th.

The crop season opened about the 12th of the month. Prior to this date the weather was cold, and snow still on the ground in the more northern counties. At the beginning the season was considered about ten days late. The unusually warm and spring-like weather, beginning on the 12th and extending to the 21st, brought the frost out of the ground, dried the soil and rapidly fitted it for working. Throughout the warmer sections farming operations were general by the 15th. Plowing and seeding had become general by the 20th; vegetation had started rapidly, trees were budding, Madison county hops were being uncovered, and in the southeast early gardens were made. Dry, cool weather followed, with frosts on the 23d and 24th, which formed ice in exposed places, but did little or no damage to vegetation. But light rains had occurred throughout the month and while crops in the ground were beginning to feel the lack of moisture, the absence of rain permitted spring work to be rushed, and at the close of the month most of the oats, spring wheat and barley had been sown, and many had planted early potatoes. Gardening had progressed satisfactorily, and in the southeast early vegetables were already up. Sugaring began early in the month, but progressed slowly until the warm period,—the crop was practically gathered by the 25th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point, (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												49.5	89	*b*
Alfred	Allegany	1824									47.3	48.2	84	16
Angelica	“	1340									48.2	48.2	85	16
Bolivar	“											47.0	84	
Friendship	Allegany	1550	30.10	30.60	8	29.76	21	0.84			47.6	49.5	85	16
Humphrey	Cattaraugus	1950									49.3	49.0	85	18
Arkwright	Chautauqua	1260										‡48.4	76	18
Jamestown	“	1328										50.8	82	16
Elmira	Chemung	863										54.2	89	19
Avon	Livingston	585										50.4	85	17
Mt. Morris	“	525										50.6	89	17
Lockport	Niagara											51.2	85	18
Victor	Ontario												85	17
Wedgewood	Schuyler	1350									47.9	49.3	87	16
Addison	Steuben	1000							67	40	49.8	50.0	87	*c*
South Canisteo	Steuben	1480							67	38	47.5	48.0	86	*d*
Arcade	Wyoming	1557									47.0	47.8	80	*c*
Varysburg	“											49.3	85	*c*
Eastern Plateau												48.6	92	18
Binghamton	Broome	870									49.5	49.8	87	18
Oxford	Chenango	550										47.2	85	*e*
Cortland	Cortland	1120										47.6	85	16
Bloomville	Delaware	1550									49.2	50.4	89	16
South Kortright	“	1700										45.8	86	15
Brookfield	Madison	1350									48.2	52.4	87	18
Hamilton	Madison	1127										46.8	85	16
Middletown	Orange	660										49.6	86	17
Port Jervis	“	470										51.3	92	18
Cooperstown	Otsego	1300									45.7	46.3	81	16
New Lisbon	“	1234									44.6	46.0	84	16
Oneonta	“	1100									48.7	49.9	86	16
Perry City	Schuyler	1038									47.2	48.9	85	*f*
Waverly	Tioga	825									49.9	51.0	90	18
Mohonk Lake	Ulster	1245										46.8	84	17
Northern Plateau												43.3	82	
Saranac Lake	Franklin											40.2	78	16
Gloversville	Fulton	802									46.6	46.5	82	*g*
Lowville	Lewis	900										44.4	78	*f*
Number Four	“	1571	30.08	30.44	8	29.56	3	0.88				42.5	79	19
Turin	“	1240										42.7	75	19
Atlantic Coast												49.4	92	18
Brooklyn	Kings	107										53.0	90	16
Manhattan Beach	Kings											46.8	79	19
New York City	New York	314	30.13	30.53	9	29.67	2	0.86	74	40.		50.0	90	18

FOR APRIL, 1896.

TURE—(IN DEGREES FAHR.)								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
8	5	70	22	44	20	5	*aa*	10.0	13.1	6.9	9 0	1.37	2.05	2.00	24	......	....
12	4	72	21	34	20	8	10	5	14	11	13	1.69	0.36	8.00	24	6.9	W.
9	4	76	25	42	16	7	3	11	10	9	9	1.58	0.48	......	24	5.5	....
8	5	76	24	42	*r*	5	2	....	....	....	9	1.48	0.35	......	17	......	....
15	4	70	25	41	*r*	9	3	6	17	7	10	1.58	0.41	......	17	2.9	W.
14	*i*	71	21	39	23	6	24	4	18	8	12	1.31	0.50	10.00	24	7.0	S. W.
17	3	59	14	28	2	6	10	....	....	....	......	......	...	......	......	......	....
16	3	66	20	32	20	5	24	3	19	8	8	2.48	0.91	12.30	24	7.0	S.
19	3	70	18	30	*r*	7	10	18	4	8	5	0.77	0.42	......	10	......	S. E.
19	4	66	23	40	30	8	3	6	20	4	8	1.05	0.34	......	17	......	....
18	*i*	71	29	38	16	5	28	15	13	2	6	0.46	0.25	......	21	1 0	N. W.
15	3	70	21	37	30	10	10	17	3	10	6	0.40	0.13	......	22	T.	W.
18	*j*	69	....	....	....	....	....	14	11	5	9	0.92	0 38	......	20	0 2	W.
13	*i*	74	22	32	*s*	9	10	5	21	4	10	2 52	2.05	2.00	17	1.5	N. W.
17	4	70	25	42	*r*	10	1	14	12	4	9	1.07	0.43	9 00	17	0.2	S. W.
12	4	74	27	44	20	11	24	16	9	5	7	1 25	0.35	......	24	2.5	W.
13	4	67	20	34	12	5	3	7	10	13	13	1.36	0.36	12.45	17	2.5	....
12	3	73	21	37	15	10	10	9	15	6	10	1.93	0.67	......	19	2.9	....
10	3	70	24	50	15	4	2	12.6	9.6	7.8	6.4	1.22	0.87	9.30	6	......	....
17	4	70	23	37	15	11	*ab*	11	11	8	6	0.63	0.32	......	2	1 0	S. E.
15	*i*	70	26	41	*t*	17	*ac*	11	11	8	6	0.77	0.30	......	21	1.0	S.
13	7	72	25	41	*r*	10	4	16	7	7	8	0.93	0.36	......	22	......	N. W.
10	3	79	28	44	16	9	25	15	7	8	6	1.69	0.47	5 00	6	0.5	W.
11	8	75	28	50	15	13	4	....	....	....	6	1.48	0.44	......	6	......	....
24	8	63	27	44	13	12	7	14	12	4	6	1.20	0.30	......	7	7.0	S. W.
14	3	71	24	40	16	7	3	10	10	10	8	0.90	0.34	11.50	21–22	1.8	W.
17	4	69	20	42	16	9	*ad*	14	9	7	3	1 40	0.87	9 30	6	4.0	....
20	*k*	72	26	46	13	8	7	12	12	6	5	1.63	0.71	......	7	0.5	N. W.
15	3	66	18	31	16	8	*ae*	12	12	6	6	1.25	0.49	......	21	6.0	S. W.
15	3	69	25	43	16	10	4	10	7	13	5	0 80	0.39	......	2	1.5	S. W.
16	3	70	26	41	16	11	4	....	....	....	7	1.39	0.36	......	6	......	....
15	4	70	24	37	15	10	3	8	15	7	10	1.58	0.84	2 30	21	1.1	N. W.
15	3	75	26	49	13	9	10	9	12	9	8	1.18	0.35	3 45	2	3 0	W.
17	4	67	17	31	*u*	4	2	22	0	8	......	......	......	......	......	6.0	....
10	3	66	21	44	30	6	25	11.2	11 0	7.8	9.6	1.29	0.65	......	3	......	....
10	3	68	20	39	19	11	4	13	10	7	10	1.37	0.28	......	21	7.5	S. W.
17	4	65	22	39	*v*	8	4	13	9	8	9	0.96	0.33	6 00	2	1.4	S. E.
13	6	65	24	44	30	10	*i*	9	14	7	9	0.80	0 20	......	22	3.0	W.
11	4	68	23	35	*w*	7	28	11	7	12	11	1.84	0 29	0 20	18	11.2	N. W.
13	4	62	18	33	30	6	25	10	15	5	9	1.48	0.65	......	3	9.1	S. W.
14	4	67	20	45	18	4	*af*	16.8	7.3	5.9	5.0	0.98	0 45	12.00	7	......	....
24	4	66	20	34	18	4	7	20	4	6	6	0 87	0.30	......	21	3.0	S.
22	6	57	14	28	19	4	28	25	5	0	4	......	......	......	......	......	N. W.
23	4	67	16	38	18	6	7	11	13	6	6	1.24	0.40	......	2	1.7	N. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Atlan. Coast (con).														
Willets Point	Queens	...	...	...	..	...	..	...	...	...	...	48.8	91	18
Brentwood	Suffolk	75	...	...	..	...	..	...	...	...	46.4	47.8	90	18
Setauket	Suffolk	40	...	...	..	...	..	...	71	39	47.0	48.7	87	18
Bedford	Westchester	290	...	...	..	...	..	...	...	...	...	50.5	92	18
Hudson Valley	...	...	...	...	..	...	..	...	...	...	...	49.9	93	19
Albany	Albany	85	30.12	30.56	9	29.68	3	0.88	73	40	...	50.0	88	16
Lebanon Springs	Columbia	930	...	...	..	...	..	...	...	...	...	46.1	86	17
Honeymead Brook	Dutchess	450	...	...	..	...	..	...	...	...	49.4	48.9	87	*e*
Poughkeepsie	Dutchess	180	...	...	..	...	..	...	...	...	...	50.2	91	17
Wappingers Falls	"	...	...	...	..	...	..	...	...	...	...	52 8	90	18
West Point	Orange	167	...	...	..	...	..	...	...	...	...	50 3	93	19
Carmel	Putnam	500	...	...	..	...	..	...	...	...	...	50.7	88	*e*
Mohawk Valley	...	...	...	...	..	...	..	...	...	...	...	48.5	80	17
Rome	Oneida	445	...	...	..	...	..	...	...	...	...	48.5	80	17
Utica	"	...	...	...	..	...	..	...	...	...	...	...	...	...
Champlain Valley	...	...	...	...	..	...	..	...	...	...	...	45.2	88	17
Plattsburgh B'ks.	Clinton	125	...	...	..	...	..	...	...	...	...	43.3	88	17
Saratoga Springs	Saratoga	...	...	...	..	...	..	...	...	...	...	...	...	...
Glens Falls	Warren	340	...	...	..	...	..	...	...	...	46.7	47.2	86	16
St. Lawrence Val.	...	...	...	...	..	...	..	...	...	...	...	45.8	83	17
Malone	Franklin	810	...	...	..	...	..	...	...	...	44.2	43.0	79	19
Madison Barracks	Jefferson	266	...	...	.	...	..	...	...	...	...	46.0	79	17
Watertown	Jefferson	486	...	...	..	...	..	...	...	...	...	49.8	83	17
Canton	St. Lawrence.	304	...	...	..	...	..	...	...	...	45.0	44.8	79	19
Massena	"	...	...	...	..	...	..	...	...	...	...	...	...	...
North Hammond.	St. Lawrence.	300	...	...	..	...	..	...	...	...	45.9	47.1	78	17
Ogdensburg	"	258	...	...	..	...	..	...	...	...	44.8	45.2	75	*h*
Potsdam	"	300	...	...	..	...	..	...	...	...	44.5	44.4	78	19
Great Lakes	...	...	...	...	..	...	..	...	...	...	...	49.0	86	17
Dunkirk	Chautauqua	590	...	...	..	...	..	...	...	...	...	...	..	...
Westfield	"	...	...	...	..	...	..	...	...	...	...	50.8	82	18
Buffalo	Erie	690	30.10	30.62	8	29.70	1	0.92	76	40	...	47.0	78	30
Pittsford	Monroe	...	...	...	..	...	..	...	...	...	49.7	50.2	84	16
Rochester	"	621	30.10	30 62	8	29.76	3	0.84	72	40	...	50.0	82	17
Appleton	Niagara	...	...	...	..	...	..	...	...	...	...	47.7	82	
Fort Niagara	"	263	...	...	..	...	..	...	...	...	...	47 6	86	17
Baldwinsville	Onondaga	390	...	...	..	...	..	...	...	...	49.8	49.9	84	16
Syracuse	Onondaga	...	...	...	..	...	..	...	...	...	...	...	...	...
Oswego	Oswego	304	30.00	30.58	8	29.67	3	0.91	75	39	...	47.0	80	19
Palermo	"	460	...	...	..	...	..	...	...	...	47.3	47.4	80	*f*
Lyons	Wayne	407	...	...	..	...	..	...	...	...	50.6	50.7	85	16
Erie, Pa	Erie	681	30.10	30.62	8	29.76	1	0.86	81	44	...	51.0	81	18

FOR APRIL, 1896 — (*Continued*).

TURE — (IN DEGREES FAH.)								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snow fall.	Prevailing direction of wind.
														h. m.			
24	*m*	67	21	44	18	6	6	....	....	....	4	1.13	0.45	12.00	7	4.5	S. W.
18	*n*	72	26	45	18	7	7	20	2	8	5	0.73	0.30	5.00	1	0.3	S. W.
24	4	63	19	38	18	5	7	13	11	6	5	1.02	0.40	......	21	......	E
14	4	78	25	40	18	6	7	12	9	9	5	0.91	0.31	11.30	7	4.8	S
18	*p*	68	23	41	*t*	5	2	12.5	9 2	8.3	5.9	1.31	1.10	......	8	......	....
22	24	66	20	38	16	8	4	13	9	8	7	0.98	0.34	......	7	3.2	S.
18	*p*	68	25	40	16	8	*bg*	12	6	12	6	1.86	0.60	14.30	21–22	7.5	W.
21	*q*	66	23	34	15	5	2	7	14	9	7	0.83	0 29	19.00	1–2	1.9	S. W.
21	9	70	25	41	15	7	7	11	9	10	5	1.11	0.53	.....	7	4.5	S.
21	4	69	26	41	13	10	*ag*	13	13	4	7	1.18	0.51	10.00	7	5.0	N.
21	4	72	23	40	18	7	8	....	....	....	3	1.98	1.10	......	8	......	E.
20	4	68	22	37	13	8	7	19	4	7	6	1.20	0.44	13.00	7	4.0	....
18	3	62	22	33	*x*	15	*ah*	....	....	....	7.0	1.25	0 40	......	1–21	......	....
18	3	62	22	33	*x*	15	*ah*	....	....	....	7	1.25	0.40	......	1–21	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
19	*i*	68	21	41	*r*	9	*bb*	10.0	9.0	11.0	3.5	1.02	0.54	24.00	21–22	......	....
19	*i*	69	19	40	*y*	10	*bc*	....	....	....	4	0 85	0.50	......	22	1 0	N. W.
20	3	66	23	41	*r*	9	*bb*	10	9	11	3	1.20	0 54	24.90	21–22	T.	S.
10	4	65	22	46	30	6	*bd*	10.0	10.8	9.2	8.0	1.43	1.03	2.00	17	......	....
12	4	67	20	29	*z*	6	7	10	11	9	12	2.17	0.74	21.30	4	11.5	S. W.
10	4	69	21	37	30	6	3	..	....	....	2	0.38	0.27	......	18	......	S. W.
16	4	67	26	46	30	14	*b*ı	10	14	6	11	1.37	0.25	......	19	......	S W.
15	4	64	22	34	27	8	*ab*	9	13	8	10	2.66	1.03	2.00	17	8 0	S. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
16	4	62	21	40	13	6	28	5	8	17	8	1.33	0.33	......	25	6.0	N.
11	5	64	22	32	26	9	3	10	11	9	9	0.72	0 29	7.00	21	2.2	S. W.
13	4	65	22	36	15	10	*bf*	16	8	6	4	1.37	0.50	......	25	5.0	S. W.
17	14	63	18	45	12	3	10	10.5	10.8	8.7	8.6	0 88	0.58	......	24	......	....
20	*m*	62	18	30	12	6	3	15	4	11	6	1.22	0.58	......	24	......	S.
18	4	60	18	32	30	3	10	5	11	14	10	0.93	0.27	......	21	......	S. W.
20	*i*	64	20	35	30	6	3	9	13	8	7	0.89	0.25	......	22	......	N. W.
19	4	63	17	29	30	7	3	13	12	5	12	1.09	0.38	......	21	1.0	S. W.
21	*i*	61	20	41	13	6	3	11	8	11	8	0.43	0.16	......	2	T.	E.
18	3	68	22	45	12	9	3	....	....	....	14	0 51	0.18	1.00	17	......	N. E.
19	*i*	65	20	35	19	9	3	13	10	7	6	0.71	0.29	......	1	0.5	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
18	4	62	16	32	19	5	3	10	7	13	7	1.06	0.35	......	3	5.0	S. E.
17	14	63	20	33	27	6	3	15	12	3	3	0.41	0.30	......	2	0.0	S. W.
20	4	65	18	32	30	4	3	9	17	4	9	1.02	0.44	......	18	T.	S W.
20	3	61	18	40	12	7	7	5	14	11	13	1.46	0.29	......	24	......	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY			TEMPERA		
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Central Lakes	....	...	.....	.....	..	......	..	....	...	.....	....	50.7	87	16
Fleming	Cayuga	1000	.....	.....	..	......	..	....	....	.....	50.6	50.4	84	16
Watkins...........	Schuyler	737	.....	.....	..	......	..	....	....	.....	....	.....	...	...
Romulus...........	Seneca	719	.....	.....	..	......	..	....	83	42	....	51.3	87	16
Ithaca	Tompkins....	810	30.10	30 56	8	29.67	*a*	0.89	70	41	50.4	50.4	86	16
Mean	....	....	30.10	30.62	8	29.56	3	0.87	73	40	....	48.0	93	19

*Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4. four hours.

(*a*) 2, 21; (*b*) 17, 19; (*c*) 16, 18; (*d*.) 17, 18, 19; (*e*) 17, 18; (*f*) 16, 19; (*g*) 16, 17; (*h*) 16, 19, 27; (*i*) (*t*) 13, 15; (*u*) 17, 23; (*v*) 13, 16; (*w*) 16, 30; (*x*) 19, 21; (*y*) 17, 20; (*z*) 13, 19, 27; (*aa*) 2, 3, 24, 28; (*ab*) (*bd*) 3, 7 28; (*be*) 3, 25; (*bf*) 1, 3; (*bg*) 4, 7.

FOR APRIL, 1896 — (*Concluded*).

TURE — (IN DEGREES FAHR.).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
18	4	66	20	35	15	8	3	9.3	12.3	8.4	5.7	1.77	1.30	00.45	21	......	....
19	i	65	18	28	30	9	3	4	22	4	2	1.40	1.00	14.00	6	T.	N. W.
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
18	4	69	22	34	30	9	3	14	5	11	6	2.90	1.30	0.45	21	1.0	S.
21	i	65	20	35	15	8	3	10	10	10	9	1.02	0.42	4.30	1	T.	S E.
8	5	66	21	50	15	3	10	11.4	10.4	8.2	6.9	1.25	2.05	2.00	21	3.4	S. W.

thermograph. ‖ Report received too late to be used in computing means. The means from
† Blank indicates that the duration is not shown in the original records, but is within twenty-

3, 4; (j) 4, 5; (k) 3, 4, 9; (m) 2, 3, 4; (n) 4, 6, 10; (p) 3, 4, 6; (q) 3, 4, 5, 6; (r) 15, 16; (s) 15, 16, 20; 3, 28; (ac) 2, 3; (ad) 3, 6; (ae) 3, 4, 7; (af) 7, 28; (ag) 2, 7; (ah) 3, 20; (bb) 4, 21; (bc) 5, 6, 22, 29;

TEMPERATURE — APRIL, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	40	32	20	23	30	30	30	34	38	38	43	58	64	62
Alfred	45	40	22	27	38	43	32	41	48	41	47	70	79	70
	29	16	13	12	17	24	20	25	22	33	36	40	53	57
Angelica	52	43	22	28	38	42	38	41	53	44	48	74	79	73
	27	17	15	9	15	24	22	26	21	34	37	40	44	51
Bolivar	40	32	20	26	22	38	34	43	53	46	53	75	80	72
	28	27	10	11	8	22	23	23	21	32	31	39	41	50
Friendship	50	45	25	29	46	46	37	43	55	46	51	77	80	75
	29	18	16	15	18	25	23	26	22	34	37	40	49	47
Humphrey	44	42	21	26	40	41	37	44	48	40	48	76	77	70
	35	17	14	14	17	24	21	24	26	32	32	41	54	53
‡ Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	51	46	27	27	41	39	34	45	52	45	56	77	78	71
	38	19	16	19	17	28	24	27	30	35	38	46	56	56
Elmira	52	45	31	35	45	49	37	45	51	45	52	71	79	75
	32	25	19	20	33	36	26	27	26	38	42	53	51	63
Avon	54	47	28	32	....	43	39	46	54	51	57	73	79	72
	28	26	20	19	....	25	25	23	22	36	35	42	54	53
Mount Morris	59	52	30	36	48	44	40	48	56	52	54	78	82	74
	29	23	18	18	25	23	25	24	22	20	35	44	52	51
Lockport	48	38	27	34	44	42	38	47	55	48	56	73	79	70
	30	21	15	16	22	26	27	26	25	38	38	42	52	51
Victor	52	46	26	33	42	44	38	42	48	51	51	70	70	80
	26	20	19	18	18	24	25	26	22	22	26	40	41	42
Wedgewood	45	40	26	31	44	51	34	43	50	40	52	65	81	75
	28	18	13	13	19	25	20	25	23	31	33	40	50	53
Addison	48	45	29	35	45	50	37	44	52	45	50	70	82	75
	38	25	18	17	23	28	25	28	22	33	36	40	44	44
South Canisteo	50	40	26	32	42	52	41	44	51	47	48	69	80	73
	25	20	14	12	14	23	21	22	19	31	33	34	44	49
Arcade	51	42	20	26	36	41	35	39	50	43	49	76	74	65
	32	16	15	13	15	16	21	24	25	33	32	42	53	55
Varysburgh	55	46	25	29	42	41	36	44	54	35	51	77	79	74
	30	23	12	16	20	26	23	23	24	25	37	43	50	50
Eastern Plateau	38	35	24	24	32	35	30	33	35	39	43	49	62	61
Binghamton	46	42	29	31	40	48	34	44	51	45	55	64	82	74
	28	26	18	17	25	25	21	26	24	33	36	40	46	54
Oxford	52	42	32	33	42	49	40	43	48	50	54	62	78	74
	26	25	15	15	22	20	17	23	20	30	33	32	37	45
Cortland	45	41	38	25	38	46	34	42	49	44	51	63	81	72
	27	23	15	15	20	22	13	23	22	32	33	34	43	49
Bloomville	58	43	31	51	46	53	44	58	50	54	55	66	80	74
	26	20	10	15	24	25	26	21	23	28	34	35	46	51
South Kortright	56	43	31	27	37	47	41	41	47	49	53	62	79	73
	24	28	12	14	18	17	21	11	15	25	30	28	42	45
Brookfield	52	49	44	41	40	45	40	44	49	54	57	56	81	74
	34	30	26	28	26	27	28	24	25	28	29	34	37	42
Hamilton	50	40	21	26	35	46	35	42	48	49	50	60	80	72
	22	24	14	15	21	19	21	19	20	31	32	30	46	50
Middletown	47	48	29	28	43	38	40	45	47	52	63	76	78	65
	34	33	20	17	20	29	20	32	32	32	35	40	58	54
Port Jervis	48	48	34	37	48	45	35	47	55	50	55	67	84	80
	30	34	20	20	27	24	27	21	20	32	30	38	38	46
Cooperstown	40	36	23	24	33	42	34	39	44	49	50	50	76	74
	25	23	15	16	21	20	26	16	20	25	32	34	46	50
New Lisbon	51	40	27	26	35	43	33	41	46	49	48	60	78	73
	24	23	15	16	21	19	21	17	20	26	29	30	43	43
Oneonta	56	46	31	31	41	48	39	48	54	56	54	64	81	75
	28	26	16	20	24	23	26	23	24	29	33	33	45	38
Perry City	48	42	27	32	39	46	38	43	48	44	54	65	81	74
	21	20	17	15	21	22	23	24	19	33	34	39	49	52
Waverly	47	44	32	35	44	52	39	49	53	42	53	67	85	77
	28	32	15	18	24	25	24	27	22	33	37	42	36	50
Mohonk Lake	38	34	30	28	41	35	31	38	39	45	44	53	64	71
	22	30	18	17	30	28	21	32	28	26	32	43	46	46

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
61	67	70	69	70	60	61	46	48	49	54	56	58	60	59	59	49.2
76	84	82	82	81	75	66	55	63	51	60	69	64	69	68	70	48.2
45	53	60	56	57	41	54	34	32	41	44	39	48	49	46	42	
80	85	81	84	83	79	68	56	62	52	64	69	70	71	68	74	48 2
44	43	51	55	50	39	54	37	27	42	37	37	44	50	41	40	
78	84	82	84	83	77	69	53	64	51	61	70	66	69	67	73	47.0
36	42	49	48	53	37	53	36	26	42	46	35	45	49	46	44	
79	85	83	84	82	77	68	58	66	53	66	73	70	73	69	75	49.5
38	44	53	51	54	39	53	37	29	41	47	38	43	49	49	41	
76	84	83	85	80	75	64	53	69	49	63	73	65	72	67	73	49.0
47	51	60	57	57	44	52	34	30	43	45	40	48	47	52	47	
...	......	......	......	......	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48.4
...	......	......	......	......	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
76	82	81	81	79	74	64	54	61	51	64	70	68	71	75	77	50.8
45	54	59	55	56	42	52	36	32	46	50	49	52	49	54	53	
80	86	83	84	89	80	75	59	65	60	66	74	72	70	73	76	54.2
50	56	63	60	68	55	61	38	41	48	49	51	56	54	55	54	
80	84	85	80	......	75	67	53	61	58	.....	64	74	72	63	76	50.4
45	50	60	57	......	46	54	38	31	48	.....	36	43	54	49	36	
82	88	89	84	85	78	70	52	65	58	69	73	74	65	75	68	50.6
45	50	63	53	62	49	52	38	36	30	38	41	44	60	60	58	
77	80	81	85	80	73	70	55	64	60	64	65	79	73	64	82	51.2
47	56	58	56	64	39	53	37	33	47	51	41	56	56	50	44	
76	80	85	84	81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45.2
38	46	45	60	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
82	87	85	81	83	78	70	54	62	55	62	68	65	64	68	69	49.3
50	55	59	56	61	46	52	36	34	40	42	43	48	48	45	42	
81	87	85	87	86	79	74	57	65	54	63	71	66	65	71	71	50.0
39	45	51	50	55	44	54	38	30	38	45	41	44	48	48	40	
80	85	86	86	86	78	72	57	66	51	61	73	66	70	68	70	48.0
40	45	53	50	54	34	53	37	26	40	42	35	45	44	46	37	
74	80	79	80	76	72	62	49	59	53	61	67	68	70	65	72	47.8
46	55	59	56	54	45	48	34	30	44	45	38	49	50	46	42	
80	84	85	85	77	75	65	55	65	65	63	70	70	70	68	79	49.3
43	50	58	55	57	52	47	36	30	43	48	57	45	46	46	43	
61	66	68	69	68	68	60	46	48	49	50	54	56	53	58	55	48.7
79	84	84	87	85	77	72	57	61	59	71	71	68	58	73	72	49.8
42	51	52	52	57	50	55	38	30	35	41	41	49	47	43	41	
78	77	85	85	76	73	63	62	64	58	68	69	64	72	73	.....	47.2
37	43	49	50	46	52	35	26	29	40	35	43	43	48	36	.....	
79	85	83	81	83	75	69	63	59	60	58	69	68	57	69	71	47.6
38	44	49	50	52	45	52	33	31	30	46	37	43	45	49	42	
82	89	87	88	82	78	72	56	70	65	50	75	64	58	77	80	50.4
42	45	51	52	51	49	51	38	32	34	41	42	45	44	53	38	
66	81	73	72	82	73	67	59	58	64	55	69	68	60	70	68	45.8
36	35	45	48	49	44	49	32	25	29	38	36	44	42	47	31	
78	82	85	87	82	80	82	56	79	81	80	79	80	75	74	72	52.4
54	56	51	53	58	52	50	38	38	47	42	45	46	42	44	46	
78	85	81	80	83	72	69	58	58	61	55	66	67	60	76	72	46.8
42	45	51	52	55	46	52	28	28	31	39	38	41	45	48	36	
78	85	86	76	82	78	70	54	65	59	52	58	54	55	69	66	49.6
40	43	60	61	43	57	58	40	39	41	40	39	41	40	44	42	
86	90	91	92	89	82	72	58	70	64	54	72	70	59	72	70	51.3
44	50	54	56	59	58	56	46	34	36	43	38	41	44	50	42	
73	81	80	79	80	68	59	48	54	57	53	63	67	63	59	63	46.3
50	50	55	60	58	52	48	34	32	35	42	42	45	48	45	43	
77	84	83	82	83	72	70	52	59	60	52	67	67	59	68	70	46.0
36	41	47	53	52	44	50	33	25	29	39	35	42	44	49	35	
80	86	83	84	85	76	67	57	64	65	60	75	72	64	75	76	49.9
41	45	52	60	55	47	52	36	31	33	42	40	46	46	52	36	
78	85	84	83	85	76	71	57	60	60	62	65	71	62	69	73	48.9
41	58	60	52	56	41	51	34	32	33	43	40	43	48	46	46	
83	89	86	90	88	81	77	62	69	61	59	75	69	63	72	73	51.0
40	48	53	51	58	49	56	38	27	34	45	40	48	49	48	44	
74	79	84	81	79	72	68	55	70	59	51	61	61	52	63	59	46.8
44	60	53	58	56	54	50	41	39	40	40	39	42	40	39	38	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	33	30	20	18	26	29	29	30	31	38	39	43	56	54
Saranac Lake	40	37	25	23	32	40	38	40	40	54	47	58	71	68
	23	14	10	12	14	24	15	15	20	30	27	40	41	36
Gloversville	41	39	32	25	39	41	38	44	45	50	49	57	76	74
	26	25	18	17	23	19	28	27	22	27	33	31	37	40
Lowville	47	39	27	24	33	47	37	40	46	52	47	55	71	66
	19	26	17	14	22	13	25	19	16	28	33	29	44	45
Number Four	51	40	22	21	29	43	34	40	43	49	46	56	69	64
	22	20	12	11	19	12	22	14	16	26	31	29	46	42
Turin	40	37	24	23	31	39	31	35	39	42	43	46	64	59
	22	21	14	13	21	16	24	23	19	27	33	30	38	42
Atlantic Coast	44	39	33	30	37	35	34	35	39	39	42	49	56	59
Brooklyn	52	48	43	44	52	53	36	45	54	51	54	60	75	75
	40	36	27	24	30	31	32	31	32	34	36	44	43	47
Manhattan Beach	61	43	47	34	39	48	38	33	44	44	42	50	51	63
	40	37	27	23	24	22	32	28	30	34	36	36	41	41
New York city	53	48	33	39	46	42	34	44	48	45	48	54	75	76
	37	33	25	23	30	32	28	29	33	35	35	43	42	59
Willet's Point	50	46	36	40	48	38	38	45	52	51	52	58	71	65
	35	24	24	24	28	32	30	27	31	32	35	40	44	44
Brentwood	50	44	....	42	47	45	37	47	52	51	54	57	71	74
	30	32	....	18	27	18	30	23	19	18	24	42	39	44
Setauket	53	42	38	38	46	37	37	45	48	48	52	59	72	72
	36	35	26	24	30	29	32	31	27	28	34	42	42	48
Bedford	55	43	39	38	49	36	37	47	56	56	54	64	78	74
	31	35	25	14	27	24	31	21	22	24	31	42	41	50
Hudson Valley	42	32	29	27	34	34	34	35	35	40	43	49	59	64
Albany	47	42	33	30	41	46	42	48	50	54	53	62	76	78
	32	28	23	22	28	26	30	32	28	30	34	34	46	54
Lebanon Springs	52	45	32	26	39	46	36	42	39	50	52	60	76	72
	24	33	18	18	23	18	28	23	19	21	27	28	38	50
Honeymead Brook	53	37	33	34	41	40	39	43	47	51	53	62	73	79
	29	32	21	21	21	21	29	26	22	23	31	33	43	53
Poughkeepsie	49	42	37	37	47	39	37	47	51	55	54	66	82	80
	28	34	23	22	26	22	30	26	21	37	37	34	43	47
Wappingers Falls	59	45	36	40	56	46	40	46	51	55	56	65	81	82
	30	35	22	21	28	25	30	28	24	26	35	38	40	50
West Point	62	44	45	35	36	49	37	35	47	50	53	55	63	76
	35	23	23	21	24	25	28	28	24	26	31	38	39	41
Carmel	57	40	31	35	46	39	38	45	44	53	52	65	82	81
	34	30	22	20	26	29	30	25	26	29	34	39	45	53
Mohawk Valley	38	30	26	32	31	34	35	36	38	41	42	54	58	54
Rome	46	42	33	42	42	43	45	48	46	50	55	65	67	68
	30	19	18	22	20	26	25	24	29	32	30	42	48	40
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	35	31	26	25	30	32	36	35	36	36	42	43	49	54
Plattsb'gh Bar'a'ks	45	37	35	30	30	35	40	40	43	46	52	47	51	61
	20	23	19	19	20	25	29	27	23	24	30	34	31	35
Glens Falls	44	37	32	30	44	45	44	45	50	52	54	62	73	75
	30	26	20	21	24	24	32	27	27	24	32	30	40	45
St. Lawrence Val'y.	31	33	24	22	29	35	32	34	35	39	42	45	59	54
Malone	35	41	29	23	28	38	36	40	41	50	43	52	73	59
	19	29	17	12	21	20	30	22	21	29	34	31	44	41
Madison Barracks	46	30	25	36	41	47	39	42	40	41	49	62	72	70
	29	21	19	10	23	27	24	21	31	23	34	31	51	48
Watertown	46	44	32	33	38	57	40	55	57	56	56	68	81	72
	24	28	18	16	22	27	24	23	23	33	36	28	57	56
Canton	31	42	27	29	36	43	40	41	44	51	51	56	74	66
	21	26	19	15	24	21	27	21	20	29	29	29	41	36

MAXIMA AND MINIMA FOR THE STATIONS — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
55	60	62	61	63	54	50	41	44	46	45	50	55	51	51	50	43.3
74	78	74	64	76	61	44	51	56	57	52	70	72	58	50	65	40.2
36	44	49	44	37	38	30	26	28	34	39	33	48	38	28	31	
75	82	82	79	80	70	61	53	61	59	51	65	67	60	65	63	46.5
40	43	59	59	51	45	47	38	33	36	37	40	41	41	51	34	
73	78	76	69	78	67	65	50	57	62	53	66	69	61	62	73	44.4
43	45	53	57	53	45	41	32	31	31	41	37	37	48	43	29	
68	74	69	65	79	64	64	48	55	60	49	63	65	55	63	69	42.5
36	39	39	48	48	34	42	30	26	31	40	33	39	48	41	34	
66	74	72	68	75	65	64	47	55	57	47	62	67	56	61	67	42.7
39	42	49	55	53	47	40	31	34	34	41	35	42	47	45	34	
64	68	68	68	65	67	60	51	51	53	49	48	47	47	55	50	49.4
80	90	86	86	81	83	78	68	70	60	65	60	60	52	66	62	53 0
58	56	62	52	62	63	50	47	43	48	44	44	40	43	48	44	
63	64	66	74	79	74	68	66	55	58	56	49	47	45	51	64	46.8
45	50	52	48	51	56	52	47	42	47	44	42	39	41	44	43	
76	85	83	90	81	73	73	54	69	60	51	52	52	51	65	54	50.0
63	62	52	52	60	61	46	45	43	46	42	41	40	40	47	43	
78	86	89	91	62	77	70	55	69	61	59	56	59	53	66	58	48.8
49	55	49	47	47	53	44	36	40	41	41	36	40	43	40	36	
...	83	85	90	78	78	75	55	70	65	.....	55	53	56	72	65	47 8
...	43	49	45	55	52	46	38	27	36	.....	35	30	40	38	38	
77	84	83	87	67	76	61	56	64	62	48	58	55	57	67	59	48.7
49	53	53	49	49	48	43	43	37	41	41	40	36	39	46	39	
82	89	91	92	76	81	74	55	69	72	58	66	69	55	74	66	50.5
48	51	55	52	59	58	52	45	30	38	40	37	34	39	48	33	
63	69	71	71	69	66	62	50	47	52	47	53	53	52	56	53	49 9
82	88	87	83	76	76	63	53	64	64	52	68	67	59	66	68	50.0
47	50	57	60	52	54	45	40	37	42	42	44	46	44	48	40	
74	81	86	80	76	70	64	51	58	65	54	65	66	64	65	65	43.1
41	41	52	52	52	45	40	37	26	30	37	36	39	39	47	33	
79	85	87	87	83	77	76	50	61	66	56	65	65	61	65	63	48.9
45	54	54	55	58	56	53	39	30	37	33	40	40	40	48	34	
84	90	91	90	83	80	72	56	67	66	54	67	67	56	70	67	50.2
43	56	52	54	56	56	54	24	30	35	33	38	40	41	46	34	
82	85	86	90	86	80	76	75	68	69	65	69	72	69	69	68	52 8
48	55	56	57	60	58	53	48	34	40	40	36	40	45	50	39	
75	83	91	92	93	79	82	72	55	69	66	53	63	65	55	72	50.3
50	61	55	52	58	58	55	48	35	42	40	37	38	40	41	40	
80	87	88	88	81	78	73	56	65	64	51	69	66	58	68	60	50.7
50	56	56	57	56	54	56	44	32	43	40	38	36	40	46	47	
60	64	68	67	62	60	52	42	47	50	50	56	58	58	54	56	48.5
74	75	80	78	78	68	68	55	58	62	60	67	69	70	70	66	48.5
45	53	57	56	45	53	35	30	36	39	39	45	47	46	39	46	
...	......	......	......	......	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
...	......	......	......	......	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
59	62	68	61	54	60	52	40	46	49	46	50	51	53	51	48	45.2
69	70	88	64	54	80	71	44	50	65	55	55	61	65	51	57	43.3
45	45	48	44	40	40	40	34	35	35	40	42	38	45	41	37	
81	86	84	80	75	73	52	47	63	60	52	66	63	60	64	66	47.2
40	45	53	55	47	47	43	37	38	35	35	36	43	42	47	32	
59	64	63	59	64	54	46	44	46	48	46	54	58	55	51	50	45.8
72	78	70	66	79	65	65	49	57	54	47	61	73	57	53	60	43.0
51	52	50	49	50	45	32	30	33	32	40	42	44	50	39	34	
71	75	79	73	77	70	62	46	58	65	59	60	69	61	64	74	46.0
44	42	53	43	46	41	39	32	35	30	42	38	46	53	44	37	
79	78	83	72	82	69	61	63	60	68	56	78	76	68	74	81	49.8
48	62	53	58	55	40	41	32	29	35	42	45	36	38	40	35	
74	77	73	66	79	67	53	57	62	58	53	66	74	58	56	63	44.8
45	50	51	50	56	42	34	32	30	35	31	42	40	50	42	32	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val. (Con.)														
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	38	40	30	36	42	48	36	46	50	46	56	64	74	68
	20	26	20	16	24	28	28	26	26	32	38	32	34	38
Ogdensburg	39	41	28	28	38	40	43	49	51	51	49	54	68	63
	22	28	19	14	11	25	27	27	28	32	32	35	40	36
Potsdam	34	40	28	28	38	39	36	39	42	48	50	56	73	70
	24	23	18	13	22	25	24	28	23	23	29	33	40	40
Great Lakes	40	31	23	25	32	35	31	34	39	41	45	51	65	61
Dunkirk	....	....	....	....	....	....	....	....	....	....	...	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	58	40	26	30	38	39	35	43	57	45	57	75	78	68
	38	20	20	20	30	29	25	25	32	35	40	45	60	58
Buffalo	55	34	24	31	35	35	35	44	54	38	51	75	71	57
	32	22	19	18	23	28	26	28	31	35	33	44	53	40
Pittsford	55	45	26	32	41	44	37	44	53	49	53	69	80	72
	30	21	20	20	25	28	27	27	25	36	40	42	57	55
Rochester	51	28	27	31	41	42	37	44	53	47	52	70	79	71
	31	21	20	19	25	29	27	29	32	37	40	44	58	57
Appleton	40	46	27	32	41	39	36	41	45	45	49	57	79	71
	31	24	21	21	28	26	28	26	27	37	37	37	38	55
Fort Niagara	41	38	27	34	42	39	37	40	49	45	55	78	71	71
	31	24	18	20	29	28	24	27	29	35	37	33	45	46
Baldwinsville	42	41	28	29	37	46	39	44	53	50	52	64	80	72
	30	20	19	19	23	26	27	25	28	35	36	40	51	53
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oswego	42	38	24	28	34	44	35	38	47	47	48	62	79	70
	29	27	19	18	26	26	28	30	26	36	39	35	53	57
Palermo	44	37	24	24	35	47	36	40	45	48	48	58	77	69
	23	24	18	17	24	20	26	25	20	33	37	31	46	53
Lyons	48	45	25	32	40	47	37	44	52	50	54	66	82	71
	30	24	21	20	26	30	29	30	27	37	41	42	53	57
Erie, Pa	61	40	30	33	43	38	33	40	54	45	55	75	80	66
	34	23	20	23	24	30	26	24	25	35	37	35	64	54
Central Lakes	39	36	24	26	33	37	31	35	38	40	45	54	67	65
Fleming	48	44	28	29	38	38	40	43	50	48	51	65	79	71
	36	33	19	19	22	26	24	23	25	35	38	41	54	60
Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Romulus	49	46	28	33	44	54	38	47	54	47	54	68	84	73
	28	24	19	18	24	28	25	26	25	33	37	41	52	55
Ithaca	47	44	29	34	41	49	35	45	51	44	52	65	82	75
	30	25	21	21	27	27	26	27	25	35	38	42	51	57
Mean	38	33	25	25	31	34	32	34	36	39	43	50	60	59

‡ Maximum and minimum by

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
74	76	78	70	76	64	50	66	60	66	54	68	74	60	58	64	47.1
44	56	56	52	52	42	40	34	32	34	46	42	46	54	42	34	
69	75	69	66	75	65	60	54	62	56	50	72	75	67	61	59	45.2
44	47	45	48	44	43	34	32	36	38	39	40	45	45	40	37	
75	77	73	69	78	66	58	56	62	56	57	64	74	63	61	55	44.4
39	45	47	46	45	46	31	31	32	33	34	42	45	51	39	31	
64	68	69	65	65	58	53	44	47	50	51	53	59	58	53	58	49.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
73	77	80	82	78	67	65	46	57	58	59	65	72	73	67	77	50.8
55	66	52	55	55	42	45	36	34	49	41	55	50	53	47	48	
67	69	62	74	70	62	50	47	60	56	51	67	72	67	64	78	47.0
48	52	46	48	38	37	39	36	35	48	37	44	52	50	49	46	
80	84	82	76	80	73	65	53	60	57	60	61	71	67	57	74	50.2
51	57	64	60	55	47	42	35	36	40	48	40	42	54	49	39	
78	81	82	75	79	72	64	55	60	57	60	61	71	66	57	74	50.0
53	59	63	60	52	49	39	36	37	45	47	42	50	54	47	45	
78	82	82	74	79	71	69	55	59	55	61	56	76	65	60	60	47.7
48	50	55	52	45	43	43	38	31	40	43	39	39	47	43	40	
78	80	86	76	79	69	68	59	60	58	64	63	72	69	59	57	47.6
47	45	56	46	43	42	42	37	33	38	39	37	37	43	42	39	
79	84	80	76	82	73	66	53	62	59	56	68	72	63	68	72	49.9
51	54	63	62	47	53	35	35	40	43	45	48	52	50	44	48	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
76	77	79	73	80	63	59	44	52	60	53	53	71	62	52	71	47.0
52	54	60	48	48	42	41	34	37	42	46	41	48	50	45	46	
77	80	75	72	80	67	67	50	59	59	63	64	71	61	63	72	47.4
45	51	56	58	58	53	43	43	40	33	43	36	38	50	40	44	
80	85	82	74	81	73	65	52	60	60	59	62	70	65	61	73	50.7
54	54	67	60	60	51	43	35	38	41	49	42	46	54	46	41	
73	78	79	81	78	75	64	48	54	64	59	65	72	70	59	73	51.0
56	66	69	54	52	48	47	39	37	46	44	46	49	54	41	45	
65	70	73	71	72	62	60	44	47	50	52	53	58	56	59	57	50.7
79	84	80	78	81	72	65	54	59	61	57	65	69	61	67	73	50.4
54	58	67	62	62	49	53	34	35	39	44	45	50	50	50	45	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
82	87	84	84	85	76	70	56	62	60	61	66	70	62	71	74	51.3
49	55	65	60	63	47	53	35	35	39	46	41	45	52	50	49	
81	86	83	82	82	76	60	51	59	60	60	61	68	61	68	70	50.4
46	52	58	57	61	50	52	36	34	39	46	43	48	50	49	43	
61	67	68	66	66	61	56	45	47	50	49	53	55	54	55	54	48.0

the Draper Thermograph.

DAILY AND MONTHLY PRECIPI .

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau..	0.02	0.13	0.14	0.04	T.	0.01	0.02	0.00	T.	0.09	0.06	0.03	T.	0.01
Alfred	.05	.22	.18	.15	....	.05	.12	....	....	.12	.13	T.	....	T.
Angelica	....	.22	.25	.05	....	T.	.10	....	....	.20	.20	.04	....	....
Bolivar	....	.21	.12	....	....	....	....	....	.08	....	....	.08	....	....
Friendship	T.	.14	.26	.01	....	.02	T.	....	....	T.	.12	.17	T.	T.
Humphrey	.05	.25	.16	.08	....	.08	.04	....	....	....	.02	.03	....	.03
Little Valley......	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek.....	T.	.15	1.05	.10	....	.01	.08	....	.02	.22	.06	T.	....	.03
Jamestown	....	.19	.30	.30	....	....	T.	...	T.	.20	.10	.03	....	.05
Elmira............	....	.20	.02	....	....	.02	....	....	....	.42	...	....	....	....
Pine City..........	.28	.24	T.	T.	T.	T.	T.	...	T.	....	T.	....	....	....
Akron	....	.08	.02	T.	. .	T	T.	....	T.	....	.03	.10	T.	....
Avon	....	.06	T.	....	....	....	T.	...	....	.05	...	....	...	....
Mt. Morris.........	....	.....	.05	.03	....	T.	.....	....	....	....	.05	....	....	T.
Lockport	T.	T.	T.	....	....	T.	.....	....	....	T.	.06	.03	....	T.
Victor	.01	.02	T.	T.	....	T.	T.	...	....	T.	....	T.	....	....
Tyrone	....	....	....	....	....	....	....	...	....	....	....	....	....	....
Wedgewood	....	.15	T.	T.	....	.02	.01	....	....	.05	....	....	....	....
Addison	T.	.07	T.	.01	....	.01	.01	....	....	.20	.04	....	....	....
Atlanta	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Haskinville	....	.10	.03	....	....	....	....	....	..	.19	.05	....	....	....
South Canisteo ...	T.	T.	.15	.10	....	T.	T.	....	....	T.	.25	....	....	T
Arcade	....	.10	.09	.03	....	T.	.10	....	....	.04	.02	.13	....	.02
Attica	....	....	....	....	....	....	....	....	....	....	...	....	....	....
Varysburgh	....	.16	.10	.03	....	T.	T.	....	....	.03	.08	.14	....	T.
Eastern Plateau..	0.03	0.20	0.02	0.04	0.01	0.17	0.14	0.00	0.00	0.03	T.	0.00	0.00	0.00
Binghamton	....	.32	T.	T.	....	.10	....	....	....	T.	...		....	....
Chenango Forks..	....	....	....	....	....	....	....	....	....	....	...	...	...	....
Oxford............	.02	.25	.10	T.	....	T.	T.	....	....	....	..	....	....	....
Cortland..........	.02	.18	.08	....	....	.10	.11	....	....	....	....	....	.	....
Bloomville.......	....	.16	....	.39	....	.47	....	....	....	....	...	..	...	....
Deposit	....	....	....	....	....	....	....	....	....	....	...	....	...	....
South Kortright..	*	†.31	....	....	....	.44	....	....	....	....	...	....	...	....
Brookfield	....	....	....	.10	.20	.20	.30	....	....	...	...	....	...	....
Hamilton	....	.23	.02	.02	....	.02	.02	....	....	....	...	....	...	....
Apulia	....	....	....	....	...	....	....	....	....	...	....	...	....	....
Middletown	*	†.18	....	T.	....	.87	....	....	....	....	...	....	....	....
Port Jervis	....	.20	....	....	....	.05	.71	....	....	....	...	...	...	....
Warwick	....	.13	....	....	....	.05	.73	....	....	...	...	...	....	....
Cooperstown.......	....	.38	.08	.07	....	....	.22	....	....	...	...	....	....	....
New Lisbon	....	.39	T.	T.	...	....	....	....	...	....	...	...	....	....
Oneonta	.29	.16	...	....	...	.36	.13	...	....	...	...	....	....	....
Perry City.........	.03	.29	T.	T.	....	.03	.02	....	....	.09	....	....	....	....
Newark Valley...	T.	.30	T.	....	....	T.	T.	....	....	...	T.	....	....	....
Waverly..........	T.	.35	.10	T.	....	.06	T.	....	....	.34	T.	...	....	....
Ellis...	....	....	....	...	....	....	....	....	....	...	....	....	....	....
Mohonk Lake	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Northern Plateau.	0.05	0.16	0.25	0.03	0.00	0.02	0.10	0.02	0.00	0.00	T.	0.00	0.00	T.
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Saranac Lake	T.	.10	.17	.08	....	.14	T.	....	....	....	T.	....	...	T.
Gloversville	0.06	.33	.03	T.	....	...	.10	....	....	....	T.	....	....	T.
Lowville.........	...	.16	.12	.05	....	....	.05	....	....	...	..	...	....	....
Number Four	.12	.26	*	†.40	....	....	.36	....	....	....	....	....	....	T.
Turin.............	.10	.11	.65	....	....	T.	.12	....	....	....	T.	....	....	T.
Kings Station....	....	...	.30	....	....	....	....	.10	....	....	....	....	....	....

TATION FOR APRIL, 1896 — (INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
T.	0.00	0.24	T.	0.07	0.05	0.13	0.06	0.00	0.26	T.	T.	T.	0.03	T.	0.00	1.36
....	....	.14	....	......	.09	.04	T.	....	.36	....	....	....	.04	T.	....	1.69
....	....	T.	....	T.	....	....	....	....	.48	....	....	....	.04	....	....	1.58
....	....	.35	....	......	.06	.20	....	....	.28	....	....	....	.04	....	....	1.48
....	....	.41	T.	T.	.07	.10	T.	....	.28	....	....	....	T.	....	....	1.58
....	....	......	....	......	.03	.04	T.	....	.50	....	....	....	....	....	....	1.31
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.01	....	.01	.10	.11	T.	....	.60	....	....	T.	.14	....	....	2.69
....	....	......	....	T.	.09	.10	....	....	.91	....	....	T.	.21	....	....	2.48
....	....	......	....	T.	....	T.	....	....	.11	....	....	....	....	....	....	0.77
....	....	.20	....	.25	....	....	....	....	....	....	....	....	....	....	....	0.97
....	....	......	....	.06	T.	.57	T.	....	.10	....	T.	....	.08	....	....	1.04
....	....	.34	....	.06	....	.12	.26	....	.14	T.	....	....	.02	....	....	1.05
....	....	T.	....	.03	.05	.25	....	....	T.	....	....	....	....	....	....	0.46
....	....	T.	....	.03	T.	.08	.13	....	.07	....	....	....	....	....	....	0.40
T.	....	......	.02	......	.38	.18	.07	....	.17	.03	....	...	.04	....	....	0.92
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	2.05	....	.06	....	.03	.04	....	.10	....	....	....	.01	....	....	2.52
....	....	.43	....	.02	T.	....	T.	....	.28	T.	....	....	T.	....	....	1.07
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.02	....	......	....	.05	.05	....	.15	....	....	....	....	....	....	0.64
....	....	.20	....	.10	T.	.10	T.	....	.35	....	....	T.	T.	....	....	1.25
....	....	.36	....	.09	.06	.10	T.	....	.22	....	....	....	T.	....	....	1.36
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.10	....	.67	T.	.47	....	....	.15	T.	....	....	T.	....	....	1.93
0.00	0.00	0.05	T.	0.05	T.	0.27	0.06	T.	0.02	0.04	0.00	T.	T.	T.	0.00	1.17
....	....	T.	....	.10	.04	.03	....	....	.04	....	....	T.	....	....	....	0.63
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.05	.05	......	T.	.30	....	T.	T.	....	....	....	....	....	....	0.77
....	....	.05	....	......	....	T.	.26	....	.03	....	....	....	....	....	....	0.93
....	....	......	....	.11	....	.10	....	....	....	.46	....	....	....	....	....	1.69
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.32	....	.11	....	.30	....	....	....	....	....	....	....	....	....	1.48
....	....	......	....	.18	....	.22	....	....	....	....	....	....	....	....	....	1.20
....	....	T.	....	.09	....	....	.34	....	....	.13	....	....	.03	....	....	0.90
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	......	....	.35	....	....	....	....	....	....	....	T.	....	1.40
....	....	......	....	......	....	.65	....	....	....	....	....	....	....	.02	....	1.63
....	....	.09	....	......	....	.49	....	....	....	....	....	....	....	....	....	1.49
....	....	......	....	.01		.49	....	....	....	....	....	....	....	....	....	1.25
....	....	.16	....	.04	....	.04	.17	....	....	....	....	....	....	....	...	0.80
....	....	......	....	.11	....	.28	....	....	.06	....	....	....	....	....	....	1.39
....	....	.07	....	.02	....	.84	.10	....	.09	....	....	....	....	....	....	1.58
....	....	T.	....	......	....	.02	.02	....	.05	....	....	....	....	....	....	0.39
....	....	.10	....	.01	T.	.13	....	....	.09	....	....	....	....	....	....	1.18
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	0.05	0.07	0.08	0.00	0.16	0.11	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.00	1.19
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.24	.05	.17	....	.28	....	....	....	.04	....	....	.15	....	....	1.37
....	....	.04	T.	.09	....	.15	.06	....	....	.10	....	....	T.	....	....	0.96
....	....	.03	....	.03	....	.06	.20	....	....	....	....	....	.10	....	....	0.80
....	....	.01	.29	.09	....	.27	....	....	....	....	....	....	.04	....	....	1.84
....	....	T.	.07	.10	....	.20	.12	....	....	.01	....	....	T.	....	....	1.48
....	....	......	....	......	....	....	.30	....	....	....	....	....	....	....	....	0.70

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.08	0.22	T.	0.00	0.00	0.16	0.31	0.00	0.00	T.	0.00	0.00	0.00	0.00
Brooklyn	T.	.06	T.	....	....	.15	.24	....	....	....	....	....	....	....
Manhattan Beach.	....	.38	....	....	....	.25	.70	....	....	....	....	....	....	....
New York City ...	T.	.40	T.	....	....	.15	.30	....	....	T.	....	....	....	....
Willet's Point	.28	.10	....	....	....	.30	.45	....	....	....	....	....	....	....
Brentwood........	.30	....	T.	....	....	.02	.01	....	....	....	....	....	....	....
Setauket..........	T.	.35	T.	....	....	.12	.13	....	....	....	....	....	....	....
Bedford	T.	.27	....	....	....	.16	.31	....	....	....	....	....	....	....
Hudson Valley....	T.	0.23	0.05	0.01	0.00	0.05	0.43	T.	0.00	0.00	T.	0.00	T.	0.00
Albany	T.	.24	T.	T.	....	....	.34	T.	....	....	T.	....	....	....
Lebanon Springs..	T.	.24	T.	.10	....	....	.51	....	....	....	T.	....	....	....
Honeymead Brook	.01	.28	....	....	....	.10	.09	....	....	....	....	....	....	....
Poughkeepsie	T.	.27	....	....	....	.08	.53	....	....	....	....	....	T.	....
Wappinger's Falls	.02	.20	T.	....	....	.11	.51	....	....	....	....	....	....	....
West Point.......	....	....	.38	....	....	....	*	† 1.10	....	....	....	....	....	....
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	.26	....	....	....	.09	.44	....	....	....	....	....	....	....
So. East Reservoir	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills.......	....	.35	....	....	....	....	.60	....	....	....	....	....	....	....
Marlborough	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohawk Valley ...	0.40	0.12	0.12	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rome	.40	.12	.12	....	....	.13	....	....	....	....	....	....	....	....
Utica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	0.00	0.26	0.05	0.01	0.00	0.00	T.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plattsb'h Barracks	....	.26	.10	....	....	....	....	....	....	....	....	....	....	....
Saratoga Springs..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Glens Falls	....	.33	....	....	....	....	T.	....	....	....	....	....	....	....
St. Lawrence Val'y	0.00	0.09	0.06	0.14	0.00	0.01	0.09	0.00	0.00	0.00	0.00	T.	T.	0.09
Malone	....	.07	.22	.74	....	....	....	....	....	....	....	....	....	.09
Madison Barracks.	....	....	....	....	....	....	....	....	....	....	....	....	....	.11
Watertown	....	.36	.01	.01	....	.06	....	....	....	....	....	T.	....	.23
Canton	....	.05	.10	.30	....	....	.30	....	....	....	....	....	....	.10
DeKalb Junction .	....	.05	.06	.03	....	....	.10	....	....	....	....	....	....	.05
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond..	....	.15	....	....	....	.03	.15	....	....	....	....	....	T.	.10
Ogdensburg.	....	.06	T.	.02	....	....	.20	....	....	....	....	....	....	.07
Potsdam	....	....	*	† .50	....	....	....	....	....	....	....	....	....	....
Great Lakes	0.02	0.14	0.06	0.03	T.	T.	0.02	T.	0.02	0.02	0.03	T.	T.	0.02
Dunkirk...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield.........	....	.08	.13	....	....	....	.05	....	.05	T.	....	....	....	....
Buffalo	T.	.12	T.	T.	....	T.	T.	T.	....	.02	.07	.05	....	.03
Adams Centre	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pittsford	....	.12	T.	T.	....	T	....	....	....	T.	T.	....	....	....
Rochester	T.	.10	.04	.01	....	T	.02	....	....	.01	T.	T.	....	T.
Scottsville	....	....	....	....	....	T.	....	....	....	....	.11	....	....	....
Appleton	T.	.16	T.	T.	....	T.	.02	....	....	.03	.02	T.	....	T.
Fort Niagara	.01	.02	.01	....	....	.01	.04	....	.03	.05	.02	.01	....	....
Baldwinsville......	.29	.03	.05	T.	....	....	T.	....	....	....	....	....	....	....
Skaneateles	....	.32	.02	.03	....	....	....	....	....	....	....	....	....	....
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridgeway	....	.20	.12	.04	T.	.02	....	....	....	.05	T.	....	....	....
Demster	....	.34	.15	....	....	....	....	....	....	....	.10	....	.04	.07
‡ Fulton...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oswego	T.	.28	.35	T.	....	T.	.11	....	....	....	T.	....	....	.07
Palermo	.01	.30	.10	T.	....	....	....	....	....	....	....	....	....	T.

TATION FOR APRIL — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.00	0.00	T.	T.	T.	0.03	0.21	0.09	0.00	0.02	T.	0 00	0.00	T.	0.00	0.00	1.12
....	....	....	....	....	....	.30	.05	....	.07	....	....	....	....	....	....	0.87
....	....	....	....	....	....	.44	.10	....	.06	....	....	....	....	....	....	1.93
....	....	....	T.	....	....	.30	.08	....	.01	T.	....	....	....	....	....	1.24
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.13
....	....	....	....	....	.20	....	.20	....	....	....	....	....	....	....	....	0.73
....	....	.02	....	T.	....	.40	T.	....	....	....	....	....	....	....	....	1.02
....	....	....	....	....	....	.04	.19	....	....	....	....	....	T.	....	....	0.91
T.	0.00	0.03	T.	0.06	0.02	0.08	0.23	0.05	0.00	T.	T.	0.00	T.	0.00	0.00	1.34
T.	....	T.	.01	.14	....	.07	.17	....	....	T.	T.	....	.01	....	....	0.98
....	....	.09	....	.32	....	....	.60	....	....	....	....	....	T.	....	....	1.86
....	....	.07	....	....	....	.24	.04	....	....	T.	....	....	....	....	....	0.83
....	....	.05	T.	....	....	.18	....	....	....	....	....	....	....	....	....	1.11
....	....	....	.02	T.	....	.08	.24	....	....	T.	....	....	....	....	....	1.18
....	....	....	....	....	....	....	.50	....	....	....	....	....	....	....	....	1.98
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.13
....	....	....	....	....	....	*	† .41	....	....	....	....	....	....	....	....	1.20
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.48
....	....	....	....	....	.20	....	.05	.40	....	....	....	....	....	....	....	1.60
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	0.00	0.04	0.00	0 00	0.40	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	1.25
....	....	....	.04	....	....	.40	....	....	.04	....	....	....	....	....	....	1.25
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0 00	0.00	0.16	0.00	0.00	T.	0.06	0.46	0 00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	1.02
....	....	T.	....	....	T.	....	.50	....	....	....	....	....	....	.05	....	0.85
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.33	....	....	....	.12	.42	....	....	....	....	....	....	....	....	1.20
0.00	0.00	0.23	0.07	0 09	T.	0.16	0.11	0.00	0.00	0.19	T.	0.00	0.02	0.00	0.00	1.41
....	....	.03	.04	.10	....	.23	.41	....	....	.06	.03	....	.10	....	....	2.17
....	....	....	.27	....	....	....	....	....	....	....	....	....	....	....	....	0.38
....	....	.06	.12	.25	....	.04	.18	....	....	.05	....	....	....	....	....	1 37
....	....	1.03	.02	.04	....	.25	....	....	....	.47	....	....	....	....	....	2.66
....	....	.34	.09	.18	....	.20	.09	....	....	.08	....	....	.01	....	....	1.28
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.29	....	.18	....	....	.10	....	....	.33	....	....	....	....	....	1.33
....	....	.02	....	....	.02	*	† .29	....	....	.02	....	....	.02	....	....	0.72
....	....	....	....	....	....	.37	....	....	....	.50	....	....	....	....	....	1.37
0.01	0.01	0.05	0.02	0.06	0.02	0.13	0.09	0.00	0.08	0.01	0.01	T.	0.02	T.	0.01	0.89
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.08	T.	.25	....	....	.58	....	....	....	....	....	....	1.22
....	....	.01	....	.07	T.	.27	....	....	.19	T.	....	T.	.10	....	....	0.93
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.16	....	.10	T.	.12	.25	....	.09	.05	....	....	....	....	....	0.89
....	....	.03	T.	.13	T.	.38	.26	....	.05	.01	....	....	.05	....	....	1.09
....	.13	....	....	.10	....	.21	.20	....	.15	T.	....	....	....	....	....	0.90
....	....	T.	T.	.09	T.	.03	....	....	.01	....	....	....	.07	....	....	0.43
....	....	.18	....	.01	....	.03	....	....	.08	....	....	....	.01	....	....	0.51
....	....	.03	....	.10	T.	.26	....	....	T.	....	....	....	....	....	....	0.76
....	....	.41	....	.02	....	.08	.09	....	....	....	....	....	....	....	....	0.97
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.04	T.	.05	....	....	T.	T.	....	....	.05	....	....	0.57
....	....	....	....	.17	....	.06	.20	....	....	....	....	....	....	....	....	1.13
....	....	....	....	.09	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	.06	.01	T.	.18	....	....	T.	....	....	T.	....	....	1.06
....	....	....	T.	T.	....	T.	....	....	....	....	....	....	....	....	....	0.41

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes (Con.)														
Phœnix	....	....	....	.38	....	....	....	...	....	....	....	....	....	....
Lyons	T.	....	....	....	....	T.	....	....	.13	....	....	T.	....	T.
Rose	T.	.22	.03	.02	....	T.	....	....	....	....	T.	....	T.	.04
Erie, Penna	.02	.15	.02	T.	....	T.	.03	...	.10	.19	.16	....	....	.13
Central Lakes	0.10	0.11	T.	0.01	0.00	0.25	T.	0.00	0.00	0.01	T.	0.00	0.00	0.00
Fleming	....	T.	....	....	....	1.00	....	...	....	....	....	....	....	....
Sherwood	....	.15	....	.05	....	....	....	....	....	....	....	....	....	....
Watkins	....	....	....	....	....	....	....	...	....	....	....	....	....	....
Romulus	....	.26	T.	....	....	T.	....	....	....	.02	....	....	....	....
Ithaca	.42	.03	.02	T.	....	T.	T.	....	....	.02	T.	....	...	....
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	0.07	0.17	0.09	0.03	T.	0.08	0.11	T.	T.	0 02	0.01	T.	T.	0.01

‡ Record for the month incomplete. ‖ Reports

TATION FOR APRIL — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.15	....	......	....	......	....	....	.32	....	....	....	.05	....	....	....	....	0.90
....	.03	......	.44	T.	.02	.26	.02	....	.02	.05	.05	....	....	....	....	1.02
....	....	.04	....	.10	T.	.38	.14	....	T.	.01	....	....	T.	....	....	0.98
....	....	......	....	.01	.25	.01	....	....	.29	....	....	T.	T.	T.	.10	1.46
0.00	0.00	0.15	0.00	0.05	0.00	0.34	0.40	0.00	0.10	T.	0.00	0.00	T.	0.00	0.00	1.49
....	....	......	....	......	....	T.	.40	....	....	....	....	....	....	....	....	1.40
....	....	......	....	......	....	....	.43	....	....	....	....	....	....	....	....	0.63
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.34	....	......	....	1.30	.61	....	.37	....	....	....	....	....	....	2.90
....	....	.25	....	.20	....	.05	.16	....	.05	T.	....	....	T.	....	....	1.02
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
T.	T.	0.10	0.02	0.05	0.01	0.19	0.16	T.	0.05	0.03	T.	T.	0.01	T.	T.	1.22

too late to be used in computing the averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAH.).									
		Normal for the month of April.	Length of record, years.	Record begins.	Record ends.	Mean for April, 1896.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR APRIL. Highest.	Year.	Lowest.	Year.
Western Plateau	......	43.9	....	....	....	50.5	+6.6	......	......	......	......
Angelica	Allegany	42.8	14	1855	1896	48.2	+5.4	48.2	1896	35.9	1857
Humphrey	Cattaraugus	43.1	13	1884	1896	49.0	+5.9	49.0	1896	37.6	1884
Elmira	Chemung	45.7	18	1851	1896	54.2	+8.5	54.2	1896	38.5	1857
Eastern Plateau	......	43.5	....	....	....	47.8	+4.3	......	......	......	......
Oxford	Chenango	44.0	29	1828	1896	47.2	+3.2	51.6	1844	37 6	1838
Cortland	Cortland	42.0	33	1829	1896	47.6	+5.6	48.0	1840	34.6	1857
Hamilton	Madison	45 4	20	1827	1896	46.8	+1.4	51.5	1844	38.9	1836
Cooperstown	Otsego	41.0	43	1854	1896	46.3	+5.3	51.6	1878	33.6	1874
Waverly	Tioga	44.9	14	1883	1896	51.0	+6.1	51.0	1896	42.0	1885
Northern Plateau	......	42.9	....	....	....	41.4	+1.5	......	......	......	......
Lowville	Lewis	42.9	31	1827	1896	44.4	+1.5	51.0	1833	34.3	1857
Atlantic Coast	......	47.6	....	....	....	49.4	+1.8	......	......	......	......
New York City	New York	48.0	26	1871	1896	50.0	+2.0	53 6	1871	41.3	1874
Setauket	Suffolk	47.2	11	1886	1896	48.7	+1.5	49 8	1891	44.7	1888
Hudson Valley	......	46 5	....	....	....	49.7	+3.2	......	......	......	......
Albany	Albany	46.1	23	1874	1896	50 0	+3 9	51.5	1878	36.6	1874
Honeymead Brook	Dutchess	45.6	16	1881	1896	48.9	+3.3	50.5	1886	40.4	1887
West Point	Orange	47.9	67	1826	1896	50.3	+2.4	......	......	......	......
Champlain Valley	......	41 4	....	....	..	43 3	+1.9	......	......	......	
Plattsburgh Barracks	Clinton	41 4	42	1839	1896	43.3	+1.9	48.2	1844	35.6	1841
St. Lawrence Valley	......	42 5	...	....	....	45.6	+3.1	......	......	......	.....
Madison Barracks	Jefferson	42.3	35	1839	1896	46.0	+3.7	52.8	1878	34.1	1874
Canton	St. Lawrence	42.5	35	1862	1896	44.8	+2.3	52.4	1878	33.7	1868
North Hammond	"	41.9	18	1867	1896	47.1	+5.2	48 8	1871	33.3	1874
Potsdam	"	43.3	29	1828	1896	44.4	+1.1	56.2	1839	37.0	1841
Great Lakes	......	42.8	....	....	....	48.6	+5 7	......	......	......	......
Buffalo	Erie	42.1	26	1871	1896	47.0	+4.9	50 0	1878	34.5	1874
Rochester	Monroe	43.8	26	1871	1896	50.0	+6.2	52.5	1878	35.6	1874
Fort Niagara	Niagara	42 6	40	1842	1896	47.6	+5 0	49 9	1878	35 6	1874
Baldwinsville	Onondaga	43 6	20	1854	1896	49 9	+6 3	49.9	1896	38.6	1857
Oswego	Oswego	41.7	26	1871	1896	47.0	+5 3	52 4	1878	36.8	1874
Palermo	"	41 6	43	1854	1896	47.4	+5.8	50.0	1878	32.4	1874
Erie, Pennsylvania	Erie	44.4	23	1874	1896	51.0	+6.6	51.0	1878	37.0	1874
Central Lakes	......	44.4	....	....	....	50.4	+6 0	......	.....	.....	......
Ithaca	Tompkins	44 4	18	1879	1896	50.4	+6 0	50.4	1896	41.3	1888
Average departure	......	......	....	....	...	....	+4 5	......	......	......	......

AND PRECIPITATION — APRIL.

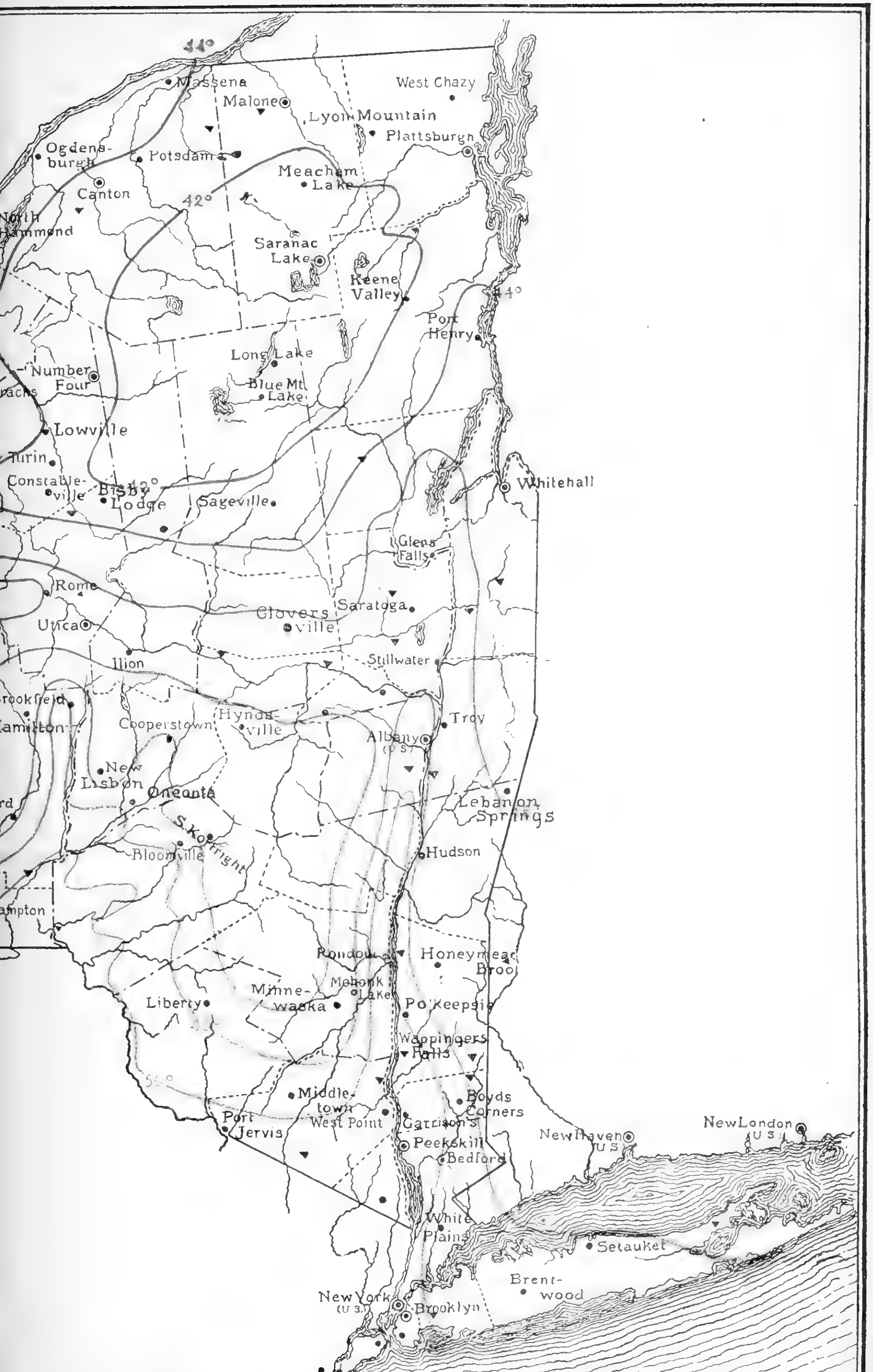
STATION.	COUNTY.	PRECIPITATION — (INCHES).									
		Average for the month of April.	Length of record, years.	Record begins.	Record ends.	Total for April, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR APRIL.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
Western Plateau	....	3.14	....	....	....	1.22	—1.92	......	......	......	......
Angelica	Allegany	3.10	12	1857	1896	1.58	—1.52	4 40	1857	0.90	1872
Humphrey	Cattaraugus	3.09	13	1884	1896	1.31	—1.78	5 61	1893	1.31	'95,'96
Elmira	Chemung	3 22	18	1851	1896	0.77	—2.45	6.51	1857	0.77	1896
Eastern Plateau	....	2.68	....	...	....	1.11	—1.58	......	......	......	......
Oxford	Chenango	2.96	26	1829	1896	0 77	—2.19	7.11	1854	0 33	1833
Cortland	Cortland	3 64	17	1851	1896	0.93	—2 71	6.78	1857	0 93	1896
Hamilton	Madison	1.89	21	1827	1896	0.90	—0.99	4.50	1829	0.52	1833
Cooperstown	Otsego	2.60	43	1854	1896	1 25	—1.35	7.12	1854	0.92	1863
Port Jervis	Orange	2.88	13	1880	1896	1.63	—1 25	4.67	1895	1.12	1881
Waverly	Tioga	2.14	14	1883	1896	1.18	—0.96	4.63	1894	0.87	1882
Northern Plateau	....	2.15	...	....	....	0 80	—1.35	......	......	......	......
Lowville	Lewis	2.15	33	1827	1896	0 80	—1.35	5.74	1857	0.35	1830
Atlantic Coast	....	3.14	....	...	....	1 13	—2.01	......	......	......	......
New York City	New York	3.09	26	1871	1896	1.24	—1.85	7.02	1874	1 00	1881
Setauket	Suffolk	3.19	11	1886	1896	1.02	—2.17	4.95	1893	1.02	1896
Hudson Valley	....	2.79	....	....		1.21	—1.58	......	......	......	......
Albany	Albany	2.42	23	1874	1896	0 98	—1.44	4.97	1874	0.56	1892
Honeymead Brook	Dutchess	2.07	16	1881	1896	0 83	—1.24	4.25	1895	0.71	1892
Poughkeepsie	"	2 45	21	1830	1896	1.11	—1.34	5.85	1831	0.61	1892
West Point	Orange	3.72	50	1840	1896	1.98	—1.74	10.53	1854	0.50	1844
Boyds Corners	Putnam	3.27	26	1870	1896	1.13	—2.14	6.31	1874	1.08	1892
Champlain Valley	....	1.80	....	....	....	0 85	—0.95	......	......	......	......
Plattsburgh Barracks	Clinton	1.80	37	1840	1896	0.85	—0.95	5.25	1840	0.30	1881
St. Lawrence Valley	....	2.04	....	....	....	1.31	—0.72	......	......	......	......
Malone	Franklin	2.49	17	1830	1896	2.17	—0 32	......	......	......	......
Madison Barracks	Jefferson	1.76	36	1841	1896	0.38	—1.38	4.90	1889	0.38	1896
North Hammond	St. Lawrence	2.09	19	1866	1896	1.33	—0.76	5.60	1867	0.65	1870
Potsdam	"	1.81	28	1828	1896	1.37	—0.44	4.18	1889	0.20	1830
Great Lakes	....	2 12	....	..	...	0 91	—1 20	......	......	......	......
Buffalo	Erie	2 43	26	1871	1896	0 93	—1 50	4.71	1878	0.76	1881
Rochester	Monroe	2.43	26	1871	1896	1 69	—1 34	4.99	1874	0.94	1884
Fort Niagara	Niagara	1.87	39	1842	1896	0.51	—1.36	4 20	1842	0.21	1887
Oswego	Oswego	2 04	26	1871	1896	1 06	—0 98	3 66	1886	0 85	1879
Palermo	"	1.47	37	1860	1896	0.41	—1.06	6.20	1863	0.26	1879
Erie, Pennsylvania	Erie	2 45	23	1874	1896	1.46	—0.99	3 86	1880	1.14	1892
Central Lakes	....	2.07	....	....	..	1 02	—1.05	......	......	......	......
Ithaca	Tompkins	2.07	18	1879	1896	1.62	—1.05	4.84	1894	1.02	1896
Average departure	....	......	....	....	...	....	—1 40	......	....	......	......

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR APRIL, 1896

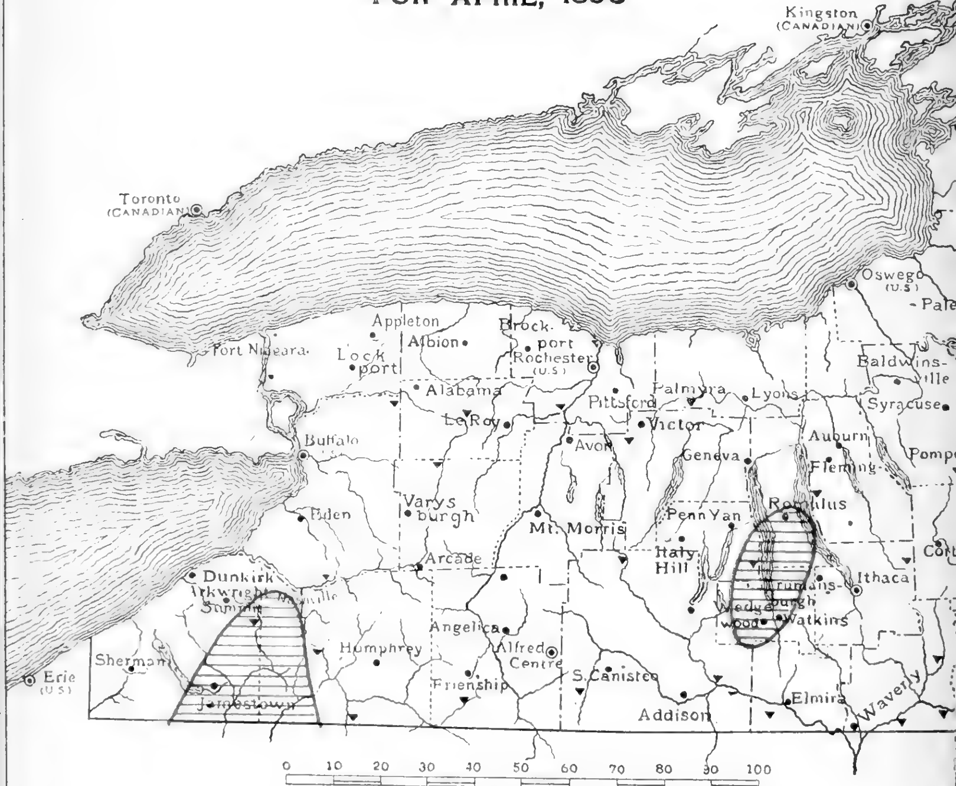

44°
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
42°
North Hammond
Saranac Lake
Keene Valley
44°
Port Henry
Long Lake
Blue Mt. Lake
Number Four
Lowville
Turin
Constableville
Bisby Lodge
42°
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Gloversville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
West Point
Boyds Corners
Garrison's
Port Jervis
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

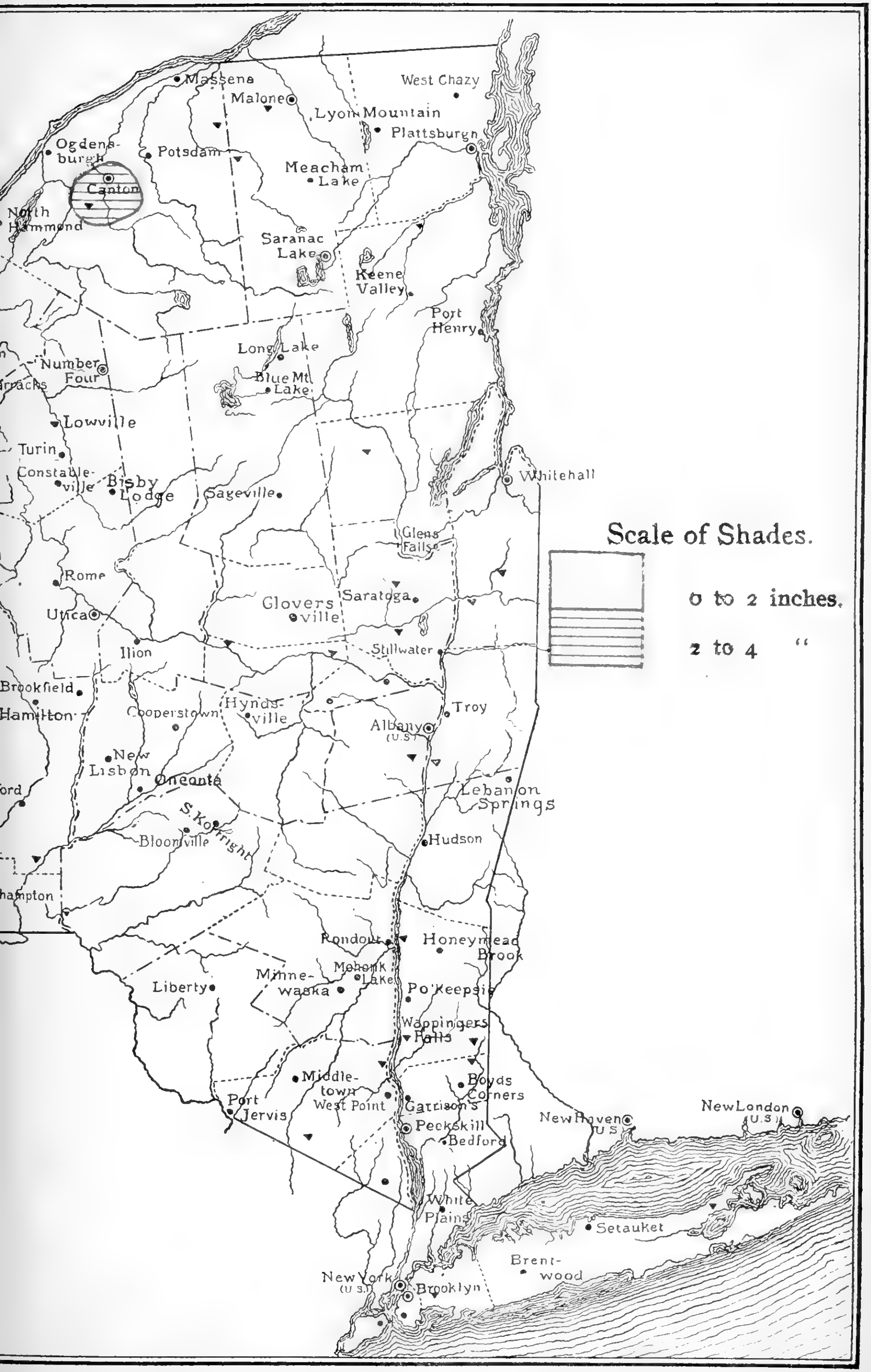
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR APRIL, 1896




Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Scale of Shades.
0 to 2 inches.
2 to 4 "
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'Keepsie
Wappingers Falls
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
Peekskill
New Haven U.S.
New London (U.S.)
Bedford
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

Meteorological Summary for May, 1896.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during May was 29.99 inches. The highest barometer was 30.43 inches at Albany on the 7th, and the lowest was 29.54 inches at Rochester on the 28th. The highest mean pressure, 30.03 inches, obtained at New York city, and the lowest, 29.96 inches, at Number Four, Lewis county. The average of the mean pressures at six stations of the National Bureau was very slightly above the normal value, the departure at Albany being the greatest.

The mean temperature of the State, as derived from the records of 73 stations, was 61.0 degrees. The highest local mean was 65.8 degrees at Brooklyn and Wappingers Falls, and the lowest was 58.0 degrees at Oswego. The highest general daily mean was 73 degrees on the 10th, and the lowest was 55 degrees on the 20th. The maximum temperature reported was 95 degrees at Middletown on the 9th, at Poughkeepsie and Brentwood on the 10th and at Brooklyn and West Point on the 11th. The minimum temperature was 29 degrees at Varysburg on the 6th, and at Brentwood on the 8th. The mean monthly range of temperature for the State was 51 degrees, the greatest local range being 66 degrees at Brentwood, and the least 36 degrees at Oswego and Erie, Pa. The mean daily range was 23 degrees. The greatest local daily range was 50 degrees at Watertown on the 14th, and the least was 2 degrees at Setauket on the 21st. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 62.6 degrees; the Eastern Plateau, 61.0 degrees; the Northern Plateau, 58.1 degrees; the Atlantic Coast, 62.8 degrees; the Hudson Valley, 63.3 degrees; the Mohawk Valley, 60.4 degrees; the Champlain Valley, 58.8 degrees; the St. Lawrence Valley, 59.3 degrees; the Great Lakes, 61.2 degrees, and the Central Lakes, 62.7 degrees. The average of the mean temperatures at 27 stations possessing records for previous years was 4.8 degrees above the normal value, excesses being reported from all stations. The departures were greatest in the Western Plateaú and Great Lake Region, and least in the St. Lawrence and Champlain Valleys. At the following stations the temperature was the highest for May during the period covered by their records: Angelica, 15 years; Humphrey, 13 years; Elmira, 17 years; Cortland, 32 years; Waverly, 14 years; Setauket, 11 years; Honeymead Brook, 16 years; Baldwinsville, 20 years.

The mean relative humidity was 69 per cent. The mean dew point was 51 degrees.

The average precipitation, as derived from the records of 93 stations, was 2.52 inches. The maximum local precipitation was 4.70 inches at Bolivar, and the least was 0.80 inches at Eagle Mills. Generally the rainfall was evenly distributed over the State, amounts exceeding four inches being reported only from a narrow belt in southern Allegany and Steuben counties, and from Romulus, Seneca county. General rains occurred on the 3d, 8th, 15th, 17th to 19th (excepting in the Hudson Valley and Atlantic Coast where rains occurred on the 19th to 21st) and from the 26th to the close of the month. The heaviest rainfall for the State occurred on the 28th. No snowfall was reported. The average precipitation at 29 stations possessing records for previous years was 0.93 inches below the normal amount, deficiencies being reported from all stations excepting Palermo. The greatest deficiency obtained over the Western Plateau.

The average number of days on which the precipitation amounted to 0.01 inches or more was 9.3. The number of rainy days was very uniform over the State. The average number of clear days was 10.4; of partly cloudy days, 13.4; and of cloudy days, 7.2, giving an average cloudiness for the State of 48 per cent.

The prevailing direction of the wind was from the southwest. The average wind travel at six stations of the National Bureau was 8,242 miles, which amount is considerably in excess of the usual values for May. The maximum velocity reported was 53 miles per hour at Buffalo on the 29th, direction from the west.

Thunderstorms occurred on the 2d and 3d at a few stations in the Great Lake Region and Western Plateau; on the 4th at one station each in the Western Plateau, Hudson Valley and Central Lake Region; on the 5th in the Atlantic Coast Region and one station each in the Northern and Eastern Plateaus; on the 8th at four stations in the Western Plateau; on the 11th, at New York city; on the 14th at five stations in the Western Plateau and at Brooklyn; on the 15th, at five widely separated stations; on the 17th, general over the State excepting in the St. Lawrence and Champlain Valleys; on the 19th, at six stations in the southeastern sections; on the 24th at five stations in the Western Plateau; on the 25th, at four stations in the western sections; on the 26th, general in all regions excepting the St. Lawrence and Champlain Valleys; on the 28th, general excepting in regions north of the Mohawk Valley; on the 29th at four stations in the Eastern and Western Plateaus; on the 30th, at seven widely separated stations; on the 31st at seven stations in the southeastern sections.

Hail was reported on the 2d, 3d, 5th, 11th, 14th, 17th, 27th, 30th and 31st.

Lunar halos were observed on the 19th, 21st and 22d.

Auroras were observed on the 2d, 3d, 17th, 19th and 20th.

Light frosts occurred on the 1st, 2d, 3d, 6th, 7th, 8th, 12th, 13th, 14th, 16th and 20th.

The weather of May was characterized by the deficient rainfall, the rapid and great changes in temperature and the high general monthly mean. From the 1st to the 19th the mean temperature was continuously above normal for the season, the average excess being about 9 degrees. The period of greatest departure was from the 9th to the 11th inclusive, the warmest day being the 10th with station means ranging from 70 to 80 degrees and the general mean for the State of 73 degrees, or about 19 degrees above the normal for this date. A maximum temperature of 95 degrees occurred on the 10th and 11th. The principal depressions of temperature occurred on the 20th, with general light frosts over the State, and on the 29th to 31st, the mean for the latter dates being slightly below normal. The general mean for the last third of the month was slightly in excess of the normal value.

The principal periods of rainfall were on the 17th to 19th and 26th to the close of the month, accompanied by severe thunderstorms, destructive hail in restricted areas, and high winds along Lake Ontario and the St. Lawrence Valley. Though rain frequency was but slightly less than usual, the precipitation was generally very light until the latter part of the month.

About the usual number of cyclonic storms for May affected weather conditions in New York. With the exception of those which passed in this region on the 18th, 26th and 28th-29th, the storms were of very moderate intensity and all passed centrally north of New York State. The storm of the 28th moved rapidly from the southwest increasing in energy and passed centrally over the Great Lake Region and the St. Lawrence Valley, developing severe thunderstorms with general and the heaviest rains of the month. The depression occupied the region north of New York, moving slowly northeastward with diminished energy on the 30th, spreading thence southeastward over New England on the 31st, with general moderate rains and falling temperature throughout this State.

The warm, dry weather that prevailed until about the 26th, while very favorable for carrying on plowing, planting and seeding, proved quite a serious drought to growing crops; meadows and pastures being the chief sufferers, and winter wheat and rye being somewhat affected. Work progressed rapidly, and was usually about ten days ahead of the season. Plowing for corn was general at the beginning of the month, and some was planted. Hop pole setting was completed, and peppermint roots set out. Early asparagus was marketed on Long Island. Wheat and oats sowing was nearly completed by the 10th, and many potatoes had been planted. Fruits were in full bloom on the 10th. Apples bloomed profusely, pears, plums, quinces, cherries, etc., rather light, while peaches were extremely scarce, being killed by the February freeze. The serious drouth was thoroughly relieved by general and copious rains of the 26th and 28th, but too late to save the grass crop. Meadows and pastures had suffered severely, and at the close of the month farmers were busy sowing fodder crops. Delayed plowing and planting started with renewed vigor after the rains, and at the close of the month nearly all the corn and most of the potatoes had been planted, and early planted potatoes were up. Bean planting was well under way; tobacco setting had begun; and a fine crop of strawberries was being picked. Hops were thriving, and considered ten days ahead. The last week was cool and windy. No damage was done to vegetation by the light frost of the 20th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA-			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau ..	....	....	....	....	..	....	..	....	...	....	....	62.6	92	26
Alfred	Allegany	1824	....	....	..	....	..	....	...	....	59.5	61.0	84	9
Angelica	"	1340	....	....	..	....	..	....	...	....	60.6	60.8	84	9
Bolivar	"	....	....	....	..	....	..	....	...	....	....	61.0	85	*a*
Friendship	Allegany	1550	....	....	..	....	..	....	...	....	....	62.0	87	10
Humphrey	Cattaraugus ..	1950	....	....	..	....	..	....	...	....	62.2	62.0	85	9
Arkwright	Chautauqua ..	1260	....	....	..	....	..	....	...	....	....	60.7	79	14
Jamestown	" ..	1328	....	....	..	....	..	....	...	....	....	63.0	85	*a*
Elmira	Chemung	863	....	....	..	....	..	....	...	....	....	65.2	91	9
Avon	Livingston ...	585	....	....	..	....	..	....	...	....	....	63.1	87	10
Mt. Morris	" ...	525	....	....	..	....	..	....	...	....	....	70.0	92	26
Lockport	Niagara	....	....	....	..	....	..	....	...	....	63.0	63.2	88	9
Victor	Ontario	....	....	....	..	....	..	....	...	....	....	....	..	..
Wedgewood	Schuyler	1350	....	....	..	....	..	....	...	....	60.4	62.5	86	9
Addison	Steuben	1006	....	....	..	....	..	....	65	52	62.0	62.4	88	9
South Canisteo	Steuben	1480	....	....	..	....	..	....	68	50	59.0	61.3	87	*a*
Arcade	Wyoming	1557	....	....	..	....	..	....	...	....	60.6	60.9	82	*b*
Varysburg	"	....	....	....	..	....	..	....	...	....	....	62.0	90	9
Eastern Plateau ...	....	....	....	....	..	....	..	....	...	....	....	61.0	95	9
Binghamton	Broome	870	....	....	..	....	..	....	...	....	62.7	62.2	88	10
Oxford	Chenango	550	....	....	..	....	..	....	...	....	....	60.0	88	10
Cortland	Cortland	1120	....	....	..	....	..	....	...	....	....	60.2	86	10
Bloomville	Delaware	1550	....	....	..	....	..	....	...	....	61.4	62.3	92	11
South Kortright ...	"	1700	....	....	..	....	..	....	...	....	...	58.4	86	10
Brookfield	Madison	1350	....	....	..	....	..	....	...	....	....	59.2	82	9
Hamilton	Madison	1127	....	....	..	....	..	....	...	....	....	59.0	86	10
Middletown	Orange	660	....	....	..	....	..	....	...	....	....	65.7	95	9
Port Jervis	"	470	....	....	..	....	..	....	...	....	....	64.0	92	*a*
Cooperstown	Otsego	1300	....	....	..	....	..	....	...	....	59.6	59.5	83	10
New Lisbon	"	1234	....	....	..	....	..	....	...	....	56.5	57.6	86	10
Oneonta	"	1100	....	....	..	....	..	....	...	....	60.8	62.6	91	10
Perry City	Schuyler	1038	....	....	..	....	..	..	...	....	60.2	61.1	86	10
Waverly	Tioga	825	....	....	..	....	..	....	...	....	63.4	62.8	90	*a*
‖ Mohonk Lake	Ulster	1245	....	....	..	....	..	....	...	....	....	....	..	..
Northern Plateau ..	....	....	....	....	..	....	..	....	...	....	....	58.1	89	10
Saranac Lake	Franklin	....	....	....	..	....	..	....	...	....	....	58.5	89	10
Gloversville	Fulton	802	....	....	..	....	..	....	...	....	59.9	59.4	87	10
Lowville	Lewis	1240	....	....	..	....	..	....	...	....	....	59.0	83	*a*
Number Four	"	1571	29.96	30.34	7	29.71	28	0.63	...	....	....	58.2	82	10
Turin	"	....	....	....	..	....	..	....	...	....	....	57.6	83	10
Atlantic Coast	....	....	....	....	..	....	..	....	...	....	....	62.8	95	*c*
Brooklyn	Kings	107	....	....	..	....	..	....	...	....	....	65.8	95	11
Manhattan Beach ..	"	....	....	....	..	....	..	....	...	....	....	60.3	92	11
New York City ...	New York	314	30.03	30.39	7	29.68	28	0.71	74	53	....	64.0	91	9
Willets Point	Queens	....	....	....	..	....	..	....	....	....	...	63.3	91	10
Brentwood	Suffolk	75	....	....	..	....	..	....	....	....	[illegible]1.8	61.2	95	10
Setanket	"	40	....	....	..	....	..	....	67	5?	[illegible]1.4	61.5	89	10
Bedford	Wostchester ..	290	....	....	..	....	..	....	....	....	....	63.3	94	10

FOR MAY, 1896.

TURE — (IN DEGREES FAH.).								SKY			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
29	6	48	24	45	14	6	*y*	11 1	15 6	4.3	9.2	2.94	1 79	......	26	......	....
36	7	48	22	35	7	10	28	5	16	10	10	2 62	0.95	5 00	26	......	S. W.
35	7	49	25	41	16	8	18	14	15	2	11	1.99	0.89	......	30–31	......	....
35	*f*	50	26	44	16	13	*z*	....	....	....	10	4.70	1.79	......	26	......	....
36	7	51	27	42	*r*	17	2	10	18	3	9	3.09	1.00	......	26	......	W.
42	7	43	21	35	16	12	*ab*	6	17	8	8	3.35	1.14	......	30	......	S. W.
45	20	34	13	21	20	6	26	....	....	....	......	......	......	......	......	......	....
40	16	45	21	36	*r*	8	*ac*	4	27	0	15	3.77	1.04	23.00	25–26	......	N. W.
43	7	48	22	37	9	11	2	19	3	9	11	3 14	1.30	......	26	......	N. W.
39	*g*	48	24	40	24	13	7	8	22	1	7	1.98	0.56	......	28	......	....
39	24	53	28	45	14	6	9	11	11	9	7	1 66	0.39	......	19	......	S.
40	20	48	25	30	9	14	17	22	4	5	8	1.15	0.40	......	26	......	W.
....	....	....	....	....	....	....	....	14	15	2	8	2.33	0.69	10.00	28	......	W.
39	20	47	23	35	*s*	13	2	4	25	2	11	2.98	1 45	9.00	28	......	S. W.
39	7	49	25	41	16	12	25	19	9	3	8	4.50	1.37	5.00	26	......	S. W.
34	*h*	53	28	41	*t*	16	25	14	9	8	8	4.03	1.35	......	25–26	......	N. W.
38	20	44	21	35	20	13	*ad*	8	22	1	8	2.48	0.58	......	28	......	....
29	6	61	28	42	6	13	18	9	21	1	8	3.27	0 99	......	19	......	....
31	20	52	26	45	13	7	23	10 6	13.8	6 6	10 9	2.74	1.18	12.00	28	......	....
39	20	49	24	38	13	10	21	12	15	4	11	3 11	1.01	......	26	......	W.
34	20	54	30	44	17	16	31	7	20	4	12	3.53	1.18	12 00	28	......	W.
35	20	51	24	41	13	14	19	13	12	6	15	2.73	0.50	......	19	......	N. W.
40	20	52	28	42	*u*	12	*ae*	11	9	11	10	2.76	1.11	21.00	31	......	W.
32	7	54	29	45	13	18	*af*	....	....	....	7	2.94	0.76	......	31	......	....
34	20	48	31	40	13	21	17	7	16	8	11	1.54	0.78	8.00	27	......	N. W.
31	20	55	26	43	13	10	*ag*	8	18	5	13	2.72	0.75	11.30	28	......	W.
40	2	55	21	36	7	7	23	10	12	9	6	2.86	1.16	......	28–29	......	....
37	1	55	26	44	16	14	*ah*	15	12	4	11	2.88	1.12	......	28	......	N. W.
38	20	45	19	34	14	8	*ai*	14	11	6	12	2.33	0.56	......	28	......	N. W.
31	20	55	26	42	13	9	21	9	12	10	14	2 42	0.55	12 00	28	......	N. W.
39	20	52	27	42	13	13	21	....	....	....	9	2.25	0.54	......	28	......	....
34	20	52	26	39	14	12	31	14	10	7	10	3.81	1.03	......	28	......	N. W.
40	*i*	50	28	44	16	11	21	7	18	6	12	2.41	0.97	4.15	26	......	N. W.
....	....	....	....	....	....	....	....	....	....	....	4	2.11	0.96	......	28	......	S.E.
31	20	53	24	45	14	7	29	8.6	17.0	5 4	10.4	2.47	1.35	8.45	26	......	....
32	19	57	26	42	14	7	29	10	18	3	9	1.98	0.83	......	25	......	S. W.
35	*j*	52	22	35	14	8	29	11	11	9	14	3.19	1.35	8.45	26	......	W.
31	20	52	22	45	14	10	3	9	18	4	9	2.03	0.77	......	26	......	W.
31	20	51	22	39	13	8	25	6	18	7	10	2.16	0 64	......	26	......	S. W.
33	20	50	19	32	14	11	*aj*	7	20	4	10	2.96	1.18	......	26	......	W.
29	8	56	21	48	15	2	21	12.8	9.7	8.5	8 3	2.48	1.44	8.30	28	......	....
40	1	55	19	34	9	13	20	11	10	10	12	2.31	0.59	17.00	21	......	W.
40	1	52	15	35	12	4	22	20	6	5	4	1.94	0.44	......	21	......	S. W.
43	1	48	17	38	9	4	21	10	12	9	11	2.01	0.52	......	28	......	S. W.
38	7	53	22	40	11	7	21	....	....	....	6	2.66	0.75	3.30	28	......	N. W.
29	8	66	29	48	15	9	21	16	4	11	7	2.18	1 00	2.00	28	......	S. W.
35	1	54	20	35	9	2	21	9	14	8	8	3.10	0.76	......	28	......	W.
31	1	63	26	47	9	4	21	11	12	8	10	3.16	1.44	8.30	28	......	S.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest	Date.
Hudson Valley												63.3	95	*c*
Albany	Albany	85	30.01	30.43	7	29.70	31	0.73	65	50		64.0	91	10
Lebanon Springs	Columbia	930										59 0	87	10
Honeymead Brook	Dutchess	450									62.	62 2	91	10
Poughkeepsie	Dutchess	180										6 .6	95	10
Wappinger's Falls	"											65 8	94	*c*
West Point	Orange	167										65.7	95	11
Carmel	Putnam	500										64.0	90	10
Mohawk Valley												60.4	84	11
Rome	Oneida	445										60.4	84	11
Utica	"													
Champlain Valley												58 8	92	*c*
Plattsburgh Bar'k	Clinton	125										58.4	92	11
Saratoga Springs,	Saratoga													
Glens Falls	Warren	340									60.5	59.1	92	10
St. Lawrence Val.												59 3	90	14
Malone	Franklin	810									58 4	58.2	82	*a*
Madison Barracks.	Jefferson	266										59 2	79	*d*
Watertown	Jefferson	486										60 5	90	14
Canton	St. Lawrence.	304									58.8	58.2	86	9
Massena	"													
North Hammond.	St. Lawrence.	300									61.4	61.2	86	*c*
Ogdensburg.	"	258										59.5	80	*a*
Potsdam	"	300									57.6	58.2	83	*a*
Great Lakes												61.2	90	9
Dunkirk	Chautauqua	590												
Westfield	"											63.0	84	*a*
Buffalo	Erie	690	29.99	30.32	7	29.57	28	0.75	68	48		58.5	83	14
Pittsford	Monroe										61 6	62 2	87	10
Rochester	"	621	29.99	30.34	7	29.54	28	0.80	64	49		63 0	89	10
Appleton	Niagara											59 9	89	9
Fort Niagara	"	263										59 9	90	9
Baldwinsville	Onondaga	390									62.5	63.4	86	9
Syracuse	Onondaga													
Oswego	Oswego	304	29 97	30.34	7	29.62	26	0.72	68	47		58.0	77	17
Palermo	"	460									60.2	59 5	82	9
Lyons	Wayne	407									62.8	63 3	87	10
Erie, Pa	Erie	681	29.99	30.30	7	29.59	28	0.71	68	22		63.0	83	11
Central Lakes												62 7	88	10
Fleming	Cayuga	1000									63.3	62.6	85	10
Romulus	Seneca	719							86	54		63.4	88	10
Ithaca	Tompkins	810	30.00	30.32	7	29 58	28	0.74	69	52	61.8	62 4	86	10
Mean			29.99	30.43	7	29.54	28	0.72	69	51		61 0	95	*e*

* Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.

(*a*) 9, 10; (*b*) 9, 14; (*c*) 10, 11; (*d*) 14, 21; (*e*) 9, 10, 11; (*f*) 7, 16; (*g*) 8, 13; (*h*) 7, 20; (*i*) 7, 16, 20 13; (*v*) 11, 23; (*w*) 22, 24; (*x*) 14, 24; (*y*) 9, 26; (*z*) 18, 19; (*ab*) 18, 19, 22; (*ac*) 18, 31; (*ad*) 18, 26. (*al*) 22, 29; (*am*) 5, 10, 19; (*an*) 2, 26, 31.

FOR MAY, 1896—(*Concluded*).

TURE—(IN DEGREES FAH.).								SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	
														h. m.			
33	*j*	54	25	42	14	6	21	11.2	9.5	10 3	8.3	2.57	1.50	......	29	......	......
42	20	49	22	34	9	6	21	8	16	7	12	1.55	0.69	......	21	......	S.
33	*j*	54	26	40	14	12	21	15	4	12	7	1.50	0.88	6.00	31	......	W.
40	1	51	24	33	9	8	21	8	15	8	9	3.17	0.97	12.00	31	......	S. W.
35	1	60	28	39	*a*	8	21	9	11	11	6	2.50	0.85	......	28	......	N.
41	8	53	27	42	14	10	21	12	4	15	11	3.58	0.92	......	28	......	S.
35	1	60	26	41	20	8	22	....	....	....	6	2.89	1.50	......	29	......	E.
39	25	51	24	38	13	14	24	15	7	9	7	2.79	1.31	11.00	28–29	......	......
38	19	46	24	33	12	12	22	....	....	....	9.0	2.85	1.00	......	28	......	......
38	19	46	24	33	12	12	22	....	....	....	9	2.85	1.00	......	28	......	......
35	*k*	57	23	40	14	10	*ak*	7.0	12.0	12.0	8.5	1.69	0.47	......	27–28	......	......
35	1	57	22	32	*v*	10	*al*	....	....	....	8	1.85	0.40	3.30	31	......	S. W.
35	*k*	57	24	40	14	10	31	7	12	12	9	1.53	0.47	......	27–28	......	W.
32	*m*	48	24	50	14	4	29	9.7	13.3	8.0	7.0	1.98	1.65	8.25	28	......	......
32	20	50	21	32	20	9	29	11	9	11	8	1.26	0.33	......	26	......	S. W.
39	*n*	40	23	40	14	13	26	....	....	....	5	2.41	0.68	......	25	......	S. W.
35	13	55	30	50	14	5	29	13	16	2	13	2.36	0.72	......	26	......	S. W.
32	13	54	24	38	13	5	29	11	14	6	3	1.51	0.84	4.00	28	......	S. W.
35	20	51	24	44	1	4	29	2	15	14	7	2.78	1.65	8.25	28	......	S
40	1	49	20	32	14	9	6	10	13	8	7	2 10	1.22	12.15	28	......	S. W.
36	20	47	23	34	24	14	*am*	11	13	7	6	1.46	0.63	......	25	......	S W.
33	13	44	19	44	8	5	18	13.7	12.4	4.9	10.4	2.35	2.05	......	25–26	......	......
43	20	41	18	28	16	10	*an*	18	10	3	7	1.94	0.60	6.00	2	......	S. W.
43	3	40	15	25	20	6	4	11	11	9	12	2 51	0.92	......	26	......	S. W.
40	7	47	21	35	*w*	11	29	12	13	6	9	2.05	0.91	......	28	......	W.
44	20	45	18	28	24	10	19	21	9	1	9	1.64	0.79	......	26	......	S. W.
38	20	51	22	43	8	14	18	12	14	5	14	2 96	2.05	......	25–26	......	S. W.
37	*p*	53	25	44	8	13	29	....	....	....	9	2.36	1.36	......	25	......	N W.
43	12	43	20	30	13	8	29	14	10	7	11	2.70	0.85	......	18	......	......
41	7	36	16	25	20	6	29	11	11	9	10	2.46	1.00	......	28	......	W.
33	13	49	22	39	13	10	29	19	12	0	7	2.36	0.95	......	26	......	S. W.
43	7	44	18	30	*x*	6	19	11	14	6	11	2.27	1.05	......	28	......	N. W.
47	20	36	14	26	14	5	18	8	20	3	14	2.63	0.56	......	26	......	W.
38	20	47	20	36	9	9	*ag*	8.7	17.0	5.6	9.0	3.19	1.30	......	28	......	......
40	20	45	19	30	20	9	*ag*	6	24	1	6	2 42	0.70	9.00	28	......	N. W.
40	20	48	22	36	*u*	13	29	10	13	8	9	4 50	1.30	......	28	......	S.
38	20	48	20	33	13	9	21	10	13	8	12	2.64	0.98	9.30	28	......	N. W.
29	*q*	51	23	50	14	2	21	10.4	13.4	7.2	9.1	2.53	2.05	......	25–26	......	S. W.

thermograph. || Report received too late to be used in computing means. The means from
† Blank indicates that the duration is not shown in the original records, but it is within 24 hours.

(*j*) 1, 20; (*k*) 1, 2; (*m*) 13, 20; (*n*) 7, 14, 20; (*p*) 7, 21; (*q*) 6, 8; (*r*) 4, 16; (*s*) 7, 13; (*t*) 4, 7; (*u*) 9, 31; (*ae*) 19, 24; (*af*) 19, 31; (*ag*) 21, 31; (*ah*) 2, 31; (*ai*) 21, 24; (*aj*) 18, 21, 28, 29; (*ak*) 22, 29, 31;

TEMPERATURE — MAY, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	62	61	63	61	60	55	57	64	71	72	73	66	63	69
Alfred	68	64	71	77	67	66	71	81	84	84	81	71	76	81
	51	50	51	46	49	40	36	48	63	60	61	54	43	48
Angelica	71	70	70	78	68	67	71	80	84	83	82	76	78	83
	55	52	50	39	49	37	35	45	48	52	58	55	43	47
Bolivar	71	67	72	78	69	68	72	81	85	85	83	75	78	82
	52	53	53	37	49	37	35	42	46	48	55	56	47	49
Friendship	72	69	72	81	69	69	74	82	86	87	84	75	78	85
	53	52	49	39	48	38	36	44	50	57	60	53	45	47
Humphrey	67	66	71	76	69	69	70	79	85	83	82	76	79	83
	50	50	51	45	51	45	42	52	60	61	62	56	50	59
‡Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	71	76	74	78	68	70	76	82	85	85	83	77	80	81
	52	53	52	42	50	44	42	49	52	57	60	60	52	57
Elmira	69	66	75	73	74	70	72	72	91	89	87	72	78	78
	57	55	56	53	57	47	43	49	54	61	65	59	52	51
Avon	76	76	74	79	67	63	70	74	....	87	83	81	94	83
	53	53	54	50	45	42	57	39	....	62	63	54	39	48
Mt. Morris	80	80	80	81	82	83	82	82	83	89	88	89	88	90
	63	60	68	60	56	53	46	64	77	77	76	58	62	45
Lockport	72	81	71	79	70	69	72	82	88	85	85	73	75	82
	51	52	50	47	41	46	44	53	52	55	57	53	47	53
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	67	62	74	78	72	69	76	75	86	85	83	71	80	80
	47	49	51	46	51	45	41	52	59	65	65	53	45	53
Addison	67	63	78	78	72	69	74	78	88	87	85	73	76	80
	51	50	52	41	50	42	39	46	50	53	63	56	44	56
South Canisteo	68	69	77	80	72	69	75	79	87	87	85	79	77	83
	48	52	52	39	48	36	34	46	49	54	61	54	40	49
Arcade	70	70	68	74	64	64	70	76	82	81	78	73	74	82
	53	51	52	43	49	41	40	48	60	62	64	56	50	54
Varysburgh	71	77	71	80	72	71	76	83	90	89	87	76	81	88
	55	52	44	44	47	29	39	46	55	60	63	52	47	50
Eastern Plateau	56	56	61	61	61	56	56	60	68	73	71	65	60	64
Binghamton	70	65	72	80	70	70	70	75	86	88	84	74	81	80
	40	48	53	44	53	40	45	47	50	54	63	59	43	50
Oxford	67	68	76	78	75	70	70	73	85	88	86	78	77	83
	42	47	50	43	47	37	38	40	44	50	54	50	35	45
Cortland	63	65	74	76	76	68	68	74	84	86	81	75	78	81
	46	46	52	40	52	40	40	45	47	55	58	54	37	49
Bloomville	73	60	68	83	80	70	75	76	91	90	92	84	83	82
	42	45	51	46	50	44	43	48	49	56	57	53	41	48
South Kortright	61	65	70	76	70	66	69	76	83	86	83	74	79	82
	36	34	49	40	45	30	32	41	43	54	55	47	34	42
Brookfield	81	80	78	77	79	75	73	78	82	81	78	76	77	77
	45	44	44	41	43	40	38	46	52	52	46	42	37	48
Hamilton	72	64	73	76	70	68	66	75	84	86	81	70	75	83
	36	47	51	41	38	44	48	41	50	58	59	48	32	43
Middletown	63	59	62	67	68	68	90	90	95	90	86	92	91	81
	46	40	48	50	50	54	54	57	68	70	68	67	68	65
Port Jervis	63	61	68	82	80	69	68	72	92	92	89	81	80	79
	37	47	50	53	50	46	45	42	49	64	67	59	50	47
Cooperstown	72	64	66	70	67	65	61	69	82	83	78	68	68	80
	48	50	50	52	52	45	45	48	52	58	62	54	40	46
New Lisbon	68	63	71	74	69	64	66	71	83	86	82	72	75	80
	40	45	51	41	48	38	37	39	48	52	52	48	33	42
Oneonta	71	71	78	79	72	69	73	76	86	91	85	80	82	82
	44	47	53	45	50	42	41	47	50	72	58	53	40	44
Perry City	70	67	75	79	79	68	72	76	85	86	82	72	74	84
	45	49	52	41	46	43	35	44	50	63	63	50	38	45
Waverly	69	64	73	82	77	75	70	76	90	90	85	80	80	84
	49	51	53	44	41	41	40	44	50	54	60	55	44	43
Mohonk Lake	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
65	62	68	67	58	56	68	68	57	60	63	69	64	63	56	57	56	62.6
70	78	81	74	61	68	72	78	65	72	70	77	72	70	61	66	60	61.0
54	44	54	60	44	37	48	57	42	40	56	59	51	60	47	44	48	
70	73	81	65	60	71	74	80	67	75	67	76	76	76	64	67	61	60.8
49	37	57	57	48	38	52	57	47	42	55	55	9	52	48	43	49	
72	79	82	76	63	70	74	79	68	75	69	78	75	73	63	68	65	61.0
57	35	53	63	50	37	51	56	39	45	54	62	45	51	46	39	50	
73	81	84	76	67	73	78	80	68	76	72	79	76	76	66	69	66	62.0
50	39	54	56	47	41	52	56	44	42	52	61	55	49	48	41	47	
75	80	76	70	61	67	75	73	66	76	67	75	71	73	59	66	61	62.0
55	45	54	58	49	43	49	61	46	46	52	60	52	52	45	44	47	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	60.7
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
68	76	76	70	63	69	77	75	70	76	71	75	73	73	62	62	58	63.0
55	40	57	62	54	41	56	63	49	50	58	64	56	56	47	47	50	
89	85	85	87	68	70	65	83	70	77	68	85	79	74	70	69	68	65.2
59	50	65	56	51	45	51	55	51	47	55	59	61	59	54	51	55	
.....	79	78	76	71	75	80	78	71	80	81	78	75	77	65	70	64	63.1
.....	46	56	62	52	41	52	61	51	40	54	55	53	49	48	47	50	
84	91	89	88	85	82	83	82	81	80	82	92	91	82	85	86	73	70.0
64	47	54	63	50	50	50	59	47	39	54	64	48	45	48	45	47	
72	81	73	74	68	72	82	78	71	75	84	76	72	80	63	73	67	63.2
57	47	59	56	52	40	50	60	48	47	56	57	52	55	47	46	45	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
75	84	85	77	64	70	68	83	67	73	66	81	78	66	66	70	64	62.5
55	52	57	60	46	39	48	55	48	43	52	58	53	52	47	45	48	
76	82	85	78	66	71	68	83	68	78	66	82	77	73	67	68	66	62.4
52	41	54	60	48	41	52	56	46	44	54	61	49	53	50	44	50	
72	80	84	79	85	69	73	82	69	76	69	81	76	74	65	69	66	61.3
51	40	54	56	45	34	48	57	42	40	53	53	42	49	47	40	49	
67	74	74	70	60	73	76	74	61	75	74	73	72	74	60	65	60	60.9
53	46	55	57	45	38	51	59	44	46	55	60	52	53	45	40	47	
72	83	75	73	63	73	81	72	68	77	76	76	75	74	64	69	63	62.0
52	43	53	60	45	58	49	52	44	43	54	46	47	50	47	43	43	
64	61	66	68	59	54	56	66	59	56	58	67	62	56	58	57	58	61.0
74	78	87	86	70	72	60	83	70	69	65	83	75	68	66	67	65	62.2
60	44	55	57	52	39	50	57	47	48	51	57	51	47	50	49	50	
75	78	84	80	65	72	67	83	72	68	67	82	80	67	70	72	67	60.0
46	40	40	49	48	34	48	54	43	44	47	54	45	42	47	42	51	
72	76	81	78	64	69	64	79	68	67	66	80	73	65	64	72	62	60.2
57	43	51	62	50	35	49	54	46	43	50	58	48	44	49	43	45	
76	81	84	83	70	71	64	84	79	60	69	79	78	67	71	68	67	62 3
53	45	50	59	58	40	48	43	49	48	47	49	48	46	50	46	52	
74	75	83	79	66	72	67	80	78	69	68	75	73	68	67	67	66	58.4
51	41	44	54	48	35	43	50	48	41	45	52	47	37	41	41	48	
75	76	73	72	68	69	71	72	70	62	76	75	78	76	75	73	69	59.2
45	45	52	48	46	34	41	40	42	38	42	41	44	40	43	45	45	
72	75	81	75	65	70	59	80	68	64	64	81	71	66	63	68	59	59 0
54	42	48	55	50	31	49	53	41	40	48	55	45	46	47	42	49	
82	80	87	86	82	61	62	76	65	65	76	76	79	68	71	71	72	65.7
52	52	53	65	59	45	46	54	58	56	45	56	58	51	51	52	52	
82	89	87	86	83	67	62	81	74	72	63	79	81	67	74	73	72	64.0
56	45	54	59	56	43	44	55	54	52	47	53	53	48	53	49	58	
69	72	70	75	60	68	60	78	64	60	59	79	70	65	65	64	65	59.5
53	48	59	57	48	38	52	53	48	52	49	55	52	44	50	46	50	
73	75	81	76	60	68	58	79	69	60	64	80	74	63	64	65	64	57.6
52	38	45	52	41	31	49	52	41	40	46	54	45	39	48	40	49	
78	80	86	79	65	75	64	83	77	65	70	85	77	67	71	72	67	62.6
56	46	50	55	50	39	51	55	45	46	47	55	51	43	50	45	52	
73	78	80	77	62	72	73	79	67	75	71	80	70	70	67	71	62	61.1
58	50	51	54	48	34	50	54	48	40	52	58	49	45	47	40	50	
78	84	88	83	71	74	62	82	75	72	70	84	77	71	69	70	71	62 8
59	40	56	53	51	40	51	54	48	45	53	60	49	48	50	44	51	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	57	58	60	61	56	53	56	62	70	72	67	57	54	58
Saranac Lake	76	72	72	72	62	64	77	79	87	89	76	70	75	80
	41	50	52	49	42	39	47	52	59	55	45	33	34	38
Gloversville	69	62	68	75	71	66	64	72	86	87	80	75	71	74
	35	45	48	52	52	43	44	46	56	61	64	55	38	39
Lowville	73	68	68	73	64	64	70	76	83	83	78	69	72	81
	43	50	58	62	49	40	40	50	56	64	60	48	34	36
Number Four	72	68	67	64	61	66	68	73	80	82	76	65	72	77
	44	51	52	44	48	44	40	49	51	52	53	44	33	40
Turin	70	65	67	70	63	62	68	71	82	83	74	.....	68	75
	43	48	52	48	50	46	43	50	56	64	61	.....	39	43
Atlantic Coast	51	51	54	65	66	57	53	53	66	76	75	68	64	59
Brooklyn	68	58	67	75	78	68	65	68	88	90	95	80	77	70
	40	47	49	57	60	52	45	43	54	66	69	58	59	54
Manhattan Beach	52	52	51	59	70	71	61	57	57	79	92	91	72	67
	40	46	46	50	56	52	44	46	43	54	61	56	56	53
New York City	60	52	63	76	80	62	59	63	91	91	89	81	70	64
	43	46	46	57	59	47	45	44	53	71	60	60	57	56
Willet's Point	61	58	67	82	78	65	61	67	86	91	90	79	74	67
	45	47	50	54	50	45	38	45	55	62	50	54	48	54
Brentwood	62	61	60	.....	77	62	70	71	80	95	90	80	81	72
	33	44	43	.....	52	46	35	29	41	59	59	48	42	40
Setauket	63	59	63	77	76	61	61	66	84	89	87	77	72	66
	35	41	45	56	56	47	43	37	49	64	53	49	53	46
Bedford	75	60	60	83	80	70	69	74	93	94	91	84	80	77
	31	44	44	54	54	49	44	34	46	64	64	51	50	41
Hudson Valley	55	56	57	63	67	58	57	58	70	76	75	67	61	63
Albany	73	62	65	80	75	66	68	71	91	91	85	74	74	80
	46	48	52	52	57	51	47	48	57	69	67	57	48	49
Lebanon Springs	69	66	62	75	74	60	65	70	85	87	73	75	72	80
	33	39	49	50	50	42	39	43	48	56	57	54	36	40
Honeymead Brook	70	64	64	77	82	62	64	72	88	91	87	75	74	79
	40	45	47	55	52	48	43	42	55	58	63	55	45	47
Poughkeepsie	72	61	65	82	83	66	68	71	92	95	92	77	78	79
	35	46	47	52	51	47	45	40	53	56	59	54	43	42
Wappingers Falls	72	78	78	82	83	73	79	74	91	94	94	80	78	84
	45	48	50	52	53	50	47	41	52	68	62	58	50	42
West Point	63	70	60	62	83	82	67	70	72	93	95	92	81	80
	35	45	46	48	52	52	45	40	45	53	70	56	51	47
Carmel	74	65	64	78	78	70	69	75	89	90	88	77	81	80
	46	44	46	51	58	48	46	48	59	65	61	53	43	59
Mohawk Valley	60	61	61	64	58	59	58	61	66	65	70	56	62	68
Rome	72	67	74	75	72	73	67	72	82	80	84	73	75	78
	47	55	48	52	44	45	50	50	50	50	55	40	48	58
Utica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Champlain Valley	48	52	57	60	61	55	53	56	63	79	71	64	56	55
Plattsburgh Bar'ks	60	65	65	67	70	70	60	64	70	90	92	78	70	65
	35	40	50	50	50	40	38	44	40	75	60	48	45	40
Glens Falls	64	67	67	75	75	64	69	68	89	92	72	74	71	78
	35	35	45	49	50	47	45	49	54	60	60	55	40	38
St. Lawrence Valley	58	63	61	59	56	52	55	61	68	71	68	59	55	58
Malone	69	73	70	70	63	55	66	73	82	82	76	64	64	71
	41	49	53	52	50	38	40	53	60	66	57	47	42	37
Madison Barrracks	73	71	76	70	67	64	67	71	73	72	74	70	71	79
	54	55	44	46	41	44	39	42	53	56	53	51	46	39
Watertown	80	78	73	70	70	72	76	74	83	84	88	76	82	90
	46	48	42	42	40	45	42	44	50	56	58	50	35	40
Canton	70	75	71	71	65	58	69	74	86	85	78	70	70	71
	40	48	52	47	47	42	40	54	57	59	57	45	32	35
Massena	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Hammond	84	84	74	72	63	70	72	68	74	86	86	70	74	76
	40	54	56	56	46	44	40	56	56	56	58	50	38	38

Maxima and Minima for the Stations—(*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
60	58	61	62	52	50	56	63	55	54	60	64	58	52	51	53	54	58.1
70	72	75	68	63	72	72	75	66	68	78	75	72	61	52	64	63	58.5
48	44	53	47	32	40	51	48	33	47	54	52	42	50	45	45	45	
72	75	72	75	64	67	58	79	69	60	67	78	71	61	62	67	65	59.4
51	48	49	59	49	35	48	52	47	46	44	47	53	44	54	43	50	
69	72	76	71	62	69	66	76	66	67	71	76	68	59	58	62	64	59.0
49	50	46	55	46	31	48	54	49	37	46	56	48	39	46	46	48	
65	67	73	67	57	64	64	69	64	67	67	72	65	65	55	58	59	56.2
51	36	43	52	42	31	42	50	41	42	59	55	47	42	39	42	40	
69	70	72	68	60	63	59	74	62	61	66	73	67	56	56	61	61	57.6
52	50	50	57	45	33	48	52	49	42	45	55	46	45	45	45	47	
66	65	69	74	70	59	54	64	66	57	54	62	70	65	65	64	66	62.8
86	76	82	86	80	65	57	82	78	69	66	78	85	73	75	73	78	65.8
63	53	62	68	63	52	52	54	64	55	47	53	62	59	59	56	60	
61	69	76	75	85	75	58	57	71	73	60	59	68	81	65	71	70	60.3
55	56	58	58	60	53	52	53	56	55	43	51	58	58	59	58	60	
82	80	84	85	81	61	55	76	73	60	59	77	81	68	70	70	75	64.0
57	59	62	66	60	52	51	53	57	51	47	52	65	59	60	57	58	
81	83	79	87	84	66	59	79	76	64	64	74	82	71	74	75	77	63.3
48	57	62	59	49	51	52	57	54	44	50	57	56	59	56	58	54	
89	75	86	90	81	70	59	75	77	65	68	82	83	78	80	74	78	61.2
41	45	49	56	54	44	50	54	55	47	39	48	59	54	50	52	54	
74	79	78	83	84	63	53	78	72	57	63	72	80	72	72	71	74	61.5
55	50	55	64	57	50	51	52	57	49	44	48	59	56	58	55	58	
80	82	81	88	85	72	54	80	76	61	68	76	81	76	72	72	73	63.3
57	53	52	66	58	43	50	52	56	49	38	48	57	49	57	47	55	
66	65	68	71	66	58	55	66	65	58	56	62	67	61	63	62	62	63.3
77	79	80	83	66	70	59	85	70	64	69	77	77	72	72	74	69	64.0
60	55	56	60	49	42	53	55	53	51	48	50	58	51	55	52	54	
73	74	80	80	72	71	58	81	71	63	67	71	75	70	72	75	70	59.0
54	43	48	53	49	33	46	52	45	46	42	45	47	43	48	45	49	
74	79	84	86	85	71	57	78	71	60	67	73	79	71	72	70	70	62.2
57	48	53	55	55	41	49	54	52	50	47	50	51	48	55	49	53	
78	84	84	90	84	71	57	81	75	62	69	79	82	70	74	73	74	62.6
52	45	50	52	52	39	49	55	50	50	39	50	51	47	56	49	56	
82	80	86	90	87	77	60	79	85	68	73	78	83	72	76	74	74	65.8
51	50	55	58	56	46	50	59	57	55	45	52	55	51	53	52	52	
73	81	85	83	91	86	71	58	83	78	62	66	77	83	69	75	74	65.7
53	55	55	60	57	45	49	50	56	53	43	48	57	50	54	52	55	
78	81	83	87	75	73	62	82	77	64	70	74	80	70	74	72	73	64.0
54	59	60	56	51	40	44	53	61	50	39	52	60	55	51	55	49	
58	62	66	67	51	59	60	55	57	56	61	64	60	56	56	60	54	60.4
71	75	78	80	64	68	67	61	68	65	68	77	72	68	68	71	65	60.4
45	50	54	54	38	50	53	49	46	46	54	50	47	43	45	48	43	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
55	64	62	64	57	50	53	65	64	52	58	60	65	57	56	56	57	58.8
72	70	77	72	72	58	65	65	82	60	65	68	79	73	60	65	67	58.4
42	50	50	52	52	38	45	55	50	38	45	48	49	48	50	50	50	
63	80	72	79	58	67	61	86	76	65	72	74	77	61	65	68	60	59.1
42	54	49	52	45	37	42	54	49	43	48	48	54	45	50	43	50	
60	61	63	63	55	53	61	62	57	58	62	64	59	55	53	54	55	59.3
69	70	75	66	64	64	75	76	63	67	78	75	65	61	58	60	63	58.2
45	52	46	54	42	32	46	55	47	40	51	56	49	45	49	45	45	
75	73	76	77	65	71	79	73	66	71	76	71	66	63	65	62	66	59.2
54	44	51	46	47	39	48	49	52	44	52	58	48	42	46	44	49	
74	79	81	74	65	78	80	70	73	77	84	76	72	68	60	65	71	60.5
54	45	47	54	50	37	36	40	36	45	46	44	48	48	45	46	48	
69	74	76	70	61	71	78	77	63	73	73	73	69	58	54	59	64	58.2
38	42	44	53	42	34	44	57	44	43	48	57	49	46	49	45	42	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
72	74	78	74	76	70	76	74	74	76	76	72	70	62	54	64	64	61.2
48	46	50	60	50	35	52	58	48	44	48	60	48	50	50	46	44	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val. (Con.)														
Ogdensburg	66	77	66	67	61	58	68	67	80	80	75	66	72	77
	40	54	54	46	48	49	42	52	54	55	60	50	45	45
Potsdam	69	70	70	69	63	56	67	72	83	83	75	67	64	74
	37	40	51	50	49	39	39	53	59	69	54	47	40	43
Great Lakes	60	62	61	63	57	54	55	64	70	72	70	60	58	64
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	73	65	67	76	68	63	70	76	84	84	80	73	77	81
	56	55	55	51	50	45	45	58	63	66	65	57	52	61
Buffalo	69	74	58	62	59	65	71	59	60	55	63	71	76	83
	51	54	43	56	46	46	46	50	49	48	49	55	53	58
Pittsford	71	75	73	76	67	60	64	78	85	87	83	65	70	81
	54	54	55	51	51	46	40	51	64	65	65	48	41	48
Rochestsr	72	77	71	77	68	60	66	89	88	89	83	66	69	77
	56	55	52	52	51	48	45	53	62	67	64	55	49	56
Appleton	61	65	68	77	67	64	61	86	89	88	84	71	65	69
	44	40	50	47	45	41	41	43	54	62	66	52	44	46
Fort Niagara	58	69	70	76	70	69	62	86	90	87	88	70	62	65
	42	39	49	45	42	40	37	42	42	65	65	54	42	41
Baldwinsville	72	74	75	77	68	68	73	72	86	84	78	70	77	83
	54	57	52	53	47	46	52	55	64	64	56	43	47	57
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oswego	68	71	70	75	57	53	60	74	76	73	70	60	62	72
	51	54	52	50	46	44	41	50	60	57	52	45	42	52
Palermo	70	72	71	78	64	62	69	74	82	80	75	64	72	78
	48	53	53	55	47	41	39	48	52	62	57	47	33	53
Lyons	70	70	71	76	68	62	68	75	85	87	81	70	70	81
	52	55	54	50	54	48	43	52	57	67	67	53	50	51
Erie, Pennsylvania	73	80	69	75	65	61	65	77	82	82	83	72	69	78
	56	56	54	54	59	48	47	55	64	68	67	56	50	52
Central Lakes	59	69	64	62	61	57	56	63	71	76	73	62	59	69
Fleming	66	68	74	71	69	70	69	74	84	85	78	71	72	81
	54	52	53	52	49	47	43	54	62	65	65	55	43	56
Romulus	69	71	75	79	73	70	72	73	87	88	84	69	78	84
	48	53	55	49	51	45	41	51	51	67	66	53	42	56
Ithaca	66	65	74	77	68	68	71	74	85	86	82	69	76	82
	51	52	53	46	53	44	41	53	54	64	64	53	43	53
Mean	57	58	60	62	60	56	56	60	68	73	71	62	59	63

‡ Maximum and Minimum by the Draper Thermograph.

MAXIMA AND MINIMA FOR THE STATIONS—(*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
72	74	77	72	62	68	72	76	67	69	75	78	65	62	62	60	62	59.5
50	50	52	57	45	42	52	56	47	46	51	53	48	50	48	48	45	
71	75	77	70	59	69	65	64	69	74	75	78	79	76	58	63	59	58.2
46	50	49	55	45	36	45	47	43	40	42	47	48	45	41	46	44	
61	63	66	64	56	55	61	67	55	59	66	68	61	62	55	58	56	61.2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	----
68	78	77	72	67	67	74	75	65	76	75	75	71	79	67	66	60	63.0
56	50	60	57	50	43	54	59	47	51	61	65	55	55	50	46	50	
64	73	67	61	61	71	70	69	64	67	74	70	66	70	57	59	59	58.5
48	50	55	51	50	46	54	52	50	50	62	54	52	53	50	51	48	
71	77	77	75	62	71	78	80	60	77	78	76	69	73	60	69	64	62.2
56	53	58	59	49	41	48	55	43	42	55	64	53	50	49	50	49	
69	78	76	72	62	66	78	78	62	76	79	76	67	74	60	68	62	63.0
55	52	51	60	48	44	53	57	50	48	60	59	55	54	50	51	49	
73	79	77	73	64	60	65	75	62	65	81	75	65	78	61	68	65	59.9
48	49	55	59	49	38	45	58	46	43	49	59	49	53	49	47	42	
72	81	72	73	68	64	71	77	67	69	77	76	78	76	60	69	80	59.9
50	50	55	52	50	38	37	61	49	42	49	49	49	56	47	46	45	
73	77	82	75	65	74	68	81	69	72	76	81	72	69	60	69	66	63.4
54	55	61	57	44	49	59	53	47	54	60	56	51	52	52	52	47	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	----
62	70	77	67	56	68	67	72	55	68	75	73	62	64	54	61	58	58.0
52	45	55	50	46	43	53	58	47	49	53	60	48	52	48	50	47	
68	73	79	71	63	68	67	75	64	68	77	79	70	62	58	77	65	59.5
51	43	50	56	45	36	50	55	50	40	40	60	48	48	48	43	48	
72	75	79	76	65	70	71	82	62	75	74	79	71	68	60	69	63	63.3
60	54	58	64	59	45	55	60	47	45	56	64	55	52	52	52	50	
65	72	75	71	60	65	75	72	59	71	76	80	72	74	64	63	58	63.0
53	55	63	66	52	47	54	62	52	51	62	62	59	57	51	52	50	
66	66	69	68	58	55	58	69	57	58	62	70	64	60	58	59	57	62.8
73	75	78	76	69	70	61	78	66	72	72	78	70	68	62	68	61	62.6
59	53	59	64	51	40	52	58	47	46	55	55	56	52	51	50	52	
75	81	80	76	66	71	70	81	65	74	72	80	78	70	64	71	66	63.4
59	52	58	56	49	40	53	57	49	43	53	63	54	51	51	48	51	
73	77	84	76	63	70	61	80	64	71	66	82	73	70	66	67	62	62.4
58	57	57	62	48	38	52	58	49	45	55	61	53	59	53	49	50	
62	63	66	67	58	55	58	64	59	57	60	65	63	59	57	58	58	61.0

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau..	0.02	0.04	0.03	T.	T.	0.00	0.00	0.08	0.00	0 00	T.	T.	T.	0.08
Alfred............	T.	....	T.	....	....	....	....	.03	....	....	....	T.	....	....
Angelica..........	....	T.	.05	....	....	....	....	.10	....	....	....	T.	....	T.
Bolivar...........	....	....	.07	....	....	....	....	T.	....	....	....	....	....	.07
Friendship........	....	T.	T.	....	....	....	....	.12	....	....	....	T.	....	.05
Humphrey.	....	.05	....	....	....	....	....	T.	....	....	....	....	....	.32
Little Valley......	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek.....	.11	....	.40	....	....	....	....	....	....	....	....	....	....	.07
Jamestown........	.11	.50	.11	.05	....	....	....	....	....	....	....	.07	....	.25
Elmira............	T.	....	....	.05	.01	....	....	.38	....	....	....	....	....	....
Pine City..........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Akron.	....	.05	....	....	T.	....	....	T.	....	....	T.	....	....	....
Avon..............	....	....	T.	T	....	....	....	T.	....	....	T.	....	....	....
Mt. Morris.........	....	....	....	....	....	....	....	T.	....	....	....	....	T.	....
Lockport..........	.14	.10	T.	....	....	....	....	....	....	....	....	T.	....	T.
Victor............	....	....	T.	T.	....	....	....	.02	....	....	....	.01	....	....
Tyrone	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood......	.01	....	T.	....	....	....	....	.44	....	....	....	....	....	....
Addison..........	T.	....	T.	....	....	....	....	.38	....	....	....	T.	....	.04
Atlanta...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Haskinville.......	T.	....	....	....	....	....	....	....	....	....	....	....	....	.20
South Canisteo...	T.	T.	T.	....	....	....	....	.10	....	....	....	T.	....	.61
Arcade	....	....	T.	....	....	....	....	T.	....	....	....	....	....	T.
Attica............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Varysburgh	....	T.	....	....	....	....	....	T.	....	....	....	T.	....	.08
Eastern Plateau..	T.	T.	0.07	0.03	0.02	0.00	T.	0.05	0.00	0.00	T.	0.00	0 00	T.
Binghamton	....	....	.42	....	....	....	....	.04	....	....	....	....	....	....
Chenango Forks..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oxford............	....	....	....	.20	T.	....	....	.15	....	....	....	....	....	....
Cortland..........	....	....	.12	....	.08	....	....	.05	....	....	....	....	..	....
Bloomville........	....	....	....	....	....	....	....	.03	....	....	....	....	....	....
Deposit...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Brookfield........	....	....	.10	.08	....	....	.02	....	....	....	....	....	....	T.
Hamilton..........	....	....	.13	.07	....	....	....	.10	....	....	....	..	....	....
Apulia............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis.......	.02	....	.03	....	....	....	....	....	....	....	....	....	....	....
Warwick..........	....	....	.10	....	....	....	....	....	....	....	T.	....	....	....
Cooperstown	....	....	.07	.12	....	....	....	T.	....	....	....	....	....	T.
New Lisbon......	....	.04	.03	....	.20	....	....	....	....	....	....	....	....	....
Oneonta	.04	....	....	.02	....	....	....	.03	....	....	....	....	....	....
Perry City........	....	....	....	....	....	....	....	.38	....	....	....	....	....	....
Newark Valley...	....	T.	.27	....	....	....	....	T.	....	....	....	....	....	....
Waverly..........	....	....	....	....	....	....	....	.07	....	....	.02	....	....	....
Ellis..............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Northern Plateau.	0.00	T.	0.02	0.01	0.04	0.00	T.	0.04	0.00	0.00	0.19	T.	0.00	0.00
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown ...	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Saranac Lake. ...	....	T.	....	....	.18	....	T.	....	....	....	....	....	....	....
Gloversville	....	....	.06	.04	.05	....	....	T.	....	....	....	T.	....	....
Lowville..........	....	.02	....	....	....	....	....	.13	....	....	....	....	....	....
Number Four.....	....	....	.04	.02	T.	....	....	T.	....	....	....	....	....	....

TATION FOR MAY, 1896 — (INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.06	0 01	0.11	0.07	0.25	0.01	T.	T.	0.00	0.12	0.06	0.70	0.04	0.45	0.01	0.27	0.29	2.79
.01	....	.03	.16	.18	....	....	....	....	.01	T.	.95	T.	.58	T.	.60	.07	2 62
.12	....	.10	.08	.25	....	....	....	....	T.	.02	.20	....	.18	...	.35	.54	1.99
....	....	T.	.02	.31	....	....	....	....	.88	....	1.79	....	.34	.11	.44	67	4.70
....	....	.06	.15	.41	....	....	....	....	...	T.	1.00	....	.23	....	.85	.22	3.09
....	....	.01	.15	.33	....	....	....	....	....	....	.82	....	.53	....	1.14	....	3.35
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.18	....	.30	.11	.33	....	....	...	....	....	....	.43	....	.72	....	.10	.47	3 22
.25	....	.15	.05	.26	....	...	....	....	....	.07	.97	....	.40	....	.10	.43	3.77
....	....	T.	.02	.11	....	.02	....	....	....	.12	1.30	....	.55	....	.13	.45	3.14
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.13	....	.14	T.	T.	....	....	.08	....	....	.04	.89	.14	.49	T.	....	....	1.96
....	.17	T.	.23	....	....	....	....	....	T.	.41	.31	.25	.56	T.	T.	.05	1.98
....	....	.15	.08	.39	.14	....	....	....	....	.35	....	....	.36	....	....	.19	1 66
.09	...	.10	....	T.	...	....	....	....	....	.14	.40	.06	.12	....	..	....	1 15
T.	....	.34	T.	.18	....	...	T.	....	....	T.	.25	.28	.69	T.	....	.56	2.33
.10	....	....	....	.25	....	....	....	....	.15	....	.20	....	.55	....	....	.65	1 90
T.	....	.02	.05	.07	....	.02	....	....	.08	T.	.43	T.	1.45	....	.10	.31	2.98
....	....	T.	T.	.08	....	....	....	....	.92	....	1.37	....	1.02	...	.54	.15	4 50
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	...	....
.06	....	.12	.05	.25	....	....	....	....	.09	T.	....	T.	.25	T.	.10	.60	1.72
....	....	T.	.08	.17	....	....	....	....	.17	T.	1.35	....	.80	....	.75	....	4 03
.20	....	.30	.12	.52	....	....	....	....	....	....	.32	T.	.58	T.	.19	.25	2 48
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.43	.11	.99	....	....	T.	....	....	T.	.95	T.	.57	....	....	.14	3.27
0.20	T.	0 08	0.08	0.24	T.	0.11	T.	0.00	0.07	0.02	0.40	0.06	0.75	0.06	0 11	0.32	2.71
.42	....	....	.03	.16	....	.02	....	....	....	....	1.01	....	.17	.22	.10	.53	3 11
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.30	....	.05	.10	.34	....	T.	....	....	.05	....	.48	.13	1.18	....	.08	.47	3.53
.19	....	.11	.16	.50	....	.01	....	....	.09	....	.28	.31	.46	.06	.04	.27	2.73
.17	....	.08	.10	.36	....	....	....	....	....	....	.06	....	.44	.15	.26	1.11	2.76
...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
.16	....	.15	....	.54	....	....	....	....	....	....	.38	30	.65	....	*	†.76	2.94
.08	....	.01	.03	.09	...	.01	....	....	.06	....	.78	...	.28	....	T.	....	1.54
.13	....	.24	.06	.22	....	.02	....	....	.07	...	.59	[illegible]	.75	....	....	.27	2.72
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		....
....	T.	....	T.	T.	T.	.57	.05	....	.60	....	...	....	*	†1.16	...	.48	2 86
.09	....	....	....	.05	....	.31	....	....	.18	....	.40	....	1.12	.08	.24	.36	2 88
T.	....	....	....	.08	...	.50	....	....	....	....	.60	....	1.00	.29	.10	.16	2.83
.15	....	.45	.08	.20	....	.02	....	....	T.	....	.33	.05	.56	.04	.24	.02	2.33
.15	....	.14	.12	.54	....	....	....	....	.02	....	.17	.07	.55	.07	.02	.30	2.42
.10	....	....	,41	.37	....	....	....	....	....	.31	....	....	.54	....	.44	...	2 25
.93	....	.12	.18	.40	....	....	....	....	.10	....	.30	T.	1.03	....	.10	.27	3.81
.28	....	T.	.02	.10	....	T.	....	....	....	....	.80	....	.92	....	.06	.50	2.95
.03	....	.01	.06	.09	...	.03	....	....	.01	....	.97	T.	.73	....	*	†.37	2.41
....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	...	...
.18	....	....	....	....	....	.31	....	...	....	....	.66	....	.96	....	....	....	2.11
0.12	0.00	0.08	T.	0.14	0.02	0.02	0.05	0.00	0.04	0.14	0.75	0.00	0 66	0.04	0.10	0.27	2.62
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.14	....	.06	T.	....	.10	....	....	....	.03	.83	T.	....	.25	T.	.38	.01	1.98
.10	....	.08	....	.16	....	.04	.02	....	.15	...	1.35	....	.65	.08	.10	.31	3 19
....	....	.04	....	.14	....	....	.10	....	....	....	.77	....	.70	07	....	.06	2.03
.37	....	.10	....	.21	....	.05	...	....	....	....	.64	....	*	†.58	....	.15	2.16

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
N. Plateau (Con.).														
Turin	....	....	T.	....	T.	....	....	.11	....	....	....	....	....	....
Kings Station	....	....	.03	....	....	....	....	....	....	....	.76	....	....	....
Atlantic Coast	0.00	0.06	0.08	0.01	0.02	?	0.00	0.00	0.00	0.00	0 03	0.00	0.00	0.06
Brooklyn	....	.10	...	....	.05	....	....	....	....	....	....	....	....	.16
Manhattan Beach	....	....	.04	.06	*	† .20	....	....	....	....	....	....	....	*
New York city	....	....	.11	T.	.04	....	....	....	....	....	....	....	....	.13
Willet's Point	...	.25	....	....	....	....	...	....	....	....	....	....	....	....
Brentwood	....	....	...	....	...	...	....	....	....	....	...	....	....	....
Setauket	....	....	.10	....	....	....	....	....	....	....	.16	....	....	T.
Bedford	....	....	.21	T.	....	....	....	...	....	....	....	....	....	....
Hudson Valley	0.00	0.00	0.02	T.	0.05	0.00	0.00	0.00	T.	0.00	0.01	0.00	0.00	0.00
Albany	....	....	06	T.	.12	....	...	...	T.	....	....	....	....	....
Lebanon Springs	....	...	T.	....	....	....	....	....	....	....	....	....	....	....
Honeymead Brook	....	...	.03	....	....	....	....	....	....	....	.05	....	....	....
Poughkeepsie	....	....	.02	....	....	...	....	....	....	....	....	....	....	....
Wappinger's Falls	....	....	....	....	....	...	....	....	....	....	T.	....	....	....
West Point	....	....	.06	...	....	....	....	...	....	....	....	....	....	....
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	T.	....	....	....	....	....	....	....	....	....	....	....
Southeast Reserv'r	....	....	....	....	....	...	....	....	...	....	....	....	....	....
Eagle Mills	....	...	....	....	.30	....	....	....	....	....	....	....	....	....
Marlborough	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	....	....	....	....	....	....	....	...	....	....	....	....	....	....
Mohawk Valley	0.07	0 00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0,00	0.00	0.00	0.00
Rome	.07	....	....	....	....	....	.07	....	....	....	....	....	....	....
Utica	...	....	....	....	....	...	....	....	....	....	....	....	....	....
Champlain Valley	0.00	0.00	0.00	0.14	0.05	T.	0.00	0.05	0.00	0.00	0.15	0.00	0.00	0.00
Plattsb'h Barra'ks	....	....	....	.20	.10	T.	....	.10	....	....	.20	....	....	....
Saratoga Springs	....	....	....	.	....	....	....	....	....	...	....	....	....	....
Glens Falls	....	....	....	.07	....	....	....	...	....	....	.10	....	....	....
St. Lawrence Val.	T.	T.	T.	T.	0.03	0.00	0.03	0.06	0.00	0.00	0.02	0.00	T.	0.00
Malone	....	....	....	....	.18	....	....	....	....	....	.16	....	....	....
Madison Barracks	...	....	....	T.	....	....	....	.26	....	....	....	....	....	....
Watertown	...	.01	.02	.03	.01	....	.21	....	....	....	....	....	....	....
Canton	....	....	....	T.	T.	....	....	....	....	....	....	....	....	....
DeKalb Junction	....	....	....	.03	....	....	....	.05	....	....	....	....	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	.02	...	....	T.	....	....	....	.13	....	....	....	....	T.	....
Ogdensburg	....	T.	T.	T.	....	...	....	.08	....	....	....	....	....	....
Potsdam	....	....	....	....	.03	....	....	....	....	....	....	....	....	....
Great Lakes	T.	0.12	0.06	0.01	T.	0.00	0.01	0.12	T.	T.	T.	0.01	T.	0.01
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	T.	.60	....	....	....	....	....	....	....	....	....	T.	....	....
Buffalo	.01	.24	.13	....	....	....	....	....	....	....	....	T.	....	....
Adams Centre	....	....	....	....	....	....	.19	....	....	....	....	....	....	....
Pittsford	....	....	....	....	....	...	....	.01	....	....	....	...	....	....
Rochester	T.	....	T.	T.	....	....	....	.02	....	....	T.	.07	....	....
Scottsville	....	....	....	....	....	....	....	.04	....	...	...	....	....	....
Appleton	.05	.20	.07	T.	.02	....	....	T.	....	....	....	.02	....	....
Fort Niagara	....	.45	T.	.06	....	....	....	....	...	....	....	....	....	.05
Baldwinsville	....	....	.08	....	....	....	....	.13	....	....	....	....	....	.05
Skaneateles	....	....	.23	....	....	....	....	....	....	....	....	....	....	....
Syracuse	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ridgeway	....	.29	.03	.02	....	....	....	....	....	.06	....	....	.01	....
Demster	....	....	.10	....	....	....	....	.20	....	....	....	....	...	....
Fulton	....	....	.27	....	....	...	...	.17	....	....	....	....	....	....
Oswego	....	....	.05	T.	....	....	....	.19	....	....	....	....	....	....
Palermo	....	....	.03	....	....	....	....	.14	....	....	....	....	....	....

TATION FOR MAY—(*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.02	....	.12	....	.19	....	T.	.16	....	....	T.	1.18	....	.96	.02	.06	.14	2.66
.06	....	.05	....	.12	...	....	....	....	.03	....	.55	....	.75	.12	.06	.94	3.47
0.06	0.00	0.00	T.	0.31	0.07	0.43	0.04	0.00	T.	0.00	0.23	0.04	0.75	0.05	0.06	0.28	2.53
.03	....	...	T.	.25	.01	.59	....	....	....	....	.28	....	.49	.02	....	.33	2.31
† .06	....	....	....	....	.02	.44	.22	....	...	...	.01	.26	*	† .33	....	.30	1.94
.02	....	....	T.	.07	.01	.45	T.	....	...	....	.27	...	.52	.06	T.	.33	2.01
....	....	....	....	.70	.38	.24	....	....	...	....	....	....	.75	...	.34	....	2.66
...	....	....	....	....	...	....	...	...	...	....	....	....	....	....	....	....	....
.21	....	....	....	.74	T.	.45	....	...	...	...	.24	....	.76	....	T.	.34	3.10
.05	....	....	....	.12	....	.41	.02	....	T.	....	.48	....	1.25	.19	.05	.38	3.16
0.04	0.00	T.	T.	0.05	0.04	0.19	T.	0.00	0.01	0.03	0.39	0.06	0.48	0.35	0.01	0.50	2.52
.01	....	.04	T.	.13	T.	T	.01	....	.04	.02	.09	T.	.24	.10	T.	.69	1.55
.01	....	T.	[illegible]	.18	T.	...	....	...	T.	.21	.05	....	.16	....	T.	.88	1.50
....	....	T.	T.	.04	.26	....	....	....	....	....	.65	...	.91	.22	.04	.97	3.17
....	....	....	...	.02	T.	.35	...	....	T.	....	.67	T.	.85	....	T.	.59	2.50
.12	....	....	T	.04	.02	.56	....	....	.02	....	.72	.02	.92	.66	.04	.46	3.58
.03	....	....	....	...	T.	[illegible]	† .50	....	...	T.	....	.50	....	1.50	....	.30	2.89
....	....	....	....	....	....	....	....	....	...	...	...	...	....	....	....	...	3.48
.14	....	....	....	T.	....	.43	....	....	....	T.	.68	...	*	† 1.31	....	.23	2.79
....	....	....	...	...	....	....	....	....	....	....	...	....	....	....	....	....	2.93
....	....	....	....	....	....	....	....	....	....	....	.25	....	.25	....	....	....	0.80
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	0.11	0.50	0.00	0.00	0.00	0.00	0.00	0.08	0.75	0.00	0.00	1.00	0.02	0.24	0.00	2.85
....	....	.11	.50	....	....	....	....	--	.08	.75	...	....	1.00	.03	.24	....	2.85
....	....	....	...	....	....	....	...	....	....	....	....	....	....	....	....	....	....
0.00	0.00	T	0.00	0.16	0.00	0.00	0.12	0.00	T.	T.	0.20	0.00	0.24	0.20	T.	0.36	1.69
...	....	....	....	T.	....	....	.25	....	....	T.	.20	...	....	.40	T.	.40	1.85
....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....
....	...	T.	....	.31	....	....	...	....	T.	*	† .26	....	.47	....	T.	.32	1.53
T.	0.00	0.09	T.	0.02	0.00	0.05	0.14	0.00	0.00	0.16	0.43	T.	0.88	0.02	0.03	0.01	1.96
.03	....	T.	.01	....	....	....	.15	....	...	....	.33	...	.23	....	.17	....	1.26
....	....	.45	....	....	....	.39	....	....	....	.68	....	....	.63	....	....	....	2.41
T.	....	.05	.01	.15	....	....	.38	....	....	....	.72	....	.70	.03	....	.04	2.36
...	....	T.	....	....	....	....	.12	....	....	....	.55	....	.84	....	....	....	1.51
....	....	.01	....	....	....	....	.10	....	....	....	.76	....	.87	.01	....	.01	1.84
....	....	....	....	....	....	....	....	....	....	....	....	...	....	....	....	....	....
....	....	.17	....	....	...	...	.19	....	....	....	.55	....	1.65	.07	....	....	2.78
....	....	.01	....	....	....	....	.20	....	...	....	.52	...	1.22	.04	...	.03	2.10
....	....	.02	....	....	....	....	....	....	....	.63	....	.03	*	† .67	.08	...	1.46
0.05	0.01	0.12	0.07	0.17	T.	T.	0.02	0.00	0.01	0.16	0.62	0.05	0.55	0.07	0.07	0.05	2.36
....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	....	....	....
....	....	.24	.08	.12	....	...	....	....	....	....	.23	....	.25	....	.42	....	1.94
.01	....	.12	.08	.34	....	....	.07	..	....	T.	.92	.10	.35	T.	T	.14	2.51
....	....	....	.06	....	.05	....	....	....	....	.69	....	....	.91	....	....	....	1.90
....	....	.43	....	....	....	....	.09	....	....	.03	.40	.02	.91	.11	....	.05	2.05
.12	....	.12	....	.12	....	....	....	....	....	T.	.79	.03	.35	....	T.	.02	1.64
.12	....	.21	....	.04	....	....	....	....	....	....	.57	.21	.25	....	....	....	1.44
.10	....	.09	T.	.11	....	....	....	....	....	.11	1.94	.01	.18	.01	T.	.05	2.96
....	.04	....	....	.03	....	....	.02	....	....	1.36	....	.24	....	....	.11	....	2.36
....	....	.10	.85	....	....	.04	....	....	.11	.31	T.	.04	.83	T.	.16	....	2.70
.14	....	.21	....	.18	....	....	....	....	.08	....	.38	.09	.59	....	.02	.23	2.15
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.06	.08	....	....	....	....	....	....	....	....	.04	1.42	.04	.40	....	....	.06	2.51
.04	....	.14	....	.22	....	....	.10	....	...	....	.80	....	.85	....	....	....	2.45
.10	....	.20	....	.32	....	....	....	....	.01	....	.96	....	.80	.10	.01	....	2.94
.03	....	.08	....	.27	....	....	.10	....	T.	....	.69	T.	1.00	.02	T.	.03	2.46
T.	....	T.	....	.40	....	....	....	....	....	....	.95	....	.74	.03	.05	.02	2.36

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes (Con.)														
Phœnix	....	....	....	.05	....	....	....	.16	.04	....	....	....	....	....
Lyons	....	....	.05	T.	....	....	T.	.41	....	....	....	....	....	.02
Rose	....	....	07	T.	...	....	....	.77	....	....	..	T.	....	....
Erie, Pennsylvania	.02	.50	.02	T.	.04	....	....	....	....	....	T.	.18	....	....
Central Lakes	T.	0.00	T.	T.	0.00	0.00	0.00	0.20	0.00	0 00	0 00	0 00	0.00	0.00
Fleming	....	....	...	....	....	....	....	.14	....	...	....	....	....	....
Sherwood	....	....	....	....	....	...	....	.16	....	....	....	....	....	....
Romulus	....	....	T	....	....	....	....	.44	...	....	....	....	....	....
Ithaca	T.	....	.01	.02	....	....	....	.08	...	....	....	....	....	....
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	0 01	0.02	0.03	0 02	0.02	T.	0 01	0.06	T.	T.	0.04	T.	T.	0.02

‡ Record for the month incomplete. ‖ Received

TATION FOR MAY — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
.15	....	....	.12	.30	.03	....	.03	....	....	.10	.32	07	...	1.10	.12	.	2 59
....	....	.17	....	.04	....	.02	....	....	T.	.34	.02	.09	1.05	T.	06	T.	2.27
.04	....	.12	....	.27	....	...	.04	....	.02	...	.78	.04	.79	T.	01	09	3.04
.01	....	.12	.06	.44	T.	....	....	....	..	.02	56	....	.12	....	.32	.22	2.63
0.26	0.06	0.12	0.13	0.40	0.00	0.01	0.00	0.00	T.	0.04	0.62	0 09	0.88	T.	0 09	0.28	3.15
.36	....		T.	.60	....	....	....	....	....	....	.4	....	.70	...	...	.21	2.42
.10	....	.11	.23	.26	....	....	....	....	...	.15	96	.19	.52	....	35	....	3.03
.12	....	.32	.13	.49	....	....	....	....	..	T.	.88	16	1.30	T.	T.	.66	4.50
.48	....	.04	.17	.27	....	.05	....	....	T.	....	.25	T.	.98	T.	02	.27	2.64
....	....	...	....	....	....	....	....	....	....	....	...	....	....	...	....	....	....
0.08	T.	0.07	0.08	0.17	0.01	0.08	0.04	0.00	0.03	0.12	0 43	0.43	0 66	0.08	0.10	0.24	2.52

too late to be included in the averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees Fahr.).						Extremes of monthly mean temperature for May.			
		Normal for the month of May.	Length of record, years.	Record begins.	Record ends.	Mean for May, 1896.	Departure from the normal.	Highest.	Year.	Lowest.	Year.
Western Plateau	....	56.2	...	......	......	62.7	+6.5	.....	......	.....	......
Angelica	Allegany	54.4	15	1854	1896	60.8	+6.4	60.8	1896	51.0	1891
Humphrey	Cattaraugus	55.7	13	1884	1896	62.0	+6.3	62.0	1896	52.6	1892
Elmira	Chemung	58.4	17	1851	1896	65.2	+6.8	65.2	1886	54.3	1856
Eastern Plateau	....	55.4	...	......	......	60.3	+4.9	.....	......	.....	......
Oxford	Chenango	55.6	29	1828	1896	60.0	+4.4	60.4	1831	50.8	1838
Cortland	Cortland	53.7	32	1829	1896	60.2	+6.5	60.2	1896	47.9	1861
Hamilton	Madison	55.3	20	1827	1896	59.0	+3.7	59.8	1833	51.3	1842
Cooperstown	Otsego	54.6	43	1854	1896	59.5	+4.9	60.7	'80-'87	46.7	1861
Waverly	Tioga	57.6	14	1883	1896	62.8	+5.2	62.8	1896	54.5	'90-'91
Northern Plateau	....	54.4	...	......	......	59.0	+4.6	.....	......	.....	......
Lowville	Lewis	54.4	32	1827	1896	59.0	+4.6	59.1	1848	48.8	1857
Atlantic Coast	....	58.8	...	......	......	62.8	+3.9	.....	......	.....	......
New York city	New York	59.7	26	1871	1896	64.0	+4.3	64.8	1880	53.5	1882
Setauket	Suffolk	58.0	11	1886	1896	61.5	+3.5	61.5	1896	55.3	1888
Hudson Valley	....	59.2	...	......	......	64.0	+4.8	.....	......	.....	......
Albany	Albany	59.5	23	1874	1896	64.0	+4.5	66.4	1880	55.9	1882
Honeymead Brook	Dutchess	57.8	16	1881	1896	62.2	+4.4	62.2	1896	51.7	1882
West Point	Orange	60.2	67	1826	1896	65.7	+5.5	.....	......	.....	......
Champlain Valley	....	55.3	...	......	......	58.4	+3.1	.....	......	.....	......
Plattsburgh Barracks	Clinton	55.3	42	1839	1896	58.4	+3.1	63.1	1847	50.3	1882
St. Lawrence Valley	....	55.6	...	......	......	59.2	+3.6	.....	......	.....	......
Madison Barracks	Jefferson	54.7	37	1839	1896	59.2	+4.5	62.6	1880	50.6	1882
Canton	St. Lawrence	56.7	35	1862	1896	58.2	+1.5	65.9	1887	51.6	'66-'83
North Hammond	"	56.2	18	1867	1896	61.2	+5.0	63.3	1870	50.3	1867
Potsdam	"	55.0	29	1828	1896	58.2	+3.2	62.4	1848	49.3	1842
Great Lakes	....	55.4	...	......	......	60.8	+5.4	.....	......	.....	......
Buffalo	Erie	54.0	26	1871	1896	58.5	+4.5	61.6	1887	49.3	1882
Rochester	Monroe	56.7	26	1871	1896	63.0	+6.3	64.2	1880	50.1	1882
Fort Niagara	Niagara	53.9	38	1842	1896	59.9	+6.0	62.9	1880	48.3	1866
Baldwinsville	Onondaga	55.3	20	1854	1896	63.4	+8.1	63.4	1896	46.8	1857
Oswego	Oswego	54.3	26	1871	1896	58.0	+3.7	61.4	1880	50.4	1882
Palermo	"	56.3	43	1854	1896	59.5	+3.2	60.9	1887	47.5	1867
Erie, Pennsylvania	Erie	57.0	23	1874	1896	63.0	+6.0	65.0	1880	51.0	1882
Central Lakes	....	57.6	...	......	......	62.4	+4.8	.....	......	.....	......
Ithaca	Tompkins	57.6	18	1879	1896	62.4	+4.8	64.6	1880	52.2	1882
Average departure	....	.....	...	......	......	.....	+4.8	.....	......	.....	......

AND PRECIPITATION — MAY.

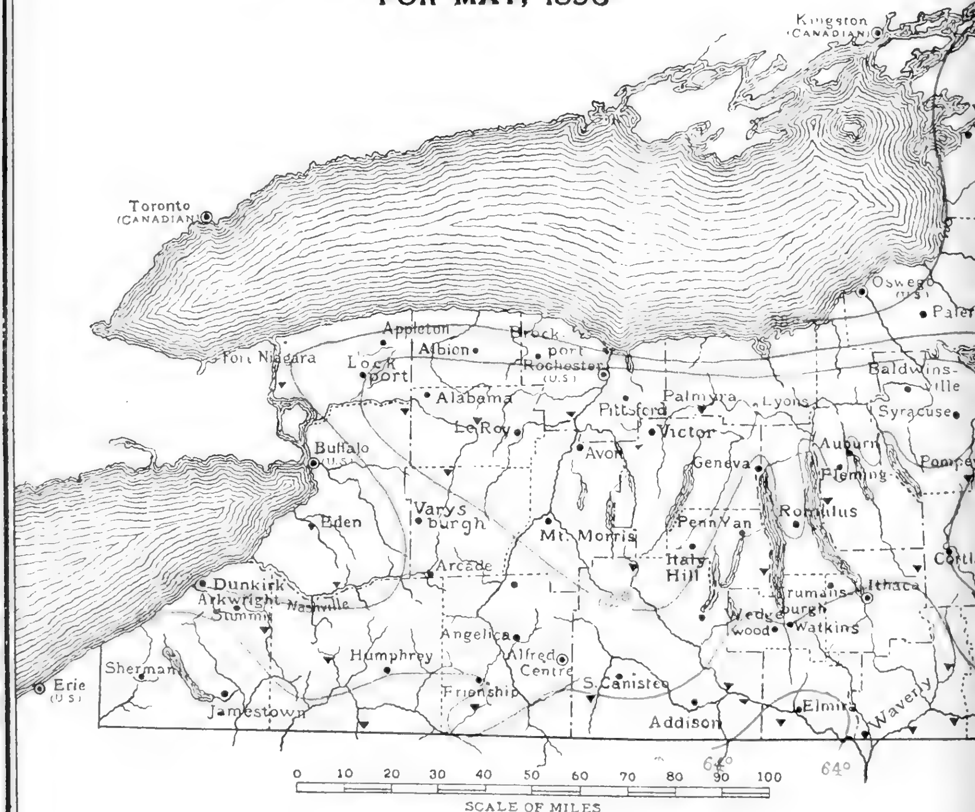
Station.	County.	Precipitation — (Inches).						Extremes of monthly precipitation for May.			
								Greatest.		Least.	
		Average for the month of May.	Length of record, years.	Record begins.	Record ends.	Total for May, 1896.	Departure from the average.	Amount.	Year.	Amount.	Year.
Western Plateau	...	4.38	...	...	...	2.83	—1.55	...	...	...	...
Angelica	Allegany	3.96	12	1871	1896	1.99	—1.97	8.82	1894	1.00	1872
Humphrey	Cattaraugus	4.89	13	1884	1896	3.35	—1.54	9.50	1894	1.45	1891
Elmira	Chemung	4.28	17	1851	1896	3.14	—1.14	7.65	1894	0.50	1891
Eastern Plateau	...	3.80	...	...	...	2.77	—1.03	...	...	...	...
Oxford	Chenango	3.58	26	1829	1896	3.53	—0.05	6.18	1844	1.04	1843
Cortland	Cortland	4.43	18	1851	1896	2.73	—1.70	7.96	1892	1.79	1862
Hamilton	Madison	3.01	21	1827	1896	2.72	—0.29	5.09	1894	1.11	1827
Cooperstown	Otsego	3.60	43	1854	1896	2.33	—1.27	8.84	1890	0.36	1879
Port Jervis	Orange	4.53	12	1880	1896	2.88	—1.65	8.44	1893	1.22	1880
Waverly	Tioga	3.63	14	1883	1896	2.41	—1.22	7.54	1893	0.59	1891
Northern Plateau	...	2.87	...	...	...	2.03	—0.84	...	...	...	...
Lowville	Lewis	2.87	34	1827	1896	2.03	—0.84	6.78	1893	1.02	'27-'41
Atlantic Coast	...	3.06	...	...	...	2.56	—0.50	...	...	...	...
New York City	New York	2.90	26	1871	1896	2.01	—0.89	6.53	1886	0.73	1887
Setauket	Suffolk	3.22	11	1886	1896	3.10	—0.12	5.87	1893	0.10	1887
Hudson Valley	...	3.70	...	...	...	2.72	—0.98	...	...	...	...
Albany	Albany	3.11	23	1874	1896	1.55	—1.56	5.30	1892	0.89	1879
Honeymead Brook	Dutchess	3.68	16	1881	1896	3.17	—0.51	7.21	1893	0.94	1887
Poughkeepsie	"	3.55	21	1830	1896	2.50	—1.05	7.06	1893	1.14	1845
West Point	Orange	4.54	51	1840	1896	2.89	—1.65	11.66	1868	1.02	1877
Boyds Corners	Putnam	3.63	26	1870	1896	3.48	—0.15	8.18	1893	0.85	1877
Champlain Valley	...	2.64	...	...	...	1.85	—0.79	...	...	...	...
Plattsburgh Barracks	Clinton	2.64	36	1840	1896	1.85	—0.79	7.13	1850	0.18	1879
St. Lawrence Valley	...	2.81	...	...	...	1.98	—0.83	...	...	...	...
Malone	Franklin	2.27	15	1830	1896	1.26	—1.01	...	...	...	...
Madison Barracks	Jefferson	2.49	36	1841	1896	2.41	—0.08	8.25	1889	0.28	1888
North Hammond	St. Lawrence	3.34	18	1867	1896	2.78	—0.56	8.00	1867	0.66	1876
Potsdam	"	3.13	28	1828	1896	1.46	—1.67	5.38	1893	0.79	1891
Great Lakes	...	2.97	...	...	...	2.33	—0.64	...	...	...	...
Buffalo	Erie	3.39	26	1871	1896	2.51	—0.88	7.35	1892	0.53	1877
Rochester	Monroe	3.28	26	1871	1896	1.64	—1.64	6.87	1894	1.12	1891
Fort Niagara	Niagara	2.84	38	1842	1896	2.36	—0.48	7.31	1894	0.58	1877
Oswego	Oswego	2.81	26	1871	1896	2.46	—0.35	7.03	1883	0.54	1877
Palermo	"	2.02	37	1860	1896	2.36	+0.34	6.90	1867	0.30	1870
Erie, Pennsylvania	Erie	3.47	23	1874	1896	2.63	—0.84	8.05	1892	1.04	1879
Central Lakes	...	4.11	...	...	...	2.64	—1.47	...	...	...	...
Ithaca	Tompkins	4.11	18	1879	1896	2.64	—1.47	7.34	1894	0.61	1891
Average departure	...	...	...	...	...	...	—0.93	...	...	...	...

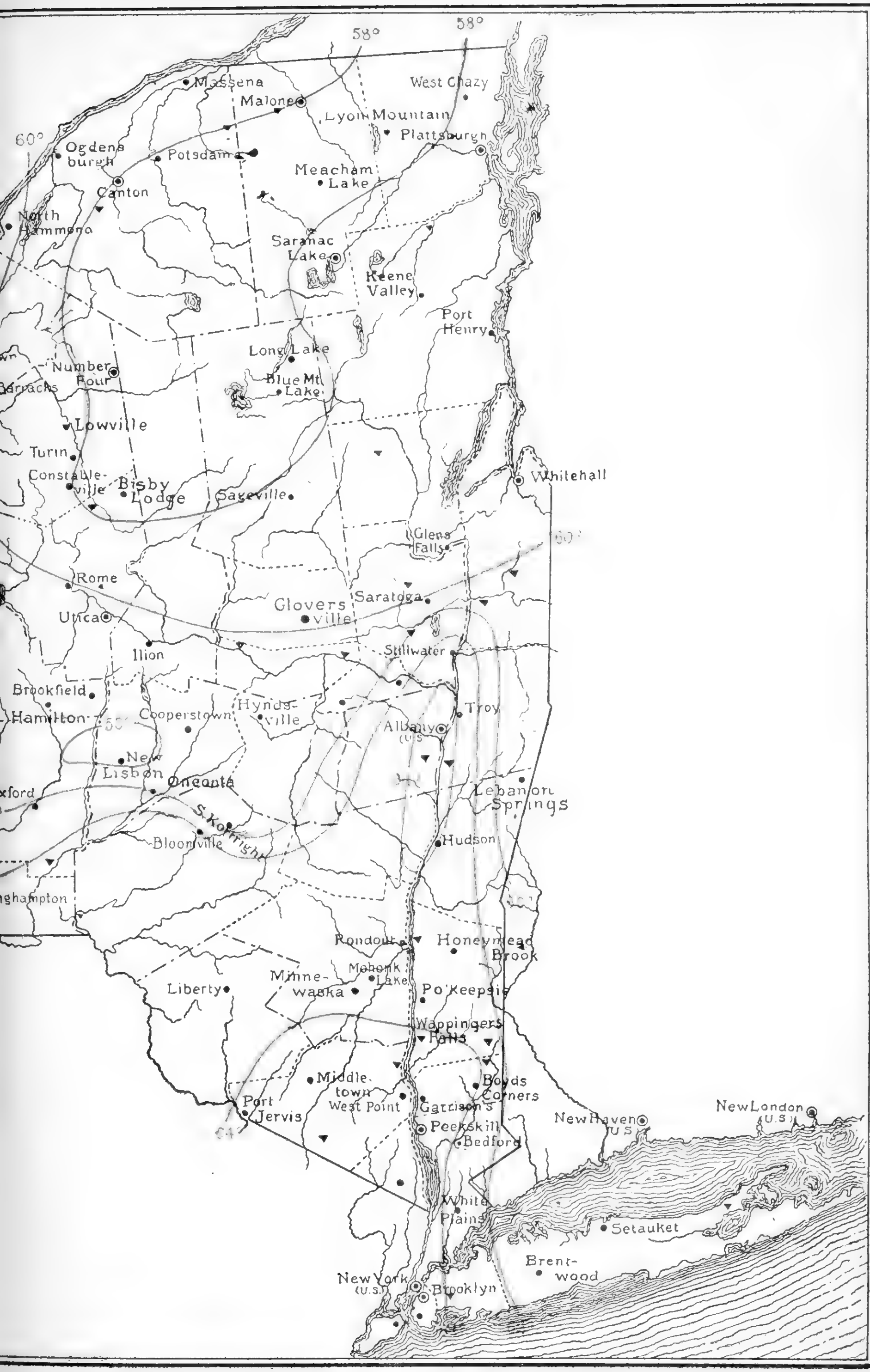
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR MAY, 1896



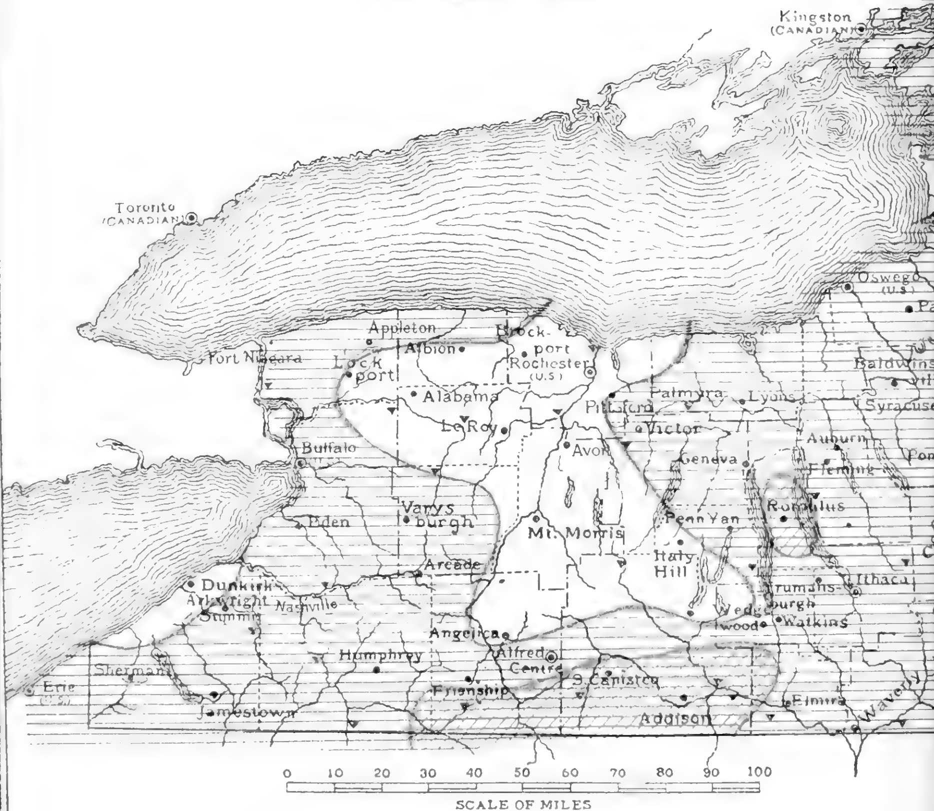

58°
58°
60°
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdens burgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Number Four
Barracks
Long Lake
Blue Mt. Lake
Lowville
Turin
Constable-ville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hynds-ville
Troy
Albany
(U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Binghampton
Rondout
Honeymead Brook
Liberty
Minne-waska
Mohonk Lake
Po'keepsie
Wappingers Falls
Middle-town
West Point
Garrison's
Boyds Corners
Port Jervis
Peekskill
Bedford
New Haven
(U.S.)
New London
(U.S.)
White Plains
Setauket
Brent-wood
New York
(U.S.)
Brooklyn

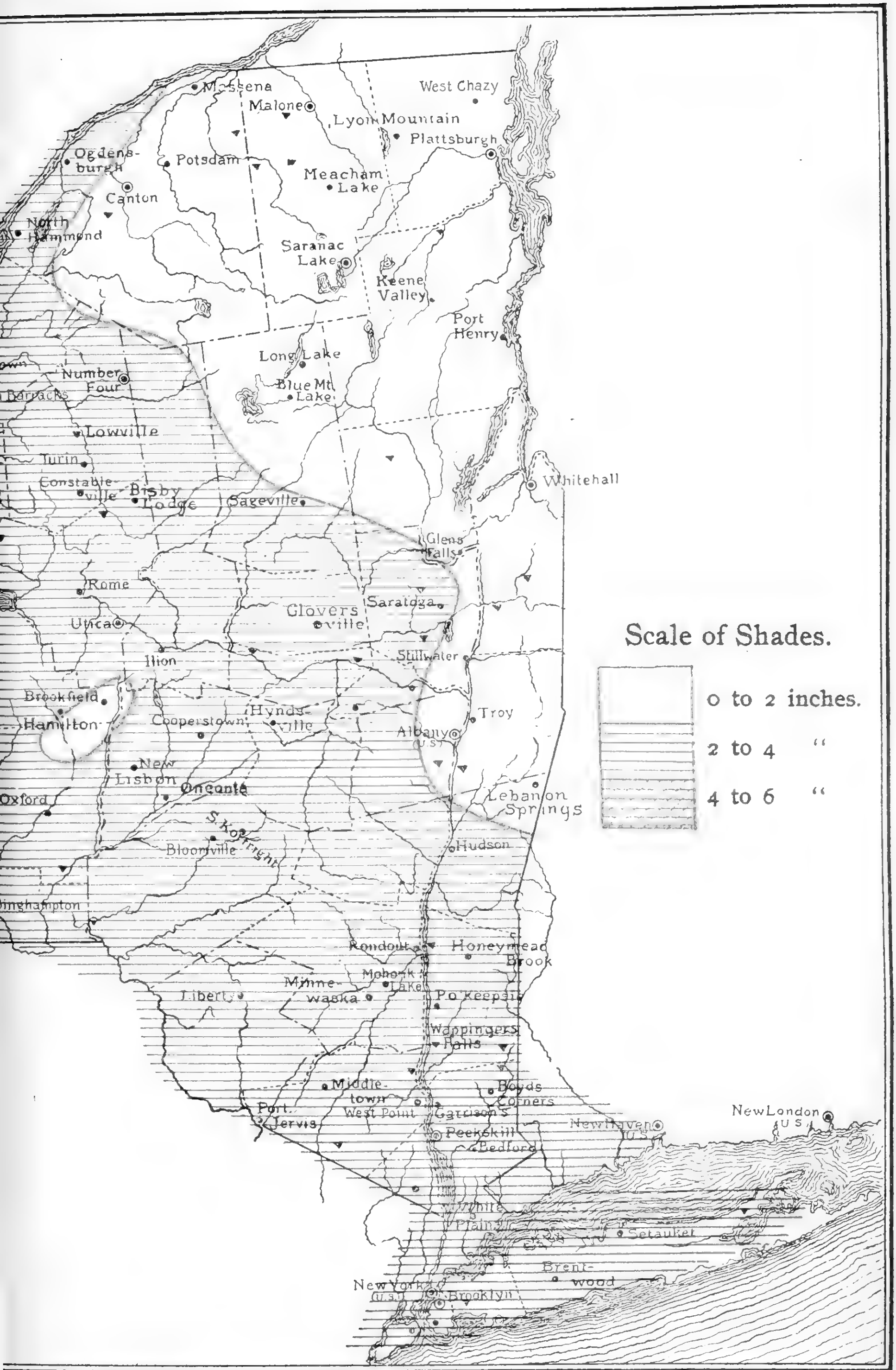
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR MAY, 1896




Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Blue Mt. Lake
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Lowville
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Bisby Lodge
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Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Oxford
Lebanon Springs
Stamford
Bloomville
Hudson
Binghampton
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "

Meteorological Summary for June, 1896.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during June was 29.98 inches. The highest barometer was 30.33 inches at Friendship on the 3d, and the lowest was 29.52 inches at New York city on the 10th. The highest mean pressure obtained over southern New York, and the lowest near Lake Ontario. The average of the mean pressure at 6 stations of the National Bureau agreed closely with the normal value.

The mean temperature of the State, as derived from the records of 73 stations, was 64.7 degrees. The highest local mean was 68.8 degrees at Brooklyn, and the lowest, 59.0 degrees, at Number Four. The highest general daily mean was 75 degrees on the 2[illegible]th, the lowest being 56 degrees on the 1st. The maximum temperature reported was 96 degrees at Mt. Morris on the 8th and at Watertown on the 9th; and the minimum, 31 degrees, at Arcade, South Canisteo and New Lisbon on the 3d. The mean monthly range of temperature for the State was 47 degrees, the greatest local value being 59 degrees at Waverly, and the least, 30 degrees, at Manhattan Beach. The mean daily range was 23 degrees. The greatest local daily range was 50 degrees at Friendship on the 3d, and the least, 3 degrees, at Brooklyn, on the 14th. The mean temperatures for the various sections of the State were as follows: The Western Plateau, 64.7 degrees; the Eastern Plateau, 63.9 degrees; the Northern Plateau, 61.6 degrees; the Atlantic Coast, 66.1 degrees; the Hudson Valley, 65.7 degrees; the Champlain Valley, 64.4 degrees; the St. Lawrence Valley, 63.9 degrees; the Great Lake Region, 65.4 degrees; the Central Lake Region, 66.0 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 1.2 degrees below the normal, excesses being reported only from 4 stations of the western and central sections.

The mean relative humidity was 73 per cent. The mean dew point was 55 degrees.

The average precipitation, as derived from the records of 94 stations, was 3.19 inches. The maximum general rainfall exceeded 6 inches in portions of the southern tier of counties, while less than 2 inches were reported over considerable areas near Lake Ontario. The greatest local amount was 6.67 inches at Brooklyn, and the least, 1.32 inches, at Rose, Wayne county. The principal rain period of the month covered the dates from the 6th to the 9th, with a maximum amount of 0.56 inches on the 8th for the State. General showers were also reported on the 16th, 21st, 24th and 28th. The average precipitation at 28 stations possessing records for previous years was 0.27 inches below the normal amount. Excesses, which obtained at 9 stations, were greatest in the Atlantic Coast Region.

The average number of days on which the precipitation amounted to 0.01 inch or more was 9.2. The number of rainy days was least in western New York and greatest in the eastern and northern sections. The average number of clear days 12.1; of partly cloudy days, 10.9; and of cloudy days, 7.0; giving an average cloudiness of 45 per cent. for the State. The cloudiness was very nearly uniform over the State.

The prevailing direction of the wind was from the southwest. The average wind travel at six stations of the National Bureau was 6396 miles. The travel was generally in excess of the usual mileage for the month. The maximum velocity at the above stations was 42 miles per hour at Buffalo on the 26th.

Thunderstorms occurred at Humphrey and Jamestown on the 4th; at 4 western stations and at Honeymead Brook on the 5th; at a few stations of all sections on the 6th and 7th; generally over the State on the 8th and 9th; at Atlantic coast stations on the 10th; at Gloversville on the 11th; at coast stations and at Humphrey on the 14th; at South Canisteo on the 15th; in western New York and at Lebanon Springs on the 16th; in all excepting the northern sections on the 17th; at Gloversville on the 18th; at Wedgewood and Lebanon Springs on the 19th; in all but the northern section on the 21st; at Jamestown and Bedford on the 26th; in western, northern and eastern New York on the 28th; at Lebanon Springs on the 29th.

Hail was reported on the 15th and 18th.

Light frosts occurred in some portions of the highlands on the 2nd, 3d, 11th and 30th.

The weather of June was generally pleasant, and for the most part favorable for farming interests. The average temperature was slightly lower than usual, the nights being especially cool. A warm wave occurred between the 3d and 10th, during which maxima of 90 degrees or more were obtained. This was succeeded by a period of deficient temperature lasting until the 17th, but thereafter growing warmer until the mean maximum for the month was obtained on the 20th. The average for the last week was slightly below the normal.

General rains were confined mainly to the first decade, the showers which followed being more local in character and rather insufficient in the east and north. About the usual percentage of sunshine obtained over the State. Thunderstorms occurred on 18 days, but generally were not very severe.

During June the weather of New York was influenced by seven areas of high and five areas of low pressure; the number of the latter being about the usual average for the month. The first and second depressions, which were broad and ill defined, passed eastward over New York on the 6th and 10th respectively, bringing general rains over the State. On the 14th a storm of marked energy passed along the Atlantic coast, accompanied by heavy rain and gales. The succeeding low pressure areas, four in number, passed north of the State on the 20th, 21st, 26th and 28th, bringing thunderstorms and local rains, with rising temperatures, especially on and about the 20th.

The most important high pressure systems passed over New York on the 2nd, 24th and 30th; the accompanying depressions of temperature being sufficient to cause light frosts in the valleys of the plateaus.

The drouth which prevailed during a part of May, and early in June, was broken by the abundant rains of the 6th to 10th, and thereafter the rainfall was generally sufficient for vegetation, excepting in some northern sections and east of Lake Ontario. During the third week heavy showers in the south caused a considerable damage by flooding. Early haying was general on or before the 20th with discouraging results, owing to the early drouth. Wheat and other grains were in fair condition, oats, especially, growing well. Small tree fruits were scarce, excepting in the northern counties, but apples and berries were abundant. Cool nights somewhat retarded the growth of garden truck.

Heavy rains occurring in southern New York on the 11th and 26th washed the soil badly in the hilly sections, and damaged bridges and other property along water courses. Four cows were killed by lightning near New Lisbon on the 8th.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations	Mean of maximum and minimum.	Highest.	Date.
Western Plateau.												64.7	96	8
Alfred	Allegany	1824									61.4	62.1	85	7
Angelica	"	1340									62.8	62.7	87	7
Bolivar	Allegany											62.2	86	7
Friendship	"	1550	30.01	30.33	3	29.61	9	0.72			62.1	64.1	89	7
Humphrey	Cattaraugus	1950									63.2	62.9	86	7
Arkwright	Chautauqua	1260										‡64.0	80	*b*
Jamestown	"	1328										64.4	85	7
Elmira	Chemung	863										67.7	90	*c*
Avon	Livingston	585										67.0	92	7
Mt. Morris	"	525										67.4	96	8
Lockport	Niagara										67.4	68.4	93	7
Victor	Ontario											66.2	90	*b*
Wedgewood	Schuyler	1350									63.7	66.0	92	20
Addison	Steuben	1000							71	56	63.8	64.0	87	8
South Canisteo	Steuben	1480							73	55	61.8	62.1	86	*d*
Arcade	Wyoming	1557									63.0	63.1	86	20
Varysburg	"											66.0	90	7
Eastern Plateau.												63.9	92	20
Binghamton	Broome	870									64.7	64.6	88	19
Oxford	Chenango	550										63.8	90	20
Cortland	Cortland	1120										63.4	89	4
Bloomfield	Delaware	1550									64.0	63.2	90	20
South Kortright	"	1700										61.6	88	*c*
Brookfield	Madison	1350									59.5	62.9	86	*e*
Middletown	Orange	660										67.8	89	20
Port Jervis	"	470										66.2	89	20
Cooperstown	Otsego	1300									60.6	63.3	85	21
New Lisbon	"	1231									59.5	60.8	84	*f*
Oneonta	"	1100									63.0	65.0	90	20
Perry City	Schuyler	1038									62.4	64.5	89	20
Waverly	Tioga	825									66.8	65.0	92	20
Mohonk Lake	Ulster	1245									66.4	62.7	85	*g*
Northern Plateau.												61.6	88	5
Saranac Lake	Franklin											62.0	88	5
Gloversville	Fulton	802									63.4	63.0	87	21
Lowville	Lewis	1240										62.4	84	*h*
Number Four	"	1571	29.95	30.28	25	29.57	9	0.71	78	53		59.0	81	5
Atlantic Coast.												66.1	91	22
Brooklyn	Kings	107										68.8	90	21
Manhattan Beach.	Kings											64.5	80	13
New York city	New York	314	29.99	30.30	25	29.52	10	0.78	80	58		66.0	87	22
Willets Point	Queens											66.4	89	*i*
Brentwood	Suffolk	75									66.0	66.6	91	22
Setauket	"	40							76	58	65.0	65.7	87	21
Bedford	Westchester	290										64.9	89	21
Hudson Valley.												65.7	91	*j*
Albany	Albany	85	29.98	30.32	25	29.58	10	0.74	71	56		68.0	91	20
Lebanon Springs	Columbia	930										62.6	89	21

FOR JUNE, 1896.

TURE—(IN DEGREES FAHR.)								SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	† Duration	Date.	Total snow fall.	
														h. m.			
31	3	51	25	50	3	5	*y*	12.7	12.9	4.4	10.1	3.62	3.45	5.00	16	......	....
36	3	49	22	40	3	12	24	6	14	10	9	4.07	1.35	4.00	9	......	S. W.
32	3	55	25	44	3	12	9	10	16	4	11	3.26	......	......	......	......	....
33	3	53	26	45	3	12	9	....	..	....	11	4.29	1.58	......	8	......	....
32	3	57	30	50	3	20	*z*	13	12	5	11	3.22	1.20	......	9	......	S. W.
38	2	48	22	32	30	10	*ab*	8	16	6	13	3.63	0.75	......	8	......	S. W.
43	2	37	14	25	3	5	*ac*	....	....	....	......	......	......	......	......	......	....
40	2	45	20	35	3	8	*ad*	8	20	2	9	3.39	0.50	8.00	26	.....	S.
45	*l*	45	22	35	30	5	*ae*	21	1	8	8	3.31	1.05	......	8	......	N. W.
37	3	55	28	45	3	10	10	9	19	2	10	1.97	0.53	......	8	......	....
24	3	62	31	48	30	19	25	14	10	6	7	2.82	1.16	......	8	......	W.
43	3	50	26	40	3	14	*af*	22	7	1	8	1.43	0.36	......	26	......	W.
38	3	52	26	44	3	13	10	15	12	3	12	2.05	0.54	......	8	.....	W.
41	3	51	24	38	30	8	24	6	22	2	12	6.23	3.45	5.00	16	......	S. W.
36	3	51	25	42	3	11	25	16	12	2	12	5.78	1.86	19.30	16	......	S. W.
31	3	55	28	45	3	15	24	16	9	5	12	6.22	2.47	6.30	9	......	W.
31	3	55	24	45	3	13	*af*	12	12	6	10	3.19	1.23	15.00	8	......	....
35	3	55	25	49	3	9	9	14	12	4	7	3.06	1.10	......	8	......	....
31	3	52	26	48	3	8	25	12.8	10.5	6.7	12.1	3.60	2.68	......	8	......	....
36	3	52	24	40	3	13	25	14	11	5	10	2.64	1.12	......	9	......	S. W.
34	3	56	31	45	5	15	14	8	18	4	9	2.96	1.00	1.00	8	......	W.
34	3	55	24	42	4	10	25	21	3	6	12	3.44	1.15	......	9	......	N. W.
36	3	54	24	43	3	13	14	9	14	7	11	3.31	1.00	12.30	11	......	W.
32	3	56	30	48	3	18	*ag*	....	....	....	9	2.75	0.86	.....	17	......	....
39	2	47	31	39	11	22	*ah*	8	16	6	8	2 75	1.22	......	9	......	S. W.
45	15	44	21	30	14	9	28	13	11	6	11	6.43	1.38	20.00	13–14	......	....
43	3	46	27	36	3	9	*ai*	14	10	6	13	5.54	1.75	......	14	......	N. W.
38	3	47	19	35	3	8	25	15	8	7	10	4.70	2.68	......	8	......	N.
31	3	54	28	46	3	11	25	11	8	11	11	3.77	1.23	......	8	......	S.
36	3	54	28	45	3	14	25	....	....	....	10	3.39	1.10	......	8	......	....
33	3	56	28	44	3	13	14	10	15	5	10	3.67	0.96	0.45	16	......	S. W.
33	3	59	26	43	3	10	24	11	11	8	12	2.85	1.03	2.15	8	......	S
48	16	37	22	35	21	10	25	19	1	10	7	2.22	1.10	......	14	......	S. W.
33	3	49	24	40	3	7	8	10.0	13.2	6.8	11.0	3.03	1.51	1.34	18	......	....
37	2	51	25	40	3	10	25	12	13	5	9	3.70	1.22	......	6	......	S. W.
40	3	47	22	35	3	7	8	11	10	9	15	3.79	1.51	1 34	18	......	S. W.
36	3	48	24	40	3	8	10	11	15	4	10	1.83	0.41	......	9	......	W.
33	3	48	24	40	3	12	*aj*	6	15	9	10	2.81	0.63	......	9	......	W.
40	*m*	40	18	41	4	3	14	13.3	7.2	9.5	9.0	5.37	2.86	13.00	14	......	....
51	15	39	18	26	11	3	14	13	6	11	12	6.67	2.86	13.00	14	......	S. W.
50	15	30	11	23	13	4	18	18	3	9	5	4.91	1.56	......	25	......	S. W.
51	15	36	15	22	15	7	28	10	13	7	11	6.38	2.59	......	14	......	N. W.
50	*n*	39	18	25	*u*	5	14	....	....	....	9	6.01	1.18	9.00	17	......	S. W.
40	4	51	24	41	4	12	*ak*	17	4	9	7	5.00	......	......	......	......	S. W.
52	*p*	35	16	24	*v*	5	8	10	9	11	7	4.10	2.74	......	14	......	S. W.
40	3	49	22	36	*w*	8	28	12	8	10	11	4.52	1.54	14.30	14	......	S.
36	2	47	22	38	5	5	7	11.7	9.0	9.3	10.6	3.29	1.90	11.20	14	......	....
47	3	44	21	31	3	9	8	10	13	7	10	2.49	0.66	......	10	.....	S.
36	3	53	26	38	5	10	7	8	13	9	9	4.49	1.78	......	10	......	W.

METEOROLOGICAL DATA

Location of Stations.			Barometer.						Humidity		Tempera			
STATION.	County.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees)	Mean of tri daily observations	Mean of maximum and minimum.	Highest.	Date.
Hudson Val. (Con.)														
Honeymead Brook	Dutchess.....	450									64.3	64.3	87	21
Poughkeepsie.....	"	180										64.5	90	*j*
Wappinger's Falls	"											67.6	91	21
West Point........	Orange.......	167										66.4	91	21
Carmel............	Putnam	500										67.3	90	*h*
Mohawk Valley...												65.2	89	19
Rome	Oneida	445										65.2	89	19
Champlain Valley												64.4	92	20
Plattsb. Barracks.	Clinton	[illegible]										64.1	89	20
Glens Falls........	Warren	340									64.5	64.6	92	20
St Lawrence Val..												63.9	96	9
Malone............	Franklin	810									62.8	62.0	82	5
Madison Barracks.	Jefferson	266										63.0	85	5
Watertown..	Jefferson	486												
Canton............	St. Lawrence.	304									62.6	62.6	88	20
Massena	St. Lawrence.													
North Hammond.	"	300									65.5	66.7	92	20
Ogdensburg	St. Lawrence.	258										64.8	86	5
Potsdam	"	[illegible]									65.8	62.7	83	5
Great Lakes.......												65.4	90	7
Dunkirk..	Chautauqua..	590												
Westfield	"											66.5	85	*c*
Buffalo	Erie	690	29.97	30.25	*a*	29.57	8	0.68	64	53		66.0	85	20
Pittsford	Monroe.......										64.8	65.4	87	7
Rochester..........	Monroe.......	621	29.97	30.26	3	29.60	9	0.66	64	53		66.0	88	7
Appleton....	Niagara											64.1	88	7
Fort Niagara......	Niagara	263										65.6	90	7
Baldwinsville	Onondaga....	390									66.0	67.6	88	7
Oswego	Oswego.......	304	29.95	30.25	3	29.55	9	0.70	69	53		63.0	84	21
Palermo	"	460									64.0	63.4	87	20
Lyons.	Wayne	407									65.9	66.1	87	7
Erie, Pa...........	Erie...........	[illegible]	29.98	[illegible]	2	29.60	8	0.66	72	57		66.0	84	8
Central Lakes												66.0	89	20
Fleming	Cayuga	1000									67.7	66.4	88	20
Romulus	Seneca	719							85	56		66.2	89	20
Ithaca	Tompkins	810	29.98	30.29	3	29.53	9	0.76	70	55	64.6	65.3	86	*h*
Mean..........			29.98	30.33	3	29.52	10	0.71	73	55		64.7	96	*k*

* Mean of the tri-daily observations. ‡ Mean of the Max. and Min. by the Draper Thermo-
tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.
four hours.

(*a*) 2, 30; (*b*) 7, 20; (*c*) 8, 20; (*d*) 7, 8, 23; (*e*) 5, 18; (*f*) 5, 8, 20; (*g*) 13, 20, 21; (*h*) 5, 20; (*i*) 20, 22; (*s*) 2, 3, 4; (*t*) 1, 3; (*u*) 19, 29; (*v*) 4, 19; (*w*) 3, 6; (*x*) 4, 30; (*y*) 22, 24, 25, 26; (*z*) 21, 22; (*ab*) 16, 24; (*ak*) 8, 30; (*al*) 9, 26; (*am*) 26, 27; (*an*) 9, 10; (*ap*) 17, 21; (*bb*) 3, 13, 30.

FOR JUNE, 1896.

TURE —(N DEGREES FAHR).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h m			
42	3	45	20	30	3	7	7	11	8	11	12	2.40	1.14	20.00	14	......	S. W.
40	3	50	24	37	3	9	25	13	10	7	9	2.71	1.19	....	14	....	S.
45	3	46	23	33	3	14	7	13	7	10	12	3.52	1.53	14	14	......	S.
42	16	49	22	33	6	5	7	...	....	....	11	4.07	1.90	11.20	14	......	S. E.
45	1	45	18	30	5	7	11	15	3	12	11	3.32	1.63	17.00	14	......	....
40	2	49	27	36	28	10	8	....	....	....	7.0	1.51	0.46	......	8	......	....
40	2	49	27	36	28	10	8	....	....	....	7	1.51	0.40	......	8	......	....
40	3	48	22	36	3	5	9	10.0	11.0	9.0	8.0	2.90	1.64	......	6-7	.....	....
45	bb	44	20	32	7	5	9	....	....	....	6	2.80	......	.....	......	......	S. W.
40	3	52	23	36	3	7	8	10	11	9	10	3.01	1.64	......	6-7	......	W.
37	29	47	23	44	4	7	9	10.7	13.0	6.3	7.1	2.92	2.12	......	9	......	....
40	30	42	20	32	5	8	8	9	14	7	7	4.57	1.58	......	9	......	N. W.
37	29	48	22	35	29	12	10	....	....	....	6	1.54	0.93	......	7	......	S. W.
40	r	56	32	43	5	19	9	8	19	3	12	3.28	1.18	......	8	......	. W
39	23	49	25	41	4	7	9	13	12	5	8	3.39	1.00	......	8	......	. W
44	s	48	24	44	4	10	al	3	13	14	4	2.36	1.42	12.45	8	.....	S.
44	4	42	19	38	4	7	9	16	11	3	8	2.57	1.54	14.00	8	......	S. W.
41	30	42	22	34	4	10	9	15	9	6	5	2.76	2.12	......	9	......	S. W.
38	3	43	19	37	3	6	22	15.3	10.2	4.5	8.0	2.28	1.31	......	9	......	....
40	2	45	19	36	3	10	am	20	5	5	7	2.90	0.96	5.15	8	......	
45	t	40	16	35	3	7	28	9	16	5	8	1.46	0.32	.....	26	.....	S. W
42	3	45	22	35	3	10	10	16	5	9	7	2.07	0.85	......	9	......	W.
44	3	44	21	36	3	12	17	19	7	4	8	2.80	1.31	......	9	......	S. W.
40	3	49	21	35	30	12	an	16	11	3	10	1.60	0.89	......	9	......	W.
41	3	49	20	30	18	10	10		....	....	7	1.79	1.30	......	9	.....	N. W.
46	2	42	21	30	3	11	25	19	8	3	8	1.49	0.61	......	8	......	....
43	1	41	17	25	19	8	22	16	7	7	7	1.57	0.69	......	8	......	W.
38	3	49	25	37	3	11	22	20	9	1	6	2.31	1.00	0.55	28	......	S. W.
45	3	42	20	30	3	9	ap	12	13	5	8	2.42	0.89	......	7	....	N. W.
47	2	37	14	22	30	6	22	11	16	3	11	4.67	1.02	......	26	......	N. E.
39	3	45	21	37	3	7	10	12.0	11.0	7.0	7.0	3.07	1.00	1.30	8	.....	....
46	30	42	20	29	x	8	10	....	....	....	6	2.41	0.85	3.00	8	......	N. W.
42	3	47	22	35	3	7	10	11	2	7	4	2.43	0.89	......	8	......	W.
39	3	47	21	37	3	10	25	13	10	7	11	4.36	1.00	1.30	8	......	N. W.
31	3	47	23	50	3	3	14	12.1	10.9	7.0	9.2	3.16	3.45	5.00	16	......	S. W.

graph. || Report received too late to be used in computing means. The means from the
† Blank indicates that the duration is not shown in the original records, but is within twenty-

(*j*) 20, 21; (*k*) 8, 9; (*l*) 1, 2; (*m*) 3, 4; (*n*) 2, 10; (*p*) 2, 4, 11, 15, 16; (*q*) 3, 13, 30; (*r*) 1, 2, 3, 14, 30; (*ac*) 22, 24; (*ad*) 24, 26; (*ae*) 24, 25; (*af*) 10, 26; (*ag*) 14, 25; (*ah*) 1, 28; (*ai*) 25, 28; (*aj*) 9, 10, 25.

TEMPERATURE — JUNE, 1896, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	53	55	58	67	70	72	75	74	68	60	59	62	61	61
Alfred	60	65	75	74	80	78	85	82	74	65	68	74	71	68
	41	38	36	58	54	62	62	62	58	51	46	50	45	48
Angelica	63	66	76	79	83	81	87	81	70	67	65	75	73	69
	43	37	32	57	53	56	62	61	58	51	39	43	48	43
Bolivar	62	66	78	78	84	82	86	84	75	68	69	75	72	70
	36	39	33	53	55	54	58	60	63	54	38	41	44	54
Friendship	67	74	82	82	87	85	89	85	76	71	78	83	73	73
	39	38	32	53	53	56	59	61	57	49	43	47	44	49
Humphrey	60	67	74	75	82	80	86	83	75	70	68	74	74	71
	41	38	44	58	58	62	62	61	60	51	46	48	51	52
‡ Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	62	66	78	76	80	80	85	81	75	65	67	75	74	70
	42	40	43	60	59	64	64	63	61	55	47	49	55	51
Elmira	66	70	78	84	86	82	84	90	83	70	76	78	78	68
	45	45	48	54	57	61	64	65	65	52	51	56	46	55
Avon	64	72	82	83	89	87	92	86	78	66	71	74	....	78
	45	44	37	53	53	63	66	65	58	56	46	45	....	48
Mount Morris	76	73	69	81	93	93	90	96	92	88	89	75	77	81
	50	41	34	49	54	63	63	65	64	48	42	46	45	50
Lockport	66	72	83	84	87	90	93	91	75	67	74	80	81	81
	46	44	43	57	59	65	65	65	57	53	50	51	53	49
Victor	66	72	82	78	86	86	90	84	74	67	74	75	74	76
	45	47	38	54	51	64	67	65	56	54	48	50	45	49
Wedgewood	64	68	77	87	86	84	88	85	77	67	71	76	78	75
	43	45	41	55	57	65	62	62	59	51	47	51	47	54
Addison	63	69	78	77	84	80	82	87	81	69	72	77	73	69
	40	41	36	50	54	58	59	62	63	53	43	47	45	45
South Canisteo	61	67	76	79	83	79	86	86	79	67	70	76	74	70
	39	36	31	51	50	57	54	58	63	48	38	42	42	50
Arcade	59	62	76	81	83	84	85	83	73	63	67	71	72	69
	41	39	31	58	55	64	61	61	50	50	44	50	49	49
Varysburgh	65	71	84	82	87	87	90	80	70	68	73	78	79	76
	44	37	35	54	54	61	66	66	61	55	57	58	47	44
Eastern Plateau	54	56	58	64	68	69	69	72	71	63	58	62	60	60
Binghamton	62	65	76	82	87	82	80	87	83	68	69	72	75	67
	41	45	36	47	55	57	62	64	65	52	44	50	44	52
Oxford	67	68	78	80	87	83	83	89	83	71	74	77	75	67
	37	40	34	43	42	52	60	63	63	50	40	44	40	52
Cortland	62	65	75	89	83	80	82	81	81	68	68	72	74	68
	40	45	34	47	48	56	61	63	63	57	45	47	42	55
Bloomville	65	71	79	81	89	85	74	85	80	74	74	76	80	64
	42	44	36	54	53	54	59	64	61	49	42	47	43	51
South Kortright	63	65	80	83	86	84	76	88	83	69	68	73	72	64
	37	40	32	39	46	48	57	62	60	49	36	40	36	46
Brookfield	67	63	78	81	86	82	83	81	76	77	79	78	78	74
	45	39	42	46	49	46	51	50	44	46	40	41	48	50
Middletown	70	71	77	78	84	85	80	82	80	75	78	78	76	85
	54	56	57	56	58	60	60	62	58	53	51	56	58	55
Port Jervis	70	72	79	78	84	88	76	84	84	76	75	79	70	68
	46	45	43	46	54	53	59	64	66	64	45	57	50	54
Cooperstown	62	61	73	77	79	81	74	82	78	67	65	67	69	62
	46	48	38	47	55	57	58	61	62	50	45	46	51	53
New Lisbon	63	64	77	79	84	82	77	84	80	68	68	70	72	61
	37	28	31	40	46	49	59	62	62	48	38	45	39	49
Oneonta	67	70	81	82	88	84	80	88	88	75	72	76	76	65
	41	43	36	45	51	54	61	53	64	53	42	49	42	50
Perry City	68	74	77	80	86	81	87	84	80	70	74	78	78	66
	40	41	33	50	50	58	61	62	58	54	48	57	40	53
Waverly	65	69	76	82	85	81	85	87	84	70	73	77	78	78
	38	39	33	50	54	58	60	64	66	55	42	44	43	57
Mohonk Lake	65	67	70	72	79	79	74	73	75	72	69	73	85	74
	50	50	50	60	50	63	50	50	50	50	50	53	51	49

REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
61	65	63	66	70	73	73	70	61	58	65	70	66	67	62	59	64.7
71	69	72	79	82	83	78	78	70	58	68	76	77	74	70	73	62.1
44	55	49	48	53	59	64	51	43	46	53	58	51	56	59	40	
70	75	73	78	83	85	78	78	75	71	73	77	74	79	73	78	62.7
49	52	49	58	57	57	60	57	50	48	54	48	52	50	48	35	
75	72	75	79	82	84	80	79	73	64	69	77	78	76	71	75	62 2
42	52	48	52	49	55	58	62	42	46	54	61	41	51	43	35	
78	77	77	84	86	87	82	79	79	66	75	82	82	77	74	83	64 1
42	55	47	47	48	57	62	59	41	43	54	57	48	49	46	57	
75	65	74	80	80	80	75	76	73	62	70	74	74	72	68	73	62 9
44	55	49	49	58	59	58	55	47	52	51	60	51	55	48	41	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	64.0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	
74	70	73	79	81	82	78	75	73	65	78	73	77	73	66	75	64 4
48	56	52	52	55	61	66	64	48	57	57	65	53	54	53	42	
74	74	78	85	86	90	88	86	79	64	69	84	81	78	77	82	67.7
50	56	50	56	55	62	74	65	56	59	64	61	54	66	56	47	
76	82	72	83	87	91	86	85	75	72	84	79	85	88	75	80	67 0
47	55	58	51	54	61	65	62	45	45	56	64	52	54	52	41	
80	78	81	78	84	86	90	89	81	80	77	81	81	80	78	87	67.4
52	53	45	49	48	60	64	67	50	48	58	57	50	51	52	39	
78	79	79	85	89	92	86	81	81	81	87	81	86	84	72	80	68 4
53	58	57	54	57	67	62	62	48	53	57	67	54	58	54	45	
78	77	75	84	87	90	85	80	74	75	74	82	86.	83	74	81	66.2
47	52	55	53	53	65	64	59	47	44	55	61	54	59	56	44	
78	74	74	83	85	92	85	81	80	59	68	81	81	79	77	82	66 0
47	56	54	55	58	64	67	58	44	51	52	59	53	59	52	44	
73	75	76	80	85	86	86	81	74	59	65	81	79	78	75	77	64 0
45	54	55	56	53	59	62	62	48	47	54	61	51	56	51	41	
75	75	75	80	85	86	84	83	72	59	67	79	78	78	76	75	62.1
43	55	51	49	50	55	59	53	41	44	51	59	46	53	46	34	
77	72	74	78	82	86	82	75	72	68	77	74	79	73	71	74	63.1
44	56	49	47	56	61	65	53	43	51	55	61	50	52	49	39	
78	75	76	83	85	87	79	78	79	66	81	79	83	78	74	78	66.0
46	55	54	49	52	59	63	54	63	54	60	63	62	59	49	39	
58	62	66	68	68	74	73	71	62	57	59	68	65	64	64	59	63.9
75	75	80	83	88	87	85	83	76	67	64	81	81	75	77	71	64.6
43	57	59	57	53	63	62	60	50	46	51	61	47	57	53	43	
75	85	80	84	88	90	89	84	73	72	82	83	82	77	83	75	63.8
38	50	57	52	47	59	59	58	44	42	56	43	42	52	46	37	
72	69	75	80	85	86	84	78	70	67	63	79	79	78	73	75	63.4
42	53	58	55	49	59	62	60	46	45	53	60	48	55	50	41	
74	76	75	85	84	90	86	85	80	68	64	84	83	70	79	77	63.2
52	40	51	54	53	62	61	65	58	45	50	52	47	45	52	44	
71	78	80	83	85	88	84	81	72	72	67	81	81	75	75	64	61 6
37	57	53	51	45	64	51	60	41	38	49	56	42	45	47	39	
75	81	82	86	84	85	84	82	74	71	70	79	82	78	76	75	62 9
41	45	52	54	52	57	58	52	44	42	42	51	54	56	52	40	
71	71	79	81	85	89	85	85	85	68	65	80	76	68	79	80	67 8
45	52	58	56	57	65	67	68	58	52	53	59	58	59	58	59	
75	68	75	86	86	89	88	86	75	68	62	82	80	69	80	82	66 2
45	53	59	58	56	65	63	67	57	50	53	60	52	60	56	49	
65	69	76	75	83	84	85	75	67	69	64	78	75	74	66	68	63.3
50	46	56	58	60	64	65	55	52	55	56	56	55	54	50	51	
70	74	75	80	83	84	83	79	71	66	63	79	79	72	72	75	60.8
36	43	54	51	46	57	59	58	41	40	52	50	42	50	51	37	
76	74	83	85	88	90	86	82	76	72	68	84	84	79	77	80	65.0
41	45	56	55	51	61	62	64	47	44	54	60	48	54	54	43	
77	71	77	85	85	89	85	79	76	65	71	81	86	82	78	81	64.5
45	53	54	49	50	58	64	57	45	44	43	56	49	54	50	41	
77	75	80	84	86	92	86	85	78	55	65	83	80	74	78	75	65.0
47	57	58	55	52	60	62	65	48	45	54	62	49	55	50	39	
66	68	69	78	80	85	85	82	78	67	62	80	76	71	75	71	62.7
49	48	49	49	50	51	50	49	54	53	52	53	53	52	54	51	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	53	53	58	63	67	67	66	69	66	58	54	55	57	57
Saranac Lake	68	65	85	86	88	80	71	73	71	66	62	62	70	69
	45	37	45	47	51	59	59	61	51	43	47	39	41	41
Gloversville	64	66	75	80	84	80	66	70	80	74	68	72	72	63
	45	45	40	46	52	55	56	63	61	55	45	47	44	50
Lowville	62	62	76	81	84	79	82	80	73	63	65	69	72	71
	46	43	36	43	46	53	61	64	60	55	47	48	40	48
Number Four	57	60	73	78	81	77	76	76	71	61	62	66	71	68
	40	42	33	45	49	55	59	62	59	49	35	40	44	46
Atlantic Coast	62	61	62	64	68	67	65	67	70	67	64	67	64	58
Brooklyn	75	77	78	80	81	81	75	83	83	77	80	81	75	57
	54	53	54	55	61	62	60	64	63	65	54	64	59	54
Manhattan Beach	71	70	71	70	68	72	70	66	70	74	70	72	80	70
	54	53	52	58	60	62	58	60	64	65	61	60	57	57
New York City	68	69	70	74	78	77	70	74	78	73	74	78	69	61
	53	53	55	57	60	59	57	63	61	59	55	60	57	53
Willet's Point	70	70	73	78	83	73	73	73	83	75	75	78	72	58
	52	50	51	56	55	57	60	60	60	50	55	56	57	53
Brentwood	76	75	....	81	83	84	80	76	83	79	81	80	72	....
	52	47	....	40	55	46	57	64	62	59	46	51	49	....
Setauket	69	68	73	76	80	73	71	65	81	70	72	77	72	61
	53	52	54	52	58	56	58	60	59	59	52	57	56	53
Bedford	70	72	76	79	84	88	68	71	80	80	75	77	72	63
	47	47	40	45	52	52	55	62	60	59	43	50	50	50
Hudson Valley	59	59	60	66	71	70	63	66	71	67	61	63	63	58
Albany	69	70	78	84	88	85	69	71	82	76	71	75	76	65
	53	52	47	56	60	61	58	62	62	56	53	55	51	53
Lebanon Springs	69	68	73	79	86	83	65	68	86	73	70	72	63	63
	41	44	36	43	48	52	55	56	56	52	41	47	52	47
Honeymead Brook	67	66	72	78	82	82	65	71	79	70	71	72	93	64
	44	44	42	49	54	55	58	62	61	61	51	49	47	50
Poughkeepsie	71	71	77	81	87	72	68	76	82	75	75	77	74	65
	44	41	40	48	53	55	58	62	62	57	42	47	45	51
Wappingers Falls	74	72	78	82	87	86	74	80	85	76	74	78	76	74
	48	48	45	50	58	59	60	62	63	61	49	55	58	50
West Point	76	71	73	76	87	88	62	68	71	81	74	76	80	73
	50	51	45	50	55	55	57	57	63	61	47	54	50	44
Carmel	71	72	81	80	90	83	68	74	81	70	70	77	75	58
	45	49	55	54	60	62	59	60	65	62	63	53	56	50
Mohawk Valley	57	56	66	71	70	71	74	55	58	60	61	61	66	60
Rome	67	72	83	85	82	80	84	60	72	75	75	75	80	75
	47	40	50	57	58	62	64	50	44	45	47	47	52	45
Champlain Valley	56	58	56	65	68	69	63	61	64	60	58	59	59	57
Plattsburgh Barr's	65	70	65	77	80	85	82	65	60	62	66	62	62	68
	50	50	45	55	55	55	50	50	55	56	54	50	45	48
Glens Falls	64	68	76	81	85	85	65	68	83	72	70	71	73	60
	46	46	40	47	52	52	56	61	60	50	44	28	56	52
St. Lawrence Val	55	55	59	63	70	69	71	68	62	59	56	60	61	60
Malone	62	61	74	78	82	80	73	70	66	60	61	64	65	68
	47	45	43	48	50	55	61	62	55	50	45	47	41	48
Madison Barracks	59	61	64	73	85	83	80	79	69	65	66	71	75	64
	46	43	48	43	60	62	64	60	48	53	42	48	57	45
Watertown	70	71	80	89	95	96	88	88	79	72	74	79	78	78
	40	40	40	51	52	60	60	63	60	44	42	43	44	40
Canton	63	63	69	82	83	69	82	78	66	68	69	74	70	69
	46	40	41	41	49	54	63	61	59	46	44	46	49	47
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	66	76	76	88	88	80	84	80	66	78	70	80	84	84
	50	44	44	44	54	64	64	65	56	50	50	50	50	50
Ogdensburg	63	65	75	82	86	75	79	68	65	70	68	74	70	74
	52	48	50	44	56	62	62	60	58	53	48	50	55	50
Potsdam	66	64	79	78	83	80	74	72	62	63	62	65	67	73
	43	42	43	44	52	51	62	51	52	50	44	50	53	44

MAXIMA AND MINIMA FOR THE STATIONS—(*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
56	60	62	65	67	72	71	65	57	60	58	68	65	65	60	56	61.6
72	78	75	82	82	85	80	75	72	75	67	80	78	78	68	73	62 0
42	44	48	51	59	59	63	40	45	52	57	59	59	54	39	50	
65	76	72	79	83	85	87	77	72	72	60	80	78	79	77	70	63.0
48	45	57	56	53	53	63	63	40	46	49	58	52	54	55	45	
72	79	74	81	83	84	82	74	74	78	64	77	78	78	71	70	62.4
43	41	50	48	50	65	59	61	40	41	53	60	54	55	54	39	
67	72	68	78	79	80	78	71	68	74	62	74	74	73	65	64	59.0
41	41	50	45	47	56	57	56	36	44	50	58	43	51	50	37	
61	63	64	67	71	75	77	77	67	60	60	68	69	65	70	66	66.1
75	72	72	75	82	84	90	89	76	68	65	82	82	68	86	79	68.8
51	58	60	61	61	68	70	71	65	55	55	61	60	63	63	59	
58	68	64	64	66	70	78	78	78	73	63	64	71	73	68	78	64.5
50	54	59	60	60	65	67	66	62	58	54	52	60	60	61	58	
73	69	67	74	82	85	86	87	72	65	63	77	79	68	78	74	66.0
51	58	58	61	66	68	70	69	63	53	54	60	65	61	64	57	
74	72	68	76	84	89	88	89	75	67	65	79	82	66	81	77	66.4
56	59	60	58	63	68	69	62	54	53	56	57	61	60	56	56	
75	76	74	75	80	89	89	91	76	73	69	80	.....	71	86	71	66.6
50	51	59	60	55	65	61	66	50	42	54	60	.....	57	59	59	
68	72	70	78	84	84	87	85	74	71	66	76	78	68	79	73	65.7
52	52	59	60	60	65	67	69	60	54	55	60	59	60	60	59	
70	74	66	81	86	86	89	86	74	67	62	80	79	68	80	75	64.9
50	50	57	61	58	63	63	68	58	46	53	58	53	60	58	50	
59	61	65	68	71	77	77	75	66	61	59	69	68	67	68	64	65.7
69	76	76	82	86	91	87	85	76	74	66	85	83	78	82	77	68.0
54	52	59	62	61	68	69	66	55	54	56	60	61	62	60	54	
61	77	76	80	83	87	89	82	69	78	69	84	78	79	80	71	62 6
47	43	56	55	51	60	60	61	46	43	49	58	49	53	53	43	
67	74	74	76	82	86	87	84	69	73	65	81	78	71	80	72	64 3
49	47	57	59	56	66	65	66	55	49	54	58	54	60	55	56	
69	73	73	86	87	90	90	84	74	71	63	81	74	74	73	80	64 5
51	47	57	54	53	65	63	52	53	46	54	50	58	58	55	56	
70	76	74	81	86	90	91	84	78	74	68	83	82	78	82	78	67.6
51	52	58	59	60	69	70	70	60	53	50	54	55	50	58	53	
65	73	72	68	83	90	91	90	89	75	67	65	81	80	69	83	65.4
50	42	44	49	58	64	64	68	59	50	53	55	58	60	60	56	
69	73	69	83	88	90	88	85	75	65	64	83	80	72	81	76	67.3
53	55	60	64	66	63	70	69	58	46	52	62	64	60	63	49	
63	68	63	68	73	76	70	68	63	66	62	66	70	68	63	64	65 2
78	80	75	84	89	88	80	81	78	80	68	82	85	86	78	80	65.2
48	57	51	52	57	64	60	54	48	52	55	50	55	50	48	49	
60	63	66	68	73	78	74	72	63	62	60	70	71	67	68	60	64.4
70	65	82	70	85	89	87	80	80	72	75	77	85	75	80	75	64.1
50	55	52	60	65	65	60	65	50	50	55	57	60	55	60	45	
67	76	74	81	88	92	86	84	76	78	64	84	84	80	74	78	64.6
54	55	54	59	55	64	64	60	47	46	45	60	56	57	57	44	
62	66	68	67	68	73	71	66	61	64	61	69	66	68	61	56	63 9
69	78	76	80	80	80	80	73	69	71	75	77	75	79	68	69	62.0
46	53	52	54	58	65	59	56	42	45	49	61	55	59	50	40	
75	78	79	73	79	84	78	81	78	82	67	74	79	83	72	70	63 0
43	47	52	48	57	65	60	61	47	49	49	60	54	60	37	44	
80	85	84	78	80	81	86	82	79	87	70	82	84	84	74	79	65 2
44	50	52	52	46	48	65	52	50	48	50	50	52	48	54	40	
76	82	82	84	83	88	80	70	79	75	75	82	79	80	69	71	62.6
46	50	51	54	55	62	61	48	39	46	48	56	50	55	52	40	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
86	80	88	78	86	92	78	80	72	80	68	76	80	78	70	70	66.7
50	54	60	56	56	66	66	58	46	52	56	66	56	58	58	45	
78	83	78	81	80	84	77	75	70	73	70	79	80	75	72	68	64.8
54	56	59	57	58	64	67	50	52	62	54	58	57	60	55	48	
74	78	77	81	80	82	79	78	80	75	74	81	74	79	69	65	62.7
49	54	57	63	57	59	53	55	57	54	53	61	51	58	47	41	

SHOWING DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes	54	55	60	66	70	72	75	73	65	60	59	62	63	61
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	63	67	81	75	83	84	82	85	72	68	68	78	76	73
	41	40	45	60	64	64	65	61	60	54	42	52	55	49
Buffalo	57	66	80	78	83	79	75	82	69	65	73	70	75	83
	45	47	45	60	64	65	64	62	56	55	50	56	58	52
Pittsford	63	64	77	80	85	82	87	84	74	65	69	70	75	71
	47	45	42	55	53	66	68	66	57	55	48	51	48	56
Rochester	63	67	80	80	85	86	88	83	72	68	70	74	74	72
	48	45	44	59	59	66	68	65	58	54	50	53	55	51
Appleton	64	68	68	71	75	78	89	80	69	66	71	75	71	70
	46	45	40	51	50	60	63	63	57	54	50	52	51	48
Fort Niagara	65	70	70	69	76	81	90	76	72	68	74	77	72	69
	46	45	41	51	51	57	63	63	59	58	51	52	52	49
Baldwinsville.....	66	67	80	82	86	83	88	86	76	67	72	74	78	75
	51	46	50	57	62	66	68	67	59	50	51	50	55	53
Oswego	54	58	68	74	78	79	80	80	64	61	58	68	71	65
	43	44	46	57	57	65	66	57	54	52	46	49	52	52
Palermo	65	67	75	80	83	84	86	85	72	67	68	70	73	70
	40	44	38	50	51	60	55	63	59	49	44	41	46	49
Lyons	64	64	75	79	85	80	87	82	76	65	70	71	74	70
	48	49	45	56	57	65	66	68	58	55	51	53	50	53
Erie, Penns'vania.	60	63	74	73	80	78	81	84	72	67	67	73	72	69
	50	47	53	61	64	62	67	65	62	58	55	57	58	56
Central Lakes	57	51	64	68	68	69	73	75	69	59	59	61	63	63
Fleming	71	78	86	84	72	79	85	85	78	63	68	68	72	71
	55	60	61	55	49	50	56	66	62	55	48	51	49	57
Romulus	65	67	77	80	87	77	87	83	78	62	72	76	79	71
	47	47	42	53	57	65	65	65	58	55	49	49	54	53
Ithaca	61	65	76	80	86	80	84	85	80	64	69	72	77	70
	45	49	39	56	55	63	63	65	59	53	46	51	47	56
Mean	56	57	60	66	69	70	69	68	66	61	59	61	62	60

‡ Max. and Min. by the Draper Thermograph.

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
62	64	64	67	70	75	75	68	61	64	65	69	69	69	63	62	65.4
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	
74	70	72	80	82	85	79	76	73	73	84	75	76	79	70	76	66.5
53	58	55	55	55	67	69	59	50	57	60	65	66	59	51	45	
74	68	72	78	76	85	75	74	75	70	78	76	77	72	70	70	66.0
53	59	58	58	62	67	67	61	52	56	60	65	64	65	58	54	
74	77	74	80	83	83	85	78	74	72	77	79	81	82	75	76	65.4
50	54	58	53	56	65	69	55	47	46	52	60	54	56	56	45.	
73	74	72	81	82	84	81	76	76	72	79	79	82	80	72	77	66.0
54	57	60	56	60	66	69	59	50	56	58	58	56	57	50	46	
69	70	72	81	84	83	83	75	72	76	72	75	83	78	69	79	64.1
52	53	53	52	55	64	67	63	46	51	55	62	52	58	52	44	
68	69	73	84	87	86	84	79	73	77	71	82	83	75	77	78	65.6
52	54	51	54	59	68	72	64	48	56	58	62	56	65	57	47	
77	74	75	82	87	87	85	77	77	78	71	81	85	81	76	77	67.6
56	60	57	57	61	69	67	51	51	56	60	56	61	57	48	55	
69	73	68	72	82	81	84	66	68	75	69	72	78	80	71	72	63.0
50	55	59	52	57	68	65	58	50	52	56	58	56	58	54	49	
75	73	73	81	83	87	85	73	73	77	67	76	83	83	72	74	63.4
47	49	58	48	50	60	65	62	42	45	42	61	50	57	52	44	
74	75	70	80	85	85	80	78	73	71	72	80	81	81	75	75	66.1
52	58	61	54	58	64	71	60	51	51	55	62	56	62	53	48	
72	66	71	74	80	81	78	73	69	72	83	74	78	72	70	73	66.0
55	58	57	57	60	69	66	67	55	60	61	67	59	60	59	51	
63	64	67	68	71	76	77	72	62	58	62	71	66	68	66	60	66.0
73	72	76	78	86	88	84	84	72	68	69	78	79	79	74	75	66.4
51	56	60	57	58	66	70	66	51	51	55	62	55	55	56	46	
79	71	75	83	87	89	86	81	75	65	71	83	80	81	77	76	66.2
50	57	57	54	58	64	68	62	49	50	56	62	51	54	55	45	
74	72	75	80	84	86	84	78	73	64	65	80	81	77	77	76	65.3
49	57	59	55	54	63	68	60	53	49	55	60	51	61	55	44	
60	64	65	67	70	75	74	70	62	61	61	69	68	67	64	61	64.7

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau ..	T.	0.00	0.00	0 05	0.04	0.12	0.21	0.89	0.65	0.08	0.00	0.00	0.00	0.06
Alfred	....	....	....	T.	T.	.04	.45	1.07	1.35	T.	...	....	....	T.
Angelica	....	....	....	.16	.14	.32	*	*	†1.98	....	...	....	....	T.
Bolivar	....	....	...	....	T.	....	.11	1.58	.99	....	....	....	....	.12
Friendship	....	....	...	T.	T.	....	.10	.68	1.20	.02	....	....	....	.15
Humphrey	....	....	....	.05	.20	...	.30	.75	.72	.08	....	....	....	.12
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	....	....	....	.40	.22	.12	.01	.46	.12	....		....	....	.22
Jamestown	....	....	....	.38	.01	.31	T.	.41	.48	T.	....	....	....	....
Elmira	....	....	....	....	....	....	.16	1.03	.75	.22	....	....	....	....
Pine City	....	....	....	....	....	...	....	....	...	....	...	....	....	....
Akron	....	....	....	....	....	....	T.	45	1 18	.09	...	....	...	....
Avon	....	....	....	....	....	.50	....	.53	.46	.15	....	....	....	....
Mt Morris	....	....	....	....	....	.15	....	1 16	....	.17	....	....	...	....
Lockport	...	....	....	...	.09	....	.15	.17	.34	.11	....	....	....	....
Victor	T.	....	....	....	....	.23	30	.54	.46	.02	....	...	....	....
Tyrone	....	....	....	....	....	....	....	1.15	.55	.15	....	....	....	....
Wedgewood	....	....	....	....	....	.02	.46	1.35	.21	.15	....	....	....	.03
Addison	....	....	....	T.	....	T.	.50	1.20	.44	.03	....	....	....	.23
Atlanta	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Haskinville	....	....	....	T.	....	.40	.20	1.15	.20	.03	....	....	....	.18
South Canisteo	....	....	....	....	....	.23	.60	.86	2.47	.15	....	....	....	.15
Arcade	....	....	....	....	.12	....	.62	1.23	.17	.09	....	...	...	....
Varysburgh	....	....	....	....	T.	....	T.	1.10	.22	18	...	....	....	....
Eastern Plateau ...	0 00	0.00	0.00	0.01	0.00	0.03	0.21	0.84	0.44	0.42	0 13	0.00	0.03	0.38
Binghamton	....	....	....	....	....	....	.35	....	1 12	.35	....	....	...	.15
Chenango Forks	....	....	....	....	....	....	....	....	..	....	....	....	..	....
Oxford	....	....	....	...	....	T.	.10	1.00	.88	.34	....	....	T.	.10
Cortland	....	....	....	....	....	.03	.18	.64	1.15	.29	....	....	....	....
Bloomville	....	....	....	....	....	....	.03	.59	.65	.07	1.00	....	....	....
Deposit	....	....	....	...	...	....	....	....	....	...	....	....	....	....
South Kortright	....	....	....	....	....	....	.14	.57	....	.30	....	....	....	.23
Brookfield	....	....	....	....	....	....	.06	.56	1.22	.52	....	....	....	....
Apulia	....	....	....	....	....	....	....	....	....	...	...	....	....	....
Middletown	....	....	....	....	....	....	.03	1.10	T.	1 00	.10	....	....	1.38
Port Jervis	....	....	....	....	....	....	....	.10	.32	.60	.62	...	....	*
Warwick	....	....	....	....	....	....	.05	1 00	.16	1.39	...	....	....	1.92
Cooperstown	....	....	....	....	....	....	.45	2.68	.10	.45	.06	....	....	....
New Lisbon	....	....	....	....	....	.04	.37	1.23	.70	.58	07	....	....	...
Oneonta	....	....	....	....	...	35	.27	1.10	31	...	.27	....	....	....
Perry City	....	....	....	....	....	T.	.53	.94	.21	.10	....	....	....	.12
Newark Valley	....	....	....	....	....	....	.67	.90	.10	.10	....	....	.45	.28
Waverly	....	....	....	.10	....	....	.02	1.03	.18	.22	....	....	....	.47
Mohonk Lake	...	....	....	....	....	....	.08	.03	....	.43	....	....	....	1.10
Northern Plateau ..	0.09	0.00	0 00	0.00	0.00	0.46	0.32	0.40	0.56	0.09	0.06	T.	0.00	0.05
West Chazy	....	....	....	....	....	....	....	....	..	....	...	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	...	....	....	....	....
Saranac Lake	.06	....	....	....	....	1.22	.64	27	1.10	....	....	..	....	....
Gloversville	T	....	....	....	....	.10	.13	.51	.68	....	.19	.01	....	.08
Lowville	....	....	....	....	....	....	.06	40	.41	.14	.05	....	....	.04
Number Four	.25	....	....	...	....	....	.51	.29	.63	.15	07	....	....	....
Kings Station	.15	....	....	....	....	1.00	.28	.54	....	.15	....	....	....	.12
Atlantic Coast	0.00	0.00	0.00	0.00	0.00	0.09	0.01	0.06	0.12	0.41	T.	0.00	0.20	2.18
Brooklyn	....	....	....	....	....	....	.02	.03	.16	.37	....	....	....	2.86
Manhattan Beach	....	....	....	....	....	....	....	T.	.15	.01	....	....	*	† 1.05
New York City	....	....	....	....	....	....	.01	.16	.26	.46	....	....	....	2.59

TATION FOR JUNE, 1896 — (INCHES.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.05	0.53	0.14	0.00	0.00	0.02	0.11	0 01	0.02	0.29	0.02	0.10	0.00	0 06	0.03	0.00	3.48
T.	.40	.02	....	...	....	.10	....	....	.49	....	....	....	T.	.15	......	4.07
....	.18	.09	....	....	....	.08	....	....	.32	....	.05	....	T.	T.	......	3.26
....	.31	....	...	....	T.	.18	.11	....	.67	....	.08	....	.06	.08	......	4 29
....	.17	.01	....	....	T.	.20	...	....	.55	....	.02	....	T	.12	......	3.22
.05	.25	.01	....	....	T.	.24	....	....	.51	....	17	....	.18	......	......	3.63
....	....	...	....	....	....	....	....	....	....	....	....	...	....	......	......	......
T.	44	.13	....	....	....	.13	....	....	.25	....	35	....	.07	.01	......	2.93
....	.45	....	....	....	T.	.40	T.	....	.34	...	.50	....	.11	T.	......	3.39
.15	.22	....	....	....	....	T.	....	...	.72	.03	....	....	...	.03	......	3.31
....	....	...	....	....	....	....	....	....	....	....	...	...	...	......	......	......
T.	.15	.03	....	....	T.	T.	T.	.42	....	....	....	....	T.	......	......	2.32
.01	.12	.01	....	....	T.	T.	....	....	....	....	.10	....	.04	.05	......	1.97
....	.65	...	....	....	.36	....	...	....	....	...	.12	....	.21	......	......	2.82
...	.10	....	....		....	...	....	....	T.	....	.36	....	.11	......	......	1 43
.08	.05	.02	....	....	....	.06	....	...	....	T.	.10	....	.17	.02	......	2 05
...	1 25	....	....	...	....	....	....	...	20	....	...	....	....	......	......	3.30
....	2.16	1.29	....	....	....	.28	....	....	.22	...	....	....	.05	.01	......	6.23
T.	1.63	.70	....	...	....	.09	.01	...	.84	.05	....	....	T.	.06	......	5.78
....	...	...	....	....	...	...	....	....	....	...	....	...	....	......	......	......
.60	.08	....	...	...	....	.03	....	....	.21	...	.04	....	03	.04	......	3 19
....	1.00	....	....	....	...	.10	...	....	55	....	.02	....	03	.12	......	6 22
.17	.48	....	....	...	....	.08	....	....	T.	...	.18	....	.05	T.	......	3.19
....	.54	.42	....	....	T.	.30	...	...	...	.30	....	....	T.	......	......	3.06
0.01	0.11	0.29	0 02	T.	0 04	0.28	T.	0.00	0.15	0.03	0 07	0.00	0 08	0.05	0.00	3 72
....	.06	.09	....	...	.06	.05	T.	....	.33	.08	....	....	....	......	......	2 6
....	....	...	....	...	....	....	....	...	....	....	....	...	....	......	......	......
....	T.	.22	....	....	T.	25	....	....	.02	....	....	...	.05	T.	......	2.96
....	.02	.08	....	....	....	.60	....	....	.01	....	.29	....	04	.11	......	3.44
.12	...	.04	....	....	.40	.32	....	....	....	....	....	....	.03	.06	......	3.31
....	....	...	....	....	....	....	....	....	....	....	....	....	...	......	......	......
....	....	.86	.36	....	.12	....	....	....	....	....	....	....	.17	......	......	2.75
....	....	20	....	....	...	T.	....	....	.03	....	....	...	.12	.04	......	2.75
...	....	...	....	....	....	....	....	....	....	....	....	....	...	......	......	......
....	.07	.98	....	...	....	.64	....	....	*	*	†.84	....	.15	.05	......	6.34
†1.75	...	.45	....	....	...	.52	...	....	.72	.63	.18	....	.20	.05	......	5 54
....	.07	.35	....	...	...	...	....	....	.53	.08	.55	....	.11	......	......	6.21
....	.08	.38	....	...	.02	.28	....	....	....	....	....	....	.20	......	......	4.70
....	.08	.11	....	....	....	40	....	....	....	...	.02	....	.17	......	......	3 77
....	.48	...	....	.06	....	.41	....	....	...	.03	...	....	....	.11	......	3.39
....	96	.43	....	...	....	...	....	....	.18	....	.02	....	T.	.18	......	3 67
....	...	....	....	....	....	.20	....	....	.22	.03	....	....	T.	.05	......	3.00
....	....	.47	...	....	...	.10	....	....	.07	.07	....	....	.03	.08	......	2 85
....	....	....	....	....	...	.33	....	....	.13	12	...	....	...	......	......	2.22
0.00	0.00	0.34	0.31	0 00	0.00	0.13	0.01	0.00	0.00	0 01	0.05	0.00	0.15	0 01	T.	2 87
....	....	....	...	...	....	....	....	....	...	....	....	...	....	......		......
....	...	....	....	....	....	....	....	...	...	....	....	....	...	.....	......	......
....	...	T.	....	....	...	T.	....	....	...	.01	.04	...	.30	.06	T.	3.70
....	....	.36	1.51	....	....	.09	.03	....	....	.03	.03	....	.03	.01	......	3.79
....	...	.24	....	....	....	.26	....	....	....	....	.09	....	.14	......	......	1.83
....	...	.42	....	....	....	.19	....	....	...	...	.07	....	.23	....	......	2 81
....	...	.68	.04	..	....	.10	....	....	....	....	...	....	.05	......	......	2.21
0.31	T.	0.62	0.09	0.00	0.00	0.07	T.	0.00	0.74	0.25	0.09	0.08	0.12	0.01	0 00	5 37
1.24	T.	..	...	....	....	.20	.02	..	.85	.62	.20	...	10	......	......	6.67
.90	....	.10	.62	....	....	*	† .25	....	*	† 1 56	.10	.06	01	.10	......	4 91
....	T.	1 32	T.	....	....	.09	T.	....	.66	.55	.19	....	.09	......	......	6.38

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlan. Coast (Con.)														
Willet's Point	....	....	....	....	....	....	....	.18	T.	1.01	....	....	1.00	1.17
Brentwood	...	....	....	....	....	....	T.	....	.10	.20	....	....	*	†3.00
Seatauket	....	....	....	....	....	....	T.	T.	.02	.23	T.	....	....	2.74
Bedford	...	...	....	....	....	....	.03	.05	.14	.58	T.	....	....	1.54
Hudson Valley	0.08	0.00	0.00	0.00	0.00	T.	0.09	0.21	0.27	0.45	0.09	T.	0.00	1.28
Albany	T.	....	....	....	....	.02	.09	.65	.05	.66	.01	....	....	.44
Lebanon Springs	T.	....	....	....	....	....	.30	.62	T.	1.78	.17	....	....	.71
Honeymead Brook	....	....	....	....	....	....	.11	.01	.13	13	.05	....	....	1.14
Poughkeepsie	....	....	....	....	....	....	.06	.23	.06	.25	.01	....	....	1.19
Wappinger's Falls	....	....	....	....	....	....	.02	.03	.10	.51	.08	....	....	1 43
West Point	....	....	....	....	....	....	....	....	.45	...	.60	.03	....	1.90
Boyds Corners	....	....	....	....	....	....	....	.07	.36	.20	....	....	....	1.81
Carmel	....	....	....	....	....	....	....	.04	.28	.23	....	....	....	1.63
Southeast Reserv'ir	....	....	....	....	....	....	....	....	.30	.45	....	....	....	1.57
Eagle Mills	.85	....	...	....	....	....	.35	.45	1.00	.36	....	....	....	1.00
Easton	....	....	....	....	....	....	...	....	....	....	....	....	....	....
Mohawk Valley	0.00	0.00	0.00	0.00	0.30	0.12	0.30	0.40	0.00	0.00	0.00	0.00	0.00	0.00
Rome	....	....	....	....	.30	.12	.30	.40	....	...	....	....	....	....
Champlain Valley	0.02	T.	0.00	0.00	0.00	0.64	0.18	0.40	0.24	0 86	0.20	T.	0 00	0 02
Plattsburgh B'rcks	...	T.	....	....	....	....	...	.40	20	1.50	.40	T.	....	....
Glens Falls	.05	....	....	....	....	1.27	.37	.40	.27	.22	....	...	....	.05
St. Lawrence Valley	0.07	0.00	0.00	0.00	0.00	0.38	0 25	1.05	0.55	0.07	0.01	0.00	0.00	0.05
Malone	...	....	....	....	....	.41	.67	1.03	1.58	....	....	...	....	....
Madison Barracks	.04	....	....	....	....	.24	.93	.09	...	....	....	....	....	....
Watertown	.24	....	....	....	....	.03	.11	1.18	.15	.02	T.	...	....	.37
Canton	....	....	....	....	....	.27	.03	1.00	.77	....	....	....	....	....
DeKalb Junction	.04	....	....	....	....	.83	T.	1.09	.99	....	.03	...	....	....
Massena	...	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	.02	....	....	....	....	.40	....	1.42	....	.52	....	....	....	....
Ogdensburg	.07	....	....	....	....	.45	....	1.54	.35	...	.03	....	....	....
Potsdam	.17	....	....	....	....	*	† .14	*	†2 12	...	....	...	...	....
Great Lakes	T.	0 00	0.00	0.05	0.00	0.10	0.18	0.41	0.37	0 10	0.00	0.00	0.00	0.65
Dunkirk	....	....	....	.14	....	....	....	....	....	.98	....	....	....	....
Westfield	....	....	....	.20	....	.24	T.	.96	.09	....	....	....	....	....
Buffalo	....	....	....	....	....	....	.26	.28	.11	.11	....	....	....	....
Adams Centre	...	....	....	....	....	....	1.02	.07	....	....	....	....	....	....
Pittsford	....	....	....	....	...	.20	....	.34	.85	.08	....	....	....	....
Rochester	T.	....	....	....	....	.23	....	.35	1.31	.04	...	....	....	....
Scottsville	T.	....	....	....	....	.50	....	.85	.31	....	....	....	....	....
Appleton	....	....	....	....	....	....	.11	.11	.86	.18	....	....	...	....
Fort Niagara	....	....	....	....	....	....	.11	.05	1.30	....	....	....	....	.04
Baldwinsville	....	....	....	....	....	T.	.11	.61	.21	....	....	....	....	....
Skaneateles	....	....	....	....	....	.06	.04	.31	.28	.30	....	....	....	....
Ridgeway	....	....	....	....	....	....	T.	.56	.48	.11	...	....	....	....
Demster	...	....	....	....	....	....	.12	.80	.18	04	....	....	....	.02
Fulton	....	...	....	....	....	...	.10	....	....	....	....	....	....	.75
Oswego	T.	...	....	....	....	.04	....	.69	.09	....	....	....	....	.04
Palermo	....	....	....	....	....	....	.20	.41	....	....	....	....	....	.08
Phoenix	....	....	....	....	...	...	.09	.19	.62	.09	....	....	....	....
Lyons	....	....	....	....	....	.08	.89	.42	42	....	....	....	....	T.
Rose	....	...	....	....	....	.17	.31	.22	.10	.01	....	....	....	T.
Erie, Pennsylvania	....	....	....	.61	....	.40	.22	.93	.18	.03	...	....	....	....
Central Lakes	0.00	0.00	0.00	T.	0.00	0.30	0.20	0.98	0.42	0.12	0.00	0.00	0 00	T.
Fleming	...	....	...	....	...	...	...	.85	.37	.15	....	....	....	....
Sherwood	....	...	...	....	....	.51	.15	.50	.11	....	....	...	....	....
Romulus	....	....	....	....	....	.66	T.	.89	.52	....	...	....	....	....
Ithaca	....	....	....	T.	....	.03	.66	1.70	.68	.31	....	....	....	T.
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	0.03	T.	0 00	0.01	0.03	0.22	0.20	0.56	0.36	0.26	0.05	T.	0.02	0.40

† Record for the month incomplete, ‖ Received too late to be included in the averages.

TATION FOR JUNE — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
....	....	1.18	....	....	....	.07	....	....	1.13	....	.12	...	.15	......	......	6.01
....	...	.20	....	....	....	....	T.	....	1.00	....	....	.50	....	......	......	5.00
....	...	.16	....	....	....	T.	....	....	.35	.25	....	....	.35	......	......	4.10
....	....	1.41	...	....	....	.05	....	....	.47	.10	.04	....	.11	T.	......	4.52
0.01	0.03	0.41	0.02	0.02	0.00	0.30	0.02	0.00	0.02	0.13	0.02	T.	0.06	T.	0.00	3.52
....	....	.43	.02	....	....	.12	....	....	....	T.	T.	....	T.	T.	......	2.49
....	...	.26	....	.17	....	.45	....	....	....	T.	....	T.	.03	T.	......	4.49
....	.05	.25	.10	....	....	.36	....	...	T.	T.	.01	....	.06	......	......	2.40
....	T.	.06	....	....	....	.79	....	....	.06	T.	....	....	T.	......	......	2.71
T.	.23	.28	....	....	....	.34	....	....	.04	.22	....	....	.24	......	......	3.52
....	....	.31	06	....	....	....	.22	....	...	.41	.05	....	.02	·02	......	4.07
.07	....	.50	....	....	....	.11	....	....	.04	.25	.06	....	....	......	......	3.47
....	....	.51	....	....	....	.27	....	....	.06	.19	.04	T.	.07	......	......	3.32
....	....	.96	....	....	....	.27	....	....	....	.24	....	....	.21	......	......	4.00
...	....	.50	....	....	....	.30	...	....	....	....	....	...	....	......	......	4.75
....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......
0.00	0.08	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	1.51
....	.08	....	....	....	....	.25	...	...	....	....	....	....	.06	......	......	1.51
0.00	0.00	0.09	0.06	0 00	0.00	0.04	0.08	0.00	0.00	0.00	T.	0.00	0.00	0.08	0.00	2.90
....	....	....	....	....	....	....	.15	....	....	....	T.	....	....	.15	......	2.80
....	....	.18	.13	....	....	.07	....	...	....	....	....	....	....	......	......	3.01
T.	0.00	0.49	T.	0.00	T.	0.08	0.00	0.00	0.00	T.	0.01	0.00	0.17	0.05	0.00	3.22
....	....	...	T.	....	....	.32	....	....	....	....	T.	....	.31	.25	......	4.57
....	.	.10	....	....	....	.13	....	....	...	....	....	....	.05	......	......	1.54
.03	...	1.10	....	....	T.	.05	....	....	....	T.	.04	....	.16	......	......	3.28
...	....	.67	....	....	....	....	....	....	....	....	....	....	.26	.15	......	3.39
....	....	2.06	....	....	....	....	....	....	....	....	.02	....	.25	......	......	5.31
....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......
....	....	...	T.	....	....	....	....	....	....	....	T.	....	T.	T.	......	2.36
....	....	....	....	....	....	.12	....	....	....	....	.01	....	....	......	......	2.57
....	....	....	....	....	....	....	....	...	....	....	....	....	.33	......	......	2.76
T.	0.21	0.15	T.	0.00	0.01	0.18	T.	0.01	0 02	0.03	0.15	0.00	0 23	0.01	0.00	2.27
....	.92	.08	....	....	....	.23	....	.15	....	.53	T.	....	.06	......	......	3.09
...	.70	T.	....	....	....	.29	....	....	T.	....	.42	....	....	......	......	2.90
T.	.28	.06	....	....	T.	04	....	....	T.	T.	.32	....	T.	......	......	1.46
....	....	.74	....	....	....	.03	....	....	....	.02	....	....	....	......	......	1.88
T.	08	....	....	....	....	T.	....	....	....	....	....	....	.45	.01	......	2.07
T.	.55	.02	....	....	T.	T.	....	....	....	....	.10	....	.20	......	......	2.80
....	95	....	....	....	....	.07	....	....	....	....	.18	....	.22	......	......	3.08
.03	.04	.02	....	....	....	.08	....	....	....	T.	.10	....	.07	T.	......	1.60
....	.02	....	....	....	....	T.	....	....	....	....	.19	....	.08	......	......	1.79
....	.13	.06	....	....	....	.07	....	....	T.	T.	....	....	.23	.07	......	1.49
....	.02	.40	....	....	.28	.26	....	....	....	....	....	....	.36	......	......	2.31
....	.15	.22	....	....	....	T.	....	....	....	....	.60	....	.16	......	......	2.28
....	....	.20	....	...	....	.57	...	....	....	....	....	....	.40	......	......	2.33
....	....	.44	....	....	....	.50	....	....	....	....	....	....	.70	......	......	2.49
....	T.	.26	....	....	....	.23	....	....	....	T.	....	....	.22	......	......	1.57
....	....	.15	....	....	....	.47	...	....	....	....	....	....	1.00	......	......	2.31
.05	....	.21	.06	....	....	....	.10	....	....	....	....	....	....	.13	......	1;54
....	.14	....	....	....	....	.05	....	....	....	.05	....	....	.34	.03	......	2.42
....	.08	.18	....	....	....	.10	....	....	....	T.	.02	....	.11	.02	......	1.32
....	.23	....	....	....	T.	.67	....	....	.30	....	1.02	....	.08	......	......	4.67
T.	0.11	0.08	0.00	T.	0.12	0.32	T.	0.00	0 05	0.02	0.00	0.00	0.15	0.16	0.00	3.04
....	....	.17	....	T.	...	.40	....	....	....	....	....	....	....	.47	......	2.41
....	.24	....	....	....	.14	.75	....	....	....	.10	....	....	.32	.15	......	2.07
....	T.	T.	....	....	.36	T.	T.	....	....	....	....	....	T.	......	......	2.43
T.	.20	.17	....	....	....	.13	....	....	.19	T.	....	....	.28	.01	......	4.36
....	....	....	....	....	....	....	....	....	....	...	....	....	....	......	......	......
0.04	0.11	0.26	0.05	T.	0.02	0.18	0.01	T.	0.13	0.05	0.05	0 01	0.11	0.04	T.	3.19

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees (Fahr.).						Extremes of Monthly Mean Temperature for June.			
		Normal for the month of June.	Length of record, years.	Record begins.	Record ends.	Mean for June, 1896.	Departure from the normal.	Highest.	Year.	Lowest.	Year.
Western Plateau	....	66.1	..	.....	......	64.4	—1.7	...	......	....	......
Angelica	Allegany	64.9	15	1854	1896	62.7	—2.2	71.1	1856	60.8	1855
Humphrey	Cattaraugus	65.2	14	1883	1896	62.9	—2.3	67.7	'90-'95	61.4	1886
Elmira	Chemung	68.2	17	1852	1896	67.7	—0.5	73.2	1895	61.2	1859
Eastern Plateau	....	64.1	.	.....	......	63.9	—0.4	....	....	....	......
Oxford	Chenango	64.2	29	1828	1896	63.8	—0.4	70.4	1828	57.9	1833
Cortland	Cortland	62.0	34	1829	1896	63.4	+1.4	66.5	1858	58.1	1851
Hamilton	Madison	63.3	19	1827	1895	.....	.....	73.6	1831	57.2	1839
Cooperstown	Otsego	64.1	43	1854	1896	63.3	—0.8	71.9	1870	57.3	1863
Waverly	Tioga	66.8	14	1883	1896	65.0	—1.8	71.2	1895	62.3	1885
Northern Plateau	....	63.1	.	......	......	62.4	—0.7	....	......		......
Lowville	Lewis	63.1	31	1827	1896	62.4	—0.7	69.4	1831	58.2	1857
Atlantic Coast	....	67.9	.	......	.....	65.8	—2.0	....	......	....	......
New York City	New York	68.9	26	1871	1896	66.0	—2.9	72.0	1892	64.2	1881
Setauket	Suffolk	66.9	11	1886	1896	65.7	—1.2	69.8	1892	53.8	1886
Hudson Valley	....	68.4	..	......	......	65.9	—2.5	....	......	....	......
Albany	Albany	68.9	23	1874	1896	68.0	—0.9	72.5	1884	65.0	1878
Honeymead Brook	Dutchess	66.8	16	1881	1896	64.3	—2.5	69.7	'82-'89	63.6	1886
West Point	Orange	69.6	67	1826	1896	65.4	—4.2	...	......	....	......
Champlain Valley	....	65.3	..	......	......	64.1	—1.2	....	......	....	......
Plattsb'gh Barracks	Clinton	65.3	42	1839	1896	64.1	—1.2	72.4	1870	60.5	1842
St. Lawrence Valley	....	65.8	..	.....	......	63.8	—2.0	...	...	...	......
Madison Barracks	Jefferson	64.9	35	1839	1896	63.0	—1.9	71.2	1870	59.2	1843
Canton	St. Lawrence	66.4	35	1862	1896	62.6	—3.8	73.9	1870	61.6	1869
North Hammond	"	67.4	19	1866	1896	66.7	—0.7	77.9	1870	63.0	1875
Potsdam	"	64.4	29	1828	1896	62.7	—1.7	69.4	1895	56.7	1833
Great Lakes	....	65.6	..	......	.....	65.0	—0.2	....	......	....	......
Buffalo	Erie	64.9	26	1871	1896	66.0	+1.1	69.0	1895	59.6	1881
Rochester	Monroe	66.5	25	1871	1896	66.0	—0.5	71.0	'93-'95	61.0	1881
Fort Niagara	Niagara	65.3	39	1842	1896	65.6	+0.3	69.7	'76-'81	59.1	1842
Baldwinsville	Onondaga	65.7	19	1854	1896	67.6	+1.9	72.0	1892	60.7	1857
Oswego	Oswego	64.0	26	1871	1896	63.0	—1.0	68.9	1876	58.2	1881
Palmero	"	65.4	40	1857	1896	63.4	—2.0	71.6	1870	61.1	1885
Erie, Pennsylvania	Erie	67.1	23	1874	1896	66.0	—1.1	71.0	1876	62.0	1881
Central Lakes	....	66.9	..	......	..	65.3	—1.6	....	......	....	......
Ithaca	Tompkins	66.9	18	1879	1896	65.3	—1.6	70.4	1892	61.3	1881
Average departure	....	....	..	......	......	....	—1.2	....	.....	...	......

AND PRECIPITATION — JUNE.

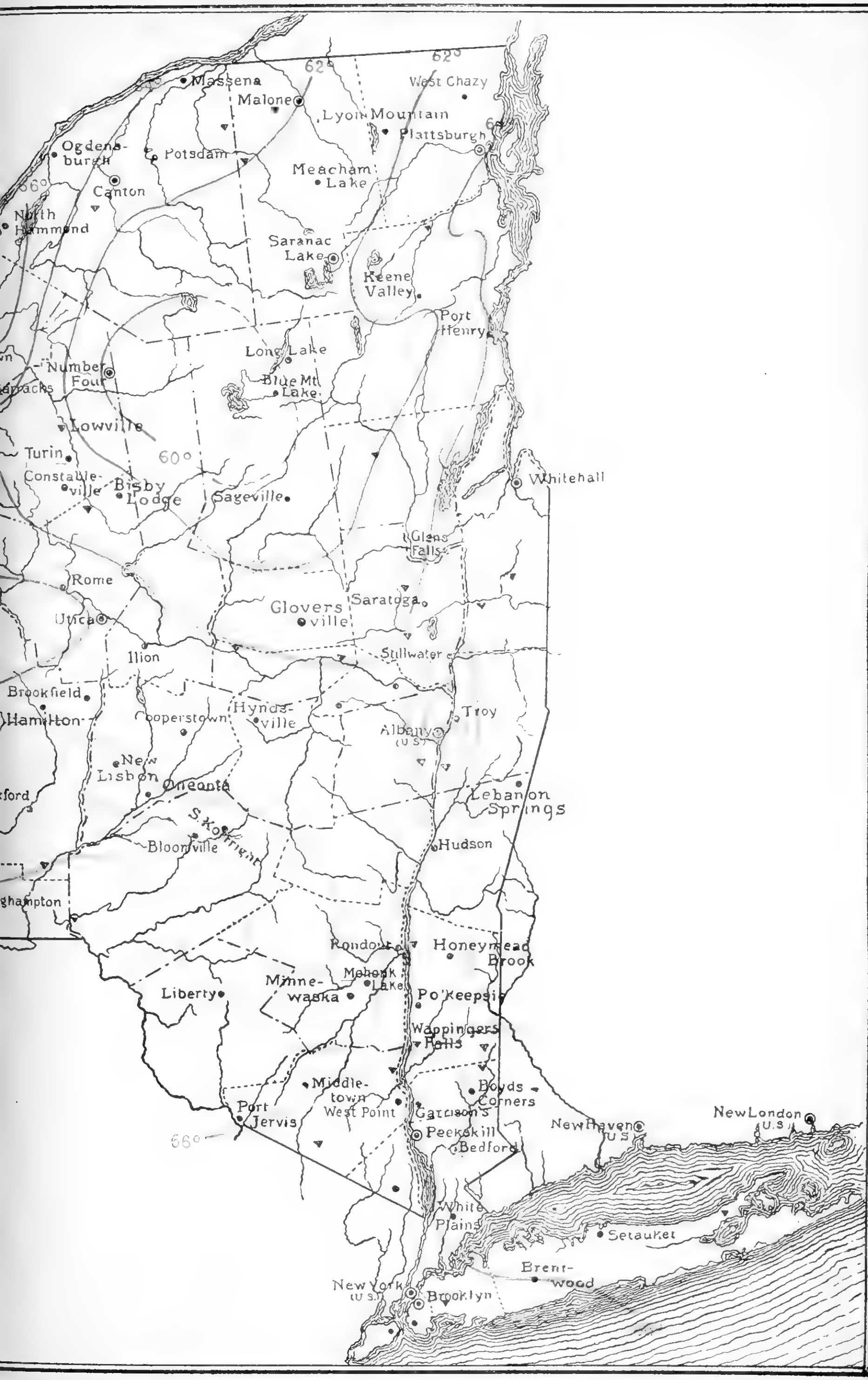
STATION.	COUNTY.	PRECIPITATION — (INCHES).						EXTREMES OF MONTHLY PRECIPITATION FOR JUNE.			
								GREATEST.		LEAST.	
		Average for the month of June	Length of record, years.	Record begins.	Record ends.	Total for June, 1896.	Departure from the average.	Amount.	Year.	Amount.	Year.
Western Plateau	......	4.46	...	......	......	3.40	—1.06	....	......	.....	......
Angelica	Allegany	4.34	14	1856	1896	3.26	—1.08	12.50	1857	2.62	1894
Humphrey	Cattaraugus	4.74	14	1883	1896	3.6[illegible]	—1.11	8.85	1889	2.14	1887
Elmira	Chemung	4.29	17	1852	1896	3.31	—0.98	7.01	1857	1.94	1894
Eastern Plateau	......	3.91	...	......	......	3.90	—0.13	.....	.....	..	......
Oxford	Chenango	4.03	26	1829	1896	2.96	—1.07	10.93	1855	1.63	1844
Cortland	Cortland	4.94	18	1851	1896	3.44	—1.50	2.55	1857	1.45	1853
Hamilton	Madison	3.32	20	1827	1895	....	......	6.60	1830	0.73	1832
Cooperstown	Otsego	4.10	43	1854	1896	4.70	+0.60	9.76	1855	0.95	1870
Port Jervis	Orange	3.69	12	1880	1896	5.54	+1.85	6.01	1892	1.39	1891
Waverly	Tioga	3.36	15	1882	1896	2.85	—0.51	7.31	1883	1.17	1888
Northern Plateau	......	3.34	..	.....	.....	1.83	—1.51	....	.....	.....	.....
Lowville	Lewis	3.34	34	1827	1896	1.83	—1.51	6.75	1835	0.19	1856
Atlantic Coast	......	2.99	...	......	......	5.24	+2.25	...	......	.....	......
New York city	New York	3.26	26	1871	1896	6.38	+3.12	7.70	1887	0.86	1894
Setauket	Suffolk	2.72	11	1886	1896	4.10	+1.38	6.57	18[illegible]7	0.58	1893
Hudson Valley	......	3.2[illegible]	...	......	......	3.03	—0.22	....	......	....	......
Albany	Albany	3.60	23	1874	1896	2.49	—1.11	6.43	1889	1.72	1895
Honeymead Brook	Dutchess	2.75	16	1881	18[illegible]6	2.40	—0.35	4.80	1887	1.22	1884
Poughkeepsie	"	2.96	21	1830	18[illegible]6	2.71	—0.25	4.78	1843	0.82	1832
West Point	Orange	3.51	49	1840	1896	4.07	+0.56	7.37	1848	0.76	1873
Boyds Corners	Putnam	3.44	26	1870	1896	3.47	+0.03	7.70	1887	0.71	1873
Champlain Valley	......	2.92	..	......	......	2.80	—0.12	.....	.....	.....	......
Plattsburgh Barr'ks.	Clinton	2.92	36	1840	1896	2.80	—0.12	7.62	1892	1.27	1881
St. Lawrence Valley	......	3.19	..	......	.....	2.81	—0.38	.....	......	......	......
Malone	Franklin	3.97	16	1830	1896	4.57	+0.60	.....	......	...	......
Madison Barracks	Jefferson	2.40	36	1841	1896	1.54	—0.86	11.50	1889	0.88	1880
North Hammond	St. Lawrence	2.91	19	1866	1896	2.36	—0.55	8.74	18[illegible]6	0.69	1895
Potsdam	"	3.48	27	1828	1896	2.76	—0.72	7.35	1889	1.52	1832
Great Lakes	......	3.22	..	......	......	2.43	—0.78	....	......	...	......
Buffalo	Erie	3.29	26	1871	1896	1.46	—1.83	9.52	1892	1.24	1876
Rochester	Monroe	3.20	25	1871	1896	2.80	—0.40	6.68	1892	1.51	1887
Fort Niagara	Niagara	2.39	40	1842	1896	1.79	—0.60	7.25	1842	0.28	1864
Oswego	Oswego	3.39	26	1871	1896	1.57	—1.82	9.81	1889	1.03	1886
Palermo	"	3.09	37	1860	1896	2.31	—0.78	8.80	1865	0.70	'64-'70
Erie, Pa	Erie	3.95	24	1873	1896	4.67	+0.72	6.84	1885	1.22	1891
Central Lakes	......	3.71	...	......	......	4.36	+0.65	...	.....	.....	......
Ithaca	Tompkins	3.71	18	1879	1896	4.36	+0.65	7.54	18[illegible]3	1.35	1884
Average departure.	......	.....	...	......	......	....	—0.27	....	......	....	......

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JUNE. 1896



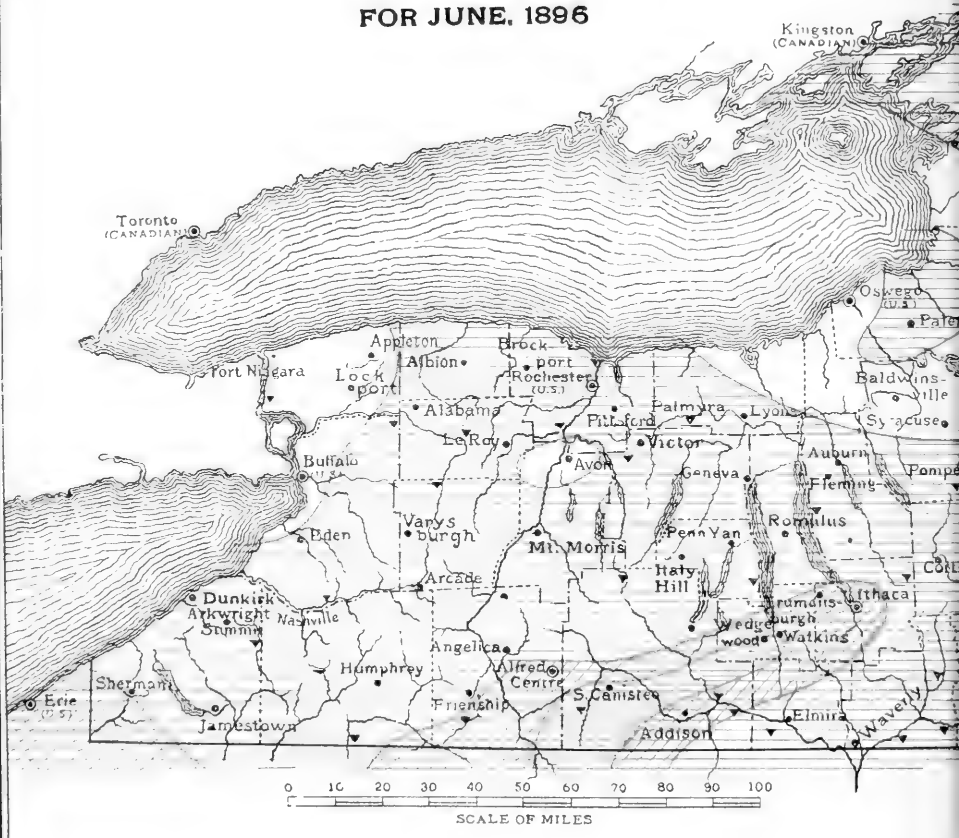
Massena
Malone
62°
62°
West Chazy
Lyon Mountain
Plattsburgh
Ogdens-
burgh
Potsdam
Canton
66°
North
Hammond
Meacham
Lake
Saranac
Lake
Keene
Valley
Port
Henry
Long Lake
Number
Four
Blue Mt
Lake
Lowville
Turin
60°
Constable-
ville
Bisby
Lodge
Sageville
Whitehall
Glens
Falls
Rome
Saratoga
Glovers
ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hynds-
ville
Troy
Albany
(U.S.)
New
Lisbon
Oneonta
Lebanon
Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead
Brook
Mohonk
Lake
Minne-
waska
Liberty
Po'keepsie
Wappingers
Falls
Middle-
town
Boyds
Corners
Port
Jervis
West Point
Garrison's
Peekskill
Bedford
66°
New Haven
(U.S.)
New London
(U.S.)
White
Plains
Setauket
Brent-
wood
New York
(U.S.)
Brooklyn

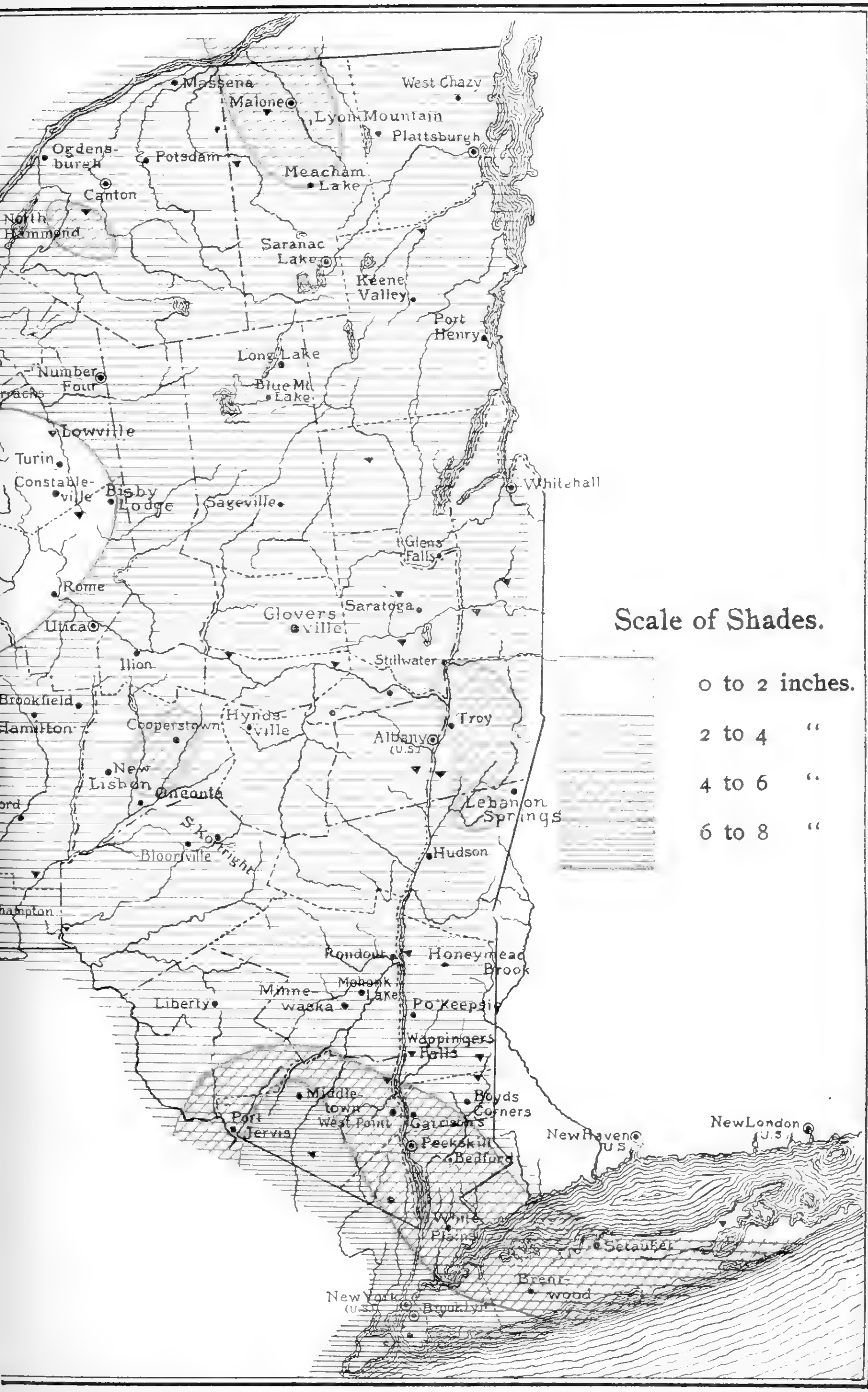
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JUNE, 1896




Massena
Malone
Lyon Mountain
West Chazy
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven U.S.
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
6 to 8 "

Meteorological Summary for July, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during July was 30.00 inches. The highest barometer was 30.40 inches at New York city on the 19th, and the lowest was 29.62 inches at Albany and Oswego on the 15th. The highest mean pressure, 30.03 inches, obtained at New York city, and the lowest, 29.98 inches, at Oswego and Number Four. The average of the mean pressures at six stations of the National Bureau was 0.03 inches above the normal; the excess being greatest in southern and eastern New York.

The mean temperature of the State, as derived from the records of 72 stations was 70.4 degrees. The highest local mean was 75.5 degrees at Brooklyn, and the lowest 65.0 at Number Four. The highest general daily mean was 76 degrees on the 12th, 29th and 30th, the lowest being 64 degrees on the 17th. The maximum temperature reported was 96 degrees at Mt. Morris on the 6th and 7th, and the minimum 40 degrees at Friendship on the 17th and 18th, and at Saranac Lake on the 31st. The mean monthly range of temperature for the State was 42 degrees, the greatest local range being 51 degrees at Mt. Morris and Bloomville, and the least 28 degrees at Manhattan Beach. The mean daily range was 20 degrees. The greatest local daily range was 46 degrees at Bloomville on the 1st, and the least was 2 degrees at Port Jervis on the 24th. The mean temperatures of the various section of the State were as follows: The Western Plateau, 69.6 degrees; the Eastern Plateau, 69.7 degrees; the Northern Plateau, 67.7 degrees; the Atlantic Coast, 73.0 degrees; the Hudson Valley, 72.7 degrees; the Mohawk Valley, 70.2 degrees; the Champlain Valley, 69.5 degrees; the St. Lawrence Valley, 68.9 degrees; the Great Lakes, 71.0 degrees; the Central Lakes, 71.4 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 0.6 degrees above the normal. Excesses generally occurred at western and southern stations, and deficiencies in the north.

The mean relative humidity was 75 per cent. The mean dew point was 61 degrees.

The average precipitation, as derived from the records of 93 stations, was 4.90 inches. The greatest general precipitation exceeded 6 inches over considerable areas of western, northern and southeastern New York, while in portions of the St. Lawrence and upper Hudson Valley and on eastern Long Island, less than 4 inches fell. The maximum local amount was 8.71 inches at Port Jervis, and the minimum, 2.43 inches at North Hammond.

The rain periods covered the dates from the 3d to the 9th, with a maximum of 0.34 inches for the State on the 4th; from the 13th to the 15th; from the 19th to the 25th, with the maximum general rainfall of the month on the 20th, and from the 27th to the 30th. The average precipitation at 28 stations possessing records for previous years was 1.05 inches above the normal amount. The largest excesses generally obtained in western New York, while in the eastern and northern sections 10 stations reported deficiencies. The amounts at Angelica, Humphrey and Elmira were the greatest shown by the records of these stations for August.

The average number of days on which the precipitation amounted to 0.01 inch or more was 12.3, which is considerably greater than the usual rain frequency for the summer months. The maximum number was reported from the Eastern and Northern Plateaus, and the southeastern section. The average number of clear days was 10.3; of partly cloudy days, 12.3; of cloudy days, 8.4; giving an average cloudiness of 50 per cent. for the State. The cloudiness was greatest in northern New York, and least in the western and southern sections.

The prevailing direction of the wind was from the southwest. The average wind-travel at 6 stations of the National Bureau was 6,931 miles, the travel generally being greater than usual for the month. The maximum velocity reported from the above stations was 50 miles per hour at New York city on the 27th.

Thunderstorms occurred at 10 stations on the 3d; at 10 stations on the 4th; at 5 stations on the 5th; at 8 stations on the 6th; at 4 stations on the 7th; at 3 stations on the 9th; at 3 stations on the 10th; at 1 station on the 12th; at 10 stations on the 13th; at 3 stations on the 14th; at 10 stations on the 15th; at 2 stations on the 16th; at 7 stations on the 20th; at 2 stations on the 21st; at 9 stations on the 22d; at 3 stations on the 23d; at 2 stations on the 24th; at 1 station on the 26th; at 13 stations on the 27th; at 12 stations on the 28th; at 17 stations on the 29th; at 13 stations on the 30th; at 1 station on the 31st.

Hail fell on the 3d.

A solar halo was observed on the 2d.

The weather during July averaged slightly warmer than usual; hot waves during the second and fourth weeks alternating with brief cool periods about the 6th, 17th and 24th; but few excessively high or unseasonably low temperatures occurred. There was an abundant rainfall, commonly in the form of local showers which were followed by bright pleasant weather; hence the month was very favorable for the growth of crops, though less so for harvesting operations. Thunderstorms occurred on 23 days being more frequent in southwestern New York than elsewhere. Phenomenally heavy rains occurred at some localities in the southeast on the 9th, and in the western section on the 20th.

During the month, the weather of New York was influenced by five areas of high and seven areas of low pressure, the number of the latter being about the usual storm frequency for July in this vicinity. Five low areas passed to the eastward over Canada on the 9th, 15th, 22d, 28th and 30th; while on the fifth and 24th, depressions passed centrally within the borders of the State. The lows passing north of the State commonly spread over the Canadian provinces, moving slowly, and giving southerly winds and warm waves over the northeastern States, as occurred in the most marked degree with the depressions of the 9th, 15th, 22d and 30th. The lows which passed centrally over New York were of moderate energy, bringing general, but not excessive, rains.

The high pressure systems were generally large and well defined, but developed no central pressures much exceeding 30.3 inches. The first and third area, only, moved northeastward to the Atlantic; the remainder, after traversing the central or northern States, passed to the south Atlantic coast, where they became nearly stationary. The highs, with their accompanying cool waves, were most strongly felt in this vicinity on and about the 2d, 8th, 14th, 18th and 24th, the greatest depression of temperature occurring in northern New York on the 16th under the influence of the fourth area; but no damaging frosts occurred.

An injurious drouth which prevailed in the eastern counties at the opening of the month was relieved by abundant rains beginning on the 4th. The weather continued rather cool for growth during the first decade after which higher temperatures and frequent showers brought vegetation rapidly forward. The reports of the first week showed oats as heading and barley and spring wheat ripening; winter wheat was cut and some rye harvested early in the month; by the 18th considerable amounts of barley had been cut and the oat harvest was commenced on the 30th; corn, tobacco and hops made satisfactory growth, the latter being in blossom by the 10th. Grapes promised well, and the apple crop was unusually good.

Local storms.— Near Honeymead brook, Dutchess county, lightning caused the loss of four barns, with contents, on the 3d; and one person was killed at Sharon Station. The storm was accompanied by destructive wind and hail, with a cloudburst and flood about Amenia. Lockport reports the heaviest rain on record at that point on the 20th. A local storm at Waverly on the 27th prostrated trees, unroofed buildings, and laid flat the grain in many fields.

METEOROLOGICAL DATA.

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point, (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												69.6	96	*b*
Alfred	Allegany	1824									66 2	67.4	86	2
Angelica	"	1310									67.6	68.2	89	3
Bolivar	Allegany											67.0	86	2
Friendship	"	1550										68.2	90	*c*
Humphrey	Cattaraugus	1950									67.6	67.5	85	2
Arkwright	Chautauqua	1260										68.7	83	2
Jamestown	"	1328										69.0	86	*d*
Elmira	Chemung	863										73.4	93	3
Avon	Livingston	585										72.0	95	2
Mt. Morris	"	525										73.3	96	*b*
Lockport	Niagara										72.2	73.2	94	*e*
Victor	Ontario													
Wedgewood	Schuyler	1350									68.8	71.0	92	3
Addison	Steuben	1000							74	60	68.0	70.0	89	*f*
South Canisteo	Steuben	1480							80	61	66.3	67.4	88	*g*
Arcade	Wyoming	1557									67.7	68.1	89	3
Varysburg	"											69.8	94	2
Eastern Plateau												69.7	95	3
Binghamton	Broome	870									71.0	71.0	93	3
Oxford	Chenango	550										69.6	92	*g*
Cortland	Cortland	1120										69.2	90	2
Bloomville	Delaware	1550									69 8	70.6	93	*h*
South Kortright	"	1700										68.0	91	3
Elka Park	Greene	2200							63	55	67.2	67.2	85	2
Brookfield	Madison	1350									68.2	72.2	93	*i*
Middletown	Orange	660										71.6	95	3
Port Jervis	"	470										72.2	89	3
Cooperstown	Otsego	1300									67.7	67 8	85	3
New Lisbon	"	1234									65 8	66.7	89	3
Oneonta	"	1100									70.0	71.2	93	*g*
Perry City	Schuyler	1038									68 4	70.1	93	2
Waverly	Tioga	825									72.4	71 0	93	*g*
Mohonk Lake	Ulster	1245									72.2	67 0	85	12
Northern Plateau												67 7	91	9
Saranac Lake	Franklin											66 8	90	2
Gloversville	Fulton	802									69.6	69.8	90	*g*
Lowville	Lewis	900										69 2	91	9
Number Four	"	1571	29.98	30.34	18	29 74	*a*	0 60	81	58		65 0	84	3
Atlantic Coast												73 0	94	12
Brooklyn	Kings	107										75 5	91	12
Manhattan Beach	"											71.2	87	29
New York City	New York	314	30 03	30.40	19	29.70	15	0.70	82	66		73.0	89	28

FOR JULY, 1896.

TURE—(IN DEGREES FAHR.).								SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more in. fell.	Total.	Greatest.	† Duration.	Date.	Total snowfall.	
														h. m.			
40	*r*	44	22	44	1	4	*ak*	10.5	12.1	8.4	13.0	5.70	4.24	......	20	......	....
46	17	40	20	32	1	4	24	5	15	11	17	4.49	0.81	5.00	4	......	S. W.
42	*r*	47	22	38	18	6	24	....	....	....	......	5.66	1.10	......	22	......	....
41	17	45	22	40	1	6	24	4	7	20	15	7.75	1.29	......	4	......	....
40	*r*	50	27	44	1	11	20	....	....	....	12	4.54	0.78	......	29	......	....
45	17	40	18	28	*ae*	6	24	7	9	15	12	7.50	1.51	......	20	......	S. W.
52	17	31	13	21	18	4	20	....	....	....	......	......	......	......	......	......	....
49	18	37	18	29	*af*	6	*al*	7	19	5	12	7.96	1.43	9.00	27	......	S. W.
49	18	44	21	33	2	8	5	24	1	6	12	5.55	1.17	......	3	......	S. W.
46	18	49	23	42	18	9	16	10	19	2	16	4.87	1.50	......	20	......	....
45	*s*	51	30	42	*ag*	17	1	4	11	16	9	4.91	1.40	......	20	......	W.
52	*r*	42	23	37	18	15	20	24	4	3	9	6.50	4.24	......	20	......	W.
...	....	....	....	....	....	....	....	....	....	....	......	4.82	......	......	......	......	....
50	25	42	22	35	1	5	24	7	22	2	15	5.02	0.70	0.12	27	......	S. W.
47	17	42	22	38	1	8	24	14	12	5	18	4.45	0.92	......	9	......	S. W.
41	17	47	25	37	1	7	24	12	13	6	11	5.01	1.00	......	13	......	W.
44	17	45	20	30	2	5	24	7	14	10	12	6 39	1.75	......	20	......	....
44	17	50	24	40	18	6	24	12	11	8	12	5.71	1.88	......	20	......	....
42	*t*	44	23	46	1	2	24	10.8	12.0	8.2	11.7	5.30	3.18	......	9	......	....
47	17	46	22	39	1	8	20	8	16	7	13	3.85	0.90	......	14	......	S. W.
44	1	48	27	44	1	12	20	7	19	5	14	5.37	1.25	......	20	......	S.
45	8	45	23	39	1	11	20	15	10	6	15	4.36	1.23	......	20	......	N. W.
42	1	51	24	46	1	9	20	11	13	7	13	5.82	1.95	10.00	4–5	......	W.
42	26	49	28	43	2	9	20	....	....	....	8	4.90	1.02	......	4	......	....
47	17	38	18	28	1	8	24	5	13	13	12	7.12	1.36	......	4	......	N. W.
47	*u*	46	24	34	*o*	10	24	6	17	8	10	3.29	0.70	12.00	20	......	N. W.
52	19	43	20	37	3	4	20	17	9	5	9	5 07	1.05	......	24–25	......	....
51	17	38	18	35	1	2	24	9	15	7	13	8.71	3.18	......	9	......	S. W.
50	24	35	15	24	1	5	20	9	13	9	12	4.60	1.38	......	20	......	S.
43	18	46	24	40	1	11	20	11	8	12	11	5.12	1.25	4.00	4	......	S.
48	18	45	26	38	*a h*	14	23	....	....	....	12	7.02	1.12	......	15	......	....
51	*v*	42	24	37	1	11	24	11	8	12	13	4.18	0.75	......	20	......	S. W.
45	18	48	24	40	1	6	20	10	13	8	13	5.81	1.11	3.00	22	......	S.
50	*w*	35	23	32	3	12	24	22	2	7	8	4.32	1.32	......	24	......	S. W.
40	31	45	21	44	16	6	20	7.5	15.5	8.0	13.8	4.92	2.88	......	20–21	......	....
40	31	50	22	35	2	6	20	6	18	7	15	4.19	1.25	......	4	......	S. W.
49	17	41	20	33	2	10	20	12	11	8	15	4.95	2.06	9.30	20	......	W.
44	16	47	23	44	16	9	20	9	17	5	13	3.50	1.40	......	20	......	W.
43	16	41	20	30	*g*	7	20	3	16	12	12	7.05	2.88	......	20–21	......	N. W.
48	19	34	16	34	26	4	*am*	14.8	7.3	8.9	13.0	4.68	2.44	16.00	4–5	......	....
58	1	33	17	27	*c*	7	24	11	9	11	14	4.23	0.82	......	22	......	W.
59	17	28	11	20	17	4	*an*	19	6	6	13	3.59	0.86	......	22	......	S. W.
59	17	30	13	23	1	4	24	15	8	8	16	4.45	1.06	......	6	......	S. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Atlan. Coast (Con).														
Willet's Point	Queens	....	....	....	..	....	..	....	....	....	...	73 2	92	13
Brentwood	Suffolk	75	....	....	..	....	..	....	....	....	70.7	73.6	94	12
Setauket	"	40	....	....	..	....	..	....	78	66	72.4	72.8	88	13
Bedford	Westchester	290	....	....	..	....	..	....	....	....	..	71.5	89	29
Hudson Valley		....	....	....	..	....	..	....	....	....	....	72.7	94	12
Albany	Albany	85	30.00	30.37	19	29.62	15	0.75	73	63	....	74 0	94	12
Lebanon Springs	Columbia	930	....	....	..	....	..	....	....	....	....	70.2	91	3
Honeymead Brook	Dutchess	450	....	....	..	....	..	....	....	....	70.9	70.8	89	3
Poughkeepsie	"	180	....	....	..	....	..	....	....	....	....	72.5	91	*j*
Wappingers Falls	"	....	....	....	..	....	..	....	....	....	..	74 4	92	13
Catskill	Greene	....	....	....	..	....	..	....	....	....	73.8	72.8	91	12
West Point	Orange	167	....	....	..	....	..	....	....	....	....	73.3	93	31
Carmel	Putnam	500	....	....	..	....	..	....	....	....	....	73.3	90	*h*
Mohawk Valley		....	....	....	..	....	..	....	....	....	....	70.2	96	22
Rome	Oneida	445	....	....	..	....	..	....	....	....	....	70.2	96	22
Champlain Valley		....	....	....	..	....	..	....	....	....	....	69.5	9[illegible]	3
Plattsburgh B'ks.	Clinton	125	....	....	..	....	..	....	....	....	....	69.5	95	3
Glens Falls	Warren	340	....	....	..	....	..	....	....	....	....	....	...	...
St. Lawrence Val.		....	....	....	..	....	..	....	....	....	....	68.9	94	*k*
Malone	Franklin	810	....	....	..	....	..	....	....	....	67.8	67.6	88	
Madison Barracks	Jefferson	266	....	....	..	....	..	....	....	....	....	69.1	87	1
Watertown	Jefferson	486	....	....	..	....	..	....	....	....	....	68 8	94	*k*
Canton	St. Lawrence.	304	....	....	..	....	..	....	....	....	67.9	68.8	90	*l*
Massena	"	....	....	....	..	....	..	....	....	....	....	....	...	...
North Hammond.	St. Lawrence.	300	....	....	..	....	..	....	....	....	68.8	70.7	90	*m*
Ogdensburg	"	258	....	....	..	....	..	....	....	....	....	69.8	87	*n*
Potsdam	"	300	....	....	..	....	..	....	....	....	....	67.8	88	2
Great Lakes		....	....	....	..	....	..	....	....	....	....	71.0	93	2
Dunkirk	Chautauqua	590	....	....	..	....	..	....	....	....	....	....	...	...
Westfield	"	....	....	....	..	....	..	....	....	....	....	71.6	90	2
Buffalo	Erie	690	30 00	30.30	18	29.68	15	0.62	70	60	....	70.0	86	29
Pittsford	Monroe	....	....	....	..	....	..	....	....	....	69.7	70.4	91	2
Rochester	Monroe	621	30.00	30 32	18	29.64	15	0 68	70	59	....	72.0	91	2
Appleton	Niagara	....	....	....	..	....	..	....	....	....	....	70.2	90	*p*
Fort Niagara	Niagara	263	....	....	..	....	..	....	....	....	....	72 8	93	2
Baldwinsville	Onondaga	390	....	....	..	....	..	....	....	....	71.3	72.6	92	12
Oswego	Oswego	304	29 98	30.35	18	29.62	15	0.73	73	60	....	69.0	86	*q*
Palermo	"	460	....	....	..	....	..	....	....	....	69.9	69.9	92	2
Lyons	Wayne	407	....	....	..	....	..	....	....	....	....	....	...	...
Erie, Pa	Erie	681	30.01	30.29	18	29.76	15	0.53	72	62	....	71.0	88	2

for July, 1896 — (*Continued*).

ture — (In Degrees Fahr.).								Sky.			Precipitation — (Inches).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snow fall.	Prevailing direction of wind.
														h. m.			
57	*x*	35	17	27	1	7	24	....	....	....	12	5.79	1.28	......	6	......	S. W.
48	19	46	24	34	26	12	8	21	2	8	8	4.70	1.50	10 00	22	......	S. W.
56	19	32	14	23	1	7	31	12	8	11	12	2.74	0.71	......	16	......	W.
52	*y*	37	19	32	1	10	*ap*	11	11	9	13	7.29	2 44	16.00	4–5	......	S. W.
44	17	42	20	38	*ai*	8	25	10 9	10.1	10.0	12.6	4.41	3.09	10.00	3–4	......	....
56	17	38	19	29	26	9	20	11	14	6	14	3.57	1.70	......	30	......	S.
44	17	47	25	38	1	11	20	11	9	11	11	4.26	1 27	......	30	......	W.
50	*z*	39	20	32	1	11	*aq*	7	14	10	16	7.60	3.09	10.00	3–4	......	S W.
46	*aa*	45	23	38	16	13	24	15	9	7	7	3.33	1.70	3.00	28	......	N.
45	17	47	20	33	17	10	24	11	13	7	17	5.40	1.21	0.30	5	......	S.
53	8	38	19	30	1	9	24	3	11	17	11	5.09	1.18	9.00	27	......	S.
51	17	42	20	30	17	8	25	....	....	....	11	2.50	0.64	......	25	......	S. E.
53	24	37	18	25	2	10	4	18	1	12	14	3.54	0.74	......	5	......	S. W.
46	15	50	25	39	30	11	19	....	....	....	11	6.04	1.50	......	23	......	....
46	15	50	25	39	30	11	19	....	....	....	11	6.04	1.50	......	29	......	....
50	1	45	18	40	3	6	21	....	....	....	15	4.76	1.50	......	14	......	....
50	1	45	18	40	3	6	21	....	....	....	15	5.00	1.50	3.45	14	.....	S. W.
....	....	....	....	....	....	..	....	....	....	....	......	4.53	.....	......	......	......	....
42	16	41	21	40	11	5	23	7.2	14.5	9.3	9.7	3.75	2.10	15.15	13	......	....
47	16	41	18	30	18	5	23	4	13	14	15	5.71	1.42	4.00	15	......	S. W.
49	18	38	20	32	17	8	20	....	....	....	5	4.02	1.85	......	20	......	S.
45	16	49	29	40	11	17	7	3	24	4	12	3.71	1.40	......	19	......	S. W.
42	16	48	24	33	18	17	*ar*	9	15	7	9	3.25	1.28	.....	28	......	S. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
52	*ab*	38	21	32	*r*	10	*as*	4	12	15	7	2.43	0.70	......	20	......	W.
52	16	35	18	28	*ac*	8	*at*	9	15	7	11	3.98	2.10	15.15	13	.....	S. W.
47	16	41	10	30	20	7	24	14	8	9	9	3.13	0.83	......	5	......	S W.
48	*r*	38	18	39	18	3	5	11.1	12.2	7.7	10.9	4.90	3 54	......	20	......	....
50	16	40	18	29	18	8	15	14	11	6	9	3.07	0.70	4.00	4	......	S.
54	16	32	13	23	18	6	12	8	14	9	11	6.35	3.54	......	20	......	W.
48	18	43	20	34	18	7	24	10	9	12	11	5.04	2.21	......	20	......	W.
54	18	37	17	30	18	6	24	16	9	6	14	4.75	2.11	......	20	......	S. W.
48	18	42	20	31	2	12	14	9	12	10	11	5.27	2 56	......	20	......	N. W.
49	18	44	20	33	18	11	*au*	....	....	....	9	3.77	2 95	......	20	......	N. W.
54	*ac*	38	20	29	*aj*	11	19	14	9	8	9	4.34	1.25	......	20	....	....
54	18	32	14	23	1	5	23	8	15	8	15	5.89	3.30	......	20	......	W.
48	17	44	22	39	18	9	20	12	15	4	12	5.07	2.85	......	20	......	S. W.
56	17	82	12	22	18	3	5	9	16	6	8	5.50	2.22	......	4	......	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Central Lakes	....	....	......	......	..	......	..	....	.....	.....	....	71.4	92	2
Fleming	Cayuga	1000	......	......	..	......	..	....	.....	.....	72.1	71.7	92	2
Romulus..........	Seneca	719	......	......	..	......	..	....	83	61	....	71.5	92	2
Ithaca	Tompkins....	810	29.99	30 33	18	29.63	15	0.70	71	62	70.6	70.9	99	*g*
Mean	....	....	30.00	30.40	19	29.62	15	0.66	75	61	....	70.4	96	*b*

* Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) − 4. four hours.

(*a*) 22, 24; (*b*) 6, 7; (*c*) 1, 2; (*d*) 2, 13; (*e*) 3, 29; (*f*) 2, 3, 13; (*g*) 2, 3; (*h*) 3, 30; (*i*) 12, 28; (*j*) 12, 20; (*t*) 1, 26; (*u*) 7, 8; (*v*) 1, 24; (*w*) 5, 8; (*x*) 18, 31; (*y*) 1, 18, 26; (*z*) 17, 19; (*aa*) 16, 17; (*ab*) 16, 17, (*aj*) 15, 30; (*ak*) 20, 24; (*al*) 16 24; (*am*) 11, 20, 24; (*an*) 11, 20; (*ap*) 7 23; (*aq*) 23, 24; (*ar*) 4, 7; (*as*)

FOR JULY, 1896 — (*Concluded*).

'TURE — (IN DEGREES FAHR.).								SKY.			PRECIPITATION — (INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	† Duration.	Date.	Total snowfall.	
														h. m.			
49	18	43	19	33	*af*	6	24	9.3	14.7	7.0	10.7	4.30	1.83	17.00	20	......	....
53	18	46	18	28	18	7	24	6	22	3	7	4.29	1.83	17.00	20	......	N. W.
51	*r*	41	20	33	1	7	23	11	13	7	11	4.92	1.12	......	20	......	S. W.
49	18	41	19	33	18	6	24	11	9	11	14	3.69	0.66	7.50	9	......	S E.
40	*ad*	42	20	46	1	2	24	10.3	12.3	8.4	12.3	4.75	4.24	......	20	......	S. W.

thermograph. || Report received too late to be used in computing means. The means from
† Blank indicates that the duration is not shown in the original records, but is within twenty-

13, 27; (*k*) 2, 29; (*l*) 2, 12, 22; (*m*) 11, 12, 22, 28, 29; (*n*) 2, 12; (*p*) 1, 2, 12; (*q*) 7, 12; (*r*) 17, 18; (*s*) 16, 19, 18, 24, 25, 26; (*ac*) 15, 17; (*ad*) 17, 18, 31; (*ae*) 1, 17; (*af*) 1, 18; (*ag*) 19, 20; (*ah*) 1, 2, 18; (*ai*) 1, 16; 4, 13, 19; (*at*) 7, 20; (*au*) 14, 15, 24.

TEMPERATURE — JULY, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau...	71	74	74	73	71	70	67	65	69	69	73	74	75	74
Alfred............	84	86	85	80	74	82	66	72	77	79	82	82	85	79
	52	59	62	62	64	54	56	52	52	57	61	58	65	65
Angelica..........	87	88	89	80	78	83	....	....	....	....	....	....	....	86
	54	58	61	62	58	54	....	....	....	....	....	....	....	67
Bolivar	84	86	85	82	78	82	71	73	80	79	83	83	85	81
	44	50	55	59	67	55	58	48	58	58	54	50	57	65
Friendship	90	90	89	84	....	85	72	78	84	82	88	86	88	84
	46	68	58	58	....	52	56	48	48	51	57	54	60	65
Humphrey..........	82	85	84	77	73	78	66	74	75	77	80	81	84	80
	54	62	62	63	62	54	54	51	57	57	61	59	64	65
‡ Arkwright.......	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....		....	....	....	....	....	....	....	....	....	....
Jamestown	83	86	85	78	76	80	70	75	80	78	82	83	86	81
	54	58	64	66	65	56	57	52	60	58	62	60	66	67
Elmira............	87	92	93	85	82	84	77	74	81	86	90	92	91	86
	60	59	61	65	74	62	63	62	53	64	62	73	61	71
Avon	91	95	92	88	77	88	82	80	90	....	87	89	86	82
	56	57	64	61	64	58	57	53	60	....	64	66	70	64
Mount Morris	87	90	95	92	89	96	96	84	85	86	87	89	88	89
	70	70	57	63	65	57	59	53	58	53	66	63	66	68
Lockport	90	93	94	86	77	87	74	84	90	85	91	92	87	85
	59	60	68	65	60	62	56	54	61	60	65	66	68	63
Victor............	93	95	90	86	77	89	94	86	83	87	89	91	81	84
	59	58	67	64	61	57	55	58	55	55	65	67	68	64
Wedgewood	91	91	92	82	79	82	72	79	78	81	88	90	85	85
	56	64	66	66	65	59	58	53	58	56	63	65	65	64
Addison	87	89	89	84	80	82	74	76	80	83	86	87	89	81
	49	55	60	64	68	60	58	56	60	55	58	56	61	67
South Canisteo ...	85	88	88	84	78	84	76	74	79	81	84	86	86	81
	48	54	56	59	62	53	58	49	56	52	54	52	56	63
Arcade	84	87	89	84	73	81	67	73	78	79	81	84	85	81
	55	57	63	64	62	54	55	51	58	57	62	61	62	65
Varysburgh	90	94	92	86	77	84	73	81	82	84	87	88	82	87
	51	55	62	63	60	56	56	52	59	54	61	58	64	63
Eastern Plateau...	68	72	75	73	70	71	65	63	69	71	73	73	72	74
Binghamton	89	92	93	85	79	84	75	78	78	84	85	87	82	81
	50	57	61	64	64	61	58	51	60	56	66	58	60	68
Oxford............	88	92	92	90	77	90	77	77	81	85	85	90	85	86
	44	51	58	60	62	58	55	48	59	55	59	54	57	68
Cortland..........	87	90	88	85	76	83	73	75	78	83	85	88	79	81
	48	55	61	62	63	59	58	45	60	57	62	56	58	65
Bloomville........	88	92	93	80	78	83	76	81	80	86	89	91	87	88
	42	54	62	61	64	58	46	50	60	65	64	58	60	65
South Kortright...	86	90	91	86	77	84	75	80	84	83	89	87	86	85
	44	47	59	57	60	52	46	48	50	62	55	55	56	62
Elka Park.........	82	85	82	76	76	76	74	72	76	78	78	82	80	78
	54	65	64	62	59	58	54	50	51	64	60	64	66	62
Brookfield	91	93	90	85	86	89	68	72	72	84	79	93	83	82
	57	59	58	61	60	61	47	47	56	62	59	61	64	62
Middletown	84	87	95	79	80	81	79	75	79	84	84	81	86	88
	56	58	58	68	66	65	68	56	69	62	63	60	62	64
Port Jervis.......	87	87	89	86	81	82	76	71	75	84	86	88	87	87
	52	59	62	68	76	62	63	56	61	60	66	68	64	68
Cooperstown.......	80	83	85	80	68	79	67	70	80	78	80	83	72	76
	56	62	63	66	60	62	58	52	62	62	60	62	66	58
New Lisbon	84	87	89	83	74	81	72	76	80	81	83	87	79	81
	44	51	57	60	59	55	52	47	58	58	60	53	57	59
Oneonta	88	93	93	89	79	88	80	80	85	87	87	92	85	86
	50	55	63	65	64	58	57	50	60	62	64	57	64	66
Perry City........	88	93	92	86	82	85	71	76	84	84	87	88	80	82
	51	58	61	63	63	56	55	59	59	53	57	63	67	62
Waverly...........	88	93	93	87	82	85	74	80	80	84	88	91	88	86
	48	55	62	62	69	61	62	40	59	53	58	56	60	66
Mohonk Lake	80	81	83	72	78	78	73	67	77	80	82	85	82	81
	52	51	51	52	50	51	51	50	63	63	64	65	64	64

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
73	63	61	64	68	70	76	75	64	60	64	66	73	74	75	74	66	69.6
76	68	72	76	73	74	83	84	68	58	72	74	81	83	84	82	73	67.4
66	52	46	46	55	64	66	62	54	54	51	53	53	65	62	63	52	
87	69	71	80	74	75	84	86	70	61	74	78	80	85	86	81	74	68.2
68	52	42	42	58	62	62	66	53	55	49	55	60	53	58	60	56	
76	69	70	77	75	73	83	85	69	60	73	76	81	82	83	85	70	67.0
64	51	41	42	53	65	64	61	55	54	47	50	61	63	65	61	59	
80	73	75	82	80	75	87	87	70	60	88	78	84	86	86	86	77	68.2
64	53	40	40	61	64	62	59	53	43	48	50	61	60	60	61	52	
75	69	73	76	73	72	82	81	68	59	72	75	78	83	82	81	74	67.5
65	54	45	54	61	64	66	63	54	53	52	53	61	65	64	63	54	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	68.7
76	67	72	78	77	75	83	81	70	62	72	76	79	81	85	83	73	69.0
67	54	50	49	62	66	67	65	56	56	53	55	64	68	66	66	60	
85	79	80	80	82	78	89	87	78	67	81	81	86	87	89	90	80	73.4
73	58	51	49	63	62	78	65	61	57	56	68	65	67	65	67	61	
85	72	75	88	80	80	88	92	73	67	78	84	84	87	93	86	76	72.0
65	63	47	46	64	67	64	64	57	56	52	54	62	63	63	60	57	
87	85	87	89	87	87	84	90	90	86	84	80	84	88	91	89	88	73.3
64	45	50	52	45	45	65	63	55	52	50	53	65	63	65	57	55	
85	72	78	89	82	81	88	92	75	73	80	85	84	88	94	90	77	73.2
59	53	52	52	65	66	66	67	56	57	54	57	68	67	67	66	57	
83	96	78	85	78	....	....	....	....	....	....	....	....	....	....	....	....	....
63	52	49	45	63	....	....	....	....	....	....	....	....	....	....	....	....	
84	76	73	81	74	75	88	90	74	59	81	82	86	89	87	89	76	71.0
62	52	51	51	60-	65	66	65	55	54	50	56	64	64	65	65	57	
83	71	74	81	76	77	85	86	73	64	77	78	86	86	88	86	76	70.0
66	55	47	48	56	67	66	64	59	56	53	51	63	65	64	64	58	
79	70	73	78	74	76	84	86	76	60	74	79	86	85	86	84	74	67.4
66	49	41	43	52	64	63	58	53	53	48	49	62	61	59	60	52	
76	65	71	79	77	73	84	86	67	61	72	78	82	82	86	83	70	68.1
62	50	44	46	62	65	66	61	54	56	52	55	63	64	62	64	52	
78	73	80	86	78	73	87	87	72	62	78	80	81	88	89	87	77	69.8
60	52	44	45	62	64	67	61	54	56	53	50	64	63	62	65	54	
72	66	64	66	68	69	75	72	67	58	65	65	73	74	75	76	67	67.7
83	78	70	83	80	75	86	86	72	70	80	86	81	87	91	86	75	71.0
67	55	47	49	69	67	70	65	58	56	50	56	64	65	66	64	56	
83	77	76	85	82	75	88	88	79	62	77	82	85	88	88	87	75	69 6
61	51	45	45	54	63	66	60	55	48	53	46	63	60	65	65	53	
83	69	75	82	76	75	86	86	79	64	76	79	80	85	86	84	81	69.2
62	52	46	46	60	64	67	62	58	50	55	48	67	65	63	67	55	
80	79	78	84	75	73	85	84	78	64	79	81	87	89	90	93	78	70.6
62	56	51	49	59	64	68	62	59	51	55	49	65	63	62	70	57	
89	71	76	81	79	74	85	84	73	62	77	79	85	88	88	86	78	68.0
52	53	45	42	51	65	65	57	56	45	52	42	63	51	55	65	56	
78	68	70	74	73	71	81	78	70	57	68	76	81	82	80	82	74	67 2
62	53	47	50	54	62	66	62	56	48	51	53	65	64	62	62	53	
86	89	89	88	82	87	91	90	70	65	71	74	87	93	91	90	88	72.2
63	63	64	62	62	59	61	66	60	55	55	56	59	63	65	66	66	
92	86	85	85	84	72	74	68	77	75	74	81	85	81	85	89	82	71.6
64	62	63	68	52	68	65	54	59	58	57	65	60	64	63	59	60	
83	76	74	77	80	80	82	82	80	60	70	80	80	86	88	88	74	72.2
67	64	51	53	55	64	70	68	65	58	57	52	66	66	68	70	67	
74	68	70	75	75	70	84	80	72	61	70	72	76	79	81	82	70	67.8
60	50	56	55	65	65	68	66	60	50	52	55	60	65	66	67	52	
79	70	74	80	76	73	84	82	70	59	75	78	82	83	86	85	71	66.7
58	49	44	43	52	62	67	59	54	46	53	43	62	60	57	64	50	
82	79	79	86	81	78	90	85	74	67	79	92	84	89	90	89	78	71.2
61	50	50	48	51	62	61	62	60	51	55	49	64	65	61	68	58	
86	71	78	82	76	78	87	87	72	62	79	84	86	85	90	88	76	70.1
61	52	58	53	55	63	66	61	56	51	54	50	64	61	60	63	55	
84	77	77	83	83	75	77	88	75	70	80	82	83	88	87	86	78	71.0
58	55	46	45	58	69	70	64	58	57	56	50	68	65	67	65	60	
80	79	72	77	75	73	79	80	78	65	75	79	80	82	83	84	80	67.0
64	63	53	53	54	54	55	55	54	53	54	54	54	54	54	55	54	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	1
Northern Plateau	69	72	71	70	64	68	62	66	72	72	71	74	71	69
Saranac Lake	85	90	77	77	67	84	70	80	82	83	83	84	77	78
	55	55	54	59	55	59	53	54	65	60	59	62	62	53
Gloversville	85	90	90	80	74	84	72	77	81	85	84	88	82	82
	55	57	66	62	63	56	57	56	61	64	62	64	64	66
Lowville	85	88	85	84	73	84	69	80	91	83	82	87	80	79
	55	57	58	56	60	57	56	56	58	62	62	67	66	63
Number Four	80	85	84	79	67	68	64	76	78	78	78	82	73	76
	55	55	54	62	53	53	53	49	57	62	61	55	63	58
Atlantic Coast	70	72	75	70	75	72	72	68	71	76	76	78	80	78
Brooklyn	85	88	89	82	85	80	82	74	81	88	89	91	91	88
	58	61	73	64	71	70	69	65	64	66	72	71	74	72
Manhattan Beach	70	73	72	74	73	91	73	76	73	72	72	85	82	84
	60	64	66	65	66	67	67	64	64	66	68	69	71	69
New York city	83	80	84	75	81	78	77	70	76	82	86	86	87	85
	60	65	65	63	69	69	66	64	62	69	70	70	71	71
Willet's Point	85	82	87	75	85	75	81	72	82	83	88	91	92	87
	58	64	63	63	66	65	62	63	64	70	67	70	69	71
Brentwood	87	87	89	83	87	81	78	70	86	....	....	94	93	91
	55	57	64	65	69	67	64	64	60	....	....	62	68	69
Setauket	82	82	87	75	82	74	78	71	82	83	85	87	88	84
	59	60	65	63	70	65	68	63	63	70	70	69	72	70
Bedford	84	86	88	75	82	75	76	71	82	85	85	88	87	84
	52	58	60	62	67	64	66	58	61	70	65	64	67	69
Hudson Valley	70	75	77	72	74	72	71	66	73	77	77	77	79	75
Albany	87	90	90	81	79	84	79	81	85	89	89	94	88	85
	60	66	69	66	68	62	62	58	66	71	70	67	70	68
Lebanon Springs	85	87	91	79	82	84	78	80	88	87	83	89	90	84
	47	56	59	60	64	56	58	50	61	62	62	56	58	64
Honeymead Brook	83	86	89	76	83	83	81	73	81	83	85	87	87	83
	51	62	65	63	63	61	62	54	58	69	67	60	65	66
Poughkeepsie	87	89	90	77	84	84	83	73	86	87	90	91	91	84
	51	62	65	64	70	62	59	55	63	68	67	58	63	49
Wappingers Falls	87	89	91	81	84	85	83	76	85	87	91	90	92	88
	56	63	65	65	71	65	66	59	65	69	70	68	72	68
Catskill	86	88	90	80	82	81	75	76	84	84	87	91	89	86
	56	62	62	60	70	63	65	53	64	68	68	64	68	68
West Point	78	80	86	90	81	84	79	80	72	83	88	89	92	87
	54	66	62	63	61	64	67	58	62	65	68	65	78	64
Carmel	85	89	90	76	83	81	82	74	82	89	86	88	89	87
	62	64	69	66	64	59	63	58	64	71	66	73	67	64
Mohawk Valley	74	77	76	74	68	71	56	66	72	74	73	76	76	73
‖ Rome	90	90	91	86	75	84	65	75	85	87	88	89	90	86
	58	64	62	62	60	58	48	58	60	60	58	63	62	60
Champlain Valley	64	70	75	61	62	63	66	65	66	68	77	78	78	69
Plattsb'gh Bar'a'ks	77	80	95	70	67	68	72	75	76	76	87	85	91	78
	50	60	55	52	57	58	60	55	56	60	67	70	65	60
Glens Falls	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
St. Lawrence Val'y.	72	76	66	64	66	69	64	67	70	72	73	75	71	69
Malone	79	88	75	70	65	75	70	77	80	81	80	86	78	74
	61	63	52	53	57	59	58	54	56	68	62	68	64	59
Madison Barracks	81	85	75	77	82	78	73	73	83	86	80	76	78	87
	61	62	59	56	59	63	58	54	57	61	62	64	64	60
Watertown	83	94	88	85	79	91	75	84	86	80	86	86	84	86
	60	60	58	62	60	59	58	52	54	56	48	56	54	55
Canton	83	90	75	71	73	84	71	82	83	84	88	90	83	79
	59	60	53	54	55	57	54	52	57	64	64	64	60	57

MAXIMA AND MINIMA FOR THE STATIONS.—(*Contiuued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
66	59	61	64	68	67	73	72	62	57	64	66	68	71	72	72	62	67.7
78	62	75	81	79	70	84	86	67	67	77	80	75	82	83	83	70	66.8
46	52	46	58	63	64	60	58	45	53	51	61	52	58	65	50	40	
83	70	74	80	79	73	84	85	71	64	75	80	80	84	87	85	72	69.8
58	54	49	50	58	63	69	62	59	52	55	50	64	63	63	66	58	
80	88	75	81	76	73	83	87	72	65	76	80	76	83	87	85	76	69.2
52	44	50	46	60	64	76	59	58	51	54	59	64	60	57	65	52	
75	61	72	75	72	69	79	81	72	62	72	75	71	79	82	79	79	65.0
52	43	50	46	59	62	62	59	56	45	50	46	62	59	55	65	50	
78	73	68	68	67	71	76	74	72	66	69	70	74	77	78	78	72	73.0
88	88	78	81	79	82	84	80	82	73	80	83	87	90	90	89	81	75.5
73	69	60	59	61	60	72	71	72	66	63	60	67	70	70	71	60	
85	85	79	75	70	70	74	78	76	77	69	78	74	74	87	80	86	71.2
68	69	59	62	61	66	67	69	67	64	63	65	63	67	69	69	67	
83	77	75	75	73	82	81	80	76	69	76	79	84	89	89	88	78	73.0
73	66	59	65	64	66	70	70	67	65	62	65	68	69	70	68	67	
88	80	78	76	77	80	85	78	77	69	77	82	81	86	89	91	78	73.2
66	60	59	57	63	71	69	70	61	62	58	65	68	67	67	68	57	
93	80	84	84	79	87	90	84	79	79	82	84	89	90	....	91	....	73.6
65	65	55	51	48	56	70	64	65	54	56	50	65	67	...	68	....	
87	76	76	77	76	80	82	78	77	70	77	80	79	84	86	84	76	72.8
71	66	61	59	56	62	71	70	68	59	61	59	65	69	68	70	69	
86	79	80	81	78	77	82	81	77	67	78	80	82	85	89	87	77	71.5
67	64	53	52	53	61	70	67	67	55	59	52	65	68	66	69	65	
75	69	64	68	70	71	77	75	72	62	66	70	75	77	77	78	72	72.7
85	76	79	84	80	76	88	86	76	68	80	86	82	90	91	92	78	74.0
64	60	56	58	62	67	72	70	65	57	58	57	68	70	68	67	61	
86	72	80	82	84	73	87	89	76	72	76	84	83	80	89	83	73	70.2
57	55	44	55	51	62	69	61	63	48	56	47	53	66	61	66	61	
85	75	74	80	79	76	84	82	75	64	74	81	82	83	85	85	75	70.8
64	62	50	52	50	63	71	67	64	53	58	52	66	67	66	68	56	
88	84	77	72	82	81	85	84	84	67	68	90	91	88	90	89	84	72.5
66	46	46	55	64	64	70	66	65	54	54	64	66	65	66	67	62	
85	80	78	82	80	80	87	83	80	68	80	85	88	88	89	88	87	74.4
68	65	45	55	58	65	72	69	66	58	62	56	67	69	70	69	63	
85	78	76	84	80	75	84	83	78	66	78	82	82	88	88	89	79	72.8
66	60	56	55	50	65	71	67	66	57	59	56	68	69	61	70	66	
89	88	81	80	82	78	79	85	80	79	65	81	84	85	89	91	93	73.3
67	64	51	54	56	63	66	68	69	57	57	54	67	68	66	70	71	
84	77	75	81	82	77	85	84	76	65	76	81	84	85	88	90	79	73.3
66	63	53	62	61	64	67	68	63	53	60	58	56	69	71	73	67	
62	62	64	68	70	68	76	78	61	62	65	74	71	74	76	70	66	70 2
78	75	80	85	80	74	87	96	70	72	80	84	80	86	86	84	82	70.2
46	50	49	52	61	62	64	60	52	52	50	65	62	62	65	55	51	
65	69	61	65	69	73	68	78	75	64	65	70	75	70	75	77	76	69 5
75	84	67	75	79	80	71	90	85	72	70	80	85	75	80	84	88	69.5
55	54	55	55	59	65	65	65	65	55	60	60	65	65	70	70	65	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
68	58	67	67	70	69	74	74	66	62	67	68	70	73	74	74	64	68.9
77	64	74	80	79	76	82	84	73	70	76	80	75	79	83	81	72	67.6
55	47	54	50	64	65	65	62	58	51	55	60	64	61	62	65	50	
83	78	84	79	80	72	78	82	75	73	70	79	75	81	86	84	77	69.1
57	53	52	49	58	64	68	62	60	53	56	54	63	60	67	62	56	
74	71	84	82	74	78	84	85	79	70	84	88	85	89	94	90	80	68.8
55	45	50	48	56	46	60	50	58	52	48	52	60	53	56	60	50	
83	63	81	85	83	78	85	90	74	72	80	83	80	85	87	84	72	68.8
54	42	54	52	61	60	60	62	52	52	57	53	52	61	59	63	50	

DAILY MEAN FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val.—(Ct).														
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	88	88	84	68	74	86	70	84	88	78	90	90	78	80
	60	64	56	58	60	58	60	56	58	65	64	68	68	60
Ogdensburg	81	87	78	68	75	81	67	82	78	80	84	87	78	80
	62	64	56	56	58	60	59	55	62	66	65	67	64	58
Potsdam	86	88	70	69	70	69	71	78	80	81	83	87	79	74
	60	64	51	52	51	50	55	53	59	65	66	61	63	55
Great Lakes	74	77	74	73	68	72	64	67	72	73	68	78	75	72
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	85	90	85	86	75	83	71	76	83	84	87	86	87	82
	62	66	67	69	63	58	58	53	62	63	68	69	72	68
Buffalo	78	84	82	80	70	76	68	79	82	73	76	76	76	82
	67	69	70	66	62	63	56	58	60	65	68	70	69	65
Pittsford	88	91	82	81	74	85	72	78	84	85	82	89	82	77
	60	62	67	61	61	60	52	55	61	60	65	68	69	63
Rochester	87	91	82	82	74	83	73	78	85	84	87	89	80	78
	61	64	67	63	62	62	57	56	62	63	66	71	67	66
Appleton	90	90	82	71	74	86	72	78	88	85	88	90	82	75
	60	59	64	58	57	59	57	54	60	59	62	65	66	63
Fort Niagara	90	93	86	83	76	85	77	87	77	82	90	90	85	77
	63	65	69	62	61	60	66	61	61	64	65	68	69	66
Baldwinsville	89	91	86	90	74	87	71	80	84	87	87	92	82	82
	64	66	66	63	64	63	56	60	63	67	69	69	66	65
Oswego	84	86	74	75	70	78	64	71	82	84	80	86	79	74
	61	64	60	64	60	61	57	55	62	63	68	71	65	65
Palermo	85	92	82	86	79	88	70	76	83	83	86	86	81	80
	56	54	59	61	60	56	58	50	58	63	65	63	63	62
Lyons	86	89	81	85	75	85	69	76	....	....	....	....	....	....
	57	62	65	65	62	63	59	57	....	....	....	....	....	....
Erie, Pennsylvania.	81	88	80	79	69	76	69	74	78	78	91	83	84	78
	64	67	69	71	66	61	58	61	60	64	67	70	72	68
Central Lakes	72	78	78	76	71	73	66	65	71	72	74	78	75	73
Fleming	87	92	86	85	85	83	73	75	79	84	85	88	79	77
	....	67	70	68	63	64	59	56	64	63	63	69	71	67
Romulus	89	92	90	85	77	87	74	77	83	83	87	89	80	82
	56	65	69	66	64	62	59	55	61	61	59	67	69	64
Ithaca	86	90	90	84	75	83	70	74	79	83	86	87	81	81
	55	65	66	67	63	61	60	52	62	61	64	65	69	66
Mean	70	74	74	70	69	70	66	66	70	72	74	76	75	73

† Max. and Min. by the Draper Thermograph.

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
82	66	84	84	76	80	86	90	76	66	82	76	86	90	90	84	74	70.7
60	52	52	52	66	68	68	64	60	52	52	52	58	66	60	66	56	
85	65	83	78	79	75	84	85	76	67	78	79	80	85	85	80	72	69.8
57	52	55	57	65	67	65	71	60	55	61	60	64	63	63	65	55	
79	62	75	83	77	81	82	86	74	70	79	80	77	80	76	82	75	67.8
56	47	54	63	60	51	67	67	60	63	54	58	65	66	58	54	57	
71	63	64	67	72	72	76	75	66	61	66	70	73	74	77	76	67	71.0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
77	70	74	83	81	78	82	83	76	68	75	78	82	83	88	83	75	71.6
69	50	53	54	63	66	68	68	59	53	52	60	67	68	69	68	58	
78	69	74	80	76	74	78	81	70	65	70	74	77	83	86	85	75	70.0
62	54	56	57	65	66	68	64	57	56	58	65	68	68	71	70	59	
81	70	73	82	78	78	85	88	69	63	77	82	80	83	89	86	73	70.4
62	54	51	48	63	66	67	57	58	56	55	57	68	65	65	67	58	
80	70	76	84	76	75	86	87	69	65	79	80	79	83	90	87	76	72.0
61	57	54	54	66	67	67	66	58	59	57	59	67	67	68	68	60	
78	71	75	77	82	80	83	84	74	70	80	81	80	80	82	85	75	70.2
64	55	50	48	63	64	65	65	60	56	54	58	66	64	66	65	60	
80	74	80	82	88	84	86	84	80	70	82	83	86	83	86	84	78	72.8
69	56	57	49	66	64	68	66	60	59	54	62	68	64	68	65	63	
83	73	78	86	78	79	90	87	73	68	79	83	80	87	91	88	75	72 6
54	55	54	59	67	67	67	62	59	56	61	70	65	66	68	59	55	
78	66	69	76	75	74	80	82	67	66	73	80	74	78	84	84	70	69.0
64	58	60	54	66	65	67	67	62	57	58	59	66	64	67	67	62	
82	72	78	87	75	74	87	88	73	64	79	84	77	84	86	86	75	69.9
58	54	48	48	65	65	66	65	60	54	51	55	64	62	63	62	57	
....	....	....	....	....	....	86	87	69	65	77	82	80	85	88	87	74	
....	..	....	....	....	....	69	66	60	58	56	56	69	66	62	70	60	....
74	67	70	80	81	78	77	81	68	64	72	78	81	79	86	82	74	71.0
70	59	56	58	66	66	69	71	61	57	56	62	66	69	69	72	64	
74	63	64	66	69	71	77	78	64	60	65	69	76	76	76	76	67	71.4
83	68	73	81	75	75	85	87	74	64	75	81	82	86	88	85	80	71.7
66	54	54	53	65	66	69	69	59.	57	55	60	69	65	66	69	60	
84	77	81	83	75	75	85	90	64	71	71	84	85	86	89	81	75	71.5
61	52	51	51	62	65	67	68	57	55	58	57	67	65	65	66	58	
84	70	74	82	75	76	85	86	70	61	76	80	83	86	87	87	74	70.9
67	55	51	49	62	67	69	66	59	55	57	54	67	65	64	69	57	
71	65	64	66	69	70	75	75	68	61	66	68	73	74	76	76	68	70.4

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau...	T.	0.00	0.20	0.64	0.04	0.08	0.10	T.	0.53	T.	T.	0.01	0.31	0 07
Alfred..............	....	....	.02	.81	.02	.01	.25	....	.57	....	....	....	.51	T.
Angelica	....	....	T.	.75	....	....	*	*	*	*	*	*	† 1.38	.12
Bolivar	....	....	.77	1.29	....	....	.65	....	.50	....	T.	....	.37	.19
Friendship	....	...	T.	*	† .75	....	.18	....	.50	....	....	....	.21	.01
Humphrey	....	....	.15	.90	....	....	.10	....	.65	....	....	....	T.	....
Little Valley	....	....	....	....	....	...	..	....	....	....	....	....	....	....
Cherry Creek......	....	....	...	.42	.17	.05	.10	....	.60	....	....	....	T.	....
Jamestown	....	....	....	1.40	....	....	.10	....	.50	....	....	....	.27	.05
Elmira..............	....	....	1.17	.17	....	....	.01	....	.71	....	....	....	.74	.35
Pine City..........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Akron ,.............	....	....	....	.41	.04	....	....	....	.51	.05	...	....	.03	....
Avon	....	....	.34	.62	.10	....	.04	....	.05	....	....	....	.25	....
Mt. Morris	....	....	.35	1.35	T.	....	....	....	.54	....	....	....	T.	....
Lockport	....	....	....	.18	T.	....	....	....	.30	....	T.	.17	....	....
‡Victor	....	...	T.	.15	.17	....	.08	....	.47	....	....	....	.08	....
Tyrone	....	....	.10	.65	....	1.30	....	....	....	....	....	....	....	....
Wedgewood	....	....	.17	.21	...	.10	.08	....	.83	....	....	....	1.25	.01
Addison	....	....	.40	.43	.02	....	.08	04	.92	....	....	....	.01	.60
Atlanta............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Haskinville........	.10	....	.03	.40	.06	.10	.18	....	.64	....	....	....	.10	.10
South Canisteo	....	....	.10	.75	T.	T.	.23	T.	.32	....	....	....	1.00	T.
Arcade	....	....	.34	.46	.06	....	.10	....	.41	....	....	....	.41	....
Attica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Varysburgh	....	....	....	.82	.08	....	.03	....	.42	....	....	....	.70	....
Eastern Plateau...	0.00	0.00	0.06	0.42	0.10	0.13	0.25	0.03	0.68	0.00	0.00	0.00	0.30	0.11
Binghamton	....	....	T.	.28	.04	....	....	....	.35	....	....	....	.11	.90
Chenango Forks...	....	....	....	...	....	....	....	....	....	....	....	....	....	....
Oxford.............	....	....	....	.69	.20	....	.48	....	.45	....	....	....	.20	.02
Cortland	....	....	.02	.27	.05	.03	.06	....	.35	....	....	....	.32	....
Bloomville.........	....	....	....	*	† 1.95	....	....	....	1 04	....	....	....	....	.33
Deposit............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright...	....	....	....	1.62	....	....	....	....	....	....	....	....	.34	....
Elka Park.........	....	....	.30	1.36	....	.06	.80	.03	1.20	....	....	....	....	....
Brookfield	....	....	.04	.06	....	.09	.60	....	.10	....	....	....	.68	....
Hamilton	....	....	....	....	....	....	....	....	....	....	....	....	...	....
Apulia.............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown........	....	....	....	*	† .62	....	.35	.17	.89	....	....	....	....	....
Port Jervis	....	....	...	....	.10	1.23	.36	.15	3.18	....	....	....	.15	....
Warwick	....	....	....	.17	.88	....	1.00	.04	.24	....	....	....	.10	.09
Cooperstown	....	....	....	.55	....	.30	....	....	.25	....	....	....	.20	....
New Lisbon	....	....	....	1.25	.06	....	.40	....	.28	....	....	....	.08	....
Oneonta	....	....	....	.75	....	.10	....	.14	.11	....	....	....	....	.31
Perry City.........	....	....	....	.19	.07	.39	.03	....	.71	....	....	....	.35	....
Newark Valley	....	....	.50	.05	.02	....	....	....	.50	....	....	....	1.72	....
Waverly	....	....	.22	.13	.03	....	....	....	.92	....	....	....	.90	.26
Ellis	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	....	....	....	.12	....	....	.01	....	.96	....	....	....	....	....
Northern Plateau..	0.00	0.00	T.	0.75	0.13	0.21	0.04	0.00	0.17	0.02	0 02	0.00	0.11	0 24
West Chazy	...	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown.....	....	....	....	....	...	....	....	....	....	....	....	....	....	....
Saranac Lake......	....	....	....	1.25	.15	.48	T.	....	.25	.02	....	....	.32	....
Gloversville	....	....	T.	.34	.10	T.	.08	....	.18	.08	....	....	.05	.06
Lowville	....	....	....	.45	.08	.16	.03	....	.13	....	.10	....	.07	....
Number Four	....	....	....	1.33	....	43	.09	....	.13	.02	....	....	.10	1.02
Kings Station	....	....	....	.20	.30	....	....	....	.18	....	....	....	....	.10

TATION FOR JULY, 1896—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.24	0.00	0.00	0.00	0.07	1.17	0.04	0.40	0.05	0.35	T.	T.	0.42	0.42	0.37	0.03	0.00	5 64
.11	....	....	....	.01	.42	.18	.28	...	.53	....	....	.68	0.1	.02	.06	....	4.49
.10	....	....	....	T.	.86	.10	1.10	....	.42	....	....	.37	*	†.46	....	....	5.66
.25	....	....	....	T.	.31	.15	1.27	.04	.56	....	T.	.89	.83	.08	T.	....	7.75
.02	....	....	....	T.	.60	....	.20	.06	.42	....	T.	.61	.20	.78	T.	....	4.54
.13	....	....	....	.88	1.51	....	.50	....	.47	....	....	.39	1 29	.53	....	....	7.50
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.43	....	....	....	.17	1.50	.04	.31	.28	.37	....	....	.52	.03	.23	....	....	5.22
1.00	....	....	....	.15	.78	....	.59	.05	.25	....	....	1.43	.39	1.00	T.	...	7.96
....	....	....	....	....	.29	....	....	....	.37	....	....	.43	1.00	.25	.06	....	5.55
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.07	....	....	....	.03	3.48	T.	.05	....	....	....	T.	.10	T.	.65	.03	....	5.45
.07	....	....	....	.05	1.50	.01	.15	.10	.15	....	....	.02	.89	.53	....	....	4.87
.13	....	....	....	....	1.40	....	.10	....	.36	....	....	T.	.34	.34	....	....	4.91
....	....	....	....	.05	4.24	....	T.	.05	T.	....	....	.04	1.25	.22	....	....	6.50
?	....	....	....	.02	*	*	*	*	*	*	*	*	*	*	†3.17	....	....
1.35	....	....	....	....	....	....	....	....	.40	....	....	.73	....	.20	....	....	4.73
T.	....	....	....	....	.38	....	.17	....	.43	.01	....	.76	.28	.29	.05	....	5.02
.08	....	....	....	...	.17	.11	.10	T.	.48	.01	....	.11	.30	.40	.17	....	4.45
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.10	....	....	....	.03	.99	.20	.80	.03	.40	....	....	.30	.73	....	.15	....	5.46
.05	....	....	....	T.	.20	....	.80	....	.48	....	....	.18	T.	.30	....	....	5.01
.28	....	....	....	T.	1.75	....	1.60	....	.30	....	T.	.27	T.	.41	....	....	6.39
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.33	....	....	....	.08	1.88	....	T.	.33	.30	....	....	.24	....	.50	....	....	5.71
0.25	0.01	0.00	0.00	T.	0.70	0.06	0.26	0.04	0.69	0.05	T.	0.37	0.13	0.25	0.35	0.01	5.36
.07	T.	....	....	....	.17	....	....	.22	.45	.20	T.	.13	T.	.21	.72	....	3.85
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.32	....	....	....	....	1.25	.13	....	.15	.80	.12	....	.02	....	.54	....	....	5.37
.08	....	....	....	....	1.23	.33	....	....	.68	....	....	.08	.06	.05	.75	....	4.36
.53	....	....	....	....	.39	....	....	.06	.87	....	....	.33	.26	....	.06	....	5.82
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.68	....	....	....	....	*	†.46	....	....	.73	....	....	.84	.11	....	.72	....	4.90
.26	....	....	....	....	1.02	T.	.06	....	.95	....	....	.63	....	.45	....	....	7.12
.26	....	....	....	....	.70	....	....	....	.18	....	....	T.	....	....	.58	....	3.29
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	.48	....	.24	....	*	†1.05	....	.75	....	....	.52	....	5.07
....	.05	....	....	....	.60	....	1.04	....	*	† .72	....	.35	....	....	.78	....	8 71
....	.20	....	....	....	....	.35	.97	....	.54	.40	....	.32	....	....	.66	.09	6 05
.40	....	....	....	....	1.38	.10	.15	....	.42	....	....	.06	....	.77	....	.02	4.60
.25	....	....	....	....	.89	.07	.22	....	.62	....	....	....	....	....	1.00	....	5.12
1.12	....	....	....	....	1.03	....	.08	....	.92	....	....	1.08	.70	.68	....	....	7.02
T.	....	....	....	T.	.75	....	.25	....	.60	....	....	.09	.40	.31	.04	....	4.18
.20	....	....	....	....	.45	....	.10	.23	.60	.10	....	.35	.72	.10	.07	....	5.71
.02	....	....	....	T.	.33	....	1.11	....	.66	....	....	.83	.04	.36	T.	....	5.81
....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	...
....	....	....	....	....	.44	....	.22	....	1.32	....	....	.45	....	.80	....	....	4.32
0 47	0.01	0.01	0.00	0.01	1.13	0.59	0.13	0.01	0.09	0.03	0.02	0.22	T.	0.20	0.20	0.00	4.80
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.15	.07	.03	....	....	.60	....	.27	.03	....	....	.10	.41	T.	.03	....	....	4.19
.90	....	T.	....	....	2.06	....	.20	.03	.13	.13	....	.01	....	.60	....	....	4.95
.40	....	....	....	.05	1.40	.05	....	....	....	....	....	.13	....	....	.45	....	3.50
....	....	....	....	....	....	2.88	.01	....	....	....	....	.46	....	.38	....	....	7.05
.90	....	....	....	....	1.57	....	.16	....	.30	....	....	.05	....	....	.54	....	4.30

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.00	0.00	0.00	0.08	0.46	0.49	0.16	0.06	0.25	T.	0.00	0.00	0.02	0.01
Brooklyn	....	....	....	....	.26	.67	.03	....	.24	....	....	....	....	....
Manhattan Beach	....	....	....	T.	.03	.28	.23	T.	.13	....	....	....	....	....
New York City	...	....	....	....	.21	1.06	.01	T.	.21	T.	....	....	T.	.01
Willet's Point	....	....	....	T.	.15	1.28	T.	.40	....	....	....	....	.13	....
Brentwood	....	....	....	.30	T.	T.	T.	....	.50	....	....	....	....	....
Setauket	....	....	....	.28	.15	.05	.03	T.	.50	....	....	....	....	T.
Bedford	....	....	....	T.	2.24	.06	.84	T.	.15	....	....	....	....	.02
Hudson Valley	T.	0.00	0.27	0.17	0.27	0.02	0.21	0.01	0.13	0.04	0.00	0.00	0.03	0 06
Albany	....	....	T.	.02	.21	....	.02	....	.05	.06	....	....	.05	T.
Lebanon Springs	....	....	T.	.33	....	.02	.21	....	....	....	....	....	.24	....
Honeymead Brook	....	....	2.62	.47	.24	T.	.28	T.	.05	.07	....	....	T.	.07
Poughkeepsie	...	....	....	*	† .68	T.	.19	T.	T.	....	....	....	....	....
Wappinger's Falls	....	....	....	.06	1.21	.05	.48	.02	T.	.11	....	....	....	.40
Catskill	....	....	.03	.64	....	...	.41	.02	1.00	....	....	....	....	....
West Point	....	....	....	....	....	.02	.35	.07	.03	....	....	....	....	.10
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	....	....	.74	.11	.12	....	.13	....	....	....	....	.06
Southeast Res'v'r	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	....	....	....	....	....	....	05	....	....	.20	....	....	.05	....
Easton	.05	....	....	....	.06	....	....	....	....	....	....	....	....	....
Mohawk Valley	0.00	0.00	0.00	0.50	0.00	0 40	0.00	0,25	0.06	0.00	0.00	0.00	0.26	0 00
Rome	....	....	....	.50	....	.40	....	.25	.06	....	....	....	.26	....
Champlain Valley	0.00	0.00	0.00	0.05	1.10	0.05	0.40	0.05	0.00	0.05	T.	0.00	0.00	1.50
Plattsburgh Bar'ks	....	....		.05	1.10	.05	.40	.05	....	.05	T.	....	....	1.50
Glens Falls	....	....	....	....	....	....	....	....	....	....	....	....	....	....
St. Lawrence Val'y.	0.00	0 00	0.00	0.10	0.38	0.04	0.02	0.00	0.17	T.	0.01	T.	0.64	0.00
Malone	....	....	....	.11	1.19	.10	.05	....	T.	....	.06	....	.74	....
Madison Barracks	....	....	....	.06	....	....	....	....	....	....	....	....	....	....
Watertown	...	....	....	.50	....	.10	.02	....	.05	T.	.05	.03	.14	....
Canton	....	....	....	....	.32	....	....	....	.10	....	....	....	.58	....
DeKalb Junction	....	....	....	....	.62	....	....	....	.06	....	....	....	.44	....
Massena	....	....	....	...	....	....	....	....	....	....	....	....		....
North Hammond	....	....	....	....	.14	.07	....	....	.36	....	....	....	.56	....
Ogdensburg	....	....	....	.01	.34	....	.02	....	.70	....	....	...	2.10	....
Potsdam	...	....	....	*	† .83	....	.30	....	.10	....	....	....	.54	....
Great Lakes	0.00	0.01	T.	0.33	0.03	0.12	0.03	0.05	0.26	T.	0.01	0.00	0.29	0.01
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	....	.10	....	.70	....	....	T.	....	.28	....	....	....	....	....
Buffalo	..	....	....	.80	T.	....	....	....	.25	...	.04	....	.24	....
Adams Center	....	....	....	.30	.23	.08	....	.06	....	....	....	....	.56	....
Pittsford	....	....	....	.18	....	.01	.02	....	.60	....	....	....	.17	....
Rochester	....	....	....	.18	.03	T.	.02	....	.44	T.	T.	....	.24	T.
Scottsville	....	....	....	.42	....	.05	....	....	.57	....	...	....	.18	....
Appleton	....	...	....	.26	....	T.	....	....	.25	T.	.04	....	.36	....
Fort Niagara	..	....	....	.14	....	.02	....	.12	....	....	.08	....	.15	....
Niagara Falls	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Baldwinsville	....	T.	....	.12	....	T.	.05	.24	....	....	....	....	.47	....
Skaneateles	....	....	....	.24	....	.77	.16	....	.40	....	....	....	.30	....
Ridgeway	....	....	....	.17	.01	....	...	....	.30	.04	.02	....	.50	....
Demster	....	....	....	....	.10	.30	.07	....	.16	....	....	....	.37	....
Fulton	...	....	....	....	....	....	....	.40	....	....	....	....	....	.12
Oswego	....	....	.01	T.	.15	.02	.03	....	.29	....	.01	....	.43	....
Palermo	....	....	T.	T.	T.	.13	.10	....	.22	....	....	....	.23	....
‖ Phœnix	....	....	....	....	.09	....	.24	.04	.25	.03	....	....	....	.46

TATION FOR JULY — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.16	0.35	0.00	0.00	0.00	0.14	0.35	0.60	0.54	0.18	0.08	0.00	0 43	T.	0.05	0.20	0.04	4.68
....	.19	....	....	....	T.	.58	.47	.66	.11	.06	....	.55	....	.05	.29	T.	4 23
T.	.02	....	....	....	T.	.06	.86	.83	T.	.13	....	*	†.56	.06	.10	.30	3.59
....	.47	....	....	....	.01	.60	.28	.72	.13	.06	....	.31	.03	.03	.31	....	4.45
1.10	....	....	....	....	.95	.20	.74	....	.12	....	....	.34	T.	.20	.18	....	5.79
....	.80	....	....	....	....	.20	1.50	....	.50	....	....	.60	....	....	.30	....	4.70
....	.71	....	....	....	....	.30	.35	.29	.05	....	....	....	....	....	.03	....	2.74
....	.29	....	....	....	T.	.54	.01	1.30	.35	.34	....	.76	T.	....	.19	....	7.29
0.16	0 10	0.00	0.00	0.00	0.34	0.20	0.26	0 23	0.30	0.28	0.00	0.19	0.25	0.20	0.69	0.02	4.38
.16	....	....	....	....	.50	....	.04	T.	.31	.40	....	.04	.01	.40	1.70	....	3.57
....	.45	....	....	....	.79	....	.03	....	*	†.55	....	.15	....	1.27	....	.22	4.26
....	.08	....	....	....	.02	.71	.09	.44	.59	....	....	.08	.34	....	1.40	....	7.60
....	.06	....	....	....	T.	.07	....	.49	....	.14	....	....	1.70	....	....	....	3.33
.20	.15	....	....	....	.10	.62	.05	.22	.51	.15	....	.24	....	....	.82	....	5.40
.13	....	....	....	....	.37	....	....	.06	.93	....	....	1.18	....	.32	....	....	5.09
....	....	....	....	....	....	.21	....	.53	....	.64	....	....	.32	....	.20	.03	2.50
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3.98
.08	.22	....	....	....	T.	.14	....	.55	.35	.23	....	.17	....	....	.64	....	3.54
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4.28
.20	....	....	....	....	.85	.10	.08	....	.05	.60	....	....	....	....	1 00	....	3 23
.85	....	....	....	....	.74	.10	2 31	....	T.	.31	....	T.	.17	....	1.17	....	5.76
0.78	0.00	0.00	0.00	0.88	1 36	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	1.50	0.00	0.00	6.04
.78	....	....	....	.88	1.36	....	....	....	.05	....	....	....	....	1.50	....	....	6.04
0.00	0.15	0.00	0.00	0.00	0.10	0.05	0.40	0.15	0.00	0.05	0.00	T.	0.50	0.00	0.40	0.00	4.76
....	.15	..	....	....	.10	.05	.40	.15	....	.05	....	T.	.50	....	.40	....	5.00
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4.53
0.51	0.00	T	T.	0.18	0.58	0.05	0.10	0.03	T.	T.	0.00	0.16	0.43	0.14	0.27	0.00	3.85
1.42	....	.02	....	....	.09	.37	.21	.05	....	T.	....	.17	1.04	....	.09	....	5.71
1.13	....	....	....	....	1.85	....	....	....	....	....	....	.35	....	.63	....	....	4.02
.58	....	....	T.	1.40	....	....	....	.03	T.	....	....	.36	....	.45	....	....	3.71
.20	....	....	....	....	.38	....	.12	.16	....	....	....	.11	1.28	...	T.	....	3.25
.25	....	....	....	....	.49	....	.44	....	....	....	....	.12	.43	....	1.71	....	4.56
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.26	....	....	....	....	.70	....	....	....	....	....	....	T.	....	....	.34	....	2.43
....	....	T.	....	....	.50	....	....	.02	....	....	....	.09	.12	.03	.05	....	3 98
.25	....	....	....	....	.61	....	.07	....	....	....	....	.10	.60	....	....	....	3.13
0.28	T.	T.	0.00	0.09	2.31	0.01	0.07	0.01	0.08	0.00	T.	0.19	0.03	0.50	0.16	0.01	4.91
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.40	....	....	....	T.	.51	....	....	.15	.28	....	....	.55	....	.10	....	....	3.07
.76	....	....	....	.08	3.54	.02	....	....	.19	....	T.	.24	....	.19	....	....	6.35
.50	....	....	....	....	1.40	....	....	....	....	....	....	.68	....	.52	....	....	4.33
.64	....	....	....	T.	2.21	....	.07	.02	.12	....	....	T.	....	1.00	....	....	5.04
.36	....	....	....	.01	2.11	....	.21	.02	.08	....	....	.01	T.	.86	.18	....	4.75
.34	....	....	....	....	1.47	....	.25	....	.13	....	....	.31	....	.51	....	....	4.24
....	T.	....	....	T.	2.66	....	.14	....	.02	....	....	.12	.32	1.19	.01	....	5.27
....	....	....	....	.07	2.95	....	.09	....	....	....	....	.15	....	....	....	....	3.77
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
.45	....	....	....	1.04	1.25	....	T.	T.	.07	....	....	T.	T.	.64	....	....	4.34
.17	....	....	....	.18	1.52	.04	....	....	.16	....	....	....	....	.95	.50	....	5.39
....	....	.02	....	....	4.27	....	.35	....	.03	....	....	.15	.19	.13	....	....	6 18
....	...	....	....	.07	3.37	....	....	.03	....	....	....	.15	....	....	1.22	.13	5.97
....	....	....	...	....	3.07	.05	....	....	....	....	....	....	....	....	....	....	3.64
T.	T.	....	....	.02	3 30	....	.02	.02	T.	....	....	.20	....	.45	.92	.02	5.89
....	....	....	....	.01	2.85	.10	.02	....	.01	....	....	.10	....	1.20	.10	....	5.07
....	....	....	....	....	1.10	....	....	....	....	.07	....	....	....	....	....	.07	2.35

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes—(Ct.)														
‡ Lyons	....	....	....	.05	....	.41	....	....	....	....	....	....	....	....
Rose	....	....	....	.07	.01	.41	.08	....	.43	....	....	....	.70	....
Erie, Pennsylvania.	....	....	....	2 22	.02	....	....	....	.30	....	....	....	....	T.
Central Lakes	0.00	0.00	0.06	0.30	0.03	0.54	0.16	0.10	0.45	T.	0.00	0.00	0.30	T.
Fleming	....	....	....	T.	....	1.10	.20	....	.34	....	....	...	.45	.01
Sherwood	....	....	.11	.47	.03	.30	.12	.41	....	T.	....	....	.35	....
Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	.01
Romulus	....	....	.13	.62	....	.21	.30	....	.79	....	....	....	.14	....
Ithaca	....	....	....	.10	.08	.53	.01	....	.66	....	....	....	.26	....
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	T.	T.	0.06	0.34	0.25	0.21	0.14	0.06	0 27	0.01	T.	T.	0.23	0.20

‡ Record for the month incomplete. || Received too late to be included in the averages.

TATION FOR JULY—(*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
....	....	....	....	....	....	....	.03	.02	.10	....	....	.02	....	.52	....	....	....
.12	....	....	....	T.	2.03	....	T.	....	.05	....	....	.01	....	.79	.01	....	4.71
1.08	....	....	....	.05	.83	....	T.	T.	.26	....	T.	.74	....	T.	....	....	5.50
0.02	0.00	0.00	0.00	0.08	1.18	0.02	0.31	0.12	0.25	0.00	T.	0.03	0.03	0.28	0.34	0.00	4.58
....	....	....	....	....	1.83	....	T.	....	.23	....	....	....	....	.14	....	....	4.29
....	....	....	....	.30	1.35	....	.57	....	.19	....	.01	.06	.02	.90	.21	....	5.41
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	1.12	.10	.22	.46	....	....	....	T.	....	....	.83	....	4.92
.07	....	....	....	T.	.44	....	.45	....	.57	....	....	.05	.10	.07	.30	....	3.69
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.29	0.06	T.	T.	0.13	0.90	0.14	0.25	0.12	0.20	0.05	T.	0.20	0.18	0 35	0.26	0.01	4.90

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).									
		Normal for the month of July.	Length of record, years.	Record begins.	Record ends.	Mean for July, 1896.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR JULY.			
								Highest.	Year.	Lowest.	Year.
Western Plateau	.....	69.0	...	.....	.....	69.7	+0.7	.....	.....	.....	.....
Angelica	Allegany	67.8	15	1854	1896	68.2	+0.4	72.7	1854	60.9	1891
Humphrey	Cattaraugus	67.8	14	1883	1896	67.5	—0.3	75.1	1887	62.8	1884
Elmira	Chemung	71.5	18	1851	1896	73.4	+1.9	75.6	1854	66.3	1851
Eastern Plateau	.....	67.8	...	.....	.....	66.9	+1.5	.....	.....	.....	.....
Oxford	Chenango	68.2	29	1828	1896	69.6	+1.4	72.1	'47-'54	64.0	1829
Cortland	Cortland	66.4	35	1829	1896	69.2	+2.8	70.9	1830	63.2	1860
Hamilton	Madison	67.2	19	1827	1895	.....	.....	70.8	1831	63.9	1829
Cooperstown	Otsego	68.0	43	1854	1896	67.8	—0.2	76.0	1868	62.7	1860
Waverly	Tioga	69.1	15	1882	1896	71.0	+1.9	74.5	1887	65.6	'84-'91
Northern Plateau	.....	69.8	...	.....	.....	69.2	—0.6	.....	.....	.....	.....
Lowville	Lewis	69.8	30	1827	1896	69.2	—0.6	71.8	1847	62.1	1891
Atlantic Coast	.....	72.6	...	.....	.....	72.9	+0.3	.....	.....	.....	.....
New York City	New York	73.4	26	1871	1896	73.0	—0.4	76.7	1887	70.1	1884
Setauket	Suffolk	71.8	12	1885	1896	72.8	+1.0	75.4	1887	68.9	1891
Hudson Valley	.....	71.7	...	.....	...	72.7	+1.0	.....	.....	.....	.....
Albany	Albany	72.5	23	1874	1896	74.0	+1.5	76.6	1887	69.1	1891
Honeymead Brook	Dutchess	69.7	16	1881	1896	70.8	+1.1	74.0	1887	66.8	1891
West Point	Orange	72.9	68	1826	1896	73.3	+0.4	.....	.....	.....	.....
Champlain Valley	.....	69.7	...	.....	.....	69.5	—0.2	.....	.....	.....	.....
Plattsburgh Barracks	Clinton	69.7	40	1839	1896	69.5	—0.2	73.8	'47-'70	65.2	1891
St. Lawrence Valley	.....	70.1	...	.....	.....	69.1	—1.0	.....	.....	.....	.....
Madison Barracks	Jefferson	70.0	35	1839	1896	69.1	—0.9	78.2	1887	65.1	1884
Canton	St. Lawrence	70.9	33	1862	1896	68.8	—2.1	78.2	1868	63.6	1865
North Hammond	"	71.4	18	1866	1896	70.7	—0.7	79.4	1868	65.1	1891
Potsdam	"	68.2	27	1828	1896	67.8	—0.4	73.6	1838	63.3	1833
Great Lakes	.....	69.8	...	.....	.....	71.0	+1.2	.....	.....	.....	.....
Buffalo	Erie	69.9	26	1871	1896	70.0	+0.1	74.9	1887	64.9	1884
Rochester	Monroe	70.5	25	1871	1896	72.0	+1.5	74.2	1887	65.1	1884
Fort Niagara	Niagara	70.8	40	1842	1896	72.8	+2.0	75.6	1887	66.4	1884
Baldwinsville	Onondaga	69.5	19	1854	1896	72.6	+3.1	73.6	1894	64.6	1865
Oswego	Oswego	69.1	26	1871	1896	69.0	—0.1	74.5	1878	64.5	1884
Palermo	"	67.7	43	1854	1896	69.9	+2.2	79.1	1868	62.9	1884
Erie, Pennsylvania	Erie	71.2	23	1874	1896	71.0	—0.2	76.0	1887	66.0	1891
Central Lakes	.....	69.8	...	.....	.....	70.9	+1.1	.....	.....	.....	.....
Ithaca	Tompkins	69.8	18	1879	1896	70.9	+1.1	74.8	1887	66.0	1884
Average departure	.....	.....	...	.....	.....	.....	+0.6	.....	.....	.....	.....

AND PRECIPITATION — JULY.

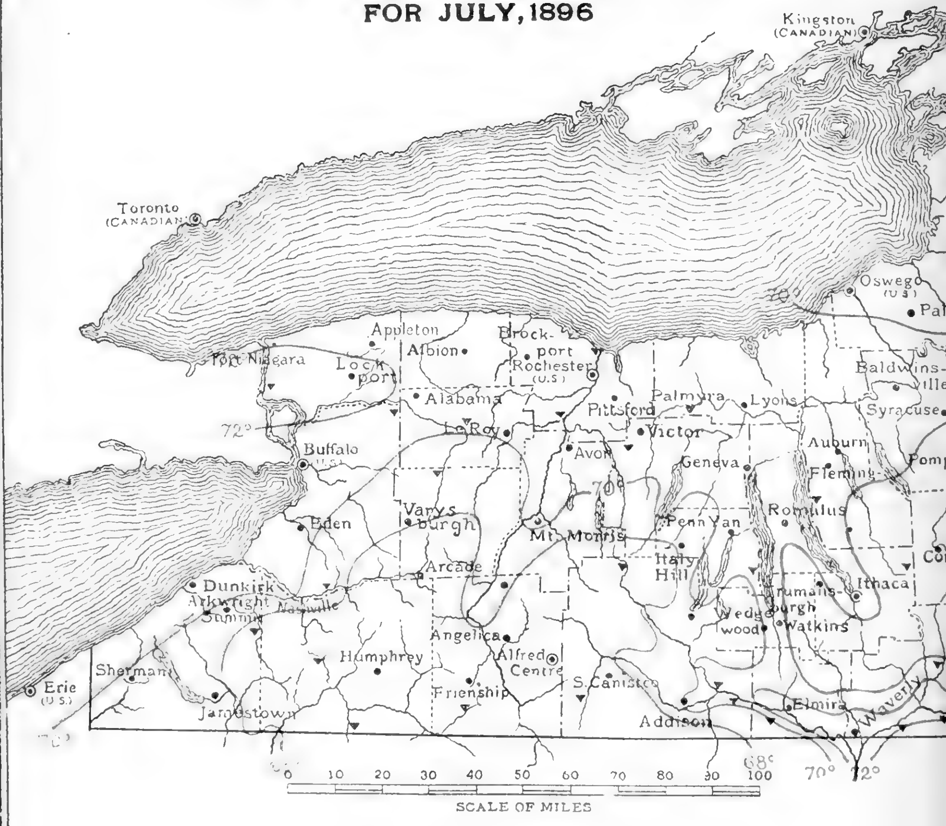
STATION.	COUNTY.	PRECIPITATION (INCHES).									
		Average for the month of July.	Length of record, years.	Record begins.	Record ends.	Total for July, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR JULY.			
								GREATEST.		LEAST.	
								Amount.	Year.	Amount.	Year.
Western Plateau	....	3.63	...	......	......	6.24	+2 61	.....	......	.....	......
Angelica	Allegany	3.48	10	1871	1896	5.60	+2 18	5.66	1896	1.79	1893
Humphrey	Cattaraugus..	4.29	14	1883	1896	7.50	+3.21	7.50	1896	2.38	1885
Elmira	Chemung	3.11	18	1851	1896	5.55	+2.44	5.55	1896	1.40	1853
Eastern Plateau	....	4.26	.	......	......	5.77	+1.39	.....	......	.....	......
Oxford	Chenango	3.97	26	1829	1896	5.37	+1.40	8.29	1844	0.70	1832
Cortland	Cortland	4.79	18	1851	1896	4.36	—0.43	8.45	1863	1.79	1861
Hamilton	Madison	3.67	20	1827	1895	.....	.....	7.79	1833	0.37	1849
Cooperstown	Otsego	4.27	43	1854	1896	4.60	+0.33	7.92	1863	0.89	1868
Port Jervis	Orange	5.10	12	1880	1896	8.71	+3.61	8.71	1896	1.83	1894
Waverly	Tioga	3.75	15	1882	1896	5.81	+2.06	7.19	1887	1.58	1895
Northern Plateau	....	3.55	...	......	......	3.50	—0.05	.....	......	.....	......
Lowville	Lewis	3.55	34	1827	1896	3.50	—0.05	8.29	1848	0.70	1832
Atlantic Coast	....	4.01	...	.....	......	3.60	—0.42	.....	.....	.....	......
New York City	New York	4.26	26	1871	1896	4.45	+0.19	9.63	1889	1.26	1893
Setauket	Suffolk	3.76	12	1885	1896	2.74	—1.02	7.43	1886	0.63	1894
Hudson Valley	....	4.30	...	.....	......	4.20	—0.11	.....	......	.....	......
Albany	Albany	4.07	23	1874	1896	3.57	—0.50	6.78	1874	1.80	1893
Honeymead Brook	Dutchess	4.70	16	1881	1896	7.60	+2.90	8.99	1889	2.23	1882
Poughkeepsie	"	3.62	21	1830	1896	3.33	—0.29	8.45	1845	0.49	1849
West Point	Orange	4.52	49	1840	1896	2.50	—2.02	10.48	1853	1.04	1894
Boyds Corners	Putnam	4.61	26	1870	1896	3.98	—0.63	13.32	1887	1.75	1894
Champlain Valley	....	3.43	...	......	......	5.00	+1.57	.....	......	.....	......
Plattsburgh Barr'ks ..	Clinton	3.43	37	1840	1896	5.00	+1.57	9.18	1874	0.95	1849
St Lawrence Valley ..	....	3.66	...	.....	......	3.82	+0.16	.....	......	.....	......
Malone	Franklin	4.05	16	1830	1896	5.71	+1.66	.....	......	.....	..
Madison Barracks	Jefferson	2.95	35	1841	1896	4.02	+1.07	7.67	1851	0.38	1881
North Hammond	St. Lawrence.	3.54	18	1866	1896	2.43	—1.11	10.31	1873	1.00	1868
Potsdam	"	4.10	26	1828	1896	3.13	—0.97	7.87	1889	1.10	1841
Great Lakes	....	2.93	...	......	...	5.22	+2.29	.....	......	.....	......
Buffalo	Erie	3.30	26	1871	1896	6.35	+3.05	7.19	1873	1.19	1882
Rochester	Monroe	3.05	25	1871	1896	4.75	+1.70	5.44	1873	1.07	1886
Fort Niagara	Niagara	2.66	40	1842	1896	3.77	+1.11	6.37	1850	0.62	1882
Oswego	Oswego	3.23	26	1871	1896	5.89	+2.66	7.62	1874	1.12	1882
Palermo	"	2.39	37	1860	1896	5.07	+2.68	6.60	1874	0.64	1882
Erie, Pa.	Erie	2.94	24	1873	1896	5.50	+2.56	7.03	1874	0.76	1890
Central Lakes	....	3.77	...	......	......	3.69	—0.08	.....	......	.....	......
Ithaca	Tompkins	3.77	18	1879	1896	3.69	—0.08	6.73	1889	1.24	1890
Average departure.	....	.....	...	......	......	.....	+1.05	...	......	....	.....

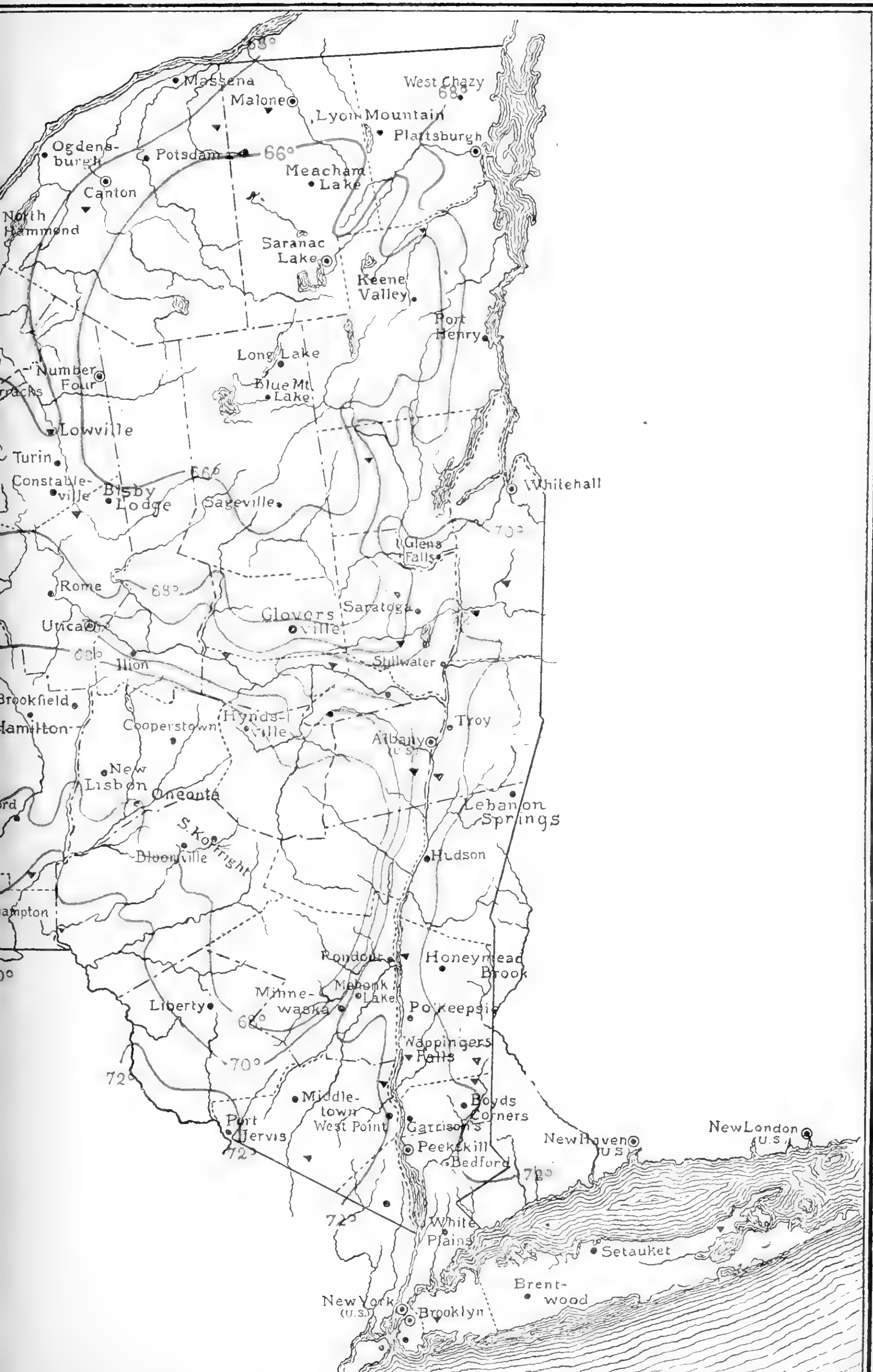
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR JULY, 1896





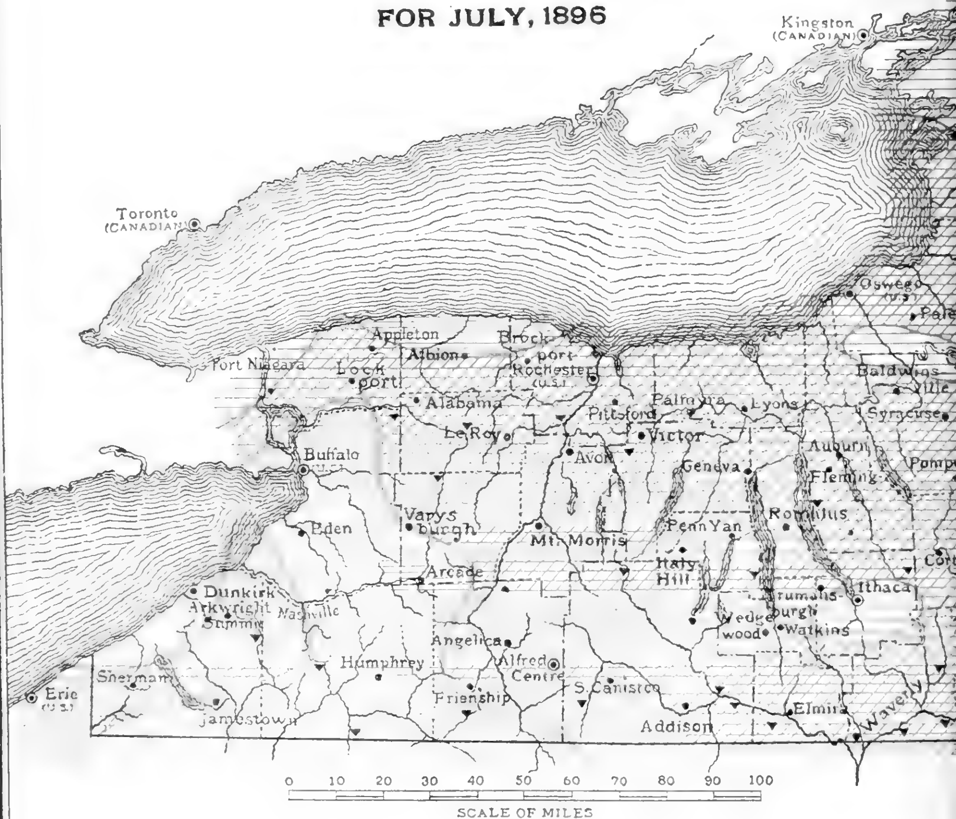
Massena
Malone
West Chazy
68°
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
66°
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
66°
Sageville
Whitehall
70°
Glens Falls
Rome
68°
Saratoga
Utica
Gloversville
68°
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
68°
Po'keepsie
70°
Wappingers Falls
72°
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
72°
Peekskill
Bedford
New Haven U.S.
New London U.S.
72°
72°
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

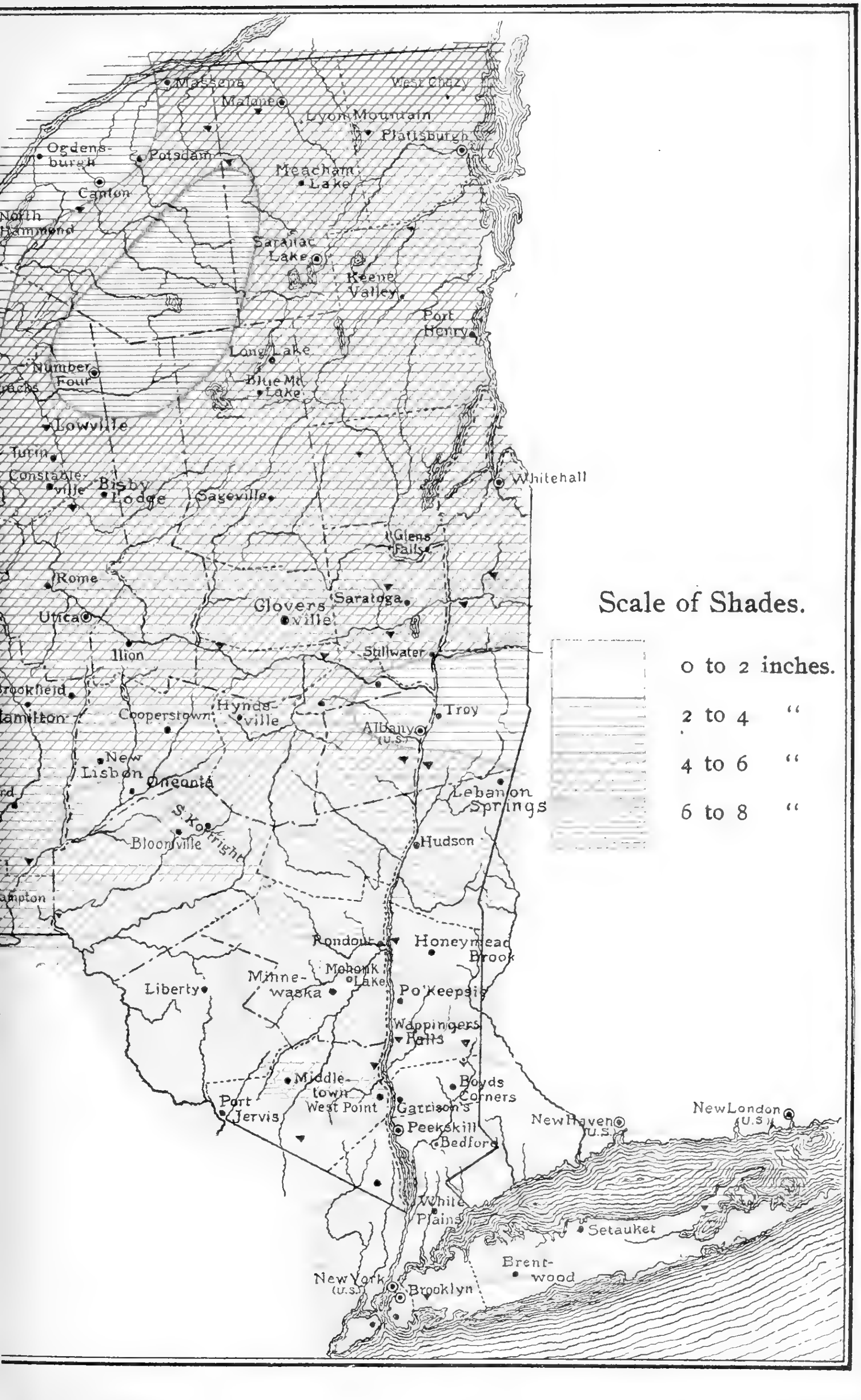
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR JULY, 1896




Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
6 to 8 "
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Gloversville
Utica
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Stillwater
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Mohonk Lake
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Liberty
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Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

Meteorological Summary for August, 1896.

The average atmospheric pressure (reduced to sea level and 32 degrees Fahr.) for the State of New York during August was 30.02 inches. The highest barometer was 30.40 inches at Erie, Pa., on the 28th, and the lowest was 29.70 inches at Oswego on the 30th. The highest mean pressure, 30.04 inches, obtained at New York city and at Erie, Pa., and the lowest, 30.00 inches, at Oswego. The average of the mean pressures at six stations of the National Bureau was 0.03 inches above the normal, excesses occurring at all stations.

The mean temperature of the State, as derived from the records of 72 stations, was 68.9 degrees. The highest local mean was 74.2 degrees at Brooklyn, and the lowest was 63.2 degrees at Number Four. The highest general daily mean was 79 degrees on the 9th, 10th and 11th, and the lowest, 57 degrees, on the 19th. The maximum temperature reported was 98 degrees at Bloomville, Delaware county, on the 6th and 8th, the minimum being 33 degrees at South Kortright and New Lisbon on the 29th, and at Friendship on the 20th and 29th. The mean monthly range of temperature for the State was 49 degrees, the greatest local range being 60 degrees. The mean daily range was 21 degrees. The greatest local daily range was 46 degrees at South Kortright on the 26th, and the least was 4 degrees at Erie, Pa., on the 23d. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 67.5 degrees; the Eastern Plateau, 67.9 degrees; the Northern Plateau, 65.8 degrees; the Atlantic Coast, 72.3 degrees; the Hudson Valley, 71.4 degrees; the Mohawk Valley, 67.8 degrees; the Champlain Valley, 68.0 degrees; the St. Lawrence Valley, 68.0 degrees; the Great Lakes, 67.9 degrees; the Central Lakes, 70.2 degrees. The average of the mean temperatures at 24 stations possessing records for previous years was 1.3 degrees above the normal, deficiencies occurring at only three scattered stations. At Waverly, Setauket and Baldwinsville the temperature was the highest for August during the period covered by their several records.

The mean relative humidity was 74 per cent. The mean dew point was 59 degrees.

The average precipitation, as derived from the records of 97 stations, was 2.98 inches. Along the eastern border of the State, and over small areas of the western highlands and the St. Lawrence Valley, the amount exceeded 4 inches; while a considerable territory near the southern border received less than 2 inches. The maximum local amount was 5.95 inches at Plattsburg Barracks, and the least was 0.72 inches at Appleton. The rain periods of the month were as follows: On the 2d and 6th to 7th, general; from the 9th to 12th showers in western New York; and on the 13th, 14th, 16th, 18th, 22d to 23d, 26th to 27th and 31st, general rains occurred.

The average number of days on which the precipitation amounted to 0.01 inches or more was 9.3; the rain frequency being least in central New York, and greatest in the northern section. The average number of clear days was 12.9; of partly cloudy days, 13.5; and of cloudy days, 4.6; giving an average cloudiness of 41 per cent. for the State.

Thunderstorms were reported as follows: At 2 stations on the 1st, 1 station on the 2d, 4 stations on the 4th, 5 stations on the 5th, 13 stations on the 6th, 10 stations on the 7th, 3 stations on the 8th, 15 stations on the 9th, 4 stations on the 10th, 1 station on the 11th, 5 stations on the 12th, 5 stations on the 13th, 4 stations on the 14th, 17 stations on the 16th, 1 station on the 17th, 12 stations on the 18th, 1 station on the 21st, 2 stations on the 22d, 8 stations on the 23d, 1 station on the 24th, 1 station on the 25th, 4 stations on the 26th, 1 station on the 30th.

Hail fell on the 9th, 12th and 18th.

Light frost occurred in some of the colder sections on the 20th, 25th, 26th, 28th and 29th.

The most noteworthy feature of the weather this month over the greater part of the United States, as well as in New York, was the term of excessive heat covering the dates from the 4th to the 14th. In the region of the upper Mississippi Valley some of the highest temperatures on record were obtained; while in New York where the temperatures were not so extreme, the prostrating effects of the hot wave was due more to its long duration and the high humidity which prevailed. During the second half of the month the weather was generally cooler than the seasonal average, light frosts occurring in exposed localities, as already specified.

The rainfall was deficient over the greater part of the State, generally falling during frequent thunderstorms, alternating with bright weather. The cloudiness was rather below the usual average for the summer months.

Five areas of high and six areas of low pressure, approximately, passed in the vicinity of this State during the month. The depressions, which in all cases passed over or beyond the northern border of the State, were broad and ill-defined, especially during the first half of the month, when the weather conditions were mainly determined by nearly permanent areas of low pressure over Canada, and of high pressure over the southern states, bringing a steady inflow of hot southerly and westerly winds. The most marked depressions were nearest New York on the 2d, 12th, 16th, 23d, 26th and 30th; the first, which traversed a portion of this State, giving the heaviest general precipitation of the month. The remaining lows were also accompanied by local electric and rainstorms.

The principal high pressure area of the month passed to the southeastern and gulf states on the 2d, and remained in that locality for ten days following. During the latter, or cooler half of August all of the three highs passed over the northeastern states to the coast; the low temperature accompanying them being mainly felt on the 19th, 25th and 28th, when light frosts occurred in the valleys of the highlands.

The sultry weather and frequent showers of the first half of August brought growing crops rapidly forward, grass and afterfeed being especially benefited; although in some sections of the north and east the drouth still continued. Rust and rotting developed to a serious extent at this time, and hops were somewhat damaged by heat. Haying was about finished in southern New York at the end of July, and the second crop was cut in the southeast about the third week of August. The oat harvest began on the 3d, beans and the Worden grapes were gathered on the 15th, and at the end of the month hop picking was well under way, and half of the tobacco was cut. The corn harvest began unusually early. Apples were abundant and sound, while peaches were generally scarce excepting in the orchards of Long Island.

The observer at Humphreys reports several barns fired and 3 cows killed by lightning on the 10th. On the 6th, 18 buildings were struck by lightning near Lebanon Springs; and on the same date many trees were prostrated by high winds at New Lisbon.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												67.5	96	*a*
Alfred	Allegany	1824									64.6	66.0	91	5
Angelica	"	1340									64.9	65.2	90	*b*
Bolivar	Allegany											66.0	90	5
Friendship	"	1550										65.6	93	5
Humphrey	Cattaraugus	1950									65.2	65.6	87	6
Arkwright	Chautauqua	1260										†66.0	87	6
Jamestown	"	1328										66.9	89	*c*
Elmira	Chemung	863										71.6	96	*d*
Avon	Livingston	585										68.8	95	6
Mt. Morris	"	525										70.4	95	6
Lockport	Niagara										68.7	70.4	92	*e*
Victor	Ontario													
Wedgewood	Schuyler	1350									68.4	70.3	96	5
Addison	Steuben	1000							73	57	66.0	68.4	95	6
South Canisteo	Steuben	1480							79	57	64.4	65.9	92	*c*
Arcade	Wyoming	1557									65.0	65.2	90	6
Varysburg	"											68 0	93	6
Eastern Plateau												67.9	98	*f*
Binghamton	Broome	870									67.8	68.1	95	5
Oxford	Chenango	550										67.4	95	6
Cortland	Cortland	1120										67.6	93	5
Bloomville	Delaware	1550									68.8	70.0	98	*f*
South Kortright	Delaware	1700										65.8	93	6
Elka Park	Greene	2200							72	57	66.3	67 1	88	*e*
Brookfield	Madison	1350									66.7	69.8	96	5
Middletown	Orange	660												
Port Jervis	Orange	470										69.6	93	6
Cooperstown	Otsego	1300									65.9	66 6	89	6
New Lisbon	"	1234									63.0	64.8	91	6
Oneonta	"	1100									66.7	69.4	96	6
Perry City	Schuyler	1038									66.1	66.8	93	*g*
Waverly	Tioga	825									70.2	70.2	96	*c*
Dryden	Tompkins											68.4	93	6
Mohonk Lake	Ulster	1245									71.3	67.2	89	6
Northern Plateau												65.8	92	6
Saranac Lake	Franklin											65.5	90	8
Gloversville	Fulton	802									67.4	67.7	92	6
Lowville	Lewis	1240										66.6	89	*h*
Number Four	"	1571	30.03	30.28	28	29.74	30	0.54	83	57		63.2	84	*i*
Atlantic Coast												72.3	95	*j*
Brooklyn	Kings	107										74.2	94	11
Manhattan Beach	"											71.8	90	11
New York City	New York	314	30.04	30.32	29	29.77	2	0.55	78	65		73.0	94	11
Willet's Point	Queens											73.0	95	*k*
Brentwood	Suffolk	75									70.2	71.9	95	*m*
Setauket	Suffolk	40									71.5	72.2	91	*m*
Bedford	Westchester	290										69.9	91	*n*
Hudson Valley												71.4	97	*p*
Albany	Albany	85	30.03	30.35	29	29.73	2	0.62	74	62		73.0	95	10
Lebanon Springs	Columbia	930										68.0	93	10

FOR AUGUST, 1896.

TURE—(IN DEGREES FAHR.)								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
33	*t*	53	23	45	*y*	7	18	12.8	14.2	4.0	9.3	2.41	1.47	......	6–7	......	....
38	20	53	23	35	29	8	23	9	14	8	9	1.11	0.38	......	2	......	W.
35	20	55	24	35	20	15	18	10	15	6	11	2.63	1.10	......	9–10	......	....
36	20	54	23	36	29	11	23	11	12	8	11	1.25	0.37	......	9	......	....
33	*t*	60	30	44	29	20	*be*	....	....	....	8	1.83	0.42	......	2	......	....
38	20	49	20	33	20	9	18	7	17	7	12	4.49	0.95	0.30	9	......	S. W.
48	29	39	13	22	5	7	18	....	....	....	......	......	......	......	......	......	....
42	*t*	47	18	30	29	8	23	7	22	2	8	3.46	0.83	1.45	9	....	S. W.
42	29	54	21	34	29	11	*bf*	23	3	5	4	0.94	0 61	......	9	......	N. W.
38	20	57	25	41	30	17	*bg*	....	....	....	11	3.92	1 22	4.00	16	......	....
38	28	57	31	45	*y*	18	22	...	....	....	3	1 85	0.70	......	5	......	W.
45	20	47	22	33	20	13	*bh*	21	10	0	6	·1.36	0.37	......	31	......	W.
....	....	....	....	....	...	....	....	....	....	....	11	4 29	1.47	......	6–7	......	W.
42	29	54	26	36	29	19	*bh*	7	24	0	12	1.54	0.49	......	2	......	S. W.
40	20	55	25	36	30	14	*cc*	20	11	0	7	0.77	0.19	1.10	9	......	W.
34	20	58	28	40	20	16	23	17	10	4	8	1.62	0.40	......	26	......	W.
39	29	51	21	34	1	9	23	12	12	7	16	3.77	0.80	0.25	6	......	....
39	29	54	25	38	29	13	11	9	21	1	12	3.79	1.00	......	2	......	....
33	29	54	24	46	26	6	13	16.5	11.1	3.4	8.1	2.53	1.53	......	13	......	....
39	29	56	25	36	29	14	2	22	8	1	8	1 42	0.70	......	7	......	S. W.
37	29	58	28	36	*z*	7	8	9	19	3	5	2.71	0.80	0.10	16	......	W.
36	29	57	24	36	*aa*	13	23	18	7	6	9	2 15	1.10	......	2	......	N. W.
40	29	58	28	40	25	13	23	23	5	3	10	2.49	0.58	8.00	2	......	W.
33	29	60	29	46	26	15	27	....	...	....	7	2.12	0.54	......	2	......	....
43	29	45	17	22	1	10	16	....	....	....	10	3.62	1.53	......	13	......	N. W.
39	29	57	25	38	20	18	8	16	13	2	6	2 82	1.26	9 30	2	......	N. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
42	29	51	21	33	29	12	*cd*	17	9	5	7	2.51	1 05	......	2	......	N. W.
40	29	49	20	28	29	10	*ce*	17	11	3	8	3 49	1.28	......	2	......	S. W.
33	29	58	27	38	30	15	23	14	12	5	9	2.45	1.10	......	2	......	S.
40	29	56	26	35	*aa*	16	*bf*	....	...	....	5	3.61	1.02	......	2	......	....
35	29	58	26	36	29	16	*cf*	12	13	6	10	2 54	0.88	......	2	......	N. W.
37	20	59	28	40	20	14	23	16	13	2	10	1.57	0.84	1 30	9	......	S.
37	29	56	22	34	*t*	14	*cg*	11	19	1	8	1.72	0.86	2.00	2	......	W.
51	17	38	19	34	*ab*	6	13	23	4	4	9	2.70	1.15	......	7	......	S. W.
36	20	48	23	37	30	10	16	11.0	17.0	3 0	10.5	2 68	0 98	10.20	2	......	....
38	28	52	23	35	24	13	18	15	15	1	13	2.78	0.73	......	18	......	S. E.
39	29	53	24	37	30	16	31	16	11	4	10	2.01	0.98	10.20	2	......	W.
39	20	50	24	36	15	10	16	8	22	1	9	2.45	0.70	......	27	......	W.
36	20	48	22	32	20	12	14	5	20	6	10	3.47	0 90	......	27	......	W.
43	30	42	17	35	1	5	*ch*	16.8	9.2	5.0	8.8	2.85	1.63	16.00	14	......	....
56	*u*	38	15	21	5	5	24	15	13	3	10	3.22	1 63	16.00	14	......	W.
51	19	39	12	23	19	5	22	23	7	1	8	2.92	1.55	......	17	......	N.
56	19	38	14	23	7	6	1	17	11	3	·10	2.46	0.74	......	14	......	N. W.
52	29	43	18	23	*ac*	7	22	....	....	....	7	1.64	0.38	1.00	18	......	N. E.
43	30	52	25	35	1	13	22	18	1	12	6	4.20	1.20	16.00	21–22	......	S. W.
52	30	39	15	21	*ad*	5	22	16	11	4	9	2.35	0.73	......	2	......	W.
44	20	47	19	29	1	7	22	12	12	7	12	3.14	0.73	6.00	2	......	S.
39	19	49	21	35	29	7	23	15.1	10.9	5.0	9.2	3.05	1.47	4.00	14	......	....
50	29	45	24	26	20	11	16	17	13	1	10	2.25	0.88	......	2	......	S.
39	19	54	25	35	29	12	23	12	13	6	7	4.48	1.20	.....	13	......	W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Honeymead Brook	Dutchess	450	....	....	..	....	..	....	....	....	68.9	68.6	90	9
Poughkeepsie	"	180	....	....	..	....	..	....	....	....	....	72.4	96	11
Wappinger's Falls	"	....	....	....	..	....	..	....	....	....	....	73.6	96	12
Catskill	Greene	....	....	....	..	....	..	....	....	....	71.6	71.6	93	9
West Point	Orange	167	....	....	..	....	..	....	....	....	....	73.0	97	*p*
Carmel	Putnam	500	....	....	..	....	..	....	....	....	....	71.1	93	9
Mohawk Valley	....	....	....	....	..	....	..	....	....	....	....	67.8	94	*c*
Rome	Oneida	445	....	....	..	....	..	....	....	....	....	67.8	94	*c*
Champlain Valley	....	....	....	....	..	....	..	....	....	....	....	68.0	92	*q*
Plattsb'h Barracks	Clinton	125	....	....	..	....	..	....	....	....	....	67.4	92	*k*
Glens Falls	Warren	340	....	....	..	....	..	....	....	....	67.6	68.7	92	6
St. Lawrence Vall'y	....	....	....	....	..	....	..	....	....	....	....	68.0	94	*r*
Malone	Franklin	810	....	....	..	....	..	....	....	....	65.6	65 6	88	11
Madison Barracks	Jefferson	266	....	....	..	....	..	....	....	....	....	....	..	..
Watertown	Jefferson	486	....	....	..	....	..	....	....	....	....	70.3	94	*r*
Canton	St. Lawrence	304	....	....	..	....	..	....	....	....	67.1	66.7	92	9
Massena	"	....	....	....	..	....	..	....	....	....	....	....	..	..
North Hammond	St. Lawrence	300	....	....	..	....		....	....	....	69.2	70.0	92	10
Ogdensburg	"	258	....	....	..	....	..	....	....	....	....	69.0	91	11
Potsdam	"	300	....	....	..	....	..	....	....	....	67.5	66.6	89	11
Great Lakes	....	....	....	....	..	....	..	....	....	....	....	69.7	98	10
Dunkirk	Chautauqua	590	....	....	..	....	..	....	....	....	....	....	..	..
Westfield	"	....	....	....	..	....	..	....	....	....	....	69.0	98	10
Buffalo	Erie	690	30.02	30.39	28	29.72	30	0.67	68	57	....	69.0	85	15
Pittsford	Monroe	....	....	....	..	....	..	....	....	....	68.3	68.8	91	*c*
Rochester	Monroe	621	30.00	30.35	28	29.74	30	0.61	70	59	....	70.0	92	5
Appleton	Niagara	....	....	....	..	....	..	....	....	....	....	69.2	90	*c*
Fort Niagara	Niagara	263	....	....	..	....	..	...	....	....	....	71.8	93	11
Baldwinsville	Onondaga	390	....	....	..	....	..	....	....	....	69.7	71.1	94	5
Oswego	Oswego	304	30.00	39.83	28	29.70	30	0.63	71	59	....	69 0	90	5
‖ Palermo	"	460	....	....	..	....	..	....	....	....	68.7	69.4	96	5
Lyons	Wayne	407	....	....	..	....	..	....	....	....	69.5	70.0	93	*c*
Erie, Pennsylvania	Erie	681	30.04	30.40	28	29.74	31	0.66	73	60	....	69.0	92	6
Central Lakes	....	....	....	....	..	....	..	....	....	....	...	70 2	94	6
Fleming	Cayuga	1000	....	....	..	....	..	....	....	....	70.4	70.4	93	5
Romulus	Seneca	719	....	....	..	....	..	....	80	60	....	70.2	95	5
Ithaca	Tompkins	810	30.01	30.34	28	29.71	31	0.63	70	60	69.0	69.9	94	6
Mean	....	....	30.02	30.40	28	29.70	30	9.61	74	59	....	68.9	98	*s*

* Mean of the tri-daily observations. ‡ Mean of the maximum and minimum by the Draper tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4. four hours.

(*a*) 5, 6, 10; (*b*) 5, 6, 8; (*c*) 5, 6; (*d*) 6, 10; (*e*) 6, 9; (*f*) 6, 8; (*g*) 5, 6, 9; (*h*) 5, 8; (*i*) 6, 7, 8, 9; (*t*) 20, 29; (*u*) 20, 30; (*v*) 20, 25; (*w*) 27, 28; (*x*) 1, 20; (*y*) 28, 29; (*z*) 20, 26, 29, 30; (*aa*) 25, 29; 8, 14; (*bc*) 10, 26; (*bd*) 22, 24, 25, 26; (*be*) 10, 16, 21, 31; (*bf*) 10, 23; (*bg*) 2, 19; (*bh*) 16, 31; (*cc*) 2, (*df*) 2, 7; (*dg*) 19, 23; (*ee*) 28, 31; (*ef*) 9, 16.

FOR AUGUST, 1896 — (*Continued*).

TURE—(IN DEGREES FAHR.).								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
44	*t*	46	19	28	*t*	11	31	12	13	6	10	4.35	1.16	8.00	14	......	S. W.
46	1	50	21	31	*ae*	11	31	19	9	3	10	2.28	0.61	12.00	17	......	N.
42	29	54	20	35	29	12	*dd*	15	12	4	10	2.46	0.72	1.00	16	......	S.
48	29	45	19	26	*af*	10	27	10	14	7	11	2.30	1.05	9.00	14	......	S.
47	20	50	21	29	1	7	23	....	....	....	7	1.96	0 80	......	2	......	S. W.
45	20	48	20	27	29	9	31	21	2	8	9	4.32	1.47	4.00	14	......	....
43	28	51	24	33	24	16	22	....	....	....	8.0	1.92	0.46	......	26	......	....
43	28	51	24	33	24	16	22	....	....	....	8	1.92	0.46	......	26	......	....
43	*t*	48	22	35	1	10	6	10.0	15.0	6.0	11.0	4.38	1.70	5.15	17	......	....
44	30	48	21	30	*ag*	10	6	....	....	....	12	5.95	1.70	5.15	17	......	S. W.
43	*t*	49	24	35	1	14	23	10	15	6	10	2.80	0.68	1.15	16	......	S.
40	*v*	48	22	41	*ah*	7	*de*	11.0	14.8	5.2	10 4	3.80	1.55	5.30	26	......	....
41	29	47	20	31	*ae*	12	5	10	13	8	14	3.63	0.65	......	27	......	W.
....	....	....	....	....	....	....	....	....	....	....	7	3.70	1.00	......	31	......	S.
40	20	54	28	41	*ah*	15	16	11	19	1	11	3.26	1.05	6 00	16	......	S. W.
40	25	52	25	38	3	14	16	13	16	2	8	3.89	1.30	2.00	16	......	S. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
48	*x*	44	21	30	*bb*	10	*ee*	5	16	10	11	4.06	1.10	......	16	......	S.
45	29	46	18	29	14	7	*de*	12	14	5	12	4.76	1 55	5.30	26	......	S. W.
43	29	46	22	34	1	13	5	15	11	5	10	3.31	0.84	1.00	16	......	S, W.
44	*t*	45	18	34	26	4	23	12.8	13.6	4.6	10.5	2.81	1 59	......	6	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
47	*w*	51	19	30	*bc*	11	*df*	19	7	5	9	4.05	1.37	......	12	......	S.
50	28	35	14	22	26	5	23	2	19	10	14	3.68	0.60	......	7	......	W.
44	29	47	20	34	26	11	16	17	10	4	8	3.34	1.40	2.00	6	......	W.
46	*t*	46	20	29	29	11	13	13	15	3	12	2.71	0.72	......	6	......	S. W.
44	20	46	20	33	15	11	31	12	12	7	9	0.72	0.25	......	20-27	......	W.
45	25	48	20	33	15	6	20	....	....	....	8	1.09	0.40	......	26	......	N. W.
47	28	47	21	26	*bd*	15	13	19	10	2	10	3.06	0.99	......	26	......	....
48	29	42	14	27	15	5	31	14	9	8	12	3.00	0.92	......	6	......	S. W.
41	29	55	23	37	15	13	*ef*	21	10	0	11	2.13	0.80	......	6	......	S. W.
46	29	47	18	27	15	8	13	10	20	1	10	3.05	1.59	......	6	......	S. W.
49	20	43	13	21	10	4	23	9	20	2	13	3.47	1.35	......	12	......	S. W.
41	29	49	20	33	29	11	*dg*	10.3	15 7	5.0	7.0	2.77	1.10	......	2	......	.. ...
46	29	47	18	28	29	11	*dg*	4	24	3	6	2.72	0.90	......	2	......	N. W.
48	20	47	22	29	6	14	23	14	8	9	5	3.17	1.10	......	2	......	W.
41	29	53	21	33	29	14	31	13	15	3	10	2.43	0.98	3 00	2	......	S. E.
33	*t*	49	21	46	26	4	23	12.9	13.5	4.6	9.3	2.92	1.70	5 15	17	......	W.

Thermograph. ‖ Report received too late to be used in computing means. The means from the
† Blank indicates that the duration is not shown in the original records, but is within twenty-

(*j*) 9, 10, 11, 12; (*k*) 10, 11; (*m*) 9, 12; (*n*) 7, 11, 12; (*p*) 12, 13; (*q*) 6, 10, 11; (*r*) 8, 15; (*s*) 6, 8, 10; (*ab*) 6, 9, 10; (*ac*) 7, 10, 31; (*ad*) 7, 31; (*ae*) 1, 15; (*af*) 29, 30; (*ag*) 16, 25, 27; (*ah*) 14, 15; (*bb*) 3, 23; (*cd*) 14, 22, 23, 24; (*ce*) 18, 27; (*cf*) 23, 31; (*cg*) 2, 13, 17; (*ch*) 22, 24; (*dd*) 2, 24, 25; (*de*) 5, 16;

TEMPERATURE—AUGUST, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau...	62	67	68	72	77	79	77	78	79	77	76	75	69	68
Alfred..............	71	74	79	81	91	80	84	88	87	85	84	84	79	80
	47	59	54	58	66	69	64	64	69	68	62	64	56	51
Angelica............	74	73	79	84	90	90	85	90	87	87	85	87	76	79
	46	54	53	58	61	66	64	68	67	62	65	68	57	52
Bolivar........	73	75	79	83	90	90	85	87	87	85	84	85	79	79
	46	62	53	54	59	63	63	66	68	65	60	60	59	52
Friendship..........	74	77	84	86	93	92	90	90	92	86	89	88	81	82
	45	47	50	52	60	62	60	64	64	66	59	60	57	52
Humphrey	71	73	78	81	86	87	82	86	85	83	82	83	74	81
	50	60	54	58	65	70	68	68	68	64	62	63	60	55
‡Arkwright.........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown.........	72	72	79	83	89	89	83	87	88	85	85	85	74	80
	53	63	58	61	67	69	67	67	71	67	64	65	64	57
Elmira..............	76	78	85	89	93	96	90	91	91	96	91	88	79	83
	58	63	57	58	65	70	71	69	74	69	70	65	69	68
Avon	85	77	82	86	91	95	88	91	89	89	87	85	80	80
	50	60	57	61	67	71	70	66	71	71	67	67	61	55
Mount Morris.......	85	84	85	88	94	95	90	94	89	90	89	85	81	82
	47	48	58	65	70	68	64	71	68	66	66	57	54	55
Lockport............	84	81	84	90	90	92	91	90	92	90	88	84	82	81
	54	63	58	64	69	72	72	68	68	71	69	67	62	60
Victor	....	....	....	86	94	93	88	91	85	88	87	86	78	80
	....	....	....	58	68	66	68	72	76	72	68	....	64	58
Wedgewood........	75	80	87	90	96	94	93	91	93	94	93	88	83	85
	52	57	57	60	67	67	70	66	70	67	[illegible]	67	59	58
Addison	75	77	81	87	94	95	89	92	91	90	90	87	80	82
	51	63	56	56	62	64	69	66	70	68	66	63	62	59
South Canisteo.....	74	77	80	85	92	92	90	89	89	88	89	87	81	82
	44	59	50	53	58	63	63	61	66	67	61	59	51	51
Arcade.......... ...	77	72	78	82	87	90	80	88	84	85	80	81	71	77
	43	59	57	59	65	66	65	66	69	66	63	64	59	53
Varysburg..........	78	78	82	85	92	93	85	90	85	89	84	85	77	83
	48	60	54	59	63	67	67	65	69	71	71	71	61	57
Eastern Plateau...	62	67	68	71	77	79	78	77	79	78	81	77	73	73
Binghamton........	75	77	80	86	95	94	90	92	93	90	91	87	83	85
	50	63	54	56	64	70	68	69	71	68	67	64	63	64
Oxford..............	80	78	83	88	93	95	91	91	93	90	93	88	85	85
	46	58	53	53	59	65	66	64	65	66	64	64	57	62
Cortland............	74	75	79	87	93	91	86	90	89	89	88	85	80	82
	49	58	53	55	61	66	68	67	69	68	66	63	58	62
Bloomville.........	76	77	85	89	95	98	94	98	95	95	97	94	90	91
	48	59	53	55	62	67	68	67	65	70	65	67	62	64
South Kortright....	75	77	83	86	92	93	88	89	92	90	90	90	87	82
	42	57	49	52	52	63	58	63	61	66	66	60	55	60
Elka Park..........	68	69	74	82	87	88	86	83	88	86	84	85	80	76
	46	56	54	61	67	70	70	66	67	68	69	66	68	61
Brookfield..........	77	73	85	91	96	94	92	89	89	92	93	92	94	88
	55	51	61	62	67	68	72	71	66	70	69	66	67	64
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis..........	76	78	82	88	90	93	90	89	92	90	92	90	86	81
	50	63	58	61	66	69	72	70	72	71	71	70	67	69
Cooperstown........	73	75	77	83	87	89	82	84	86	85	86	83	81	80
	48	60	55	57	62	66	68	61	65	69	67	66	59	58
New Lisbon........	74	74	79	84	90	91	87	87	87	88	89	86	83	81
	43	58	52	50	57	62	64	64	63	67	63	64	57	59
Oneonta............	79	80	85	89	95	96	90	93	92	93	93	89	86	86
	48	60	53	55	62	66	68	66	66	68	66	67	60	66
Perry City...	76	76	81	86	93	93	87	89	93	88	90	84	78	83
	46	46	53	55	63	63	68	64	69	68	68	62	57	56
Waverly............	78	82	86	90	96	96	93	93	95	93	93	93	86	89
	49	64	56	55	64	68	66	70	71	68	70	64	61	63
Dryden.............	75	74	80	86	92	93	88	89	89	88	89	83	79	81
	50	60	54	55	62	70	69	67	73	67	67	66	65	61
Mohonk Lake	70	75	78	83	87	89	86	84	88	88	88	87	79	79
	54	54	54	54	55	55	54	55	54	51	62	72	73	64

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
72	71	59	58	57	56	63	67	72	65	66	66	59	56	57	63	56	67.4
84	79	68	65	61	70	72	80	75	76	76	78	69	68	73	79	67	66.0
56	66	44	46	47	38	53	50	66	54	44	54	42	41	38	52	52	
83	80	69	64	67	70	72	82	79	76	75	80	66	67	70	73	64	65.2
58	58	43	49	46	35	47	52	57	52	42	47	43	46	36	44	48	
84	78	70	65	65	70	70	78	77	75	75	79	68	66	73	77	68	66.0
53	60	41	44	46	36	51	46	66	54	42	46	40	40	27	43	55	
89	81	72	69	68	74	72	....	....	82	83	83	71	69	77	80	68	65.6
53	61	40	44	45	33	52	....	....	14	40	45	40	40	33	44	48	
84	76	67	58	66	71	65	76	73	72	74	77	68	69	72	71	64	65.6
60	64	49	49	46	38	52	54	63	57	17	57	44	43	41	50	52	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	66.0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
84	77	67	65	64	68	65	74	74	72	74	79	68	65	72	72	67	66.9
60	67	52	52	48	42	55	55	66	57	49	55	47	46	42	50	54	
87	85	69	71	67	80	76	76	83	83	79	80	73	70	76	86	74	71.6
68	74	55	52	51	47	54	56	72	62	49	60	55	48	42	57	57	
88	82	72	70	65	73	77	87	87	77	76	84	77	68	73	81	79	68.8
65	60	50	49	48	38	54	53	53	59	46	52	47	16	40	40	53	
90	86	....	....	....	....	81	86	83	80	85	86	86	83	84	82	79	70.4
67	47	....	....	.	....	59	68	58	45	53	44	43	38	39	48	37	
88	82	73	72	66	78	78	88	84	75	79	85	72	67	75	79	66	70.4
60	69	54	52	51	45	58	55	70	56	48	58	46	48	46	53	53	
....	....	70	70	71	74	79	87	81	77	....	....	72	69	75	82	....	69.8
....	....	52	49	48	45	55	57	67	55	....	....	56	48	41	50	....	
89	83	74	70	70	75	75	80	87	84	86	81	73	71	78	81	73	70.3
60	64	50	47	48	43	55	51	66	59	51	55	48	48	42	52	54	
87	83	70	71	63	74	76	82	82	80	78	81	72	69	73	81	71	68.4
57	63	45	46	48	40	53	48	68	57	47	51	49	45	41	45	54	
85	81	71	70	68	74	76	83	81	77	78	79	70	71	74	80	70	65.9
53	60	44	43	46	34	49	47	65	55	41	50	42	39	36	45	53	
84	78	68	65	63	68	71	80	73	72	73	80	67	65	70	75	65	65.2
57	59	48	48	46	40	52	51	64	53	14	52	43	42	39	50	46	
89	81	78	69	69	75	75	82	79	79	82	79	75	75	77	80	68	68.0
55	60	46	48	45	41	52	51	65	54	41	51	43	42	39	50	48	
70	71	63	59	58	57	61	65	71	68	62	64	62	58	56	62	61	68.0
87	81	71	68	67	72	75	80	83	80	80	81	70	70	75	78	70	68.1
56	61	52	47	40	41	51	52	67	60	56	52	54	45	39	47	52	
87	81	74	70	68	75	75	80	82	80	78	80	72	72	73	78	72	67.4
52	60	47	46	47	39	45	49	50	57	43	44	55	42	37	42	54	
85	81	72	68	66	73	72	80	80	76	79	80	73	67	72	80	71	67.6
51	66	51	49	50	38	49	54	67	58	43	50	53	49	36	48	55	
92	75	78	72	73	80	70	79	78	82	85	77	78	77	79	80	76	70.0
55	59	55	48	55	44	47	52	65	59	45	44	52	45	40	46	55	
87	78	71	68	66	72	74	78	80	77	79	87	68	69	72	76	70	65.8
50	62	50	48	47	37	42	48	62	56	39	41	53	38	33	41	52	
76	72	...	....	....	....	....	70	71	72	68	70	64	63	65	70	65	....
56	62	....	....	....	....	....	52	60	60	50	50	54	48	43	48	53	
89	87	83	78	76	79	76	76	78	77	75	73	74	72	69	71	69	69.8
63	65	61	58	42	41	46	50	54	58	55	51	52	48	39	43	45	
....	....	..	....	..	....	....	....	....	....	....	....	....	....	..	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.	....
84	78	75	71	70	74	71	70	77	77	77	78	75	73	75	76	68	69.6
61	64	57	51	49	45	50	58	65	65	52	51	50	48	42	48	50	
81	80	70	60	65	70	72	77	81	75	75	76	65	66	68	75	66	66.6
56	64	53	50	48	43	49	54	64	58	50	55	55	50	40	52	53	
83	77	71	68	65	71	70	77	79	76	76	77	68	67	70	77	70	64.8
50	57	49	43	46	36	40	47	64	52	39	43	47	42	33	39	47	
86	78	75	73	70	76	74	82	82	79	80	81	73	72	75	82	74	69.4
56	62	53	49	52	42	47	52	66	59	45	47	53	46	40	49	52	
86	84	70	66	65	70	76	81	82	80	76	83	72	71	71	79	69	66.8
50	63	47	45	43	39	51	50	66	53	43	52	49	45	35	46	53	
88	84	75	70	70	77	77	84	84	81	81	81	75	82	77	80	75	70.2
56	64	47	45	45	37	53	48	70	60	45	47	54	43	39	44	58	
86	84	69	67	65	72	76	83	82	77	77	81	70	67	71	79	68	68.4
62	61	55	48	46	38	58	55	67	56	50	54	55	41	37	53	53	
79	74	74	68	67	68	67	69	75	76	74	73	73	71	69	71	69	67.2
65	63	51	58	52	52	57	59	63	65	57	57	59	55	52	56	57	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	61	65	68	72	76	75	75	74	76	77	75	73	71	68
Saranac Lake	77	72	80	85	84	87	87	90	89	87	88	82	82	82
	52	52	60	65	65	67	57	66	64	65	64	59	59	49
Gloversville	77	77	79	85	89	92	87	90	88	89	88	89	87	84
	45	59	57	57	65	69	70	63	63	72	67	67	64	66
Lowville	76	74	78	85	89	88	87	89	88	86	85	85	81	83
	43	58	59	60	69	68	69	57	69	61	67	64	59	56
Number Four	71	71	75	80	82	84	84	84	84	82	81	80	79	69
	41	54	52	60	65	62	62	55	65	65	63	60	55	57
Atlantic Coast	67	72	73	77	79	79	80	80	81	83	83	83	81	76
Brooklyn	79	83	83	89	93	90	91	89	93	93	94	93	90	81
	60	67	66	69	72	72	72	74	75	77	78	79	77	72
Manhattan Beach	79	72	82	76	83	85	83	80	83	85	90	87	86	87
	60	66	65	69	70	72	72	72	72	75	71	75	75	72
New York City	71	80	79	87	89	91	91	92	90	91	94	92	88	80
	65	66	68	67	70	74	68	73	75	77	76	77	74	70
Willet's Point	74	81	83	90	93	82	93	93	93	95	95	94	92	86
	64	61	64	69	70	69	70	73	73	72	73	72	71	69
Brentwood	80	81	83	89	89	93	94	94	95	94	92	95	93	85
	45	61	54	64	65	69	68	69	70	72	70	66	71	69
Setauket	74	80	81	85	89	83	90	88	91	89	90	91	87	77
	59	64	62	66	69	68	69	71	72	75	73	73	72	69
Bedford	77	79	80	86	90	85	91	89	90	90	91	91	88	81
	48	62	66	65	65	69	68	70	70	73	70	72	70	68
Hudson Valley	64	66	70	76	79	82	80	80	83	83	82	82	75	76
Albany	78	80	83	91	94	94	91	94	92	95	94	93	84	86
	56	62	62	66	70	72	73	71	73	74	72	72	70	66
Lebanon Springs	75	75	81	88	88	92	89	87	91	93	89	90	87	87
	44	60	53	56	61	66	66	62	63	68	64	63	61	61
Honeymead Brook	72	73	78	85	88	89	88	86	90	89	89	88	85	79
	48	61	55	62	65	70	71	67	68	70	67	67	69	66
Poughkeepsie	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wappingers Falls	79	80	83	90	93	95	92	95	94	93	95	96	89	89
	53	68	59	66	70	73	72	74	73	80	76	73	69	65
Catskill	75	76	81	88	92	92	88	91	93	92	92	92	83	84
	53	62	60	63	69	72	73	70	71	74	71	73	69	67
West Point	81	76	82	83	91	96	90	96	93	95	96	97	97	89
	52	67	58	63	67	77	70	66	71	75	71	78	72	69
Carmel	76	77	83	88	91	90	92	91	83	92	92	91	88	81
	61	60	63	69	73	73	69	71	76	78	74	73	70	64
Mohawk Valley	68	65	68	74	81	81	74	74	76	78	78	73	73	70
Rome	80	75	80	86	94	94	85	85	85	88	89	86	85	84
	56	56	56	63	68	68	62	62	68	68	67	60	61	55
Champlain Valley	60	67	71	74	77	72	76	78	78	80	80	78	74	72
Plattsburgh Bar.	72	75	88	80	88	70	80	90	85	92	92	87	87	80
	45	55	60	65	65	60	65	65	70	67	70	70	60	60
Glens Falls	80	78	80	87	91	92	91	90	90	91	90	88	82	82
	45	60	56	62	64	66	69	65	65	68	69	65	65	64
St. Lawrence Val.	62	67	69	74	74	75	79	75	80	78	79	77	71	70
Malone	74	73	80	83	72	80	84	86	85	87	88	81	77	78
	43	58	57	66	60	60	70	60	68	65	72	67	58	51
Madison Barracks	78	78	76	78	88	86	84	90	86	85	82	84	84	85
	48	52	59	57	62	68	69	61	72	71	75	64	60	56
Watertown	85	82	84	88	92	90	92	94	91	90	86	92	88	92
	46	58	59	62	68	70	70	59	71	68	68	66	59	51
Canton	80	79	81	87	91	87	89	90	92	89	89	88	82	83
	43	43	43	65	63	62	68	58	71	67	70	65	60	51
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	76	80	88	86	86	88	90	90	90	92	90	90	86	86
	48	60	58	61	68	68	70	60	76	74	76	70	62	56
Ogdensburg	77	79	77	82	72	85	89	87	90	85	91	86	80	90
	50	61	60	68	65	63	71	65	74	72	73	70	62	61
Potsdam	78	76	80	86	75	78	86	86	88	87	89	84	79	84
	44	58	58	60	62	59	69	63	73	67	63	68	59	56

MAXIMA AND MINIMA FOR THE STATIONS — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
69	66	59	56	53	56	58	66	69	63	60	63	61	55	55	63	59	65.8
83	76	70	60	62	74	70	75	78	75	76	76	67	67	71	79	62	65.5
61	50	44	47	41	43	54	60	50	40	47	55	48	38	46	55	45	
85	78	72	69	68	71	70	79	80	77	75	79	72	70	70	80	70	67.7
54	59	54	49	43	43	45	52	62	60	48	45	55	48	39	43	51	
85	79	70	66	64	71	73	81	79	75	76	79	72	67	70	78	72	66.6
49	59	52	49	42	39	43	52	64	53	43	49	51	44	40	48	54	
80	72	66	62	61	68	68	75	75	72	71	75	68	64	66	74	67	63.2
53	56	45	45	41	36	44	52	62	50	43	49	52	41	39	48	51	
74	74	70	65	62	64	64	67	73	72	70	69	68	65	64	63	64	72.3
81	82	77	74	74	73	74	71	80	75	81	80	77	76	75	75	73	74.2
70	68	66	60	57	56	57	63	68	70	62	62	65	59	58	56	58	
78	77	77	75	74	72	72	70	70	77	75	78	72	76	74	71	70	71.8
70	71	65	59	51	56	61	65	64	69	62	63	64	56	56	58	62	
79	77	74	73	70	73	71	69	80	76	77	75	75	73	73	71	73	73.0
70	69	63	57	56	57	60	63	68	66	64	62	63	58	58	60	59	
85	80	77	78	71	74	72	71	79	76	82	78	77	75	74	76	78	73.0
66	66	56	56	56	54	59	64	69	62	60	62	57	58	52	54	55	
86	85	80	76	75	76	78	75	85	....	78	79	80	75	76	75	76	71.9
64	63	62	46	45	50	45	62	67	....	57	64	54	51	45	43	45	
80	80	76	76	71	74	75	68	79	76	76	78	77	73	73	70	77	72.2
67	66	67	57	54	59	57	63	68	69	64	61	61	61	59	52	56	
80	78	76	72	70	72	70	67	79	77	77	77	75	74	72	73	70	69.9
66	66	60	49	48	44	48	60	65	67	54	55	58	48	48	45	51	
74	74	68	62	60	61	63	67	71	72	67	68	68	63	60	64	63	71.4
86	80	77	72	69	76	73	80	79	82	78	80	75	74	74	78	71	73.0
64	69	61	54	52	50	57	62	68	63	58	55	59	53	50	54	67	
82	81	75	75	72	77	76	80	76	78	74	78	71	71	75	75	67	68.0
58	61	53	43	39	45	50	59	64	61	46	50	55	51	40	45	49	
82	79	72	74	67	72	72	74	77	77	73	76	71	70	72	72	65	68.6
62	65	57	49	49	44	49	58	65	63	52	55	59	47	44	50	54	
....	....	..	....	....	....	....	....	....	....	....	....	..	....	....	....	....	72.4
....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	
86	84	80	74	72	74	75	77	81	80	78	80	77	81	77	79	77	73.6
66	68	60	54	52	48	53	63	66	64	66	64	61	59	42	51	52	
81	78	77	73	69	75	71	77	77	83	78	78	77	76	74	78	72	71.6
62	66	60	52	51	51	54	61	65	66	57	54	67	53	48	52	57	
83	88	88	79	76	72	76	72	70	79	80	82	80	77	76	77	77	73.0
67	65	62	55	52	47	53	60	63	67	57	57	62	50	51	51	53	
85	83	79	72	70	71	70	72	80	82	78	80	72	73	75	76	64	71.1
66	60	53	50	50	45	48	49	58	61	60	62	61	48	48	53	55	
74	72	62	58	56	62	64	70	68	64	65	68	61	58	61	61	56	67.8
85	75	74	8	68	73	74	78	78	80	80	80	74	73	74	75	67	67.8
64	50	49	48	44	50	54	62	58	47	50	55	48	43	48	47	45	
69	72	66	60	55	58	61	65	70	70	62	61	63	60	58	59	62	68.0
82	85	75	72	65	65	72	73	76	80	79	69	78	70	70	69	75	67.4
55	55	60	50	50	50	50	50	60	60	49	49	48	55	45	44	50	
84	82	75	70	70	75	72	78	80	80	73	80	75	71	72	78	72	68.7
55	64	54	50	45	43	50	58	66	60	49	46	52	46	43	45	51	
71	70	62	59	57	59	62	69	71	65	62	66	62	58	58	67	60	68.0
85	74	67	63	62	70	72	76	78	72	69	77	68	64	69	77	67	65.6
54	62	50	50	47	45	48	55	60	54	44	52	53	49	41	53	54	
89	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
53	56	60	54	45	44	52	59	64	57	45	54	54	48	49	50	47	
94	80	76	79	72	78	80	87	83	83	83	84	75	75	77	82	74	70.3
53	65	53	48	44	40	49	50	67	54	46	52	50	48	44	57	55	
88	78	72	62	65	75	74	82	82	76	75	80	70	65	73	80	65	66.7
51	64	50	47	47	41	47	57	65	49	40	52	50	45	41	54	49	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
86	74	70	68	68	70	74	84	80	78	82	82	80	68	68	78	66	70.0
50	60	54	54	50	48	56	56	68	56	54	56	56	58	50	56	56	
85	75	74	68	65	73	71	83	78	74	79	82	70	67	69	79	67	69.0
59	68	56	55	50	48	52	58	70	58	51	55	52	50	45	59	50	
87	77	74	64	65	73	74	79	78	77	76	79	68	67	71	78	66	66.6
54	62	54	50	44	45	51	56	55	52	44	46	52	48	43	55	51	

SHOWING DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes	67	69	71	75	80	81	78	78	80	80	78	76	70	71
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	80	75	78	86	87	93	82	90	87	98	85	83	75	79
	57	64	62	66	71	74	71	66	72	68	67	65	61	59
Buffalo	77	73	75	79	81	83	78	83	82	84	78	81	76	81
	58	61	63	70	73	74	70	72	72	70	72	67	64	62
Pittsford	78	75	80	85	91	91	86	88	87	86	84	84	75	78
	54	60	60	63	70	69	70	69	70	71	69	67	62	60
Rochester	79	76	81	86	92	92	85	90	87	88	86	85	75	81
	56	61	61	67	70	70	72	69	72	73	70	68	64	60
Appleton	81	78	83	88	90	90	86	85	89	89	88	81	78	80
	52	63	56	65	68	73	71	65	72	71	68	67	62	59
Fort Niagara	79	80	84	84	92	90	89	90	90	90	93	85	82	84
	53	64	64	68	70	73	73	63	70	72	70	68	67	62
Baldwinsville	80	78	82	89	94	90	89	91	89	90	89	87	79	83
	58	62	65	65	73	71	69	72	73	73	71	65	64	58
Oswego	77	70	78	84	90	89	82	81	82	84	81	80	77	77
	56	60	61	65	69	69	71	69	74	72	73	71	65	68
Palermo	....	....	....	....	....	....	...	....	....	....	....	....	...	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lyons	76	75	80	87	93	93	87	88	87	87	86	85	75	80
	55	62	65	63	70	71	72	70	75	73	72	70	67	63
Erie, Pa.	74	74	76	86	86	92	79	88	86	88	86	79	72	76
	61	64	60	67	72	73	72	72	76	67	68	66	67	63
Central Lakes	65	67	70	75	81	81	80	80	81	80	79	78	71	71
Fleming	77	75	80	86	93	89	87	89	87	88	88	83	78	78
	55	62	62	65	71	74	71	71	75	73	73	70	65	62
Romulus	78	77	80	88	95	94	91	90	89	88	86	91	82	84
	54	52	60	63	69	65	69	68	73	71	68	72	63	60
Ithaca	75	76	80	87	93	94	86	92	90	89	89	85	78	83
	52	61	57	60	67	72	70	69	74	72	71	66	62	62
Mean	64	67	70	74	78	78	78	77	79	79	79	77	73	72

‡ Maximum and minimum by the Draper Thermograph.

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
74	72	64	61	59	60	65	70	73	67	64	70	61	59	60	68	61	69.7
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
84	78	69	67	65	68	71	80	79	73	75	82	68	65	70	80	75	69.0
62	65	57	51	50	48	53	60	58	57	60	52	47	47	48	53	55	
85	78	69	66	65	70	72	82	74	75	75	78	67	66	71	74	66	69.0
67	63	54	51	53	52	60	61	69	61	56	56	50	50	50	62	52	
85	79	71	68	64	71	76	82	82	76	79	86	70	67	72	80	68	68.8
56	68	52	53	50	46	55	55	69	57	49	52	49	47	44	55	53	
89	79	71	69	66	72	74	84	81	76	80	84	71	67	75	81	66	70.0
60	59	54	53	51	46	58	59	66	60	52	56	50	49	46	56	48	
88	80	72	70	67	69	75	77	79	74	72	84	71	67	74	80	67	69.2
55	69	59	58	54	44	56	53	67	56	46	55	47	50	45	54	56	
90	83	78	71	70	72	76	83	83	79	75	85	71	73	76	79	71	71.8
57	72	59	56	56	66	59	55	71	58	45	58	58	46	51	61	56	
88	81	73	73	68	75	76	85	84	78	80	83	72	70	75	82	69	71.1
66	56	56	53	52	56	57	59	63	52	54	57	53	47	57	59	49	
86	80	70	67	63	68	73	81	82	72	74	81	67	66	71	81	63	69.0
59	71	62	55	51	50	56	58	68	62	56	58	58	58	48	56	58	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	....
85	82	71	69	65	71	74	82	81	76	76	82	69	67	70	81	69	70.0
58	61	60	55	53	49	55	58	70	57	52	58	54	51	46	55	55	
85	77	69	68	64	69	71	77	74	72	73	81	69	64	70	78	66	69.0
67	68	60	56	56	49	60	62	70	60	55	63	52	57	55	58	59	
71	74	63	61	58	60	66	70	76	70	65	71	64	60	62	71	64	70.2
82	81	69	68	63	73	73	84	80	77	78	83	75	65	74	82	75	70.4
59	65	54	55	52	49	57	57	69	63	52	63	49	52	46	57	58	
86	84	73	70	67	74	76	83	82	81	80	82	73	69	73	81	72	70.2
59	65	54	54	51	48	56	56	68	61	52	58	61	53	61	69	56	
86	83	71	69	66	74	76	82	85	78	80	81	71	68	74	82	69	69.9
55	65	56	52	51	43	59	56	69	60	48	59	55	51	41	55	55	
72	72	64	60	57	59	63	68	71	68	64	67	63	59	59	64	61	68.9

‖ Received too late to be used in computing means.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.01	0.39	0.00	T.	T.	0.14	0.12	0.00	0.31	0.08	0.01	0.24	0.03	T.
Alfred	....	.38	....	....	....	T.	....	....	24	...	....	....	.06	....
Angelica	T.	.44	....	....	....	.25	....	....	*	†1.10	....	.18	.08	....
Bolivar	...	.11	....	....	...	....	....	...	.37	.03	.05	....	....	....
Friendship	T.	.42	....	....	....	T.	....	....	.40	.01	....	.20	T.	....
Humphrey	....	.29	....	....	...	.35	....	....	1.21	.68	....	.77	.04	....
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	T.	.43	....	....	.01	.33	T.	....	.32	.43	.06	.70	T.	...
Jamestown	T.	.01	....	.05	....	.05	....	....	.83	.27	.13	.76	.05	....
Elmira	....	.12	....	....	....	....	....	....	.61	....	....	....	....	....
Pine City	....	....	....	....	....	....	...	....	....	....	....	....	....	....
Akron	T.	.39	....	....	.09	....	....	....	.13	....	T.	.79	....	T.
Avon	T.	.38	....	...	....	.50	.10	....	....	....	....	.13	....	....
Mt. Morris	....	.65	....	....	*	†.70	....	....	T.	T.	....	T.	T.	....
Lockport	T.	....	....	....	....	.21	....	....	.33	....	....	.25	....	....
Victor	*	†.55	....	....	....	*	†1.47	....	.63	....	....	.24	.36	....
Tyrone	....	.35	....	....	....	....	.40	....	.40	....	.01	.10	....	.02
Wedgewood	.01	.49	....	....	....	....	·05	....	.31	.01	....	....	....	....
Addison	T.	.05	....	....	....	....	....	....	.19	....	....	....	....	....
Atlanta	....	.84	....	....	....	.09	.82	....	.17	T.	....	.12	.02	....
Haskinville	....	.53	....	....	....	.10	.17	....	.25	....	....	.12	....	.06
South Canisteo	*	†.28	....	....	....	....	....	....	T.	....	....	.05	.01	....
Arcade	.15	.48	....	....	....	.80	.08	....	.07	.07	.02	.33	.07	.02
Attica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Varysburgh	T.	1.00	....	....	....	T.	.73	....	.06	....	....	.36	T.	....
Eastern Plateau	T.	0.73	0.00	0.00	0.01	0.14	0.33	0.02	0.08	0.01	0.00	0.03	0.11	0.03
Binghamton	....	.04	....	....	....	....	.70	....	....	....	....	....	....	....
Chenango Forks	...	....	....	....	....	....	....	....	....	....	...	....	....	....
Oxford	T.	1.10	....	....	....	T.	.47	....	T.	....	....	....	....	..
Cortland	T.	1.10	....	....	....	....	.16	....	....	....	....	....	....	.02
Bloomville	....	.58	....	....	.06	.09	.35	....	....	....	....	....	....	.08
Deposit	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright	....	.54	....	....	.11	....	.37	.10	....	....	....	....	....	....
Elka Park	....	.65	...	...	....	....	.12	....	.02	....	...	·43	1.53	....
Brookfield	....	1.26	....	....	..	.10	.68	....	....	..	....	....		....
Hamilton	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Apulia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	....	1.05	....	....	....	....	....	....	.12	....	....	....	....	.30
Warwick	....	.63	....	....	..	....	....	.12	.15	.13	....	....	.30	....
Cooperstown	....	1.28	....	....	....	.75	.07	....	.07	....	....	....	....	....
New Lisbon	....	1.10	....	....	....	.12	.14	.10	.05	....	....	....	....	....
Oneonta	....	1.02	....	....	....	1.00	.86	....	....	....	....	....	....	....
Perry City	T.	.88	....	....	....	.02	.27	....	.15	....	....	....	T.	....
Newark Valley	.06	.38	....	....	....	....	.12	....	....	....	....	...	....	....
Waverly	....	.03	....	....	....	.28	.01	....	.84	....	....	T.	T.	....
Dryden	....	.86	....	....	....	....	.17	....	T.	T.	....	....	....	....
Mohonk Lake	....	....	....	....	....	....	1.15	....	....	....	....	....	....	.10
Northern Plateau	0.06	0.51	0.00	T.	0.08	0.05	0.01	T.	0.05	0.00	0.00	0.06	0.00	0.02
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown	....	....	....	....	....	....	....	...	....	....	....	....	....	....
Saranac Lake	.20	....	....	.02	.28	T.	....	.01	....	....	....	....	....	....
Gloversville	T.	.98	....	....	....	.02	....	....	.02	....	....	....	....	.02
North Lake	....	....	....	....	....	....	....	...	....	....	....	...	....	....
Lowville	....	.33	..	....	....	.16	....	....	....	....	...	....	....	....
Number Four	...	.36	....	...	....	.09	....	..	.17	....	....	....	....	....
Kings Station	.12	.90	....	....	.10	....	.07	....	.05	....	....	.30	....	.09
Atlantic Coast	0.00	0.45	T.	0.00	0.00	0.00	0.29	0.06	0.00	0.01	0.00	0.00	0.00	0.61
Brooklyn	....	.28	T.	....	....	....	.43	.12	....	....	....	....	....	1.63
Manhattan Beach	....	.15	....	....	....	....	....	....	....	....	....	....	....	.15
New York City	....	.37	....	....	....	....	.62	.14	....	....	....	....	....	.74

TATION FOR AUGUST, 1896—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.00	0.13	0.02	0.17	0.05	0.00	T.	T.	0.18	0.01	0.00	0.02	0.28	T.	0.00	0.02	0.13	2.48
....	T.	.01	.03	.01	....	....	....	.11	....	....	....	.22	....	....	....	.05	1.11
....	....	.06	T.	....	....	T.	....	.02	.04	....	T.	.37	....	....	.02	.07	2.63
....	.02	....	.22	.02	....	....	....	.22	.01	....	....	.12	....	....	....	.08	1.25
....	T.	....	.21	....	....	....	....	.15	....	....	T.	.32	....	....	T.	.12	1.83
....	.07	.02	.28	....	....	T.	....	.26	....	....	.32	....	....	....	.20	....	4.49
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.29	T.	.48	.03	....	T.	....	.16	....	....	....	.16	....	....	....	.23	3.63
....	T.	....	.70	....	....	T.	T.	.26	....	....	T.	.35	....	....	T.	T.	3.46
....	T.	....	....	....	....	....	....	.14	....	....	....	.07	....	....	....	....	0.94
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.46	.09	....	....	....	T.	....	.08	....	....	T.	.63	....	....	.15	.48	3.29
....	1.22	T.	.20	.14	....	T.	....	.29	....	....	.07	.37	....	....	....	.52	3.92
....	T.	....	....	....	....	....	....	T.	....	....	....	.50	....	....	....	T.	1.85
....	T.	....	T.	....	....	....	T.	.16	....	....	.04	T.	....	....	....	.37	1.36
....	....	.01	....	.12	....	....	....	.49	....	....	....	.32	T.	....	....	.10	4.29
....	.10	....	....	.20	....	....	....	....	.10	....	....	.50	....	....	....	....	2.18
....	.07	.01	0.4	.08	....	T.	....	.07	....	....	....	.37	....	....	....	0.3	1.54
....	T.	T.	.08	.06	....	T.	....	.17	T.	....	....	.17	....	....	....	.05	0.77
....	.02	T.	.11	.10	....	....	....	.05	....	....	....	.27	....	....	....	T.	2.61
....	....	.10	.18	....	....	T.	....	....	....	....	....	.26	....	....	....	.09	1.86
....	.22	T.	T.	.25	....	T.	T.	.36	....	....	....	.40	....	....	....	.05	1.62
....	.06	T.	.74	....	....	T.	T.	.35	....	....	....	.29	....	....	.02	.22	3.77
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.21	.08	.30	....	....	....	....	.35	....	....	.10	.20	.05	....	T.	.32	3.79
0.00	0.39	T.	0.07	0.02	0.00	0.03	0.05	0.10	T.	T.	0.01	0.13	0.01	0.00	0.02	0.07	2.42
....	.11	....	.07	.04	....	....	....	.09	....	....	....	.32	....	....	....	.05	1.42
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.80	....	T.	.12	....	....	....	.22	....	....	....	....	....	....	....	T.	2.71
....	.23	....	.06	....	....	.03	....	.09	....	....	....	.43	....	....	....	....	2.15
....	.58	....	....	....	....	.20	....	.23	....	....	....	.23	....	....	....	.09	2.49
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.47	....	....	....	....	....	....	.31	....	....	....	....	....	....	....	.22	2.12
....	.37	....	....	....	....	.05	.18	....	....	....	....	.11	....	....	....	.16	3.62
....	.47	....	....	....	....	.21	.10	....	....	T.	....	....	....	....	....	....	2.82
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.21	....	.04	.04	....	....	.33	....	....	....	....	....	....	....	.42	....	2.51
....	.14	....	.20	....	....	....	.28	.04	....	....	....	....	....	....	....	.20	2.19
....	.86	....	.17	....	....	....	....	.09	....	....	....	.20	....	....	....	....	3.49
....	.66	....	....	....	....	.01	....	.09	....	....	....	....	.18	....	....	....	2.45
....	.51	....	....	....	....	....	....	....	....	....	.22	....	....	....	....	....	3.61
....	.37	....	.11	.22	....	T.	....	.06	....	....	....	.33	....	....	....	.13	2.54
....	T.	....	.15	....	....	....	....	.18	.02	....	....	.17	....	....	....	T.	1.08
....	.01	....	.07	T.	....	T.	T.	.16	.03	....	....	.11	....	....	....	.03	1.57
....	.28	T.	.03	T.	....	.04	....	.06	....	....	....	.24	....	....	....	.04	1.72
....	.55	....	.35	....	....	.05	.04	.10	....	....	....	.03	....	....	....	.33	2.70
0.00	0.34	0.00	0.37	0.03	0.00	0.09	0.01	0.34	0.02	0.00	0.06	0.33	0.00	0.00	0.04	0.10	2.58
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.55	....	.73	....	....	.14	.05	.11	....	....	.30	.01	....	....	.21	.17	2.78
....	.09	....	.48	....	....	.05	....	.31	.02	....	....	....	....	....	....	.02	2.01
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	.38	....	.23	.10	....	.05	....	.40	....	....	....	.70	....	....	....	.10	2.45
....	.60	....	.40	....	....	.11	....	.64	....	....	....	.90	....	....	....	.20	3.47
....	.08	....	....	.06	....	.10	....	.22	.06	....	....	.04	....	....	....	....	2.19
0.06	0.01	0.31	0.29	T.	0.00	0.00	0.45	0.08	0.06	T.	0.00	T.	0.00	0.00	0.00	0.18	2.85
T.	T.	.16	.07	T.	....	....	.24	.08	.06	....	....	....	....	....	....	.15	3.22
.40	....	1.55	*	†.20	....	..	.12	.30	.15	....	....	....	....	....	....	....	2.92
....	T.	.09	.03	....	....	....	.27	.03	.03	....	....	T.	....	....	....	.21	2.46

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlan. Coast--(Con.)														
Willet's Point	....	.38	....	....	....	....	T.	....	....	....	....	....	....	.13
Brentwood	....	.50	....	....	....	....	.20	....	....	....	....	....	....	1.00
Setauket	....	.73	....	....	....	...	.25	.12	....	....	...	....	....	.13
Bedford	....	.73	....	....	....	....	.53	.14	....	.10	....	....	....	.50
Hudson Valley. ...	0.00	0 77	0.00	0.00	0.06	T.	0.40	0.00	T.	0.00	0.00	0.01	T.	0.57
Albany	....	.88	....	....	....	T.	.64	....	T.	....	....	....	....	.18
Lebanon Springs...	.	.89	...	....	...	....	1.13	....	....	....	....	....	....	1.20
Honeymead Brook.	T.	.65	....	....	...	....	.34	....	....	....	....	T.	T.	1.16
Poughkeepsie	....	.35	....	....	....	....	.34	....	....	...	....	....	....	.16
Wappinger's Falls.	....	.45	....	....	....	....	.45	....	....	....	....	....	....	.06
Catskill............	...	.32	....	....	....	....	.07	....	....	....	....	.13	....	1.05
West Point...	....	.80	....	....	....	....	....	....	....	....	....	....	....	.12
Boyds Corners.....	....	....	....	....	...	....	....	....	....	....	....	....	....	....
Carmel	....	1.13	....	....	....	....	.52	....	....	....	....	....	....	1.47
Southeast Reserv'r.	..	....	...	....	....	...	....	....	...	....	....	....	....	....
Eagle Mills...	....	1.00	....	....	....	...	.50	...	....	....	....	....	....	.02
Easton.............	....	1.26	....	....	.56	T.	T.	....	....	....	...	T.	....	.26
Mohawk Valley....	0.00	0.45	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0 00	0.00
Rome....	....	.45	....	....	....	.16	....	....	....	....	....	....	....	....
Champlain Valley..	0.00	0.49	0.00	0.00	0.35	0.32	0 44	0.00	0.00	0.00	0.30	0.18	0.10	0.06
Plattsburgh Bar'ks.	....	.20	....	....	.70	.65	.85	....	....	....	....	.35	.20	....
Glens Falls.........	....	.78	....	...	....	....	.04	....	....	....	.61	....	....	.11
St. Lawrence Val'y.	0.01	0.03	0.00	0.02	0.35	0.17	0.00	0.00	0.03	T.	0.00	0.03	0.00	0.00
Malone	....	.07	....	.10	.49	.31	....	....	.08	T.	....	....	....	....
Madison Barracks..	....	....	....	....	....	....	....	....	.04	...	....	.21	....	....
Watertown.........	.12	....	....	....	...	.04	....	....	.12	....	....	....	....	....
Canton	....	....	....	....	.71	.14	.. .	....	....	....	....	....	....	....
DeKalb Junction...	....	....	....	....	.13	.34	....	....	....	T.	..	....	....	....
Massena..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond...	....	....	....	.01	.50	.43	....	...	....	T.	....	....	....	....
Ogdensburg.......	....	.08	....	.02	.55	T.	....	....	....	.02	....	....	....	....
Potsdam............	....	.11	....	...	.43	.10	....	....	....	...	....	....	....	....
Great Lakes........	T.	0.30	0.00	T.	T.	0.42	0.15	0.01	0.07	0.05	0.03	0.24	0.01	T.
Dunkirk............	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield...........	.. .	1.03	....	....	....	....	.20	....	T.	.26	.12	1.37	....	.07
Buffalo	T.	.42	....	T.	....	....	.60	....	.01	.02	.16	.31	T.	....
Adams Center......	....	....	....	....	....	.08	....	....	.03	....	....	..	....	....
Pittsford	T.	.28	....	....	....	1.40	....	....	.51	....	....	....	....	....
Rochester	T.	.20	....	....	....	.72	....	....	.31	T.	T.	.01	T.	T.
Scottsville..........	....	.47	....	....	....	.57	....	....	.09	.	.07	....	....	....
Appleton...........	.01	.04	....	....	T.	....	....	....	....	T.	....	.17	....	....
Fort Niagara.......	T.	....	....	.06	....	.02	....	.08	....	....	.20	...	....	....
Niagara Falls	T.	.09	....	.01	....	....	.02	....	T.	....	.02	.39	....	....
Baldwinsville	....	.49	....	...	...	.48	.14	T.	....	....	....	.29	T.	....
Skaneateles........	....	1,07	....	....	....	.20	.38	....	.03	....	....	.50	.02	....
Ridgeway	.03	.07	....	....	.04	.03	....	....	T.	....	....	.19	....	....
Demster	....	.20	....	....	....	.27	.20	....	.13	....	....	....	....	....
Fulton.............	....	.23	....	....	..	.70	....	....	.	....	....	....	....	....
Oswego............	T.	.14	....	....	....	.92	.15	....	.02	T.	....	....	....	T.
‖ Palermo..........	.0?	.	....	...	....	.80	.19	....	.	....	....	....	.	....
Phœnix	....	.33	....	....	....	....	.58	....	.08	....	....	....	.15	....
Lyons	....	.	....	....	....	1.59	.48	.08	....	....	T.	T.	.02	....
Rose................	T.	.26	....	....	....	.81	.09	....	.04	T.	....	.01	T.	....
Erie, Pennsylvania.	....	.32	....	..	....	.18	.02	....	.02	.66	.03	1.35	.09	..

TATION FOR AUGUST — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
			.38				.20	.10	.10							.35	1.64
	T.		1.00				1.20									.30	4.20
	T.	.37	.06	T.			.50	T.	.04			T.				.15	2.35
	.10	.03	.19				.63	.05	.07	T.						.10	3.14
T.	0.27	T.	0.13	0.03	0.00	0.01	0.16	0.32	0.09	0.00	0.00	0.08	0.00	0.00	0.00	0.19	3.97
	.08		.02	.03		T.	.01	T.	.30			.02				.09	2.25
	.03		.15					.91				T.				.17	4.48
	.82		.09				.11	.09	.33			.35				.41	4.35
	*	†.61	.02				.08	.11	.05			.13				.43	2.28
	.72	T.				.06	.02	.17	.10			.11				.32	2.46
	.19		.04	.02		.05		.20				.10				.13	2.30
.05			.45	.04				.40	.10								1.96
																	4.60
	.47						.23	.27				T.				.23	4·32
																	3.74
	.15			.20			.25	1.00				.05					3.17
			.51	.04			.90	.09				T.				.16	3.78
0.00	0.43	0.00	0.00	0.00	0.00	0.25	0.10	0.02	0.00	0.00	0.46	0.00	0.00	0.00	0.05	0.90	1.92
	.43					.25	.10	.02			.46				.05		1.92
0.00	0.34	0.85	0.27	0.01	0.00	0.00	0.08	0.12	0.14	0.00	0.04	0.10	0.00	0.00	0.00	0.08	4.38
		1.70	.40				.15	T.	.20			.40				.15	5.95
	.68		.14	.02				.25	.07		.09					.01	2.80
0.00	0.94	T.	0.23	0.02	0.08	0.12	0.03	0.34	0.11	0.00	0.37	0.22	0.18	0.00	0.12	0.30	3.70
	.63		.09	.02		.39	.26	.34				.65	.08			.12	3.63
	.45				.64				.86				.50			1.00	3.70
	1.05	.01	.65	.02		.16		.32			.50					.26	3.26
	1.30		.12			.08		.36					.87			.31	3.89
	.77		.29	.08		.06		.51				.62				.23	3.03
																	....
	1.10		.14			.12		.33			.16	.53			.64	.10	4.06
	1.35		.40			.06		.33			1.55				.23	.17	4.76
	.84		.15			.07		.55			.76				.12	.18	3.31
T.	0.22	0.01	0.17	2.14	0.00	0.03	0.02	0.16	0.04	T.	0.23	0.22	0.00	0.00	0.05	0.08	2.17
																	....
.08			.49					T.			.43						4.05
	.29	.02	.38			T.	T.	.32	T.		.44	.40			.06	.22	3.68
	.45		.26			.20		.55			.75				.20	.08	2.60
	.38		.34					.07			T.	.28			T.	.08	3.34
	.58		.01	.25		.01		.12			T.	.38			.04	.08	2.71
	.64		.08					.05				.31				.16	2.44
	.02		T.			T.	T.	.09			.18	.07			.05	.09	0.72
			.08					.06			.40				.10		1.00
	T.		.50					.11			.41	.17			.20	.19	2.11
	.08		.34	T.		.04	.16	T.			.99				.05	T.	3.06
	.93		.05	.15				.13				.53				.06	4.05
	.01		.08			T.		.06				.35			.13	.12	1.11
	.06		.22	.35		.09		.33				.44				.18	2.47
	.41								.80	T.	.59					.03	2.76
	.04		.10	.83		.12		.20			.03	.39			T.	.06	3.00
	.10		.12	.30		.03		.06				.40				.10	2.13
	T.	.10		.73			T.	.29				.92				.09	3.27
	.06	T.	.15			T.	.20				.35	T.			.09	.03	3.05
	.11			.45		.03		.37			*	†.48				.03	2.68
	.21	T.	.18	T.		T.	T.	.24			.11	.06					3.47

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Central Lakes	T.	0.92	0.00	0.00	0.00	0.35	0.12	0.02	0.01	0.00	0.00	0.05	0.03	0.00
Fleming............	....	.90	....	....	....	.35	.20	....	....	...	....	.20	....	....
Sherwood	....	.70	....	....	....	.50	.04	.06	....	....	...	....	.13	....
Watkins............	....	....	....	....	....	....	....	....	....	....	....	....	....	..
Romulus........ ...	....	1.10	....	....	....	.56	....	....	T.	....	....	....	....	....
Ithaca..............	T.	.98	....	....	....	T.	.24	....	.05	....	....	....	T.	....
Penn Yan...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average..........	0.01	0.50	T.	T.	0.08	0.18	0.19	0.01	0.06	0.02	0.04	0.08	0.03	0.13

‡Record for the month incomplete. ‖Received too late to be included in the averages.

TATION FOR AUGUST — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.00	0.27	T.	0.03	0.15	0.00	0.01	0.01	0.14	0.00	0.00	0.00	0.61	0.00	0.00	0.02	T.	2.74
....	T.	....	....	..	....	....	....	.47	....	....	..	.60	....	....	....	....	2.72
....	.33	....	...	.25	....	.01	.03	.02	....	....	....	.50	....	...	.07	....	2.64
...	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....
....	.34		T.	.18	....	....	....	....	....	....	....	.99	....	....	T.	....	3.17
....	.42	T.	.13	.17	....	.02	....	.05	....	....	....	.36	....	....	....	.01	2.43
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.01	0.33	0.12	0.17	0.04	0.01	0.05	0.07	0.18	0.05	T.	0.12	0.20	0.02	0.00	0.03	0.12	2.98

* Amount included in next measurement. † Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.)									
		Normal for the month of August.	Length of record, years.	Record begins.	Record ends.	Mean for August, 1896.	Departure from the normal.	EXTREMES OF MONTHLY MEAN TEMPERATURE FOR AUGUST.			
								Highest.	Year.	Lowest.	Year.
Western Plateau	....	66.3	...	......	......	67.5	+1.2	....	......	.....	......
Angelica	Allegany	64.8	14	1854	1896	65.2	+0.4	69.2	1872	61.5	1889
Humphrey	Cattaraugus	65.3	14	18-3	1896	65.6	+0.3	66.7	1888	62.8	1886
Elmira	Chemung	68.8	18	1851	1896	71.6	+2.8	71.9	1895	63.1	1851
Eastern Plateau	....	65.6	...	......	......	67.9	+2.3	.....	......	.....	......
Oxford	Chenango	65.7	29	1828	1896	67.4	+1.7	70.8	1831	61.8	1851
Cortland	Cortland	64.4	34	1829	1896	67.6	+3.2	69.3	1863	60.0	1851
Cooperstown	Otsego	65.6	43	1854	1896	66.6	+1.0	71.5	1877	61.0	'61-'66
Waverly	Tioga	66.7	15	1882	1896	70.2	+3.5	70.2	1896	64.0	1883
Northern Plateau	....	64.8	...	......	......	66.6	+1.8	.....	......	.....	......
Lowville	Lewis	64.8	29	1827	1896	66.6	+1.8	68.8	1831	60.5	1848
Atlantic Coast	....	71.6	...	......	......	72.6	+1.0	.....	.....	.....	.....
New York City	New York	72.5	26	1871	1896	73.0	+0.5	76.0	1872	70.4	'87-'89
Setauket	Suffolk	70.7	12	1885	1896	72.2	+1.5	72.2	'95-'96	68.8	1889
Hudson Valley	....	70.3	...	......	.....	71.5	+1.2	.....	......	.....	......
Albany	Albany	70.6	23	1874	1896	73.0	+2.4	73.3	1881	67.2	1885
Honeymead Brook	Dutchess	68.2	16	1881	1896	68.6	+0.4	73.7	1882	66.1	'83-'86
West Point	Orange	72.2	67	1826	1896	73.0	+0.8	.....	......	.....	......
Champlain Valley	....	67.6	...	......	......	67.4	−0.2	.....	......	.....	......
Plattsburgh Barracks	Clinton	67.6	40	1839	1896	67.4	−0.2	71.7	1843	64.2	1894
St. Lawrence Valley	....	68.0	...	......	.....	67.8	0.0	.....	......	.....	......
Madison Barracks	Jefferson	68.7	34	1839	1895	.....	......	74.7	1876	63.7	1889
Canton	St. Lawrence	67.4	34	1862	1896	66.7	−0.7	74.0	1876	62.7	1866
North Hammond	"	69.5	18	1867	1896	70.0	+0.5	77.2	1873	61.8	1866
Potsdam	"	66.5	27	1828	1896	66.6	+0.1	70.5	1846	60.5	1833
Great Lakes	....	68.4	...	......	......	70.0	+1.4	.....	......	.....	......
Buffalo	Erie	68.7	26	1871	1896	69.0	+0.3	73.5	1872	64.7	1885
Rochester	Monroe	68.8	25	1871	1896	70.0	+1.2	73.3	1876	63.8	1885
Fort Niagara	Niagara	69.6	40	1842	1896	71.8	+2.2	74.6	1876	64.3	1866
Baldwinsville	Onondaga	67.0	19	1854	1896	71.1	+4.1	71.1	1896	60.7	1866
Oswego	Oswego	68.3	26	1871	1896	69.0	+0.7	73.1	1872	63.2	1885
Palermo	"	67.5	42	1854	1895	.....	.....	71.6	1887	61.6	1885
Erie, Pennsylvania	Erie	69.3	23	1874	1896	69.0	−0.3	73.0	'76-'81	65.0	1885
Central Lakes	....	67.7	...	......	....	69.9	+2.2	.....	......	.....	......
Ithaca	Tompkins	67.7	18	1879	1896	69.9	+2.2	71.5	1881	64.6	1885
Average departure	....	.....	...	......	......	.....	+1.3	.....	......	.....	......

AND PRECIPITATION — AUGUST.

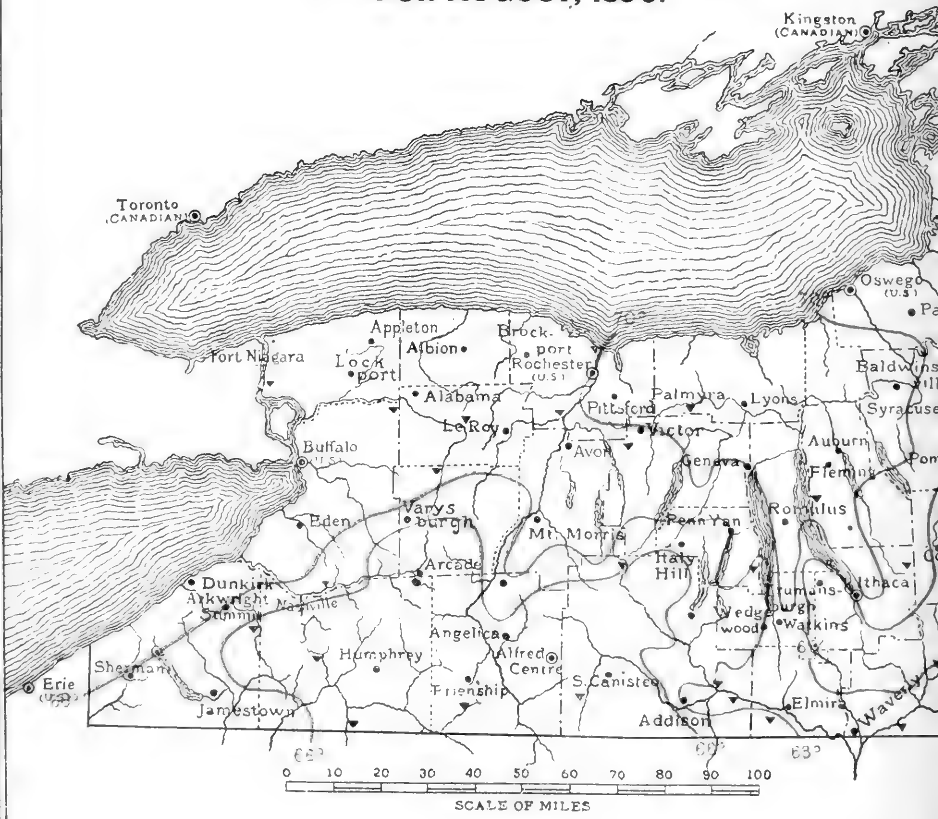
STATION.	COUNTY.	Average for the month of August.	Length of record, years.	Record begins.	Record ends.	Total for August, 1896.	Departure from the average.	Extremes of Monthly Precipitation for August. Greatest. Amount.	Greatest. Year.	Least. Amount.	Least. Year.
Western Plateau		3.87				2.69	—1.18				
Angelica	Allegany	3.90	12	1856	1896	2.63	—1.27	6.72	1890	1.83	1856
Humphrey	Cattaraugus	4.45	14	1883	1896	4.49	+0.04	10.11	1885	1.63	1889
Elmira	Chemung	3.25	17	1851	1896	0.94	—2.31	6.45	1860	0.94	1896
Eastern Plateau		3.73				2.49	—1.24				
Oxford	Chenango	3.54	26	1829	1896	2.71	—0.83	5.38	'32-'35	0.86	1830
Cortland	Cortland	3.54	18	1851	1896	2.15	—1.39	5.49	1859	1.45	1894
Cooperstown	Otsego	4.09	43	1854	1896	3.49	—0.60	9.46	1856	0.63	1876
Port Jervis	Orange	4.21	12	1880	1896	2.51	—1.70	8.14	1895	1.32	1883
Waverly	Tioga	3.26	15	1882	1896	1.57	—1.69	6.31	1891	1.23	1889
Northern Plateau		3.42				2.45	—0.97				
Lowville	Lewis	3.42	32	1827	1896	2.45	—0.97	8.76	1892	0.91	1846
Atlantic Coast											
New York city	New York	4.62	26	1871	1896	2.46	—2.16	10.42	1875	1.18	1886
Setauket	Suffolk	4.39	12	1885	1896	2.35	—2.04	6.65	1893	2.35	1896
Hudson Valley		4.25				3.11	—1.14				
Albany	Albany	3.96	23	1874	1896	2.25	—1.71	7.58	1885	0.53	1876
Honeymead Brook	Dutchess	4.20	16	1881	1896	4.48	+0.28	8.55	1885	0.96	1894
Poughkeepsie	"	3.72	21	1830	1896	2.28	—1.44	8.67	1831	1.04	1894
West Point	Orange	4.72	49	1840	1896	1.96	—2.76	11.75	1868	0.05	1876
Boyd's Corners	Putnam	4.64	26	1870	1895	4.60	—0.04	10.33	1875	1.20	1876
Champlain Valley		3.13				1.70	—1.43				
Plattsburgh Barracks	Clinton	3.13	37	1840	1896	1.70	—1.43	7.18	1892	0.37	1876
St. Lawrence Valley		3.31				3.68	+0.37				
Malone	Franklin	3.51	16	1830	1896	3.63	+0.12				
Madison Barracks	Jefferson	2.45	35	1840	1896	3.70	+1.25	6.14	1871	0.47	1881
North Hammond	St. Lawrence	3.63	19	1866	1896	4.06	+0.43	11.78	1892	0.37	1874
Potsdam	"	3.66	27	1828	1896	3.31	—0.35	9.92	1893	0.31	1845
Great Lakes		2.70				2.77	—0.07				
Buffalo	Erie	2.63	26	1871	1896	3.68	+1.05	10.63	1885	0.05	1876
Rochester	Monroe	3.05	25	1871	1896	2.71	—0.34	7.26	1886	0.36	1876
Fort Niagara	Niagara	2.54	38	1842	1896	1.00	—1.54	7.21	1849	0.33	1876
Oswego	Oswego	2.68	26	1871	1896	3.00	+0.32	6.47	1893	0.29	1874
Palermo	"	2.00	36	1850	1896				1892	0.41	1866
Erie, Pennsylvania	Erie	3.33	21	1873	1896	3.47	+0.14	7.45	1885	0.54	1894
Central Lakes		3.30				2.43	—0.87	7.97			
Ithaca	Tompkins	3.30	18	1879	1896	2.43	—0.87	8.14	1885	0.39	1881
Average departure							—0.81				

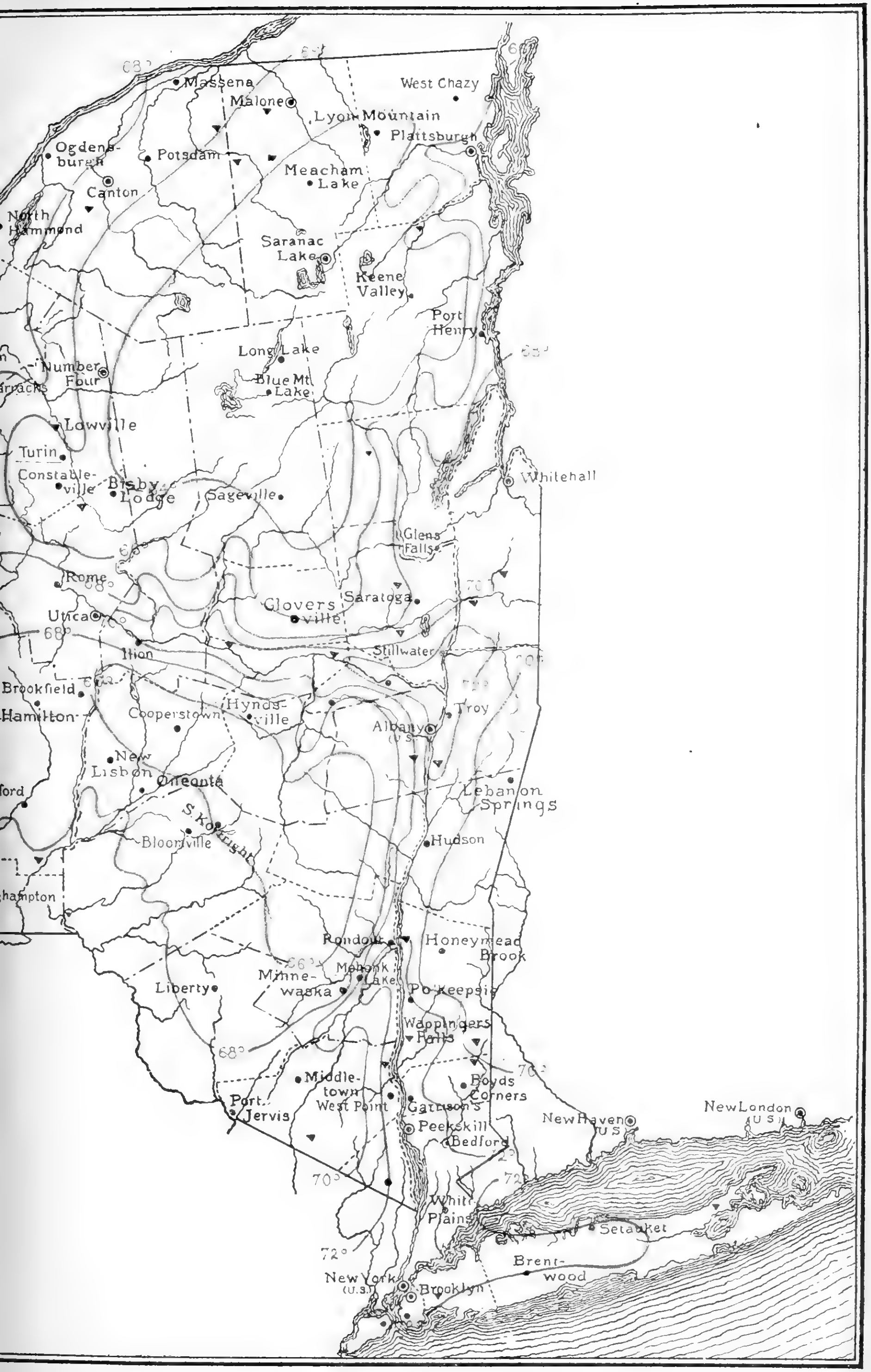
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR AUGUST, 1896.





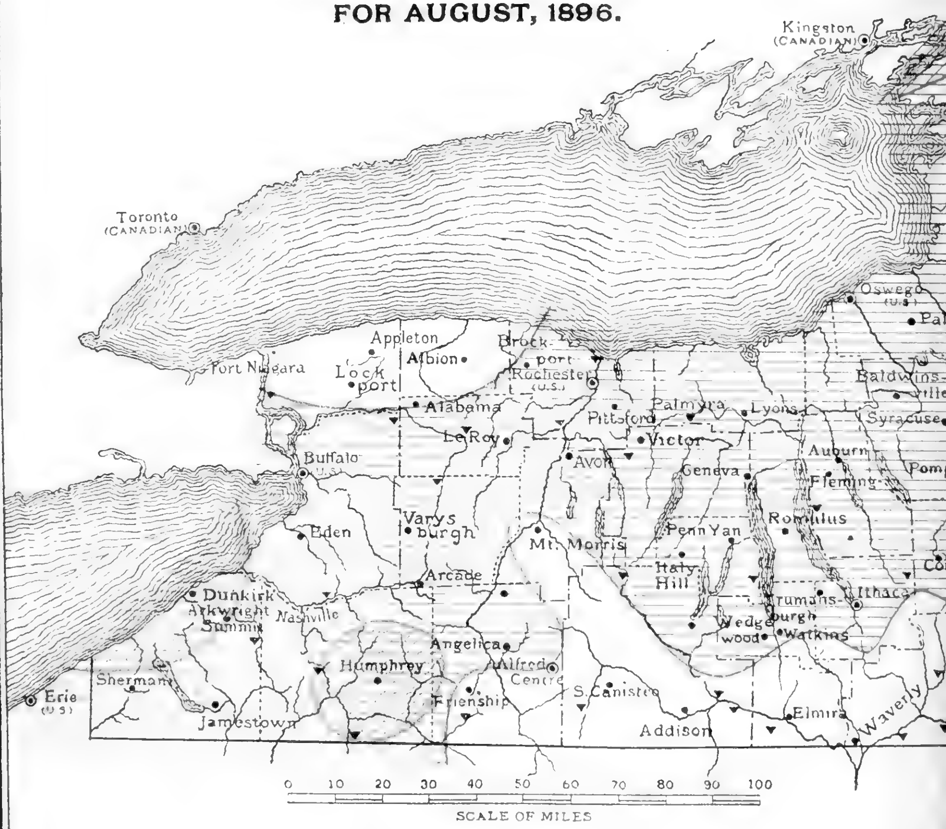
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Gloversville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Minnewaska
Mohonk Lake
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
68°
70°
72°
66°

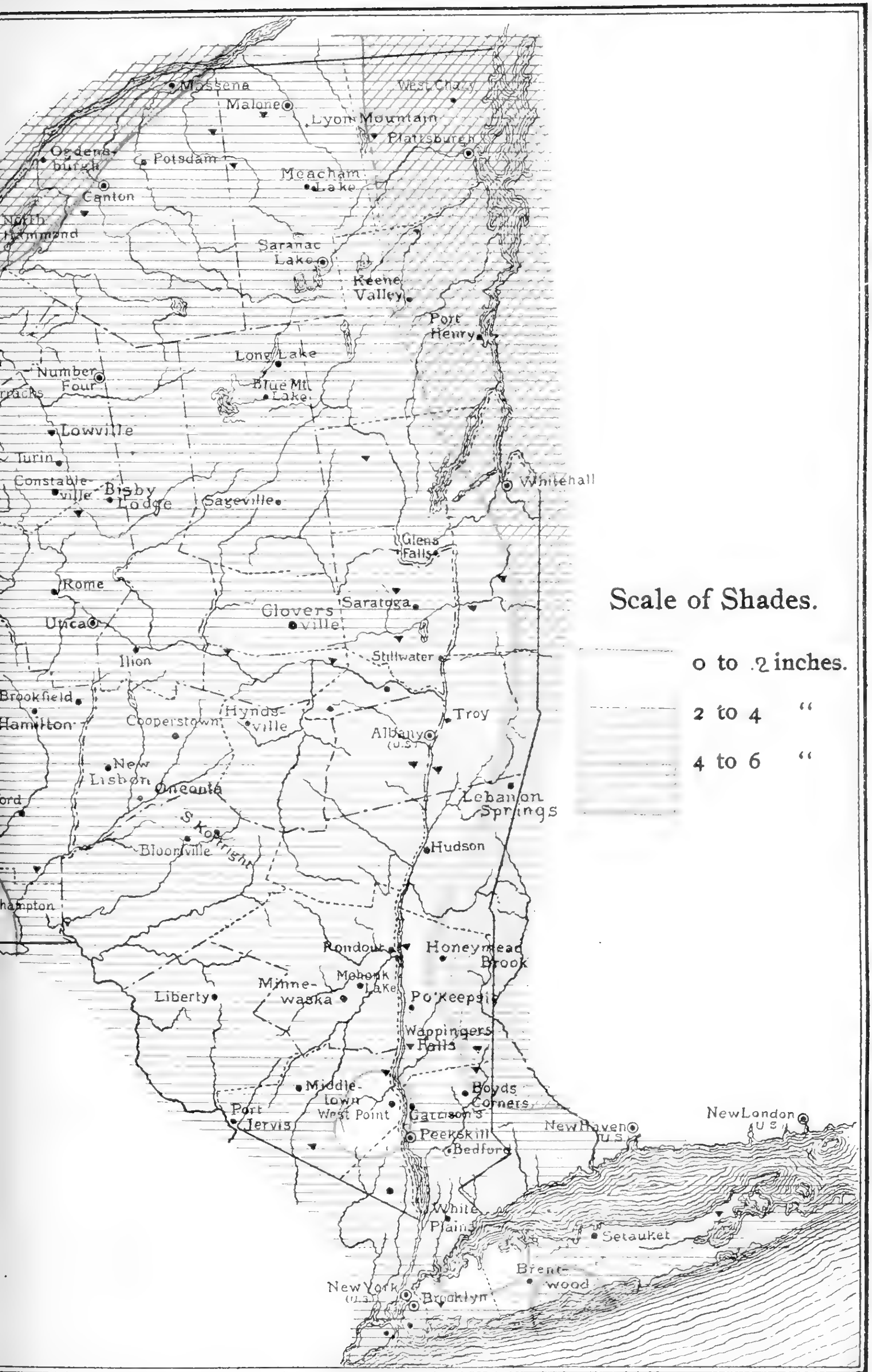
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR AUGUST, 1896.





Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
S. Kortright
Lebanon Springs
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

Meteorological Summary for September, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during September was 30.04 inches. The highest barometer was 30.39 inches at Friendship on the 23d, and the lowest was 29.14 inches at Ithaca on the 30th. The mean pressure was slightly higher in the eastern than in the central and western sections. The average of the mean pressure at 6 stations of the National Bureau was 0.04 inches below the normal, the deficiency amounting to 0.07 inches at New York, and to 0.03 inches near the lakes.

The mean temperature of the State, as derived from the records of 73 stations, was 59.4 degrees. The highest local mean was 65.6 degrees at Brooklyn, and the lowest 54.3 degrees at Number Four. The highest general daily mean was 74 degrees on the 11th, and the lowest 44 degrees on the 23d. The maximum temperature reported was 97 degrees at Waverly on the 11th, the minimum being 25 degrees at Number Four on the 23d. The mean monthly range of temperature for the State was 25 degrees, the greatest local range being 67 degrees at Waverly, and the least 39 degrees at Brooklyn. The mean daily range was 20 degrees. The greatest local daily range was 47 degrees at Friendship on the 2d, and the least 3 degrees at Erie, Pa., on the 15th. The mean temperatures of the various sections of the State were as follows: The Western Plateau, 58.8 degrees; the Eastern Plateau, 58.9 degrees; the Northern Plateau, 55.8 degrees; the Atlantic Coast, 63.9 degrees; the Hudson Valley, 61.1 degrees; the Mohawk Valley, 58.9 degrees; the Champlain Valley, 58.0 degrees; the St. Lawrence Valley, 58.0 degrees; the Great Lakes, 59.9 degrees; the Central Lakes, 60.9 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 1.0 degrees below the normal, excesses being reported from only 3 stations.

The mean relative humidity was 77 per cent. The mean dew point was 52 degrees.

The average precipitation, as derived from the records of 94 stations, was 4.63 inches. The heaviest general rainfall exceeded 6 inches over considerable areas of eastern and southeastern New York, and was less than 4 inches in portions of the central section, and over smaller scattered areas elsewhere.

The maximum local amount was 8.12 inches at Warwick, Orange county, and the minimum 1.97 inches at Brookfield, Madison county. General rains, which were heaviest in northern New York, occurred on the 3d. On the 5th and 6th the precipitation was heavy in the southeastern counties, with lesser amounts throughout the State. On the 14th light general rains occurred; on the 16th moderate, with the maximum over the Northern Plateau; on the 18th the heaviest general rains of the month; on the 21st, 26th, 27th, 28th moderate general. The average precipitation at 27 stations possessing records for previous years was 0.83 inches above the normal amount, deficiencies occurring at only 7 stations. The greatest excesses obtained in the Coast Region, the Central, Hudson and the Champlain Valleys.

The average number of days on which the precipitation amounted to 0.01 inches or more was 10.6, the rain frequency being greatest in western and northern New York, and least in the central and southeastern sections. The average number of clear days was 10.3; of partly cloudy days, 10.1; and of cloudy days 9.6, giving an average cloudiness of 50 per cent. for the State. The greatest cloudiness obtained in the St. Lawrence Valley, and the least near the Atlantic Coast.

The prevailing winds were from the southwest. The average wind travel at 6 stations of the National Bureau was 7430 miles, the values being generally greater than usual for the month both along the Atlantic Coast and the Great Lakes. The maximum velocity recorded was 57 miles per hour at Buffalo on the 19th.

Thunderstorms were reported at one station on the 2d, at 9 stations on the 3d, at 1 station on the 5th, at 5 stations on the

12th, at 1 station on the 13th, at 2 stations on the 14th and also on the 15th, at 10 stations on the 17th, at 3 stations on the 18th, at 14 stations on the 19th.

Hail fell on the 3d, 17th and 19th.

Light frosts were general in the interior from the 1st to the 5th, and at a few stations on the 16th, 18th and 20th. Killing frosts occurred in exposed localities on the 1st, 2d, 17th and 21st, and were quite general in the interior on the 23d.

General features of the weather.—This month, although averaging slightly cooler than usual, embraced two warm periods; the first extending from the 9th to the 15th, with the general maxima on the 11th when the temperature of the State was 10 degrees above the normal. The second, and lesser warm wave covered the period from the 25th until the end of the month. The most noticeable deficiencies of temperature occurred during the first week, and between the 19th and 25th, with killing frosts, which, however, were severe and general only during the latter period.

The rainfall was slightly in excess over the greater part of the State. General rains were confined mainly to the first and third weeks and the closing days of the month, a heavy local precipitation being reported from various sections during each period. The cloudiness was rather above the average for September, and the wind velocity also higher than usual.

The tropical cyclone which passed over southwestern New York on the night of the 29th and 30th was notably severe, as indicated by the remarks at the close of this summary.

Seven areas each of high and low pressure, influenced the weather in the vicinity of this State during September. Generally the depressions were not strongly developed, and on approaching the coast assumed a trough or V shape, usually extending from the St. Lawrence Valley and Lakes to the southward. Storms of this class passed nearest this State on the 1st, 3d, 6th, 11th, 18th, 20th and 26th. The hot wave, culminating on the 11th, accompanied the third depression, which extended from Canada to the Mexican Gulf. The succeeding area developed a considerable energy over the lakes, giving the highest wind velocities of the month at some stations.

In addition to the above a storm moved northward off the Atlantic Coast on the 10th; and on the night of the 29th-30th a cyclone of tropical origin passed from Pennsylvania to the Lake Region, giving the lowest barometer of the month, 29.14 inches at Ithaca.

The high pressure areas, which were generally large and of moderate intensity, were felt in this vicinity mainly on the 1st to 2d, 5th, 8th, 13th to 14th, 20th, 23d and 29th. Those bringing a noteworthy reduction of temperature about the 5th and 23d were very large systems which covered the greater part of the United States in the eastward course. The winds generally passed to the Atlantic over the northeastern rather than the southern coast.

The cool, cloudy weather of the first week delayed the growth of late crops, but general rains on the 3d were beneficial in relieving a partial drouth which especially affected pasturage at that time. Much corn was already cut, the second hay crop was partly secured, and in some localities, beans even gathered and potatoes dug. The tobacco crop was housed in good condition, while early varieties of hops were already being picked. The succeeding week of bright hot weather brought grapes to maturity, and was favorable to harvesting buckwheat. The weather continued warm and dry until the general rains of the 19th, which gave the early sown wheat a rapid growth. The frosts of the 21st to 24th came too late to do material damage. The apple crop was exceptionally large and fine, but much of the fruit was blown from the trees and injured by the storm of the 30th. The crop was also damaged by high wind on the 19th along the lakes.

Ground water was generally low during the month.

Notes on the cyclone of September 29th-30th: Cortland, violent wind storm, 1 to 4 a. m., buildings and trees blown down; Waverly, southeast gale on 30th, 2 a. m., blew down trees, buildings, etc.; Ithaca, large trees uprooted or broken, and buildings unroofed. Many barns demolished in vicinity; Bedford, very heavy rain night of 30th; Watertown, high south wind on the 30th, much minor damage; North Hammond, heavy gale at daylight on the 30th, blowing down fences and trees. Nearly all fruit on the ground; Baldwinsville, very high wind, trees blown down, some buildings unroofed.

Local storms.—A small but violent tornado which occurred near Otsego Lake, Otsego county, on the 12th, is described by Mr. F. R. Van Horn. The storm began about 2 miles west of the lake, and moving eastward, tore down 6 acres of timber, uprooted and scattered the buckwheat in a field, and tore up over 30 apple trees in an adjoining field. Passing thence through the woods, it uprooted large oak, hickory and chestnut trees and twisted others off 5 or 6 feet above the ground, in some instances carrying large trees over a field 200 to 300 feet wide and into the lake beyond. Much thunder and lightning preceded the tornado, which formed about 5:30 p. m. The path of the storm did not exceed one-eighth of a mile in width, and was sharply defined.

On the 12th, also, one man was killed and four injured by lightning, and property was destroyed to the extent of $600. Property was also destroyed by lightning at Bloomville.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA-			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												58.8	95	11
Alfred	Allegany	1824									55.6	57.5	89	12
Angelica	"	1340									56.3	56.9	88	12
Bolivar	Allegany													
Friendship	"	1550	30.07	30.39	23	29.67	29	0.72				58.2	90	11
Humphrey	Cattaraugus	1950									57.8	57.4	90	12
Arkwright	Chautauqua	1260										‡57.5	80	11
Jamestown	"	1328										58.8	86	11
Elmira	Chemung	863										61.8	91	11
Avon	Livingston	585										58.8	90	11
Mt. Morris	"	525										60.4	92	11
Lockport	Niagara										58.9	60.0	87	11
Victor	Ontario													
Wedgewood	Schuyler	1350									58.5	60.8	95	11
Addison	Steuben	1000							72	50	58.7	59.7	90	11
South Canisteo	Steuben	1480									56.5	58.0	90	11
Arcade	Wyoming	1557									55.5	56.9	86	11
Varysburg	"											59.0	91	11
Eastern Plateau												58.9	97	11
Binghamton	Broome	870									60.5	60.4	94	11
Oxford	Chenango	550										58.2	92	11
Cortland	Cortland	1120										59.3	91	11
Bloomville	Delaware	1550									59.8	61.4	95	12
South Kortright	Delaware	1700										57.1	88	11
Elka Park	Greene	2200							86	54	57.1	56.8	82	12
Brookfield	Madison	1350									56.0	56.7	93	11
Middletown	Orange	660												
Port Jervis	Orange	470										61.4	89	11
Cooperstown	Otsego	1300									56.3	56.5	85	11
New Lisbon	"	1234									55.3	56.2	89	*a*
Oneonta	"	1100									58.4	60.6	90	11
Perry City	Schuyler	1038									56.5	57.0	91	11
Waverly	Tioga	825									61.5	61.6	97	11
Dryden	Tompkins											60.2	90	11
Mohonk Lake	Ulster	1245									61.5	60.8	85	11
Northern Plateau												55.8	90	11
Saranac Lake	Franklin											55.3	86	11
Gloversville	Fulton	802									57.2	58.2	90	11
North Lake	Herkimer											54.6	87	13
Lowville	Lewis	900										56.4	87	11
Number Four	"	1571	30.04	30.28	2	29.67	30	0.61	88	47		54.3	85	11
Atlantic Coast												63.9	87	*b*
Brooklyn	Kings	107										65.6	84	10
Manhattan Beach	"											63.5	85	11
New York City	New York	314	30.04	30.35	26	29.70	30	0.65	80	56		65.0	86	10
Willets Point	Queens											64.8	87	11
Brentwood	Suffolk	75									62.2	62.8	87	10
Setauket	"	40							79	57	63.2	63.9	84	11
Bedford	Westchester	290										61.7	86	11

FOR SEPTEMBER, 1896.

TURE — (IN DEGREES FAHR.).								SKY			PRECIPITATION — (INCHES).						
Lowest	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
26	*c*	59	22	47	2	5	*r*	11.2	8.7	10.1	11.4	4 73	1 68	......	30	......	......
28	23	61	23	36	10	10	13	8	10	12	13	5.04	1 20	20.45	18–19	......	S. W.
27	23	61	24	42	2	13	22	7	13	10	12	4 96	1.02	......	19	......	......
28	23	62	27	47	2	13	6	13	9	8	11	5.65	1.43	......	30	......	S. W.
29	23	61	21	33	9	10	*s*	8	7	15	11	5.05	1.09	......	30	......	S. W.
34	23	46	12	21	2	7	*t*	....	....	....	......	......	......	......	......	......	......
36	23	50	17	32	2	5	5	6	15	9	12	5.48	1.25	......	18–19	......	S W.
35	24	56	23	40	10	9	30	20	1	9	7	2.73	1.12	......	19	......	N. W.
28	23	62	23	37	25	11	15	....	....	....	10	3.82	0 89	......	3	......	......
26	*c*	66	26	45	4	10	13	14	8	8	12	3.94	0.90	10.00	19	......	W.
30	23	57	20	32	2	10	*u*	9	5	16	10	4.45	1.25	......	29	......	W.
31	23	64	25	39	*f*	15	13	8	17	5	14	5.09	1.65	22 00	19	......	S. W.
32	24	58	24	41	10	9	13	17	5	8	11	3.67	0.98	20.00	19	......	W.
27	23	63	28	42	10	12	13	14	7	9	11	5.10	1.47	......	29	......	W.
27	23	59	21	31	2	11	6	9	7	14	14	6.18	1.68		30	......	......
26	23	65	23	39	*g*	5	13	12	9	9	11	5.15	1.25	......	30	......	......
27	23	58	23	46	10	5	23	11.7	10.9	7.4	9.4	4.27	3 05	......	5	......	......
33	*c*	61	25	44	10	12	13	17	7	6	8	4.62	2 38	......	19	......	S. W.
28	23	64	28	41	*h*	10	13	10	13	7	9	2.15	0.95	......	19	......	S.
30	24	61	23	39	2	5	23	16	7	7	13	3.70	0 79	......	19	......	N.
33	23	62	26	40	9	13	*v*	15	7	8	9	4.06	1.48	17.00	19	......	W.
28	23	60	25	42	2	7	22	....	....	....	6	3.68	1.42	......	19	......	......
29	23	53	18	34	28	9	29	....	....	....	8	7.42	2.50	......	29	......	N. W.
34	2	59	26	38	12	16	*w*	9	15	6	6	1.97	0.73	5 00	3	......	S W.
....	....	....	....	....	....	....	....	....	....	....	......	....	......	......	......	......	......
36	24	53	21	33	9	9	30	8	19	3	10	5.43	2.47	......	5	......	N. W.
31	23	54	19	33	25	7	13	10	11	9	9	4.33	1.20	......	19	......	N.
27	23	62	26	40	2	10	13	9	10	11	12	5.07	2 35	......	12	......	S.
34	23	56	25	38	2	11	13	....	....	....	10	3.13	0.70	......	19	......	......
33	*c*	58	24	41	2	12	30	11	10	9	13	3.97	0.88	......	19	......	N. W.
30	24	67	28	46	10	11	30	12	10	8	10	3.57	1.84	19.30	19		N. W.
33	*c*	57	21	38	2	7	13	....	....	....	......	......	......	......	......	......	......
38	23	47	16	22	*i*	8	*x*	....	....	....	9	6 64	3 05	......	5	......	N. W.
25	23	59	21	36	10	6	*y*	9.8	12.0	8.2	11.4	4.93	1.71	......	19	......	......
27	22	59	23	34	30	10	24	9	14	7	13	4.75	1.71	......	19	......	W.
32	23	58	22	35	25	10	13	16	5	9	12	6.21	1.42	......	12	......	W.
27	23	60	19	27	10	6	*y*	....	....	....	8	5.59	1.59	15.00	17	......	......
2	23	60	22	36	10	7	19	9	15	6	13	3 09	0 65	......	19	......	W.
25	23	60	20	35	9	9	*aa*	5	14	11	11	5.01	1.41	......	20	......	W.
30	24	46	17	40	24	5	*ab*	11.8	9.2	9.0	8.7	4.48	2.10	22.30	5–6	......	
45	*c*	39	14	26	24	5	13	11	11	8	9	4 49	1.58	20.00	6	......	S. W.
44	*c*	41	13	25	20	8	*ac*	15	7	8	4	4.37	1.76	......	7	......	N. E.
43	23	43	14	24	19	7	6	11	10	9	9	3 04	0.86	......	19	......	N. W.
43	*d*	44	19	32	19	8	17	....	....	....	8	5.68	1.70	8.00	6	......	S. W.
30	24	57	24	40	24	13	*ad*	....	....	....	......	......	......	......	......	......	......
42	24	42	14	23	24	6	*ae*	11	8	11	9	3.62	0 92	......	19	......	S.
33	24	53	20	34	24	5	*af*	11	10	9	13	5.69	2.10	22.30	5–6	......	S. W.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest	Date.
Hudson Valley ...	....	....	....	....	....	....	....	....	....	....	....	61.1	92	11
Albany	Albany	85	30.05	30.37	2	29.61	30	0.76	77	53	....	62.0	90	11
Lebanon Springs	Columbia	930	....	....	....	....	....	....	....	....	....	58.3	87	12
Honeymead Brook	Dutchess	450	....	....	....	....	....	....	....	....	60.0	59.7	85	11
Poughkeepsie	"	180	....	....	....	....	....	....	....	....	....	60.7	92	11
Wappinger's Falls	"	....	....	....	....	....	....	....	....	....	....	60.6	87	11
Catskill	Greene	....	....	....	....	....	....	....	....	....	62.4	62.2	89	11
West Point	Orange	167	....	....	....	....	....	....	....	....	....	63.0	90	12
Carmel	Putnam	500	....	....	....	....	....	....	....	....	....	62.2	90	11
Mohawk Valley ...	....	....	....	....	....	....	....	....	....	....	....	58.9	85	11
Rome	Oneida	445	....	....	....	....	....	....	....	....	....	58.9	85	11
Champlain Valley	....	....	....	....	....	....	....	....	....	....	....	58 0	89	11
Plattsburgh Bar'k	Clinton	125	....	....	....	....	....	....	....	....	....	57.1	85	3
Glens Falls	Warren	340	....	....	....	....	....	....	....	....	58.3	58.8	89	11
St. Lawrence Val.	....	....	....	....	....	....	....	....	....	....	....	58.0	88	11
Madison Barracks	Jefferson	266	....	....	....	....	....	....	....	....	....	58.6	87	12
Watertown	Jefferson	486	....	....	....	....	....	....	....	....	....	58.1	88	11
Canton	St. Lawrence	304	....	....	....	....	....	....	....	....	56.8	56.2	86	*b*
Massena	"	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	St. Lawrence	300	....	....	....	....	....	....	....	....	58.3	58.8	88	11
Ogdensburg	"	258	....	....	....	....	....	....	....	....	....	59.1	86	11
Potsdam	"	300	....	....	....	....	....	....	....	....	57.9	57.3	85	11
Great Lakes	....	....	....	....	....	....	....	....	....	....	....	59.9	93	12
Dunkirk	Chautauqua	590	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	"	....	....	....	....	....	....	....	....	....	....	60.0	87	11
Buffalo	Erie	690	30.02	30.36	23	29.58	30	0.78	71	51	....	60.0	81	11
Pittsford	Monroe	....	....	....	....	....	....	....	....	....	58.7	58.6	90	11
Rochester	Monroe	621	30.03	30.34	23	29.55	30	0.79	73	50	....	60.0	92	11
Appleton	Niagara	....	....	....	....	....	....	....	....	....	....	58.8	88	11
Fort Niagara	Niagara	263	....	....	....	....	....	....	....	....	....	60.8	91	11
Baldwinsville	Onondaga	390	....	....	....	....	....	....	....	....	59.9	60.3	89	11
Oswego	Oswego	304	30.02	30.29	23	29.52	30	0.77	74	50	....	60.0	90	11
¦ Palermo	"	460	....	....	....	....	....	....	....	....	60.1	59.6	93	12
Lyons	Wayne	407	....	....	....	....	....	....	....	....	59.3	60.3	90	11
Erie, Pa	Erie	681	30.03	30.37	23	29.47	29	0.90	75	52	....	61.0	87	11
Central Lakes	....	....	....	....	....	....	....	....	....	....	....	60.9	92	11
Fleming	Cayuga	1000	....	....	....	....	....	....	....	....	60.4	60.8	91	11
Romulus	Seneca	719	....	....	....	....	....	....	83	52	....	61.2	92	11
Ithaca	Tompkins	810	30.03	30.30	23	29.14	30	1.16	71	51	59.5	60.6	91	11
Mean	....	....	30.04	30.39	23	29.14	30	0.79	77	52	....	59.4	97	11

* Mean of the tri-daily observations. ¦ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4.

(*a*) 11, 12; (*b*) 10, 11; (*c*) 23, 24; (*d*) 5, 23; (*e*) 21, 23, 24; (*f*) 10, 24; (*g*) 11, 25; (*h*) 2, 25; (*i*) 9, 13; (*u*) 3, 30; (*v*) 14, 29; (*w*) 18, 19; (*x*) 12, 17; (*y*) 2, 30; (*aa*) 13, 19; (*ab*) 13, 17, 29; (*ac*) 18, 28; (*ad*) 3, 29; (*cd*) 13, 28.

FOR SEPTEMBER, 1896—(*Concluded*).

TURE—(IN DEGREES FAHR.).								SKY.			PRECIPITATION—(INCHES).						Prevailing direction of wind.
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	
														h. m.			
31	23	53	21	34	2	5	13	11.6	9.4	9 0	7.8	5.65	4.28	21.00	5-6	.....	......
40	23	50	19	28	9	5	13	13	9	8	9	3.31	1.28	......	6	......	S.
31	23	56	23	34	2	9	20	5	13	12	7	5.83	2 25	......	6	......	N. W.
33	24	52	19	29	25	7	28	8	11	11	8	7 21	4 28	21.00	5-6	......	S. W.
33	24	59	25	38	*j*	9	28	12	10	8	5	5.70	3.84	22.00	5-6	......	N.
27	24	50	21	31	*k*	11	23	14	10	6	9	7.01	4.21	22.00	5-6	......	N.
40	*e*	49	18	27	2	10	28	10	12	8	8	5.24	2.36	22.00	6	......	S.
39	24	51	21	32	4	10	29	....	....	....	7	5.74	2.40	17.00	5-6	......	S. E.
34	24	56	20	34	2	7	17	19	1	10	9	5.18	2 60	12.00	5-6	......	......
30	22	55	21	34	3	10	14	....	....	....	14 0	4.57	0.78	......	19	......	......
30	22	55	21	34	3	10	14	....	....	....	14	4.57	0.78	......	19	......	......
32	23	54	22	33	*h*	7	13	11.0	7.0	12.0	11.5	3.83	1.75	......	5-6	......	......
34	24	51	21	42	2	10	*bb*	....	....	....	11	2.85	0.60	12.60	6	......	S. W.
32	23	57	22	33	*h*	7	13	11	7	12	12	4.81	1.75	......	5-6	......	N. W.
25	23	57	21	34	*m*	9	25	6.5	11.0	12 5	11 3	4.83	1.66	.....	19	......	......
35	23	52	21	31	10	13	30	....	....	....	10	5.84	1.23	......	19	......	S. W.
26	23	62	23	32	30	9	25	....	....	....	11	4.43	1.15	......	19	......	......
25	23	61	22	41	10	10	19	7	15	8	12	5.46	1.66	......	19	......	S. W.
32	23	56	19	34	*n*	6	27	1	13	16	12	4.50	1.54	......	19	......	S. W.
30	23	56	19	31	10	8	21	9	9	12	13	3.64	1.22	......	19	......	S. W
28	23	57	22	31	23	7	19	9	7	14	10	5.10	1.01	22.00	2-3	......	S. W.
31	23	51	16	43	10	3	15	10 9	9.1	10.0	11.3	3.99	1.66	......	29-30	......	......
36	23	51	16	29	2	9	24	15	3	12	10	4.73	1 32	......	19	......	S.
35	23	46	16	23	8	9	*bc*	11	8	11	13	4.39	0 88	......	30	......	S. W.
31	23	59	19	36	26	9	*bd*	8	13	9	9	3.73	0 75	......	19	......	W.
34	23	58	18	31	10	9	13	8	11	11	11	3.50	0.76	......	19	......	S. W.
36	23	52	17	29	*p*	8	*be*	10	10	10	11	4.17	1.66	......	29-30	......	N. E.
44	22	47	18	43	10	10	*cc*	....	....	....	11	3.71	1.37	......	29	......	N. W.
38	22	53	20	29	25	13	23	21	3	6	11	5.63	0 94	......	29	......	......
41	23	49	14	28	25	6	19	10	6	14	13	4.05	0.82	......	19	.....	S.
40	23	53	15	28	12	6	15	....	....	....	10	2.51	0.63	......	30	.....	......
40	23	50	17	30	*q*	9	*cd*	9	14	7	13	3.72	0.70	......	5	......	N. W.
42	23	45	12	23	2	3	15	6	14	10	12	3.72	1 12	......	19	......	S. W.
36	23	55	19	42	10	8	5	8.0	13.7	8 3	9.0	4.62	1.34	......	19	......	......
36	23	55	18	28	2	9	13	4	22	4	6	4.93	1.23	3.00	19	......	N. W.
36	23	56	19	42	10	8	5	12	6	12	9	5 10	1.34	......	19	......	W.
37	*c*	54	20	37	10	9	13	8	13	9	12	3.84	0 92	5.00	3	......	N. S.
25	23	55	20	47	2	3	15	10 3	10 1	9.6	10.6	4.59	4 28	21.00	5-6	......	S. W.

thermograph. ‖ Report received too late to be used in computing means. The means from
† Blank indicates that the duration is not shown in the original records, but it within 24 hours.

(*j*) 4, 26; (*k*) 2, 24; (*m*) 8, 9, 10, 29; (*n*) 8, 9, 10; (*p*) 24, 25; (*q*) 9, 10; (*r*) 5, 13; (*s*) 5, 29; (*t*) 5, 6, 13; 22, 29; (*ae*) 28, 29; (*af*) 17, 29; (*bb*) 7, 41, 15, 25; (*bc*) 13, 21, 24; (*bd*) 1, 30; (*be*) 13, 27; (*cc*) 19, 24,

TEMPERATURE — SEPTEMBER, 1896, SHOWING DAILY MEANSFOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	51	57	63	53	51	60	59	59	62	68	74	74	65	70
Alfred	64	74	74	65	56	64	68	74	77	85	88	89	67	80
	36	39	50	36	40	53	51	41	43	49	62	61	57	60
Angelica	63	75	67	63	59	67	67	71	79	84	83	88	73	80
	32	33	48	36	40	53	49	40	38	52	56	61	59	61
Bolivar	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Friendship	68	78	74	66	59	66	70	78	79	87	90	89	76	84
	32	31	51	31	39	53	49	38	38	47	59	59	58	61
Humphrey	62	72	67	67	55	62	63	72	80	82	85	90	73	80
	37	44	51	40	45	51	50	43	47	54	62	64	57	58
‡Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	62	72	68	64	59	62	65	72	75	82	86	85	76	79
	41	40	57	46	54	54	53	44	48	62	63	63	68	61
Elmira	68	74	78	66	61	76	71	75	78	86	91	82	75	83
	43	37	58	51	42	60	48	43	52	46	62	65	65	66
Avon	64	68	74	65	64	62	70	73	75	85	90	85	70	80
	40	38	50	40	40	50	50	43	44	50	64	64	38	52
Mt. Morris	67	78	75	83	61	70	74	78	....	88	92	80	69	80
	37	48	54	38	39	55	50	41	....	49	62	64	59	60
Lockport	65	76	67	65	67	62	71	74	78	84	87	79	76	80
	44	44	57	43	46	47	50	46	50	58	65	62	60	56
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	72	75	76	70	58	71	73	77	79	92	75	92	74	83
	41	44	51	43	42	53	50	48	48	53	66	65	59	60
Addison	66	76	78	66	60	71	68	75	77	87	90	89	71	81
	38	36	56	42	39	55	48	43	44	40	60	63	62	63
South Canisteo	66	76	75	67	59	71	69	73	78	86	90	89	71	83
	32	37	51	36	39	52	48	37	49	44	58	57	59	59
Arcade	61	72	71	62	58	64	66	70	74	80	86	84	70	78
	35	41	51	37	45	53	47	43	46	52	63	62	58	59
Varysburgh	60	74	70	67	60	67	71	77	81	87	91	84	67	84
	36	38	53	37	43	52	50	50	57	53	52	65	62	59
Eastern Plateau	54	53	67	54	50	61	58	57	59	67	74	74	67	67
Binghamton	66	74	83	67	63	72	70	75	80	87	94	93	77	83
	44	36	56	44	36	56	48	43	41	43	60	63	65	63
Oxford	67	72	80	70	67	72	72	72	77	84	92	90	73	75
	37	31	57	50	33	51	40	38	39	45	52	52	63	61
Cortland	71	73	78	62	61	71	67	72	75	83	91	88	74	77
	43	34	57	43	39	53	48	38	40	45	57	60	60	60
Bloomville	71	72	80	74	63	69	74	80	85	90	94	95	80	73
	43	35	56	44	37	53	46	44	45	52	55	63	64	60
South Kortright	64	72	80	64	67	69	69	68	72	81	88	86	74	73
	42	30	76	36	32	50	43	38	36	50	50	58	60	56
Elka Park	57	64	72	60	58	68	64	65	68	78	82	82	70	69
	45	39	52	42	42	50	49	44	47	60	61	66	56	54
Brookfield	64	70	67	62	64	61	60	68	66	90	93	86	81	80
	42	34	49	38	40	41	40	42	40	54	61	48	49	50
Port Jervis	65	68	81	72	65	70	73	71	80	85	89	81	76	73
	45	39	53	45	42	55	47	45	47	60	59	63	59	59
Cooperstown	60	66	76	59	60	65	64	68	70	77	85	83	70	69
	45	35	52	42	35	50	47	41	43	52	56	63	63	58
New Lisbon	63	70	69	62	61	70	69	70	75	81	89	89	72	71
	41	30	55	34	33	52	40	36	36	45	52	59	62	58
Oneonta	66	74	80	69	65	75	72	74	78	84	90	89	75	73
	47	36	57	42	38	54	49	42	43	50	56	62	64	60
Perry City	65	75	67	61	60	71	69	71	74	83	91	86	74	78
	42	34	54	42	35	52	46	39	39	44	59	59	58	60
Waverly	71	77	81	72	61	72	75	78	83	90	97	96	78	87
	36	33	60	43	37	52	46	40	43	44	59	62	65	63
Dryden	63	74	80	61	62	72	69	73	74	82	90	88	72	78
	43	36	56	45	41	55	51	43	52	53	62	60	65	64
Mohonk Lake	64	68	77	66	65	66	70	69	73	82	85	78	65	69
	49	51	57	51	47	52	53	48	51	63	70	70	43	55

REGIONS AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
63	59	64	59	57	50	53	48	41	51	56	64	62	55	58	57	58.8
70	73	70	70	66	58	64	52	50	66	72	73	71	61	64	62	57.5
54	40	52	45	44	38	40	38	28	36	42	57	52	46	50	45	
79	67	71	72	60	58	74	52	49	65	71	75	68	63	66	59	56.9
52	43	52	45	44	40	35	39	27	33	31	51	52	47	48	45	
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	....
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	
71	73	74	73	68	61	67	59	53	68	78	74	72	64	69	65	58.2
52	45	53	43	44	40	37	39	28	34	32	51	53	48	47	47	
67	71	68	69	62	57	68	52	50	63	72	72	66	59	63	63	57.4
53	47	53	44	42	37	40	37	29	37	44	57	49	44	53	44	
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	57.5
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	
67	69	68	68	63	58	63	56	49	64	69	67	64	59	65	65	58.8
59	47	57	47	47	39	42	43	36	38	40	55	53	46	56	47	
70	76	75	75	74	65	70	59	57	70	74	78	85	68	65	70	61.8
58	50	47	48	51	42	39	42	40	35	37	57	61	51	51	61	
73	69	76	74	69	58	67	62	52	66	75	78	71	61	74	66	58.8
62	46	54	48	54	41	39	39	28	35	38	55	56	49	47	53	
73	79	78	74	76	62	67	61	60	68	76	79	74	68	72	66	60.4
55	49	58	43	52	39	37	41	26	26	36	56	52	48	44	50	
72	71	75	75	65	59	69	56	53	67	76	73	64	61	76	62	60.0
58	51	55	50	48	42	43	43	30	44	45	58	53	47	50	52	
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	....
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	
68	77	76	77	70	65	73	58	55	74	73	79	78	64	63	64	60.8
52	42	55	48	43	38	48	39	31	35	44	53	53	48	46	48	
70	71	76	73	71	63	70	58	54	70	74	80	78	64	67	66	59.7
55	45	54	48	49	42	38	45	33	32	34	48	50	52	51	52	
72	73	76	73	71	61	68	58	53	68	74	79	78	62	67	67	58.0
55	39	50	42	46	41	34	40	27	32	35	47	49	48	47	46	
68	67	71	70	60	54	62	52	47	62	71	72	70	57	67	62	56.9
51	44	54	45	42	38	37	38	27	40	41	56	50	45	50	45	
74	75	73	75	62	61	64	54	55	70	76	71	70	60	70	65	59.0
52	51	59	46	43	38	38	40	26	38	37	53	52	46	49	46	
64	57	61	59	61	51	51	51	43	50	54	62	64	58	59	59	58.9
70	72	75	73	74	58	70	60	51	68	73	78	76	70	66	73	60.4
53	43	52	47	52	44	37	43	33	33	39	53	54	53	50	54	
74	70	75	73	68	58	68	60	52	68	72	77	76	66	67	68	58.2
53	41	47	41	50	40	33	40	28	30	31	45	53	49	51	50	
71	69	73	70	70	58	66	57	50	67	73	78	75	71	65	70	59.3
62	40	50	45	56	42	35	42	45	30	37	54	54	54	50	58	
76	78	71	78	70	66	67	65	60	70	69	76	77	70	67	70	61.4
57	46	50	47	53	44	38	43	33	35	45	49	54	53	54	55	
73	68	73	70	71	56	66	49	47	65	68	72	73	65	70	71	57.1
52	41	44	43	51	43	31	42	28	31	33	49	51	48	61	56	
68	63	63	66	72	54	63	54	55	57	61	68	71	64	60	67	56.8
54	46	52	47	57	39	38	48	29	35	48	54	54	30	51	54	
77	75	73	67	65	66	66	65	63	66	67	68	68	65	64	65	56.7
45	43	47	51	49	44	42	41	37	38	39	40	44	41	42	39	
77	75	69	72	73	62	66	62	57	67	69	73	75	69	65	70	61.4
65	53	54	54	60	48	39	52	37	36	41	45	48	58	55	61	
70	62	68	64	67	53	62	55	45	60	68	70	72	62	69	66	56.5
53	45	48	48	48	40	35	41	31	36	35	50	55	49	60	47	
70	66	72	69	68	56	66	55	49	65	70	76	74	65	68	69	56.2
55	40	45	44	51	39	30	40	27	30	32	42	48	49	48	50	
75	72	75	74	72	63	71	61	53	69	73	77	78	66	71	74	60.6
56	46	48	48	53	43	38	45	34	35	39	50	54	52	51	54	
68	66	76	74	59	57	65	53	49	66	72	79	76	66	67	62	57.0
50	38	48	44	46	38	35	40	33	33	35	50	54	47	44	50	
73	76	80	80	75	65	71	62	58	72	75	80	80	70	66	68	61.6
60	45	54	44	55	42	36	43	38	30	32	48	58	54	52	57	
69	68	73	72	70	.....	67	53	48	66	73	78	77	60	68	70	60.2
51	49	54	48	52	.....	37	39	33	33	46	56	52	51	53	59	
73	68	65	69	76	61	63	61	52	63	66	69	71	....	....	....	60.8
63	51	57	55	58	47	49	46	38	42	50	58	58	....	....	....	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau..	52	53	59	51	49	58	57	55	59	65	72	72	66	63
Saranac Lake......	59	70	64	61	61	71	67	71	77	83	86	80	67	71
	35	48	44	32	42	51	39	39	45	53	59	54	56	59
Gloversville	64	72	77	66	64	67	67	72	75	84	90	89	69	71
	46	38	55	41	36	49	50	40	44	55	59	62	59	56
North Lake........	64	53	64	68	57	60	65	64	70	76	80	85	87	66
	44	47	50	44	38	48	51	40	44	49	55	59	65	58
Lowville	62	67	68	59	61	70	67	73	75	82	87	81	73	72
	44	35	53	39	33	51	54	38	43	46	58	62	58	56
Number Four......	59	62	64	54	60	66	63	71	75	78	85	82	69	67
	46	36	48	42	36	50	48	40	40	45	56	61	60	57
Atlantic Coast	61	60	66	61	59	66	64	65	65	73	74	70	69	65
Brooklyn	69	73	82	69	69	72	72	71	73	84	81	80	76	72
	56	52	61	55	54	60	55	63	58	67	66	66	71	59
Manhattan Beach..	71	68	69	77	69	71	70	73	70	73	85	75	77	71
	55	53	58	54	54	62	57	57	57	60	67	64	66	59
New York City....	68	70	83	71	67	71	74	70	72	86	84	78	75	71
	54	56	64	54	57	64	58	60	58	66	68	67	61	58
Willet's Point.....	71	73	82	72	71	72	78	74	73	85	87	77	76	75
	48	54	56	50	43	54	56	60	61	64	63	66	59	59
Brentwood.........	77	75	77	72	74	76	71	74	76	87	85	84	80	77
	47	39	64	42	41	58	47	53	56	63	59	56	60	58
Setauket	68	71	79	68	68	74	72	70	70	80	84	76	73	68
	54	53	61	53	50	60	58	59	60	65	64	62	61	58
Bedford	68	70	80	70	69	71	74	71	72	84	86	77	72	71
	50	38	58	50	40	57	47	51	54	64	59	58	60	57
Hudson Valley....	57	56	68	60	55	63	61	61	62	71	74	73	68	65
Albany	69	72	79	70	68	69	74	75	79	85	90	88	66	73
	52	45	57	50	43	54	52	49	51	63	64	67	61	58
Lebanon Springs ..	65	70	78	64	68	73	72	71	72	81	85	87	76	75
	39	36	57	42	38	50	42	41	43	59	56	63	60	55
Honeymead Brook.	65	67	77	63	66	71	70	70	72	81	85	81	69	72
	43	39	57	49	42	55	46	48	50	63	59	62	60	57
Poughkeepsie	70	73	85	80	59	73	75	73	74	85	92	81	75	75
	42	36	55	42	38	56	45	47	46	66	56	60	64	46
Wappingers Falls .	68	75	84	73	72	74	70	72	73	85	87	82	81	77
	49	44	57	47	43	56	52	50	51	57	66	62	66	61
Catskill...........	71	71	80	70	67	70	73	74	72	85	89	82	75	75
	49	44	60	50	43	55	51	49	51	66	63	61	62	59
West Point........	67	71	74	84	73	71	72	77	74	73	86	90	79	72
	50	43	47	52	44	52	53	55	55	58	61	60	65	58
Carmel	68	72	80	69	68	71	75	74	73	82	90	81	70	74
	50	38	59	48	45	54	49	50	52	65	62	64	61	53
Mohawk Valley....	54	66	60	52	57	59	54	57	66	66	74	72	74	67
Rome	65	74	77	65	64	70	65	69	74	78	85	83	84	72
	42	58	43	40	50	48	42	45	48	55	62	62	63	62
Champlain Valley .	56	58	66	55	52	54	54	58	59	66	71	75	65	64
Plattsburgh Bar'ks	66	83	85	65	65	59	65	70	70	73	79	84	75	68
	50	41	45	45	35	44	55	45	45	50	56	64	60	58
Glens Falls........	66	70	79	66	68	64	72	74	76	83	89	88	66	72
	44	37	56	45	38	50	46	44	46	58	60	64	59	58
St. Lawrence Val..	56	56	58	53	53	62	61	60	63	66	73	69	68	63
Madison Barracks.	....	....	....	....	....	....	71	70	72	78	82	87	79	74
	....	....	....	....	....	....	50	43	45	47	59	60	57	53
Watertown	69	72	69	68	69	74	75	70	75	78	88	80	78	75
	41	45	42	40	46	48	46	42	50	52	60	60	65	60
Canton	65	70	66	80	67	72	68	73	74	86	86	76	69	72
	42	40	49	40	36	54	49	43	45	45	59	56	58	51
Massena...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond ..	66	66	66	66	62	68	80	84	84	84	88	80	70	70
	50	46	56	46	44	54	50	50	50	50	60	60	58	54

MAXIMA AND MINIMA FOR THE STATIONS — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
58	52	56	57	54	48	48	46	39	45	52	61	61	53	53	60	55.8
67	67	68	65	58	57	63	47	49	54	67	72	73	63	68	75	55.3
38	43	48	50	38	38	42	27	33	44	49	54	44	31	40	41	
75	67	67	69	69	55	63	60	53	59	70	75	77	62	62	73	58.2
55	45	46	48	52	43	35	45	32	38	35	48	52	46	43	54	
60	63	64	....	64	62	50	57	50	44	55	67	71	70	63	61	54.6
48	40	44	....	43	37	32	41	27	30	34	41	53	47	40	55	
66	64	69	68	60	56	63	55	48	60	71	74	71	63	69	67	56.4
53	38	45	45	53	38	34	40	27	35	38	57	54	46	36	56	
65	62	63	64	58	54	58	48	45	54	67	68	67	63	70	65	54.3
48	36	42	44	49	36	39	38	25	33	37	55	52	42	38	52	
68	66	67	66	68	57	57	59	50	54	60	64	64	65	63	67	63.9
76	73	72	72	80	67	63	65	60	71	74	75	76	72	67	74	65.6
65	61	62	62	62	50	50	58	45	45	49	55	58	62	61	64	
68	71	72	70	71	76	64	66	63	57	68	65	69	67	69	70	63.5
59	60	60	62	62	51	50	55	44	44	48	52	57	59	60	60	
75	74	72	74	81	63	65	63	56	67	70	73	72	69	66	72	65.0
64	59	60	61	57	51	51	50	43	44	54	58	57	61	58	63	
77	77	69	76	83	66	77	64	56	70	74	74	76	71	71	71	64.8
62	61	61	60	51	46	47	45	43	45	51	55	58	58	59	57	
79	76	73	74	83	62	72	68	58	70	73	75	74	74	72	76	62.8
58	55	51	51	50	40	35	55	40	30	41	51	46	60	59	62	
75	69	68	72	80	64	66	66	57	65	70	73	75	68	65	72	63.9
61	60	59	60	59	51	48	58	45	42	52	56	57	62	59	63	
77	74	65	73	80	65	66	62	56	67	72	74	75	69	62	73	61.7
61	55	60	55	57	48	39	53	40	33	40	53	48	57	57	61	
67	60	61	63	66	55	53	56	40	49	56	62	65	61	60	66	61.1
77	70	68	73	74	61	66	63	56	60	71	75	78	65	68	76	62.0
59	52	57	56	53	46	42	47	40	41	44	55	57	52	50	58	
72	71	66	68	72	53	65	64	48	58	69	72	73	65	63	73	58.3
58	45	48	46	53	44	34	41	31	32	38	48	53	53	47	57	
76	68	67	68	76	58	66	63	49	60	68	70	72	63	67	72	59.7
61	50	55	52	55	44	39	50	38	33	39	50	51	56	55	52	
76	74	76	75	80	64	69	64	55	67	74	76	77	64	65	76	60.7
43	46	41	52	56	43	37	47	39	33	38	48	50	55	55	59	
81	72	68	71	79	65	69	66	53	68	72	74	78	76	72	75	60.6
64	54	51	55	58	48	43	50	42	37	42	50	49	56	58	58	
75	70	67	74	76	63	62	62	55	62	69	74	76	65	65	74	62.2
61	52	55	56	57	51	40	48	40	40	45	54	56	55	53	60	
74	80	75	69	76	80	67	70	65	57	69	72	75	75	66	71	63.0
59	55	55	56	57	49	42	52	42	39	45	51	51	56	56	57	
80	74	66	74	78	64	68	65	52	64	70	74	80	66	65	76	62.2
57	52	59	59	61	52	38	46	38	34	43	50	60	56	54	61	
66	58	56	58	52	50	56	42	42	51	61	64	59	58	61	59	58.9
75	70	68	66	62	55	65	55	50	62	68	75	70	68	65	70	58.9
58	45	45	50	42	44	46	30	35	40	54	54	48	47	57	48	
66	56	54	58	60	52	51	52	45	46	52	60	64	55	50	57	58.0
70	70	65	65	68	59	62	63	60	54	55	65	70	70	58	65	57.1
60	42	40	50	52	44	42	45	35	34	45	50	55	45	35	35	
76	68	65	70	68	60	65	55	54	61	70	76	76	64	69	72	58.8
56	45	48	49	54	45	36	44	32	36	37	50	55	42	39	56	
59	54	57	59	57	51	55	50	41	52	56	63	59	54	54	62	58.0
74	64	70	70	73	62	61	63	54	58	62	73	68	59	61	71	58.6
58	40	42	53	54	41	42	48	35	39	47	52	53	45	39	58	
67	66	72	71	63	58	66	56	53	64	55	74	68	70	72	75	58.1
57	44	43	49	44	38	46	40	26	40	46	48	45	46	44	43	
64	64	66	69	60	57	67	59	50	63	71	72	67	59	69	70	56.2
43	37	48	44	50	36	44	38	25	43	42	52	54	39	35	52	
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	
...	......	......	......	......	......	....	....	....	....	....	....	....	....	....	....	....
66	64	64	70	62	56	66	54	50	60	70	72	60	64	66	68	58.8
50	44	52	50	54	40	42	42	32	46	46	56	54	46	46	54	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val. (Con.)														
Ogdensburg	70	72	66	60	65	70	70	79	79	83	86	76	70	72
	45	44	52	43	41	55	52	50	54	52	65	59	60	54
Potsdam	66	70	71	66	65	72	67	69	74	78	85	75	74	71
	44	40	41	42	37	53	48	49	48	59	59	58	54	52
Great Lakes	56	59	65	55	55	62	60	60	63	68	77	71	65	67
Dunkirk...........	....	....	....	....	....	....	....	....	....	....	...	....	....	....
	....	....	....	....	....	....	....	....	....	...	....	....	....	....
Westfield..........	62	75	76	61	64	64	63	74	74	83	87	80	72	80
	45	46	56	47	48	54	52	50	55	62	62	63	61	58
Buffalo	64	71	72	63	66	67	67	75	78	74	81	80	68	77
	48	49	54	48	48	56	54	52	58	62	68	64	59	57
Pittsford	54	73	73	60	62	70	68	73	75	84	90	75	70	77
	45	42	58	45	44	58	53	44	47	53	66	65	57	54
Rochester	64	72	70	61	62	69	69	75	77	86	92	73	70	76
	45	45	56	49	47	57	54	49	49	55	68	63	61	57
Appleton	65	69	72	62	61	65	66	66	70	82	88	72	68	76
	45	43	58	44	45	56	51	45	49	57	64	59	60	55
Fort Niagara	71	72	74	64	65	68	70	69	73	88	91	80	72	79
	47	46	60	51	46	56	52	47	46	45	67	62	60	54
Baldwinsville......	67	74	74	64	65	74	71	75	76	76	89	83	75	79
	44	47	49	45	48	55	46	47	52	55	64	61	60	61
Oswego............	62	72	72	58	62	70	65	69	70	77	90	72	70	71
	55	45	60	52	44	54	54	49	50	53	64	66	61	57
Palermo	65	72	70	61	62	70	65	68	69	77	80	93	69	71
	50	45	61	52	43	54	54	48	50	53	66	65	60	57
Lyons	64	73	74	61	62	71	68	71	79	82	90	76	71	77
	49	45	57	47	45	58	53	50	49	52	65	65	62	58
Erie, Pa	63	74	76	61	64	63	64	72	73	81	87	76	69	73
	51	51	61	51	52	55	55	53	58	67	72	69	62	62
Central Lakes	57	61	67	56	55	66	62	62	64	65	77	74	67	70
Fleming	64	74	75	60	62	73	69	70	74	81	91	82	70	79
	48	46	57	49	45	60	55	48	52	53	69	65	61	62
Romulus............	67	74	75	66	62	72	70	75	77	82	92	85	73	78
	50	60	57	50	54	63	55	58	59	40	54	65	63	58
Ithaca	65	74	78	64	62	72	69	73	75	85	91	84	71	78
	48	40	58	50	42	58	52	45	46	48	65	65	62	63
Mean	55	58	64	55	54	61	59	59	62	68	74	72	67	66

‡ Maximum and minimum by the Draper Thermograph.

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
68	67	67	66	63	64	63	61	52	62	70	71	65	66	65	71	59.1
50	55	50	50	54	40	55	40	30	47	47	58	53	45	40	55	
61	67	66	66	59	67	63	58	59	61	69	72	65	68	67	73	57.3
47	39	48	48	52	47	45	36	28	42	44	52	53	40	39	52	
63	58	63	62	61	51	55	50	45	54	61	65	61	65	60	58	59.9
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
68	66	71	70	68	58	65	55	52	53	74	71	67	63	67	67	60.0
58	48	58	52	48	44	45	44	36	44	49	59	54	48	53	49	
70	68	70	69	60	58	62	56	55	62	73	68	66	61	71	67	60.0
55	51	55	54	45	41	53	40	35	53	54	58	51	48	51	52	
68	66	74	73	63	58	64	53	51	61	75	77	71	60	70	61	58.6
55	49	54	49	46	41	42	41	31	41	46	41	52	49	49	52	
68	67	71	72	59	58	64	54	53	68	74	76	68	61	70	66	60.0
56	52	53	52	46	42	45	40	34	42	46	61	52	50	52	49	
70	65	71	68	63	60	66	56	54	67	73	72	62	59	70	64	58.8
60	52	54	49	49	43	43	46	36	38	44	57	54	49	49	52	
70	71	70	70	70	63	66	61	60	61	74	71	65	61	60	62	60.8
57	54	53	50	60	45	48	44	45	51	57	57	52	50	59	48	
71	66	74	71	61	60	66	56	52	68	74	79	73	65	70	67	60.3
48	52	52	54	46	44	48	36	39	43	45	58	51	50	54	50	
65	60	70	69	60	56	64	53	50	62	74	76	68	60	69	70	60.0
59	50	54	59	54	44	44	46	41	43	46	58	56	50	51	53	
65	60	70	69	64	55	63	54	50	62	73	74	68	59	69	66	59.6
59	50	53	59	55	44	44	48	40	42	46	58	56	50	51	56	
68	65	72	71	63	58	64	57	51	67	72	76	67	61	69	66	60.3
54	49	55	53	47	45	43	44	40	50	45	58	56	52	52	53	
67	66	68	69	61	58	64	56	52	62	74	70	66	60	69	54	61.0
64	52	60	53	50	45	47	46	42	46	52	62	56	49	56	50	
63	56	64	61	58	51	55	50	44	53	59	68	65	56	59	61	60.9
69	65	74	72	64	58	65	59	50	66	75	81	75	60	68	68	60.8
55	45	55	52	51	43	45	43	36	41	48	58	55	49	53	53	
70	69	73	72	65	59	66	57	52	68	73	80	72	64	68	67	61.2
56	43	55	50	46	42	46	43	36	39	43	56	54	49	48	53	
70	68	74	72	72	59	66	55	50	69	74	78	77	63	65	74	60.6
56	46	55	50	49	44	41	44	37	37	43	57	56	52	51	52	
64	58	60	60	59	52	54	50	44	51	57	63	62	58	58	61	59.4

|| Received too late to be used in computing means.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.00	0.00	0.51	T.	0.41	0.12	0.01	0.00	0.00	T.	0.00	T.	T.	T.
Alfred	....	....	.51	...	.45	....	....	....	....	....	....	....	.01	....
Angelica	....	....	.33	....	*	† .52	....	....	....	....	....	....	....	....
Bolivar	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Friendship	....	....	.50	....	.20	.25	....	....	....	....	....	....	....	....
Humphrey	....	....	.43	....	.40	T.	....	....	....	....	....	....	....	T.
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	....	....	.40	....	.66	.12	.09	....	....	....	....	....	....	....
Jamestown	....	....	.54	....	.81	.09	T.	....	....	....	....	....	....	....
Elmira	....	....	.25	....	.31	....	....	....	....	....	....	....	....	....
Pine City	....	....	.60	....	.10	.06	....	....	....	....	....	....	....	....
Akron	....	....	.93	T.	.40	.44	....	....	....	....	....	T.	....	....
Avon	....	....	.89	....	....	.35	....	....	....	....	....	....	T.	....
Mt. Morris	....	....	.34	....	.30	.26	....	....	....	.03	....	....	.02	....
Lockport	....	....	.41	....	.26	.21	....	...	....	....	....	....	.06	....
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone	....	...	.53	....	.65	....	....	....	....	....	....	....	....	....
Wedgewood	....	....	.56	....	.58	.06	....	....	....	....	....	....	....	....
Addison	....	....	.27	....	.70	.05	....	....	....	....	....	...	....	....
Atlanta	....	....	.40	....	.23	....	....	....	....	....	....	....	T.	.02
Haskinville	....	....	.45	....	.38	.22	....	....	....	....	....	....	....	....
South Canisteo	....	....	.40	....	.55	....	....	....	....	....	....	....	T.	....
Arcade	....	....	.76	....	.35	.09	.08	....	....	....	....	....	....	....
Attica	....	....	....	...	....	....	....	....	....	..	....	....	....	....
Varysburgh	....	....	.65	....	.48	.12	.10	....	....	....	....	....	....	....
Eastern Plateau	0.00	0.00	0.37	T.	0.69	0.39	0.00	0.00	0.00	0.00	0.00	0.31	0.01	0.01
Binghamton	....	....	.42	....	.13	.06	....	....	....	....	....	.80	....	....
Chenango Forks	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oxford	....	....	.22	....	.18	.09	....	....	....	....	....	....	.10	....
Cortland	....	....	.45	.01	.50	.03	....	....	....	....	....	....	....	....
Bloomville	....	....	*	† .50	*	† .55	....	....	....	....	....	*	† .99	....
Deposit	....	....	....	....	..	....	....	....	....	....	....	....	....	....
South Kortright	....	....	.61	....	.71	....	....	....	....	....	....	.21	....	....
Elka Park	....	....	.39	....	2.33	.16	....	....	....	....	....	....	....	.03
Brookfield	....	....	.73	....	.40	....	....	....	....	....	....	....	....	....
Hamilton	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Apulia	....	...	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	...	....	....	....	....	....	....	....	....	....	....
Port Jervis	....	....	.14	....	*	†2.47	....	....	...	....	....	....	....	....
Warwick	....	....	.10	....	.80	3.88	....	....	....	....	....	....	...	T.
Cooperstown	....	....	.32	....	.41	....	....	....	....	....	....	1.14	....	.02
New Lisbon	....	....	.12	....	.30	.18	....	....	....	....	....	2 35	.02	....
Oneonta	....	....	.30	....	....	.37	....	....	....	....	....	.41	....	.14
Perry City	....	....	.44	....	.50	....	....	....	....	....	....	....	....	....
Newark Valley	....	....	.26	....	.25	.25	....	....	....	....	....	....	....	....
Waverly	....	....	.47	....	.39	.04	....	....	....	....	....	.01	....	....
‡Dryden	....	...	.76	....	.36	....	....	....	....	....	....	....	....	....
Mohonk Lake	....	....	.20	....	3.05	.85	....	....	....	....	....	....	...	....
Northern Plateau	T.	T.	0.52	0.15	0.43	0.42	0.01	.00	0.00	0.00	0.00	0.50	0.01	0.01
West Chazy	....	....	....	...	....	....	....	....	....	....	....	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Saranac Lake	T.	T.	....	.89	.35	.11	....	....	....	....	....	.05	T.	.07
Gloversville	.01	....	.45	....	.61	.84	....	....	....	....	....	1.42	.03	....
North Lake	....	....	.70	....	.55	....	....	....	....	....	....	....	....	....
Lowville	....	....	.54	....	.28	.11	.05	....	....	....	....	....	....	....
Number Four	....	....	.87	....	.30	.16	....	....	....	....	....	....	....	....
Kings Station	....	....	.56	....	.50	1.29	....	....	....	....	....	1.50	.05	....

tation for September, 1896 — (Inches.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.08	T.	0.21	0.12	0 97	0.01	T.	0.28	T.	0.00	0.00	0.02	0.21	0.39	0.36	0.87	4.58
.08	....	.10	.09	1.11	....	....	.15	....	....	....	.04	.35	.79	.36	1.00	5.04
.09	....	.13	.10	1.02	....	....	.35	....	....	....	.02	*	†.84	*	†1 56	4.96
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
.10	....	.08	T.	1.40	....	....	.21	....	....	....	T.	.45	.63	.40	1.43	5.65
.20	....	.18	.85	.40	....	....	.37	....	....	....	T.	.43	.30	.40	1.09	5.05
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
.16	....	.20	-.38	.70	.04	....	.27	....	....	....	T.	.06	.42	.21	.83	4.64
.30	....	.40	.07	1.18	....	....	.46	....	...	....	T.	.15	.30	.30	.88	5.48
....	....	......	...	1.12	....	....	.08	....	....	....	....	....	.43	.34	.20	2.73
....	....	......	*	†1.32	.07	.07	....	....	....	....	....	....	.32	...	.81	3.35
....	T.	.41	T.	.94	....	....	.46	....	....	....	T.	.14	T.	.51	1.80	6.03
.08	....	.21	....	.64	....	.02	.40	....	....	....	T.	T.	.24	.12	.87	3.82
....	....	.30	....	.90	....	....	.75	....	....	....	.02	...	.40	.02	.60	3.94
....	....	.37	....	.60	....	....	.34	....	....	....	....	.23	.75	1.25	T.	4.45
....	....	......	...	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	1.10	....	....	.15	....	....	....	....	....	....	....	1.35	3.78
.04	....	.25	.05	1.60	.10	....	.09	T.	....	....	.01	.27	.55	.46	.40	5.02
.07	....	.04	T.	.98	....	....	.08	....	....	....	....	.02	.46	.35	.65	3.67
.04	....	.16	....	1 01	....	....	.28	....	....	....	....	.40	.46	.06	.60	2.66
.10	....	.35	T.	1 10	....	....	.20	....	....	....	T.	.20	.77	.15	.92	4.84
.12	....	.06	.69	.30	....	T.	.20	....	....	....	.13	1.00	....	1.47	.18	5.10
.16	....	.65	.06	1.15	....	....	.35	....	....	....	.08	.17	.30	.30	1.68	6.18
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.42	T.	1.20	....	....	.25	....	....	...	T.	.10	.34	24	1.25	5.15
0.04	0.01	0.23	0.18	1.00	0.09	0.00	0.05	0.00	0.00	0.00	T.	0.03	0.15	0 33	0.41	4.44
....	....	.45	....	2.38	....	....	....	....	....	....	....	....	....	.04	.34	4.62
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	.02	.95	.07	....	T.	....	....	....	....	....	.18	....	.34	2 15
.08	....	.23	....	.79	.26	....	.06	....	....	....	....	.21	.27	.07	.74	3.70
....	....	.35	....	1.48	....	....	.19	....	....	....	....	....	....	....	....	4 06
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.29	....	1.42	....	....	....	....	....	....	....	....	....	.44	....	3.68
....	....	.25	1.40	.36	....	....	....	....	....	....	....	....	....	2.50	....	7.42
....	....	.48	.20	......	....	....	T.	....	....	....	....	....	.10	.06	T.	1.87
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	......	....	....	....	....	....	...	....	....	....	....	....	....
.08	....	.10	....	.32	.43	....	.26	....	....	....	....	....	....	.12	1.51	5.43
.15	.11	.08	....	1.17	....	....	.06	....	....	....	....	....	....	.06	1.71	8.12
.01	....	.60	....	1.20	....	....	....	....	....	....	....	....	.25	....	.38	4 33
.13	....	.24	....	1.08	.04	....	....	....	....	....	....	....	.16	.10	.35	5.07
....	....	.15	....	.70	.55	....	....	...	....	....	...	....	.17	.19	.15	3.13
.04	....	.19	.05	.88	.05	....	.15	....	....	....	.05	.27	.51	.51	.33	3.97
T.	...	.28	....	1.50	....	....	T.	....	....	....	....	....	.15	T.	.55	3.24
....	....	.01	....	1.84	....	....	.01	....	....	....	....	T.	.16	.42	.22	3.57
.05	....	.13	....	.93	.09	....	.03	....	....	....	....	....	.65	....	....	...
.18	....	.06	1.35	.05	...	....	.10	....	....	....	....	....	....	.80	....	6.64
0.09	0.00	0.72	0.00	0.74	0.53	0.00	0.20	0.01	0.02	0.00	0.06	0.18	0.20	0.03	0.33	5.24
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
....	....	.27	....	1.71	....	....	.27	.07	T.	....	.02	.39	....	.09	.46	4.75
.10	....	1 00	....	1.11	.02	....	T.	....	....	....	....	....	.26	*	†.36	6.21
.20	....	1.59	....	......	1.50	....	....	....	....	....	....	.20	.45	....	.40	5.59
.06	....	.19	....	.65	.26	....	.26	....	.06	....	....	.06	.20	....	.37	3.09
.19	....	.52	....	......	1.41	....	.35	....	.09	....	.32	.45	....	....	.35	5.01
....	....	.77	....	1.00	....	....	.32	....	....	....	....	....	.32	.10	.38	6.79

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.02	0 00	0.62	0.01	0.50	1.35	0.00	0.00	T.	T.	0.00	T.	0.01	0.00
Brooklyn	....	....	.94	....	.50	1.58	....	....	....	....	....	....	....	....
Manhattan Beach.	.14	....	*	†.68	.66	1.76	....	....	....	....	....	....	....	....
New York city	....	....	.48	.02	.47	.69	....	....	....	....	....	T.	T.	....
Willet's Point	....	....	.95	....	.93	1.70	....	....	....	....	....	T.	....	....
Brentwood	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Setauket	....	....	.55	....	.12	.51	....	....	T.	T.	....	....	.02	....
Bedford	....	....	.16	.02	.33	1.77	....	....	....	....	....	.01	.02	....
Hudson Valley	0.02	0.00	0.18	0.11	0.17	2.64	T.	0.00	0.00	0.00	0.00	T.	T.	T.
Albany	....	....	.25	T.	.10	1.28	.02	....	....	....	....	T.	T.	T.
Lebanon Springs..	....	....	*	†.71	*	†2.25	....	....	....	....	....	T.	....	....
Honeymead Brook	....	....	.50	....	.31	3 97	....	....	....	....	....	....	....	....
Poughkeepsie	....	....	T.	....	.39	3.45	....	....	....	....	....	T.	....	....
Wappinger's Falls	....	....	.06	....	.40	3.81	....	....	....	....	....	T.	.03	....
Catskill	....	....	.30	....	*	†2 36	....	....	....	....	....	T.	....	....
West Point	....	....	....	....	*	†2.40	....	....	....	....	....	....	....	....
Boyds Corners....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	.08	....	....	2.60	....	....	....	....	....	....	....	....
Southeast Reserv'r	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	....	....	....	1.00	....	1.50	....	....	....	....	....	....	....	....
Easton	.16	....	.44	....	....	1.76	....	....	....	....	....	....	....	....
Mohawk Valley ...	0.00	0.08	0.30	0.00	0.76	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rome	....	.08	.30	....	.76	....	.04	....	....	....	....	....	....	....
Champlain Valley.	0.00	0.00	0.16	0.26	?	?	0.05	0.00	0.00	0.00	0.00	?	?	0.00
Plattsb'h Barra'ks	....	....	T.	.52	....	.60	.10	....	....	....	....	....	....	....
Glens Falls	....	....	.32	....	*	†1.75	....	....	....	....	....	*	†.65	....
St. Lawrence Val..	0.04	0.02	0.94	0.06	0.26	0.15	0.01	0.00	0.00	0.00	0.00	0.00	T.	0.00
Madison Barracks.	....	*	†.60	....	....	....	....	....	....	....	....	....	....	....
Watertown	....	*	†.08	.46	.57	.05	....	....	....	....	....	....	....	....
Canton	.10	....	1.28	....	.19	.17	.08	....	....	....	....	....	....	....
DeKalb Junction .	.15	....	1.41	....	.20	.31	....	....	....	....	....	....	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond..	....	.01	.64	....	.28	.18	....	....	....	....	....	....	T.	....
Ogdensburg.......	....	.05	.42	....	.32	.10	....	....	....	....	....	....	....	....
Potsdam	....	*	†1.01	....	*	† .26	....	....	....	....	....	....	....	....
Great Lakes	0.01	T.	0.39	0.02	0.43	0.19	T.	0.00	0.00	0.00	0.00	T.	T.	0.02
Dunkirk...........	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	....	....	.65	....	.12	.50	....	....	....	....	....	....	....	....
Buffalo	....	....	.56	....	.30	.41	....	....	....	....	....	....	....	....
Adams Centre	....	....	.70	....	*	† 56	....	....	....	....	....	....	....	....
Pittsford...........	....	....	.50	....	.60	T.	....	....	....	....	....	....	....	....
Rochester	....	T.	.50	T.	.51	.05	....	....	....	....	....	T.	....	....
Scottsville	....	....	.39	....	.52	....	....	....	....	....	....	....	....	....
Appleton	....	T.	.16	....	.33	38	....	....	....	....	....	....	....	....
Fort Niagara	....	....	.13	....	.50	*	†.08	....	....	....	....	....	.03	....
Niagara Falls.....	....	....	.26	....	.34	.47	....	....	....	....	....	....	.02	....
Baldwinsville	....	....	.35	....	.77	T.	....	....	....	....	....	....	....	.29
Skaneateles	....	....	.52	....	.40	....	....	....	....	....	....	....	....	....
Ridgeway	....	....	.26	....	.26	.24	....	....	....	....	....	....	....	....
Demster	....	....	.76	.03	.60	.03	....	....	....	....	....	....	....	....
Fulton............	....	....	.40	....	.82	....	....	....	....	....	....	....	....	....
Oswego	....	T.	.66	....	.53	.15	....	....	....	....	....	....	....	....
Palermo	....	T.	.10	....	....	.20	.10	....	....	....	....	....	....	....
Phœnix	.09	....	.03	.28	....	.66	....	....	....	....	....	....	....	....

-TATION FOR SEPTEMBER — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.16	T.	0.10	0.06	0.70	0.18	0.00	0.05	T.	0 00	0 00	0.00	0.00	0.00	0 11	0.61	4.48
.01	....	.08	....	.55	...	....	.05	....	....	....	....	....	....	T.	.78	4.49
.02	....	T.	.02	.03	.84	....	....	.02	....	....	....	....	....	....	.20	4.37
T.	T.	.09	....	.86	.15	....	.03	....	....	....	....	....	....	T.	.25	3.04
.13	....	.16	.34	.85	....	....	T.	....	....	....	....	....	....	.62	....	5.68
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	....
.70	....	.12	....	.92	T.	....	.06	....	....	....	....	....	....	T.	.62	3.62
.12	....	.13	....	.99	.10	....	.17	....	....	....	....	....	....	.06	1.81	5.69
0.04	0.00	0.21	T.	1.08	0.11	0.00	0 16	T.	0.00	0.00	0.00	0 00	0.05	0.02	0.71	5.52
T.	....	.25	T.	.75	T.	....	.24	T.	....	....	....	....	.14	....	.28	3.31
T.	....	.61	....	*	†1.68	....	.02	....	....	....	....	....	.03	....	.53	5.83
T.	....	.09	....	1.70	....	....	.13	....	....	....	....	....	T.	.01	.50	7 21
....	....	T.	....	1.00	....	....	.28	....	....	...	....	...	....	T.	.58	5.70
.16	....	......	....	1.10	....	....	.40	....	....	....	....	....	....	.02	1.03	7.01
.05	....	.35	....	1.05	....	....	.06	....	....	....	....	...	....	.15	.92	5.24
.11	....	.09	....	1.15	....	....	.05	....	....	....	....	....	....	....	1 94	5.74
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	6.54
.07	....	.11	....	1.10	....	....	.32	....	....	....	....	....	....	*	†.90	5.18
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....	....	5.17
....	....	.02	....	.10	1 00	....	....	...	....	....	....	....	.05	....	.37	4.04
T.	....	.61	....	1.74	....	....	.08	...	....	....	...	....	.25	....	,26	5.30
0.41	0.22	0.60	0 48	0.78	0.00	0.00	0.04	0.00	0.00	0.00	0.10	0.53	0.00	0 15	0.08	4.57
.41	.22	.60	.48	.78	....	....	.04	....	....	....	.10	.53	....	.15	.08	4.57
0.00	0.00	0.30	0.08	0.38	0.26	0.00	0.10	0.02	0.00	0.00	0.00	T.	0 40	0.00	0.31	3.83
....	....	.05	.17	.11	.50	....	.10	.05	....	....	....	T.	.45	....	.20	2.85
....	....	.56	....	.65	.02	....	.10	....	....	....	....	....	.34	....	.42	4.81
0.09	0.22	0.07	0.13	1.26	0.06	0.00	0 44	T.	0 08	0.00	0.13	0.49	0.01	0.32	0.39	4.94
....	1.12	......	.34	1.23	...	....	1 06	....	.10	....	.14	.41	....	.84	....	5 84
.14	.32	......	....	1.15	....	....	.36	....	.19	....	....	.43	....	....	.68	4.43
....	....	......	.26	1.66	....	....	.27	....	....	...	.12	.68	.03	....	.62	5.46
.25	....	.26	....	.90	.30	....	.25	....	.05	....	....	.94	.04	....	.55	5 61
....	....	......	....	......	....	....	....	....	....	....	....	....	....	....		....
.03	....	.07	....	1.54	.10	....	.41	....	.07	....	.21	....	....	*	†.96	4 50
.05	.09	......	.33	1.22	....	....	.05	.02	....	....	.39	.50	*	*	†.10	3 64
13	....	.15	....	1.10	....	....	.67	....	,14	....	*	†.79	....	.74	.11	5.10
0.16	0.01	0.40	0.05	0.74	0.14	0.00	0.18	T.	T.	T.	0.02	0.23	0.16	0 32	0.73	4.20
...	....	......	....	......	....	....	....	....	....	....	....	....	....	...	....	....
.12	....	.23	....	1.32	....	....	.39	....	....	....	....	.49	....	.78	.13	4.73
.15	....	.34	.01	.66	....	....	.21	.02	....	....	....	.21	.04	.60	.88	4.39
.16	....	.22	....	.50	1.02	....	....	.06	....	.03	.04	....	....	....	.37	3.66
....	....	.50	....	.75	....	....	.35	....	....	....	T.	.08	.14	.20	.61	3.73
.06	....	.37	T.	.76	T.	....	.18	....	....	....	T.	.12	.12	.20	.63	3.50
....	....	.29	....	.70	....	....	.32	....	....	....	....	....	.24	....	.90	3.36
.05	....	.44	.01	.70	....	...	.20	....	....	T.	T.	.12	....	.36	1 42	4 17
....	....	.48	....	.62	....	....	.10	....	....	.04	....	.16	....	1.37	.20	3.71
.03	....	.40	....	.65	....	....	.31	....	....	....	....	.20	....	....	1.30	3.98
....	....	.68	.36	.80	....	....	.05	....	....	....	.12	.92	....	.94	.35	5.63
.11	....	.86	....	1.00	.20	....	.19	....	....	....	....	.18	.83	.40	.39	5 08
.10	....	.36	. .	.65	....	....	.14	....	....	....	.02	.18	....	.42	1.50	4 13
.51	....	.35	....	.73	.16	....	.08	....	....	....	.03	.08	.15	....	.80	4 31
.75	....	.35	....	1.01	...	....	.15	....	....	....	....	.78	....	....	1.62	5.88
.36	....	.33	....	.82	.09	....	.07	...	T.	....	.02	.06	.16	.10	.70	4.05
.36	....	.30	..	.44	....	....	06	T.	T.	T.	T.	....	.22	.10	.63	2.51
.29	....	.16	.09	.46	.90	....	.08	....	....	....	....	.43	.76	....	.92	5.15

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes (Con.)														
Lyons	....	....	.17	....	.70	T.	....	....	....	....	....	....	....	.06
Rose	.03	....	.40	....	.68	.22	....	....	....	....	....	....	....	....
Erie, Pennsylvania	....	....	.36	T.	.16	.18	T.	....	....	....	....	....	....	....
Central Lakes	0.13	0.00	0.47	0 00	0.57	0.08	0.00	0.00	0.00	0.00	0.00	0.08	T.	0 02
Fleming	.53	....	....	....	.60	....	....	....	....	....	....	....	....	....
Sherwood	....	....	.53	....	.64	....	....	....	....	....	....	.34	...	.07
Watkins	....	...	....	....	....	....	....	...	....	....	....	....	....	....
Romulus	....	....	.44	....	.66	.34	...	....	....	....	....	....	...	....
Ithaca	....	....	.92	....	.38	T.	....	....	....	....	....	....	T.	....
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	0.02	0.01	0.45	0 06	0 47	0.60	0.01	0.00	T.	T.	0.00	0.10	T.	0 01

‡ Record for the month incomplete. ‖ Received too late to be included in the averages.

TATION FOR SEPTEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
....	.15	.24	.46	.39	.05	....	.26	....	....	T.	.14	37	....	.42	.31	3.72
.09	....	.63	....	.67	.33	....	.17	....	....	....	12	.11	.33	.20	.61	4.59
.08	....	.54	.08	1.12	....	....	.23	...	....	....	T.	.10	.22	.52	.40	3.72
0.05	0.02	0.30	0.12	1.07	T.	T.	0 12	0.00	0.00	0.00	0 02	0.31	0.40	0.26	0.52	4.55
....	....	.72	...	1.23	....	....	....	....	....	....	....	1.20	....	....	.65	4.93
....	.10	.24	.45	.76	....	....	.18	....	....	....	.07	....	....	.70	.25	4.33
....	....	......	....	......	....	...	....	...	...	...	....	....	....	....	...	....
.14	...	.14	T.	1 34	...	....	.26	....	....	....	....	T.	89	T.	89	5.10
.06	T.	.11	.03	.92	.02	T.	.03	...	....	....	T.	.03	.69	.35	.30	3.84
....	....	......	....	......	....	...	....	....	....	....	...	....	....	..	....	....
0 12	0.06	0.31	0.12	0.87	0.14	T.	0.16	T.	0.01	T.	0.04	0.20	0.17	0.19	0.50	4.63

* Amount included in next measurement. † Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees Fahr.). Normal for the month of September.	Length of record, years.	Record begins.	Record ends.	Mean for Sept., 1896.	Departure from the normal.	Extremes of monthly mean temperature for September. Highest.	Year.	Lowest.	Year.
Western Plateau	....	60.0	....	....	....	58.7	—1.3	......	......	......	......
Angelica	Allegany	58.2	14	1854	1896	56.9	—1.3	61.3	1894	53.6	1871
Humphrey	Cattaraugus	59.5	14	1883	1896	57.4	—2.1	64.5	1884	52.7	1883
Elmira	Chemung	62.4	18	1851	1896	61.8	—6.6	66.6	1891	57.6	1860
Eastern Plateau	....	58.7	....	....	....	58.9	+0.2	......	......	......	......
Oxford	Chenango	58.8	28	1828	1896	58.2	—0.6	66.1	1846	53.9	1829
Cortland	Cortland	57.1	34	1829	1896	59.3	+2.2	62.6	1846	52.5	1848
Cooperstown	Otsego	58.2	43	1854	1896	56.5	—1.7	66.7	1881	53.3	'60-'63
Waverly	Tioga	60.6	15	1882	1896	61.6	+1.0	67.2	1888	55.7	1883
Northern Plateau	....	57.2	....	....	....	56.4	—0.8	......	......	......	......
Lowville	Lewis	57.2	29	1827	1896	56.4	—0.8	61.9	1846	52.5	1829
Atlantic Coast	....	65.2	....	....	....	64.4	—0.7	......	......	......	......
New York City	New York	66.1	26	1871	1896	65.0	—1.1	72.4	1881	61.2	1871
Setauket	Suffolk	64.2	12	1885	1896	63.9	—0.3	67.8	'91-'95	61.6	1887
Hudson Valley	....	63.0	....	....	....	61.6	—1.5	......	......	......	......
Albany	Albany	63.1	23	1874	1896	62.0	—1.1	71.0	1881	58.5	1875
Honeymead Brook	Dutchess	61.2	16	1881	1896	59.7	—1.5	65.1	1891	56.2	1893
West Point	Orange	64.8	67	1826	1896	63.0	—1.8	......	......	......	......
Champlain Valley	....	59.2	....	....	....	57.1	—2.1	......	......	......	.
Plattsburgh Barracks	Clinton	59.2	41	1839	1896	57.1	—2.1	65.3	'43,'81	54.8	1893
St. Lawrence Valley	....	58.8	....	....	....	57.7	—1.8	......	......	......	......
Madison Barracks	Jefferson	61.2	37	1839	1896	58.6	—2.6	70.4	1881	56.3	1842
Canton	St. Lawrence	60.9	34	1862	1896	56.2	—4.7	70.4	1881	54.1	1863
North Hammond	"	58.3	18	1866	1896	58.8	+0.5	67.4	1869	55.1	1866
Potsdam	"	57.8	29	1828	1896	57.3	—0.5	63.0	1846	52.6	1893
Great Lakes	....	61.8	....	....	....	60.2	—1.5	......	......	......	......
Buffalo	Erie	62.0	26	1871	1896	60.0	—2.0	71.5	1889	57.7	1883
Rochester	Monroe	62.1	25	1871	1896	60.0	—2.1	71.4	1881	56.7	1871
Fort Niagara	Niagara	62.6	41	1842	1896	60.8	—1.8	71.0	1881	57.5	1883
Baldwinsville	Onondaga	60.6	19	1854	1896	60.3	—0.3	65.5	1881	56.0	1863
Oswego	Oswego	61.6	26	1871	1896	60.0	—1.6	70.3	1881	57.2	1893
Palermo	"	60.0	43	1854	1896	59.6	—0.4	65.1	1881	54.5	1883
Erie, Pennsylvania	Erie	63.4	24	1883	1896	61.0	—2.4	71.7	1881	58.6	1888
Central Lakes	....	61.0	....	....	....	60.6	—0.4	......	......	......	......
Ithaca	Tompkins	61.0	18	1879	1896	60.6	—0.4	71.2	1881	56.4	1883
Average departure	....	.....	....	....	....	....	—1.1	......	......	......	......

AND PRECIPITATION — SEPTEMBER.

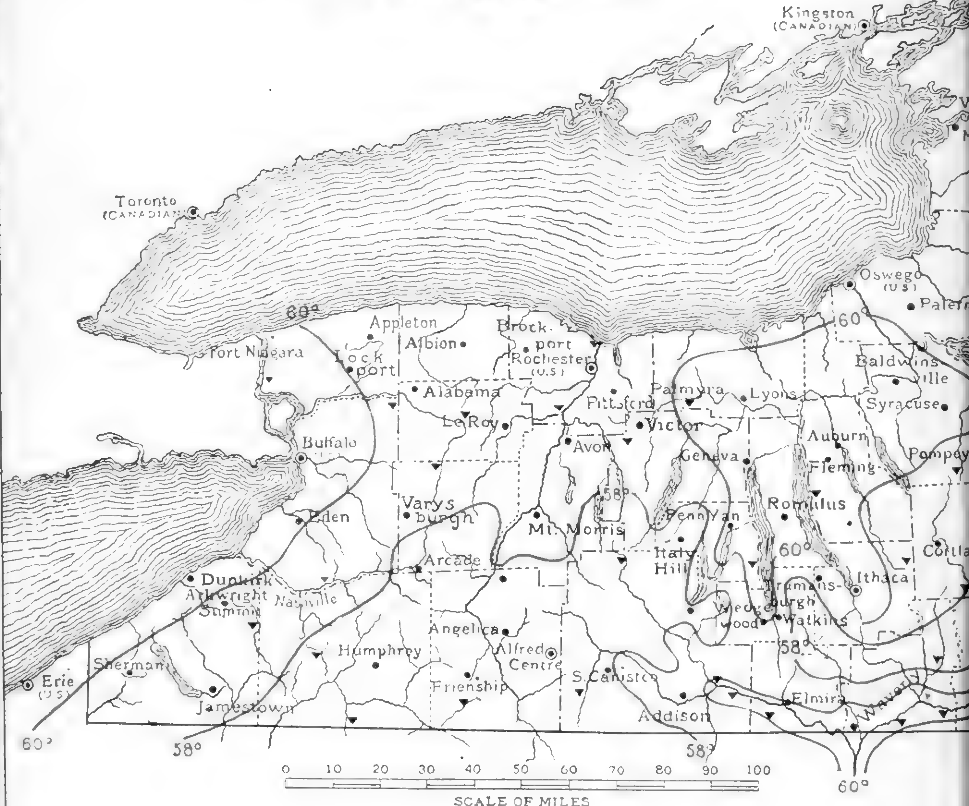
STATION.	COUNTY.	PRECIPITATION — (INCHES). Average for the month of September.	Length of record, years.	Record begins.	Record ends.	Total for Sept., 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR SEPTEMBER. GREATEST. Amount.	Year.	LEAST. Amount.	Year.
Western Plateau	......	3.44	....	....	....	4.25	+0.81	......	......	......	......
Angelica	Allegany	3.32	12	1856	1896	4.96	+1.64	8.72	1890	0.68	1871
Humphrey	Cattaraugus	4.22	14	1883	1896	5.05	+0.83	9.00	1890	1.90	1895
Elmira	Chemung	2.77	18	1851	1896	2.73	—0.04	6.14	1890	0.63	1855
Eastern Plateau	......	3.43	....	....	....	3.84	+0.41	......	......	......	......
Oxford	Chenango	3.53	26	1829	1896	2.15	—1.38	7.76	1853	1.62	1832
Cortland	Cortland	3.59	19	1850	1896	3.70	+0.11	6.56	1861	1.51	1862
Cooperstown	Otsego	3.39	43	1854	1896	4.33	+0.94	7.24	1890	1.17	1871
Port Jervis	Orange	3.35	12	1880	1896	5.43	+2.08	6.06	1894	0.61	1892
Waverly	Tioga	3.28	15	1882	1896	3.57	+0.29	8.24	1890	1.28	1882
Northern Plateau	......	2.86	....	....	....	3.09	+0.23	......	......	......	......
Lowville	Lewis	2.86	32	1827	1896	3.09	+0.23	5.36	1847	0.88	1848
Atlantic Coast	......	3.71	....	....	....	3.33	—0.38	......	......	......	......
New York City	New York	3.69	26	1871	1896	3.04	—0.65	14.51	1882	0.15	1884
Setauket	Suffolk	3.74	12	1885	1896	3.62	—0.12	7.22	1889	0.93	1885
Hudson Valley	......	3.66	....	....	....	5.49	+1.91	......	......	......	......
Albany	Albany	3.42	23	1874	1896	3.31	—0.11	8.91	1890	1.80	'84,'95
Honeymead Brook	Dutchess	4.12	16	1881	1896	7.21	+3.09	10.58	1882	0.71	1885
Poughkeepsie	"	2.56	22	1830	1896	5.70	+3.14	5.70	1896	0.20	1846
West Point	Orange	4.21	49	1840	1896	5.74	+1.53	13.50	1882	0.17	1846
Boyds Corners	Putnam	4.00	25	1870	1894	....	......	10.77	1888	0.75	1881
Champlain Valley	......	2.84	....	....	....	2.85	+0.01	......	......	......	......
Plattsburgh Barracks	Clinton	2.84	37	1840	1896	2.85	+0.01	6.25	1840	0.51	1887
St. Lawrence Valley	......	3.31	....	....	....	5.15	+1.91	......	......	......	......
Malone	Franklin	3.52	15	1830	1895	....	......	......	......	......	......
Madison Barracks	Jefferson	3.11	36	1840	1896	5.84	+2.73	6.27	1890	0.41	1844
North Hammond	St. Lawrence	3.60	17	1866	1896	4.50	+0.90	10.44	1866	0.69	1871
Potsdam	"	3.01	29	1828	1896	5.10	+2.09	5.13	1846	0.47	1836
Great Lakes	......	3.08	....	....	....	3.65	+0.57	......	......	......	......
Buffalo	Erie	3.27	26	1871	1896	4.39	+1.12	7.44	1878	1.07	1871
Rochester	Monroe	2.39	26	1871	1896	3.50	+1.11	5.69	1876	0.51	1871
Fort Niagara	Niagara	2.87	40	1842	1896	3.71	+0.84	7.25	1850	0.26	1844
Oswego	Oswego	2.85	26	1871	1896	4.05	+1.20	6.33	1890	0.76	1881
Palermo	"	3.13	37	1860	1896	2.51	—0.62	7.55	1890	1.04	1880
Erie, Pennsylvania	Erie	3.95	24	1873	1896	3.72	—0.23	8.45	1876	1.13	1893
Central Lakes	......	2.94	....	....	....	3.84	+0.90	......	......	......	......
Ithaca	Tompkins	2.94	18	1879	1896	3.84	+0.90	6.62	1890	0.94	1879
Average departure	......	......	....	....	....	....	+0.83	......	......	......	......

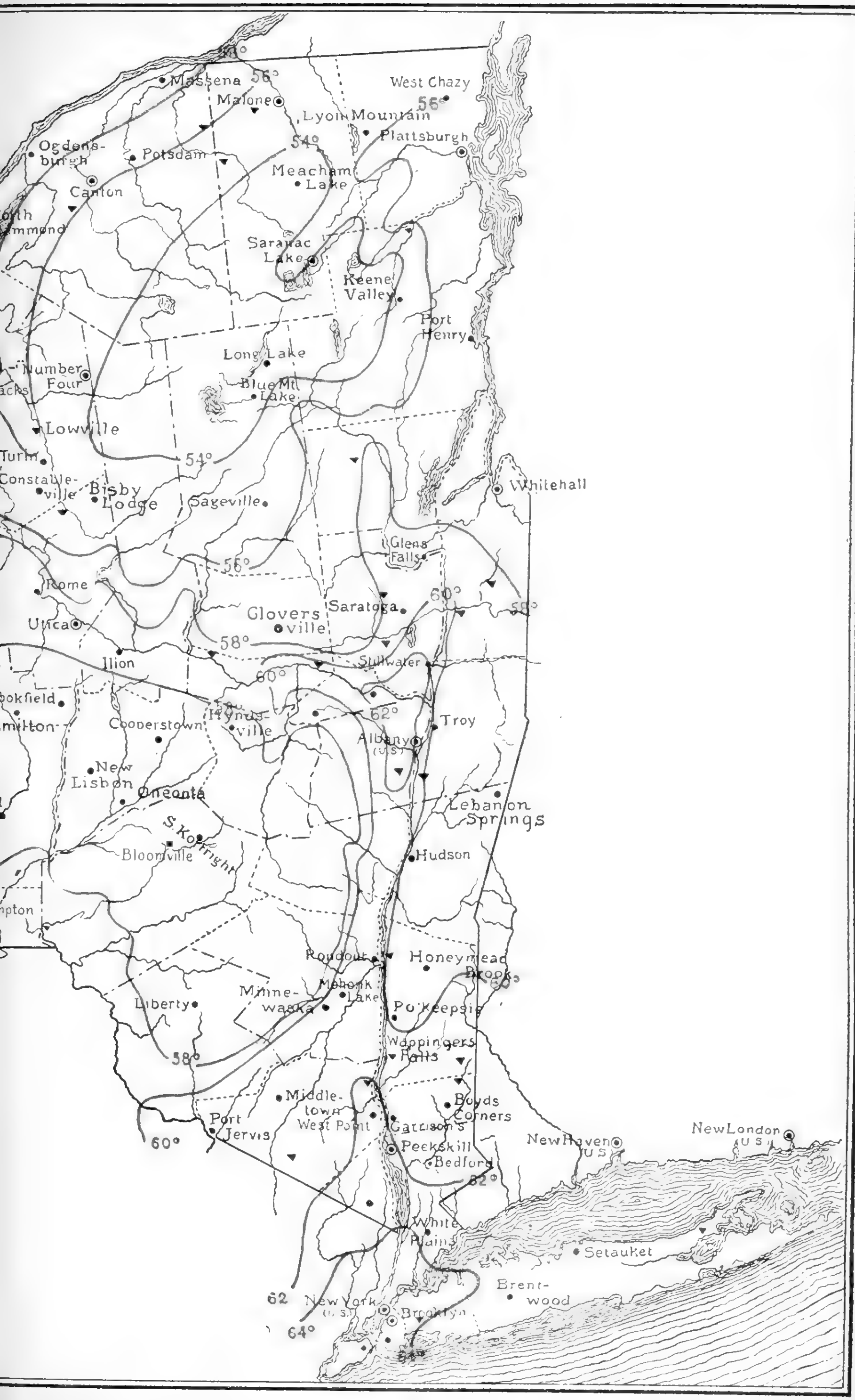
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR SEPTEMBER, 1896.





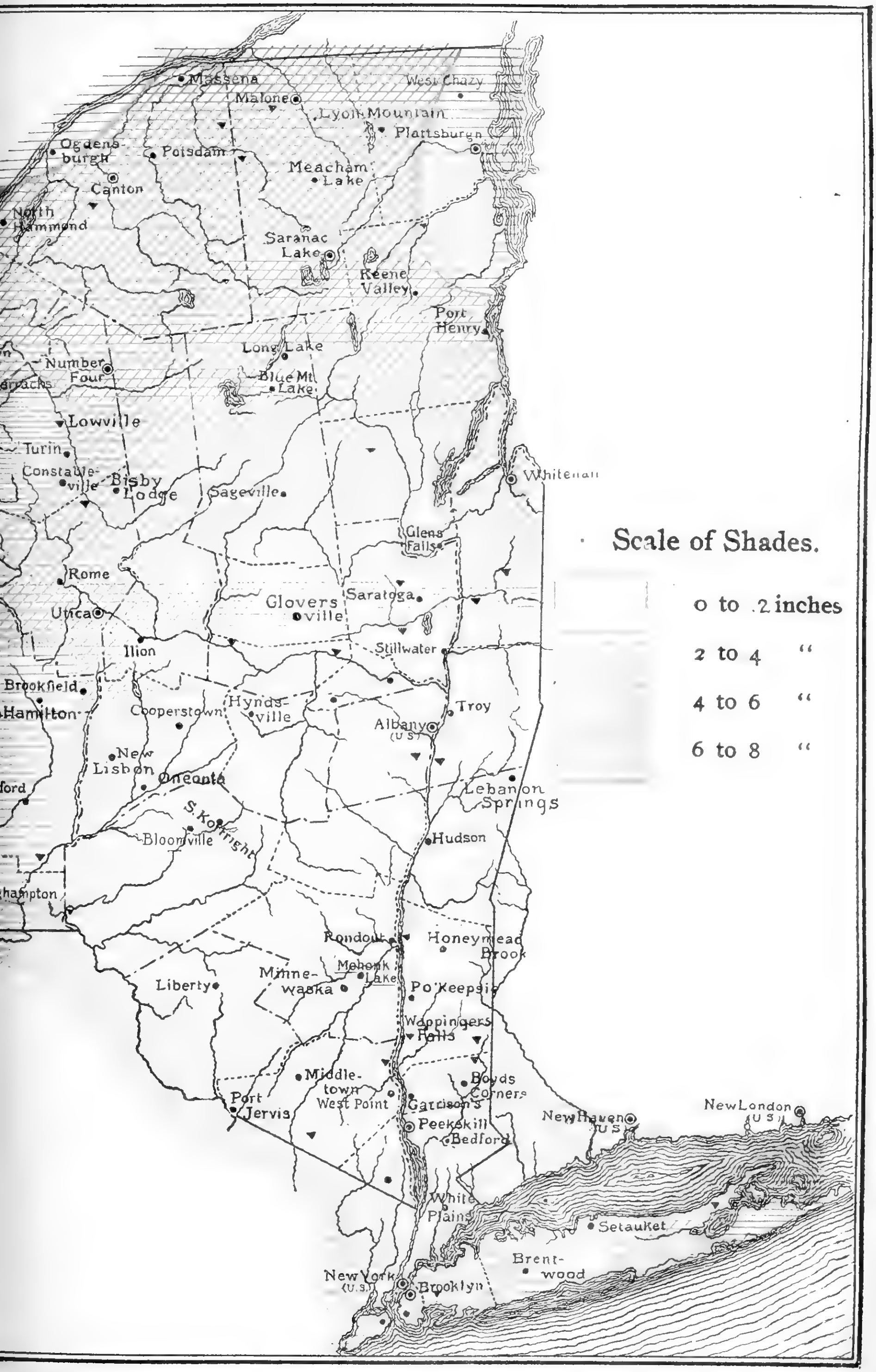
Massena
56°
Malone
West Chazy
56°
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
54°
Meacham Lake
Canton
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
54°
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
56°
Glens Falls
Rome
Saratoga
60°
58°
Glovers ville
Utica
58°
Ilion
Stillwater
60°
Brookfield
62°
Hyndsville
Troy
Cooperstown
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
60°
Minnewaska
Mohonk Lake
Liberty
Po'keepsie
Wappingers Falls
58°
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
60°
Peekskill
New Haven U.S.
New London U.S.
Bedford
62°
White Plains
Setauket
Brentwood
62
New York (U.S.)
Brooklyn
64°
64°

MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR SEPTEMBER, 1896.



Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Utica
Glovers ville
Saratoga
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to .2 inches
2 to 4 "
4 to 6 "
6 to 8 "

Meteorological Summary for October, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during the month of October was 30.06 inches. The highest barometer was 30.64 inches at Albany on the 10th, and the lowest was 29.60 inches at New York city on the 24th. The mean pressure was highest in the central and southwestern parts of the State, and lowest in the northern section. The average pressure at six stations of the National Bureau was 0.02 inches above the normal, excesses occurring at all stations except Oswego.

The mean temperature of the State, as derived from the records of 70 stations, was 46.1 degrees, the highest local monthly mean being 52.9 degrees at Brooklyn, and the lowest, 41.7 degrees, at North Lake. The highest daily mean for the State was 67 degrees on the 30th, and the lowest, 37 degrees, on the 19th. The maximum temperature reported was 79 degrees at Avon and Perry City on the 29th, the minimum being 17 degrees at New Lisbon on the 26th. The mean monthly range of temperature for the State was 45 degrees; the greatest range, 58 degrees, occurring at Perry City, and the least, 34 degrees, at Potsdam. The mean daily range was 16 degrees; the greatest daily range being 45 degrees at Brentwood on the 21st, and the least, 2 degrees, at scattered stations on several dates. The mean temperatures of the several regions were as follows: The Western Plateau, 44.8 degrees; the Eastern Plateau, 45.4 degrees; the Northern Plateau, 42.7 degrees; the Atlantic Coast Region, 51.4;

the Hudson Valley, 48.5 degrees; the Mohawk Valley, 45.2 degrees; the Champlain Valley, 44.6 degrees; the St. Lawrence Valley, 44.6 degrees; the Great Lake Region, 47.1 degrees; the Central Lake Region, 46.8 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 2.5 degrees below the normal, deficiencies occurring at all stations.

The mean relative humidity for the State was 77 per cent. The mean dew point was 39 degrees.

The average precipitation for the State, as derived from the records of 96 stations, was 2.57 inches. The greatest general precipitation occurred to the southwest of the Central Lakes, exceeding 5 inches, while the least was under 1 inch over a considerable area bordering Lake Ontario. The greatest local amount was 6.49 inches at South Canisteo, and the least 0.58 inches at Rochester. A list of the heaviest rates of precipitation will be found in the accompanying table of meteorological data. From the 1st to the 3d scattering showers occurred; on the 4th and 5th moderate rains in the southeast; on the 6th and 7th, general, but heavy only over the Western Plateau and Central Lakes; from the 12th to 14th, the heaviest rains of the month, excepting in the St. Lawrence Valley; from the 16th to 24th, scattering showers, with a light snowfall in the colder sections; on the 29th to 31st, showers excepting along the coast, heaviest in the northern section. The average snowfall for the State amounted to only a trace. No snowfall was reported along the coast; but at six stations of the plateaus amounts varying from 1 to 2 inches were measured. The average precipitation at 27 stations possessing records for previous years was 1.00 inch below the normal; excesses being reported from only 5 scattered stations. The rainfall was the least recorded for October by the Weather Bureau station at Rochester.

The average number of days on which the precipitation amounted to 0.01 inches or more was 8.9. The rain frequency was, as a rule, greatest in eastern New York, and least in the west. The average number of clear days was 8.4; of partly cloudy days, 9.0; and of cloudy days, 13.6; giving an average cloudiness of 58 per cent. Over the Western Plateau, the Great Lakes, the St. Lawrence Valley and the Atlantic Coast the cloudiness was below the general average.

The prevailing wind direction was from the northwest. The average wind travel at six stations of the National Bureau was 8,201 miles; with a maximum velocity of 48 miles per hour at Buffalo on the 20th.

Light thunderstorms or distant lightning were observed at 5 stations of western New York on the 29th, 30th and 31st.

Killing frosts occurred at some northern and highland stations on the 8th, and were quite general on the 9th, also frequently during the two following weeks.

Hail fell on the 3d, 7th, 8th, 18th and 21st; and sleet fell on the 21st and 22d.

A solar halo was observed on the 28th, and a lunar halo on the 19th.

General features of the weather.—The temperature was below the normal continuously from the beginning of October until the 27th, the greatest deficiency occurring on the 9th, when killing frosts were generally reported, being the first of the season at many stations. The weather was much warmer after the 27th, and on the closing days of the month the excess of temperature amounted to nearly 15 degrees above the normal.

The precipitation was unevenly distributed, being quite heavy in a few of the southern counties, while in areas bordering Lake Ontario, the St. Lawrence Valley and other scattered localities, it was unusually light. The greatest rain frequency and cloudiness obtained during the first and a portion of the second decades, after which the weather was generally pleasant. The first fall of snow for the greater part of the State occurred on or about the 15th.

The severe frosts of the 9th injured some garden truck, but crops were generally secured from damage. The rainfall was rather light for fall seeding in most localities, but the drouth was severe only in a few of the northwestern counties. Some damage to property was due to heavy rains on the 13th along the Canisteo river.

On the 20th buildings were unroofed and other damage caused by high winds at Baldwinsville.

Five areas of high and nine areas of low pressure influenced our weather this month; the number of depressions being rather above the average for October. Four disturbances passed along the coast in a northerly direction about the 2d, 6th, 12th and 18th; the storm of the 12th, which was of tropical origin, being the most energetic of this series. Disturbances of a second class, originating to the westward, passed over the Northeastern States or Canada on the 6th to 8th, 21st, 23d to 24th; and a fourth low had moved eastward as far as the upper lakes on the 31st. No general storms of notable severity passed over New York this month.

The high-pressure systems were, in most cases, large and well defined, their general path being from the Northwestern to the

Central States and coast, and thence northeastward toward the Gulf of St. Lawrence. Their influence was mainly felt in this State on and about the 5th, 9th, 19th, 22d and 25th, which dates also mark the principal cold periods of October. The fact that the low areas frequently passed off the coast, until the last week, in large measure explains the cool weather which was felt on the dates between the passage of the anticyclones.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau												44.8	77	29
Alfred	Allegany	1824									42.6	43.7	73	29
Angelica	"	1340									42.4	43.0	71	29
Bolivar	"											44.0	73	29
Friendship	Allegany	1550										43.6	75	29
Franklinville	Cattaraugus													
Humphrey	"	1950									44 7	44.2	74	29
Arkwright	Chautauqua	1260										‡45.1	70	30
Jamestown	Chautauqua	1328										45 8	74	30
Elmira	Chemung	863										47.2	70	1
Avon	Livingston	585										45.3	76	29
Mt. Morris	"	525												
Lockport	Niagara										46.2	47.2	74	30
Victor	Ontario											44.6	76	29
Wedgewood	Schuyler	1350									44.0	45 1	75	29
Addison	Steuben	1000							77	43	45.5	46.0	75	29
South Canisteo	Steuben	1480							79	37	43.0	44.6	76	29
Arcade	Wyoming	1707									42.2	42.9	71	29
Varysburg	"											44.3	77	29
Eastern Plateau												45 4	79	29
Binghamton	Broome	870									45 4	46.4	73	29
Oxford	Chenango	550										43.8	70	29
Cortland	Cortland	1120										44.8	72	29
Bloomville	Delaware	1550												
South Kortright	Delaware	1700										42.6	69	29
Brookfield	Madison	1350									46.2	47 8	70	31
Middletown	Orange	660												
Port Jervis	"	470										47.7	70	31
Cooperstown	Otsego	1300									44 2	44.3	63	*a*
New Lisbon	"	1234									42.4	42.8	68	29
Oneonta	"	1100									46.4	47.3	72	31
Perry City	Schuyler	1038									43.5	43.6	79	29
Straits Corners	Tioga													
Waverly	"	825									45.7	46.8	77	29
Dryden	Tompkins													
Mohonk Lake	Ulster	1245									47.1	47.2	69	*b*
Northern Plateau												42.7	67	30
Saranac Lake	Franklin											41 8	64	*c*
Gloversville	Fulton	802									43.8	44 8	63	31
North Lake	Herkimer											41.7	62	*d*
Lowville	Lewis	900										43.4	67	30
Number Four	"	1571	30.03	30.53	10	29.61	24	0.92	89	36		41.9	62	*e*
Atlantic Coast												51.4	77	31
Brooklyn	Kings	107										52.9	72	31
Manhattan Beach	"											51.2	70	1
New York City	New York	314	30.05	30 53	10	29.60	24	0 93	79	44		52.0	72	31
Willet's Point	Queens											51.6	76	31
Brentwood	Suffolk	75									51.5	50.4	72	31
Setauket	Suffolk	40							77	44	51.9	52.5	73	31
Bedford	Westchester	290										49 2	77	31
Primrose	"													

FOR OCTOBER, 1896.

TURE—(IN DEGREES FAHR.).								SKY.				PRECIPITATION—(INCHES).					
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	‡ Duration.	Date.	Total snowfall.	Prevailing direction of wind.
20	*i*	49	17	40	27	2	13	9.5	8.7	12.8	8.3	3.37	3.50	......	12	......	......
24	19	49	16	31	10	5	5	7	7	17	14	5.02	2.91	24 00	12–13	0.1	W.
20	*i*	51	19	40	27	2	13	11	8	12	8	3.18	1.44	......	12–13	T.	......
19	*i*	54	23	40	*ee*	2	13	12	6	13	7	4.03	1.70	......	12	T.	......
22	23	53	19	39	10	6	12	9	11	11	8	4.03	1.51	......	12	T.	W.
25	23	49	16	31	15	7	*aa*	7	8	16	8	3 00	1 01	......	13	1.5	S. W.
32	9	38	10	23	17	3	*ab*	....	....	....	......	......	......	......	......	......	......
28	23	46	16	32	15	6	*ac*	8	8	15	8	2.17	0.69	......	12	1.0	S. W.
25	10	45	16	34	26	5	*ad*	13	5	13	5	4.86	2.95	......	13	......	N. W.
23	23	53	19	36	26	7	*ae*	7	9	15	6	1.48	0.44	......	14	......	......
....	....	....	....	....	....	....	....	12	6	13	5	1.41	0.80	......	13	......	N.
29	*j*	45	17	29	28	7	20	13	9	9	7	1.27	0 40	20.00	6–7	0.2	E.
25	*k*	51	18	34	26	4	13	....	....	....	......	1.61	......	......	......	T.	W.
24	19	51	18	33	26	5	14	6	15	10	11	4.42	2 90	......	13	T.	N. W.
23	26	52	18	38	27	4	*bc*	14	12	5	14	5 73	3.30	24.00	12–13	T.	N. W.
23	*m*	53	20	38	27	7	13	11	3	17	9	6 49	3 50	......	12	T.	W.
.23	19	48	16	30	26	5	12	8	11	12	9	3.22	1.33	14 00	12	1.0	......
23	19	54	20	38	10	5	13	10	7	14	4	2.63	1.00	......	12	T.	......
17	26	49	18	44	26	3	*af*	9.7	7.8	13.5	9.7	2.99	2.78	......	13	......	......
26	23	47	17	33	27	6	14	8	9	14	12	3.68	1.90	......	13	T.	S. E.
18	26	52	21	39	27	7	14	6	8	17	10	2.69	1.00	......	13	T.	W.
23	23	49	16	37	27	5	14	18	7	6	13	3.32	1.61	......	13	T.	N. W.
....	....	....	....	....	....	....	....	10	2	19	9	3.25	1.15	3.00	30	......	W.
18	26	51	20	37	28	10	14	....	....	....	5	2.35	0 89	......	14	......	......
21	23	49	20	30	22	14	*bb*	4	16	11	12	1.37	0.38	12.00	13	1.5	N. W.
....	....	....	....	....	....	....	....	....	....	....	5	3 52	......	......	......	......	......
24	26	46	16	30	26	5	7	10	13	8	10	3.53	1.17	......	14	0	N. W.
23	26	40	12	29	26	3	14	9	2	20	9	2 23	0.88	......	13	T.	N.
17	26	51	19	38	27	7	14	7	5	19	9	2:09	0.90	11.00	13	T.	S.
24	26	48	18	36	27	5	14	....	....	....	8	2.26	0.91	......	13	......	......
21	*i*	58	18	35	26	5	13	7	9	15	8	4.07	2.78	......	13	......	N.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	......
21	26	56	21	44	26	3	13	7	10	14	11	4.90	2.28	......	13	......	N. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	......
31	*n*	38	12	30	27	5	6	21	4	6	10	3.11	1.32	......	13	......	N. W.
20	19	43	17	35	11	3	13	6.2	9.8	15.0	10 6	2.54	1.73	....	13	......	......
22	25	42	18	32	28	6	8	8	10	13	9	1.31	0.51	......	6	0.5	N. W.
21	26	42	16	34	26	3	13	8	5	18	16	3.06	1.73	......	13	T.	S. W.
20	19	42	17	32	29	6	5	....	....	....	6	2.90	0.80	......	8	1.8	N. E.
21	26	46	18	35	11	7	7	6	11	14	13	2.15	0.57	......	7	0.1	N. W.
21	26	41	16	33	15	5	8	3	13	15	9	3.44	1.05	......	7	0.2	N. W.
25	*p*	42	14	45	21	3	*bd*	9.8	8.9	12.3	8.7	2.40	1.50	12.00	23–24	......	......
34	26	38	12	33	20	4	*be*	9	7	15	8	1.73	0 67	12.00	24	......	E.
35	19	35	11	23	22	4	*bf*	15	7	9	8	1 64	0.60	15 30	24	......	N. E.
36	19	36	12	25	27	3	17	5	11	15	11	1.71	0.72	......	13	......	N. W.
31	25	45	15	36	27	5	5	....	....	....	7	2.43	0.78	......	23	......	N. E.
25	*p*	47	20	45	21	6	13	11	7	13	5	4.10	1.50	12.00	23–24	......	N. W.
33	26	40		24	23	3	5	8	12	11	10	2.87	0.88	......	13	......	W.
26	26	51	17	39	27	3	13	11	9	11	12	2.35	0.98	23.10	13	......	N.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	......

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Hudson Valley												48 5	76	1
Albany	Albany	85	30.07	30 64	10	29.62	24	1 02	81	41		48 0	67	31
Lebanon Springs	Columbia	930										45.2	67	30
Honeymead Brook	Dutchess	450									46.9	46.6	69	31
Poughkeepsie	"	180										48 2	75	31
Wappinger's Falls	"											50 0	72	*f*
Catskill	Greene										48.8	49 0	71	31
West Point	Orange	167										51.8	76	1
Carmel	Putnam	500										49.0	72	31
Mohawk Valley												45.2	64	12
Rome	Oneida	445										45 2	64	12
Champlain Valley												44.6	78	1
Plattsburgh B'ks.	Clinton	125										43.7	78	1
Glens Falls	Warren	340									44.7	45.4	65	*g*
Lake George	"													
St. Lawrence Val'y												44.6	69	28
Madison Barracks	Jefferson	266										46.3	68	29
Watertown	"	486										45.6	69	28
Canton	St. Lawrence	304									43.0	42.8	68	*h*
Massena	St. Lawrence													
North Hammond	"	300									44.4	45 2	64	30
Ogdensburgh	"	258										46.0	65	31
Potsdam	"	300									40.8	41.9	59	15
Great Lakes												47.1	78	30
Dunkirk	Chautauqua	590												
Westfield	"											47.5	77	30
Buffalo	Erie	690	30 07	30.52	9	29.68	30	0.84	70	37		48 0	73	30
Pittsford	Monroe										46.1	46 3	76	29
Rochester	"	621	30.06	30.52	10	29.68	24	0.84	74	38		47.0	76	29
Appleton	Niagara											45.8	74	30
Fort Niagara	Niagara	263										47 6	75	30
Baldwinsville	Onondaga	390									46.8	47.5	73	29
Oswego	Oswego	304	30.04	30.56	10	29.62	24	0.94	74	38		47.0	73	29
Palermo	Oswego	46[illegible]									46.3	46 2	76	5
Lyons	Wayne	407									47.2	47.4	73	29
Erie, Pa	Erie	681	30.07	30.41	9	29.71	23	0.70	69	28		48.0	78	30
Central Lakes												46.8	75	29
Fleming	Cayuga	1000									46.8	46.5	75	29
Romulus	Seneca	719							80	38		47.1	74	29
Ithaca	Tompkins	810	30.07	30 57	10	29 63	24	0.94	76	39	46.1	46 7	74	29
Mean			30.06	30 64	10	29.60	24	0.89	77	39		46.1	79	29

* Mean of the tri-daily observations. † Blank indicates that the duration is not shown in the the Draper thermograph. ‡ Report received too late to be used in computing means. The + 9 p. m.) ÷ 4.

(*a*) 29, 30; (*b*) 15, 31; (*c*) 28, 30; (*d*) 1, 29, 31; (*e*) 15, 28, 30; (*f*) 1, 2, 31; (*g*) 1, 31; (*h*) 30, 31; (*i*) 23, 10, 15; (*t*) 10, 25; (*u*) 9, 26; (*v*) 19, 20; (*w*) 10, 19, 2?, 26; (*x*) 16, 27; (*y*) 26, 27; (*aa*) 12, 13, 24; (*ab*) 13; (*bf*) 6, 14; (*cc*) 5, 6; (*cd*) 1, 7; (*ce*) 1, 7, 25; (*cf*) 8, 18; (*dd*) 4, 8, 12, 13; (*de*) 5, 8, 12, 13; (*df*) 6, 8, FOR OCTOBER — *Concluded.*

TURE — (IN DEGREES FAHR.).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	‡ Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
20	26	46	16	36	26	3	6	8 1	6.5	16 4	10.9	2.62	1.40	......	13	......	......
29	23	38	15	28	27	4	13	8	4	20	14	1.53	1.01	......	13	......	N.
20	26	47	16	30	26	5	27	4	7	20	11	3.07	1.20	......	13–14	......	S. W.
23	26	46	16	28	*x*	5	5	7	7	17	16	2.96	1 40	......	13	......	N. E.
23	26	52	20	36	26	3	6	9	9	13	7	2 66	1.22	......	13	......	N.
28	26	44	17	32	26	7	*cc*	8	8	15	13	3.34	0.92	......	13	......	N.
29	*i*	42	15	30	27	4	18	7	8	16	9	2.39	1.33	......	13	......	N. W.
28	26	48	12	27	28	6	6	....	....	...	8	2.36	0 90	......	15	......	S. W.
24	26	48	16	32	26	5	*be*	14	3	14	9	2.63	1.02	10.00	22–23	......	......
25	25	39	16	22	21	2	8	....	....	....	8.0	1.90	0 75	......	13	......	......
25	25	39	16	22	21	2	8	....	....	..	8	1.90	0.75	......	13	......	......
22	26	46	16	32	27	2	6	9 0	6.0	16.0	11.0	2.66	1.70	22.00	12-13	......	......
28	*q*	50	16	29	16	2	6	....	....	....	9	1.68	0.44	......	8	......	S. W.
22	26	43	17	32	27	4	14	9	6	16	13	3.65	1.70	22.00	12–13	......	N.
18	20	41	18	37	15	4	18	8.0	13.6	9.4	6 3	1.37	0.70	......	6	......	......
28	*r*	40	20	33	12	11	21	.	....	..	4	2.24	0.70	......	7	......	S. W.
18	20	51	22	37	15	12	24	7	14	10	10	1.72	0.64	......	29	......	N. E.
25	*s*	43	19	36	15	7	*cd*	8	14	9	4	1.02	0.56	......	7	T.	N. E.
26	26	38	14	30	15	4	18	3	22	6	9	1.35	0.54	......	29	0.8	N.
27	24	38	16	27	15	6	*ce*	13	9	9	7	0 73	0 27	5.00	21	0.5	S. W,
25	*t*	34	19	28	10	10	3	9	9	13	4	1.14	0.40	......	29	......	N. E.
23	23	45	14	31	26	2	24	8 9	8 5	13.6	8.8	1 49	1.00	......	7	......	......
32	*u*	45	16	30	26	3	1	14	6	11	5	1.40	0.40	......	6	T.	S. W.
34	10	39	11	27	10	4	13	7	7	17	9	1.90	0.56	......	13	......	W.
28	*k*	48	17	31	26	5	8	9	13	9	7	1.19	1.00	......	7	T.	W.
30	19	46	14	29	26	4	3	6	8	17	8	0 58	0.33	......	7	......	S. W.
27	19	47	14	30	26	5	*cf*	10	5	16	7	1 15	0.64	16.40	6-7	T.	N. W.
29	19	46	15	29	15	6	7	....	....	....	7	1.37	0.55	16.00	6–7	......	N. E.
30	22	43	16	27	22	6	13	14	5	12	7	2.07	0 95	......	13	T-	......
30	26	43	11	30	26	5	5	7	5	19	13	1.45	0.43	......	7	......	S. E.
23	23	53	17	30	26	7	18	6	13	12	14	2.02	0.45	......	14	......	S. W
31	*k*	42	14	29	26	4	13	6	14	11	9	1.26	0 53	......	13	T.	W.
32	19	46	11	24	26	2	24	10	9	12	11	2.01	0.58	......	12	......	N. W.
27	23	46	14	31	26	4	*dd*	6.0	11.3	13.7	7.0	3 59	3.00	8.10	13	......	......
29	*v*	46	14	29	26	5	*be*	1	19	11	5	3.10	2.00	......	13 14	......	N. W.
29	*w*	45	16	31	26	6	13	11	5	15	5	3.30	1.34	......	13	......	S.
27	23	47	13	29	*y*	4	*de*	6	10	15	11	4 37	3.00	8.10	13	T.	N. W.
17	26	45	16	45	21	2	*df*	8.4	9.0	13.6	8.9	2.49	3.50	......	12.	T.	N. W.

original records, but is within twenty-four hours. ‡ Mean of the maximum and minimum by means from the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m.

26; (*j*) 19, 23; (*k*) 10, 23; (*m*) 19, 23, 29; (*n*) 25, 26, 27; (*p*) 20, 21; (*q*) 10, 20, 26; (*r*) 10, 11, 26; (*s*) 9, 1, 12; (*ac*) 12, 13; (*ad*) 12, 14; (*ae*) 3, 13; (*af*) 13, 14; (*bb*) 10, 12; (*bc*) 5, 12, 13; (*bd*) 5, 13, 17; (*be*) 4, 13, 24; (*ee*) 11, 26.

TEMPERATURE—OCTOBER, 1896, SHOWING DAILY MEANS FOR

STATION.	1		3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	52	47	47	49	46	46	43	40	40	42	45	43	44	47
Alfred	56	56	48	51	47	54	48	41	50	57	60	44	46	50
	44	36	41	42	42	41	34	34	28	26	32	38	40	40
Angelica	56	57	52	54	52	50	44	42	49	57	60	45	42	53
	43	42	46	42	37	39	37	33	30	23	26	39	40	35
Bolivar	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Friendship	59	57	50	64	51	56	47	47	53	63	62	45	48	55
	46	38	39	43	37	34	37	35	29	24	26	39	41	42
Franklinville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Humphrey	54	61	49	50	53	47	45	43	53	59	63	44	46	51
	44	37	40	40	39	33	35	34	30	30	35	37	39	39
‡Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	54	55	56	53	56	53	48	44	53	60	62	48	48	53
	46	40	37	41	36	35	39	34	33	33	36	42	42	41
Elmira	70	57	57	60	56	56	55	47	50	55	62	45	48	52
	50	43	47	51	46	46	42	39	35	25	34	40	42	47
Avon	59	57	53	56	53	56	51	44	47	52	57	54	51	58
	47	32	46	46	34	32	41	34	29	30	27	37	44	44
Mount Morris	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lockport	56	53	57	58	60	61	50	46	49	56	56	50	52	56
	47	39	39	48	42	36	42	38	32	31	32	42	44	43
Victor	59	55	51	57	52	58	48	44	49	55	56	53	46	54
	48	39	45	44	39	39	41	34	30	25	29	37	42	43
Wedgewood	60	56	50	56	50	54	48	44	48	58	60	44	45	45
	43	36	43	43	44	41	38	32	30	27	34	38	39	40
Addison	60	59	52	55	52	56	51	51	50	57	59	45	47	52
	48	40	46	47	48	45	41	39	32	25	30	41	43	44
South Canisteo	59	59	53	56	52	56	51	46	51	58	59	46	49	51
	43	41	42	43	44	41	36	34	30	25	29	36	42	40
Arcade	53	52	49	48	49	53	45	40	46	56	57	45	47	50
	45	36	41	39	35	30	35	34	27	29	35	40	41	40
Varysburgh	55	60	52	52	50	59	42	44	51	63	57	48	47	55
	45	34	46	38	31	29	36	32	28	25	29	35	42	40
Eastern Plateau	53	50	50	49	50	50	47	41	39	40	43	46	46	47
Binghamton	58	55	55	58	57	59	53	44	51	58	58	54	54	48
	50	41	43	46	47	46	42	37	34	25	30	42	42	42
Oxford	61	55	58	53	55	57	52	48	48	57	53	55	53	47
	42	37	43	42	43	44	40	34	29	21	27	40	39	40
Cortland	58	53	52	55	53	52	52	43	45	55	56	51	49	48
	45	37	45	46	46	46	43	36	35	24	31	42	41	43
Bloomville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	48	49	47	46	45	48	45	37	36	27	33	42	43	45
South Kortright	59	57	58	52	54	56	51	44	44	53	50	53	50	51
	45	45	42	38	40	44	37	33	31	19	29	38	37	41
Brookfield	63	65	57	53	56	54	52	54	47	46	53	49	54	58
	41	39	37	37	40	36	37	34	31	32	34	35	36	40
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	68	65	60	58	58	60	55	48	52	54	51	53	50	54
	50	49	48	47	48	49	50	40	30	27	38	42	43	46
Cooperstown	58	55	54	50	50	55	47	43	43	51	51	54	49	48
	46	45	45	46	46	44	36	36	24	36	44	43	44	45
New Lisbon	60	55	52	51	54	52	50	44	41	54	51	53	50	48
	43	46	43	39	43	44	38	34	29	22	29	42	41	41
Oneonta	61	59	57	54	57	56	59	47	52	60	56	57	53	52
	50	48	46	45	45	48	42	39	32	27	32	37	44	47

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
50	46	43	36	34	41	42	39	38	37	38	43	49	51	62	61	54	44.8
62	52	45	37	37	49	48	46	50	38	45	58	65	64	73	69	61	
35	36	34	30	24	31	33	27	25	30	27	27	36	41	51	57	43	43.7
62	53	50	39	38	50	47	49	47	38	45	58	66	66	71	69	67	
27	41	37	31	23	29	33	27	20	30	23	20	26	28	41	48	41	43.0
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
65	51	52	40	41	52	51	49	52	41	48	59	66	63	75	70	62	
31	39	36	31	23	32	34	28	22	28	27	24	30	30	45	45	40	43.6
....	....	....	....	39	46	54	47	50	47	45	57	65	67	73	72	64	
....	....	....	....	34	29	34	32	21	29	30	29	27	31	50	50	41	....
64	49	49	40	39	46	43	48	51	39	47	59	57	65	74	72	63	
33	33	34	30	31	31	32	31	25	32	28	32	39	44	53	55	43	44.2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	45.1
62	52	57	43	40	48	48	47	49	40	47	58	65	64	72	74	67	
32	41	37	32	32	36	35	31	28	33	34	31	36	37	52	59	45	45.8
64	56	49	43	46	53	53	50	53	45	48	60	65	65	64	66	65	
39	41	39	32	29	33	41	35	28	34	30	26	33	34	51	49	51	47.2
63	56	53	42	45	51	50	47	52	45	44	60	64	69	76	73	61	
30	42	40	34	24	35	36	26	23	32	26	24	30	34	54	51	45	45.3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
63	55	49	45	49	53	46	48	50	46	50	59	64	68	73	74	68	
37	42	37	32	29	46	36	30	29	32	31	32	41	39	55	57	44	47.2
63	53	46	42	43	50	52	46	52	52	51	60	63	68	76	....	....	
38	37	35	32	27	27	33	31	25	31	27	26	35	38	54	....	....	44.6
66	54	48	42	44	51	49	49	56	50	51	61	71	65	75	67	66	
34	36	33	28	24	28	35	28	28	26	25	28	40	42	51	53	46	45.1
65	55	49	43	43	53	53	53	53	48	48	60	68	65	75	68	64	
35	37	38	32	26	31	39	31	24	29	27	23	30	33	47	45	45	46.0
64	55	48	45	42	52	52	50	53	47	48	60	67	67	76	70	64	
28	36	35	29	23	28	34	28	23	27	28	23	29	33	48	49	41	44.6
59	50	46	40	39	45	47	44	48	38	44	56	63	64	71	70	60	
30	37	35	30	23	33	33	28	26	32	27	26	38	40	44	56	41	42.9
62	52	46	42	44	48	50	48	53	46	49	63	65	68	77	75	66	
29	34	34	27	23	34	31	28	24	32	28	42	33	35	45	47	41	44.3
49	45	42	40	38	40	45	39	38	40	36	40	46	48	58	55	57	45.4
61	55	49	44	43	50	58	48	53	45	43	59	65	64	73	65	65	46.4
38	33	37	35	27	33	38	32	26	32	30	27	32	35	53	50	50	
62	56	48	43	56	48	55	50	53	44	43	55	62	62	70	63	65	
32	31	30	32	22	28	32	34	19	27	21	18	23	27	45	38	46	43.8
61	59	45	41	42	51	52	46	53	46	40	58	64	64	72	65	62	
36	36	36	34	26	32	37	29	23	28	32	26	27	33	42	50	47	44.8
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
38	34	36	36	30	29	37	31	27	34	30	25	30	32	45	42	44	....
57	53	50	47	43	45	53	43	46	48	37	52	58	63	69	66	64	
31	19	30	32	27	28	31	26	24	39	25	18	24	26	35	39	52	42.6
59	61	64	56	58	59	57	58	49	60	57	63	64	66	68	69	70	
43	42	44	40	42	37	35	28	21	35	37	39	40	42	43	42	45	47.8
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
62	61	55	50	50	48	57	50	54	50	44	54	57	59	68	63	70	
43	33	40	40	27	30	45	29	28	42	30	24	30	33	49	45	54	47.7
57	50	43	41	42	47	50	44	51	45	38	52	48	53	63	63	62	
35	36	34	36	31	35	38	28	24	32	32	23	30	32	48	48	54	44.3
59	53	44	43	47	47	53	47	53	46	37	54	62	62	68	63	63	
33	30	31	32	27	27	32	24	19	27	24	17	24	29	48	40	37	42.8
65	56	50	47	46	52	50	49	57	50	43	57	66	64	71	67	72	
38	36	36	38	31	33	40	32	25	33	31	24	30	33	50	45	52	47.3

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
***East. Plat.*—(Con.)**														
Perry City	59	54	51	56	52	58	49	44	45	52	56	47	45	49
	44	38	43	44	45	42	38	35	27	22	26	40	40	40
Strait's Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Waverly	63	66	55	60	56	58	55	48	56	60	59	47	46	49
	47	40	47	46	48	48	45	38	30	23	28	42	43	44
Dryden	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	62	58	56	52	52	53	55	48	48	50	48	53	52	51
	....	....	....	....	....	48	44	37	35	35	37	41	42	44
Northern Plateau	52	48	46	46	48	49	44	37	37	40	43	47	47	46
Saranac Lake	52	46	47	49	58	61	45	37	46	48	59	48	55	56
	42	38	37	39	35	41	33	31	23	26	32	34	38	27
Gloversville	62	56	55	53	54	62	52	45	49	52	53	59	50	51
	49	46	44	45	45	47	42	36	33	26	28	44	47	45
North Lake	62	61	50	49	50	53	58	44	44	44	55	58	61	51
	44	45	41	39	44	42	43	31	29	28	30	36	39	42
Lowville	59	53	53	51	56	54	49	43	45	57	60	62	51	56
	48	40	41	41	43	38	42	33	32	23	25	35	38	38
Number Four	56	50	49	50	58	55	46	36	44	56	58	58	54	55
	46	41	40	40	41	39	35	31	28	37	31	36	36	38
Atlantic Coast	62	58	57	55	52	54	55	47	45	46	49	50	48	51
Brooklyn	69	64	65	57	56	61	62	55	55	56	53	53	50	54
	57	54	52	53	51	51	50	42	38	40	45	47	46	48
Manhattan Beach	70	65	62	62	57	54	59	61	52	52	54	53	53	49
	58	53	51	52	50	50	51	41	36	37	43	47	46	45
New York City	63	61	61	57	54	60	59	50	53	53	52	52	50	53
	55	53	52	50	49	50	47	41	38	42	43	46	44	46
Willet's Point	66	64	64	58	55	60	62	54	54	57	54	52	55	64
	55	51	54	52	50	50	42	38	39	42	47	46	47	43
Brentwood	70	68	65	61	59	63	65	53	....	54	56	56	52	61
	53	53	51	53	49	49	48	36	27	29	46	49	46	48
Setauket	66	63	59	58	54	58	62	53	51	56	55	56	52	54
	59	55	53	52	51	50	51	45	39	39	48	49	45	49
Bedford	64	62	60	55	53	57	60	52	55	56	51	50	47	54
	56	52	49	47	48	49	48	40	29	30	39	44	44	46
Primrose	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hudson Valley	60	56	55	51	51	54	53	46	42	42	44	49	48	48
Albany	66	57	58	55	55	59	58	50	52	56	56	62	51	52
	54	47	47	46	48	48	45	41	38	30	33	46	47	46
Lebanon Springs	65	66	66	53	54	56	56	46	45	52	49	56	51	50
	51	46	45	40	46	46	45	38	32	26	34	40	45	44
Honeymead Brook	63	58	59	52	52	58	60	48	47	53	53	55	52	51
	52	50	44	45	47	47	48	36	28	27	32	42	42	44
Poughkeepsie	67	67	62	56	55	58	62	55	53	58	53	56	54	54
	51	49	47	46	47	55	42	38	28	26	32	43	43	45
Wappingers Falls	72	72	66	56	55	59	60	56	51	50	48	55	54	54
	56	51	54	48	48	51	44	40	32	30	38	42	43	45
Catskill	67	59	57	55	55	57	62	51	52	58	53	58	53	52
	55	49	46	47	47	49	46	41	39	30	34	44	44	47
West Point	76	66	63	63	59	54	59	60	57	54	58	53	54	49
	52	53	43	49	47	48	50	39	31	31	38	43	43	42
Carmel	68	62	66	54	55	61	57	51	52	56	52	52	44	55
	53	50	49	49	48	50	49	38	31	34	40	42	39	44
Mohawk Valley	54	52	52	51	52	51	44	46	38	40	46	54	48	42
Rome	63	60	60	56	59	57	51	47	45	50	55	64	53	52
	44	44	44	46	45	45	36	45	30	30	38	45	43	31
Champlain Valley	62	51	47	48	46	51	49	45	41	38	41	48	47	44
Plattsburgh Bar'ks	78	60	47	50	44	50	51	49	47	46	50	55	59	56
	54	45	40	40	37	48	42	39	32	28	29	30	36	31
Glens Falls	65	55	55	56	58	60	59	50	50	53	55	61	49	47
	51	45	44	46	46	46	44	40	33	26	30	45	43	43
Lake George	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....

MAXIMA AND MINIMA FOR THE STATIONS — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
60	52	46	40	42	55	46	47	51	42	42	56	63	64	79	66	62	43.6
35	36	34	30	24	27	34	26	21	26	24	21	30	35	55	50	42	
....	....	42	42	45	49	54	50	52	48	44	58	64	62	71	63	67	
....	...	38	34	23	27	40	29	24	29	24	22	29	33	46	45	45	....
68	59	51	42	48	53	56	54	56	46	50	65	70	66	77	66	69	46.8
35	35	37	34	25	28	40	30	26	31	22	21	27	31	52	45	45	
....	....	....	....	....	....	....	....	...	....	....	....	..	....	....	....	....	
....	....	....	....	....	....	....		....	....	....		....		....	....	....	....
69	59	47	47	48	51	52	48	50	53	45	52	61	56	63	62	69	47.2
45	47	33	38	33	32	43	35	35	35	31	31	31	42	41	54	58	
46	42	37	37	33	37	42	35	38	35	31	36	43	44	51	52	53	42.7
63	50	43	46	40	48	53	42	53	44	33	52	57	64	59	64	59	41.8
32	29	30	27	27	34	29	29	27	26	22	29	27	32	47	49	39	
64	52	44	45	41	49	52	42	52	46	39	55	62	55	55	58	63	44.8
36	34	35	37	30	29	36	30	23	32	28	21	37	32	45	40	44	
57	60	47	41	43	36	45	43	48	47	38	36	49	47	62	55	62	41.7
34	32	29	31	26	26	35	27	23	26	26	21	26	27	30	40	47	
61	53	41	42	43	46	50	41	49	42	39	55	61	63	60	67	61	43.4
32	37	31	30	25	30	35	31	28	29	25	21	30	30	49	42	47	
62	45	39	41	39	42	48	39	47	37	35	51	57	62	55	62	59	41.9
29	33	28	31	24	29	32	28	29	25	25	21	27	32	48	48	46	
53	53	50	48	43	47	53	46	50	50	42	43	53	59	59	60	64	51.4
67	68	53	52	52	61	63	53	61	55	50	53	66	60	67	69	72	52.9
48	47	47	45	36	38	50	38	50	49	36	34	44	46	53	54	59	
53	61	67	52	50	53	57	62	55	59	56	49	58	63	57	60	63	51.2
48	49	45	45	35	38	50	39	41	50	36	36	38	46	48	53	55	
67	67	50	49	50	58	64	52	58	54	49	57	70	57	69	69	72	52.0
47	48	47	42	36	45	45	37	46	40	36	40	45	50	52	56	60	
50	60	51	54	52	60	61	56	62	57	51	56	72	61	68	69	76	51.6
44	46	37	45	35	40	38	37	48	36	31	32	36	48	52	52	48	
62	58	62	55	54	56	70	....	63	56	53	55	65	61	68	68	72	50.4
35	33	40	46	27	25	25		26	40	30	23	30	34	52	45	45	
59	66	56	53	49	58	66	51	62	59	47	56	66	58	67	72	73	52.5
47	43	48	47	39	35	48	40	38	44	39	33	43	44	52	54	58	
62	62	52	47	49	57	61	52	57	57	49	57	71	63	70	71	77	49.2
46	33	40	40	33	27	45	35	27	40	30	26	32	34	50	45	58	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
52	49	46	42	40	40	47	43	41	46	40	40	48	48	56	57	61	48.5
63	59	49	47	47	51	55	49	54	53	44	57	64	60	63	66	67	48.0
43	38	40	40	34	34	40	34	29	38	33	30	36	36	51	44	49	
58	57	48	48	50	48	51	48	47	50	43	50	44	59	62	67	64	45.2
40	30	31	31	29	23	37	30	24	36	27	20	39	33	44	44	51	
61	61	49	45	47	52	57	50	53	53	46	48	61	58	65	68	69	46.6
39	33	38	36	29	28	35	30	27	39	35	23	33	33	44	52	52	
65	65	49	44	52	53	59	54	56	58	51	59	67	61	71	66	75	48.2
36	32	37	36	29	27	34	28	26	38	29	23	33	32	49	48	48	
64	63	62	46	49	52	60	55	59	55	50	60	65	62	68	67	72	50.0
42	36	42	39	32	30	40	35	30	40	32	28	35	40	49	55	59	
65	61	48	45	50	48	54	54	52	52	48	56	64	59	63	62	71	49.0
46	39	39	41	34	34	46	35	29	39	35	29	34	37	48	44	53	
54	65	65	49	46	51	55	59	53	57	55	43	57	65	60	65	68	51.8
45	39	41	40	33	30	43	34	30	40	33	28	34	38	40	50	51	
63	63	52	46	47	55	56	52	59	54	48	56	68	59	68	66	72	49.0
47	41	39	40	30	28	32	40	34	38	34	24	38	40	47	43	53	
46	44	42	36	36	45	41	36	38	38	34	41	46	48	54	55	52	45.2
56	52	47	43	43	52	52	45	48	47	44	54	55	53	62	63	62	45.2
37	35	37	28	30	38	30	28	28	28	25	28	36	43	45	47	42	
47	44	43	39	37	36	45	46	38	43	40	35	42	43	46	52	56	44.6
56	59	54	41	44	44	51	57	46	51	53	38	50	53	51	54	62	43.7
30	30	33	32	32	28	38	33	32	34	31	28	31	30	30	49	52	
62	55	49	44	45	45	53	44	51	51	45	51	60	57	58	61	65	45.4
41	30	35	39	26	28	36	30	23	35	30	22	28	32	46	43	43	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....
....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	....	....	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Lawrence Valley	53	49	50	47	47	46	44	41	40	42	44	46	44	49
Madison Barracks.	67	59	61	58	55	51	56	50	47	52	59	62	57	52
	47	40	49	38	40	32	36	34	33	28	28	29	36	37
Watertown	60	56	53	58	60	60	50	47	52	62	64	60	53	66
	42	40	41	38	36	34	37	34	30	30	28	33	31	32
Canton	57	52	49	52	51	53	45	43	46	53	54	55	53	60
	50	42	38	33	35	34	38	35	25	25	26	35	35	35
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	62	54	54	54	56	56	48	44	50	54	56	60	60	62
	48	48	46	46	44	44	40	38	32	30	28	38	38	44
Ogdensburg	58	57	59	54	53	52	54	44	50	59	59	56	56	62
	52	40	42	45	43	40	38	36	30	32	35	38	36	48
Potsdam	56	55	57	51	56	57	53	55	57	53	55	57	55	58
	42	40	47	34	34	36	35	33	31	25	30	31	33	35
Great Lakes	54	49	49	50	50	50	46	43	41	45	47	48	48	49
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	56	57	54	57	57	58	50	46	53	60	58	50	50	55
	53	37	38	35	38	38	40	41	32	35	36	39	43	35
Buffalo	55	55	53	53	55	57	47	45	49	61	57	49	49	54
	47	43	46	45	43	41	39	37	35	34	39	44	45	44
Pittsford	59	54	52	55	53	57	49	43	47	56	57	52	49	55
	47	40	46	41	33	40	42	38	31	28	32	44	39	45
Rochester	58	53	52	55	51	58	48	43	47	57	58	52	52	55
	45	44	48	48	43	42	38	38	35	34	38	44	47	48
Appleton	57	52	55	56	55	56	50	45	45	54	52	49	53	55
	48	42	40	43	41	35	43	40	34	32	33	43	45	44
Fort Niagara	58	57	55	58	56	59	50	49	48	56	55	50	53	56
	49	46	44	46	49	35	44	40	35	31	36	43	44	41
Baldwinsville	62	58	54	56	56	59	52	46	49	55	58	58	51	54
	42	43	47	48	48	47	39	38	31	32	41	42	45	40
Oswego	58	53	52	54	53	53	51	45	44	54	56	55	50	54
	50	46	46	48	48	47	43	39	36	32	38	45	45	46
Palermo	68	55	55	70	76	62	55	51	54	54	57	57	58	55
	50	40	40	45	48	47	46	43	32	26	30	39	41	42
Lyons	61	55	52	55	55	58	51	47	44	56	57	53	50	55
	48	42	47	46	44	48	40	38	35	31	36	43	46	47
Erie, Pennsylvania.	55	54	54	54	56	56	46	49	48	58	55	49	50	56
	49	48	42	42	42	42	40	40	36	40	42	45	44	48
Central Lakes	54	47	47	51	50	50	46	41	41	42	45	46	47	47
Fleming	58	54	50	52	53	53	51	45	45	56	50	50	49	51
	49	40	44	47	47	45	41	36	36	30	36	42	44	42
Romulus	61	55	53	55	53	54	51	45	50	51	59	52	50	53
	47	39	45	47	46	46	42	38	35	29	32	41	44	42
Ithaca	58	54	52	55	52	52	50	43	46	57	58	48	48	49
	49	42	46	48	48	47	42	39	34	29	35	44	44	44
Mean	56	51	50	50	49	50	47	43	40	42	45	48	47	47

‡ Maximum and Minimum by the Draper Thermograph

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded.*)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
47	43	38	39	36	41	42	40	44	40	38	41	47	46	52	53	54	44.6
59	65	45	46	46	52	50	51	62	66	54	44	56	59	68	65	67	46 3
29	39	32	32	34	38	39	37	41	39	30	28	37	34	42	41	50	
66	58	52	46	45	46	52	48	53	44	56	59	64	69	67	67	66	45.6
29	32	30	30	24	18	34	32	33	32	34	37	36	38	54	52	43	
61	....	46	44	44	50	53	46	53	46	40	55	58	56	62	68	68	42.8
25	....	27	31	26	33	32	28	30	27	26	29	38	31	42	42	43	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
62	44	40	38	44	44	42	46	50	44	42	54	56	60	60	64	60	45.2
32	38	32	34	28	38	36	36	38	34	28	26	40	34	40	54	48	
64	50	49	47	46	51	53	44	54	47	40	55	60	55	60	62	65	46.0
37	30	29	33	29	38	38	33	34	27	34	32	40	35	45	52	47	
59	45	44	45	43	56	49	45	53	43	42	44	45	50	55	54	56	41.9
36	33	31	28.	27	30	31	28	30	31	25	29	30	32	29	30	32	
51	47	42	39	38	44	43	40	41	39	39	47	50	54	63	64	56	47.1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
60	50	53	46	44	53	51	46	48	45	47	62	62	70	75	77	68	47.5
46	40	38	33	33	35	35	35	34	38	35	32	43	49	58	60	45	
59	51	44	43	43	52	49	45	47	46	45	55	60	67	67	73	57	48.0
47	40	38	36	35	38	36	34	36	35	35	42	49	52	57	56	52	
64	54	45	44	45	50	52	48	52	45	45	61	64	68	76	73	65	46.3
38	37	37	32	30	35	32	32	28	33	32	30	37	38	56	53	45	
66	52	45	43	42	50	51	47	51	43	44	61	64	67	76	74	66	47.0
38	39	39	32	30	38	33	32	32	35	31	32	40	43	56	60	49	
64	55	47	43	44	51	45	46	47	44	47	60	55	58	73	74	60	45.8
35	42	38	38	27	38	38	31	30	33	33	30	36	37	52	52	45	
68	58	48	46	47	54	46	49	51	45	48	61	57	55	73	75	70	47.6
39	43	37	36	29	36	39	31	34	31	34	35	40	37	49	54	50	
62	50	46	43	47	52	53	57	55	46	45	60	62	64	73	68	65	47.5
41	38	38	31	32	46	34	30	31	32	31	35	39	40	51	51	46	
56	48	44	44	44	52	46	46	52	44	41	60	55	63	73	66	64	47.0
45	42	36	38	35	34	38	36	31	34	34	30	39	43	54	55	50	
57	50	45	43	40	48	50	45	51	41	41	58	59	64	63	63	63	46.2
31	39	34	36	32	30	35	33	23	31	30	28	30	39	50	50	46	
64	54	45	44	45	49	50	49	53	45	45	61	62	64	73	67	64	47.4
39	42	39	36	32	37	35	33	31	37	33	32	39	42	55	56	49	
62	52	47	42	43	52	50	46	48	42	48	62	63	69	74	78	62	48.0
43	46	40	38	32	40	38	33	35	40	36	38	48	50	59	61	49	
49	47	42	40	37	42	44	41	42	41	37	45	51	54	64	61	58	46.8
60	53	46	44	45	51	50	48	57	45	41	61	63	65	75	67	68	46.5
34	40	36	34	29	29	35	33	30	33	32	32	41	46	54	57	53	
64	54	47	45	45	52	50	49	56	56	45	60	65	66	74	69	67	47.1
38	41	36	36	29	34	38	32	29	36	33	29	38	47	52	49	46	
61	52	47	43	43	53	52	47	53	44	42	59	64	65	74	66	65	46.7
39	42	39	36	30	33	40	34	27	33	32	30	35	39	54	57	50	
49	46	42	40	37	41	44	40	41	41	38	41	48	50	56	57	56	46.1

‖ Received too late to be used in computing means.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.06	T.	0.02	T.	T.	0.14	0.31	0.04	0.00	0 00	0.00	1.00	1.40	0.30
Alfred	.03	....	.03	....	T.	.14	42	.09	....	....	....	1.66	1.87	.50
Angelica	....	....	....	....	....	*	*	†.62	....	....	....	1.17	.72	.32
Bolivar	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Friendship	.04	....	T.	....	....	.05	.53	T.	....	....	....	1.51	1.41	.16
‡Franklinville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Humphrey	....	....	T.	....	....	.47	.17	....	....	....	....	.78	1.01	....
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	.11	.10	T.	....	....	.16	.81	T.	....	....	....	.38	.47	.11
Jamestown	.24	....	....	....	....	.28	.33	....	....	....	....	.69	.30	.03
Elmira	....	....	T.	....	....	.31	....	....	....	....	....	1.14	2.95	.12
Pine City	.12	....	.02	....	....	.39	....	....	....	....	....	.80	1.95	1.60
Akron	0:	T.	....	....	....	.14	.40	....	....	....	....	*	†.89	T.
Avon	.10	....	....	....	....	....	.30	.13	....	....	....	T.	.39	.44
‖Mt. Morris	....	....	....	....	....	....	.35	....	....	....	....	.03	.80	.13
Lockport	.12	....	....	....	....	*	†.40	....	....	....	....	T.	.39	....
Victor	.15	....	.10	....	....	.19	T.	....	....	....	....	*	*	†.42
Tyrone	....	....	.04	....	....	....	....	....	....	....	....	....	1.40	1.23
Wedgewood	.02	....	.06	T.	T	.07	.24	T.	....	....	....	.62	2.90	.20
Addison	.05	....	.01	....	....	.01	.36	.04	....	....	....	1.25	3.30	.36
Atlanta	.16	....	.03	....	....	....	.50	.06	....	....	....	.67	1.30	.40
Haskinville	.10	....	....	....	T.	T.	....	.48	....	....	....	.80	1.60	.32
South Canisteo	....	....	.04	T.	....	T.	.50	....	....	....	....	3.50	1.93	T.
Arcade	.05	....	....	....	....	30	.39	T.	....	....	....	1.33	.90	....
Attica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Varysburgh	T.	....	T.	....	....	T.	.70	....	....	....	....	1.00	.50	....
Eastern Plateau	0 05	T.	T.	0.03	0.02	0.14	0.28	0.04	0.00	0.00	0.04	0.22	1.20	0.36
Binghamton	.04	.04	.02	....	....	....	.30	....	....	....	....	.45	1 90	.35
Chenango Forks	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oxford	.13	.03	....	....	T.	T.	.30	.12	....	....	....	T.	1.00	.44
Cortland	.12	....	....	....	....	....	.38	.09	....	....	....	.16	1 61	.42
Bloomville	....	....	....	....	T.	....	.25	.20	....	....	....	.65	....	.15
Deposit	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright	....	....	....	.22	....	....	.42	....	....	....	....	....	*	†.89
Brookfield	.12	....	....	.02	....	.08	.12	.13	....	....	.16	....	.38	.12
Hamilton	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Apulia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	1.33	....	....	....	....	.15	....	.88
Port Jervis	....	....	....	....	.08	....	....	....	....	....	.36	....	.36	1.17
Warwick	....	....	....	.10	.08	....	.12	....	....	....	....	.19	1.00	.27
Cooperstown	.17	....	....	.03	....	....	.27	.03	....	....	....	....	.88	.32
New Lisbon	.11	....	....	....	....	.01	.37	....	....	....	....	....	.90	.25
Oneonta	....	....	....	....	....	.49	.10	....	....	....	....	....	.91	....
Perry City	....	....	T.	....	....	.30	T.	....	....	....	....	.36	2.78	.26
Newark Valley	.12	....	....	....	....	....	.21	....	....	....	....	.25	2 70	.45
‡Straits Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Waverly	....	....	....	....	....	....	.30	....	....	....	....	1.20	2.28	.40
Ellis	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	....	....	....	.15	.05	.31		....	....	....	.18	.06	1.32	.31
Northern Plateau	0.11	0.02	0.04	0.01	0.04	0.09	0.51	0.15	0 00	0.00	0.00	0.00	0.58	0.26
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Saranac Lake	....	.04	.02	....	....	.51	.21	T.	....	....	....	....	.10	....
Gloversville	T.	.05	....	.04	.03	.02	.33	.02	....	....	....	....	1.73	.31
North Lake	.10	....	....	....	....	....	....	.80	....	....	....	....	....	.70
Lowville	.15	....	....	....	....	....	.57	.06	....	....	....	....	.08	.23
Number Four	.25	....	....	....	....	....	1.05	....	....	....	....	....	.27	....
Kings Station	.15	....	.20	....	.24	....	.91	....	....	....	....	....	1.28	.34

TATION FOR OCTOBER, 1896 — (INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	T.	0.01	0.08	0.01	0.04	0.10	T.	T.	T.	0.00	0 00	0.00	T.	0.07	0.06	0.05	3.49
....	T.	.09	.04	.02	.01	.04	T.	....	T.	....	....	....	....	....	....	.08	5 02
....	T.	T.	T.	.02	....	.12	....	....	.03	...	....	....	....	....	....	.18	3.18
....	....	....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....
....	T.	T.	T.	T.	T.	.15	....	....	T.	....	....	...	....	....	....	.18	4 03
....	....	T.	.45	....	.04	.18	T.	....	.01	....	....	....	....	....	.65	....	....
....	....	....	.06	.02	.42	T.	....	....	....	....	....	....	T.	....	.07	....	3.00
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	T.	.06	.05	.10	.13	.02	....	T.	...	....	..	....	....	-04	...	2 54
....	T.	...	T.	.10	....	.20	....	....	T.	....	....	....	T.	....	T.	....	2.17
....	....	....	.34	....	....	....	....	T.	....	....	....	....	....	....	T.	....	4.86
.10	....	....	...	...	....	....	....	....	....	....	....	....	....	....	.03	.03	5.04
....	....	T.	.02	T.	T.	24	T.	....	....	....	....	....	....	T.	.10	....	1.80
....	....	...	T.	....	T.	.12	....	....	T.	....	....	....	....	....	T.	....	1.48
....	....	T.	T.	....	....	.10	....	....	....	....	...	....	...	...	T.	....	1.41
....	....	...	.02	...	....	.22	....	....	....	....	....	....	...	....	.12	....	1.27
....	....	*	†.34	....	*	*	†.41	....	T.	....	....	....	...	T.	....	....	1.61
....	...	....	...	....	....	....	....	...	....	....	....	....	....	1.35	....	....	4 02
....	....	....	.20	....	....	....	....	...	T.	....	....	....	...	.04	.04	.03	4 42
....	...	....	.13	....	.06	.04	....	....	T.	....	....	....	....	.01	03	08	5.73
....	.03	.02	.02	....	.05	.03	....	....	...	....	....	....	....	....	T.	.15	3.42
....	.05	.05	.10	....	.08	....	....	....	....	....	....	....	....	....	.03	.19	3.80
....	T.	.01	.14	T.	T.	.07	....	....	....	....	....	....	....	T.	.15	.15	6.49
....	T.	....	.05	....	.07	.11	....	....	....	....	....	....	....	....	.02	....	3 22
....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....
....	....	....	T.	T.	T.	.43	....	....	T.	....	....	....	....	....	T.	....	2.63
0.03	T.	0.00	0.22	T.	0.12	0.02	0.00	0.21	0.05	T.	T.	0.00	T.	0.01	0 09	0.01	3.08
....	....	....	.27	....	T.	.03	....	....	.21	....	....	....	....	.04	.03	....	3.68
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....
....	....	....	.35	...	....	....	...	....	.25	....	....	....	....	.05	.02	....	2.69
.02	....	....	.33	....	.04	...	....	....	.03	....	....	....	....	.02	.04	.06	3.32
....	....	....	.25	....	.41	....	....	.51	...	....	....	....	....	.08	1.15	...	3.25
....	....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	...	...
....	....	....	*	*	†.55	....	....	.27	....	....	....	....	....	....	....	....	2.85
....	....	....	.10	.01	....	....	....	....	....	.05	.08	....	....	....	....	....	1.37
....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....
T.	....	....	T.	T.	.33	....	....	.83	....	....	....	....	....	....	....	....	3.52
.35	.03	....	....	....	.17	.05	....	.90	....	....	....	....	....	....	.06	....	3.53
....	....	....	.05		.05	.06	....	.74	....	....	....	....	....	....	....	....	2.66
....	....	....	.28	....	.10	....	....	.15	....	....	....	....	....	....	...	....	2.23
....	....	....	.23	....	.06	...	....	.09	.07	....	....	....	....	....	....	....	2.09
.11	....	....	.33	....	.14	....	....	.12	....	....	....	....	.06	....	....	....	2.26
....	....	....	.28	...	....	....	....	....	T.	....	....	....	....	.02	.03	.04	4.07
....	...	....	.22	....	.10	T.	....	...	.16	...	....	....	....	....	.05	....	4.26
....	...	....	.37	....	.05	.03	....	....	.11	....	....	....	....	T.	.08	....	....
....	....	....	.43	....	.17	.01	....	.08	....	....	....	....	....	.01	.02	...	4.90
....	....	....	....	....	....	....	...	....	....	...	....	....	....	....	...	...	....
....	....	....	....	....	.30	.10	....	.30	....	....	....	....	....	....	....	....	3.11
T.	T.	0.00	0.12	0.02	0.08	0.15	0.03	T.	0.06	0.00	0.00	0.00	0.00	0.30	0.10	0.17	2.85
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
...	T.	....	T.	....	.05	.04	T.	....	.05	....	....	....	....	.29	....	....	1 31
.03	T.	....	.14	.03	.12	.06	T.	T.	.03	....	....	....	....	.10	.02	....	3.06
....	....	....	....	.12	....	.20	....	....	....	....	....	....	....	....	.50	.48	2.90
....	....	....	.12	....	13	.08	.13	....	.04	....	....	....	....	.33	.03	.20	2 15
....	....	....	.40	....	.09	....	.07	....	.04	....	....	....	....	.95	....	.32	3.44
....	....	....	.08	....	10	.50	....	.05	.20	....	....	....	....	.16	.04	....	4.25

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.00	0.00	0.01	0.30	0.10	0.02	0.07	0.00	0.00	0.00	0.08	0.09	0.78	0.08
Brooklyn	....	....	T.	.09	....	....	.12	....	....	....	*	†.21	*	*
Manhattan Beach	....	....	....	.02	.10	....	.10	....	....	....	*	†.20	.32	.25
New York City	....	....	T.	.03	.02	....	.07	....	....	....	03	.11	.72	.04
Willet's Point	....	....	....	.15	....	.12	....	....	....	....	.28	.20	.78	T.
Brentwood	....	....	T.	1.00	.50	....	....	....	....	....	....	....	1.00	.10
Setauket	....	....	.06	.63	.08	....	.15	....	....	....	.08	T.	.88	.05
Bedford	....	....	...	.20	.03	T.	.07	....	....	....	.02	.15	.95	.03
Primrose	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hudson Valley	0 04	T.	0.01	0 04	0.14	0.01	0.26	T.	0.00	0.00	T.	0.03	0.97	0.12
Albany	.10	T.	T.	.01	T.	T	.04	....	....	....	....	.03	1.01	.08
Lebanon Springs	....	....	.06	....	.20	.07	.31	.03	....	....	....	T.	1.20	.15
Honeymead Brook	.02	T.	T.	.13	.04	.01	.22	....	....	....	....	.05	1.40	.01
Poughkeepsie	....	....	....	....	.20	....	.22	....	....	....	....	T.	1.22	.04
Wappinger's Falls	T.	....	....	.21	.06	T.	.36	....	....	....	T.	.22	.92	.13
Catskill	.05	....	....	....	.17	T.	.15	....	....	....	....	T.	1.33	.21
West Point	....	....	....	....	.15	....	.10	....	....	....	....	....	.26	....
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	....	....	.28	....	.14	....	....	....	....	.21	.98	....
So. East Reservoir	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	.05	....	....	....	....	....	.60	....	....	....	....	....	.75	.25
Easton	.23	....	....	....	.25	....	.47	....	....	....	....	....	.67	.33
Mohawk Valley	0.00	0.00	0.00	0.00	0.00	0.31	0 12	0.00	0.00	0.00	0.00	0.00	0.75	0.08
Rome	....	....	....	....	....	.31	.12	....	....	....	....	....	.75	.08
St. Johnsville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Champlain Valley	0.30	0.08	0.02	T.	0.04	0.00	0.52	0.22	0.00	0.00	0.00	0.00	0.52	0.32
Plattsb'h Barracks	.35	.10	.05	T.	T.	....	.38	.44	....	....	....	....	....	T.
Glens Falls	.26	.06	....	....	.08	....	.67	....	....	....	....	....	1.05	.65
Lake George	....	....	....	....	....	....	....	....	....	....	....	....	....	....
St. Lawrence Val'y	0.04	0.01	0.00	0.00	0.00	T.	0.33	0.02	0.00	0.00	0.00	0.00	T.	0.00
Madison Barracks	....	....	....	....	....	....	.70	....	....	....	....	....	T.	....
Watertown	....	....	....	....	....	....	.47	.09	....	....	....	....	....	....
Canton	.16	....	....	....	....	....	.56	....	....	....	....	....	....	....
DeKalb Junction	.13	....	....	....	....	....	....	....	....	....	....	....	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	....	....	....	....	....	....	.21	.04	....	....	....	....	....	....
Ogdensburg	....	....	....	....	....	.02	.05	....	....	....	....	....	....	....
Potsdam	....	.05	....	....	....	....	*	†.30	....	....	....	....	....	....
Great Lakes	0.12	T.	T.	T.	0.00	0.18	0.44	0.06	T.	0.00	0.00	0.09	0.27	0.11
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	....	....	....	....	....	.40	.20	....	....	....	....	.30	.40	....
Buffalo	.08	....	....	....	....	.13	.30	....	....	....	....	.37	.56	....
Adams Centre	.17	....	....	....	....	1.02	....	....	....	....	....	....	....	....
Pittsford	.03	....	....	....	....	....	1.00	.02	....	....	....	....	.01	....
Rochester	.04	....	T.	....	....	T.	.33	.01	....	....	....	....	.01	.01
Scottsville	.20	....	....	....	....	....	....	....	....	....	....	.39	....	....
Appleton	.02	....	....	....	....	.13	.51	....	....	....	....	T.	.04	....
Fort Niagara	.20	....	....	.03	....	*	†.55	....	....	....	....	....	.17	....
Niagara Falls	....	....	....	....	....	.45	.65	....	....	....	....	....	.43	....
Baldwinsville	....	....	....	....	....	.59	.15	T.	....	....	....	.03	.95	....
Skaneateles	.20	.03	....	....	....	....	.58	.46	....	....	....	....	1.06	.78
Ridgeway	....	....	....	....	....	.03	.49	....	....	....	....	....	.20	....
Demster	.25	....	....	....	....	....	.65	.20	....	....	....	....	.25	....
Fulton	.20	....	....	....	....	....	.93	....	....	....	....	....	.54	....
Oswego	.17	....	....	....	....	....	.43	.03	T.	....	....	....	.09	.06
Palermo	.35	....	....	....	....	.04	.36	.10	....	....	....	....	....	.45

TATION FOR OCTOBER — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
0.03	0 00	0.00	T.	0.00	0.02	0.05	0.00	0.31	0.40	0.00	0.00	0.00	0.00	T.	T.	T.	2.40
†.59	....	....	T.	....	....	.05	....	*	†.67	....	...	....	....	....	....	T	1.73
...	....	....	....	....	....	.05	....	*	†.60	....	....	....	....	....	....	....	1.64
.03	....	....	T.	....	....	.02	....	.15	.49	....	....	....	....	T.	T.	....	1.71
....	....	....	....	....	.12	....	....	.78	....	....	....	....	....	....	T.	....	2.43.
....	....	....	T.	....	....	....	....	*	†1.50	....	....	....	....	....	....	....	4.10
.09	....	....	T.	....	....	T.	....	.20	.65	....	....	....	....	....	T.	....	2.87
.04	....	....	.03	....	....	.24	....	.11	.48	....	....	....	....	....	....	T.	2.35
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.11	0.01	0.01	0.10	T.	0.06	0.11	0.09	0.12	0.27	0.00	0.04	0.00	0.00	T.	0 04	0.01	2.63
.04	....	....	.01	....	.01	.02	....	....	.12	....	....	....	....	.03	.02	.01	1.53
.06	....	....	.27	....	*	*	†.72	....	....	....	....	....	....	T.	....	....	3.07
....	....	.02	.13	....	.08	.25	....	.16	.41	....	....	....	....	....	.01	.02	2.96
....	....	T.	T.	....	.10	.16	....	.72	....	....	....	....	....	....	....	....	2.66
T.	....	.11	.22	T.	.07	.10	....	.19	.69	....	...	....	....	....	.06	...	3.34
...	....	....	.11	....	.12	.13	...	....	.12	....	....	....	....	....	....	....	2.39
.90	.08	....	....	T.	.04	....	.03	....	.80	....	....	....	....	....	....	....	2.36
....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	2.21
....	....	....	....	T.	T.	T.	...	*	†1 02	....	....	....	....	....	....	....	2.63
...	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	2 39
...	....	....	....	....	....	08	.75	....	....	....	.35	....	....	....	.10	....	2.83
.09	....	....	.24	....	.11	.26	....	....	.28	....	....	....	....	....	.18	.06	3.17
0.00	0.00	0 00	0 34	0.05	0.00	0.10	0.00	0.00	0.00	0 00	0.00	0.00	0.00	0.00	0.15	0.00	1.90
....	....	....	.34	.05	....	.10	....	....	....	....	....	....	....	....	.15	....	1.90
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	0.00	?	0.12	0 06	0.12	0 00	0.00	0.07	0.00	0.00	0.00	0.00	0 11	0.06	0.00	2.66
....	....	....	....	.25	....	.01	....	....	....	....	....	....	....	.02	.08	....	1.68
....	....	....	*	†.13	13	.23	....	....	.14	....	....	....	....	.20	.05	....	3.65
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0.00	0.04	0 09	0.01	0 09	0.07	0 00	0.00	0.01	0 00	0.00	0.09	0.00	0.34	0.11	0 03	1.33
....	....	.23	....	....	.27	....	....	....	....	....	....	.61	....	.43	...	....	2.24
....	....	08	.08	....	.11	.04	....	....	.02	....	....	....	....	.64	.12	.07	1.72
....	....	T.	.21	....	....	....	....	....	....	....	....	....	....	.09	...	....	1.02
....	....	....	.15	....	.07	.08	....	....	.06	....	....	....	....	....	.55	.04	1.08
....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....
...	...	....	.06	.08	.15	.12	....	....	....	...	....	....	....	.54	.10	.05	1.35
....	....	....	.05	....	....	.27	....	....	.02	....	....	....	....	.30	....	.02	0.73
....	....	....	*	†.39	....	....	....	....	....	....	....	....	....	.40	...	....	1.14
0.00	T.	T.	0.06	0 06	0.02	0.08	0 02	0.01	0.02	T.	0.00	T.	T.	0 04	0.08	0.04	1.71
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	.10	T.	....	T	....	....	....	....	....	....	....	....	T	....	1.40
....	....	T.	T.	T.	.05	.27	....	....	.01	T.	....	....	....	....	.13	....	1 90
....	....	....	.04	.34	....	.08	....	....	.12	....	....	....	....	....	....	....	1.77
....	....	.01	T.	T.	.01	.11	....	....	....	....	....	....	...	....	T.	....	1.19
....	....	T.	T.	T.	.01	.12	....	....	T.	....	....	....	....	....	.05	....	0.58
....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	0.59
....	....	T.	T.	....	.02	.25	....	....	T.	....	....	....	T.	....	.18	....	1.15
....	....	....	.02	....	....	.22	....	....	....	....	....	....	....	....	.18	....	1.37
....	....	....	....	....	....	.20	....	....	....	....	....	....	....	....	.30	....	2 03
....	....	T.	.24	....	.02	....	....	....	T.	....	....	....	T.	....	.09	....	2.07
....	....	....	.21	....	....	....	....	....	....	....	....	....	....	....	....	.16	3.48
....	....	....	T.	....	....	.10	....	....	....	....	....	T.	....	....	.14	....	0.96
....	....	....	.18	.12	.07	....	.20	....	.07	....	....	....	....	.16	.16	....	2.31
....	....	....	....	.30	....	....	....	.14	....	....	....	....	....	.21	.20	....	2.52
....	....	....	.15	T.	.05	.03	.11	....	.02	....	....	....	....	.20	.04	.07	1.45
....	....	....	.10	.05	.05	....	.03	....	.04	....	....	....	....	.30	....	.15	2.02

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes (Con.)														
Phœnix	.33	....	...	....	....	....	.72	.08	....	....	....	....	.09	.79
Lyons	T.	T.	T.	....	....	.25	.25	....	....	....	....	.07	.53	....
Rose	.10	....	....	....	....	....	.30	.34	T.	....	....	....	.19	.16
Erie, Penna	.09	....	...	....	....	.33	.43	T.	....	....	...	.58	.14	....
Central Lakes	0.10	0 00	T.	T.	T.	0.14	0.43	0.05	0.00	0.00	0.00	0.08	2.25	0.25
Fleming	.25	...	....	....	....	....	.65	.20	....	...	...	....	*	†2.00
Sherwood	.04	....	....	.01	T.	.56	.10	....	....	....	....	.11	2.42	....
‡Watkins	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Romulus	.10	....	T.	....	....	..	.65	....	....	....	....	T.	1.34	.60
Ithaca	.03	...	.02	....	....	T.	.32	....	....	....	....	.19	3.00	.16
Penn Yan	....	....	....	....	....	....	....	...	....	....	....	....	....	....
Average	0.08	0.01	0.01	0.04	0.05	0.13	0.33	0.06	T.	0.00	0.01	0.15	0.87	0.19

* Amount included in next measurement. † Not included in computing averages.

TATION FOR OCTOBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
....	....	....	....	.16	....	.03	.10	....	.09	....	....	....	....	.02	.05	....	2.46
....	....	.02	....	....	.04	T.	....	....	T.	....	....	.02	.01	....	.07	....	1.26
....	..	....	.06	T	.08	.10	....	....	.03	....	....	....	....	....	.07	.33	1 76
....	T.	.01	02	.30	.04	.03	....	....	....	....	....	...	....	....	.04	....	2.01
0.00	0.00	0.05	0.18	0.00	T.	T.	0.00	0.00	T.	0.00	0.00	0.00	0.09	0.01	0.03	0.07	3.61
....	....		....	....	....	....	....	....	....	....	....	...	....	....	....	....	3.10
....	....	.25	....	....	....	....	....	....	....	....	....	....	....	.05	.10	.02	3.66
....	....	....	....	....	....	....	....	....	T.	....	....	....	....	....	....	.06	....
....	....	T.	.61	....	....	....	....	....	....	....	....	....	....	....	T.	....	3.30
....	....	T.	.30	....	.10	T.	....	....	T.	....	....	....	....	01	.06	.27	4.37
....	....	....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....
0.02	T.	0.01	0.13	0.03	0.05	0.08	0.01	0.06	0.09	T.	T.	0.01	T.	0.09	0.07	0.04	2.57

‡ Record for the month incomplete. ‖ Received too late to be included in the averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).						EXTREMES OF MONTHLY MEAN TEMPERATURE FOR OCTOBER.			
		Normal for the month of October.	Length of record, years.	Record begins.	Record ends.	Mean for October, 1896.	Departure from the normal.	Highest.	Year.	Lowest.	Year.
Western Plateau		47.3				44 8	—2.5				
Angelica	Allegany	45.4	14	1854	1896	43.0	—2 4	49.5	1894	39.6	1889
Humphrey	Cattaraugus	46.8	14	1883	1896	44.2	—2.6	51.7	1894	42.4	1895
Elmira	Chemung	49 7	18	1850	1896	47.2	—2.5	53.7	1894	45.0	1859
Eastern Plateau		46.8				44.9	—1.8				
Oxford	Chenango	46.2	28	1828	1896	43.8	—2.4	54.1	1846	39.8	1836
Cortland	Cortland	45.7	34	1829	1896	44.8	—0 9	51.2	1835	38.4	1836
Cooperstown	Otsego	46 5	43	1854	1896	44.3	—2.2	53.3	1879	40.7	1865
Waverly	Tioga	48.7	15	1882	1896	46.8	—1.9	57.6	1888	42.9	1889
Northern Plateau		45.7				43.4	—2.3				
Lowville	Lewis	45.7	30	1827	1896	43.4	—2.3	51 4	1835	40.6	1841
Atlantic Coast		54.2				52 2	—1.9				
New York City	New York	55.1	26	1871	1896	52 0	—3.1	60.1	1879	50.0	1876
Setauket	Suffolk	53.2	12	1885	1896	52 5	—0.7	55.0	1893	50.0	1838
Hudson Valley		51.2				48.8	—2.4				
Albany	Albany	50.7	23	1874	1896	48.0	—2 7	55.8	1879	45.6	1888
Honeymead Brook	Dutchess	48.7	16	1881	1896	46.6	—2.1	53.1	1882	44.6	1895
West Point	Orange	54 1	65	1826	1896	51.8	—2.3				
Champlain Valley		46.9				43.7	—3.2				
Plattsb'gh Barracks	Clinton	46.9	42	1843	1896	43.7	—3.2	53.6	1879	42.0	1888
St. Lawrence Valley		47.6				44.0	—3.6				
Madison Barracks	Jefferson	49.1	37	1839	1896	46 3	—2 8	59.6	1879	41.4	1889
Canton	St. Lawrence	47.2	34	1862	1896	42.8	—4.4	59.2	1874	40.2	1868
North Hammond	"	47 6	14	1866	1896	45.2	—2.4	54.3	1870	41.5	1889
Potsdam	"	46.5	29	1828	1896	41.9	—4.6	52.0	1835	36.9	1836
Great Lakes		49.8				47.3	—2.5				
Buffalo	Erie	50 2	26	1871	1896	48.0	—2.2	58 3	1879	45.0	1888
Rochester	Monroe	49.8	26	1871	1896	47.0	—2.8	57.6	1879	43.9	1889
Fort Niagara	Niagara	50.4	41	1842	1896	47.6	—2.8	59.1	1879	43.4	1856
Baldwinsville	Onondaga	48.3	18	1854	1896	47.5	—0.8	52 4	1894	43.5	1865
Oswego	Oswego	50.5	26	1871	1896	47.0	—3.5	59.8	1872	43.9	1889
Palermo	"	47.3	43	1854	1896	46.2	—1.1	53.9	1879	41.8	1889
Erie, Pa	Erie	52 1	23	1874	1896	48.0	—4.1	60.0	1879	46.0	'89-'95
Central Lakes		49.2				46.7	—2 5				
Ithaca	Tompkins	49.2	18	1879	1896	46.7	—2.5	56.0	1879	42.9	1889
Average departure.							—2.5				

AND PRECIPITATION — OCTOBER.

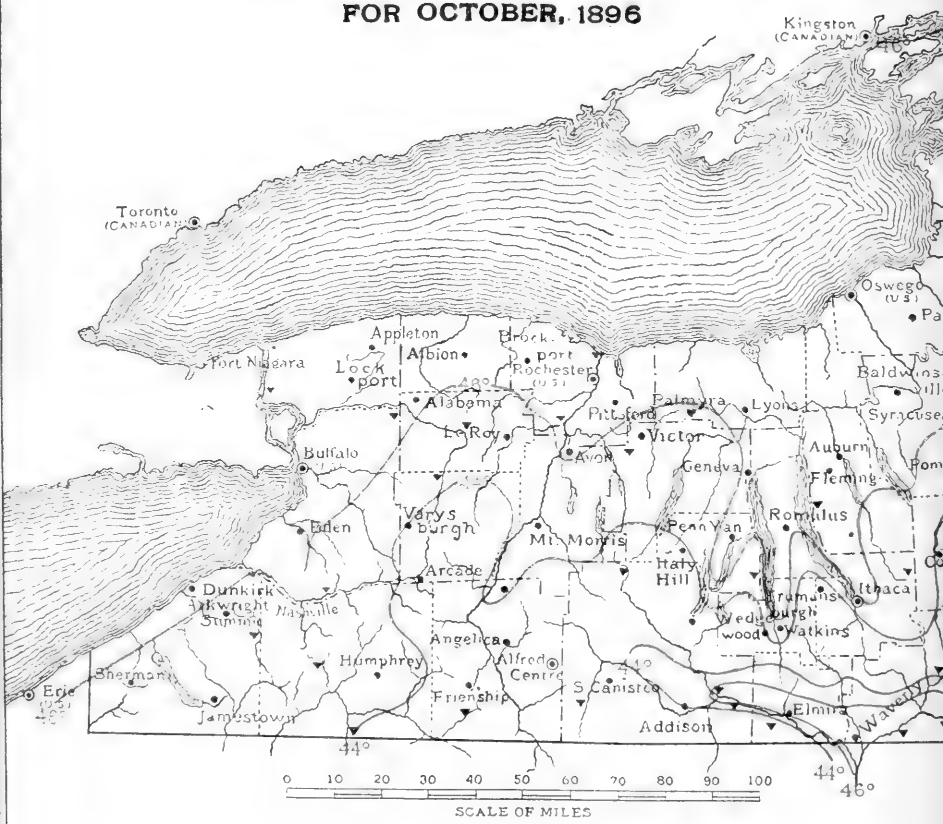
STATION.	COUNTY.	PRECIPITATION — (INCHES). Average for the month of October.	Length of record, years.	Record begins.	Record ends.	Total for October, 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR OCTOBER. GREATEST. Amount.	Year.	LEAST. Amount.	Year.
Western Plateau.....	....	3.25	...	......	......	3.68	+0.43	.....	......	.....	......
Angelica	Allegany	3.16	13	1856	1896	3.18	+0.02	6.44	1873	1.32	1895
Humphrey...........	Cattaraugus ..	3.46	14	1883	1896	3.00	—0 46	5.94	1890	1.55	1886
Elmira	Chemung	3.14	19	1850	1896	4.86	+1.72	7.00	1861	0.78	1895
Eastern Plateau.....	....	3.31	...	......	......	3.33	+0.03	.....	......	.....	......
Oxford................	Chenango	3.24	25	1829	1896	2.69	—0.55	5.97	1894	0.67	1839
Cortland	Cortland......	3.76	19	1850	1896	3.32	—0.44	6.73	1862	0.85	1895
Cooperstown	Otsego.........	3.25	43	1854	1896	2.23	—1.02	6.65	1857	0.88	1856
Port Jervis...........	Orange	3.19	12	1880	1896	3.53	+0.34	7.25	1890	0.61	1892
Waverly..............	Tioga.........	3.10	15	1882	1896	4.90	+1.80	5.60	1885	0.70	1882
Northern Plateau....	....	3.22	...	......	......	2.15	—1.07	....	......	.....	......
Lowville..............	Lewis	3.22	33	1827	1896	2.15	—1.07	5.80	1850	0.46	1839
Atlantic Coast.......	....	4.24	...	......	......	2.29	—1.95	....	......	.....	......
New York city	New York....	3.44	26	1871	1896	1.71	—1.73	7.69	1877	0.58	1879
Setauket..............	Suffolk	5.04	12	1885	1896	2 87	—2.17	10.20	1890	0.90	1892
Hudson Valley	....	3 55	...	......	......	2.34	—1.21	.....	......	.....	......
Albany...............	Albany	2.85	23	1874	1896	1.53	—1.32	7.86	1877	0.27	1882
Honeymead Brook...	Dutchess	3.30	16	1881	1896	2.96	—0 34	6.43	1890	0.92	1892
Poughkeepsie	"	3.68	21	1830	1896	2.66	—1.02	8.64	1833	0.89	1892
West Point...........	Orange	3.87	49	1840	1896	2.36	—1.51	10.25	1855	T.	1892
Boyds Corners........	Putnam	4.06	26	1870	1896	2.21	—1.85	8.38	1877	0.92	1892
Champlain Valley...	....	2.83	...	......	......	1.68	—1.15	.....	......	....	......
Plattsburgh Barr'ks.	Clinton	2 83	37	1840	1896	1.68	—1.15	7.64	1850	0.46	1879
St. Lawrence Valley..	....	3 81	...	......	......	1.58	—2.53	.....	......	.....	......
Malone	Franklin	2.92	16	1830	1895	....	......	.....	......	.....	......
Madison Barracks...	Jefferson	5.08	36	1840	1896	2 24	—2.84	12.39	1850	0.92	'79-'82
North Hammond	St. Lawrence..	4.21	14	1866	1896	1.35	—2.86	9.21	1872	0.76	1895
Potsdam...............	" ..	3.02	28	1828	1896	1.14	—1.88	6.11	1843	0.73	1895
Great Lakes.	....	3.21	...	......	......	1.56	—1.66	.....	......	.....	......
Buffalo	Erie	3.62	26	1871	1896	1 90	—1.72	7.33	1881	0.74	1879
Rochester	Monroe	2.83	26	1871	1896	0 58	—2 25	8.67	1873	0.58	1896
Fort Niagara.........	Niagara	2 24	41	1841	1896	1.37	—0.87	5.25	1864	0.69	1892
Oswego...............	Oswego.......	3.20	26	1871	1896	1.45	—1.75	7.55	1878	0.50	1882
Palermo	"	3.38	37	1860	1896	2.02	—1.36	7.90	1862	0.30	1882
Erie, Pa...............	Erie	4.01	24	1873	1896	2.01	—2 00	8.17	1885	1.18	1879
Central Lakes........	....	3.06	...	......	......	4.37	+1.31	.....	......	.....	......
Ithaca	Tompkins	3.06	18	1879	1896	4.37	+1.31	5.26	1885	0.31	1879
Average departure.	....	.....	...	......	......	.....	—1 00	.....	......	.....	......

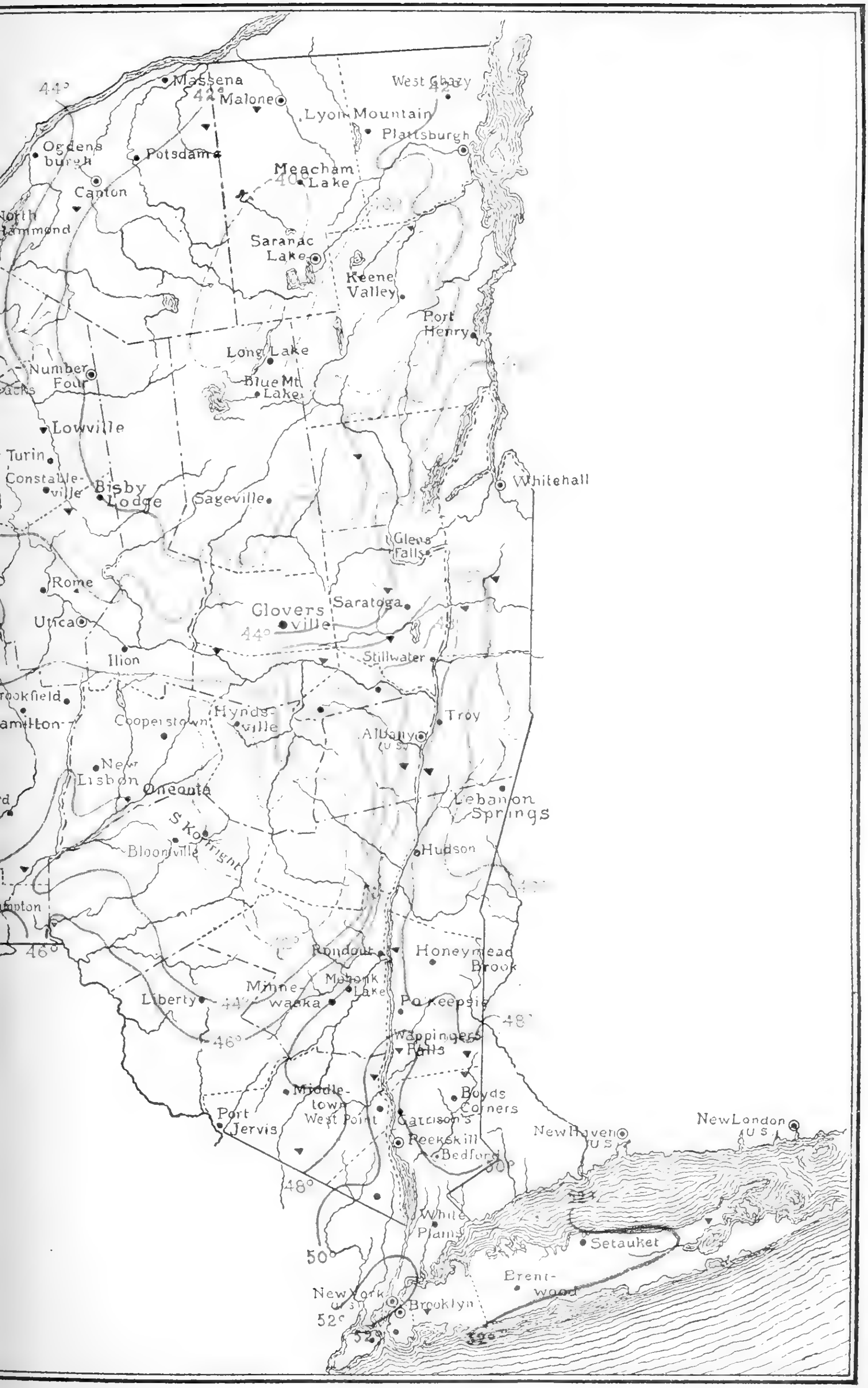
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR OCTOBER, 1896





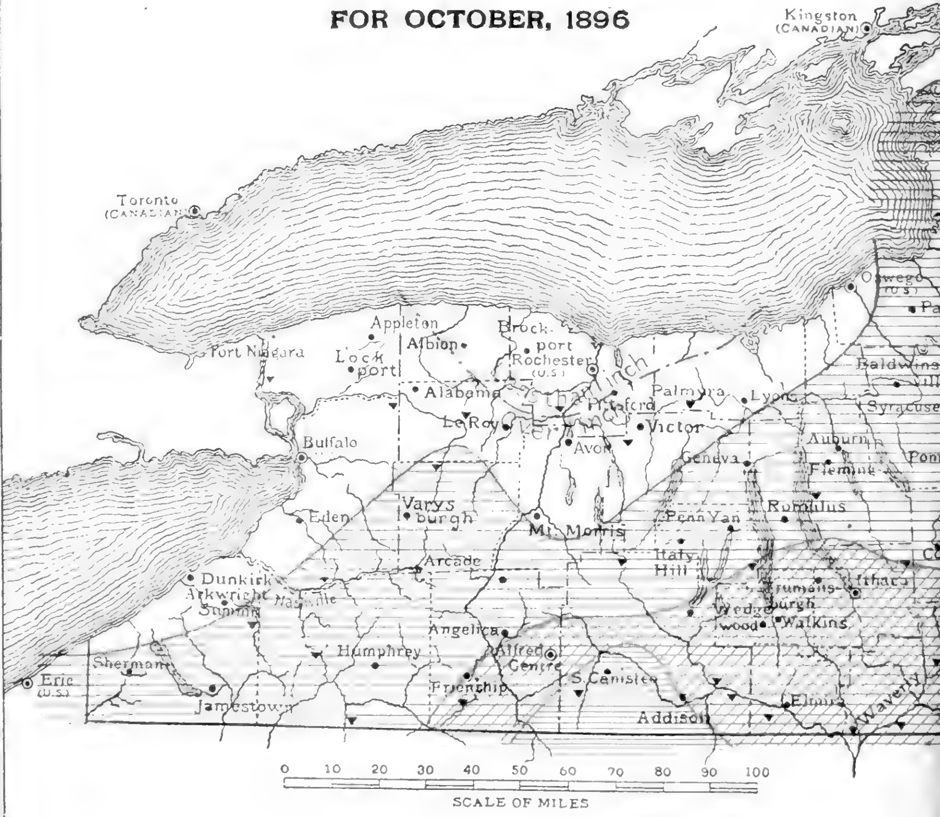
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Blue Mt. Lake
Number Four
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Minnewaska
Mohonk Lake
Liberty
Poughkeepsie
Wappingers Falls
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
44°
42°
40°
46°
48°
50°
52°

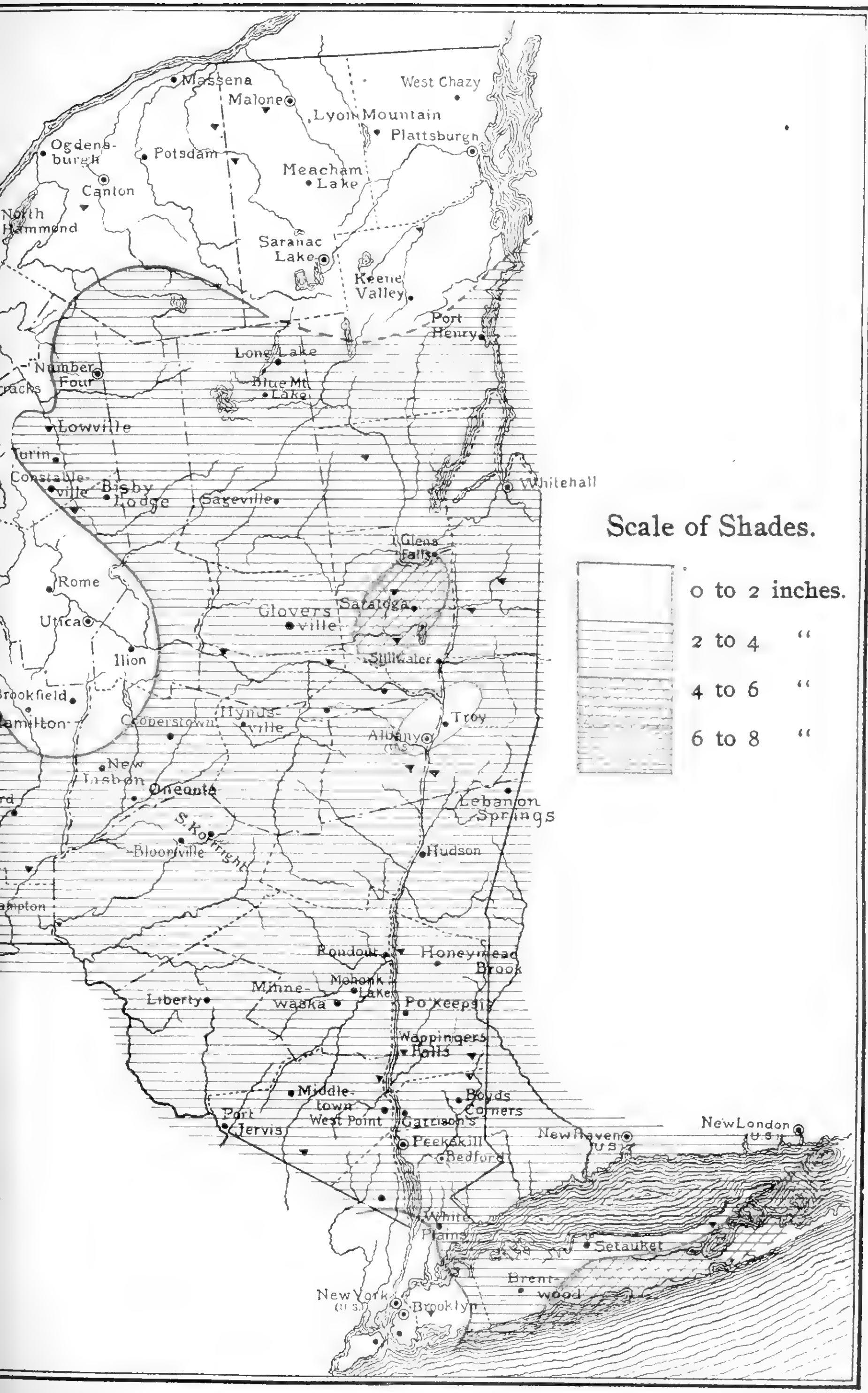
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR OCTOBER, 1896




Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
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Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
6 to 8 "

Meteorological Summary for November, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during the month of November was 30.17 inches. The highest barometer was 30.80 inches at Albany on the 23d, and the lowest was 29.40 inches at Buffalo and Oswego on the 5th. The mean pressure exceeded 30.20 inches in southeastern New York, while along the lakes the average was about 30.14 inches. The average pressure at 6 stations of the National Bureau was 0.10 inches above the normal value, large excesses occurring at all stations.

The mean temperature of the State, as derived from the records of 74 stations, was 41.9 degrees; the highest local monthly mean being 48.7 degrees at Brooklyn, and the lowest, 35.8 degrees at Saranac Lake. The highest daily mean for the State was 58 degrees on the 27th, and the lowest was 26 degrees on the 30th. The maximum temperature reported was 78 degrees at Watertown on the 26th, the minimum being 1 degree below zero at Canton and Saranac Lake on the 22d. The mean monthly range of temperature for the State was 53 degrees; the greatest range, 67 degrees, occurring at Canton, and the least, 40 degrees, at Setauket. The mean daily range was 17 degrees; the greatest daily range being 45 degrees at Canton, on the 23d, and the least, 2 degrees at Angelica on the 13th and at Primrose on the 28th. The mean temperatures of the several regions were as follows: The Western Plateau, 42.3 degrees; the Eastern Plateau, 42.4 degrees; the Northern Plateau, 37.5 degrees; the Atlantic Coast Region, 47.2 degrees; the Hudson Valley, 43.4 degrees; the Mohawk Valley, 39.1 degrees; the Champlain Valley, 40.1 degrees; the St. Lawrence Valley, 39.6 degrees; the Great Lake Region, 43.1 degrees; the Central Lake Region, 44.2 degrees. The average of the mean temperatures at 26 stations possessing records for previous years was 4.7 degrees above the normal, excesses occurring at all stations. The values were the highest recorded for November at 13 widely distributed stations; while at Oswego and Honeymead Brook equally high temperatures occurred only in November of the years 1877 and 1888, respectively.

The mean relative humidity for the State was 76 per cent. The mean dew point was 36 degrees.

The average precipitation for the State was 3.34 inches, as derived from the records of 99 stations. The greatest general precipitation ranged from 4 to 6 inches or more over the northern-central portion of the State, while the least was under 1 inch in a small area southwest of the Central Lakes. The maximum local precipitation was 6.21 inches at North Lake, Herkimer county, and the least was 0.83 inches at Addison, Steuben county. A list of the heaviest rates of precipitation will be found in the accompanying table of meteorological data. The first general rains, and the heaviest for the month, occurred on the 5th. On the 8th moderate rain or snow occurred, mainly in western and northern New York; on the 11th, general, heaviest near the Great Lakes; on the 13th, moderate general; snows from the 17th to the 20th, a light rainfall in western and central New York; on the 21st, moderate rain and snow, heaviest in the western and central sections; on the 22d, light general rain or snow; on the 24th and 25th, moderate rains over the northern and central sections; on the 28th, rain on the coast and Lake Regions; on the 30th a considerable snowfall along the coast, with lesser amounts in northern New York. The average total snowfall over the State was 2.9 inches. Appreciable amounts were measured at all stations, the maximum for northern New York being 13 inches at Lowville, while the greatest value for more southerly stations was 9.9 inches at Humphrey. Generally, the lightest snowfall occurred in eastern New York north of the coast region; the storm of the 30th bringing the total for the latter section above the general average for the State. The average precipitation at 27 stations possessing records for previous years was 0.23 inches below the normal; excesses being reported from but 5 stations, generally located on the northern and eastern plateaus.

The average number of days on which the precipitation amounted to 0.01 inches or more was 10.8; the rain frequency being greatest, on the average, near the Great Lakes and over the northern plateau, and least near the Atlantic coast. The average number of clear days was 5.9; of partly cloudy days, 9.5; and of cloudy days, 14.6; giving an average cloudiness of 62 per cent. The maximum cloudiness obtained over the Northern Plateau and the Great Lake Region, and the minimum in the eastern part of the State.

The prevailing wind direction was from the southwest. The average total wind travel at 5 stations of the National Bureau was 9,173 miles, the totals being in excess of the usual values for the month. The maximum velocity reported from the above stations was 72 miles per hour at Buffalo on the 6th.

Thunderstorms or distant lightning were reported from 6 stations of eastern New York on the 5th; from 3 stations of southern-central New York on the 6th; at Number Four on the 17th; at North Hammond on the 17th; at Mount Morris on the 29th.

Hail fell on the 13th, 21st, 28th and 29th; and sleet fell on the 21st, 25th, 28th, 29th.

A solar halo was observed on the 20th, and a lunar halo on the 9th.

General features of the weather.—This month ranks among the warmest Novembers on record in this State, the mean temperatures exceeding any previously obtained at one-half of the stations possessing long records, among them being Cooperstown, whose observations extend over 44 years. The fluctuations of temperature were notably large and frequent, especially during the latter half of the month. The values were from 3 to 10 degrees below the normal during four brief periods, central about the 10th, 14th, 20th and 30th. Between these dates warm waves were felt, the most marked occurring on the 17th and 27th, with excesses of 20 and 25 degrees respectively. It is also of interest to note that the mean temperature for the State on the 27th reached the highest value which occurred during October preceding.

The precipitation, which averaged slightly below the usual amount for the State, was quite unevenly distributed, the amount in the northern-central counties and the southeastern highlands being abundant, while drouth conditions obtained in the region between the Central Lakes and the Genesee Valley. This distribution of rain is in marked contrast to that for October, when the heaviest fall occurred in the southwestern counties. An appreciable snowfall occurred in northern New York and in Chautauqua county on the 8th and 9th, but in the central section generally the first considerable snow storm was on the 13th to 14th; while near the coast the largest amounts were recorded on the 30th. The snow melted quickly, leaving the ground bare during nearly the entire month. The maximum depth reported was 7 inches at Lowville on the 30th.

The number of fair days this month was about the usual average for November. No disastrous wind storms were reported in the interior, although the total mileage registered was somewhat greater than usual. A severe gale occurred on Lake Erie on the 6th, Buffalo reporting a velocity of 72 miles per hour on that date. The thunderstorms reported from several stations on the 5th and 6th were in most cases of small intensity; but at Tivoli, Dutchess county, a storehouse, lumber yard and church were fired by lightning, the damage being estimated at four thousand dollars.

The month appears to have been favorable to farming interests, mild weather permitting plowing to be carried on until the 28th. A drouth prevailed in portions of the southern tier of counties, but apparently did not injure winter grains.

The atmospheric movements during November showed a decided increase in frequency and energy over those of preceding months. The number of high pressure areas which affected our weather conditions was 7, and of low pressure areas, 11; the latter number being in excess of the usual storm frequency for November. The common path of the depressions was from the Central States northeastward over the Great Lakes and thence to the Gulf of St. Lawrence; the dates of nearest approach to New York being the 1st, 5th, 8th, 11th, 17th, 18th, 21st, 24th and

27th. All of these disturbances, and especially the extensive areas of the 5th, 17th and 27th brought southerly winds and increased temperatures; but a contrary effect was produced by a cyclone which passed northward over the Atlantic on the 13th. The sharply defined low which passed over Canada on the 5th, with a central pressure of 29.4 inches, gave the greatest average precipitation and wind velocity of the month. The storm of the 30th brought the first considerable snowfall of the season in the Atlantic Coast Region.

The anticyclonic systems were generally large and strongly developed. Their usual path was from the western to the central or southern States, thence spreading along the Atlantic Coast line. After the 14th a nearly permanent area of very high barometer was maintained in the extreme northwest; and from it the successive waves of high pressure passing eastward became detached. Owing to the southerly trend of the highs, they tended, as a rule, to reinforce the action of the cyclonic areas in giving warm southerly winds over this vicinity; but the cold wave of the 20th was due to a different condition; the high pressure in that case spreading along the Canadian border, and developing a pressure of 30.7 inches over northern New York. At the close of the month the high pressure system in the northwest developed great intensity, extending to the Atlantic coast, and bringing the coldest weather of the month in this vicinity.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean	Highest.	Date	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Western Plateau.												42.3	76	18
Alfred	Allegany	1824									40.1	41.1	67	3
Angelica	"	1340									40.0	41.6	68	18
Bolivar	"											41.5	68	19
Friendship	Allegany	1550										42.2	69	*b*
Franklinville	Cattaraugus											41.8	67	*c*
Humphrey	"	1950									41.2	41.6	71	3
Arkwright	Chautauqua	1260										‡42.1	65	26
Jamestown	Chautauqua	1328										42.8	67	*b*
Elmira	Chemung	863										45.2	73	26
Avon	Livingston	585										41.2	70	18
Mt. Morris	"	525												
Lockport	Niagara										42.5	42.6	68	18
Victor	Ontario													
Wedgewood	Schuyler	1350									40.4	42.2	69	18
Addison	Steuben	1000							66	36	43.2	44.3	76	18
South Canisteo	"	1480							77	36	41.2	43.0	70	18
Arcade	Wyoming	1707									40.0	41.2	67	18
Eastern Plateau.												42.4	71	18
Binghamton (1)	Broome	870									42.8	43.6	69	18
Binghamton (2)	"		30.22	30.72	23	29.72	5	1.00				44.0	69	18
Oxford	Chenango	550										40.1	65	*j*
Cortland	Cortland	1120										42.8	68	18
Bloomville	Delaware	1550									42.7	43.0	70	27
South Kortright	"	1700										39.8	67	27
Brookfield	Madison	1350												
Middletown	Orange	660												
Port Jervis	"	470										43.3	68	*m*
Cooperstown	Otsego	1300									40.6	41.1	68	27
New Lisbon	"	1234									38.7	39.6	68	27
Oneonta	"	1100									43.9	45.4	70	27
Perry City	Schuyler	1038									40.5	41.0	67	27
Straits Corners	Tioga											41.2	67	27
Waverly	"	825									43.1	41.4	71	18
Dryden	Tompkins													
Mohonk Lake	Ulster	1245									41.7	43.8	64	*t*
Northern Plateau.												37.5	66	26
Saranac Lake	Franklin											35.8	65	27
Gloversville	Fulton	802									38.9	39.6	65	27
North Lake	Herkimer											36.0	61	28
Lowville	Lewis	900										39.0	66	26
Number Four	"	1571	30.16	30.68	23	29.60	5	1.08				37.2	63	*v*
Atlantic Coast												47.2	74	*t*
Brooklyn	Kings	107										48.7	72	27
Manhattan Beach	"											47.8	71	1
New York city	New York	314	30.21	30.76	23	29.60	5	1.16	79			48.0	70	27
Willets Point	Queens											47.1	73	*t*
Brentwood	Suffolk	75									47.1	46.2	72	27
Setauket	Suffolk	40							76	41	47.8	48.4	69	17
Bedford	Westchester	290										45.4	74	17
Primrose	"											45.8	74	2

FOR NOVEMBER, 1896.

TURE—(IN DEGREES FAHR.)								SKY.			PRECIPITATION—(INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	+ Duration	Date.	Total snow fall.	Prevailing direction of wind.
														h. m.			
14	30	51	18	41	19	2	13	6.5	9.1	14.4	9.6	2.27	1.02	......	10	......	....
16	30	51	17	38	19	5	30	3	12	15	15	2.15	0.49	......	11	4.5	S. W.
18	30	50	17	35	19	2	13	7	12	11	8	2.08	0.86	......	11	3.0	....
17	*a*	51	20	37	2	8	17	...	....	...	6	1.42	0.53	......	5	......	W.
18	30	51	20	37	19	8	30	4	15	11	9	2.29	0.80	......	11	1.6	W.
17	30	50	18	37	19	4	17	3	6	21	12	3.18	0.90	......	11	4.6	S. W.
16	30	55	16	32	28	6	17	4	8	18	11	2.93	1.05	......	11	9.9	S. W.
19	30	46	12	22	19	4	*d*	....	....	...	......	......	......	......	......	......	....
18	30	49	15	33	28	5	*e*	2	12	16	12	0.70	0.86	9.30	11	7.0	S. W.
22	30	51	16	37	19	3	29	13	2	15	5	1.40	0.65	......	4	......	N. W.
18	*f*	52	18	40	19	6	30	5	10	15	8	1.82	0.55	......	21	......	....
....	....	....	....	....	....	...	....	10	3	17	8	2.60	0.80	8.00	11	T.	N. W.
18	30	50	15	31	28	5	21	13	6	11	8	2.12	0.72	......	11	T.	W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
17	*g*	52	20	40	19	10	*h*	5	16	9	12	2.03	1.00	23.30	4-5	2.0	S. W.
20	23	56	20	38	19	6	17	9	11	10	9	0.83	0.41	15.00	5	0.2	S. W.
14	30	56	23	40	19	8	29	8	4	18	11	1.82	0.55	......	5	2.1	W.
16	30	51	16	41	19	4	17	5	10	15	10	3.68	1.00	15.00	21	6.7	....
10	24	51	20	43	24	3	*i*	6.9	8.4	14.7	10.7	3.09	3.28	......	5	......	....
19	30	50	18	39	19	7	30	10	4	16	11	2.66	1.32	20.00	5	1.0	S. E.
19	30	50	17	41	19	5	20	3	9	18	14	1.78	0.81	......	5	......	W-N.W.
16	*k*	49	21	38	19	10	29	6	9	15	11	2.66	1.15	......	5	T.	W.
19	*g*	49	17	31	*p*	4	27	12	8	10	13	3.17	1.12	......	5	0	N. W.
10	24	60	23	43	24	10	29	8	6	16	13	3.42	1.48	33.00	4-5	0.2	S.
13	20	54	19	35	19	9	30	....	....	....	6	2.83	1.47	......	5	1.0	....
....	...	...	....	....	....	....	....	....	....	...	......	......	......	......	......	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
18	23	50	16	34	2	3	8	10	14	6	10	5.31	2.80	......	5-6	T.	N. W.
17	20	51	15	34	19	5	25	11	3	16	10	3.56	1.95	......	5	0.1	S.
14	23	54	20	39	19	8	29	2	9	19	10	2.96	1.78	......	5	2.5	S.
19	23	51	19	34	19	6	30	....	....	....	9	2.20	0.89	......	5	......	....
14	14	53	19	40	19	7	13	2	11	17	11	2.44	0.72	......	5	6.0	S. W.
18	*n*	49	20	37	19	3	29	7	7	16	11	2.95	1.50	......	4-5	4.0	S.
18	*q*	53	21	39	*r*	9	*s*	5	13	12	15	2.58	1.46	22.00	4-5	3.3	N. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
21	23	43	13	27	19	5	11	....	....	...	6	4.79	3.28	......	5	T.	N. W.
—1	22	59	16	43	23	4	*u*	2.5	9.2	18.3	13.6	4.87	3.00	......	5	......	....
—1	22	66	17	43	23	4	29	2	9	19	15	2.80	0.55	......	5	8.5	W.
10	23	55	16	33	19	5	13	6	5	19	14	5.37	2.56	......	5	1.0	S. W.
6	23	55	16	29	4	4	7	....	....	....	8	6.21	3.00	......	5	2.0	S. W.
4	23	62	16	32	26	7	9	1	14	15	16	5.23	1.39	......	5	13.0	S.
7	23	56	16	42	19	4	*w*	1	9	20	15	4.75	1.06	......	5	11.5	S.
17	23	48	17	42	2	2	28	8.9	7.7	13.4	9.0	3.29	3.29	......	4-5	......	....
28	23	44	13	23	*x*	4	30	8	7	15	12	3.06	1.19	19.00	5	5.0	W.
26	23	45	13	28	20	6	4	8	7	15	8	2.60	1.20	......	29	6.0	N. W.
27	30	43	14	27	28	4	30	9	6	15	10	2.12	0.51	......	29	3.8	S. W.
28	14	45	18	29	2	9	4	....	....	....	6	2.62	0.84	5.00	5	0.3	N. E.
19	15	53	22	40	2	6	30	8	9	13	8	5.10	2.00	10.00	5	5.5	S. W.
29	15	40	14	25	15	6	*z*	8	10	12	11	3.21	1.40	24.00	5	3.0	N. W.
17	23	57	20	36	2	6	30	8	10	12	12	4.69	3.29	20.15	4-5	4.0	S.
18	23	56	19	42	2	2	28	13	5	12	5	2.91	1.71	......	5	T.	....

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY.		TEMPERA			
STATION.	County.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri daily observations	Mean of maximum and minimum	Highest.	Date.
Hudson Valley...												43.4	77	19
Albany	Albany	85	30.20	30.80	23	29.52	5	1.28	83	38		44.0	67	17
Lebanon Springs	Columbia	930										40.6	65	27
Honeymead Brook	Dutchess	450									42.3	41.8	69	17
Poughkeepsie	"	180										43.2	71	17
Wappinger's Falls	Dutchess											45.4	77	19
Catskill	Greene										44.3	44.2	67	*v*
West Point	Orange	167										44.0	73	1
Carmel	Putnam	500										43.6	70	17
Mohawk Valley...												39.1	64	*j*
St. Johnsville	Montgomery													
Rome	Oneida	445										39.1	64	*j*
Champlain Valley												40.1	68	18
Plattsb. Barracks.	Clinton	1[illegible]5										39.0	68	18
Glens Falls	Warren	340									39.2	40.2	66	27
Lake George	"										40.3	41.2	66	*v*
St. Lawrence Val..												39.6	78	26
Madison Barracks.	Jefferson	266										41.2	69	27
Watertown	"	486										41.2	78	26
Canton	St. Lawrence.	304									37.0	37.0	66	27
Massena	St. Lawrence.													
North Hammond.	"	300									40.8	41.1	64	27
Ogdensburg	"	258										39.8	70	27
Potsdam	"	300									36.8	37.1	69	28
Great Lakes												43.1	71	18
Dunkirk	Chautauqua	590												
Westfield	"											44.8	70	26
Buffalo	Erie	690	30.14	30.65	22	29.40	5	1.25	73	35		43.0	68	27
Pittsford	Monroe										43.9	43.1	71	18
Rochester	"	621	30.13	30.64	22	29.58	5	1.06	75	34		42.0	71	18
Appleton	Niagara											42.6	68	18
Fort Niagara	Niagara	263										44.0	70	26
Baldwinsville	Onondaga	390										42.6	69	*j*
Oswego	Oswego	304	30.13	30.65	22	29.40	5	1.25	74	34		43.0	70	6
Palermo	Oswego	469									40.8	41.2	67	18
Lyons	Wayne	407									43.7	43.8	70	18
Erie, Pa	Erie	681	30.15	30.60	22	29.56	5	1.04	75	35		44.0	70	26
Central Lakes												44.3	70	*b*
Fleming	Cayuga	1000									43.2	44.0	70	18
Romulus	Seneca	719							80	35		44.2	70	*b*
Ithaca	Tompkins	810	30.15	30.67	23	29.44	5	1.23	74	37	43.8	44.7	69	18
Mean			30.17	30.80	23	29.40	5	1.15	76	36		41.9	78	26

* Mean of the tri-daily observations. ‡ Mean of the Max. and Min. by the Draper Thermo tri-daily observations are derived by the formula, (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) ÷ 4. four hours. (1) Voluntary Observer. (2) U. S. Weather Bureau.

(*a*) 10, 30; (*b*) 18, 26; (*c*) 3, 18, 26; (*d*) 17, 30; (*e*) 17, 29, 30; (*f*) 20, 22; (*g*) 20, 30; (*h*) 6, 27, 29, 30; (*t*) 2, 17; (*u*) 7, 12, 29, 30; (*v*) 17, 27; (*w*) 12, 30; (*x*) 20, 28; (*y*) 5, 21; (*z*) 14, 20, 30; (*aa*) 7, 16; (*ab*)

FOR NOVEMBER — (*Concluded*).

TURE — (IN DEGREES FAHR).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m			
12	23	52	18	43	19	4	21	6.4	10.6	13.0	10.1	2.98	3.80	......	5-6	......	....
20	23	47	14	29	19	6	25	7	10	13	13	1.80	0.56	......	5	0.1	S.
12	23	53	18	29	16	8	18	3	9	18	9	3.15	1.45	......	5	2.0	S. E.
15	23	54	17	29	2	5	30	4	15	11	13	2.24	0.68	......	5	2.0	S. W.
16	23	55	20	37	2	6	30	7	10	13	6	1.45	0.86	......	5	T.	N.
20	23	57	20	43	19	4	21	7	12	11	13	3.17	0.82	......	5	0.2	N.
20	23	47	16	26	*aa*	5	4	4	15	11	9	3.46	2.56	......	5	0.8	S. E.
20	23	53	18	31	28	5	21	....	....	....	9	5.10	3.80	......	5-6	0.8	S. W.
17	23	53	18	30	15	7	21	13	3	14	9	3.43	1.93	......	4-5	2.0	....
11	19	53	16	28	19	8	20	....	....	....	12.5	3.76	0.90	......	5	......	....
....	....	....	....	....	....	....	....	....	....	....	13	2.45	0.63	......	5	1.0	....
11	19	53	16	28	19	8	20	....	....	....	12	5.06	0.90	......	5	......	....
6	23	56	17	38	*ab*	5	*ac*	8.5	5.5	16.0	11.0	4.31	3.05	......	5-6	.....	....
6	23	62	17	38	18	8	7	....	....	....	10	2.19	0.95	......	6	T.	W.
13	23	53	16	31	19	5	*ac*	6	5	19	11	5.55	3.05	......	5-6	1.0	W.
13	23	53	17	38	19	5	25	11	6	13	12	5.18	2.62	......	5	2.0	S. W.
—1	22	61	18	45	23	4	*ad*	3.8	14.2	12.0	10.5	2.92	0.73	......	5-6	......	....
12	23	57	18	34	27	5	11	....	....	....	9	2.96	0.73	......	5-6	6.1	S. W.
13	23	65	18	43	19	4	29	4	14	12	14	4.42	0.50	......	6	......	S. W.
—1	22	67	19	45	23	4	14	1	19	10	10	3.26	0.62	......	5	5.0	S. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
12	23	52	15	44	23	4	*ae*	0	21	9	11	2.31	0.62	......	6	3.5	W.
11	23	59	19	37	18	6	21	8	10	12	12	2.58	0.35	......	11	4.4	S. W.
3	23	66	19	42	19	5	14	6	7	17	7	2.02	0.51	......	6	3.0	S. W.
13	30	51	15	39	19	3	*af*	4.8	8.2	17.0	12.8	3.05	1.00	......	9	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
20	30	50	16	35	19	3	20	4	3	23	9	4.81	1.00	......	9	3.5	S. W.
18	30	50	13	23	23	3	9	2	8	20	17	3.32	0.75	......	21	......	W.
18	30	53	18	38	19	8	29	6	7	17	12	2.28	0.62	.....	21	4.0	S. W.
18	30	53	15	29	18	4	29	3	12	15	18	2.49	0.58	......	21	5.5	S. W.
20	30	48	16	38	19	5	29	4	6	20	12	2.00	0.58	......	11	2.5	S. W.
20	30	50	18	36	19	8	25	....	....	....	9	1.86	0.50	......	11	2.4	N. W.
13	30	56	17	30	18	7	22	13	4	13	9	3.07	0.88	......	10	T.	....
20	20	50	14	27	18	5	12	2	7	21	15	3.95	0.87	......	11	5.6	S.
18	20	49	16	33	19	6	14	5	11	14	14	3.60	0.99	......	11	2.0	S. W.
21	30	49	16	39	19	5	29	5	14	11	11	3.24	0.93	......	10	1.5	S. W.
20	30	50	11	24	5	3	13	4	10	16	15	2.90	0.59	......	11	......	S.-S.W.
18	30	50	16	39	19	5	*bb*	4.7	13.0	12.3	8.7	2.60	1.11	13.00	5	......	....
18	30	52	16	37	19	7	27	....	21	9	5	2.88	1.11	13.00	5	2.0	N. W.
20	30	50	18	38	19	8	*c*	10	5	15	8	2.92	0.71	......	21	3.2	S.
22	30	47	15	39	19	5	*bb*	4	13	13	13	2.00	0.88	14.30	5	T	S. E.
— 1	22	53	17	45	23	2	*bd*	5.9	9.5	14.6	10.8	3.31	3.80	......	5-6	2.9	S W.

graph. ‖ Report received too late to be used in computing means. The means from the
† Blank indicates that the duration is not shown in the original records, but is within twenty-

(*i*) 8, 29; (*j*) 18, 27; (*k*) 23, 30; (*m*) 5, 17, 27; (*n*) 15, 23; (*p*) 7, 15; (*q*) 14, 15; (*r*) 15, 19; (*s*) 27, 30; 18, 19; (*ac*) 8, 25; (*ad*) 14, 25, 29, 30; (*ae*) 25, 30; (*af*) 9, 13, 29; (*bb*) 13, 14; (*bc*) 13, 27, 30; (*bd*) 13, 28.

TEMPERATURE — NOVEMBER, 1896, SHOWING DAILY MEANS FOR THE

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	51	48	52	53	54	41	44	38	33	32	45	40	32	30
Alfred	60	63	67	57	63	44	58	44	35	40	52	44	34	32
	40	36	36	51	40	32	31	30	26	19	36	34	25	24
Angelica	61	63	65	62	65	49	50	39	36	44	53	46	32	34
	35	30	42	46	49	37	34	29	28	19	34	30	30	25
Bolivar	61	64	67	60	65	....	....	58	38	44	53	45	....	38
	35	27	32	44	42	....	....	24	26	17	31	34	....	24
Friendship	....	65	68	61	65	46	60	42	40	45	56	46	41	35
	....	31	33	41	43	34	30	29	28	20	36	31	28	26
Franklinville	60	63	67	59	62	44	53	48	36	42	52	46	37	32
	33	30	35	37	44	33	29	31	26	18	37	35	27	24
Humphrey	61	68	71	58	60	38	57	39	38	39	51	45	34	34
	41	38	44	48	39	31	32	27	24	21	35	33	25	23
‡ Arkwright	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	60	64	66	60	63	40	54	38	36	46	52	45	36	35
	41	36	41	50	40	33	32	29	26	23	37	36	24	27
Elmira	68	64	65	61	63	53	61	46	44	45	53	49	42	38
	50	37	38	52	46	40	31	36	30	25	40	38	24	28
Avon	64	56	65	65	65	54	61	49	47	38	54	47	39	36
	37	31	32	33	54	39	28	31	20	30	39	38	30	22
Mount Morris	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lockport	61	57	66	66	67	49	41	42	43	44	56	44	40	38
	39	34	41	47	46	38	32	32	32	30	38	35	29	29
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	66	60	66	58	65	44	60	50	43	44	49	50	38	39
	43	38	38	46	44	34	31	31	25	20	35	32	25	21
Addison	64	67	67	60	67	49	61	52	42	44	55	54	41	36
	40	33	35	42	47	37	28	32	29	21	39	36	31	29
South Canisteo	62	64	69	61	68	48	61	49	41	44	55	51	41	37
	39	30	34	44	45	35	27	33	23	16	29	30	28	25
Arcade	58	59	64	59	64	42	57	40	37	42	51	43	33	33
	37	37	42	49	41	33	31	29	27	19	37	33	24	24
Eastern Plateau	50	47	7	49	58	47	46	43	35	34	44	40	35	29
Binghamton (1)	61	63	62	57	67	57	62	52	40	45	54	45	40	32
	40	35	32	47	55	36	30	34	32	20	40	35	30	24
Binghamton (2)	62	62	64	59	67	47	61	50	40	47	52	46	39	32
	42	36	34	48	48	39	31	33	32	27	41	35	28	26
Oxford	60	60	60	55	63	58	59	50	43	45	50	47	40	35
	34	28	28	40	48	33	27	35	25	20	31	28	25	18
Cortland	61	50	63	57	66	63	61	54	39	46	52	48	37	33
	39	33	34	44	53	39	30	37	31	20	38	31	30	24
Bloomville	64	69	63	56	64	57	62	54	52	50	52	49	50	53
	41	33	35	41	45	39	34	30	24	36	21	26	35	31
South Kortright	56	55	59	57	64	61	56	52	40	42	54	50	39	35
	37	35	25	33	50	34	31	34	25	20	34	29	25	18
Brookfield	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	66	66	60	58	68	50	60	45	43	47	52	47	41	36
	42	32	36	42	52	40	31	42	31	24	37	38	29	27
Cooperstown	56	53	52	56	62	61	56	50	39	40	50	44	38	30
	40	38	32	36	54	40	34	34	29	24	38	35	30	23
New Lisbon	58	56	61	56	63	60	56	51	39	43	50	44	36	28
	33	29	28	36	52	38	30	30	25	19	35	30	27	17
Oneonta	66	58	65	60	67	64	64	56	44	47	54	49	41	34
	41	40	33	42	55	42	36	35	32	26	40	35	34	25
Perry City	60	52	64	60	66	46	57	48	40	43	52	47	34	32
	40	30	30	42	46	35	27	31	26	18	35	31	27	14
Strait's Corners	60	62	63	56	64	46	57	53	43	43	50	47	40	33
	38	34	33	39	45	37	27	29	26	19	30	33	29	22
Waverly	65	70	69	60	67	62	64	48	46	46	53	50	42	41
	39	32	33	41	55	40	26	35	29	20	40	34	32	18
Mohonk Lake	61	64	55	50	62	58	56	53	42	40	52	50	40	38
	49	47	40	44	44	42	49	38	34	32	47	39	33	27

Regions, and Daily Maxima and Minima for the Stations.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
42	58	57	60	42	26	36	33	32	44	45	59	61	45	26	22	42.3
52	61	59	66	61	27	46	40	40	49	57	66	64	62	26	22	41.1
29	46	53	50	23	18	27	21	19	32	29	54	56	26	20	16	
53	63	61	68	58	30	41	40	40	46	58	67	63	60	29	26	41.6
29	43	52	50	23	19	29	24	19	32	29	53	55	29	22	18	
52	61	61	68	35	31	48	44	41	52	58	67	65	54	31	27	41 5
28	39	53	50	25	20	30	22	19	33	28	50	55	28	21	17	
54	63	61	69	64	30	48	41	41	53	60	69	68	63	32	26	42.2
31	40	51	51	27	20	29	23	20	32	30	53	54	28	21	18	
52	61	59	67	61	29	43	43	43	53	59	67	65	63	29	22	41.8
28	44	55	50	27	20	27	29	20	39	41	46	55	28	21	17	
51	63	59	69	48	28	47	40	41	51	57	70	64	60	28	24	41.6
28	45	53	52	25	20	28	26	23	37	23	54	54	28	20	16	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	42.1
....			....	....	....	....	....	....	....			....		....	......	
52	62	60	67	62	32	47	40	44	52	58	67	65	60	27	23	42.8
31	46	55	51	30	24	32	31	27	42	36	54	56	27	22	18	
55	65	62	70	65	34	47	35	48	53	51	73	68	65	30	30	45.2
40	42	51	49	28	24	28	28	24	40	42	54	59	34	27	22	
53	64	65	70	65	33	39	42	46	51	54	56	68	62	32	25	41.2
25	39	45	59	25	18	20	18	19	37	38	39	53	32	23	19	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......
54	62	62	68	36	38	37	36	51	55	42	69	65	59	33	27	42.6
32	44	50	44	24	22	32	26	24	37	34	51	58	28	23	18	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	
55	65	63	69	62	32	43	44	38	50	56	68	65	60	31	27	42.2
28	40	49	48	22	17	24	23	22	33	34	49	55	30	21	17	
56	66	62	76	64	31	46	45	41	53	59	69	67	63	35	35	44.3
34	37	56	44	26	23	29	27	20	35	33	47	58	35	27	21	
56	66	64	70	65	36	49	44	41	53	66	69	68	67	32	32	43 0
25	46	54	49	25	18	25	22	19	32	27	46	54	32	24	14	
50	59	58	67	62	30	44	37	42	52	59	66	64	60	26	22	41 2
29	46	54	52	21	19	28	23	22	35	32	54	55	26	20	16	
37	48	56	57	45	27	33	35	29	43	41	54	61	48	31	24	42.4
54	65	67	69	66	30	44	43	40	54	52	67	68	68	35	26	43.6
26	35	55	49	27	20	27	30	22	35	36	48	57	35	26	19	
54	65	65	69	65	28	44	42	39	54	53	68	68	66	33	26	44 0
33	38	55	53	24	23	22	27	22	39	36	49	60	33	26	19	
50	60	63	65	62	35	38	42	37	48	44	64	65	60	35	30	40.1
18	25	40	45	24	17	23	27	16	31	28	40	50	32	25	16	
54	63	62	68	64	32	43	42	39	49	48	66	62	63	34	27	42.8
23	33	50	49	32	19	25	31	22	37	34	46	58	33	24	19	
38	64	65	64	62	45	43	44	39	53	51	65	79	64	40	36	43.0
25	31	52	50	30	23	18	24	12	10	34	43	51	38	30	21	
48	59	61	63	60	31	42	42	37	48	45	62	67	43	36	26	39.8
20	30	47	49	25	13	21	25	14	28	29	42	57	32	23	17	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	
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....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	
50	59	68	65	47	35	32	41	41	58	48	58	68	57	48	32	43.3
22	29	36	45	41	28	26	37	18	38	31	40	50	53	32	26	
48	58	63	64	61	28	40	40	40	45	40	62	68	58	33	25	41.1
23	38	50	49	27	17	23	25	18	38	35	37	58	33	25	19	
50	60	64	65	61	29	40	40	39	49	45	64	68	61	33	26	39.6
15	28	45	45	22	15	22	21	14	31	30	42	54	31	25	17	
54	62	66	67	64	47	46	47	42	53	50	64	70	66	39	31	45.4
28	41	52	52	30	22	28	27	19	38	34	44	58	37	29	25	
52	62	64	66	63	31	44	43	40	50	56	66	67	60	31	26	41.0
27	35	50	47	23	18	25	24	18	36	34	48	54	31	23	17	
54	61	64	66	61	31	41	42	39	52	52	65	67	61	27	26	41.2
18	32	43	45	24	20	27	29	18	36	35	45	55	32	24	19	
57	69	64	71	65	33	45	45	43	54	60	69	68	59	35	31	44.4
18	33	50	46	26	20	27	29	29	40	35	48	59	35	25	22	
45	60	64	62	59	39	39	49	33	53	43	56	63	61	40	30	43.8
27	40	52	50	32	24	24	28	21	35	35	39	53	38	28	24	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	47	41	39	46	52	44	42	40	33	34	40	38	32	26
Saranac Lake	53	46	54	55	61	41	50	37	36	40	48	41	34	39
	38	27	29	41	39	35	36	30	29	32	38	31	20	20
Gloversville	58	52	54	60	61	60	53	46	41	42	52	45	37	32
	38	34	30	34	48	40	38	34	31	25	35	35	32	25
North Lake	57	53	46	59	55	59	38	50	37	34	38	45	38	32
	35	31	29	30	44	35	34	36	27	26	28	33	30	19
Lowville	57	50	51	55	60	53	51	49	37	41	53	45	37	29
	38	35	28	43	50	36	35	36	30	29	34	37	29	21
Number Four	55	49	62	54	59	48	50	47	33	39	43	38	34	28
	37	33	30	44	47	34	35	31	26	27	33	34	26	19
Atlantic Coast	55	55	51	52	58	52	50	50	43	42	47	51	42	35
Brooklyn	60	68	60	60	63	54	58	55	48	50	57	55	47	40
	53	47	45	49	58	45	41	49	40	35	39	40	39	32
Manhattan Beach	71	59	70	56	60	62	54	56	54	48	54	58	54	46
	52	49	44	46	54	46	44	44	38	36	36	50	38	32
New York City	60	70	56	58	64	59	62	55	49	51	60	55	48	38
	51	47	47	50	57	44	44	42	37	37	45	45	35	31
Willet's Point	60	73	62	60	62	59	62	59	51	55	50	60	49	41
	42	44	45	51	45	40	39	45	32	33	30	40	32	28
Brentwood	68	70	60	66	68	63	61	60	50	51	64	64	48	38
	45	30	32	45	55	[illegible]	29	45	30	[illegible]	29	45	32	24
Setauket	61	67	56	59	64	61	60	58	49	49	62	56	48	39
	49	44	45	46	55	45	42	48	42	34	41	47	55	33
Bedford	61	69	65	54	63	62	[illegible]	53	50	[illegible]	56	[illegible]	49	[illegible]
	44	33	33	37	52	43	40	44	32	26	34	39	29	26
Primrose	63	74	59	57	63	57	62	54	49	52	56	61	50	41
	42	32	34	39	40	45	34	41	37	26	33	36	31	31
Hudson Valley	52	51	47	48	52	52	48	46	39	37	45	44	38	32
Albany	59	57	57	55	66	58	57	52	46	49	34	48	45	36
	45	43	36	42	51	47	44	59	34	31	42	40	34	28
Lebanon Springs	56	54	55	54	62	63	52	50	42	43	52	52	43	34
	40	32	28	37	47	41	39	39	28	22	30	33	28	25
Honeymead Brook	58	66	57	54	63	52	56	49	44	46	53	47	48	33
	43	37	35	38	47	38	29	40	30	26	35	35	38	22
Poughkeepsie	59	70	61	55	65	58	62	49	45	48	55	48	45	40
	40	33	31	40	52	41	35	31	28	24	33	35	26	23
Wappinger's Falls	62	68	72	55	75	74	69	54	48	45	54	55	45	38
	44	38	34	44	62	40	38	44	33	26	36	39	34	28
Catskill	56	65	58	50	65	64	58	50	47	47	54	51	45	37
	46	41	35	45	50	45	32	41	32	31	38	38	34	28
West Point	73	60	62	58	61	64	52	60	51	47	48	56	48	41
	48	40	38	42	50	43	41	45	37	29	35	43	32	30
Carmel	62	66	62	54	64	60	63	48	46	49	56	50	44	37
	42	39	33	42	45	39	44	39	36	24	39	29	26	24
Mohawk Valley	50	59	52	50	49	40	46	36	36	36	44	40	34	34
St. Johnsville	....	....	....	....	....	....	....	....		....		....	41	39
	....	....	....	....	....	....		....	....	....		....	37	33
Rome	57	58	58	55	60	45	54	43	43	43	52	45	36	40
	43	43	46	44	58	35	38	28	28	30	35	34	24	24
Champlain Valley	51	41	43	41	51	52	46	43	37	36	42	44	39	31
Plattsburgh Br'cks	63	59	51	49	52	57	48	51	44	43	43	54	47	36
	43	42	33	32	35	45	40	40	30	32	34	41	33	25
Glens Falls	58	56	56	50	60	61	52	43	43	43	51	49	41	35
	40	39	30	32	48	43	38	38	27	25	35	35	34	28
Lake George	59	61	59	52	64	63	59	45	48	46	52	50	44	35
	42	39	33	25	49	44	37	39	29	29	37	35	34	25
St. Lawrence Val.	50	47	44	48	56	46	43	40	37	38	44	43	36	29
Madison Barracks	63	61	52	61	61	63	56	45	45	47	46	51	43	35
	47	43	32	34	49	40	38	34	32	35	41	42	33	24
Watertown	61	54	58	66	68	44	55	48	39	43	52	43	42	32
	44	40	38	36	48	34	33	34	29	30	34	36	29	24
Canton	58	52	....	....	63	50	50	....	43	40	52	45	37	30
	43	34	....	....	39	39	35	....	30	30	35	36	27	26
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....

MAXIMA AND MINIMA FOR THE STATIONS — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean.
34	45	51	49	37	20	23	23	20	36	34	46	55	45	28	21	37 5
45	59	59	62	32	25	30	22	45	45	47	61	65	42	25	25	35.8
34	45	29	32	10	12	20	−1	2	30	25	43	41	22	21	14	
50	60	62	57	63	30	32	37	34	48	38	46	65	58	36	29	39.6
24	34	53	42	30	18	17	20	10	33	31	33	38	36	27	20	
35	43	55	55	59	34	24	35	24	39	42	46	59	61	48	24	36.0
19	28	32	45	34	10	12	21	6	11	28	31	46	38	22	18	
49	60	60	64	54	26	33	36	34	45	37	66	65	63	33	25	39.0
21	34	50	38	26	13	18	15	4	32	28	34	55	33	23	20	
44	56	63	61	60	26	35	35	35	43	35	61	63	59	29	21	37.2
20	32	45	38	18	9	11	11	7	31	28	34	54	39	21	17	
40	51	57	56	50	38	38	41	35	48	44	51	61	56	40	31	47.2
52	62	69	61	60	53	46	46	45	54	50	65	72	69	40	33	48.7
31	44	49	56	50	30	33	41	28	45	40	47	53	46	35	29	
40	52	60	66	56	60	38	48	46	50	52	50	58	64	62	40	47.8
30	42	46	50	48	32	32	34	26	30	40	40	50	52	38	28	
52	64	70	62	58	37	46	46	48	59	49	59	70	67	40	31	48.0
35	43	49	52	37	32	31	33	29	44	43	47	54	40	31	27	
50	55	73	62	60	47	47	48	49	62	50	58	72	58	49	40	47 1
36	40	48	45	34	32	32	30	29	38	39	48	55	38	29	23	
53	64	68	65	62	41	48	48	51	60	58	59	72	....	47	32	46.2
19	42	44	47	40	30	32	30	20	36	30	42	54	....	33	26	
54	63	69	61	59	40	51	48	43	59	51	60	66	65	44	36	48.4
29	42	51	51	40	34	34	34	31	42	36	47	55	44	35	30	
53	68	74	61	60	39	41	51	43	58	52	55	70	65	42	31	45.4
23	36	41	50	36	29	28	29	17	39	31	42	51	41	30	25	
55	64	72	58	61	48	39	45	41	58	46	57	70	66	42	35	45.8
22	33	35	47	40	31	29	38	18	38	30	45	53	64	36	29	
36	49	56	54	47	32	31	35	29	44	39	48	57	51	37	29	43.4
50	63	67	59	60	31	40	42	41	55	40	57	66	63	38	32	44.0
30	40	50	43	31	22	24	25	20	40	34	36	56	38	31	25	
45	58	62	54	57	35	40	40	37	52	45	58	65	62	40	29	40.6
17	29	41	46	35	19	19	20	12	34	29	37	49	39	29	19	
48	60	69	59	55	30	39	40	38	55	42	57	66	64	35	29	41.8
20	38	47	49	32	23	24	26	15	30	31	41	47	37	29	24	
51	66	71	62	59	34	42	45	42	60	43	62	70	64	49	31	43 2
25	38	44	48	32	27	26	26	16	40	29	42	44	39	29	25	
54	63	71	63	77	38	33	45	42	50	47	58	68	64	41	34	45.4
26	32	38	49	34	28	29	28	20	30	32	42	44	38	32	22	
49	63	67	59	57	36	38	44	39	60	44	56	67	62	40	32	44.2
25	37	47	45	35	24	28	28	20	39	34	41	53	40	32	26	
37	55	63	70	61	60	33	47	46	45	58	52	59	69	65	39	44.0
26	34	40	45	42	40	28	28	20	22	34	38	38	38	35	29	
53	64	70	63	52	34	33	42	41	58	43	54	68	63	38	35	43 6
23	36	42	50	34	25	26	30	17	41	34	41	52	38	28	27	
37	48	54	52	36	26	28	27	29	39	37	46	52	42	30	25	39.1
50	59	60	64	62	40	32	35	35	47	44	49	66	63	42	31	......
24	34	54	43	33	18	21	22	15	34	32	35	40	36	27	21	
48	55	62	64	39	28	35	33	45	46	42	60	64	43	30	30	39.1
25	42	39	39	11	20	23	18	20	30	31	40	40	27	21	17	
36	43	53	47	42	24	23	27	22	37	35	38	53	52	38	29	40.1
35	47	64	68	60	38	25	39	27	41	47	38	53	64	52	34	39.0
25	31	30	30	30	14	14	25	6	10	27	23	36	48	30	25	
50	58	65	53	59	27	32	35	34	48	35	49	65	60	40	34	40.2
25	33	46	38	28	18	15	15	13	33	30	30	47	40	30	22	
53	57	66	55	55	29	34	36	38	54	37	53	66	61	43	36	41.2
25	34	47	39	17	17	17	19	13	33	32	34	48	39	30	22	
37	44	50	49	41	22	27	23	24	41	33	40	55	48	31	26	39.6
42	51	62	62	67	38	34	38	29	47	46	38	69	61	50	38	41.2
26	32	49	34	34	14	17	24	12	24	29	26	35	43	28	21	
48	61	62	68	68	31	33	31	40	50	50	78	67	65	29	26	41.2
25	33	40	34	25	16	25	18	13	30	27	46	53	40	25	21	
46	61	62	64	60	27	30	30	40	43	35	54	66	60	31	28	37.0
30	33	34	28	16	12	22	−1	−5	32	22	26	53	30	23	19	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Vl. (Con)														
North Hammond.	60	56	56	56	60	48	50	42	46	46	50	50	40	34
	40	40	32	36	50	40	38	36	34	34	40	42	34	28
Ogdensburg	57	60	55	61	65	58	48	51	43	46	52	48	45	37
	43	38	38	35	48	40	36	35	34	34	40	36	30	24
Potsdam	56	52	54	62	63	58	46	47	43	40	50	49	47	28
	31	30	29	28	53	37	36	33	31	30	33	35	23	23
Great Lakes	52	46	51	55	55	43	47	39	35	36	47	42	34	32
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	66	63	67	65	67	45	59	43	37	45	56	45	40	37
	39	38	50	52	41	35	35	30	26	26	38	39	28	31
Buffalo	57	58	65	63	64	45	58	40	35	43	52	44	35	41
	45	41	47	58	42	38	36	31	32	30	41	35	30	27
Pittsford	64	52	62	63	67	48	62	46	42	44	56	47	39	36
	41	37	40	38	45	37	38	35	32	26	40	37	30	24
Rochester	63•	53	63	63	65	47	62	40	37	44	55	46	39	35
	46	38	41	51	44	36	36	34	32	28	40	38	28	25
Appleton	61	51	54	63	67	48	56	44	42	44	56	44	41	37
	36	34	40	43	48	42	30	35	30	33	38	38	32	29
Fort Niagara	63	57	54	62	65	50	58	45	40	44	57	46	41	40
	41	36	39	40	48	40	34	35	31	33	38	37	32	30
Baldwinsville.....	62	54	58	60	64	47	57	46	42	46	54	47	39	44
	40	37	38	49	42	36	37	32	29	30	42	36	24	26
Oswego	61	48	60	62	65	47	56	45	41	42	54	45	37	34
	46	43	41	47	47	40	36	38	32	29	38	40	32	28
Palermo	60	51	59	59	62	59	59	47	41	41	51	44	37	30
	41	37	32	43	53	39	34	33	30	26	38	32	30	24
Lyons	61	53	63	62	66	49	58	46	40	45	51	50	42	36
	46	40	38	50	49	42	37	36	33	28	40	39	32	28
Erie, Penns'vania.	62	58	69	62	64	46	55	39	35	45	53	44	35	36
	46	43	52	54	42	36	36	31	27	27	41	59	32	30
Central Lakes	55	47	51	54	58	47	47	43	36	34	47	41	35	30
Fleming	64	55	65	60	65	57	59	53	42	47	52	46	39	33
	48	40	39	49	55	39	36	37	30	21	39	35	30	25
Romulus...........	64	55	65	61	64	53	60	52	41	41	55	50	39	24
	46	38	37	47	49	39	35	33	29	26	39	33	31	25
Ithaca	63	55	64	59	67	51	60	48	42	45	54	47	37	33
	47	40	37	50	51	41	34	36	31	25	41	35	32	28
Mean	51	47	48	50	54	46	46	42	36	36	44	42	36	31

‡ Max. and Min. by the Draper Thermograph. ‖ Received

Maxima and Minima for the Stations — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Monthly mean
46	56	60	60	60	28	34	36	56	60	36	54	64	56	36	28	41.1
36	36	40	32	20	20	22	20	12	36	32	32	54	36	26	24	
47	54	62	67	47	27	36	32	39	50	50	39	70	58	40	30	39 8
30	32	35	30	18	14	20	16	11	35	24	24	35	30	23	20	
45	58	52	60	59	23	29	26	33	46	29	35	64	69	32	41	37.1
26	28	39	44	17	11	21	7	3	33	21	24	30	33	23	19	
44	59	55	57	41	29	34	33	37	45	42	57	58	40	28	24	43.1
....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	......	......
	....	....	....	....	....	....	....	....	....	....	....	....		....	......	
54	58	64	68	65	38	46	39	50	59	62	70	68	56	30	26	44.8
34	52	50	52	30	35	23	33	29	38	35	58	53	28	23	20	
51	60	59	64	43	31	44	36	50	54	52	68	68	46	27	24	43 0
40	52	48	45	25	25	29	27	27	35	35	50	46	27	20	18	
54	65	65	71	63	35	46	40	47	52	43	69	69	55	32	28	43 1
35	44	48	41	25	22	28	38	24	32	32	41	56	30	24	18	
54	65	64	71	46	34	40	35	47	52	42	69	69	48	28	25	42.0
35	48	43	42	23	23	29	28	28	35	35	42	53	28	24	18	
55	63	63	68	64	36	37	38	50	54	42	67	67	56	30	26	42.6
32	38	49	[illegible]	26	22	25	30	24	36	34	42	55	29	25	20	
55	63	64	68	67	48	36	40	50	57	42	70	69	59	45	37	44 0
35	45	48	42	31	23	26	30	25	41	34	40	35	30	24	20	
56	64	64	69	40	35	42	32	49	49	52	68	69	42	42	41	42.6
42	49	46	39	22	23	31	25	25	35	39	46	41	28	22	13	
52	64	62	70	52	32	40	35	43	49	43	70	66	53	35	30	43.0
34	42	44	43	27	20	26	29	24	40	36	44	55	33	25	21	
52	61	62	67	62	30	25	35	40	47	38	66	64	56	33	27	41.2
26	34	45	44	29	18	22	26	21	38	30	36	56	33	24	20	
55	65	65	70	65	33	42	40	43	50	49	68	64	59	31	29	43.8
35	42	45	45	26	23	29	31	27	42	36	46	38	34	26	21	
56	64	62	70	37	32	44	38	52	51	63	70	69	35	29	26	44.0
36	52	57	56	32	27	32	35	31	42	39	59	48	31	24	20	
42	55	57	60	46	29	36	37	34	44	44	58	62	48	30	24	44 3
56	67	62	70	62	31	42	43	41	49	52	69	65	63	33	27	44.0
27	45	53	49	25	19	25	29	24	37	37	50	58	31	24	18	
56	65	63	70	66	41	45	46	46	49	49	70	66	63	35	28	44.2
27	43	50	48	28	30	26	28	25	35	35	42	58	32	25	20	
56	65	63	69	66	31	45	45	40	51	54	68	66	63	34	28	44.7
31	46	51	51	27	24	30	31	26	40	37	51	57	34	27	22	
38	50	55	54	43	27	31	31	29	42	39	50	58	48	31	26	41.9

too late to be used in computing means.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.00	0.00	T.	0.06	0.33	0.03	T.	0.02	0.01	T.	0.59	0.01	0.11	0.04
Alfred	....	....	....	T.	.40	T.	.01	....	01	....	.49	....	.09	.10
Angelica	....	....	....	....	.18	....	....	....	T.	....	.86	....	.20	....
‡ Bolivar	....	....	....	....	.53	....	....	....	....	....	....	....	....	....
Friendship	....	....	T.	.38	....	T.	T.	....	T.	....	.80	....	.11	....
Franklinville	....	....	....	T.	.27	T.	T.	....	.04	....	.90	....	.12	.01
Humphrey	....	....	....	....	.27	T.	T.	....	.01	....	1.05	....	.22	.15
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	....	....	....	....	.25	08	T.	....	.09	....	.97	....	.40	.05
Jamestown	....	....	....	T.	.36	T.	....	....	....	....	.86	....	.20	.10
Elmira	....	....	....	.65	.35	....	....	....	....	...	.28	....	....	....
Pine City	....	....	....	....	.10	....	....	....	....	....	.18	.11	.02	.05
Akron	....	....	....	.08	.10	.30	T.	.08	.03	T.	...	T.	T.	....
Avon	....	....	....	....	.33	....	....	....	....	....	.40	....	.05	.14
Mt. Morris	....	....	....	....	.40	....	....	T	....	....	.80	....	T.	.10
Lockport	....	....	....	T.	.13	.12	....	.25	T.	....	.72	....	T.	T.
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone	....	....	....	....	....	....	....	....	....	...	....	....	....	....
Wedgewood	....	....	....	.03	.97	....	T.	....	....	....	.32	....	.05	....
Addison	....	....	....	T.	.41	....	T.	....	....	....	.22	....	T.	.01
Atlanta	....	....	...	....	.45	....	....	....	....	....	.55	....	.12	....
Haskinville	....	....	....	T.	.40	...	T.	....	....	....	.50	....	.05	....
South Canisteo	....	....	....	T.	.55	....	T.	....	T.	....	.40	....	.11	....
Arcade	....	....	....	T.	.20	T.	T.	....	.01	....	.97	....	.26	T.
Attica	....	....	....	....	....	...	....	....	....	....	....	....	....	....
Varysburgh	....	....	....	...	.	....	....	....	....	....	....	....	....	....
Eastern Plateau	0 06	0.00	0.00	0.05	1.45	0.10	0.01	0.12	0.00	0.00	0.26	0.01	0.08	0.07
Binghamton (1)	....	....	....	.06	1.32	T.	....	06	....	....	.14	.04	.10	...
Binghamton (2)	....	....	....	.05	.81	....	....	T.	....	....	.12	01	.09	.01
Chenango Forks	....	....	....	....	....	....	....	....	....	....	....	....	...	.
Oxford	....	....	....	....	1.15	.02	....	.06	....	....	....	....	.11	T.
Cortland	....	....	....	.03	1.12	....	....	.28	....	....	.60	....	.08	.06
Bloomville	....	....	....	....	1.48	....	...	.25	....	....	.57	....	....	.05
Deposit	...	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright	....	....	....	....	1.47	....	....	*	†.53	....	.19	....	.10	....
Brookfield	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hamilton	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Apulia	....	....	...	....	....	....	...	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	....	....	....	....	1.85	1.16	....	.53	....	...	.14	...	.17	....
Warwick	....	....	....	....	1.40	.40	....	.32	...	....	.10	.07	.03	....
Cooperstown	....	....	....	....	1.95	....	....	.18	....	....	.27	....	.08	....
New Lisbon	....	....	....	....	1.78	...	....	08	....	...	.21	....	.15	....
Oneonta	....	....	....	.24	89	....	.14	.10	....	....	.12	....	....	....
Perry City	....	....	....	....	.72	....	T.	....	....	....	.40	....	.15	.55
Newark Valley	....	....	....	.10	1.20	....	....	....	....	....	.35	T.	.02	T.
Straits Corners	....	....	....	.20	1.46	T.	....	....	....	....	.38	T.	.11	.14
Waverly	....	....	....	.16	1.30	....	.01	....	....	....	.18	.02	.05	.25
Dryden	....	....	....	...	....	....	....	....	....	...	...	....	....	....
Mohonk Lake	....	....	....	....	3.28	....	....	....	....	....	.31	....	....	....
Northern Plateau	0.00	0.00	0.00	0.01	1.84	0.06	0.01	0.22	0.03	0 02	0.53	0.00	0.09	T.
West Chazy	....	....	....	....	....	....	....	....	...	....	...	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	....	...	....	...	....
Saranac Lake	....	....	....	....	.55	.06	....	.29	.06	T.	.17	....	.07	T.
Gloversville	....	....	....	.02	2.56	.13	....	.18	....	....	.38	....	.01	.01
North Lake	....	....	....	....	3.00	.01	....	....	....	....	.80	....	....	....
Lowville	....	....	....	.02	1.39	.10	.06	....	.10	....	.89	....	.10	....
Number Four	....	....	....	....	1.06	*	†.16	T.	....	.14	.60	....	.16	....
Kings Station	....	....	....	....	2.50	....	....	.85	....	....	.33	....	.20	....

TATION FOR NOVEMBER, 1896—(INCHES).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.00	0.00	T.	0.03	0.03	0 00	0.34	0.03	0 03	0.18	0.09	0.01	0.17	0.09	0.01	0.08	2 19
....	....	T.	.04	....	....	26	T.	.05	.13	.15	....	*	†.22	.05	15	2 15
....	....	T.	*	T.	....	.40	....	....	....	.02	....	.08	.14	T.	20	2.08
....	....	....	....	....	....	.40	T.	....	.18	13	....	11	.07	T.	....	....
....	....	....	T	T.	....	.45	T.	T.	.20	.10	....	.10	.10	T.	.05	2.29
....	....	T.	....	.11	....	.63	.06	....	.37	.07	....	.26	.26	T.	.08	3.18
....	....	T.	T.	....	....	.05	T.	.40	.28	T.	....	30	....	T.	.20	2.93
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	T.	.01	.11	....	.60	.11	T.	.42	.13	.02	45	.25	T.	.15	4 09
....	....	T.	T.	.05	....	55	.02	T.	.36	.13	....	.55	.12	T.	40	3.70
....	....	....	.02	....	....	....	....	....	....	.10	....	T.	T.	....	....	1 40
....	....	T.	....	04		.05	....	..	.07	09	.01		.09	12	T.	0.93
....	....	T	.29	.17	....	66	....	T.	.27	04	T.	.31	.20	T.	....	2.53
....	....	....	....	....	....	.55	....	....	.21	.05	....	09	T.	T.	T.	1.82
....	...	....	....	T.	....	.50	T.	....	.30	.05	....	.25	.20	....	T.	2.60
....	....	T.	.22	....	...	.12	.42	....	....	.14	....	T.	....	....	....	2 12
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....	....	.05	T.	06	....	.03	T.	....	.03	.11	....	.09	.14	T.	T.	2.03
...		....	....	....	....	.05	T.	....	.01	.08	.02	.01	.02	T.	T.	0.83
....	....	.05	.04	....	...	.25	....	....	.24	.04	....	T.	.08	....	....	1.82
....	....	....	....	....	....	.15	...	....	.14	.10	....	T	05	T.	.07	1.46
....	....	....	.07	1.	....	.02	T.	.11	.06	.15	.15	.10	T.	T.	.10	1.82
....	....	T.	T	.05	...	1.00	...	....	38	.07	...	.47	.07	T	20	3 68
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
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0.01	0.00	0.01	T.	0.01	0.00	0.18	0.04	0.01	0.09	0.12	T.	0.12	0.22	0 09	T.	3.07
....	...	....	...	....	....	.08	.11	....	.15	.10	....	....	.50	T.	T.	2.66
....	....	....	....	T.	....	.02	.05	....	.13	.10	.01	.12	.25	....	.01	1.78
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	T.	....	...	....	.25	.15	T.	.25	10	....	.30	.25	.02	T.	2.66
..	....	.02	....	.04	....	.42	....	....	.12	.01	....	.21	.18	....	....	3.17
.13	....	....	....	....	...	.28	....	....	.15	.16	....	T.	....	....	....	3 42
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
...	....	....	....	....	....	.25	....	....	*	†.29	....	....	....	....	....	2.83
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
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....	....	....	....	....	....	.15	.14	....	....	.27	....	.03	.87	....	....	5.31
....	....	....	....	....	....	.10	.19	....	....	.09	....	....	.32	.60	.05	3 67
....	....	....	.01	....	....	.46	....	....	.18	.08	....	.30	.05	....	....	3 56
....	....	....	....	....	....	.23	....	....	.15	02	.01	.18	.15	....	....	2.96
....	....	.08	....	....	....	....	....	.18	....	21	...	24	....	....	....	2 20
....	....	.03	....	....	....	.08	.05	....	.07	08	....	.10	21	....	....	2.44
....	...	T.	....	T.	....	.12	....	....	....	.12	....	20	.10	....	....	2 21
....	....	....	....	.05	....	.09	....	....	.03	.20	....	.12	17	T.	T.	2.95
....	....	02	....	....	....	.07	....	....	.05	.11	....	.08	.27	....	.01	2.58
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	...	....	....	....	.23	....	....	....	.16	.06	....	....	.75	....	4.79
T.	T.	0.02	0.19	0.05	0.00	0 49	T	0 04	0.33	0.46	0.14	0.13	0.17	0.01	0.13	5.09
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	...	...	..	....	....	....	....	....	....	....	....	....	....	....
T.	T.	11	.27	....	....	.35	.01	24	06	.45	....	10	....	.01	T.	2.80
....	....	T.	.04	.03	....	.61	....	T.	.57	.18	.40	.23	.02	....	T.	5.37
....	....	....	.60	....	....	.20	....	....	....	.90	.30	....	.40	....	....	6.21
....	....	....	....	.16	....	.52	....	....	.31	.32	.15	.23	.16	.02	.70	5 23
....	....	....	.21	.11	....	.40	....	....	.46	.44	....	*	†.56	*	†.45	4.75
....	....	....	....	....	....	.85	....	....	.60	.46	....	.10	.28	....	....	6.17

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.00	0.00	0.00	0.07	1.37	0.01	0.00	T.	0.00	0.00	0.17	0.16	0.06	0.02
Brooklyn	....	....	....	....	1.19	T.	....	....	....	....	.22	.11	.02	....
Manhattan Beach	....	....	....	....	.10	.10	....	....	....	....	*	†.22	20	....
New York City	....	....	....	....	.43	.01	....	T.	....	....	.15	.08	T.	....
Willet's Point	....	....	....	.54	.84	....	....	....	....	....	....	.30	T.	....
Brentwood	....	....	....	....	2 00	....	....	....	....	....	.50	.60	.10	....
Setauket	....	....	....	T.	1.40	....	....	....	....	....	..	....	.13	.12
Bedford	....	....	...	T.	3 29	....	....	.01	....	....	.12	02	T.	....
Primrose	....	....	....	....	1.71	....	....	T.	....	....	.20	T.	T.	....
Hudson Valley	T.	0.00	0.00	T.	1.25	0.18	0.00	0.29	T.	0.04	0.11	0 03	0.06	T.
Albany	....	....	....	....	.56	.26	....	.36	....	....	.08	.01	.03	T.
Lebanon Springs	....	....	....	..	1.45	.49	....	.20	....	....	.09	T.	*	†.15
Honeymead Brook	....	....	....	T.	.68	.25	....	.18	....	....	.16	.03	20	....
Poughkeepsie	....	....	...	....	.86	....	....	.19	....	....	.18	T.	T.	....
Wappinger's Falls	T.	....	....	T.	.82	.62	....	.22	.04	....	.18	02	.14	....
Catskill	....	....	....	....	2.56	....	....	.41	....	....	.13	T.	.08	....
West Point	....	....	....	....	*	†3.80	....	*	†.08	....	....	.04	....	.03
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	....	....	1.93	....	....	....	....	....	.17	T.	.08	....
Southeast Reserv'ir	....	....	....	....	....	....	....	....	....	....	....	....	..	....
Eagle Mills	....	....	....	....	1.00	....	....	.45	....	...	.15	....	....	....
Easton	....	....	....	....	1.36	...	....	.56	....	.36	....	.16	T.	....
Mohawk Valley	0.00	0.00	0.00	0.45	0.52	0.00	0.00	0.06	0.00	0.45	0.09	0 00	0.08	0.00
St. Johnsville	....	....	....	....	.63	....	....	.11	....	....	09	....	.08	....
Rome	....	....	....	.90	.40	....	....	....	....	.90	.09	....	.07	....
Champlain Valley	0.00	0.00	0.00	0.00	1.93	0 41	T.	0.40	0.08	0.00	0 12	0.01	T.	T.
Plattsburgh B'rcks	....	....	....	....	.11	.95	T.	..	.25	....	T.	.02	T	T.
Glens Falls	....	....	....	....	3.05	.12	....	.64	....	....	.19	....	....	....
Lake George	....	....	....	....	2.62	.16	....	.57	....	....	.16	....	T.	T.
St. Lawrence Valley	0.00	0.00	T.	0.03	0.32	0.47	0.02	T.	0.10	0.11	0 27	T.	0.08	T.
Madison Barracks	....	...	....	.22	....	.73	....	....	.25	....	.66	....	.15	....
Watertown	....	....	....	....	.46	.50	....	....	.46	22	.42	....	.42	T.
Canton	....	....	....	....	.62	.12	T.	....	....	.28	....	T.	....	T.
DeKalb Junction	....	....	....	....	.53	.36	....	....	...	....	.29	....	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	....	....	....	....	....	.62	.16	.02	....	.27	...	....	....	....
Ogdensburg	....	....	T.	...	*	† 83	....	....	....	....	.35	....	.02	T.
Potsdam	....	....	....	....	*	†.51	....	....	....	....	.20	....	....	T.
Great Lakes	T.	0.00	0.00	0.08	0.35	0.04	T.	0.02	0.08	0.11	0.64	T.	0 13	0.04
Dunkirk	....	....	....	....	....	....	....	....	....	...	....	....	....	....
Westfield	....	....	....	T.	....	...	T.	....	1 00	....	1.00	....	T.	....
Buffalo	....	....	....	.06	.29	.07	.01	.13	.09	T.	.69	....	.02	....
Adams Centre	....	....	....	....	.19	....	....	....	.18	24	.56	....	....	....
Pittsford	....	....	....	T.	.29	.06	....	....	....	T.	.60	....	T.	.34
Rochester	....	....	....	.01	.30	.05	T.	T.	T.	T.	.54	....	.25	.17
Scottsville	....	....	....	....	....	...	....	....	....	....	..	....	....	....
Appleton	....	....	....	.03	.03	....	....	02	T.	....	.58	....	.14	....
Fort Niagara	....	....	....	....	.10	....	....	T.	....	T.	.50	....	.05	....
Niagara Falls	....	....	....	.06	.11	.10	....	.10	....	....	.49	....	.04	....
Baldwinsville	....	....	....	.65	.34	....	....	....	....	.88	.05	....	.06	....
Skaneateles	....	....	....	....	.51	....	....	....	....	...	.41	....	.10	....
Ridgeway	....	..	....	....	....	....	....	....	....	....	.59	....	.06	....
Demster	....	...	....	....	.30	....	....	....	....	....	.96	....	.24	....
Fulton	....	....	....	....	1.01	....	..	....	....	....	.95	....	.30	....
Oswego	..	....	....	T.	.56	T.	T.	....	....	....	.87	....	.42	T.
Palermo	T.	....	....	.10	.82	....	.05	....	....	....	.99	....	.15	....
Phoenix	....	....	....	....	1.12	.40	....	....	....	....	.85	.05	.03	.16
Lyons	....	....	....	.57	.02	....	....	....	....	.93	T.	T.	.15	....
Rose	....	....	....	T.	.64	T.	....	....	..	....	.92	....	.40	T.
Erie, Pennsylvania	....	....	....	.04	.07	T.	.01	T.	.20	.02	.59	....	.04	.01

tation for November—(*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.01	T.	0.00	0.00	T.	0.00	0.07	0.09	0.00	0.01	T.	T.	T.	0.55	0.31	0.36	3.29
....	....	....	....	T.		T.	.08	....	T.	....	....	....	.38	.56	.50	3.06
....	....	....	....	....	....	.02	.16	....	....	....	....	....	*	†1.20	.60	2.60
....	....	....	....	T.	....	.03	.10	....	T	.01	T.	....	.41	.51	.39	2.12
....	....	....	....	....	....	.18	....	....	....	....	....	....	.74	......	.02	2.62
....	....	....	....	....	....	.10	....	....	....	T.	T.	T.	1.00	.30	.50	5.10
.09	.03	....	....	T.	....	.02	.11	....	.03	T.	....	....	.35	.45	.48	3.21
....	....	....	....	T.	....	.02	.30	....	.03	.03	.01	T.	.29	.17	.40	4.69
....	....	....	....	....	....	.18	....	....	....	....	T.	....	.65	.17	......	2.91
0.00	0.00	0.00	T.	0.00	0.00	0.17	0.01	0.00	0.10	0.05	0.07	0.03	0.18	0.14	0.03	3.13
....	....	....	....	....	....	.08	.02	....	.06	.04	.22	T.	.03	.05	......	1.80
....	....	....	T.	....	....	.10	....	....	.21	T.	.28	....	.18	T.	......	3.15
....	....	....	....	....	....	.12	.03	....	.01	.04	....	....	.39	.14	.01	2.24
....	....	....	....	....	....	.14	....	....	....	.04	....	....	.04	.....	T	1.45
....	....	....	....	....	....	.16	....	....	.08	.04	T	....	.52	.30	.03	3.17
....	....	....	....	....	....	.05	....	....	.02	....	.07	....	.20	.02	......	3.54
....	....	....	....	....	....	.26	....	....	.03	....	....	....	....	.78	.08	5.10
....	....	....	....	....	....	....	....		....	....	....	....	....	......	......	3.96
....	....	....	....	....	....	*	†.38	....	T.	T.	T.	....	....	†.70	.17	3.43
....	....	....	....	....	....	....	....	....	....		....	....	....	......	......	3.38
....	....	....	....	....	....	....	....	....	.10	....	.15	....	.15	......	......	2.00
....	....	....	....	....	....	.59	....	....	.53	.32	....	.29	.13	......	......	4.30
0.00	0.00	0.05	0.12	0.02	0.00	0.72	0.02	0.38	0.27	0.23	0.16	0.15	0.02	0.00	0.00	3.86
....	....	.01	T.	.03	....	.54	.03	T.	.47	.05	.31	.05	.05	......	......	2.45
....	....	.09	.23	....	....	.90	....	.75	.07	.4	....	.25	....	......	......	5.06
0.00	0.00	0.00	0.01	0.08	0.00	0.36	0.09	0.00	0.34	0.10	0.24	0.04	0.08	0.02	0.00	4.31
....	....	....	.04	.22	....	....	.26	....	.05	....	.25	....	.04	....	......	2.19
....	....	....	....	....	....	.60	....	....	.38	.13	.23	.05	.12	.04	......	5.55
....	....	....	T.	.02	....	.47	....	....	.60	.18	.23	.08	.07	.02	......	5.18
0.10	0.06	0.00	0.24	0.09	0.00	0.22	?	0.00	0.22	0.20	0.05	0.18	0.11	0.02	0.01	2.96
....	....	....	.26	....	....	.21	....	....	....	.42	....	....	....	.06	......	2.96
....	....	....	.10	.22		†.50	....	....	.30	.38	....	.28	.10	T.	.06	4.42
.20	....	....	....	.44	....	.40	....	....	.48	T.	....	.25	.37	.10	......	3.26
.16	....	....	.66	....	....	.06	....	....	....	.55	....	.15	....	T.	......	2.76
....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......
.16	.07	....	.47	....	....	.20	....	....	.17	.05	....	.52	....	......	......	2.31
.20	T.	....	.20	....	....	*	†.40	....	.35	.01	.32	.03	.30	T.	......	3.01
....	.37	....	.39	....	....	*	†.30	....	.25	....	....	....	....	......	......	2.02
0.00	0.01	0.01	0.14	0.04	T.	0.45	0.11	0.10	0.19	0.10	0.03	0.27	0.15	0.02	0.04	3.13
....	....	....	....	....	....	....	....	....	....	....	....	....	....	......	......	......
....	....	.20	....	....	....	.80	....	.60	.05	.07	....	.79	....	......	.30	4.81
....	....	.01	.13	.03	....	.75	T.	.04	.33	.03	T.	.44	.20	T.	T.	3.32
....	....	....	.60	....	....	....	.28	....	.16	.20	.06	....	.30	.12	......	2.89
....	....	.01	.15	....	....	.62	.03	T.	T.	.08	.01	.08	.01	......	......	2.28
....	....	T.	.06	.03	....	.58	.04	.01	.24	.08	.01	.07	.01	.01	.03	2.49
....	....		....	....	....	....	....	....	....	....	....	....	....	......	......	
....	....	T.	.07	.02	....	.51	....	....	.12	.09	....	.10	.29	T.	T.	2.00
....	....	....	.12	....	....	T.	.44	.10	....	....	....	.31	....	.10	.14	1.86
....	....	....	.31	T.	....	.62	....	....	.12	.11	.07	.11	.42	......	......	2.66
....	....	T.	.28	....	....	....	T.	.34	....	.14	....	.33	....	......	......	3.07
....	....	....	.04	.15	....	.45	.20	....	.40	.03	.05	.17	.22	......	......	2.73
....	....	....	.18	.06	....	.61	.03	.01	.10	.19	.05	.11	.39	......	......	2.38
....	....	....	.10	.25	....	.26	....	....	.60	....	.16	.22	.24	......	......	3.33
....	....	....	.10	....	....	.66	.09	.22	....	.27	T.	.44	.03	.04	....	4.11
....	....	T.	.10	.17	T.	.46	.04	.01	.30	.22	.03	.58	.10	.08	.01	3.95
....	....	....	.39	.01	....	.40	T.	.20	.09	.14	....	.20	....	.05	.01	3.60
....	....	....	T.	....	....	....	.88	....	.33	.03	.15	....	.27	......	......	4.27
....	.18	.03	.02	....	....	.68	....	.33	T.	.04	T.	.29	....	......	......	3.24
....	....	....	.03	....	....	.66	T.	....	.39	.08	T.	.42	.10	T.	....	3.64
....	....	T.	T.	.04	....	.40	T.	.11	.32	.10	T	.42	.23	.02	.30	2.90

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Central Lakes.	0.00	0.00	0.00	T.	0.79	0.00	0.02	0.00	0.00	0.00	0.26	0.00	0 11	0.11
Fleming	....	...	....	....	1.11	....	....	....	....	....	....	....	.20	....
Sherwood..........	....	....	....	....	*	*	*	*	*	*	†.70	....	.10	.06
Watkins....	....	....	....	....	.80	....	....	....	....	....	.28	....	.10	.11
Romulus	....	....	...	....	38	....	...	....	....	....	.49	....	....	.36
Ithaca	....	....	....	T.	.88	....	.11	....	...	....	.29	....	.13	.02
Penn Yan.........	....	....	...	....	...	...	...		....	....	....	....	...	....
Average.........	T.	0 06	T.	0.08	1.02	0.13	0.02	0.11	0.03	0.08	0.30	0.02	0.09	0.03

‡ Record for the month incomplete. || Received too late to be included in the averages.

TATION FOR NOVEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total.
0.00	0.01	0.02	0.03	0.02	0.00	0.28	T.	0.06	0.32	0.11	0.00	0.11	0.14	0.00	T.	2.32
....	....	....	....	....	....	.27	....	....	1.10	.20	....	....	....	......	......	2.88
....	....	.03	.13	....	....	.33	....	.30	.06	.02	....	.30	.11	......	......	2.14
....	.03	.07	....	....	....	.04	....	.02	.03	.05	...	....	.14	......	......	1.67
....	....	T.	....	...	....	.71	....	...	.39	.21	....	.13	.25	......	......	2.92
....	....	.02	....	.08	....	.06	.02	T.	.03	.08	....	.10	.18	......	T.	2.00
....	....	....	....	....	....	....	....	....	....	....	..		....	......	......	......
0.01	0.01	0.01	0.08	0.03	T.	0.33	0.04	0.06	0.20	0.15	0.07	0.12	0.17	0.06	0.05	3.34

* Amount included in next measurement. † Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees Fahr.). Normal for the month of November.	Length of record, years.	Record begins.	Record ends.	Mean for Nov., 1896.	Departure from the normal.	Extremes of monthly mean temperature for November. Highest.	Year.	Lowest.	Year.
Western Plateau . ..	....	36.3	...	......	......	42.8	+6.5	.....	......	.....	......
Angelica	Allegany	32.8	14	1851	1896	41.6	+8.8	41.6	1896	30.6	1871
Humphrey	Cattaraugus..	36.6	14	1883	1896	41.6	+5.0	41.6	1896	30.2	1886
Elmira	Chemung.....	39.4	17	1850	1896	45.2	+5.8	45.2	1886	33.9	1858
Eastern Plateau	....	36.3	...	......	......	42.1	+5.8	.....	......	.....	......
Oxford...............	Chenango	35.9	28	1828	1896	40.1	+4.2	42.7	1847	30.6	1842
Cortland	Cortland	36.1	34	1829	1896	42.8	+6.7	45.0	1849	38.4	1836
Cooperstown	Otsego	35.0	43	1854	1896	41.1	+6.1	41.1	1896	26.8	1873
Waverly	Tioga	38.3	15	1882	1896	44.4	+6.1	44.4	1896	35.0	1882
Northern Plateau.....	....	35.2	...	......	......	39.0	+3.8	.....	......	.....	......
Lowville	Lewis	35.2	31	1827	1896	39.0	+3.8	42.6	1830	29.1	1843
Atlantic Coast........	....	44.1	...	......	..... .	48.2	+4.1	.....	......	.....	......
New York city........	New York	43.7	27	1870	1896	48.0	+4.3	48.6	1870	37.5	1873
Setauket	Suffolk	44.5	12	1885	1896	48.4	+3.9	48.4	1896	40.5	1894
Hudson Valley	....	40.0	...	......	......	43.3	+3.3	.....	......	.....	......
Albany......	Albany	39.4	23	1874	1896	44.0	+4.6	44.0	1896	32.0	1875
Honeymead Brook....	Dutchess	38.5	16	1881	1896	41.8	+3.3	41.8	'88-'96	34.7	1894
West Point............	Orange	42.1	66	1826	1896	44.0	+1.9	.....	......	.....	......
Champlain Valley....	....	34.8	...	......	......	39.0	+4.2	.....	......	.....	......
Plattsburgh Barracks.	Clinton	34.8	42	1843	1896	39.0	+4.2	43.5	1849	28.9	1875
St. Lawrence Valley..	....	34.9	...	......	......	39.1	+4.2	.....	......	.....	......
Madison Barracks	Jefferson	36.8	36	1839	1896	41.2	+4.4	46.1	1849	27.6	1873
Canton................	St. Lawrence.	34.4	34	1862	1896	37.0	+2.6	38.8	1863	25.6	1873
North Hammond	" ..	34.7	19	1866	1896	41.1	+6.4	41.1	1896	25.5	1873
Potsdam	" ..	33.8	39	1828	1896	37.1	+3.3	40.4	1830	30.4	1842
Great Lakes	....	38.5	...	......	......	42.8	+4.4	.....	......	.....	......
Buffalo.....	Erie	38.4	26	1871	1896	43.9	+4.6	43.7	1883	30.3	1873
Rochester	Monroe.......	39.2	27	1871	1896	42.0	+2.8	42.0	1896	26.6	1873
Fort Niagara..........	Niagara	39.5	41	1842	1896	44.0	+4.5	47.5	1849	31.5	1873
Baldwinsville	Onondaga	38.0	18	1854	1896	42.6	+4.6	42.6	1896	36.2	1857
Oswego	Oswego	38.5	27	1870	1896	43.0	+4.5	43.0	'77-'96	32.0	1873
Palermo	"	34.8	43	1854	1896	41.2	+6.4	41.9	1859	26.8	1873
Erie, Pennsylvania ...	Erie	40.8	23	1874	1896	44.0	+3.2	44.0	1896	34.4	1880
Central Lakes	....	38.5	...	......	......	44.7	+6.2	.....	......	.....	......
Ithaca	Tompkins	38.5	18	1879	1896	44.7	+6.2	44.7	1896	33.1	1880
Average departure..	....	...	...	......	......	...	+4.7	.....	......	.....	......

AND PRECIPITATION — NOVEMBER.

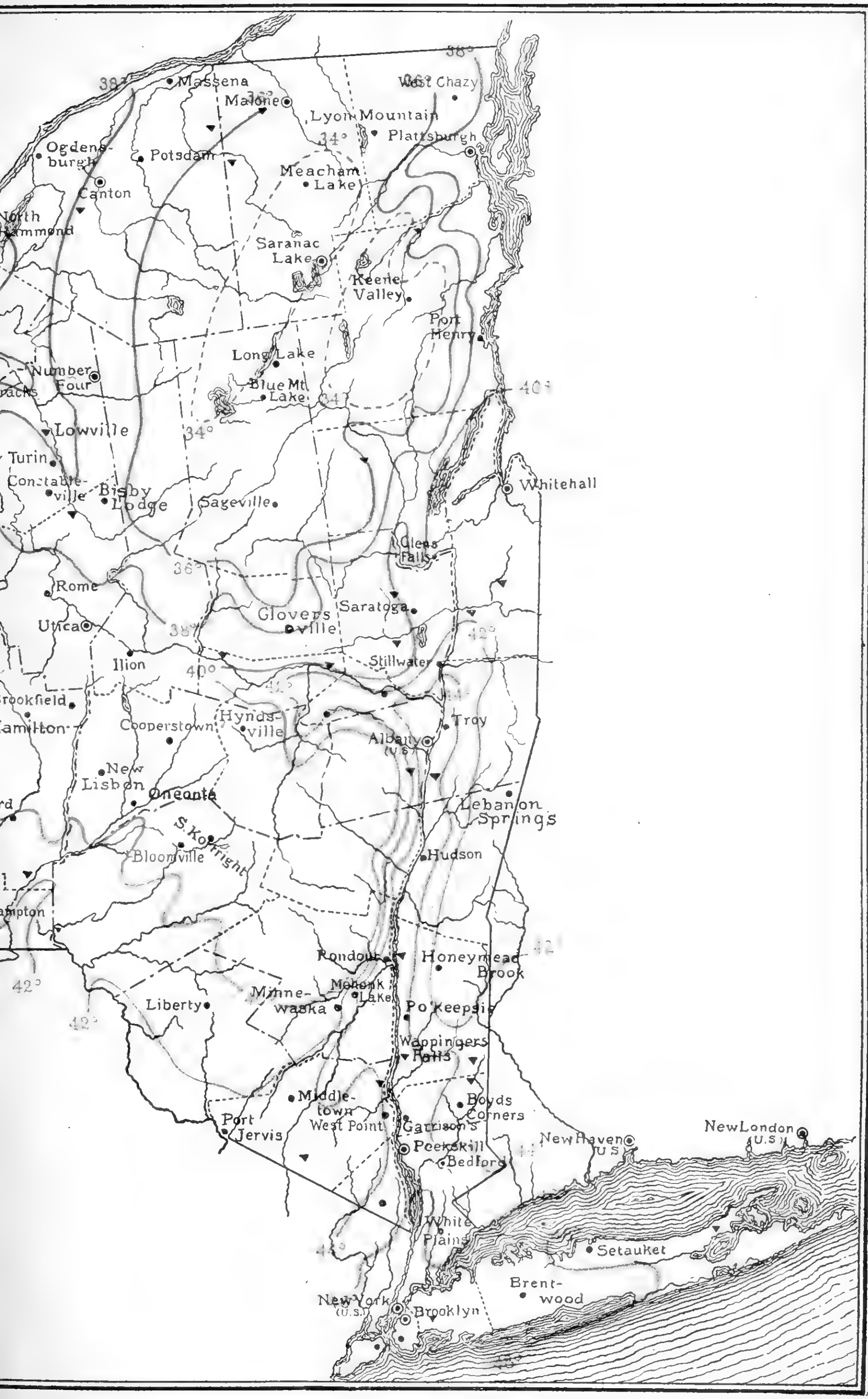
STATION.	COUNTY.	PRECIPITATION — (INCHES). Average for the month of November.	Length of record, years.	Record begins.	Record ends.	Total for Nov., 1896.	Departure from the average.	EXTREMES OF MONTHLY PRECIPITATION FOR NOVEMBER. GREATEST. Amount.	Year.	LEAST. Amount.	Year.
Western Plateau	....	2.59	...	......	......	2.14	—0.46	.....	.....	.....	.....
Angelica	Allegany	2.55	11	1871	1896	2.08	—0.47	4.27	1879	1.64	1871
Humphrey	Cattaraugus	3.27	14	1883	1896	2.93	—0.34	6.23	1886	1.64	1894
Elmira	Chemung	1.96	16	1851	1896	1.40	—0.56	4.19	1889	0.31	1861
Eastern Plateau	....	2.88	...	......	......	3.46	+0.58	.....	.....	.....	.....
Oxford	Chenango	2.76	26	1829	1896	2.66	—0.10	4.95	1852	0.91	1831
Cortland	Cortland	3.21	19	1850	1896	3.17	—0.04	5.60	1851	1.94	1893
Cooperstown	Otsego	3.07	43	1854	1896	3.56	+0.49	5.38	1858	1.45	1876
Port Jervis	Orange	3.01	12	1880	1896	5.31	+2.30	5.31	1896	1.12	1883
Waverly	Tioga	2.34	15	1882	1896	2.58	+0.24	5.90	1889	0.91	1883
Northern Plateau	....	3.30	...	......	......	4.78	+1.48	.....	.....	.....	.....
Lowville	Lewis	3.30	33	1827	1896	4.78	+.148	5.24	1830	1.40	1827
Atlantic Coast	....	4.22	...	......	......	2.66	—1.55	.....	.....	.....	.....
New York City	New York	3.74	27	1870	1896	2.12	—1.62	9.82	1889	0.82	1890
Setauket	Suffolk	4.69	12	1885	1896	3.21	—1.48	8.22	1892	0.74	1890
Hudson Valley	....	3.44	...	......	......	2.91	—0.53	.....	.....	.....	.....
Albany	Albany	2.90	23	1874	1896	1.80	—1.10	5.40	1886	0.91	1893
Honeymead Brook	Dutchess	3.00	16	1881	1896	2.24	—0.76	4.86	'89 '92	0.80	1890
Poughkeepsie	"	3.11	21	1830	1896	1.45	—1.66	7.00	1830	0.80	1890
West Point	Orange	4.04	48	1840	1896	5.10	+1.06	10.02	1816	1.05	1844
Boyds Corners	Putnam	4.16	26	1870	1896	3.96	—0.20	8.45	1889	1.12	1890
Champlain Valley	....	2.38	...	......	......	2.19	—0.19	.....	.....	.....	.....
Plattsburgh Barracks	Clinton	2.38	37	1840	1896	2.19	—0.19	4.39	1885	0.54	1882
St. Lawrence Valley	....	2.82	...	......	......	2.43	—0.37	.....	.....	.....	.....
Malone	Franklin	2.87	16	1830	1895	.....	.....	.....	.....	.....	.....
Madison Barracks	Jefferson	2.95	35	1840	1896	2.96	+0.01	10.02	1889	1.27	1870
North Hammond	St. Lawrence	3.26	18	1866	1896	2.31	—0.95	6.78	1866	1.73	1874
Potsdam	"	2.18	28	1828	1896	2.02	—0.16	4.10	1889	0.17	1836
Great Lakes	....	3.31	...	......	......	3.02	—0.29	.....	.....	.....	.....
Buffalo	Erie	3.53	27	1870	1896	3.32	—0.21	6.05	1886	1.82	1894
Rochester	Monroe	2.83	27	1870	1896	2.49	—0.34	5.46	1877	0.80	1887
Fort Niagara	Niagara	2.39	41	1841	1896	1.86	—0.53	4.82	1842	0.54	1887
Oswego	Oswego	3.39	26	1871	1896	3.95	+0.56	6.45	1880	1.78	1883
Palermo	"	3.62	37	1860	1896	3.60	—0.02	6.60	1866	1.01	1882
Erie, Pennsylvania	Erie	4.08	24	1873	1896	2.90	—1.18	8.35	1879	1.90	1894
Central Lakes	....	2.45	...	......	......	2.00	—0.45	.....	.....	.....	.....
Ithaca	Tompkins	2.45	18	1879	1896	2.00	—0.45	6.03	1886	1.25	1880
Average departure	....	...	...	......	......	.....	—0.23	.....	.....	.....	.....

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR NOVEMBER, 1896

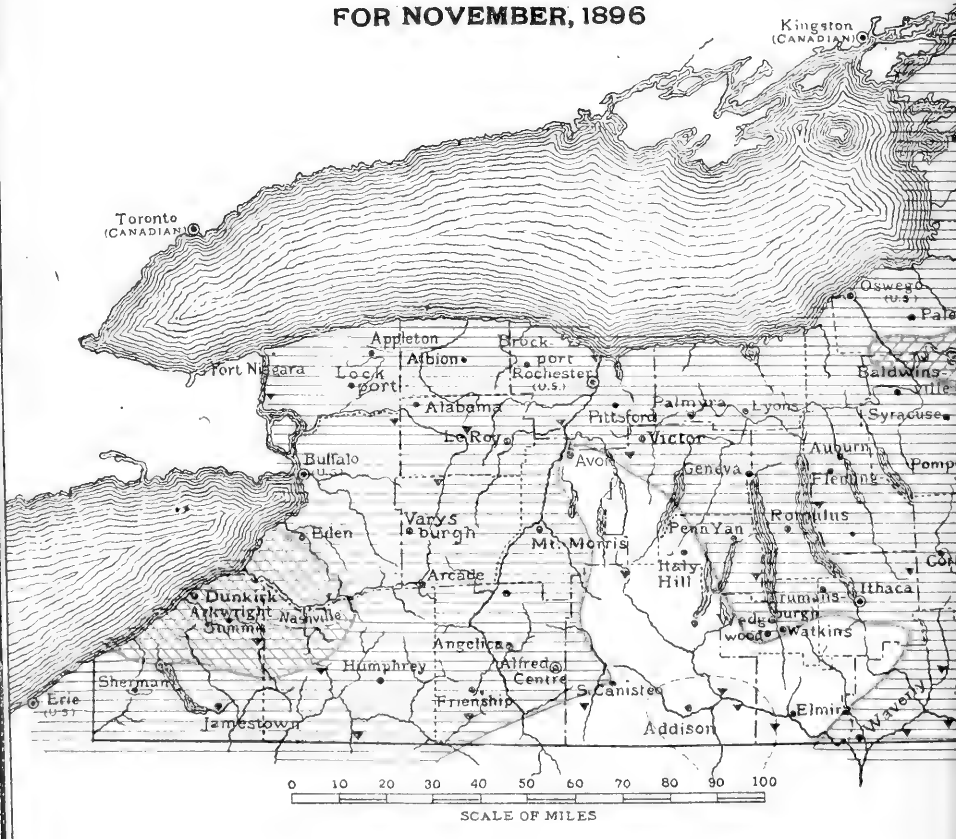

Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Utica
Gloversville
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
West Point
Garrison's
Port Jervis
Peekskill
Bedford
New Haven U.S.
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
34°
36°
38°
40°
42°

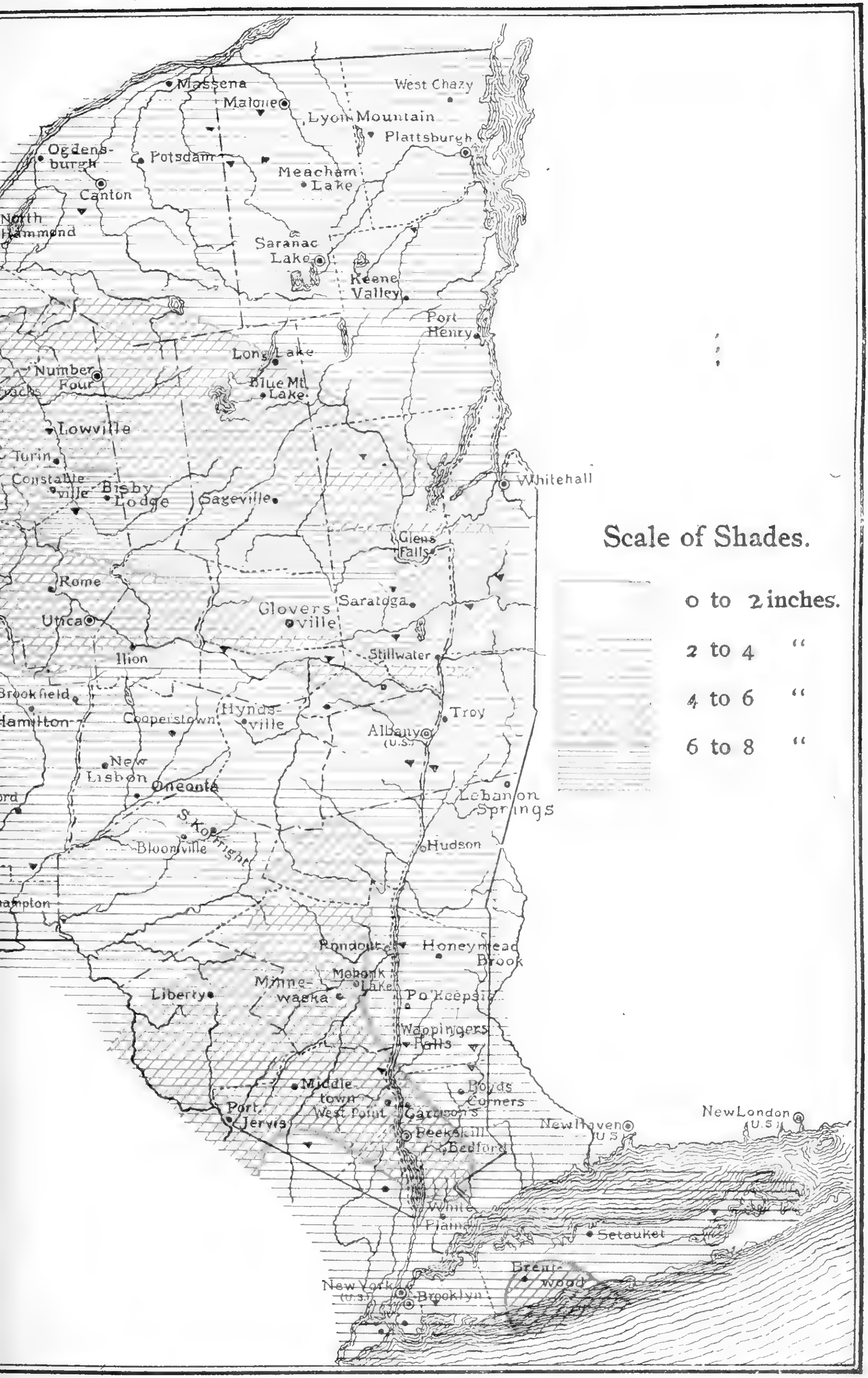
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR NOVEMBER, 1896




Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Gloversville
Utica
Ilion
Stillwater
Brookfield
Hyndsville
Cooperstown
Hamilton
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'Keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven (U.S.)
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
0 to 2 inches.
2 to 4 "
4 to 6 "
6 to 8 "

Meteorological Summary for December, 1896.

The average atmospheric pressure (reduced to sea-level and 32 degrees Fahr.) for the State of New York during December was 30.18 inches. The highest barometer was 30.96 inches at Albany on the 27th, and the lowest was 29.44, also at Albany, on the 9th. The highest mean pressure obtained over the eastern-central section, and the lowest in the vicinity of Lake Ontario. The average pressure at 6 stations of the National Bureau was 0.10 inches above the normal, the greatest excess being 0.13 inches at Albany.

The mean temperature of the State, as derived from the records of 75 stations, was 25.3 degrees; the highest local monthly mean being 32.8 degrees at Setauket, and the lowest 16.1 degrees at Saranac Lake. The highest daily mean for the State was 41 degrees on the 6th and 13th, and the lowest was 5 degrees on the 24th. The maximum temperature reported was 69 degrees at Waverly on the 6th; the minimum being 20 degrees below zero at North Lake on the 22d, at Saranac Lake on the 25th, and at Wappingers Falls on the 26th. The mean monthly range of temperature for the State was 58 degrees; the greatest range, 80 degrees, occurring at New Lisbon, and the least, 44 degrees at Arkwright and Erie, Pa. The mean daily range was 15 degrees; the greatest daily range being 50 degrees at South Kortright on the 29th, and the least, 1 degree, at Brooklyn on the 23d. The mean temperatures of the several regions were as follows: The Western Plateau, 27.5 degrees; the Eastern Plateau, 25.9 degrees; the Northern Plateau, 19.3 degrees; the Atlantic Coast, 30.4 degrees; the Hudson Valley, 25.3 degrees; the Mohawk Valley, 24.1 degrees; the Champlain Valley, 21.8 degrees; the St. Lawrence Valley, 21.8 degrees; the Great Lakes, 28.9 degrees; the Central Lakes, 27.9 degrees. The average of the mean temperatures at

26 stations possessing records for previous years was 1.7 below the normal; excesses being reported only from 4 stations located in western New York.

The mean relative humidity for the State was 76 per cent. The mean dew point was 21 degrees.

The average precipitation for the State was 1.43 inches of rain and melted snow, as derived from the records of 98 stations. The greatest general precipitation ranged from 2 to 4 inches to the east and southeast of Lake Ontario, in the extreme southeastern counties, and over a small area of the highlands near Lake Erie; while over a narrow strip extending from Orleans to Chemung counties less than 1 inch fell. The maximum local precipitation was 3.82 inches at Demster, Oswego county, and the minimum was 0.35 inches at Eagle Mills, Rensselaer county. A list of the heaviest rates of precipitation will be found in the accompanying table of meteorological data. A moderate snowfall occurred near the Great Lakes on the 1st and 2d, but the first general precipitation of the month occurred on the 8th and 9th, falling as snow in northern New York, and generally as rain in the remainder of the State. A considerable snowfall occurred along the coast on the 16th; in western New York from the 18th to 21st, and throughout the State on the 23d. The average total snowfall for the State was 8.6 inches. The maximum amount ranged from 10 to 17 inches in the coast region, and over a large portion of western New York and the Northern Plateau. The greatest local snowfall was 17.7 inches at Bedford, and the least, 1.5 inches in the Champlain Valley. The average precipitation at 27 stations possessing records for previous years was 1.39 inches below the normal, deficiencies occurring at all stations. The precipitation was the least on record for December at Humphrey, Elmira, Port Jervis and Buffalo.

The average number of days on which the precipitation amounted to 0.01 inches or more was 6.6; the maximum number occurring in the Great Lake Region and the least in eastern New York. The average number of clear days was 9.1; of partly cloudy days, 9.8; of cloudy days, 12.1; giving an average cloudiness of 55 per cent. for the State. The greatest cloudiness obtained in western New York, and the least in the southeastern section.

The prevailing wind direction was from the west. The average total wind-travel at 6 stations of the National Bureau was 8,973 miles, being above the usual values at all stations. The maximum velocity reported from the above stations was 56 miles per hour at Buffalo on the 9th.

No thunderstorms were reported this month.

Hail fell on the 6th, 9th, 10th and 15th, and sleet fell on the 15th.

Lunar halos were observed on the 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th and 20th.

General features of the weather.— The average temperature for December was slightly below the normal, sharply defined cold periods at the opening of the month, and from the 15th to the 28th, alternating with unseasonably mild weather. The total precipitation was exceptionally light, especially in western-central New York, and the ground was generally bare of snow for the greater part of the month, although in portions of the Western and Northern Plateaus a week to ten days of sleighing was reported during the latter half of December. The number of fair days was somewhat greater than usual for the winter months.

Five areas of high and nine areas of low pressure influenced our weather conditions this month. The number of low pressure areas was somewhat less than the usual storm frequency for December, and few of them attained great intensity. Five depressions passed eastward beyond the northern border of the State on the 6th, 13th, 19th, 26th and 30th, on all of which dates a marked increase of temperature occurred; but the accompanying precipitation was light excepting at the time of passage of the third low, when a moderate snowfall occurred in western New York. A cyclone passed northward far beyond the coast line on the 3d, coincidently with a decided fall of temperature in this vicinity. On the 9th to 10th a depression formed over New England, developing rapidly, and giving heavy rain and high winds over New York. A second severe storm passed along the coast on the 16th, giving a considerable snow fall which was badly drifted by high winds. Finally, a low area of moderate energy passed eastward over Pennsylvania on the 23d, giving an appreciable snowfall throughout the State, and cold northerly winds.

The most noteworthy anticyclones of this month, like those of November, were offshoots from nearly stationary areas over the western part of the continent. The first high moved eastward to the Great Lake Region on the 2d and 3d, bringing a severe cold wave of brief duration. The second high area was confined mainly to the southern States and coast, and tended to raise the temperature over the northern States. The third anticyclone developed to the northward of the Great Lakes on the 14th, bringing a decided depression of temperature which was continued by a series of waves of high pressure spreading eastward from a strongly developed high in the northwest. The pressure increased over nearly the entire continent until the 27th, when the area moved off the coast, while a general rise of temperature occurred in its rear. The last anticyclone developed in central Canada, and the colder weather due to it was beginning to be felt in this vicinity at the close of the month.

Reports from 39 stations show that only on the Adirondack Plateau was there an appreciable covering of snow on the ground on the 15th. On the 31st the depth ranged from 1 to 6 inches over portions of the Northern and Eastern Plateaus and along the Atlantic Coast. Over the greater part of the State there was not sufficient snow for a week's sleighing during the month.

Reports on the closing of streams were received from the observers at Binghamton, Cooperstown, Wappingers Falls, Caldwell and North Hammond. The Susquehanna froze over on the 4th, was clear on the 6th and closed again on the 18th. The Hudson closed on the 24th and the St. Lawrence on the 25th, teams crossing on the ice on the 28th, but opened again on January 1st. Lake George closed on the 24th. On the 1st to 3d, Otsego Lake was covered by ice for a distance of two miles from the foot of the lake.

The observer at Perry City, Schuyler county, states that winter wheat appeared in good condition at the end of the month.

The severe cold wave which occurred in southeastern New York on the 25th and 26th deserves special notice. The maximum temperature on both dates was not much lower in southeastern New York than elsewhere, but at night intense cold developed throughout a strip of territory about 30 miles in width, and extending along the eastern portion of the State from Rensselaer county to southwestern Connecticut, and beyond to central Long Island. The minimum 20 degrees below zero, at Wappingers Falls, was much the lowest temperature in the State on the night of the 26th.

METEOROLOGICAL DATA.

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA.			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point, (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest	Date.
Western Plateau												27.5	62	6
Alfred	Allegany	1824									25.5	25.5	54	13
Angelica	"	1340									25.6	25.7	53	12
Bolivar	"											26.8	55	*a*
Friendship	Allegany	1550	30.20	30.92	27	29.66	13	1.26				27.4	55	*a*
Franklinville	Cattaraugus											26.6	52	13
Humphrey	"	1950									28.5	28.2	56	13
Arkwright	Chautauqua	1260										‡28.8	52	12
Jamestown	Chautauqua	1328										26.6	54	?
Elmira	Chemung*	863										30.0	60	13
Avon	Livingston	585										27.8	55	12
Mt. Morris	"	525												
Lockport	Niagara										30.6	30.3	54	12
Victor	Ontario													
Wedgewood	Schuyler	1350									25.3	26.4	62	6
Addison	Steuben	1000							72	22	26 0	28.8	57	13
South Canisteo	"	1480							72	19	26.9	27.1	56	*a*
Arcade	Wyoming	1707									25.6	25.8	51	12
Eastern Plateau												25.9	69	6
Binghamton (1)	Broome	870									26.8	26.9	58	13
Binghamton (2)	"		30.23	30.94	28	29 67	9	1.27				27.0	56	13
Oxford	Chenango	550										24.0	53	13
Cortland	Cortland	1120										26.2	56	13
Bloomville	Delaware	1550												
South Kortright	"	1700										23.6	52	13
Brookfield	Madison	1350												
Middletown	Orange	660												
Port Jervis	"	470										27.4	54	13
Cooperstown	Otsego	1300									24.2	24.0	53	13
New Lisbon	"	1234									23.2	23.0	65	9
Oneonta	"	1100									28.8	28.5	55	13
Perry City	Schuyler	1038									25.4	25.4	54	13
Straits Corners	Tioga											25.0	54	13
Waverly	"	825									27.7	28.6	69	6
Dryden	Tompkins													
Mohonk Lake	Ulster	1245									26.2	27.2	51	13
Northern Plateau												19.3	54	6
Saranac Lake	Franklin											16.1	46	6
Gloversville	Fulton	802									22.8	23.3	54	6
North Lake	Herkimer											18.4	44	*b*
Lowville	Lewis	900										20 2	50	13
Number Four	"	1571	30.12	30.68	27	29 51	9	1.17				18.5	46	13
Atlantic Coast												30 4	58	13
Brooklyn	Kings	107										31.7	53	*c*
Manhattan Beach	"											30.4	54	14.

for December, 1896.

ture—(In Degrees Fahr.)								Sky.			Precipitation—(Inches).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	†Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
-11	27	57	14	42	28	3	*z*	8.6	9.3	13.1	7.3	1.39	0.91	21.00	9	......	......
—6	27	60	14	31	27	3	11	4	11	16	13	1.64	0.70	......	8–9	12.4	S.
—7	28	60	15	42	28	5	1	6	12	13	7	1.23	0.50	......	9	6 0	......
—4	*g*	59	16	38	28	6	18	7	6	18	6	1.38	0.70	......	9	6.0	W.
—7	27	62	17	40	28	8	*aa*	7	16	8	8	1.40	0.57	......	9	5.9	W.
-11	27	63	14	42	28	3	18	8	5	18	13	1.61	0.91	21 00	9	9.3	W.
4	24	52	15	31	28	5	22	2	13	16	7	1.62	0 62	......	8	10.8	S. W.
8	24	44	9	20	28	4	*ab*	....	....	....	......	......	......	......	......	......	......
0	24	54	12	27	28	5	*ac*	6	8	17	10	2.63	0.83	......	10	18.0	S. W.
—1	28	61	13	32	28	5	7	18	1	12	3	0.61	0 38	......	8	......	N. W.
—5	26	60	15	38	26	3	*ad*	6	12	13	3	0.79	0.72	......	9	......	......
....	....	....	....	....	....	....	....	9	6	16	5	1.50	0.60	9.00	8–9	8.0	N.
7	24	47	12	22	28	4	30	15	7	9	7	1.35	0.48	19.00	9–10	4.4	W.
—2	27	64	16	32	27	6	11	8	16	7	7	1.42	0.40	.....	23	7.5	S. W.
—4	28	61	16	36	28	6	1	16	5	10	6	0 88	0.49	17.00	8–9	5.7	W.
—5	27	61	18	33	27	7	16	14	1	16	4	1 14	0.65	......	8	4.2	W.
—1	3	52	12	26	*q*	6	*ae*	3	10	18	10	1 66	0.88	24.00	8–9	9.8	......
-15	28	64	16	50	29	3	*af*	8.5	11 3	11 3	6.5	1.34	1.00	22.00	*ee*	......	......
—6	*h*	64	16	35	28	6	2	10	11	10	8	1.20	0.52	23.00	8–9	6.3	N W.
—7	28	63	20	37	28	4	19	4	7	20	10	0.77	0.28	......	9	......	W.
-11	27	64	20	37	28	10	*ag*	6	13	12	9	1.72	0 65	......	9	6.2	N. W.
—9	27	65	16	32	27	5	31	12	8	11	11	2.32	0 57	......	9	......	N.
-11	27	63	19	50	29	8	2	....	....	..	3	1.37	1.00	......	10	......	......
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	......
—8	28	62	16	34	28	4	19	18	11	2	6	1.14	0.50	17.00	22–23	7.5	N. W.
—7	*h*	60	13	35	28	3	9	12	6	13	5	1.21	0 53	.....	9	3.5	S.
-15	28	80	19	42	28	5	16	9	8	14	5	0.95	0.57	......	9	8.0	S.
—5	*j*	60	16	35	28	6	16	....	....	....	4	0.96	0 42	.....	8	......	......
—8	27	62	16	29	13	3	7	6	10	15	7	1.40	0 48	......	9	8.0	S. W.
—6	27	60	17	32	28	7	11	7	17	7	6	1 43	0 74	14.09	8–9	6.5	S.
-10	28	79	20	47	28	6	16	5	17	10	6	1.01	0.62	16.00	8–9	5.3	N. W.
o	*g*	51	14	31	27	5	16	4	16	11	4	1.90	1.00	22 00	22–23	9.5	S. W.
-20	*k*	64	17	48	*r*	2	*ah*	8.8	6.0	16.2	8.2	1 97	1.10	......	8	......	......
-20	26	66	19	48	*r*	4	9	8	7	16	6	1.44	0 74		8	14.8	W.
—9	28	63	15	31	29	4	10	13	2	16	9	1.67	0 78	.10	9	7.1	S. W.
-20	22	64	17	40	22	2	*ah*	10	6	15	8	2.70	1.10	......	8	16.0	N.
-18	24	68	17	35	27	4	10	6	11	14	9	1.46	0 60	......	9	14 0	W.
-15	24	61	17	33	28	4	*lb*	7	4	20	9	2.59	0.85	......	8	17.4	S.
-12	28	55	16	46	28	1	23	15.3	7.9	7 8	4.6	1 71	1 20	22.04	16	......	......
+6	28	47	11	22	29	4	15	13	11	7	5	1.70	0.87	20.00	16	12.0	W.
+6	24	48	12	19	*s*	4	3	20	1	10	6	1 46	0.60	......	23	12 0	N. E.

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date
Atlan. Coast (Con)														
New York City	New York	314	30.18	30 93	28	29.55	9	1.38	74			32 0	55	13
Willet's Point	Queens											31.6	57	14
Brentwood	Suffolk	75									29.6	28.6	53	9
Setauket	Suffolk	40							68	23	32.4	32 8	56	9
Bedford	Westchester	290										28 5	58	13
Primrose	"											28.2	54	13
Hudson Valley												25.3	53	14
Albany	Albany	85	30 20	30.96	27	29.44	9	1.52	82	20		26.0	50	6
Lebanon Springs	Columbia	930										23.6	48	*d*
Honeymead Brook	Dutchess	450									24 4	24.2	49	*e*
Poughkeepsie	"	180										23.2	52	13
Wappinger's Falls	Dutchess											25.6	50	6
Catskill	Greene										26.4	26.6	49	13
West Point	Orange	167										27.6	53	14
Carmel	Putnam	500										25.8	51	13
Mohawk Valley												24.1	48	13
St. Johnsville	Montgomery	810										24.1	48	13
Rome	Oneida	445										22 2	50	12
Champlain Valley												21.8	50	7
Plattsburgh B'ks.	Clinton	125										19.2	50	7
Glens Falls	Warren	340									22.4	22 4	46	6
Lake George	"								84	20	22 5	23.8	48	6
St. Lawrence Val.												21.8	51	13
Madison Barracks	Jefferson	266										22.2	50	13
Watertown	"	486										23 0	51	13
Canton	St. Lawrence.	304									20.2	19.8	49	*f*
Massena	St Lawrence.													
North Hammond.	"	300									21.8	22.8	50	13
Ogdensburg	"	258										22.9	50	12
Potsdam	"	300									19.8	20.2	49	13
Great Lakes												28 9	58	12
Dunkirk	Chautauqua	590												
Westfield	"											31.9	57	12
Buffalo	Erie	690	30.19	30.83	27	29.60	9	1.23	77	23		30.0	57	12
Pittsford	Monroe										29.6	29.0	55	12
Rochester	"	621	30.17	30 84	27	29.53	9	1.31	72	21		29.0	55	12
Appleton	Niagara											29.6	53	12
Fort Niagara	Niagara	263										31.0	56	12
Baldwinsville	Onondaga	390									26.7	26.3	56	13
Oswego	Oswego	304	30.18	30.91	27	29.54	9	1.37	79	20		27.0	53	13
Palermo	Oswego	460									24.0	23.6	49	13
Lyons	Wayne	407									29.5	29 0	55	13
Erie, Pa	Erie	681	30.19	30.80	27	29.64	13	1.16	80	26		32 0	58	12

FOR DECEMBER, 1896 — (*Continued*).

TURE — (IN DEGREES FAHR.).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range.	Date.	Least daily range.	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest rainfall.	† Duration. h. m.	Date.	Total snow fall.	Prevailing direction of wind.
5	24	50	13	20	25	5	2	13	8	10	4	1.70	0 88	......	16	12.6	S. W.
6	23	51	17	29	23	7	19	....	....	....	5	0.90	0.36	......	8	..	N. E.
—9	25	62	23	40	28	8	*bc*	18	5	8	4	2.70	1.20	22.00	16	17.0	N. W.
8	24	48	13	21	*t*	4	2	17	7	7	5	1.62	0.52	2.45	15	11.0	W
-12	28	70	21	46	28	8	2	18	9	4	5	2 18	0 90	21.25	22–23	17.7	N. W.
—9	28	63	19	39	28	4	2	8	14	9	3	1.47	0.70	......	16	14 0	....
-20	25	60	17	44	25	5	16	11.3	10.7	9.0	4 5	1.47	0.94	......	23	......	....
—7	28	57	14	30	29	5	16	6	13	12	3	0.73	0 50	......	23	5.0	S.
-11	28	59	18	37	*h*	9	*bd*	8	10	13	4	0.91	0.50	21.30	9	7.5	N. W.
-11	25	60	16	34	*u*	6	2	9	13	9	5	1.47	0.90	17.00	8–9	5.7	S. W.
—8	29	60	18	35	29	6	2	14	10	7	5	1.67	0.68	......	8	6.5	N.
-20	25	70	20	44	25	8	*bd*	13	12	6	6	1.93	0.94	......	23	12.5	S. W.
—9	28	58	16	28	*v*	6	16	9	13	9	2	1.35	0.70	16.00	9	6.5	N. W.
—2	28	55	16	29	*w*	8	*be*	...	....	....	5	1.63	0.65	......	17	10.7	S W..
—7	28	58	16	29	*x*	6	*bf*	20	4	7	6	2.10	0.69	14.00	16	13 0	....
-10	28	58	15	29	29	6	*bg*	8 0	15.0	8.0	11.0	1 19	0.57	......	9	......	....
-10	28	58	15	29	29	6	*bg*	8	15	8	11	1.19	0.57	......	9	5.5	W.
-10	23	60	17	22	26	6	30	....	....	....	9	2.52	1.21	......	8	......	....
—6	24	53	15	35	27	5	*bh*	13.5	4.5	13.0	3.0	1.07	0.90	......	9	......	....
—5	24	55	15	35	27	5	*cc*	....	....	...	3	0.87	0.81	......	9	T.	W.
—6	*l*	52	15	27	31	7	2	14	4	13	3	1.29	0.90	......	9	1.5	N. E.
—4	*m*	52	15	26	31	5	7	13	5	13	3	1.06	0.83	13.30	9	1.5	S. W.
-17	*g*	61	16	38		2	17	5 8	13.4	11.8	6.5	1.13	0.93	......	10	......	....
-10	24	60	16	38	27	2	17	....	....	....	6	1.61	0.76	8.30	14	4.7	W.
-10	24	61	16	34	27	5	23	3	25	3	9	1.48	0.93	......	10	2.4	S. W.
-17	*g*	66	18	38	28	6	*cd*	8	11	12	6	0.80	0.20	12.00	20	8.0	S. W.
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
—8	*n*	58	14	30	19	4	*ce*	0	6	25	7	1.02	0.56	......	9	4.7	N.
-12	24	62	18	33	26	7	*cf*	14	12	5	8	1.06	0.40	9.00	9	9.3	S. W.
-12	24	61	16	32	18	5	*cg*	4	13	14	3	0.83	0.40	......	18	6.0	S. W.
-10	27	50	12	35	26	2	19	4.5	7.5	19.0	10.4	1.69	0.86	......	8	......	....
....	....	....	....	....	....	....	....	....	....	....	......	......	......	......	......	......	....
9	27	48	14	32	29	2	19	7	5	19	6	1.36	0.62	......	20	13.5	S. W.
8	24	49	11	24	28	3	30	0	9	22	11	0.84	0.23	......	8	......	W.
3	28	52	13	32	28	5	*ch*	3	12	16	8	2.04	0.74	......	23	10.0	W.
8	24	47	12	25	28	4	19	4	5	22	15	2.21	0.72	......	23	13 9	S. W.
8	*j*	45	11	25	28	4	15	1	9	21	11	1.11	0.36	......	8–9	11.0	S. W.
10	24	46	11	29	28	4	15	....	....	....	4	0 56	0.27	......	8	1.0	N. E.
—3	26	59	15	35	26	5	7	13	2	16	8	1.72	0.86	......	8	3.3	....
—1	24	54	13	23	26	6	11	3	7	21	19	3.16	0.70	......	9	19.6	S. E.
-10	27	59	14	27	*y*	4	7	7	7	17	12	2.36	0.60	19.00	9	11.8	S. W
4	27	51	11	23	28	4	7	5	10	16	10	1.64	0.70	......	8	7.5	N. W
14	23	44	9	21	28	3	7	2	9	20	11	1.56	0.44	......	8	......	S. W

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						HUMIDITY		TEMPERA			
STATION.	COUNTY.	Elevation, feet.	Mean.	Highest.	Date.	Lowest.	Date.	Monthly range.	Mean relative.	Dew point (degrees).	Mean of tri-daily observations.	Mean of maximum and minimum.	Highest.	Date.
Central Lakes	....	....	......	......	..	......	..	....	....	.....	....	27.9	59	13
Fleming	Cayuga	1000	......	......	..	......	..	....	....	.....	27.4	27.4	59	13
Romulus	Seneca	719	......	......	..	......	..	...	76	19	....	28.6	58	13
Ithaca	Tompkins....	810	30.18	30.90	27	29.55	9	1.35	75	21	27.7	27.7	58	13
Mean	....	....	30.18	30.96	27	29.44	9	1.30	76	21	....	25.3	69	6

* Mean of the tri daily observations. ‡ Mean of the maximum and minimum by the Draper the tri-daily observations are derived by the formula (7 a. m. + 2 p. m. + 9 p. m. + 9 p. m.) — 4. four hours. (1) Voluntary observer. (2) U. S. weather bureau.

(*a*) 12, 13; (*b*) 7, 14; (*c*) 7, 13; (*d*) 6, 13, 14; (*e*) 6, 13; (*f*) 5, 13; (*g*) 24, 27; (*h*) 27, 28; (*j*) 24, 28; 28; (*u*) 25, 28; (*v*) 14, 28; (*w*) 6, 27; (*x*) 28, 29; (*y*) 3, 28; (*z*) 6, 11, 18, 22; (*aa*) 11, 19; (*ab*) 7, 15, 16; (*bd*) 2, 16; (*be*) 3, 23; (*bf*) 2, 9; (*bg*) 9, 10, 16; (*bh*) 7, 12, 17; (*cc*) 12, 17; (*cd*) 9, 10, 11, 30; (*ce*) 5, 9, 10,

FOR DECEMBER, 1896 — (*Concluded*).

TURE — (IN DEGREES FAHR.).								SKY.			PRECIPITATION — (INCHES).						
Lowest.	Date.	Monthly range.	Mean daily range.	Greatest daily range	Date.	Least daily range	Date.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total.	Greatest.	† Duration.	Date.	Total snowfall.	Prevailing direction of wind.
														h. m.			
—3	27	60	14	32	28	5	11	6.3	13.0	11.7	4.3	1.16	0.96	......	9	....	....
0	*h*	59	14	32	28	5	11	6	17	8	1	0.40	0.40	......	23	4.0	N. W.
—2	27	60	15	29	27	7	11	8	12	11	3	2 08	0.96	......	9	5.0	S.
—3	27	61	13	26	28	5	*ck*	5	10	16	9	1.00	0.64	17.00	8-9	3.6	S E.
-20	*p*	58	15	50	29	1	23	9.1	9 8	12.1	6.6	1.41	1.20	22.00	16	8.6	S. W.

thermograph. ‖ Report received too late to be used in computing means. The means from
† Blank indicates that the duration is not shown in the original records, but is within twenty-

(*k*) 22, 26; (*l*) 24, 25; (*m*) 25, 27; (*n*) 21, 22, 24; (*p*) 22, 25, 26; (*q*) 17, 28; (*r*) 26, 28; (*s*) 5, 8, 9; (*t*) 4, (*ac*) 1, 25, 30; (*ad*) 6, 22; (*ae*) 1, 11, 15; (*af*) 7, 9; (*ag*) 2, 8; (*ah*) 28, 31; (*bb*) 10, 11, 30; (*bc*) 15, 16; 30; (*cf*) 10, 30; (*cg*) 5, 30; (*ch*) 2, 14; (*ck*) 7, 11; (*ee*) 10, 22, 23.

TEMPERATURE — DECEMBER, 1896, SHOWING DAILY MEANS FOR

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	18	15	16	23	35	43	36	38	37	39	37	42	44	32
Alfred	18	21	22	29	41	51	39	42	44	43	36	52	54	35
	12	0	0	11	24	34	32	33	32	33	33	32	35	22
Angelica	18	20	24	33	43	51	40	44	43	43	42	53	52	38
	13	—4	—2	12	27	30	30	32	33	33	32	32	38	24
Bolivar	23	22	26	32	45	53	44	45	39	44	42	55	55	34
	13	12	3	10	28	29	29	33	31	31	33	29	26	25
Friendship	23	24	27	34	45	53	44	44	4[illegible]	44	41	55	55	43
	13	8	2	10	27	30	29	34	32	35	33	33	35	22
Franklinville	19	22	24	32	42	50	40	40	44	45	43	44	52	40
	12	9	—9	4	29	40	36	34	32	32	33	34	37	27
Humphrey	22	27	32	30	42	54	43	41	41	46	39	55	56	35
	11	11	5	13	22	37	33	33	30	34	32	32	34	24
Arkwright	....	....	....	....		....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	20	23	36	34	44	49	....	....	....	....	....	....	51	37
	15	15	12	17	31	31	....	....	....	....	....	....	37	30
Elmira	25	23	29	31	41	59	40	45	43	49	42	54	60	35
	18	14	9	14	27	37	35	33	37	38	35	34	42	28
Avon	25	25	28	32	34	41	40	42	40	43	45	55	53	50
	13	8	10	25	28	38	30	32	30	30	31	32	37	33
Mount Morris	....	....	....	....	....	....		....	....	....	....	....	....	....
	....	....	....	....	....	....		....	....	....	....	....	....	....
Lockport	25	29	31	36	47	49	40	44	40	45	45	54	47	38
	14	12	15	20	32	35	32	32	34	36	35	35	34	26
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wedgewood	22	21	30	30	39	62	39	40	42	40	38	50	60	38
	12	6	5	13	24	33	32	30	31	32	32	30	36	18
Addison	24	22	28	32	43	56	43	43	45	47	42	53	57	38
	18	10	8	12	28	35	31	33	36	37	34	27	30	28
South Canisteo	24	21	28	32	46	54	41	42	46	47	42	56	56	39
	13	2	0	9	24	32	29	32	32	32	30	30	32	22
Arcade	18	21	21	32	42	46	41	41	40	42	38	51	49	34
	12	4	—1	13	30	36	34	34	31	23	32	32	34	22
Eastern Plateau	20	16	17	21	33	43	36	36	40	37	35	38	44	34
Binghamton (1)	23	21	25	31	39	55	42	45	49	45	40	50	58	42
	13	15	9	12	27	35	29	31	34	33	32	32	36	25
Binghamton (2)	22	19	27	34	41	54	43	47	50	45	39	52	56	40
	15	14	10	11	30	36	32	32	34	33	33	31	39	22
Oxford	24	20	27	30	40	50	39	40	45	41	39	48	53	47
	13	10	5	8	25	30	27	30	32	26	25	23	27	20
Cortland	20	20	26	29	39	54	44	38	46	40	39	53	56	55
	14	11	6	12	28	37	32	31	33	33	30	29	38	29
Bloomville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright	21	17	....	29	40	49	44	44	42	38	39	45	52	46
	12	9	....	6	25	32	26	25	31	26	25	25	37	21
Brookfield	....	....	....	....	....	....	....	....	....	....	....		....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	26	24	27	34	42	48	49	41	45	45	41	48	54	43
	16	14	13	9	22	25	25	28	35	38	32	24	28	32
Cooperstown	23	18	22	30	38	49	38	38	38	38	35	44	53	40
	17	11	5	14	30	35	32	30	35	30	30	30	35	22
New Lisbon	24	19	25	30	38	52	42	40	65	37	37	48	54	41
	14	10	2	7	28	33	29	26	31	27	27	24	25	17
Oneonta	31	24	28	35	43	53	45	46	50	42	41	51	55	45
	19	15	10	14	32	38	33	31	35	34	32	30	39	25
Perry City	23	22	25	30	40	53	35	41	45	43	39	49	54	38
	15	8	3	10	23	32	32	30	31	29	26	27	25	18
Strait's Corners	25	23	26	29	37	51	35	40	44	44	39	48	54	37
	14	11	6	10	11	27	20	32	33	32	32	25	29	24
Waverly	27	25	33	33	41	69	46	44	47	50	42	53	61	43
	17	9	6	9	25	35	32	34	35	38	35	27	35	25
Mohonk Lake	27	19	32	28	42	42	45	35	42	42	40	41	51	49
	18	8	8	19	32	35	34	27	36	36	31	32	33	30

THE REGIONS, AND DAILY MAXIMA AND MINIMA FOR THE STATIONS.

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
25	23	25	32	25	25	22	19	14	10	18	22	12	19	33	38	35	27.4
24	24	35	34	27	25	24	21	20	13	22	27	26	35	39	40	42	25.5
17	15	14	27	16	15	16	15	4	0	10	11	—6	5	29	34	24	
28	25	35	36	24	28	29	22	20	13	23	29	23	35	39	41	40	25.7
20	14	9	24	18	18	17	14	5	—2	10	11	–6	—7	28	34	25	
30	28	37	36	34	30	32	29	15	16	23	29	23	36	39	41	43	26 8
20	16	10	30	19	14	18	15	6	—4	13	15	—4	—2	23	33	26	
29	27	40	38	28	32	28	28	26	16	25	30	23	37	44	44	44	27.4
20	16	12	26	20	19	11	10	5	—5	15	17	—7	—3	19	35	26	
24	25	36	35	33	27	26	24	22	10	20	23	27	39	38	40	46	26.6
19	16	11	32	19	19	19	16	7	2	5	15	-11	—3	29	34	34	
26	31	41	43	28	35	27	22	21	18	20	28	30	44	37	40	50	28.2
20	13	16	23	19	19	19	17	5	4	13	16	7	13	30	33	31	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	28.8
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
34	30	38	37	29	27	26	26	26	17	21	29	31	37	37	39	45	26 6
28	22	15	28	20	20	17	18	9	0	16	17	7	10	31	34	34	
31	30	36	41	40	35	27	25	16	31	30	33	15	31	42	46	49	30.0
21	20	19	32	20	26	19	14	10	7	20	24	5	—1	26	37	28	
49	49	31	36	34	30	22	12	12	19	25	33	29	32	40	44	43	27.8
32	30	10	26	19	18	13	9	6	11	8	—5	—1	0	19	34	25	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
29	29	38	39	32	36	28	30	23	19	32	36	26	35	39	40	40	30.3
21	20	18	31	23	22	20	18	15	7	20	26	12	13	34	36	27	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
29	23	39	34	27	34	24	22	22	15	33	30	30	32	42	44	41	26.4
15	16	15	25	16	17	16	7	6	2	5	13	—2	6	22	34	20	
31	34	49	38	32	33	29	26	23	19	27	33	26	32	43	45	44	28 8
22	25	15	28	22	23	19	15	9	3	6	18	—2	—4	22	34	27	
30	24	36	38	31	32	29	26	21	19	26	31	28	35	43	46	44	27.1
15	17	9	29	18	16	18	12	7	2	10	15	—5	3	25	32	25	
24	23	37	35	25	27	27	25	20	12	22	28	22	35	39	40	37	25 8
18	15	11	25	17	20	17	14	5	3	11	13	2	9	30	28	25	
24	21	24	29	25	22	21	16	14	6	16	20	8	12	25	37	34	25.9
34	26	38	35	35	30	28	24	22	14	24	31	22	29	38	43	41	26.9
18	19	15	27	20	17	15	6	6	2	7	8	—6	—6	17	33	27	
32	25	36	36	23	30	28	24	21	10	25	31	16	30	38	42	41	27.0
19	18	17	24	19	18	12	9	4	4	10	17	0	—7	19	35	24	
32	29	35	33	33	32	30	25	23	16	27	30	18	27	35	40	38	24.0
15	12	9	19	15	10	9	5	2	—2	6	5	-11	-10	5	27	22	
34	31	34	34	34	29	29	23	23	14	22	30	23	23	32	40	36	26.2
16	14	12	27	19	16	13	2	7	2	6	8	—9	—4	15	28	31	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
27	25	31	37	32	26	28	24	20	8	25	28	28	29	40	41	40	23.6
14	9	8	16	12	11	9	4	6	—7	4	11	-11	-10	-10	30	23	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
28	33	38	36	28	32	32	27	28	17	28	33	22	26	35	42	45	27.4
19	23	18	18	24	20	12	16	19	3	3	9	5	—8	7	32	35	
23	22	29	35	31	25	25	22	17	11	25	27	13	28	37	40	40	24 0
15	18	14	20	16	10	11	7	—2	—6	11	13	—7	—7	17	34	25	
28	22	33	35	32	28	26	20	18	9	23	28	15	27	35	39	39	23.0
13	17	8	17	13	6	9	4	—4	-13	8	4	-13	-15	5	30	25	
32	27	36	40	37	31	32	28	24	15	28	32	21	32	42	44	44	28.5
17	21	18	22	18	15	20	14	7	—5	10	17	— 3	—5	18	33	27	
30	23	32	35	30	31	23	25	22	8	28	32	17	32	41	42	42	25.4
14	15	12	25	16	16	11	6	6	—2	8	14	—8	15	20	31	23	
31	28	33	33	33	32	29	22	22	22	27	29	17	27	37	41	41	25.0
16	12	15	25	18	18	12	8	8	6	5	9	—6	—5	13	33	26	
38	26	45	38	35	33	31	25	25	25	33	31	27	37	42	44	48	28 6
17	20	13	25	20	20	16	10	10	—6	—4	8	—5	10	18	34	28	
32	23	32	32	34	30	34	21	19	17	31	29	31	30	41	46	49	27.2
17	18	15	20	19	18	19	11	5	0	6	14	0	5	16	34	24	

DAILY MEANS FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Northern Plateau	16	7	8	17	29	38	33	28	32	32	30	32	35	26
Saranac Lake	18	14	20	31	41	46	33	33	32	32	32	41	42	25
	—3	—3	3	13	31	30	14	19	28	26	21	22	18	2
Gloversville	23	22	24	30	36	54	43	33	39	37	41	44	50	40
	17	9	3	16	25	31	33	25	32	33	31	27	27	24
North Lake	23	19	15	17	30	36	44	34	39	32	33	30	35	44
	12	—1	—6	0	5	30	28	22	25	29	25	20	21	22
Lowville	23	15	22	27	36	43	39	35	36	37	34	43	50	41
	15	-15	-11	7	25	33	28	18	29	33	26	30	32	20
Number Four	18	16	16	26	34	42	43	35	35	33	31	40	46	35
	12	—7	—1	2	24	34	25	23	27	29	27	27	35	12
Atlantic Coast	26	22	22	25	35	40	43	40	46	44	40	39	44	41
Brooklyn	31	25	27	38	42	47	53	47	49	50	46	48	53	46
	23	13	13	20	30	34	39	34	43	42	38	34	40	38
Manhattan Beach	31	29	22	26	41	43	49	53	51	50	52	46	48	54
	23	20	18	18	22	32	40	34	34	42	38	36	38	38
New York City	33	24	30	39	45	49	54	49	51	54	45	48	55	48
	22	19	18	23	29	38	40	36	41	42	36	34	40	35
Willet's Point	33	29	28	38	48	50	51	52	50	51	46	50	49	57
	22	20	16	17	29	36	32	32	42	36	30	32	30	29
Brentwood	33	32	28	38	48	49	51	51	53	52	47	51	51	50
	15	21	6	3	20	22	30	25	43	27	26	20	35	31
Setauket	31	26	29	39	45	52	52	50	56	49	47	49	55	48
	26	22	20	18	31	35	36	35	44	35	39	31	41	38
Bedford	32	22	31	38	46	54	54	46	50	49	50	50	58	49
	16	14	14	7	21	28	26	26	41	31	32	22	34	30
Primrose	32	23	27	36	45	49	53	42	50	50	46	49	54	48
	14	19	17	9	21	22	26	26	41	41	29	21	27	15
Hudson Valley	24	21	17	22	33	37	37	34	41	41	36	36	40	37
Albany	29	23	25	34	43	50	48	40	46	44	41	44	48	44
	21	14	10	18	33	37	36	30	38	36	34	30	34	24
Lebanon Springs	27	19	19	30	40	48	42	39	47	47	40	42	48	48
	10	10	4	6	25	25	28	24	34	34	26	23	30	26
Honeymead Brook	31	19	24	34	41	49	45	39	47	46	40	44	49	41
	15	13	9	8	22	29	26	25	36	35	27	25	33	28
Poughkeepsie	32	22	27	34	45	32	47	39	48	48	45	49	52	46
	20	16	10	9	24	25	25	27	35	30	26	22	31	25
Wappinger's Falls	32	24	25	35	40	50	45	40	48	48	45	47	49	45
	20	16	12	12	27	26	25	28	32	35	28	25	28	26
Catskill	35	27	24	33	45	43	46	37	46	45	47	45	49	46
	19	16	11	11	27	33	32	27	35	37	33	26	34	28
West Point	32	29	22	25	35	51	47	45	48	50	45	43	46	53
	20	18	14	14	14	22	29	29	30	41	33	27	28	36
Carmel	27	21	24	34	44	48	46	42	46	47	43	48	51	44
	16	15	12	9	23	25	26	29	40	36	25	38	33	30
Mohawk Valley	22	17	14	24	33	41	38	34	36	35	33	36	37	38
St. Johnsville	28	23	24	32	37	50	43	39	39	38	39	43	48	45
	16	11	4	16	29	32	34	30	33	22	27	29	26	30
Rome	37	20	25	35	42	48	40	40	44	40	45	50	48	31
	8	5	9	18	21	31	28	20	33	30	30	28	28	10
Champlain Valley	23	13	13	20	31	38	38	32	34	36	33	34	35	34
Plattsb'gh Bar'a'ks	31	24	10	26	38	41	50	35	35	38	37	33	39	48
	16	3	3	5	14	34	30	22	20	30	28	28	24	25
Glens Falls	26	16	33	30	38	46	40	36	42	41	38	41	43	43
	15	9	4	11	26	29	32	27	32	33	28	29	26	20
Lake George	34	18	24	31	38	48	39	38	45	41	38	43	44	45
	16	8	4	15	29	33	34	31	31	31	28	32	31	22
St. Lawrence Val'y	19	11	16	25	36	38	34	30	34	34	34	38	42	28
Madison Barracks	26	22	24	29	38	46	46	35	38	38	40	39	50	49
	19	4	7	14	20	34	32	21	31	32	28	30	36	22
Watertown	23	21	23	30	46	46	40	38	42	39	46	48	51	40
	16	2	5	8	24	25	28	22	30	29	26	26	30	17
Canton	25	13	24	33	49	45	38	38	35	36	35	44	49	39
	6	0	6	9	34	29	20	20	29	30	29	32	35	14

MAXIMA AND MINIMA FOR THE STATIONS.—(*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
17	16	17	23	17	11	11	4	2	-4	7	15	2	12	27	33	24	19.3
19	20	29	35	9	14	11	11	10	7	21	28	14	32	35	39	25	
4	-2	0	8	2	2	-5	-5	-12	-12	2	-20	-18	-16	30	19	0	16.1
27	27	32	32	33	26	24	17	18	10	22	29	13	20	35	40	41	
14	18	9	16	11	11	12	6	0	-8	6	13	-6	-9	4	34	19	23.3
29	31	24	31	30	12	20	20	15	16	5	18	25	30	33	35	26	
9	9	9	11	7	1	8	-20	-19	-16	-15	1	-12	28	30	27	24	18.4
20	20	32	32	33	20	19	11	9	0	21	30	22	25	37	40	40	
10	9	7	18	9	2	5	-9	-4	-18	-6	20	-13	-9	14	32	20	20.2
26	18	30	32	30	21	18	14	11	-1	18	27	13	28	32	36	37	
8	8	1	16	6	0	1	-10	-7	-15	-6	5	-14	-5	16	32	13	18.5
31	26	29	31	30	23	26	26	21	15	19	25	19	16	25	35	40	30.4
33	30	34	42	32	32	33	31	26	20	29	32	20	27	36	42	45	31 7
29	21	23	25	27	24	22	24	19	7	12	20	14	6	14	33	30	
42	32	30	31	42	32	32	35	31	23	20	31	32	19	29	36	48	
28	20	22	22	26	24	22	20	22	6	8	18	14	10	12	24	34	30.4
35	30	36	44	34	32	38	34	29	20	32	32	29	29	34	42	47	
26	20	22	28	23	24	22	24	9	5	12	18	10	10	19	33	34	32.0
38	31	42	36	30	35	38	37	35	34	38	36	31	33	38	36	46	
24	16	29	24	23	19	21	22	6	8	15	15	11	10	21	20	26	31.6
35	32	34	44	....	34	38	35	29	19	29	34	33	32	40	48	49	
27	24	21	16	....	12	1	12	15	0	-9	16	-3	-8	4	31	30	28.6
38	33	33	45	39	31	34	32	30	17	29	34	34	30	39	43	44	
28	25	25	27	25	23	21	22	17	8	12	20	16	9	22	34	36	32.8
30	28	34	40	36	37	39	27	24	18	33	37	31	34	37	42	50	
21	18	20	15	21	15	7	12	14	0	2	15	3	-12	10	27	30	28.5
32	30	34	42	33	34	35	32	28	20	32	36	20	30	38	44	46	
22	20	24	14	26	15	7	13	19	4	10	11	10	-9	3	30	29	28.2
24	21	23	37	37	23	23	17	16	5	10	20	11	8	19	31	34	25 3
26	22	32	38	39	31	24	20	18	12	24	34	16	17	34	44	44	
18	17	16	19	14	15	18	11	4	-2	6	12	-2	-7	4	30	20	26.0
29	25	26	36	35	25	30	22	20	10	24	28	28	26	29	40	41	
10	16	14	12	14	10	11	4	10	-7	-4	-3	-9	-11	8	30	26	23.6
27	24	28	32	29	28	30	23	19	8	23	33	9	24	35	41	41	
16	15	14	16	16	14	13	6	7	-3	-11	13	-5	-10	18	22	23	24.2
29	25	33	37	36	33	35	24	21	19	27	24	22	33	27	21	42	
18	18	15	17	20	15	13	11	13	-3	-7	11	13	14	-8	-1	22	23.2
31	26	32	36	35	35	36	26	22	12	24	35	33	26	37	45	43	
18	18	16	18	22	18	18	6	10	-12	-20	2	-10	-16	4	29	24	25.6
29	25	30	38	36	34	32	26	29	15	21	35	25	19	30	40	47	
19	19	16	19	19	17	17	10	8	-3	0	8	-1	-9	5	28	25	26 6
44	33	28	31	38	30	31	33	26	26	21	29	35	26	26	36	46	
20	18	19	20	24	21	15	15	18	1	3	15	6	-2	9	18	31	27.6
30	21	31	42	31	30	31	28	20	14	25	30	12	22	36	42	44	
20	14	16	18	16	14	8	10	10	-1	-2	9	2	-7	7	25	31	25.8
24	22	21	26	25	17	20	15	12	2	10	22	4	2	16	34	34	24.1
33	25	29	33	34	24	25	26	21	12	20	29	18	14	31	37	39	
16	19	13	19	16	10	16	4	4	-7	0	15	-9	-10	2	30	30	24.1
26	25	27	30	20	25	25	23	13	10	25	28	10	20	35	34	31	
13	10	12	15	7	10	10	5	-10	-3	10	-5	-4	0	15	28	15	22.2
19	17	16	23	22	16	13	10	7	2	6	20	6	5	18	33	31	21.8
27	14	13	25	36	16	14	8	9	4	8	28	31	7	25	35	44	
9	8	8	8	10	5	0	-1	-2	-5	-4	5	-4	-4	2	23	24	19.2
24	24	25	36	32	26	20	17	16	6	19	30	16	16	31	39	43	
15	16	10	14	11	10	12	8	3	-6	-6	16	-4	-5	5	27	16	22.4
25	22	27	35	35	28	20	19	15	16	20	30	15	19	29	44	43	
16	16	12	17	10	9	14	9	3	-4	-4	14	-4	-4	13	28	17	23.8
16	18	17	28	22	13	6	1	1	-4	12	19	4	15	29	35	27	21.8
30	23	10	35	38	23	22	9	11	9	11	32	30	23	35	37	40	
10	8	8	10	15	5	4	-3	-3	-10	-9	9	-8	6	11	33	22	22 2
21	32	34	30	28	18	18	19	5	5	28	36	26	28	38	40	40	
9	18	22	22	8	10	5	-5	0	-10	5	8	-8	20	28	22	18	23.0
23	20	21	40	34	15	9	8	4	2	26	34	7	29	36	40	36	
9	9	4	20	8	-1	-10	-11	-13	-17	2	1	-17	-9	26	34	12	19.8

DAILY MEAN FOR THE REGIONS, AND DAILY

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
St. Law. Val. (Con.)														
Massena	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	----	----	----	----	----	----	----	----	----	----	----	----	----	----
North Hammond	26	20	24	36	40	48	38	36	36	38	38	46	50	34
	20	10	10	18	36	36	32	28	32	34	32	32	34	16
Ogdensburg	31	26	24	33	40	49	45	42	48	40	40	50	49	40
	8	4	10	15	30	28	28	25	30	33	30	33	34	13
Potsdam	20	10	34	40	37	44	36	37	35	34	36	41	49	39
	9	−4	3	30	32	25	24	21	22	28	29	32	36	12
Great Lakes	20	19	22	28	39	42	36	36	38	40	39	45	44	32
Dunkirk	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Westfield	25	25	30	36	45	48	41	45	45	48	42	57	56	40
	15	17	18	19	33	32	33	34	35	37	36	36	38	26
Buffalo	22	32	30	38	48	47	38	43	43	46	45	57	51	35
	14	15	16	23	33	38	34	34	34	38	36	40	35	24
Pittsford	25	22	29	35	45	50	45	42	42	45	42	55	53	42
	14	17	14	20	32	35	32	33	32	36	35	33	35	37
Rochester	24	24	29	35	46	48	39	43	42	44	42	55	51	35
	15	15	16	18	34	36	33	34	34	36	36	36	35	25
Appleton	24	26	29	36	40	46	39	42	41	45	43	53	47	40
	16	13	13	20	32	39	33	33	36	38	35	32	37	26
Fort Niagara	28	28	32	37	49	48	40	42	41	44	45	56	50	40
	14	14	20	22	40	38	30	34	34	37	37	36	38	26
Baldwinsville	42	24	28	35	45	52	38	40	40	43	39	51	56	41
	14	13	15	22	36	33	33	33	33	32	32	33	31	19
Oswego	24	20	28	33	40	48	40	40	42	42	40	48	53	38
	15	8	12	20	33	40	32	32	34	35	34	34	38	21
Palermo	22	18	26	30	37	42	36	38	39	37	45	49	45	40
	16	2	−1	16	29	35	32	31	34	32	31	37	31	20
Lyons	25	25	30	35	44	52	38	42	43	44	43	52	55	38
	17	14	18	22	32	36	34	35	33	38	34	35	38	21
Erie, Pennsylvania.	22	24	28	37	47	48	40	42	40	49	42	58	52	37
	17	17	20	19	30	40	37	37	34	36	38	42	37	28
Central Lakes	21	19	18	23	34	47	40	37	39	38	37	43	46	33
Fleming	26	22	28	31	41	55	41	41	44	40	38	52	59	43
	15	13	12	17	18	39	33	33	33	34	33	34	40	23
Romulus	25	27	31	22	42	56	53	41	45	42	40	50	58	43
	15	14	13	18	29	36	40	32	32	34	33	34	37	21
Ithaca	24	23	27	32	40	56	39	43	45	42	40	51	58	42
	18	14	8	16	31	38	34	34	35	35	35	34	41	23
Mean	21	16	16	23	34	41	37	34	38	38	35	38	41	34

‡ Max. and Min. by the Draper Thermograph. ‖ Received too late to be

MAXIMA AND MINIMA FOR THE STATIONS — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly mean.
....	...	....	.....	....	.....	.....	.....	....	.....	.....	.....	.....	.....	.. .	.....	... .	
....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
20	28	28	40	40	22	14	10	8	4	20	32	8	22	40	38	38	22.8
10	14	10	28	10	8	—8	—8	—6	—8	0	4	—4	2	18	34	18	
21	24	31	37	38	21	21	11	10	4	33	37	16	28	37	40	41	22.9
10	11	10	22	6	4	—4	—4	—4	-12	1	4	—5	—4	20	33	13	
16	19	20	39	34	24	8	4	3	4	25	31	20	29	36	39	36	20.2
7	4	8	7	7	3	—7	—4	—7	-12	5	0	-10	4	24	34	13	
25	23	26	33	26	25	21	17	15	13	22	26	14	21	34	39	33	28.9
....	....	....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
....	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
30	29	41	45	29	29	30	28	26	22	35	38	40	40	45	45	43	31.9
25	21	19	30	27	25	21	21	13	11	20	22	9	10	13	35	35	
28	29	39	41	32	30	26	23	18	19	28	33	23	39	40	40	40	30.0
22	21	25	26	22	25	18	14	10	8	19	19	11	15	35	37	26	
28	27	35	39	30	30	27	18	24	17	27	33	24	35	42	44	41	29.0
20	19	11	27	20	20	17	12	11	8	14	23	5	3	29	35	23	
29	28	36	38	25	30	26	20	23	16	25	32	19	35	41	44	38	29.0
23	19	18	25	21	22	17	13	11	8	16	19	8	10	33	36	24	
29	29	35	38	33	32	28	25	23	21	28	33	24	33	39	41	41	29.6
25	22	17	29	23	20	21	18	12	8	17	24	12	8	28	35	28	
29	31	39	41	38	33	28	24	24	20	30	34	30	40	41	42	32	31.0
25	23	22	30	24	22	21	16	11	10	15	27	14	11	32	35	27	
29	23	33	37	27	31	19	19	19	20	28	32	14	25	40	43	40	26.3
15	14	15	18	12	15	7	8	0	1	20	—3	1	3	18	35	20	
28	25	29	38	29	30	24	19	19	22	26	35	14	26	39	44	39	27.0
17	16	19	28	16	12	6	4	8	—1	18	12	1	4	20	35	20	
26	22	29	35	33	25	25	16	14	13	24	32	11	24	34	41	39	23 6
16	13.	9	23	16	8	8	0	3	—7	13	14	-10	—3	18	33	20	
28	26	33	38	30	30	27	21	20	15	29	33	18	31	42	44	41	29.0
19	20	19	30	21	21	18	9	10	10	17	15	4	8	29	37	25	
32	29	47	39	30	28	29	28	27	24	24	33	28	39	41	42	42	32.0
26	24	19	31	27	23	22	22	14	15	18	24	18	18	37	37	35	
23	22	24	32	28	25	20	16	16	8	18	25	11	16	30	39	35	27.9
27	24	30	34	34	30	25	27	23	12	26	31	22	32	39	42	44	27.4
16	15	14	36	19	16	12	9	8	6	10	17	0	0	25	36	26	
29	31	35	38	39	33	30	24	25	14	27	33	27	30	40	45	43	28.6
17	19	15	28	20	18	12	9	9	7	13	19	—2	7	16	35	25	
30	26	31	36	36	31	26	22	22	11	25	32	21	28	37	43	43	27.7
18	17	18	29	21	19	14	8	9	4	8	18	—3	2	23	34	27	
23	21	22	29	26	20	18	14	12	5	14	21	9	13	26	35	32	25 3

used in computing means. (1) Voluntary observer. (2) U. S. Weather Bureau.

DAILY AND MONTHLY PRECIPI

STATION.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Western Plateau	0.06	0.01	T.	T.	T.	T.	0.01	0.23	0.38	0.06	0.04	0.02	0.00	0.00
Alfred	.20	....	T.	....	T.	....	....	.28	.42	.06	.01	....	....	....
Angelica	T.	....	T.	....	....	....	....	.15	.50	....	.10	....	....	....
‡ Bolivar	T.	....	....	....	....	....	....	.16	.70	....	.06	....	....	....
Friendship	.08	....	T.	T.	T.	....	....	.24	.57	T.	....	....	....	....
Franklinville	.06	....	.01	.01	T.	T.	....	.05	.91	T.	.08	....	....	....
Humphrey	.02	....	T.	T.	....	....	....	.62	T.	.23	....	....	....	....
Little Valley	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cherry Creek	.38	T.	.04	.06	....	....	....	.17	.90	T.	.13	....	....	....
Jamestown	.20	.10	T.	T.	T.	....	....	T.	T.	.83	....	....	....	....
Elmira	....	....	....	....	....	....	....	.38	.18	....	....	....	....	....
Pine City	T.	T.	....	....	....	....	T.	.22	....	....	.01	....	....	....
Akron	....	....	....	.03	T.	T.	.08	*	†.54	T.	.12	....	....	....
Avon	....	....	....	....	....	....	T.	T.	.72	....	....	....	....	....
Mt. Morris	....	....	....	....	....	....	T.	.10	.50	....	.10	....	....	....
Lockport	T.	....	....	T.	T.	....	.21	....	*	†.48	T.	....	...	....
Victor	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tyrone	....	....	....	....	....	....	....	.25	....	....	....	.48	....	....
Wedgewood	T.	.03	....	....	T.	....	....	.32	.29	T.	.03	....	....	....
Addison	.01	....	....	....	....	....	....	.26	.23	....	T.	....	....	....
Atlanta	....	....	....	....	....	....	T.	.30	.20	....	.18	....	....	....
Haskinville	.05	....	....	....	....	....	....	.10	.48	....	.10	....	....	....
South Canisteo	T.	T.	....	....	....	....	....	.65	T.	.07	T.	....	....	....
Arcade	.20	.01	T.	T.	T.	....	....	.30	.58	....	....	....	....	....
Attica	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eastern Plateau	T.	T.	0.00	T.	T.	0.00	0.01	0.27	0.32	0.08	0.03	0.00	0.00	0.00
Binghamton (1)	....	....	....	....	....	....	....	.08	.44	.04	.03	....	....	....
Binghamton (2)	.02	T.	....	T.	T.	....	....	.15	.28	...	.02	....	....	....
Oxford	T.	....	....	.02	....	....	....	.32	.65	.08	.05	....	....	....
Cortland	....	....	....	....	....	....	....	.12	.57	.03	....	....	....	....
Bloomville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
South Kortright	....	....	....	....	....	....	....	....	....	1.00	....	....	....	....
Brookfield	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hamilton	....	....	....	....	....	....	....	....	...	....	....	....	....	....
Apulia	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Port Jervis	....	....	....	.02	....	....	....	.42	....	....	.08	....	....	....
Warwick	....	....	....	....	....	....	....	.20	.26	....	.05	....	....	....
Cooperstown	....	....	....	....	....	....	.10	.15	.53	.05	....	....	....	....
New Lisbon	....	....	....	T.	....	....	....	.04	.57	....	.05	....	....	....
Oneonta	....	....	....	....	....	....	....	.42	.14	.08	....	....	....	....
Perry City	....	....	....	....	....	....	....	.65	.09	....	.03	....	....	....
Newark Valley	T.	....	....	....	T.	....	....	40	40	....	....	....	....	....
Straits Corners	....	....	....	....	T.	....	....	.37	.37	....	.06	....	....	....
Waverly	....	....	....	....	T.	....	....	.42	.20	....	.04	....	....	....
Dryden	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohonk Lake	....	....	....	....	....	....	....	*	†.90	....	....	....	....	....
Northern Plateau	0.05	0.06	0.03	0.02	0.01	0.03	0.03	0.54	0.47	0.02	T.	0.00	T.	0.00
West Chazy	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Elizabethtown	....	....	....	....	....	....	....	....	....	....	....	...	....	....
Saranac Lake	T.	....	....	T.	T.	.14	....	.74	.27	T.	....	....	T.	....
Gloversville	T.	....	....	.15	....	.02	T.	.20	.78	T.	T.	....	....	....
North Lake	....	.20	.20	....	....	....	....	1.10	.20	.10	....	....	....	....
Lowville	.32	....	....	....	.07	....	.65	....	.60	....	.03	....	...	....
Number Four	....	.16	....	....	....	...	.12	.85	.38	....	....	....	....	....
Kings Station	....	....	....	....	....	....	....	.32	.60	...	....	....	....	....

tation for December — (Inches.)

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	T.	T.	0.04	0.03	0.03	0.10	0.21	0.12	0.02	0 02	T.	0.00	T.	T.	T.	T.	1.38
....	T.	....	.05	.01	01	.20	.30	.07	T.	.02	.01	....	....	T.	T.	T.	1.64
....	T.	....	T.	T.	.03	.12	.25	.08	....	T.	T.	....	....	....	....	....	1.23
....	....	....	....	....	....	.19	.22	.05	....	....	....	....	....	....	....	....	1.38
....	T.	....	.04	T.	T.	.12	.20	.10	....	.05	T.	....	....	T.	....	....	1.40
....	....	....	.04	.02	T.	07	.17	.16	.02	.01	T.	....	....	T.	....	....	1.61
....	....	....	.06	.20	.10	.15	.24	....	T.	....	....	....	....	T.	...	....	1.62
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	.12	.11	.04	.30	.32	.22	.06	.12	T.	....	....	T.	....	....	2.97
T.	....	....	.20	.10	T.	40	.40	.20	.10	.10	T.	....	....	T.	T.	....	2 63
....		....	....	...	....	....	.05	....	...	....	....	....	....	....	....	....	0.61
T.	T.	....	T.	T.	T.	.10	.55	T.	T.	T.	....	....	T.	....	....	....	0.88
....	....	....	.11	....	.03	.02	.11	.22	....	....	....	....	T.	....	....	....	1.26
....	....	....	T.	T.	T.	.05	.02	T.	....	...	....	....	....	....	....	....	0.79
....	....	....	T.	T.	T.	T.	.50	.30	...	...	T.	....	....	....	....	....	1.50
....	....	....	.22	....	.02	.02	.20	....	.20	T.	....	....	....	T.	....	....	1.35
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	.35	....	....	....	....	....	....	....	....	1.08
....	....	....	T.	T.	....	.05	.30	.40	T.	....	T.	....	...	....	....	....	1 42
....	...	....	T.	T.	....	.03	.20	.15	....	....	....	....	....	....	....	....	0.88
....	....	....	....	....	....	....	.10	....	....	.07	....	....	....	....	....	....	0.85
....	...	....	T.	T.	....	.05	.11	.10	....	....	T.	....	....	T.	....	....	0.99
....	T.	T.	T.	....	T.	.12	.30	T.	....	....	T.	....	....	....	....	....	1.14
....	....	....	.05	T.	.05	.20	.13	.10	T.	.04	T.	....	....	....	....	....	1.66
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
0.00	0 03	0 00	0.03	0 02	0.02	0 04	0 11	0.27	0.04	T.	T.	0.00	0.00	0.00	0.00	0.00	1.32
....	....	....	.05	T.	....	.08	.08	40	....	..	....	....	....	....	....	....	1.20
....	....	....	.01	.01	T.	.02	.04	.21	.01	T.	T.	....	....	....	....	....	0 77
....	....	....	.10	.05	T.	T.	.05	.40	....	..	T.	....	....	....	....	....	1.72
....	....	....	.08	.13	.22	.15	.09	.39	.47	.07	....	....	....	....	....	....	2 32
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	...	....	....	....	.18	....	.19	....	....	....	....	....	....	....	....	1.37
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	...	....	...	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....
....	.12	....	....	....	....	....	.32	.18	....	....	....	....	...	....	....	....	1.14
....	.37	....	....	....	....	....	.14	.20	....	....	....	....	....	....	....	....	1.22
....	....	....	.08	....	....	....	....	.30	....	....	....	....	....	....	....	....	1.21
....	....	....	.03	....	....	....	T.	.26	....	....	....	....	....	....	....	....	0 95
....	....	....	....	....	....	....	.32	....	....	....	....	....	....	....	....	....	0.96
....	....	....	....	.06	....	....	.08	.45	.04	....	....	....	....	....	....	....	1 40
....	....	....	..	T.	....	.02	.10	.30	....	....	....	....	....	....	....	....	1.22
....	....	....	.03	....	....	.15	.15	.30	....	....	....	....	....	....	....	....	1.43
....	T.	....	T.	....	....	T.	.15	.15	.05	....	....	....	....	....	....	....	1.01
....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	*	†1.00	....	....	....	...	....	....	....	....	1.90
0.00	0.00	0.00	0.10	0.05	0.08	T.	T.	0.15	0.01	0.06	0 04	0.00	0.00	T.	T.	0 00	1 84
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	.07	T.	.06	T.	03	T.	.01	.04	.08	....	....	T.	T.	....	1.44
....	....	....	.03	.12	T.	.03	T.	.31	...	T.	.03	....	....	....	....	....	1 67
....	....	....	.40	....	.20	....	....	....	....	.30	....	....	....	....	....	...	2.70
....	....	....	....	.12	....	....	....	.20	....	.03	.04	....	....	....	....	....	1.46
...	....	....	*	† .58	.19	....	....	.15	.07	....	.09	....	....	....	...	...	2 59
....	....	....	....	....	....	....	....	.25	....	....	....	....	....	....	....	....	1.17

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Atlantic Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.39	0.02	0.06	T.	0.00	0.00
Brooklyn	....	....	....	....	....	....	....	T.	.30	....	.03	....	....	....
Manhattan Beach	....	....	....	....	....	....	....	....	.20	.02	.04	....	....	....
New York City	....	....	....	....	....	....	....	T.	.32	....	.02	....	....	....
Willet's Point	....	....	....	....	....	....	....	.36	....	.10	....	.01	....	....
Brentwood	....	....	....	....	....	....	....	....	.80	....	.20	....	....	....
Setauket	....	....	....	....	....	....	....	....	.40	....	.17	....	....	....
Bedford	....	....	....	....	....	....	....	.01	.40	....	....	....	....	....
Primrose	....	....	....	....	....	....	....	....	.37	....	....	....	....	....
Hudson Valley	T.	0.00	0 00	T.	T.	0.00	0.01	0.10	0 46	T.	0.02	0.00	0 00	0.00
Albany	....	....	....	....	....	....	....	07	.16	T.	....	....	....	....
Lebanon Springs	T.	....	....	....	....	....	....	....	.50	.02	....	....	....	....
Honeymead Brook	....	....	....	....	T.	....	....	.20	.70	....	.07	....	....	....
Poughkeepsie	....	....	....	T.	....	....	....	.68	.30	....	....	....	....	....
Wappinger's Falls	....	....	....	T.	....	....	....	....	.06	....	.02	....	....	....
Catskill	T.	....	....	....	T.	....	....	....	.70	....	T.	....	....	....
West Point	....	....	....	....	....	....	....	....	.53	....	.03	....	....	....
Boyds Corners	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carmel	....	....	....	....	....	....	....	....	.62	....	.11	....	....	....
Southeast Res'v'r	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Eagle Mills	....	....	....	....	....	....	.10	....	....	....	....	....	....	....
Easton	....	....	....	....	....	....	....	....	1.02	....	....	....	....	....
Mohawk Valley	0.01	0.00	0.00	0.00	0.01	0.01	0 00	0.00	0.57	0.13	0.02	0.00	0.00	0.00
St. Johnsville	.01	....	....	....	.01	.01	....	....	.57	.13	.02	....	....	....
‖ Rome	....	....	....	.04	.03	....	....	1.21	.44	....	....	....	....	....
Champlain Valley	T.	T.	T.	0.08	T.	T.	T.	0.04	0.85	0.02	T.	0.00	0.00	T.
Plattsburgh Bar'ks	....	T.	....	....	....	.01	T.	....	.81	.05	....	....	....	T.
Glens Falls	....	....	....	.25	....	....	T.	....	.90	....	....	....	....	....
Lake George	T.	....	....	T.	T.	....	T.	.12	.83	T.	T.	....	....	....
St. Lawrence Val'y.	T.	T.	0.01	T.	0.02	?	0.07	0.02	0.34	0.05	0 02	0.00	0.05	0.11
Madison Barracks	....	....	....	....	....	....	....	....	....	....	.16	....	.34	.76
Watertown	....	....	.04	....	.12	....	.10	*	*	†.93	....	....	....	....
Canton	T.	....	....	T.	....	....	.10	.10	....	.20	....	....	....	....
DeKalb Junction	....	....	....	....	....	....	.04	....	.82	....	....	....	....	....
Massena	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Hammond	....	....	....	....	....	....	.05	....	.56	.10	....	....	....	....
Ogdensburg	.02	....	....	T.	*	† 09	.01	....	.40	....	....	....	....	....
Potsdam	....	....	....	....	....	....	.20	....	.23	....	....	....	....	....
Great Lakes	0.13	0 02	0.01	0.02	T.	T.	0.06	0.30	0.38	0.05	0.04	T.	T.	T.
Dunkirk	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield	.06	T.	T.	....	....	....	....	.53	....	....	....	....	....	....
Buffalo	T.	T.	T.	T.	.01	....	.01	.23	.21	T.	T.	....	T.	....
Adams Center	.06	.02	....	....	....	.03	....	.67	.04	....	....	.02	....	....
Pittsford	....	....	....	....	....	....	.10	.25	.43	.03	....	....	....	....
Rochester	T.	.05	....	....	T.	....	.06	25	.42	.03	08	....	....	T.
Scottsville	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Appleton	.03	T.	T.	T.	T.	....	.18	.23	.13	T.	.04	....	....	....
Fort Niagara	....	....	T.	T.	....	....	....	.27	....	.13	....	....	....	....
Niagara Falls	....	....	....	....	T.	....	.16	.11	.40	....	....	....	....	....
Baldwinsville	.10	....	....	....	T.	.03	....	.86	.25	.15	....	....	....	....
Skaneateles	....	....	....	....	....	....	....	.12	.98	....	.05	....	....	....
Ridgeway	....	.03	....	T.	.03	....	.11	.04	.41	....	.07	....	....	....
Demster	1.00	....	....	.30	....	....	....	.10	1.00	.08	.11	....	....	....
Fulton	....	....	....	....	....	....	.21	.38	.68	.19	....	....	....	....
Oswego	.70	....	.5	.10	T.	....	.10	.20	.70	.03	.15	....	....	....
Palermo	.45	.20	.14	....	....	....	.10	.10	.60	....	....	....	....	....

TATION FOR DECEMBER — (*Continued*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
T.	0.67	0.05	0.00	0.00	0.00	0.00	0.01	0.52	0 00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71
....	.87	....	....	....	....	....	...	.50	....	....	....	....	....	....	....	....	1.70
....	.29	.40	....	....	....	....	....	.60	....	....	....	....	....	....	....	...	1.46
T.	.88	....	....	....	....	....	T.	.48	....	....	....	....	....	....	....	....	1 70
....	.15	....	....	....	....	....	....	.28	....	....	....	....	....	....	....	....	0.90
....	1.20	....	....	....	....	....	....	.50	....	....	....	....	....	....	....	....	2.70
....	.52	....	....	....	....	....	.03	.50	....	....	....	....	....	....	....	....	1.62
....	.85	....	....	....	....	....	.02	.90	....	....	....	....	....	....	....	..	2.18
....	.70	....	....	....	....	....	....	.40	....	....	....	....	....	....	....	....	1.47
T.	0.08	0 06	T.	T.	0.00	T.	0.02	0.46	0.02	0.01	T.	0.00	0.00	0.00	T.	0.00	1.81
....	....	....	....	T.	....	T.	T.	.50	....	....	T.	....	....	....	T.	....	0.73
....	....	....	....	.03	....	T.	....	.36	....	....	T.	....	....	....	....	....	0.91
....	....	...	....	....	....	T.	.05	.45	....	....	....	....	....	....	....	....	1 47
....	.06	....	....	...	....	....	.06	.57	....	....	....	....	....	...	....	....	1 67
T.	.02	....	.03	....	....	T.	.10	.94	....	....	....	....	....	....	....	....	1.93
....	....	....	...	....	....	....	....	.65	....	....	....	....	....	....	....	....	1.35
....	....	.65	....	....	....	....	.02	.40	....	....	...	....	....	....	....	....	1.63
....	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	...	2.72
....	.69	....	....	....	....	T.	....	.68	....	....	....	....	....	....	....	....	2.10
....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	...	2.03
....	....	....	....	....	....	....	....	.10	....	.10	.05	....	....	....	....	....	0.35
....	....	....	....	....	....	....	....	....	.18	....	....	....	....	....	....	....	1.20
0.00	0.00	0.00	0.07	0.01	0.00	0.02	0.00	0.31	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	1.19
....	....	....	.07	.01	....	.02	....	.13	....	.01	....	....	....	....	....	.02	1 19
....	....	....	.30	....	.03	....	.36	.08	....	.03	....	....	....	....	....	....	2 52
0,00	0.00	0.00	T.	T.	T.	T.	T.	0.08	0.00	T.	T.	0.00	0.00	0.00	0.00	0.00	1.07
....	....	....	....	....	....	T.	....	....	....	T.	....	....	....	....	....	....	0 87
....	....	....	....	....	....	T.	....	.14	....	....	....	....	....	....	....	....	1.29
....	....	....	T.	T.	T.	T.	T.	.11	....	T.	T.	....	....	....	....	....	1.06
0.00	0.00	0.00	0.12	0.02	0.06	0.01	0.00	0.01	0.00	0.02	0.06	0.00	0.01	0.01	0.00	0.00	1 10
.18	....	....	.07	....	....	....	....	...	....	.10	....	....	....	T.	....	....	1.61
....	....	....	.10	....	....	....	....	.10	....	*	† .09	....	....	....	....	....	1.48
....	....	....	.10	....	.20	....	....	....	....	....	.10	....	....	....	....	....	0.80
....	....	....	....	....	....	....	....	....	....	....	....	....	.05	....	....	....	0.91
...	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....
....	....	....	.05	.15	....	.04	....	....	....	....	.07	....	....	....	....	....	1.02
....	....	...	*	† .10	.20	....	....	....	....	....	.20	....	....	.04	....	....	1 06
....	....	....	.40	....	....	....	....	....	....	....	....	....	....	....	....	....	0.83
T.	T.	0.00	0.08	0.02	0.08	0.12	0.12	0.18	0.06	0.04	T.	T.	T.	T.	1.01	T.	1.72
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	T.	....	.62	T.	.07	.03	.05	....	....	....	....	....	....	....	1 36
T.	....	....	.07	T.	.04	.03	.09	.13	.01	T.	T.	....	....	T.	.01	....	0.84
....	.01	....	....	.02	....	....	....	....	.30	.42	.06	....	....	....	....	....	1.65
....	....	....	.16	T.	....	.22	.11	.74	T.	T.	....	....	....	T.	....	....	2 04
....	T.	...	.05	.11	T.	.24	.14	.72	.02	.02	T.	T.	....	.01	.01	T.	2.21
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	.09	T.	.06	.10	.10	*	† .15	....	....	T.	....	T.	....	....	1.11
....	....	...	.06	....	*	*	*	*	† .10	....	....	....	....	....	....	....	0.56
....	....	....	.08	....	....	.07	.12	.15	....	....	....	....	....	T.	....	....	1 09
....	....	....	.10	T.	T.	T.	.03	T.	.20	T.	T.	....	....	....	....	....	1.72
....	....	....	.05	....	....	....	.04	.12	.03	.03	....	....	....	....	.02	....	1.44
....	....	....	.05	....	....	.04	.04	.05	.02	....	....	....	....	T.	....	....	0 89
....	....	....	.15	....	....	.80	....	.15	....	....	....	....	....	....	.13	....	3 82
....	....	....	.02	....	....	.03	.60	.07	.05	.01	....	.02	.01	....	.02		2.29
....	T.	....	.07	.02	.30	.46	.01	.18	.03	.03	.01	....	....	.01	.01	....	3.16
....	....	....	.20	.09	.25	....	....	.20	.01	....	.02	....	....	T.	....	....	2.36

DAILY AND MONTHLY PRECIPI

STATIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Great Lakes (Con.)														
Phœnix	....	.05	....	....	....	....	.03	....	....	.20	.12	....	....	....
Lyons	.05	....	....	....	...	...	T.	.70	.06	.12	T.	....	....	....
Rose	...	.10	....	.	T.	.01	.05	.21	.67	T.	.14	....	....	....
Erie, Pa	0.2	.01	T.	T.	T.	....	....	.44	.30	....	T.	....	...	....
Central Lakes	T.	0.03	0.00	0.00	T.	0 00	T.	0.29	0 33	0.01	0.12	0.09	0.00	0.00
Fleming	....	....	...	...	....	....	....	...	T.		....	....	....	....
Sherwood	....	.14	....	....	....	....	....	.80	....	0.5	....	....	....	....
Watkins	...	...	...	....	....	....	....	*	†.56	....	....	....	....	....
Romulus	....	....	...	....	....	....	T	....	.96	T.	.61	....	....	....
Ithaca	T.	.03	....	....	T.	....	T.	.30	.36	.02	.01	....	....	....
Penn Yan	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Average	0.02	0.01	T.	0.01	T.	T.	0.02	0.18	0.45	0.04	0.04	T.	T.	0.01

‡ Record for the month incomplete. ‖ Received too late to be included in the averages.

TATION FOR DECEMBER — (*Concluded*).

15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.
....	....	....	....	.15	...	....	.20	....	....	.11	....	....	....	....	....	....	0.86
....	....	....	.10	T.	.05	.05	.40	.10	....	. ..	....	....	....	.01	T.	....	1.64
....	....	....	.15	.05	....	.04	.05	.25	.20	.15	T.5	....	....	T.	....	....	2.07
.07	.03	....	.12	T.	.03	.09	.17	.28	T.	T.	T.	T.	....	T.	....	....	1.56
0.01	T.	0.00	T.	T.	T.	T.	0.01	0.22	0.01	T.	T.	0.00	0.00	0.01	T.	0.00	1.12
....	....	....	....	....	T.	....	....	.40	....	....	....	....	....	....	T.	....	0.40
.03	....	....	....	....	....	....	....	....	....	....	....	....	....	.04	....	....	1.06
*	†.50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.06
....	....	....	T.	T.	T.	....	T.	.51	....	....	....	....	....	T.	....	....	2.08
....	T.	....	T.	T.	....	02	.03	.20	.03	T.	T.	....	....	....	....	....	1.00
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....
T.	0.08	0.01	0 04	0.02	0.03	0.03	0.05	0.23	0.02	0.02	0 01	T.	T.	T.	T.	T.	1.43

* Amount included in next measurement. † Not included in computing averages.

STATISTICS OF TEMPERATURE

STATION.	COUNTY.	Temperature (Degrees Fahr.). Normal for the month of December.	Length of record, years.	Record begins.	Record ends.	Mean for December, 1896.	Departure from the normal.	Extremes of Monthly Mean Temperature for December. Highest	Year.	Lowest.	Year.
Western Plateau	....	27.5	...	.....	.....	28.0	+0.5	.....	.....	.....	....
Angelica	Allegany	25.8	14	1854	1896	25.7	—0.1	34.3	1889	18.8	1872
Humphrey	Cattaraugus	27.8	14	1883	1896	28.2	+0.4	37.0	1889	20.3	1886
Elmira	Chemung	28.8	16	1850	1896	30.0	+1.2	38.2	1891	23.5	1851
Eastern Plateau	....	26.6	...	.....	.....	25.7	—0.9	.....	.....	.....	....
Oxford	Chenango	26.0	29	1828	1896	24.0	—2.0	34.2	1829	15.3	1831
Cortland	Cortland	26.4	34	1829	1896	26.2	—0.2	34.1	1848	20.3	38, 51, 54
Cooperstown	Otsego	24.9	43	1854	1896	24.0	—0.9	33.6	1891	14.7	1876
Waverly	Tioga	29.0	15	1882	1896	28.6	—0.4	35.6	1891	22.3	1886
Northern Plateau	....	23.3	...	.....	.....	20.2	—3.1	.....	.....	.....	....
Lowville	Lewis	23.3	31	1827	1896	20.2	—3.1	32.3	1829	11.8	1831
Atlantic Coast	....	34.8	...	.....	.....	32.4	—2.4	.....	.....	.....	....
New York City	New York	34.2	27	1870	1896	32.0	—2.2	42.0	1891	25.2	1876
Setauket	Suffolk	35.4	12	1885	1896	32.8	—2.6	41.8	1891	30.6	1886
Hudson Valley	....	29.4	...	.....	.....	25.9	—3.5	.....	.....	.....	....
Albany	Albany	28.5	23	1874	1896	26.0	—2.5	38.6	1881	17.4	1876
Honeymead Brook	Dutchess	28.4	16	1881	1896	24.2	—4.2	35.4	1891	22.5	1886
West Point	Orange	31.4	68	1826	1896	27.6	—3.8	.....	.....	.....	....
Champlain Valley	....	22.6	...	.....	.....	19.2	—3.4	.....	.....	.....	....
Plattsburgh Barracks	Clinton	22.6	41	1839	1896	19.2	—3.4	33.4	1891	11.3	1890
St. Lawrence Valley	....	23.4	...	.....	.....	21.2	—2.1	.....	.....	.....	....
Madison Barracks	Jefferson	25.5	36	1839	1896	22.2	—3.3	36.0	1891	15.4	1890
Canton	St. Lawrence	22.6	34	1862	1896	19.8	—2.8	36.5	1881	9.2	1876
North Hammond	"	23.2	18	1866	1896	22.8	—0.4	34.2	1891	13.1	1871
Potsdam	"	22.2	29	1828	1896	20.2	—2.0	33.9	1891	11.0	1890
Great Lakes	....	29.8	...	.....	.....	28.4	—1.4	.....	.....	.....	....
Buffalo	Erie	29.7	27	1870	1896	30.0	+0.3	37.4	1889	19.4	1876
Rochester	Monroe	29.9	27	1870	1896	29.0	—0.9	36.6	1889	19.5	1876
Fort Niagara	Niagara	29.6	41	1842	1896	31.0	+1.4	39.2	1889	22.5	1859
Baldwinsville	Onondaga	28.0	18	1854	1896	26.3	—1.7	36.6	1889	22.4	1856
Oswego	Oswego	29.2	27	1870	1896	27.0	—2.2	37.2	1842	20.4	1890
Palermo	"	25.0	43	1854	1896	23.6	—1.4	34.0	1891	15.7	1867
Erie, Pennsylvania	Erie	32.6	23	1874	1896	32.0	—0.6	41.0	1889	22.0	1876
Central Lakes	....	29.7	...	.....	.....	27.7	—2.0	.....	.....	.....	....
Ithaca	Tompkins	29.7	18	1879	1896	27.7	—2.0	39.2	1891	22.0	1880
Average departure	....	.....	...	.....	.....	.....	—1.7	.....	.....	.....	....

AND PRECIPITATION — DECEMBER.

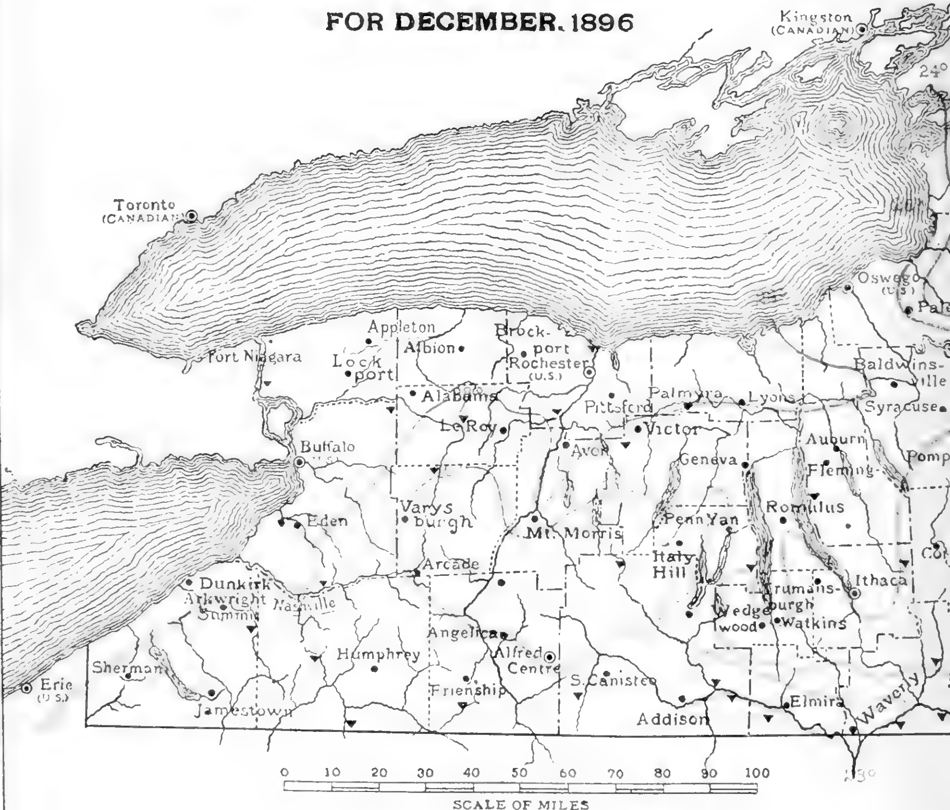
STATION.	COUNTY.	PRECIPITATION (INCHES).									
		Average for the month of December.	Length of record, years.	Record begins.	Record ends.	Total for December, 1896.	Departure from the average.	Extremes of Monthly Precipitation for December.			
								Greatest.		Least.	
								Amount.	Year.	Amount.	Year.
Western Plateau	.....	2.73	...	.....	.....	1.15	—1.58	.....	.....	.....	.....
Angelica	Allegany	2.60	11	1856	1896	1.23	—1.37	4.02	1895	1.13	1892
Humphrey	Cattaraugus	3.05	14	1883	1896	1.62	—1.43	5.74	1893	1.62	1886
Elmira	Chemung	2.55	16	1851	1896	0.61	—1.94	4.50	1858	0.61	1896
Eastern Plateau	.....	2.67	...	.....	.....	1.48	—1.19	.....	.....	.....	.....
Oxford	Chenango	2.49	27	1829	1896	1.72	—0.77	4.46	1850	0.90	1835
Cortland	Cortland	2.80	19	1850	1896	2.32	—0.48	4.39	1850	1.08	1892
Cooperstown	Otsego	2.69	43	1854	1896	1.21	—1.48	6.02	1881	0.97	1877
Port Jervis	Orange	3.13	12	1880	1896	1.14	—1.99	6.05	1894	1.14	1896
Waverly	Tioga	2.23	15	1882	1896	1.01	—1.22	4.34	1890	0.70	1892
Northern Plateau	.....	2.92	...	.....	.....	1.46	—1.46	.....	.....	.....	.....
Lowville	Lewis	2.92	33	1827	1896	1.46	—1.46	5.81	1893	0.59	1846
Atlantic Coast	.....	3.26	...	.....	.....	1.65	—1.60	.....	.....	.....	.....
New York City	New York	3.23	27	1870	1896	1.70	—1.53	6.66	1884	0.95	1877
Setauket	Suffolk	3.28	12	1885	1896	1.60	—1.68	5.65	1890	1.56	1892
Hudson Valley	.....	3.23	...	.....	.....	1.64	—1.59	.....	.....	.....	.....
Albany	Albany	2.65	23	1874	1896	0.73	—1.92	6.16	1878	0.71	1877
Honeymead Brook	Dutchess	2.97	16	1881	1896	1.47	—1.50	4.63	1894	1.03	1892
Poughkeepsie	"	3.08	21	1830	1896	1.67	—1.41	6.46	1847	0.95	1843
West Point	Orange	3.56	50	1840	1896	1.63	—1.93	6.25	1840	0.83	1867
Boyds Corners	Putnam	3.90	26	1870	1896	2.72	—1.18	8.74	1878	1.11	1892
Champlain Valley	.....	1.99	...	.....	.....	0.87	—1.12	.....	.....	.....	.....
Plattsburgh Barracks.	Clinton	1.99	37	1840	1896	0.87	—1.12	7.25	1850	0.17	1886
St. Lawrence Valley	.....	2.27	...	.....	.....	1.15	—1.12	.....	.....	.....	.....
Madison Barracks	Jefferson	2.27	36	1840	1896	1.61	—0.66	6.28	1878	0.35	1874
North Hammond	St. Lawrence.	2.79	16	1866	1896	1.02	—1.77	6.11	1866	0.94	1874
Potsdam	"	1.76	28	1828	1896	0.83	—0.93	4.89	1893	0.46	1841
Great Lakes	.....	3.17	...	.....	.....	1.78	—1.39	.....	.....	.....	.....
Buffalo	Erie	3.41	27	1870	1896	0.84	—2.57	5.86	1881	0.84	1896
Rochester	Monroe	3.35	27	1870	1896	2.21	—1.14	6.17	1888	1.00	1874
Fort Niagara	Niagara	2.07	41	1841	1896	0.56	—1.51	4.13	1878	0.31	1845
Oswego	Oswego	3.38	26	1871	1896	3.16	—0.22	10.49	1878	1.02	1876
Palermo	"	3.68	37	1860	1896	2.36	—1.32	7.95	1878	1.35	1892
Erie, Pa.	Erie	3.15	24	1873	1896	1.56	—1.59	6.44	1881	0.75	1876
Central Lakes	.....	2.32	...	.....	.....	1.00	—1.32	.....	.....	.....	.....
Ithaca	Tompkins	2.32	18	1879	1896	1.00	—1.32	4.75	1881	0.85	1892
Average departure.	.....	.....	...	.....	.....	.....	—1.39	.....	.....	.....	.....

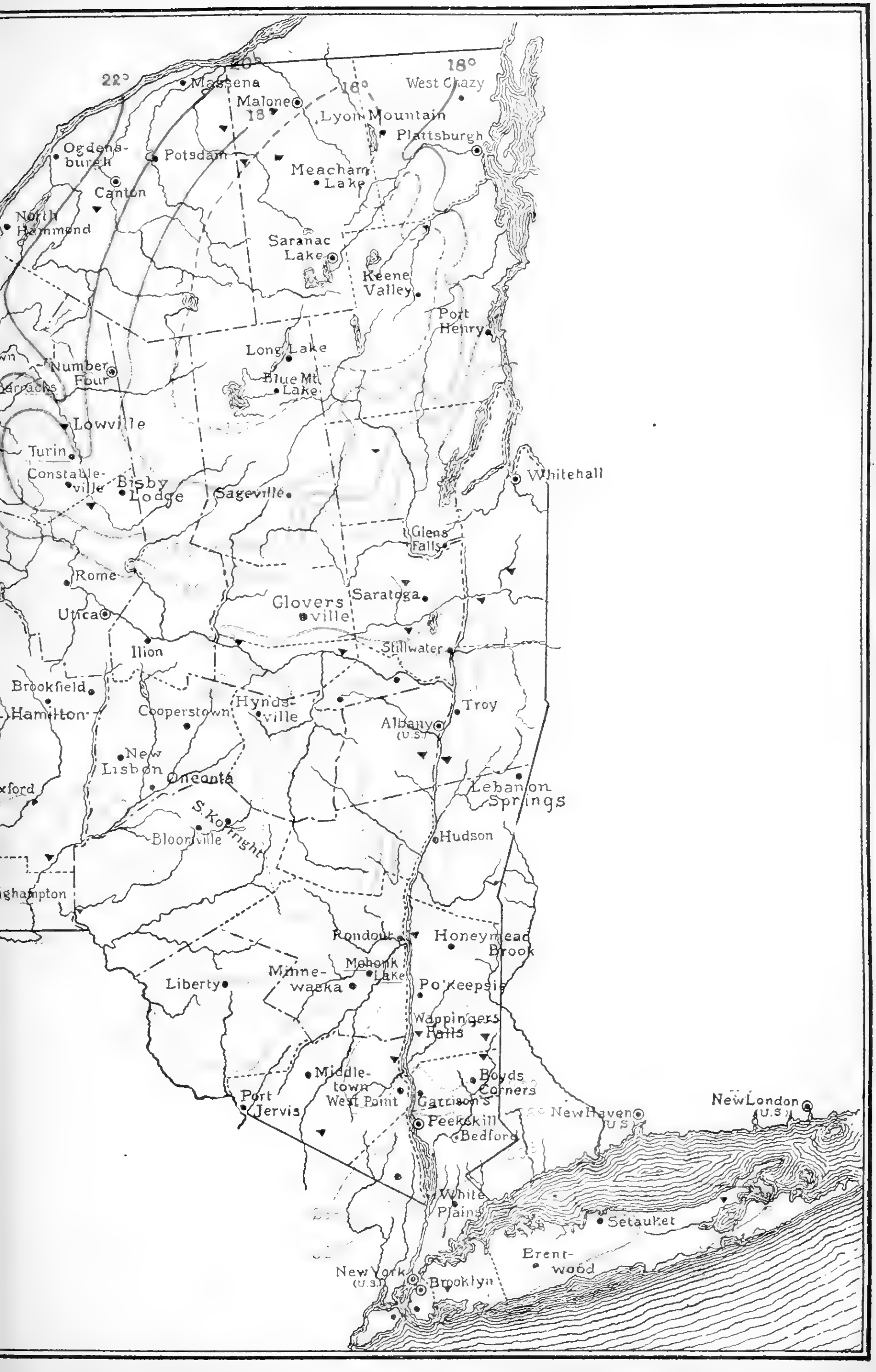
MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR DECEMBER, 1896





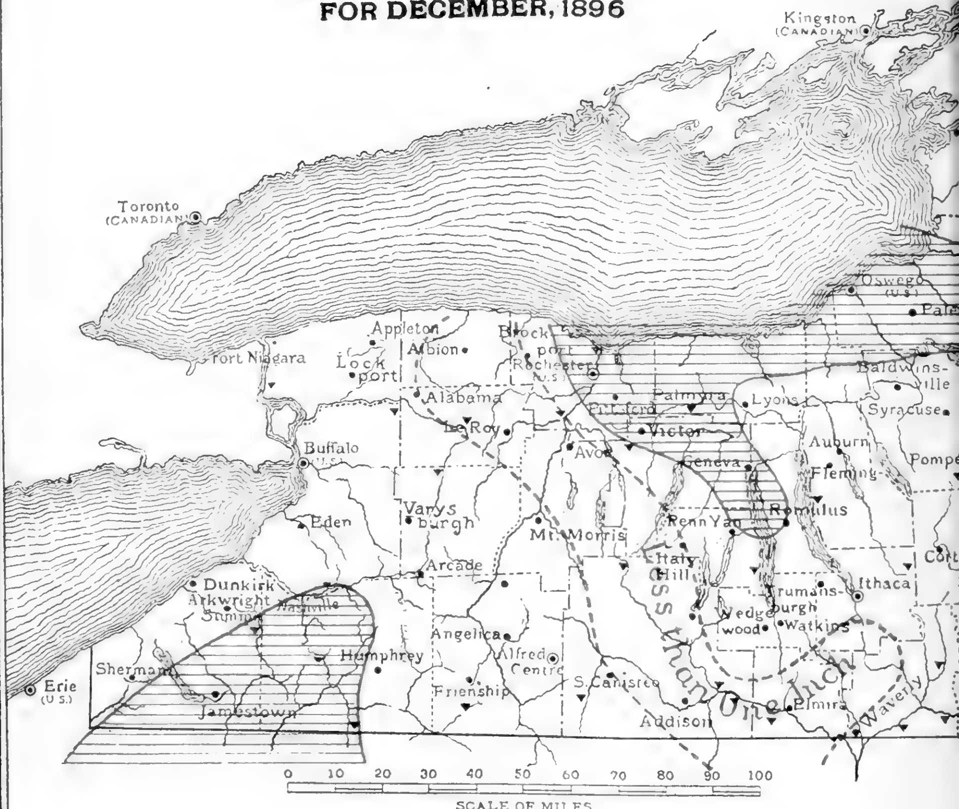
22°
20°
18°
16°
18°
Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Ilion
Stillwater
Brookfield
Troy
Hamilton
Cooperstown
Hyndsville
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
New Haven (U.S.)
New London (U.S.)
Bedford
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

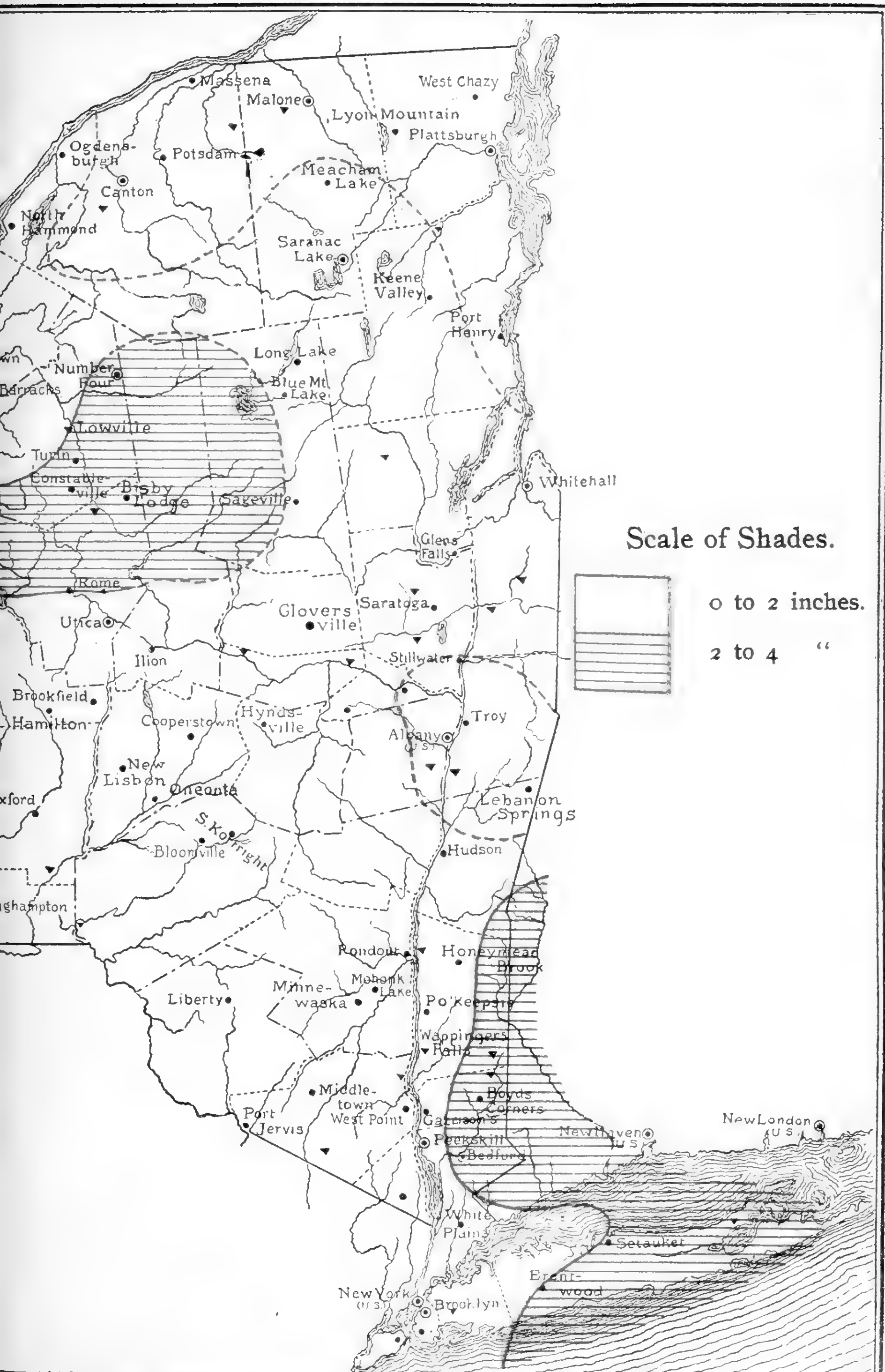
MAP OF THE STATE OF NEW YORK

SHOWING

THE PRECIPITATION

FOR DECEMBER, 1896





Scale of Shades.

(blank)	0 to 2 inches.
(lined)	2 to 4 "

PART IV.

METEOROLOGICAL REPORT FOR THE YEAR 1896.

Meteorological Summary for the Year 1896.

The average atmospheric pressure (reduced) for the State of New York during 1896 was 30.05 inches; the highest monthly mean pressure, 30.18 inches, occurring in January and December, and the lowest, 29.90 inches, in February. The highest barometer was 30.96 inches at Albany on December 27th, and the lowest was 28.70 inches at New York city on February 6th, giving a range of 2.26 inches within the State. The highest local monthly mean pressure was 30.22 inches at Albany in January, the lowest being 29.87 inches at Oswego in February. The greatest local annual range was 2.23 inches at New York city, and the least was 1.45 inches at Buffalo. The mean annual range for all stations was 1.93 inches. The greatest departures of mean pressure over the State from the normal were +0.10 inches in April, November and December, and —0.19 inches in February.

The mean annual temperature of the State was 46.1 degrees, as derived from the records of 70 stations; the mean temperature for July, the warmest month, being 70.4 degrees, and of January, the coldest month, 20.2 degrees. The highest local annual mean was 52.4 degrees at Brooklyn, and the lowest, 40.5 degrees, at Saranac Lake. The highest local monthly mean was 75.5 degrees at Brooklyn in July, and the lowest was 11.2 degrees at Potsdam in January. The maximum temperature reported during the year was 98 degrees at Bloomville, Delaware county, on August 6th and 8th, and the minimum, 43 degrees below zero at Canton on February 17th; giving an annual range of 141 degrees within the State. The average daily range for the year was 19 degrees; the greatest local value being 25 degrees at Oxford, and the least 12 degrees at Arkwright. The mean annual temperature of the State, as derived from the records of 26 stations possessing records for previous years was 0.7 degrees above the normal. The values were generally in excess in the southern and central sections and below the normal in northern New York.

The average total precipitation over the State for the year was 39.13 inches, as derived from the records of 112 stations. The maximum local precipitation was 51.87 inches at Bedford, Westchester county, while the minimum was 24.98 inches at Fort Niagara. The greatest monthly average for the State was 5.52 inches in February, the least, 1.22 inches in April. The greatest local monthly precipitation was 12.02 inches at West Point in March, and the least was 0.38 inches at Madison Barracks in April. The total amount and distribution of rainfall over the State are shown in detail by the fourth chart of this report, and the average daily amounts by the sixth chart. The average precipitation for 1896 at 27 stations possessing records for previous years was 0.67 inches below the normal amount. Deficiencies occurred at 14 stations, being greatest on the Atlantic Coast. The average total snowfall at 49 well distributed stations was 78.2 inches. The snowfall exceeded 100 inches at 5 stations on the highlands near the Great Lakes, and at Rochester and Canton; the maximum amount being 184.9 inches at Number Four, Lewis county. The least snowfall reported was 22.9 inches at Fort Niagara.

The average number of days on which the precipitation amounted to 0.01 inches or more was 124; the greatest storm frequency obtaining on the Northern Plateau, and the least along the eastern border of the State, in the coast region and the St. Lawrence valley. The average number of clear days, for the State, was 117; of partly cloudy days, 121; of cloudy days, 128; giving an average cloudiness of 53 per cent. The distribution of cloudiness is shown by the fifth chart of this report.

General Features of the Weather.—The averages of temperature, precipitation and cloudiness for the year 1896 were very nearly normal; but nevertheless, the current conditions were remarkable for extreme ranges and large fluctuations, especially during the colder months of the year. The lowest average daily temperature over the State yet recorded by this Bureau, 8 degrees below zero, occurred on February 17th, on which date also a minimum temperature of 43 degrees below zero was reported from Canton, this being, with one exception, the lowest value ever recorded in this State. A cold wave of notable severity also occurred on January 6th. Periods of abnormal warmth obtained during April and May, the maxima for the former month being among the highest recorded for April. The hot wave of the first half of August will be long remembered, both for continuously high temperatures and the great humidity which prevailed.

Large fluctuations of pressure occurred, corresponding to those of temperature. On February 6th the remarkably low pressure, 28.70 inches, was recorded at New York city; and on December 27th the highest value yet recorded by this Bureau was registered.

The temperature was generally above the normal from January 16th to February 16th, a cold period following until April 10th. This was succeeded by unseasonably warm weather, continuing till May 10th. With the exception of the hot wave of August, the temperature conditions of the summer were equable and pleasant. September, October and December were cooler than usual, while November ranks as an exceptionally warm month.

The weather of January was generally bright and pleasant, with a light precipitation and little sleighing. February and March were rough and windy months, with a large excess of rain and snow. Heavy freshets on several occasions caused considerable damage along the southern river systems; and a severe blizzard about March 11th, blockaded traffic for several days in the southern and western sections. Robins and blue birds commonly appeared about the 26th to 30th of the month.

April, May and June gave a light average rainfall, and a large percentage of bright weather. Navigation opened on the St. Lawrence river on April 16th, on Lake Champlain on the 20th, and on Chautauqua lake on the 15th. Snow disappeared from the clearings early in the month, and the farming season began about the 12th, and progressed rapidly, plowing and seeding being general by the 20th. The warm weather brought vegetation rapidly forward, and by May 10th fruit trees were in full bloom. The drouth, beginning in April and continuing until the latter part of May, injured grains and had a disastrous effect upon the hay crop. Thunderstorms were severe and frequent during May, causing a considerable loss of property.

The summer rainfall occurred largely in the form of local showers, alternating with bright weather; the conditions thus being favorable for growth, but less so for harvesting. Early haying began before June 20th. By the first week of July oats were heading and barley and spring wheat were ripening. Winter wheat and some rye were harvested early in the month. Barley cutting began about the 18th, and the oats harvest on the 30th in a few cases. Severe local storms occurred on July 3d and 27th, and flooding rains fell in portions of the Lake Region on the 20th.

The hot, muggy weather of the first half of August brought corn and other crops rapidly forward, but also developed rust and rotting among grains and potatoes. The second hay harvest was commenced during the third week, and in many cases was larger than the first crop. Corn cutting began toward the close of the month, at a date much earlier than usual, and the tobacco harvest was also well under way. Heavy thunderstorms caused a serious loss of property in scattered localities on the 10th and 18th.

September and October brought an increase of cloudiness and wind velocity, and a deficiency of average temperature which was very marked during the latter month. Killing frosts occurred in the colder parts of the State on September 19th and more generally on the 25th; but sheltered localities were not visited by severe frosts until October 9th, when nearly all crops had been secured against damage. General rains during the latter part of September started early fall seeding, but the rainfall for October was quite deficient, except in portions of the southern counties. The harvesting of corn, potatoes, beans and tobacco was completed under very favorable conditions in September. Grapes, also, were generally secured without damage from frost. The first snowfall of the season was commonly reported on October 12th.

A severe cyclone of tropical origin passed over western New York on September 30th, causing widespread damage to property. A small but violent tornado occurred near Otsego lake on the 12th.

November was characterized by large fluctuations of temperature, with an unusually high average value, a deficiency of precipitation and much cloudiness. Although a drouth prevailed in portions of the southern section, the month was generally favorable for farming interests, the mild weather permitting plowing to be carried on until the 28th.

The weather of December was generally pleasant, the precipitation for the month being very light, and the cloudiness less than the usual average. The temperature of the month was slightly deficient, two cold periods during the first and third weeks alternating with unseasonably warm weather. Rivers and lakes were generally closed to navigation by ice about the 24th. The ground was bare of snow during the greater part of the month.

METEOROLOGICAL DATA

Location of Stations.			Barometer.						Tempera-		
STATION.	COUNTY.	Elevation, feet.	Annual mean.	Highest monthly mean.	Month.	Lowest monthly mean.	Month.	Annual range.	Annual mean.	Highest monthly mean.	Month.
Western Plateau									46.6	69.6	July.
Alfred	Allegany	1824							44.9	67.4	July
Angelica	"	1340							45.1	68.2	July
Bolivar	"									67.0	July
Friendship	Allegany	1550							46.1	68.2	July
Humphrey	Cattaraugus	1950							46.0	67.5	July
Arkwright	Chautauqua	1260							46.1	68.7	July
Jamestown	"	1328							47.2	69.0	July
Elmira	Chemung	863							49.7	73.4	July
Avon	Livingston	585							47.1	72.0	July
Mt. Morris	"	525								73.3	July
Lockport	Niagara									73.2	July
Wedgewood	Schuyler	1350							46.8	71.0	July
Addison	Steuben	1000							47.5	70.0	July
South Canisteo	Steuben	1480							45.7	67.4	July
Arcade	Wyoming	1707							44.7	68.1	July
Varysburg	"									69.8	July
Eastern Plateau									46.0	69.7	July
Binghamton	Broome	870							46.9	71.0	July
Oxford	Chenango	550							45.2	69.6	July
Cortland	Cortland	1120							45.5	69.2	July
Bloomville	Delaware	1550								70.6	July
South Kortright	"	1700							44.0	68.0	July
Brookfield	Madison	1350								72.2	July
Middletown	Orange	660								71.6	July
Port Jervis	Orange	470							48.3	72.2	July
Cooperstown	Otsego	1300							44.1	67.8	July
New Lisbon	"	1234							43.1	66.7	July
Oneonta	"	1100							47.9	71.2	July
Perry City	Schuyler	1038							45.3	70.1	July
Waverly	Tioga	825							48.1	71.0	July
Mohonk Lake	Ulster	1245							46.2	67.2	Aug.
Northern Plateau									42.0	67.7	July
Saranac Lake	Franklin								40.5	66.8	July
Gloversville	Fulton	802							44.3	69.8	July
Lowville	Lewis	1240							43.0	69.2	July
Number Four	"	1571	30.03	30.19	Jan.	29.91	Feb.	1.83	40.8	65.0	July
Atlantic Coast									50.6	73.0	July
Brooklyn	Kings	107							52.4	75.5	July
Manhattan Beach	"										July
New York City	New York	314	30.06	30.21	Nov.	29.90	Feb.	2.28	51.1	73.0	*b*
Willet's Point	Queens								50.7	73.2	July
Brentwood	Suffolk	75								73.6	July
Setauket	"	40							50.9	72.8	July
Bedford	Westchester	290							49.3	71.5	July

FOR THE YEAR 1896.

TURE — (IN DEGREES FAHR.).						SKY.			PRECIPITATION — (INCHES).						
Lowest monthly mean.	Month.	Maximum.	Minimum.	Annual range.	Mean daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more in. fell.	Total for the year.	Greatest monthly.	Month.	Least monthly.	Month.	Total snowfall.
23.2	Jan.	96	—24	120	19	113	129	124	126	37.37	5.64	July	1.36	April	......
21.5	Jan.	91	—18	109	19	67	145	154	165	37.95	5 04	Sept	1.11	Aug.	99 5
22.1	Jan.	90	—22	112	18	....	....	...	......	37.28	5.66	July	1.23	Dec.	86.5
......	......	90	......	....	....	....	....	...	......	......	7.75	July.	....	......	......
23.2	Jan.	93	—23	116	23	....	....	...	124	36.34	5.65	Sept.	1.40	Dec.	66 9
24 0	Jan.	90	—16	106	18	67	135	164	139	43.47	7.50	July	1.31	April	115.0
23.0	Feb.	87	—14	101	12	....	....	...	......	......	......	......	....		......
25.6	Jan.	89	—15	104	17	65	183	118	135	48.80	7.96	July	2.17	Oct.	128.0
24.6	Jan.	96	—10	106	18	200	38	128	85	31.49	5.55	July	0.61	Dec.	......
21.8	Jan.	95	—16	111	20	....	....	...	....	......	......	......	....	......	......
......	......	96	—12	108	....	....	....	...	86	31.02	2.35	Feb.	0.46	April	53.0
......	......	94	......	....	....	....	....	...	......	......	......	......	....	......	......
22.0	Jan.	96	—17	113	21	73	226	67	146	41.35	6.23	June	1.42	Dec.	70.5
24.8	Jan.	95	—13	108	21	181	107	78	127	35.38	5.78	June	0.77	Aug.	49.1
23.4	Mar.	92	—17	109	24	154	77	135	112	44.77	6.49	Oct.	1.44	Dec.	86.1
21.4		90	—20	110	19	93	122	151	143	41.65	6.39	July	1.46	April	89.0
......	......	94	—24	118	....	....	....	...	......	......	......	......	....	......	......
19.8	Jan.	98	—32	130	21	120	127	119	131	38.62	5.41	July	1.17	April	......
21.0	Jan.	95	—19	114	20	....	....	...	......	......	......	......	....	......	......
20.1	Jan.	95	—25	120	25	86	166	114	131	37.08	5.56	Mar.	0.77	April	66.7
20.0	Jan.	93	—23	116	20	187	96	83	155	37.02	4 54	Mar.	0.93	April	......
......	......	98	—23	121	....	....	....	...	......	......	......	......	....	......	......
17.9	Jan.	95	—30	125	24	....	....	...	......	......	......	......	....	......	......
......	......	96	—32	128	....	....	....	...	......	......	......	......	....	......	......
......	......	95	......	....	....	....	....	...	......	......	......	......	....	......	......
21.8	Jan.	93	—11	104	20	138	150	78	113	51.34	8.71	July	1.14	Dec.	53.5
17.0	Jan.	89	—23	112	16	143	94	129	119	39.28	5.36	Feb.	1.21	Dec.	71.1
17.2	Jan.	91	—26	117	22	97	108	161	124	34.76	5.12	July	0.80	April	73.7
21.9	Jan.	96	—17	113	22	....	....	...	......	......	......	......	....	......	......
20.7	Jan.	93	—20	113	22	91	126	149	134	36.62	4.18	July	1.40	Dec.	74.1
23.6	Jan.	97	—17	114	23	97	150	119	139	35.01	5.81	July	1.01	Dec.	53.8
20.3	Jan.	......	—14	....	....	....	....	...	......	......	......	......	....	......	77.5
14.7	Jan.	92	—38	130	20	92	139	135	150	43.26	6.36	Feb.	1.19	April	......
11.7	Jan.	90	—38	128	21	103	113	120	149	34.02	4.75	Sept.	1.11	Jan.	124.9
16.6	Jan.	92	—25	117	19	133	81	152	162	45.17	6.59	Mar.	0.96	April	85.5
15.4	Jan.	91	—32	123	20	79	184	103	144	34.47	5.23	Nov.	0.80	April	110 0
15.2	Jan.	85	—31	116	19	54	148	164	144	50.64	7.93	Feb.	1.84	April	184.9
27.2	Jan.	95	—12	107	16	154	104	108	109	42.10	6.63	Feb.	1.12	April	......
28.2	Jan.	95	— 3	98	15	150	100	116	124	42.15	6.67	June	0.87	April	73.5
......	......	92	......	....	....	209	68	89	85	36.46	4.91	June	1.46	Dec.	60.1
28 0	Jan.	94	— 6	100	14	134	118	114	124	37.99	6.38	June	1.24	April	58.4
26.6	Jan.	95	— 4	99	18	...	...	...	86	45.35	7.98	Feb.	0.90	Dec.	......
......	......	95	— 9	104	....	....	....	...	......	......	......	......	....	......	......
27.8	Jan.	91	— 5	96	15	139	113	114	106	37.28	6.46	Feb.	1.02	April	39.5
25.5	Jan.	94	—12	106	20	139	118	109	129	51.87	9.51	Feb.	0.91	April	75.9

METEOROLOGICAL DATA

LOCATION OF STATIONS.			BAROMETER.						TEMPERA-		
STATION.	COUNTY.	Elevation, feet.	Annual mean.	Highest monthly mean.	Month.	Lowest monthly mean.	Month.	Annual range.	Annual mean.	Highest monthly mean.	Month.
Hudson Valley									48.1	72.7	July
Albany	Albany	85	30.06	30.22	Jan.	29.90	Feb.	2.22	48.4	74.0	July
Lebanon Springs	Columbia	930							45.2	70.2	July
Honeymead Brook	Dutchess	450							46.6	70.8	July
Poughkeepsie	Dutchess	180							47.8	72.5	July
Wappinger's Falls	"								49.8	74.4	July
West Point	Orange	167							49.4	73.3	July
Carmel	Putnam	500							48.7	73.3	July
Mohawk Valley									45.3	70.2	July
Rome	Oneida	445							45.2	70.2	July
Champlain Valley									44.0	69.5	July
Plattsb'h Barracks	Clinton	125							42.8	69 5	July
Glens Falls	Warren	340									
St. Lawrence Vall'y									43.4	68.9	July
Malone	Franklin	810									
Madison Barracks	Jefferson	266								69.1	July
Watertown	Jefferson	486								70.3	Aug.
Canton	St. Lawrence	304							42 1	68.8	July
North Hammond	"	340							44.8	70 7	July
Ogdensburg	"	258							44.2	69.8	July
Potsdam	"	300							41.7	67.8	July
Great Lakes									47.4	71.0	July
Westfield	Chautauqua								49.0	71.6	July
Buffalo	Erie	690	30.05	30.19	Dec	29.90	Feb.	1.45	47.2	70 0	July
Pittsford	Monroe									70.4	July
Rochester	Monroe	520	30.04	30.17	Dec.	29 89	Feb.	1.89	47 7	72.0	July
Appleton	Niagara	330							46.9	70.2	July
Fort Niagara	"	263							48.1	72.8	July
Baldwinsville	Onondaga	390							47.3	72.6	July
Oswego	Oswego	304	30.03	30.18	Dec.	29.87	Feb.	2.02	45.0	69.0	*b*
Palermo	"	460							45.2	69.9	July
Lyons	Wayne	407									
Erie, Pennsylvania	Erie	681	30.06	30.19	Dec.	29.93	Feb.	1.68	49.0	71.0	July
Central Lakes									47.8	71.4	July
Fleming	Cayuga	1000							47.7	71.7	July
Romulus	Seneca	719							48.1	71.5	July
Ithaca	Tompkins	810	30.05	30.18	Dec.	29.90	Feb.	2.12	47.7	70.9	July
Mean			30 05	30.18	*a*	29.90	Feb.	1.93	46.1	70.4	July

(*a*) January, December; (*b*) July, August;

NOTE.— The annual mean temperatures and average total precipitation, also the extremes table.

FOR THE YEAR 1896 — (*Concluded*).

TURE—(IN DEGREES FAHR.).						SKY.			PRECIPITATION—(INCHES).						
Lowest monthly mean.	Month.	Maximum.	Minimum.	Annual range.	Mean daily range.	Number of clear days.	Number of partly cloudy days.	Number of cloudy days.	Number of days on which 0.01 or more inches fell.	Total for the year.	Greatest monthly.	Month.	Least monthly.	Month.	Total snowfall.
21.1	Jan....	97	—21	118	20	131	110	125	114	41.98	6.14	Mar...	1.07	Jan ...	......
20.0	Jan....	95	—16	111	18	118	128	120	130	27.88	4.66	Mar...	0 73	Dec ...	54.5
18.8	Jan....	93	—21	114	21	97	111	158	104	40.56	5.83	Sept	0 87	Jan ...	64.0
20.6	Jan....	91	—18	109	19	93	146	127	129	43.95	7.60	July ..	0.83	Apr...	47.3
21.0	Jan....	96	—11	107	22	144	110	112	87	36.47	6.20	Mar...	0.88	Jan ...	63.3
22.4	Jan....	96	—20	116	21	137	123	106	137	46.98	7.84	Mar...	1.18	Apr...	85.2
22.8	Jan....	97	—11	108	19	....	....	...	98	45.90	12.02	Mar...	1.19	Jan. ..	......
21.9	Jan....	93	—10	103	18	198	139	129	110	44.20	7.69	Feb...	1.10	Jan ...	54.4
28.4	Feb ...	96	—19	115	20	....	....	...	139	40.26	7.59	Feb...	1.25	Apr...	......
20.4	Feb ...	96	—19	115	20	....	....	...	139	42.12	7.59	Feb...	1.25	Apr...	......
16.0	Jan....	95	—25	120	18	....	....	..	104	40.51	6.52	Mar...	1.02	Apr...	......
14.4	Jan....	95	—25	120	18	....	....	...	104	......	......	....	...	....	85.5
17.7	Jan....	......	—16	....	....	....	....	...	......	41.38	6.52	Mar...	1.08	Jan ...	68.8
13.4	Jan....	96	—43	139	20	101	135	130	89	34.62	4.94	Sept ..	1.10	Dec...	......
......	....	88	......	....	....	....	....	...	......	......	......	......	...	....	......
16.1	Jan....	87	—40	127	....	....	....	...	75	33.01	5.84	Sept ..	0 38	Apr...	80.2
......	....	96	......	....	....	....	....	...	......	......	......	......	...	....	......
13 2	Jan....	92	—43	135	21	104	153	109	......	37.43	5.46	Sept ..	0.80	Dec...	107.0
15.3	Jan....	92	—36	128	....	38	148	180	111	29.74	4.50	Sept ..	1.02	Dec...	68.7
14.2	Jan....	91	—28	119	19	129	138	99	......	......	......	......	...	....	73 3
11 2	Jan....	89	—31	120	20	134	102	130	82	31.39	5.10	Sept ..	0.83	Dec...	97.0
23.4	Jan....	98	—30	128	16	113	109	144	136	35.24	4.91	July...	0.89	Apr...	......
26.7	Mar...	98	—12	110	17	168	73	125	92	34.71	4.73	Sept .	1 22	Apr...	......
25.0	d	86	— 9	95	14	61	137	168	152	37.29	6.35	July...	0.84	Dec...	......
......	....	91	......	....	....	....	....	...	......	......	......	......	...	....	......
23.0	Jan....	92	—10	102	16	122	121	123	173	36.84	6.32	Mar...	0.58	Oct ...	127.0
24.3	Jan ...	90	—12	102	16	98	108	160	133	28.41	5.27	July...	0.43	Apr...	56.4
24.4	Jan..	93	— 5	98	18	....	....	...	104	24.98	3.77	July...	0.51	Apr...	22.9
19.5	Jan ...	94	—22	116	18	172	75	119	126	39.23	6.39	Feb...	0 71	Apr...	91.1
21.0	Jan....	90	—20	110	14	91	93	182	166	38.32	5.89	July ..	1.06	Apr...	83.2
18 4	Jan....	96	—30	120	18	....	....	...	124	33.57	5.13	Feb...	0.41	Apr...	88.0
24 2	Jan....	....	—14	...	....	....	....	...	......	......	......	......	...	....	90.0
27.0	Jan....	92	— 7	99	13	76	157	133	152	36.81	5.50	July...	1 46	Apr...	......
22.9	Jan....	95	—18	113	17	112	115	139	147	37.37	4.58	July...	1.12	Dec...	......
22.8	Jan....	93	—17	110	17	....	....	.	68	34.59	4.93	Sept ..	0 40	Dec...	80.0
23.2	Jan....	95	—17	112	18	131	93	142	83	41.79	5.10	Sept ..	2.08	Dec...	49.9
22.8	Jan....	94	—18	112	17	93	137	136	143	36.17	4.75	Mar ..	1.00	Dec...	59.5
20.2	Jan....	98	—43	141	19	117	121	128	124	39.13	5.52	Feb...	1.22	Apr...	78.2

(*c*) January, March; (*d*) January, February, March.

for the regions and for the State, are derived from the monthly values as shown in the succeeding

MONTHLY AND ANNUAL TEMPERATURE

LOCATION OF STATIONS.		TEMPERATURE—							
STATION.	COUNTY.	January.	February.	March.	April	May.	June.	July.	August.
Western Plateau		23.2	24.4	24.2	49.5	62.6	64.7	69.6	67.5
Alfred	Allegany	21.5	22.4	21 9	48.2	61.0	62.1	67.4	66.0
Angelica	"	22.1	23.5	23 3	48.2	60 8	62.7	68.2	65.2
Bolivar	"	....	....	....	47.0	61.0	62 2	67.0	66.0
Friendship	"	23 2	25 2	24.4	49.5	62.0	64.1	68.2	65.6
Franklinville	Cattaraugus	....	....	....	....	....	....	....	....
Humphrey	"	24.0	24.2	24.9	49.0	62 0	62.9	67.5	65.6
‡Arkwright	Chautauqua	24.0	23.0	24.4	48.4	60.7	64.0	68.7	66.0
Cherry Creek	"	....	....	....	....	....	...	....	....
Jamestown	Chautauqua	25.6	25.8	26.6	50.8	63.0	64.4	69 0	66.9
Elmira	Chemung	24.6	27.2	28.2	54.2	65.2	67.7	73.4	71.6
Pine City	"	....	....	....	...	....	....	....	....
Akron	Erie	....	....	....	....	....	....	....	....
Avon	Livingston	21.8	24.8	24 4	50.4	63.1	67.0	72.0	68.8
Mt. Morris	"	24.9	26.6	26.7	50.6	70.0	67.4	73.3	70 4
Lockport	Niagara	....	....	....	51.2	63.2	68.4	73.2	70.4
Victor	Orleans	22.4	24 8	25.2	....	....	66.2	....	....
Tyrone	Schuyler	....	....	....	....	....	....	....	....
Wedgewood	"	22.0	22.6	23 9	49.3	62.5	66.0	71.0	70.3
Addison	Steuben	24.8	26.2	25.4	50 0	62.4	64 0	70.0	68.4
Atlanta	"	....	....	....	....	....	....	....	....
Haskinville	Steuben	....	....	....	....	....	....	....	....
South Canisteo	"	23.6	24.2	23.4	48.0	61.3	62.1	67.4	65.9
Arcade	Wyoming	21.4	21.8	21.4	47 8	60.9	63.1	68.1	65.2
Varysburg	"	21.8	24.0	23.2	49.3	62 0	66.0	69.8	68.0
Eastern Plateau		19.8	23.4	24 5	48.6	61.1	63.9	69.7	67.9
Binghamton (1)	Broome	21.0	24.8	24.4	49.8	62.2	64.6	71.0	68.1
Binghamton (2)	"	....	...	....	...	....	....	....	....
Oxford	Chenango	20.1	23.7	24.6	47.2	60.0	63.8	69.6	67.4
Cortland	Cortland	20.0	22.2	23.2	47.6	60.2	63.4	69.2	67.6
Bloomville	Delaware	18.1	23.2	22.4	50.4	62.3	63.2	70.6	70.0
Deposit	"	....	....	....	....	....	....	....	....
South Kortright	"	17.9	23.3	24.6	45.8	58.4	61.6	68 0	65.8
Elka Park	Greene	....	....	...	....	....	....	67.2	67.1
Brookfield	Madison	*18.1	23.2	24 8	52.4	59.2	62.9	72.2	69,8
Hamilton	"	17.3	21.2	21.6	46.8	59.0	....	....	....
Middletown	Orange	21.3	22 5	27.4	49.6	65.7	67.8	71.6	....
Port Jervis	"	21.8	26.0	28.4	51.3	64 0	62 2	72.2	69.6
Warwick	"	....	....	....	....	....	....	....	....
Cooperstown	Otsego	17.0	20.7	22.3	46.3	59.5	63.3	67.8	66.6
New Lisbon	"	17.2	21.2	21.7	46.0	57 6	60.8	66.7	64.8
Oneonta	"	21.9	26.0	27.3	49 9	62.6	65.0	71.2	69.4
Perry City	Schuyler	20.7	22.8	22.0	48.9	61.1	64.5	70.1	66.8
Newark Valley	Tioga	....	....	....	....	....	....	....	....
Straits Corners	"	....	....	....	....	...	....	....	....
Waverly	Tioga	23.6	26.2	26.4	51.0	62.8	65.0	71.0	70.2
Dryden	Tompkins	....	....	....	....	....	....	....	68.4
Mohonk Lake	Ulster	20.3	23.8	26.3	46.8	61.6	62.7	67.0	67.2
Northern Plateau		14.7	18.1	19-9	43.3	58 1	61.6	67.7	65.8
Saranac Lake	Franklin	11.7	15.1	17.7	40.2	58.5	62 0	66.8	65.5
Gloversville	Fulton	16.6	20 1	22.8	46.5	59.4	63.0	69.8	67.7
North Lake	Herkimer	....	....	....	....	....	....	....	....

AND PRECIPITATION, 1896.

DEGREES (FAHR.).					PRECIPITATION—(INCHES).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
58 6	44 8	42.3	27.5	46.6	2.31	4.14	3.52	1.36	2.79	3.48	5.64	2.48	4.59	3.49	2.19	1.38	37.37
57.7	43.7	41.1	25.5	44.9	2.51	3.28	4.33	1.69	2.62	4.07	4 49	1.11	5.04	5.02	2.15	1.64	37.95
56.9	43.0	41.6	25.7	45.1	2.34	4.16	4.21	1.58	1.99	3.26	5.66	2.63	4.96	3.18	2.08	1.23	37.28
56.4	44.0	41.5	26.8	....	1.95	2.93	3.79	1 48	4.70	4 29	7.75	1 25	4.86	0 03	....	1.38	.....
58.2	43.6	42 2	27.4	46.1	2.03	3.23	3.45	1.58	3 09	3.22	4 54	1.83	5.65	4.03	2.20	1.40	36.34
....	....	41.8	26.6	....	....	....	....	....	....	....	....	---	....	....	3.18	1.61	.....
57.4	44.2	41.6	28.2	46.0	2.43	4.83	3.33	1.31	3.35	3.64	7.50	4.49	5 05	3.00	2 93	1.62	43.47
57.5	45.1	42.1	28.8	46.1	....	....	....	....	....	....	....	....	....	....	....	.....	.....
....	....	....	....	....	3.60	5.62	4.29	2.69	3.22	2.93	5.22	3.63	4.64	2.54	4.09	2.97	45.44
58.8	45.8	42.8	26.6	47.2	3.08	5.57	5.21	2.48	3.77	3.29	7.96	3.46	5.48	2.17	3.70	2.63	48.80
61.8	37.2	45.2	30.0	49.7	1.56	3.40	3.22	0.77	3.14	3.31	5.55	0.94	2.73	4.86	1.43	0 61	31.49
....	....	....	....	....	1.82	4.04	3.16	0.97	....	....	....	....	3.35	5.04	0.93	0.88	....
....	....	....	....	....	3.08	3 02	3.95	1.04	1.96	2.32	5.45	3.29	6.03	1.80	2.53	1.26	35.73
58.8	45.3	41 2	27.8	47 1	1 97	....	3 23	1.05	1.98	1.97	4.87	3.92	3.82	1.48	1.82	0.79	.....
60.4	....	---	....	....	2.60	5.35	1.92	0.46	1.66	2.82	4.91	1.85	3.94	1.41	2.60	1.50	31.02
60.0	47.2	42.6	30.3	....	....	....	....	0.40	1.15	1.43	6.50	1.36	4.45	1.27	2.15	1.35	.....
....	44 6	....	....	....	1.82	4.72	....	0.92	2.33	2.05	....	4.29	....	1.61	....	.....	.....
....	....	....	....	---	1.67	....	....	....	1.90	3.30	4.73	2.18	3.78	4.02	....	1.08	.....
60.8	45 1	42 2	26.4	46.8	1.72	5.62	3.43	2 52	2.98	6.23	5.02	1.54	5.02	4 42	2.03	1.42	41.85
59.7	46.0	44.3	28.8	47.5	1 47	3.18	3.05	1.07	4.50	5.78	4.45	0 77	3.67	5 73	0.83	0.88	35.38
....	....	....	....	....	2.13	2.50	2.41	---	....	---	....	2.61	2.66	3.42	1.82	0.85	.....
....	....	....	---	....	2.06	3.41	2 43	0 64	1.72	3.19	5.46	1.86	4.84	3.80	1.46	0.99	31.86
58.0	44.6	43 0	27.1	45.7	2.76	5.62	3.71	1.25	4 03	6.22	5.01	1.62	5 10	6.49	1.82	1.14	44 77
56.9	42.9	41.2	25.8	44.7	2 35	3.86	3.50	1.36	2.48	3.19	6 39	3.77	5.18	3.22	3.68	1 66	41.64
59.0	44 3	....	....	....	3.25	4 93	3.95	1 93	3.27	3.06	5.71	3.79	5.15	2.63	....	.....	.....
58.9	45 4	42.4	25.9	46.0	1.54	4.83	4.88	1.17	2.71	3.72	5.41	2.42	4.44	3.08	3.10	1.32	38.62
60.4	46.4	43.6	26 9	46 9	....	4.28	4.68	0.63	3.11	2.64	3.85	1.42	4.62	3.68	2.66	1.20	.....
....	....	44 0	27 0	....	....	....	....	....	....	....	....	....	....	....	1.78	0.77	.....
58.2	43.8	40.1	24.0	45.2	1.99	4.97	5.56	0.77	3.55	2 96	5.37	2.71	2.15	2.69	2.66	1.72	37.08
59.3	44.8	42.8	29.2	45.5	1.86	4.50	4.54	0.93	2.73	3.44	4.36	2.15	3.70	3 32	3.17	2.32	37 02
61.4	....	43 0	....	....	2.26	3.64	2.84	1.69	2.76	3.31	5 82	2.49	4.06	3.25	3.86	.....	.....
....	....	---	....	....	1.30	3.25	3.60	....	....	....	....	....	....	....	....	.....	.....
57.1	42.6	39.8	23.6	44.0	....	4 81	3.76	1.48	2.94	2.75	5.50	2.12	3.68	2.35	2.83	1.37	.....
56.8	....	....	....	....	---	....	....	....	....	---	7.12	3.62	7.42	....	....	.....	.....
56.7	47.8	....	....	....	1.50	5.69	4.23	1.20	1.54	2.75	3.29	2.82	1.97	1.37	....	.....	.....
....	....	....	....	....	1.38	3.02	3.52	0.90	2.72	....	....	....	....	....	---	.....	.....
....	....	....	....	....	1.89	7 00	8.09	1.40	2.86	6.43	5.07	---	....	3 52	....	.....	.....
61.4	47.7	43.3	27.4	48.3	1.55	6.51	6.60	1.63	2.88	5.54	8.71	2.51	5.43	3.53	5 31	1.14	51.34
---	....	....	....	....	0.97	4.97	4.86	1.49	2.83	6.21	6.05	2.19	8.12	2.66	3.67	1.22	45.24
56 5	44.3	41.1	24.0	44.1	1.48	5.36	4.74	1.25	2.33	4 70	4.60	3.49	4 33	2.23	3.56	1.21	39,28
56 2	42 8	39.6	23.0	43.1	0.86	4.31	3.96	0.80	2.42	3.77	5.12	2.45	5 07	2.09	2.96	0.95	34.76
60 6	47.3	45.4	28.5	47.9	....	7.44	4.79	1.39	2.25	3.39	7.02	3 61	3.13	2.26	2 20	0.96	.....
57.0	43.6	41.0	25.4	45 3	1.68	3.58	3.70	1.58	3.81	3.67	4.18	2.54	3.97	4.07	2 44	1.40	36.62
....	....	....	....	....	1.30	4.55	3.98	0.39	2.95	3.00	5.71	1.08	3.24	4.26	2.21	1.22	33.89
....	---	41.2	25.0	....	....	....	....	....	....	....	....	....	....	....	2.95	1.43	.....
61.6	46.8	44.4	28.6	48 1	1.66	4.07	3.40	1.18	2.41	2.85	5.81	1.57	3.57	4.90	2.58	1.01	35.01
60.2	....	....	....	....	....	....	....	....	....	....	....	1.72	....	....	....	.....	.....
60.8	47.2	43.8	27.2	46.2	1.49	4.99	11.07	....	2.11	2.22	4.32	2.70	6.64	3.11	4.79	1.90	.....
55.8	42.7	37.5	19.3	42 0	2.25	6.36	5.56	1.19	2.63	2.87	4.80	2.58	5.24	2.85	5.09	1.84	43.26
55.3	41.8	35.8	16.1	40.5	1.11	4.28	4.31	1.37	1.98	3.70	4.19	2.78	4.75	1.31	2.80	1.44	34.02
58.2	44.8	39.6	23.3	44.3	1.47	5.90	6.59	0.96	3.19	3.79	4.95	2.01	6.21	3.06	5.37	1.67	45.17
54.6	41.7	36.0	18.4	....	....	....	....	---	....	....	....	....	5.59	2.90	6.21	2.70	....

MONTHLY AND ANNUAL TEMPERATURE

LOCATION OF STATIONS.		TEMPERATURE—							
STATION.	COUNTY.	January.	February.	March.	April.	May.	June.	July.	August.
Northern Plateau (Con.)									
Lowville	Lewis	15.4	18.8	21.0	44.4	59.0	62.4	69.2	66.6
Number Four	"	15.2	17.5	18.6	42.5	56 2	59.0	65.0	63.2
Turin	"	14.2	18 8	19.5	42.7	57 6	....	....	....
Kings Station	Saratoga	....	....	....	....	....	....	....	....
Atlantic Coast		27.2	30.5	32 4	49.4	62.8	66.1	73 0	72.3
Brooklyn	Kings	28.2	31.0	33.6	53.0	65.8	68 8	75.5	74.2
Manhattan Beach	"	....	....	....	46.8	60.3	64.5	71.2	71.8
New York city	New York	28 0	30.0	32 0	50.0	64.0	66 0	73.0	73.0
Willet's Point	Queens	26 6	30.4	31.3	48 8	63 3	66.4	73.2	73.0
Brentwood	Suffolk	....	....	32.0	47.8	61.2	66.6	73.6	71.9
Setauket	"	27.8	31.3	33.1	48.7	61.5	65.7	72.8	72.2
Bedford	Westchester	25.5	29.9	31.8	50.5	63.3	64.9	71.5	69.9
Primrose	"	....	....	....	....	....	....	....	....
Hudson Valley		21 1	26.2	28.1	49 9	63 3	65.7	72.7	71.4
Albany	Albany	20.0	25.0	27.0	50.0	64 0	68.0	74.0	73.0
Lebanon Springs	Columbia	18.8	24 6	25.7	46.1	59 0	62.6	70.2	68 0
Honeymead Brook	Dutchess	20.6	25.2	26.4	48 9	62.2	64 3	70.8	68.6
Poughkeepsie	"	21.0	27.2	28 4	50.2	62.6	64.5	72.5	72.4
Wappinger's Falls	Dutchess	22.4	28.2	31.2	52.8	65.8	67.6	74.4	73.6
Catskill	Greene	....	....	....	....	....	....	72.8	71.6
West Point	Orange	22.8	26.4	29.5	50.3	65.7	65.4	73.3	73.0
Boyd's Corners	Putnam	....	....	....	....	....	....	....	....
Carmel	Putnam	21.9	26.8	28.6	50.7	64.0	67.3	73.3	71.1
Southeast Reservoir	"	....	....	....	....	....	....	....	....
Eagle Mills	Rensselaer	....	....	....	....	....	....	....	....
Easton	Washington	....	....	....	....	....	....	....	....
Mohawk Valley		20.6	20.4	24.2	48.5	60.4	65.2	70.2	67.8
St. Johnsville	Montgomery	....	....	....	....	....	....	....	....
Rome	Oneida	20.6	20.4	24.2	48.5	60.4	65.2	70.2	67.8
Champlain Valley		16.0	18.4	23.2	45.2	58.8	64.4	69.5	68.0
Plattsburgh Barracks	Clinton	14 4	16 0	21.5	43.3	58.4	64 1	69.5	67.4
Glens Falls	Warren	17.7	20.8	24 8	47.2	59.1	64.6	....	68.7
Lake George	"	....	....	....	....	....	....	....	....
St. Lawrence Valley		13.4	16 5	21.4	45.8	59.3	63 9	68.9	68.0
Malone	Franklin	12.2	15.3	19 6	43 0	58.2	62.0	67 6	65 6
Madison Barracks	Jefferson	16.1	19.7	23.1	46.0	59.2	63 0	69.1	....
Watertown	"	....	....	24.7	49.8	60.5	65.2	68 8	70.3
Canton	St. Lawrence	13.2	15.4	19.6	44.8	58.2	62 6	68.8	66.7
DeKalb Junction	St. Lawrence	....	....	....	....	....	....	....	....
North Hammond	"	*15.3	17.2	21 6	47.1	61.2	66.7	70.7	70.0
Ogdensburg	"	14.2	17.3	22 5	45.2	59.5	64.8	69.8	69.0
Potsdam	"	11.2	13.9	19.1	44.4	58.2	62.7	67.8	66.6
Great Lakes		23.4	24 9	25.4	49.0	61.2	65.4	71.0	69.7
Dunkirk	Chautauqua	....	....	....	....	....	....	....	....
Westfield	"	27.7	28.0	26.7	50.8	63.0	66.5	71.6	69.0
Buffalo	Erie	25.0	25.0	25.0	47.0	58.5	66.0	70.0	69.0
Adams Center	Jefferson	....	....	....	....	....	....	....	....
Pittsford	Monroe	....	25.2	25.0	50.2	62 2	65.4	70.4	68.8
Rochester	"	23.0	25.0	25 0	50.0	63.0	66.0	72.0	70.0
Scottsville	Monroe	....	....	....	....	....	....	....	....
Appleton	Niagara	24.3	24 9	26.1	47.7	59 9	64.1	70.2	69.2
Fort Niagara	"	24.4	24.8	26.4	47.6	59.9	65.6	72.8	71.8
Niagara Falls	"	....	....	....	....	....	....	....	....
Baldwinsville	Onondaga	19.5	23.1	24.1	49.9	63.4	67.6	72.6	71.1

AND PRECIPITATION, 1896 — (*Continued.*)

(Degrees Fahr.).					Precipitation — (Inches).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
56.4	43.4	39.0	20.2	43 0	2.32	4.73	4.88	0 80	2.03	1.83	3.50	2.45	3.09	2.15	5.23	1.46	34 47
54 3	41.9	37.2	18.5	40.8	3.04	7.93	6 55	1 84	2.16	2.81	7.05	3 47	5.01	3.44	4.75	2 59	50.64
....	....	....		....	4.42	9 11	4 63	1 48	2.96	....	....		....	....	....	....	....
....	....	....	....	....	1.15	6.20	6.40	0.70	3.47	2.21	4 30	2.19	6.79	4.25	6.17	1.17	45.00
63.9	51.4	47.2	30.4	50.6	1.54	6.63	5.55	1.12	2.48	5.37	4.68	2.85	4.48	2.46	3.29	1.71	42 10
65.6	52 9	48.7	31.5	52 4	1.54	6 19	6.14	0 87	2.31	6 67	4.23	3 22	4 49	1 73	3.06	1.70	42.15
63.5	51.2	47 8	30.4	....	2.50	4 12	4.48	1 93	1.94	4.91	3.59	2 92	4 37	1 64	2 60	1.46	36.46
65 0	52.0	48.0	32.0	51.1	1 25	5.50	6 13	1.24	2.01	6.38	4.45	2 46	3 04	1.71	2.12	1.70	37 99
64.8	51.6	47.1	31.6	50.7	1.10	7.98	7.41	1.13	2.66	6.01	5.79	1 64	5.68	2.43	2.62	0.90	45.35
62.8	50 4	46.2	28.6	....	....	....	2.82	0.73	2.18	5.00	4 70	4.20	....	4.10	5.10	2.70	....
63.9	52.5	48.4	32.8	50 9	1.48	6.46	4.81	1.02	3.10	4.10	2 74	2.35	3.62	2.87	3.21	1.62	37.38
61.7	49.2	45.4	28.5	49.3	1.40	9.51	7.03	0.91	3 16	4 52	7.29	3.14	5.69	2.35	4·69	2.18	51.87
....	....	45 8	28.2	....	....	....	....	....	....	....	....	....	....	...	2.91	1.47	....
61.1	48.5	43.4	25.3	48 1	1.07	5.95	6 14	1.34	2.52	3.52	4.38	3 97	5.52	2.63	3.13	1.81	41.98
62.0	48.0	44.0	26 0	48.4	0 98	4.03	4.66	0 98	1.55	2.49	3.57	2.25	3.31	1.53	1.80	0.73	27.88
58.3	45.2	40 6	23.6	45 2	0 87	4.92	5.22	1.86	1.50	4.49	4.26	4 48	5.83	3.07	3.15	0.91	40.56
59 7	46.6	41.8	24.2	46 6	0.91	5 47	5.34	0.83	3.17	2.40	7.60	4.35	7.21	2.96	2 24	1.47	43 95
60.7	48.2	43.2	23 2	47.8	0.88	5 98	6 20	1.11	2.50	2.71	3.33	2.28	5 70	2.66	1.45	1.67	36.47
60.6	50.0	45.4	25.6	49 8	1.36	6.19	7.84	1.18	3.58	3.52	5.40	2 46	7.01	3 34	3.17	1 93	46.98
62.2	49.0	44.2	26.6	....	....	....	....	....	....	....	5.09	2.30	5 24	2.39	3.54	1.35	....
63.0	51.8	44.0	27.6	49 4	1.19	4.46	12.02	1.98	2 89	4.07	2.50	1.96	5.74	2 36	5.10	1.63	45.90
....	....	....	....	....	1 09	8 41	8.30	1.13	3.48	3.47	3.98	4.60	6.54	2.21	3.96	2.72	49 89
62 2	49.0	43.6	25.8	48.7	1 10	7.69	6.90	1.20	2.79	3.32	3.54	4.32	5.18	2.63	3 43	2.10	44 20
....	....	...	....	....	1.30	7.18	6.80	1.48	2.93	4.00	4.28	3.74	5.17	2.39	3 38	2.03	44.68
....	....	....	....	....	1 30	6.53	2.60	1.60	0.80	4.75	3.23	3.17	4.04	2 83	2.00	0.35	33.20
....	....	....	....	....	0.75	4.61	4.52	....	....	....	5.76	3.78	5.30	3.17	4.30	1.20	....
58.9	45 2	39.1	23.2	45.3	2.17	7.59	4.74	1 25	2.85	1.51	6.04	1.92	4 57	1.90	3.86	1.86	40.26
....	....	....	24.1	....	....	....	....	...	....	....	....	....	....	....	2.45	1.19	....
58.9	45.2	39.1	22.2	45 2	2 17	7.59	4.74	1 25	2.85	1.51	6.04	1.92	4 57	1.90	5.06	2.52	42.12
58 0	44.6	40.1	21.8	44 0	1.56	5.81	6.52	1.02	1.69	2 90	4 76	4.38	3.83	2.66	4.31	1.07	40.51
57.1	43 7	39 0	19 2	42.8	2 05	6.21	....	0.85	1.85	2.80	5.00	5.95	2.85	1.68	2.19	0.87	....
58.8	45.4	40.2	22.4	....	1.08	5 41	6.52	1.20	1.53	3.01	4.53	2.80	4.81	3.65	5.55	1.29	41.38
....	....	41 2	23 8	....	....	....	....	....	....	....	....	....	...	....	5.18	1.06	....
58.0	44.6	39.6	21.8	43.4	1.49	4.82	3.84	1 41	1.96	3.22	3.85	3 70	4.94	1.33	2.96	1.10	34.62
....	....	....	....	....	1.34	6.47	4.75	2.17	1.26	4.57	5.71	3.63	...	....	....	....	....
58.6	46.3	41.2	22.2	....	1.05	5.30	1.96	0.38	2 41	1.54	4.02	3.70	5.84	2 24	2.96	1.61	33 01
58.1	45 6	41.2	23.0	....		....	5.23	1.37	2.36	3.28	3.71	3.26	4.43	1.72	4.42	1.48	....
56.2	42.8	37.0	19.8	42.1	2 25	5.45	4 49	2.66	1.51	3 39	3.25	3.89	5 46	1.02	3.26	0.80	37.43
....	....	....	....	....	1 40	3.81	3.30	1 28	1.84	5.31	4.56	3.03	5.61	1.08	2.76	0.91	34.89
58.8	45.2	41.1	22.8	44.8	1.06	3.20	3 34	1 33	2.78	2.36	2.43	4.06	4.50	1.35	2.31	1.02	29 74
59.1	46.0	39.8	22.9	44.2	1 09	....	....	0.72	2.10	2.57	3.98	4.76	3.64	0.73	3.01	1.06	....
57.3	41 9	37.1	20.2	41.7	1.80	4.66	3.81	1.37	1.46	2.76	3.13	3 31	5.10	1.14	2 02	0.83	31.39
59.9	47.1	43.1	28.9	47.4	2.70	4.64	4.00	0.89	2.36	2.27	4.91	2.71	4.20	1.71	3.13	1.72	35.24
....	....	....	....	....	...	....	....	....	....	3.09	....	....	....	....	....	....	....
60 0	47.5	44 8	31.9	49.0	2.00	4 65	2.58	1.22	1.94	2.90	3.07	4.05	4.73	1.40	4.81	1.36	34.71
60.0	48 0	43.0	30.0	47.2	3.28	5.02	3.61	0.93	2.51	1.46	6.35	3.68	4 39	1.90	3.32	0.84	37.29
....	....	....	....	....	....	....	....	....	1.90	1.88	4.33	2 60	3.66	1.77	2.89	1.65	....
58.6	46.3	43.1	29.0	....	....	4.29	4.84	0.89	2.05	2.07	5.04	3.34	3.73	1.19	2.28	2.04	....
60.0	47.0	42.0	29.0	47.7	3.38	5 37	6 32	1.09	1.64	2.80	4.75	2.71	3.50	0 58	4.49	2.21	36.84
....	....	....	....	....	....	....	....	0.90	1 44	3 08	4.24	2.44	3.36	0.59	....	....	....
48.8	45.8	42.6	29.6	46.9	3 10	3 25	2.65	0 43	2.96	1,60	5.27	0 72	4.17	1.15	2.00	1.11	28.41
60.8	47.6	44.0	31.0	48.1	2.80	2.71	2 54	0.51	2.36	1.79	3.77	1.00	3.71	1.37	1.86	0.56	24.98
....	....	....	....	....	....	....	....	....	....	....	....	2.11	3.98	2.03	2.66	1 09	....
60.3	47.5	42.6	26.3	47.3	3.53	6.39	4.52	0.71	2.70	1.49	4.34	3.06	5.63	2.67	3.07	1.72	39.23

MONTHLY AND ANNUAL TEMPERATURE

LOCATION OF STATIONS.		TEMPERATURE —							
STATION.	COUNTY.	January.	February.	March.	April.	May.	June.	July.	August.
Great Lakes (Continued).									
Skaneateles	Onondaga	....	....	....	....	....	....	....	....
Ridgeway	Orleans	....	....	....	....	....	....	....	....
Demster	Oswego	....	....	....	....	....	....	....	....
Fulton	"	....	....	....	....	....	....	....	....
Oswego	"	21.0	23.0	24.0	47.0	58.0	63.0	69.0	69.0
Palermo	Oswego	18.4	21.0	22.6	47.4	59.5	63.4	69.9	69 4
Phœnix	"	....	....	....	....	....	....	....	....
Lyons	Wayne	24.2	25.8	26 2	50.7	63.3	66.1	....	70.0
Rose	"	....	....	....	....	....	....	....	....
Erie, Pa	Erie	27.0	28.0	28.0	51.0	63.0	66.0	71.0	69.0
Central Lakes		22.9	24.9	25.1	50 7	62.7	66 0	71.4	70 2
Fleming	Cayuga	22.8	24.6	24.8	50.4	62.6	66.4	71.7	70.4
Sherwood	"	....	....	....	....	....	....	....	....
Watkins	Schuyler	....	....	....	....	....	....	....	....
Romulus	Seneca	23.2	24.9	25.2	51.3	63.4	66 2	71.5	70 2
Ithaca	Tompkins	22.8	25.2	25.2	50.4	62.4	65.3	70.9	69.9
Mean		20.2	22.8	24.8	48.0	61.0	64.7	70.4	68 9

* Mean temperatures are derived from tri-daily observations. ‡Mean temperatures are de
(2) United States Weather Bureau. All means not otherwise indicated are derived from maxi
NOTE —The mean temperature and average total precipitation for the several regions are

AND PRECIPITATION, 1896 — (*Concluded*).

DEGREES (FAHR).					PRECIPITATION — (INCHES).												
September.	October.	November.	December.	Annual mean.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual total.
....	....	....	....	....	2.08	3.84	5 56	0.97	2.15	2.31	5.39	4.05	5.08	3.48	2.73	1 44	39.08
....	....	....	....	..	3 00	2 95	2 00	0.57	2 51	2.28	6.18	1.11	4.13	0.96	2.38	0.89	28.96
....	....	....	....	....	1.61	4.76	3.53	1.13	2.45	2.33	5 97	2.47	4 31	2.31	3.33	3.82	38 02
....	....	....	...	....	3.93	7.35	4.74	....	2.94	2.49	3.64	2 76	5 88	2 52	4.11	2.29	...
60.0	47.0	43.0	27.0	45.9	2 04	4.90	4.79	1.06	2.46	1.57	5.89	3.00	4 05	1 45	3.95	3.16	38.32
59.6	46.2	41.2	23 6	45.2	2.00	5.13	3.67	0 41	2.36	2.31	5.07	2 13	2.51	2.02	3.60	2.36	33.57
...	....	...	....	....	1.52	5.23	6.26	0 90	2 59	1.54	2 35	3.27	5.15	2.46	4 27	0.86	36.40
60 3	47.4	43.8	29.0	....	2 57	4.28	5 25	1.02	2.27	2.42	....	3.05	3.72	1.26	3.24	1 64	....
....	....	....	....	....	2.63	4.87	4.73	0.98	3.04	1.32	4.71	2.68	4.59	1,76	3 64	2.07	37.02
61.0	48.0	44.0	32.0	49.0	1.52	3.96	3.41	1.46	2 63	4.67	5.50	3.47	3 72	2.01	2.90	1 56	36.81
60.9	46.8	44.3	27.9	47 8	1.86	4.41	4 50	1.49	3.15	3.04	4.58	2.74	4 55	3.61	2.32	1.12	37.37
60.8	46.5	44.0	27.4	47.7	1.80	4.29	3.95	1.40	2.42	2.41	4.29	2.72	4 93	3.10	2.88	0.40	34.59
....	....	....	....	....	1.84	5 09	4.85	0.63	3.03	2.97	5.41	2.64	4.33	3.66	2 14	1.06	37.63
....	....	....	...	....	....	....	....	..	....	....	....	....	...	....	1.67	1.06	....
61.2	47.1	41 3	28.6	48.1	2.34	3.66	4 47	2.90	4 50	2 43	4.92	3.17	5.10	3.30	2 92	2.08	41.79
60 6	46.7	44 7	27.7	47.7	1 46	4.61	4.75	1 02	2 64	4.36	3.69	2.43	3.84	4.37	2.00	1.00	36.17
59.4	46.1	41.9	25.2	46 1	1.85	5.52	4.92	1.22	2.52	3 19	4.90	2.98	4.63	2.57	3.34	1.49	39.13

rived from maximum and minimum by the Draper thermograph. (1) Voluntary observer.
mum and minimum by the ordinary self-registering thermometers.
derived from the monthly values for the region.

STATISTICS OF TEMPERATURE.

STATION.	COUNTY.	TEMPERATURE (DEGREES FAHR.).						EXTREMES OF ANNUAL MEAN TEMPERATURE.			
		Annual normal.	Length of record, years.	Record begins.	Record ends.	Mean for the year 1896.	Departure from the normal.	Highest.	Year.	Lowest.	Year.
Western Plateau	...	45.9	...	...	...	46.9	+1.0	...	...	...	...
Angelica	Allegany	44.2	12	1855	1896	45.1	+0.9	45.7	1891	42.7	1892
Humphrey	Cattaraugus	45.2	13	1884	1896	46.0	+0.8	47.6	1891	42.6	1885
Elmira	Chemung	48.3	12	1851	1896	49.7	+1.4	50.8	1894	45.0	1856
Eastern Plateau	...	44.9	...	...	...	45.7	+0.8	...	...	...	...
Oxford	Chenango	45.1	26	1828	1896	45.2	+0.1	47.6	1828	42.8	'36 '43
Cortland	Cortland	44.1	30	1829	1896	45.5	+1.4	46.2	1846	40.8	1856
Cooperstown	Otsego	43.8	43	1854	1896	44.1	+0.3	46.9	1870	41.5	1875
Waverly	Tioga	46.7	14	1883	1896	48.1	+1.4	49.0	1894	43.8	1885
Northern Plateau	...	43.4	...	...	...	43.0	—0.4	...	...	...	...
Lowville	Lewis	43.4	27	1827	1896	43.0	—0.4	47.0	1828	39.8	1892
Atlantic Coast	...	51.2	...	...	...	51.0	—0.2	...	...	...	...
New York City	New York	51.9	26	1871	1896	51.1	—0.8	54.0	1891	48.7	1875
Setauket	Suffolk	50.6	11	1886	1896	50.9	+0.3	52.2	1891	48.8	1888
Hudson Valley	...	48.6	...	...	...	48.1	—0.5	...	...	...	...
Albany	Albany	48.2	23	1874	1896	48.4	+0.2	51.4	1881	43.7	1875
Honeymead Brook	Dutchess	47.0	16	1881	1896	46.6	—0.4	49.4	1889	45.6	1893
West Point	Orange	50.8	61	1826	1896	49.4	—1.4	51.1	1870	46.8	1875
Champlain Valley	...	45.0	...	...	...	42.8	—2.2	...	...	...	...
Plattsburgh Barracks	Clinton	45.0	40	1839	1896	42.8	—2.2	46.4	1870	40.4	1875
St. Lawrence Valley	...	44.4	...	...	...	43.3	—1.2	...	...	...	...
*Madison Barracks	Jefferson	45.2	30	1839	1896	44.6	—0.6	47.7	'80-'94	42.1	1875
Canton	St. Lawrence	45.5	31	1862	1896	42.1	—3.4	47.2	1878	40.4	1875
North Hammond	"	45.3	12	1867	1896	44.8	—0.5	49.5	1870	42.8	1892
Potsdam	"	41.8	26	1828	1896	41.7	—0.1	46.0	1828	40.8	1826
Great Lakes	...	46.6	...	...	...	47.2	+0.6	...	...	...	...
Buffalo	Erie	46.6	26	1871	1896	47.2	+0.6	48.8	'78-'94	42.7	1875
Rochester	Monroe	47.0	25	1871	1896	47.7	+0.7	49.6	'78-'94	43.8	1885
Fort Niagara	Niagara	47.4	36	1842	1896	48.1	+0.7	50.8	1878	44.4	1875
Baldwinsville	Onondaga	46.0	18	1854	1896	47.3	+1.3	48.2	'91-'94	43.7	1856
Oswego	Oswego	46.3	26	1871	1896	45.9	—0.4	51.2	1878	42.2	1885
Palermo	"	44.4	37	1860	1896	45.2	+0.8	47.8	1878	41.0	1885
Erie, Pennsylvania	Erie	48.5	23	1874	1896	49.0	+0.5	51.7	1878	42.9	1890
Central Lakes	...	47.0	...	...	...	47.7	+0.7	...	...	...	...
Ithaca	Tompkins	47.0	18	1879	1896	47.7	+0.7	49.5	1891	41.3	1885
Average departure	...	...	...	...	...	...	+0.7	...	...	...	...

* One month interpolated in mean for 1896

AND PRECIPITATION—ANNUAL.

STATION.	COUNTY.	PRECIPITATION (INCHES). Annual average.	Length of record, years.	Record begins.	Record ends.	Total for the year 1896.	Departure from the average.	EXTREMES OF ANNUAL PRECIPITATION. Greatest.	Year.	Least.	Year.
Western Plateau	.....	40.15	...	.....	.....	37.41	−2.74	.....	.....	.....	.....
Angelica	Allegany	40.42	8	1872	1896	37.28	−3.14	52.07	1890	28.61	1872
Humphrey	Cattaraugus	44.70	13	1884	1896	43.47	−1.23	59.29	1890	30.70	1895
Elmira	Chemung	35.34	12	1854	1896	31.49	−3.85	50.71	1860	25.77	1895
Eastern Plateau	.....	37.62	...	.....	.....	39.95	+2.33	.....	.....	.....	.....
Oxford	Chenango	33.03	25	1829	1896	37.08	+4.05	48.39	1853	29.13	1856
Cortland	Cortland	38.01	18	1851	1896	37.02	−0.99	55.25	1857	32.61	1895
Cooperstown	Otsego	38.69	43	1854	1896	39.28	+0.59	58.13	1890	29.90	1864
Port Jervis	Orange	43.75	12	1880	1896	51.34	+7.59	55.05	1890	31.90	1880
Waverly	Tioga	34.61	14	1883	1896	35.01	+0.40	48.49	1890	26.25	1895
Northern Plateau	.....	35.02	...	.....	.....	34.47	−0.55	.....	.....	.....	.....
Lowville	Lewis	35.02	29	1827	1896	34.47	−0.55	47.32	1857	26.47	1844
Atlantic Coast	.....	45.71	...	.....	.....	37.68	−8.02	.....	.....	.....	.....
New York City	New York	44.64	26	1871	1896	37.99	−6.65	58.68	1889	35.73	1895
Setauket	Suffolk	46.78	11	1886	1896	37.38	−9.40	53.94	1890	37.38	1896
Hudson Valley	.....	41.49	...	.....	.....	40.82	−0.67	.....	.....	.....	.....
Albany	Albany	35.60	23	1874	1896	27.88	−7.72	49.37	1878	25.84	1891
Honeymead Brook	Dutchess	40.20	16	1881	1896	43.95	+3.75	48.67	1893	34.48	1886
Poughkeepsie	"	35.80	20	1830	1896	36.47	+0.67	49.63	1831	28.67	1849
West Point	Orange	47.41	41	1840	1896	45.90	−1.51	63.56	1853	28.37	1844
Boyds Corners	Putnam	48.44	26	1870	1896	49.89	+1.45	63.51	1888	38.52	1880
Champlain Valley	.....	29.78	...	.....	.....	36.00	+6.22	.....	.....	.....	.....
‡Plattsb'gh Barr'ks	Clinton	29.78	35	1840	1896	36.00	+6.22	43.90	1850	18.91	1887
St. Lawrence Val'y	.....	32.78	...	.....	.....	31.38	1.40	.....	.....	.....	.....
Madison Barracks	Jefferson	30.12	26	1841	1896	33.01	+2.89	55.73	1889	22.26	1879
North Hammond	St. Lawrence	36.94	11	1867	1896	29.74	−7.20	46.71	1867	27.00	1874
Potsdam	"	31.27	26	1828	1896	31.39	+0.12	52.39	1889	18.54	1836
Great Lakes	.....	35.50	...	.....	.....	34.64	−0.87	.....	.....	.....	.....
Buffalo	Erie	38.05	26	1871	1896	37.29	−0.76	60.24	1878	30.44	1874
Rochester	Monroe	35.06	25	1871	1896	36.84	+1.78	49.89	1873	20.30	1887
Fort Niagara	Niagara	27.26	32	1842	1896	24.98	−2.28	40.82	1878	16.71	1884
Oswego	Oswego	35.15	26	1871	1896	38.32	+3.17	55.83	1878	23.41	1887
Palermo	"	36.50	37	1860	1896	33.57	−2.93	49.40	1864	24.19	1884
Erie, Pennsylvania	Erie	41.01	23	1874	1896	36.81	−4.20	55.23	1878	30.24	1891
Central Lakes	.....	34.41	...	.....	.....	36.17	+1.76	.....	.....	.....	.....
Ithaca	Tompkins	34.41	18	1879	1896	36.17	+1.76	46.39	1890	19.74	1879
Aver'ge depart're	.....	.....	...	.....	.....	.....	−0.67	.....	.....	.....	.....

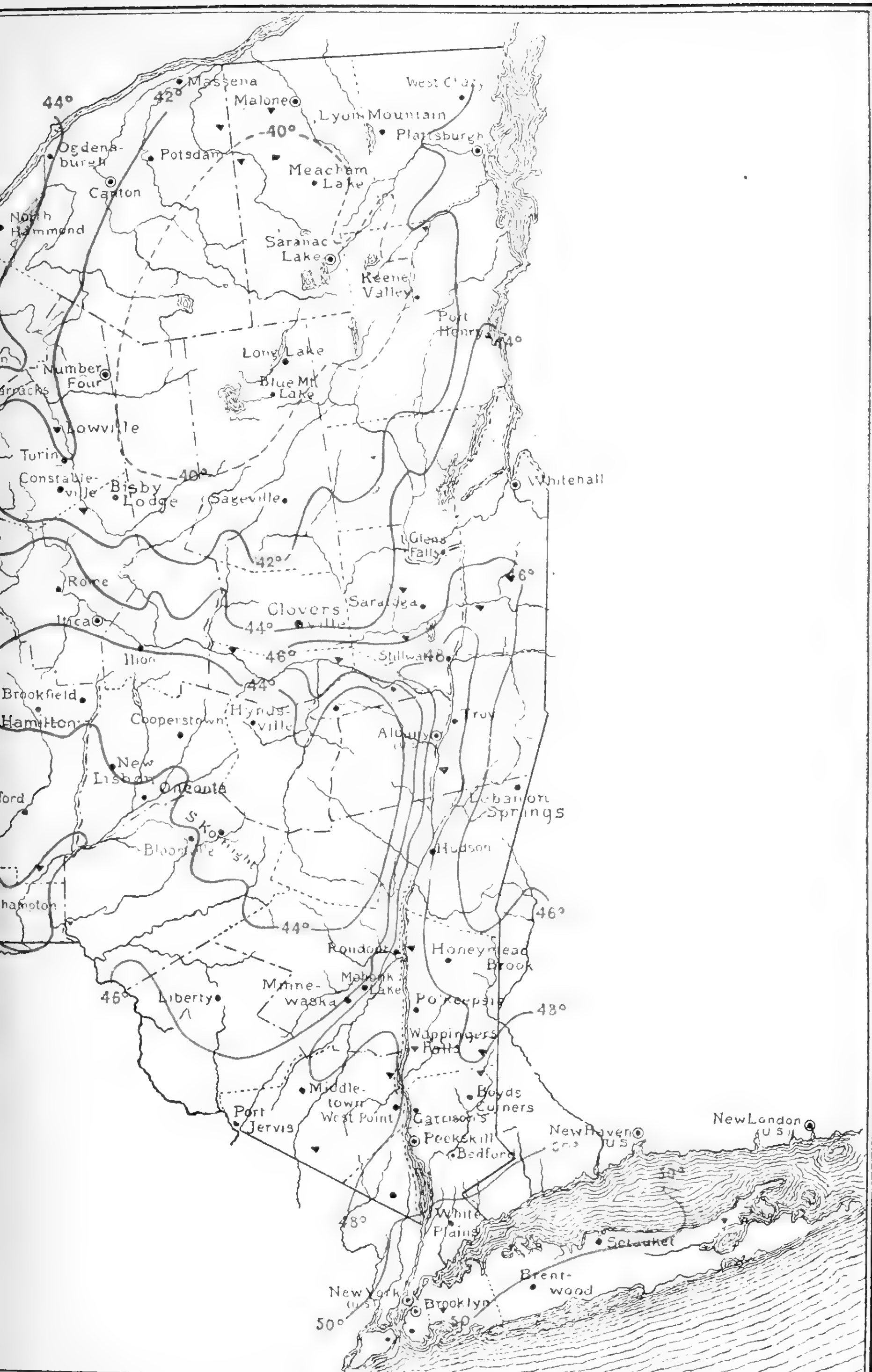
‡ One month interpolated in total for 1896.

MAP OF THE STATE OF NEW YORK

SHOWING

THE MEAN TEMPERATURES

FOR THE YEAR 1896.



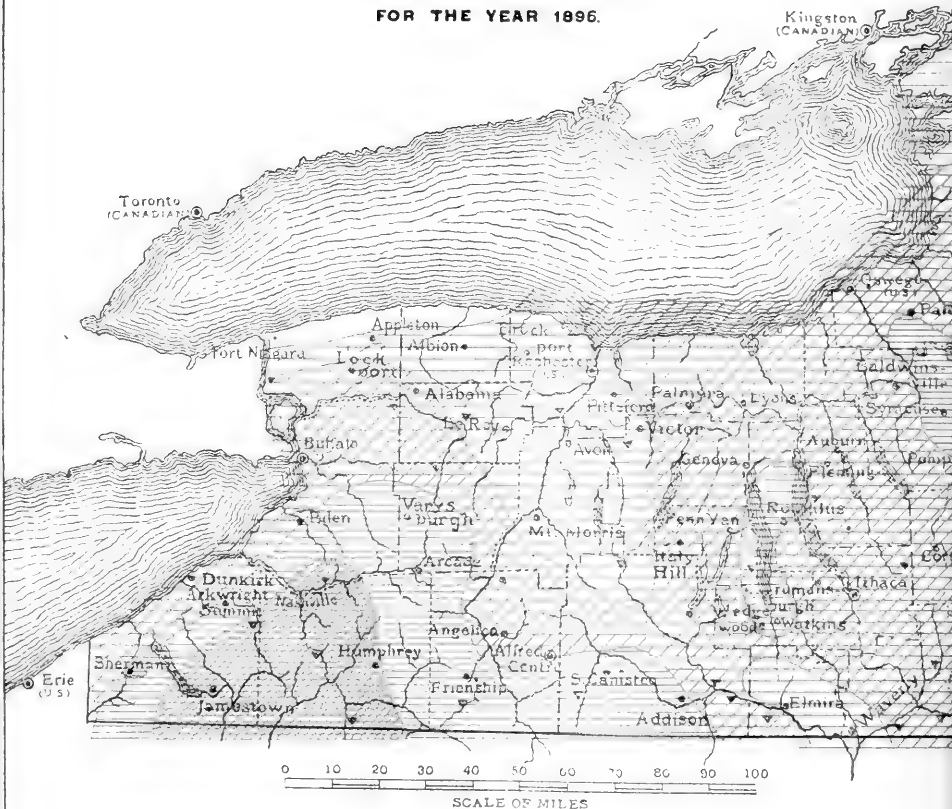
44°
42°
Massena
Malone
Lyon Mountain
West Chazy
Plattsburgh
40°
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
44°
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
40°
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
42°
46°
Rome
Saratoga
Gloversville
Utica
44°
Ilion
46°
Stillwater
48°
44°
Brookfield
Hyndsville
Troy
Hamilton
Cooperstown
Albany
New Lisbon
Oneonta
Lebanon Springs
ford
S. Kortright
Bloomville
Hudson
hampton
46°
44°
Rondout
Honeymead Brook
46°
Liberty
Minnewaska
Mohonk Lake
Po'keepsie
48°
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven U.S.
New London U.S.
50°
White Plains
Setauket
48°
Brentwood
New York U.S.
Brooklyn
50°
50°

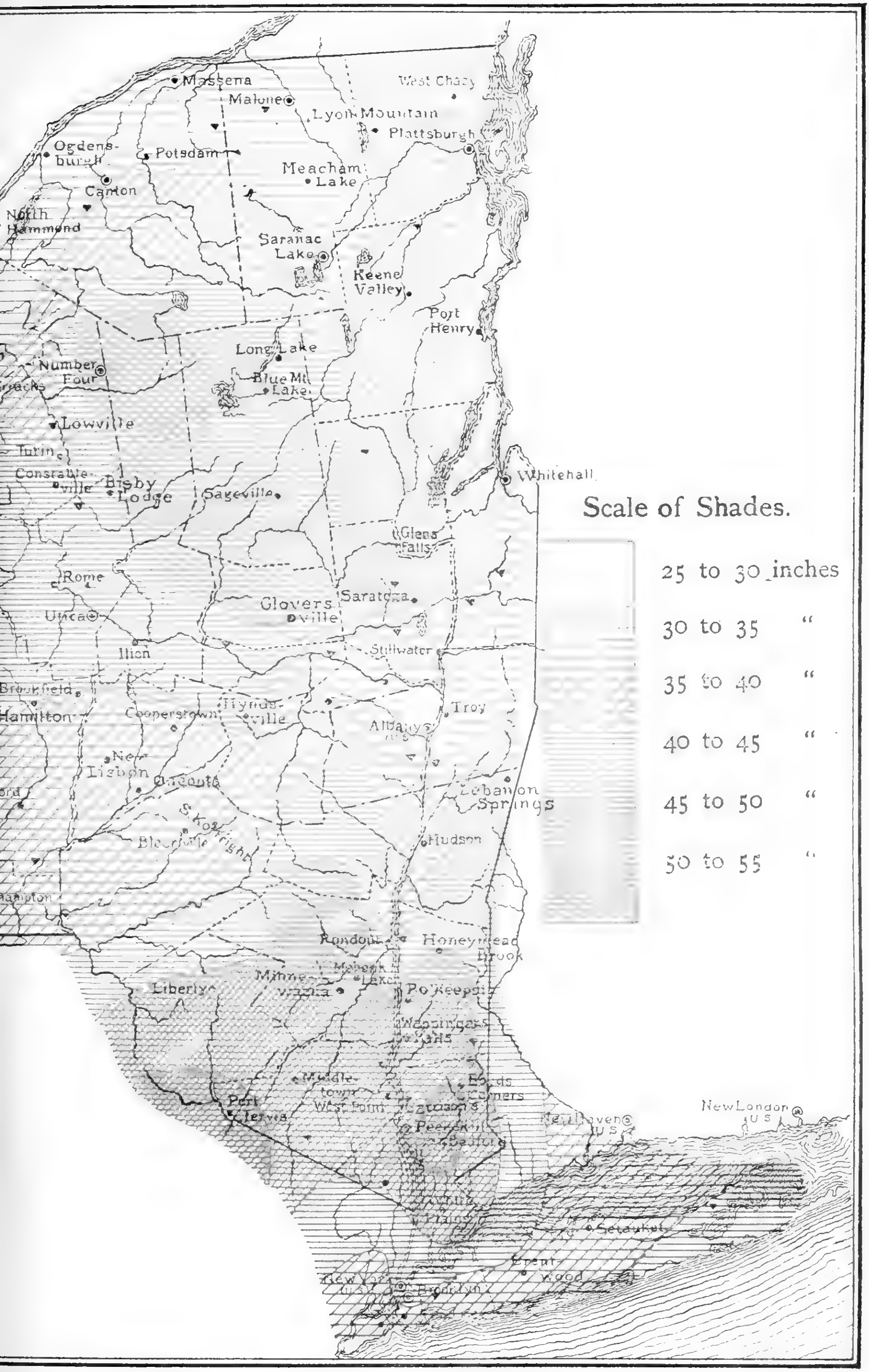
MAP OF THE STATE OF NEW YORK

SHOWING

THE TOTAL PRECIPITATION

FOR THE YEAR 1896.



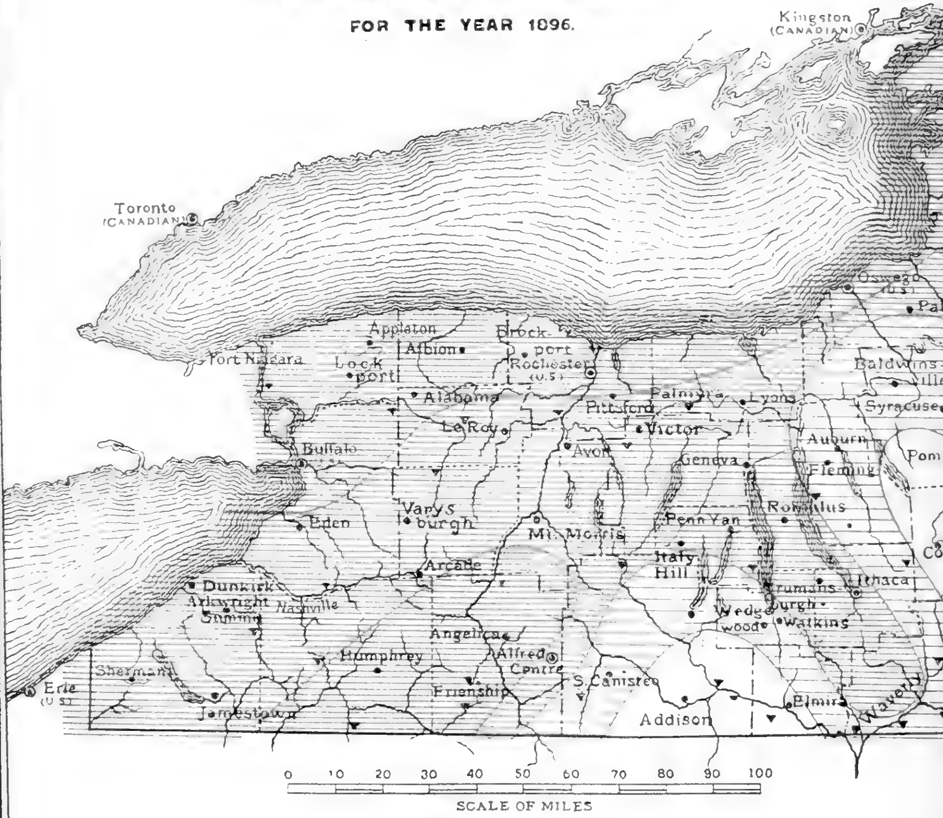

Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Glovers ville
Utica
Stillwater
Ilion
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Liberty
Minnewaska
Po'Keepsie
Wappingers Falls
Middletown
West Point
Bonds Corners
Port Jervis
Peekskill
Bedford
New London
New Haven
White Plains
Setauket
Brentwood
New York
Brooklyn
Scale of Shades.
25 to 30 inches
30 to 35 "
35 to 40 "
40 to 45 "
45 to 50 "
50 to 55 "

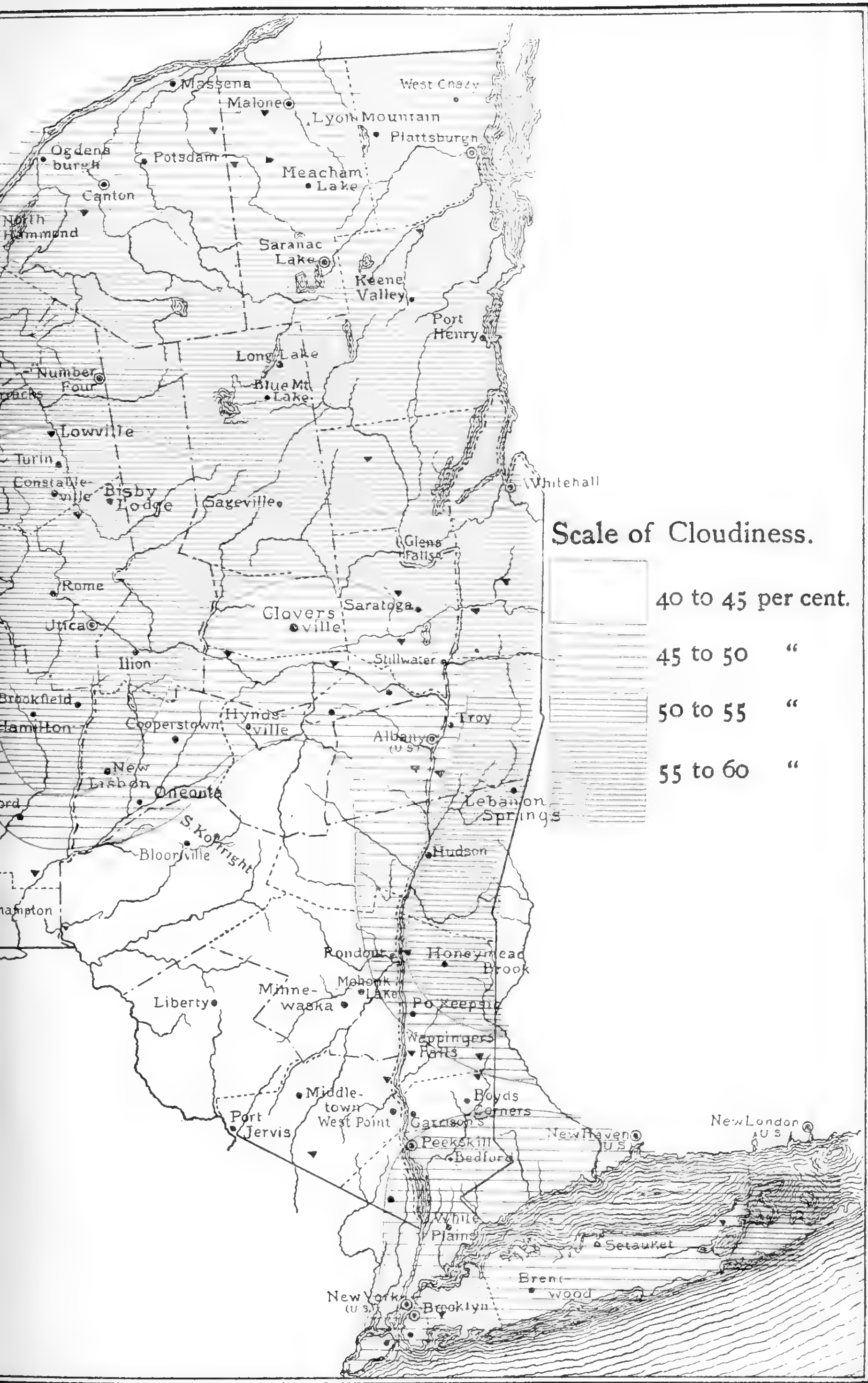
MAP OF THE STATE OF NEW YORK

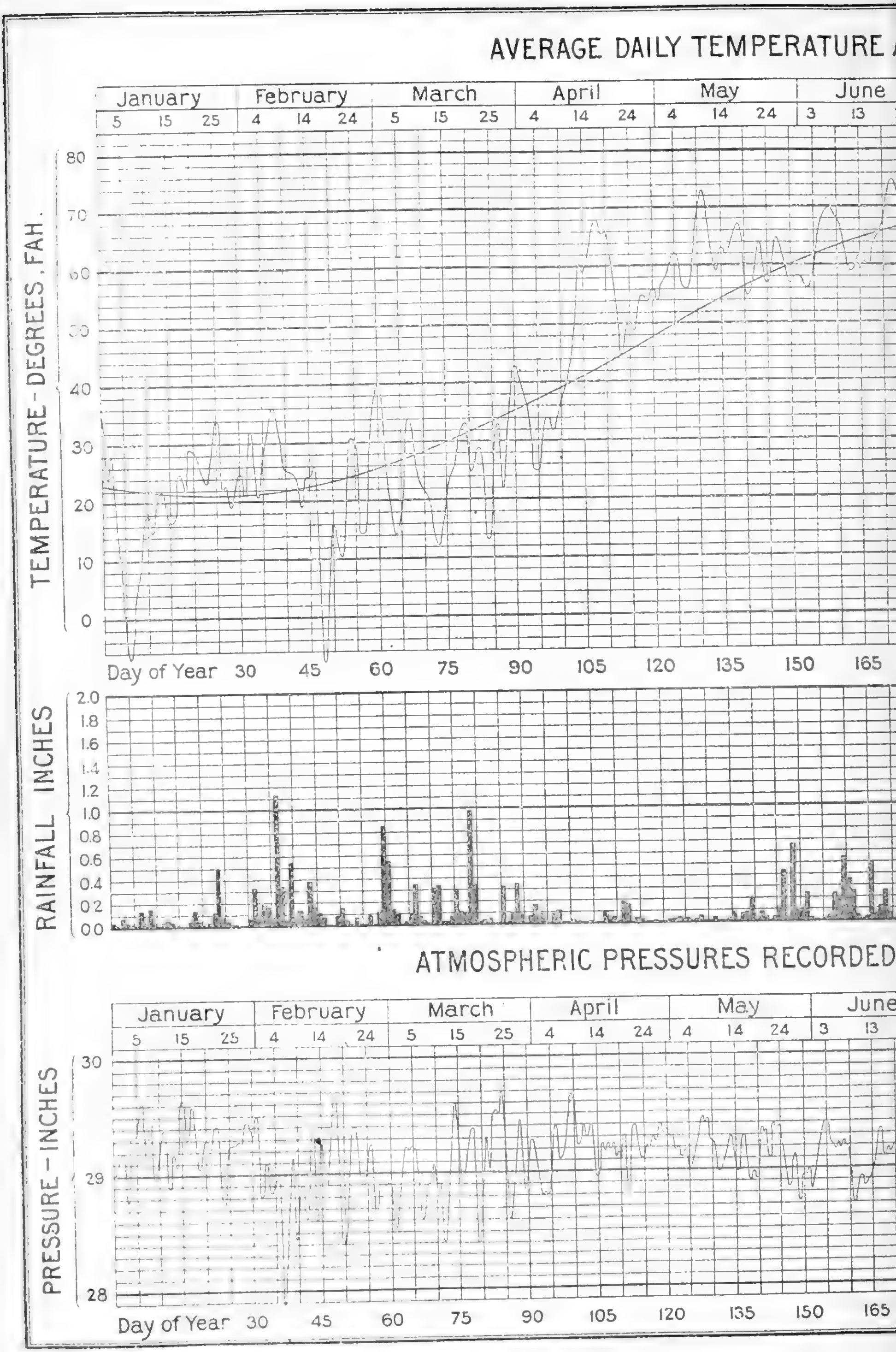
SHOWING

THE RELATIVE CLOUDINESS

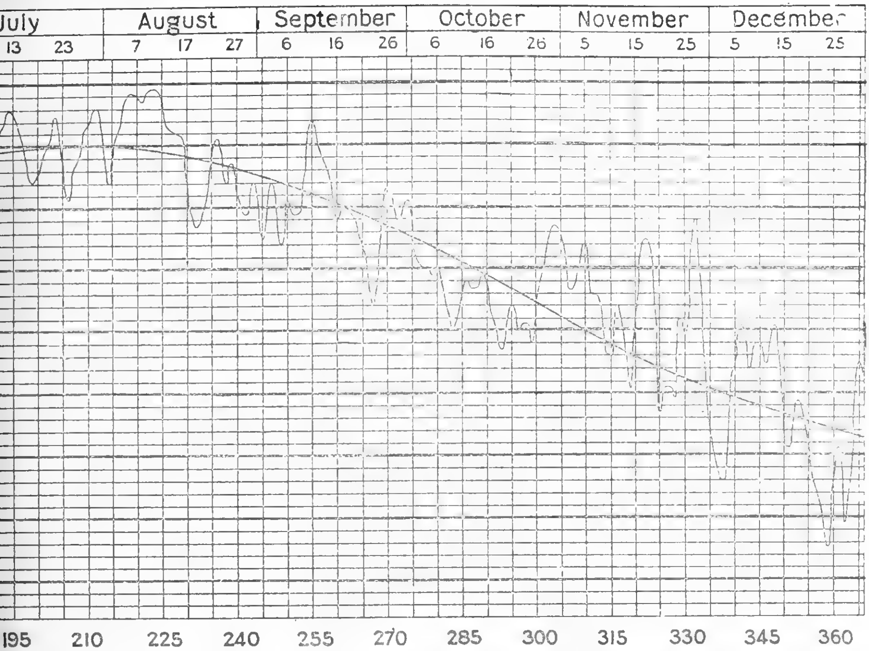
FOR THE YEAR 1896.

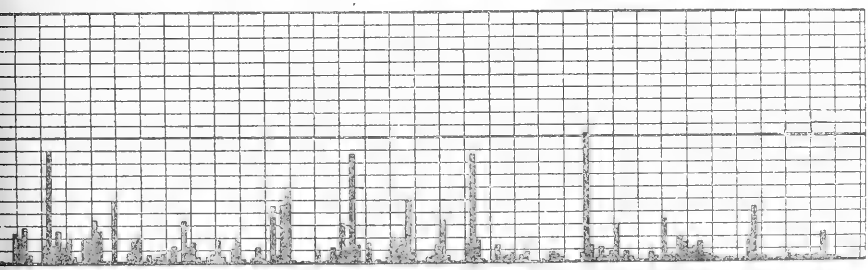



Massena
Malone
West Chazy
Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
Meacham Lake
Canton
North Hammond
Saranac Lake
Keene Valley
Port Henry
Long Lake
Number Four
Blue Mt. Lake
Lowville
Turin
Constableville
Bisby Lodge
Sageville
Whitehall
Glens Falls
Rome
Saratoga
Utica
Gloversville
Ilion
Stillwater
Brookfield
Hamilton
Cooperstown
Hyndsville
Troy
Albany (U.S.)
New Lisbon
Oneonta
Lebanon Springs
S. Kortright
Bloomville
Hudson
Rondout
Honeymead Brook
Mohonk Lake
Minnewaska
Liberty
Po'keepsie
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
West Point
Garrison's
Peekskill
Bedford
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Cloudiness.
40 to 45 per cent.
45 to 50 "
50 to 55 "
55 to 60 "

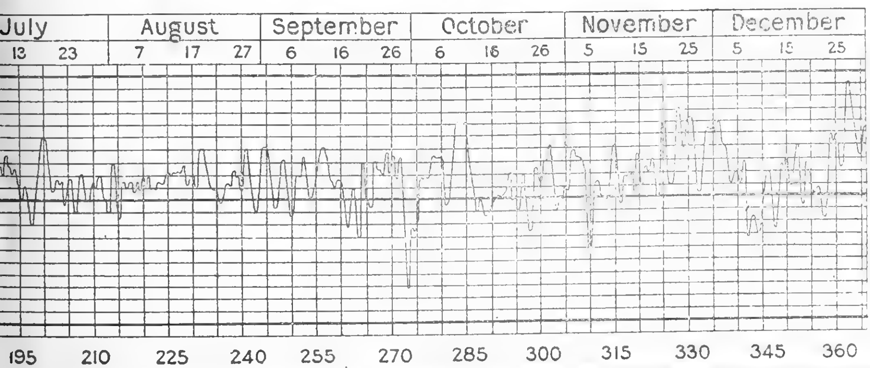

AVERAGE DAILY TEMPERATURE A
January
February
March
April
May
June
5 15 25 4 14 24 5 15 25 4 14 24 4 14 24 3 13
TEMPERATURE - DEGREES, FAH.
80
70
60
40
30
20
10
0
Day of Year 30 45 60 75 90 105 120 135 150 165
RAINFALL INCHES
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
ATMOSPHERIC PRESSURES RECORDED
January
February
March
April
May
June
5 15 25 4 14 24 5 15 25 4 14 24 4 14 24 3 13
PRESSURE - INCHES
30
29
28
Day of Year 30 45 60 75 90 105 120 135 150 165

ECIPITATION OVER THE STATE 1896.





ACA DURING 1896 (810 FEET ABOVE TIDE).



E.T.T.

Part V.

I. Description of Stations.

II. Statistical Table of Stations.

III. Sample Crop Report.

Description of Stations.

WESTERN PLATEAU — ALLEGANY COUNTY.

Station, Alfred — In Charge of Mr. Laurence La Forge at Alfred University.

Established in 1889; latitude, 42 deg. 15 min. north; longitude, 77 deg. 55 min. west; elevation, 1,824 feet.

The town of Alfred is situated near the upper limit of a valley which opens, in a northeasterly direction, toward the Alfred station of the New York, Lake Erie and Western Railroad, 2 miles distant. The station is located in the town, half-way up the eastern slope of the valley, on both sides of which the hill rises to the heights of from 100 to 200 feet.

Until the latter part of 1895, the observatory was equipped as follows:

A standard Green barometer was hung in a room (heated in winter) on the first floor of a house on Sayles street. The maximum, minimum, wet and dry thermometers, with a Draper thermograph, were located in a louvred shelter of a pattern of the United States Weather Bureau standard. The shelter is 7 feet above the ground, and 35 feet from any buildings.

The rain-gauge was 28 inches above the ground, and 30 feet from buildings.

The station has been very recently completely equipped with an anemograph and anemometer, a thermograph and a sunshine recorder, also soil thermometers; and systematic observations for the determination of the climate of the locality are being made.

WESTERN PLATEAU — CATTARAUGUS COUNTY.

Station, Humphrey — Mr. Charles E. Whitney, Observer.

Equipped (by Signal Service) 1885-1886; latitude, 42 deg. 12 min. north; longitude, 78 deg. 34 min. west; elevation, 1,950 feet, as determined by aneroid readings; no data have been previously obtainable, and consequently the height given in the report of 1889 is very much in error.

The station is about 10 miles northeast of the Great Valley station of the New York, Lake Erie and Western railroad. It is near the summit of a ridge of hills, 350 feet above, and on the northwest side of a stream which flows into the Allegany River at Great Valley station. The hills in this section rise to an average height of 1,900 or 2,000 feet above tide, and are intersected by numerous deep valleys.

Mr. Whitney's station is situated between two knolls, toward the east and west respectively, whose summits are from 50 to 80 feet above the station.

The dry and wet bulb and the maximum and minimum thermometers are placed under the roof of a piazza facing toward the south, in an angle formed by the main portion of the house and a wing on the eastern side. The height of the thermometers above the ground is about 7 feet; above the floor of the piazza, 5½ feet, and below its roof, 3 feet. The width of the piazza is 4 feet. The thermometers are hung several inches away from the wall of the building.

The rain-gauge is situated about 45 feet north-northwest of the main portion of the house. Two or three dwarf fruit trees are at a distance of 12 or 15 feet, and are the only obstacles to a free circulation of air in the vicinity. The top of the gauge is 4 feet above the ground.

An anemometer placed at this station is mounted on the south gable of the house, 7 feet above the ridge and about 30 feet above the ground.

WESTERN PLATEAU — CHAUTAUQUA COUNTY.

STATION, ARKWRIGHT — MISS ETTA L. WILCOX, OBSERVER.

Established in August, 1890; special temperature station; latitude, 42 deg. 25 min. north; longitude, 79 deg. 15 min. west; elevation, 1,260.

This station is situated about 6 miles east southeast of Dunkirk, on the range of hills which borders the shore of Lake Erie. The writer's observations of an aneroid barometer give the elevation of this station as approximately 685 feet above the level of Lake Erie. The thermograph is located at the house of Mr. E. I. Wilcox, which stands on the northern slope of a ridge rising above the general level of the hills to a height of 200 or 300 feet, half a mile in the rear of the station. The ground falls away from Mr. Wilcox's house toward the north and west, so that there is an unobstructed view toward Buffalo plains and over Lake Erie. The station is somewhat sheltered from the south winds by the ridge mentioned, but air currents from all other directions have a free circulation about it. The shelter of the Draper thermograph is placed at the eastern end of a northern piazza, at a height of 4½ feet above the floor and 7 feet from the ground. The eastern and western ends of the piazza are formed by wings projecting about 7 feet from the body of the house; the thermograph being placed about 1 foot distant from the outer side of the piazza. The rays of the sun are excluded from the shelter and its vicinity at all times, excepting possibly for an hour in the late afternoons of summer.

WESTERN PLATEAU — CHAUTAUQUA COUNTY.

STATION, JAMESTOWN — MR. N. D. LEWIS, OBSERVER.

Established in November, 1895; latitude, 42 deg. 06 min. north; longitude, 79 deg. 16 min. west; elevation, 1,321 feet.

This station is situated in the city of Jamestown, on the crest of a hill extending in an easterly and westerly direction. The surrounding country is hilly, mainly a moraine formation, intersected by short valleys.

Maximum and minimum thermometers are exposed on the eastern side of the house, at a height of 15 feet from the ground, and are protected by a piazza roof. They are exposed to the sun's rays only at sunrise in mid-winter.

The rain-gauge stands on a level surface, and is 15 to 20 feet from the nearest tree or buildings. Its top is 9 feet above the ground.

WESTERN PLATEAU — CHEMUNG COUNTY.

STATION, ELMIRA — MESSRS. W. S. & C. R. GERITY, OBSERVERS.

Established November, 1888; latitude, 42 deg. 06 min. north; longitude, 76 deg. 56 min. west; elevation, 863 feet.

The city of Elmira is located upon the broad valley bottom of the Chemung river, at its point of intersection with a deep depression extending northward from Pennsylvania to the valley of Seneca lake. Beyond the city limits the hills rise abruptly from the flat lands to the higher levels of the Western Plateau.

The meteorological station is located near the center of the city at the business house of Messrs. Gerity, on the southeast corner of Lake and Carrol streets. The thermometer shelter projects from a window on the north-northwest side and second story of the brick building. Its dimensions are approximately 3 feet in width, 2 feet in depth and 3 feet in height, the thermometers being secured near its center at a distance of 18 inches from the window, which is always closed. The sides and front of the shelter are closed, the provision for ventilation consisting of an open bottom and air spaces between the top and sides. The thermometers are 18 feet above the pavement.

WESTERN PLATEAU — LIVINGSTON COUNTY.

STATION, AVON — MR. W. G. MARKHAM, OBSERVER.

Established in August, 1895; latitude, 42 deg. 55 min. north; longitude, 77 deg. 47 min. west; elevation, 585 feet.

This station is located in open country of the Genesee Valley bottom, 23 miles south of Lake Ontario, and is about 100 rods east of the Genesee river and 25 feet above its highest level. At high water the valley is carried over an area 1½ miles in breadth. The surface is gently undulating to the east, while westward, hills rise to a considerable elevation. The valley is broad and open toward the south.

Maximum and minimum thermometers are attached to the north end of a building, their height above the ground being 5 feet. They are protected by a hood 6 inches deep, open toward the north, and the rays of the sun are excluded at all hours.

The rain-gauge is mounted upon a post, its top being 4 feet 8 inches above the ground. The surface near by is quite level, and the gauge is at an ample distance from obstructions to free air circulation.

WESTERN PLATEAU — LIVINGSTON COUNTY.

STATION, MOUNT MORRIS — MR. J. KNAPPENBERG, OBSERVER.

Established June, 1890; latitude, 42 deg. 42 min. north; longitude, 77 deg. 56 min. west; elevation, 525 feet, (approximately).

Mt. Morris is situated in the valley bottom, on the borders of Dansville creek. The course of the stream in this vicinity is toward the north, hills of moderate elevation rising on the eastern and western sides. The general surface of the neighboring country slopes rapidly from the high hills, further south, toward the plains of the Great Lake region.

The maximum and minimum thermometers are exposed on the north side of Mr. Knappenberg's barn, and are said to be sheltered from sunlight at all hours, and also from moisture. The rain-gauge stands freely exposed in the yard.

WESTERN PLATEAU — SCHUYLER COUNTY.

STATION, WEDGEWOOD — MR. O. F. CORWIN, OBSERVER.

Equipped with standard instruments in December, 1889; latitude, 42 deg. 25 min. north; longitude, 76 deg. 56 min. west; elevation, 1,350 feet.

This station is situated on the high hills which rise abruptly from the valley of Seneca lake, and is about three-quarters of a mile west of Wedgewood depot of the Fall Brook Coal Company's railroad. The ground rises gradually to the west and south of Mr. Corwin's house, where the instruments are located, but slopes away from it in all other directions. The temperature and rainfall at this station should fairly represent the climatic features of the highlands near the central lakes.

The thermometer shelter is about 30 feet west of the house, and is supported on posts at a height of 4 feet above the sod. Its dimensions are about 3½ by 2½ feet at the base and 3 feet in height. The sides are of board (unpainted), with a door of the width of the shelter on the east side. Ventilation is obtained by spaces about one-eighth of an inch in width between the boards, and by a large number of holes bored in the sides at such an angle that rain is excluded. The top double, with an air space, and has a slight slope. The thermometers are hung near the center of the shelter. The rain-gauge is placed on a post 4½ feet above the ground, that it may be above snow-drifts. The only obstacles to a free circulation of air in the vicinity of the gauge is a hedge of shrubs 20 feet distant and about 12 feet in height.

WESTERN PLATEAU — STEUBEN COUNTY.

STATION, SOUTH CANISTEO — MR. JAMES E. WILSON, OBSERVER.

Equipped November, 1889; latitude, 42 deg. 12 min. north; longitude, 77 deg. 34 min. west; elevation, 1,480 feet.

This station is situated in the valley of a creek, 5 miles south-southeast of the town of Canisteo. The hills rise abruptly from the valley at distances ranging from 100 to 200 feet on the eastern and western sides of the station. The high ridges of the surrounding country are separated by deep valleys similar to the one in which the station is located, opening northward toward the Canisteo river. The highest point in the neighborhood is the "Swale," about 3 miles east of the station.

The dry and wet and the maximum and minimum thermometers are exposed under a piazza of Mr. Wilson's house, 5 feet in width and facing the northeast. The thermometers are secured to a window of the house with air space between. Canvas is spread along the front of the piazza to exclude the rays of the morning sun from the instruments and also from the piazza floor. The thermometers are 5 feet above the ground.

The rain-gauge is 20 feet distant from the nearest building 10 or 12 feet in height, and about as far from a few small fruit trees. The height of the top of the gauge above the ground is 2 feet.

WESTERN PLATEAU — WYOMING COUNTY.

STATION, ARCADE — MR. J. D. TATE, OBSERVER.

Established April, 1890; latitude, 42 deg. 32 min. north; longitude, 78 deg. 26 min. west; elevation, 1,707 feet.

This station is located near the eastern side of a ridge of hills which lie west of a valley extending from Arcade to Sandusky. The valley of Arcade is about 2 miles west-northwest of the station. Toward the north the ground slopes gently from the station to the valley bottom, 140 feet below; while toward the west and southwest the ridge rises to a height of 100 to 200 feet above the station. The surrounding country is very hilly, some of the higher summits reaching an elevation of more than 2,000 feet above tide.

The dry and wet bulb, maximum and minimum thermometers are exposed out of the north window of an unheated one-story wing of Mr. Tate's house. The sides of the shelter are the window blinds, which are secured in a position at right angles to the wall of the house by a wide board forming the top of the shelter. The thermometers are 9 feet above the ground, and facing outward, are reached by steps. The front of the shelter is open, while a wide board at the bottom cuts off radiation from the ground.

The rain-gauge is about 40 feet northwest of the house. There are no trees or other obstructions to a free air circulation in its vicinity. The top of the gauge is 26 inches above the ground.

WESTERN PLATEAU — WYOMING COUNTY.

STATION, VARYSBURGH — MR. H. C. ORR, OBSERVER.

Equipped with maximum and minimum thermometers in February, 1893; latitude, 42 deg. 45 min.; longitude, 78 deg. 20 min.; elevation not known.

The town of Varysburgh is situated in the Tonawanda valley, which extends nearly north and south through western Wyoming county. The station is located within the limits of the village.

The thermometer shelter is built substantially after the specifications of the United States Weather Bureau, having louvred sides and a sloping shingled roof. It is 24 feet southeast of the nearest building (a barn) and is not affected by any artificial heat. The thermometers are 5½ feet above the ground.

The rain-gauge stands on level ground, 30 feet south of Mr. Orr's house and 12 feet south of a small fruit tree. The top of the gauge is 2 feet above the ground.

EASTERN PLATEAU — BROOME COUNTY.

STATION, BINGHAMTON — SUPERINTENDENT OF STATE HOSPITAL; MR. J. J. EASTMAN, OBSERVER.

Established (by Signal Service) October, 1889; latitude, 42 deg. 07 min. north; longitude, 75 deg. 55 min. west; elevation, 870 feet.

The instruments are located on the grounds of the pumping station of the State hospital water-works, on the northern bank of the Susquehanna river. North of the station the ground rises abruptly to the hospital grounds, over 200 feet above, and beyond the hospital the ground continues to rise to a much greater elevation. The station is at the outskirts of the city of Binghamton, which lies on the broad plain toward the south and west.

The dry bulb and maximum and minimum thermometers are exposed in a louvred shelter, built after the signal service specifications, and is supported at the height of 12 feet from the ground on a skeleton platform. It is 90 feet west of the pumping station, 100 feet north of the river bank, and about 30 feet above mean water level of the river.

The rain-gauge is 90 feet west of the water-works, and there are no obstructions nearer than this to interfere with a free air circulation. The top of the gauge is 8 feet above the ground.

EASTERN PLATEAU — CHENANGO COUNTY.

STATION, OXFORD — MR. JOHN P. DAVIS, OBSERVER.

Latitude, 42 deg. 26 min. north; longitude, 75 deg. 40 min. west; elevation, 1,000 feet; location changed to Oxford village in 1893.

This station is located at Mr. Davis' residence in the town of Oxford, on the western side of the Chenango river valley; the surface being nearly level in the vicinity of the station.

The maximum and minimum thermometers are secured 6 feet above the sod, to the north side of a barn. They are protected by louvred wings at the sides, and by a closed board roof.

The rain-gauge is situated in the garden, about 25 feet distant from the barn. Its top is 2 feet above the ground.

EASTERN PLATEAU — DELAWARE COUNTY.

STATION, SOUTH KORTRIGHT — MR. D. C. SHARPE, OBSERVER.

Established (by Signal Service) in 1888; equipped by State Service, February, 1890; latitude, 42 deg. 20 min. north; longitude, 74 deg. 43 min. west; elevation, 1,700 feet.

This station is located in a deep valley of the Catskill mountains through which the western branch of the Delaware river flows in a southwesterly direction. On the southern side of the valley the mountains rise to a height of about 1,000 feet, and to a somewhat less elevation on the northern side. The valley at this point is about one-half mile wide, the station being located near its center.

The maximum and minimum thermometers are exposed in a doorway about 2 feet deep, on the north-northwest side of Mr. Sharpe's house.

The instruments face toward the northeast, and are never reached by the direct sunlight. The hall into which the door leads is unheated. The walls of the building are of wood. The thermometers are about 8 feet above the sod.

The rain-guage is 20 feet distant from the south side of the house. The top of the gauge is 2 feet above the ground.

EASTERN PLATEAU — DELAWARE COUNTY.

STATION, BLOOMVILLE — MR. F. J. CAMPBELL, OBSERVER.

Established in August, 1895; latitude, 42 deg. 20 min. north; longitude, 74 deg. 49 min. west; elevation, 1,550 feet.

Bloomville station is situated on the flat lands lying on the western side of the Delaware river; and is one-fourth of a mile from the terminus of the U. and D. railway. It is surrounded by high hills, excepting toward the north and northeast.

The maximum and minimum thermometers are placed, at a height of 5½ feet above the ground, on the northern side of the house. They are sheltered by a hood 3 feet wide and 4 feet long. Neither the thermometers nor the adjacent walls are subjected to the sun's rays or to artificial heating.

The rain-gauge stands on level ground 50 feet from the nearest building (which is about 20 feet high). The top of the gauge is 4 feet 3 inches above the ground.

The winter climate is not considered severe in this vicinity, the ground seldom freezing to a greater depth than 1 foot.

EASTERN PLATEAU — MADISON COUNTY.

STATION, BROOKFIELD — MR. D. B. STILLMAN, OBSERVER.

Established December, 1889; latitude, 42 deg. 48 min. north; longitude, 75 deg. 20 min. west; elevation, 1,350 feet.

The town of Brookfield is situated in the deep valley of Beaver creek, a small stream flowing southward into the Unadilla river. The hills rise abruptly on the eastern and western sides of the town to heights ranging from 200 to 800 feet.

The meteorological station is located at Mr. Stillman's house which stands a few hundred feet east of the creek, the ground in its vicinity rising gradually toward the eastern hills.

The dry and wet bulb, and the maximum and minimum thermometers are supported by a horizontal board facing the north window of an unheated hallway in the second floor of the building.

The roof of the house projects over the thermometers, affording a partial shelter from rain. The walls of the building, with the high eastern hills, shade the instruments until late in the afternoons of summer, when they are exposed to the rays of the sun for about an hour. The thermometers are about 12 feet above the ground and 1 foot distant from the window.

The rain-gauge is located about 40 feet from the western side of the house, its top being 2 feet above the ground.

EASTERN PLATEAU — MADISON COUNTY.

STATION, HAMILTON, AT COLGATE ACADEMY — PROF. W. F. LANGWORTHY, OBSERVER.

Established June, 1894; latitude, 42 deg. 49 min. north; longitude, 75 deg. 35 min. west; elevation, 1,000 feet.

Colgate academy is situated at the outskirts of the village of Hamilton and has practically the free exposure of the open country. The station is located on the broad valley-bottom; hills of a moderate elevation beginning at a considerable distance from the academy.

Dry and wet, maximum and minimum thermometers are placed in a louvred shelter of standard dimensions and construction, which is supported at a height of 2 feet above a board platform, and 12 feet above the ground. It is about 100 feet distant from the academy in an open field, and there are no obstacles to a free air circulation.

A rain-gauge is secured to a corner post rising above the platform and is about 13 feet above the ground.

EASTERN PLATEAU — ORANGE COUNTY.

STATION, MIDDLETOWN — IN CHARGE OF SELDEN H. TALCOTT, M. D., DR. ALLEN AND MR. EWER, OBSERVERS. AT THE STATE HOSPITAL.

Established January, 1890; latitude, 41 deg. 25 min. north; longitude, 74 deg. 25 min. west; elevation, 700 feet.

The State hospital is located about 1 mile southwest of Middletown, and is about 50 feet above the city. The ground slopes rapidly away from the station toward the north and east, but southward the country is nearly level with the station, or rises slightly above it.

The dry and wet, maximum and minimum thermometers are exposed on the northern side of a wing of the hospital, one and one-half stories in height. The instruments are secured to framework facing the window, 2 feet distant from it, and 10 feet above the ground. The thermometers are about 4 feet below the roof, which, extending 4 feet beyond the wall, is utilized as a shelter. The rays of the sun are entirely excluded from the instruments and the sod beneath, in the morning by the high wall of the main building, which extends for 170 feet or more toward the north, and in the afternoon by a northern extension of the wing. The window is only opened for the purpose of moistening the wet-bulb thermometer. The room within is unheated but the corridor in the basement beneath is warmed by steam during the winter. The thermometers are about 40 feet distant from the main building.

The rain-gauge is exposed on a lawn east of the main building and about 100 feet from it. There are no obstructions to a free air circulation in the vicinity of the gauge, other than a few ornamental shrubs 30 or 40 feet distant.

EASTERN PLATEAU — ORANGE COUNTY.

STATION, PORT JERVIS — PROFESSOR JOHN M. DOLPH, OBSERVER.

Established November, 1889; special temperature station; equipped with a thermograph in December, 1890; latitude, 41 deg. 21 min. north; longitude, 74 deg. 40 min. west; elevation, 470 feet.

Port Jervis is situated between the Delaware and Neversink rivers, at a short distance north of their point of junction. The valley of the Delaware makes an abrupt turn at this point, from the southeast to the southwest, the Neversink river entering from the northeast at the bend. The surface rises gradually toward the north in the vicinity of the station, which is about 50 feet above the river surface. But beyond the city limits high hills close in abruptly about the valley.

The thermometers and thermograph are exposed in a louvred shelter built substantially after the pattern employed by the United States Weather Bureau. The shelter is about 20 feet from the northeastern side of the house, and 3 feet above the ground.

The rain-gauge is placed upon a post at a height of 4 feet 8 inches above the ground, between two low buildings whose roofs rise above the gauge to a height about equal to their distance from it.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, COOPERSTOWN — MR. G. POMEROY KEESE, OBSERVER.

Established 1854; latitude, 42 deg. 41 min. north; longitude, 74 deg. 57 min. west; elevation, 1,300 feet.

Cooperstown is situated in the valley at the southern end or foot of Otsego lake, hills rising abruptly on the eastern and western sides of the town. The stream flowing south from the lake through a narrow valley, forms one of the principal sources of the Susquehanna river. The meteorological station is 200 feet southwest from the shore of the lake, and is sufficiently isolated from the buildings of the town to admit of a very free air circulation. The hills on the eastern and western sides of the valley are respectively one-half and three-fourths of a mile from the station.

The dry, wet, maximum and minimum thermometers are secured to the side posts of a northern piazza of Mr. Keese's residence; their distance from the ground being about 9 feet, and from the piazza roof, 5 feet. The sun reaches the piazza only near the hours of rising and setting, and at these times one-half of the piazza is always in the shade of a projecting doorway; hence by moving the thermometers from one side of the piazza to the other, they are kept shaded for several hours preceding the time of observation. The walls of the house are of brick, from which the instruments are separated by at least several inches of air space.

The rain-gauge is 60 feet south of the house, and has no obstacle to a free air circulation in its vicinity. The top of the gauge is 4 feet above the ground.

Mr. Keese's record of temperature was kept during 36 years from readings of a Green standard thermometer, with which the instrument furnished by this service early in 1890 was found to agree closely. The rain-gauge in use for 36 years was the Pike "conical" form, which, as compared with the gauge of the New York Bureau, is found to give a slightly deficient registration. The exposure of the instruments has been substantially the same during the entire period of the record.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, NEW LISBON — MR. G. A. YATES, OBSERVER.

Established November, 1892; latitude, 42 deg. 35 min. north; longitude, 75 deg. 13 min. west; elevation, 1,234 feet.

This station is situated in the open country on the rolling lands of the Butternut Creek valley, which is here about three-fourths of a mile wide, the adjacent hills being of moderate elevation.

Maximum and minimum thermometers are exposed in a louvred shelter of United States standard form and dimensions; their height from the sod being 6 feet. The shelter is 30 feet northeast of Mr. Yates' house, and is near, but not directly under, a fruit tree.

The rain-gauge is supported by a fence post at a height of 6 feet from the ground. A barn 40 feet away is the nearest building.

EASTERN PLATEAU — OTSEGO COUNTY.

STATION, ONEONTA — MESSRS. FORD AND FORD, OBSERVERS.

Established August, 1894; latitude, 42 deg. 27 min. north; longitude, 75 deg. 6 min. west; elevation, 1,000 feet.

The town of Oneonta is situated in a valley of the eastern highlands, at the junction of the Susquehanna, Charlotte and Schenevus rivers.

The maximum and minimum thermometers are exposed in front of the drug store of Messrs. Ford, on the north side of Main street. The instruments are 6 feet above the sidewalk. Direct sunlight is excluded by an awning; but the pavement is liable to become heated in the early morning and the late afternoon.

The rain-gauge is mounted at the center of the flat tin roof of the business block, at a height of about 40 feet from the ground; the bottom of the gauge resting upon the roof.

EASTERN PLATEAU — SCHUYLER COUNTY.

STATION, PERRY CITY — MR. W. H. JEFFERS, OBSERVER.

Equipped with standard instruments in December, 1889; latitude, 42 deg. 03 min. north; longitude, 76 deg. 44 min. west; elevation, 1,038 feet.

This station is located about 4 miles west-southwest of Trumansburgh, on the hills west of Cayuga lake, from whose shore it is about 6 miles distant. Mr. Jeffers' house is situated on the west bank of a brook which, after flowing southward 50 rods, meets a larger stream emptying into Cayuga lake; the ground rising gradually from the valley of the creek toward the northwest and south. At a distance of 8 miles to the south is the range of Newfield hills, whose summit reaches an altitude of 2,100 feet; and a similar high tract of land lies to the west of the station near Seneca lake. The valley in which the station is situated, with others opening out of it, form an irregular depression extending through this western range of hills.

The maximum, minimum, wet and dry bulb thermometers are exposed in a shelter built on the north side of a low wing of Mr. Jeffers' house. The bottom of the shelter, which is about 4½ feet above the ground, is constructed of slat work, which cuts off radiation from the sod. The sides are louvred in the manner adopted by the Signal Service, and a slanting roof and a door opening toward the north are provided.

The rain-gauge is about 80 feet east of the house and about 30 feet south of a corn house. The gauge is 2 feet 9 inches above the ground.

EASTERN PLATEAU — TIOGA COUNTY.

STATION, WAVERLY — MR. T. P. YATES, OBSERVER.

Established by Signal Service in August, 1887; latitude, 42 deg. 01 min. north; longitude, 76 deg. 34 min. west; elevation, 824 feet.

This station is near the northeastern limits of the village of Waverly, and its surroundings are more like an open country than might be expected from its proximity to the village. The station is about two-thirds of the distance between the gradual slope from the Susquehanna river and the hills a mile away, which form the northern boundary of the valley. The elevation of the hills in this vicinity, on either the north or south side of the valley, probably does not exceed 300 to 500 feet.

The dry and wet bulb and the maximum and minimum thermometers are exposed in a shelter 40 feet east of Mr. Yates' house. The shelter consists of a double unpainted box open at the bottom having an air space 1 inch in width between the sides, and with slat work at the top opening to the ventilators in the ridged roof. Some additional ventilation is also obtained through a few spaces from one-eighth to one-fourth of an inch in width between the boards at the sides of the shelter. The dimensions of the shelter (outside) are 2 by 3 feet at the base and 2½ feet in height, exclusive of the roof. The thermometer supports are secured to a board near the back or south side of the inner box, and the door of the shelter opens toward the north. The height of the thermometers above the sod is 4½ feet.

The rain-gauge is 6 feet north of the shelter, 45 feet from the house (which has two stories and an attic), and about 35 feet from the branches of a large fruit tree. The top of the gauge is 6 feet above the ground.

EASTERN PLATEAU — ULSTER COUNTY.

STATION, MOHONK LAKE, AT THE MOUNTAIN HOUSE — MR. A. K. SMILEY, OBSERVER.

Established in November, 1895; latitude, 41 deg. 47 min. north; longitude, 74 deg. 09 min. west; elevation, 1,235 feet.

This station is situated about 12 miles west of the Hudson river upon a mountain ridge separating the Shawangunk and Wallkill valleys. Immediately east of the station the ground falls away precipitously for several hundred feet to the valley lands, and thence, more gradually, to the Wallkill river, between which and the Hudson the surface is comparatively flat. There is also a sharp descent from the Mountain House to the valley on the northwestern side. The summit of the range is a ridge of rocks rising a hundred feet or more from the eastern border of Mohonk lake; the Mountain House being situated in the northwestern side, and commanding an unobstructed view over the valley in that direction.

The dry, wet-bulb, maximum and minimum thermometers are exposed on the southeastern piazza of a small building belonging to the hotel, and fronting toward the lake. The instruments are secured to the side of the house, and are protected by the piazza roof, which is about 17 feet wide. They are exposed to the rays of the sun between the hours 8 and 9 a. m. Their height above the ground is 10 feet, and above the water surface 18 feet.

The rain-gauge stands on a floating boat wharf at a distance of 150 feet from the nearest building or woods. The top of the gauge is 3 feet above the lake.

NORTHERN PLATEAU — FRANKLIN COUNTY.

STATION, SARANAC LAKE — EDWIN R. BALDWIN, M. D., OBSERVER.

Established November, 1893; latitude, 44 deg. 19 min. north; longitude, 74 deg. 08 min. west; elevation about 1,500 feet.

This station is situated in the village of Saranac Lake, one-eighth mile from the Saranac river, and 75 or 100 feet above its surface; the ground about the station being very nearly level. A hill rises about 100 feet above the station toward the north-east, and at a considerable distance north and northeastward is a range of the Adirondack mountains.

Maximum, minimum, dry and wet-bulb thermometers are placed in a shelter having louvred sides, its dimensions being 26 inches in length, 18 inches deep and 28 inches high. The shelter has a peaked shingled roof, and is painted white. It is located in the rear of Mr. Baldwin's house, over turf, and is 50 feet from the nearest building. The thermometers are 4½ feet from the ground.

The rain-gauge stands near the shelter, and is 2 feet above the ground.

NORTHERN PLATEAU — FULTON COUNTY.

STATION, GLOVERSVILLE — MR. L. W. CHAMBERLAIN, OBSERVER.

Established (by Mr. Chamberlain) December, 1883; latitude, 43 deg. 5 min. north; longitude, 74 deg. 30 min. west; elevation, 850 feet.

The city of Gloversville is situated on the southern slope of the Adirondack Plateau, near the upper limits of a valley tributary to the Mohawk; the city being about 600 feet above the Mohawk river. The station stands on the city hospital grounds, which slope sharply upward at the eastern border of the city.

The instrument shelter stands on the slope west of and below the hospital building, 38 feet distant; and there are no objects nearer than this to obstruct the air circulation. The shelter, containing a full set of thermometers, is constructed after the specifications of the Weather Bureau, and stands 5 feet above the sod.

The rain-gauge is located on the same slope 20 feet north of the shelter, and at about the same level.

Mr. Chamberlain has made careful and systematic observations upon the weather for the past 15 years.

NORTHERN PLATEAU — LEWIS COUNTY.

STATION, NUMBER FOUR — MR. CHARLES FENTON, OBSERVER.

Established by the National Service in December, 1888; equipment completed by the State in December, 1889; latitude, 43 deg. 50 min. north; longitude, 75 deg. 12 min. west; elevation, 1,571 feet.

The station, Fenton's Number Four, is 18 miles east of Lowville, near the western limits of the Adirondack wilderness. The station stands on a plateau which commands a view of Beaver lake, about one-half mile distant, and also a considerable range of the surrounding country in all directions. Since the hills in this section are much lower than the peaks of the eastern Adirondacks, the air circulation about the station is nearly unobstructed.

The dry, wet bulb and maximum and minimum thermometers are exposed near the northwest corner of Mr. Fenton's main building in a single-louvred shelter of the Signal Service pattern. The shelter is about 11 feet above the ground, and is reached by a narrow platform extending out about 10 feet from the piazza of the house. It is exposed to the rays of the sun until about 9 in the morning; but during the remainder of the day the shelter is shaded by the main building.

The rain-gauge is situated on open ground, free from obstacles to a favorable exposure. The height of the funnel is about 3 feet from the ground. The barometer (by Schneider Bros.) is hung near the window of an unheated room on the first floor of the building.

NORTHERN PLATEAU — LEWIS COUNTY.

STATION, TURIN — MR. R. T. CHURCH, OBSERVER.

Established by the State Service in October, 1890; latitude, 43 deg. 38 min. north; longitude, 75 deg. 25 min. west; elevation, 1,240 feet.

This station is located on the same terrace of "Tug Hill" range already described with reference to Constableville; but the plateau is not so wide as at the latter place, and the hills rise much more abruptly westward from Turin toward Gomer Hill (the highest point of the range) whose summit is 2,100 feet above tide. A consideration of the very heavy rains or cloud bursts which have occurred during past years in this section, as well as its exceedingly severe winter climate and deep snows, indicate the existences of peculiar meterological conditions well worthy of further investigations.

This station is situated about one-fourth of a mile west of the village of Turin, and is but a few hundred feet from the base of the steep hills of the range.

The dry and wet bulb thermometers, and the maximum and minimum, are exposed out of a north window on the first floor of Mr. Church's house. The afternoon sun is excluded by wings from the eastern and western sides of the window; and over these a slanting board cover is placed, forming a shelter from rain and snow. The windows are always closed and the rooms are unheated. The sod immediately beneath the instruments is protected at all hours by the house and a fir tree at its northwestern corner. The dwelling is a frame house.

The rain-gauge is located in an open field 100 feet distant from the house. The height of the mouth of the gauge is 5 feet above ground.

COAST REGION — SUFFOLK COUNTY.

STATION, BRENTWOOD — MR. W. H. ROSS, M. D., OBSERVER.

Established February, 1891; latitude, 40 deg. 45 min. north; longitude, 73 deg. 14 min. west; elevation, 75 feet.

This station is situated 1 mile northeast of Setauket post-office, at a distance of one-fourth mile from the Hotel Austral.

The maximum and minimum, dry and wet bulb thermometers are exposed on the north side of Dr. Ross' residence, about 6 feet above the floor of a veranda, whose roof acts as a shield from the sun and weather. Their height above the ground is 7 feet. The rain-gauge has a favorable exposure upon an open plat of ground.

COAST REGION — SUFFOLK COUNTY.

STATION, SETAUKET — MR. SELAH B. STRONG, OBSERVER.

Equipped with State instruments in January, 1890; latitude, 40 deg. 57 min. north; longitude, 73 deg. 05 min. west; elevation, 40 feet.

This station is situated 1 mile northeast of Setauket post-office upon a neck of land projecting into estuaries of Long Island sound. The Oldfield light, a prominent point of the northern coast of Long Island, is about 1 mile distant toward the northwest.

Mr. Strong's house stands on ground 40 feet above sea-level, with an open exposure on all sides excepting the northeast, where a cedar grove stands on a slight elevation.

The instrument shelter, containing a full equipment of thermometers, is fastened to a window casing on the north side of the house. It is louvred on three sides, with slat work at the bottom; the side facing the window being open. The dimensions of shelter are: Width, 20 inches; height, 24 inches; depth, 10 inches. Its height above ground is 6 feet, and the distance from the window 4 inches.

The roof of an open piazza prevents the rays of the afternoon sun from reaching the shelter, while a grove toward the east has a similar effect in the morning.

The rain-gauge stands upon nearly level ground, and is well removed from obstructions to a free air circulation. Its height above ground is 12 inches.

Observations upon temperature and rainfall have been made continuously at this station since 1885, Signal Service instruments being used until 1890.

COAST REGION — WESTCHESTER COUNTY.

STATION, BEDFORD — MR. WILLIAM A. HYDE, OBSERVER.

Established in March, 1894; latitude, 41 deg. 11 min. north; longitude, 73 deg. 39 min. west; elevation, about 290 feet.

Mr. Hyde's residence is situated in the hamlet of Bedford Centre, having practically the exposure of the open country, which is a rolling plateau in this vicinity.

The maximum and minimum thermometers are located under the roof of a porch, on the south side of the house. They are secured to a post, at an elevation of 6 feet above the ground, and 5 feet above the piazza floor. Rays of the sun are excluded from the instrument by maple shade trees and by a screen over the thermometers.

The rain-gauge is mounted about 4 feet above the ground, on the fence of an open lot. The exposure is very satisfactory.

HUDSON VALLEY — COLUMBIA COUNTY.

STATION, LEBANON SPRINGS — MR. ARTHUR K. HARRISON, OBSERVER.

Established in March, 1892; latitude, 42 deg. 29 min. north; longitude, 73 deg. 20 min. west; elevation, 930 feet.

This station is located on the eastern side of a narrow valley which runs nearly north and south through the high hills of eastern Columbia county.

The maximum and minimum thermometers are exposed on the northern side of a building under a "hood;" their distance from the walls of the building being 5 or 6 inches, and from the ground 5 feet.

The rain-gauge is exposed in a slightly sloping, open meadow. Its height above ground is 1 foot 4 inches.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, WAPPINGER'S FALLS — MR. H. C. TOWNSEND, OBSERVER.

Equipped with rain-gauge May, 1890, with maximum and minimum thermometers in February, 1893; latitude, 41 deg. 35 min. north; longitude, 73 deg. 56 min. west.

This station is located at the eastern edge of the town of Wappinger's Falls, in the valley of Wappinger's creek. The surrounding country is broken, one of the higher hills rising about 300 feet west of the station. The station stands on a point of land extending into Wappinger's lake, a body of water 1 mile long and about half a mile wide.

The maximum and minimum thermometers are exposed on the northwestern side of a small wing of Mr. Townsend's house, and in a shallow angle formed by the wing and the main portion of the house. They are protected by a shelter 3 feet high, 3 feet wide and 1 foot deep; its top and back being of solid wood, and the front and sides of lattice work. During the summer the sun reaches the shelter for about an hour in the morning and afternoon, but at other seasons it is entirely shaded. The thermometers are 5 feet 2 inches above the ground and 8 inches from the wing wall. The room within is not heated.

The rain-gauge is 50 feet from the house, and at ample distance from trees and buildings. Its top is 7 feet 4 inches above the ground.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, HONEYMEAD BROOK — DR. JAMES HYATT, OBSERVER.

Equipped April, 1890; latitude, 41 deg. 51 min. north; longitude, 73 deg. 42 min. west; elevation, 450 feet.

This station is situated about 1 mile southeast of the village of Stanfordville and is about 4 rods distant from the track of the N. D. and C. R. R. The valley through which this road passes opens toward the south-southwest into the Hudson valley; hence it is thought that the meteorological conditions of the station are similar to those of the Hudson valley north of the Highlands. The general surface rises for several miles east and southeast from the station to the high hills west of the Harlem valley, while in its immediate vicinity the ground is broken by numerous irregular hills having a comparatively small elevation.

The dry and wet bulb, and the maximum and minimum thermometers are placed at the angle formed by the northeast side of the main portion of Mr. Hyatt's house and the northwest side of a wing projecting about 4 feet from the main building, the instruments thus fronting toward the north. The thermometers, excepting the maximum, are sheltered by board sides and bottom, and a sloping roof, the front being wholly open to the northwest, and the back half open. The maximum thermometer is placed near by, outside the shelter. The wings of the house exclude the sun at all hours.

The rain-gauge, which was constructed by Mr. Hyatt, is 70 feet southeast of the house. Its top is 4½ feet above the ground. Its readings agree well with the gauge of the State service.

HUDSON VALLEY — DUTCHESS COUNTY.

STATION, POUGHKEEPSIE, VASSAR COLLEGE OBSERVATORY.

Latitude, 41 deg. 41 min. north; longitude, 73 deg. 53 min. west; elevation, 180 feet.

This station is located on a plateau 180 feet above the Hudson river and about 2 miles from its eastern bank. The country is rolling and quite flat in the immediate vicinity, giving an open exposure.

The thermometers are placed in a louvred shelter of standard pattern, about 50 feet from the college observatory, and not far from a clump of evergreen trees. The shelter is exposed to sunlight excepting in the early morning and late afternoon. The thermometers are 5 feet above the sod.

The rain-gauge is a copper bucket, 10 inches in diameter, made by Badger & Sons, furnished by the New England Weather Service. It is about 40 feet distant from the observatory.

HUDSON VALLEY — PUTNAM COUNTY.

STATION, CARMEL — MR. THOMAS MANNING, OBSERVER.

Date of establishment not known; latitude, 41 deg. 25 min. north; longitude, 73 deg. 40 min. west; elevation, 500 feet.

This station is about 1,000 feet east of the village of Carmel, near the foot of a gradual descent from the village. The surrounding country is much broken by abrupt, irregular hills, probably not exceeding 300 or 400 feet in height above the general surface.

The station is equipped with a maximum and minimum thermometer, owned by Mr. Manning, and a rain-gauge of the pattern used in the Croton aqueduct system. The thermometers are exposed on the northern piazza of Mr. Manning's house, at the height of 5 feet above the floor, and at about the same distance below the roof. The instruments are about 15 feet from the western or nearest end of the piazza, the roof of which (8 feet in width), with the hill westward, probably shields the thermometer from the direct rays of the sun at all hours.

The rain-gauge is on level ground, about 100 feet south of the house, and has an unobstructed air circulation about it. The funnel of the gauge is about 12 inches in diameter, and its height above the ground is 12 inches.

HUDSON VALLEY — SARATOGA COUNTY.

STATION, STILLWATER — REV. R. G. THOMPSON, OBSERVER.

Established May, 1893; latitude, 42 deg. 57 min. north; longitude, 73 deg. 45 min. west.

This station is located in the town of Stillwater, in the Hudson river valley, which at this point is about 1 mile in width, high hills rising on each side. The river is about 40 rods distant from the station.

The maximum and minimum thermometers are exposed on a northern piazza, on the northeastern side of the house in summer, and on the northwestern side in winter. They are 5 feet from the brick wall of a room heated throughout the year; being mounted on a backing of inch board, with screens of the same material at the top and sides. In winter the sun strikes the back and end of the shelter for a short time in the afternoon, but in its summer position the shelter is shielded at all hours by the house and by large elms near by. The thermometers are 7½ feet above the ground.

The rain-gauge is placed on level ground 25 feet from buildings, and 10 feet from a small fruit tree. The top of the gauge is about 14 inches above the ground.

MOHAWK VALLEY — ONEIDA COUNTY.

STATION, ROME — H. C. SUTTON, M. D., OBSERVER.

Date of establishment not known; equipped by the State Service in October, 1890; latitude, 43 deg. 11 min. north; longitude, 75 deg. 28 min. west; elevation, 445 feet.

Rome is situated at the western extremity of the Mohawk valley near the summit of the water shed separating the Hudson river system from that of the great lakes. The valley at this point is broad and flat, opening westward toward Oneida lake and the great lake region. The exposure of instruments has been changed several times during the two years past; but at present the maximum and minimum and dry and wet bulb thermometers are secured to the northern post of an open summer house, whose roof affords a protection from rains, and, with buildings towards the east and west, excludes the sun at all hours.

The rain-gauge is located south of the summer house at an ample distance from buildings. Its top is 12 inches from the ground.

CHAMPLAIN VALLEY — SARATOGA COUNTY.

STATION, SARATOGA — MR. W. H. HALL, M. D., OBSERVER.

Established October, 1890; special temperature station; latitude, 43 deg. 05 min. north; longitude, 73 deg. 48 min. west; elevation, 270 feet.

The general surface in the vicinity of Saratoga is a plain, bordered on the west by the Palmerstown range of hills, and on the east ridges of lesser height separate the plain from the Hudson river. The station is, no doubt, subject to the conditions of both the Champlain and Hudson valleys; but the character of the topography of Saratoga county indicates that the prevailing air currents are from the north rather than the south. There are no records of previous systematic meteorological observations for Saratoga covering a period longer than one year.

The thermograph was removed in May, 1892, from the location described in the report of 1890, and is now exposed out of the north window of the tower of the High School building, at a height of 50 feet from the ground.

CHAMPLAIN VALLEY — WARREN COUNTY.

STATION, GLENS FALLS — PROF. C. L. WILLIAMS, OBSERVER.

Established October, 1891; latitude, 43 deg. 19 min. north; longitude, 73 deg. 40 min. west; elevation, 340 feet (approximately).

Glens Falls village is at the southern border of Warren county, on the bank of the Hudson river, which at this point flows eastward through a broad valley. The country is nearly flat toward the south, and also northward as far as the French mountain range on the eastern shore of Lake George.

The station is located at the Glens Falls academy, No. 60 Warren street. The shelter is secured to the northern side of a wood building, 10 by 10 feet, which is built against the brick school building. The shelter is 30 inches high by 18 inches deep by 24 inches wide. Its sides are of wood, free air circulation being obtained by slits at all the edges, and through the wire screen in front. The height of the thermometers (dry, wet, maximum and minimum) is 4 feet from the ground.

The rain-gauge is placed 2 feet above an open plat of ground and 60 feet from any buildings.

ST. LAWRENCE VALLEY — FRANKLIN COUNTY.

STATION, MALONE — MR. A. B. JOHNSON, OBSERVER.

Established in the town in November of 1889, and discontinued in the summer of 1890; the present station was established in November, 1890; latitude, 44 deg. 57 min. north; longitude, 74 deg. 19 min. west; elevation, 810 feet.

The town of Malone is at the base of the lower foot hills of the Adirondacks, from which the ground slopes gradually and uniformly to the St. Lawrence river, 18 miles distant. The station is located on the summit of a rise of ground 1½ miles south-southwest of the town, and about 200 feet above the tracks of the Vermont Central railroad. The station commands a very extensive view of the St. Lawrence valley toward the north and west, and of the Adirondack mountains to the southward.

The dry, wet, maximum and minimum thermometers are exposed about 15 feet from the northern side of Mr. Johnson's residence, in a shelter built after the specifications of the United States standard.

The rain-gauge stands in an open space 90 feet distant from the nearest buildings and 3 feet above the ground.

ST. LAWRENCE VALLEY — JEFFERSON COUNTY.

STATION, WATERTOWN — MR. F. M. PORTER, OBSERVER.

Established October, 1890; transferred to Mr. Porter in July, 1894; latitude, 43 deg. 57 min. north; longitude, 75 deg. 54 min. west; elevation, 580 feet (approximately).

This station is located at Mr. Porter's residence, 154 State street, about 1½ miles southeast of the business center of Watertown, its exposure being practically that of the open country. The station stands near the summit of a ridge, being about 100 feet higher than the former station in the city.

The thermometers hang in a shelter 2 feet 8 inches long, 12 inches deep and 3 feet high, with louvred windows and a glazed door in front. The roof is sloping, the bottom and back are closed, the door opening toward the northeast. The shelter is situated midway between a low wing of the house and the barn, 30 feet distant from each. It is secured to a post at a height of 5 feet above the sod.

A barometer located in a room on the first floor of the house was found to be out of adjustment and was returned to the central office for correction.

The rain-gauge is fastened at the back of the shelter, its top being well above the roof and 7 feet from the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, NORTH HAMMOND — MR. C. A. WOOSTER, OBSERVER.

Established (by the National Service with a standard thermometer) in November, 1888; and completely equipped by the State Service in December, 1889; latitude, 44 deg. 30 min. north; longitude, 75 deg. 40 min. west; elevation, about 340 feet.

The station is situated in the open country 6 miles north of the Hammond depot of the Rome, Watertown and Ogdensburg railroad, and about 1 mile from the St. Lawrence river. Northwestward from the station the surface of the country is nearly flat, with a gradual slope toward the river; whilst toward the east, and 300 feet from the station, the general surface rises some 30 or 40 feet. There are no high hills in the vicinity of the station.

The dry, wet and maximum and minimum thermometers are exposed on the northwestern side of a wing of the observer's house, and under the roof of a piazza 5 feet wide. The instruments are secured to the wood work of the wing 6 feet above the floor and 9 feet above the ground. The room within is heated throughout the year; but as a check, a standard thermometer located in a shaded position away from the veranda is read at each observation and thus far the results have agreed very closely. The sun's heat is excluded from the piazza until late in the afternoon, when the floor and the walls are liable to radiate their heat to the instruments. Efforts have been made to remedy this defect.

The rain-gauge is located about 35 feet west of the wing of the house ($1\frac{1}{2}$ stories in height), and a distance from a low outbuilding equal to the height of the latter. The top of the gauge is about 5 feet above the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, POTSDAM — MR. G. W. F. SMITH, OBSERVER.

Established December, 1889; latitude, 44 deg. 40 min. north; longitude, 75 deg. 01 min. west; elevation, 300 feet.

This station is situated on Leroy street, Potsdam, at a distance of 1 mile north from the center of the town, and well removed from other buildings. The station is about 100 feet above the tracks of the Rome, Watertown and Ogdensburg railroad, on the summit of a knoll which is the highest point within a radius of a mile. The ground slopes gradually away from the station in all directions. The surrounding country is flat as far as the Adirondack foot hills, nearly 10 miles distant.

The dry and wet bulb and maximum and minimum thermometers are exposed in a shelter which is built out from the window on the north side of a low, unheated building attached to Mr. Smith's residence. The shelter is louvred at the sides and front, and in the rear a small door gives access to the instruments from the interior of the building. The dimensions of the shelter are about 3 by $2\frac{1}{2}$

feet at the base, and 3 feet in height. It has a slanting double roof and slat bottom. The rays of the sun touch the top of the shelter at noon, but are excluded from it at other times by the walls of the building, and also by a pine tree west of the house. The walls adjacent to the shelter are of wood. The height of the thermometers above the ground is 6 feet.

The rain-gauge is located 70 feet north of the house, and about 25 feet from a few small fruit trees. The top of the gauge is 5 feet above the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, OGDENSBURG, AT THE ST. LAWRENCE STATE HOSPITAL.

Established December, 1889; latitude, 44 deg. 43 min. north; longitude, 75 deg. 30 min. west; elevation, 258 feet.

The State Hospital is situated on a broad, open plain, within 100 rods of the St. Lawrence river, and about 2 miles from the center of Ogdensburg. The thermometers (which belong to the hospital) are located on a third-story balcony of the administration building opening towards the west-southwest. They are exposed in a shelter 24 inches broad by 30 inches deep, and 6 feet in height, louvred from top to base (which rests on the piazza floor). The shelter is painted brown. The dry and wet bulb and maximum and minimum thermometers are located midway between its sides, being 5 feet above the floor and 36 feet above the ground. The piazza becomes heated from the direct rays of the sun in the afternoon; and hence the maximum temperatures indicated may be somewhat too high.

The rain-gauge is located 75 feet southeast from the nearest building, upon a lawn. Its top is 9 inches above the ground.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, MASSENA — MR. A. J. NELSON, OBSERVER.

Established in 1890; re-established July, 1894; latitude, 44 deg. 55 min. north; longitude, 77 deg. 54 min. west; elevation, 200 feet (approximately).

Massena is situated at the extreme northern border of the State, on the broad and nearly level country adjacent to the St. Lawrence river, which is 3 miles distant from the village. The maximum and minimum thermometers are located at the store of Mr. Nelson, on Harrowgate street. The instruments are secured to the rear or western wall of a shed 12 feet high at the back of the store; the height of the thermometer above the ground being 8 feet. The shed is rather loosely boarded on all sides excepting the south, which is open. The temperatures indicated may be somewhat too high, owing to the heating of the adjacent unpainted wall by the sun.

The rain-gauge is placed at the rear of Mr. Nelson's residence on Glenn street. Its distance from the house is about the same as the height of the building.

The present location of the thermometers is one-fourth mile north of the former station.

ST. LAWRENCE VALLEY — ST. LAWRENCE COUNTY.

STATION, CANTON — MR. C. W. BOLTON, OBSERVER.

Established November, 1889; instruments transferred from Prof. Henry Priest to present observer in March, 1894. Latitude, 44 deg. 35 min. north; longitude, 73 deg. 12 min. west; elevation, 304 feet.

The meteorological station is located at the summit of a slope on the north side of the Grasse river, which is about 300 feet distant. Although within the limits of the village, the station has a very open exposure.

The thermometers are secured to the northern wall of a frame building, at a distance of 3 feet from the northwest corner. A screen toward the west cuts off all direct rays of the sun; but to prevent direct radiation to the thermometers from the ground in the afternoon, a shelter having louvred sides and front, with a solid top and bottom, was to be placed around the instruments. These are now placed about 5½ feet above the ground.

The rain-gauge is located about 30 feet from the house, and is also about the same distance from the barn. The height of portions of these buildings adjacent to the gauge is about equal to their distance from it.

GREAT LAKE REGION — CHAUTAUQUA COUNTY.

STATION, WESTFIELD — MR. G. SCHOENFELD, OBSERVER.

Established in October, 1895; latitude, 42 deg. 21 min. north; longitude, 79 deg. 37 min. west; elevation, 758 feet.

This station is situated in the open country, 2 miles from Lake Erie, toward the north, and 2 to 3 miles from the main ridge of the Chautauqua county hills toward the south. The surface is a plain slope from the lake toward the hills.

The thermometers are exposed on the north side of a building, 2 feet from its walls and 8 feet above the ground. They are protected by a hood or roof and by lattice work sides; the dimensions of the shelter being 2 x 2 x 3 feet. They are not exposed to direct sunlight or other source of heat.

The rain-gauge stands on level ground, 35 feet from the nearest building. Its top is 8 feet above the ground.

This locality is not subject to autumn frosts or very severe winter weather, a week of continuous sleighing being rare. There is less rain and dew than on the highlands. Brisk winds are frequent.

GREAT LAKE REGION — MONROE COUNTY.

STATION, PITTSFORD — REV. G. H. GOMPH, OBSERVER.

Established in June, 1895; latitude, 43 deg. 05 min. north; longitude, 77 deg. 34 min. west; elevation, 515 feet.

The land about Pittsford is slightly rolling, with a general slope in a northerly direction into the Irondequoit basin and Lake Ontario. The station is situated at the western end of the village.

The maximum and minimum thermometers are exposed in a shelter built out from the north window of an unused second-story room, their distance from the ground being 15 feet. The shelter is built of window blinds, and is about 18 inches deep, 2 feet 6 inches wide in front and 3 feet 6 inches at the rear. The bottom and top are open, but the cornice of the house, 6 feet above, affords partial protection from weather. Direct rays of the sun are excluded at all hours.

The rain-gauge stands on nearly level ground, and is 60 feet distant from any trees or buildings. The top of the gauge is 6 feet above the ground.

Interesting notes as to the course of thunderstorms in this vicinity are furnished by the observer.

GREAT LAKE REGION — NIAGARA COUNTY.

STATION, APPLETON — MR. H. A. VAN WAGONER, OBSERVER.

Established, August, 1889; latitude, 43 deg. 20 min. north; longitude, 78 deg. 41 min. west; elevation, 270 feet.

This station is situated in the open country, on the broad plain of northern Niagara county, at a distance of 1 mile from Lake Ontario.

The dry and wet bulb, maximum and minimum thermometers are mounted, under a hood, at the northern end of Mr. Van Wagoner's house. They are shielded from the sun's rays at all hours; in the morning by a wing of the house and also by a canvas screen, and in the afternoon by a building a dozen feet to the west. The instruments are about 5 feet from the ground.

The rain-gauge stands between the house and barn, being about 50 feet distant from each. Its top is 4 feet nine inches above the ground.

GREAT LAKES — OSWEGO COUNTY.

STATION, PALERMO — MR. E. B. BARTLETT, OBSERVER.

Observations commenced in 1854; equipped with standard maximum and minimum thermometers (by Signal Service) in July, 1887; fully equipped by State Service in February, 1890; latitude, 43 deg. 24 min. north; longitude, 76 deg. 20 min. west; elevation, 460 feet.

This station is situated in the open country about 6 miles south-southwest of the town of Mexico, Oswego county. The surface of the surrounding country is rolling; the ridges, which are generally low, extending from northwest to southeast. A hill, said to be the highest point in Oswego county, lies 3½ miles southeast of the station, but no marked rise of ground occurs until within half a mile of the summit. The station is situated on the northern slope of one of the ridges mentioned. The ground rises rapidly for a short distance at the rear or south side of the station, but falls away from it on the eastern and northeastern sides, thus giving a free circulation of air from the east, north and west.

The thermometers are exposed in a shelter of the dimensions and pattern used by the United States Weather Bureau. This shelter is 6 feet above the ground and 17 feet from the north side of Mr. Bartlett's house.

The rain-gauge is 50 feet from the northeast corner of the house in a clear space. The bottom of the gauge is 1 inch above the ground.

Details as to the manner in which long records of temperature and rainfall were obtained by Mr. Bartlett may be found in the report of this bureau for the year 1890.

GREAT LAKES — WAYNE COUNTY.

STATION, LYONS — M. A. VEEDER, M. D., OBSERVER.

Date of establishment not known, but prior to 1888; latitude, 43 deg. 06 min. north; longitude, 77 deg. 00 min. west; elevation, 407 feet.

Mr. Veeder's house is on or near the summit of the gradual slope on which the town of Lyons is situated. The ground falls away gently from the station to the northeast and south, but toward the west is nearly level for a quarter of a mile, to the base of an abrupt ridge, extending in a north and south direction, and 75 to 100 feet in height. The general character of the surrounding country is that of a plain, broken by numerous isolated low hills. The thermometers are exposed in a single-louvred shelter about 3½ feet in width by 3 feet in height, which is placed out of the window of an unheated room on the second floor and north side of the house. The shelter has a sloping roof and its bottom is closed. The front and sides are of single-louvred work, while at the back the raising of the window-sash gives access to the thermometers. In the early summer the shelter is exposed to the sun up to about 9 a. m., but is shielded from solar rays during the remainder of the day.

The rain-gauge is placed on a roof having a southeastern exposure, and is 12 feet above the ground. A second roof rises about 6 feet above the gauge, at a distance of 18 feet from it, and 16 feet toward the northwest a roof also rises about 10 feet above the gauge.

CENTRAL LAKES — CAYUGA COUNTY.

STATION, FLEMING — MR. ROBERT WARWICK, OBSERVER.

Established December, 1889; latitude, 42 deg. 51 min. north; longitude, 76 deg. 36 min. west; elevation, 1,000 feet.

This station is situated in the open country, on the ridge of land lying between Cayuga and Owasco lakes, its distance from the latter being about 2½ miles, and from the city of Auburn 4 miles. The surface in the vicinity of the station is quite flat, but with a general slope downward toward the north.

The thermometers have recently been removed from the shelter described in the report of 1890, and are now exposed in a corn-house, whose north side is of open lattice work. The thermometers are suspended on the north side of the house, 3 feet from the lattice and 6 feet from the ground.

The rain-gauge is located about 100 feet west of Mr. Warwick's house, and is well removed from obstructions to a free air circulation.

CENTRAL LAKES — SENECA COUNTY.

STATION, ROMULUS — MR. J. H. CORYELL, OBSERVER.

Instruments transferred from Mr. B. E. Hicks September 7, 1891; latitude, 42 deg. 43 min. north; longitude, 76 deg. 56 min. west; elevation, 719 feet.

This station is situated in the western part of the village of Romulus, near the summit of the ridge separating the basins of Cayuga and Seneca lakes. The high southern plateau terminates in a somewhat abrupt descent at Ovid, 6 miles south of Romulus, north of which a comparatively flat country extends to Lake Ontario.

The thermometers are exposed in a single-louvred shelter 20 inches wide, 36 inches long, and 30 inches high, with a hinged bottom, and a drop-door in front facing the west. The shelter is located at the eastern side of the house, and is exposed to the direct rays of the sun only from 10 to 12 a. m. The instruments are hung in the center of the shelter at a height of 5 feet 6 inches above the ground.

The rain-gauge is 30 feet distant from any buildings or trees, the nearest of the latter being small shrubs 8 feet high. The gauge is 30 inches above the ground.

CENTRAL LAKES — TOMPKINS COUNTY.

STATION, ITHACA — AT THE COLLEGE OF CIVIL ENGINEERING, CORNELL UNIVERSITY.

Established 1874; latitude, 42 deg. 27 min. north; longitude, 76 deg. 29 min. west; elevation, 810 feet.

This station is situated on the hill bordering the eastern side of Cayuga Lake valley, its distance from the head of the lake being about 1 mile and its elevation above the lake level 400 feet. South of the city of Ithaca, which lies immediately below the station, the valley divides into two branches, the first and main branch extending through the hills toward the southwest, while the second forms the narrow channel of Six Mile creek, which flows from the highlands southeast of the city into Cayuga lake. The meterological station has an open exposure toward the main valley on the west, while eastward, after a slight rise near the station, the surface is nearly flat along the course of the Fall creek; but numerous hills arise to heights varying from 300 to 500 feet above the general level, at distances of a mile or more to the southeast of the station.

The instrumental equipment of the station is as follows:

Barometers.— These instruments are placed in the basement clock room of the engineering college.

1. The standard, a Fuess normal siphon barometer, is so constructed that any error due to the presence of air at the top of the mercurial column may be detected and approximately corrected by varying the capacity of the cistern, and so making the column occupy more or less of the vacuum chamber at the top. The pressure of any gas in the vacuum chamber will increase as the space is diminished, so that, under these conditions, the readings will not agree.

2. A Draper barograph furnishes a continuous record of pressure. The cistern of this instrument is suspended upon long spiral springs, while the main tube is fixed. The proportions of the various parts are such that a rise of pressure forces the mercury up into the tube from the cistern, which then rises; and a decreasing pressure produces a contrary effect. The record is made by a pen attached to the cistern, which bears against a record sheet moved horizontally by clock work. Since this barograph acts by balancing the weight of the mercurial column against the weight of the atmosphere, the correction for the temperature of the mercurial column is very small, falling within the limits of other errors of the instrument. The latter seldom amount to 0.01 inch.

3. A Green's Fortin barometer of the ordinary pattern, having a fixed zero point, to which the level of the cistern is adjusted, is used for purposes of current comparisons.

Thermometers.— 1. Standard dry bulb and maximum and minimum thermometers are mounted in a shelter of the Weather Bureau pattern. The shelter stands about 40 feet east of the college building, upon a grass plot sloping downward toward the west; the height of the instruments above the sod being about 6 feet.

2. A continuous record of temperature is furnished by a Richard thermograph placed in the shelter. The pen tracing the record is attached to an arm whose position is governed by the expansion or contraction of a metal tube filled with alcohol. The recording sheet is carried by a cylinder, revolved by clock-work, at the rate of one turn per week. This thermograph, which is very accurate when properly adjusted, is checked by comparison with the adjacent standard thermometer.

Hygrometers.— The shelter also contains a hair hygrometer (Richard's), whose registering mechanism is similar to that of the thermograph; but in this case the pen arm is moved by the expansion and contraction of a bundle of hairs which are rendered very sensitive to the action of moisture by a special process of the makers. The index or datum of this hygrometer is liable to change somewhat during prolonged wet or dry periods; but gives very satisfactory results when adjusted from time to time to agree with the values of humidity indicated by the whirled psychrometer. (See " Instructions to voluntary observers " for full information regarding the latter instrument.)

A Richard dry and wet bulb recording hygrometer has also been used at this station, but thus far has not proved as satisfactory as the instrument just described. In principle it consists of two Richard thermographs, one of which has its alcohol tube moistened constantly by muslin dipping into a reservoir, while the other tube is kept dry. The instrument is so constructed, however, that the records of both dry and wet bulbs are traced upon the same cylinder.

Evaporometer.—An evaporometer (Richard's) is located beneath the shelter at a height of 2 feet from the ground; direct sunlight and driving rain or snow being excluded by louvred sides. The evaporometer consists, essentially, of a pair of scales, one pan of which carries the water, whose evaporation is to be measured, and a pen attached by suitable mechanism to the scale arm, which records on a rotating cylinder the rise or fall of the scale beam as the quantity of water is diminished or increased.

Actinometer.—An actinometer or sunshine recorder (Richard's) is mounted on a shelf out of a south window of the college. The intensity of solar heat is measured by the difference in temperature between two glass bulbs 4 inches in diameter, placed side by side, one of which is coated with lamp-black while the other is silvered. The two have the same temperature (nearly) when the sky is overcast, but the black bulb absorbs the heat of solar rays more rapidly than the bright under a clear sky. Each bulb contains a coil of copper tube filled with alcohol, and communicating with separate tubes similar to those of the thermographs, each of which has its recording lever and pen, whose tracings are made on a cylinder rotating once in two days. The differences between the temperatures traced by the two levers indicate the intensity of the solar radiation.

Wind Registers.—Two sets of wind registers are in use at the central station, each set furnishing an automatic record both of velocity and direction. Firstly, the instruments provided eighteen years ago by the director, and whose records have since been maintained, are mounted about 8 feet above the ridge of the engineering building and 75 feet above the ground. The wind vane has for its axis a rod which is brought down through the roof, and carries at its lower extremity a cylinder about 3 inches in diameter and 9 inches long. A pencil held in a suitable carriage moves vertically down the length of the cylinder in 24 hours; and since the cylinder turns with the vane, the pencil tracing upon a sheet of paper which is wrapped around the cylinder, furnishes a continuous record of the wind direction.

The anemometer, which is of the Robinson pattern, has four hemispherical cups carried on spokes radiating from a vertical axis. Rotation is caused by the greater force which the wind exerts upon the concave over that upon the convex sides of the cups; and when the number of revolutions indicates 1 mile of wind travel, an electric contact is made by a mechanism attached to the axle of the anemometer. Wires attached to the instrument transmit the current to a Gibbon register located on the first floor of the building. A screw-thread is cut upon the axis of the recording cylinder of this register, and as it is rotated by clockwork at the rate of one turn in 6 hours, the screw also gives it a motion lengthwise with the axis, so that a pen in a fixed position would trace a spiral line around its surface. In fact, the recording pen is attached to the pole piece of an electro-magnet in circuit with the anemometer, and hence, at every mile-contact, a notch is made in the spiral line traced by the pen upon the recording sheet, and the number of miles of wind travel for any given time is found by counting the number of these notches. It is necessary to replace the recording sheet each day.

A second wind vane and pair of anemometers are mounted on the tower of McGraw hall, one of the University buildings, standing on the crest of the hill and overlooking the Cayuga valley. These instruments are 12 feet above the roof of the tower, and 140 feet from the ground, being thus more exposed to the full force of the wind than those just described. The anemometer for measuring horizontal wind currents is of the Richard's construction, consisting of a small wind-mill with 6 inclined vanes radiating from a horizontal axis, which axis, extending into a metal case, makes an electric contact with each hundred revolutions by means of suitable gearing. The entire apparatus revolves freely about a vertical axis in the same manner as an ordinary wind-mill, and is made to face the wind by a broad, wedge-shaped tail at the rear. The vertical axis, which is tubular, passes down into the interior of the tower, and within it are carried the wires which transmit the measurements of wind velocity.

As the instrument was furnished by the makers, the cylinder upon which the record of wind direction is traced, was fixed to the lower end of the axis of the wind-vane; but since the registers at the central station are located in the Engineering building, 600 feet distant from the anemometers, a different arrangement was necessary. The present device consists, firstly, of a fixed metallic ring (a) 3 inches in diameter, through the center of which the lower end of the wind-vane axis passes. This ring is divided into four segments or quadrants, each being connected with a wire passing to the corresponding quadrant of a similar ring (b) on the register in the distant building. A metallic contact piece secured to the wind-vane axis bears against the quadrants of (a), passing from one to the other as the direction of the wind changes. The ring (b) also has its contact piece, which is secured to the axis of the recording cylinder, said cylinder being rotated uniformly by clock work at the rate of one turn in 6 minutes. Its contact piece is in circuit with one pole of an electric battery, the other pole being grounded; and the contact piece of (a) is also grounded through the wind-vane axis. Hence, when the contact piece of (b), in its steady rotation, passes over the quadrant corresponding to that upon which the wind-vane contact is resting, a current is allowed to pass through (b) and its connecting wire to (a) and thence to the ground. This current actuates an electro-magnet in the register, thus pressing a pen against the cylinder until its contact piece, by rotation, passes off from the quadrant corresponding to the wind direction, when it is released. The pen falls vertically the length of the cylinder once in 24 hours, and, in the manner explained above, at every revolution of the cylinder, leaves a trace upon that part of its circumference which corresponds to the direction of the wind at the time.

The register, as thus described, records the wind direction only to four points; but by broadening the contact piece of (a) so that it can bear upon portions of two quadrants at the same time, as, for example, upon the north and west quadrants, for a northwest wind, both north and west are recorded upon the cylinder, and such a tracing is read northwest.

As previously stated, the wires of the velocity register pass through the hollow axis of the vane; and at the lower extremity of the latter are connected through mercury cups with wires running to the Engineering building. At every hundredth revolution of the anemometer, corresponding to 100 meters of wind, a circuit is made through an electro-magnet of the register; and this turns the proper recording cylinder through one one-thousandth part of a complete revolution. The recording pen (which is attached to the same carriage with that of the direction register), traverses the length of the cylinder in 24 hours, and thus leaves upon the tracing sheet a spiral line, every complete turn indicating 100 kilometers of wind.

In addition to the hundredth meter contact, the anemometer is also provided with a second contact, which is made at every revolution of the anemometer wheel, and the circuit thus established is transmitted to a Richard's anemo-cinemograph, devised to register the details of the wind movement, and to show its maximum force during gusts. In this instrument an electro-magnet and mechanism operated by it, raise the pen arm of the cinemograph about one-thirty-second of an inch at every contact; while a clock-work depresses the arm at a rate proportionate to its distance from the zero position. With a given wind velocity, therefore, the arm takes a position such that the rate at which it is being raised by the anemometer contacts exactly balances that at which it is being depressed by the clock movement; and in this position is quickly changed to correspond with variations in the wind velocity. As in the other instruments, the height of the pen above the zero point is registered upon a band of paper carried by a uniformly rotating cylinder. As the cinemograph is needed chiefly to record the force of violent gusts, a mechanism has been devised which puts it in operation only when the wind velocity exceeds 30 miles per hour.

A Richard's anemometer for measuring the force of vertical air currents (or their vertical components), is also placed on the tower of McGraw hall. This anemometer has four inclined blades or fans, rotating about a vertical axis, upward and downward currents turning it in opposite directions. Two sets of contacts are provided, one of which is operated by upward and the other by downward currents. The number of turns of the anemometer is registered upon a cylinder in the manner employed for recording horizontal velocities, excepting that the cylinder is made to turn to the right by downward currents, and in the opposite direction by upward currents. The movement of the cylinder is also ten times more rapid than in the case of the horizontal register for winds of the same velocity.

Rain-gauges of three kinds are in use at the central station. 1. An ordinary 8-inch gauge of the Weather Bureau pattern, which is the standard. 2. A Ferguson self-registering gauge, which weighs the water or snow in the receiver by means of a spring-balance, and automatically records the amount upon a strip of paper wound around a cylinder placed beneath the gauge. 3. A Wild-Fuess electric recording gauge, whose registering mechanism is inside the Engineering building. The guage has a funnel about 14 inches in diameter at the top, which discharges through a small tube into tilting buckets beneath. The buckets are balanced in such a manner that when one is filled it tips downward and empties, while the second bucket is brought under the tube from the funnel, and in its turn is filled and tipped. Each time this operation is completed, an electric circuit is made through wires connected with the register in the building. The record is made upon a strip of paper hanging vertically from a roll at the top of the case, and weighted at its lower end. The electric circuit, operating an electro-magnet and ratchet-wheel, drops the strip of paper about one-fiftieth of an inch at each tilt of the bucket, so that the distance through which the weight and strip of paper falls measures the amount of rainfall. The time register is made by a pen-arm moving horizontally across the paper strip (about 1½ inches wide) each hour, and sliding rapidly back to its initial position at the end of the hour. When no rain is falling, these horizontal hour lines are separated by the making of a contact within the clock, which moves the paper downward through the same space due to a tilt of the bucket. In dry weather, therefore, the paper is ruled with parallel horizontal lines about one-fiftieth of an inch apart; but a rainfall separates the lines by an amount corresponding to the amount of water falling in an hour.

STATISTICAL TABLE OF STATIONS ESTABLISHED BY OR REPORTING TO THE NEW YORK WEATHER BUREAU, FROM 1899 TO DATE.

COUNTY.	Stations.	Name of observer.	Latitude.		Longitude.		Elevation, feet.	Description, page.	Established.	Region.
			Degrees.	Minutes.	Degrees.	Minutes.				
Albany	Albany	U. S. Weather Bureau	42	40	73	45	85	......	—, 1874	Hudson Valley.
Albany	Bethlehem Centre	L. H. Myers	42	31	73	48	......	......	May, 1890	Hudson Valley.
Albany	Watervliet Arsenal	Post Surgeon, U. S. A.	42	47	73	40	50	......	—, 1824	Hudson Valley.
Allegany	Alfred Centre	Prof. F. S. Place	42	15	77	55	1,824	......	—, 1889	Western Plateau.
Allegany	Angelica	Prof. John P. Slocum	42	18	78	02	1,840	......	November, 1888; April, 1890	Western Plateau.
Allegany	Bolivar	Dr. Dorr Cutler	42	04	78	12	......	......	May, 1890	Western Plateau.
Allegany	Canaseraga	H. J. Davis	42	28	77	50	1,275	......	March, 1892	Western Plateau.
Allegany	Friendship	H. J. Davis	42	13	78	10	1,550	......	January, 1893	Western Plateau.
Broome	Binghamton	State Hospital	42	07	75	35	870	......	October, 1889	Eastern Plateau.
Broome	Chenango Forks	Dr. Z. A. Spendley	42	15	75	53	901	......	May, 1890	Eastern Plateau.
Broome	Deposit	H. W. Bixby	42	04	75	27	1,010	......	October, 1896	Eastern Plateau.
Broome	Ninevah	W. J. Barnett	42	12	75	39	1,032	......	October, 1888	Eastern Plateau.
Cattaraugus	Frankiinville	J. W. Kales, M. D	42	20	78	29	......	......	October, 1896	Western Plateau.
Cattaraugus	Humphrey	Charles E. Whitney	42	12	78	34	1,950	......	—, 1885	Western Plateau.
Cattaraugus	Little Valley	E. Sweetland	42	15	78	50	1,594	......	August, 1891	Western Plateau.
Cattaraugus	Limestone	M. W. Wagner	42	02	78	40	1,416	......	May, 1890	Western Plateau.
Cayuga	Sherwood	W. F. Searing	42	45	76	40	......	......	May, 1894	Central Lakes.
Cayuga	Fleming	Robert Warwick	42	51	76	30	1,000	......	December, 1889	Central Lakes.
Chautauqua	Arkwright	Miss E. L. Wilcox	42	25	79	15	1,260	......	August, 1890	Western Plateau.
Chautauqua	Cherry Creek	W. S. Blaisdell	43	18	79	07	......	......	May, 1890	Western Plateau.
Chautauqua	Dunkirk	Maxwell Scott	42	29	79	20	600	......	August, 1890	Great Lakes.
Chautauqua	Jamestown	N. D. Lewis	42	06	79	16	1,321	......	November, 1895	Western Plateau.
Chautauqua	Nashville	C. M. Libby	42	00	79	00	1,130	......	March, 1894	Western Plateau.
Chautauqua	Sherman	Rev. Charles Simpson	42	10	79	37	1,570	......	November, 1889	Western Plateau.
Chautauqua	Westfield	G. Schoenfeld	42	21	79	37	758	......	October, 1895	Western Plateau.
Chemung	Elmira	Gerity Brothers	42	06	76	56	863	......	November, 1888	Western Plateau.
Chemung	Pine City	Dr H. M. Darling	42	02	76	54	......	......	May, 1890	Western Plateau.
Chenango	Afton	D. C. Hyde	42	13	75	53	979	......	May, 1890	Eastern Plateau.

Chenango	Oxford	John P. Davis	42	23	75	40	1,000		December, 1889	Eastern Plateau.
Clinton	Lyon Mountain	P. J. Mullin	44	41	73	57	1,917		May, 1890	Northern Plateau.
Clinton	West Chazy	W. H. Robinson	44	45	73	28	250		May, 1890	Northern Plateau.
Clinton	Plattsburgh	Prof. G. H. Hudson	44	42	73	27	150		December, 1890	Champlain Valley.
Clinton	Plattsburgh Barracks	Post Surgeon, U. S. A.	44	39	73	28	100		——, 1839	Champlain Valley.
Columbia	Lebanon Springs	Arthur K. Harrison	42	29	73	22	920		January, 1892	Hudson Valley.
Cortland	Cortland	Prof. D. L. Bardwell	42	36	76	13	1,120		January, 1892	Eastern Plateau.
Delaware	Bloomville	F. J. Campbell	42	20	74	49	1,550		August, 1895	Eastern Plateau.
Delaware	Deposit	M. R. Hulse	42	04	75	27	1,010		May, 1890	Eastern Plateau.
Delaware	South Kortright	D. C. Sharpe	42	20	74	43	1,700		——, 1888 / February, 1890	Eastern Plateau.
Dutchess	Honeymead Brook	Dr. James Hyatt	41	51	73	42	425		April, 1890	Hudson Valley.
Dutchess	Pawling	Ira W. Hoag	41	32	73	35	......		May, 1890	Hudson Valley.
Dutchess	Poughkeepsie	Vassar College	41	41	73	55	180		......	Hudson Valley.
Dutchess	Wappingers Falls	H. C. Townsend	41	35	73	55	......		May, 1890 / February, 1892	Hudson Valley.
Erie	Eden Centre	W. P. Hunt	42	40	78	35	813		December, 1889	Great Lakes.
Erie	Akron	H. A. Wilder	43	01	78	32	770		May, 1890	Western Plateau.
Erie	Buffalo	U. S. Weather Bureau	42	53	78	53	690		——, 1870	Great Lakes.
Erie	Fort Porter	Post Surgeon, U. S. A.	42	53	78	54	660		January, 1849	Great Lakes.
Essex	Ausable Forks	F. E. Trumbull	44	25	73	28	550		May, 1890	Northern Plateau.
Essex	Elizabethtown	M. B. Davis	44	12	73	41	......		June, 1895	Northern Plateau.
Essex	Keene Valley	J. H. Bailey	44	09	73	50	1,015		November, 1889	Northern Plateau.
Essex	Port Henry	C. W. Lansing	44	05	73	30	......		April, 1892	Champlain Valley.
Franklin	Ampersand	Otto Ruhl	44	19	74	14	1,539		December, 1888	Northern Plateau.
Franklin	Hiawatha House (Axton)	Charles H. Wardner	44	13	74	18	......		November, 1892	Northern Plateau.
Franklin	Malone	A. B. Johnson	44	50	74	18	810		November, 1890	St. Lawrence Valley.
Franklin	Saranac Lake	E. R. Baldwin, M. D.	44	18	74	19	1,550		November, 1893	Northern Plateau.
Fulton	Gloversville	L. W. Chamberlain	43	03	74	22	802		April, 1892	Northern Plateau.
Genesee	Alabama	S. S. Parker	43	04	78	33	648		April, 1890	Western Plateau.
Genesee	Batavia	N. Bogue	43	00	78	18	900		May, 1890	Western Plateau.
Genesee	Le Roy	W. E. Annin	42	58	78	02	870		......	Western Plateau.
Catskill	Greene	A. D. Wilbur	42	13	73	52	......		August, 1896	Hudson Valley.
Greene	Tannersville	H. M. Wilson	42	0	74	07	1,900		February, 1889	Eastern Plateau.
Herkimer	Bisby Lodge	Henry Studer	43	33	75	00	1,800		May, 1892	Northern Plateau.
Herkimer	Ilion	G. A. Trowbridge	43	00	75	04	480		October, 1888	Mohawk Valley.
Herkimer	Little Falls	S. E. Babcock, C. E.	43	03	74	52	924		December, 1896	Mohawk Valley.
Herkimer	Little Falls (Reservoir)	S. E. Babcock, C. E.	43	12	74	48	1,526		December, 1896	Northern Plateau.
Jefferson	Adams Centre	A. E. Cooley	43	54	76	01	619		May, 1890	Great Lakes.
Jefferson	Carthage	Rev. R. J. Thompson	43	58	75	37	740		February, 1893	Northern Plateau.
Jefferson	Madison Barracks	Post Surgeon, U. S. A.	43	56	76	06	266		......	St. Lawrence Valley.
Jefferson	Watertown	Frank M. Porter	43	57	75	54	486		October, 1890	St. Lawrence Valley.

STATISTICAL TABLE OF STATIONS ESTABLISHED, ETC., FROM 1889 TO DATE—(*Continued*).

COUNTY.	Station.	Name of observer.	Latitude. Degrees.	Latitude. Minutes.	Longitude. Degrees.	Longitude. Minutes.	Elevation, feet.	Description, page.	Established.	Region.
Kings	Brooklyn	Prof. W. C. Peckham	40	41	73	59	107	......	......	Coast Region.
Kings	Fort Hamilton	Post Surgeon, U. S. A	40	37	74	02	25	......	—, 1813	Coast Region.
Lewis	Constableville	Charles E. Taylor	43	32	75	27	1,246	......	November, 1888	Northern Plateau.
Lewis	Lowville	Charles S. Rice	43	47	75	30	900	......	May 18, 1890	Northern Plateau.
Lewis	Number Four (Fenton's)	Charles Fenton	43	50	75	12	1,571	......	December, 1888. December, 1889	Northern Plateau.
Lewis	Turin	R. T. Church	43	38	75	25	1,240	......	October, 1890	Northern Plateau.
Livingston	Avon	W. G. Markham	42	55	77	47	585	......	May, 1890. August, 1885	Western Plateau.
Livingston	Mt. Morris	J. E. White	42	42	77	56	525	......	June, 1890	Western Plateau.
Madison	Brookfield	D. B. Stillman	42	48	75	20	1,350	......	December, 1889	Eastern Plateau.
Madison	Chittenango	F. H. Gates	43	04	75	54	......	......	May, 1890	Great Lakes.
Madison	Hamilton	Prof. W. F. Langworthy	......	......	......	......	1,127	......	June, 1894	Eastern Plateau.
Monroe	Brockport	F. A. Winne, M. D	43	13	77	58	525	......	February, 1890	Great Lakes.
Monroe	Pittsford	Rev. G. H. Gomph	43	05	77	34	515	......	June, 1895	Great Lakes.
Monroe	Rochester	U. S. Weather Bureau	43	08	77	42	621	......	—, 1870	Great Lakes.
Monroe	Scottsville	Isaac Budlong	43	01	77	48	......	......	May, 1890	Western Plateau.
Montgomery	Canajoharie	Prof. C. M. Bean	42	53	74	35	......	......	December, 1896	Mohawk Valley.
Montgomery	St. Johnsville	E. G. Storms	42	59	74	44	......	......	October, 1896	Mohawk Valley.
New York	Central Park	Daniel Draper, Ph. D	40	46	73	58	97	......	—, 1868	Coast Region.
New York	Fort Columbus	Post Surgeon, U. S. A	40	42	74	01	23	......	—, 1821	Coast Region.
New York	New York city	U. S. Weather Bureau	40	43	74	00	314	......	—, 1870	Coast Region.
Niagara	Fort Niagara	Post Surgeon, U. S. A	43	16	79	05	263	......	—, 1829	Great Lakes.
Niagara	Appleton	H. A. Van Wagoner	43	20	78	41	330	......	August, 1889	Great Lakes.
Niagara	Lockport	Chas. H. Cornes, C. E	43	10	78	45	600	......	April, 1891	Western Plateau.
Niagara	Newfane	F. B. Clark	43	17	78	45	......	......	......	Great Lakes.
Niagara	Niagara Falls	Geo. W. Whitney	43	05	79	05	......	......	August, 1896	Great Lakes.
Niagara	Pendleton Centre	W. D. Lovell	43	06	78	48	580	......	December, 1889	Great Lakes.
Niagara	Somerset	W. B. Thurber	43	21	78	35	......	......	......	Great Lakes.
Oneida	Booneville	Byron Hughes	43	28	75	21	1,135	......	May, 1893	Northern Plateau.
Oneida	Rome	H. C. Sutton, M. D	43	11	75	28	445	......	October, 1890	Mohawk Valley.
Oneida	Utica	Masonic Home	43	05	75	13	557	......	—, 1879	Mohawk Valley.

Oneida	West Camden	W. H. Gifford	43	21	75	51	......	......	May, 1890	Great Lakes.
Onondaga	Apulia	W. H. Tibbett	42	48	76	05	1,227	......	May, 1890	Eastern Plateau.
Onondaga	Baldwinsville	S. C. Suydam	43	11	76	21	390	......	December, 1890	Great Lakes.
Onondaga	Pompey	Prof. T. H. Armstrong	42	53	76	03	1,720	......	September, 1890	Eastern Plateau.
Onondaga	Skaneateles	Edward Conron	42	56	76	27	950	......	August, 1892	Great Lakes.
Onondaga	Syracuse	D. McCarthy & Co	43	03	76	11	509	......	August, 1895	Great Lakes.
Ontario	Geneva	Mrs. N. S. Yates	42	51	76	59	459	......	December, 1888	Central Lakes.
Ontario	Victor	M. F. Webster	42	59	77	26	650	......	July, 1891	Western Plateau.
Orange	Middletown	State Hospital	41	25	74	25	660	......	January, 1890	Eastern Plateau.
Orange	Port Jervis	Prof. John M. Dolph	41	21	74	40	470	......	November, 1889	Eastern Plateau,
Orange	Warwick	John W. Sly	41	14	74	21	502	......	May, 1890	Eastern Plateau.
Orange	West Point	Post Surgeon, U. S. A.	41	24	73	57	167	......	——, 1824	Hudson Valley.
Orleans	Albion	Prof. F. A. Greene	43	14	78	13	547	......	May, 1891	Great Lakes.
Orleans	Kendall	R. N. Hunt	43	20	78	04	......	......	November, 1889	Great Lakes.
Orleans	Lyndonville	B. B. Barry	43	27	78	25	......	......	May, 1890	Great Lakes.
Orleans	Ridgeway	M. E. Weld	43	16	78	25	......	......	June, 1895	Great Lakes.
Orleans	West Kendall	J. H. Derrick	43	20	78	06	......	......	June, 1894	Great Lakes.
Oswego	Demster	F. W. Squires	43	17	76	20	......	......	May, 1890	Great Lakes.
Oswego	Fulton	Prof. G. B. Clapp	43	18	76	26	387	......	November, 1894	Great Lakes.
Oswego	Oswego	U. S. Weather Bureau	43	29	76	35	304	......	——, 1871	Great Lakes.
Oswego	Palermo	E. B. Bartlett	43	24	76	20	460	......	July, 1887	Great Lakes.
Oswego	Phœnix	C. J. Fuller	43	13	76	20	......	......	October, 1892	Great Lakes.
Oswego	Sand Bank	I. W. Bennett	43	27	76	01	......	......	May, 1890	Great Lakes.
Otsego	Cooperstown	G. Pomeroy Keese	42	41	74	57	1,300	......	——, 1842, 1853	Eastern Plateau.
Otsego	New Lisbon	G. A. Yates	42	35	75	13	1,234	......	November, 1892	Eastern Plateau.
Otsego	Oneonta	Ford & Ford	42	22	75	06	1,190	......	August, 1894	Eastern Plateau.
Putnam	Ardenia	Rev. R. B. Arden	41	24	73	56	157	......	——, 1856	Hudson Valley.
Putnam	Boyd's Corners	Thomas Manning	41	29	73	43	546	......	......	Hudson Valley.
Putnam	Carmel	Thomas Manning	41	25	73	40	500	......	......	Hudson Valley.
Putnam	Southeast Reservoir	Thomas Manning	......	......	......	......	......	......	......	Hudson Valley.
Queens	Willett's Point	Post Surgeon, U. S. A.	40	48	73	48	......	......	......	Coast Region.
Rensselaer	Eagle Mills	M. Weatherwax	42	44	73	34	......	......	August, 1894	Hudson Valley.
Rensselaer	Stephentown	R. A. Holcomb	42	30	73	30	1,000	......	September, 1890	Hudson Valley.
Rensselaer	Schodack Depot	P. B. Burton	42	34	73	43	208	......	May, 1890	Hudson Valley.
Richmond	Fort Wadsworth	Post Surgeon, U. S. A.	40	35	74	04	......	......	......	Coast Region.
St. Lawrence	Canton	C. W. Bolton	44	35	75	12	304	......	November, 1889	St. Lawrence Valley.
St. Lawrence	De Kalb Junction	C. A. Hallegas	44	29	75	16	300	......	May, 1890	St. Lawrence Valley.
St. Lawrence	Massena	A. J. Nelson	44	55	77	54	......	......	April, 1890	St. Lawrence Valley.
St. Lawrence	North Hammond	C. A. Wooster	44	30	75	40	340	......	......	St. Lawrence Valley.
St. Lawrence	Norwood	B. A. Whitney	44	38	75	00	......	......	May, 1890	St. Lawrence Valley.

STATISTICAL TABLE OF STATIONS ESTABLISHED, ETC., FROM 1889 TO DATE — (*Concluded*).

COUNTY.	Station.	Name of observer.	Latitude. Degrees.	Latitude. Minutes.	Longitude. Degrees.	Longitude. Minutes.	Elevation, feet.	Description, page.	Established.	Region.
St. Lawrence	Ogdensburg	State Hospital	44	43	75	30	258		January, 1891	St. Lawrence Valley.
St. Lawrence	Potsdam	G W. F. Smith	44	40	75	01	300		December, 1889	St. Lawrence Valley.
Saratoga	Galway	J. P. Crouch	43	01	74	03			June, 1890	Northern Plateau.
Saratoga	King's Station	R. E. Kronkite	43	10	73	47	588		May, 1890	Northern Plateau.
Saratoga	Stillwater	Rev. R. J. Thompson	42	57	73	40	110		May, 1893	Hudson Valley.
Saratoga	Saratoga	W. H. Hall, M. D	43	05	73	48	270		October, 1890	Champlain Valley.
Schenectady	Quaker Street	William Weaver	42	44	71	12	973		November, 1889	Eastern Plateau.
Schoharie	Hyndsville	C. P. Bouton	42	40	74	35	1,162		June, 1890	Eastern Plateau.
Schoharie	Middleburgh	F. X. Straub	42	30	74	20	640		July, 1888	Eastern Plateau.
Schuyler	Perry City	W. H. Jeffers	42	33	76	44	1,038		December, 1889	Eastern Plateau.
Schuyler	Tyrone	A. C. Weller	42	24	77	05			June, 1895	Western Plateau.
Schuyler	Watkins	Chas. W. Ingalls	42	22	76	55	600		February, 1892	Central Lakes.
Schuyler	Wedgewood	O. F. Corwin	42	25	76	56	1,350		December, 1889	Western Plateau.
Seneca	Romulus	J. H. Coryell	42	43	76	57	719		August, 1891	Central Lakes.
Steuben	Addison	H. A. Ainsworth, M. D	42	07	77	16	1,000		December, 1890	Western Plateau.
Steuben	Atlanta	Wheeler Clason	42	36	77	31	1,325		May, 1890	Western Plateau.
Steuben	Corning	Dr. H. M. Darling	42	08	76	05	942			Western Plateau.
Steuben	Hammondsport	H. O. Fairchild	42	25	77	09	800		June, 1890	Central Lakes.
Steuben	Haskinsville	W. G. Collins							June, 1895	Western Plateau.
Steuben	Savona	M. S. Collier, M D.	42	17	77	15	1,053			Western Plateau.
Steuben	South Canisteo	James E. Wilson	42	12	77	34	1,480		November, 1889	Western Plateau.
Suffolk	Brentwood	W. H. Ross, M. D	40	46	73	14	75		February, 1891	Coast Region.
Suffolk	East Hampton	J. F. Bell, M. D	40	58	72	11	16		January, 1890	Coast Region.
Suffolk	Setauket	Selah B. Strong	40	57	73	05	40		—, 1885	Coast Region,
Sullivan	Liberty	Ed. Tarbell	41	46	74	46	1,467		May, 1890	Eastern Plateau.
Tioga	Apalachin	Frank B. Tracy	42	04	76	10	822		—, 1889	Eastern Plateau.
Tioga	Newark Valley	M. D Clinton	42	14	76	12	966		May, 1890	Eastern Plateau.
Tioga	Nichols.	F. C. Lowman	42	01	76	21	800		May, 1890	Eastern Plateau.
Tioga	Straits Corners	W. E. Elmendorf	42	09	76	24			October, 1896	Eastern Plateau.
Tioga	Waverly	T. P. Yates	42	01	76	34	825		January, 1882	Eastern Plateau.

Tompkins	Caroline	J. W. Reed	42	20	76	20	......	......	February, 1894	Eastern Plateau.
Tompkins	Dryden	J. Giles Ford	42	29	76	19	......	......	August, 1896	Eastern Plateau.
Tompkins	Ellis	Oscar Snyder	42	26	76	25	......	......	November, 1892	Eastern Plateau.
Tompkins	Ithaca	College of Civil Engin'g	42	27	76	29	810	......	——, 1874	Central Lakes.
Tompkins	McLean	Newton Baldwin	42	35	76	19	1,000	......	May, 1890	Eastern Plateau.
Tompkins	Newfield Summit	Luther Leonard	42	23	76	40	2,000	......	October, 1892	Eastern Plateau.
Tompkins	Trumansburgh	Loren P. Smith	42	32	76	40	800	......	May, 1891	Central Lakes.
Ulster	Marlborough	E. E. McNamee	41	37	73	59	300	......	July, 1890	Hudson Valley.
Ulster	Minnewaska	E. A. Smiley	41	44	74	14	1,800	......	November, 1889	Eastern Plateau.
Ulster	Mohonk Lake	A. K. Smiley	41	47	74	10	1.235	......	November, 1895	Eastern Plateau.
Ulster	Rondout	H. A. Stone	41	55	73	58	150	......	November 1888	Hudson Valley.
Warren	Glens Falls	Prof. C. L Williams	43	19	73	41	340	......	October, 1891	Champlain Valley.
Warren	Lake George	Galloway C. Morris	43	26	73	43	358	......	October, 1896	Champlain Valley.
Warren	Queensbury	DeWitt C. Jenkins	43	25	73	40	300	......	November, 1888	Champlain Valley.
Washington	Easton	H. Tabor	43	00	73	35	......	......	May, 1890	Hudson Valley.
Washington	Whitehall	Prof. W. W. Howe	43	33	73	24	115	......	January, 1893	Champlain Valley.
Wayne	Lyons	M A. Veeder, M. D	43	06	77	00	407	......	——, 1889	Great Lakes.
Wayne	Palmyra	L D. Cummings	43	05	77	09	740	......	......	Great Lakes.
Wayne	Rose	George Smart	43	09	76	55	......	......	April, 1895	Great Lakes.
Westchester	Bedford	W. A. Hyde	41	12	73	38	75	......	November, 1893	Coast Region.
Westchester	David's Island	Post Surgeon, U. S. A.	40	52	73	46	......	......	......	Coast Region.
Westchester	Peekskill	John N. Tilden, M. D.	41	17	73	55	250	......	November, 1889	Hudson Valley.
Westchester	Primrose	W. A. Cornelius	40	58	73	51	......	......	October, 1896	Coast Region.
Westchester	White Plains	Prof. O. R. Willis	41	05	73	40	273	......	——, 1854	Coast Region.
Wyoming	Arcade	J D. Tate	42	32	78	26	1,557	......	April, 1890	Western Plateau.
Wyoming	Attica	H. T Bramer	42	50	78	19	1,000	......	May, 1890	Western Plateau.
Wyoming	Castile	W. E. Pratt	42	47	78	05	1,400	......	February, 1893	Western Plateau.
Wyoming	Varysburgh	H. C. Orr	42	45	78	20	......	......	April, 1892	Western Plateau.
Yates	Italy Hill	Mrs. J. Pulver	42	39	77	17	2,080	......	July, 1890	Western Plateau.
Yates	Penn Yan	Hollowell & Wise	42	39	77	05	756	......	April, 1892	Central Lakes.
Erie, Pa	Erie	U. S. Weather Bureau	42	07	80	05	681	......	——, 1873	Great Lakes.

SAMPLE COPY OF THE CROP BULLETIN OF THE NEW YORK STATE WEATHER BUREAU, ISSUED WEEKLY DURING THE CROP SEASON, IN CO-OPERATION WITH THE UNITED STATES DEPARTMENT OF AGRICULTURE WEATHER BUREAU.

Vol. VIII. For the week ending Saturday, June 6, 1896. No. 7.

CORNELL UNIVERSITY,
ITHACA, N. Y., *June* 9, 1896.

The following information is condensed from the reports of crop correspondents for the week ending Saturday, June 6, 1896:

Albany County (Albany).— Home strawberries in market. Some injury to grapes by insects. Rain, 0.69.

Allegany County (Bolivar).— Grass looks better since the rains, but crop will be very light. Old meadows very light. Apples looking well. Rain, 1.11.

Broome County (Chenango Forks).—A majority of old meadows have been plowed up and sown to corn and millet. Pasturage very poor.

Cattaraugus County (Humphrey).— Oats on fall plowing look fine, but on spring plowing rather weak and uneven. Worms working in oats in places. Corn looks pale and sickly. Grass nearly all daisies and weeds. Frosts and the recent drouth killed nearly all old meadows. New seeding rather thin. Rain, 1.19. Little Valley — Light hay crop even with favorable weather, as drouth, frosts and grasshoppers of last two years have permanently injured all old meadows and most pastures. Some new seeded will be good. Rain, 0.20. Olean — Apples good. Not many cherries or plums. Grain never looked better. Grass is variable; high land meadows and old meadows generally very poor, and much new seeding is also very light, but some well cared for and top dressed after last cutting will produce excellently.

Cayuga County (Cascade).— Grass very light; clover and timothy heading out and not a foot high. Pastures fair. Barley and oats improved; corn fair. No fruit except apples. All berries promising. Rain, 0.33. Sherwood — Many meadows very short for this time, while others are good. Stock does well, as the grass is very nutritious. New meadows very light. Clover so short and thin it will be hard to gather, but timothy may grow under favorable conditions. Rain, 0.35.

Chautauqua County (Cherry Creek).— New seeding of clover and timothy doing nicely; old meadows poor. Grapes much damaged by high winds. Not in many years have oats, barley, corn, etc., looked so vigorous as at this time. Cut worms damaging some late planted crops. Rain, 1.21. Dunkirk—The drouth has affected the grass crop. More frequent rains back in the country will cause a better crop than along the shore. Rain, 0.50. Poland Centre — Strawberries ripening finely. Timothy heading short and thin.

Chenango County (New Berlin Centre).— Oats and potatoes look well. Rain, 0.15.

Columbia County (Canaan Centre).— Rye in blossom and doing pretty well. Grass very short, and hay thin and weedy. Very dry. Lebanon Springs — Soil dry and dusty. Meadows look badly; grass thin and short; some are plowing up grass lands and sowing to forage crops. Corn looks worse. Rain, 0.88.

Clinton County (West Chazy).— No rain, and very much needed. Poor prospects for hay unless rain comes soon, and then it will be light. Some new seeding was winter killed.

Dutchess County (Bangall).— Pastures and meadows will be deficient. Unusual large sowing of fodder corn and grass seeding in progress. Troublesome pear and apple blight, and plant lice. Rain, 1.01. Wappingers Falls — Grass and hay improving on the lowlands. Uplands very thin; little or no clover. Quality is unusually good. Upland grains of little good. Oats extra fine. Hops to top of poles; potatoes very good. Rain, 0.46.

Erie County (Buffalo).— Rain is badly needed in this vicinity. Rain, 0.14.

Franklin County (Malone).— Showers not as beneficial as expected on account of cold, dry winds, which checked growth. Potato planting finished; cultivating corn begun. Hay crop in critical condition, and if rain does not come soon crop will be light. Pastures getting short. Rain, 0.17.

Jefferson County (Adams Centre).— Early sown grain looks well but late sown is spotted and weak. Barley and oats is hardly fair. Winter grains are in very poor condition. Pastures very short. Many meadows being plowed up and sowed to corn and millet. Peas never looked better. Very dry; no rain. Antwerp— Meadows making slow growth. On clay ground grains are poor and uneven. General outlook bad. Corn grows slowly. Carthage — Copious rains of last week refreshed pastures and meadows, but hay as a crop is very poor and weedy. Red clover in blossom two weeks earlier than usual. Orchard grass is heading and June grass will be ripe during the week.

Lewis County (Lowville).— Large part of last year's grass seeding plowed up, and what is left is generally thin. Old meadows not recovered from last year and are very poor. Pasturage short and milk decreasing. Rain, 0.06.

Livingston County (Avon).— Grass and hay are light and brown. Timothy will not head out unless we have more rain. Oats fair and good; corn good; wheat fair. Rain, 0.55.

Madison County (Bouckville).— Grass growing slowly, and under most favorable conditions cannot be other than a very poor crop. Much corn and some millet drilled in to supplement the hay crop. Corn makes little progress; potatoes doing well. Strawberries just beginning to ripen. Rain, 0.25. Hamilton — Cultivating corn and potatoes the main work. Grass improves little and is very poor.

Monroe County (Pittsford).— Clover is short and light; timothy is headed out and is less than one-half the usual height, and is rusty at the bottom. Pastures turning brown, and being plowed for sowed corn. Rochester — Rain, 0.25.

Montgomery County (Canajoharie).— Hay is injured beyond recovery and the crop will be very poor. Many meadows sowed to fodder corn. Hops, grains and potatoes are looking well, but rain badly needed.

New York City.— Rain, 0.33.

Niagara County (Appleton).—All crops need more rain, hay and grass especially. Hay is quite poor, but may be improved by timely rains. Bean planting underway. Some corn rotting. Rain, 0.05.

Oneida County (Deansboro).— Meadows in poor condition, the recent rains being too late to improve them. Pastures short. Hops, corn and oats in fair condition. Wheat indicates small yield; many fields showing considerable smut.

Onondaga County (Baldwinsville).— No rain, and very dry. Spring crops looking well, but little improvement in grass. Clover is scarce. Several pieces of tobacco set this week. Oran — No rain, and soil very dry. Wheat heading very short; meadows are beyond much help. Some corn and potatoes reported as dried in the hill. Some potatoes yet to plant.

Ontario County (Phelps).— Potato planting mostly finished. Most spring grains beginning to look weak and yellow, and is not stooling well. Old meadows going back every day; some not as good as ordinary pastures should be. Clover blossomed out so short that little could be raked if cut. Rain needed.

Orange County (Chester).— Grubs and wire worms and the drouth playing havoc with onion fields. Acres plowed up and seeded to carrots, potatoes, etc. The onion grub has made its appearance in every kind of a vegetable patch. Early cherries an entire failure. Hay is a failure, so reply farmers. Low meadows will cut some hay, but high grounds will not make a cutting growth. Pasturage is good now and milk a surplus.

Orleans County (Ridgeway).— Grass in very poor condition. Last year's seeding nearly all killed by the drouth. Rain, 0.06.

Oswego County (Demster).—No rain. Oswego — Fine growing week. Strawberries and string beans in market much earlier than usual. Rain, 0.07. Palermo — Many acres of last year's seeding have to be plowed up as there is scarcely a clover plant to be seen. Corn, oats and potatoes doing well, but pastures have begun to fail. Rain, 0.07. Parish — No rain. Much sweet corn rotted and will have to be replanted. Meadows very poor, and much of last year's seeding mostly sorrel. Pastures are pretty fair.

Otsego County (Cooperstown).—Another dry week. The hay crop must be light; many meadows sowed to corn. All crops doing well except grass. Rain, 0.02.

Rensselaer County (Eagle Mills).—Rye is heading very short, a large per cent. winter-killed. Oats small, but growing. Grass and pastures very short. Rain, 0.85.

Saratoga County (Kings Station).— Crops need rain. Rain, 1.15.

Schuyler County (Perry City).—All spring grain looks very well. Meadows improved but still in poor condition. Wheat improved but a large per cent. killed in spots by ice smothering. Some blight on apple trees. Rain, 0.27. Wedgewood — Grass light, short and thin, an occasional piece fairly good. Pastures short. First clover cutting on the 5th. Rain, 0.31.

Schoharie County (Hyndsville).—Very dry. Hops grow fast. Grain very short, especially winter grains. Oats in very poor condition. Some plowing for buckwheat.

Steuben County (Addison).—Rain too late to overcome effects of drouth on hay. Rain, 0.15. Atlanta — Last year's clover seeding very thin and short. Old meadows very short and light. Rain, 0.77. Haskinville —Potato planting well under way. Frost of 3d slightly damaged strawberries. Rain, 0.70. South Canisteo — Some early oats quite foul. Corn doing finely. It now looks as if not much more than half the meadows would be cut. On uplands meadows seem to be thinning instead of taking on growth. Rain, 0.75.

St. Lawrence County (DeKalb Junction).— Timothy heading and only about eight inches high. Rain, 0.60. North Hammond— Vegetation has progressed finely, but meadows will be light. Grain looks very promising. Planting all done. No rain, and much needed.

Suffolk County (Setauket).— Pastures in fair condition, but rain too late to give a good hay crop. Strawberries fine. A few early peas in market. Corn looks good. Rain, 0.34.

Tioga County (Newark Valley).— Pastures and meadows very short. Dairymen feeding grain; and sowing corn for fodder. Oats doing well; cut worms damaging corn. Rain, 0.50. Waverly — Wheat winter-killed, and injured by the drouth. Rye in poor condition. Late rains cannot help the grass, which is very poor. Rain ,0.47.

Washington County (Whitehall).— Oats, grass and pastures much improved by rains of 1st. Grass however is very short and a very light hay crop expected.

Westchester County (Bedford).— Meadows and grass improved by recent rains but still short and thin. Newly seeded meadows better than old. Oats much improved, and look fine. More rain is needed.

Wyoming (Arcade).— Plowing is suspended for want of rain. Cutting rye is begun. Hay crop in extremely poor condition; clover being the worst. Rain, 0.56.

General Remarks.

The showers of the past week were very unevenly distributed, many sections getting none at all. Consequently there is much complaint of drouth again. The fore part of the week was quite cool, with light frosts on the 3d in the exposed localities which in parts of Steuben county slightly damaged some strawberries and nipped tender garden vegetables, but the weather rapidly warmed up and, with the exception of a few extremely dry localities, the week is reported as a good growing one.

Notwithstanding the dry weather spring grains as a rule continue to grow nicely, but the protracted drouth has seriously affected winter grains and the hay crop, especially the latter. Wheat and rye are heading very short, and possibly are ripening prematurely. Some rye has already been cut in Wyoming county. Under the most favorable conditions hay cannot be other than a poor crop. Clover is in blossom, and some has been cut, but like timothy, etc., it is extremely short and thin, and in some places the fields seem to be sowed with sorrel instead of grass seed. Throughout the state but few report even some lowland meadows as in fair condition, while many upland meadows and clover fields are hardly worth cutting.

Farmers everywhere are plowing up many old meadows and sowing to forage crops, usually corn. In many sections, but principally in the eastern Ontario Lake vicinity, last year's seeding also is of little value. Pastures are in much better condition than meadows, but are short, and in some places dairymen are obliged to feed grain.

Farm work is well advanced, and with but few exceptions corn and potato planting is finished. Early garden truck is coming to market in the more favored localities. Hops are vigorous, and newly set tobacco seems in good condition.

Berry bushes of all kinds set unusually full, and fine strawberries are being picked. The fruit prospects remain unchanged. The onion crop of Orange county is greatly reduced by insect pests, combined with the drouth. The onion grub, which heretofore has confined its ravages to that tuber, is particularly numerous and has attacked other vegetables as cabbages, carrots, etc. Many acres have been plowed and re-seeded to potatoes.

The following is extracted from the national bulletin for week ending Monday, June 1st:

Corn planting is now practically finished in the more northerly corn States, except in North Dakota, where it is still in progress. In the central corn belt the crop has made rapid growth during the week and is generally in excellent condition.

Winter wheat harvest is well advanced in Texas and Oklahoma, and has begun as far north as the southern portions of Kansas, Missouri and Illinois, and wheat is ripening rapidly in Indiana and Ohio.

Spring wheat seeding has been finished in North Dakota, but some remains to be done in extreme northern Minnesota, where seeding has been retarded by wet weather.

The week has been exceptionally favorable for transplanting tobacco which has been nearly completed in Kentucky and Virginia, and has begun in New England and New York.

E. A. FUERTES,
Director.

R. M. HARDINGE,
Assistant Director.

LIST OF STATIONS IN NEW YORK DISPLAYING THE OFFICIAL FORECASTS.

STATION.	County.	Name.
Coeymans	Albany	S. H. & E. J. Sherman.
South Bethlehem	"	G. H. VanVeghten.
Andover	Allegany	Andover State Bank.
Belfast	"	W. Ingleby.
Cuba	"	Underwood Bros.
*Fillmore	"	Postmaster.
Rushford	"	W. W. Thomas.
*Wellsville	"	E. W. Barnes.
*Binghamton	Broome	Postmaster.
Olean	Cattaraugus	H. D. Sibley.
Randolph	"	Wm. Rathbone.
Versailles	"	W. L. Brown.
Auburn	Cayuga	W. H. Meaker.
Moravia	"	Stanton & Ballard.
‖Port Byron	"	Theo. Billinger.
Jamestown	Chautauqua	Y. M. C. A.
*Jamestown	"	Postmaster.
Silver Creek	"	F. L. Smith.
Elmira	Chemung	Gerity Bros.
‖New Berlin	Chenango	John Conery.
Norwich	"	Reed Campbell.
*Plattsburgh	Clinton	W. A. Crooks.
Chatham	Columbia	John Streeter.
‖Kinderhook	"	J. S. Hasford.
‖Kinderhook	"	Geo. W. Wilkins.
Cortland	Cortland	W. H. Clark.
*Cortland	"	Postmaster.
Little York	"	Dr. E. M. Santee.
Truxton	"	Muller Bros.
*Grand Gorge	Delaware	Postmaster.
South Kortright	"	D. C. Sharpe.
‖Bangall	Dutchess	Dr. James Hyatt.
*Rhinebeck	"	Postmaster.
*Wappingers Falls	"	Postmaster.
Black Rock	Erie	Pratt & Letchworth Co.
Ebenezer	"	John J. Metzger.
Eden Center	"	L. E. Boutwell.
Gardenville	"	Ed. Obertrifter.
Lake View	"	F. W. Cook.
Port Henry	Essex	C. W. Lansing.
*Port Henry	"	Postmaster.
Whallonsburgh	"	G. H. Whyland.
*Malone	Franklin	Postmaster.
North Bangor	"	A. E. Russell.
*Gloversville	Fulton	Postmaster.

LIST OF STATIONS, ETC. — (*Continued*).

STATION.	County.	Name.
‖Le Roy	Genesee	Geo. E. Marcellus.
Catskill	Greene	A. D. Wilbur.
West Coxsackie	"	J. H. Witbeck.
Adams	Jefferson	Preston & Fish.
Alexandria Bay	"	C. W. Crossman.
Evans Mills	"	W. Rulison.
Pierrepont Manor	"	S. J. Andrus.
Dansville	Livingston	A. H. Plimpton.
*Dansville	"	Postmaster.
Mt. Morris	"	N. A. Seymour.
*Canastota	Madison	Postmaster.
*Oneida	"	Postmaster.
‖Perryville	"	W. T. Cross.
Brockport	Monroe	Dr. F. A. Winne.
*Amsterdam	Montgomery	Postmaster.
New York	New York	J. C. Summers.
New York	"	Grammar School No. 46.
New York	"	University City of New York.
Lockport	Niagara	Daily Journal.
Niagara Falls	"	Daily Cataract.
Sanborn	"	Postmaster.
*Blossvale	Oneida	Postmaster.
*Rome	"	Postmaster.
*Baldwinsville	Onondaga	S. C. Suydam.
Fairmount	"	Geo. B. Cotton.
‖Fayetteville	"	E. L. Parker.
Kirkville	"	Dr. M. A. Curtiss.
Syracuse	"	The Herald Co.
*Syracuse	"	D. McCarthy & Co.
‖Warners	"	Dr. A. G. Anthony.
Woodward	"	R. B. Knapp.
Geneva	Ontario	Agricultural Exp. Station.
†Geneva	"	Patent Cereal Co.
‖Naples	"	Postmaster.
†Shortsville	"	Empire Drill Co.
Victor	"	Postmaster.
Chester	Orange	W. W. Bodle.
Goshen	"	E. L. Roys.
Newburg	"	City Hall.
*Newburg	"	Postmaster.
Albion	Orleans	Prof. F. A. Greene.
*Albion	"	Postmaster.
Mexico	Oswego	Oswego County Asylum.
North Scriba	"	E. J. Lawton.
Phœnix	"	C. J. Fuller.
‖Pulaski	"	L. Mitchell.
Cooperstown	Otsego	G. Pomeroy Keese.
Oneonta	"	Editor "Star."
Far Rockaway	Queens	S. J. Ellsworth.
*Hoosick Falls	Rensselaer	Postmaster.

LIST OF STATIONS, ETC.—(*Continued*).

STATION.	County.	Name.
*Troy	Rensselaer	A. M. Church Co.
*Canton	St. Lawrence	Postmaster.
Gouverneur	"	H. C. Rogers.
Massena	"	A. J. Nelson.
‖Ballston Spa	Saratoga	Frank Jones.
*Mechanicville	"	Postmaster.
*Schenectady	Schenectady	Reeves-Vedder Co.
Jefferson	Schoharie	Geo. M. Proper.
North Hector	Schuyler	Geo. Predmore.
Odessa	"	F. J. Prentice.
Ovid	Seneca	L. C. Pitcher.
Waterloo	"	Woolen Mills.
Hornellsville	Steuben	The Times.
†Rheims	"	H. E. Lobeck.
Woodhull	"	R. C. Park.
Greenport	Suffolk	Fred. Terry.
Manhansett House	"	H. K. Motley.
Sayville	"	Francis Hoag.
*Waverly	Tioga	Postmaster.
Owego	"	The Record.
*Owego	"	Postmaster.
Ithaca	Tompkins	Cornell University.
Ithaca	"	Treman, King & Co.
†Ithaca	"	D., L. & W. Car Shops.
*Ithaca	"	Rothschild Bros.
‖Kerhonkson	Ulster	J. J. & M. Wilkinson.
Saugerties	"	Dawes Brothers.
Glens Falls	Warren	R. W. Sherman.
Taylors on Schroon	"	H. V. Parsell.
*Warrensburg	"	Geo. W. Davison.
*Salem	Washington	Postmaster.
Lyons	Wayne	Zimmerlin Bros.
*Lyons	"	Postmaster.
*North Rose	"	Postmaster.
‖Ontario	"	J. C. Howk.
Rose	"	I. L. Wright.
‖Walcot	"	J. C. Seaman.
Fieldhome	Westchester	C. DeP. Field.
*Irvington	"	Postmaster.
‖Montrose	"	J. F. Bushnell.
Peekskill	"	F. A. Smith.
Tarrytown	"	C. H. Curtiss.
Yonkers	"	P. A. Deyo & Son.
‖Arcade	Wyoming	Frank P. Hulette.
Attica	"	Ed. Volckens.
Silver Springs	"	J. M. Duncan.
Warsaw	"	L. E. Lounsberry.
Varysburg	"	H. C. Orr.
Penn Yan	Yates	Hallowell & Wise.

* Distributing center. About 575 postoffices receive, by mail from distributing centers, and bulletin, the forecasts. ‖ Display cold-wave and frost warnings. † Whistle signals.

LIST OF CROP CORRESPONDENTS AND SPECIAL RAIN FALL OBSERVERS OF THE NEW YORK STATE WEATHER BUREAU — 1896.

STATION.	County.	Name.
Albany	Albany	U. S. Weather Bureau.
Angelica	Allegany	Prof. J. P. Slocum.
Bolivar	"	*Dr. Dorr Cutler.
Friendship	"	H. J. Davis.
Binghamton	Broome	F. H. Haskins.
Chenango Forks	Broome	*Dr. Z. A. Spendley.
Conewango	Cattaraugus	O. H. Phillips.
Humphrey	"	Chas. E Whitney.
Little Valley	"	*E. Sweetland.
Olean	"	F. N. Godfrey.
Cascade	Cayuga	Alton E. Banks.
Sherwood	"	*W. F. Searing.
Cherry Creek	Chautauqua	*W. S. Blaisdell.
Dunkirk	"	Maxwell Scott.
Poland Centre	"	Mrs. Ellen Cheney.
Pine City	Chemung	*H. M. Darling, M. D.
Brisben	Chenango	Geo. W. Lenderson.
New Berlin Centre	"	W. H. Bagg.
West Chazy	Clinton	*W. H. Robinson.
Canaan Centre	Columbia	C. E. Cadalso.
Lebanon Springs	Columbia	Arthur K. Harrison.
Cortland	Cortland	*Frank Donegan.
Little York	"	M. H. Gates.
Deposit	Delaware	*M. R. Hulce.
Bovina Centre	"	*F. J. Campbell.
Honeymead Brook	Dutchess	James Hyatt.
Wappinger's Falls	"	H. C. Townsend.
Akron	Erie	*H. A. Wilder.
Buffalo	"	U. S. Weather Bureau.
Elizabethtown	Essex	M. B. Davis.
Malone	Franklin	Albert B. Johnson.
Johnstown	Fulton	W. S. Comrie.
Corfu	Genesee	C. W. Carrier.
Adams Centre	Jefferson	*A. E. Cooley.
Antwerp	"	H. N. Howard.
Carthage	Jefferson	C. P. McDonald.
Leyden	Lewis	Dwight W. Miller.
Lowville	"	Charles S. Rice.
Mt. Morris	Livingston	J. Knappenburg.
Canastota	Madison	Fred M. Keeney.
Bouckville	Madison	L. W. Griswold.
Hamilton	"	*A. J. Tracey.
Pittsford	Monroe	Rev. G. H. Gomph.
Rochester	"	U. S. Weather Bureau.
Scottsville	"	*Isaac Budlong.

* Special Rain Fall Observers.

LIST OF CROP CORRESPONDENTS, ETC.— (*Concluded*).

STATION.	County.	Name.
Canajoharie	Montgomery	Willis Bullock.
New York City	New York	U. S. Weather Bureau.
Appleton	Niagara	H. A. Van Wagoner.
Niagara Falls	"	*Geo. W. Whitney.
Chuckery	Oneida	W. G. Comstock.
Deansborro	Oneida	H. E. Miller.
Taberg	"	B. Frank Ranney.
Westernville	"	Stanley Warcup.
Skaneateles	Onondaga	*Edward Conron.
Shortsville	Ontario	J. Hart Latting.
Port Jervis	Orange	Prof. J. M. Dolph.
Warwick	"	*John W. Sly.
Chester	"	W. W. Bodle.
Ridgeway	Orleans	*M. E. Weld.
Demster	Oswego	*F. W. Squires.
Fulton	Oswego	*Prof. B. G. Clapp.
Oswego	"	U. S. Weather Bureau.
Palermo	"	E. B. Bartlett.
Parish	"	H. E. Boorn.
Pennelsville	"	R. Sutton.
Phœnix	Oswego	*C. J. Fuller.
Cooperstown	Otsego	G. Pomeroy Keese.
Eagle Mills	Rensselaer	*M. Weatherwax.
De Kalb Junction	St. Lawrence	*C. A. Hallegas.
Massena	"	W. H. Paddock.
North Hammond	St. Lawrence	C. A. Wooster.
Kings Station	Saratoga	*R. E. Cronkhite.
Perry City	Schuyler	W. H. Jeffers.
Tyrone	"	*H. E. Jones.
Wedgewood	"	O. F. Corwin.
Addison	Steuben	Dr. H. R. Ainsworth.
Atlanta	"	*Wheeler Clason.
Haskinville	"	*W. G. Collins.
South Canisteo	"	James E. Wilson.
Setauket	Suffolk	S. B. Strong.
Newark Valley	Tioga	*M. D. Clinton.
Waverly	"	T. P. Yates.
Easton	Washington	*H. Taber.
Whitehall	"	W. J. Spink.
Lyons	Wayne	Dr. A. F. Sheldon.
Rose	Wayne	*George Smart.
Bedford	Westchester	*Merritt M. Clark.
Mount Kisco	"	Benjamin Durham.
Arcade	Wyoming	J. D. Tate.
Varysburg	"	H. C. Orr.
Penn Yan	Yates	Ralph W. Eastman.
Erie, Pa	Erie, Pa	U. S. Weather Bureau.

* Special Rain Fall Observers.

PART VI.

THE CLIMATE OF NEW YORK STATE.

The Climate of New York State.

By E. T. Turner, C. E., Meteorologist to the New York Weather Bureau.

The first edition of this monograph, published in the Annual Report for 1893, is nearly exhausted, and immediate and pressing demands require its reissue at this time, pending a thorough revision which is not now possible, owing to pressure of routine work at the Central Office.

E. A. FUERTES,

Director New York Weather Bureau.

PREFACE.

During the past seventy years a very large amount of data has accumulated, bearing upon the climate and weather of New York; the efforts of the Smithsonian Institution and the New York Board of Regents having awakened a general and practical interest in these subjects early in the century. The system of observations organized by the Regents in 1826 at more than fifty schools and academies in the State is noteworthy as being the first important attempt made in this country toward the investigation of local climate. The general scheme of work adopted at the outset was very similar to that developed within recent years by the local weather services of the various States; while the methods of observation were approved by competent meteorologists of the time. The Regents' system was finally discontinued in 1863; but thereafter records of the weather were maintained at several Military Posts as well as by numerous independent observers; and between the years 1871 and 1874 five stations were established in New York by the United States Signal Service. The State Meteorological Bureau, which was organized in 1889, has also furnished valuable data from more than sixty well distributed stations.

The preparation of this report required a criticism of nearly all of the voluminous records thus obtained, and which have apparently been accepted without question hitherto. This feature of the work is described in some detail in section VI, and the considerations are there given which led to the exclusive use of recent observations wherever practicable, especially as regards temperature. The results of the Regents and other early observations have been, in part collated and summarized in the valuable essays of *Hough and †Coffin, and are also represented in the

* Essay on the Climate of the State of New York, by F. B. Hough, Albany, N. Y.

† A Letter upon the Climate of New York, by Professor J. H. Coffin. Contained in the "Natural History of New York State," Albany, 1843.

treatises of *Schott and †Blodgett. The statistics of climate in the vicinity of New York city were consolidated and employed in special investigations by Dr. Daniel Draper, Director of the New York Meteorological Observatory.

The accompanying tables and charts are intended to give in themselves a fairly complete account of the climate of the State, the text dealing mainly with the causes of the more important features thus shown. The relations of climate to plant growth and to sanitary conditions are barely touched upon, as results of value can be expected only from a thorough treatment of these subjects by specialists. Some topics which properly belong to a description of local climate are also necessarily omitted, or but briefly considered. Thus, no satisfactory account could be given of the irregularities to which rainfall is subject or of the rates of flow during storms, since the work of several years will be required to collect and properly discuss such data for the entire State.

The writer desires to express his indebtedness to Professor E. A. Fuertes, Director of the State Meteorological Bureau, for the use of records and results on file at the Central Office, and also to many persons named in the body of this report who have contributed valuable data in response to inquiries. Special acknowledgment is due to Mr. I. W. Brewer, who provided copies of a large number of manuscript records used in this investigation while on duty as an officer of the State Bureau.

I. GENERAL CLIMATIC INFLUENCES.

Before proceeding to deal with the climate of the State proper it may be of interest to glance briefly at certain general meteorological influences to which our local conditions are mainly due.

The prevalence of westerly winds is the most obvious and permanent feature of the atmospheric circulation in the middle latitudes of the globe. This movement of the air masses in a measure communicates the conditions of the continental interiors to the

* Atmospheric Temperature and Precipitation in the United States, by C. A. Schott. Smithsonian Contributions to Knowledge, 2 vols., Washington, 1876 and 1881.

† Climatology of the United States, by Lorin Blodgett, Philadelphia, 1857.

eastern coasts, while in the same manner the influence of the ocean is extended well inland along the western coasts. During the winter heat is lost from large land surfaces by radiation much more rapidly than it is gained from the oblique rays of the sun, and consequently in high latitudes regions of intense cold are found within the continents. Over the ocean, on the other hand, radiation proceeds slowly as compared with the rate on land surfaces, while vast quantities of heat are gained from equatorial currents.

In summer the increased heat received from the sun is absorbed more rapidly by land than by water, so that the thermal relation between continents and oceans is the reverse of that which obtains in winter.

The result of these conditions, so far as temperature is concerned, is shown plainly in the following:

TABLE 1.

AVERAGE TEMPERATURE IN DEGREES FAHRENHEIT.

West Coast of America.

STATION.	North latitude.		Temperature. January.	Temperature. July.
	Deg.	Min.	Degrees.	Degrees.
San Francisco, Cal	37	48	50	60
Portland, Or	45	32	38	68
Olympia, Wash	47	37	38	62
Sitka, Alaska	57	03	27	54
North Interior of America.				
St. Paul, Minn	44	58	8	72
St. Vincent, Minn	48	56	—10	65
Fort Simpson, British America	62	07	—18	59
East Coast of America.				
Norfolk, Va	36	51	40	79
Washington, D. C.	38	53	32	77
New York, N. Y	40	43	30	74
Boston, Mass	42	21	25	71
Portland, Me	43	39	22	69
West Coast of Europe.				
Toulouse, France	43	37	39	70
Paris, France	48	50	36	65
London, England	51	33	38	64
Christiana, Norway	59	55	23	62
Hammerfest, Finland	70	42	23	54

From this table it will be seen that the westerly winds from the interior of America give the northeastern States about the same mid-winter temperature which prevails in western Europe at the arctic circle, while at our latitude the mid-summer heat of the two coasts is nearly equal on the same parallels. In general, north of latitude 40 degrees the annual temperature of land surfaces is less than that of the oceans.

A more detailed account of the character and climatic effect of prevailing winds requires some consideration of the distribution of atmospheric pressure. Air masses are forced out from regions of high toward those of low barometer, and, owing to a deflecting force due to the earth's rotation, these outflowing winds in the Northern Hemisphere also tend to circulate about the center of high pressure in the direction in which the hands of a watch move. The winds flowing toward a center of low pressure revolve about it in a direction opposite to the movements of watch hands.

The principal permanent high pressure system to be considered in connection with our own climate is the vast area stretching across the Atlantic between latitudes 20 and 40 degrees, moving somewhat northward from the average position in summer and autumn and to the south of it in winter. This area forms part of a belt of high mean pressure which extends around the globe near latitude 30 degrees north.

A permanent area of low barometer is found over the north Atlantic, with a minimum pressure of 29.5 inches to the east of Greenland in January. The depression is much less intense during the summer, but nevertheless controls the winds of the northern Atlantic and northeastern America throughout the greater portion of the year.

Thirdly, the intense winter cold of the land surfaces in the interior of the continent causes a contraction of the lower air strata and consequently an inflow at higher levels from surrounding warmer regions. Thus the mass of air becomes greater over the cold area and the barometric pressure increases. In summer the oceans become, relatively, cold areas, and hence a reversal of the above process takes place at that season, making the pressure over the continents lower than over the oceans.

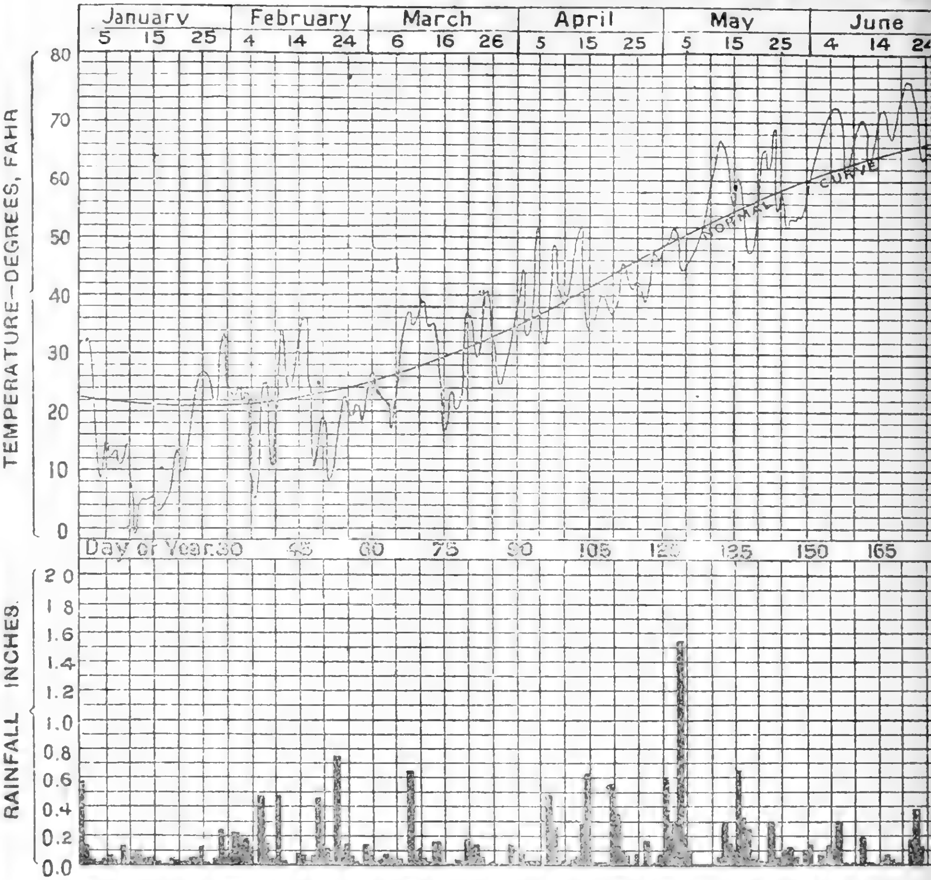
Lastly, there is the very important class of shifting areas of low and high pressure known as cyclones or storms and anti-cyclones, respectively, and to these are due the abrupt weather changes common over the central and eastern States. Areas of this class present all gradations of size and intensity, in some cases controlling the winds and weather over the greater part of the continent, while in others their courses are barely traceable. Cyclones and anticyclones alike have a general eastern motion across the continent from their point of origin; the former usually bearing northward to the vicinity of the Great Lakes and the St. Lawrence valley and Gulf, while the average course of the latter is southeastward toward the general high pressure region of the Atlantic which has already been referred to. The rate at which cyclones traverse the continent ranges from 600 to 900 miles per day; while the average velocity of anticyclones is slightly less.

The climatic effects of the several pressure systems mentioned may now be considered; and first with reference to the conditions which obtain in winter. At that season the high pressure area of the central Atlantic extends also over the southern States, and is joined to the "high" which develops in winter over the interior of the continent, and whose maximum pressure of 30.2 inches is found over the northwestern States. On the other hand the low pressure area of the north Atlantic has reached its greatest central depression of 29.5 inches, while the borders of the system cover the great water areas which indent the eastern coast of British America; and, acting with the continental high pressure, gives strong northwesterly winds along the entire northeastern portion of America. The frequent passage of cyclonic storms over the lower lakes and the St. Lawrence valley also brings these regions into the low pressure system; the line of demarcation between which and the high pressure system of the Atlantic and southern States is found to pass in the vicinity of this State. Thus, although our prevailing winter winds are northwesterly, a moderate variation in the intensity of the southern high or the northern low pressure area is sufficient to modify their direction very materially. For example, in January, 1890, the average pressure over the southeastern States was 0.2 inch above the normal value, while to the north of this State there was about an equal deficiency; and consequently the prevailing winds were southerly, raising the mean temperature for the month 10 degrees to 12 degrees above the normal.*

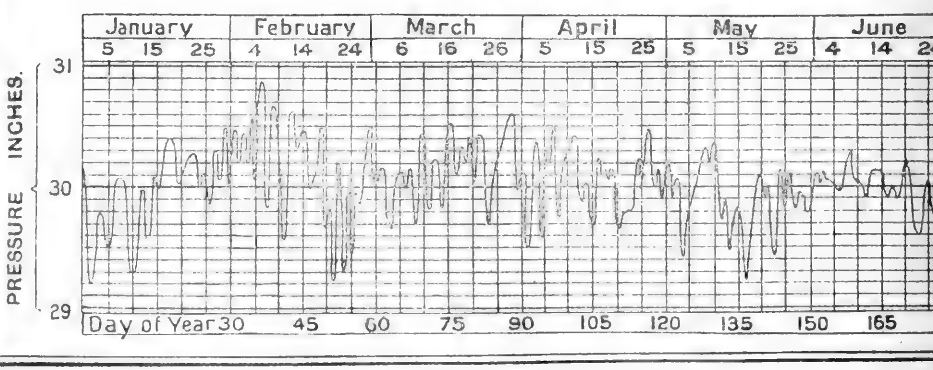
Every cyclonic storm which passes over or north of the State causes an increase of temperature, due, in part, to the southerly winds which flow towards the depressed area. Such events occur, on an average, five or six times during each of the winter months; so that by platting the temperature of the State for each day, a curve is obtained similar to that shown in plate 1, which represents the actual condition of pressure and mean daily temperature which obtained during the year 1893. The cyclonic systems give northwesterly winds in the rear of the storm centers, so that a considerable fall of temperature usually occurs after their passage; and this effect is frequently increased by the anticyclonic areas which follow, bringing masses of cold dry air from the interior of the continent to the eastern coast. The average difference between the extremes of mean daily temperature occurring in advance and in the rear of winter storms passing north of New York is about sixteen degrees, as determined by an examination of fifty individual cases; the variation being greatest in the northern and least in the southern section of the State. Storms passing to the southward of New York are also usually preceded by an increase of temperature in the region of the Great Lakes, and the southern and southeastern sections; while north of the Mohawk valley only northerly winds are felt, and therefore no rise of the temperature results. A depression which passes eastward over the center of the State may cause a great difference between

* An opposite effect is produced by an unusually low pressure over the north Atlantic, when in conjunction with a strong development of the continental "high;" in which case the northwesterly circulation is strengthened, and the low temperature of the interior extends to the eastern States.

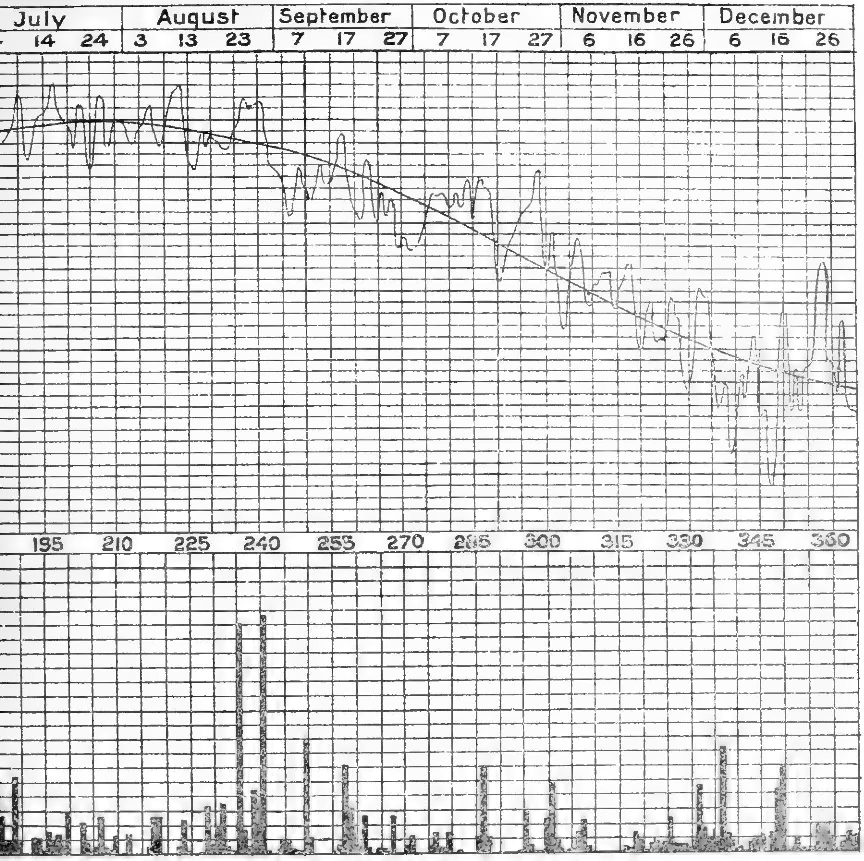
AVERAGE DAILY TEMPERATURE AN



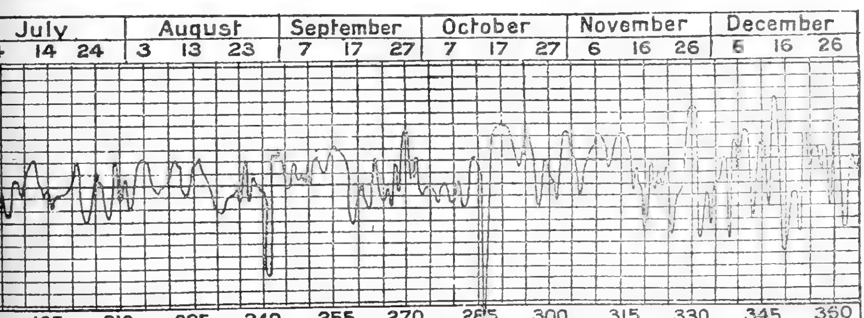
ATMOSPHERIC PRESSURES RECORDED AT IT



AINFALL OVER THE STATE, 1893.



CA DURING 1893. (REDUCED TO SEA LEVEL.)



the temperature in the northern and southern sections. A remarkable case of this kind occurred on January 11, 1890, when the mean daily temperature of stations in the St. Lawrence valley was fifty-three degrees lower than that obtaining near the Pennsylvania border.

During the average winter month two or three storms pass northeastward along the Atlantic coast. These are usually preceded by an increase of temperature in the southeastern sections, and by a decrease in the western and Great Lake regions.

There exists an intimate relation between the character of the air circulation and the precipitation of moisture over the State. Our northwesterly winds are essentially dry, owing to the lack of moisture in the continental interior, and also, in winter, to the coldness of the air, which gives it a very small vapor carrying capacity. Hence precipitation during the winter occurs almost entirely in connection with storm areas passing in the vicinity of the State, and which mainly derive their supply of vapor from the inflow of moist air induced by them from the Atlantic, or from the region of the Gulf of Mexico. The heaviest precipitation accompanies the Atlantic storms and those passing up the Mississippi and Ohio valleys to the Great Lakes; both of these classes of storms being characteristic of the autumn and winter rather than of the summer months. Hence, while the winter is the dryest season of the year over the greater portion of New York, it brings a heavy precipitation of rain and snow in the vicinity of the Atlantic coast, the southwestern highlands of the State, and the region of the Great Lakes. Over the Canadian provinces of Ontario and Quebec, the winter precipitation is exceedingly small; and this characteristic is shared by the St. Lawrence, Hudson and Champlain valleys and the central plateau of New York. The supply of moisture from the region of the Gulf of Mexico appears to be nearly exhausted before reaching the Canadian provinces and the St. Lawrence valley, although the southwestern Adirondack highlands receive a considerable rain and snow fall from southwesterly winds; while the moisture from the Atlantic is largely precipitated over the mountains of New England and northern New York.

During the winter months elongated depressions, or "troughs" of low pressure, are frequently formed over the eastern States; their longest diameter commonly extending from the region of the Gulf of Mexico to the Great Lakes, and including portions of the Ohio and Mississippi valleys. Such systems often derive their moisture both from the Mexican gulf and the Atlantic; and many of the heaviest rain and snow storms of the winter are due to conditions of this nature, especially in the vicinity of the lake region and on the highlands adjacent to the Atlantic coast.

The character of our winters depends very largely upon the number and general course of the anticyclones. As previously stated, the usual course is somewhat south of the east across the States toward the permanent Atlantic "high;" but in many cases the intense cold waves originating in British America move directly eastward along the Canadian border to the coast, and thence pass southward. Under such conditions the northern part of New York experiences the full effects of the cold waves, their severity in the more southern sections being usually somewhat decreased by the influence of the Great Lakes. Statistics as to the relative frequence and amount of temperature changes in various parts of the State will be found on pages 463, 464.

In the spring, and especially during April and May, the increased amount of heat received from the sun brings about a rapid modification and shifting of pressure systems, which are then less sharply contrasted than at other seasons. The winds decrease greatly in velocity, and their direction is variable, although the southerly component which is characteristic of summer becomes well defined during May. The pressure conditions of March are essentially those of a winter month, the high pressure systems over central British America and the southern Atlantic coast being still in force, while the cyclone of the north Atlantic continues to give northerly winds over eastern Canada and the adjacent States. In April and May the pressure has decreased over nearly the whole extent of North America, the barometer being relatively higher over the central and southeastern States, thus giving a condition similar to that described below for the summer season. A marked decrease in the number of cyclonic storms occurs from March to April and May; and the frequent showers which commonly occur during the latter months appear to be, more than at any other time, the effect of admixture of air currents having different temperatures.

An inspection of pressure charts for the summer months shows an area of low pressure over the northern interior of the continent in place of the anticyclonic area which was present there during the winter. The depression over the north Atlantic has decreased in intensity, while the high pressure system of the central Atlantic has become stronger, controlling the winds over the ocean and on both the European and American coasts, between parallels 10 degrees and 50 degrees north. A western branch of this area also covers the southern and central United States as far as the Mississippi valley, and thus the southerly wind system of the western Atlantic is extended well into the interior of the continent, increasing to a marked degree the summer temperature of the northern States. (In southwestern Europe the Atlantic "high" produces an opposite thermal effect, since that region is on the eastern side of the anticyclonic center and hence is subject to northerly winds.) In summer, as in winter, any increase of pressure over the southern States tends to raise the temperature in the region to the northward, and when such an increase occurs in conjunction with a dimunition of pressure over Canada, a "hot wave" usually occurs in the northern States. The average path of cyclonic storms is more northerly than in winter, and comparatively few depressions pass to the southward or eastward of New York until August.

The Gulf of Mexico and the Atlantic Ocean contribute large supplies of moisture to the air currents which move northward over the States in summer. Hence, although cyclonic depressions are less frequent than at any other season, the rainfall accompanying each storm is apt to be heavy, and over the greater part of the country the maximum total precipitation for the year occurs in the summer months. The local showers and thunderstorms characteristic of the season usually accompany the passage of low pressure areas near the State; but such a condition is not necessary to their occurrence, especially in mountainous sections, where only a moist air and the convectional currents produced by high temperature appears to be necessary to local thunderstorm formation. The relative frequency of local showers in different parts of the State, as bearing upon the distribution of summer rainfall, will be referred to later.

Considering now the pressure conditions of autumn, we find that in September the anticyclonic area of the Atlantic has moved northward and that the maximum pressure, 30.1 inches, extend westward over the central Atlantic States, maintaining southerly winds along our coast. The western limits of the anticyclonic system are found beyond the Mississippi valley, and during October the pressure remains high over the central and southern States, while diminishing over the ocean. The transient anticyclones of October and the early days of November show a strong tendency to drift very slowly over the region of average maximum pressure extending from the middle States to the central coast; and under such conditions the warm southwesterly winds and bright weather of "Indian Summer" prevail in the northern States.

The rainfall of September is usually light in the region east of the Upper Lakes, although no marked variation from the normal distribution of pressure characteristic of the month is required to bring about a heavy precipitation. For example, in September, 1890, the anticyclones moved to the northeastern rather than to the central part of our coast; and in one case, such an area, acting with a depression to the westward, gave easterly winds and phenomenally heavy rains over Central New York for several days; the pressure over the State being meanwhile unusually high (30.4 inches).

The maximum general rainfall of the autumn season occurs in October, accompanying the shifting of prevailing winds and a decided increase of storm frequency which obtains during the month. The northern winter commences soon after the middle of November; at which time the continental high pressure area and the depression of the North Atlantic are strongly developed, and northerly winds again prevail over the eastern States.

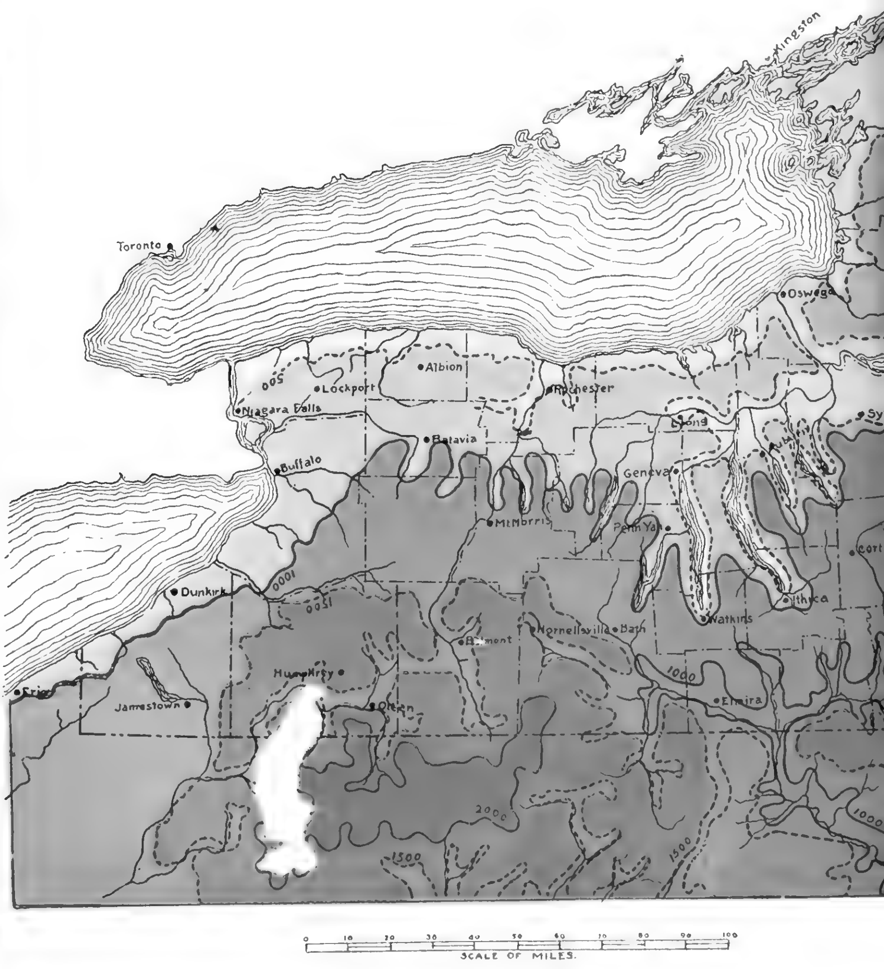
MAP OF THE STATE OF NEW YORK

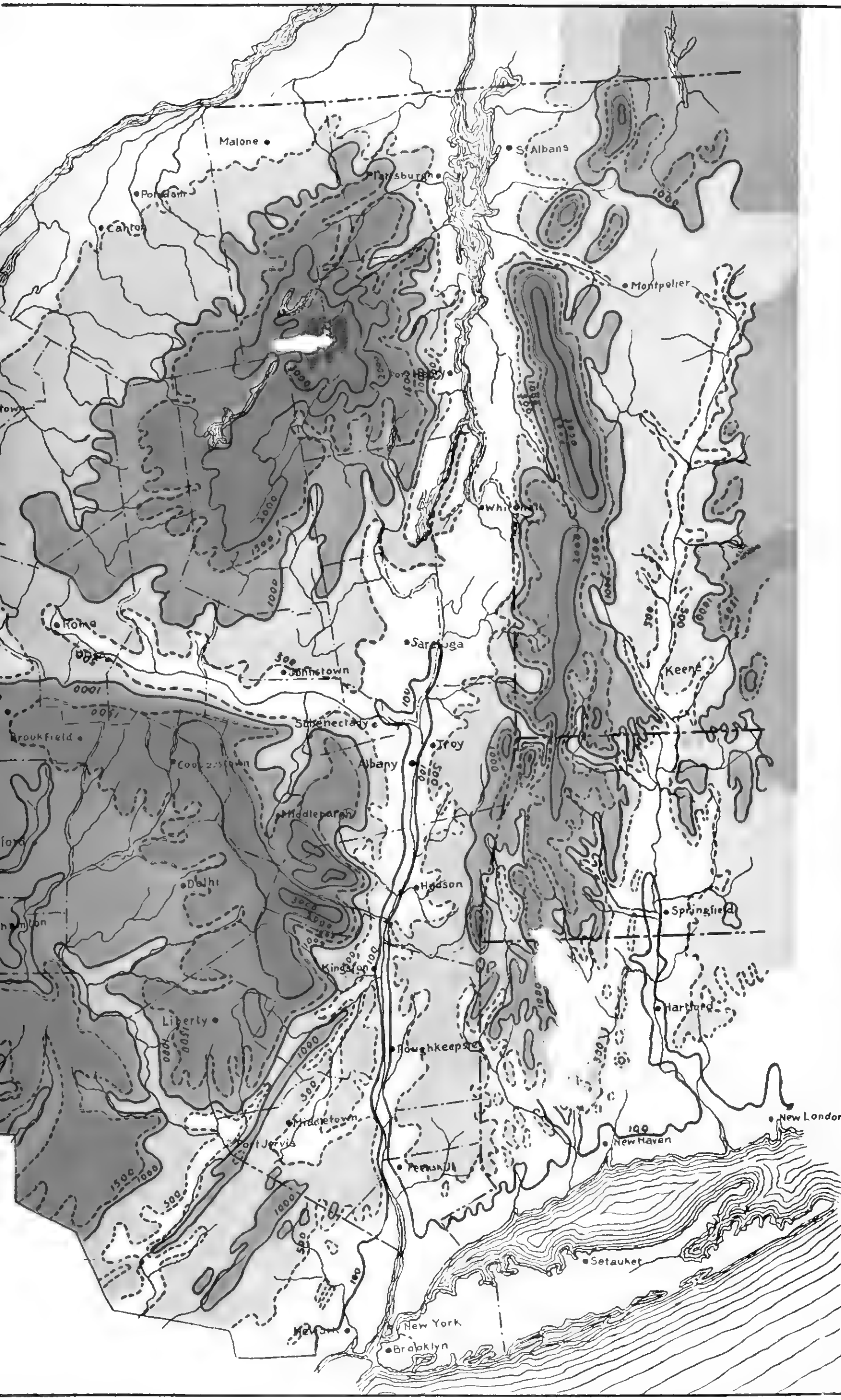
SHOWING

ELEVATIONS OF THE SURFACE

ABOVE SEA LEVEL.

FROM DATA OF GEOLOGICAL AND STATE SURVEYS AND RAILROAD LEVELS.





Malone
St Albans
Plattsburgh
Potsdam
Canton
Montpelier
Port Henry
Whitehall
Rome
Saratoga
Johnstown
Keene
Schenectady
Troy
Albany
Brookfield
Cooperstown
Middleburgh
Delhi
Hudson
Springfield
Kingston
Hartford
Liberty
Poughkeepsie
Middletown
Port Jervis
New London
New Haven
Peekskill
Setauket
New York
Newark
Brooklyn

II. PHYSICAL FEATURES OF NEW YORK.

The following outline of the orography of New York is substantially as given by Professor Arnold Guyot. Further details are exhibited by the accompanying relief map.

The mass of the State is a triangular table-land, elevated 1,500 or 2,000 feet above the ocean, and may be considered the north-eastern extremity of the plateau which, in this latitude, forms the western half of the Appalachian system. The natural limit of this belt toward the west and north is the large depression of Lakes Erie and Ontario, and which continues down the course of the St. Lawrence river to the ocean. In the east the table-land is terminated by the deep valley occupied by Lake Champlain and the Hudson river; while southward the highlands extend without interruption into Pennsylvania. The eastern edge along the Hudson and Champlain valleys is formed by a series of mountain chains more or less isolated from each other, and bearing the highest summits in the State. They are: The Highlands which cross the Hudson at the limit of the coast region; the Shawangunk and Catskill mountains on the western bank of the river; and the system of the Adirondacks covering the territory between the St. Lawrence and Champlain valleys. Within this eastern wall the true mountain chains cease; but the remainder of the plateau is indented by numerous valleys, the bottoms of which are generally several hundred feet below the common level, and which are separated by high ridges. A remarkable feature is the deep transversal cut which forms the valley of the Mohawk and Lake Oneida, opening a channel from the low country of the Lake Region to the Hudson valley, and thus dividing the main plateau into the distinct masses of the Appalachian and Adirondack systems.

A subdivision of the central or Appalachian highlands is due to the deep channel of Seneca lake, extending from the plains bordering Lake Ontario southward to the valley of the Susquehanna. The two sections of the highlands thus separated are here designated as the eastern and western plateaus; the former extending from the central lakes to the Hudson valley, and the latter westward from the central lakes to the depression of Lake Erie.

III. Tem

TABLE 2.—AVERAGE MONTHLY AND ANNUAL TEMPERA

STATIONS.	County.	Elevation above tide, feet.	Length of record—years.	From-to	January.
Western Plateau		1,287	......	....	22.0
Sherman	Chautauqua	1,570	3	1890-92	22.0
Humphrey	Cattaraugus	1,950	8	1884-92	22.0
Alfred Centre	Allegany	1,824	4	1889-92	21.5
Angelica	"	1,340	4	1889-92	
South Canisteo	Steuben	1,480	4	1884-92	21.5
Addison	"	1,000	3	1888-92	24.0
Elmira	Chemung	860	7	1854-60	23.0
Wedgewood	Schuyler	1,350	4	1889-92	21.5
Arcade	Wyoming	1,570	3	1890-92	20.5
Alabama	Genesee	648	2	1890-91	22.5
Pendleton Centre and Lockport	Niagara	580	4	1889-92	21.5
Eastern Plateau		1,070	......	....	21.3
Middletown	Orange	660	3	1890-92	26.0
Minnewaska	Ulster	1,800	3	1890-92	22.0
Liberty	Sullivan	1,500	7	1854-60	20.5
South Kortright	Delaware	1,700	3	1890-92	20.0
Quaker Street	Schenectady	973	3	1890-92	19.0
Middleburgh	Schoharie	640	3	1889-91	24.0
Cooperstown	Otsego	1,234	22	1871-92	20.5
"	"	....	39	1854-92	20.3
Oxford	Chenango	1,250	3	1890-92	20.0
Binghamton	Broome	870	3	1889-92	23.0
Waverly	Tioga	825	10	1883-92	
Homer	Cortland	1,100	10	1854-63	20.0
Brookfield	Madison	1,350	3	1890-92	20.0
Perry City	Schuyler	1,038	4	1889-92	21.0
Northern Plateau		1,578	......	....	16.0
Lyon Mountain	Clinton	1,917	2	1890-92	15.5
Number Four	Lewis	1,571	4	1889-92	16.0
Constableville	"	1,246	4	1889-95	16.5
Atlantic Coast		82	......	....	30.5
Block Island, R. I.*		27	12	1880-92	31.2
Setauket	Suffolk	40	7	1886-92	30.5
Central Park	New York	97	22	1871-92	29.8
New York city	"	164	21	1871-92	30.6
Hudson Valley		221	......	....	21.5
Garrisons or Ardenia	Putnam	157	20	1871-90	27.0
Stanfordville or Honeymead Brook	Dutchess	425	9	1883-92	24.2
Mountainville	Orange	218	4	1883-86	26.3
Albany	Albany	85	7	1886-92	23.0
Champlain Valley		?186	......	....	16.3
Plattsburgh Barracks	Clinton	?186	13	1880-92	16.3
St. Lawrence Valley		431	......	....	15.9
Gouverneur	St. Lawrence	400	10	1861-70	15.1
North Hammond	"	?340	4	1889-92	18.0
Canton	"	304	4	1889-92	16.0
Potsdam	"	300	4	1889-92	15.5
Malone	Franklin	810	2	1890-92	15.0
Great Lakes		481	......	....	23.4
Madison Barracks	Jefferson	266	22	1871-92	19.0
Oswego	Oswego	304	9	1884-92	22.5
Palermo	"	460	22	1871-92	20.2
Lyons	Wayne	407	4	1889-92	24.0
Rochester	Monroe	621	22	1871-92	24.1
Hess Roads	Niagara	330	4	1889-92	23.1
Buffalo	Erie	690	19	1874-92	24.1
Dunkirk	Chautauqua	600	3	1890-92	27.0
Erie, Pennsylvania		681	5	1888-92	27.0

perature.

TURES, REDUCED TO THE 22 YEARS PERIOD, 1871–1892.

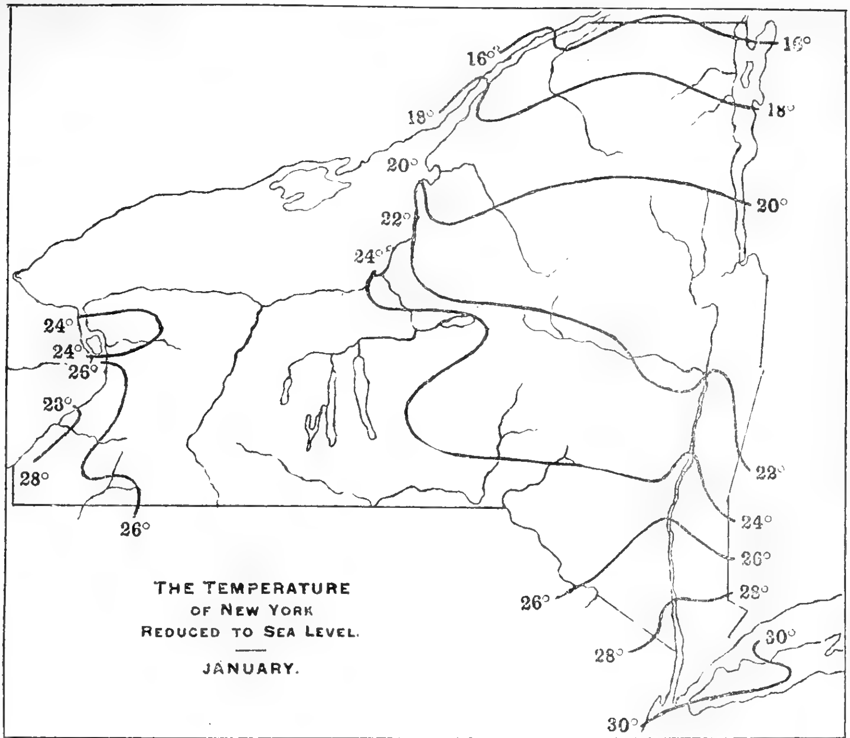
February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
23.6	28.5	41.7	54.8	64.3	68.6	66.6	59.3	47.3	35.5	26.7	44.8
24.0	28.0	40.0	53.0	63.0	66.5	64.5	58.0	47.0	35.5	27.0	44.0
24.0	29.0	42.0	56.0	64.0	69.0	66.0	59.0	47.0	35.2	26.6	45.1
23.0	28.0	41.0	55.0	64.5	67.5	65.0	57.5	46.0	35.0	26.0	44.1
23.0	28.0	41.5	54.5	63.5	68.0	66.5	58.5	46.5	35.0	26.0	44.1
26.0	30.0	44.0	56.0	66.0	70.0	68.0	60.5	48.5	37.0	28.0	46.5
24.8	31.5	45.0	58.0	67.0	72.0	69.0	62.0	49.0	36.5	27.5	47.2
23.0	28.0	41.5	54.5	63.5	68.0	66.0	58.5	46.5	35.0	26.0	44.1
22.0	26.5	39.5	54.0	64 0	68.0	65.5	58.0	47.0	34.5	25.5	43.6
23.5	29.0	42.0	55.0	64.5	69.0	68.0	61.0	48.5	36.0	27.0	45.4
22.5	27.5	40.0	53.0	63.0	69.0	67.0	60.0	48.0	35,5	27.0	44.4
22.5	28.6	42.0	55.6	64.8	68.6	66.3	61.5	47.2	35 6	25.9	44.7
28.0	34.0	46.0	59.0	68.0	72.0	70.0	63.0	51.0	39.0	29.0	48.8
23.0	30.0	42.0	55.0	64.0	68.0	66.0	60,0	48.0	36.0	25.5	45.0
21.3	27.4	41.2	55.4	64.5	68.2	66.4	59.0	46.9	34.7	25.4	44.1
21.0	27.0	41.0	55.0	64.0	67.0	65.0	58.0	46.0	35.0	26.0	43.8
20.0	27.0	41.0	55.0	64.0	68.0	65.0	58.0	46.0	35 0	24.0	43.5
25.0	31.0	45.0	59.0	68.0	70.0	68.0	61.0	50.0	38.0	28.0	47.2
21.3	27.3	41.2	55.3	64.6	68.1	66.4	58.9	46.9	34.7	25.3	44.1
21.2	27.4	40.8	54.5	64.0	68.1	65.6	58.2	46.5	34.9	24.8	43.8
21.0	28.0	41.0	55.0	64.0	68.0	65.0	58.0	46.0	36.0	25.0	43.8
25.0	31.0	44.0	57.0	66.0	70.0	68.0	61.0	49.0	37.0	28.0	46.6
22.0	27.0	41.0	54.0	63.0	68.0	65.0	57.0	45.0	34.0	25.0	43.8
21.0	27.0	41.6	55.0	64.0	68.0	66.0	59.0	46.0	34.0	25.0	43.8
23.0	28.0	41.0	54.0	64.0	68.0	66.0	58.0	46.0	35.0	26.0	44.1
16.8	24.0	36.8	51.8	60.3	63.8	62.5	55.0	43.3	31.0	21.2	40.3
16.0	24.0	36.0	50.0	59.0	62.0	61.0	54.0	43.0	31.0	21.0	39.6
17.0	24.0	37.3	52.3	60.3	64.0	62.5	55.0	43.0	30.5	21.0	40.2
17.5	24.0	37.0	53.0	61.5	65.5	64.0	56.0	44.0	31.5	21.5	41.0
31.6	35.9	46.7	57.6	67.0	72.3	71.1	65.3	55.1	43.9	34.5	50.8
31.5	35.0	43.8	52.3	61.6	68.8	68.1	62.7	54.3	45.7	37.2	49.1
32.0	36.2	47.0	58.0	67.0	72.0	71.0	66.0	56.0	44.0	34.5	51.2
31.2	36.1	48.3	60.7	70.9	75.0	72.9	66.4	54.6	42.7	33.4	51.8
31.7	36.3	47.9	59.3	68.8	73.5	72.4	66.0	55.3	43.4	34.0	51.6
26.9	32.2	46.2	58.8	68.1	72.0	69.6	62.8	50.8	39.0	28 5	48.4
28.8	34.7	48.2	60.2	69.2	73.2	71.4	63.6	51.6	40.6	29.5	49.8
26.4	32.8	45.1	57.6	66.8	70.3	68.3	61.9	50.0	37.9	28.0	47.3
27.9	33.2	45.3	57.4	67.1	71.0	68.5	62.0	50.3	38.6	28.7	48.0
24.5	32.0	46.0	60.0	69.5	73.6	71.1	63.7	51.6	39.1	28.0	48.4
17.5	25.9	40.8	55.2	64.7	69.9	67.5	58.6	46.9	34.5	21.8	43.2
17.5	25.9	40.8	55.2	64.7	69.9	97.5	58.6	46.9	34.5	21.8	43.2
17.3	26.5	40.4	55.5	64.2	68.2	65.9	58 4	45.7	33.2	22.2	42.8
18.0	26.0	40.0	55.0	64.0	68.0	66.0	59.0	46.0	34.0	22.5	42.8
19.0	28.0	41.5	56.5	65.0	69.0	67.0	60.0	47.0	34.5	24.0	44.1
17.0	26.5	40.5	56.0	64.0	68.0	65.7	58.0	45.5	33.0	22.0	42.6
16.5	26.0	40.0	55.5	64.0	68.0	65.5	57.5	45.0	32.5	21.5	42.3
16.0	26.0	40.0	55.5	64.0	68.0	65.5	57.0	45.0	32.0	21.0	42.0
24.3	29.9	42.0	54.8	64.9	69.8	68.1	61.1	49.3	37.3	28.4	46.0
19.5	28.0	40.5	55.0	66.0	70.0	68.0	61.0	48.0	35.0	25.0	44.6
23.4	29.0	40.8	53.8	62.6	68.5	68.0	61.0	49.5	37.0	27.5	44.8
22.0	26.8	39.7	54.6	64.5	68.4	66.4	58.9	46.5	34.5	24.7	43.9
24.5	30.0	43.0	56.0	65.0	70.0	68.0	61.0	49.0	37.0	28.5	46.3
25.0	30.3	43.3	56.4	65.9	70.5	68.8	62.0	49.8	37.5	28.5	46.8
23.5	29.5	42.0	52.5	64.5	68.5	67.0	59.5	48.0	37.5	28.5	45.3
24.7	30 0	41.3	53.7	64.3	69.9	68.6	62.0	50.2	38.0	29.2	46.3
27.6	32.5	43.5	55.6	65.5	71.0	69.1	62.5	51.4	39.7	31.9	48.0
27.6	32.6	43.5	55.6	65.5	71.0	69.1	62.5	51.4	39.7	31.9	48.0

III. Tem

TABLE 2.—AVERAGE MONTHLY AND

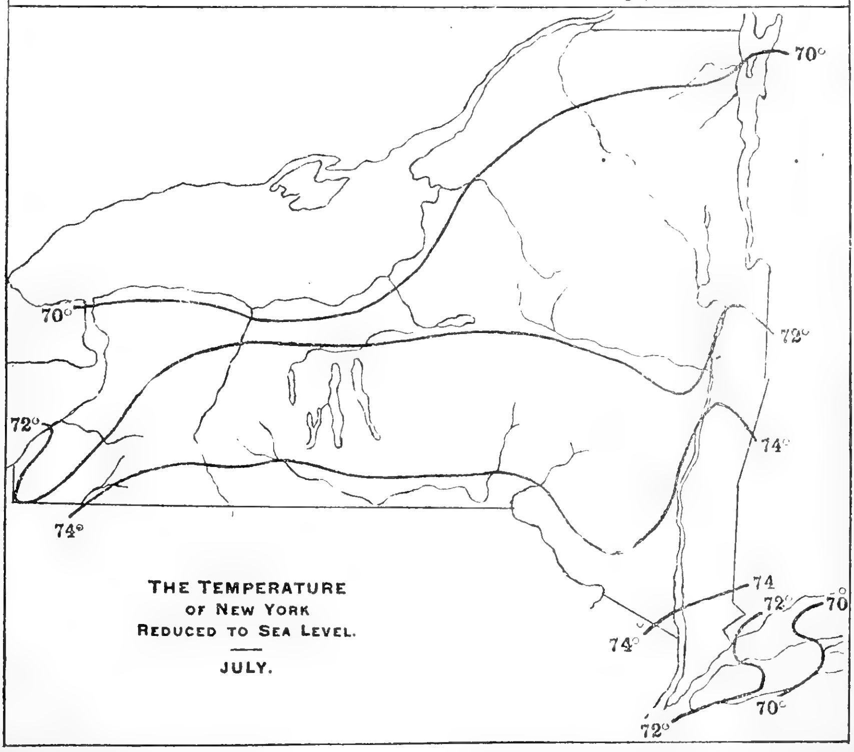
STATIONS.	County.	Elevation above tide, feet.	Length of record—years.	From-to	January.
Central Lakes	....	645	......	....	24.2
Ithaca	Tompkins	840	14	1879-92	24.4
Geneva	Ontario	450	16	1854-92	24.0
Mohawk Valley	....	639	......	....	21.0
Utica	Oneida	537	5	1888-92	21.0
Hamilton College at Clinton	"	900	7	1854-60	21.0
Ilion	Herkimer	480	2	1889-90	21.0
Average Temperature of the ten Regions		662	......	....	21.6

NOTE.—For an account of the method by which averages are reduced to the 22 years period, see possible. *Normal taken from "Monthly Weather Review."



The Temperature of New York Reduced to Sea Level.

January.



The Temperature of New York Reduced to Sea Level.

July.

perature.

ANNUAL TEMPERATURES, ETC.—(*Concluded*).

February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
25.8	30.6	44.2	57.3	66.0	70.8	68.7	61.6	49.6	37.1	28.3	47.0
26.5	31.1	44.4	57.5	66.1	70.7	68.5	61.2	49.2	37.2	28.5	47.1
25.0	30.0	44.0	57.0	66.0	71.0	69.0	62.0	50.0	37.0	28.0	47.0
22.8	28.8	42.8	55.8	65.0	69.2	67.3	60.0	48.0	35.9	25.8	45.2
22.5	29.0	42.0	56.0	65.0	69.0	67.5	60.0	48.0	35.0	26.0	45.2
23.0	28.5	42.5	55.5	65.0	69.5	67.5	60.0	48.0	35.0	25.5	45.1
22 5	29.0	43.0	56.0	65.0	69.0	67.5	60.0	48.0	35.0	26.0	45.2
22.9	29.2	42.3	55.7	65.0	69.3	67.4	60.4	48.3	36.3	26.3	45.4

section IV. Averages have been corrected for hourly variation by McAdie's tables when

III. TEMPERATURE.

The temperature conditions which prevail in the vicinity of New York, and the general influences to which they are due, have already been referred to in section I. The local variations of temperature and their effects within the State itself are shown in detail by the accompanying tables and charts, as regards both average and extreme conditions, dates of frost, and periods of navigation in lakes and rivers.

In referring special features of temperature distribution (as exhibited by the tables), to their proper causes, the effect of altitude alone upon the normals of the various stations should, in the first place, be eliminated by reducing the temperatures at all stations to sea-level. The results of such a reduction are shown by means of isothermal lines drawn for the months of January and July respectively, in diagrams 1 and 2. For reasons which will appear further on, it has been assumed that the temperature is lowered at the rate of 0.3 degrees F. per 100 feet of increased altitude in January, and 0.4 degrees per 100 feet in July. The rate of decrease is probably not perfectly constant for the entire State, but must be assumed to be so for purposes of comparison.

The first point to be considered is the variation of climate which may properly be attributed to differences of latitude within the State. The average temperature of the globe at the latitude of New York's southern boundary (40 degrees 40 minutes north) is for the year 55.6 *degrees; for mid-winter (January) 38.9 degrees, and for mid-summer (July) 72.5 degrees. Selecting the normals of New York city and Malone as representing the actual conditions which obtain at the northern and southern boundaries of the State respectively, the following deviations from strictly average conditions are shown:

At New York city the temperature (reduced to sea-level) for

The year is 4.0° below the average of Lat. 40° 40′.

January is 9.0° below the average of Lat. 40° 40′.

July is 1.5° above the average of Lat. 40° 40′.

* The values here given were computed from the determination made by Ferrel, "*Recent Advances*," p. 152.

At Malone the temperature (reduced to sea-level) for
The year is 5.2° below the average of Lat. 45° 00′.
January is 14.2° below the average of Lat. 45° 00′.
July is 1.3° below the average of Lat. 45° 00′.

These departures, although considerable, are not greater than might be expected between restricted local conditions and an average which includes the widely different thermal states of oceans and continents. A better idea of the relation which temperature bears to geographical position is obtained by tracing over the Northern Hemisphere the thermal belt in which this State is included. It is to be noted that for this purpose continental temperatures have in all cases been reduced to sea-level.*

The isothermal line of 70 degrees, which will be observed on the chart for July to pass from the Great Lakes over northern New York, extends thence eastward through New England to the vicinity of the coast, where it again turns toward the southwest, meeting the line of 70 degrees which appears over eastern Long Island. This isothermal then passes directly eastward over the Atlantic near parallel 40 degrees, intersecting the coast of Europe in northern Spain. Reaching the warmer land surface, it tends somewhat north of east through central France, Austria, central Russia and Siberia. Near the eastern coast of the latter country it turns southward through 20 degrees of latitude and passing to the Pacific over the island of Japan, continues nearly eastward, meeting the coast of America in central California. Thence it follows the meridian of 120 degrees west well northward into British America before again turning to the southeast in the direction of the Great Lakes and northern New York.

The line indicating 74 degrees in July passes from New York directly southward over the ocean until opposite Virginia; thence slightly south of east to Morocco in north Africa, where it turns northward to France; thence passes through southern Europe (north of the Italian peninsula) to the Black sea through central Asia at latitude 50 degrees, and near the coast turns southward to Japan. Diverging somewhat from the isotherm of 70 degrees,

* The isothermal charts of Buchan furnish the basis of the description given herewith.

in its course over the Pacific, it touches America in southern California, follows the Rocky mountains northward to British America and thence takes a southeasterly direction to the Great Lakes and New York.

In January, New York is to be classed with quite different regions of the globe from those named above. The isotherm of 15 degrees, which appears near the northern boundary of the State, passes thence over Labrador, the southeastern coast of Greenland and the Arctic Ocean. When well to the northward of Scandinavia it turns southeastward through Central Russia (passing north of St. Petersburgh) to the northern border of the Caspian Sea. Proceeding eastward to northern Japan and northeastward over the Pacific it reaches the southern coast of Alaska, when it again trends southward to South Dakota and finally passes north of the Lake Region to the St. Lawrence valley.

The mean January temperature of 30 degrees (that of New York city) is found also in southern Newfoundland, Iceland and northern Norway. This isotherm turns sharply southward in the latter region and passes to eastern Germany, Austria and the northern border of the Black Sea, when its course becomes eastward to the Pacific. Like all the preceding lines it intersects Japan and thence passes northeastward to the Aleutian Islands. Following the American coast line to the border of the United States, it turns southeastward to Missouri and thence passes to the southern shore of the Great Lakes.

As may be seen by the table on page 422, there are but few regions of the globe in which the cold gains so rapidly with increase of latitude as in the vicinity of New York, especially in the winter This condition is due to the influence of the Great Lakes, which affect central and southern New York much more than the northern section, and also to the fact that the path of low pressure areas lies in close proximity to the State.

From the forms of the isothermals of charts 1 and 2 it is apparent that, after eliminating the differences of temperature due to elevation above sea-level, there remain three important sources of local variation in the climate of the State; namely, the ocean, the Great Lakes, and certain prominent irregularities of the land surface which modify the direction and force of the prevailing winds.

THERMAL INFLUENCE OF THE OCEAN.

Atlantic Coast Region.—Owing to the general eastward drift of the atmosphere throughout the year, the effect of the ocean upon the temperature of the Atlantic States is, under normal conditions, derived almost entirely from a restricted portion of the water surface contiguous to the coast. The air flowing toward low area storms over the land may, however, occasionally be drawn from the region of the Gulf Stream, whose warmest axis is about 300 miles from the coast of this State. The stream at this point has a total width of 300 miles (the width at the surface is considerably less); a mean temperature for the year of over 73 degrees; and summer and winter temperatures of about 80 degrees and 70 degrees respectively, in the latitude of New York. Notwithstanding the fact that cold or polar currents exist on the landward side of the stream, it is stated by Captain J. E. Pillsbury, U. S. N., that "if the prevailing winds in New England in winter were southeast instead of northwest, the climate would be equal to that of the Azores Islands, mild and balmy. The current is in its place, ready to give off heat and moisture to the air, but the erratic movement of the winds may deliver this heat and moisture at unexpected times and seasons, and thus give rise to the erroneous belief that the Gulf Stream itself has gone astray." The writer has met with no investigations of the meteorological side of the question, and only the general statement can be made, that, with a special distribution of pressure, extensive easterly wind systems may bring from the Gulf Stream to the coast quantities of heat sufficient to modify our climate considerably during very brief periods.

The temperatures of portions of the sea surface near the coast line are shown approximately by the following averages of observations made at Sandy Hook and Block Island, from 1881 to 1886:

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Sandy Hook......	37.8	36.1	38.6	44.4	53.3	63.3	70.9	73.3	70.3	61.4	51.3	41.9
Block Island	37.1	34.6	36.5	42.5	49.8	58.4	65.5	67.2	64.5	57.7	49.8	41.7

The very considerable differences here shown between the temperatures of February and August, especially at Sandy Hook, are in part due to making the observations in very shoal water; but allowing for this, the annual range is large as compared with that of the open ocean (usually between 5 degrees and 10 degrees), showing the effect of the land winds upon the temperature of the water.

The nearest approach to a true maritime climate within the territory of New York is to be found at the eastern extremity of Long Island. The temperature conditions of this region may be represented without much error by the average monthly values obtained at Block Island (see table 2), twenty miles due east.

These temperatures, although obtained at a distance of but fifteen miles from the mainland of New England, will be found to follow quite closely the water temperatures previously given for Block Island, and to share their moderate annual range. The midsummer mean is, very nearly, that of Malone, at the northern boundary of the State, while the temperature for January is between those of New York city and Washington. The equalizing effect of the water is thus very appreciable, although far below that exerted in the open ocean, or on the western shores of the continents. A few examples of true maritime climates in various latitudes are given for comparison.

TABLE 3.

STATIONS.	North latitude.		Average Temperature.			
			Jan.	July.	Year.	Range.
	Deg.	Min.	Degrees.	Degrees.	Degrees.	Degrees.
Bermuda Islands	32	23	61	79†	69.6	18
Madeira	32	38	60	73	66	13*
Azores	38	08	57	72	63	15
Guernsey (Channel Islands)	49	28	43	62	51	19*
Monach (Hebrides)	57	32	42	57	49	15*
Dublin, Ireland	54	36	40	60	49	20
Block Island, U. S.	41	10	31	69	49	38

The following places, on or near the mainland of the western shores of the continents, have a partially maritime climate:

STATIONS.	Latitude.		Temperature.			
			Jan.	July.	Year.	Range.
	Deg.	Min.	Degrees.	Degrees.	Degrees.	Degrees.
Brest, France	48	23	33	64	53	31*
London, England	51	33	38	64	51	26
Edinburgh, Scotland	55	56	37	58	47	21
San Francisco, California	37	48	50	60	56	10
Olympia, Washington	47	07	38	62	51	24
Sitka, Alaska	57	03	27	54	42	27

* The true annual range is slightly greater than the difference between January and July means.

† Maximum occurs in August.

For the interior of the American continent, on the other hand, table 1 shows annual ranges of monthly mean temperature varying from 64 degrees to 77 degrees. The greatest annual range of monthly mean temperature in New York State is 53 degrees at stations in the St. Lawrence Valley.

A comparison of the normal temperatures of Block Island for the spring and autumn with those of stations in New York plainly shows the effect of the ocean in retarding the progress of the seasons. The harmonic analysis applied to the monthly mean temperatures of New York State and also to those for Block Island shows the epoch of the principal component for Block Island to exceed that for the State by 12 degrees (of arc), so that, on an average for the year, the progress of thermal conditions on

Block Island and eastern Long Island is 12.2 days later than in the main portion of New York. (Ferrel shows the average retardation of maritime, as compared with truly continental climates, to be from twenty to twenty-five days.)

A gradual modification of these conditions is found in passing from the eastern to the western extremity of Long Island. At East Hampton the annual range is already increased to 39.5 degrees, and at Setauket on the sound, about midway between Brooklyn and Montauk Point, the range is 41.5 degrees.

The sea breeze is an important feature of the summer weather along the south shore, tending to reduce the range of temperature by moderating the midday heat; but details as to its effect can not be given, as the writer has met with no systematic observations upon the phenomena for this section of the coast. The researches of the New England Meteorological Society, confined mainly to the coast of Massachusetts, show that on warm, fair days the sea breeze "reaches the shore commonly between eight and eleven o'clock in the forenoon, with a velocity of ten or fifteen miles per hour, its velocity rapidly diminishing inland. It produces a distinct and agreeable depression of temperature on the coast, but the effect is not carried inland as far as the wind extends."

The breeze commonly penetrates inland about ten miles, but, naturally, to a greater distance when acting with the prevailing southwesterly winds of the coast, while it may be wholly overcome if opposing them. Thus the south shore of Long Island is favorably situated to receive the full benefit of the sea breeze, which should penetrate well into the interior, although gaining considerably in warmth beyond the immediate shore line, as stated above.

The sandy plains of southern Long Island rise gradually toward a ridge of low hills extending through the center of the island nearly from the western to the eastern extremity and which bear a considerable growth of pine timber. The northern side of the island is therefore somewhat sheltered from the force of strong sea winds, which meet with but little obstruction on the southern shore.

The effect of the ocean upon the portion of the state lying north of the coast line mainly results from the passage of high and low pressure areas over the eastern part of the continent, as has already been mentioned. The prevailing northwesterly winds of winter, if uninterrupted, would maintain the severe cold of the continental interior quite to the coast line, while the normal southwesterly circulation of summer brings to New York land rather than sea winds. In reality, the State is subject to an alteration of maritime and continental climates, following each other at intervals of a few days in conjunction with cyclonic and anticyclonic movements; the continental type prevailing during the winter and the maritime during the summer. The entire State may be subject to the ocean winds or only a few of the southeastern counties; and hence no very sharp line of demarcation can be expected between climatic conditions adjacent to the coast and those inland. The flat country, which extends from Long Island Sound to northern Westchester county, is, however, most fully exposed to sea influences, the ridge of the highlands which passes in a northeasterly direction from Rockland into Putnam county offering the first obstruction to their penetration inland. No reliable observations covering a long period are available to show the precise effect of the highlands upon temperature; but results furnished by a few new stations during the past three years indicate that the conditions are more distinctly maritime on the southern than on the northern side, a result which receives some confirmation from the character of the rainfall in the vicinity, as will appear later. The isothermal charts accompanying this report accordingly show the section south of the highlands to have a smaller annual range, cooler springs and warmer autumns than the remainder of the State.

Some special notes upon the climate of New York city are given on page 500.

THERMAL INFLUENCE OF THE GREAT LAKES.

Referring again to the charts of sea-level temperature, it will be observed that the Great Lakes cause a deflection of the isotherms similar to that due to the ocean. The temperature of the lake waters, and consequently of the air over them, follows the seasonal changes more rapidly than does the ocean, owing to the smaller mass of the former; but the situation of the lakes upon the western side of the State gives them a greater effect upon the prevailing winds, at least during the autumn and winter, than is derived from the Atlantic. The absolute effects of these inland seas upon the air temperature may be better studied in the interior of the continent than in New York, where a variety of other influences are also at work. For comparison, Moorhead and Duluth, Minnesota and Marquette, Michigan, are chosen; the three stations having approximately the same latitude and elevations. Moorhead represents a nearly pure continental climate; Duluth, 220 miles to the east, is upon the western border of Lake Superior; and Marquette, still 230 miles east of Duluth, is upon the southern shore of Lake Superior. The following table shows a modification of temperature which may be attributed to the influence of the lake.

STATIONS.	Monthly Mean Temperature.			
	January.	July.	Year.	Range.
Moorhead	—1.5°	67.9°	36.8°	69.4°
Duluth	+8.6	66.7	39.2	58.1
Marquette	+14.3	66.0	40.6	41.7

The winds of summer are land winds for Duluth and Marquette and hence modify the temperature less than the lake winds of winter.

The extremes and annual averages of monthly mean temperature for cities of both the upper and lower Lake Regions are given in the following table; and those for eastern New York are also added for comparison.

TABLE 4.

	STATIONS.	Average Temperature.			
		January.	July.	Year.	Range.
		Degrees.	Degrees.	Degrees.	Degrees.
Lower Lakes	Oswego	22.5	68.5	44.8	46.0
	Roehester	24.1	70.5	46.8	46.4
	Buffalo	24.1	69.9	46.3	45.8
	Erie	27.0	71.0	48.0	44.0
	Cleveland	25.5	71.5	48.8	46.0
	Detroit	25.1	72.0	48.1	46.9
Upper Lakes	Port Huron	21.1	69.8	44.8	49.7
	Chicago	24.1	72.3	48.5	48.2
	Milwaukee	18.6	69.4	44.9	50.8
	Duluth	8.6	66.7	39.2	58.1
Eastern New York	New York city	30.6	73.4	51.6	42.8
	Albany	23.0	73.6	48.4	50.6

Thus the cities of the Upper Lakes (excepting Duluth) do not differ greatly from those of the Lower Lakes in annual temperature, but the annual *range* of the former is somewhat larger, owing in part to their greater distance from the ocean.

The only observations upon the temperature of the Lower Lakes, off shore, which the writer has met with, are those made by Professor Dewey in 1838 and quoted in the report of Professor Coffin. "The temperatures are the averages of observations made at intervals of six or eight miles across Lake Ontario, from the Genesee River to Coburgh, Canada (not including those made near the shore), about a foot below the surface." For comparison, the mean temperature at Albany for the several half months during which the observations were made is also given here.

DATE OF OBSERVATION.	Temperature.	
	Lake.	Albany.
	Degrees.	Degrees.
May 14 and 15	39.3	51.0
May 21 and 22	39.0	61.0
June 19	47.5	73.0
August 7	66.0	73.0
September 4	60.5	63.0
October 16	53.1	42.0
November 13	45.7	41.0

The low temperatures recorded in May are attributed to the melting of ice in Lake Erie, Professor Dewey stating that the lake frequently is not clear of ice until about the middle of the month. "Owing to its shallowness, Lake Erie is frozen over to a large extent nearly every winter from December to March or April, whereas the main body of Lake Ontario is sufficiently free from ice to permit navigation even in the severest seasons."

Local southwesterly winds prevail throughout the year on the southern shores of both lakes and over much of the territory between them, a result due in part to the deflecting influence of the hills of southwestern New York, as will be made apparent by an inspection of the accompanying relief map. The southerly component is especially prominent in summer, giving lake winds at Buffalo and land winds at Rochester, with a slightly lower temperature at the former than at the latter place. Thus, Buffalo may properly be selected to determine the maximum thermal effect due to the Lower Lakes, and for this purpose its monthly averages were analyzed by the method referred to in connection with the temperatures at Block Island. The results are given, together with those for St. Louis, as an example of a continental climate; Cooperstown as equidistant from the lakes and the ocean; Block Island and the State for the purpose of extending comparisons.

STATION.	*Epoch of first component.		Progress of temperature; days later than at St. Louis.
	Deg.	Min.	
St. Louis†	195	04	0
Cooperstown	202	38	7.5
New York State‡	202	56	8.0
Buffalo	206	36	11.5
Block Island	214	57	20.0

Probably somewhat more than the difference in epoch here shown between Buffalo and Cooperstown may safely be attrib-

* The cosine formula $T = A_0 + A_1 \cos. (x - e)$ is used here. † Value as given by Ferrel. ‡ The periodic formula for New York State, from which the curve of plate 1 was constructed, is as follows: $T = 45.9° + 24.4° \cos [t - (202° 56')] + 0.76° \cos. [2t - (311° 30')] + 0.45° \cos. [3t - (50° 50')]$. The mean monthly temperatures for the State used were the averages of the values at Humphrey, Cooperstown, Lowville (Regents' record), New York city, Albany, Plattsburgh, Canton, Oswego and Ithaca. The mean annual temperature thus derived for the State is 0.5° higher than that of Table 2.

uted to the influence of Lake Erie, owing to the greater distance of Buffalo from the ocean. The retarding influence of the lake will exceed the average value in the spring and autumn and will fall below it after the formation of ice in winter.

Lake Ontario exerts its principal thermal effect in tempering the cold waves of winter, which usually approach the State from the northwest. A single example will serve to illustrate this. On January 19, 1892, an anticyclonic area passed eastward over Canada, giving northerly winds and very cold weather over the northeastern States. The following temperatures were obtained on the northern and southern shores of the lake, respectively:

DATE.	NORTH SHORE.		SOUTH SHORE.	
	Kingston.*	Toronto.	Oswego.	Rochester.
January 19, 8 A. M.	+ 2	+4	+12	+16
January 19, 8 P. M.	— 6	0	+ 8	+12
January 20, 8 A. M.	—22	—8	— 2	+ 6

The winds were northerly throughout the observations.

Here the lake appears to have maintained the temperature at Rochester from 14 to 28 degrees above the point to which it would otherwise have fallen; and thus the very moderate annual minima shown by tables 9 and 10 are explained. The frequent occurrence of conditions similar to the above give to the south shore of Lake Ontario an average mid-winter temperature 5 degrees higher than that of the north shore.

The effect of the Great Lakes, although appreciable in nearly all of the western and central New York, is most prominent over the land surfaces which slope toward them. Thus at Arcade, thirty miles from Lake Erie and nine hundred feet above its level, the temperature of May is reduced and that of October is raised about 1 degree, as compared with the values at Alfred Centre and Angelica, a few miles distant to the southwest of

* Kingston is near the head of the St. Lawrence river and at a greater distance from the lake than Toronto.

Arcade, but situated beyond the slope of the lake. Arcade, in fact, appears to mark the limit of distance at which the thermal effects of the lakes can be distinguished from those of the ocean.

The most temperate climate of the Great Lake Region is that of the Chautauqua county "Grape Belt," which extends from the southern shore of Lake Erie up the lower slopes of the Chautauqua county hills; its length being about sixty miles, and its width from two to six miles. This section, represented by the stations Erie and Dunkirk, has the same annual midsummer and midwinter temperatures as Mountainville, in the Lower Hudson valley, but differs from the latter in its cooler spring and warmer autumn seasons. As will be seen further on, the date of autumn frosts is unusually late in the grape belt, and the minimum temperatures of winter are less severe than in any other portion of the State excepting the Atlantic coast region. The characteristic features of the climate are due to the lake and to the high hills, which rise on the easern side, somewhat in the form of a half ellipse or oval, approaching the lake most closely at the northern and southern extremities of the county, and leaving a large extent of sheltered territory in the center. The highest altitude of the grape belt is found in the vicinity of Prospect, about 1,300 feet above tide, and 700 feet above Lake Erie. Assuming the decrease of temperature to be 0.4 degrees per 100 feet of altitude, as for the main portion of the State, the midsummer temperature of this upper limit is about 68 degrees.

The highlands of southwestern New York subside gradually toward the north, leaving a nearly level tract of country stretching between northern Lake Erie and the southern shore of Lake Ontario. The temperature of this region is mainly determined by the southwesterly winds from Lake Erie; but in the northern part a tract extending eastward from the Niagara river through Niagara and Orleans counties is subject to westerly land winds which blow over the isthmus between the two lakes, and hence are but little affected by the temperature of the water. The winter cold is therefore greater than in the adjacent territory on the northern side, while in summer the temperature is about one degree in excess of that on the border of Lake Ontario.

The final descent from the Western plateau of the State to the level of Lake Ontario is found in the "Limestone Ridge," an abrupt declivity extending eastward from the Niagara river nearly parallel with the lake shore at a distance of about ten miles. This ridge breaks the force of southwesterly winds to some degree, and with the added effect due to the convex form of the lake shore in this locality, causes a more moderate winter climate in the northern portions of Niagara and Orleans counties than obtains in their central and southern sections.

The lowlands included in the system of the Oswego river, lying to the eastward of the Central Lakes, are more exposed to the winds of the Great Lakes than to those from other directions, and hence may properly be included in the region of the Great Lakes. The low and sheltered position of this tract gives it a high temperature relatively to the surrounding country, as shown by the few observations of temperature which have been made at Syracuse and other points within the region; and also by statements received as to the short duration of snow in winter, and the rapid advance of vegetation in the spring.

THE VALLEYS OF NEW YORK.

The principal regions requiring mention here as deriving peculiar climatic conditions from the form of adjacent land surfaces are the Hudson, Champlain, St. Lawrence and Mohawk Valleys, and the region of the Central Lakes.

The Hudson and Champlain valleys, taken together, form a deep channel, extending nearly northward from the Atlantic coast to the lower St. Lawrence valley; the total length of the depression from the highlands of Rockland county to the northern border of the State, being 270 miles. The valley is bordered on the east by the Green Mountains of Vermont, and their southern branches in western Massachusetts and Connecticut; and on the west by the

Adirondack system of northern New York, the Helderberg hills, the Catskill and Shawangunk Mountains and the Highlands. A broad valley which opens out of the Hudson toward the southwest through Orange county, separating the Shawangunk ridge from the Highlands, is here included as part of the Hudson valley.

The prevailing winds of the Hudson valley blow nearly north and south throughout the year; southerly winds predominating in the vicinity of Albany from May to October, inclusive, and northerly winds during the remainder of the year. Toward the southern limit of the valley the periodicity of the winds appears to follow that of the Atlantic, changing from south to north in September. No long records of the wind direction in the Champlain valley were procurable in a form suitable for comparison; but a five years' series observed prior to 1850 indicates substantially the same conditions as at Albany.

The high temperature of the sheltered section of the lower Hudson valley is represented by the normals of Ardenia, while Honeymead Brook and Mountainville, although located within the valley slopes, are exposed much more to the conditions of the highlands. The annual ranges at the three stations vary but little from 46 degrees, which is below the average of the interior of the State, probably owing to the tempering influence of the ocean, although the advance of the spring and autumn seasons appears to be but little retarded by maritime influences. Proceeding northward to the comparatively open country stretching from the vicinity of Albany toward Lake Champlain, it is found that the summer temperatures are not reduced, while the winters are considerably colder. This increase of the annual range of temperature indicates that in summer southerly winds carry the warmth of the lower valley well to the northward and possibly even over the region of Lake Champlain, while a reverse direction of the winds of winter practically extends the limits of the Champlain valley climate below Albany, probably to the ridge of the Catskills on the western side and below them on the eastern side of the river. The river itself has little effect upon temperature during the winter, since it is frozen over, on an average, from December 16th to March 20th at Albany, and is also closed by ice during a portion of the winter below the northern Highlands. Tables showing the dates of opening and closing of navigation in Lake Champlain and the Hudson river for a long period of years will be found on pages 471, 472.

The northern portion of the Champlain valley, represented by Plattsburgh, is exposed to the northerly winds of winter, and hence its temperature then differs but little from that of the same latitude of northern New York generally. The summer temperature is slightly higher than at any other stations in northern New York, owing to the shelter afforded by the mountains on the eastern and western sides. The annual range is exceeded only by that of Gouverneur.

THE ST. LAWRENCE VALLEY.

The long records obtained at Potsdam and Gouverneur prior to 1850 show that at the former station southwesterly winds prevail throughout the year and at the latter during all months excepting November, December and April, when the direction is northwesterly. That the winds of the Great Lakes are mainly of the same character has been already shown; and these find their natural outlet through the channel of the St. Lawrence valley, as will be made apparent by an inspection of the relief map. Hence, in summer when the southerly component is at a maximum, this section may be included in the region of the Great Lakes, as regards its temperature conditions. In winter there are no obstructions to the northwesterly winds from the plains of Canada, and even the southern component is then frequently due to the deflecting influence of the Adirondack plateau upon winds blowing directly from the west.*

* The following table by Professor Coffin, giving the thermal effects of winds from various directions, gives additional ground for the above statement. Local southwesterly winds in which the *southerly* component predominates may be considered as lake winds, and those in which the *westerly* component predominates as true westerly or even northwesterly winds. The second column shows the number of days, hours and minutes that the wind blew from each point of compass during the year; and the third, the average rise or fall in the temperature per hour during each wind, expressed in decimals of a degree. + denotes a rise, and — a fall.

COURSE OF WINDS.	Duration of winds.			Variation in temperature per hour.
	Days.	Hours.	Minutes.	
North	7	5	15	—0.197
North by east	5	22	15	—0.165
North-northeast	8	0	15	—0.144
Northeast by north	10	15	15	—0.063
Northeast	14	1	52	—0.015
Northeast by east	16	12	30	+0.094
East northeast	13	4	38	+0.115
East by north	4	21	30	+0.077
East	2	15	15	+0.103
East by south	2	8	15	+0.162
East-southeast	2	15	45	+0.146
Southeast by east	2	13	15	+0.114
Southeast	2	17	29	+0.140
Southeast by south	4	3	8	+0.145
South-southeast	7	4	14	+0.138
South by east	8	7	31	+0.161
South	20	40	0	+0.314
South by west	21	4	45	+0.177
South-southwest	22	6	45	+0.162
Southwest by south	22	16	30	+0.065
Southwest	29	12	15	—0.018
Southwest by west	25	21	30	—0.055
West-southwest	16	23	45	—0.018
West by south	13	6	0	—0.081
West	17	5	45	—0.063
West by north	11	14	7	—0.069
West-northwest	8	19	8	—0.252
Northwest by west	9	8	53	—0.281
Northwest	8	20	38	—0.322
Northwest by north	9	15	37	—0.306
North-northwest	8	2	15	—0.276
North by west	6	9	46	—0.236

NOTE.—The broad surface of the St. Lawrence River somewhat modifies the temperature in its immediate vicinity, and its influence is especially beneficial in preventing early frosts in autumn. The coldest part of the region, on the other hand, appears to be that near the foothills of the Adirondack mountains, as in the case of Gouverneur, Watertown and Madison Barracks, which stations probably owe their extremely low minimum temperatures to the nightly down-flow of cold air from the highlands.

The following table furnishes a comparison between the temperature of northern New York as a whole, and other points of the globe having similar conditions:

TABLE 5.

	Temperature.			
	January.	July.	Annual.	Range.
	Degrees.	Degrees.	Degrees.	Degrees.
Northern New York	16	68	43	52
St. Paul, Minn	10	72	43	62
Omaha, Neb	17	77	49	60
Helena, Mont	15	67	43	53
St. Petersburgh, Russia	16	64	38	48

THE MOHAWK VALLEY.

The prevailing winds of this deep depression between the highlands of northern and central New York are almost exclusively easterly and westerly, following the general course of the valley. Its temperature conditions are but little known from observation, excepting at Utica, which represents the cold section of the region. The winter temperature is here considerably below that at points of the Lake Region to the westward having substantially the same latitude and elevation, and differs but little from that of the highlands toward the south. The explanation of this peculiar condition lies partly in the exposure of Utica and its vicinity as far west as Palermo to northerly winds which have not passed over any portion of Lake Ontario; and also in part to the nocturnal downflow of air from the adjacent hills, to be referred to later. The summer temperature of Utica is, very nearly, that of the Lake Region.

Statements which the writer has received from persons familiar with the region of the Mohawk show that, in passing eastward, no substantial variation from the above conditions is met with until the valley broadens out in the central or eastern part of Montgomery county. Here the temperatures are similar to those of the adjacent portion of the Hudson valley; the latter being apparently rather the cooler region in summer, owing to its greater exposure to northerly winds.

It may be remarked, as Coffin has already noted, that the temperature of the upper Mohawk valley is very near the average for the State as a whole throughout the year.

THE CENTRAL LAKE REGION.

From a climatic standpoint this region may be taken to include Canandaigua, Keuka, Seneca and Cayuga Lakes; the lesser dimensions and greater elevation of Owasco and Skaneateles Lakes classifying them more properly with the plateau region. The basins of Keuka and Seneca Lakes are prolonged in nearly open channels, extending through the central highlands from the plain of the Great Lakes on the north to the valley of the Susquehanna on the south; the valleys of Cayuga and Canandaigua, on the other hand, being closed by high hills toward the south. The winds follow quite closely the direction of the valleys, especially in their southern portions, and hence must traverse a large extent of the lake surfaces.

The average annual temperature of the Central Lake region does not differ materially from that of the section bordering the southern shore of Lake Ontario, the annual *range* also being nearly identical in both regions.

The temperature conditions of Seneca and adjacent lakes were closely studied several years ago by W. D. Wilson, D. D., of Hobart College, Geneva, whose conclusions are as follows: In comparing the influence of the lakes upon Ithaca and Geneva, respectively, "Ithaca has the advantage of about half a degree of latitude and fifty feet of elevation, which, combined, make scarcely so much as one degree of temperature in its favor. * * * The lakes are much the same in size, about forty-five miles long, with an average width of two or three miles. Cayuga Lake, however, is much the shallowest and freezes over more extensively than Seneca."

"The point of contrast, however, is chiefly this: The one (Ithaca) is at the south end and the other (Geneva) at the north end of a long body of standing water. * * * In winter, while the water is warmer than the air and is also giving out heat by the formation of ice, the prevailing winds are the polar winds from the north; consequently they are warmed by the lake before they reach Ithaca, while these cold winds pass only over the land to convey the heat away from Geneva. But in summer, when the prevailing winds are the return current from the equator, those winds for Ithaca come from off the land and are not cooled by the lake until after they have passed the town." Observations are then quoted, showing that "the influence is quite manifest in winter, producing a difference of 3.3 degrees in favor of Ithaca, their average being 29.4 degrees, ours 26.1 degrees. In summer the difference is slight and is in their favor until the last half of August. For the first half of September their average is 62.9 degrees, ours 63.3 degrees. For the last half theirs is 56.1 degrees, ours 57.6 degrees."

"During the whole of summer Ithaca's return current comes from over a tract of land which is quite uneven in surface and has a mean temperature considerably lower than Ithaca itself. During the first part of the summer, until about the middle of August, our return current comes, not from the lake at all, but from a point of the compass too far west of south to have been influenced by the lake. After the first of August we have a much larger proportion of southwest winds, and then we begin to feel the influence of the lake, and while the influence is in the direction of cooling during the day it effects a retardation of the process of cooling during the night, and thus, as I presume, while the average for the twenty-four hours is greater than theirs, our days are cooler and our nights are warmer than at Ithaca."

Making due allowance for the cooler exposure of the present University Station at Ithaca, which is four hundred feet above that referred to by Dr. Wilson, the normals given in the general table of this report are in substantial agreement with the above statements, which will also hold true of the Central Lake region as a whole.

THE HIGHLANDS OR PLATEAUS OF NEW YORK.

The rate at which the average annual temperature decreases with altitude is usually given as 1 degree to 300 feet of elevation, the rate being somewhat below this value in winter and above it in summer. The rule is subject to considerable local variation, however, and it was deemed best to make an approximate determination for this State. Owing to the variety of local influences which had also to be considered it was found necessary to make a trial of various factors of reduction and draw isotherms representing the results, accepting those which reduced the effects of altitude to a minimum. The rates of decrease in this case are 0.3 degrees per hundred feet of elevation for the winter and 0.4 per hundred feet for the summer, agreeing well with the usual values. For the mountains of Northern New York however, a factor much smaller than 0.3 degrees appears to hold for the winter months; but the latter was adhered to throughout in constructing the sea-level isotherms of plates 1 and 2.

The highland districts of Central New York are substantially alike in their temperature conditions, as these are shown by observation and also by the character and seasonal development of vegetation, and hence only a general account of their climate is required. The Adirondack Plateau has some distinctive features needing a separate statement.

In computing the temperature normals of the eastern and western plateaus, it was found that closer comparisons could be made between Cooperstown (chosen as the standard of reference) and nearly all other stations of the plateaus, than between the latter and low level stations of the coast and lake regions. In fact, the thirty-eight year normal of Cooperstown may, without much error, be taken to represent the temperature of the plateaus at the altitude of 1,000 to 1,500 feet throughout the central portion of the State. The western plateau shows, in winter, a slight excess of temperature (about one degree) over that of the eastern region, which may be attributed in part to the influence of the Great Lakes, and in part to the gradual manner in which the surface declines toward the north; Dr. Hann having shown that the prevailing air currents are generally less cooled when passing up a gradual incline than when the vertical gradient is large.

It has already been stated that the thermal influence of Lake Erie is distinctly noticeable in the spring and autumn over the large tract which slopes toward its surface; and that a difference of about one degree is thus brought about between western Wyoming county and adjacent stations in Allegany county. After the freezing of Lake Erie, the coldest region of the plateau appears to be the ridge separating the system of the Genesee river from that of Lake Erie. Lake Ontario, remaining open throughout the year, can not fail to temper somewhat the winter climate of the region as a whole.

It may be noted that Humphrey, in central Cattaraugus county, has a higher temperature than might be expected from its elevated position and the character of the surrounding country. This station belongs to the upper limit of the Ohio valley, and it seems possible that special climatic conditions may thus be introduced here. Southerly winds are found to occur at Humphrey more frequently that at adjacent stations to the northward; but whether these belong to a general system, or are merely local, must be decided by further observation.

The general equality of temperature over the eastern plateau is rather remarkable when the extent and irregular surface of the region are considered. The sea-level isotherms in the southeastern portion show the influence of the ocean to a small degree; but in fact this effect is masked by the high altitude and mountainous character of the section, excepting at Minnewaska, which overlooks the plains toward the southeast, and is fully exposed to air currents from that direction. Middletown, which occupies a sheltered position still further southward, may for climatic purposes be properly classed as a station of the Hudson valley, to whose influence it is mainly subject.

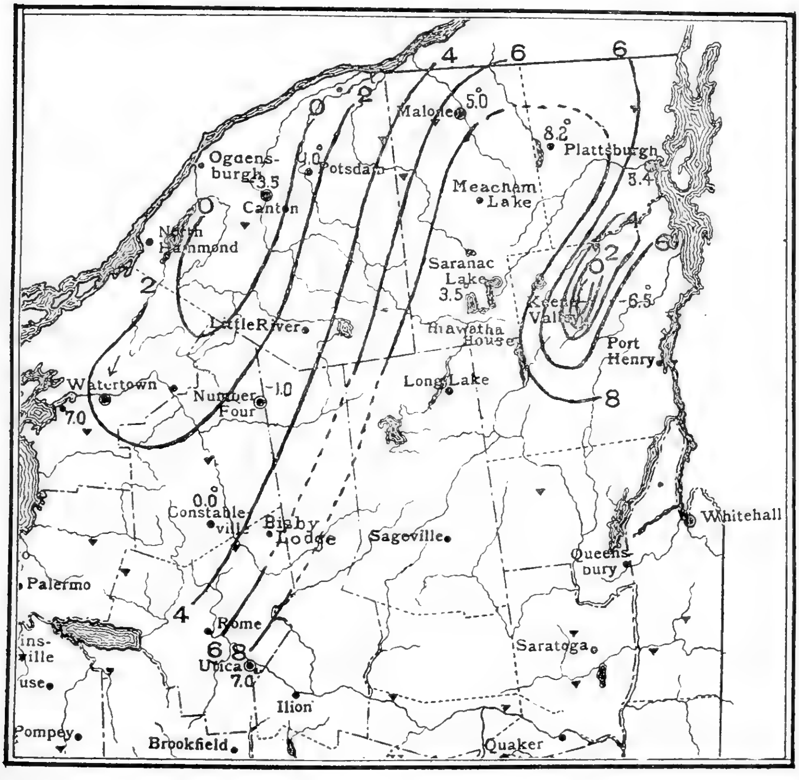
The narrow valleys of the highlands are found to vary but little in average temperature from the adjacent hills; while in case of the broader depressions more heat is gained during the day than is lost at night by the flow of cold air down the slopes. Thus the mean temperatures of Binghamton, Waverly, Elmira and Addison, in the main branches of the Susquehanna valley, are but little over a degree lower than those of the Central Lake region, although the difference is greater in the spring and fall, owing to the retarding influences of the lakes.

No statement can be made here as to the climate of the Catskill mountain region, owing to the lack of any adequate data.

The Adirondack Plateau is subject mainly to the same influences which determine the climate of the St. Lawrence valley, excepting that the central and eastern portions of the highlands are not reached by the lake winds. A very broken and heavily timbered surface offers great obstructions to the circulation of air currents, and hence the summer temperature, although the lowest in the State, is somewhat higher than would otherwise be, due to the elevation of the region.

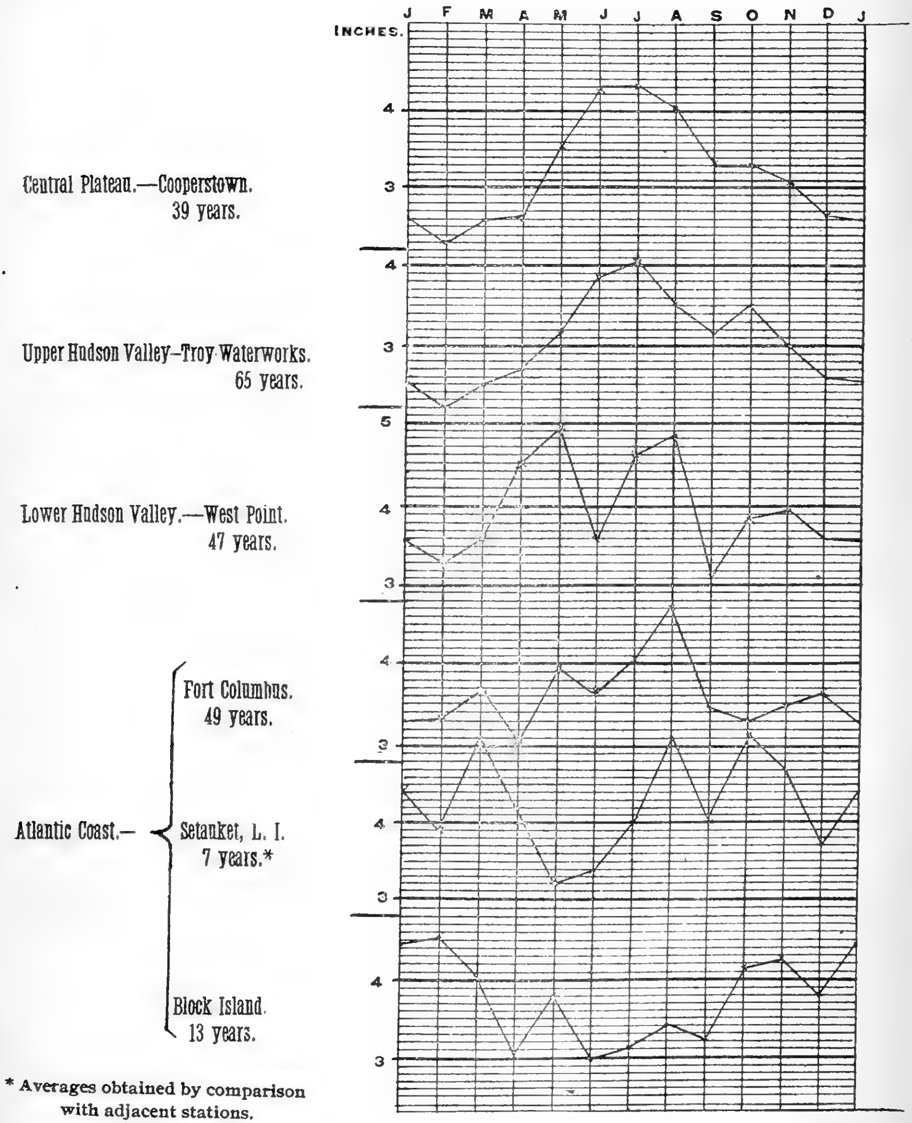
The normals given in the general table can not be considered to be fully established, depending as they do upon a few brief series of observations. If even approximately correct, however, they represent a true anomaly of temperature during the winter, since the average values at some of the mountain stations are then higher than those recorded at stations of the St. Lawrence Valley, more than a thousand feet below. In order to investigate more fully the existence of such a condition, several dates were selected when the region was subject to anticyclonic areas and their accompanying cold waves. An inversion of temperature was found to exist in a considerable number of cases, but most decidedly on December 8, 1890. The isotherms of the accompanying chart represent the average temperatures for that day in northern New York, as reduced to sea level by applying the factor 0.3 degrees for each 100 feet of elevation of the various stations, the accompanying figures showing the actual (unreduced) temperature at each station. Keene Valley, whose temperature (— 6.5 degrees) was the lowest of the series, is located at the bottom of a deep mountain valley or gorge in a position to receive the downfall of cold surface air from a large

INVERSION OF TEMPERATURE IN NORTHERN NEW YORK, DECEMBER 8th, 1890.



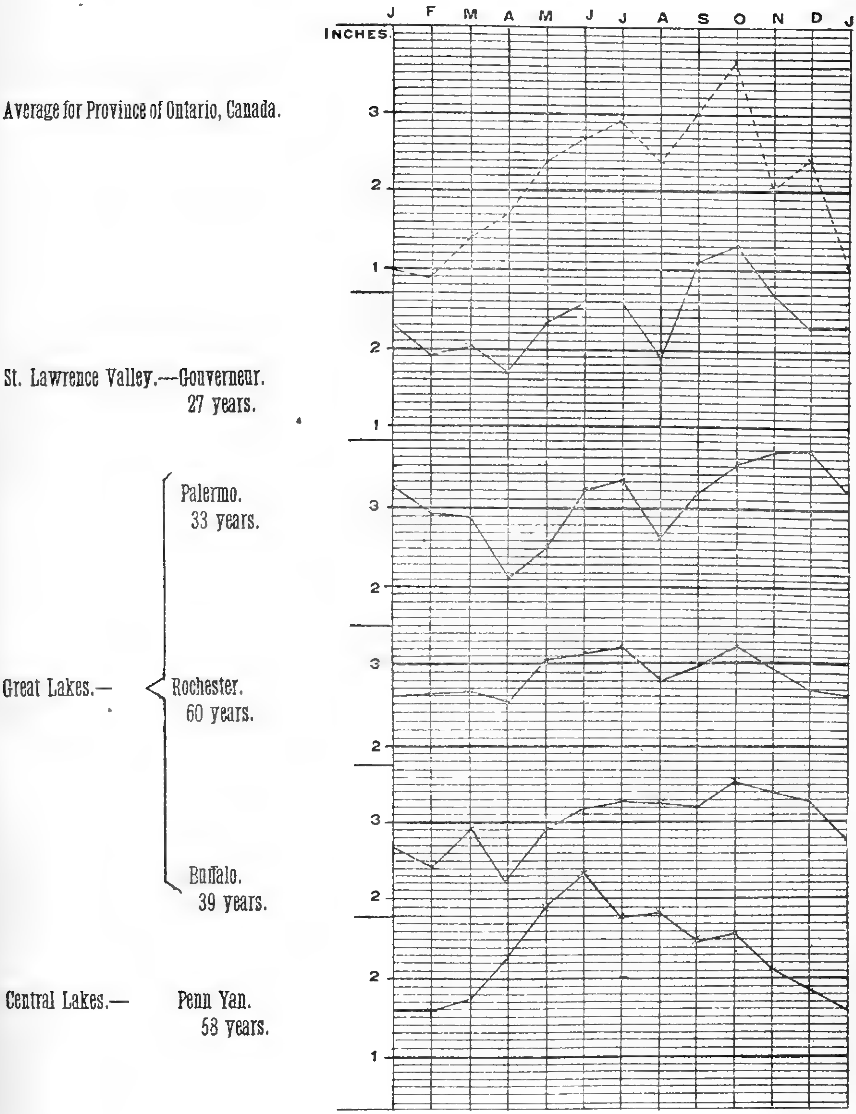
Isothermal Lines show the mean daily temperature as reduced to sea level by deducting 0.3° from the actual temperature for each 100 feet of elevation. Small figures show actual temperatures. [The mean temperature at Keene Valley was—6.5°.]

FLUCTUATIONS OF NORMAL RAINFALL. 1.

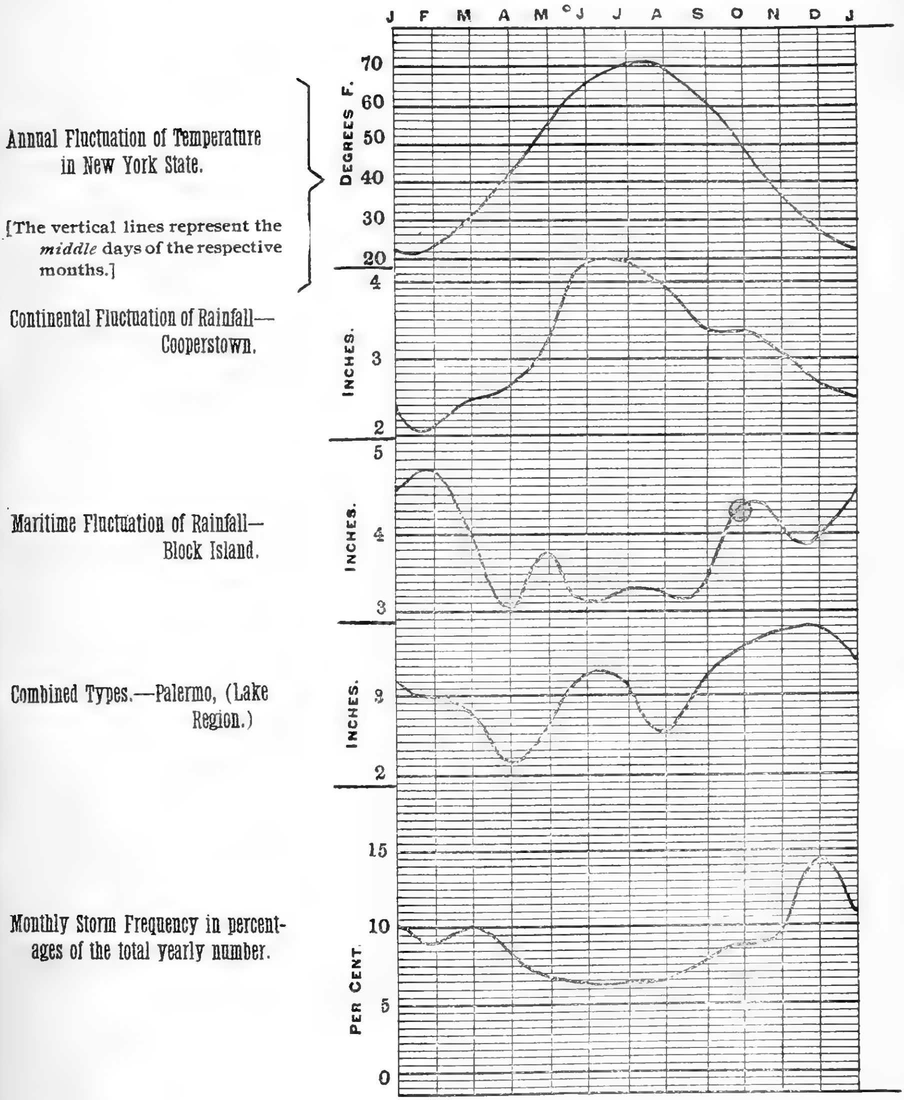


* Averages obtained by comparison with adjacent stations.

FLUCTUATIONS OF NORMAL RAINFALL. 2.



RELATION OF RAINFALL TO STORM FREQUENCY AND TEMPERATURE.



area in the vicinity. The distribution of temperature at the remaining stations, and especially at Canton, Lyon Mountain and Plattsburgh, is such as would be due to a rather rapid gain of warmth with increased elevation in the mass of the cold wave itself. Evidently, no very frequent recurrence of such a condition would be required to equalize the average monthly temperature of the valleys and highlands.

So far, then, as present records show, the whole of northern New York has substantially the same average winter temperature, excepting as certain deep valleys are subject to a local cooling through an accumulation of the colder and denser air. In summer the warmth of the highlands decreases at about 0.3 degrees per hundred feet of elevation above sea level; and the average temperature of the Adirondack region at that season is thus reduced to nearly the same value which obtains on the sea coast of northern Maine; the days, however, being warmer and the nights cooler than in the coast region.

The New England Green Mountains.—A third highland region of the State is that belonging to the system of the Green Mountains of New England, and extending over the New York border in Rensselaer, Columbia and northern Dutchess counties. The climate here appears to be colder than in the highlands of central New York at the same latitude, but no definite statements can be made, as observations representing this section are lacking at present. Some data which have been obtained upon frosts will be found on page 470.

TABLE

EXTREMES OF MONTHLY AND

Fort Columbus. Record

	January.		February.		March.		April.		May.		June.	
	Temperature, Deg. F.	Year.	Temperature, Deg. F.	Year.	Temperature, Deg. F.	Year.	Temperature, Deg. F.	Year.	Temperature, Deg. F.	Year.	Temperature, Deg. F.	Year.
		18—		18—		18—		18—		18—		18—
Warm months..	39.6	90	41.3	28	44.6	42	53.6	44, 71	66.6	80	74.6	25
	38.5	80	39.2	90	53.9	59	52.9	30, 68	64.9	26	74.1	31
	37.0	70	38.1	42	43.7	25	52.4	22, 65	63.8	29	74.0	65
	36.5	43	37.3	67	43.3	65	52.1	27	63.2	64	73.2	76
	26.4	89	37.2	34	43.2	72	52.0	29	62.1	87	73.1	80
Cold months....	*19.6	57	21.5	36	29.5	85	42.3	74	54.4	50	62.6	36
	22.5	56	22.5	68	30.3	43	43.3	57, 75	54.6	82	63.4	39
	23.8	40	23.1	85	30.8	56	43.7	52	55.0	49	64.5	37
	24.0	27	23.3	38	31.5	88	44.1	50	55.3	37	65.7	86
	24.2	67	23.9	55,56	31.1	72	44.3	36	55.9	68	65.8	81
Rochester. Record												
Warm months..	36.5	80	34.5	34	40.3	59	54.3	30	64.3	80	72.1	70
	32.7	90	34.1	57	40.1	78	52.7	33	62.4	87	71.4	54
	32.6	58	32.7	82	40.0	31	52.5	44	61.9	33	71.1	58
	31.6	38,43,76	32.2	40	39.8	42	52.4	78	61.7	81	70.1	53
	31.0	33	31.5	90	39.0	71	48.0	40	61.5	59	70.0	31, 76
Cold months....	15.0	57	13.7	85	20.0	85	35.4	74	49.0	67	60.2	39
	17.1	88	15.0	75	22.3	72	37.2	58	49.1	50	60.7	42
	17.4	56	16.4	38	23.3	43	38.6	57	50.2	82	61.1	81
	18.3	75, 84	17.4	55	24.0	83	38.9	75	51.1	49	61.5	62
	19.5	40	17.6	89	24.6	88	39.9	41, 50	51.3	61	61,9	47
Potsdam. Record of 21 Years, 1828–1848,												
Warm months..	27.0	43	28.9	28	35.3	45	56.2	39	62.4	48	70.5	70
	25.6	41	28.4	34	35.1	34	52.2	44	60.1	54	68.9	38
	24.7	55	25.1	40	34.8	46	51.1	30	60 0	43	68.8	41
	23.8	38	23.9	61	34.1	42	47.9	46	58.8	29	68.3	28
	22.8	28	23.8	67	33.6	38	45.8	40	58.5	55	67.8	31
Cold months....	7.4	37	9.5	38	16.2	73	37.0	41, 47	48.0	41	56.7	33
	8.6	40	11.0	33	21.5	63	37.4	68	49.3	42	59.6	42
	9.1	44	11.4	36	23.4	69	37.5	28	49.5	67	59.9	62
	10.6	54	11.7	68	24.1	70	37.7	62	49.6	61	60.0	69
	10.9	67	13.2	29	24,9	36	38.1	38	50.3	66	61.0	63
Burlington, Vt. Record												
Warm months..	29.9	80	28.4	40,77	35.9	78	49.5	44	64.9	87	70.7	84
	28.0	43	28.1	57	35.8	42,71	49.0	78	61.3	89	70.2	70
	26.9	89	26.7	72	35.4	59	48.4	86	61.0	79	70.0	83
	26.1	76	26.6	42	34.1	45	48.2	89	60.2	81	68.9	88
	25.5	90	26.0	51	33.9	46	47.7	46	60.1	80	68.3	76
Cold months....	9.9	44	11.8	68	19.3	85	33.5	74	49.2	66	61.1	63
	10.5	88	12.2	85	19.8	72	37.5	47,68,75	49.8	67	61.3	57, 63; 69, 82
	11 0	57	12.9	43	20.6	63	37.9	59	51.4	61	61.1	61
	11.2	65	13.8	75	22.4	83	38.5	54	51.5	58	61.4	53
	12.2	40, 67	14.3	49	22.6	69	38.9	62	51.6	49	61.8	49

EXTREME RANGES OF MONTHLY

	January.	February.	March.	April.	May.	June.
Fort Columbus..	20.0	19.8	15.1	11.3	12.2	12.0
Rochester.......	21.5	20.8	20.3	18.9	15.3	11.9
Potsdam and Gouverneur,..	20.2	19.4	19.1	19.2	14.4	13.8
Burlington, Vt..	20.0	16.6	16.6	16.0	15.7	9.8

* January, 1857, was the coldest month on record at Philadelphia and at New Bedford, Mass.; the

† The coldest July at Philadelphia since 1771.

6.

ANNUAL MEAN TEMPERATURES.

of 70 *Years*, 1822–1891.

July.		August.		September.		October.		November.		December.		Annual.	
Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.	Temperature. Deg. F.	Year.
	18—		18—		18—		18—		18—		18—		18—
81.3	25	76.8	63	74.5	77	61.5	79	51.1	30	41.3	29	54.4	25
78.8	30	76.5	28	73.2	81	59.6	60,61,81	48.6	70	41.1	89	54.0	28
78.4	22,68	76.4	31	71.1	65	59.1	22	48.4	22	40.4	52,91	54.0	30
78.2	76	76.2	77	71.0	22	57.8	30	48.2	46,49	40.2	81	53.6	65,80
77.3	72	76.0	45	70.2	84	58.6	78	46.7	81	39.3	48	53.5	78
69.5	37	67.9	36	60.7	35	45.9	36	38.2	23	22.2	31	47.2	36
70.8	84	68.6	37	62.2	37,71	50.3	88	38.8	73	25.9	76	49.2	37,75
71.4	88,91	69.8	35	63.0	87	50.8	76	39.2	42	27.4	51	49.6	35
72.2	46,71	70.4	24,55	63.4	48	51.6	69	39.4	75	28.3	80	49.9	56,68
72.3	40	70.6	33	63.8	52,59	51.9	41	39.7	27	28.4	35	50.0	88

of 62 *Years*, 1830–1891.

76.2	68	73.7	76	71.4	81	58.0	79	46.7	49	36.5	89	49.8	78
74.9	56	73.0	64	66.4	65	54.7	31	46.6	30	36.2	81	49.2	30
74.3	78	72.3	81	66.0	91	54.1	39	42.7	46	36.1	77,91	49.1	54
74.2	87	71.6	53	65.7	46,74	54.0	82	42.3	55,58	34.6	52	48.8	77,80
74.1	38	71.4	77	65.0	84	53.6	71	42.2	50	34.4	48	48.7	46,81,91
65.4	84	62.5	66	56.2	48	41.4	36	27.0	73	16.2	31	43.8	85
65.5	43	63.3	36	56.3	60	43.8	38,89	32.1	38	18.5	67	44.1	36
65.6	60	64.3	85	56.7	35,71	44.1	88	33.0	39	19.7	76	44.2	75
66.8	41	65.5	39	57.0	71	44.5	41	33.1	71	20.5	72	44.5	88
96.9	42	65.8	69	57.2	63	45.1	69	33.7	75,80	22.6	86	45.0	38

and Gouverneur, Record of 13 *Years*, 1861–1873.

74.2	68	70.4	45,54	63.0	46	52.0	35	40.4	30	32.1	29	46.0	28
73.6	38	70.3	40	62.2	55,65	49.7	39	39.8	46	28.8	48	45.8	46
73.0	40	69.0	38	60.4	41	49.5	54	38.9	28	28.4	47	45.7	48,54
72.6	55	68.4	28,47	60.3	34,69	49.1	29	38.1	66	26.4	30,73	45.4	39
71.3	47	67.6	67	59.7	54	48.2	55	38.0	47	26.1	43	44.7	30
63.3	33	60.5	33	51.4	71	36.9	36	25.1	73	11.7	72	40.8	36,62
64.3	62	61.8	61	53.1	42	40.4	41	26.1	71	12.2	31	41.4	37,61
64.4	61,71	62.5	36	53.8	48	41.6	43	29.0	27	14.5	67	41.5	68
64.5	43	62.8	69	54.0	29,35	41.7	65	30.0	43	14.7	35	42.0	67
65.9	29	63.8	73	54.2	68	41.8	68,69	30.5	41	15.4	45	43.0	66

of 52 *Years*, 1840–1891.

76.7	87	72.5	40	66.0	91	54.7	79	43.3	49	34.8	91	48.5	91
74.0	68	71.6	90	65.4	81	53.3	82	41.3	46	34.7	81	47.6	89
73.2	78	70.5	41,88,91	65.2	84	52.7	78	40.4	50	31.3	89	47.5	78
72.7	49	70.4	45	65.0	89	51.1	45,51	40.0	89	30.3	52	46.2	77
72.5	70	70.1	42	64.7	46	50.6	81	39.8	47,60,77	30.0	48	46.1	84
63.8	60,65	60.1	66	53.1	71	40.8	65	28.0	73	14.5	67	42.0	68
64.2	43	63.0	55	54.0	64	41.3	89	28.6	71	14.8	90	42.1	66
65.1	59	63.1	56	54.5	60	41.9	76	29.4	75,80	16.9	76	42.3	67
65.5	67	63.5	69,74	54.8	63	42.2	59	31.6	69	17.3	54	42.4	56,62
65.7	62	64.2	57	55.2	59	42.5	64	31.7	68	17.8	45	42.5	65

AND ANNUAL TEMPERATURE.

11.8	8.9	12.5	15.6	12.9	19.1	7.2
10.8	11.2	15.2	16.6	19.7	20.3	6.0
10.9	9.9	11.6	15.1	15.3	20.4	5.2
12.9	12.4	12.9	13.9	15.3	20.3	6.5

records of these stations extending over the past 75 and 78 years, respectively.

EXTREMES OF MONTHLY AND ANNUAL TEMPERATURE.

The accompanying table shows the warmest and coldest months and years which have occurred during a long period at four representative localities of the State.

At Fort Columbus, in New York harbor, the observations of the entire series have presumably been made under conditions which would not cause discrepancies exceeding a degree in the mean values, so that the differences shown may be attributed to actual variations of weather. At Rochester the records were kept by voluntary observers prior to 1871, and at the Weather Bureau station thereafter; but the normal derived from the two series do not differ by so much as 2 degrees for any month, while the variation for the year is but 0.3 degrees. There is some local variation between the conditions at Potsdam and Gouverneur, and a small percentage of the differences shown in the table may be attributed to this fact. The record at Burlington, Vt., has been maintained without change of method or exposure of instruments for fifty-two years. The thermometers, although selected with care, were not standardized, and it seems probable that an increase in the mean values for the summer months observable during the latter part of the record may be due in part to instrumental error.

In cases where the extreme values did not depart very widely from the averages, a considerable diversity was found even among adjacent stations as to the seasons of greatest heat and cold, and the best that could be done under these circumstances was to examine several records in each section of the State, selecting the dates in which there was substantial agreement. The values given for these dates are, however, those observed at the standard stations of the table, excepting in a few cases where these were found to be obviously in error, when the average was interpolated from adjacent stations.

It may be of interest to compare the extreme conditions in the vicinity of New York city with the normal temperature of quite different climates.

The warmest January at Fort Columbus=40 degrees.

The average January at Norfolk, Va.,=40 degrees.

The average January at Atlanta, Ga.,=43 degrees.
The average January at Jacksonville, Fla.,=55 degrees.
The average January at San Francisco, Cal.,=50 degrees.
The average January at Portland, Ore.,=38 degrees.
The average January at Paris, France,=36 degrees.
The average January at London, England,=38 degrees.
The coldest January at Fort Columbus,=20 degrees.
The average January at Portland, Me.,=20 degrees.
The average January at Chicago, Ill.,=25 degrees.
The average January at Milwaukee, Wis.,=19 degrees.
The average January at Spokane Falls, Wash.,=20 degrees.
The average January at Christiana, Norway,=23 degrees.
The average January at St. Petersburgh, Russia,=16 degrees.
The warmest July at Fort Columbus,=81 degrees or 79 degrees.
The average July at Baltimore, Md.,=79 degrees.
The average July at Jacksonville, Fla.,=83 degrees.
The average July at St. Louis, Mo.,=79 degrees.
The average July at Alexandria, Egypt,=80 degrees.
The average July at Madrid, Spain,=76 degrees.
The average July at Rome, Italy,=77 degrees.

Notes descriptive of seasons of extreme heat and cold which have occurred in the vicinity of New York are given in section V.

DAILY FLUCTUATIONS OF TEMPERATURE.

The following average daily amplitudes or ranges of temperature are given by Mr. A. McAdie in his work on "Mean Temperatures and their Corrections in the United States":

TABLE 7. DAILY AMPLITUDES OF TEMPERATURE.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Albany	7.0	8.0	8.4	12.2	14.2	13.6	14,6	14.4	14.4	11.2	7.1	5.5
New York city ..	6.8	7.5	9.5	11.0	11.2	11.5	11.0	10.2	10.0	9.8	8.2	6.7
Buffalo	3.8	4.8	5-8	7.9	9.0	8.1	8.0	10.3	9.9	7.3	5.4	3.7
Rochester	4.4	5.4	6.3	10.0	11.6	12.5	12.0	11.4	11.2	9.5	6.8	4.0

At each of the stations, with the exception of Albany, the daily amplitude is decreased by proximity to the Great Lakes or the ocean; the effect being most marked at Buffalo, where the prevailing winds come from the lake. The large percentage of cloudy weather which obtains in the Lake Region also tends to reduce the values at both Buffalo and Rochester, while New York city is less affected by this cause. The absence of large bodies of water near Albany, its position on the lower slopes of a broad valley, and a lesser degree of cloudiness than obtains in the Lake Region combine to make its range larger than at the three remaining stations.

But one determination of amplitude has been made for this State in addition to the above. This is for the station Mohawk, situated in the deeper portion of the Mohawk valley, and hence representing conditions somewhat different from those at any of the Weather Bureau stations. The amplitudes, as given by Schott, are:

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Deg. 7.2	Deg. 9.3	Deg. 10.5	Deg. 13.7	Deg. 16.1	Deg. 18.0	Deg. 15.1	Deg. 15.8	Deg. 14.9	Deg. 11.0	Deg. 6.5	Deg. 6.

The cloudiness is at a decided maximum in winter at Mohawk, and hence the range does not then differ greatly from that of Albany. The large range which obtains in summer is such as would be expected to result from the rapid heating of the quiet air of the valley during the day, alternating with a downflow of chilled air from the highlands at night.

As shown by McAdie's tables, the time of the maximum temperature at the Weather Bureau stations does not vary substantially from 3 p. m. during the year. At Mohawk the maximum occurs, by the tables, at 4 p. m. during April, May and June, and varies but little from 3 p. m. during the remainder of the year. For the State generally, the minimum temperature may be expected to occur at about the time of sunrise during the summer, and from one to two hours before sunrise in winter. At Mohawk, however, the lowest temperature is not reached until the time of sunrise in winter, owing to the later hour at which the rays of the sun penetrate into the valley.

Observations have recently been made within this State at a few stations located on hill or mountain tops, whose results as regards daily amplitude of temperature it would be of interest to compare with the foregoing. The records do not, however, much exceed a year in length, and hence can not give even approximately correct values of daily variations. The mean daily ranges are given herewith (page 452) for three of these stations, in connection with the values for the same months at points in adjacent valleys. These ranges are not, like the above, freed from the effects of unperiodic variations from day to day, and hence are much in excess of the true amplitudes, the excess, however, being approximately the same for the stations of each pair.

TABLE 8.

MEAN DAILY RANGES AT HILL AND VALLEY STATIONS.

STATIONS.	Altitude.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Feet.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Italy Hill	2,080	11.7	14.7	14.9	18.0	20.6	21.9	19.4	19.3	17.7	17.7	14.9	....
South Canisteo	1,340	17.0	17.0	18.4	23.3	30.7	29.4	25.7	24.5	26.3	23.5	19.3	....
Differences	740	5.3	2.3	3.5	5.3	10.1	8.5	6.3	5.2	8.6	5.8	4.4	....
Lyon Mountain	1,917	13.9	18.5	14.2	15.0	18.3	15.6	14.8	14.7	15.7	13.6	13.6	14.1
Plattsburg	150	17.9	19.5	17.5	19.1	21.7	20.1	17.2	16.0	19,0	16.1	14.8	15.0
Differences	1,767	4.0	1.0	3.3	4.1	3.4	4.5	2.4	1.3	3.3	2.5	1.2	0.9
Minnewaska	1,800	12.2	13.4	15.7	17.8	21.1	21.3	15.1	13.3	13.4	16.1	18.7	19.1
Honeymead Brook	425	16.2	16.1	15.8	23.8	24.5	21.7	21.2	19.0	18.2	18.3	18.4	17.4
Differences	1,375	4.0	2.7	0.1	6.0	3.4	0.4	6.1	5.7	4.8	2.2	—0.3	—1.7

The effect of the elevated position and open exposure of the hill tops in decreasing the daily range is here apparent.

For comparison with the above the following mean daily ranges at stations of the National Service are given, the means embracing the five-year period, 1881-1885.

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Albany....	15.8	16.1	13.9	16.8	17.5	17.9	16.7	16.7	16.3	16.2	13.1	12.9
Block Island	13.9	12.8	11.9	11.8	11.2	11.7	11.5	10.1	10.1	11.0	11.3	12.4

It will be seen that at Block Island the mean daily range owes its principal component to the irregular temperature changes which takes place from day to day, since the range is at its maximum during the months of greatest temperature variability, when, on the other hand, the small amplitude proper is at its minimum.

The fact that the instrument shelters at National Weather Bureau stations are located at a considerable distance from the ground (the average height in this State being over 100 feet) may in part explain the lesser range at these stations as compared with some of the values obtained by the State Bureau.

VALLEY WINDS AND INVERSIONS OF TEMPERATURE.

During clear nights, both in winter and summer, the ground loses heat rapidly by radiation, and the air, in contact with it, becoming cool and dense, flows down the slopes towards the lower levels of the valleys. In central Europe this phenomenon appears to be most noticeable in winter, being greatly strengthened by the intense anticyclonic conditions which often occur during that season; while in New York the rapid radiation which is necessary to the process is usually checked by clouded skies during the colder part of the year.

At Ithaca, in the Central Lake Region, the night wind usually commences from one to two hours after sunset, blowing from the south down the channels of the two principal streams flowing into Cayuga lake. At first a light breeze, it increases in force during the night and attains a maximum velocity probably not less than eight miles per hour. The current in the main valley at the head of the lake (as observed by means of small balloons) is from 50 to 100 feet in depth before midnight, and no doubt becomes greater before morning. This volume of cold air gradually increases until sufficient to overcome the heating effect of the lake waters, reaching the northern extremity of the valley toward morning.

The essential features of the night wind, as thus outlined, are common to all highland districts, although the contour of the land surfaces near Ithaca (and also the presence of the lake) give it rather unusual strength. As an additional instance, the case of Utica may be mentioned; the phenomenon being there more marked than would at first be expected from the character of the surrounding country. The relief map accompanying this report shows the valley to open both eastward and westward from Utica; the highlands, however, rising mainly towards the northeast and southeast of the city. The following observations upon the winds during the winters and summers of two years were found in the report of the Board of Regents (second series).

DIRECTION OF SEASONAL WINDS.	HOURS AND NUMBER OF OBSERVATIONS.		
	6 A. M.	2 P. M.	10 P. M.
In summer:			
Number of observations of easterly winds	116	44	47
Number of observations of westerly winds	93	160	59
In winter:			
Number of observations of easterly winds	97	93	77
Number of observations of westerly winds	81	127	108

The prevailing westerly winds at midday, while mainly due to the general atmospheric circulation, must be considerably strengthened by the updraught of air on the heated hill slopes. At night, when the motion of the upper currents is no longer imparted to the surface air by convectional action, the downflow from the hills proceeds unchecked; but, owing to the distance of the city from the highlands, the easterly wind does not become fully established there until after the evening observation, and is much more apparent in the early morning. The large percentage of cloudiness in winter evidently tends to decrease the frequency of easterly winds at that season.

The valley winds have a considerable climatic importance, since they bring a cool and refreshing air at night which is not felt on the plains or upper hill slopes. Also, in the autumn and winter the same condition gives earlier frosts and lower nocturnal temperatures in the valleys than obtain on the hills or plains, as long as the skies remain clear.

The following temperature readings were obtained at hill and valley stations of central New York during the clear weather accompanying anticyclonic conditions in January and February, 1892:

LOCATION.	Altitude.	TEMPERATURE (FAHRENHEIT).														
		JANUARY 9.			JANUARY 10.			JANUARY 20.			JANUARY 21.			FEBRUARY 6.		
		Max.	Min.	Range.	Max.	Min.	Range.	Max.	Min.	Range.	Max.	Min.	Range.	Max.	Min.	Range.
	Feet.															
Oxford (Hill)	1,250	21	4	17	17	— 8	25	11	—24	35	21	—10	31	22	— 3	25
Brookfield (Va.) ..	1,350	24	—3	27	17	—16	33	6	—28	34	21	—17	38	30	—16	46

NOTE.—The rapid rise of the general surface of the eastern plateau brings the valley bottom at Brookfield above the level of Oxford. The distance between the stations is about thirty miles.

The inversion of temperature which occurred in northern New York on December 8, 1891, has already been described (page 444). In that case there was apparently a cold stratum of surface air and a slight increase of temperature with vertical height within the mass of the anticyclone itself. Such a condition must be less likely to occur south of Lake Ontario, as the surface air for the time being loses its intense cold in passing over the water.

TABLE

RECORDS OF MAXIMUM

YEAR.	Atlantic Coast.						Hudson Valley.				Eastern Plateau.				Central Lakes.		Western Plateau.	
	Fort Columbus.		Central park, New York.		New York City.		Bangall or Honeymead Brook.		Albany.		Pompey.		Hamilton.*		Ithaca.		Humphrey.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1820	....	....	....	....	....	....	....	....	100	—5	..	....	....	....	....	....	....	....
1821	....	....	....	....	....	....	....	....	93	—14	..	....	....	....	....	....	....	....
1822	100	—1	....	....	....	....	....	....	90	—14	..	....	....	....	....	....	....	....
1823	91	3	....	....	....	....	....	....	94	—6	..	....	....	....	....	....	....	....
1824	96	2	....	....	....	....	....	....	89	—3	..	....	....	....	....	....	....	....
1825	104	—3	....	....	....	....	....	....	98	—6	..	....	....	....	....	....	....	....
1826	97	—1	....	....	....	....	....	....	93	—12	90	—13	....	....	....	....	....	....
1827	96	6	....	....	....	....	....	....	91	—18	90	—14	93	—20	96	—2	....	....
1828	99	9	....	....	....	....	....	....	96	—2	90	—1	95	—20	96	8	....	....
1829	95	7	....	....	....	....	....	....	92	—10	88	—11	93	—20	....	....	....	....
1830	98	5	....	....	....	....	....	....	97	—12	90	—11	95	—20	96	—1	....	....
1831	89	8	....	....	....	....	....	....	94	—10	85	—5	96	—23	....	....	....	....
1832	97	1	....	....	....	....	....	....	91	—11	87	—16	....	....	....	....	....	....
1833	94	8	....	....	....	....	....	....	91	—10	84	—9	94	—24	98	—4	....	....
1834	94	6	....	....	....	....	....	....	96	—3	..	....	93	—14	....	....	....	....
1835	89	—1	....	....	....	....	....	....	89	—23	85	—18	92	—34	98	—12	....	....
1836	89	0	....	....	....	....	....	....	93	—16	87	—16	95	—28	94	—18	....	....
1837	86	10	....	....	....	....	....	....	90	—12	86	—10	....	..	92	—10	....	....
1838	94	13	....	....	....	....	....	....	96	—6	91	—12	....	....	95	—8	....	....
1839	86	6	....	....	....	....	....	....	92	—12	89	—13	90	—25	91	—12	....	....
1840	90	2	....	....	....	....	....	....	96	—23	89	—18	....	....	98	—14	....	....
1841	92	9	....	....	....	....	....	....	96	—12	90	—5	....	....	....	....	....	....
1842	85	16	....	....	....	....	....	....	91	—5	89	—9	88	—16	90	2	....	....
1843	93	9	....	....	....	....	....	....	93	—14	88	—8	96	—15	94	—6	....	....
1844	92	3	....	....	....	....	....	....	86	—12	..	....	90	—15	94	—1	....	....
1845	99	6	....	....	....	....	....	....	97	—11	..	....	92	—13	97	—4	....	....
1846	95	5	....	....	....	....	....	....	97	—11	..	....	93	—16	97	—7	....	....
1847	94	12	....	....	....	....	....	....	90	—6	..	....	92	—12	99	—7	....	....
1848	91	3	....	....	....	....	....	....	93	—15	..	....	93	—21	94	—4	....	....
1849	94	0	....	....	....	....	....	....	93	—10	..	....	94	—18	....	....	....	....
1850	94	9	....	....	....	....	....	....	91	—10	..	....	....	....	....	....	....	....
1851	93	4	....	....	....	....	....	....	90	—9	..	....	....	....	....	....	....	....
1852	93	—2	....	....	....	....	....	....	93	—7	..	....	....	....	95	—1	....	....
1853	98	9	....	....	....	....	....	....	91	2	..	....	....	....	....	....	....	....
1854	93	5	....	....	....	....	....	....	94	—11	..	....	....	....	....	....	....	....
1855	92	—6	....	....	....	....	....	....	94	—15	..	....	....	....	....	....	....	....
1856	95	—6	....	....	....	....	....	....	96	—9	..	....	....	....	....	....	....	....
1857	91	—5	....	....	....	....	....	....	92	—19	..	....	....	....	....	....	....	....
1858	93	8	....	....	....	....	....	....	96	—3	..	....	....	....	....	....	....	....
1859	92	—3	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1860	91	0	....	....	....	....	....	....	85	—14	..	....	....	....	....	....	....	....
1861	92	—7	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1862	91	9	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1863	93	3	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1864	99	4	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1865	91	3	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1866	....	—12	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1867	89	5	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1868	92	—1	A.	A.	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1869	92	8	94	6	....	....	....	....	....	....	..	....	....	....	....	....	....	....
1870	96	10	94	9	A.	A.	....	....	....	....	..	....	....	....	....	....	....	....
1871	87	—3	92	—2	91	—1	....	....	....	....	..	....	....	....	....	....	....	....
1872	97	3	95	3	94	2	....	....	....	....	..	....	....	....	....	....	....	....
1873	95	—2	94	—1	94	—4	....	....	A.	A.	..	....	....	....	....	....	....	....
1874	98	....	98	3	93	4	....	....	92	—16	..	....	....	....	....	....	....	....
1875	92	—5	93	—3	95	—6	....	....	90	—18	..	....	....	....	....	....	....	....
1876	102	5	98	3	99	—2	....	....	93	—5	..	....	....	....	....	....	....	....
1877	97	9	92	10	93	6	....	....	92	—7	..	....	....	....	....	....	....	....
1878	98	7	94	7	91	9	....	....	92	—18	..	....	....	....	A.	A.	....	....
1879	97	—2	98	—4	94	—3	....	....	91	—8	..	....	....	....	93	—8	....	....
1880	95	—5	96	—6	94	—6	....	....	92	—10	..	....	....	....	94	—12	....	....
1881	95	3	101	—3	100	1	....	....	92	—10	..	....	....	....	96	—10	....	....
1882	95	—3	93	—6	93	—1	....	....	92	—14	..	....	....	....	44	—15	....	....
1883	90	3	95	—1	90	4	....	....	94	—8	..	....	....	....	91	—8	88	....
1884	92	—3	91	—3	92	1	95	—13	92	—16	..	....	....	....	93	—20	90	—15
1885	95	0	99	—2	96	0	91	—19	97	—10	..	....	....	....	96	—13	90	—24
1886	90	—3	94	—4	90	—2	97	—8	97	—11	..	....	....	....	96	—11	90	—14
1887	95	5	96	4	94	6	93	—18	95	—15	..	....	....	....	95	—12	95	—5

9.

AND MINIMUM TEMPERATURES.

Great Lakes.												St. Lawrence Valley.				Champlain Valley.			
Erie, Pa.		Buffalo.		Rochester.		Oswego.		Pierrepont Manor.		Madison Barracks.		Gouverneur.		Potsdam.		Plattsburgh Barracks.		Burlington, Vermont.	
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	95	—13	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	89	—23	....	....	....	....
....	....	....	....	98	—5	....	....	....	....	....	....	....	....	90	—27	....	....	....	....
....	....	....	....	....	—5	....	....	....	....	....	....	95	—27	93	—20	....	....	....	....
....	....	....	....	....	—6	....	....	....	....	....	....	98	—30	89	—29	....	....	....	....
....	....	....	....	91	2	....	....	....	....	....	....	90	—32	85	—27	....	....	....	....
....	....	....	....	93	2	....	....	....	....	....	....	98	—27	93	—22	....	....	....	....
....	....	....	....	89	—6	....	....	....	....	....	....	92	—40	90	—30	....	....	....	....
....	....	....	....	90	—8	....	....	....	....	....	....	....	....	90	—28	....	....	....	....
....	....	....	....	91	—4	....	....	....	....	....	....	....	....	86	—28	....	....	....	....
....	....	....	....	98	1	....	....	....	....	....	....	93	—30	96	—24	....	....	....	....
....	....	....	....	88	—2	....	....	....	....	....	....	86	—26	94	—17	....	....	....	....
....	....	....	....	94	—2	....	....	....	....	....	....	93	—40	94	—34	100	—24	94	—16
....	....	....	....	96	—3	....	....	....	....	....	....	94	—27	89	—16	91	—16	89	—11
....	....	....	....	91	—5	....	....	....	....	....	....	100	—24	91	—20	85	—16	90	—10
....	....	....	....	92	—6	....	....	....	....	....	....	95	—23	90	—12	89	—14	95	—12
....	....	....	....	89	—2	....	....	....	....	....	....	94	—28	85	—28	87	—18	82	—22
....	....	....	....	102	0	....	....	....	....	....	....	99	—30	91	—20	92	—16	86	—13
....	....	....	....	96	1	....	....	....	....	....	....	98	—32	94	—22	....	—14	87	—10
....	....	....	....	95	0	....	....	....	....	....	....	....	—22	95	—18	93	—14	88	—10
....	....	....	....	94	0	....	....	....	....	....	....	96	—38	92	—27	90	—17	90	—25
....	....	....	....	95	—9	....	....	B.	B.	....	....	....	....	....	....	98	—20	88	—14
....	....	....	....	94	—1	....	....	93	—12	....	....	....	....	....	....	94	—14	87	—20
....	....	....	....	....	....	....	....	97	—18	....	....	....	....	....	....	95	—18	93	—18
....	....	....	....	94	—7	....	....	94	....	....	....	....	....	....	....	92	—21	88	—12
....	....	....	....	....	....	....	....	96	—10	....	....	....	....	....	....	....	....	87	—8
....	....	....	....	....	....	....	....	97	—18	....	....	97	—36	....	....	....	....	90	—19
....	....	....	....	....	....	92	—22	93	—32	....	....	90	—44	....	....	....	....	90	—24
....	....	....	....	96	—6	92	—11	95	—23	....	....	....	....	....	....	....	—16	93	—16
....	....	....	....	91	—13	93	—18	92	—30	....	....	....	....	....	....	....	....	89	—26
....	....	....	....	94	2	....	....	89	—11	....	....	....	....	....	....	....	....	95	—19
....	....	....	....	94	—10	86	—18	88	—27	....	....	....	....	....	....	....	....	95	—30
....	....	....	....	93	—4	....	....	92	—23	87	—21	....	—20	....	....	....	....	89	—12
....	....	....	....	94	—14	85	—13	87	—27	85	—46	87	—38	....	....	....	....	86	—32
....	....	....	....	93	2	37	—1	92	—8	88	—21	90	—22	....	....	....	....	94	—10
....	....	....	....	91	—2	94	—14	90	—20	93	—34	91	—24	....	....	....	....	88	—27
....	....	....	....	94	—4	90	—19	94	—24	92	—24	95	—27	....	....	....	....	94	—18
....	....	....	....	92	—2	86	—11	93	—15	89	—49	92	—29	....	....	....	....	88	—18
....	....	....	....	96	—10	88	—15	91	—29	88	—30	90	—28	....	....	....	....	91	—25
....	....	....	....	91	1	90	—10	91	—13	88	—32	88	—25	....	....	....	....	92	—13
....	....	....	....	93	—4	90	—8	94	—26	....	....	98	—28	....	....	....	....	96	—14
....	....	....	....	86	—5	82	4	83	—21	....	....	82	—18	....	....	....	....	86	—8
....	....	....	....	92	6	85	1	89	—13	92	—18	90	—20	....	....	....	....	90	—18
....	....	....	....	....	....	90	—12	87	—30	94	—44	88	—40	....	....	....	....	90	—18
		B.	B.	B.	B.	B.	B.												
....	....	90	—1	94	—3	92	—11	....	....	95	—36	91	—30	....	....	....	....	90	—14
B.	B.	86	—3	88	—12	90	—4	....	....	94	—25	86	—28	....	....	....	....	85	—12
93	8	87	2	96	—5	94	—2	....	....	92	—34	....	....	....	....	....	....	91	—12
91	—16	85	—13	94	—12	98	—14	....	....	96	—35	....	....	....	....	....	....	87	—18
90	—4	88	0	92	—1	98	—2	....	....	96	—25	....	....	....	....	....	....	91	—14
91	2	89	0	90	—4	89	—9	....	....	....	....	....	....	....	....	....	....	87	—16
94	9	92	3	94	0	100	—3	....	....	95	—26	....	....	....	....	....	....	94	—16
92	—11	89	—2	91	—4	94	—7	....	....	83	—30	....	....	....	....	....	....	89	—16
90	—11	85	—9	92	—8	93	0	....	....	92	—30	....	....	....	....	....	....	89	—10
93	—11	91	—7	98	—2	97	—3	....	....	94	—41	....	....	....	....	....	....	90	—16
89	—2	85	—5	88	—7	92	—13	....	....	88	—8	....	....	....	....	....	....	94	—24
92	—7	84	—6	84	—6	98	—6	....	....	90	—18	....	....	....	....	....	....	89	—20
89	—10	88	—14	92	—10	93	—18	....	....	90	—29	....	....	....	....	....	....	93	—20
90	—12	87	—13	95	—11	90	....	....	....	90	—30	....	....	....	....	....	....	88	—20
90	—11	87	—12	91	—6	89	—17	....	....	87	—32	....	....	....	....	....	....	90	—23
94	—4	94	—2	91	—5	90	—10	....	....	94	—36	....	....	....	....	....	....	93	—19

TABLE

RECORDS OF MAXIMUM

YEAR.	ATLANTIC COAST.						HUDSON VALLEY.				EASTERN PLATEAU.				CENTRAL LAKES.		WESTERN PLATEAU.	
	Fort Columbus.		Central Park, New York.		New York City.		Bangall or Honeymead Brook.		Albany.		Pompey.		Hamilton.*		Ithaca.		Humphrey.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1888	94	0	96	0	96	2	96	—14	92	—10	..	....	....	....	96	—15	90	—12
1889	91	1	91	3	90	2	92	— 4	92	— 5	..	....	....	....	92	—12	87	—16
1890	91	8	98	7	95	6	92	— 7	98	— 4	..	....	....	....	95	— 3	92	— 4
1891	97	10	98	9	94	9	92	0	95	— 5	..	....	....	....	92	— 2	92	— 1
Means	94	3	95	1	94	1	94	—10	§93	§11	88	—11	93	—20	†94	†11	90	—11
Extremes	104	—12	101	—6	100	—6	97	—19	§98	§18	91	—18	96	—34	†96	†20	95	—24

* In the town of Hamilton, Madison Co., to be distinguished from the station Hamilton College of and extremes derived from second series, 1860–1873. § Means and extremes derived from second following were obtained from self-registering instruments, and under standard conditions, B Rec

9 — (*Concluded*).

AND MINIMUM TEMPERATURES.

GREAT LAKES.												ST. LAWRENCE VALLEY.				CHAMPLAIN VALLEY.			
Erie, Pa.		Buffalo.		Rochester.		Oswego.		Pierrepont Manor.		Madison Barracks.		Gouverneur.		Potsdam.		Plattsburgh Barracks.		Burlington, Vermont.	
Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
88	— 8	86	— 8	95	— 8	89	—10	....	....	91	—19	....	....	....	....	....	....	87	—23
89	—10	89	—10	92	— 9	90	— 5	....	....	92	—26	....	....	....	....	....	....	89	—18
94	2	89	7	95	— 6	93	0	....	....	100	—19	....	....	....	....	....	....	91	—12
89	0	90	4	94	6	90	1	....	....	92	—11	....	....	....	....	....	....	94	— 5
90	— 5	88	— 4	‖92	‖6	‖93	‖— 7	92	—20	92	—23	‡90	‡—27	91	—23	92	—17	90	—17
94	—16	94	—14	‖96	‖12	100	‖—18	97	—32	100	—46	‡95	‡—40	96	—34	100	—24	96	—32

the general tables. †Means and extremes derived from second series, 1879–1891. ‡Means series, 1874–1891. ‖Means and extremes derived from second series, 1872–1881. A Records ords from self-registering instruments.

MAXIMUM AND MINIMUM TEMPERATURE.

Table 9 presents the statistics of temperature during long periods at several points representing the prominent climatic region of New York, and also exhibits the highest and lowest values which have been recorded in the State.

The accuracy of the maximum temperatures (excepting as marked with the reference A) can not be vouched for, especially as regards the records kept prior to the establishment of Signal Service standards and methods in 1870. Maxima of 100 degrees or more within this State are to be accepted with caution. Even in cases where the values appear to be systematically too high, however, they may give relative results of value when compared with others of the same series.

While a slight defect in the exposure of the thermometer may cause too high a maximum reading, the minimum reading is not likely to be too low excepting as the result of defects in the scale of the instrument; and hence the minimum values given in the table are subject to less error than the maxima. The lowest value (–46 degrees) does not appear improbable, in view of the minimum of –35 degrees obtained under standard conditions in 1889. Mercury is several times reported to have been frozen at points not usually so subject to extreme cold as the station in question. (See page 504.) The lowest temperatures in New York have thus for been obtained near the upper limit of the St. Lawrence valley, between the north eastern shore of Lake Ontario and the Adirondack highlands. Owing to the fact that the instruments of Weather Bureau stations are usually located on the roofs of high buildings, such stations are not credited, in table 9, with the standard conditions of exposure used by the stations of the State service.

In table 10 will be found the maxima and minima observed at a large number of stations provided with the standard thermometers of the National and State Weather Bureaus. Although the observations extend over only four years, the results are valuable for purposes of comparison. The maxima in a few cases appear to be affected by an imperfect exposure of the thermometers.

TABLE 10.

MAXIMUM AND MINIMUM TEMPERATURES DURING FOUR YEARS, 1889–1892.

STATIONS.	Counties.	1889.		1890.		1891.		1892.*		REMARKS.	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Elevation above tide.	Situation of Station.
Western Plateau.										*Feet.*	
Alfred Centre	Allegany	......	......	90	—6	88	—10	92	—9	1,824	Valley.
Angelica	Allegany	89	—22	91	—14	......	—14	92	—22	1,340	Valley.
Humphrey	Cattaraugus	89	—16	92	......	92	—1	90	—8	1,950	Hill.
Mt. Morris	Livingston	......	......	......	......	98	1	95	—11	525	Valley.
Lockport	Niagara	......	......	93	......	93	0	92	—3	616	Plain.
Wedgewood	Schuyler	93	—12	97	1	......	......	96	—6	1,350	Hill.
Addison	Steuben	......	......	......	......	95	0	94	—14	1,000	Slope.
South Canisteo	Steuben	90	—12	93	—7	92	—10	93	—14	1,480	Valley.
Arcade	Wyoming	......	......	......	......	86	—9	89	—18	1,557	Slope.
Italy Hill	Yates	......	......	......	......	90	1	......	......	2,080	Hill.
Eastern Plateau.											
Binghamton	Broome	......	......	......	......	93	—4	94	—17	870	Valley.
Oxford	Chenango	......	......	89	—14	90	—8	88	—24	1,250	Hill.
South Kortright	Delaware	......	—14	98	—20	92	—14	94	—12	1,700	Valley.
Brookfield	Madison	......	......	94	—15	91	—15	95	—28	1,350	Valley.
Port Jervis	Orange	......	......	92	—1	94	1	94	—4	470	Valley.
Cooperstown	Otsego	86	—15	88	—15	87	—2	90	—18	1,300	Valley, near lake.
Quaker Street	Schenectady	......	......	90	—7	90	—6	93	—12	973	Hill.
Perry City	Schuyler	91	—14	97	—8	93	—9	94	—15	1,028	Valley.
Middleburgh	Schoharie	94	—22	96	—11	......	......	......	......	640	Valley.
Waverly	Tioga	89	—13	93	—15	95	—2	97	—19	825	Valley.
Minnewaska	Ulster	94	—22	......	......	95	—2	93	—11	1,800	Hill.
Northern Plateau.											
Constableville	Lewis	89	—25	89	—14	89	—18	......	—24	1,246	Slope.
Number Four	Lewis	88	—27	87	—17	86	—19	88	—23	1,571	Hill.
Turin	Lewis	......	......	......	......	87	—16	86	—17	1,240	Slope.
Keene Valley	Essex	......	......	......	—17	......	—12	......	......	1,015	Valley.
Lyon Mountain	Franklin	......	......	......	......	85	—15	......	—9	1,917	Slope.
Saranac Lake	Franklin	......	—34	......	......	......	......	......	......	1,540	Valley, near lake.
Coast Region.											
New York City	New York	90	2	95	6	94	9	96	8	164	Plain.
Setauket	Suffolk	88	—5	91	8	93	12	94	6	40	Hill near L. I. Sound.
Block Island, R. I.	......	81	2	85	10	85	9	88	3	27	

MAXIMUM AND MINIMUM TEMPERATURES DURING FOUR YEARS, 1889-1892 — (*Concluded*).

STATIONS.	Counties.	1889.		1890.		1891.		1892.*		REMARKS.	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Elevation above tide.	Situation of station.
Hudson Valley.										*Feet.*	
Albany	Albany	92	—5	98	—4	95	—5	96	—5	85	Valley.
Bangall or Honeymead Brook	Dutchess	92	—4	92	......	92	0	92	—4	425	Slope.
Poughkeepsie	Dutchess	......	......	......	......	99	—7	98	—11	180	Slope.
Carmel	Putnam	......	......	......	......	97	1	93	0	500	Valley.
Mohawk Valley.											
Utica	Oneida	100	—23	95	—10	92	—3	93	—26	537	Valley.
Ilion	Herkimer	93	—20	......	......	......	......	......	......	480	Valley.
Champlain Valley.											
Plattsburgh	Clinton	......	......	92	—12	91	—9	98	—10	150	Valley, near lake.
Burlington, Vt	Chittenden	89	—18	91	—12	94	—5	......	......	....	Hill, near lake.
St. Lawrence Valley.											
Malone	Franklin	......	......	......	......	89	—11	87	—13	810	Hill.
Madison Barracks	Jefferson	92	—26	100	—19	92	—11	......	—31	266	Valley, near lake.
Canton	St. Lawrence	92	—35	95	—16	93	—15	......	—31	304	Plain.
North Hammond	St. Lawrence	94	—22	......	......	......	......	91	......	340	Plain.
Potsdam	St. Lawrence	90	—26	93	......	93	—15	......	......	300	Plain.
Great Lakes.											
Buffalo	Erie	89	—10	89	7	90	4	84	—2	690	Plain, near lake.
Rochester	Monroe	92	—9	95	—6	94	6	94	—3	621	Plain.
Hess Roads Station	Niagara	91	—9	97	2	90	2	92	0	330	Plain.
Baldwinsville	Onondaga	......	......	......	......	96	0	99	—17	390	Plain.
Oswego	Oswego	90	—5	93	0	90	1	91	—3	304	Slope, near lake.
Palermo	Oswego	89	—9	94	6	96	—6	95	—18	460	Slope.
Lyons	Wayne	92	—2	93	5	93	7	92	0	407	Slope.
Erie, Pa	Erie	......	......	94	2	89	0	90	2	681	
Central Lakes.											
Fleming	Cayuga	98	—4	96	3	94	0	92	—5	1,000	Plain.
Geneva	Ontario	96	—12	99	0	98	2	97	—8	459	Slope.
Ithaca	Tompkins	92	—12	96	—3	92	—2	97	—6	840	Slope.

* Minima for January and February only.

An unbroken record of temperature has been kept at Cooperstown, N. Y., since 1842; a standard thermometer favorably exposed being used after 1853. Mr. G. Pomeroy Keese, the observer, gives, as the highest temperature of the entire period, 96 degrees on July 3, 1868, and as the lowest, –30 degrees on February 7, 1855, and January 24, 1857.

VARIABILITY OF TEMPERATURE.

This important climatic element may be measured by the average difference which obtains between the mean temperature of successive days, a method which eliminates the nearly constant diurnal variation. General A. W. Greely gives in "American Weather" the values thus derived for representative stations in New York and other States during January, the month which in most cases has the maximum variability:

TABLE 11. VARIABILITY OF TEMPERATURE.

For the Great Lake Region the mean variability in January is 7.4 degrees.

For the eastern central section the mean variability in January is 7.6 degrees.

For the Atlantic coast region the mean variability in January is 6.5 degrees.

During the same month the variability on the coast of California is 2 degrees; on the south Atlantic and Gulf coasts 6 degrees; in the central states of the Mississippi valley from 8 degrees to 9 degrees; and in the region of the upper Missouri valley from 9 degrees to 10 degrees. The greatest variability which has been found within the United States is 11 degrees at Portland, Me.

The following table exhibits the variability of temperature in various parts of the State in a somewhat different manner from the above:

TABLE 12.

DIFFERENCES BETWEEN THE MEAN TEMPERATURES OF CONSECUTIVE DAYS FOR AN AVERAGE WINTER MONTH.

STATION AND SECTION OF STATE.	DEGREES DIFFERENCE BETWEEN CONSECUTIVE DAYS.				
	Degrees. 5–10	Degrees. 10–15	Degrees. 15–20	Degrees. 20–25	Degrees. Over 25
	Number of times of occurrence per month.				
Canton (St. Lawrence Valley)	7.0	6.0	4.0	2.0	2.5
Hess Roads (Great Lakes)	11.0	5.0	2.5	0.5	0
Honeymead Brook (Lower Hudson Valley)	8.0	4 5	3.5	1.5	0
Setauket (Long Island)	10.9	6.0	2.0	0.5	0.2

These values are derived from a total of nine winter months observations at each station. A longer series might be expected to modify the averages somewhat, while changing the relative values but little. The mean values were, in each case, computed from tri-daily observations.

The most obvious feature shown here is the excess of large ranges in the St. Lawrence valley as compared with the remainder of the State. The tempering effect of the Great Lakes is lacking in that region; and moreover, there appears to be a general increase of variability in the direction of the Eastern Canadian Provinces.

A graphic representation of the variability of temperature in New York will be found in plate 1.

TABLE 13.

FROSTS.

STATION.	County.	Authority.	Period, years.	Last Killing Frost of Spring. Average date.	Last Killing Frost of Spring. Earliest date.	Last Killing Frost of Spring. Latest date.	First Killing Frost of Autumn. Average date.	First Killing Frost of Autumn. Earliest date.	First Killing Frost of Autumn. Latest date.
Western Plateau.									
Humphrey	Cattaraugus	C. E. Whitney	10	June 24	May 28	July 26	Sept. 24	Sept. 11	Oct. 7
Eastern Plateau.									
Cooperstown	Otsego	Weather Review, 1888	30	....	....	....	Sept. 27	Sept. 3	Oct. 22
Waverly or Factoryville	Tioga	Weather Review, 1888	20	....	....	....	Oct. 7	Aug 24	Oct. 30
Coast Region.									
New York City	New York	Signal Office Reports	18	April 13	March 15	May 27	Nov. 5	Oct. 7	Nov. 23
Hudson Valley.									
Albany	Albany	Signal Office Reports	18	April 13	....	....	Oct. 23	Sept. 26	Nov. 21
St. Lawrence Valley.									
North Hammond	St. Lawrence	C. A. Wooster	14	....	....	....	Oct. 10	Sept. 1	Nov. 13
Great Lakes.									
Oswego	Oswego	Signal Office Reports	18	April 24	March 26	May 27	Oct. 15	Aug. 28	Nov. 5
Palermo*	Oswego	E. B. Bartlett	33	....	....	....	Oct. 12	Sept. 21	Nov. 1
Rochester	Monroe	Signal Office Reports	18	May 5	April 11	May 27	Oct. 15	Sept. 26	Nov. 4
Buffalo	Erie	Signal Office Reports	18	April 30	March 30	May 29	Oct. 15	Sept 23	Nov. 12
Erie, Pa.	....	Signal Office Reports	18	April 23	March 26	May 7	Oct. 30	Oct. 5	Dec. 4
Amherst, Mass.	....	U. S. Weather Review, 1888	47	....	....	....	Sept. 20	Aug. 10	Oct. 8
Middletown, Conn	....	U. S. Weather Review, 1888	29	....	....	....	Oct. 2	Sept. 10	Oct. 22
Dyberry, Pa	....	U. S. Weather Review, 1888	26	....	....	....	Sept. 23	Aug. 30	Oct. 21

* The date, September 19th, given in the U. S. Weather Review, 1888, is that of first light frost. Date of first killing frost newly computed.

TABLE 14.

DATES OF FROST AS GIVEN IN REGENTS REPORT.

STATION.	County.	Period years.	First Killing Frost of Autumn. Average date.		Earliest date.		Latest date.	
Western Plateau.								
Dale or Middlebury	Wyoming	17	September	23	August	27	October	15
Prattsburg	Steuben	10	September	26	September	9	October	16
Eastern Plateau.								
Goshen	Orange	9	October	4	September	2	October	12
Montgomery	Orange	8	September	24	August	30	November	2
Hartwick	Otsego	13	September	22	August	3	October	21
Cherry Valley	Otsego	12	September	17	August	20	October	7
Oxford	Chenango	16	September	15	September	3	September	30
Cazenovia	Madison	19	September	13	August	3	October	3
Hamilton	Madison	15	September	11	August	2	October	13
Pompey	Onondaga	15	September	20	September	3	October	15
Onondaga	Onondaga	15	September	21	September	6	October	19
Homer	Cortland	17	September	29	August	3	October	16
Northern Plateau.								
Johnstown	Fulton	13	September	18	September	2	October	12
Fairfield	Herkimer	18	September	13	August	28	October	12
Lowville	Lewis	17	September	16	....		....	
Coast Region.								
East Hampton	Suffolk	15	October	20	September	28	November	27
Flatbush	Kings	24	October	4	September	13	October	26
Jamaica	Queens	24	September	29	September	2	October	28
Mt. Pleasant	Westchester	9	September	28	August	3	November	3
North Salem	Westchester	19	September	19	August	3	October	11
Hudson Valley.								
Newburgh	Orange	15	October	9	September	23	October	23
Kingston	Ulster	15	September	28	September	9	October	17
Poughkeepsie	Dutchess	14	October	1	September	10	October	16
Hudson	Columbia	17	October	6	September	10	October	20
Kinderhook	Columbia	16	September	22	September	1	October	9
Albany	Albany	19	October	9	September	9	October	28
Cambridge	Washington	8	September	27	August	24	October	13
Salem	Washington	9	September	21	September	8	October	1
Granville	Washington	12	September	27	September	12	October	26
St. Lawrence Valley.								
Potsdam	St. Lawrence	22	September	7	August	4	October	7
Gouverneur	St. Lawrence	12	September	16	August	24	October	1
Great Lakes.								
Auburn	Cayuga	20	September	30	August	4	October	28
Rochester	Monroe	18	September	26	September	11	October	24
Lewiston	Niagara	17	September	25	August	3	October	11
Fredonia	Chautauqua	16	September	29	August	28	October	25

FROSTS.

Table 13 exhibits the average and extreme dates of the last killing frost of spring and the first of autumn at nine places in New York and at Erie, Pa. The date for Palermo,* Humphrey and North Hammond were furnished by Messrs. E. B. Bartlett, C. E. Whitney and C. A. Wooster, and for the remaining localities

*It may be noted that dates given for Palermo, in the U. S. Weather Review for 1888 are those of the first *light* frost of autumn. The error is here corrected by means of a second series of observations kindly forwarded by Mr. Bartlett.

were derived from the reports of the Signal Service. Some data hitherto published have not been included in the table, owing to uncertainty as to the severity of the frosts reported.

The dates of table 14 have been computed from the observations of frosts which were obtained under the first portion of the New York Regents' system (1826-1850). No information could be obtained by the writer as to the severity of the frosts reported; but, from the evidence of the records themselves, it appears probable that both light and killing frosts were included in many cases. The results have a value, however, in fixing the earliest average date on which killing frosts may have occurred during the periods which they represent.

Efforts to obtain records of frosts from numerous additional points in the State were mainly unsuccessful; but several of the persons applied to kindly forwarded general information which may properly be included here.

The Hudson Valley.— Dr. James Hyatt, of Honeymead Brook, central Dutchess county, states that "injurious cold waves and late spring frosts likely to damage fruits and crops are those which, for the most part, in this locality, come in May. In April a cold wave or frost is not liable to do so serious injury. June frosts are extremely rare and August frosts perhaps equally so. In 1816 there were frosts every month in the year. The crops of Indian corn were all destroyed, and seed for the next year's planting had to be brought from a great distance. * * * Serious damage here is unlikely before September 15th, while after October 1st frosts are generally harmless, since the crops are secured before that date. During the past nine years we have had several injurious or killing spring frosts, but no autumnal ones of a disastrous nature." It is stated that a very unusually late and injurious spring frost on May 30th, 1884.

Mr. H. C. Townsend, of Wappingers Falls, Dutchess county, furnishes a list of killing frosts during seven years, 1886-1892. The average date of the last killing frost of spring was May 9th, the earliest date being April 30th and the latest May 20th. The average date of the first killing frost of autumn was October 12th, being three days earlier than at Palermo for the same period. The earliest date of the record is September 7th and the latest October 25th. These frosts were observed in the valley of Wappingers creek and are probably earlier than the average of the region.

Immediate proximity to the river moderates the severity of frosts considerably, according to the observations of Mr. H. A. Stone, of Rondout.

THE CENTRAL LAKE REGION.

In the absence of adequate observations upon frosts the following dates of beginning and ending of freezing weather at Ithaca may be found useful. During the past fourteen years the last freezing temperature (32 degree) of spring has, on an average, occurred on May 6th, the earliest date for the period being April 9th and the latest May 29th, The average date of first freezing temperature in autumn was October 10th; the earliest occurrence being September 26th, while in one case 32 degrees was not recorded until October 31st. Temperatures of 32 degrees in October or even the latter part of September are not likely to be injurious to crops then exposed, while considerably higher air temperatures in May do not preclude the possibility of great refrigeration and disastrous frost near the surface of the ground or in valley bottoms. Dr. J. Hyatt, previously quoted, notes cases in which injurious frosts occurred late in May, while the temperature registered 40 and 41 degrees at a point 12 to 20 feet above the general level.

Data from the grape region of Keuka lake were furnished by Mr. H. O. Fairchild. From 1880 to 1892 May frosts damaged grapes somewhat in four cases, in three of which the injury was confined mainly to the valleys. The earliest instance of a killing autumnal frost was on September 22d, and in three years some damage was sustained on October 11th and 12th. The only case of October frost in addition to these occurred on the 27th. Mr. Fairchild states that a temperature of 28 degrees is usually injurious only to the foliage of grape vines.

The Great Lake region is very fairly represented in table 13 by five stations well distributed over the region. It will be seen that the conditions are here very favorable as regards the occurrence of frost, and especially so in the section of the Chatauqua grape belt represented approximately by the record of Erie, Pa. The following information concerning this region is given by Mr. S. S. Crissey of Fredonia:

"The first killing frost of autumn for the past twenty-five years has not occurred until the last week in October or after October 25th. The one notable exception was the autumn of 1891, when it occurred on October 12th. In several years it has not occurred until in November. I now speak of a frost or freeze of sufficient severity to injure ripe grapes exposed on the vines. I have had a Concord vineyard in bearing since 1869, and have never (until last year) had a pound injured in autumn."

"As to the danger from spring frosts: The vine begins to leaf out here May 10th, and we rarely have a severe frost after that time. I have never suffered in my locality, which has a high airy exposure; but some vineyards unfavorably located were injured in 1889 and 1891 by frosts about May 17th. Where lands lie facing the lake or with a northern slope they rarely, or almost never, suffer from frosts after May 15th. Of course, frosts before May 10th would do no injury." * * *

"The most serious injury to vineyards in this section during the past twenty-five years occurred in two cases when winter came on with the ground in unusually dry condition, giving a 'dry freeze.' * * * To guard against this condition, which occurs about one year in ten, vineyardists in the dryer localities have abandoned fall plowing of their ground."

Mr. J. Ryckman of Brockton furnishes statements substantially similar to the above, adding that the total extent of grape vineyards in the Chautauqua belt is now about 30,000 acres.

The Central Plateau.— The early dates of frosts at Cooperstown and Humphrey, as compared with those of other stations of the table, are explained by the high elevation of the general land surface in their vicinity, which is also intersected by deep valleys very favorable to the occurrence of low nocturnal temperatures, and hence the dates at these stations may be considered to represent nearly, or quite, the earliest occurrence of frost in the central plateau region. Waverly, on the other hand, is situated in a very broad depression where, as has already been seen, the effect of nocturnal cooling is much less marked.

Mr. A. K. Harrison of New Lebanon, in N. E. Columbia county, states: "We often have frosts in August, and a few years ago (in 1889 or 1890) there was frost during every month excepting July." The data furnished, although not sufficient to establish an average, makes it apparent that frosts occur earlier in the eastern highlands than in the main portion of the Central Plateau.

Northern New York.—In commenting on the dates of autumnal frosts at North Hammond, in the St. Lawrence valley, Mr. C. A. Wooster states that their late occurrence (as given in the table), is in part due to close proximity to the St. Lawrence River, two miles wide at that point, as well as to several other local conditions. At Hammond, six miles from the river, frosts occur somewhat earlier.

So far as can be learned, frosts occur in the southern portion of the Adirondack region proper about three weeks earlier than in the Mohawk valley. Mr. C. A. McCoy of Sageville, who furnished this estimate as the result of many years of observation, places the average date of the last killing frosts of spring between May 25th and June 5th, and that of the first of autumn between September 1st and 15th.

In the mountainous section of the northeastern Adirondacks the last frost of spring occurs near the close of May and the first of autumn about September 20th, as stated by Mr. J. H. Bailey of Keene Valley, Essex county.

Periods of Navigation in Lakes, Rivers and Canals.

TABLE 15.

Dates of Opening and Closing of Navigation in the Hudson River at Albany.

[Dates from 1646 to 1888 were obtained from the "Climate of New Jersey," by J. C. Smock. The records from 1888 to 1892 were furnished by the State Engineer, Albany.]

YEARS.	River open.	River closed.	Number of days open.	YEARS.	River open.	River closed.	Number of days open.
1646......	....	November 25	....	1841.....	March 24	December 19	270
1675-6....	February 26	....	....	1842.....	February 4	November 29	298
1786......	March 23	....	....	1843.....	April 13	December 9	240
1789......	....	Feb. 3 (1790)	....	1844.....	March 14	December 11	272
1790......	March 27	December 8	256	1845.....	February 24	December 4	283
1791......	March 17	December 8	266	1846.....	March 15	December 15	275
1792......	....	December 12	...	1847.....	April 6	December 24	262
1793......	March 6	December 26	295	1848.....	March 22	December 27	280
1794	March 17	Jan. 12 (1795)	301	1849.....	March 19	December 25	281
1795......	....	Jan. 23 (1796)	....	1850.....	March 9	December 17	283
1796......	....	November 28	....	1851.....	February 25	December 13	291
1797......	....	November 26	....	1852.....	March 28	December 22	269
1798......	....	November 23	....	1853.....	March 21	December 21	275
1799......	....	Jan. 6 (1800)	....	1854.....	March 17	December 8	266
1800......	....	Jan. 3 (1801)	....	1855.....	March 20	December 20	275
1801......	February 28	Feb. 3 (1802)	340	1856. ...	April 10	December 16	250
1802......	....	December 16	....	1857.....	February 27	December 27	303
1803......	....	Jan. 12 (1804)	....	1858.....	March 20	December 18	273
1804......	April 6	December 13	251	1859.....	March 13	December 10	272
1805......	....	Jan. 9 (1806)	....	1860....	March 6	December 14	283
1806......	February 20	December 11	294	1861.....	March 5	December 23	293
1807......	April 8	Jan. 4 (1808)	271	1862.....	April 4	December 19	259
1808......	March 10	December 9	274	1863.....	April 3	December 11	252
1809......	....	Jan. 19 (1810)	....	1864.....	March 11	December 12	276
1810......	....	December 14	....	1865.....	March 22	December 16	269
1811	....	December 20	....	1866.....	March 20	December 15	270
1812......	....	December 21	...	1867.....	March 26	December 8	257
1813.. ...	March 12	December 22	285	1868.....	March 24	December 5	256
1814......	....	December 10	....	1869.....	April 5	December 9	248
1815......	....	December 2	....	1870.....	March 31	December 17	261
1816......	....	December 16	....	1871.....	March 12	November 29	263
1817......	....	December 7	....	1872.....	April 7	December 9	246
1818	March 25	December 14	264	1873.....	April 16	November 22	220
1819	April 3	December 13	254	1874.....	March 19	December 12	268
1820......	March 25	November 13	233	1875.....	April 13	November 29	230
1821......	March 15	December 13	273	1876.....	April 1	December 2	245
1822......	March 15	December 24	284	1877.....	March 30	December 31	276
1823......	March 24	December 16	267	1878.....	March 14	December 20	281
1824......	March 3	Jan. 5 (1825)	308	1879.....	April 4	December 20	260
1825......	March 6	December 13	282	1880.....	March 5	November 25	265
1826......	February 26	December 24	301	1881.....	March 21	Jan. 2 (1882)	287
1827......	March 20	December 25	208	1882.....	March 8	December 4	273
1828....,	February 8	December 23	319	1883.....	March 29	December 15	261
1829......	April 1	Jan. 11 (1830)	285	1884.....	March 25	December 19	269
1830......	March 15	December 23	283	1885.....	April 7	December 13	250
1831......	March 15	December 5	265	1886.....	March 30	December 3	248
1832......	March 25	December 21	271	1887.....	April 9	December 20	255
1833......	March 21	December 13	267	1888.....	April 5	....	....
1834......	February 21	December 15	297	1889.....	March 19	Not closed...	286
1835......	March 25	November 30	250	1890.....	Entire winter	December 3	337
1836......	April 4	December 7	247	1891.....	March 22	December 4	277
1837......	March 28	December 13	260	1892.....	March 31	....	....
1838......	March 19	November 25	251				
1839.....	March 21	December 18	272	Averages	March 20	December 16	271
1840......	February 21	December 5	288				

NOTE.—The Report of the New York Regents (1850-1863) gives a record of dates of closing of navigation at Hudson city during 54 years, 1817-70. The *average* date of closing computed from the series is December 18th.

TABLE 16.

Date of freezing over of Lake Champlain at its widest part opposite the city of Burlington, Vermont; also, date of opening of the lake, with duration of ice each year from 1816 *to* 1892.

[From memoranda kept by John Johnson, Joseph D. Allen and Charles E. Allen of Burlington, Vt. (Width of lake at point of observation is ten miles.)]

YEAR.	Broad lake closed.	Broad lake open.	Days duration of ice.	YEAR.	Broad lake closed.	Broad lake open.	Days duration of ice.
1816......	February 9	April 5	56	1855.....	February 4	April 20	75
1817......	January 29	April 16	77	1856. ...	January 22	April 18	87
1818......	February 2	April 15	72	1857.....	January 15	April 9	84
1819......	March 4	April 17	44	1858.....	February 12	April 6	53
1820....	February 3 March 8	March 12	38	1859.....	January 11	April 2	81
				1860.....	February 2	April 2	61
1821......	January 15	April 21	96	1861.....	January 23	April 14	81
1822......	January 24	March 30	65	1862.....	February 5	April 23	77
1823......	February 7	April 5	57	1863.....	February 4	April 26	81
1824......	January 22	February 11	20	1864.....	February 17	March 13	25
1825......	February 9	April 1	51	1865.....	January 17	April 5	78
1826	February 1	March 24	51	1866.....	January 30	April 11	71
1827......	January 21	March 31	69	1867.....	January 20	April 8	78
1828......	Not closed ...	....	......	1868.....	January 7	April 15	99
1829......	January 30	April 4	64	1869.....	January 19	April 20	91
1830......	January 15	April 12	87	1870.....	February 25	April 12	46
1831......	January 16	April 10	84	1871.....	January 24	March 12	47
1832......	February 6	April 17	71	1872.....	January 8	April 22	105
1833......	February 2	April 6	63	1873.....	January 29	April 25	83
1834......	April 14	April 21	7	1874.....	February 1	March 27	54
1835......	January 10	April 12	92	1875.....	January 16	April 30	101
1836......	January 27	April 21	85	1876.....	February 2	April 24	82
1837......	January 15	April 28	103	1877.....	January 15	April 5	80
1838......	February 2	April 13	70	1878.....	January 29	March 1	30
1839......	January 25	April 6	71	1879.....	January 29	April 22	32
1840......	January 25	February 20	26	1880.....	February 2	March 28	34
1841......	February 18	April 26	67	1881.....	January 19	March 22	92
1842......	Not closed ...	....	......	1882.....	January 23	March 4	71
1843......	February 26	April 23	66	1883.....	January 26	April 23	86
1844......	January 25	April 11	77	1884.....	January 8	April 19	101
1845	February 3	March 26	51	1885.....	January 24	April 25	91
1846......	February 10	March 30	48	1886.....	January 24	April 15	80
1847......	February 15	April 24	68	1887.....	January 8	April 30	111
1848......	February 13	March 31	47	1888.....	January 22	April 24	91
1849......	February 7	March 30	51	1889.....	February 7	April 11	64
1850......	Not closed ...	....	......	1890...	February 10 February 21	February 11 February 28	1 7
1851.....	February 1	March 30	47				
1852......	January 18	April 21	93	1891...	January 27 February 14	January 31 February 27	4 13
1853......	January 28	April 10	72				
1854......	January 28	April 11	73	1892.....	February 14	April 3	47
				Averages	January 30	April 7	66.8

TABLE 17.

Time of arrival of first boat at Plattsburgh, 1843 *to* 1891.

[Record of the "Plattsburgh Republican," furnished by C. F. Bixby, Editor and Proprietor.]

YEAR.	Arrival.	YEAR.	Arrival.	YEAR.	Arrival.	YEAR.	Arrival.
1843	April 27	1856	April 22	1869	April 26	1882	April 5
1844	April 19	1857	April 10	1870	April 19	1883	April 24
1845	April 1	1858	April 7	1871	March 17	1884	April 28
1846	April 7	1859	March 31	1872	April 24	1885	April 25
1847	May 1	1860	April 1	1873	April 18	1886	April 19
1848	April 11	1861	April 15	1874	April 6	1887	April 30
1849	April 8	1862	April 30	1875	May 1	1888	April 25
1850	March 25	1863	April 27	1876	April 25	1889	April 12
1851	April 3	1864	April 13	1877	April 13	1890	April 12
1852	April 24	1865	April 6	1878	April 1	1891	April 9
1853	April 12	1866	April 12	1879	April 28	1892	....
1854	April 19	1867	April 17	1880	April 1		
1855	April 23	1868	April 17	1881	April 21	Average	April 15

TABLE 18.

Record of sleighing across Lake Champlain on the ice, between Plattsburgh and Burlington, from 1868 *to* 1883, *inclusive.*

[From the "Plattsburgh Republican."]

YEAR.	First trip.	Last trip.	YEAR.	First trip.	Last trip.
1868	January 9	March 17	1876	February 4	April 3
1869	January 23	March 27	1877	January 2	March 26
1870	February 10	March 30	1878	February 9	March 6
1871	January 23	March 8	1879	January 27	April 7
1872	January 9	March 9	1880	February 17	February 26
1872–1873	December 30	April 5	1881	January 17	February 19
1874	February 4	March 14	1882	February 1	March 2
1875	January 6	April 1	1883	January 23	April 10
Average				January 23	March 19

TABLE 18A.

The following table of water levels of Lake Champlain is furnished by Mr. Bixby from the records of the Plattsburgh Republican.

YEAR.	Highest rise.		Lowest fall.		YEAR.	Highest rise.		Lowest fall.	
	Ft.	In.	Ft.	In.		Ft.	In.	Ft.	In.
1874	7	8	12	10	1880	9	6	13	8½
1875	8	6	12	8	1881	8	9	13	2½
1876	6	7	13	3	1882	9	5	13	2½
1877	8	10	13	2½	1883	7	11	13	3½
1878	8	5	12	4	1884	7	3	13	2½
1879	7	0	13	4	1885	7	0	11	11
					1886	7	10½	12	11½
Average for twelve years						8	0.5	13	0

TABLE 19.

Dates of opening navigation in the St. Lawrence river, at Ogdensburgh, from 1832 to 1892, and dates of closing navigation from 1832 to 1870. Records from 1832 to 1870 from New York Regents' Reports. Remaining records from the Collector of Customs, Ogdensburg.

YEARS.	Navigation opens.	Navigation closes.	YEARS.	Navigation opens.	Navigation closes.
1832	....	December 20	1863	April 14	December 11
1833	April 12	December 21	1864	April 18	December 16
1834	April 2	December 17	1865	April 3	December 16
1835	April 4	November 28	1866	April 11	December 17
1836	April 20	December 7	1867	April 17	December 10
1837	April 20	December 20	1868	April 1	December 19
1838	April 12	December 7	1869	April 14	December 23
1839	April 11	December 26	1870	April 11	December 20
1840	April 1	December 9	1871	March 21	....
1841	April 16	December 8	1872	April 17	....
1842	March 24	December 1	1873	April 15	....
1843	May 3	December 20	1874	March 31	....
1844	April 6	December 16	1875	April 27	....
1845	April 1	December 15	1876	April 14	....
1846	April 6	December 25	1877	April 10	....
1847	April 20	December 8	1878	March 21	....
1848	April 4	December 25	1879	April 19	....
1849	April 14	December 21	1880	April 1	....
1850	March 30	December 12	1881	March 26	....
1851	April 5	December 16	1882	March 28	....
1852	April 5	December 25	1883	April 13	....
1853	April 4	December 21	1884	April 7	....
1854	April 13	December 13	1885	April 23	....
1855	April 21	December 17	1886	April 10	....
1856	April 29	December 22	1887	April 15	....
1857	April 25	December 29	1888	April 11	....
1858	April 8	December 7	1889	April 1	....
1859	April 12	December 17	1890	April 1	....
1860	April 9	December 18	1891	April 4	....
1861	April 12	December 9	1892	April 8	....
1862	April 11	December 13	Average	April 10	December 16

TABLE 20.

Dates of opening navigation on Lake Erie, at Buffalo, from 1807 *to* 1890, *and dates of closing navigation from* 1871 *to* 1890. *Records from* 1807 *to* 1871, *from New York Regents' Reports. Remaining records from reports to the Chief Signal Officer.*

Year.	Navigation opened.	Year.	Navigation opened.	Year.	Navigation opened.	Year.	Navigation opened.	Navigation closed.
1807...	June 1	1828..	April 1	1849..	March 25	1871..	April 1	December 27
1808...	....	1829..	May 8	1850..	March 25	1872..	May 5	December 18
1809...	May 26	1830..	April 11	1851..	April 2	1873..	April 29	November 28
1810...	April 30	1831..	May 8	1852..	April 20	1874..	April 18	December 5
1811...	June 4	1832..	April 28	1853..	April 14	1875..	May 12	December 11
1812...	....	1833..	April 24	1854..	April 29	1876..	May 10	December 17
1813...	....	1834..	April 6	1855..	April 21	1877..	April 20	December 13
1814...	April 19	1835..	May 8	1856..	May 2	1878..	March 16	December 7
1815...	....	1836..	April 27	1857..	April 27	1879..	April 24	December 14
1816...	May 16	1837..	May 5	1858..	April 15	1880..	March 19	December 8
1817...	April 29	1838..	March 31	1859..	April 7	1881..	May 1	December 30
1818...	April 21	1839..	April 11	1860..	April 17	1882..	March 26	December 1
1819...	May 6	1840..	April 24	1861..	April 13	1883..	April 25	December 7
1820...	May 1	1841..	April 14	1862..	April 15	1884..	April 22	December 6
1821...	May 13	1842..	March 7	1863..	April 3	1885..	May 2	November 9
1822...	April 15	1843..	May 6	1864..	April 13	1886..	April 15	December 7
1823...	May 3	1844..	March 8	1865..	April 26	1887..	April 17	December 14
1824...	April 28	1845..	April 3	1866..	April 28	1888..	April 28	December 6
1825...	March 12	1846..	April 4	1867..	April 21	1889..	April 12	December 14
1826...	May 23	1847..	April 23	1868..	April 19	1890..	March 31	....
1827...	April 21	1848..	April 9	1869..	May 2			
				1870..	April 16	Av'ge	April 7	December 9

TABLE 21.

Dates of opening of navigation on Lake Ontario at Oswego, from 1835 *to* 1892, *and dates of closing navigation from* 1871 *to* 1892. *Records from* 1835 *to* 1871, *from New York Regents' Report. Remaining records from the collector of customs, Oswego.*

YEARS.	Navigation opens.	
1835	April	2
1836	April	16
1837	April	1
1838	April	6
1839	April	3
1840	April	4
1841	April	6
1842	March	7
1843	April	8
1844	March	15
1845	March	28
1846	March	24
1847	March	25
1848	January	8
	April	5
1849	March	28
1850	March	21
1851	March	20
1852	April	1
1853	March	12
	January	19
1854	January	18
	February	27
1855	January	3
	February	13
1856	April	19
1857	April	6
1858	April	1
1859	April	1
1860	March	9
1861	April	1
1862	April	2

YEARS.	Navigation opens.		Navigation closes.	
1863	April	2	....	
1864	April	5	....	
1865	April	1	....	
1866	March	17	....	
1867	April	6	....	
1868	April	1	....	
1869	April	10	....	
1870	April	6	December	19
1871	March	20	December	13
1872	April	13	December	12
1873	April	7	December	6
1874	March	31	December	4
1875	April	13	December	9
1876	April	5	December	28
1877	April	14	December	26
1878	March	11	December	10
1879	April	9	December	16
1880	March	10	January, '81	24
1881	April	2	December	5
1882	March	22	November	30
1883	April	6	December	11
1884	April	5	December	12
1885	May	2	December	15
1886	April	1	December	7
1887	April	9	December	6
1888	April	14	December	11
1889	April	4	December	18
1890	March	25	January, '91	17
1891	April	4	December	28
1892	April	5	December	21
Average	March	28	December	16

TABLE 22.

Dates of the opening and closing of Erie Canal. Records to 1871 *obtained from the New York Regents' Reports. Later records furnished by State Engineer.*

YEARS.	Canal opened.	Canal closed.	No. of days of navigation.	YEARS.	Canal opened.	Canal closed.	No. of days of navigation.
1824	April 30	December 4	219	1860	April 25	December 12	232
1825	April 12	December 5	238	1861	May 1	December 10	224
1826	April 20	December 18	243	1862	May 1	December 10	224
1827	April 22	December 18	241	1863	May 1	December 9	223
1828	March 27	December 20	269	1864	April 30	December 8	223
1829	May 2	December 17	230	1865	May 1	December 12	226
1830	April 20	December 17	242	1866	May 1	December 12	226
1831	April 16	December 1	230	1867	May 6	December 20	229
1832	April 25	December 21	241	1868	May 4	December 7	217
1833	April 19	December 12	238	1869	May 6	December 10	218
1834	April 17	December 12	240	1870	May 10	December 10	214
1835	April 15	November 30	230	1871	April 24	December 1	220
1836	April 25	November 26	216	1872	May 13	December 1	202
1837	April 20	December 9	234	1873	May 15	December 5	205
1838	April 12	November 25	228	1874	May 5	December 5	215
1839	April 20	December 16	241	1875	May 18	November 30*	197
1840	April 20	December 3	228	1876	May 4	December 1	211
1841	April 24	November 30	221	1877	May 8	December 7	214
1842	April 20	November 28	222	1878	April 15	December 7	237
1843	May 1	November 30	214	1879	May 8	December 6	212
1844	April 18	November 26	222	1880	April 16	November 21*	220
1845	April 15	November 29	228	1881	May 12	December 8	211
1846	April 16	November 25	224	1882	April 11	December 7	241
1847	May 1	November 30	214	1883	May 7	December 1	208
1848	May 1	December 9	223	1884	May 6	December 1	209
1849	May 1	December 5	219	1885	May 11	December 1	205
1850	April 22	December 11	234	1886	May 1	December 1	214
1851	April 15	December 5	235	1887	May 7	December 1	208
1852	April 20	December 16	239	1888	May 10	December 3	207
1853	April 20	December 20	245	1889	May 1	November 30	214
1854	May 1	December 3	217	1890	April 28	November 30	216
1855	May 1	December 10	224	1891	May 5	December 5	215
1856	May 5	December 4	214	1892	May 1	....	.....
1857	May 6	December 15	223				
1858	April 28	December 8	225	Average	April 27	December 6	224
1859	April 15	December 12	242				

* By ice.

TABLE 23.

Date of disappearance of ice from Otsego lake, furnished by Mr. G. Pomeroy Keese.

YEAR.	Date.	YEAR.	Date.	YEAR.	Date.	YEAR.	Date.
1841......	April 25	1855.......	April 24	1869.......	April 21	1882.......	April 6
1842......	March 30	1856.......	April 26	1870*......	April 16	1883.......	April 26
1843......	April 26	1857.......	April 6	1871†......	....	1884.......	April 22
1844......	April 13	1858.......	April 5	1872.......	April 27	1885.......	April 26
1845......	April 1	1859.......	March 30	1873.......	May 4	1886.......	April 24
1846......	April 7	1860.......	April 7	1874.......	May 5	1887.......	April 28
1847......	April 25	1861.......	April 14	1875.......	May 7	1888.......	April 30
1848......	April 10	1862.......	April 22	1876.......	April 26	1889.......	April 11
1849......	April 7	1863.......	April 23	1877.......	April 27	1890.......	April 8
1850......	April 24	1864.......	April 21	1878.......	April 1	1891.......	April 15
1851......	March 30	1865.......	April 5	1879.......	April 30	1892.......	April 5
1852......	April 26	1866.......	April 14	1880.......	April 7		
1853......	April 9	1867.......	April 15	1881.......	April 25	Average.	April 17
1854......	April 20	1868.......	April 16				

Cazenovia lake.—Average date of opening, April 12th, and of closing, December 12th. From a record of thirty-six years, 1835 to 1870, published in reports of New York Regents. Earliest date of opening, March 20, 1859; latest date, April 26, 1843, 1847, 1856. Earliest date of closing, November 30, 1838, and (partly) November 26, 1869. Latest date of closing, December 27, 1848.

Canandaigua lake.—Average date of opening, March 31st, and of closing, February 18th. From a record of sixteen years, 1856-1871, in reports of New York Regents. In 1857, 1859, 1862, 1867, the lake did not freeze over.

The following general statements are given in cases where no statistical tables could be obtained:

CAYUGA LAKE.

Ice forms over the shallows at the head and foot of the lake, closing navigation, on an average, early in December and breaks up at the close of March or early in April. The lake is said, on good authority, to have frozen solidly over its entire length twice in the past twenty-five years. The greatest depth of the lake is, from the Cornell University surveys, 435 feet, opposite Sheldrake.

* Closed January 8, 1870. † Closed December 21, 1871.

SENECA LAKE.

The pamphlet of Dr. W. D. Wilson, previously quoted, states that "Seneca lake never freezes over far from the shore." Ice usually forms, however, to some extent in the shallow section near the foot of the lake. Mr. W. B. Dunning, of the Seneca Lake Navigation Company, informs the writer that the company's steamers run throughout the year. The surveys made by the college of civil engineering, Cornell University, give the greatest depth of Seneca lake as 618 feet, opposite North Hector.

KEUKA LAKE.

Mr. W. W. Eastman, superintendent of the Keuka Lake Navigation Company, furnishes the following statement: "Our lake usually freezes at this end (near Penn Yan) about the 24th or 25th of December, but only from 5 to 10 miles up. The west branch, at the Branchport end, freezes about the same time, but seldom further than Pultney, about 5 miles. The upper end, from Hammondsport to Gibsons and Keuka, and usually down as far as Ogoyago, as a rule, is open; but I have known it to be closed the entire length. We have run a boat from Penn Yan to Hammondsport as late as the 11th of February and have run in January quite often. We usually run a boat on the upper end all winter." The greatest depth of Keuka lake is 186 feet, about midway up the west branch, according to University surveys.

CHAUTAUQUA LAKE.

Mr. C. E. Grandin, superintendent of the Chautauqua Steamboat Company, states that "the ice came last year (1891) about December 20th and went out March 24th. This would be a fair average for this lake. However, during January, 1876, steamers made regular trips for four days, beginning with the 1st, an unusual occurrence."

LAKE PLEASANT

and others of the same chain, in the southern Adirondacks, usually become frozen between November 15th and December 10th, as observed by Mr. G. A. McCoy, of Sageville.

TABLE

Precipi

AVERAGE MONTHLY,

STATIONS.	County.	Elevation above tide.	Length of record.	From-To.	January	February.	March.
		Feet.	Yrs.				
Western Plateau		1,307			2.52	2.23	2.51
Humphrey‡	Cattaraugus	1,950	7	1884-91	3.07	2.60	2.70
Middlebury (or dale)	Wyoming	1,190	17	1826-48	1.46	1.77	2.26
Little Genesee ‡	Allegany	1,500	7	1866-73	3.22	2.58	3.34
Nile‡	"	1,600	7	1876-89	3.16	2.66	2.50
Prattsburgh ‡	Steuben	1,494	9	1829-45	1.90	1.94	2.00
Mt. Morris ‡	Livingston	525	8	1885-92	......	......	......
Elmira	Chemung	863	10	1850-62	2.34	1.82	2.28
Eastern Plateau		1,056			3.52	2.34	2.46
Goshen	Orange	425	10	1834-49	2.50	2.42	2.52
Montgomery	"	380	11	1830-42	2.64	2.22	2.24
Port Jervis ‡	"	470	9	1880-92	4.05	3.20	3.16
Liberty	Sullivan	1,500	12	1850 63	2.69	3.14	2.78
Cooperstown	Otsego	1,300	39	1854-92	2.61	2.29	2.59
Cherry Valley	"	1,320	13	1830-51	2.66	2.57	2.80
Hartwick	"	1,100	10	1830-49	2.35	1.74	2.25
Oxford	Chenango	980	20	1830-52	2.47	2.21	2.27
Waverly	Tioga	825	10	1883-92	2.20	1.91	2.50
Homer	Cortland	1,100	14	1850-63	2.81	2.79	2.89
Cazenovia	Madison	1,200	27	1830-74	2.86	2.52	3.15
Hamilton	"	1,127	18	1827-49	2.25	2.65	2.27
Pompey	Onondaga	1,800	16	1830-52	1.69	1.60	1.26
Onondaga	"	1,260	11	1832-43	2.01	1.49	1.82
Northern Plateau		973			3.11	2.78	3.06
Constableville ‡	Lewis	1,246	4	1889-92	6.16	5.64	3.90
Lowville	"	847	22	1827-72	2.38	2.54	2.12
Fairfield	Herkimer	1,185	17	1828-72	2.62	1.79	2.33
Johnstown	Fulton	660	12	1830-45	3.14	2.72	3.78
Pottersville‡	Warren	875	4	1879-83	1.80	1.80	2.50
Elizabethtown ‡	Essex	600	4	....	......	......	......
Keene Valley‡	"	1,015	5	1879-84	2.10	2.10	3.00
Dannemora‡	Clinton	1,356	5	1880-91	3.50	2.90	3.80
Coast Region		132			3.47	3.22	3.74
Block Island, R. I.		27	13	1880-92	4.42	4.53	4.07
East Hampton	Suffolk	16	16	1828-52	2.93	2.30	2.54
Setauket‡	"	40	7	1886-92	4.40	3.90	5.10
Fort Columbus	New York	25	49	1836-90	2.30	3.33	3.69
New York city	"	164	23	1870-92	3.96	3.65	4.12
Mt. Pleasant	Westchester	125	13	1830-44	2.16	1.50	2.55
Tarrytown	"	152	12	1860-72	3.07	3.20	3.84
White Plains	"	273	30	1862-91	4.58	4.41	4.24
Croton Dam	"	136	12	1860-72	2.99	2.99	4.20
North Salem	"	361	20	1830-56	2.93	2.40	3.04
Hudson Valley		230			2.89	2.26	2.88
Ardenia	Putnam	157	22	1869-90	2.63	2.65	3.70
West Point	Orange	167	47	1840-92	3.57	3.32	3.60
Newburgh	"	65	25	1830-71	2.73	2.46	2.53
Poughkeepsie	Dutchess	......	15	1830-70	3.34	2.08	3.22
Honeymead Brook †	"	425	9	1884-92	3.95	2.66	2.81
Red Hook	"	......	11	1830-42	2.86	1.54	2.39
Kingston	Ulster	188	19	1830-49	2.92	1.93	2.74
Hudson	Columbia	150	15	1830-70	2.37	1.97	3.22
Kinderhook	"	125	17	1830-46	2.21	1.53	2.48
Albany	Albany	85	19	1874-92	3.07	2.60	2.87
Troy Water-works*	Rensselaer	......	65	1826-90	2.55	2.19	2.48
Cambridge	Washington	500	13	1827-39	2.55	2.19	2.48
Champlain Valley		262			1.73	1.35	1.94
Plattsburgh	Clinton	125	32	1840-92	1.77	1.43	2.05
Burlington, Vt.		400	15	1877-91	1.69	1.27	1.82
St. Lawrence Valley		414			2.19	2.15	2.49
Gouverneur	St. Lawrence	400	27	1837-74	2.30	1.92	2.16
North Hammond	"	? 340	15	1866-92	2.93	2.64	2.61
Potsdam	"	394	20	1828-48	1.40	1.06	1.48
Ogdensburg ‡	"	232	5	1850-60	2.10	2.60	3.70
Malone	Franklin	703	11	1830-77	2.24	2.46	2.54

24.

tation.

ANNUAL AND SEASONAL PRECIPITATION.

April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	Spring.	Summer.	Autumn.	Winter.
2.68	3.36	4.23	3.25	3.13	2.90	3.28	2.76	2.73	35.58	8.55	10.61	8.94	7.48
3.31	4.90	5.15	3.60	4.60	4.50	3.83	3.60	3.28	45.14	10.91	13.35	11.93	8.95
2.46	2.92	3.40	3.30	2.81	2.83	2.88	2.56	1.79	30.44	7.64	9.51	8.27	5.02
2.24	2.26	3.53	4.31	2.81	2.89	3.22	2.95	3.11	36.46	7.84	10.65	9.06	8.91
1.90	3.02	5.14	3.10	2.15	2.24	3.14	2.99	2.72	34.72	7.42	10.39	8.37	8.54
2.25	3.00	4.20	3.00	3.00	2.56	3.38	2.36	2.82	32.41	7.25	10.20	8.30	6.66
.....	......	3.52	2.37	3.45	....	......	......	......	......	......	9.34	......	......
3.89	4.08	4.67	3.05	3.08	2.38	3.20	2.11	2.66	35.56	10.25	10.80	7.69	6.82
2.80	3.54	4.16	4.04	3.50	3.13	3.31	2.81	2.82	37.43	8.81	11.69	9.26	7.68
2.14	3.30	3.53	2.98	2.55	2.74	2.95	2.27	3.40	33.30	7.96	9.06	7.96	8.32
2.32	3.05	4.06	3.36	2.62	2.53	3.28	2.74	3.12	34.18	7.61	10.04	8.55	7.98
2.60	4.17	3.79	5.52	4 83	3.20	2.86	2.30	3.10	42.78	9.93	14.14	8.36	10.35
4.62	4.28	5.18	4.82	4.00	3.08	3.11	3.77	4.34	45.81	11.68	14.00	9.96	10.17
2.63	3.55	4.23	4.29	4.02	3.32	3.31	3.07	2.67	38.58	8.77	12.51	9.70	7.57
3.03	4.04	4.35	4.24	3.45	3.55	3.90	3.18	3.07	40.84	9.87	12.04	10.63	8.30
4.45	3.52	3.65	3.80	2.87	2.18	3.72	3.17	2.62	36.32	10.22	10.32	9.07	6.71
2.52	3.60	4.27	3.77	3.34	3.35	3.36	2.73	2.47	36.36	8.39	11.38	9.44	7.15
1.94	3.20	3.75	3.57	4.25	2.94	2.74	2.31	2.00	33.31	7.64	11.57	7.99	6.11
4.12	4.15	5.55	4.92	3.78	4.00	4.06	3.66	3.23	45.96	11.16	14.25	11.72	8.83
3.05	3.50	4.41	4.19	3.68	3.49	3.65	2.90	3.08	40.48	9.70	12.28	10.04	8.46
1.93	2.93	3.48	3.79	2.70	3.68	3.12	2.54	2.78	34.12	7.13	9.97	9.34	7.68
1 78	3.08	4.21	4.12	3.19	2.93	3.23	2.10	1.57	30.76	6.12	11.52	8.26	4.86
2.12	3.20	3.74	3.12	3.62	2.76	3.10	2.66	1.99	31.63	7.14	10.48	8.52	5.49
2.66	3.45	3.28	4.09	3.50	3.19	3.47	3.48	2.90	38.97	9.17	10.87	10.14	8.79
3.20	4.80	3.50	5.60	4.50	4.00	4.00	5.90	5.30	56.50	11.90	13.60	13.90	17.10
2.11	2.73	3.48	3.52	3.04	2.82	3.21	3.03	2.54	33.55	6.96	10.04	9.09	7.46
2.49	3.13	4.29	4.21	3.65	3.08	3.56	2.46	2.71	36.31	7.94	12.15	9.10	7.12
2.63	3.34	4.35	4.12	3.35	2.72	3.36	3.57	3.29	40.37	9.75	11.82	9.65	9.15
2.40	2.80	1.90	3.00	2.70	3.00	2.70	2.50	1.90	29.00	7.70	7.60	8.20	5.50
.....	......	1.90	3.00	2.70	3.00	2.70	2.50	1.90	29.00	......	7.60	8.20	......
2.90	3.30	2.50	3.50	3.20	3.40	3.10	3.00	2.20	34.30	9.20	9.20	9.50	6.40
2.90	4.00	4.30	5.80	4.90	3.50	5.00	4.90	3.40	48.90	10.70	15.00	13.44	9.80
3.50	3.90	3.53	4.20	4.54	3.59	3.93	3.87	3.41	44.93	11.16	12.27	11.37	10.13
3.03	3.81	2.96	3.12	3.41	3.24	4.16	4.22	3.82	41.79	10 91	9.49	11.62	12.57
3.82	3.66	2.98	2.60	3.22	3.27	3.65	3.16	3.17	37.30	10.02	8.80	10.68	8.40
4.20	3.20	3.40	4.00	5.10	4.00	5.10	4.70	3.70	50.80	12.50	12.50	13.80	12.00
3.05	3.93	3.67	4.07	4.72	3.50	3.32	3.45	3.65	43.74	10.67	12.46	10.30	10.31
3.35	3.10	3.39	4.56	4.81	3.83	3.37	3.86	3.14	45.14	10.57	12.76	11.06	10.75
3.57	3.63	3.33	4.31	3.83	3.03	3.27	2.44	2.67	36.29	9.75	11.47	8.74	6.33
3.26	4.56	3.80	5.03	5.41	3.69	4.22	4.23	3.27	47.58	11.66	14.24	12.14	9.54
3.76	3.32	3.70	5.10	4.56	3.41	3.18	4.25	4.86	49.37	11.32	13.36	10.84	13.85
3.78	5.68	4.66	5.22	6.16	4.78	4.79	5.26	2.83	53.34	13.66	16.04	14.83	8.81
3.14	4.06	3.37	4.03	4.15	3.14	4.21	3.16	3.33	40.96	10.51	11.55	10.24	8.66
2.82	3.53	3.68	4.24	3.69	2.90	3.52	3.15	2.89	38.46	9.23	11.62	9.57	8.04
3.72	3.78	3.29	4.41	3.92	3.09	3.84	3.93	3.08	42.04	11.20	11.62	10.86	8.36
4.50	4.96	3.60	4.58	4.84	3.12	3.81	3.95	3.62	47.47	13.06	13.02	10.88	10.51
2.09	4.51	3.65	3.50	3.58	2.74	3.54	3.09	2.43	36.85	9.13	10.73	9.37	7.62
2.87	3.60	3.66	4.09	4.41	2.54	3.94	3.35	3.23	40.33	9.69	12.16	9.83	8.65
2.14	3.19	2 89	5.90	4 88	3.50	3.29	3.28	2.95	41.44	8.14	13.67	10.07	9.56
3.18	3.03	3.99	4.31	2.83	2.45	2.75	2.46	2.36	34.15	8.60	11.13	7.66	6.76
2.15	3.43	3.49	3.72	2.81	2.26	3.11	3.37	3.17	35.10	8.32	10.02	8.74	8.02
2.28	3.09	3.60	3.66	2.60	2.23	4.51	2.67	3.09	35.29	8.59	9.86	9.41	7.43
2.97	3.41	4.55	4.35	3.35	2.94	3.25	2.69	2.75	36.48	8.86	12.25	8.88	6.49
2.49	3.08	3.81	4.28	4.03	3.53	3.28	3.02	2.73	38.79	8.44	12.12	9.83	8.40
2.70	3.16	3.85	4.06	3.52	3.17	3.49	2.99	2.62	36.78	8.34	11.43	9.65	7.36
2.70	3.16	3.85	4.06	3.52	3.17	3.49	2.99	2.62	36.78	8.31	11.43	9.65	7.36
1.88	2.63	3.16	3.24	3.39	3.09	3.12	2.61	1.92	30.06	6.44	9.79	8.83	5.00
1.86	2.51	2.90	3.32	3.11	2.85	2.98	2.35	1.88	29.01	6.42	9.33	8.18	5.08
1.89	2.75	3.41	3.15	3.68	3.33	3.27	2.87	1.97	31.10	6.46	10.24	9.47	4.93
2.21	2.82	3.54	3.39	2.75	3.26	3.44	2.71	2.57	33.52	7.52	9.68	9.41	6.91
1.71	2.37	2.60	2.56	1.99	3.13	3.34	2.70	2.28	29.06	6.24	7.15	9.17	6.50
2.06	3.27	3.12	3.62	3.58	3.72	4.95	3.33	2.74	38.57	7.94	10.32	12.00	8.31
1.70	3.02	3.31	4.03	2.81	3.11	3.34	1.93	1.44	28.63	6.20	10.15	8.38	3.90
3.00	2.40	5.00	3.40	3.40	2.60	2.30	3.30	3.70	37.50	9.10	11.80	8.20	8.40
2.59	3.00	3.64	3.35	1.96	3.71	3.23	2.27	2.71	33.70	8.13	8.95	9.21	7.41

TABLE 24 — AVERAGE MONTHLY

STATION.	County.	Elevation above tide.	Length of record.	From-To	January.	February.	March.
		Feet.	Yrs.				
Great Lake Region	....	494	......	....	2.63	2.38	2.55
Madison Barracks	Jefferson	262	34	1840-92	2.38	1.92	2.53
Pierrepont Manor	"	617	23	1849-71	2.25	2.10	2.30
Oswego	Oswego	250	35	1856-92	3.19	2.76	3.10
Oswego (U. S.) †	"	304	22	1870-92	3.01	2.50	2.75
Palermo	"	460	33	1860-92	3.20	2.95	2.89
Syracuse ‡	Onondaga	407	9	1840-52	2.26	2.10	2.68
Auburn	Cayuga	650	28	1827-89	2.56	2.20	2.24
Rochester	Monroe	500	60	1831-92	2.60	2.63	2.67
Rochester (U. S.) †	"	621	22	1870-92	3.21	2.68	3.02
Millville ‡	Orleans	600	6	1842-47	......	......	......
Lewiston	Niagara	280	14	1830-50	1.38	1.30	1.54
Fort Niagara	"	262	36	1841-92	2.02	2.01	2.13
Buffalo (U. S.) †	Erie	690	22	1870-92	2.95	2.79	2.64
Buffalo	"	600	39	1832-92	2.79	2.56	2.91
Fredonia	Chautauqua	715	16	1830-64	2.04	1.84	1.99
Erie, Pa. (U. S.) †	....	681	20	1873-92	3.61	3.40	2.91
Central Lake Region	....	690	......	....	2.25	2.05	2.24
Ithaca (University)	Tompkins	800	14	1879-92	2.28	2.09	2.23
Ithaca (city)	"	417	19	1830-74	1.81	1.76	2.51
Geneva	Ontario	567	20	1841-68	1.60	1.12	1.76
Waterburgh ‡	Tompkins	800	9	1874-82	3.22	2.41	2.87
Penn Yan	Yates	740	58	1829-83	1.59	1.60	1.77
Canandaigua	Ontario	813	7	1830-37	3.00	3.43	2.31
Mohawk Valley	....	745	......	....	3.20	3.70	3.54
Utica	Oneida	500	38	1826-92	3.34	3.10	3.07
South Trenton	"	835	10	1863-74	3.90	5.90	4.94
Hamilton College	"	900	11	1850-60	2.35	2.11	2.60
Mean of the ten Regions	....	630	......	....	2.65	2.45	2.74

* A series consolidated from observations at Troy, Lansingburgh and Albany. Investigation
U. S. belong to the

‡ Averages for stations having less than ten years observations are cor

ANNUAL AND SEASONAL PRECIPITATION — (*Concluded*).

April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	Spring.	Summer.	Autumn.	Winter.
2.26	2.97	3.29	3.19	2.91	3.24	3.61	3.24	2.88	35.17	7.78	9.36	10.11	7.89
1.80	2.51	2.57	3.01	2.63	3.14	5.44	3.09	2.49	33.51	6.84	8.21	11.67	6.79
2.60	3.36	2.66	3.42	3.14	3.66	4.05	3.60	3.06	36.20	8.26	9.22	11.31	7.41
2.61	3.12	3.42	3.53	2.88	3.20	3.56	3.70	3.56	38.63	8.83	9.83	10.46	9.51
2.04	2.65	3.61	3.33	2.54	2.79	3.33	3.33	3.29	35.16	7.44	9.48	9.45	8.80
2.11	2.56	3.20	3.31	2.63	3.18	3.54	3.70	3.70	37.06	7.56	9.14	10.42	9.85
2.81	3.16	3.66	3.53	2.53	3.62	3.91	3.39	3.10	36.75	8.65	9.72	10.92	7.46
2.23	3.36	3.59	3.59	3.37	3.14	3.41	3.01	2.72	35.42	7.83	10.55	9.56	7.48
2.53	3.02	3.19	3.21	2.81	2.95	3.24	2.95	2.69	34.49	8.22	9.21	9.14	7.92
2.46	3.07	3.40	3.04	3.04	2.34	3.04	2.95	2.75	35.00	8.55	9.48	8.33	8.64
.....	.....	.....	.....	.....	.....	.....	.....	.....	30.00	.....	.....	.....	.....
1.64	2.19	2.72	2.27	2.10	2.68	2.44	1.69	1.15	23.10	5.37	7.09	6.81	3.83
1.87	2.39	2.48	2.71	2.41	2.94	2.30	2.47	2.02	27.75	6.39	7.60	7.71	6.05
2.37	3.30	3.53	3.37	3.28	3.28	3.73	3.61	3.30	38.15	8.31	10.18	10.62	9.04
2.30	2.90	3.18	3.26	3.03	3.20	3.58	3.49	3.17	36.37	8.11	9.47	10.27	8.52
1.93	3.32	3.83	3.34	3.78	4.46	4.31	3.27	2.93	37.04	7.24	10.95	12.04	6.81
2.57	3.73	4.27	2.87	3.45	4.10	4.21	4.35	3.20	42.72	9.11	10.36	12.90	10.35
2.56	3.47	3.65	3.43	3.13	2.86	3.16	2.39	2.22	33.41	8.27	10.21	8.41	6.52
1.98	3.88	3.81	3.85	3.45	2.76	3.40	2.59	2.41	34.65	8.09	11.11	8.75	6.69
3.00	3.54	3.83	3.31	2.99	3.40	3.25	2.87	2.27	34.54	9.05	10.13	9.52	5.84
3.25	3.36	3.12	3.05	3.39	2.72	2.99	2.17	1.87	30.40	8.37	9.56	7.88	4.59
2.41	2.23	4.00	4.25	2.60	2.98	3.60	1.80	2.42	34.79	7.51	10.85	8.38	8.05
2.32	2.90	3.39	2.81	2.88	2.51	2.58	2.11	1.77	28.23	6.99	9.08	7.20	4.96
2.42	4.91	3.74	3.30	3.47	2.83	3.13	2.82	2.56	37.92	9.64	10.51	8.78	8.99
3.64	3.88	4.62	4.85	4.03	4.04	4.21	4.10	3.76	47.62	11.05	13.55	12.35	10.66
2.83	3.63	4.28	4.62	3.71	3.54	3.44	3.85	3.68	43.09	9.53	12.61	10.83	10.12
3.66	4.22	4.69	5.46	4.63	4.29	4.73	4.23	4.05	51.70	12.82	14.78	13.25	13.85
4.42	3.78	5.04	4.47	3.76	4.29	4.46	4.23	3.55	45.06	10.80	13.27	12.98	8.01
2.70	3.36	3.71	3.79	3.47	3.22	3.50	3.11	2.81	37.52	8.80	10.96	9.84	7.91

shows that the series may practically be considered as continuous. † Stations designated U. S. Weather Bureau.

rected by comparison with adjacent stations possessing longer records.

IV. PRECIPITATION.

ANNUAL FLUCTUATIONS OF RAINFALL.

The fluctuations in the average or normal amount of rainfall from month to month do not occur in a uniform manner over the entire area of New York, but must rather be classed under several quite distinct types depending upon atmospheric conditions which have already been summarily described in section I. The character of various types and their important modifications are shown in considerable detail by plates 2 and 3. It may be noted that the irregular lines in the diagrams have no meaning other than as connecting the points on the ordinates or verticals representing the average monthly rainfall.

A close approach to the continental type of rainfall, with its early summer maximum, is found over the central plateau regions (including the eastern and western plateaus and the southern Adirondack region) as represented by Cooperstown. Proceeding eastward to the central Hudson valley, a July maximum is found which extends through the Champlain valley and over the Province of Quebec. In the southern Hudson valley the maximum varies from July to August, while south of the Highlands the August maximum obtains almost exclusively; also extending over Long Island to Setauket, but disappearing at East Hampton and Block Island. The Great Lakes and St. Lawrence valley show a June or July maximum, which, however, is secondary to that of autumn.

Autumn rains.—Over the State, generally, a large precipitation obtains in October, as compared with the months immediately preceding and following. This constitutes the principal maximum of the year at several stations of the St. Lawrence valley, the central part of the Great Lake Region, central Long Island and beyond the limits of New York, in New Brunswick, Nova Scotia and Ontario. Within this State and October minimum is found only in the vicinity of New York city, but is a feature common to the coast south of that point, and also obtains at several places in the interior of New England. A relatively light rainfall during September is characteristic of the State at large, whereas in the Upper Lake region the general autumn maximum occurs during that month. Erie, Pa., shows a November maximum, which feature also prevails in the Ohio valley.

Over the greater part of the interior of New York the precipitation during the winter is the least of the year. Block Island on the contrary has its annual maximum at that season, while the coast stations generally appear to be about equally subject to continental and maritime influences, showing but slight seasonal variations. This is also true, in even a greater degree, of the region bordering the Lower Lakes, and Rochester may be taken as an example in which an annual fluctuation is almost wholly lacking. Oswego has a principal maximum in June, and a secondary in autumn and early winter, but the latter becomes predominent at Palermo a few miles to the eastward, and attains a remarkable intensity along the ridge running parallel to the lake in Lewis county.

In the spring a March maximum is very pronounced at the Atlantic coast stations, and is also observable inland in a lesser degree. A diminution again occurs in April, after which the curves of the continental type rise towards their summer maximum, corresponding to the change of prevailing winds from northerly to southerly which occurs in May.

The distinction between a continental and maritime rainfall may admit of the following summary statement: Since precipitation is largely the result of an upward motion and consequent cooling of air masses, it will occur on the continents in summer when a high temperature renders diurnal convectional processes most active, and the prevailing winds also are such as to afford an abundant supply of vapor. Over or near large bodies of water, on the other hand, the daily convectional process is weak, and hence such regions are mainly dependent for their rainfall upon the powerful updraught of air within cyclonic storms, which are most numerous in winter. These conditions are sufficiently illustrated by the accompanying figures in which Cooperstown represents, approximately, the continental type, Block Island the maritime, and Palermo, in the Great Lake Region, a maritime type varied by a secondary summer maximum.

THE AMOUNTS OF ANNUAL RAINFALL

in different sections of the State are mainly determined, first by proximity to sources of vapor, vapor-laden air currents; and secondary, by the character of local topography. In the case of New York State a more definite and substantially correct form of the latter statement is that, under similar conditions, the precipitation is roughly proportional to the altitude of land surfaces. This rule does not apply to the central and southern Atlantic States, whose mountain ridges are parallel to the prevailing direction of vapor bearing winds.

As has been stated, the Atlantic Ocean furnishes the principal vapor supply of the northeastern States. While passing inland with easterly winds the moisture is, in the first place, largely precipitated over the mountains of New England, as is rendered apparent by the extraordinary rainfall on Mount Washington, averaging over 90 inches per annum. A similar effect is no doubt due to the Green Mountain system near the New York border; and hence the lowlands to the westward, including the Champlain and upper Hudson valleys receive a somewhat deficient supply as compared with that of the State as a whole. A marked increase of rainfall is again found in the Adirondack highlands, and beyond these a decrease in the St. Lawrence valley.

Sea-winds from the southeast find no obstruction on the immediate coast of New York; but passing inland meet the abrupt hill ranges of the southeastern counties, and probably give to each a copious rainfall as compared with that of the intervening valleys. Very few observations of rainfall have been made on the eastern side of these ridges; and the above statement rests mainly upon a two years' record of the mountain station Minnewaska, which during that period obtained an excess of fourteen inches over the largest value at any low level station in the vicinity. Liberty, in the mountainous region of Sullivan county, also shows the direct influence of the sea wind both by its large annual precipitation and by a pronounced secondary maximum in winter; the latter feature disappearing at stations further northward.

Western New York receives an appreciable portion of its vapor supply from the Gulf of Mexico, judging from the frequent southwesterly direction of the rain-winds; and also from similarities existing between the rain types of the Lower Lakes and those of the Gulf and the Mississippi and Ohio valleys. The total precipitation over the depressed area occupied by the lakes is rather below the average for the State; but wherever the surface rises abruptly from their shores the amount rapidly increases and considerably exceeds that common to equal altitudes in the interior. The winter maximum appears prominently in a large snowfall over the southwestern highlands and still more so through a section including the hills of Lewis county, the uppre Mohawk valley and an adjacent spur of the eastern highlands in Madison county.

The rainfall in central New York is generally abundant, although somewhat less than that of the southeastern and southwestern highlands. A deficiency, as compared with the average for the State, exists in the principal valleys of the Susquehanna system and also into the depression of the Central Lakes.

No records exist to establish, even approximately, the amount of rainfall in the central Adirondack region. The brief series of observations obtainable from points near the eastern and western limits of the plateau have been carefully analyzed by comparison of individual monthly values with those of the adjacent stations in the Champlain and St. Lawrence valleys, the highlands showing a marked excess in all cases. The amounts of rain in the interior shown by the accompanying charts were estimated from the data of border stations, somewhat modified by the character of local topography.

THUNDERSTORMS.

Summer rains in New York occur to a large extent as thunderstorms, and generally the regions showing pronounced summer maxima are very subject to these electrical disturbances.

The summer of 1892 was remarkable for the frequent occurrence of thunderstorms over the northeastern States, and an investigation which was then undertaken with the aid of numerous voluntary observers has furnished information of value as bearing upon the distribution of rainfall over New York. A preliminary study of the data has shown, first, that thunderstorms develop most frequently in the broken or mountainous sections of the State, and especially in the highlands near the Pennsylvania border and Lake Erie, the Catskill and adjacent mountain ranges, and in the eastern portion of the Adirondack plateau. Regions of less frequent origination are found near the shore of Lake Ontario, in the St. Lawrence valley and on the Atlantic coast.

In all parts of the State the storms move in a generally easterly course, showing, however, considerable divergencies from this direction which are in some degree characteristic of different regions of the State. Thus, in western New York and the St. Lawrence valley the usual movement is toward the north of east, in the central part of the State nearly east, while in the Hudson and Champlain valleys, a southerly component is more frequently found. The average rate of motion of thunderstorms in this State is about thirty miles per hour; the maximum velocity thus far observed being about fifty miles per hour.

The storms which originate in the southwestern section appear in most cases to die out on the middle slopes of the western plateau, and do not often continue their course to the region of Lake Ontario. Hence, the region stretching from northern Erie county eastward to the lower ends of the Central Lakes is one of minimum storm frequency, and has a light annual rainfall. The central part of the eastern plateau, on the other hand, appears to derive a considerable proportion of its storms from the section south of the Central Lakes and near the Pennsylvania border.

Disturbances originating in the Catskill and adjacent mountains usually move across or down the lower Hudson valley, which is therefore a region of great storm frequency; and similarly the storms of the eastern Adirondacks often pass to the St. Lawrence valley. The whole of the interior of the Adirondack region, with its high mountains and numerous streams and lakes, also appears very favorable for the development of thunderstorms, although a sufficient number of observations are still lacking.

SNOWFALL.

The data upon snowfall are very meagre for the State as a whole, and only the most general facts relating to the subject can be given here.

The following measurements of the total depth of snow falling each month during the three past winters are derived from the report of the New York Meteorological Bureau.

TABLE 25.

TOTAL SNOWFALL DURING THREE WINTERS.

STATION.	County.	Depth in Inches and Tenths.		
		1889-90.	1890-91.	1891-92.
Western Plateau.				
Humphrey	Cattaraugus	59.5	94.7	119.8
Alfred Centre	Allegany	28.7	*60.0	73.8
South Canisteo	Steuben	47.2	85.7	80.5
Eastern Plateau.				
Cooperstown	Otsego	37.2	110.0	59.5
Brookfield	Madison	....	145.0	83.5
Quaker Street	Schenectady	....	73.0	60.0
Waverly	Tioga	31.5	88.0	51.9
Northern Plateau.				
Constableville	Lewis	92.0	148.7	170.7
Number Four	Lewis	95.0	90.1	141.2
Saranac Lake	Franklin	*65.0	....	....
Atlantic Coast.				
Setauket	Suffolk	21.5	16.5	17.0
Hudson Valley.				
Honeymead Brook	Dutchess	25.8	72.8	40.6
Champlain Valley.				
Plattsburgh	Clinton	....	61.9	62.1
St. Lawrence Valley.				
Canton	St. Lawrence	62.8	47.3	79.5
North Hammond	St. Lawrence	57.3	....	59.8
Great Lakes.				
Palermo	Oswego	38.0	40.5	54.7
Hess Roads	Niagara	30.2	49.3	60.3
Mohawk Valley.				
Utica	Oneida	85.0	165.0	151.6
Central Lakes.				
Ithaca	Tompkins	34.2	57.1	50.3
Geneva	Ontario	41.4	52.9	53.4

The average values for the three years indicate that substantially the same snow fall obtains over all of the highland regions of the State, with some exceptional cases of very heavy local amounts. The latter are found in the southwestern counties, especially in the vicinity of Lake Erie and in the tract which has previously been described as including portions of Lewis, Oneida and Madison counties, where the total snow fall is generally the greatest to be found east of the Rocky Mountains. As stated in the preceding pages, the southeastern highlands are subject to a heavy precipitation in winter, and owing to the low mean tem-

* One month interpolated.

perature of the region this must fall largely as snow. The winter maximum in the vicinity of the Atlantic coast is manifested in a larger percentage of heavy rains, as is true also in a lesser degree of the Great Lake region. The precipitation in the main portion of the Hudson and Champlain valleys is at a minimum in winter, as already stated, giving only a moderate snow fall for those regions.

The following table exhibits the average and extreme dates of the first snowfall at several representative points in New York. The data were obtained from the first series of Regents' observations, 1826 to 1850, excepting in the case of Signal Service stations.

TABLE 26.

FIRST SNOWFALL. AVERAGE AND EXTREME DATES.

STATION.	County.	Length of record.	Average Date.		Earliest.		Latest.	
			Month.	Day.	Month.	Day.	Month.	Day.
Atlantic Coast.								
East Hampton	Suffolk	16	Dec	3	Nov	14	Dec	29
New York City (U. S.)	New York	13	Nov	16	Oct	15	Jan	4
Jamaica	Queens	22	Nov	24	Nov	4	Dec	18
North Salem	Westchester	19	Nov	16	Oct	4	Dec	2
Hudson Valley.								
Kingston	Ulster	18	Nov	19	Oct	12	Dec	15
Poughkeepsie	Dutchess	16	Nov	20	Oct	12	Dec	17
Albany (U. S.)	Albany	12	Nov	3	Oct	11	Nov	22
Great and Central Lakes.								
Auburn	Cayuga	20	Nov	2	Sept	28	Dec	17
Oswego (U. S.)	Oswego	13	Oct	25	Sept	19	Nov	13
Rochester (U. S.)	Monroe	13	Oct	29	Oct	5	Nov	13
Buffalo (U. S.)	Erie	13	Oct	25	Oct	6	Nov	13
Fredonia	Chautauqua	17	Oct	30	Oct	14	Dec	4
Erie, Pa. (U. S.)	....	13	Oct	25	Oct	6	Nov	13
Ithaca	Tompkins	15	Nov	3	Oct	5	Dec	16
Mohawk Valley.								
Utica	Oneida	21	Nov	1	Sept	28	Dec	3
Central Plateau.								
Middlebury or Dale	Wyoming	17	Nov	1	Sept	27	Nov	29
Hamilton	Madison	18	Oct	15	Sept	22	Nov	12
Cazenovia	Madison	19	Oct	26	Sept	29	Nov	23
Northern New York.								
Fairfield	Herkimer	17	Oct	18	Sept	28	Nov	15
Lowville	Lewis	19	Oct	29	Oct	15	Dec	19
Potsdam	St. Lawrence	20	Oct	30	Sept	27	Nov	26

NOTE.—Records designated (U. S.) were obtained at Signal Service Stations after 1873. Other records were obtained between 1826 and 1850.

FREQUENCY OF RAINY DAYS.

The accompanying table shows the average frequency with which a rain or snow fall amounting to one one-hundredth of an inch or more occurs, during each month, at six stations in New York and also at Block Island, R. I., and at Erie, Pa.; the former station representing, approximately, eastern Long Island and the latter southwestern New York. The rainy days are here expressed in percentages of the total number of days in each month, following the method of the Signal Service charts, from which the values at all stations excepting Ithaca were derived. The period of observation covers eighteen years at Buffalo, Rochester, Oswego and New York city, sixteen years at Erie, Pa., fifteen years at Albany, thirteen years at Ithaca and eight years at Block Island.

TABLE 27.

PERCENTAGE OF RAINY DAYS.

STATION.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total annual number.
Block Island, R. I.	47	44	39	35	38	32	36	29	29	35	39	41	135
New York city	39	39	38	37	34	35	36	32	31	31	34	36	131
Albany	45	43	44	40	40	41	39	31	34	35	43	44	146
Oswego	55	49	40	39	37	36	32	26	35	46	56	55	153
Rochester	65	58	57	42	38	39	37	32	38	47	53	61	171
Buffalo	59	55	55	41	39	39	35	31	38	46	55	59	170
Erie, Pa	65	58	57	44	39	41	33	32	41	51	57	65	178
Ithaca	50	54	46	37	46	40	43	37	37	40	46	50	161

The probability of rain for all portions of the State may be fairly estimated from the averages at these stations, although some local variation must be expected, especially in summer, when local rains and thunderstorms are found to be quite unequally distributed over the State. It will be observed that precipitation occurs most frequently during the winter months at all stations, but, making due allowance for this general tendency, the number of rainy days is found to follow in a general way the fluctuations of the rain curves shown in plates 3 and 4, which fact may aid in the estimation of rain probability for various special localities. Thus, in the hilly regions of southern New York, the lower Hudson valley and the Adirondack highlands, summer rains are more frequent than at any station given in the table. Points at the eastern border of the region of Lake Ontario unite the summer with the winter maximum, and the station North Volney in this section has the unusual number of 189 rainy days during the average year, as stated by General A. W. Greely in "American Weather."

CLOUDINESS.

The average or normal values of cloudiness for the State, like the estimates of rain probability, must be based mainly upon the observations of the National Weather Service. A vast amount of data upon the subject was collected under the Regents' system of observation, from 1826 to 1863; and during the last decade of the series five of the records given in the accompanying table were obtained, by means of tri-daily observations. The methods used prior to 1850 were radically different from those employed in recent years, and hence the results of the two systems do not admit of comparison.

The accompanying table show: (1) The average percentages of cloudiness (over-cast=100 per cent.) which obtain at eight National and five Regents' stations, during each month; and (2) the number of clear, partly cloudy and cloudy days at the same National stations, with the exceptions of Burlington, Vt.

TABLE 28.

PERCENTAGES OF CLOUDINESS. (OVERCAST = 100 PER CENT.)

STATION.	County.	Years' record.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Block Island, R. I.	....	8	55	48	51	45	51	40	43	44	47	49	51	56	47.5
New York city	New York	18	57	51	53	52	51	47	48	47	46	47	51	56	50.5
Liberty	Sullivan	10	62	62	60	57	49	47	44	45	43	52	66	66	54.0
Albany	Albany	15	60	57	61	58	52	48	48	50	50	58	60	70	56.0
Burlington, Vt	....	11	57	58	64	53	56	44	46	40	51	70	61	72	56.0
Hamilton College	Oneida	10	76	74	65	56	48	43	38	36	39	57	75	79	57.0
Homer	Cortland	12	76	76	68	61	54	60	47	47	50	61	80	79	63.0
Elmira	Chemung	8	66	62	54	54	47	52	45	45	51	55	68	66	55.0
Geneva	Ontario	10	71	69	62	58	48	48	42	41	45	58	70	74	57.0
Oswego	Oswego	18	81	74	69	56	51	49	47	47	52	65	80	86	63.0
Rochester	Monroe	18	80	70	69	56	50	48	45	44	49	60	77	83	61.0
Buffalo	Erie	18	77	66	64	56	52	48	48	44	50	60	74	81	62.4
Erie, Pa	....	16	77	66	64	55	52	48	48	44	50	60	74	81	62.4

TABLE

NUMBER OF CLEAR, PARTLY CLOUDY (FAIR),

STATION.	County.	January.			February.			March.			April.			May.		
		C	F	O	C	F	O	C	F	O	C	F	O	C	F	O
Block Island, R. I....	....	8.4	14.2	8.4	9.0	14.0	5.2	10.0	13.6	7.4	11.6	11.6	6.8	10.4	13.6	7.0
New York city.......	New York......	7.6	12.1	11.3	7.8	11.0	9.5	7.3	13.8	9.9	8.2	12.0	9.8	9.3	13.2	8.5
Albany	Albany.........	5.7	12.7	12.6	7.2	10.8	10.2	6.3	13.1	11.6	8.1	11.3	10.6	9.2	13.3	8.5
Oswego..............	Oswego.........	1.1	7.1	22.8	3.1	8.5	16.6	3.9	11.1	16.0	6.7	10.6	12.7	9.1	12.3	9.6
Rochester	Monroe.........	1.3	8.8	20.9	3.1	11.4	14.1	3.7	11.6	15.7	7.4	10.3	12.3	8.7	13.0	9.3
Buffalo	Erie	1.3	9.4	20.3	4.5	10.6	13.2	4.9	12.7	13.4	6.5	11.7	11.8	9.1	12.2	9.7
Erie, Pa...............	....	2.1	10.1	18.8	4.2	10.8	13.2	4.6	12.3	14.1	6.9	13.3	9.8	10.7	12.4	7.9

NOTE.—Periods of observation three years less

29.

AND OVERCAST DAYS AT NATIONAL STATIONS.

June.			July.			August.			September.			October.			November.			December.			Annual.		
C	F	O	C	F	O	C	F	O	C	F	O	C	F	O	C	F	O	C	F	O	C	F	O
13 4	12.0	4.6	12.4	14.6	4.0	9.6	16.8	4.6	12.0	12.3	5.7	11.0	11.7	8.3	8.8	12.5	8.7	6.8	14.7	9.5	124	161	80
8.3	14.9	6.8	7.9	15.8	7.3	9.8	12.5	8.7	10.1	11.7	8.2	10.4	12.7	7.9	8.8	11.4	9.8	6.0	13.5	11.5	101	155	109
9.3	12.8	7.9	9.2	14.7	7.1	11.5	12.7	6.8	9.9	11.8	8.3	7.9	12.3	10.8	4.4	11.1	14.5	3.8	11.3	15.9	92	148	125
8.6	12.4	8.6	9.1	14.9	7.0	9.7	13.3	8.0	7.5	12.0	10.5	5.3	10.3	15.4	1.3	6.4	22.3	0.7	5.5	24.8	66	125	174
8.2	12.3	9.4	8.6	15.0	7.4	10.1	13.4	7.5	8.4	13.0	8.6	6.5	11.1	13.4	2.4	9.0	18.6	0.9	6.7	23.4	66	136	163
8.4	13.6	8.0	9.1	15.7	6.2	10.3	14.0	6.7	8.7	12.6	8.7	6.7	10.3	12.6	2.3	9.2	18.5	0.7	8.2	22.1	73	141	151
9.9	13.2	6.9	10.4	15.3	5.3	11.3	13.8	5.9	9.3	12.2	8.5	7.5	9.2	14.3	1.9	8.6	19.5	1.4	6.8	22.8	80	138	147

than those given in table of percentages.

Chart 14 exhibits, approximately, the annual percentage of cloudiness for all sections of the State; the values for the Adirondack Region, however, being somewhat uncertain, as they depend wholly upon observations at border stations.

The main features of the map are based upon the averages given in the table, with such modifications as have been suggested by comparing and charting the results obtained by numerous voluntary observers during the past three years. The first series of Regents' observations were also found useful when compared among themselves.

The nearly uniform cloudiness over the State in summer is substantially the same in amount as that of the Great Lake Region and the north eastern States in general. It is about five per cent. below the average of the middle Atlantic coast, and from ten to fifteen per cent. above that of the Central States. In winter there is a general increase of cloudiness from the Gulf of Mexico northward, and especially in the region of the Ohio valley. The Great Lakes also become an important source of cloud formation at this season, the entire region from Lake Huron to western New York being subject to more than seventy per cent. of overcast skies, which is the maximum amount for the United States, if a small portion of the northern Pacific coast be excepted. Eastward and southward from the Central Lakes the cloudiness decreases, and on the Atlantic coast the amount is over twenty per cent. below that of the Great Lake Region.

There are many interesting and peculiar features of cloud distribution within New York; but local observations, still inadequate in most cases, have not been sufficiently discussed for publication.

HUMIDITY.

The following values of Relative Humidity (or percentage of moisture relative to saturation) were derived from observations at seven stations of the Signal Service from the opening of the stations (in 1871 in most cases) to 1886.

TABLE No. 30.

Relative Humidity (Per Cent).

STATION.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	**Year.**
Block Island, R. I	76	78	75	76	83	83	82	82	82	79	78	79	**79**
New York city	74	73	68	65	66	69	71	72	72	70	70	73	**70**
Albany	75	74	71	63	62	66	67	68	72	72	74	76	**70**
Oswego	74	74	73	68	67	70	71	71	71	71	71	76	**71**
Rochester	80	77	76	67	64	67	68	68	70	72	76	80	**72**
Buffalo	80	78	75	71	68	71	72	71	72	73	76	79	**74**
Erie, Pa	79	78	76	70	66	70	70	70	72	72	75	79	**73**

Although the absolute amount of moisture in the air is least during the winter, the percentage relatively to saturation (the relative humidity) is then generally at a maximum. At Block Island, however, the northerly winter winds have traversed a lesser expanse of water surface than the southerly or ocean winds of summer, and this circumstance, with the more moderate degrees of heat and cold to which the island is subject, reverses the rule applying to inland stations, causing the maximum humidity to occur during the summer. This is the case also along the south shore of New England and probably over the greater part of Long Island.

The maximum humidity at the Weather Bureau Stations within the State is found at Buffalo, which is subject to prevailing winds from the Lake. The region of least moisture, on the other hand, appears to be the Champlain valley, as shown by a two years' record at Plattsburgh. The conditions are here very dissimilar to those of stations at the same latitude in the St. Lawrence valley, the latter region showing substantially the same humidity which obtains near the Great Lakes.

Definite values of the relative humidity at stations of the State Service are omitted here, owing both to the brevity of their records and to the fact that the hours and methods of observation generally employed by voluntary observers give results which can only be compared with those of the National Service by taking full account of the manner of observation in each case. In the course of preparation of this paper a careful examination was made of the records of humidity published by the State Bureau; but, aside from the facts mentioned regarding the Champlain and St. Lawrence valleys, no local peculiarities in the distribution of moisture were found of a sufficiently marked character to warrant publication until more extended observations can be obtained. In general, there appears to be the usual slight increase of humidity with altitude over the plateau regions, in summer; but otherwise, the values given for the Signal Service stations may be considered to hold true also throughout the adjacent territory.

GENERAL CLIMATIC DATA AND NOTES.

RESUMÉ OF CLIMATIC ELEMENTS AT NEW YORK CITY.

(Values derived from U. S. Weather Bureau records, unless otherwise specified.)

NORMAL TEMPERATURES: Annual, 51.6°; January, 30.6°; July, 73.4°.

Maxima: Average of annual maxima, 94°; highest.......... { 100° in 1881, U. S. station. 101° in 1881, Central Park. 104° in 1825, Fort Columbus.

Minima: Average of annual minima, + 1°; lowest. { —6.0° in 1875 and 1880, at U. S. station. —6.0° in 1880 and 1882, at Central Park. -12.0° in 1866, at Fort Columbus.

Daily variations: Mean daily range: Greatest, 17.0°, in June; least, 13.2°; in December. Daily periodic change, or amplitude, greatest. 11.5°, in June; least, 6.7°, in December. Average variability of successive daily means, in January, 6.5°.

PRECIPITATION: Average annual, 45.31 inches; greatest average monthly, 4.77 inches, in August; least average monthly, 3.05 inches, in May.

Number of rainy days: Greatest, 39 per cent, in January and February; least, 31 per cent, in September and October.

Cloudiness: Annual percentage, 50.5, greatest, 57 per cent, in January; least, 46 per cent, in September.

No. clear days, year ..	101.0	No. p'tly cl'dy d'ys, year..	155.0	No. cloudy days, year ..	109.0
No. clear days, Jan ..	7.6	No. p'tly cl'dy d'ys, Jan ..	12.1	No. cloudy days, Jan...	11.3
No. clear days, Sept..	10.1	No. p'tly cl'dy d'ys, Sept..	11.7	No. cloudy days, Sept...	8.2

Mean relative humidity: Annual, 70 per cent; greatest, 74 per cent, in January; least, 65 per cent, in April.

Average date of first snow, November 16th; average date of first killing frost, November 5th; average date of last killing frost of spring, April 13th.

Average velocity of the wind in miles, per hour:

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
11.0	11.4	11.6	8.9	7.9	7.7	7.4	7.3	8.0	9.5	10.1	10.9.	9.30

RESUMÉ OF CLIMATIC ELEMENTS AT ALBANY.

NORMAL TEMPERATURES: Annual, 48.4°; January, 23.0°; July, 73.6°.

Maxima: Average of annual maxima, 93°; highest......... { 98° in 1890, U. S. station. 100° (?) in 1820, private record.

Minima: Average of annual minima, —11°; lowest.... { —18° in 1875 and 1878, U. S. station. —23° in 1840, Regents' series.

Daily variations: Mean daily range, greatest, 17.9°, in June; least, 12.9°, in December. Periodic change, or amplitude, greatest, 14.6°, in July; least, 5.5°, in December. Average variability of successive daily means in January, 7.6°.

PRECIPITATION: Average annual, 38.80 inches; greatest average monthly, 4.18 inches, in July; least average monthly, 2.54 inches, in February.

Number of rainy days: Greatest, 45 per cent, in January; least, 31 per cent, in August.

Cloudiness: Annual percentage, 56.0; greatest, 70 per cent, in December; least, 48 per cent, in June and July.

No. clear days, year..	92.0	No. p'tly cl'dy d'ys, year....	148.0	No. cloudy days, year...	125.0
No. clear days, Dec...	3.8	No. p'tly cl'dy d'ys, Dec....	11.3	No. cloudy days, Dec ...	15.9
No. clear days, June .	9.3	No. p'tly cl'dy d'ys, June...	12.8	No. cloudy days, June..	7.9

Mean relative humidity: Annual, 70 per cent; greatest, 76 per cent, in December; least, 62 per cent, in May.

Average date of first snow, November 3d; average date of first killing frost, October 23d; average date of last killing frost of spring, April 13th.

Average velocity of the wind in miles, per hour:

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
6.7	7.1	7.8	6.7	6.2	5.9	5.6	5.0	5.2	6.1	7.0	7.0	6.35

RESUMÉ OF CLIMATIC ELEMENTS AT ROCHESTER.

NORMAL TEMPERATURE: Annual, 46.8°; January, 24.1°; July, 70.5°.

Maxima: Average of annual maxima, 92°; highest { 98° in 1881, U. S. Record. 102° in 1845, Regents' and private records.

Minima: Average of annual minima, -6°; lowest. { —12° in 1873 and 1875, U. S. records. —14° in 1861, Regents' and private records.

Daily variations: Mean daily range, greatest, 19.5°, in June; least, 14.5°, in January. Daily periodic change, or amplitude, greatest, 12.5°, in June; least, 4.0°, in December. Average variability of successive daily means in January, 7.4° (approximately).

PRECIPITATION: Average annual, 35.06 inches; greatest average monthly, 3.32 inches, in June; least average monthly, 2.43 inches, in September.

Number of rainy days: Greatest, 65 per cent, in January; least, 32 per cent, in August.

Cloudiness: Annual percentage, 61.0; greatest, 83 per cent, in December; least, 41 per cent, in August.

No. clear days, year ..	66.0	No. p'tly cl'dy d'ys, year...	136.0	No. cloudy days, year.	163.0
No. clear days, Dec...	0.9	No. p'tly cl'dy d'ys, Dec....	6.7	No. cloudy days, Dec..	23.4
No. clear days, Aug...	10.1	No. p'tly cl'dy d'ys, Aug....	13.4	No. cloudy days, Aug.	7.5

Mean relative humidity: Annual, 72 per cent; greatest, 80 per cent, in January and December; least, 64 per cent, in May.

Average date of first snow, October 29th; average date of first killing frost, October 15th; average date of last killing frost of spring, May 5th.

Average velocity of the wind in miles, per hour:

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
13.8	12.7	12.2	11.2	10.0	8.8	8.0	7.9	9.4	10.4	11.8	12.1	10.68

RESUMÉ OF CLIMATIC ELEMENTS AT BUFFALO.

NORMAL TEMPERATURE: Annual, 46.3°; January, 24.1°; July, 69.9°.

Maxima: Average of annual maxima, 88°; highest, 94°, in 1887.

Minima: Average of annual minima, —4°; lowest, —16°, in 1875.

Daily variations: Mean daily range, greatest, 15.4°, in May; least, 12.2°, in December. Daily periodic change, or amplitude, greatest, 10.8°, in August; least, 3.7° in December. Average variability of successive daily means, 7.4° (approximately).

PRECIPITATION: Average annual, 38.14 inches; greatest average monthly, 3.93 inches, in October; least average monthly, 2.48 inches, in April.

Number of rainy days: Greatest, 59 per cent, in January and December; least, 31 per cent, in August.

Cloudiness: Annual percentage, 62.4; greatest, 81 per cent, in December; least, 44 per cent, in August.

No. clear days, year ..	73.0	No. p'tly cl'dy d'ys, year...	141.0	No. cloudy days, year.	151.0
No. clear days, Dec...	0.7	No. p'tly cl'dy d'ys, Dec....	8.2	No. cloudy days, Dec..	22.1
No. clear days, Aug...	10.3	No. p'tly cl'dy d'ys, Aug....	14.0	No. cloudy days, Aug.	6.7

Mean relative humidity: Annual, 74 per cent; greatest, 80 per cent, in January; least, 68 per cent, in May.

Average date of first snow, October 25th; average date of first killing frost, October 15th; of last killing frost of spring, April 30th.

Average velocity of the wind in miles, per hour:

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
14.8	13.5	11.8	9.7	9.1	8.6	8.3	8.6	9.1	10.6	13.5	14.0	10.98

V. HISTORICAL NOTICES OF THE WEATHER IN AND NEAR NEW YORK.

The following statements are derived mainly from Blodgett's Climatology of the United States; and from the statistics presented by Mr. J. C. Smock in the Climate of New Jersey. (Data from the former source are designated by the reference (B.) and from the latter by (S.).)

1717. In 1717 the "great snow" occurred, which is often mentioned in New England history of that date. It continued for several days, February 19th to 24th, and remained five or six feet deep on a level at Boston, and over all the settled parts of New England. This winter is the most conspicuous, if not the only one noted for extreme cold prior to 1740. (B.)

1740. The winter of 1740–41 was distinguished both in the United States and Europe for intense cold. Jefferson speaks of it as having been in Virginia only less severe than that of 1779–80. The Boston News Letter of March 5th says: "We hear from Stratford, Conn., that the Sound is frozen over three leagues across, so that people ride every day thence to Long Island." In a subsequent number a certificate of several persons appears, testifying that they had crossed the Connecticut river on the ice and with horses, on the 1st of April. (B.)

The following is from the diary of Col. A. Hasbrouck, of Kingston, N. Y., extracts from which were published in a recent issue of the New York Times: "In the year of our Lord 1740–41, that winter began the beginning of December, and continued to the last of March, 1741, and we rode over Hudson's river with horses and sleighs * * * to the 20th of March."

1754–5. Winter unusually mild. Troops sailed from New York to Albany in January and February. (S.)

1780. In 1780 the most signal and severe depression of temperature occurred belonging to our entire history, excepting, perhaps, that of 1856. * * * Webster remarks an immense snowfall in New England; "for six weeks no snow melted. The Sound was entirely covered with ice between Long Island and the main, and between New York and Staten Island." (B.)

"The winter began the beginning of December, 1779, and continued to the latter end of March, 1780. A very deep snow, above three feet and more, and driven up in heaps, in many places six and seven feet high * * * and so severe a cold for most part of the winter that the like has never been known by the oldest living in this country, and continued to near the latter end of March, 1780." "People did ride with horses and sleighs from New York to Staten Island, * * * and from New York to Paulus Hook and Bergen and also to Long Island, and did ride upon the ice from New York to Albany, and further, and also crossed the Sound upon ice from New London to Long Island with carriages of burden, which has never been known to have been done before. The snow was not as deep as in the hard winter, so called, in the years 1740–41, but much colder and of longer continuation." (Hasbrouck.)

1784–5. "The winter began about the middle of December, 1784, and continued to the 15th of April, 1785, so that the fields were yet covered with snow and people rode across the Hudson river at the mouth of Rondout kill the 5th day of April, 1785, with horses and sleighs upon the ice, and men walked across upon the ice until the 9th of April." (Hasbrouck.)

1805–6. An open winter; Hudson river free from ice February 20th. (S.)

1810. Hudson river open until January 19th. (S.)

1812–16. From May to September, 1812, each month was from 3.6 degrees to 7.2 degree below the average (at Cambridge, Mass.) * * * a refrigeration equaled for two months only, June and July of 1816, which were 5 degrees and 5.8 degrees below. In the Northern States snows and frosts occurred in every month of both summers; Indian corn did not ripen; fruits and grains were greatly reduced in quantity or wholly cut off. * * * In England, 1816 was almost as extreme as in the United States. (B.)

1820–21. In New York the winter of 1820–21 was also "one of the four during a century in which the Hudson between Paulus Hook and New York was crossed on the ice. (Caldwell.)" (B.)

1826–35. "On February 22d, 1826, mercury solidified at Plattsburgh, N. Y., a condition requiring a reduction to –40½ degrees, and in January, 1835, mercury froze at Lebanon, N. Y." (Hildreth.) "In the winter of 1835–36 the thermometer was below zero on twenty-six days." (Fisk.) In many parts of New England snow remained uninterruptedly from December until May. * * * Long Island Sound was closed by ice. "The summer months of 1835 were nearly as severe as those of 1812 and 1816." (B.)

1852. In January the East River at New York was closed and crossed on the ice on the 20th and for three days following. (B.)

1853. A warm year * * * winter of 1852–53 one of the warmest on record and very wet, the winter rainfall at Newark having been 15.85 inches. (S.)

1856. In 1856 a period of severe cold continued for nearly three months, the greatest refrigeration occurring between the 25th and 28th parallels. Long Island Sound was closed to navigation from January 25th to February 27th and the harbor of New York was much obstructed by ice, which several times made temporary communication across the East River. (B.)

1857. An excessive cold January and summer. On January 24th the temperature at Troy was –33.

(It has been remarked that it is impossible to use the state of the rivers and harbors at the present time as any measure of the relative strength of cold, when compared with early records, owing to the breaking up of the ice now effected by steam craft.)

Mr. John Hulburt, of Arkport, Allegany county, N. Y., has kindly furnished the writer with extracts relating to the weather from a journal kept by him continuously since 1846. The following notes will be of interest here:

1841. The first fall of snow for the year was on April 20th-21st.

1842. An open winter and early spring. * * * Frost June 1st, killed all fruit.

1843. Snow fully three feet deep in woods.

1844. A very prolific year.

1845. May 30th, ice three-fourths inch thick.

1846. Winter very cold, deep snow which lay on till March. Killing frost May 22d; corn replanted, giving a fine crop.

1847. A very cold and backward year. Not a leaf to be seen on May 1st. A fine fruit year.

1849. On the 28th of December two feet of very wet snow fell, blockading all roads. Sleighing remained until March.

1850. Hard snow storm May 28th, and very cold. * * * From July 14th to August 9th, rain fell every day. All the wheat sprouted in shock. No such harvest weather known about here before or since.

1851. Cold and fair; sleighing all winter.

1852. June 5th corn all cut down by frost; ice one-quarter inch thick.

1853. The summer of 1853 was noted for the "great drought;" no rain to speak of for three months, May, June and July. No frost from April to September 29th. The winter of 1853–4 was remarkably mild, with only two weeks sleighing.

1854. For twelve days in July the mercury stood at 95 degrees and over in the shade, and for eighteen days it was over 90 degrees. That was the hottest summer I ever knew, * * * It was followed by a cold fall and early snow.

1855. The "heated term" of '54 was followed by a remarkably cold February, the mercury falling below zero fourteen mornings out of the twenty-eight, and fine sleighing till March 6th.

1856. Opened cold and kept it up all winter and well into April. Sleighing good from January 5th to April 3d. On the latter date I find this record "south wind and rain, the first drop in 100 days." Several times that winter the mercury was 30 degrees below zero; the 14th of February, 32 degrees below. It was a winter long to be remembered for extreme cold. August was very cool and September very warm till the 29th.

1857–58. Plows ran in January, in fact some farmers about here plowed every month that winter.

1859. January and February were noted for absence of snow and mild weather; roads very dry all through March and much plowing done. On April 23d I find this record: "Snowed hard all day, and wind blew a hurricane—more snow fallen to-day than all winter—and plump eight inches deep to-night." May 7th, 90 degrees at 2 p. m., a remarkably warm month. June 4th, cold, with rain and snow; June 5th, ice one-quarter inch thick. The forest leaves were almost full size, and before noon were a butternut color. Early wheat and corn cut down. Another hard freeze on the 11th and a still harder one on the 12th, but nothing left to kill.

1860. A mild winter, plowing all done in April.

1861. August 2d, thermometer at sunrise 80 degrees, 94 degrees at noon, 100 degrees at 2 p. m.; the warmest day I ever saw. A remarkably warm fall; December 9th and 10th thermometer at 80 degrees.* Sheep in pasture till December 21st, which is unprecedented.

* The temperature on these dates were remarkably high throughout New York, the maximum noted at stations of the Regents' system being 64 degrees.—ED.

1862. The record of April 1st is: An immense body of heavy snow on ground two feet deep; three months good sleighing.

1863. Very hot and wet summer; fine crops.

1864. Very hot and dry in July.

1865. Cherries in full bloom April 27th. A warm and dry summer.

1865–6. No snow to make sleighing.

1867. One foot of snow January 20th remained till March. Rain fell on twenty-eight days in May. Summer months fine for grain—wheat never better.

1868. The average temperature for July the highest I ever knew. No rain to reach potatoes till August 20th.

1868–9. Good sleighing all winter, and until March 24th. Coldest summer and most rain I ever knew. The coldest November on record.

1870. Thermometer at 0 degree but three mornings all winter. Only ten days sleighing. A very warm spring and summer. Plowing till December 16th.

1871. February 5th, 30 degrees below zero at 6 a. m. and 10 degrees below all day. Early spring.

1872. Great drouth in May, and very hot and dry all through June.

1874. A very open winter, with but little snow. Temperature below zero several days in April. A hot summer followed.

1875. Begins with thermometer at zero and keeps very cold all winter. Ice-houses all filled after March 20th with ice over two feet thick. Year closed with the thermometer at 80 *degrees.

1876. New Year's day the warmest on *record. No snow till February 15th, and then only a flurry. Very warm in July and up to August 21st.

1877. January 14th: "Scarcely a day since Christmas that it has not snowed; snow four feet deep in the woods, and very solid. A great many roofs falling in." A fine year for corn.

1878. A very warm March. Cherries in bloom April 23d.

* Maximum temperature at Ithaca on December 31, 1875, was 59 degrees; January 2, 1876, 64 degrees.

1879. Cold winter and good sleighing. Cold, backward spring.

1881. Cold until the middle of April. Very dry until October, and then very wet and warm balance of year.

1882-83. Heavy snow storm November 26th, lies on all winter; very cold and backward spring.

1884. From August 4th till 21st the thermometer was 90 degrees and over every day. December closes very warm.

1885. April 1st: "My thermometer has marked zero and below forty-five times since January 1st." May was a warm, lovely month.

1885-6. A remarkably mild winter; plowing mostly completed in March.

1887. Fine, open winter; no sleighing. A hot July on an average, but winter clothing necessary on the 10th. Very open weather until the middle of December.

1888. A very mild winter; severe blizzard on March 12th and 13th.

1889. A mild January and very changeable weather in February. Grain all sowed in March. May 29th, thermometer 26 degrees; grass, garden stuff and potatoes all cut down. June 1st, water two feet higher than I ever saw it on the Canisteo river and another flood June 17th.

1890. The year opens warm, and January closes with a temperature of 68 degrees (the temperature obtained also at the Weather Bureau station at Erie, Pa. *Ed.*). The warmest and wettest winter on record; not a sleigh seen all winter.

1891. A winter of frequent rain and snow.

1892. Good sleighing nearly all winter. A remarkably fine year for farmers.

The following remarks of Dr. J. Hyatt, of Dutchess county, have a bearing upon the question, "Is our climate changing?" "It is important to note that killing frosts and all sorts of quick or extensive ranges of temperature or precipitation (including, perhaps, in a lesser degree, pressure changes) have greatly increased within my own adult experience of fifty-five years, and that these injurious effects have advanced in full proportion, if not more, with deforestation. In this locality there is not more than one-half the tree and forest growth standing, compared with what existed fifty-five years ago."

VI. DERIVATION OF TEMPERATURE AND RAINFALL NORMALS.

The temperature and rainfall data given in the preceding pages were derived from the following sources:

1. Observations taken at various academies of the State between the years 1826 and 1868, under the supervision of the Board of Regents of New York. The results were published in two volumes, the first covering the period 1826-1850 and the second from 1850-1868.

2. Monthly and annual normals given in Nos. 277 and 353 of the "Smithsonian Contributions to Knowledge," published in 1876 and 1881. The data presented in these works were derived by Mr. C. A. Schott from all available sources, including the first series of New York Regents' reports, the records taken under the supervision of the Smithsonian Institution, the U. S. Army and the U. S. Patent Office.

3. Records of stations of the National Signal Service and Weather Bureau.

4. The reports of the New York State Meteorological Bureau, issued monthly, 1889-1892, from Cornell University.

5. Miscellaneous records published in the United States Weather Review or furnished to the writer by independent observers.

TEMPERATURE NORMALS.

Owing to the large differences which obtain between the temperature of the same month in successive years, reliable average or normal values can be derived only from records extending over a long period. Such records are not numerous in this State; and few of those which exist have been obtained under precisely the same circumstances from first to last. Satisfactory values can, however, be determined for a few points in various sections of the State and the normals of adjacent stations may be derived from these by comparing the shorter with the longer records month by month, since the differences between the temperatures at adjacent stations are much more constant than the temperatures themselves. But before using this method it is necessary to ascertain the limits of distance within which the temperatures have a similar variation, especially in a region situated, like New York, near the usual path of storms. For example, a cyclonic depression passing south of this State may give a warm wave over the southern counties, while anticyclonic conditions and extreme cold prevail in the northern section. Further, the inversion of temperature, or decrease with height, occurring within anticyclonic areas, is frequently the source of deviation from the usual thermal relations between highland and valley stations.

TABLE No. 31.

Variability of Monthly and Annual Mean Temperature.

STATIONS.	Latitude N.		Longitude W.		Year's record.	Mean Variability in Degrees Fahrenheit.					Probable Error of Mean or Normal.				
						January.	February.	July.	August.	Year.	January.	February.	July.	August.	Year.
	Deg.	Min.	Deg.	Min.		Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg	Deg.	Deg.	Deg.
1. Potsdam	44	40	75	01	21	4.3	4.3	2.0	2.1	1.1	0.80	0.80	0.40	0.38	0.20
2. Lowville	43	47	75	30	20	4.3	4.0	1.8	1.4	0.8	0.80	0.62	0.30	0.25	0.18
3. Rochester	43	08	77	42	21	3.8	3.8	1.2	1.6	1.4	0.71	0.70	0.23	0.32	0.27
4 Lewiston	43	11	79	04	17	3.5	3.6	2.0	1.8	1.5	0.73	0.74	0.41	0.37	0.31
5. Cazenovia	42	56	75	54	20	3.7	4.0	1.6	1.3	1.0	0.71	0.76	0.31	0.25	0.19
6. Cooperstown	42	41	74	57	38	4.4	4.0	2.4	2.3	1.0	0.59	0.54	0.40	0.37	0.16
7. Fredonia	42	27	79	21	18	3.6	4.5	2.0	2.2	1.0	0.74	0 93	0.41	0.45	0.20
8. Flatbush	40	40	73	56	24	3.4	3 7	1.4	1.4	1.1	0.57	0.63	0.24	0.24	0.19
9. Central Park	40	44	74	00	23	3.7	3.2	1.8	1.9	1.1	0.68	0.58	0.33	0.35	0.20
Mean of 3, 6 and 9	....		....		...	4.0	3.7	1.8	1.9	1.2	......	......	......	......	......

TABLE No. 32.

Variability of Temperature Differences.

PAIRS OF STATIONS.	Number of years compared.	Distances between stations.	Difference of elevation.	Variability of Temperature Differences.					Probable Error of Mean Temperature Differences.				
				January.	February.	July.	August.	Year.	January.	February.	July.	August.	Year.
		Miles.	Feet.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
1. Flatbush — Jamaica	24	8	24	1.1	0.9	0.9	1.0	0.8	0.19	0.16	0.17	0.18	0.14
2. Albany — Kinderhook	17	20	5	0.7	0.7	0.7	0.5	0.4	0.14	0.15	0.16	0.11	0.08
3. Rochester — Oswego	7	63	317	0.7	0.8	0.4	0.3	0.3	0.24	0.28	0.14	0.10	0.10
4. Rochester — Buffalo	18	66	70	0.4	0.6	0.6	0.6	0.5	0.08	0.12	0.12	0 12	0.10
5. Rochester — Ithaca	13	75	220	0.8	1.0	0.7	0.6	0.3	0.18	0.30	0.17	0.16	0.08
6. Rochester — Gouverneur	10	140	220	2.5	1.0	1.1	1.9	0.6	0.66	0.27	0.32	0.47	0.16
7. Flatbush — Potsdam	21	275	250	2.4	2.1	1.9	1.7	1.1	0.44	0.40	0.37	0.32	0.20
8. Ithaca — Cooperstown	11	83	450	0.9	1.0	0.7	0.9	0.4	0.24	0.25	0.18	0.24	0.10
9. Pompey — Cazenovia	13	10	600	0.7	1.2	0.8	1.4	0.6	0.17	0.32	0.17	0.34	0.16
10. Pompey — Cherry Valley	13	68	550	1.3	1.4	1.5	1.3	0.4	0.32	0.34	0.36	0.32	0.10
11. Central Park — Rochester	21	260	524	1.2	1.3	1.5	1.3	0.8	0.21	0.22	0.28	0.23	0.16
12. Central Park — Cooperstown	23	150	1,203	1.1	1.5	1.4	1.2	0.5	0.19	0.25	0.24	0.21	0.08
13. Central Park — Burlington, Vt	23	270	303	1.3	1.6	....	....	....	0.28	0.34	......	......	......

In order to obtain a numerical expression of the reliability of the normals as derived both from independent records and by comparison with adjacent stations, a method developed and extensively used by Dr. J. Hann was employed, the results of the computations appearing in tables 31 and 32. The mean variability of temperature, as shown in table 31, is the average difference between monthly or annual normals and the individual values from which the normals are derived. In the same way, table 32 gives the average variability to which the temperature differences between several pairs of stations are subject.

To determine the probable error of the means or normals obtained from data subject to the given degrees of variation, the following modification of Peters' formula* is used: $r_m = .845 \frac{V}{\sqrt{n-1}}$; where r^m is the probable error of the mean of normal, V is the average deviation from the mean value, or the variability, and n is the number of years covered by the record.

The maximum variability of means was found by a trial of several records to be fairly represented by the values for January and February, and the minimum by those of July and August. The character of the variation of differences is also best indicated by the midsummer and midwinter rates, and hence only the above four months and the year are included in the tables. It will be seen that the normal of Cooperstown, whose record is the longest of the series, is liable to errors, amounting to 0.6 degrees in winter and 0.4 degrees in summer, while at the remaining stations the uncertainty is considerably greater than at Cooperstown during the winter months. In several cases, however, errors of observation, or in the published records, undoubtedly affect the results to some degree; hence the average variability at the foot of the table is derived from three stations whose data were known to be reliable, rather than from the entire number. For the same reason, only the pairs of stations in table 32 num-

* Reducible substantially to Fechner's formula used by Dr. Hann. A strict accuracy would require the probable error of the variability itself to be taken into account, but this is not necessary in the present case.

bered 3, 4, 5, 6, 7, 8, 11 and 12 can be fully relied upon as determining the variability of actual temperature differences. The results of pair No. 13 are also undoubtedly reliable for the winter months.

A glance at the tables suffices to show the great stability of differences between regions as widely separated as the Atlantic Coast and the Great Lakes, or the Coast and the lower Champlain valley; and also, in the case of Cooperstown and Central Park, proves the effect of differences of altitude to be small in Central New York. Thus, while a single normal derived from a record of thirty-eight years is subject to a probable error of 0.6 degrees, a system of concurrent observations extending over twenty years would suffice to reduce the uncertainty of differences between even remote stations to about half of that amount.

The case may also be stated thus: Adopting 4.0 degrees as the average variability for January, a record of forty-five years is found necessary to reduce the probable error of the normal to 0.5 degrees; whereas, with a variability of differences as great as 1.6 degrees between Central Park and Burlington, only ten years are required to reduce the relative error to the same amount.*

In view of the advantages thus to be derived from the use of a series of records embracing the same years at a large number of stations, an effort was made at the beginning of this investigation to deduce the normals from the first series of Regents' observations at the academies of the State during the period 1826–1850. All of the longer records were examined and compared, month by month, and in this manner a large number of errors (many of which are systematic) were detected in the published tables. In a few cases the records proved to be quite satisfactory (notably those of Albany, Kinderhook, and in a lesser degree, Rochester). It is a peculiarity of these early observation, not easily explained, that the mean temperatures for January are

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*The above formula may be transformed to $n=0.71\frac{V^2}{R^2}$; where V is the variability, R is a definite value of the probable error (n this case 0.5°), and n is the number of years required to reduce the probable error to the given amount.

almost uniformly too high, in a large number of cases exceeding the values for February. Many of the defects are, no doubt, due to the difficulty of making the first observation precisely at sunrise, and to the variable hour of the last observation, one hour after sunset.*

In the second period of the Regents' system of observations, between 1850 and 1868, fixed hours were employed to advantage, and several valuable records have been obtained from this series.

It was finally decided to base the system of normals upon recent observations, in which standard instruments were employed under known conditions of exposure. Continuous records at the stations, Central Park, Cooperstown and Rochester, each covering the period 1871–1891, were used as the standards of the system. All shorter records were compared with these, month by month, and the relation between the temperature conditions of the standard and secondary stations thus determined. The normals in the table are then to be considered as applying to the twenty-one year period, even for observations made prior to 1870, as it was still possible to compare these with the record of Cooperstown.

Several records of great merit are not credited in the table of normals with the full periods over which their observations extend, since the continuity of the series was broken by important changes in the location of thermometers, as became apparent at once upon comparison of successive monthly and annual values with the records of adjacent stations. In nearly all cases of this nature the means given in the table were derived from the later portions of the records.

The results of table 31 show the mean of a twenty-one years' period to be liable to a maximum deviation of 0.8 degrees from the true normal. The record of Cooperstown might be considered to afford a basis for the reduction of the whole system to a thirty-eight year period, with a maximum error of 0.6 degrees; but it was deemed best not to attempt this upon the authority of a single record. The twenty-one and thirty-eight years' averages for

* In many cases, irregularities in the temperature records appear to be due to a change of observers.

Cooperstown in general show a fairly close agreement; the maximum deviation being 0.9 degrees in May, and that of the annual mean 0.3 degrees.

It will be seen, finally, that a thoroughly satisfactory determination of normals for the entire State can not yet be made. Many important localities are represented by but four years of observation, giving an average relative error of from 0.5 degrees to 1 degree for the State at large. The observations now being carried on at numerous stations by members of the State Weather Service may be expected to supply the needed data in the course of a few years.

AVERAGE RAINFALL.

The average values of rainfall given in table 14 were derived from nearly all available records of a length sufficient to subordinate accidental to permanent features. The monthly and annual totals for each station were examined, and a few obviously incorrect values were omitted from the computations; while records having large systematic differences from those of neighboring stations were rejected altogether, unless all of the conditions attending the observations were known to be satisfactory. In most cases however, the records show a general agreement as to the characteristic features of rainfall distribution over the State and also conform to definite types of annual fluctuation; from which it is concluded that accidental errors are not so numerous as to very materially affect the averages. In the majority of cases the observations were made under the direction or general supervision of the Board of Regents or the Smithsonian Institution, and observers were supplied with gauges of a satisfactory pattern.

An estimate of the reliability of permanence of the averages of table 24 will be of value here. As the result of an extensive investigation of many hundreds of records obtained from all parts of the world, Mr. A. Binnie of the Institute of Civil Engineers of Great Britain gives the following probable errors of annual rainfall averages covering various periods:

The probable error of a 35 years record is 1.78 per cent. of the annual amount.

The probable error of a 30 years record is 2.26 per cent. of the annual amount.

The probable error of a 25 years record is 2.75 per cent. of the annual amount.

The probable error of a 20 years record is 3.24 per cent. of the annual amount.

The probable error of a 15 years record is 4.75 per cent. of the annual amount.

The probable error of a 10 years record is 8.22 per cent. of the annual amount.

These values were generally found to include both irregular and possible secular variations of rainfall. As the uncertainty of monthly averages is not given, a rough estimate is here attempted by the method of variability, as explained in the case of temperature normals. The average deviations of the single monthly values from their means were found to be as follows for the thirty-eight years record of Cooperstown

The average variability of rainfall for January=34 per cent. of the total.

The average variability of rainfall for February=42 per cent. of the total.

The average variability of rainfall for June=36 per cent. of the total.

The average variability of rainfall for July=32 per cent. of the total.

Mean for the four months=35 per cent. of the total.

From the mean variability, 35 per cent., the following probable errors of the average monthly values are found by the formula of page 513:

For a 40 years record the probable error of monthly means =6 per cent.

For a 30 years record the probable error of monthly means =6 per cent.

For a 20 years record the probable error of monthly means =8 per cent.

For a 15 years' record the probable error of monthly means =10 per cent.

For a 10 years' record the probable error of monthly means =12 per cent.

As stated, these values are but rough approximations, since the departures from rainfall averages do not fully meet the definition of residuals as employed in the method of least squares.

All records under ten years in length were corrected for the general excess or deficiency of rainfall during their period by comparison with the nearest station having an established normal, no correction being attempted, as a rule, for longer series. A few four and five years' averages have been admitted when longer records were lacking, in case the deviation from neighboring stations was of a somewhat constant character, as, for example, in comparing the rainfall of the Adirondack plateau with that of the Champlain valley, an excess in the rainfall of the former over the latter region was almost uniformly noted in the case of individual months.

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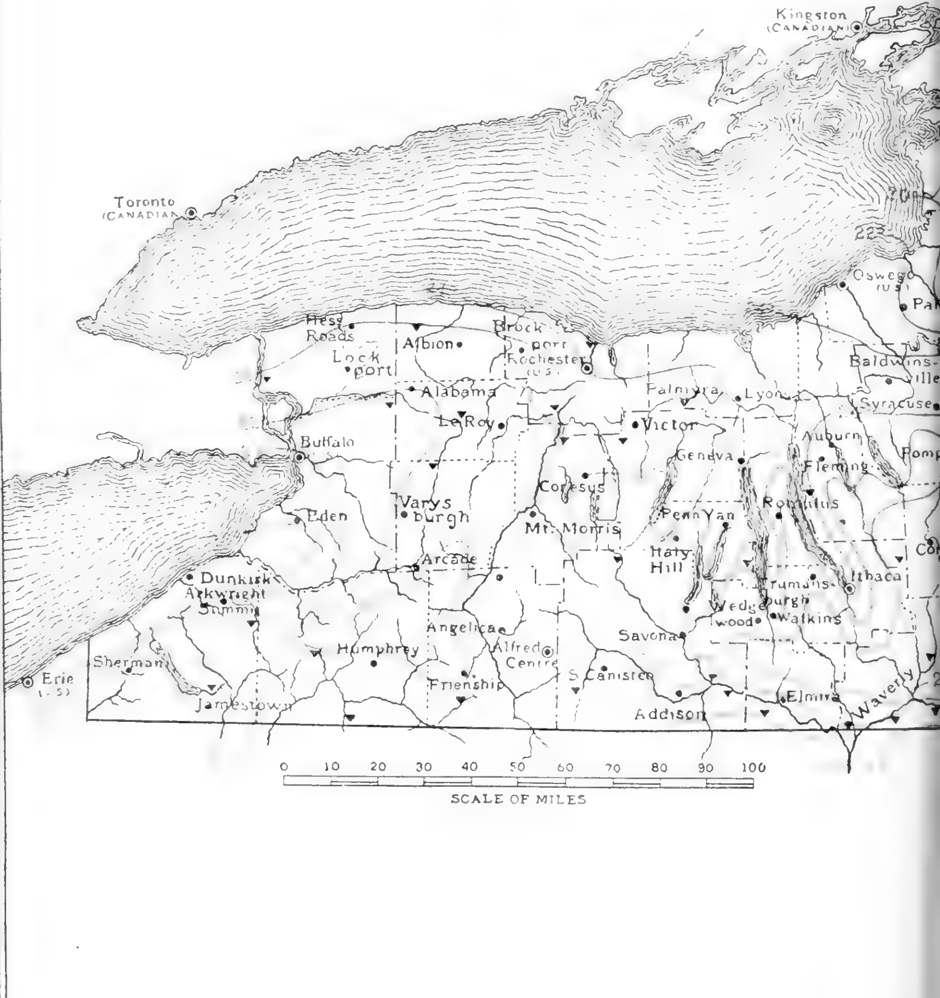
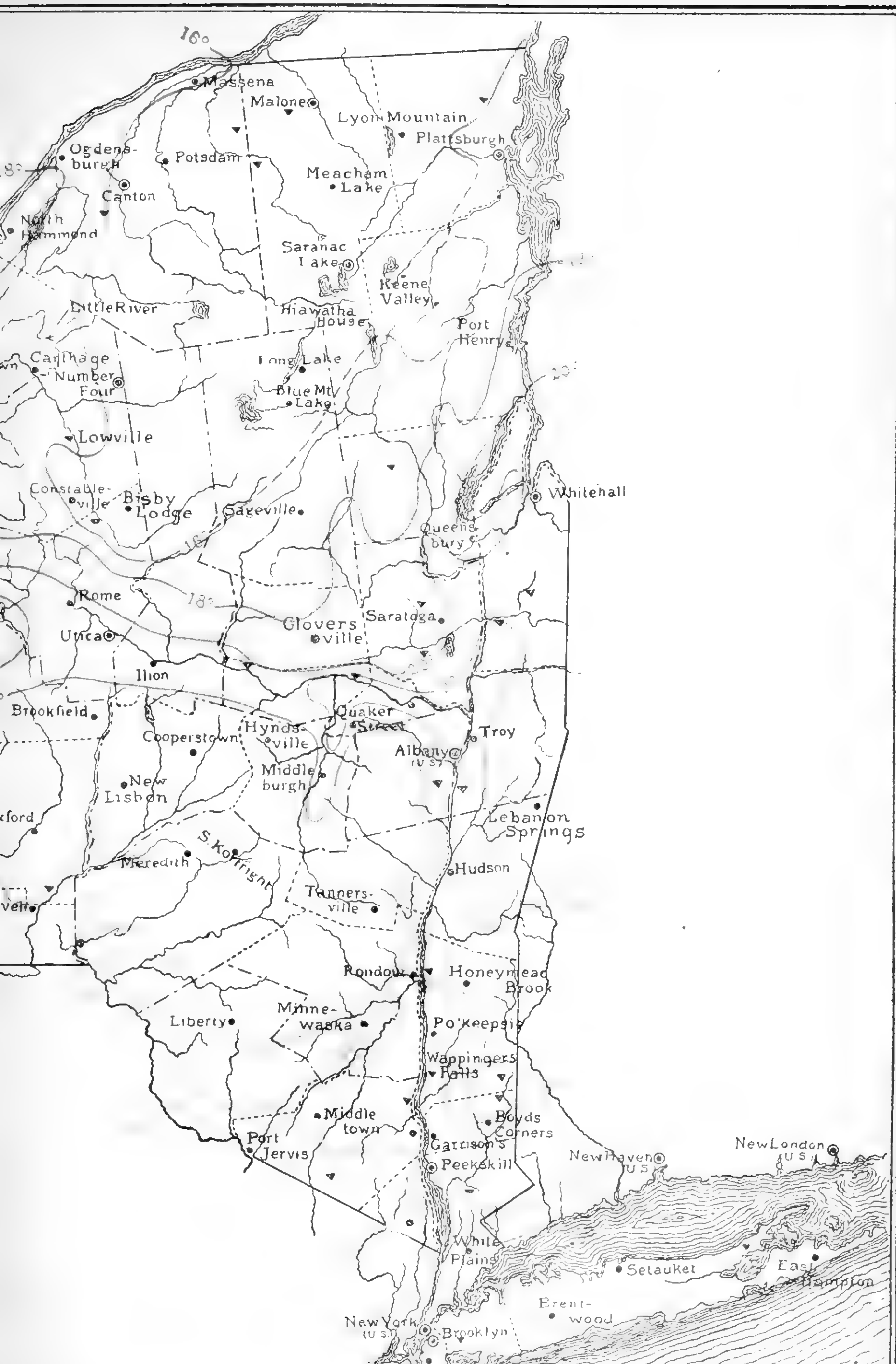
MAP OF THE STATE OF NEW YORK

SHOWING

THE NORMAL TEMPERATURES.

FOR JANUARY.





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Canton
Meacham Lake
North Hammond
Saranac Lake
Keene Valley
Little River
Hiawatha House
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Honeymead Brook
Liberty
Minnewaska
Po'keepsie
Wappingers Falls
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Brentwood
New York (U.S.)
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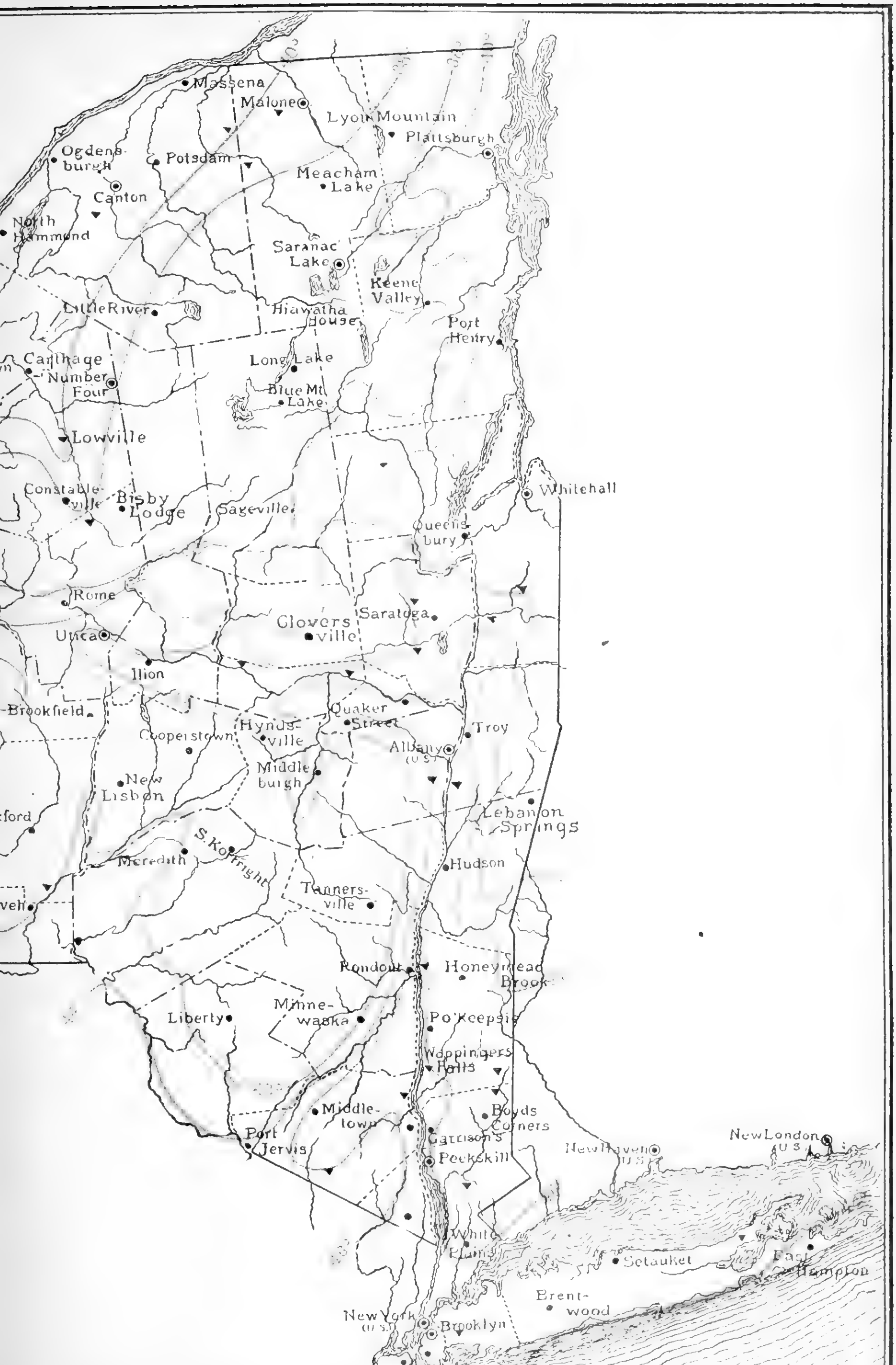
MAP OF THE STATE OF NEW YORK

SHOWING

THE NORMAL TEMPERATURES.

FOR APRIL.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Sageville
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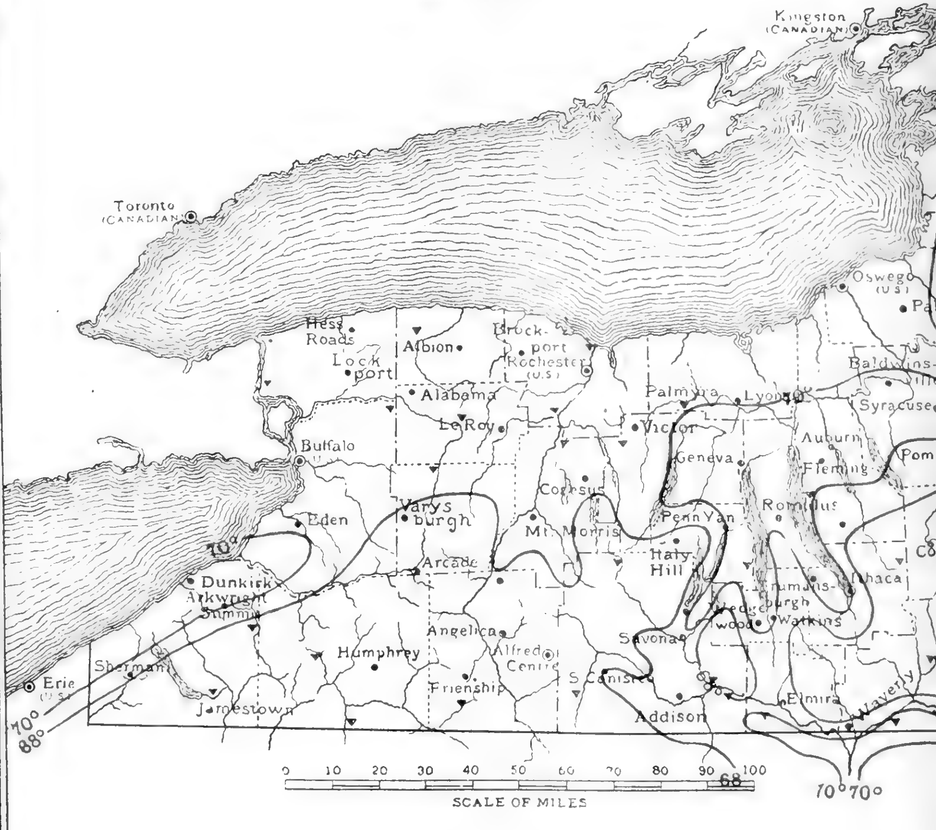
East Hampton
Brentwood
New York (U.S.)
Brooklyn

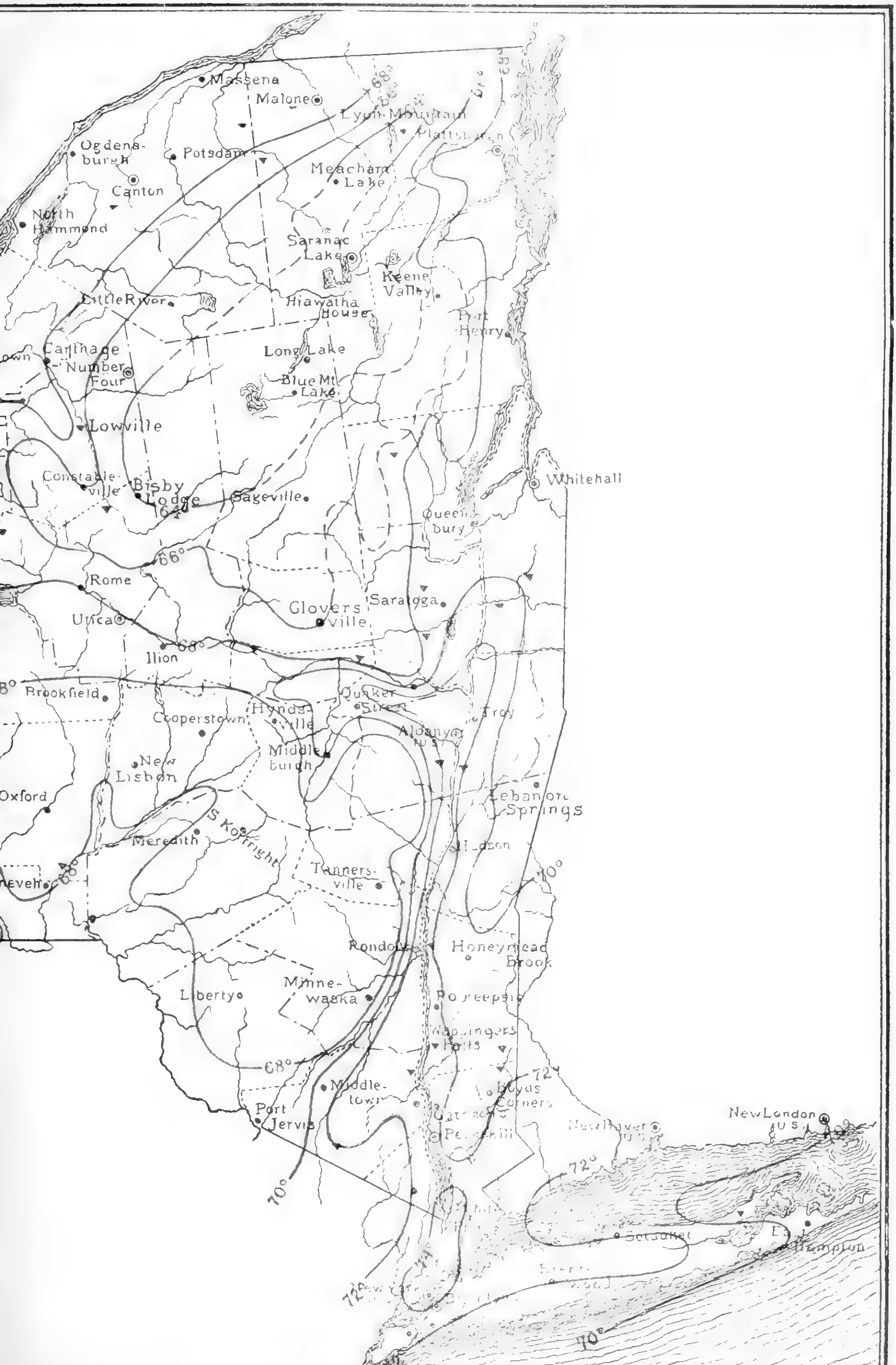
MAP OF THE STATE OF NEW YORK

SHOWING

THE NORMAL TEMPERATURES.

FOR JULY,

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Wappingers Falls
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Middletown
Boyds Corners
Port Jervis
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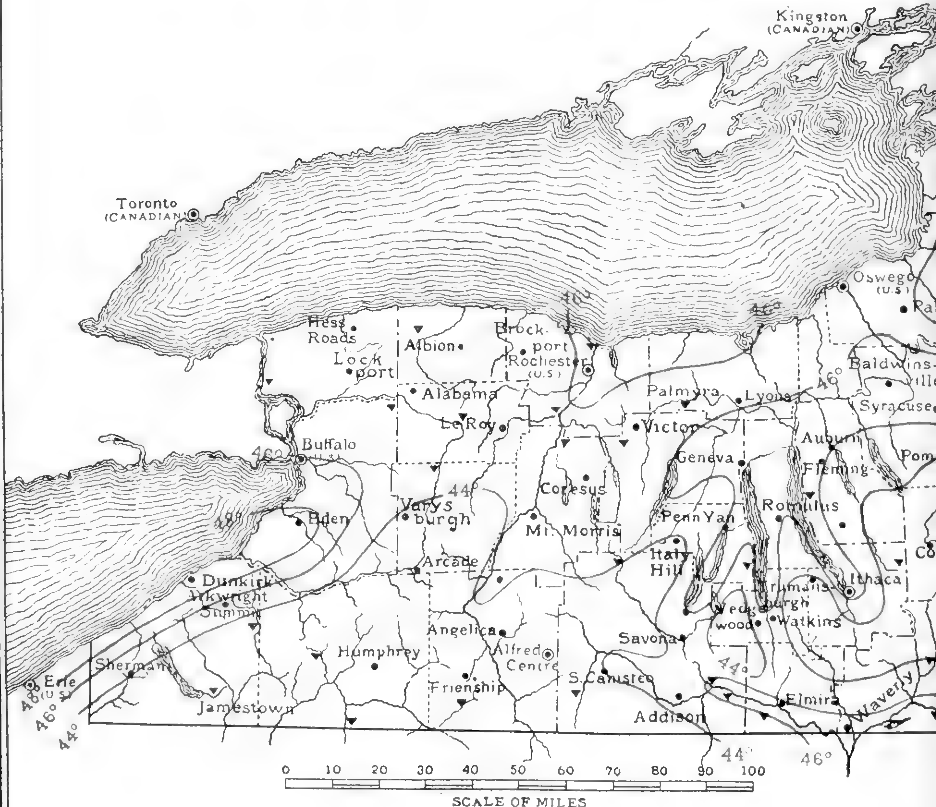
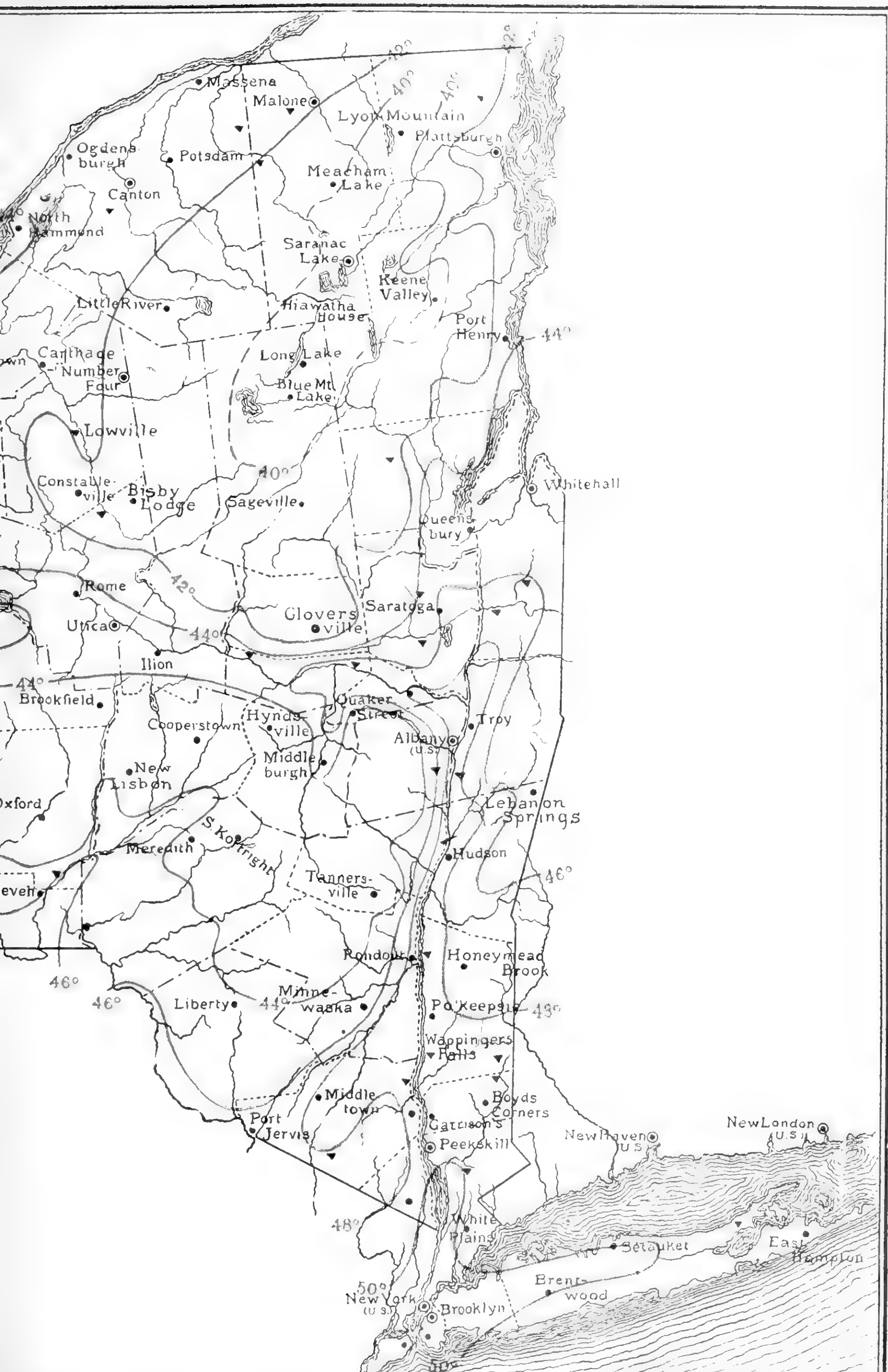
MAP OF THE STATE OF NEW YORK

SHOWING

THE NORMAL TEMPERATURES.

FOR THE YEAR.

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White Plains
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East Hampton
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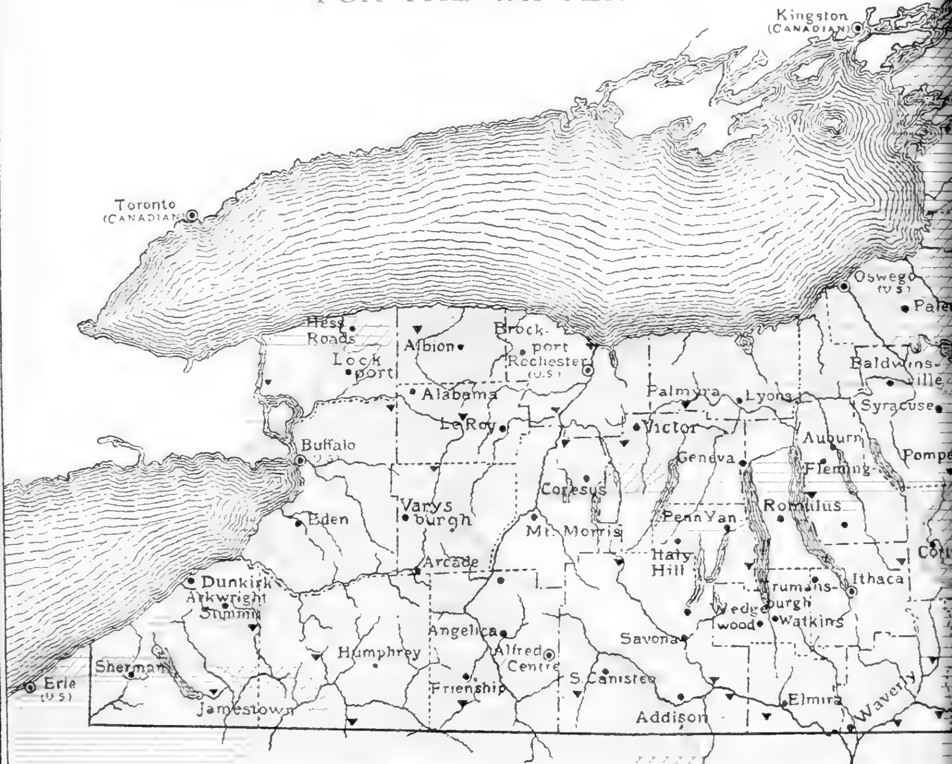
New York (U.S.)
Brooklyn
Brentwood

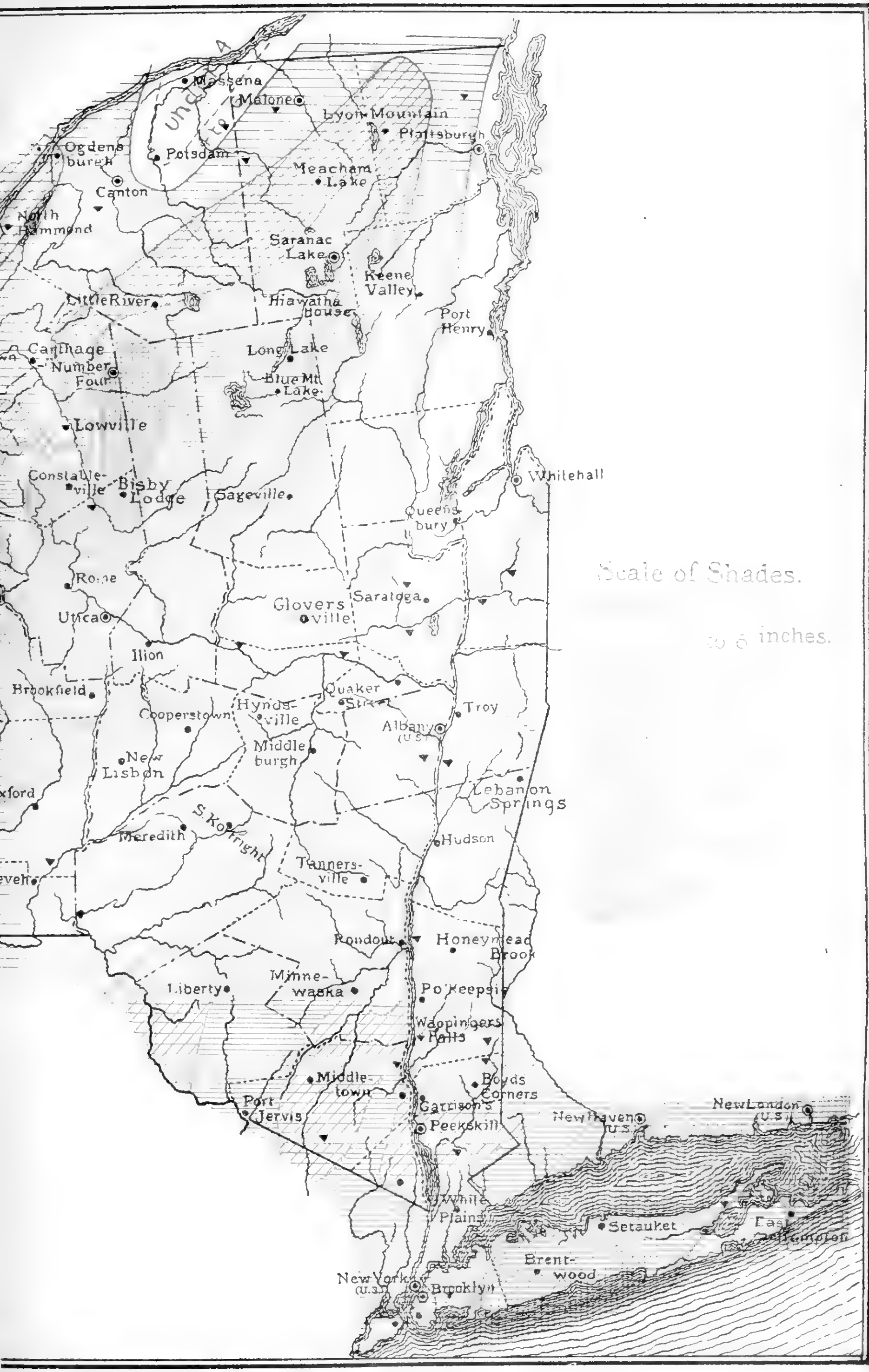
MAP OF THE STATE OF NEW YORK

SHOWING

THE AVERAGE PRECIPITATION

FOR THE WINTER.





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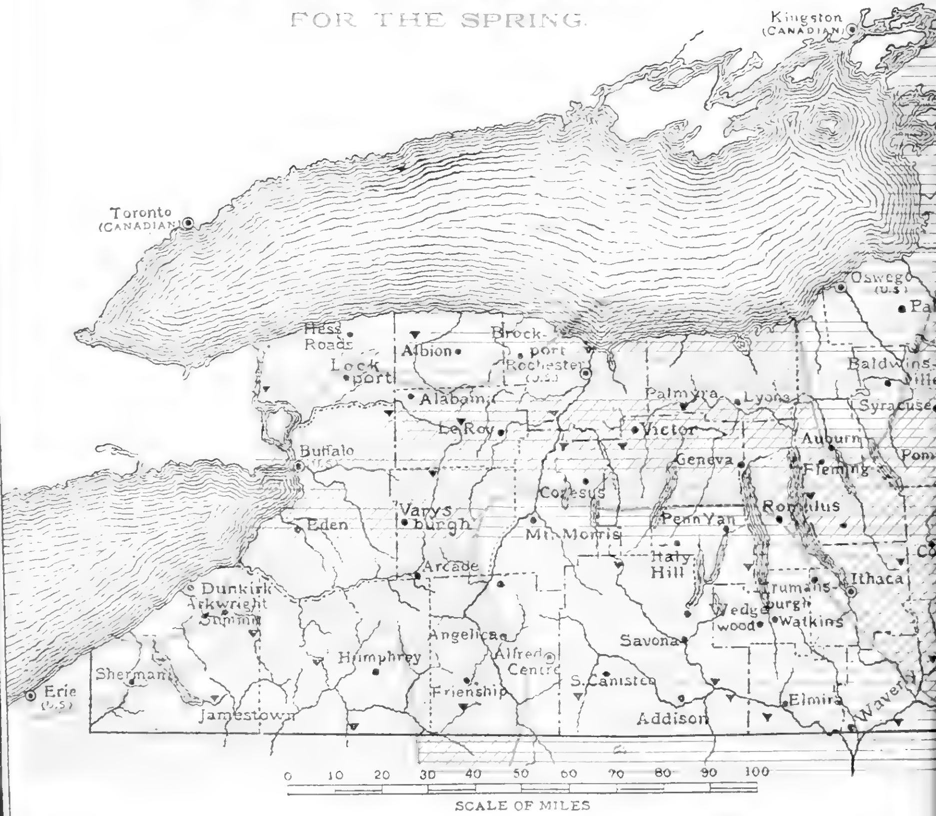
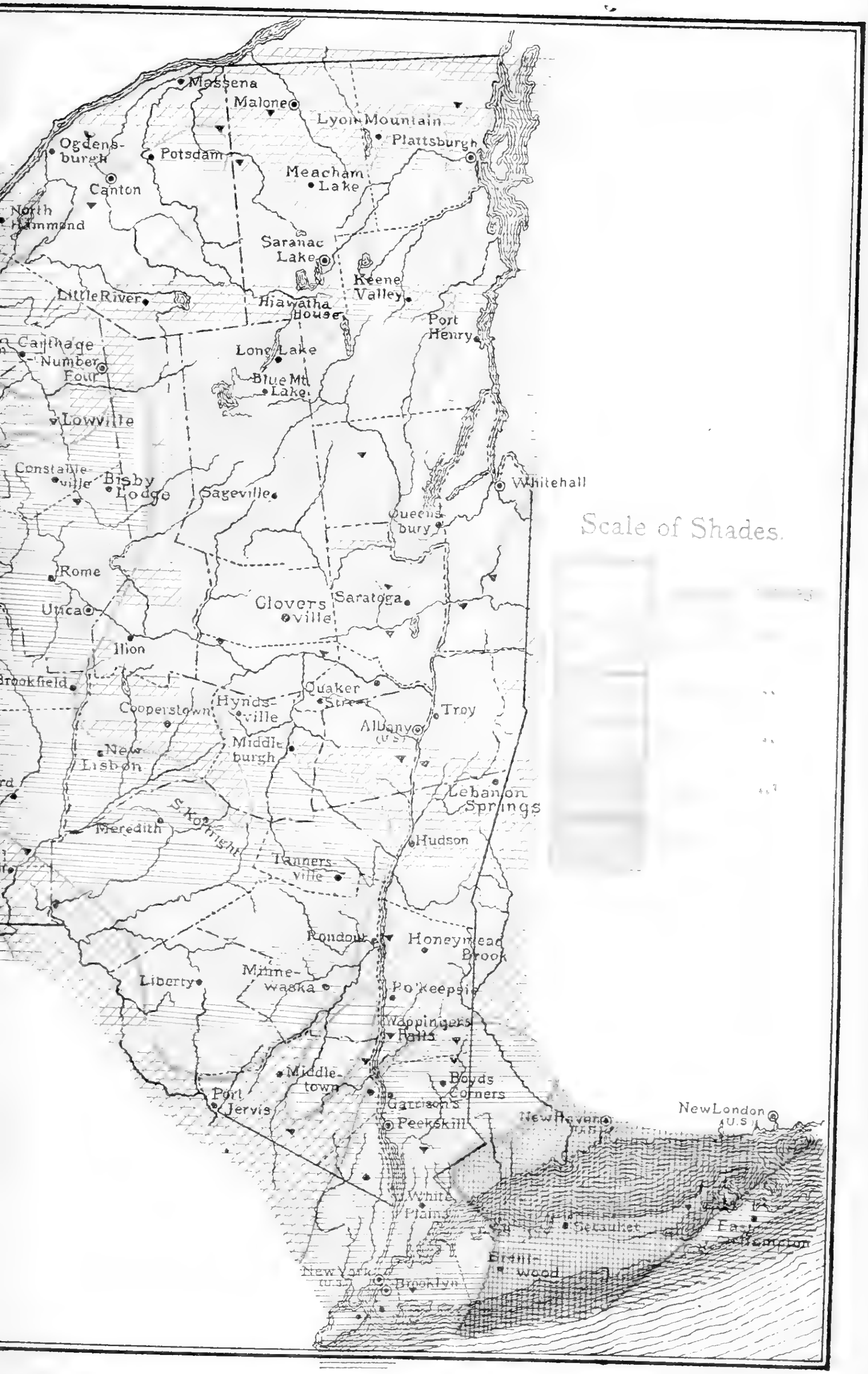
Wappingers Falls
Middletown
Boyds Corners
Port Jervis
Garrison's
Peekskill
New Haven U.S.
New London (U.S.)
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

MAP OF THE STATE OF NEW YORK
SHOWING
THE AVERAGE PRECIPITATION
FOR THE SPRING.

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Middletown
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Garrison's
Peekskill
New Haven
New London (U.S.)
White Plains
Setauket
East Hampton
Brentwood
New York (U.S.)
Brooklyn

MAP OF THE STATE OF NEW YORK

SHOWING

THE AVERAGE PRECIPITATION

FOR THE SUMMER.

Massena
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Lyon Mountain
Plattsburgh
Ogdensburgh
Potsdam
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Meacham Lake
North Hammond
Saranac Lake
Keene Valley
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Wappingers Falls
Middletown
Boyds Corners
Port Jervis
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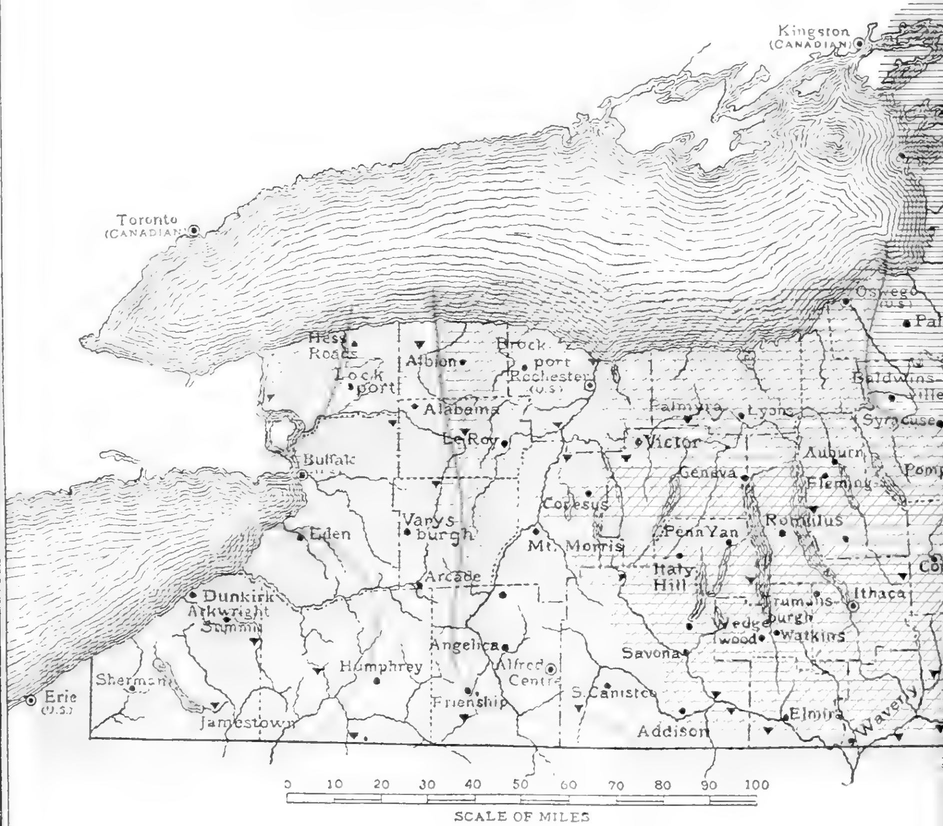
Peekskill
New Haven U.S.
New London U.S.
White Plains
Setauket
East Hampton
Brentwood
New York (U.S.)
Brooklyn

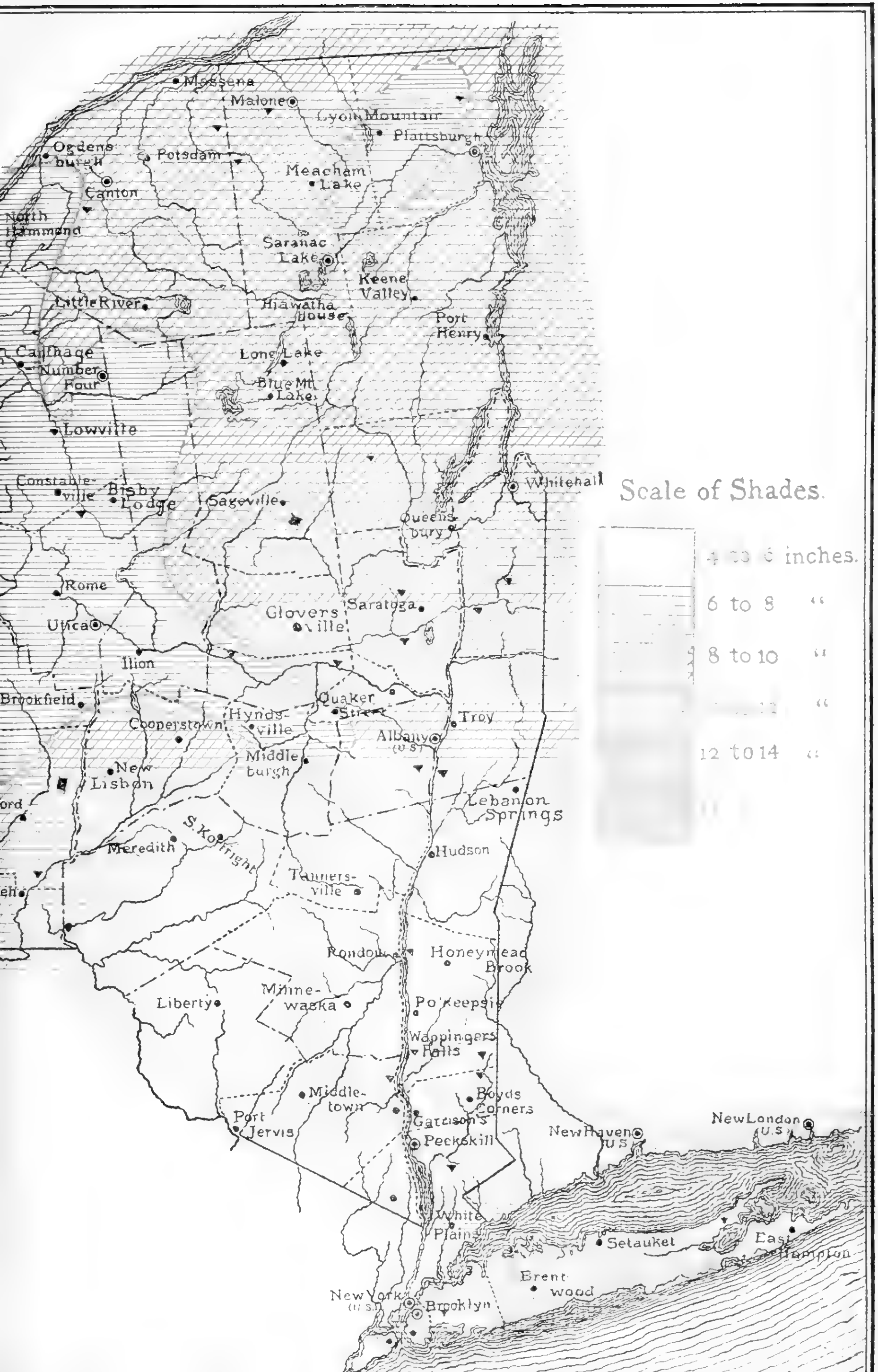
MAP OF THE STATE OF NEW YORK

SHOWING

THE AVERAGE PRECIPITATION

FOR THE AUTUMN





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Garrison's
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New Haven U.S.
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Setauket
East Hampton
Brentwood
New York (U.S.)
Brooklyn
Scale of Shades.
4 to 6 inches.
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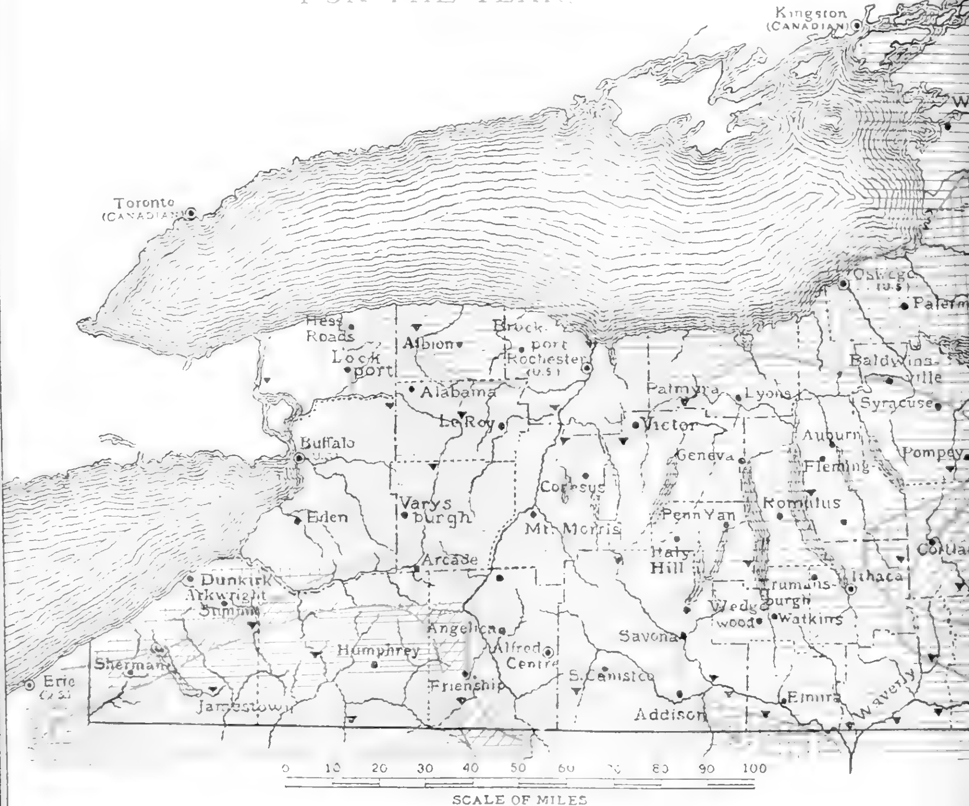
8 to 10 "
12 to 14 "

MAP OF THE STATE OF NEW YORK

SHOWING

THE AVERAGE PRECIPITATION

FOR THE YEAR.

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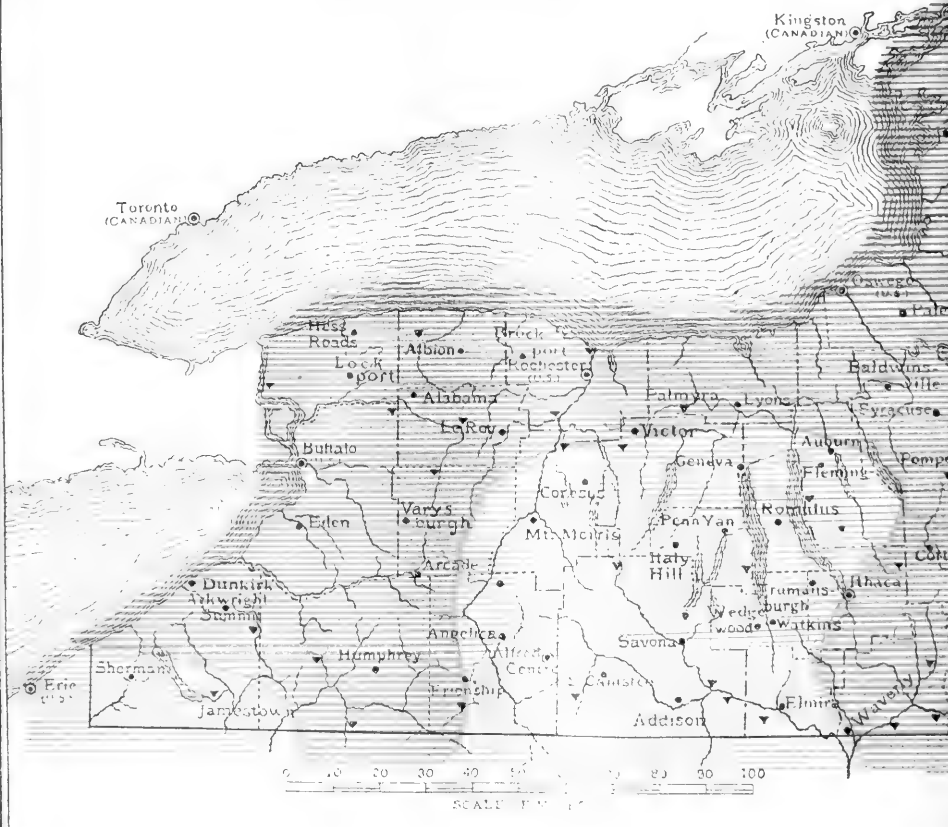
Boyds Corners
Port Jervis
Garrison's
Peekskill
New Haven U.S.
New London U.S.
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn

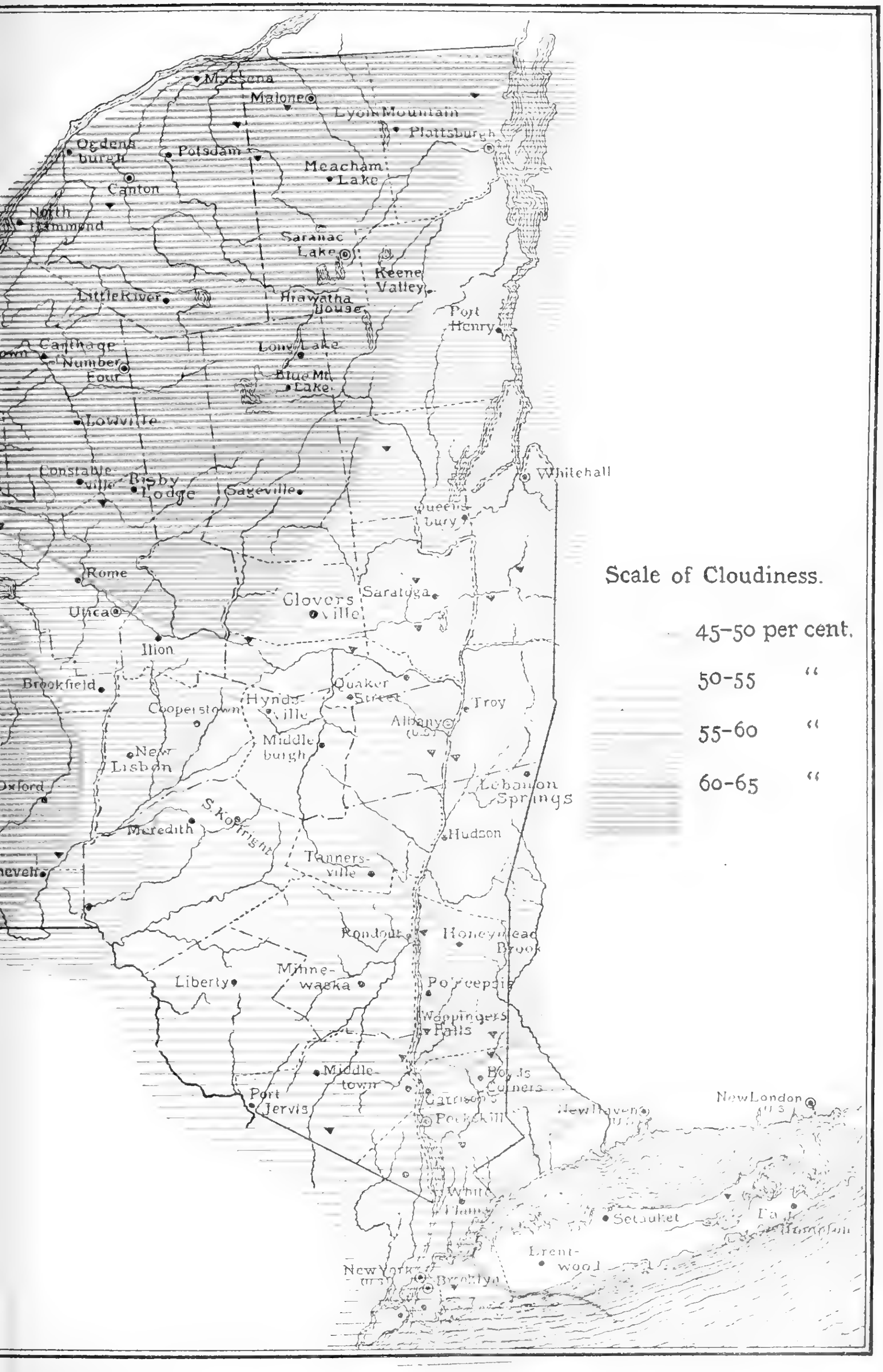
MAP OF THE STATE OF NEW YORK

SHOWING

THE AVERAGE CLOUDINESS,

FOR THE YEAR.

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Liberty
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Wappingers Falls
Middletown
Boyds Corners
Port Jervis
Garrisons
Peekskill
New London (U.S.)
New Haven
White Plains
Setauket
Brentwood
New York (U.S.)
Brooklyn
Scale of Cloudiness.
45–50 per cent.
50–55 "
55–60 "
60–65 "

Cornell University — Agricultural Experiment Station.

NINTH ANNUAL REPORT

OF THE

Agricultural Experiment Station.

ITHACA, N. Y.

1896.

TRANSMITTED TO THE LEGISLATURE JANUARY 15, 1897.

WYNKOOP HALLENBECK CRAWFORD CO.,
STATE PRINTERS.
ALBANY AND NEW YORK
1897

STATE OF NEW YORK

No. 11.

IN ASSEMBLY

JANUARY 15, 1897.

NINTH ANNUAL REPORT

OF THE

Agricultural Experiment Station of Cornell University.

STATE OF NEW YORK:

DEPARTMENT OF AGRICULTURE,
ALBANY, *January* 15, 1897.

To the Honorable the Legislature of the State of New York:

In accordance with the provisions of the statutes relating thereto, I have the honor to herewith transmit the Ninth Annual Report of the Agricultural Experiment Station at Cornell University.

CHARLES A. WIETING,

Commissioner of Agriculture.

REPORT.

ITHACA, N. Y., *January*, 1897.

To the Commissioner of Agriculture, Albany, N. Y.:

Sir.—I have the honor to transmit herewith the ninth annual report of the Agricultural Experiment Station of Cornell University, in accordance with the act of Congress of March 2, 1887, establishing the Station.

In addition to the general report of the director and the special reports of his scientific coadjutors, this document includes two appendices, one of which contains the bulletins published by the Station during the year and the other a detailed statement of the receipts and expenditures.

The Experiment Station of Cornell University is supported by an annual appropriation from the Federal treasury. But under chapter 437 of the Laws of New York for 1896 an appropriation of $16,000 was made to the Station to be expended in horticultural investigations, experiments and instruction in the Fourth Judicial Department. This work has been the leading feature of the year, and the staff have been greatly encouraged by the growing interest which it has awakened in the rural population. The labors of the staff have been unusually arduous, and some of them have suffered in health in consequence. If it is the desire of the State that this work of university extension in agriculture be continued, the authorities of Cornell University stand ready to undertake it, though some improvements in the organization of the Station staff will be necessary in order to meet the constantly increasing demands which the work of the Station has already called forth.

I have the honor to be your obedient servant,

J. G. SCHURMAN,

President of Cornell University.

Report of the Director.

To the President of Cornell University:

Sir: I have the honor to transmit herewith my ninth annual report, with those of the treasurer, the chemist, the botanist and the plant pathologist, the entomologist, the agriculturist, the horticulturist and that of the assistant professor of dairy husbandry and animal industry; together with an appendix of eighteen bulletins, covering the year ending December 31, 1896. Also a detailed statement of the receipts and expenditures for the fiscal year ending June 30, 1896.

The reports and bulletins give, in brief, an outline of the work undertaken and accomplished, with suggestions as to future operations, together with the results of the year's work, so far as they have been published. In addition to results reached by experimentation, much valuable information has been secured by studying the condition of various branches of agriculture in many localities throughout the State. In so large a State as New York the conditions as to climate, soil and tillage vary so widely that only by a study of growing crops in various localities, and where serious damage to plants occurs, can the most satisfactory results be secured.

Chapter 437 of the Laws of 1896 provided funds to be expended in the Fourth Judicial Department in "Conducting investigations and experiments in horticulture; in discovering and remedying the disease of plants, vines and fruit trees; in ascertaining the best means of fertilizing vineyard, fruit and garden plantations, and of making orchards, vineyards and gardens prolific; in disseminating horticultural knowledge by means of lectures or otherwise, and in preparing and printing for free distribution the results of such investigations and experiments, and such other information as may be deemed desirable and profitable in promoting the horticultural interests of the State." The Federal law, known as the "Hatch Act," passed March 2, 1887, has a much wider scope and permits investigations to be carried on in all subjects related to Agriculture.

The funds provided by the State for carrying on this work have been expended, in part, in publishing information believed to be both desirable and profitable, though such information was not secured entirely by our own scientific investigations.

An effort has been made to awaken an interest in rural pursuits by imparting instruction to both young and old by means of schools and lectures at central points. The value of this work has been so heartily appreciated by the people, and so many have joined the agricultural science reading courses, that provision should be made for continuing the work. To do this a special corps of instructors and investigators will have to be provided, as the work has outgrown the provisions which have been made for carrying it forward. The present force can direct and simplify the work, supervise the expenditures and the publications, and select expert assistants to perform the major part of the work, but the staff, as now constituted, is unable to meet the demands which are made and which are increasing day by day.

Never before has there been such an awakening or such an earnest desire for instruction in rural affairs. The people of the State are calling for help in all lines of Agriculture; they demand facts which may serve to give direct help, and instruction as to the best methods whereby desired results may be reached most economically.

Within the past few years much has been done, and well done, to instruct the rural population in those subjects which are directly related to the production of animals, the cultivation of plants and the betterment of rural homes. Thousands of publications are sent out by the Station annually, and we have reason to believe that they are read with pleasure and profit. Hundreds of letters are at hand which give evidence that the publications are highly appreciated.

It is found that many persons residing in the cities and villages own land which they either farm or control. These persons have shown unusual interest in the investigations which have been conducted and in the Station publications. It is believed that the interest shown by this class, who have a natural love for rural pursuits, is stimulating the country people, who have had fewer opportunities for study and research.

The eighteen bulletins published during the year contain 522 pages. About 12,000 copies of each issue have been sent out, or more than six million pages, embodying the results of investigations and observations made by the Station staff. In addition, some 700 bound copies of the complete transactions of the year are forwarded to other stations and to libraries.

Herewith appended is a list of the bulletins published since the organization of the Station under the Federal act of March 2, 1887, a copy of which is hereunto attached, and also chapter 437 of the Laws of the State of New York, passed May 9, 1896.

Bulletins of Cornell University Agricultural Experiment Station, 1888 to 1897.

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* Edition exhausted.

*31 Forcing English Cucumbers.
*32 Tomatoes.
*33 Wireworms.
*34 Dewberries.
*35 Combination of Fungicides and Insecticides.
*36 Grain for Cows at Pasture.
*37 Sundry Investigations of 1891.
38 Native Plums and Cherries.
39 Creaming and Aerating Milk.
40 Removing Tassels from Corn.
41 Steam and Hot Water for Heating Green-house.
*42 Electro Horticulture.
*43 Trouble of Winter Tomatoes.
*44 Pear Tree Psylla.
*45 Tomatoes.
*46 Mulberries.
*47 Feeding Lambs and Pigs.
*48 Spraying Apple Orchards.
49 Sundry Investigations of 1892.
*50 The Bud Moth.
*51 Four New Types of Fruit.
*52 Cost of Milk Production.
53 Ædema of the Tomato.
*54 Dehorning.
55 Green-house Notes.
*56 The Production of Manure.
*57 Rasberries and Blackberries.
58 Four-Lined Leaf-Bug.
59 Does Mulching Retard Maturity of Fruits.
*60 The Spraying of Orchards.
61 Sundry Investigations of the Year.
*62 The Japanese Plums in North America.
*63 Coöperative Test of Sugar Beets.
64 On Certain Grass-Eating Insects.
*65 Tuberculosis in Relation to Animal Industry.

* Edition exhausted.

*66 Test of Cream Separators.
*67 Some Recent Chinese Vegetables.
*68 The Cultivated Poplars.
*69 Hints on the Planting of Orchards.
*70 The Native Dwarf Cherries.
71 Apricot Growing in Western New York.
72 The Cultivation of Orchards.
73 Leaf Curl and Plum Pockets.
74 Impressions of the Peach Industry in New York.
75 Peach Yellows.
76 Some Grape Troubles in Western New York.
77 The Grafting of Grapes.
78 The Cabbage Root Maggot.
79 Varieties of Strawberry Leaf Blight.
80 The Quince in Western New York.
81 Black Knot of Plums and Cherries.
82 Experiments with Tuberculin.
83 A Plum Scab in Western New York.
84 The Recent Apple Failures in New York.
*85 Whey Butter.
*86 Spraying of Orchards.
87 Dwarf Lima Beans.
88 Early Lamb Raising.
*89 Feeding Pigs.
90 The China Aster.
91 Recent Chrysanthemums.
92 Feeding Fat to Cows.
93 Cigar Case Bearer.
*94 Damping Off.
95 Winter Muskmelons.
96 Forcing House Miscellanies.
97 Entomogenous Fungi.
98 Cherries.
99 Blackberries.
100 Evaporated Raspberries in New York.

* Edition exhausted.

101 The Spraying of Trees and the Canker Worm.
*102 General Observations in Care of Fruit Trees.
*103 Soil Depletion in Respect to Care of Fruit Trees.
104 Climbing Cutworms in Western New York.
105 Test of Cream Separators.
106 Revised Opinions of the Japanese Plums.
107 Wireworms and the Bud Moth.
*108 The Psylla and New York Plum Scale.
109 Geological History of the Chautauqua Grape Belt.
110 Extension Work in Horticulture.
111 Sweet Peas.
112 The 1895 Chrysanthemums.
113 Diseases of the Potato.
114 Spraying Calendar.
115 The Pole Lima Beans.
116 Dwarf Apples.
117 Fruit Brevities.
*118 Food Preservatives and Butter Increasers.
119 Texture of the Soil.
120 Moisture of the Soil and Its Conservation.
121 Suggestions for Planting Shrubbery.
122 Extension Work in Horticulture, 2d Report.
123 Green Fruit Worms.

ACT OF 1887 ESTABLISHING AGRICULTURAL EXPERIMENT STATIONS.

AN ACT to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United

* Edition exhausted.

States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided,* That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the Legislature of such State or Territory shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

Sec. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate from time to time such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purpose of this act. It shall be the duty of each of said stations annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

Sec. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: *Provided, however,* That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SEC. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 7. That nothing in this act shall be constructed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SEC. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the Legislature of such State may apply in whole or in part the appropriation by this act made to such separate agricultural college or school, and no Legislature shall by contract express or implied disable itself from so doing.

SEC. 9. That the grants of moneys authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants: *Provided*, That payment of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its Legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the Secretary of the Treasury.

SEC. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

Approved, March 2, 1887.

AN ACT making an appropriation for horticultural investigations by the Cornell University Experiment Station.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. The sum of sixteen thousand dollars, or so much thereof as may be necessary, is hereby appropriated out of any money in the treasury not otherwise appropriated, to be paid to the Agricultural Experiment Station at Cornell University, to be expended in the fourth judicial department, in conducting investigations and experiments in horticulture; in discovering and remedying the disease of plants, vines and fruit trees; in ascertaining the best means of fertilizing vineyard, fruit and garden plantations, and of making orchards, vineyards and gardens prolific; in disseminating horticultural knowledge by means of lectures or otherwise, and in preparing and printing for free distribution the results of such investigations and experiments, and such other information as may be deemed desirable and profitable in promoting the horticultural interests of the state. Such experiment station may, with the consent and approval of the Commissioner of Agriculture, appoint horticultural experts to assist such experiment station in the fourth judicial department. Such experts may be removed by such experiment station in its discretion, and may be paid for their services such sum as may be deemed reasonable and proper, and as shall be approved by the Commissioner of Agriculture. All of such work by such experiment station and by such experts shall be under the general supervision and direction of the Commissioner of Agriculture. The sum appropriated by this act shall be paid by the treasurer of the state upon the warrant of the comptroller, to the treasurer of Cornell University, upon such treasurer filing with the comptroller a bond in such sum and with such sureties as the comptroller may approve, conditioned for the faithful application of such sum to the purposes for which the same is hereby appropriated. Such sum shall be payable by the treasurer of Cornell University upon vouchers approved by the officers or agents of such university having charge of such experiment station, and such vouchers shall be filed by the treasurer of Cornell University in the office of the comptroller of the state.

I. P. ROBERTS.

Report of the Treasurer.

The Cornell University Agricultural Experiment Station in account with the United States Appropriation, 1895-6.

Dr.

To receipts from treasurer of the United States as per appropriation for fiscal year ending June 30, 1896, as per act of Congress approved March 2, 1887	$13,500 00

Cr.

By salaries	$8,405 98
Labor	1,098 29
Publications	793 74
Postage and stationery	257 46
Freight and express	32 20
Heat, light and water	5 36
Chemical supplies	312 65
Seeds, plants and sundry supplies	600 73
Fertilizers	148 74
Feeding stuffs	157 13
Library	80 94
Tools, implements and machinery	96 46
Furniture and fixtures	394 13
Scientific apparatus	276 18
Live stock	20 00

Traveling expenses	$146 45
Contingent expenses	10 00
Building and repairs	663 56
	$13,500 00

We, the undersigned, duly appointed auditors of the corporation, do hereby certify that we have examined the books and accounts of the Cornell University Agricultural Experiment Station for the fiscal year ending June 30, 1896; that we have found the same well kept and classified as above, and that the receipts for the year from the treasurer of the United States are shown to have been $13,500.00, and the corresponding disbursements $13,500.00, for all of which proper vouchers are on file and have been by us examined and found correct, thus leaving no balance on hand.

And we further certify that the expenditures have been solely for the purpose set forth in the act of Congress approved March 2, 1887.

H. B. LORD,
R. H. TREMAN,
Auditors.

[L. S.]

Attest:

EMMONS L. WILLIAMS,
Custodian.

Report of the Chemist.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—One hundred and eighty-four samples were analyzed in the chemical laboratory of the Experiment Station during the year 1896, as follows:

Five samples of milk, for fat; four samples of manure leachings, for fertilizing value; fifteen samples of manures, ditto; fourteen samples of grain, straw and chaff, ditto; six samples of soil, for nitrogen, phosphoric acid and potash; six samples of clover, for nitrogen; complete analyses of eleven samples of straws, grain and chaff; sixteen samples of corn and five samples of beans, for fodder value; sixty-seven samples of soils, for moisture; nineteen samples of grapes, for sugar and acid; three samples of Paris green, for arsenic; four complete analyses of fertilizers; four samples of sugar beets, for sugar; one sample of corn, for moisture; and one sample of "Callerine," a food preservative.

Investigations are in hand on the urine of the horse, the relation of the composition of celery to its quality and the estimation of the pentosans.

G. C. CALDWELL.

Report of the Botanist.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—Since the presentation of the last annual report from the Botanical Division several changes have been necessitated in the organization of the staff of the department, owing to the resignation of Professor Albert Nelson Prentiss on account of prolonged illness, during last February. Professor Prentiss has since died and it seems fitting here to call attention to his long service in the University, and to his continued interest in the advancement of the work of the Experiment Station by promoting the investigations of these botanical subjects which are peculiarly related to Agriculture.

In the reorganization of the Division the Cryptogamic Botanist was appointed Botanist. Dr. E. J. Durand, the Assistant Cryptogamic Botanist, being transferred to the instructing staff of the University, Mr. B. M. Duggar was appointed Assistant Cryptogamic Botanist of the Experiment Station.

During Dr. Durand's connection with the Division of Botany he made a special study of a serious disease of current canes which had been called to our attention from various localities in New York. These investigations have occupied considerable time owing to the desirability of tracing the life history of two different but closely related fungi which are parasitic on the canes. This has been done by the aid of pure cultures in artificial media. The bulletin is now ready for publication. It treats of the general character of the disease, the structure of the fungus, its development, and suggestions for treatment. The fungus belongs to a genus which contains several very injurious parasites of plants.

During the last year I have given considerable time to the investigation of the diseases of timber trees, and a bulletin on this subject is nearly ready for publication. Also a bulletin on anthracnoses of plants which is the result of several years study will be ready for publication before very long.

Mr. B. M. Duggar, the Assistant Cryptogamic Botanist, has conducted a number of investigations with remarkable vigor and has already accomplished a considerable amount of important work, though he has been connected with the department for only six months. Besides the work which he did in the Horticultural Schools of the State during the summer and autumn, I would call attention to the following investigations by him. He has nearly ready for publication a bulletin dealing with a serious trouble of stored celery. This rot of celery is caused by a species of Septoria, which during the summer is the cause of the so-called spot of celery. He has been able to demonstrate that the same fungus carried into the houses in the autumn in storing the celery spreads there on the plants with entirely different appearances and effects. He has also in progress an investigation on several different kinds of rot of celery grown in houses during the winter. This will in the future be presented as a second bulletin. Another very important piece of investigation is that of the pear and quince leaf spot, which owing to the long period required for the complete development of the parasites connected with it, will require a longer time for its completion, but there is scientific evidence now on hand to indicate that important information can be published concerning these diseases when the investigations are completed. Besides these definite lines of investigation Mr. Duggar has others in progress on several other plant parasites, all of which in the future will contribute to the knowledge of the life histories of these low forms of plant life, which it is desirable to know in order to determine rational methods of treatment. Mr. Duggar has also conducted considerable of the correspondence, answering the letters of inquiry about plant diseases.

I cannot close without acknowledging the important aid which Professor Rowlee of the Botanical Department has given in attending to the correspondence upon subjects with which he is familiar.

Considerable additions have been made to the apparatus in the department which aids materially in the prosecution of the work.

GEORGE F. ATKINSON.

Report of the Entomologist.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—As the carrying out of the Entomological work of the Station has been performed during the past year almost entirely by the Assistant Entomologist, I have requested him to prepare a report on it, which I hereby transmit.

JOHN HENRY COMSTOCK.

To the Entomologist of the Cornell University Agricultural Experiment Station:

Sir.—The year 1896 has been an exceedingly busy and interesting one for the Entomological Division of the Station. So far as insect pests are concerned, the year has been rather a remarkable one in New York State. The codlin moth, plum curculio and other insects which can usually be depended upon to harass the fruit-grower every year were noticeably much less destructive. But the year was marked by the appearance in injurious numbers of several insects that had not attracted serious attention anywhere in our State for more than a decade; they were thus new pests to many farmers and fruit-growers. The army worm (Leucania unipuncta), the green fruit worms (Xylina sp.), the pistol-case-bearer (Coleophora malivorella), and the peach twig-worm (Anarsia lineatella) were these apparently "new" insect pests that have ravaged New York crops during the past year. Our notes contain considerable new information about all of the above insects and several others, and this knowledge is being put into the form of bulletins as fast as possible.

The following bulletins were issued from this Division during the year:

No. 107. Wireworms and the Bud Moth.

No. 108. The Pear Psylla and the New York Plum Scale.

No. 123. Green Fruit Worms.

Another on the pistol-case-bearer is ready for publication, and our investigations in 1896 resulted in sufficient material for at least three more bulletins which we hope to have ready for publication before next spring. In these three bulletins we expect to discuss the army worm in New York State, a currant stem-girdler and a new raspberry cane-magot, and the codlin moth. The first will contain many new figures, the second much new information, accompanied by new illustrations, and the third will embody some very important, as well as new, facts regarding that apparently best-known of all fruit pests—the apple worm or codlin moth.

Some important results have been obtained in our extensive peach borer experiment, and new ideas suggested by these are now being tested. We shall continue the experiments another year at least.

Considerable work has been done by this Division under the auspices of the so-called Experiment Station Extension or Nixon bill. The investigations undertaken resulted in material for Bulletin 123 and for the bulletin on the pistol-case-bearer, just completed. The Assistant Entomologist spent over a month in giving instruction in the horticultural schools held in different parts of the Fourth Judicial District.

The correspondence of the Division continues to increase rapidly, and now occupies a large share of our time. But, believing that this is one of the most valuable and important phases of our work, we continue to cheerfully give to every correspondent the latest and best information at our command. Nearly 800 letters of inquiry regarding insects and their injuries were answered during the year; 125 of these answers were prepared for publication and have appeared in the columns of agricultural journals. Several technical articles have also been written for entomological journals.

M. V. SLINGERLAND.

Report of the Agriculturist.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—I submit herewith the report of the Agricultural Division of the Cornell University Experiment Station for the year 1896. The larger part of the work has been along the lines of determining the effects of introculture upon the production of farm crops and investigations with reference to the conservation of soil moisture. That there is need for investigation and dissemination of knowledge along these lines is shown by the low average yield of the staple crops throughout the State compared with what might be secured were better methods of tillage more generally practiced.

Interesting and valuable results have been secured with reference to potato culture and the production of forage crops. A comparative study of some leguminous plants to determine their nitrogen storing capacity has been commenced and will be continued during the coming year.

The hay crop and the permanent pastures throughout the State have been so affected by droughts during the past few years that it has become a serious question with many farmers as to what they shall provide in their place or to supplement them. To throw light on this subject experiments have been inaugurated with the view of determining the best crops for green soiling and how silage may best be preserved under different methods of treatment. Many experiments commenced in former years have been duplicated and results verified. The subject of the leaching of manures has received considerable attention and there is now material at hand for the publication of several bulletins upon the subjects which have been under investigation.

Lime and its action upon acid soils, its value as a conserver of moisture and the beneficial action it exerts on the physical condition of soils are all questions now under investigation and to be investigated during the coming year. It is proposed to commence a series of coöperative culture experiments. Such marked results have been obtained at the Station by improved conditions and by increased tillage of farm crops that in order more fully to verify the results obtained and awaken interest in the work among farmers, an extensive coöperative experiment in potato culture will be inaugurated.

In general, the work of the Division will be largely along the lines of securing increased crop production by better methods of tillage.

L. A. CLINTON.

Report of the Horticulturist.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—The past year has been altogether a most prosperous one for the Horticultural Division of the Experiment Station. Its endeavors, however, have been somewhat dismembered, owing to the experiment extension work which has been asked of it by the Legislature. The work might be roughly divided, therefore, into the two categories of home work, or station work proper, and the extension or itinerant work. The later has consumed by far the greater amount of our time and energies during the past year, as, in fact, it did in the two preceding years. In reporting the condition of my Division to yourself early in 1894, I took occasion to suggest that one of the means by which the Experiment Station could help the people was through State aid, which should give us facilities for publishing more information and which should allow us also to hold horticultural meetings or schools for the purpose of popularizing and disseminating the horticultural knowledge of which experimenters are now possessed. At that time I had not anticipated that the recommendation would find such complete and speedy fulfillment. It was in that very year that we were asked to undertake the extention of our horticultural work, and this endeavor has now been prosecuted consecutively for three years. The full results of this work, so far as they can be indicated at the present time, are set forth in Bulletins 110 and 122. I need, therefore, say nothing more respecting the extension feature of the work of my Division.

At the present time I am as anxious that the Horticultural Division of the Station may return to its original type of labor as I was three years ago that it depart therefrom. My reason for this feeling is the fact that this extension work has now grown to be such a large and responsible enterprise that it should no longer be confined to one division of the Experiment Station. It should be placed under the management of a separate division, and there is every reason to believe that it would be more useful to the State if applied to other branches of rural effort that to horticulture. In the home Station itself, there have been comparatively few changes, and these have not all been for the betterment of the Division. One of the Experiment Station forcing-houses has been entirely rebuilt and is now an ideal house for certain lines of experiment. The orchards have now come to bearing age and have occupied so much of our small area that we have very little left for conducting experiments in vegetables and other annual crops. A year ago, a considerable area of my Division was demolished by changes in the grounds of the University, and the entire collection of grapes, of native plums and many small fruits, to all of which we had given much attention, were entirely obliterated. In order to repair this damage in part, we have, during the past year, fitted up a new piece of land and have set thereon a small experimental vineyard. The loss of the native plum orchard is practically irreparable, however, because it contained many varieties and seedlings which are not in the market; and the same remark will apply to some of the small fruits. Considering the limitation of our area, and the variable character of the land, we can not make extensive studies of fruit plantations, and we must give increasingly greater attention to subjects of intensive gardening. The greatest needs of the home Division at present are still greater facilities in the forcing of plants and extension of the experiments in ornamental plants and decorative gardening. The extensive commercial fruit plantations of New York State afford ample facilities in which to study the question of fruit-growing in its fullness, with the simple exception of the testing of varieties, an enterprise which, however, we have never undertaken as a leading role in our experiment work. But in some of the finer and intenser kinds of horticultural work, as the forcing-house industry and others, there is a great need, it seems to me, for increased facilities right here. One of the next lines of effort which we must undertake, and which is yet new to the experiment station research of the country, is a line of studies in the forcing of fruits. Our experiments in the forcing of vegetables, whilst not yet concluded, have, nevertheless, reached the point at which we are able to give rather definite advice respecting the commercial aspects of the subject.

It gives me the greatest pleasure to express my gratitude to yourself and to all my associates for the most generous help which has been given the work of my Division during the trying responsibilities of the past three years.

L. H. BAILEY.

Report of the Assistant Professor of Husbandry and Animal Industry.

To the Director of the Cornell University Agricultural Experiment Station:

Sir.—I have the honor to transmit a brief report upon the work of the Dairy Division of the Agricultural Experiment Station for the year 1896.

The work of the Division has progressed along the lines pursued in former years. The most extensive experiments for the past year have been in relation to the quantity of milk as effected by changes in the food of the animal, and in this work I have had the assistance of graduate students in the College of Agriculture. Material is now in hand that will be ready for publication at no very distant date.

The records of the production of our herd that were begun some five years ago have been continued during the year and have added materially to our facilities for work. We have also been able to test the weekly production of several herds of thoroughbred cattle in various parts of the State.

In conclusion I can not refrain from again calling attention to the need for an assistant in this Division who shall give his whole time to the work of the Agricultural Experiment Station.

H. H. WING.

BULLETIN 106—January, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

REVISED OPINIONS

OF THE

JAPANESE PLUMS.

Burbank. Page 46.

By L. H. BAILEY.

ORGANIZATION.

Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

In 1895, the following Bulletins were issued:

84. The Recent Apple Failures in Western New York.
85. Whey Butter.
86. Spraying of Orchards.
87. The Dwarf Lima Beans.
88. Early Lamb Raising.
89. Feeding Pigs.
90. The China Asters.
91. Recent Chrysanthemums.
92. Feeding Fat to Cows.
93. The Cigar-Case-Bearer.
94. Damping Off.
95. Winter Muskmelons.
96. Forcing-House Miscellanies.
97. Entomogenous Fungi.
98. Cherries.
99. Blackberries.
100. Evaporated Raspberries in Western New York.
101. The Spraying of Trees; with remarks on The Canker-Worm.
102. General Observations Respecting the Care of Fruit Trees; Weeds.
103. Soil Depletion in Respect to the Care of Fruit Trees.
104. Climbing Cutworms in Western New York.
105. Tests of Cream Separators.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.

CORNELL UNIVERSITY,
ITHACA, N. Y., *January* 1, 1896.

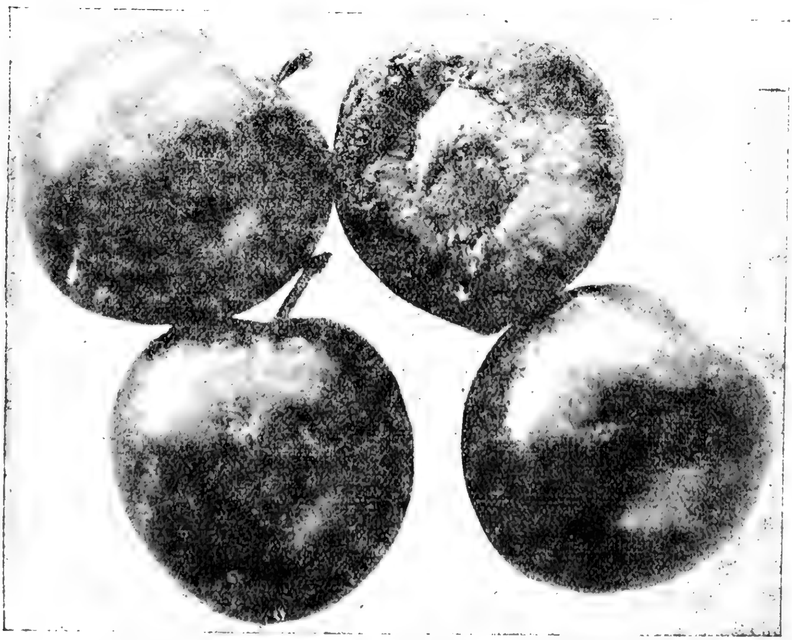
Honorable Commissioner of Agriculture, Albany:

SIR.—The following account of the Japanese plums is submitted for publication under the Experiment Station Extension bill (chapter 230, Laws of 1895). There is a universal interest in the Japanese plums amongst the fruit growers of western New York and it, therefore, seems to be wise to publish this bulletin, as a sort of report of progress, even though the subject is very much confused. It is hoped that the bulletin may tend to check further confusion, by bringing into one report an account of all the varieties which are now before the public. In making these studies of Japanese plums, I have depended quite as much upon the information which I have gathered in many plantations about the State as I have upon our own tests.

L. H. BAILEY.

NOTE.—The illustrations in this bulletin show the fruits full size, but the reader must bear in mind the fact that pictures always look smaller, to the untrained eye, than the objects which they represent.

1.—Abundance, from Daniel Roberts, Keyport, N. J. (See page 41.)



6.—Chase. (See page 49.)

Revised Opinions of the Japanese Plums.

Two years ago this station published an account (Bulletin 62, "The Japanese Plum in North America") of the Japanese plums as they were then known in this country. Our knowledge was very fragmentary and imperfect at the time, and it was not expected that final conclusions could be reached respecting most of the questions which were uppermost in the public mind. Yet the confusion in which the whole subject lay was so great that it was thought better to publish such conclusions and facts as we possessed rather than to allow the perplexities and the entanglements of nomenclature to increase. Many of the varieties which were passing under indefinite class names were renamed, and the new nomenclature has been widely adopted by nurserymen.

The interest in Japanese plums is unabated, and it now seems to be wise to again report upon the subject, adding the experiences of the two past seasons. It will be many years yet before the difficulties of nomenclature can be wholly cleared up, but an occasional report of progress may be expected to hasten the final outcome. A few varieties are now fairly well understood, and descriptions of these are printed in large type in this paper. I have attempted to add descriptions of all other varieties, in smaller type, for the purpose of bringing our scattered knowledge together for convenient reference; but many of these varieties I have not yet seen in fruit and I cannot, therefore, vouch for the accuracy of the descriptions.

In my former report, I said that "altogether, the Japanese plums constitute the most important type of fruit introduced into North America during the last quarter of a century, and they should receive careful tests in all parts of the country." I am now more fully convinced of the truth of this statement than I was at that time; but some persons seem to have read it so carelessly as to have obtained the idea that I recommend the Japanese plums as superior to the old domestica or European types and to the natives. The latter classes were already well established a quarter century ago, when the Japanese sorts first came into the country, and their value is not lessened by the introduction of the Japanese type. Wherever the common domestica plums will succeed, they are still the most valuable types, but some of the Japanese sorts can be added for variety with profit. The Japanese type is adapted to a much wider range of our country than the domestica plums are, and they introduce certain features which are invaluable everywhere. The peculiarly desirable features presented by many of the Japanese plums, in various degrees, are earliness, great productiveness, almost complete freedom, so far, from black-knot and leaf-blight, long-keeping qualities and beauty of fruit. In quality they are generally inferior to the domesticas, although several of them compare favorably in this respect with the Lombard. The only other foreign species of fruit which has been lately introduced into this country and which approaches the Japanese plums in importance, is the kaki or Japanese persimmon; but this fruit is confined to the fig belt, whilst the plum thrives from Canada to the Gulf. A third Japanese fruit — introduced over a quarter century ago — the Japanese pear, is also important, and a report on it may be expected from this station within the present year.

It is yet too early, in my judgment, to recommend the extensive planting of the Japanese plums in this State, yet such varieties as Red June, Abundance, Burbank, and Chase seem to be safe to plant: and to this lot may no doubt be added, as a second-choice list, Georgeson, Maru, Chabot, Ogon, Berckmans, Satsuma. For very early, we might add Berger and Yosebe, and Willard. The first two are very small, and the last is very poor in quality. The experiences of one or two more seasons may modify this list considerably, but it represents the best information which I possess at the present moment, for New York.

Those who desire a fuller exposition of the history and characteristics of the Japanese plums, may consult our Bulletin 62.*

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*The following additional historical notes may be added: D. E. Hough, who first received the Japanese plums in this country, had a small nursery in Vacaville, California, about 1870 to 1875. Professor Wickson writes: "Mr. Hough was a very expert budder and budded stock for others as well as on his own account. He was quite given to roving from place to

It may be said that the fear expressed in that bulletin that these plums may be found to bloom too early for safe cultivation in western New York, has proved to be unfounded. Farther south, however, and even in Ohio and Indiana, the habitual early bloom of some varieties renders them unsafe. The winters are more uniform in character here than they are farther south, and the "warm spells" of early spring are rarely pronounced enough to start the blossoms. It is probable, also, that the many large bodies of water in and about western New York exert a considerable influence in retarding the fitful variations of early spring. I have yet to hear of any serious loss of Japanese plums through late spring frosts. There was an abundant crop of them in many parts of western New York in 1895, notwithstanding the hard frosts of May.

ABUNDANCE (*Lovett, Catalogue*, 1888). Figs. 1, 2.

Botan, of some.

Medium to large, globular to globular-oblong, generally with a distinct but minute point at the apex, often unequal-sided; stem ¾ in. long; under-color yellow, overlaid with coppery red or with very bright pink-red on the exposed side, in well-colored specimens the entire surface reddened and the under-color almost completely obscured or showing through only in dots and small flaky patches; flesh firm, yet rather elastic and very juicy, sometimes slightly stringy, light amber-yellow, sweet and fully as good as

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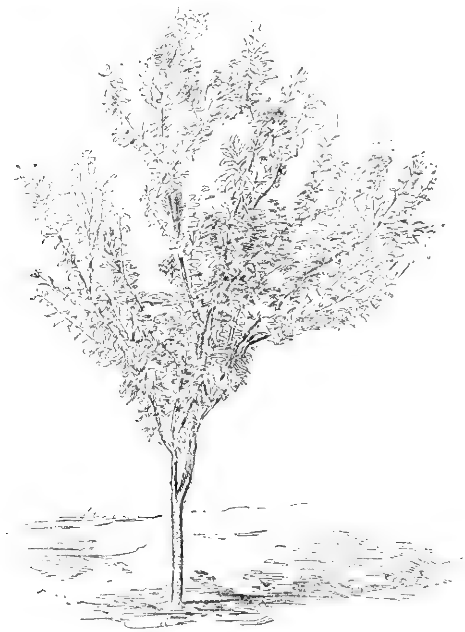
place and turned over his acquisitions to other parties. He seems to have pulled up stakes in Vaca valley between his enlistment of the United States officer in Japan in getting the trees, and the arrival of the trees in San Francisco, and therefore he turned over the stock to John Kelsey. D. E. Hough died about twelve years ago."

Mr. Burbank wrote me as follows, in 1894, respecting his first importation: "My collector whom I sent to southern Japan about ten years ago for the Satsuma—of which, two years before, I had found a description in a book in the Mercantile Library of San Francisco, written by a sailor—sent me about half or more of the Japan plums now in general cultivation. All collectors inform me that there were no nurseries until lately, and when an order was given, the collector secured a few here and there, wherever they could be found. This accounts for the confusion of the names."

Lombard when well ripened, although sometimes having a slight musky flavor, the skin rather sour; cling.

The above description is drawn from specimens received from Daniel Roberts, Keyport, New Jersey, and from many New York samples which were indistinguishable from Roberts' specimens. I wrote to Mr. Lovett for fruits from the original tree of Abundance: he replied that the tree is not standing, but referred me to Mr. Roberts, whose trees were propagated from the original stock.



2.—Abundance tree, 6 years old.

Mr. Roberts sent me excellent samples, some of which I then sent to Mr. Lovett, who wrote that the fruit "arrived in perfect condition, and is the true Abundance." I was thus particular about the matter, because there appear to be two if not three things sold in the country as Abundance; or else the variety is wonderfully modified by climate and local conditions. This exact type of Abundance is much planted in western New York. It is the same variety which I described and figured in Bulletin 62.

The Abundance makes a hardy, thrifty, upright-spreading tree, (Fig. 2). It is very productive, and the fruit generally needs thinning to bring it to perfection. Abundance ripened at Ithaca in 1895 the first week in August, over two weeks ahead of Lombard, a week ahead of Burbank, three weeks later than Yosebe, two weeks later than Willard, and a week to ten days later than Red June.

I do not know if the Yellow-fleshed Botan is identical with Abundance. This name was given by P. J. Berckmans to distinguish a variety received by him from Luther Burbank under the name of Botan. There were two varieties in the batch, and the other, with a lighter-colored and sweeter flesh was named, by Mr. Berckmans, Sweet Botan. This latter is now called Berckmans. When Mr. Lovett sent out his Abundance, it was pronounced to be identical with Yellow-fleshed Botan by Mr. Berckmans. "I have seen trees that were received from Lovett," Mr. Berckman writes, "whose fruit was identical with Yellow-fleshed Botan." The Yellow-fleshed Botan fruits which Mr. Berckmans has sent me several times, seem to differ from the Abundance, as grown here, in the yellower color, less prominent point at the apex, and shorter stem, but these differences may all be due to climate or other local environments. I often notice that plums may be shorter-stemmed when grown in the south than when grown in the north. In specimens which I have received from Berckmans, the Yellow-fleshed Botan has a lighter-colored flesh than the Berckmans. We have trees of the Yellow-fleshed Botan growing, and shall soon be able to determine its relationship to Abundance.

BABCOCK (*Bailey*, *Cornell Bull.* 62, *p.* 19, 1894).

Botankio and Botan, of some.

"Medium to large ($1\frac{1}{2}$–$1\frac{3}{4}$ in. diam.), round-conical; skin yellow overlaid with purplish red, rather thick; flesh deep orange and solid, a little coarse, sweet, of good flavor and quality; cling; rather late, ripening about with the Burbank, or about a week earlier than Chabot in the south.

"Imported in 1885 by Luther Burbank. Now named for Col. E. F. Babcock, a well-known nurseryman of Little Rock, Arkansas, and among the first to grow and recommend the variety."—*Bulletin* 62.

I have never seen a fruit which I could refer to this variety. I substituted the name Babcock for the loosely applied Botankio, drawing my description very largely from notes furnished me by Colonel Babcock. Our own variety bought as Botankio turns out to be Abundance.

BAILEY (*J. L. Normand, Catalogue*, 1891).

"Large, nearly globular, with only a slight tendency to become conical; ground-color rich orange, overspread with light and bright cherry red, and showing many minute orange dots; flesh thick and melting, yellow, of excellent quality; cling. Tree strong and upright, productive. Closely related to Burbank, but rounder and mostly larger, and a week or more later.

"Imported by J. L. Normand, Marksville, Louisiana, and by him named and introduced in 1891. Figured in American Gardening, xiii. (1892), p. 700. There appears to be another Bailey plum of the domestica type. I know it only from a plate made by Dewey of Rochester, and who declares that it 'has not failed to bear for twenty-five successive years.' The Rochester Lithographing Co., successors to Dewey, write me that this plate was in Dewey's stock before 1886, but that they know nothing further about it."—*Bulletin* 62.

I have not yet fruited this variety, but I have received it from several sources. Mr. Berckmans regards it as identical with Chabot. It is also remarkably like the Chase and Hoyo Smomo. It is possible that all these four names belong to the same plum. It is evidently a good plum, whatever its proper name may be found to be.

BERCKMANS (*Bailey, Cornell Bull.* 62, *p.* 20, 1894).

True Sweet Botan.
Sweet Botan.
White-fleshed Botan.
Botan, of some.

Medium (or slightly above if thinned), broadly and obtusely conical and somewhat angular in cross-section; dull deep blood red if ripened in the sun, sometimes with yellowish patches on the shaded side; flesh very sweet, moderately juicy or dry; cling or semi-cling; ripens with Abundance or just ahead of it. Becomes too dry when very ripe.

Introduced by Luther Burbank in 1887, from imported stock. The variety does not appear to be a true Botan, and its nomenclature is so confused and indefinite that I renamed it for Mr. Berckmans, who, to distinguish it from another variety which was also received under the name of Botan (see remarks on Yellow-fleshed Botan, under Abundance), called it White-fleshed Botan. Mr. Berckmans considers it poor in quality, but as it is grown in the north it compares well with Abundance; and even the specimens which Mr. Berckmans has sent me seem to me to be superior in quality to the Abundance which he has sent. Deeper and duller red than Abundance, lacks the point characteristic of that variety, and the flesh is much drier. Very productive. Figured in Bulletin 62.

BERGER (*Munson; Bailey, Cornell Bull.* 62, *p.* 20, 1894).

Fruit very small and globular, bright uniform red, with a firm, meaty and sweet yellow flesh and a very small free stone, ripening the middle of July in New York.

There has been much confusion respecting this plum. Mr. Berckmans once sent it to me without a name, saying that it came from H. H. Berger & Co., of San Francisco, as Red Nagate. N. S. Platt sent it from Connecticut as Satsuma, the name under which it was received from Berger. It came from the south (also originally from Berger) as Shiro Smomo. I also have it from western New York, unnamed. T. V. Munson, Texas, sent specimens which he called the Berger, and I adopted his name and published it in Bulletin 62. He writes as follows of it: "The Berger plum is an upright, cherry-like tree. It bears a purple fruit about the size of the Black Tartarian cherry, with meaty flesh, nearly free stone which is as small as the pit of the common Black Morello cherry and much the same shape." It falls from the tree as soon as ripe, leaving the stem on the tree. An interesting little fruit for the home garden, but too small for market. There is a picture of it in Bulletin 62. See Yosebe.

BLOOD: See Satsuma.

BLOOD PLUM NO. 3.

"Fruit somewhat smaller than Satsuma, flesh very deep red and juicy, sweet; middle of July; tree of very open straggling growth." —*P. J. Berckmans, Catalogue*, 1895.

BLOOD PLUM NO. 4.

"This corresponds with the description of *Honsmomo* of the Agricultural Bureau of Tokio. Fruit medium, dark red flesh; July 10th to 25th; tree of erect growth."—*P. J. Berckmans, Catalogue*, 1895.

BOTAN: See Abundance, Babcock, Berckmans, Willard.

BOTANKIO: See Abundance and Babcock.

BURBANK (*Van Deman, Rept. Dept. Agric.*, 1891, *p.* 392.)

Fig. on title page and Nos. 3 and 4.

Medium, to rather large upon thinned trees, conical to oblong in form, the point generally blunt; ground color orange-yellow mostly

3.– Burbank From Luther Burbank, Santa Rosa, Cal.

rather thinly overlaid with red and showing many yellow dots, often more or less marbled, in the sun becoming rather dense red; flesh firm and meaty, yellow, not stringy, rich and sugary; cling. As compared with Abundance, it is a week or two later, more oblong and lacking the peculiar point of Abundance, flesh firmer and not inclined to be stringy, and sweeter, lacking the slight muskiness of Abundance. Burbank is shaded and splashed with dull maroon-red and is much spotted, the yellow under-color being conspicuous. Abundance is a vivid pink-red, the yellow ground conspicuous only on the shaded side. In 1895, the Burbank on our grounds was less than a week later than Abundance, but the very dry season may have ripened it ahead of its usual season.

A specimen of the Burbank sent by Luther Burbank, Santa Rosa, Cal., is shown natural size in Fig. 3. It is very unlike the Burbank as grown in the east. The size is greater, and the color a deep claret red with minute golden dots. The flesh was very thick, firm and meaty, and of excellent quality.

The variety is a most sprawling, flat-topped or even drooping grower (Fig. 4); and this habit distinguishes the variety from all other Japanese plums which we have grown. The tree should probably be headed-in when young, to keep it within bounds. The fruit generally needs thinning, for the tree is enormously productive.

The Burbank was imported by Luther Burbank, Santa Rosa, California, late in 1885, and named for him by H. E. Van Deman.

4.—Burbank tree, 6 years old.

See Rept. Dept. Agr. 1891, p. 392, where it is also given a good colored plate. Generally introduced in 1890.

The Russian plum 20 M, sent me by Professor Budd, is indistinguishable from Burbank. We have two trees of it, and they bore two or three bushels of plums this year.

BURBANK No. 1.

Said to resemble Berckmans. I do not know it.

BURBANK No. 2.

"Described as of medium size, regular and globular in shape, yellow over-spread with purplish carmine, with a yellow very juicy flesh which is fine-grained and of good quality; pit nearly free. Very early. This variety is not reported in any recent tests."—*Bulletin* 62.

"Burbank No. 2, from Berckmans, fruited in 1892 and since; no apparent difference between it and our Abundance."—*Stark Bros.*, 1895.

BURBANK NO. 3: See Late Blood.

BURBANK NO. 4: See Heikes.

BURBANK NO. 11.

I know this only from specimens received the past summer from Stark Bros., Louisiana, Missouri. It looks very much like Willard.

5.—Chabot.

Freestone or very nearly so. Drops easily. Season of Red June, and said by Stark Bros. to be not worth propagating.

CHABOT (*Burbank*). Fig. 5.

Medium to large (size of Burbank), oblong-conical; under-color orange, deeply overlaid with light cherry-red, the sunny side dark red, and many minute golden dots showing through the red over-color; flesh yellow, rather soft, not stringy, sweet and of excellent quality, with no almond flavor; skin scarcely sour; cling. An excellent plum, ripening early in September in this latitude.

Imported from Japan by Mr. Chabot, of Berkeley, California, but introduced to the trade by Luther Burbank in 1886. See Chase.

CHABOT BLOOD.

"A novel and remarkable addition to our fruits. The size is medium, stem very short, and of a brick red or cinnabar color; flesh firm, fine brick red color; very juicy and sweet, and with a peculiar aromatic flavor."—*Catalogue California Nursery Co., Fourth Edition* (*recent: no date*).

CHASE (*R. G. Chase Co., Catalogue*, 1893). Fig. 6.

Hattonkin, of some.
Yellow Japan, of some.

Medium to large, heart-shaped; under-color yellow (like Abundance), deeply overlaid with dull red and showing many golden dots, finally becoming uniformly dull red all over; bloom thick; flesh yellow, firm, rather juicy, sweet and good; skin rather tough; cling. The coloring is that of the Burbank, but the plum is more pointed and it is two or three weeks later, ripening in this latitude the first or second week in September.

This very excellent plum was bought by the Chases for Abundance, but is about a month later than that variety. It is of the Chabot type and may not be distinct (see remarks under Bailey). The tree is a strong upright-spreading grower, and productive. It is considerably disseminated in New York under the name of Yellow Japan, although it is a red plum. Chase Co. speaks of the tree as "a good grower" and blooming "two weeks later than Abundance, thus escaping the spring frosts."

DELAWARE (*Burbank, Catalogue*, 1893).

"Roundish, conical, medium in size, purplish bronze in color with a white bloom; flesh wine-color, juicy, combining many flavors. Trees semi-dwarf, very productive. Catalogued amongst Luther Burbank's novelties, 1893. Said to be a cross of Satsuma and Kelsey."—*Bulletin* 62.

DOUGLAS (*R. H. Price, Bull.* 32, *Texas Exp. Sta., p.* 488, 1894).

Munson, of Bailey, Bull. 62, p. 27.
Hytankayo, of Whitaker.
Hattankio, of some.

"Size rather large, conical, yellow with purple tinge; skin tough; flesh firm, flavor very good. Tree upright vigorous grower, hardy and very productive. Nearly free from attacks of insects and fungi."—*Dr. Whitaker, Tyler, Texas, in Bull.* 32, *Texas Exp. Sta.*

Imported and introduced by Dr. Whitaker. The name Munson which I proposed for this plum in Bulletin 62, is antedated by another Munson plum of the Chickasaw type.

EARLIEST OF ALL (*Stark Bros.*).

Yosebe, of some.

"Small to medium, globular; color a solid dark red; quality good; pit small, free. Fully ten days earlier than Red June. It drops as soon as colored. Our idea in growing this variety for market would be to shake the fruit on a sheet and market in quart berry boxes. Very productive. Leaf very narrow, conduplicated and somewhat smaller than the Red June."—*Stark Bros.* See Uchi-Beni.

ENGRE.

Fruit small, globular, red, almost exactly like Willard and of same season; poor. It seems to differ from Willard in foliage, however. The leaves are short and elliptic, whilst those of Willard are long and obovate. Little known. Two varieties seem to be passing under this name.

EXCELSIOR (*Cherokee Nursery Co.*).

"A seedling of the Kelsey. Fruit large, round, 1½ inches in diameter; color reddish purple, with heavy blue bloom, flesh sweet, juicy, melting and of excellent quality. Ripens early in June. The trees of this variety had more fruit last year than any other variety, either native or foreign. It is undoubtedly a cross between the Kelsey and some variety of the Chickasaw type. The tree is a very strong grower, symmetrical and handsome; a valuable variety."—*Catalogue, Cherokee Nursery Co., Waycross, Ga.*

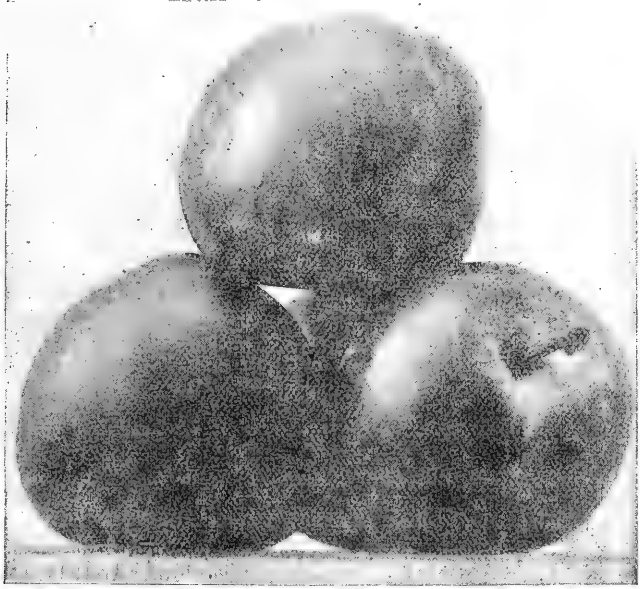
The fruits which I have seen were an inch and a half in diameter, round-conical, with a distinct small sharp point; stem slender; color very bright dark red with many minute gold dots; flesh soft and watery, sweet; cling. The fruit and foliage suggest only the Wild Goose type (*Prunus hortulana*), but the pit suggests Kelsey.

FURUGIYA.

Name given, without description or comment, by J. L. Normand, Marksville, La., in "Special Circular of New Japan Plums and Rare Novelties," 1895–6.

GEORGESON (*Bailey, Cornell Bulletin* 62, *p*. 23), Figs. 7 and 8.

Hattonkin, No. 1.
Hattonkin, of some.
Hattankio, of some.



7.—Georgeson.

Medium in size, or fairly large when thinned, variable in shape but usually irregularly globular with a flattened apex but sometimes obscurely conical; color a clear rich uniform yellow, with a thin white bloom and minute whitish dots in the skin; flesh very firm, not juicy nor stringy, sweet and good; skin sour; strong clingstone. Ripe at Ithaca in 1895 the last days of August and first days of September, one or two weeks later than Burbank. I had it from Niagara county, New York, however, early in August. A very long keeper. Fairly productive.

Tree (Fig. 8) a sprawling, forked grower, intermediate in form between Abundance and Burbank. The variety is well distributed in Western New York, under a variety of names. Imported by H. H. Berger & Co., San Francisco, and brought to notice chiefly by J. L. Normand, Marksville, La.

GOLDEN (*Burbank Catalogue*, 1893).

Said to be a cross of Robinson (a Chickasaw) and Kelsey.

HALE (*G. H. and J. H. Hale*, 1895).

"J," of Burbank.

Prolific, of Burbank.

8.—Georgeson, 6 years old.

A very handsome, large round-cordate plum, usually lop-sided; orange, thinly overlaid with mottled red, so as to have a yellowish red appearance, or, in well-colored specimens, deep cherry-red with yellow specks; flesh yellow, soft and juicy (not a good keeper), not stringy, with a very delicious, slightly acid, peachy flavor; skin somewhat sour; cling. Very late. I know the fruit only from specimens sent at two or three different times by Luther Burbank. To my taste, these specimens have been the best in quality of all Japanese plums, although Mr. Burbank regards it as inferior in this respect to Wickson (which see). Seedling of Satsuma.

HATTANKIO: See Douglas, Georgeson, Kerr.

HATTONKIN No. 1: See Georgeson.

HATTONKIN No. 2: See Kerr.

HEIKES (*Bailey, Cornell Bulletin* 62, *p.* 23, 1894).
Burbank No. 4.

Much like Late Blood, but rather more flattened on the ends, or oblate, mostly darker in color, the flesh acid. Little known.

Named for W. F. Heikes, of the Huntsville Nurseries, Huntsville, Ala.

HOUSMOMO.

Name inserted in "Special Circular" (1895–6) by J. L. Normand, without note or comment. (Misprint for Honsmomo? See Blood No. 4).

HOYO SMOMO.

Apparently identical with Bailey, which see.

HYTANKAYO: See Douglas.

JUICY (*Burbank, Catalogue*, 1893).

Cross of Robinson (a Chickasaw plum) and Kelsey.

KELSEY (*W. P. Hammon & Co., Oakland, Cal.*).

Very large (2–3 in. diam.) and long-pointed, tapering gradually from a heart-shaped base, usually somewhat lop-sided, with a deep furrow-shaped suture; color, bright red-purple on a yellow ground, more or less marked with dots, very showy; flesh light yellow and rather firm, rich and pleasant in flavor, free or only slightly clinging to the small stone, more or less hollow above the pit.

The first Japanese plum introduced into this country, but it did not attract much attention outside of California, until ten or twelve years ago. It was figured by Mr. Van Deman in Department of Agriculture Report for 1886, plate X., and again (colored) in report for 1887, plate I.; in Wickson's California Fruits, p. 351; and in my Bulletin 62. Its behavior is not uniform in different years. F. M. Ramsay, of Lampasas, Texas, writes me that in 1888 his Kelsey ripened in September, in 1889 in July, and in 1890 in June. L. A. Berckmans, Georgia, says* that in 1887 the Kelsey did not mature until October 1; in 1889 it ripened in July; in 1890 it "began to ripen the latter part of July and continued for eight weeks," and on October 1 perfectly green specimens were on the trees. It has a more or less prolonged indefinite season of bloom.

*Proc. 14th meeting, Ga. Hort. Soc. (1889) 52.

Luther Burbank (Santa Rosa, Cal.) writes: "Kelsey blooms here all winter, from December to March." In California the tree is said to be nearly evergreen.

There are still the most conflicting reports respecting the hardiness of Kelsey. Some persons declare that it fruits in New York; but every report, when run down, shows that the party is mistaken in the variety. The furthest north that I have known Kelsey to fruit is in extreme southern Delaware. J. Van Lindley says* that in 1893 in North Carolina his Kelsey trees "were loaded with fruit, large and fine, quality of the very best." It ripened from the first to the last of August. "The Kelsey," he continues, "stands at the head for canning and preserving, and sells in any market at fancy prices, but it comes into competition with other fruits grown north." Kelsey has been killed by cold in northern Texas; on the other hand, the trees are said to have come through the winter with little injury in Iowa. My first experience with the Kelsey was at Lansing, Michigan, where the trees killed to the snow line the first winter. Professor Tamari, of Tokio, says that the variety is too tender for the northern plum sections of Japan. Mr. H. E. Van Deman, formerly pomologist of the Department of Agriculture, wrote me upon the hardiness of Kelsey, in 1892, as follows: "My present opinion is that it is about as hardy as the fig. All reliable information that has come to this office up to this date is to the effect that it is not suitable to the northern states because of its tenderness. I know from personal observation that between here [Washington] and Baltimore trees have been seriously injured by winter-killing. Occasionally I have heard of Kelsey plum trees withstanding severe cold, but in every case yet followed up, it has been found that the trees were not correctly named." I am inclined to think, however, that the Kelsey will sometimes endure a New York winter if the wood has been well ripened; but I doubt if it will ever bear in this state.

The following correspondence to the *California Fruit Grower* (Sept. 14, 1885) still further explains the vagaries of the Kelsey:

"The Kelsey Japan plum is surely erratic in disposition, — more or less reliable.

"My experience teaches me, however, that it bears much more regularly when in close proximity to some other variety of plum.

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*Thirteenth Rep. N. Car. Hort. Soc. (1893) 20.

"This is very marked, not only in outside rows, but in the center of the block. Wherever I have an old tree of Satsuma, immediately surrounding that tree the Kelseys bear well.

"It does better with very little pruning.

"It must be sprayed with a good fungicide once or twice a year to keep in check the shot-hole fungus.

"It succeeds best in heavy, moist land, and preferably in the coast or bay counties.

"In marketing it, great care must be taken as to when the fruit is picked. Some seasons it colors much more than others, hence the danger of waiting for color.

"I pick mine the very hour (if possible) that the slighest color is apparent. They will color up afterwards in the boxes before they reach destination — referring, of course, to the eastern markets.

"My trees are picked over seven or eight times.

"When the fruit sets very thickly it must be well thinned.

"The prices have been very satisfactory to me. I am well repaid for the extra labor, the fruit netting me four cents to eight cents per pound.

"Conditions and surroundings vary so much that I would not advise one way or the other. Almost any variety of plum or prune could be grafted on Kelseys, where they are not profitable. Why not use Robe de Sargent, especially if the root is peach?

"A double-worked Robe de Sargent tree is best, as it makes a larger tree, and larger fruit as well as more of it.

"It will not unite directly on the peach, as is generally known, hence the suggestion to double work, using the Kelsey on peach root.

"LEONARD COATES.

"NAPA, Cal., September 9, 1895."

George S. Higby, Poway, San Diego Co., California, writes as follows of the Kelsey: "I had the honor, I believe, of exhibiting the first specimens of Kelsey in San Diego county. The Kelsey is fast becoming a popular fruit in this county, and is adapted both to the sea-coast and inland valleys. I think that in the near future it may take a position equal to the French or California prune as a dried fruit. A well ripened Kelsey has very few superiors."

KERR (*Bailey*, *Cornell Bulletin* 62, *p.* 25, 1894).

Hattonkin No. 2.

Hattonkin, of Berckmans and others.

"Medium to large, generally very strongly conical with a deep suture; color orange-yellow, with a creamy bloom; flesh juicy and sweet, good in quality; cling; early.

"An excellent variety, but not tested in the north. It varies considerably in shape, even on the same tree, occasional specimens occurring without the point. Mr. Berckmans writes me that in 1890 the round form seemed to predominate, while in 1892 the pointed or normal form alone was produced. Imported from Japan by Frost & Burgess, Riverside, California. Named for J. W. Kerr, of Denton, Maryland, one of the most intelligent plum growers of the central states." — *Bulletin* 62.

"Kerr is not the earliest of the large-sized plums, but most excellent in quality. It partakes more of the Green Gage flavor than any other of the group." — *P. J. Berckmans*, 1895.

Figured in Bulletin 62.

LATE BLOOD (*Burbank, in early lists*).

Hale, of Bailey, Bulletin 62.
Burbank, No. 3.

Medium in size, globular or slightly flattened, scarcely if at all pointed, rather light bright uniform red; flesh red, firm and sweet, tightly clinging to the pit.

Imported by Luther Burbank in 1885, together with Heikes, which see. Mr. Burbank writes me that he disposed of this and No. 4 after they had fruited in the nursery row, and that he now has no knowledge of them. Very much like Satsuma, but a few days later and appears to bloom earlier; also less pointed, and somewhat different in leaf. Little known.

LATE HATTANKIO (*Cherokee Nursery Co., Waycross, Ga., in letter*, 1894).

"Color pale orange yellow, heavily covered with a white bloom. Suture very slight. Flesh dark yellow, very firm and somewhat dry with a slight astringency. Generally of poor quality and irregular shape. Ripe with us June 15th to 20th."

LONG FRUIT (*Burbank*).

Very small, roundish in shape, red, early and said to be a shy bearer. Thought by some to be the same as Engre. Others say that it is the same as Red June. Possibly two things are propagated under this name. Stark Bros. write of it: "Equally small or smaller than your cut of Berger [in Bull. 62], and very acrid." Imported by Luther Burbank in 1885, but very little known.

MARU (*Burbank*). Fig. 9.

Masu and Massu.

Medium in size, depressed-globular with an obtuse point; very dark uniform maroon-red with numberless minute golden dots;

9.—Maru.

flesh deep yellow, rather soft, with a musky flavor which is not disagreeable, sweet, but quality only medium, skin sour; cling to half cling. Often acid in flavor. Season of Abundance. Said to be very hardy in bud.

Imported by Luther Burbank in 1885. Maru is Japanese for *round*.

MIKADO.

"It is a large, golden yellow plum when ripe, and samples measured seven and one-quarter inches in circumference. It is considered now as the most profitable variety that is propagated in the valley, ripening early, the trees good bearers and the fruit bringing very high prices. Last season they brought as high as $11 per box in the eastern markets, or over fifty cents a pound, and this season bringing from $5 to $7 per box."—*Vacaville* (*Cal.*) *Reporter*, quoted in *California Fruit Grower*, xiii. 198 (Sept. 2, 1893).

"A very large plum, of greenish yellow color, nearly round, very little suture, a very rapid grower, more so than any other. This is the most remarkable of all plums for its enormous size, beauty and good quality. It is probably the largest plum in existence; ripens fifteen days after Yeddo. I have had specimens of it larger than any Kelsey, or as large as any common-size Elberta peach."—*J. L. Normand, Marksville, La., Special Circular*, 1895-6.

MUNSON: See Douglas.

NAGATE NO BOTANKYO.

"Early."—*J. L. Normand, Special Circular*, 1895-6.

NORMAND (*J. L. Normand, Catalogue*, 1891).

Normand Yellow.
Normand's Japan.

Medium to large, obtusely conical with a heart-like base and short stem; color clear golden yellow; flesh firm and meaty, yellow, of high quality; the small pit free. Very prolific, and ripens just after Berkmans and Abundance. Allied to Georgeson and Kerr; less conical than the latter.

Imported by J. L. Normand, Marksville, La., and by him disseminated under the name of Normand's Japan in 1891. Figured in Bull. 62.

OCTOBER PURPLE (*Burbank*).

A very large black-purple heart-like plum, with no splashes of lighter color; flesh amber-yellow, red beneath the skin, very juicy, but yet firm, somewhat stringy, very sweet and good; skin sour; cling. Very late.

OGON.

Fruits medium in size, flattened at the ends or tomato shaped, not at all conical, the suture prominent; color clear lemon with a light creamy bloom giving the fruit a whitish appearance; flesh thick and very meaty, not juicy, firm and keeping long, of second or third quality, entirely free from the stone. Tree only moder-

10.—Red June.

ately productive in New York, or in some regions even shy. Early, ripening in New York from late July to the middle of August. Excellent for canning.

Imported by H. H. Berger & Co., San Francisco. One of the best known varieties, but evidently not increasing in popularity in this state. Figured in Bulletin 62.

O-HATANKYO.

"Said to be early."—*J. L. Normand*, "*Special Circular*," 1895–6.

ORIENT (*Stark Bros., Catalogue*, 1893).

Red Nagate, of some.

"Large, broadly conical; red, very highly colored; flesh yellow, of high quality. Ripens soon after Burbank. Introduced in the

11.—Red June, 6 years old.

fall of 1893 by Stark Bros. Louisiana, Mo. Figured in American Gardening xiv. (1893), p. 363."—*Bulletin* 62.

Possibly the same as Chabot.

RED JUNE (*Stark Bros., Catalogue*, 1893). Figs. 10 and 11.

Red Nagate, of some.

Shiro-Smomo, of some.

Medium to nearly large size, cordate and very prominently elongated at the apex, the suture deep, generally lop-sided, deep vermilion-red all over, with a handsome bloom, very showy; flesh light lemon-color or whitish, firm and moderately juicy, not stringy ; very slightly subacid to sweetish, the skin slightly sour, of good pleasant quality although not so rich as some ; cling to half cling ; pit small.

A very handsome plum, ripened at Ithaca in 1895 from July 28 to August 1, nearly a week later than Willard, and a week earlier than Abundance. By all odds the best Japanese plum ripening before the Abundance which I have yet tested. Tree (Fig. 11) upright-spreading, vigorous and hardy, about as productive with us, so far, as Abundance. I thought that the quality of our specimens last season were nearly or quite equal to that of Abundance.

Imported by H. H. Berger & Co., San Francisco. The nomenclature of the variety here described is much confused. H. H. Berger & Co. write me that the true Japanese Red Nagate has red flesh, which this has not. The name Red Nagate is applied to such different varieties, and there is such an absence of opinion as to what the true Red Nagate is, that I have adopted Red June as the only tenable name.

This is the variety to which the name Shiro Smomo is oftenest applied, but it is neither a Smomo plum nor is it white (Shiro means *white*), thus affording a curious instance of the utter confusion of the American application of the names of the Japanese plums. Professor Georgeson tells me that the Shiro Smomo of the Japanese is a small white early plum with yellow flesh, somewhat cling and of medium season. I do not know if it occurs in this country ; and it is probably not worth while to endeavor to fit the name to any variety. The Ogon is probably the nearest to it of any variety in this list.

SAGETSUNA.

Name given in J. L. Normand's "Special Circular," 1895-6, without comment.

SATSUMA.

Blood.
Yonemomo.

Size medium to rather large, broadly conical with a blunt, short point, suture very deep ; color very dark and dull red all over, with greenish dots and an under-color of brown-red ; flesh blood-red, rather coarse and acid, fair to good in quality, tightly clinging to the pit ; midseason ; productive.

Imported by Luther Burbank in 1886. Figured in Pomologist's Report, Rept. Dept. Agr. 1887, Plate I. (colored), and also in Wickson's California Fruits, 351, the latter copied from the former. I have never seen a Satsuma with such a small pit as represented in these cuts, nor of the same shape. The fruit appears to be uniform in shape and markings, and it is figured from life in Bulletin 62. The Satsuma is hardy in the northern states. Stark Bros., Louisiana, Mo., write that it blooms too early with them and is not so hardy as some others. This belongs to the Beni-Smomo group of Japanese, which is characterized by red flesh. Season about with Burbank. Usually too sour to be agreeable, and the color is such that the market will probably object to it. Very long keeper.

SEA-EGG (*Burbank*).

Mr. Burbank sends me a very handsome and well-marked Japanese plum under this name, which is globular heart-shape in outline, and mottled-red; flesh very thick and meaty, orange-yellow, sweet and excellent, with a slight muskiness; cling.

SHIRO SMOMO: see Red Nagate and Berger.

SHIPPER (*Burbank*).

Fruit oval, light red with a white bloom; flesh very firm, yellow, sweet and juicy; long keeper. Tree sturdy, but a moderate grower. Described with Burbank's Novelties, 1893. Seedling of Satsuma.

SHIRA TA BENE.

"Similar to Satsuma, but much earlier, ripening in July; fruit blood-red through."—*J. H. Haynes (Indiana) in Prairie Farmer*, Dec. 21, 1895, 8.

STRAWBERRY: see Uchi-Beni.

SWEET BOTAN: see Berckmans.

TRUE SWEET BOTAN: See Berckmans.

UCHI-BENI.

Ura-Beni.

Honsmomo.

Strawberry.

Medium in size, heart-shape and somewhat pointed, bright carmine red; flesh red and fine-grained, somewhat acid, rather poor in quality; cling; rather early. Little known. Uchi-Beni means *inside red.*

Stark Bros. write me as follows, under date of August 12, 1895 "This is a small plum, similar to the variety you describe as Berger, and is the variety we called Strawberry when we propagated it; but we discarded it two years ago. Ripens a few days after the Earliest of All, but is not so large nor so good quality and is not at all productive, while the Earliest of All is remarkably productive."

WHITE-FLESHED Botan: See Berckmans.

WASSE BOTONKYO.

Name given, without comment, in J. L. Normand's "Special Circular," 1895–6.

WASSE SMOMO.

"Said to be very early."—*J. L. Normand*, "*Special Circular*," 1895–6.

WASSU.

Name only, in J. L. Normand's "Special Circular," 1895–6.

WEEPING BLOOD.

"This is a valuable acquisition, said to produce a blood-red plum of good quality. The tree must be seen to be appreciated. I have them here on my experimental grounds, growing finely; I budded them at different heights on straight peach stock four to eight feet from the ground, with slender limbs curving down gracefully like the Tea's Weeping mulberry. Single trees set out on the lawn look grand."—*J. L. Normand*, "*Special Circular*," 1895–6.

WHITE KELSEY.

"This is a duplicate in size and shape of the common Kelsey, except it is of a pale, creamy color, almost white when ripe; does not rot before maturity like the Kelsey, and much earlier to ripen and later to bloom than it; delicious in flavor."—*J. L. Normand*, "*Special Circular*," 1895–6.

WICKSON (*Burbank*, *Catalogue*, 1894).

Perfection, of Burbank.

A remarkably handsome and very large, deep maroon-red plum of the Kelsey type. Long cordate or oblong pointed; flesh firm, deep amber-yellow, clinging to the small pit. There is apt to be a hollow space about the pit, as there is in Kelsey. I have had the plums from Burbank three times, all of them in good condition, and have tested them when in prime condition; but each time the fruit has had such a pronounced musky-almond flavor that I could not enjoy it. Mr. Burbank, however, regards it as superior to Hale in quality. Excellent keeper. Cross of Burbank with Kelsey, Burbank furnishing the seed.

Stark Bros. report that nursery stock of this variety has stood 22° below zero at their place without injury.

WILLARD (*W. F. Heikes*, 1893). Fig. 12.

Botan No. 26.

Medium in size, spherical to oblong in general outline, but prominently cornered or angled, never pointed, the sinus very slight but stem cavity deep; color bright claret-red with many minute yellow dots; flesh rather firm, whitish, of poor quality; freestone. A strong, vigorous and hardy tree, productive and one of the earliest plums yet tested in the north, ripening in Central New York late in July. In appearance the fruit is remarkably like some of the improved types of *Prunus Americana*. The fruit is handsome when well ripened, and keeps two to three weeks if picked when it begins to color, but the quality is almond-like and poor — so poor that I can not recommend it. Fruit picked in 1895 on July 16, when it just began to color, kept until August 6, the specimens shriveling rather than rotting.

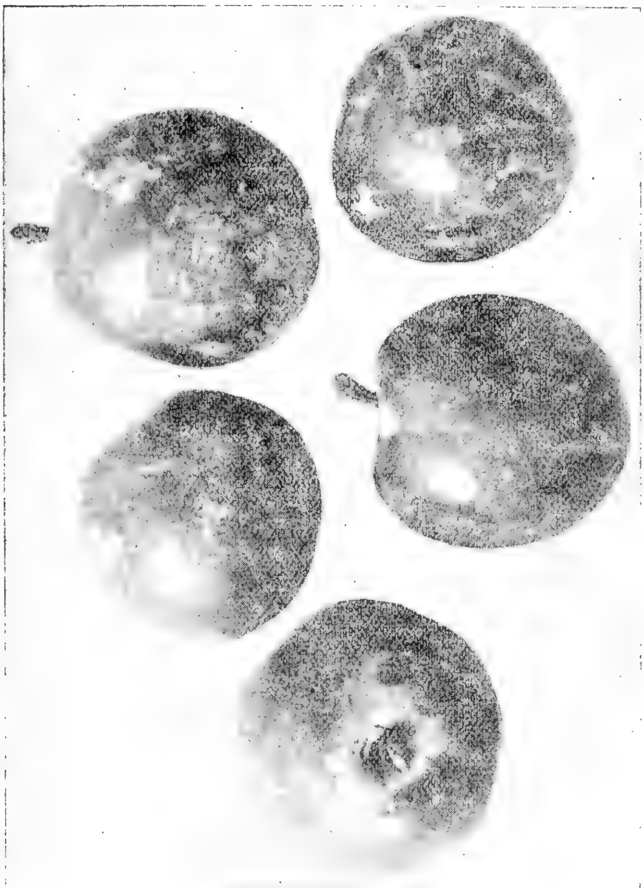
Cions procured from California six or seven years ago by S. D. Willard, Geneva, N. Y., and named for him by W. F. Heikes in *Practical Nurseryman*, June, 1893. It was undoubtedly imported from Japan, but the history of it is lost. Mr. Burbank writes: "I had the Willard sixteen years ago. Not valuing it very highly, I discarded it many years ago, although it may prove valuable as an early variety; but I would prefer Stark Bros.' Red June, which ripens at the same time, but even that variety, though handsome, is poor in quality."

YEDDO.

"Much like White Kelsey, which it resembles in some respects, but it is of a deeper yellow color and ten days later to ripen, and very attractive and fine-flavored plum."—*J. L. Normand*, "*Special Circular*," 1895–6.

YELLOW JAPAN: See Chase.

YONEMOMO: See Satsuma.



12.—Willard. Grown by S. D. Willard, Geneva, N. Y.

YOSEBE. Fig. 13.

A small short-oblong-pointed fruit, with slender stem and almost no suture; deep purple-red all over; flesh dark yellow, soft, subacid, with a pronounced almond flavor; pit small and free. A handsome very early plum, but the quality poor. Falls from the tree as soon as ripe, leaving the stem on the tree. Ripe here a week earlier than Willard.

Tree an upright grower, with reddish twigs and light-colored foliage. Leaves comparatively small and rugose, somewhat conduplicate, very prominently serrate, yellowish green. Stipules conspicuous. Tree very unlike other Japanese plums, when in leaf.

13.—Yosebe. One of the Sumomo or cherry-like type.

There are two or three varieties passing as Yosebe, and nobody knows which one is entitled to the name. Neither do I know whether the proper orthography of the name is Yosebe or Yosobe. It is probable that all the varieties have been given separate names, which can be used as soon as the characteristics of the varieties are understood.

Apt to be confounded with Berger. The Berger is small and nearly or quite globular, with a smooth circular cherry-like pit; Yosebe is distinctly cordiform and a half to twice larger, with a roughish and lenticular pit. The two are also very unlike in foliage.

L. H. BAILEY.

BULLETIN 107—January, 1896.

Cornell University—Agricultural Experiment Station,
ITHACA, N. Y.
ENTOMOLOGICAL DIVISION.

WIREWORMS
AND
THE BUD MOTH.

By M. V. Slingerland.

ORGANIZATION.

Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and The Bud Moth.

EXPLANATORY NOTE.

In Bulletin 33, issued in November, 1891, Professor J. H. Comstock and the writer gave a detailed account, occupying 80 pages, of nearly three years of experimentation with *wireworms.* The bulletin embodied the results of our efforts to discover a practicable method of preventing the ravages of these pests, and a study of the life-history of several common species.

In Bulletin 50, issued in March, 1893, the writer devoted 26 pages to a detailed discussion of the *bud moth*, one of the most destructive insect pests in the orchards of western New York. Our two years' study of the insect enabled us to correct several erroneous statements regarding its habits and life-history which had a very practical bearing on the method of combating it.

Wireworms had long ranked among the worst insects pests of the general farmer; the bud moth threatened to "nip in the bud" many a prospective crop of fruit; and unfortunately what little definite and accurate knowledge has been published regarding these insects was widely scattered and inaccessible to the farmer or fruit grower. Therefore, as our bulletins combined these previously ascertained facts with many new ones, the results of much original investigation, the demand for the bulletins was so great that the entire edition of each was exhausted in less than a year. So that during the past two or three years that these bulletins have been "out of print," the information they contain has been inaccessible to the hundreds of correspondents who have desired information regarding wireworms and the bud moth.

Although but few observations have since been made on these insects, it seems advisable, in consideration of the above facts, to again discuss them. In the following pages we, therefore, give, in a condensed form, the information contained in Bulletins 33 and 50; what few new facts we have seen recorded are also included in their proper connection, thus bringing the information up to date. Several new figures enliven the pages.

M. V. SLINGERLAND.

CONTENTS.

Wireworms.

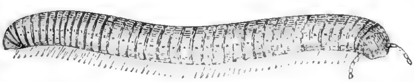
RESULTS OF EFFORTS TO DISCOVER A PRACTICABLE METHOD OF PREVENTING THE RAVAGES OF THESE PESTS, AND A STUDY OF THE LIFE HISTORY OF SEVERAL COMMON SPECIES.

I. Introduction.

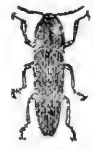
Among the most prominent of the pests that infest field crops are the insects commonly known as wireworms. These are long slender grubs of a yellowish-white color and with unusually hard bodies. Their wire-like form and the hardness of the body has suggested the common name. Two wireworms are shown, natural size, among the roots in figure 16; one is represented enlarged in figure 14. Unfortunately the term wireworm has been misapplied to certain animals—the millipedes—which are not true insects but belong to a different class in the animal kingdom. Figure 15 represents a millipede. The following pages do not treat of millipedes.


14.—A wireworm, twice natural size.

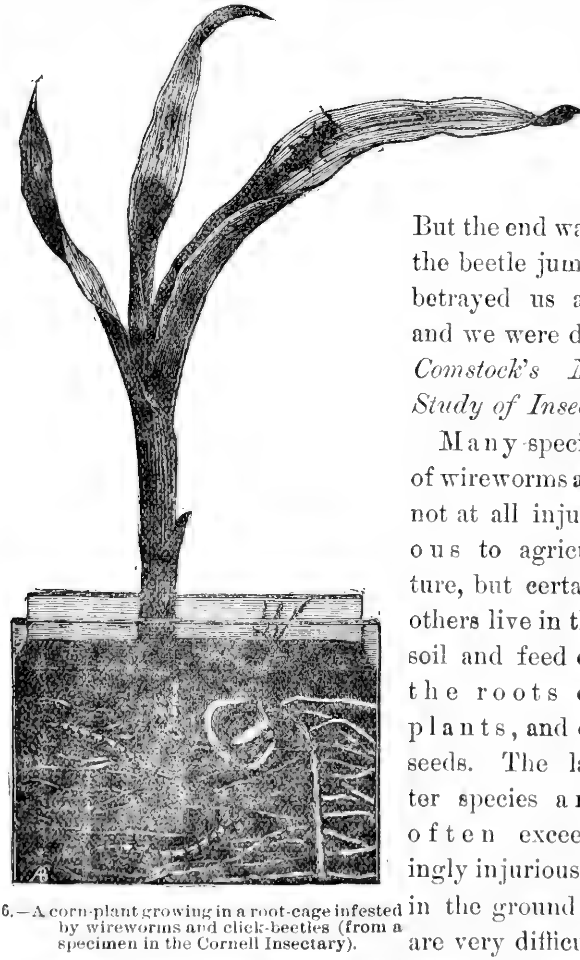
The true wireworms are the young of click-beetles, or snapping-bugs as they are more commonly termed. Our common kinds of click-beetles are mostly small or of medium size; a few are larger. Two are shown on the corn plant in figure 16, and figures 17 and 18 represent others. They are usually of a uniform brownish color; some are conspicuously spotted. More than five hundred kinds of click-beetles have been described from North America. "There is hardly a country child that has not been entertained by the acrobatic performances of these long, tidy-appearing beetles. Touch one of them and it at once curls up its legs and drops as if shot; it usually lands on its back, and lies there


15.—A millipede.

for a time as if dead. Suddenly there is a click, and the insect pops up into the air several inches. If it comes down on its back, it tries again and again until it succeeds in striking on its feet, and then runs off. We remember well carrying these creatures into the old district schoolhouse, where all lessons had to be learned from books, and where nature was never given a chance to teach us anything. Here with one eye on the teacher and one on this interesting jumper laid on our book behind the desk, we found a most fascinating occupation for the tedious moments. But the end was always the same; the beetle jumped so high that it betrayed us and was liberated, and we were disgraced." (*From Comstock's Manual for the Study of Insects, p.* 543).

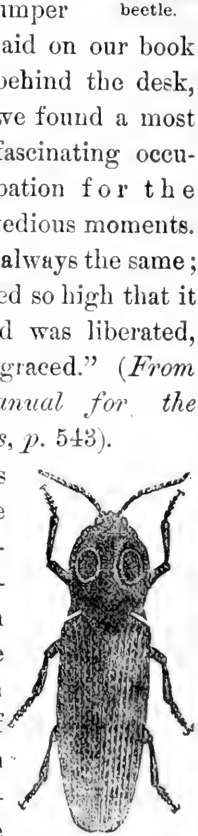


17.—A click-beetle.



16.—A corn-plant growing in a root-cage infested by wireworms and click-beetles (from a specimen in the Cornell Insectary).

Many species of wireworms are not at all injurious to agriculture, but certain others live in the soil and feed on the roots of plants, and on seeds. The latter species are often exceedingly injurious; and as they work in the ground out of sight, they are very difficult to combat.



18.—The Eyed Elater (Alaus oculatus).

During three years (1889, 1890 and 1891) we made numerous experiments to ascertain a practical method of preventing the ravages of these pests. Unfortunately our efforts were not attended with that degree of success for which we had hoped, and thus the chief object of our investigations was not accomplished. But we did succeed in proving the futility of many methods that have been very generally recommended for the destruction of these pests; and it seemed worth while to publish the detailed results of our experiments, as given in Bulletin 33, for they might save farmers from making expensive efforts that would surely bring no adequate returns.

Much has been written upon how to combat wireworms. And yet, at the time Bulletin 33 was written (November, 1891), there had not been published the results of a single extensive series of carefully conducted experiments. Professor Forbes has recently published some results he obtained in 1888 and 1891 (Seventh Report, p. 48–49), and these will be noted in connection with the discussion of our experiments. Most writers on this subject have reasoned and written, but have not tested their theories.

II. Methods of Experimentation.

Under this heading in Bulletin 33, we described and figured the different kinds of cages used in our experiments. As they are of general interest to the working entomologist only, we will not again discuss them. Suffice it to say in this connection that every precaution was taken to keep the wireworms under as nearly natural conditions as possible, and the experiments were conducted in a systematic and careful manner. To eliminate possible sources of error, comparative or check cages were used in each experiment; in these check experiments the cages were the same as the others, only they remained untreated. So far as practicable, every method was applied as it would be in the field.

III. Experiments.

Both defensive and offensive measures were used in our experiments. Thus we tried to protect seed from the ravages of the wireworms, and we also tried to destroy the insects in each of three different stages of their existence — as wireworm or larva, pupa, and adult; no eggs were obtained upon which to experiment. The scope of our experiments was necessarily large as they embraced nearly all the methods that we found recommended in the literature of these insects. Only the general results can be given here; they were published in much detail in Bulletin 33. Most of them were made in 1890 and 1891, while some were begun in 1889. The results of Professor Forbes' recently published experiments will also be included in their proper connection in this discussion.

A. PROTECTION OF SEEDS.

The most conspicuous of the injuries caused by wireworms, and the one most keenly appreciated by the farmer, is the destruction of the seed. Thus farmers have given more attention to protecting their seeds than to any other method of combating wireworms. Seeds have been coated with various substances in the effort to render them distasteful or poisonous to the insects, and several methods are strongly recommended. But as none of the recommendations were based on carefully ascertained facts, we tested each one.

1. Protection of Seed by a Coating of Paris Green and Flour.

This method promised to be a most desirable one; for, if it resulted as we confidently expected, not only would the seed be protected but the wireworms would also be killed.

We coated kernels of corn with varying amounts of Paris green and flour (in one case sugar was added), and carried on a large number of experiments covering a period of nearly two years. The only apparent result of the coating was to retard the sprouting of the seeds. We saw wireworms destroy several of the coated seeds without apparent injury to themselves.

In 1888, Professor Forbes found that corn which "was covered with a coating of the green poison, was eaten freely by some of the wireworms without killing them." In 1885, he also mixed Paris green with the soil in which the corn was planted without any injurious effect on the wireworms, but the corn failed to grow.

It is thus evident that it is useless to try to protect seed from the attacks of wireworms by coating it with a Paris green mixture.

2. Protection of Seed by a Coating of Tar.

It has long been a common practice among farmers to coat their seed corn with tar to prevent its being attacked by wireworms. However, no one has demonstrated that they will not attack corn thus coated.

Our results from two years of experimentation show that sometimes larvæ will attack seed corn even when it is completely coated with tar. In actual practice, but few of the kernels would get a complete coat; it requires considerable disagreeable labor to apply the coating; germination is considerably retarded, even when the kernel has been previously soaked in water; and corn thus treated cannot be readily used in a planter. From these considerations it can be seen that this method of protection does not afford that degree of certainty and practicability which is desired.

3. PROTECTION OF SEED BY SOAKING IT IN A SOLUTION OF SALT.

This method was quite commonly practiced many years ago among farmers in western New York. Our series of experiments, extending over a period of nearly a year, made it evident that corn soaked in a saturated salt solution is as readily eaten by wireworms as if not thus soaked, and no injury results to the wireworms.

4. PROTECTION OF SEED BY SOAKING IT IN A COPPERAS SOLUTION.

In 1876 an Illinois farmer reported favorable results from soaking his seed corn before planting in a solution of copperas (sulphate of iron), to protect it from the attacks of wireworms.

After two seasons of experimentation with the solution, we got no results which indicated that wireworms would not eat and destroy seed soaked in it as readily as any other, and receive no injury therefrom.

5. PROTECTION OF SEED BY SOAKING IT IN A CHLORIDE OF LIME AND COPPERAS SOLUTION.

Our experiments during two seasons gave conclusive evidence that a solution of chloride of lime and copperas will not protect seed corn which has been soaked in it from the attacks of wireworms.

6. PROTECTION OF SEED BY SOAKING IT IN KEROSENE OIL.

In our experiments with this substance made in the spring of 1891 the wireworms destroyed nearly every kernel of corn we planted; there were no indications that this food disagreed with them.

7. PROTECTION OF SEED BY SOAKING IT IN SPIRITS OF TURPENTINE.

The soaking of seed corn in turpentine has been frequently recommended as a preventive against attack from wireworms. All of the kernels of corn we thus soaked were destroyed, before germination began, by the wireworms and they were unaffected by the meal.

8. PROTECTION OF SEED BY SOAKING IT IN A STRYCHNINE SOLUTION.

The idea of soaking seed corn in a solution of strychnine was suggested to us by the fact that seed thus soaked is used to poison sparrows and gophers. Our results from experiments made in 1891 showed that although seed corn be soaked in a very strong solution of strychnine, it is rendered neither distasteful nor destructive to wireworms. Prof. Forbes has recently reported similar results from experiments made in Illinois in 1888 and 1891.

9. PROTECTION OF SEED BY SOAKING IT IN OTHER POISONOUS SUBSTANCES.

In 1888 and 1891, Professor Forbes fed to wireworms corn that had been soaked in the following:

A mixture of Paris green and water.

Fowler's solution, diluted with an equal quantity of water.

An alcoholic solution of arsenic.

A solution of arsenic in boiling water.

An alcoholic solution of corrosive sublimate.

A saturated solution of potassium cyanide.

In almost every case the wireworms fed upon the kernels without injury to themselves. Thus, Professor Forbes says, "that it is not practicable to protect corn by means of these substances, even were it possible to use them without retarding or preventing the germination of the seed."

B. DESTRUCTION OF THE LARVÆ.

The various methods that have been proposed for the destruction of wireworms fall under two heads: First, destruction by starvation; second, destruction by the use of insecticides.

1. Destruction of Wireworms by Starvation.

a. Starvation by Clean Fallow.

It has been the general belief that the wireworms which infest our fields could live but a short time in soil in which no vegetation was allowed to grow. No experiments were recorded, however, to show how long the worms could live in such soil.

We kept several experiment cages in "clean fallow" for nearly a year, and more wireworms remained alive (many of them passed through the transformations to the beetle stage) in these cages than in similar cages in which grass was kept growing. Therefore, we would not advise the farmer to lose the use of his land for a season and the labor necessary to keep it free from all vegetation in the hope that he may thus starve out the wireworms.

b. Starvation by the Growth of Supposed Immune Crops.

It is supposed there are certain crops so distasteful to wireworms that when these crops are grown the worms will either perish from hunger or leave the field, and thus the succeeding crops be spared from the ravages of these pests. The crops usually recommended for starving out the wireworms are buckwheat, mustard and rape.

BUCKWHEAT.

In this country more attention has been directed to buckwheat as a supposed immune crop than to any other.

By a series of experiments extending over a period of two years, we proved that wireworms will attack and cut off roots of buckwheat; and that they can live for many months and undergo the transformations necessary for the continuance of the species, in soil in which only buckwheat is growing. Therefore as wireworms have lived as long and thrived as well in cages of buckwheat as they have in cages of timothy and clover, we cannot regard buckwheat as an immune crop.

MUSTARD.

In Europe, mustard has long been regarded as a crop that clears the soil of wireworms by starving them out. We experimented with both the Chinese and brown mustard, and wireworms lived in cages containing no other vegetation but these plants for from one to two years; we have never been able to keep them alive so long in cages containing clover and timothy. Thus our experiments do not indicate that a crop of mustard will render the soil so free from wireworms that the succeeding crop will escape their ravages.

RAPE.

Another crop, upon which it is said wireworms will not feed, is rape. It is but little grown in America, but is considerably grown in England to provide pasture that will fatten sheep readily.

Wireworms lived as long and thrived as well in our breeding cages on roots of rape as in soil in which clover and timothy were grown. Thus, it would seem that rape can no more be regarded as an immune crop than any other crop cultivated at the same time.

2. DESTRUCTION OF WIREWORMS BY MEANS OF INSECTICIDES.

As the species of wireworms which infest growing crops live during their whole larval life beneath the surface among the roots, it is a more difficult matter to reach them with insecticides than those pests which feed exposed on the plants. A substance must have great penetrating and killing power to be of any value. Most of the substances that have been recommended were first applied merely as fertilizers, but in later years their insecticidal properties also have been much discussed.

(*a*) *Substances that act merely as Insecticides.*

Most of the insecticides which we used are well known and have been used successfully against other underground insects.

KEROSENE, PURE AND AS AN EMULSION.

In 1885, Professor Forbes found that "applications of these substances made to wireworms in the earth were found practically ineffective, any strength sufficient to kill them killing vegetation also." Our experiments corroborate Professor Forbes' conclusion. We found that wireworms could be killed by using either substance in sufficient quantities, but this amount would destroy all vegetation and would be too expensive an application.

CRUDE PETROLEUM, PURE AND AS AN EMULSION.

On the whole our results with the crude petroleum emulsion and with the crude petroleum were not as promising as those obtained with the kerosene oil emulsion.

POISONED DOUGH.

In our experiments in 1888, poisoned sweetened dough was used with some success to attract and destroy the click-beetles. (See Bulletin No. 3, Nov. 1888, p. 38). As the wireworms in our breeding cages readily came to the surface to eat wheat scattered thereon, it was thought that many might be attracted by sweetened dough placed on the surface.

A few experiments soon made it evident that the wireworms could not be thus attracted to the poisoned dough.

BISULPHIDE OF CARBON.

This substance has been quite extensively used against certain subterranean insects. Our experiments showed that it would kill wireworms when poured into a hole near infested plants; but as it had to be used at the rate of about 150 gallons per acre, its cost would be excessive.

(*b*) *Substances that act also as Fertilizers.*

There are several substances now in common use as fertilizers which possess some insecticidal properties. Dealers in the potash fertilizers, especially kainit and muriate of potash, claim that the ravages of wireworms are effectually checked by the use of their fertilizers. In 1890 and 1891 we carried on a large series of experiments with salt, kainit, muriate of potash, lime, chloride of lime, and gas-lime to determine whether they might be effectually used against wireworms.

SALT.

Many farmers assert that salt either destroys wireworms, drives them deeper into the soil beyond the roots, or renders the soil so obnoxious that the worms leave.

1. *Will salt kill wireworms?* From a large series of experiments we found that to destroy wireworms, salt must be used at the rate of about eight tons to the acre, or over one per cent. of the soil to a depth of four inches must be salt. This amount would be very destructive to vegetation.

2. *Will salt drive wireworms deeper into the soil?*—In 1891 we thoroughly tested this supposed action of salt upon wireworms by

means of special apparatus devised for the purpose (see Bulletin 33, p. 230, for detailed description and figures).

The results of this experiment indicated that salt applied at the rate of 1000 pounds per acre (a heavy dressing) interfered with the germination of wheat, and neither drove the wireworms deeper into the soil, nor caused them to migrate any appreciable distance.

KAINIT.

This is a German potash salt which is now much used as a fertilizer in this country. We made many and varied experiments with kainit on wireworms. The results obtained indicate that kainit has but little, if any, effect on wireworms in the soil even when applied in very large quantities, as from four to nine tons per acre.

It should be noted that these results are diametrically opposed to those obtained by Professor J. B. Smith of the New Jersey Experiment Station (*Insect Life*, Vol. 4, Nos. 1 and 2, p. 45; Bull. 85, N. J. Exp. Sta., p. 5; An. Rept. N. J. Exp. Sta. for 1891, p. 42). However, none of the statements yet made by Professor Smith are supported by sufficient evidence to lead us to modify the conclusions derived from the results of our experiments. Professor Forbes says of the experiment upon which most of Professor Smith's evidence is based: "It is evident from the context that this experiment had been made some years before, apparently not under the inspection of an entomologist." Mr. F. M. Webster, entomologist of the Ohio Experiment Station, in discussing the methods of fighting the wireworms, says (Bull. 51, Ohio Expt. Sta., p. 137): "There may be some virtue in the application of kainit, although this has not as yet been thoroughly and clearly demonstrated."

MURIATE OF POTASH.

This is a product of German mines, and is our principal potash fertilizer.

After many experiments extending over a period of more than nine months, we were forced to conclude that it has to be used at the rate of from four to six tons per acre to have any effect on the larvæ, and then it is not so effective as the cheaper kainit or the much cheaper common salt. Its use in such large quantities would also be very destructive to vegetation. Although a valuable fertilizer, it is too expensive an insecticide to use against wireworms.

LIME.

Lime has long been used as a fertilizer, and many report good results from its use on fields infested by wireworms. However, our experiments covering a period of over seven months showed that lime applied at the rate of even 200 bushels per acre, either slaked or unslaked, or as lime water, had no effect upon the wireworms.

CHLORIDE OF LIME.

Several experiments made with this substance showed that it will kill wireworms in the soil, but must be used at the rate of nearly six tons per acre. It is thus impracticable and too expensive.

GAS LIME.

This is the refuse lime thrown out at gas works. When fresh it smells strongly of ammonia and sulphur, but becomes nearly odorless after exposure to the air for a few days. We thoroughly tested it; and our experiments indicate that the killing properties of the gas lime soon pass away, and it has to be used fresh in such great quantities (twenty to forty tons per acre) to be even partially effective that, notwithstanding its cheapness, it is hardly practicable on large areas.

C. DESTRUCTION OF PUPÆ AND ADULTS. (CLICK-BEETLES).

1. FALL PLOWING.

It is with pleasure that we turn from the discussion of measures that give little or no promise of practical use to one that we believe is of great importance. For the results of our experiments convince us that much can be done towards checking the increase of wireworms by fall plowing.

The explanation of the beneficial results that will follow fall plowing we believe to be found in the following facts, which were brought out in our studies of the life history of our more common species of wireworms: Wireworms live for at least three years in the worm or larval state. In this state they cease feeding about

November 1st, and hibernate until spring. When the worms are fully grown they change to soft white pupæ which resemble the beetle in form. This change takes place in the species that commonly infests field crops during the month of July. The pupa state lasts only about three weeks, the insect assuming the adult form in August. But, strange to say, although the adult state is reached at this time, the insect remains in the cell in the ground in which it has undergone its transformations till the following April or May, nearly an entire year.

We found that in every case where we disturbed the soil so as to break these earthen cells, the insects within perished.

This experience clearly indicates that if infested fields are plowed after July 20th and thoroughly pulverized and kept stirred up, many of the little earthen cells may be broken and the tender pupæ or beetles within destroyed. After three or four weeks of this thorough cultivation, wheat or rye may be sown.

In connection with this fall plowing and cultivation we earnestly recommend the method of short rotation of crops to farmers having land badly infested with wireworms. Do not keep fields in sod for more than a year or two at a time. No doubt it will require several, at least three years by this method, to render the soil comparatively free from the pests as only the pupæ and adults are killed each fall, while most of the one and two-year-old wireworms will escape injury. Those farmers who practice the method are not troubled with wireworms.

2. TRAPPING.

Our experiments on preventing the ravages of wireworms by trapping were carried on in 1888 and 1889. Two methods were employed, trapping by baits, and by lanterns.

On trapping by baits.—This method has been discussed in detail in Bulletins 3 and 33 of this Station, so that only the general results will be given here. The baits, which consisted of sliced potatoes, wads of green clover, and sweetened and unsweetened cornmeal dough were placed under boards in various parts of a badly infested corn field. Instead of attracting the wireworms, as was expected, their parents — the click-beetles — came to the baits in large numbers; the clover attracted by far the larger number (65 per cent).

It was found that the beetles were the most active at night, and that they seek their food chiefly by running over the surface of the ground.

When it was found that they were so readily attracted to the baits, poisoned clover baits were used with the result that most of the click-beetles were destroyed, proving that they fed upon the baits and thus suggesting a practical method of combating them. Where the insects are very numerous over a limited area, many of the beetles can be killed with the expenditure of a very little labor in distributing these poisoned baits.

On trapping by lanterns.— A series of six trap-lanterns were kept lighted every night here on the University farm from May 1st to October 1st, 1889. During the whole five months only eighty click-beetles were captured. Thus the method has no practical value in fighting wireworms.

GENERAL SUMMARY OF THE METHODS OF COMBATING WIREWORMS.

When we began our experiments in 1889, we confidently expected to be able in a short time to tell farmers how to protect their seed and their growing crops from these pests. We thought that the greatest part of our work would be to determine which of several ways is the most practicable, the easiest used, or involved the least labor or expense. For three years we did our best; and we failed to discover a single satisfactory method of protecting seed, or of destroying immature wireworms in the soil.

We did learn, however, why fall cultivation will destroy the wireworms ready to pupate, the pupae, and the beetles; the beetles can also be trapped and killed in large numbers with poisoned clover baits. We also learned that many commonly recommended plans are useless.

Such a short rotation of crops as will include a period of thorough cultivation in the fall will prove the best method of fighting these pests yet suggested.

IV. Notes on the Transformations of Several Species of Wireworms.

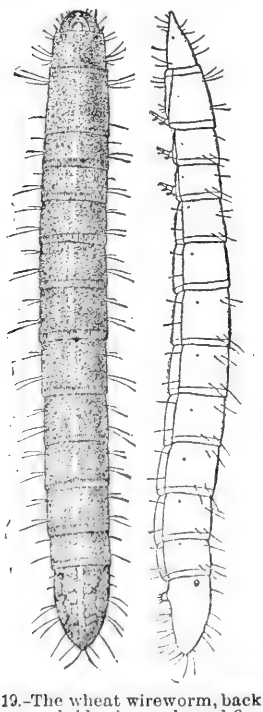
We used nearly 10,000 wireworms in our experiments. They were collected by correspondents in Lewis county and forwarded to us in invoices of a thousand or more at a time. We were easily able to distinguish five different species among those sent. The species were kept in separate cages, thus enabling us to make many observations on the habits, etc., of each during the course of our experiments upon them.

1. THE WHEAT WIREWORM.

Agriotes mancus, Say.

This species is probably the most numerous and most destructive kind of wireworm in our State; it constituted 91 per cent. of the 10,000 with which we experimented.

The beetle (Fig. 21) was described in 1823, but nothing was known of its life until 1867 when Dr. Fitch described the wireworm (Fig. 19) and added a few other notes. It is widely distributed and has been reported as destructive in Canada and some of the Western States.



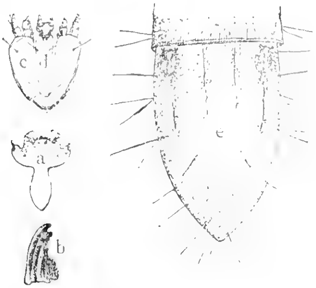
19.-The wheat wireworm, back and side view, enlarged five diameters (after Forbes).

Its life-history.—It is not known where any species of click-beetle lays its eggs. It is the general opinion that they are laid in the spring in the earth close to the roots of the plants.

We never found any of the wheat wireworms less than 4 mm. in length; they measure when full grown from 16 to 19 mm. They are of a waxy-yellow color; their general appearance is well represented in figure 19 (a detailed description was given in Bulletin 33, p. 257). The eye-like depressions (Fig. 20, *e*) on the sides of the last segment render it easily distinguished from most other wireworms. How long this insect remains in the wireworm state, we failed to learn. We found that one cannot draw accurate conclusions as to their age from their size. Our observations indicated that this wheat wireworm may trouble the farmer at least three years before assuming the beetle state; it grew only about 2 mm. during six months.

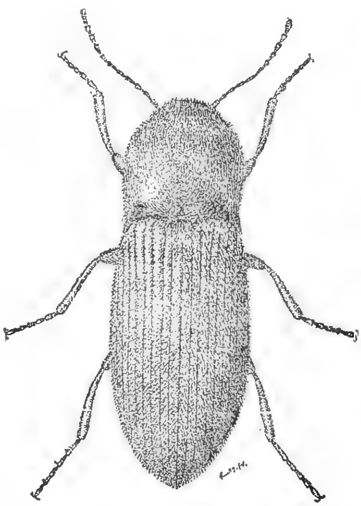
The wireworms cease feeding in the fall before November 1st, and descend into the soil for several inches where they remain in a torpid condition all winter. With appetites sharpened by their long fast, they come toward the surface in the spring and do more damage than at any other time.

When they become full grown, which occurs about July 1st, these wheat wireworms prepare for pupation by forming a little earthen cell in the soil, usually less than six inches from the surface. The pupa is of a pure white color, very soft, and about one-fourth longer than the beetle which it resembles in general appearance. The pupal stage lasts about three weeks, and by September 1st all have transformed to beetles.



20.—The wheat wireworm. a, b. c. d, details of mouth parts, enlarged; e, caudal segment, enlarged.

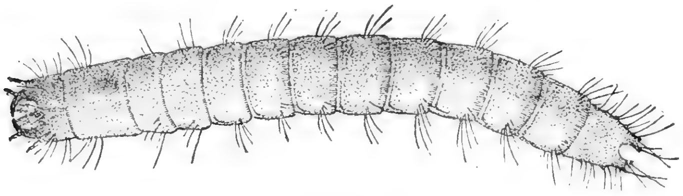
The beetles (one is shown, enlarged seven times, in figure 21, and natural size on the upper part of the corn plant in figure 16) are of a dark brown color. They remain in the little earthen cells, made by the wireworms, all winter, and work their way to the surface during April. They fly well and can run quite rapidly; when disturbed they "play possum" for a time. They will eat clover leaves and we saw one at work on a kernel of wheat. They lived but a few days after emerging in our cages. When and where they lay their eggs still remains one of nature's secrets.


21.—Agriotes mancus, the adult, enlarged 7 diameters (after Forbes).

2. *Asaphes decoloratus*, Say.

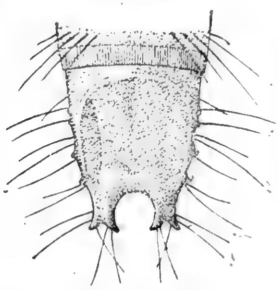
This click-beetle is widely distributed over the northern states east of the Mississippi river, and occurs in both cultivated and grass lands. It has not yet occurred in sufficient numbers to be injurious; only about five per cent. of the wireworms we have examined belonged to this species.

Its life-history.—Our specimens of the wireworms ranged in length from 7 mm. to 25 mm. They are of a dark, waxy-yellow color; their form and characteristic features are well shown in figures 22 and 23 (a detailed description is given in Bulletin 33, p. 261). What little data we have indicates that the duration of the wireworm period is at least three years.



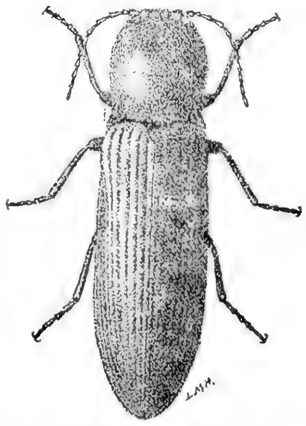
22.—The wireworm of Asaphes decoloratus, enlarged three and three-fourths diameters (after Forbes).

Unlike the wheat wireworm, this wireworm matures in May. The change to a pupa takes place in little earthen cells in the soil. We have not seen the pupa; this stage lasts about three weeks. Most of the beetles emerged in our cages in June. In Professor Forbes' experiments in Illinois they emerged as early as May 25th.



23.—Caudal segment of the wireworm of Asaphes decoloratus, much enlarged (after Forbes).

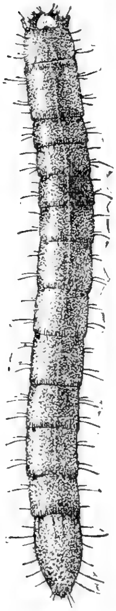
The beetle varies from 9 mm. to 15 mm. in length, and is of a shining blackish color with brown legs. Its characteristic features are well shown in figure 24. All the beetles emerge before fall, but of the further life of this insect we know nothing.



24.—Asaphes decoloratus, the adult, enlarged four and one-fifth diameters (after Forbes).

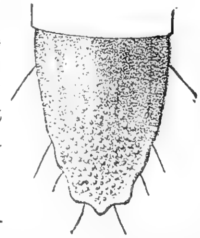
3. *Melanotus communis*, Gyll.

This species of wireworm is very common in cultivated lands, especially in corn fields, in our State; Professor Forbes found an allied species (*M. cribulosus*) much more common in Illinois corn fields. The insect is widely distributed, ranging at least from Nebraska to New Jersey and Canada.



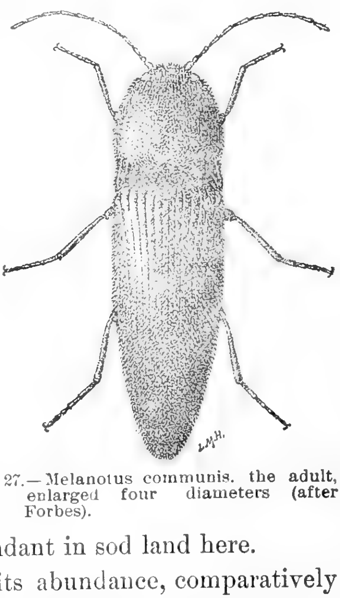
26.—The corn wireworm (Melanotus cribulosus), enlarged 4½ diameters (after Forbes).

Its life-history.— The mature wireworms vary in length from 25 mm. to 30 mm. They are of a light brown color, with the head, thorax and last segment considerably darker. (They are described in detail in Bulletin 33, p 265). Figure 25 shows the characteristics of the caudal segment of this wireworm, and figure 26 (although it is of the closely allied species *M. cribulosus*) will serve equally well to show the principal features of the whole worm.



25.—Caudal segment of the wireworm of Melanotus communis, greatly enlarged (after Forbes).

The insect spends at least three years as a wireworm; one specimen lived in our cages for nearly two years. The change to a pupa takes place in earthen cells during July. The pupa is white and tender, and changes to a beetle in about a month. The principal characteristics of the slender, glossy, dark brown beetle are well shown in figure 27. They remain in earthen cells in the soil all winter, emerging in May. The secret of the rest of their life remains with nature.

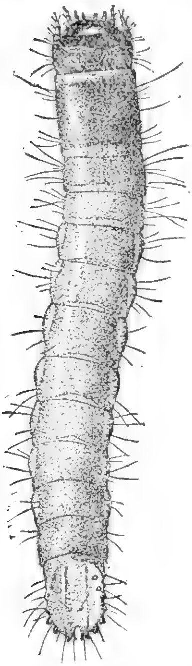


27.—Melanotus communis. the adult, enlarged four diameters (after Forbes).

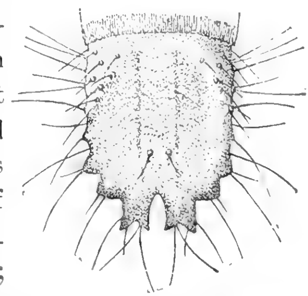
4. *Drasterias elegans*, Fabr.

This species of wireworm is widely distributed over the country, and has been reported as exceedingly abundant and injurious to young wheat in Indiana. We have found it quite abundant in sod land here.

Its life-history.— Notwithstanding its abundance, comparatively little is known of the life of this insect. It is one of the smallest of the wireworms, measuring from 9 mm. to 12 mm. in length when full grown. Its body is considerably flattened and of a light waxy-yellow color. Figures 28 and 29 well illustrate its characteristic features. (It is described in detail in Bulletin 33, p. 268). They undergo their transformations in earthen cells in the soil, the change to a beetle taking place about July 1st. The beetle is of a general rusty-brown color with black markings; it is shown natural size and enlarged in figure 30. We were unable to determine whether they emerged in the fall or passed the winter in the earthen cells. Professor Forbes has recorded considerable data on this point which leads him to conclude that it seems probable that they emerge in the summer and early fall, probably laying their eggs in part the same season; that it hibernates in sheltered places and continues abundant until June of the following year, doubtless breeding meanwhile; and that it lives two seasons in the earth as a wireworm.



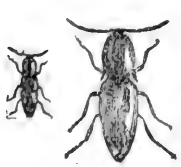
28. — The wireworm of Drasterias elegans, enlarged seven diameters (after Forbes).



29. — Caudal segment of the wireworm of Drasterias elegans, much enlarged (after Forbes).

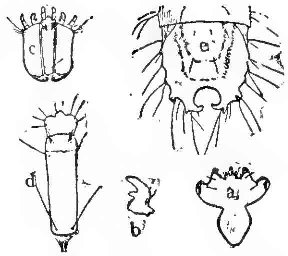
5. *Cryptohypnus abbreviatus*, Say.

We met with a few wireworms of this species in old sod land. The beetle has been known since 1823, and it is not uncommon throughout North America. It is a robust beetle, about one-fourth of an inch in length and of a brownish-black color with a greenish-bronze lustre. (For detailed descriptions see Bulletin 33, p. 270, of Trans. Am. Ent. Soc., 1891, p. 7).



30. — Drasterias elegans, the adult natural size and enlarged.

The wireworms are from 7 mm. to 9 mm. in length when mature, and closely resemble the young worms of *Asaphes decoloratus* (Fig. 22). They are of a dark waxy-yellow color and considerably flattened in form. The caudal segment and some details of the mouth parts are shown in figure 31. (For a detailed description see Bulletin 33, p. 271).



31.—Wireworm of Cryptohypnus abbreviatus. a, b, c, details of the mouth-parts; e, the caudal segment—all enlarged.

The Bud Moth.

Tmetocera ocellana.

This bud moth has come to be recognized by many of the most extensive apple growers of western New York as the most injurious and hardest to fight of any insect now present in their orchards. It works in the opening leaf (Fig. 32) and flower buds

32—Work of the bud moth in opening leaf buds.

(see frontispiece), and often nearly the whole crop on many trees is destroyed while yet in the bud. It is also especially destructive when it attacks recently budded or grafted trees and nursery stock. Besides apple, it also feeds upon pear, plum, cherry, quince and peach trees and blackberry buds.

Thus, fruit growers have to fear in the bud moth a pest which is capable of literally "nipping in the bud" a prospective crop of fruit, a graft, or a budded stock.

ITS HISTORY AND DISTRIBUTION.

As the insect has been known in Europe for more than half a century before it was recorded in this country, it is, therefore, no doubt an imported species. It attained economic importance in Europe about 1840, and was first discovered in this country in 1841 in Massachusetts, where it was doing considerable damage; by 1869 it had become to be "the most injurious enemy of the apple-tree, next to the canker-worm, in the State." The same year it did some damage in Pennsylvania, and in 1870, plum trees were attacked by it in Canada. The first record of the occurrence of the insect in New York State is, in 1880 in a Union Springs nursery. The previous year it was found at Washington, D. C., and by 1885, it had reached Nova Scotia. In 1887, it was quite injurious near Rochester, N. Y., and in 1888 and 1890, apple and blackberry buds were injured in Maine. Throughout Massachusetts, New York and Canada the insect appeared in very destructive numbers in 1891, and in Michigan in 1892. It has been found in Missouri, and two or three years ago was introduced into Idaho.

The bud moth is thus widely distributed over the New England and Middle States and Canada; it occurs as far south as Washington, D. C., and as far west as Idaho.

HOW IT IS SPREAD.

The active moths doubtless fly readily from orchard to orchard and thus the pest may slowly spread. But a much more fruitful source of infestation is to be found in nursery stock. We have seen the insect at work in several nurseries, and it is claimed that it was introduced into Idaho on stock received from one of our New York nurseries. Its manner of hibernating makes its distribution very easy on nursery stock.

ITS NAME AND CLASSIFICATION.

The bud moth is closely allied to the codlin moth, and resembles the latter in size and form, but differs in structure, in coloring and in its habits and life-history.

A spot, somewhat eye-like in appearance, on each front wing of the moth suggested its name — *ocellana* — which was given to it in

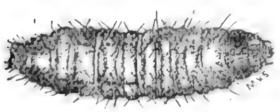
Austria in 1776. The popular name — eye-spotted bud moth — first used by Dr. Harris in 1841, is now in common use. The moth has been described under five different names, and has been placed in six different genera. The genus *Tmetocera* ("cut-horned," from the notched appearance of the base of the antennæ of the male moth) was established in 1859 for the reception of this insect which still remains its only representative.

HOW ITS PRESENCE IS INDICATED.

The caterpillars of the bud moth are astir early in the spring, usually about May 1st, and soon begin their destructive work on the swelling and opening fruit and leaf buds. They eat into the buds, and often so check and disfigure a small tree as to spoil its symmetry. More often the caterpillar does not begin its work until the buds are nearly half opened. It then feeds upon the central expanding leaves or flowers, tying them together with silken threads (see the frontispiece, and figure 32). Some of the partly eaten leaves soon turn brown and thus render the work of the insect quite conspicuous; one correspondent wrote that his trees looked as though a fire had swept quickly through them, as so many leaves had turned brown. This tying together of the opening leaves and flowers and the brown appearance of many of them, are the most characteristic indications of the presence of the insect.

ITS APPEARANCE.

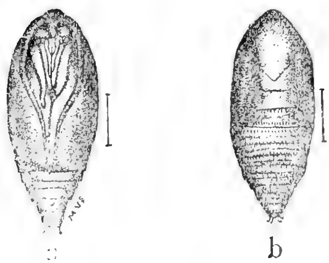
The caterpillar.—It is in this stage that this insect is familiar to fruit-growers. It appears on the buds in the spring as a little brown caterpillar, about .16 of an inch long, with a black head and thoracic shield. In June, when the caterpillars are full-grown (Fig. 33) they are about half an inch in length and are of a cinnamon brown color; the head, thoracic shield, and true legs are black. The body is sparsely hairy, and bears five pairs of pro-legs.



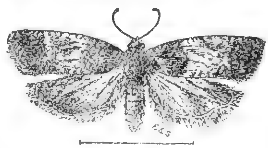
33.—Caterpillar of the bud moth about three times natural size.

The pupa.—This quiescent stage of the insect is passed in the nests in the latter part of June in a tube of dead leaves. Two views of a pupa are shown in figure 34. It is about .27 of an inch in length and of a light brown color; the dorsum of each abdominal segment bears two transverse rows of small tooth-like processes directed caudad.

The moth.—The moth (Fig. 35) measures about three-fifths of an inch across its expanded wings. It is of a general dark ash-grey color with a broad cream white band across the front wings. Dr. Harris saw the resemblance to two eye-like spots in the arrangement of two short horizontal black dashes followed by a vertical streak of lead blue near the anal angle of the front wings, and in the three or four similar black dashes, also followed by a streak of lead blue, near the apex of these wings.



34.—Pupa of the bud moth; a, ventral view; b, dorsal view—enlarged.



35.—The bud moth—the adult insect, twice natural size.

ITS LIFE-HISTORY.

Although the caterpillar and pupa of the bud moth were known more than eighty years ago, its true life-history, as observed by Mr. J. Fletcher, the Canadian Goverment entomologist, and the writer, was not recorded until 1892 (Report of Entomologist for Dept. Agr. Canada, 1891, p. 195).

Its appearance and habits in the spring.—The date of the emergence of the little brown caterpillars from their winter retreats varies considerably in this state. They seem to time their appearance by the date at which the buds begin to open. Thus the earliness or lateness of the season or of the variety of the tree infested will vary the time from two to four weeks, ranging from April 15 to May 15.

In some cases the caterpillar appears before the bud has opened sufficiently for it to readily enter. It is then forced to eat its way into the bud. Once within the bud it revels in the very tender growing leaves or flower buds, tying them together with its silken threads, and thus forming for itself a well protected nest within which its destructive work goes on (Figs. 32 and 36). It does not confine its work to one or two leaves or flowers, but seems to delight in devouring a part of a leaf here or one side of a developing flower there. So that nearly every leaf or flower in the opening bud is forced to contribute to the greed of the little creature, thus greatly increasing its destructiveness.

It is especially destructive on young trees or nursery stock as it then most often attacks the terminal buds, sometimes burrowing down the shoot for two or three inches causing it to die, and thus greatly marring the symmetry of the tree.

36.—Characteristic nest of the bud moth caterpillar; and several of the curious eggs, greatly enlarged, laid by the moth.

The later work of the caterpillars in the opening leaves has been well described by Professor Comstock as follows:

"The larva settles on one of the more advanced leaves, of which it cuts the petiole half through either near its base or close to the leaf so that it wilts. Of this half dead leaf it forms a sort of tube by rolling the edge of one side more or less down and fastening it with silken threads and then lining the inside sparsely with silk. If the leaf which it has selected as its final home should become too weak at the place where it has been cut so that there may be danger of its falling to the ground; then the larva goes to work and either strengthens it with silk which is fastened to the twig and petiole or ties the apical portion of the tube to another leaf or cuts that part of the leaf which contains its tube from the rest of the leaf, so that either the whole or only that portion which contains the tube hangs suspended from another leaf." The larva lives in this tube most of the time, only coming forth to feed; when disturbed it retreats into the tube out of sight. In feeding it draws other leaves, one after another, toward it and fastens them with threads of silk, thus forming a nest (Fig. 36). Some of these partially devoured leaves soon turn brown and die, thus rendering the nest quite conspicuous.

The caterpillars continue to feed in the spring, mostly at night, for six or seven weeks, and probably shed their skin three times during this time.

Pupation.—Within a tube, usually formed in the nest by rolling up one side of a leaf or by bringing together two or three half devoured leaves and securely fastening everything with silken threads, the full-grown caterpillar retreats and lines the interior with a thin closely woven layer of silk. This forms the cocoon within which the caterpillar is soon to undergo its wonderful change to a pupa. The date of this change varies in this State from June 1st to 25th. About ten days are spent as a pupa, then by the aid of the tooth-like hooks on its back, it works its way nearly out of the cocoon, and its skin splits open to allow the pretty little moth to emerge.

Habits of the moth.—The moths begin to appear as early as June 5th in our State, and often all have not emerged by July 10th. They are most active during the night, remaining quiet during the day on the trunk and limbs of the tree, with wings folded roof-wise; in this position they closely mimic the bark. They probably live about two or three weeks.

Egg-laying.—Three or four days after emerging, the moths begin to lay eggs, working mostly at night. They are laid on the leaves singly or in small clusters slightly overlapping each other. They are curious objects (Figs. 36 and 37). In fact they so closely resemble minute drops of water or a fish's scale on the leaf as to necessitate the use of a lens to determine the egg characteristics. They are very transparent and will reflect the prismatic colors like a drop of water.

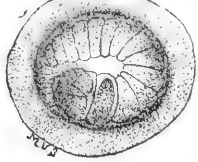
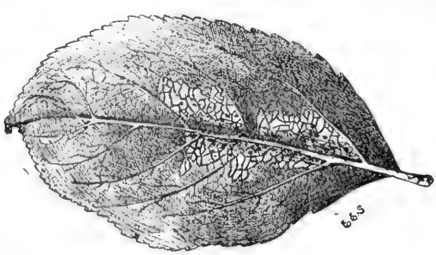


FIG. 37.—Egg of bud moth showing the developing caterpillar within—greatly enlarged.

They are disc-like, very much flattened, usually oval in outline, a few are circular, and measure .8 mm. by .7 mm. A flat outer rim .2 mm. wide adheres closely to the leaf, leaving a central slightly elevated rounded disc in which the larva develops. About nine days after the eggs are laid the developing greenish caterpillar lying curled up in the central portion can be plainly seen through the shell. The egg-stage lasts from seven to ten days.

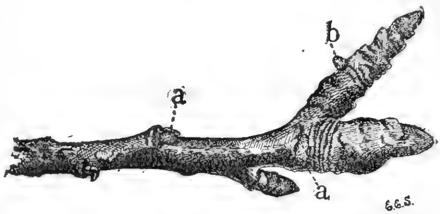
Summer habits of the caterpillar.—Soon after emerging through a hole near the edge of the central portion of the egg-shell, the little greenish caterpillar begins to feed upon the skin of the leaf, usually upon the underside. A few hours later it makes for itself a tube of silk open at both ends and usually made alongside the mid-rib. From these silken homes the caterpillars sally forth to feed upon the surrounding tissues, protecting themselves as they go by a thin layer of silk spun over their feeding grounds (Fig. 38). They feed upon one epidermis and the inner tissues of the leaf, leaving the net-work of veinlets; the opposite epidermis forms the floor of its feeding grounds. The veinlets and the epidermis soon turn brown, thus rendering the summer work of the insect quite conspicuous. Rarely more than one caterpillar works on a leaf.



38.—Leaf showing the work of a young caterpillar during the summer.

The caterpillars continue to feed in this manner during July and August, and a part of September. Soon after the third or fourth moulting of the skin, they cease feeding and seem to know instinctively that they have reached that point in their development when it is necessary for them to make preparations to go into winter quarters, even though it be several weeks yet before the leaves become unfit for food, or fall from the trees.

Hibernation.—Our observations in 1891 and 1892 definitely showed that the bud moth passes the winter as a half-grown caterpillar snugly hidden in a silken case on the tree. Figure 39 represents a twig, natural size, bearing three of these hibernacula at *a*, *a*, and *b*. These little winter homes are very inconspicuous objects as they are scarcely more than an eighth of an inch in length, and are covered with bits of dirt from the bark or are sometimes made under some convenient piece of dead leaf or bud-scale. One must be very familiar with these hibernacula to be able to find them, even on a badly infested tree. The caterpillars begin to go into winter quarters early in August and all are snugly tucked away before the leaves fall. They instinctively build their winter homes near the winter buds on the twigs so they may be at hand to nip the bud upon its showing any signs of opening in the spring. The life-cycle is completed with the opening of spring and the appearance of the little brown caterpillars on the buds.



39.—Twig showing the position of the winter homes of the caterpillar at a, a, and b, natural size.

Number of broods.—There is but one generation of the insect in a year in this and more northern latitudes. The moth appears and lays her eggs in June or July, and the caterpillars feed upon the leaves until half-grown, in which stage they hibernate. Possibly two broods may occur further south.

ITS NATURAL ENEMIES.

In Europe, five parasites are recorded at work upon this insect. Three parasites (*Phytodictus vulgaris*, *Pimpla* sp. and *Microdus laticinctus*) have been reared from it in this country; the latter species seems to be quite common in some localities.

Besides these parasitic enemies, the bud moth is sometimes eaten by birds in Canada, and we also found a large wasp (*Odynerus catskillensis*) storing its cell with the caterpillars which must furnish delicious morsels for the grub of the wasp when it hatches.

Doubtless all of these foes aid considerably in keeping the pest in check, but it has now become so numerous and wide spread that its enemies are insufficient and the devices of man must be called into action.

METHODS OF PREVENTING ITS RAVAGES.

This insect is proving an exceedingly hard one to combat. It cannot be effectively and practicably fought while in the adult or egg stages, and there is but little hopes of reaching the caterpillars in their hibernacula during the winter. Although the caterpillars work under a silken covering on the undersides of the leaves during the early part of the summer, it may be possible to kill some of them with a Paris green spray, but we doubt it. The pupæ can be reached only by hand-picking the nests during the ten days in June which the insect passes in this stage. Thus, so far as we now know, the most vulnerable period in the life-cycle of the bud moth is during the last half of its caterpillar life when it is at work upon the opening buds, leaves and flowers.

We once saw a case where hand-picking could have been profitably practiced. A block of young pear trees had become badly infested and each caterpillar's nest was rendered conspicuous by one or two brown dead leaves. All of the then nearly full-grown caterpillars could have been quickly killed by collecting and burning their nests; this would have effectually prevented the appearance of the insect another year One man could have thus exterminated the pest in that block of a thousand or more young trees in a very short time. This method may prove practicable in many cases where nursery stock becomes infested. The nests should be gathered before June 1st.

Although hand-picking is the surest method of checking the insect, it is impracticable on large trees, and besides, by the time the work of the caterpillar has progressed far enough to render its nest conspicuous, it has done most of its damage. Fruit growers cannot afford to wait until after the developing fruit and new growth are "nipped in the bud" before placing any obstacles in the way of this insect.

We believe the pest can be reached with an arsenical spray applied *frequently* and *thoroughly*. It will necessitate at least two thorough applications *before the flowers open* If possible keep the swelling and opening buds coated with Paris green so that the little caterpillar's first meal in the spring will be a poisonous one. In order that the spraying should be thoroughly done at this time, fruit growers should realize that if the insect is not killed before the blossoms open they will not have another chance to do it nearly so effectively until the next spring.

If the trees are usually badly infested with the apple scab or other fungi it would be well to combine the Paris green with the Bordeaux mixture, and in this case using about one pound of the poison to one hundred gallons of the fungicide; the poison will adhere longer if applied with the fungicide. If Paris green only is applied, use about one pound to two hundred gallons and always add two or three pounds of freshly slaked lime to prevent the burning effects of the free arsenic in the Paris green. Take especial pains to thoroughly wet the buds on the smallest twigs. With at least two thorough applications of Paris green before the flowers open we believe this insect can be effectively checked for the season. Do not spray when the trees are in bloom as many honey-bees may be killed.

The limited time during which this bud moth can be reached by sprays renders it an especially hard insect to fight. It will require thoughtful, intelligent, and persistent work early in the spring to hold it in check.

MARK VERNON SLINGERLAND.

BULLETIN 108—January, 1896.

Cornell University—Agricultural Experiment Station,

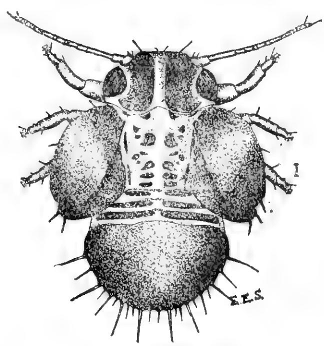
ITHACA, N. Y.

ENTOMOLOGICAL DIVISION.

THE PEAR PSYLLA

AND

THE NEW YORK PLUM SCALE.



By M. V. Slingerland.

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BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.

I. The Pear Psylla.*

Psylla pyricola Förster.

During the past five years this minute insect has inflicted such severe losses upon pear growers in various parts of the country that it threatens to seriously interfere with the successful cultivation of this fruit.

Its History, Distribution and Destructiveness.

The insect is an old offender, and like most of our other imported insect pests, it has wrought much more destruction here than in Europe, its native home. It was probably first introduced into this country upon young pear trees imported from Europe in 1832 by Dr. Ovid Plumb, of Salisbury, Conn.;† during the next five years he lost several hundred trees from its ravages. By 1848, it had spread into Massachusetts and into Dutchess and Columbia counties in New York. It is not again recorded as injurious until 1871, and then in Illinois; this State seems yet to be the western limit of its range. In 1879, it was destructive at Ithaca and at Saratoga, N. Y. A dozen years passed without any record of its injury. Then, in 1891, it suddenly appeared in enormous numbers in restricted localities in quite widely separated portions of this and other States, and thousands of dollars worth of fruit and many valuable trees were ruined by its ravages. Pear orchards at Fitch-

* This insect was discussed in detail in Bulletin 44, issued in October, 1892. There was so great a demand for the bulletin that the issue was exhausted in about a year. While this discussion includes an abstract of Bulletin 44, it also contains much new material, especially in regard to the distribution of the insect, its natural enemies, and to the methods of fighting it.

†The evidence submitted by Dr. Lintner (Ninth Rept. p. 319) to show that this insect "may have been operating in the State of New York as early as in 1824, if not in the preceding century," is far from conclusive.

burg, Mass., Meriden, Conn. and Pomona, Md., were devastated. In this State, it was especially destructive, orchards in the eastern, central and western portions suffering severely; many trees ultimately dying. One orchard near Ithaca promised 600 bushels of fruit, but less than 50 matured; and, Mr. G. T. Powell, at Ghent, had an estimated yield of 1,200 barrels reduced to less than 100 barrels of marketable fruit.

At the time we wrote Bulletin 44 (1892), the insect was known to occur only in Connecticut, Massachusetts, New York, Illinois and possibly in Michigan; its occurrence in Maryland, noted above, was not recorded until 1894.

In 1892, it was found abundant in Ohio. In 1893, it was discovered in New Jersey, and we also received it from Thomaston, Me. In 1894, it was found to be quite generally distributed over New Jersey, and had appeared in Canada (Freeman, Ont.) and Virginia for the first time. The same year it invaded a Maryland orchard (Chestertown, Md.) of over 20,000 trees in overwhelming numbers, and was quite destructive to several orchards in western New York. This year (1895) we have learned of no serious outbreaks of the pest. We have, however, received it from Clinton, Mich., where it did considerable damage in 1894.

We believe the insect is now present in alarming numbers in most of the pear orchards in New York State. We have not failed to find it in any orchard examined for this purpose in western New York, especially in Niagara county and in the vicinity of Rochester. Specimens have been sent us from Coxsackie, Pavilion, Milton, Carlton and Dansville, N. Y.; and it has been recorded from Athens, Menands, Catskill and Baltimore, N. Y.

Thus, the range of the insect has been greatly increased since 1892. It now ranges from Maine southward through Massachusetts, Connecticut, New Jersey, Maryland and into Virginia, and westward through New York, Canada, Ohio and Illinois to the Mississippi river, beyond which it has not yet been recorded.

How it Spreads.

In spite of its wide distribution, it seems to be rather a local insect, and its spread from orchard to orchard rather slow. Some of Coe Brothers' orchards at Meriden, Conn., have been badly infested for 15 years, and, yet, it had not appeared (in 1892) in one orchard set in 1881 only half a mile distant.

Our New York nurserymen are reported to be responsible for its introduction into Maryland, Virginia, New Jersey and Canada. In nearly every case it is claimed the source of infestation can be directly traced to pear stocks bought of New York nurserymen in 1890 or 1891, or about the time the pest was so numerous in this State. It is supposed that the hibernating form of the insect is thus distributed.

ITS CLASSIFICATION AND NAME.

This pear pest is one of the true bugs and belongs to the family *Psyllidae*, commonly known as jumping plant-lice from the leaping habit of the adult insects. Thirty-four species of Psyllids have thus far been described from the United States.

Psylla pyricola, although it was observed in this country in 1833, received its name in Europe fifteen years later. Previous to 1848, European writers had referred to the species as *Psylla pyri*, not distinguishing it from that species. *Psylla pyricola* sometimes attacks the apple-tree in Europe, but it seems to confine its attacks to the pear in this country.

INDICATIONS OF ITS PRESENCE.

During severe attacks of this pest, old trees put forth but little new growth, new shoots often droop and wither in May, the leaves turn yellow and the fruit grows but little, and in midsummer the leaves and half-formed fruit often fall from the trees. The insect also indicates its presence by secreting large quantities of a sweet, water-like, sticky liquid called "honey dew" which often covers all parts of the tree; it has literally rained from the leaves in some cases and smeared the backs of horses during cultivation*. A black fungus soon grows all through this honey-dew and thus gives the tree a disgusting blackish appearance as if treated with a thin

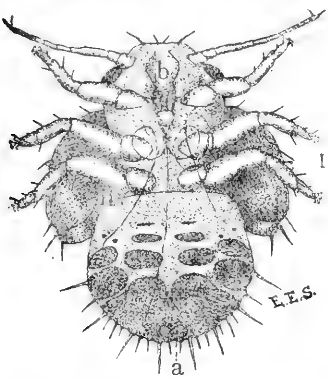
* During the severe attack in Maryland in 1894, "the leaves were scarcely at all yellowed, but were covered with dead and dry patches or spots, sometimes invading almost the entire leaf." It seemed to be due "to the sun-scalding resulting from the collection of the honey-dew on the leaves in large drops."

coat of black paint or soot. Pear trees of all varieties and ages are attacked in this State.

Although the indications of the presence of some enemy is so conspicuous, the depredator is so small as to be easily overlooked.

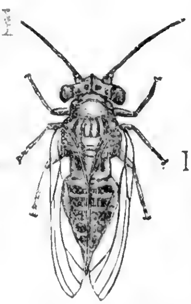
ITS APPEARANCE.

The immature insect.—These curious, minute, oval, immature forms are called nymphs. The newly-hatched ones (Fig. 43) are yellow in color, with crimson eyes, and can scarcely be seen with the unaided eye. During their growth they gradually acquire the black markings, shown in the frontispiece and in figure 40, and become tinged with red. A very conspicuous feature in the full-grown nymph is the large black wing-pads on each side of the body.



40.—Full-grown nymph of the pear psylla, ventral view, greatly enlarged.

The adult insect.—In this form (Fig. 41) the insect strikingly resembles a cicada or dog-day harvest-fly in miniature. Its general color is crimson, with broad black bands across the abdomen. Its thickened femora enable it to jump like a flea. In the male insect the abdomen terminates in a large trough-shaped segment from which project upward three narrow copulating organs; the end of the abdomen of the female resembles a bird's beak.



41.—Psylla pyricola, the adult insect, much enlarged.

ITS LIFE-HISTORY.

But little was known of the life-history of the pear psylla, either in Europe or in this country, previous to the publication of our Bulletin No. 44 in 1892.

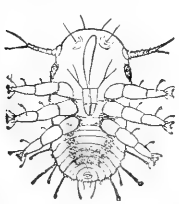
How it passes the winter.—The insect hibernates in the adult stage, hidden in the crevices under the loosened bark on the trunk and large limbs of the pear trees; a favorite hiding place on some trees is in the cavity formed by the bark growing about the scar of a severed limb. During warm days they often crawl about on the branches and trunk. They are not easily seen as they are so small and their color so closely imitates the bark.

Egg-laying of the winter brood.—During the first warm spring weather the adults come from their hiding places, copulate, and egg-laying soon begins. In this State, most of the eggs are usually laid before April 25. They are placed in the creases of the bark or in old leaf scars, about the bases of the terminal buds of the preceding year's growth; some occur about the side buds, near the terminal ones. They are usually laid singly, but rows of eight or ten sometimes occur. The eggs (Fig. 42) are scarcely visible to the unaided eye; it would take eighty of them placed end to end to measure an inch. They are elongate pyriform in shape, smooth and shining, and of a light orange-yellow color when first laid, becoming darker before hatching. A short stalk on the larger end attaches the egg to the bark, and a long thread-like process projects from the smaller end.

42.—Egg of pear psylla, greatly enlarged.

The temperature conditions in the spring influence the time of oviposition and the duration of the egg-state. In 1892, the eggs were from seventeen days to three weeks in hatching. Hatching usually begins about May 10. By the 18th most of the nymphs are out and their parents have disappeared.

Habits of the nymphs.—Immediately after emerging, which usually happens about the time the leaves are expanding, the minute nymph (Fig. 43) seeks its favorite feeding place, the axils of the leaf petioles, and later on stems of the forming fruit. When these axils become full they gather on the leaves. Their food consists entirely of the sap of the tree, which they suck through a short, sharp beak. Unless disturbed, they move about but very little, sometimes becoming covered with their own honey-dew. They stop feeding only when their skin gets too small, and they cast it off for a new elastic one that they grow just beneath the old one.



43.—Newly-hatched nymph of pear psylla, ventral view, greatly enlarged. (Reduced from figure by U. S. Dept. of Agr).

Habits of the adult.—The strong legs and wings of the adult enable it to spring up and fly away with surprising quickness upon the slightest unnatural jar. The hibernating forms are not as active and are readily captured. The adults also feed upon the sap by means of a sharp beak, but seem to have no favorite feeding place.

Egg-laying and habits during the summer.—In about a month after emerging from the egg in the spring, the nymphs become full grown and at the last casting of the skin the adult insects appear.

This first brood, appearing about June 10, and all subsequent summer broods of the adults, differ strikingly from those that hibernate. The winter forms differ in size, being nearly one-third larger, in their much darker coloring, and especially in the darker coloration of the front wings. Thus, in this pear psylla, we have a case of true dimorphism; the winter form had been described as a distinct species, *Psylla simulans.*

In about a week after their transformation from the nymph stage, the summer adults copulate and begin laying eggs for another brood. These eggs do not differ from those laid by the winter forms, but they are laid singly or in groups, not on the bark of the twigs, but on both sides of the leaves, tucked in among the hairs along the midrib or adroitly placed in the notches of the toothed edge of the leaf. They hatch in from eight to ten days.

A careful study was made of one generation of the insect in 1892 and the many interesting details then learned have been recorded in Bulletin 44. It was found that the nymphs cast their skin five times, at intervals of from three to seven days, the adult insect appearing at the fifth or last moult. So life-like were some of the cast skins as they were left on the leaves by the nymphs that it often required close examination with a lens to determine if the object was alive or only a nymph's cast-off garment. In each stage the nymphs secreted globules of honey-dew several times larger than themselves. Although the adults feed, they do not grow nor do they seem to secrete any honey-dew, but void considerable quantities of a whitish excrement. The summer adults probably live for less than a month, while those that hibernate remain alive for at least six months.

Number of broods.—Our observations indicate at least four broods in this State; the adults were the most numerous on or about June 15, July 20, August 20 and September 25, or a brood appeared about once a month. Apparently a fifth brood appeared in Maryland in 1894. The adults emerging in September and later were the hibernating form.

Honey-dew and excrement.—The honey-dew occurs in such immense quantities that it seems almost impossible that it is all secreted by the nymphs, and yet such is the fact. We found that one nymph secreted at least four drops (i. e. four minims) before it became an adult. In the case of the nymphs most of the food is elaborated into honey-dew; some is assimilated, and the waste matter voided as excrement. The adults, however, seem to secrete no honey-dew, and consequently they void considerable quantities of excrement.

The honey-dew and excrement are very different substances. The former is a clear water-like liquid and forms into globules when secreted. The excrement, however, is a whitish semi-solid substance which is voided in long cylindrical strings, or minute whitish balls which roll from the anus like quicksilver globules. The honey-dew seems to be secreted from the anus with the excrement.

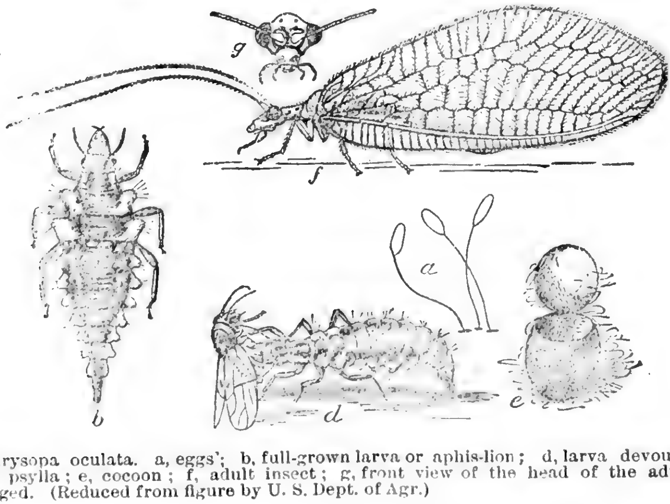
ITS NATURAL ENEMIES.

When we wrote in 1892, no enemies of the pear psylla had been recorded; we had heard rumors that a lady-bug beetle was destroying them in some localities, but there was nothing definite.

However, during the outbreak in Maryland in 1894, at least two predaceous insects were found feeding on the psyllas, one of which did very efficient work. As both of the insects are common in our State, pear-growers should learn to know them. One is a common lace-winged fly, *Chrysopa oculata.* Its various stages are well illustrated in figure 44. It is such an interesting creature and proved such an efficient foe of the psylla in Maryland that we give a brief sketch of its life.

The adult (Fig. 44, *b*) is a beautiful dainty creature with its wings and body of a pea-green color, and with a pair of large eyes that shine like melted gold. It is a very helpless creature, does not feed at all, and remains concealed in low grass during the day, becoming active and depositing its eggs in the evening. It emits a very disgusting odor when handled. "The lace-wing is a prudent mother; she knows that if she lays her eggs together on a leaf the first aphis-lion (as the young are called) that hatches will eat for its first meal all his unhatched brothers and sisters. She guards against this fratricide by laying each egg on the top of a stiff stalk of hard silk about half an inch high (Fig. 44, *a*). Groups of these eggs are very pretty, looking like a tiny forest of white stems bearing on their summits round glistening fruit. When the first of the brood hatches, he scrambles down as best he can from his egg perch to the surface of the leaf, and runs off, quite unconscious that the rest of the family are reposing in peace high above his head." (*Comstock's Manual for the Study of Insects, p.* 181).

Mr. Marlatt, who observed its work in Maryland, says of the young aphis-lion: "On approaching the egg or young psylla nymph, it immediately grasps it between its long, curved, mandible-like organs, which amount to two sucking tubes, between the tips of which the egg or young nymph is held and rolled one way and the other, as between thumb and finger, the juicy contents being in the meantime rapidly extracted; the dry shell is cast aside, the whole operation frequently taking less than a minute. The aphis-lion is an extremely hungry one and is always feeding. It eats anything that comes in its way, is totally fear-

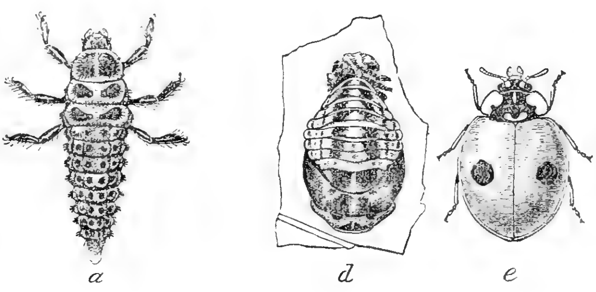


44.—Chrysopa oculata. a, eggs; b, full-grown larva or aphis-lion; d, larva devouring an adult psylla; e, cocoon; f, adult insect; g, front view of the head of the adult—all enlarged. (Reduced from figure by U. S. Dept. of Agr.)

less, and is also, unfortunately, cannibalistic, eating its own kind with great readiness. It is a safe estimate to say that one aphis-lion will destroy several hundred eggs and nymphs of the psylla in addition to the adults which it will destroy (see *d* in figure 44) in its later larval growth." In about ten days the aphis-lion becomes fully grown (Fig. 44, *b*) and rolls itself up into a tiny ball and weaves around it a glistening, white cocoon (*e* in figure 44), which looks like a seed-pearl. Possibly while secluded in this pearly cell the aphis-lion repents its greedy, murderous ways, and changes in spirit. In from ten to fourteen days, a neat lid is cut from the upper end of the cocoon (see *e* in figure 44) and an active pupa* wriggles out, from which in an hour or so the dainty lace-wing emerges. There are several broods of this predaceous enemy of the psylla during the year.

It is to be hoped that this lace-wing may see fit to include the pear psylla in its menu in New York State, where there is abundant opportunity for it to do our pear growers as efficient service as it has rendered in Maryland.

The other insect enemy of the pear psylla is the very common red lady-bug (*Adalia bipunctata*) with a black spot on each wing-cover (Fig. 45 *e*). It is so common that if it can be induced to feed freely upon the pear pyslla it will prove a very efficient aid in the warfare against the pest. It is predaceous in both its larval (Fig. 45, *a*) and adult stages. Mr. Marlatt saw a beetle with an adult psylla in its mandibles in the Maryland orchard; and he says one of the beetles cleaned the eggs from the leaves of a young pear tree in his breeding cage about as fast as upwards of 50 to 75 psyllas laid them. He reared from the egg state a brood of the lady-bug



45.—Adalia bipunctata. a, larvæ; d, pupa; e, adult—all enlarged. (Reduced from figure by U. S. Dept. of Agr.)

* Most writers state that the *adult* emerges from the cocoon, but, as was pointed out by Dr. Shimer in 1865 and by Dr. Riley in 1869, what they have called the *pseudo-imago* or *sub-imago* comes from the cocoon. The names given this stage of the insect are misleading, as they properly apply to a *winged* stage preceding the imago stage of may flies. In the case of the lace-winged flies, their *pupae* are sufficiently active to force their way out of the cocoon.

beetles on the eggs and nymphs of the pear pyslla. Our correspondent in Clinton, Mich., writes that he has "noticed the common lady-bug feeding on the nymphs of the pyslla."

Birds have been seen picking the adult psyllas out of their winter retreats in Niagara county; so industrious were the birds that but few pysllas were left on some trees.

HOW TO COMBAT PEAR PSYLLA.

The eggs. — Although the eggs laid early in the spring are freely exposed on the bark to the action of insecticides, yet we were surprised to find that many of them hatched after they had been dipped in kerosene oil, turpentine, benzine, and several of the washes used for killing scale insects. Mr. Marlatt reports that in July he killed many of the eggs laid on the leaves, by spraying with a kerosene or whale-oil soap emulsion diluted with from seven to nine parts of water. However, as many of the eggs cannot be killed in this way and as the insect can be combated much more effectively in another stage, we do not consider it advisable to fight it in the egg-stage.

The nymphs. — Our experiments in 1892, showed that the nymphs in all stages were quickly killed by kerosene emulsion.* Others who have tested it thoroughly report success.

Usually most of the damage is done in this State by the first brood of nymphs before June 15. It is therefore very important that the insect should be checked early in the season. We now advise using the emulsion diluted with about fifteen parts of water, instead of with twenty-five, as it is more effective against the nymphs, and it will also kill the adult insects. As the nymphs begin to hatch just as the leaves are expanding, then is the time to

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* The formula is ½ pound hard or soft soap, 1 gallon water, 2 gallons kerosene.

First, thoroughly dissolve the soap in boiling water. While this solution is still very hot add the kerosene; if the whole is then left over the fire for a few moments to raise the temperature of the kerosene slightly, it will facilitate the emulsifying process. Remove from the fire and quickly begin to agitate the whole mass through a syringe or force pump of some kind; draw the liquid into the pump and force it back into the dish. Continue this operation for five minutes or until the whole mass assumes a creamy color and consistency which will adhere to the sides of the vessel, and not glide off like oil. If desired for use immediately, it may begin spraying; about May 15 is usually the time in this State. Where they are numerous, a second or third spraying will be necessary. *The emulsion must be applied liberally and thoroughly;* it will not injure the tree in the least. It is much more difficult to fight the insect later in the summer, when the tree is in full foliage and many of the nymphs are covered with honey-dew. Watch for their appearance on the unfolding leaves in the spring and act promptly. Spray two or three times in a week if necessary; make every effort to prevent the development of a second brood.

The adults.—In Bulletin 44 we suggested that a thorough washing of the trunks and larger branches of the trees in winter with kerosene emulsion (at least five per cent. kerosene), or a strong soap solution, would destroy many of the adults in hibernation in the crevices of the bark. It is reported that a whale-oil soap solution has been thus used very effectively in New Jersey. We believe it is a practical method, and should be practiced in infested orchards.

We once saw hundreds of the hibernating adults congregated on the smooth trunks of a large block of young standard pear trees. There were twenty-five or more on each tree, and all of them on the same sides of the trees. It was a short job with a rag or mitten to grasp the tree at the base, draw the hand up the trunk and thus crush the psyllas.

Is it practicable to fight the adults in summer? They are then often very numerous but are very shy and active, and fly from the tree the moment the spray strikes it. It would thus seem that "spraying has practically no value against the adults during their active summer existence" (Mr. Marlatt). However, several of our

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now be readily diluted with cold water, preferably with rain water. Or the whole mass may be allowed to cool when it has a semi-solid form, not unlike loppered milk. This stock if covered and placed in a cool dark place will keep for a long time. In making a dilution from this cold stock emulsion, it is necessary to measure out the amount of the emulsion required and first dissolve it in three of four parts of boiling water; if cold water be used a large quantity of a white flocculent mass rises to the surface and does not dissolve. After the stock emulsion is dissolved, cold water may be added in the required quantities. If all the utensils are clean, and the directions followed closely, no free oil will rise to the surface of the dilution.

New York pear growers have demonstrated the practicability of fighting the adult insect. In 1894, the presence of the pest in destructive numbers was not suspected in one Niagara county orchard until the leaves began to drop off in July. The kerosene emulsion spray was at once directed against the enemy with the result that it at once brought down millions of the adults, their dead bodies being thickly strewn about the spraying apparatus. Although the insect had gotten such a start in the orchard, it was so effectively checked with the emulsion that but few psyllas were found in 1895. Mr. Geo. T. Powell, who has had more practical experience with this insect than any other fruit grower in the State, also sends us the following brief, yet graphic, account of his fight with the insect in 1894:

"May 10th. Eggs began to hatch and we sprayed with kerosene emulsion, diluted 1 to 20.

May 15th. The nymphs began to get out in full force, when we began spraying with great thoroughness. When the wind blows hard, the spraying is not done so effectively, especially in the tops of quite tall trees.

May 16th. Sprayed a second orchard. The day is clear and still. The work is very much more effective, killing the young psyllas quickly and in all parts of the tree.

May 17th. Sprayed the first orchard again. Many insects alive, the emulsion not having hit them thoroughly on account of high winds. Unless the insect is destroyed the fruit will be worthless.

June 5th. After several rainy days, sprayed pear trees again and for the last time as the psylla seems to be pretty well knocked out by this time; only a few nymphs are feeding, but quite a number of adults about the tree.

June 11th. Finding a few nymphs still coming out and working, we sprayed again and at the same time bringing down millions of the adults that escaped former sprayings. The day is very still and warm. The greatest possible force is given the spray, which goes over the tops of the highest trees. The stones on the ground and the platform of the machine are covered with dead adults. A sheet is placed under a small tree, and after spraying but ten seconds, 150 adults fell upon the sheet and in five minutes 90 per cent of them were dead.

After discovering the extent to which the adults were being destroyed, the entire orchards were gone over, extra force being given to the spray to bring down as many adults as possible, thereby lessening largely the number to multiply next year.

We used a hand-pump on the Phillip's sprayer and stopped at each tree, spraying very thoroughly before leaving it. There is no power machine that will do this work thoroughly enough as yet;

for pressure on the pump cannot be kept on strong enough or long enough to do the work effectually.

Results.—Notwithstanding a very long and severe drouth, we brought through a very good crop of pears of excellent quality, the first good crop in four years. The trees made growth and have quite rallied from an almost hopeless condition of decline.

June 18, 1890. I very thoroughly annihilated the psylla last year. My pear orchard is improving remarkably. Sprayed only once this season, they were so few."

Geo. T. Powell.

Disheartened pear growers cannot fail to find much encouragement in the above account of how the ravages of this pear psylla were checked in one of the worst afflicted orchards in our State.

II. The New York Plum Scale.

Lecanium juglandis? Bouché.

This insect (Fig. 46), which suddenly appeared in overwhelming numbers in many of the largest plum orchards in western New York in 1894, was discussed in detail in our Bulletin No. 83, December, 1894. The bulletin is not yet out of print and can be obtained by addressing the Director of the Experiment Station. Several new and important facts have been learned about the insect since the bulletin was published, and these are included in the following notes which aim to give fruit-growers the latest news about this serious pest.

46.—Plum branches badly infested with the full-grown scales, natural size.

Extent of its damage in 1894.— The serious picture we drew in Bulletin 83 of the ravages of the insect did not tell half the truth. Before the winter was far advanced, it was found that the strain on many trees from so many millions of little pumps sucking out their vital fluid — the sap—had been too great. In one orchard three hundred of the oldest bearing trees had succumbed in January, and three hundred more died before spring.

Effect of the winter of 1894–'95 on the scales.—When winter set in, each one of the 50,000 of the best plums trees in western New York harbored millions of the little scales, thus threatening the entire destruction of thousands of these trees in 1895. The situation was exceedingly serious. However, in January it was reported at the meeting of the Western New York Horticultural Society that "a large percentage of the insects were being killed by the winter." We at once made a careful examination of many infested branches sent in by correspondents in different localities, and found that the report was well founded; the good news was fortunately true. From 50 to 75 per cent. of the scales were then dead, and evidently more succumbed later for we believe that in most orchards less than 25 per cent. of those that went into hibernation in the fall were alive in April, 1895. Apparently those most exposed died first, indicating that weather conditions of some sort may have caused their death. But whether it was due solely to low temperature, or to the sharp, dry, chilling winds that prevailed, we cannot say.

Extent of damage in 1895.—So far as we have learned, all those who suffered so severely from the insect in 1894, are unanimous in their opinion that but very little damage has been done by it in their orchards this year; and it has not been numerous enough to attract particular attention except on a few trees. This general exemption from injury this year was due to three principal causes. First, a majority of the scales died from some cause during the winter, thus greatly checking the future development of the insect. Second, most of those having infested trees carried on a vigorous warfare against the pest with the kerosene emulsion, both in the fall and early spring. Third, thousands of the scales were killed by minute parasites in the spring, and the lady-bug beetles which feed upon the scales were unusually numerous and active during the summer.

However, a few orchards suffered considerably from the insect this year; we learned of one apple orchard in Niagara county that was quite badly injured. On the whole, the insect did very little damage in 1895 compared with the destruction wrought in 1894.

The future outlook.—What little information we have indicates that the insect is going into hibernation in considerable numbers on some trees, but the outlook for 1896 is encouraging. Nevertheless, it will not do to be too sanguine. Every tree known to harbor the pest should be carefully examined this fall, during the winter, and especially early in the spring.

Previous to last year, New York orchards had never suffered from the attacks of this or any other Lecanium scale, and they may not be threatened so seriously again for many years to come. But we can never tell when to expect most of our insect foes to appear in alarming numbers, so that our fruit growers must be continually on the alert and watch this plum pest closely every year.

Its name.—Experts are not yet agreed upon the name this Lecanium should bear. It has lately been decided by Mr. Newstead, of England, that it is identical with the Europen insect—*Lecanium prunastri.* Messrs. Cockerell and Maskell conclude that it is probably identical with *Lecanium juglandis* which Bouché found on black walnut in Germany over fifty years ago.*

Its history and distribution.—The fact that isolated specimens of this insect can be found on almost any large plum tree in certain portions of the State, indicates that it has been with us for many years. The few years preceding 1894, happened to offer the conditions most favorable for its multiplication in excessive numbers in western New York; and it then forced itself upon our attention by its destructive work.

Mr. L. O. Howard, U. S. Entomologist, reports (Yearbook of U. S. Dept. of Agr. for 1894, p. 272) that there are two other distinct kinds of Lecaniums affecting plum trees in the United States. One of these passes the winter in the same stage as does our New York species, while the other hibernates as a nearly full-grown, rounded female. Our New York species has

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* Mr. Maskell writes us on October 6, 1895: "I have examined your insects, and agree with Mr. Cockerell that on the whole they are nearest to *Lecanium juglandis.* I don't quite see how your insect can be *L. prunastri* which has very marked epidermal puncta. I don't think you will go far wrong in calling it *L. juglandis.*"

recently appeared in destructive numbers in Canada. It is also more generally distributed over our state than was suspected when we wrote Bulletin 83. We have received it from Aquetuck, Hector, Schoharie (on *Prunus simoni*), Eastwood and Penn Yan, N. Y.

Its food-plants.—The insect still remains par excellence a plum pest, yet several quince and apple trees have been seriously injured by it. A possible source of infestation for some of the orchards near Geneva was found to be an ash grove which was very badly injured in 1894 by a Lecanium which is apparently the same as the one working on the plum trees. The grove was also badly injured this year, the leaves all dropping off during the summer.

Probably the Lecaniums found in such large numbers on maple and other forest trees in different parts of the State are distinct from the plum Lecanium.

Its natural enemies.—The small, black, elevated, smooth, parasitized scales described in Bulletin 83, p. 693, were very numerous last spring, and we bred many of the minute four-winged flies. Mr. L. O. Howard has determined them as *Coccophagus lecanii* Fitch, a Chalcid which is common in many parts of the country and attacks several different kinds of Lecaniums. This little foe proved a valuable ally of the fruit-grower last spring, as we found a considerable percentage of the scales parasitized.

47.—Spiny larval skins of lady-bug beetles, natural size.

From several different sources we have learned that the twice-stabbed lady-bug beetle was very numerous in the infested plum trees this year. Several groups of the spring skins (Fig. 47) shed by their larvæ when they pupate, have been sent in by plum growers. Protect these little lady-bugs, as they are doing valiant service in the extermination of this pest.

Results of spraying.—All who sprayed with the kerosene emulsion (diluted with 4 parts of water) according to the directions given in Bulletin 83, report general success. There is no longer any question about its killing the scales hit by it.

During the summer we saw infested trees that had been sprayed with different substances to kill the young scales then on the leaves. Some of the scales had been killed, but as it was evident that a great majority, over 75 per cent., were uninjured, the applications were far from a success. The liquids had also injured the bloom on what little fruit there was. What results we saw fully confirmed our opinion, expressed in Bulletin 83, that the insect cannot be effectually and practicably checked by sprays while it is on the leaves during the summer and early fall.

Spray infested trees once after the leaves fall in autumn, and at least twice in the spring before the buds open. Use kerosene emulsion diluted four times, and the application cannot be done too thoroughly; each little scale must be hit.

MARK VERNON SLINGERLAND.

BULLETIN 109—January, 1896.

Cornell University—Agricutural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DEPARTMENT.

GEOLOGICAL HISTORY

OF THE

CHAUTAUQUA GRAPE BELT.

By R. S. TARR.

ORGANIZATION.

Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.
The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and The Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.

CORNELL UNIVERSITY,
ITHACA, N. Y., *January* 1, 1896.

The Honorable Commissioner of Agriculture, Albany.

SIR: One of the most obvious circumstances connected with the cultivation of many fruits is the fact that the most successful plantations of them are confined within somewhat narrow areas or in well marked geographic regions. This circumstance is emphatic in the grape belt of Chautauqua county. It becomes a matter of great importance to determine the reasons for the existence of these fruit belts, and to ascertain how far their limits may probably be extended with profit. A study of the surface geology and topography of any of these belts may be expected to afford most interesting and valuable facts for the pomologist, for this type of investigation is yet practically untouched by scientific inquiry. In Chautauqua county there is a particular reason for such an inquiry because of the fact that the entire Erie slope is not equally adapted to the grape, although vineyards have been almost promiscuously planted upon it. It is necessary that the true grape belt be delimited and charted. In seeking to take up this investigation, we have been fortunate to secure the services of R. S. Tarr, Professor of Geology in Cornell University. It is a happy circumstance that Chautauqua county, which originated and matured the movement for Experiment Station extension work, should now be the scene of the first specific attempt in this country, on the part of an Experiment Station, to analyze the physical geography of a fruit belt.

L. H. BAILEY.

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48.— Wave-cut cliff and beach of Lake Erie, north of Ripley.

Geological History of the Chautauqua Grape Belt.

Introduction.

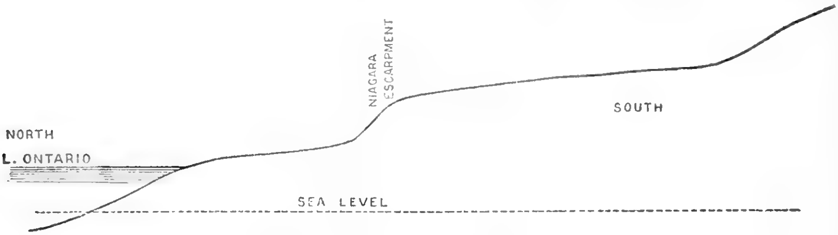
This study was made primarily for the purpose of ascertaining the natural conditions which favor fruit growing in the grape belt of the Erie shore of New York. It became immediately evident that these conditions had to do both with the soil and the climate. Concerning the latter, little detailed information of value could be obtained; for in order to gain this information, meteorological observations must be carried on for a series of years at stations located in different places. In order to find out how the soil varies, a rather careful study of characteristics and distribution was made, and the satisfactory study of these involved the question of origin. Since the origin is a question of some interest, it will be included in this paper.

In general, it may be said that the two factors of soil and climate have conspired to make the grape belt a district admirably adapted to fruit raising. While each is of importance, it is evident that the climatic peculiarities are of more importance than the soil. Both the characteristics of climate and soil are due to the topographic peculiarities and the geological history of the region included within the grape belt and in its immediate neighborhood.

The time occupied in the field study has amounted to only about three weeks — two in June, one in September and two days in November — and therefore a great amount of detail can not be expected. Although a little work was done east of Silver Creek, the study was practically limited to the region between this town and the state line. During the study, I have received many courtesies from the residents of the grape belt, and I am particularly indebted to Mr. J. W. Spencer, of Westfield. In September I was aided by Mr. T. L. Watson, of Cornell University. In running the three lines of levels, Mr. M. D. Tennant, of Westfield, did the leveling and the writer acted as rodman.

TOPOGRAPHY.

The situation of the grape belt is peculiar. From Lake Ontario southward, toward Niagara Falls or Lockport, there is a nearly level plain extending to the base of the Niagara escarpment, known



49.—Profile of the Niagara escarpment.

locally as "the mountain" (Fig. 49), which raises quite abruptly to a height of two or three hundred feet. This escarpment is well seen at Lewiston, where the basal plain stretches away toward the lake with scarcely any diversity to break the monotony. All of this plain is less than 500 feet in elevation above the sea, and it borders the entire southern shore of Ontario.

South of the Niagara escarpment, toward Batavia or Buffalo, there is another plain, which beyond Buffalo narrows down to a width of only one or two miles as the state line is approached. It is nowhere below 500 feet, nor above 800 feet in elevation. This narrow strip which borders the Erie shore is the true grape belt. Everywhere the southern margin of this plain is backed by an

50.—Location of the grape belt.

escarpment or ridge (Fig. 50), which quickly raises to a height of 500 or 600 feet above the plain, and in some places is over 1,000 feet above the lake. Therefore, the grape belt (in New York) is a narrow plain extending north-eastward from the Pennsylvania state line, and bounded on the north by the lake, on the south by a high range of hills. East of Silver Creek the plain widens and the bounding escarpment loses in elevation. This narrow plain is only a small fragment of the real plain; for the waters of Lake Erie cover the greater part of it. As is shown in the profile (Fig. 50), the plain descends beneath the lake waters and ascends on the Canadian side. Not merely is a part of the plain now submerged, but at a recent geological period more of it, and that part now occupied by the most flourishing vineyards, was covered by the lake waters. Lake Erie now plays an important part in modifying the climate of the grape belt; it formerly did important service in modifying the soils.

THE BED ROCK.

As revealed along the lake shore, and in the remarkable gorges which cut the escarpment and the plain, the bed rock is entirely upper Devonian shales and sandstones above the horizon of the Hamilton, which does not extend farther west than Evans. Both plain and escarpment are made of these; but it is probable that the latter owes its elevation to the protective effect of some harder layers of upper Devonian rock now removed.

51.—Section of the grape belt.

On the northern face of the escarpment the soil is prevailingly thin and the plough frequently reaches the bed rock; but on the plain, the bed rock is rarely seen at the surface, excepting in the stream beds and in the shale ridges, which are found mainly east of Dunkirk. Still the bed rock plays an important part in the soils; for fragments of shale are commonly present in all the soils of the district.

THE SOILS.

General description of the soils.— If we should make several north and south sections across the grape belt, from the middle of the escarpment to the lake shore, they would be found to vary in details according to the location of the line, but to be quite the same in general features. The average condition would be as follows (Fig. 51). Commencing on the hillside with a thin soil of clayey nature, and with an abundance of pebbles, (Fig. 53) and perhaps boulders, at the base of the hill, when at the elevation of about 250

52.— **Map** of the region in the vicinity of the Grape Belt. Showing the approximate location of the three beaches and the moraines (M).

feet above the lake, we come to a gravelly soil in which the pebbles are well rounded (Fig. 57) as if by water action. North of this there is a steep slope of twenty or thirty feet, at the base of which the soil becomes clayey, and this continues usually for several hundred feet, or possibly as many yards, when gravelly conditions are again encountered, somewhere in the vicinity of the main Buffalo and Erie turnpike. One or two gravel terraces are found here, and at the base of the northernmost of these clay again appears. Here, as in the case of the first gravel ridge, there are springs at the junction of the gravel and clay, so that, where not artificially drained, this place is continuously indicated by swampy conditions. From the top of the upper (southernmost) gravel ridge to the spring line at the base of the lowest the descent is about ninety feet, and the distance anywhere between two and three hundred yards and a mile or even more, though usually not far from a quarter of a mile.

From this point lakeward, a distance of one or two, and in some places even three miles, the plain is somewhat irregular, with a general descent toward the lake, which is some 150 to 160 feet below the gravel ridges. The soil is usually a clay, though it is often of a sandy nature. The immediate shore line is commonly a bluff, either of shale or of clay (Figs. 48, 59 and 61), though at times it is in the form of a beach, without any well-developed bluff (Fig. 58).

As has been said, this will hold in general for *any* north and south line, whether at the state line, Fredonia, Silver Creek or any intermediate point. If, however, we make our section nearly parallel to the lake shore, remaining at the same elevation above its surface, we find a remarkable uniformity of conditions. Thus we may pass from Erie, Pa. (and indeed from far to the west of this), to Hamburg, N. Y., without leaving a belt of gravel, excepting where the road crosses a stream; or, if on the hillsides, one may pass over the same distance upon a boulder-bearing clay; or, if near the lake, upon a fine clay soil, usually free from boulders. These differences are constant and they are due to definite causes. Since the result is of importance to the fruit grower, the cause must at least be of interest. Before considering the cause, we will examine the conditions in a little more detail.

The hillside soils.—Above the upper gravel (see map, Fig. 52), which usually lies but a short distance south of the main road, the ground generally commences to rise more rapidly and the escarpment is soon reached. On this hillside there is considerable grape raising, but the soil is altogether different from that in the region to the lakeward, which is the main grape belt. The base of this soil is a clay of very fine texture; but there are some local variations from this. In some cases the soil is a loam and in places it is even sandy, while on the other extreme it is often a dense hardpan; but nearly everywhere the bulk of the soil is clay, whether it is

53.—Section in the boulder clay on Mayville and Westfield road.

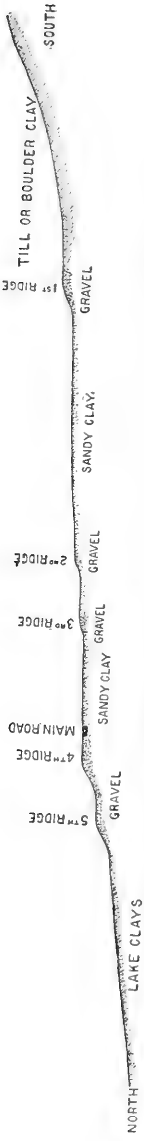
hard and compacted into hardpan or is a loose and relatively friable loam. When fresh, the color is blue; but since the soil is generally somewhat disintegrated, the color ordinarily seen is a yellow, which is due to iron rust leached from the soil fragments.

Next in importance to the clay is the presence of pebbles. These are very numerous, and at times they are of considerable size. It is important to note the form of these. They are angular, and if rounded at all, this is usually on only one or two of the sides, so that angular corners are almost invariably to be found. Moreover, the sides of these often bear numerous grooves and scratches. While many of the pebbles are fragments of shale rock, like that which forms the bed rock of the region, a careful examination shows that there are many which are foreign to this part of New York. Thus granites, sandstones and limestones are found in a region which from the bed rock yields only shales and sandy shales. If we could examine the soil particles with a microscope, we should find them to be composed of minute rock particles, fresh and unchanged, as if worn or ground from the rock by some strong force. The entire mass is put together without arrangement, and there are no distinct layers such as those found in the lower gravel soils. We say it is unstratified, though sometimes (as in figure 53) there is a partial stratification, never very distinct.

This soil varies greatly in thickness, being usually several feet deep; but while sometimes, particularly in the stream valleys, it attains a depth of several hundred feet, in other places on the hillsides it forms a very thin veneer over the shale rock. Near the crest of the escarpment there is another belt of soil of morainic origin; but as this is not in the true grape belt, it need not be considered here.

This clay soil is the same as that which covers the greater part of the area of New York and New England, and of Canada to the north of these districts. Its characteristics and origin are well understood by geologists, to whom it is known as *till* or *boulder clay*. In the first half of this century its origin was in dispute; but we now know that it is a deposit from a great continental glacier which occupied northeastern North America, and extended outward in all directions from a center near Hudson Bay or Labrador, behaving like the present ice sheet of Greenland, or the Antarctic. Slowly moving across New York State, toward the south, with a depth certainly as great as a mile (for it covered the highest mountains of the east), it ground down the rocks, reducing them to a fine clay, which is often called rock flour, and caused a mingling of pebbles from various sources. Thus the granite from the Canadian highlands is stranded on the hillsides of Chautauqua county and is there mingled with the shale. The grooved and scratched pebbles show that this process of grinding was in operation.

Much of this material was dragged beneath the ice; and owing to variations in the topography of the land, in currents or in supply,



54.—Section to show the relative position of the gravel ridges and the other classes of soil.

in some places it accumulated to a depth of several hundred feet, while in other places it was not so extensively deposited, just as in some places a river scours its channel clear, while elsewhere it is building a bar. Finally the ice disappeared from these hillsides and all of the material that was in or under it was left to form the present hillside soils.

The hillside soils are somewhat difficult to work, partly because of the roughness of the surface, partly because of the irregularities of the texture and composition, which, even in the same field, may very differently affect capillarity and drainage. Moreover, it is often a dense hardpan which is difficult to till. Still it is a strong, sturdy soil, which, when properly cultivated, furnishes good crops. However, it is not so well adapted to grapes as the more sandy soils of the valley.

The gravel ridges.—Throughout the entire grape belt (Fig. 54), there are three distinct gravel areas, extending approximately parallel to the Erie shore. On one of the two northernmost of these the main road to Buffalo is generally located, while the third is south of this, at distances generally varying from one or two hundred yards to more than a half mile. Between these distinct ridges there are sometimes one or two less distinct gravel beds; but most of the space between them is occupied by a clayey soil. In some places, particularly near the larger streams, the entire belt is gravelly.

The surface of the gravel ridges is typical. Each one is remarkably level-topped (Fig. 55), and the roads that follow them often extend for miles almost on a dead level. There are distinct terraces, and when viewed from the north they present a bold face which rises quite abruptly to a height of from fifteen to thirty feet (Fig. 56), beyond which a nearly level plain is usually encountered (Figs. 54 and 55). Near the streams the terrace is broader than elsewhere; and in some cases it is a true ridge with a nearly level top but with a slope both to the north and the south (Fig. 65).

The soil of these gravel ridges is peculiar, and it is upon them that many of the best vineyards are located. Wells and natural sections show that the gravel soil varies in depth from one or two feet near the edge, to ten or fifteen feet. Beneath the gravel is found clay or shale. The gravel soil consists of pebbles and sand

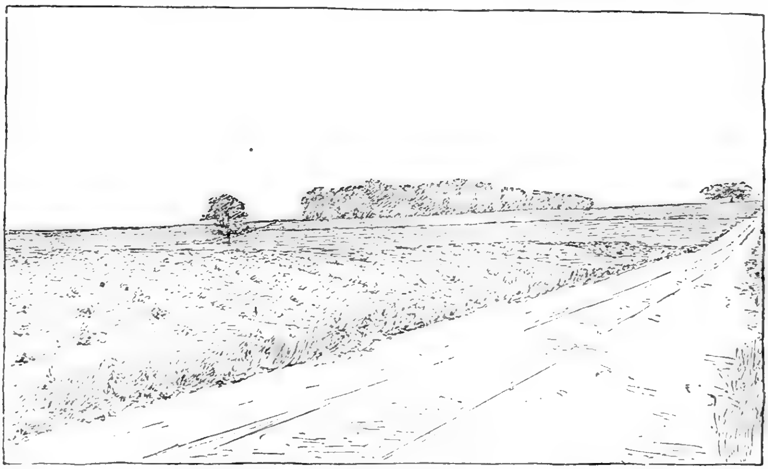
55.—Round the crest of a gravel ridge just east of Fredonia.

with scarcely any clay, excepting that which has come from the disintegration of some of the fragments. After plowing it does not form clotted bunches, but is loose, friable and porous. Water readily passes through it, and for this reason, forms of vegetation whose roots do not extend deep into the soil are in danger of suffering in times of drought.

When examined in a fresh section, it is found that the gravel is often very pebbly, and that the pebbles are sometimes very large.

Compared with those of the hillside, the pebbles are found to be well rounded and smoothed (Figs. 57 and 66), as if by water action. There are few if any angular corners, and no grooves or scratches. The clay element is practically absent, and the pebbles are bound together by sand instead. The pebbles and sand are in layers, or are stratified (Fig. 57), so that there are several important differences between the soils of the two zones.

A comparison with the beaches of the present lake shore shows a striking resemblance, not only in texture but in the surface outline. In both cases there are many rounded pebbles and much sand; and in both cases, also, the surface form is that of a flat-topped



56. — Upper terrace southeast of Sheridan.

terrace. However, in the beach there is almost no clay, while in the gravel ridges the decay of some of the pebbles and sand particles has furnished some clay; and also the action of vegetation and cultivation has somewhat modified the gravel ridge soil. The meaning of this resemblance will soon be shown to be similarity of origin. As many who have tilled the gravel soil have conjectured, the ridges are true lake beaches now stranded on dry land.

The lake clay soils.—In the present lake, gravel beaches are being formed along the shore line; and each time that there are strong waves, the washing action of the water moves the pebbles backward and forward, rounding them by grinding off tiny particles of clay. The force of the waves and currents is capable of carrying the beach sand and gravel only to a very short distance from the shore line; but the clay that is worn away by the waves passes in suspension for a considerable distance from the shore line before settling to the bottom. During windy days the waters immediately off shore are clouded with sediment. Fishermen know that at a distance of only a few yards from the shore the lake bottom is almost everywhere covered with clay or sandy clay. The soundings made by the United States Engineers, who have surveyed the bottom of Lake Erie, show that a muddy bottom is the prevailing feature.

When the lake waters reached to the height of the gravel ridges, the region below this was naturally a place for the deposit of clay.

57.—Section through the upper beach at Westfield, showing stratification of pebbles and sand.

While some pebbles may have been drifted away by the ice, and dropped to the bottom away from the shore, the clay was in most places free from large fragments. In some places, particularly opposite the mouths of streams, the clay might be replaced by sand for a considerable distance from the coast. An examination of the soil between the northernmost gravel ridge and the lake shore, shows that these features exist.

A layer of clay, varying in depth from a few inches to several feet, is spread over most of the region west of Silver Creek and north of the gravel ridges. Oftentimes it rests on the bed rock, barely covering it: in other cases it is found above the true boulder clay, and in some stream cuts one may often see a bed of dense boulder clay upon which rests a foot or two of clay, which is often quite sandy. In such places, one has the opportunity of studying the differences between the two kinds of clay soil, one of which is characteristic of the hillsides. The lake clays are found to be in layers, as if deposited in water, and the clay is usually less dense than the boulder clay, while pebbles are relatively scarce.

Shale gravel.—Between the lake shore and the true gravel ridges, in some places there are low ridges of shale, on which the soil is so thin that deep plowing reaches the friable shale bed rock. The soil is then made up of a mixture of fragments of shale and clay, forming what is known as shale gravel. These deposits are not

58.—Modern beach at Barcelona, showing the crest in the background.

very extensive, and they merely represent rock hills which have not been deeply covered by glacial or lake deposits. They are less common west of Silver Creek than they are east of that town.

The relative value of the soils.—Of the three important kinds of soil in the grape belt. the gravel is distinctly the best for fruit raising, and the hillside soils of the least value. That the fruit growers have generally recognized this, is shown by the fact that in the belt of gravel there is a much greater percentage of vineyard than in either of the other belts. While it is so readily permeable to water that plants whose roots do not extend deep into the ground may suffer from droughts, it rests upon a much less permeable rock or clay, over which water is constantly percolating; and those forms of vegetation whose roots are able to reach down to this zone are not endangered. The depth of this permanent water zone is variable, but it is usually several feet.

The width of this gravel belt is very variable, as indeed are the details of its composition. Near the mouths of large streams, as at Silver Creek, Fredonia, Westfield and the state line, the zone broadens so that a sandy soil extends from the base of the true gravel ridge across the plain, nearly, if not quite, to the lake. Between the streams the gravel ridges become narrower terraces, and the lake clay soil commences at their very base. Therefore, in different parts of the grape belt, the area in which the soil features are especially adapted to grape raising is somewhat variable; but there is a certain uniformity, and the importance of this to the question of origin is sufficient to call for a more detailed statement of the features of the gravel ridges, or, as we may now call them, the ancient beaches.

THE MODERN BEACHES.

Let us first take a glimpse at the present shore line features of Lake Erie. There are two separate kinds of shores, the rock or clay bluffs (Fig. 48) and the gravelly or sandy beaches (Fig. 61). Oftentimes the bluff is faced by a beach (Figs. 48 and 61). Where the larger streams enter the lake, the width of the beach is increased, and the waves are not cutting at the base of the shale bluffs. The cliffs need not delay us, for it is the beaches with which we have to do in particular. The beaches consist of sand and gravel thrown by the storm waves to a height of several feet above the reach of the ordinary waves. In time of strong waves the water dashes over the top of the beach, moving the pebbles to and fro, although they are situated fully ten feet above the present lake surface (measured at Barcelona) (Fig. 58). This is the crest of a terrace whose width varies, sometimes being a narrow strip at the base of a bluff (Fig. 59), sometimes, especially near the mouth of a stream, broadening out to quite an extensive plain. At Silver Creek and at the mouth of Cattaraugus Creek, the beach deposits are very extensive; and in the latter, the action of the wind by building sand dune hills has raised the level above the reach of the highest waves. In these places also, bars are being built opposite the mouth of streams (Fig. 60).

59.— Crest of modern beach at Barcelona with a clay bluff in the background.

The reason why these beaches are being built is that the supply of gravel is greater than the waves are able to remove. In some cases the supply comes mainly from the rocky headlands, in others

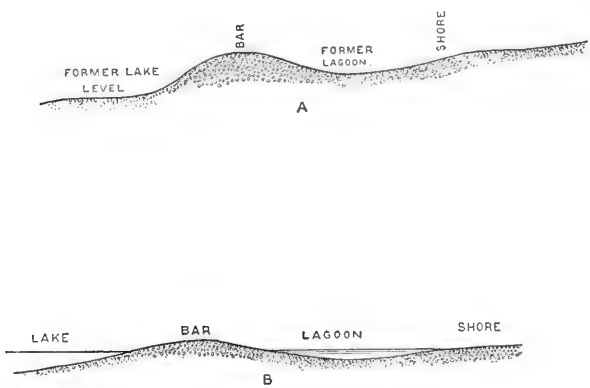
60.— Present bar formation at Silver Creek.

from streams. Where it can not all be ground down to a fine clay, that can be carried off shore and dropped to the bottom, it accumulates as beach gravel; and so, year by year, the beaches encroach

61.—Present beach of Lake Erie, north of Dunkirk.

upon the lake. The crest of the beach, which may be ten feet above the lake level, represents the highest point to which the lake waves can reach and bear gravel: in other words it represents the height reached by the violent storm waves. Since this varies with the exposure, the crest of the beach may vary in height, as we have seen that it varies in width. This variation amounts to only a few feet, the beach being higher on exposed than on sheltered coasts.

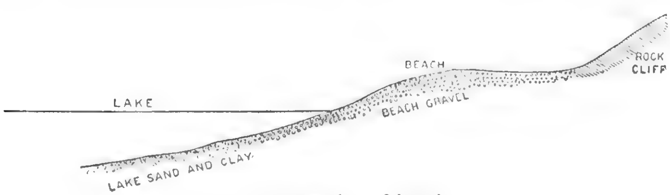
Generally the top of the beach is nearly level (Figs. 59 and 61);



62.— Cross section of bar: ancient A ; modern B.

but where accumulations are made off shore, as they sometimes are where streams bring considerably more gravel than the waves can dispose of, a bar is built, and this slopes both ways (see Figs. 60 and 62B. Also compare with Figs. 62A and 65).

Therefore the top of the true beach is a plain of varying width, whose elevation is nearly uniform, both along the shore and at



63.—Cross section of beach.

right angles to it. If it is in the form of a bar, the elevation remains nearly uniform in the direction of the length of the bar, but at right angles to this it rapidly descends in both directions. In the beach, the flat topped plain is faced on the lakeward side by a rapidly sloping front; and this descent continues beneath the lake waters. (Fig. 63).

Therefore on the shore of the present lake we have a terrace plain of a nearly uniform level, and the terrace slope (Figs. 58, 59 and 61), the whole being composed of well rounded and water-worn

64.—Pebbles of the modern beach at Barcelona.

gravel and sand (Figs. 58 and 64). We also find numerous wave-cut cliffs either in the clay (Fig. 61) or in the rock (Fig. 48); and opposite the mouths of the streams there are often formed bars (Fig.

65.—Section through a bar. Midway between Sheridan and Fredonia. Beach to be seen in the background in the gap cut through the bar.

60) which are welded at their base to the beach, and stretch more or less completely across the stream mouth. Sometimes there are

spits of gravel; and there are numerous other minor details of shore line features.

THE ANCIENT BEACHES.

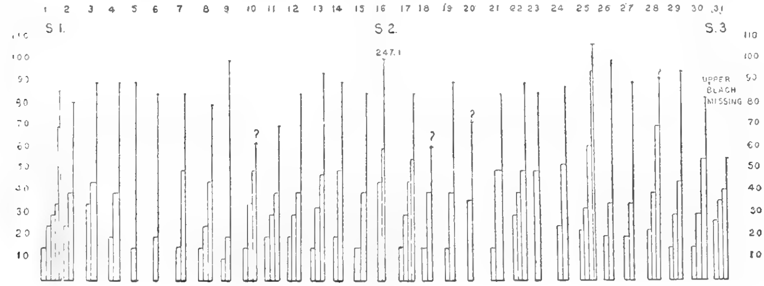
Most of the features just described are found also in the gravel ridges. They usually have all of the characteristics of beaches (Figs. 56 and 66), and near the streams they are often transformed to bars (Fig. 65). The resemblance is so close that even the most casual observers have noticed it and formed the theory that the ridges

66.—Photograph showing pebbly nature of old beach terrace near Sheridan.

were made by the lake waters. So far no fossils of lake shells have been found in the gravels, though some have been reported by residents of the region. It would be of great importance to find these* for they would determine beyond question whether the gravel ridges are lake or ocean beaches. There is little reason for believing the latter, although this explanation has been suggested by some.

* If any reader should know of the existence of fossil shells like those now living in the lake, I should be very glad to be informed of the occurrence.

The gravel ridges.—In passing from one end of the district to the other, numerous differences are found in the gravel ridges. Perhaps the most important change is in the number of beaches (Fig. 67). From the base of the lowest to the crest of the highest, there is a vertical range of from 85 to 100 feet* in a distance which is often less than a half mile. In this distance there are always two distinct ridges or beach terraces and usually several. There seem to be five beaches, though it is rare to find all developed in the same section. In thirty-one sections whose elevations were measured with the aneroid barometer, only one (Number 17) clearly exhibited five ridges. In section 1 there are six gravel ridges, but one or two of these may have been bars opposite the stream mouth.



67.—Diagram to show the elevation of the different terraces (in thirty-one sections) above the base of the lowest terrace. 1, at State Line ; 30, just east of Silver Creek.

There are four beaches in section 10, in which the upper beach was not measured; and there are also four in Section 31 where the upper beach is absent. In several places (nine sections, 8, 11, 12, 13, 22, 25, 28, 29 and 30) four beaches appear in the same north and south line. On the other hand there are places where the three lower beaches are merged into one terrace, or in which one or two of the beaches are so indistinct as to be scarcely noticeable (notably section 16).

From State Line to Sheridan the upper beach is quite distinct; but east of that place this beach begins to lose distinctness and it disappears just east of Silver Creek. The lower beaches extend eastward, one

* The elevation of the lake is 573 feet above sea level ; and of the base above the lake, as determined by a line of levels run at Portland, 147 feet. Therefore at this point the base of the lowest beach ridge is 720 feet above sea level.

disappearing just south of Hamburg, the others extending to the vicinity of Crittenden where they also die out. Without analyzing my measurements here, it may be said that the crest of the first or lowest beach ranges from 15–20 feet above the base of the terrace; the second beach ranges between 10–15 feet above this; the third from 10–15 feet higher; the fourth also 10–15 feet higher; and the fifth between 30–40 feet above this. As one drives along the main road to Buffalo, the face of the upper terrace is frequently visible, while the road itself is usually upon either the lowest, or, more commonly on the second level. From just west of Silver Creek to within three miles of Fredonia, it follows the lowest; but west of this is more commonly on the upper level, though at times descending to the lower. When visible, the third and fourth beaches (measured from the base) are indicated by slight gravel ridges. There is so much variability in these respects that to make the feature entirely clear it would be necessary to describe the region in much detail. From figure 67 one will obtain an idea of the irregularity of level, throughout which, however, there is considerable uniformity.

Below the upper terrace there is usually a bench or plain which slopes quite uniformly up to the base of the terrace and on the northern margin ends in a steep descent; but in a number of places this plain is diversified by slight benches of gravel, marking some of the intermediate beaches. From the crest of the upper terrace toward the south there is also a plain, which is usually very narrow, but is sometimes gradually merged into a broad till-covered plain (Fig. 54).

From the lake shore to the base of the first gravel ridge, near the main road, there are no beaches of a distinct character, although in one or two places there are indications of wave action. Over this plain, which is often one or two miles in width, the soil is mostly of clay, as has already been noted. However, north of the town of Portland there is an ancient sand dune region, in which the sand is no longer in movement, having probably had its features introduced immediately after the lake water left the land. The sand is fine in texture, quite like moulders' sand, and it is heaped into the typical conical peaks with enclosed craters, which characterize sand dune belts. Here the topography is very rough; but elsewhere the prevailing condition is that of a plain, sloping lakeward.

Variations in the gravel ridges.— Not only do the number of the gravel ridges vary, but there is a considerable difference in their characteristics from one point to another. Generally the slope of the terrace front is abrupt (Fig. 68), and the top quite level; but, as has already been noted, it may be in the form of a ridge or bar instead of a beach. There is also a variation in width, which in some cases is very marked. Notably opposite the mouths of streams the width of the gravel is greatly increased, the deposit there being in the nature of a delta. Here the steep front of the terrace disappears and is replaced by a gravel slope, crossed by numerous gullies and traversed by ridges of gravel; and this gravel extends for a considerable distance toward the

68.—Front face of lower beach terrace just west of Portland. East of section line No. 2, Fig. 67.

lake, gradually becoming a sand, and then, near the lake, a clay. The best delta in the area studied is that upon which the town of Fredonia is situated; but there are other similar deposits near the mouth of nearly every stream of considerable size.

Just as in the modern beach, there is also a variation in texture in any single gravel ridge. But quite unlike the modern beach, the material is always a gravel. In the entire region studied I have found no considerable part of either terrace made of sand. In small areas there is often much sand; but nearly everywhere there are layers of rounded pebbles in close association.

On the present shore there are many wave-cut cliffs of shale; but in the entire region occupied by the gravel ridges, from State

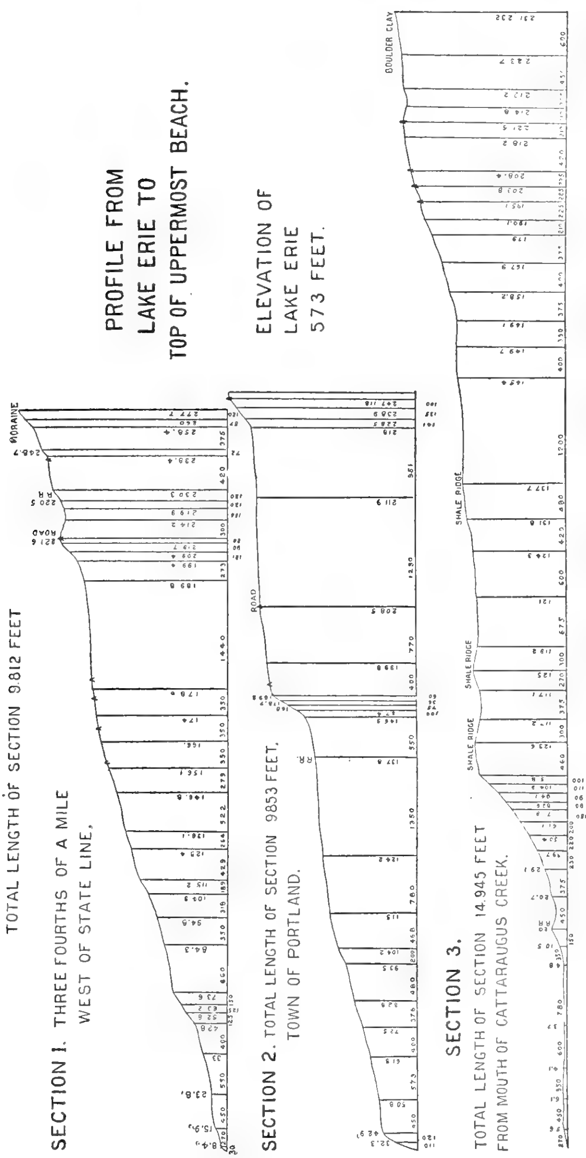
Line to Hamburg, I have not found a single rock cliff. In some cases wells have reached rock near the front edge of the gravel terrace, suggesting the possibility of such cliffs veneered over with gravel which has slipped down from above. This would be possible only with low rock cliffs; and we may therefore conclude that in this part of the shore line there are no wave-cut cliffs which are at all comparable in size to those of the present lake shore. Whether there are any wave-cut cliffs of gravel I am not so certain. There are places where the lowest terrace may be of this nature; but this could not be proved, for beach gravel covers the face and base.

In any event, it may be concluded that the prevailing feature of these ancient shore lines is the wave-built, instead of the wave-cut terrace. In this respect there is a marked difference in the features of the present lake shore, and a resemblance to such coasts as the sandy shores of New Jersey and the Carolinas. This is a feature which needs to be explained and will be discussed in later pages.

Irregularities of level of gravel ridges. — When formed by the lake waters, these ridges were essentially horizontal. That is to say, leaving out of question certain minor variations from place to place, such as we see on any beach at present, the average crest of each beach from one end of the region to the other, was a horizontal line, just as is the case on the present lake shore. Still, at present, these ridges are not horizontal. As determined by careful lines of levels, and by numerous elevations obtained by other means, they are tilted so that the eastern end is higher than the western. This necessarily records a change in the level of the land since the beaches were deposited. Along the line of beaches from Cleveland to Silver Creek the change amounts to over 90 feet. Therefore, since the distance is about 150 miles, the change in level amounts on the average to about three-fifths of a foot per mile. The levels made in the grape belt are not of decisive value for the distance between them is not great. Still in the profiles (Fig. 69) one sees that very nearly the same change is recorded.*

* From Section 1 to Section 3 the distance is 36 miles. The crest of the second beach is 185 feet above lake level at State Line, 195 feet at Portland and 221 feet just east of Silver Creek. In other words, the beach increases in elevation at the rate of about 1 foot a mile. There is little doubt that the uplift is greater in the east than in the west.

Interpretation. — For a long time we have known more or less concerning elevated lake beaches which seem to nearly surround the



69. Profiles show the height of the terraces above Lake Erie. Beach ridges shown by inverted V's. Height above Erie indicated in feet and tenths of feet. Distance between stations (marked at base of diagram) given in feet.

Great Lakes. Different geologists have studied different sections and so we have many scraps of knowledge; but these are not sufficiently complete to allow of any full statement of their meaning. Indeed, one of the needs of North American geology is to have some one person follow this subject to an end by tracing the beaches not only to the States, but also through Canada. There is much yet to be learned, though we are in a position to state the more general facts of the history.

It cannot be doubted that these ridges were formed in water. Their resemblance to the shore lines of the lake is so perfect, in almost every particular, that the conclusion is almost forced upon us that the water in which they were formed was lake water; and this conclusion scarcely admits of a reasonable doubt. No other explanation than beach origin can be admitted, for no other possible cause can be found, and if of beach origin, then the beaches were formed either in lake or ocean. In support of the latter hypothesis no single fact can be found which does not equally apply to the theory of origin in lake waters; and against the ocean theory there are facts which seem to entirely exclude it. If these were formed in the ocean they should be continuous; but the beaches end quite abruptly, the upper one just south of the town of Silver Creek, the next south of the town of Hamburg, and the others and lower ones near Crittenden. There is no known reason why ocean beaches should thus terminate, while, as we shall see, there is an excellent reason why lakes should cease to build beaches at these points.

Everything then points to lake origin, and all the observed facts may be accounted for by this theory, while no known fact opposes it. Therefore we may consider it more than a theory; it is a proved fact. There remains to be explained (1) why Lake Erie should have been so much higher than now; (2) why the beaches end so abruptly, and (3) why they are no longer horizontal. These facts can best be explained in the course of a brief statement of the geological history of the region.

RÉSUMÉ OF THE GEOLOGICAL HISTORY.

Before the last geological period, the northern part of New York had valleys and hills, plains and escarpments, very much as at present, though the details of topography were quite different. Among the more important differences was the absence of the great lakes, which occupy valleys that have been transformed to lakes largely by the action of the glacier. Over this country the glacier ice slowly advanced until practically the whole of New York was covered, and for a time this ice sheet ground its way over the rocks, carrying fragments southward and wearing down the valleys and the hills as it passed. All life was of course exterminated from the region and the land was transformed to a dreary icy plateau like that of central Greenland. Why it came or how long it remained are questions which the geologists of the future must answer, if we ever learn. That it came and worked, performing certain tasks we of the present century have determined.

At last, by some change in the condition of the climate, the ice sheet began to melt away and to uncover the buried land. It seems to have done this quite rapidly, though somewhat intermittently. That is, it would stand for awhile with its front along a certain line, then quite rapidly melt away and transfer its front to a distance of a dozen or so miles to the north, where it would again take a stand. This is indicated by the moraines, which are irregular hills of glacial deposits that were accumulated at the front of the ice. The glacier was carrying a load of rock materials, and when these reached the front they were dropped from the melting ice and therefore accumulated. If the ice stood long enough a moraine was built along the margin; if its stand was brief no morainic accumulations were made. One of these moraines passes through Jamestown, another past the northern end of Lakes Chautauqua, Bear and Cassadaga, and in a general east and west line back of the crest of the escarpment. Another line passes just east of Silver Creek, one near Hamburg, and another through Crittenden.

Beneath and in the ice was a load of rock fragments which were moving southward. They were being ground over one another and over the bed rock, so that they were being reduced to clay by the scouring action of the ice, which worked somewhat like a great sandpaper. When the glacier disappeared, this material was left where it happened to be, and so a soil was deposited which was composed of clay and pebbles derived from various sources to the north. This till or boulder clay was dragged into many of the old valleys, either wholly or partially filling them, so that the streams have often been obliged to cut new channels in the shale. Sometimes these rock gorges end abruptly where the stream crosses or flows in the old drift-filled valleys and then the shale wall is changed to one of till, in which the boulder clay is sometimes one or two hundred feet deep, as is the case in parts of the gulf near Westfield.

As the ice withdrew, with a south-facing front, it naturally interfered with all north-flowing streams. It formed a dam and caused many reversals of drainage. The St. Lawrence valley was occupied by the ice when the front had retreated north of the escarpment which partly encloses the grape belt. Therefore these north-flowing streams could not drain by the present outlet, but were pounded back and forced to take another place of outflow, and this was of course the lowest point in the enclosing hills, a point which was naturally higher than the present outlet. While the lake was held at its upper place of outflow it was building the upper beach, which has been called Sheridan beach. The outflow of this lake was then at Fort Wayne, Ind., into the Wabash, and the beach may be traced continuously to this outlet. However, in the east this beach comes to an end just south-east of Silver Creek; and near its eastern end there is a tract of moraine.*

To the southward of the town of Hamburg, on the road to New Boston, there is another morainic belt, and a second beach, which can be quite continuously traced from west of Silver Creek nearly to Hamburg, begins to disappear as this town is neared. The last place at which it could be distinctly determined is near Eden Church, southwest of Hamburg; but a third beach from the top passes directly through Hamburg, and has been found to disappear near Crittenden. In each case, as the moraine is approached, the beach becomes less distinct and finally can be traced no farther.

This shows that while these beaches were being built at their respective levels, the ice was standing at different places and was bringing materials which were being laid down at its front in the form of moraines. At first the ice front passed near Silver Creek and then the upper beach was made, while the outflow of the lake was past Fort Wayne. Then the edge of the ice withdrew for a distance until some lower outlet was formed, and again to a still lower, more northern point, when another and still lower outlet was

*This moraine has not been traced, so that nothing can be stated concerning its extension; but it appears in quite distinct development about two miles east of Silver Creek, extending nearly to the town.

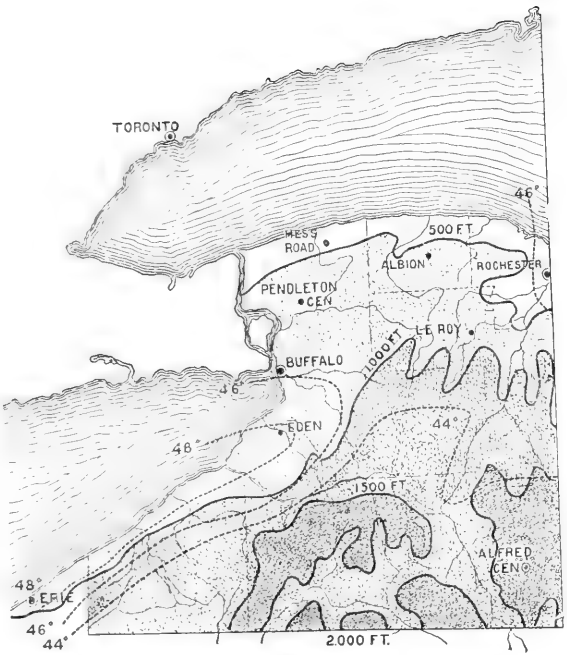
established. One of these last two outlets was past Chicago; but we know too little about the subject to state which one represents this stage, or to tell where the third outlet was.

At last the ice retreated far enough for the Erie basin to take its present outflow past Buffalo; but the valley of the St. Lawrence was still ice dammed, and Ontario was raised to the level of the overflow of the Mohawk valley. Thus temporarily the several Great Lakes had their level raised by ice dams; and during this time distinct shore lines were formed.

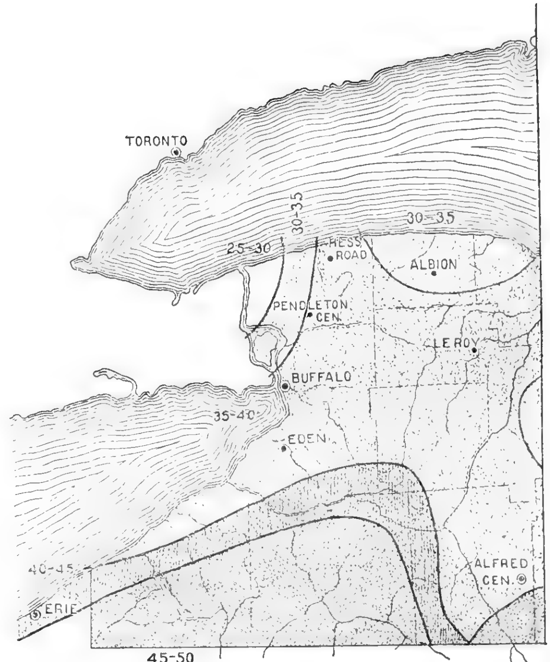
There are some differences from the present shore lines still to be accounted for. Why, for instance, are there no rock cliffs, but everywhere a series of beach gravels, a condition of so much importance to the grape grower? It would have been a serious disadvantage to have had the vineyards traversed by two or three rock escarpments like that of the present lake shore. In the first place, the question whether the waves and currents shall cut or build depends upon whether they are able to remove all of the material that they obtain by one cause or another. That is the reason why beaches are not built on some of the exposed head lands of the lake, while they are commonly present in the enclosed bays, and why the gravel accumulations opposite the mouths of the streams are more extensive than elsewhere.

There are various reasons why the waters of the ancient lake were less able to remove the materials furnished them than is the case with the present lake. As the ice was leaving the land, there was at first a time when no vegetation covered the clay soil, and when the whole surface was attacked by the rain just as a plowed field is to-day. Therefore the streams were given more materials to carry to the lake. In the second place, the rains must also have been heavier when the cold ice wall was melting and furnishing vapor to the air. Besides this, the streams entered the lake at the base of the hill, while now they flow for a mile or two over a plain. Another important reason is the fact that the shores were gradually rising. Therefore, for various reasons, the lake was given more materials than the waves and currents could dispose of, and hence they accumulated in the gravel ridges which we find.

A second important difference between the old shores and the present ones, is the fact that they are no longer horizontal. This is



71.—Average temperature for the year in degrees Fahrenheit. From report of the State Weather Bureau.



70.—Rainfall in inches, giving total for the year. From report of the State Weather Bureau.

due to a tilting of the land since the beaches were formed. There is abundant evidence that the land is now and has been in the past in a state of motion. Actual historic record proves this in several places, and geological study proves it in many more. Since the glacial period the movement in this part of the land has been that of tilting, with greater elevation in the northeast. Therefore these beaches do not show so great a change as they would if they extended in a more nearly north and south direction. The amount of tilting varies from place to place, but in the Chautauqua grape belt averages not far from one foot per mile.

A final question that we may ask, is how long ago this happened. To this no definite answer can be returned. A study of Niagara gorge, which has been formed since Lake Erie fell below the lowest gravel ridge, seems to show a period between 4,000 and 15,000 years. There is some reason for believing that the first is nearer to the truth than the last, and that it may even be a shorter period than this. Otherwise it would be difficult to account for the fact that these gravel ridges have resisted destruction so well. Nor can we state any more definitely how long it took the lake waters to build the beaches. They probably do not represent a great length of time, for materials were apparently rapidly supplied.

CLIMATIC CONDITIONS.

While the soil is a very important element in the value of the grape land, the climate is of even greater importance. Hence, while this study was not made primarily with the object of determining the climatic peculiarities of the belt, some features of a general nature were so pronounced that they attracted attention. The lake is a great modifier of climate. In the spring, by reason of the low temperature of its waters, it holds back the vegetation and this tends to keep it behind the ordinary frosts. Its very presence checks frost by moderating the temperature of the neighboring air. In the summer, the water tends to cool the air of the day and to keep the nocturnal temperature fairly high. During the fall, the water has been warmed by the summer sun, and the influence of this warm body of water lengthens the growing season and tends to keep off the early autumn frosts.

There are many other influences, but nothing of importance can be stated excepting on the basis of a careful study extending over several years. The lake breeze of the day must moderate the daytime temperature; and the land breeze of the night may in some cases so keep the air in motion as to prevent frosts. That there is a marked influence upon climate as a result of the peculiar conditions of topography and neighborhood of water, is evident at the very first. The sketch maps (Figs. 70 and 71) show that the mean annual rainfall is greater on the escarpment than on the lake plain, and that the mean annual temperature of the hills is lower than that near the lake. During the disastrous frost of May, 1895, the vineyards in the grape belt, taken as an average, suffered less near the lake, while those farthest from the water were most injured. Still there were cases of vineyards near the lake that suffered considerably, while some on the escarpment were scarcely touched.*

MOST FAVORABLE PLACES FOR THE LOCATION OF VINEYARDS.

As has been said, there are two factors in the problem which deals with the reason for the conditions in the grape belt, one climatic the other geologic. The climatic features are dependent upon the location near a large lake, and the presence of the bounding escarpment, which confines this influence to a narrow limit. In the eastern part, where the escarpment is relatively low and far from the lake, the influence of the lake is much less distinct.†

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*The behavior of this frost was altogether remarkable, leaving some districts or vineyards almost unharmed, and nearly ruining the crop in others, while even in the same vineyard these extremes were sometimes noticed. This was probably chiefly due to eddies of the air, for even though air is almost quiet, it is still in uneven motion. One may see this illustrated on a calm day by noticing the movements of a column of smoke. The air, being invisible does not reveal these movements, and we become aware of them only when the conditions are exceptional, as when a frost is dealing out destruction to vegetation. The condition of the ground also affects the frost, and the question whether it is dry or moist, freshly plowed or turf covered, whether there are trees or pastures or plowed ground in the neighborhood, all have their influence; but this subject has never been properly studied, and it is not possible to state just how these differences affect frost action.

†This was well illustrated during a frost in the middle of September, 1895. At Westfield there was no indication of a frost, east of Silver Creek signs of its effect began to appear, and at Hamburg, the frost had done considerable damage to the more delicate forms of vegetation.

This is the main reason why the grape belt does not extend far east of Silver Creek. Even in the distance of a few miles, from the lake to the crest of the hill, where grape raising practically ceases, there is much variation in climate, as has already been pointed out.

Considering the three belts of soil from the standpoint of their adaptability to grape raising, the hillside soils are of least value, the climate is least favorable, and the surface configuration of the land is least adapted to this industry. The lake clay soils are of poorer grade than the gravel soils, but the climate is in favor of this belt. The defect of soil texture, which is against most of the lake clay soils, can be readily overcome by a very little intelligent study of the conditions; and so there seems to be no reason why the vineyards should not extend from the base of the hill to the lake. Indeed, the favorable climatic conditions make this industry possible even on the hillsides for a considerable elevation above the plain.

INFLUENCE OF THE GRAVEL RIDGES.

One of the most striking influences of the gravel ridges is upon the roads. For the greater part of the distance, each of the two main gravel strips is occupied by a road which is remarkable for its levelness and for the gravelly material which makes the excellent roadbed. Travelling is therefore extremely easy, and it is very probable that this natural roadway was the site of an Indian trail. Even the position of the towns is often determined by the gravel ridges. Several of the villages and towns, east of Silver Creek, are (including Hamburg) on the gravel; and west of this town, in New York, every place of any size on the Erie shore (excepting Dunkirk, which is so situated because of its port) is located on the gravel ridges. This is true of Sheridan, Fredonia, Brockton, Portland, Westfield and Ripley.

Another important influence is upon the water supply. The gravel furnishes a reservoir through which the water percolates along the junction with the clay; and at the base of the gravel ridges, springs occur where the line of junction nears or reaches the surface. So important is this underground reservoir that not only are the houses on the ridges easily supplied with water, but houses below the beaches are in some cases furnished with water from this source.

Of course the most important influence is upon the fruit industry, and this has already been discussed in sufficient detail. Two or three suggestions may, however, be in place. There is no reason why the fruit district should not extend beyond Silver Creek. For several miles beyond that town the conditions are favorable, though they become less and less so as the distance increases. Another point is the feasibility of increasing the range of crops. The climate and soil are well adapted to all kinds of fruits which are common to this latitude; and one would suppose that even the tobacco plant might be profitably grown in a region so peculiarly favored. Almost all conditions have conspired to make this one of the most favored spots in the state.

R. S. TARR.

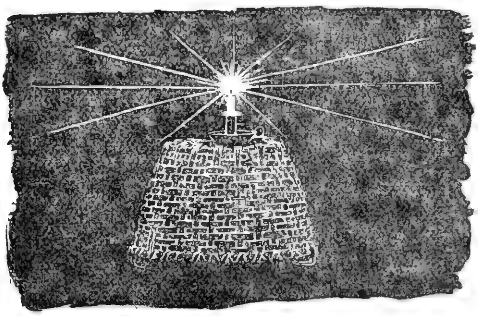
BULLETIN 110—January, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

Extension Work in Horticulture.



By L. H. Bailey.

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BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.

Extension Work in Horticulture.

The Honorable Commissioner of Agriculture, Albany:

SIR.— A report of progress of the work which has been undertaken by the Cornell University Agricultural Experiment Station in pursuance of the requirements of the Experiment Station Extension bill, is herewith submitted.

At the outset, it is proper to say that this bill originated entirely with the people. The beginnings of it occurred in 1893, when certain Chautauqua county persons asked the Station to undertake some experiment work in their vineyards. We replied that while we should like to take up the investigations, our funds were insufficient to meet the expense without endangering work in which we were already engaged; and this lack of funds would be keenly felt if other sections of the State should also, following the Chautauqua example, ask for help. We suggested to them, therefore, that if their local horticultural society could raise sufficient funds to meet the expense of fertilizers, traveling and incidentals, we should try to detail a man to look after the work. The matter dropped here; but the next winter we heard of a movement on foot amongst the Chautauqua people to obtain a small State appropriation to pay for experiment work in their vineyards. The movement was placed in the hands of S. F. Nixon, assemblyman from Chautauqua county, who early in 1894, obtained a grant of $16,000, one-half of which was to be expended by the Cornell Experiment Station in work in horticulture in the Fifth Judicial Department of the State, an area comprising sixteen counties of western New York. This is the only instance, so far as I know, of a movement for experiment station work which has been initiated and pushed to a final passage wholly by a farming community. The laws upon which our land-grant colleges and the agricultural experiment stations are founded were conceived and completed almost wholly by a comparatively small body of educators and experimenters, aided by persons in the various professions. But at last, the people themselves, whom these foundations are intended to benefit, have felt the touch of the new spirit and the quickened life, and have demanded additional funds to be expended more immediately under their own direction. It must be gratifying to every citizen of New York to know that this State is the pioneer in this experiment station extension movement.

The clause in the law of 1894 which appropriated money to the Cornell Experiment Station, is as follows: "The sum of eight thousand dollars, or so much thereof as may be necessary, is hereby appropriated out of any moneys in the treasury, not otherwise appropriated, to be paid to the agricultural experiment station at Cornell university for the purpose of horticultural experiments, investigations, instruction and information, in the fifth judicial department, pursuant to section eighty-seven of the agricultural law." The law also provided that "such experiment station may, with the consent and approval of the commissioner of agriculture, appoint horticultural experts to assist such experiment station in the fifth judicial department, in conducting investigations and experiments in horticulture; in discovering and remedying the diseases of plants, vines and fruit trees; in ascertaining the best means of fertilizing vineyard, fruit and garden plantations, and of making orchards, vineyards and gardens prolific; in disseminating horticultural knowledge by means of lectures or otherwise; and in preparing and printing, for free distribution, the results of such investigations and experiments, and such other information as may be deemed desirable and profitable in promoting the horticultural interests of the State. * * * * All of such work by such experiment station and by such experts shall be under the general supervision and direction of the commissioner of agriculture." This bill became a law by the Governor's signature, May 12, 1894. In the Legislature of 1895, Mr. Nixon introduced a bill to continue the work, but increasing the amount given to Cornell Experiment Station to $16,000. This second bill became a law on the 4th of April, 1895.

Upon taking up the work asked for by the bill, in the early summer of 1894, the Cornell Experiment Station placed the immediate prosecution of the enterprise in the hands of a chief "horticultural expert," in the language of the law, and the present writer was elected to that office, with the expectation that most or all of the work should be completed during the summer vacation. In entering upon his duties, this officer laid out three general lines of work, as specified in the law,—"conducting investigations and experiments," "disseminating horticultural knowledge by means of lectures or otherwise," and "preparing and printing" the results of the work. In other words, the work was to be divided between research, teaching, and publication. The enterprise was new and untried; the territory to be covered is large, the interests varied, and the demands numerous; and the promotors of the bill had large expectations of the results. The responsibility of inaugurating the enterprise was keenly felt, for a mistake in the beginning might be expected to exert a serious and baneful influence upon future legislation designed to improve the conditions of rural life. The officer in charge has been extremely fortunate, however, in having the hearty support of his colleagues, the free coöperation of the commissioner of agriculture, and, above all, the kindly and intelligent interest of scores of horticulturists in his territory. It was conceived that, in the beginning, a comparatively small and well digested enterprise prosecuted by a few carefully chosen men would be productive of better results than any bold attempt, with a large force, to carry the work into every part of the fifth judicial department. Inasmuch as the original grant was obtained through the exertions of the grape-growers of Chautauqua county, it was designed to undertake careful studies of the vineyard interests at the outset. The immediate charge of this work was placed in the hands of my assistant, E. G. Lodeman, who, to fit himself more specifically for certain problems which were presenting themselves, went to Europe (at his own expense) and visited the vineyards of the Rhine, of Italy and Southern France. The entomological inquiries were placed in the hands of M. V. Slingerland, assistant entomologist of the Experiment Station. Certain lines of investigation made at Ithaca were placed in immediate charge of Michael Barker, who was secured from the Botanic Gardens of Harvard University. We also associated with us for a time in certain field work, Mr. Harold G. Powell, a senior in agriculture in Cornell University, and one who has had much experience in pomological matters.

In 1895 the work was placed in the hands of the director of the station (who was absent the previous year) and the writer, but the immediate charge of it was given, as the year before, to the latter officer. Some additional help was secured because of the larger work which was demanded by the larger appropriation; but in general the enterprise went forward upon the same lines as in 1894.

1. RESEARCH OR EXPERIMENT.

There are two types of experiment work which the people seemed to require of us. One type is a demand for more exact knowledge upon many rural problems; and in order to obtain this knowledge it was thought best to prosecute the inquiries at the Station at Ithaca where there are facilities for scientific work and where the experiments can be given that personal attention which is absolutely essential to truthful results. The other type of experiment is a demand for actual tests of fertilizers, spraying, methods of tillage, and the like, which shall be made upon the farms in various parts of the territory, and where they may be seen by the farmers themselves. These experiments are rather more object lessons than scientific research for they are largely concerned with problems which are already well understood, and their results are not capable of such exact analysis as are those which are obtained from painstaking and long continued experiments at the home station. This latter category comes rather more directly under the head of teaching than of experiment.

Arrangements were at once made to take up certain lines of experiment at Ithaca which the fifth judicial department seems to need; and several lines of inquiry which had been already undertaken by the station and had been discontinued because of lack of funds, were again taken up, since they were capable of yielding quicker results, and with much less expenditure of money, than experiments which should be newly started. Some of the inquiries which were completed and published from this state fund in this way are: Apricot Growing in western New York; The Cultivation of Orchards; The Grafting of Grapes; The Native Dwarf Cherries; Black-Knot of Plums and Cherries, and Methods of Treatment; The Spraying of Orchards; Winter Muskmelons; Forcing-House Miscellanies (comprising accounts of heating glass houses, lettuce growing under glass, celery under glass, cress, forcing egg-plants, winter peas, bees in greenhouses, methods of controlling greenhouse pests, treatment of carnation rust); Revised Opinions of Japanese Plums. Several other lines of experiment, touching the horticultural interests of our territory and which had already been carried to a certain point by our own funds, are now going forward at the home station, and the results may be expected in bulletin form, as they mature.

Certain wholly new investigations have also been undertaken at the home station for the benefit of western New York, most of which, however, are not yet ready for publication. Certain of these studies have been prosecuted in part upon the farms in western New York, particularly those relating to insects. The bulletins of this type which have already been published are as follows: A Plum Scale in Western New York; The Climbing Cutworms in Western New York; The Cigar-Case-Bearer in Western New York; The Dwarf Lima Beans; Recent Chrysanthemums; The China Asters, with remarks upon Flower Beds; The Spraying of Trees, with remarks upon the Canker-Worm; Soil Depletion in Respect to the Care of Fruit Trees. A half dozen other investigations of this type are already completed and awaiting publication.

Another type of research work which we have undertaken under the auspices of this bill is the investigation of the conditions of certain horticultural interests in western New York. In the interest of these particular inquiries, we have traveled no less than 25,000 miles in western New York and have visited and examined many hundreds, if not thousands, of plantations. We have attempted in these investigations to learn the actual state of the industries and to suggest means for their improvement. They are really the beginning of a horticultural survey which can be much extended with great profit. Some of these inquiries have already matured, and the results are published in the following bulletins: Hints on the Planting of Orchards; The Peach Industry in Western New York; Peach Yellows; Some Grape Troubles in Western New York (with a particular account of the "rattling" of grapes in Chautauqua county); Varieties and Leaf-Blight of the Strawberry; The Quince in Western New York; The Recent Apple Failures of Western New York; Cherries; Blackberries; Evaporated Raspberries in

Western New York; General Observations Respecting the Care of Fruit Trees; Geological History of the Chautauqua Grape Belt. Various other investigations of this type have been completed, for the time, and the reports may be expected soon. Some of these are currant growing, gooseberries, the Japanese pears, and dwarf apples. Other inquiries which have been under way for the past two seasons still need one or two more years' work before they are ready for publication. Some of the most promising of these are the bean industry, dwarf peats. standard pears, plums, strawberries, raspberries. Many other horticultural industries, some of which are sadly in need of investigation, we have not yet been able to touch. Some of the most pressing of these untouched problems are connected with the growing of various vegetable crops for the canning trade, some of the forcing-house industries, and the nursery business.

The experiments which are now in progress in western New York are chiefly concerned with the fertilizing of fruit lands. There are, for example, experiments under way in fertilizing peach lands at Youngstown, Niagara county, and near Morton, Monroe county; in fertilizing apple orchards near Lockport, and in Wayne county; in fertilizing and managing nursery lands at Dansville; and several tests upon grape lands in Chautauqua county. Aside from these definite experiments, we are keeping close run of the experiments which are making by various farmers in our territory.

At the present time every intelligent farmer is an experimenter. We are in a transition period as respects the methods and objects of farming. But the greater part of all this experiment is lost unless it is carefully studied and collated by a specialist, and the summary results of it given to the world. Much of this cumulative body of experience of the best farmers is capable of yielding better results than similar work which might be undertaken at an experiment station. In fact, there are many lines of investigation touching rural economy, or farm management, which can be undertaken in no other way than by a study of actual farm conditions. An experiment station, which is necessarily constituted for scientific research, cannot touch many of the most vital problems of farming. The only ideal station is that which adds the farm of every one of its constituents to its own resources.

2. TEACHING.

One of the distinctive marks of the last decade, in educational lines, is the extension of university teaching to the people. Probably no movement of the latter part of the century is destined to exert a greater influence upon the form of our institutions and civilization than this attempt to leaven the entire lump of citizenship with the inspiration of higher motives. The agricultural experiment station movement is itself a part of this general desire to carry the new life to every person, whether college-bred or not. But this movement, beneficent as it is, still lacks some of the means of making itself felt. It must have a closer vital connection with the people. The people must be made to hear, even though they desire to be deaf. Good citizenship has a right to demand that every person live up to the full stature of his opportunities. The establishment of the experiment stations upon a federal grant ensures stability and removes them beyond the reach of petty and local jealousies and criticisms; but the addition of a state grant to the federal grant brings them home to the people and awakens a personal interest in them in the rural communities which can be obtained in no other way. If this state aid asks for extension teaching, still more will be gained towards spreading the influence of the stations. The results of the experiment station work must be carried to every farmer's door; and if he shuts the door, they must be thrown in at the window.

The greatest good to be derived from this experiment station extension bill was conceived, therefore, to be teaching. So meetings have been held and attended — nearly fifty of them in the last two years — in which something has been said of the new teaching of science and the new demands of the times. This teaching has not only been cordially met by the rural communities, but it has been eagerly sought by them. The rural population is ready for instruction, and by far the greater part of those who receive it endeavor to profit by it. The derision of "book-farming," of which we have heard so much, has all gone, because the teaching is now worth being received. In the light of our present knowledge it is easy to see that most of the agricultural teaching of a generation ago was wholly unsuited to the conditions which it desired to reach, and it had, for the most part, a most meager foundation both of fact and of inspiration. If "book-farming" came to be a by-word, it was because the epithet was deserved. It is true that the agricultural industries are the most difficult to all industries to reach with the educational motive, but this is because of the inherent difficulties of the subjects and not because farmers are unwilling to learn.

The truth of these remarks is attested by the large attendance at many of the meetings which have been held under the auspices of the bill, by the eager questioning of the attendants, and by the enormous correspondence which pours into the Experiment Station offices. An instance of the awakening interest may be cited. The writer met about twenty fruit growers at Hotel Richmond, Batavia, in early spring. The work of the year in Genesee county was talked over. On the 14th day of May an orchard meeting was held at South Bethany at which 300 to 400 people were present; on the 18th of July, at a potato-spraying contest at Stafford, 500 or 600 people were in attendance; on the 22d of August, at Nelson Bogue's, near Batavia, the turnout was estimated at 1,500 to 2,000. Yet, large as this number is, the writer has addressed a western New York farmers' audience of twice this size during the past season! Surely the time is ripe for sowing the seed of the new agriculture!

Some of the teaching under the auspices of this bill has been done by sending a man to attend horticultural and grange meetings, when such a favor was requested. Last spring we inaugurated a series of "spring rallies," which were brisk, active meetings of one or two days' duration. For the most part, two or three persons took part in these meetings — the officer in charge of the work, Mr. Lodeman and Mr. Slingerland. It was the purpose of these meetings to send the farmer into the season's work with such an initial velocity that he could not stop himself before the harvest time. There were plain direct talks about the philosophy of tillage, fertilizing the land, conservation of moisture, and the like, instructions about spraying, and sometimes talks about insects. An orchard was generally sprayed for the purpose of explaining the operation. These meetings were uniformly well attended. Some of the best of them were held at Morton, Clyde, Dundee and Youngstown.

The most exact work which has been done in extension teaching, however, is in the holding of certain meetings which we have called "horticultural schools." These are designed to carry the most useful features of university extension methods to the aid of the rural communities. The instruction is designed to be somewhat fundamental in character, of such a nature that it interests the listener in the subject because of its intellectual relish, and thereby sets him to thinking. If the farmer thinks correctly, he then does correctly. In the treatment of insects, for example, the listener is asked to consider the anatomy, physiology, natural history, and habits of insects, and little is said about the means of destroying noxious kinds. He can read current literature the more intelligently and with keener interest, for having even a little of the fundamental knowledge, and he is very likely to carry the new habit of thought directly into the field with him. Another feature of these schools which has met with much favor is the training of the powers of observation by placing specimens of twigs, fruits, flowers, or other objects, in the hands of the participants, asking that they explain what they see. It is true that most persons do not see what they look at, and still fewer persons draw correct conclusions from what they see. It has been our habit to enroll those persons who signify a desire to attend all the sessions of a school, in order that they may feel themselves to be intimately identified with the movement; and the roll is generally called at the opening of each session. An average attendance of forty or fifty persons is sufficient for a successful school. The first school was held at Fredonia in the holidays of 1894. The enrollment was about 60; but the effect of the teaching was felt throughout a wide constituency. It is generally only the most influential persons who attend such schools, and they spread the instruction far and wide; and the teaching is perhaps all the better for being second-hand and for being worked over into more assimilable shape. The high-water mark in these schools was reached at Jamestown, where over 100 persons were enrolled, and where the interest was at high tension from start till finish. Other persons than those enrolled attend the exercises, and the evening lectures draw a larger audience.

The instructors in these schools were mostly teachers in Cornell University, and each one provided printed synopses of his lectures for the use of his hearers. At the first Fredonia school, the last day, by request of the promoters in that vicinity, was given over to local speakers upon "practical" questions: but we were requested, in arranging the program for the second school, to omit all local talent in order that the exercises might "not fall below the university standard." Five of these schools have been held. The character of them can best be understood by a display of the announcements and the synopses:

CONSPECTUS

OF A

SCHOOL OF HORTICULTURE

TO BE HELD AT

FREDONIA, CHAUTAUQUA CO., N. Y.,

Dec. 26–29, 1894,

Under the auspices of

THE EXPERIMENT STATION EXTENSION, OR NIXON, BILL.

Conducted by L. H. Bailey, and a committee of Chautauqua Horticulturists, consisting of John W. Spencer, S. S. Crissey, I. A. Wilcox, G. Shoenfeld, U. E. Dodge, E. K. Hough, F. W. Howard, L. Roesch, F. M. Southwick, G. Jaarda, J. C. Thies, S. G. Bartlett.

Day sessions will be held in Temple of Honor Hall and evening sessions in the large Normal Hall.

WEDNESDAY, DECEMBER 26.

2.00 P. M.

1. Announcements.
2. Observation upon *Twigs.*
3. *How Plants Live and Grow.* With demonstrations with the microscope. W. W. ROWLEE, Assistant Professor of Botany in Cornell University.

7.00 P. M.

4. *An Analysis of Landscapes,* with stereopticon views. L. H. BAILEY.

THURSDAY, DECEMBER 27.

9.30 A. M.

5. Observations upon *Fruit Buds*.

6. *The Nursery*. Discussion upon the propagation of plants, illustrated with the operations and nursery-grown specimens. NELSON C. SMITH, Geneva.

2.00 P. M.

7. Observation upon *Seeds*.

8. *A Brief of the Evolution of Plants*. Origination of varieties. Philosophy of domestication and pruning. L. H. BAILEY.

7.00 P. M.

9. *The Geological History of Soils*. With stereopticon views. R. S. TARR, Assistant Professor of Dynamic Geology and Physical Geography in Cornell University.

FRIDAY, DECEMBER 28.

9.30 A. M.

10. Observation upon *Leaves*.

11. *Chemistry of the Grape and of Soil*. G. C. CALDWELL, Professor of Chemistry in Cornell University.

2.00 P. M.

12. Observation upon *Flowers*.

13. *Theory of Tillage and Productivity of Land*. I. P. ROBERTS, Director of the College of Agriculture, Cornell University.

7.00 P. M.

14. *What are Fungi?* Considered with special reference to the grape, with stereopticon views. E. G. LODEMAN, Instructor in Horticulture in Cornell University.

SATURDAY, DECEMBER 29.

9.30 A. M.

15. Observation upon *Fruits*.

16. *Commercial Grape Culture in Chautauqua County*. Considered in various aspects, by S. S. CRISSEY, Fredonia; G. SCHŒNFELD, Westfield; J. A. TENNANT, Ripley.

2.00 P. M.

17. Observation upon *The Apple.*
18. Continuation of No. 16.
19. General Question Box.
20. Final exercises.

This is probably the first school of its kind devoted to horticulture in this country. With no precedents to guide us, we shall probably make mistakes, but we shall all do our best. It will always be a pleasant memory that we have participated in a pioneer movement.

The day exercises will aim at specific instruction in particular subjects. The evening exercises will be popular illustrated lectures.

Everyone is invited to attend the various exercises. Persons have the privilege of enrolling themselves as students for the purpose of receiving personal aid upon the points under discussion. At the close of each day's exercise the students will be questioned upon the subject. This questioning is not pursued for the purpose of ascertaining the student's knowledge of the exercise, but to elucidate the subject under discussion. During this exercise, also, the student has the privilege of freely asking questions upon the topic under consideration. It is expected that the instructors will not be interrupted with questions during the course of the exercise.

Each day session will be opened with a *lesson upon observation.* Students will be given specimens, as indicated in the program, and ten minutes will be allowed for examination of them. The students will then be questioned as to what they have seen.

Students should provide themselves with note-book and pencil.

Roll will be called immediately upon the hour set for meeting.

Printed synopses of all the day lectures will be distributed to students.

While most of the instruction deals with fundamental principles, special applications will be made to the grape whenever possible.

Roster of the first Fredonia School:

J. R. Adams, Fredonia.
L. S. Allnott, Fredonia.
S. G. Bartlett, Fredonia.
F. A. Beckwith, Fredonia.
A. J. Blodgett, Fredonia.
Newell Cheney, Poland Center.
Mrs. Newel Cheney, Poland Center.
H. B. Clothier, Forestville.
T. W. Clute, Fredonia.

E. L. Colvin, Fredonia.
L. E. Cowden, Fredonia.
S. S. Crissey, Fredonia.
U. E. Dodge, Fredonia.
M. M. Fenner, Fredonia.
G. H. Green, Fredonia.
E. A. Guest, Fredonia.
G. C. Guthrie, Fredonia.
Sam'l Hall, Fredonia.
Geo. T. Hammond, Fredonia.
F. D. Hardenburg, Brocton.
W. W. Harris, Brocton.
Mrs. W. W. Harris, Brocton.
E. K. Hough, Fredonia.
F. W. Howard, Fredonia.
G. Jaarda, Fredonia.
F. M. Kidder, Fredonia.
C. I. Mason, Fredonia.
A. Matthews, Portland.
J. A. Miller, Fredonia.
R. E. Morris, Brocton.
A. F. Newton, Fredonia.
O. Ostrander, Fredonia.
J. N. Palmer, Fredonia.
Dr. William Parks, Fredonia.
J. J. Parker Fredonia.
J. M. Pettit, Fredonia.
Dr. A. P. Phillips, Fredonia.
J. A. Powers, Portland.
Dr. N. Y. Richmond, Fredonia.
L. Roesch, Fredonia.
P. L. Saxon, Fredonia.
G. Schœnfeld, Westfield.
J. W. Skinner, Laona.
C. L. Snow, Forestville.
F. M. Southwick, Dunkirk.
J. W. Spencer, Westfield.
A. M. Tennant, Westfield.
J. A. Tennant, Ripley.
Carl Thatcher, Fredonia.
D. M. Thayer, Fredonia.
Mrs. D. M. Thayer, Fredonia.
John C. Theis, Fredonia.
M. J. Tooke, Sheridan.
E. I. Wilcox, Fredonia.
I. A. Wilcox, Portland.
C. W. Wilson, Fredonia.
E. P. Wilson, Fredonia.
H. M. Wolbur, Fredonia.
——58 Students.

CONSPECTUS

OF A

SCHOOL OF HORTICULTURE

TO BE HELD AT

YOUNGSTOWN, NIAGARA CO., N. Y.,

Friday and Saturday, August 16 and 17, 1895,

Under the auspices of the

EXPERIMENT STATION EXTENSION, OR NIXON, BILL.

FRIDAY, AUGUST 16.

Morning Session—10 A. M.

1. Music.
2. Observations on Buds and Branches.
3. The Soil—Its resources and management.

I. P. ROBERTS,
Professor of Agriculture,
Cornell University.

Afternoon Session—2 P. M.

4. Music.
5. Observations on the Peach.
6. The Orchard.—Management of land and trees.

L. H. BAILEY,
Professor of Horticulture,
Cornell University.

Evening Session—7.30.

7. Music.
8. The Science of the Weather.—Illustrated by charts and diagrams.

R. S. TARR,
Professor of Geology and Physiography,
Cornell University.

SATURDAY, AUGUST 17.

Morning Session—10 A. M.

9. Music.
10. Observations on the Apple.
11. Insects Injurious to the Peach.—Illustrated by actual specimens.

M. V. SLINGERLAND,
Entomologist in the Experiment Station,
Cornell University.

Afternoon Session—2 P. M.

12. Music.
13. Observations on the Apple-scab.
14. The Spraying of Orchards.—Lessons of the year.

E. G. LODEMAN,
Assistant Horticulturist,
Cornell University.

The meeting will be held in the Opera House.

The school is free to everybody, and every one interested in horticulture is invited to attend.

Come with note-book and pencil.

Be on hand promptly at the opening hour. The observations will be the most interesting exercises.

Bring in specimens of fruits, flowers, insects, and whatever else interests you.

Come with the determination to learn all you can about the subjects under discussion.

A SCHOOL OF HORTICULTURE

WILL BE HELD IN

UNION GRANGE HALL, JAMESTOWN, N. Y.,

October 31, November 1 and 2, 1895,

Under the auspices of

THE NIXON, OR EXPERIMENT STATION EXTENSION, BILL.

Conducted by L. H. Bailey, Cornell University.

FREE TO ALL.

THURSDAY, OCTOBER 31.

2.00 P. M. Lesson in observation upon *Bark*.
Outline of the Nutrition of Plants. With Examples. E. J. Durand, Instructor in Botany, Cornell University.

7.30 P. M. Address on Evolution in the Vegetable Kingdom. L. H. Bailey, Professor of Horticulture, Cornell University.

FRIDAY, NOVEMBER 1.

10.00 A. M. Observation on *Insects*.
Insects and Insect Enemies. M. V. Slingerland, Entomologist in the Experiment Station, Cornell University.

2.00 P. M. Observation on *Flowers.*

Plows and Plowing. I. P. Roberts, Director of the College of Agriculture, Cornell University.

7.30 P. M. The Geological History of Jamestown Region. With lantern slides. R. S. Tarr, Professor of Geology, Cornell University.

SATURDAY, NOVEMBER 2.

10.00 A. M. Observation on the *Apple.*

How can the Farmer tell what Fertilizer his Soil Needs? G. C. Caldwell, Professor of Chemistry, Cornell University.

2.00 P. M. Observation on *Fungi.*

Fungi and Fungous Enemies. E. G. Lodeman, Instructor in Horticulture, Cornell University.

Let every one who is interested in agriculture and horticulture come and take part in the sessions.

Bring in all specimens of plants, insects, fruit, and the like, concerning which you wish to ask questions.

Come with note-book and pencil.

Read up on the subject under discussion before you come. You will then get more out of the instruction.

Be on hand *promptly* at the opening hour.

This is an opportunity for every one to renew his school days.

Roster of the Jamestown school:

R. Adams, Jamestown.
James S. Aiken, Fluvanna.
Mrs. Geo. L. Ames, Gerry.
Miss Nettie J. Armstrong, Jamestown.
B. B. Bissell, Gerry.
Mrs. R. M. Bissell, Gerry.
Flint Blanchard, Jamestown.
Mrs. Flint Blanchard, Jamestown.
L. G. Brainard, Ellington.
Mrs. Mary Brainard, Ellington.
Miss Ellen A. Breed, Jamestown.
Simeon Brownell, Dewittville.
Mrs. Simeon Brownell, Dewittville.
W. O. Brownell, Bemus Point.
Miss Callahane, Jamestown.
A. M. Cheney, Jamestown.
Mrs. A. M. Cheney, Jamestown.
Asa Cheney, Bemus Point.
J. Cheney, Jamestown.
Mrs. J. Cheney, Jamestown.
Mrs. Kate Cheney, Bemus Point.
Lewis Cheney, Kaintone.
Miss Martha Cheney, Bemus Point.

Newel Cheney, Poland Center.
Mrs. Newel Cheney, Poland Center.
Amos Colburn, Ellington.
Miss Minnie Comstock, Jamestown.
F. A. Crandall, Falconer.
J. W. Creal, Kaintone.
Thos. W. Crouch, Jamestown.
Chas. M. Dow, Jamestown.
Edwin Durand, Frewsburg.
F. E. Durand, Frewsburg.
Mrs. F. E. Durand, Frewsburg.
Mrs. O. J. Felton, Falconer.
C. C. Fisher, Stow.
F. A. Fitch, Randolph.
L. D. Gale, Steadman.
Miss Louise E. Geer, Jamestown.
C. D. Gifford, Jamestown.
Mrs. C. D. Gifford, Jamestown.
T. H. Gifford, Jamestown.
W. C. Gifford, Jamestown.
Mrs. W. C. Gifford, Jamestown.
G. A. Gladden, Napoli.
Mrs. G. A. Gladden, Napoli.
A. L. Gleason, Open Meadow.
Miss Gertrude Green, Ashville.
Miss Ophelia Griffith, Jamestown.
Mrs. Daniel Griswold, Jamestown.
Miss Bertha Gron, Jamestown.
E. A. Harvey, Fluvanna.
Mrs. E. A. Harvey, Fluvanna.
W. Haskin, Ellery.
A. Hazeltine, Jamestown.
R. T. Hazelton, Frewsburg.
Jared Hewes, Stedman.
W. L. Hyde, Jamestown.
Miss Lottie C. Landon, Jamestown.
Miss E. E. Leet, Jamestown.
G. F. Leet, Point Chautauqua.
C. H. Love, Frewsburg.
N. D. Lewis, Jamestown.
R. R. Lord, St. Clairville.
S. A. Markham, Ellington.
Mrs. S. A. Markham, Ellington.
O. D. Mitchell, Busti.
Mrs. Anna A. Mills, Jamestown.
S. M. Morley, Stow.
Mrs. L. Morgan, Jamestown.
Mrs. Florence Morton, Stow.
W. Palmeter, Jamestown.
V. E. Peckham, Jamestown.
Mrs. V. E. Peckham, Jamestown.
Miss Clara Phillips, Bemus Pt.
George A. Phillips, Bemus Pt.
Mrs. J. Phillips, Bemus Point.
Mrs. Mary Phillips, Jamestown.
Mrs. L. J. Pierce, Jamestown.
H. Pike, Jamestown.
Mrs. Josephine Price, Jamestown.
David Rider, Levant.
Mrs. David Rider, Levant.
Mrs. L. S. Robertson, Ashville.
D. F. Rose, Jamestown.
Mrs. D. F. Rose, Jamestown.
E. H. Sample, Kennedy.
S. J. Sample, Jamestown.
Mrs. S. J. Sample, Jamestown.
W. H. Seymour, Kennedy.
Miss Laura F. Sheldon, Jamestown.
D. Sherman, Jamestown.

Mrs. D. Sherman, Jamestown.
S. O. Smith, Busti.
Mrs. L. T. Stafford, Kennedy.
W. J. Staples, Frewsburg.
Mrs. S. M. Stewart, Ashville.
E. A. Stone, Poland.
Mrs. E. A. Stone, Poland.
C. N. Taylor, Frewsburg.
Lawrence Taylor, Frewsburg.
F. D. Thompson, Boomertown.
Mrs. N. R. Thompson, Jamestown.
S. W. Thompson, Jamestown.
Samuel Townsend, Frewsburg.
A. A. VanVleck, Jamestown.
Mrs. A. A. Van Vleck, Jamestown.
M. B. Wample, Jamestown.
Mrs. M. B. Wample, Jamestown.
T. H. Welch, Stow.
R. I. Weld, Sugar Grove, Pa.
Mrs. Mary Wheeler, Ellington.
J. W. Whitford, Stow.

———113 students.

A SCHOOL OF HORTICULTURE

WILL BE HELD IN

THE COURT HOUSE, LOCKPORT, N. Y.,

November 29 and 30, 1895,

Under the auspices of

The Nixon, or Experiment Station Extension, Bill.

Conducted by L. H. Bailey, Cornell University.

Free to All.

Friday, November 29.

2.00 p. m. Lesson in observation upon *Seeds*.
The Soil. What there is in it and how to get it out. I. P. Roberts, Director of the College of Agriculture, Cornell University.

7.30 p. m. Address, Landscape Art. With lantern views. L. H. Bailey, Professor of Horticulture, Cornell University.

SATURDAY, NOVEMBER 30.

9.30 A. M. Observation on *Insects*.
Insects and Insect Enemies, with specimens and models. M. V. Slingerland, Entomologist in the Experiment Station, Cornell University.

11.00 A. M. Black-Knot and Potato Blight, with drawings and specimens. E. G. Lodeman, Instructor in Horticulture, Cornell University.

2.00 P. M. A session with the growers. "How Science-teaching Looks to a Farmer." John W. Spencer, Westfield, Chautauqua Co.
"Is Orchard Culture Going to Supplant Mixed Husbandry?" Albert Wood, Carlton, Orleans Co.

Roster of the Lockport school:

Asa Baldwin, Lockport.
E. M. Baldwin, Lockport.
R. A. Barnes, Lockport.
George Bebe, Lockport.
Lewis T. Bell, Lockport.
F. M. Bradley, Lake Road.
Jones W. Brown, Lockport.
H. H. Bugbee, Gasport.
Wm. Bugbee, Gasport.
Ellis S. Button, Gasport.
Fernando Capen, Warren's Cor's.
Merritt H. Carl, Lockport.
W. B. Cook, Lockport.
E. E. Crosby, Lockport.
I. N. Crosby, Pekin.
J. R. Crosby, Lockport.
F. Day, Hartland.
L. S. DeWolf, Gasport.
Ralph G. DeWolf, Gasport.
Wm. L. Dysinger, Lockport.
Chas. Oedes, Lockport.
Wm. H. Outwater, Olcott.
M. B. Reed, Medina.
Wm. Scism, Lockport.
W. E. Shafer, Lockport.
E. Ashley Smith, Lockport.
John W. Spencer, Westfield.
H. L. Taylor, Cambria.
E. Terry, Ridge Road.
Geo. P. Tower, Youngstown.
H. B. Tower, Ransomville.
Mrs. H. B. Tower, Ransomville.
A. G. Eighme, Lockport.
A. Flanders, Lockport.
E. G. Gafla, North Ridge.
Almon Gallup, Lockport.
C. Gaylord, Lockport.
T. Greiner, La Salle.
W. T. Hall, Lockport.
T. J. Hastings, Ridge Road.
Geo. W. Haynes, Lockport.
Geo. W. Hildreth, Lockport.
T. Hough, Lockport.
Orman S. Jaques, Wright's Cor's.
W. T. Mann, Barker.
G. E. Manning, Ransomville.

Daniel McCarthy, Lockport.
Chas. H. McClem, Newfane.
A. Merlen, Gasport.
F. R. Montgomery, Johnson's Creek.
Franklin Moore, Ransomville.
Luke Tower, Youngstown.
B. Treadwell, Lockport.
A. D. Tripp, North Ridgeway.
A. E. Van Dusen, Hickory Cor's.
John Walker, Ridge Road.
A. J. Wheeler, Cheboygan, Mich.
E. V. Wheeler, Lockport.
P. B. Wilson, Kuckville.
Albert Wood, Carlton.
Miss E. A. Wood, Pekin.
J. S. Woodward, Lockport.

——— 62 students.

PROGRAM

OF A

SCHOOL OF HORTICULTURE,

TO BE HELD AT

FREDONIA, CHAUTAUQUA CO., N. Y.,

December 30 and 31, 1895, and January 1 and 2, 1896.
Under the auspices of

THE EXPERIMENT STATION EXTENSION, OR NIXON, BILL.

Conducted by L. H. Bailey.

Day Sessions will be held in Temple of Honor Hall and Evening Sessions in the Large Normal Hall.

MONDAY, DECEMBER 30.

2.00 P. M.

1. *Observation upon Pollen.*
2. Pollen: What it is and what it does. By E. J. Durand, Instructor of Botany in Cornell University. Illustrated by charts, and pollen under the microscope.

7.30 P. M.

3. Address: How Plants Obtain their Nitrogen. By George F. Atkinson, Professor of Cryptogamic Botany, Cornell University. With lantern views.

TUESDAY, DECEMBER 31.

10.00 A. M.

4. *Observation of Insects.*
5. Insects: How they live, grow and multiply. By M. V. Slingerland, Assistant Entomologist to the Experiment Station, Cornell University. Illustrated by specimens, charts and *papier maché* models.

2.00 P. M.

6. *Observation upon Soils.*
7. Stock, Silos and Soiling for Fruit Growers. By I. P. Roberts, Director of the College of Agriculture, Cornell University.

7.30 P. M.

8. Address: The American Boy. By Professor Roberts.

NEW YEAR'S DAY.

10.00 A. M.

9. *Observation upon "Knot-holes.*
10. The Philosophy and Practice of Pruning. By L. H. Bailey.

2.00 P. M.

11. *Observation upon Black Currants of the Shops.*
12. Flower-Growing for Amateurs. By Ernest Walker, Florist, New Albany, Indiana.

7.30 P. M.

13. Address: History of Grape-Growing in America. By L. H. Bailey. With lantern views.

THURSDAY, JANUARY 2.

10.00 A. M.

14. *Observation upon Figs.*
15. Vegetable Gardens under Glass. By W. M. Munson, Professor of Horticulture, Agricultural College of Maine. With photographs and samples of the vegetables.

2.00 P. M.

16. *Observation upon Potatoes.*
17. Potato Blight and Potato Rot. By E. G. Lodeman, Instructor in Horticulture, Cornell University. With specimens.

Everyone is invited to attend the various exercises. Persons have the privilege of enrolling themselves as students for the purpose of identifying themselves intimately with the extension movement. At the close of each day's exercise the students will be questioned upon the subject. This questioning is not pursued for the purpose of ascertaining the student's knowledge of the exercise, but to elucidate the subject under discussion. During the exercise, also, the student has the privilege of freely asking questions upon the topic under consideration. It is expected that the instructors will not be interrupted with questions during the course of the exercise. Discussion and questions asked for the purpose of eliciting information are always welcome; but there is no time for mere argument and contention.

The day exercises will aim at specific instruction in particular subjects. The evening exercises will be popular illustrated lectures.

Each day session will be opened with a *lesson upon observation*. Students will be given specimens, as indicated in the program, and ten minutes will be allowed for the examination of them. The students will then be questioned as to what they have seen.

Students should provide themselves with note-book and pencil.

Roll will be called immediately upon the hour set for meeting.

Printed synopses of all the day lectures will be distributed to students.

Read up on the subject under discussion before you come to the meeting. You will then get more out of the instruction.

Roster of the second Fredonia School:

(On account of the bad weather and the interruption of New Year's Day, the attendance was smaller than it otherwise would have been.)

S. M. Aldrich, Fredonia.
F. Baldwin, Fredonia.
W. T. Benjamin, Fredonia.
P. G. Cate, Fredonia.
H. B. Clothier, Forestville.
R. C. Clothier, Silver Creek.
T. W. Clute, Fredonia.
E. L. Colvin, Fredonia.
L. E. Cowden, Fredonia.
S. S. Crissey, Fredonia.
Eliza Denton, Fredonia.
U. E. Dodge, Fredonia.
Elbert A. Guest, Fredonia.
George Hammond, Fredonia.
F. W. Howard, Fredonia.
G. Jaarda, Fredonia.
F. M. Kidder, Fredonia.
J. N. Larder, Fredonia.

John C. Theis, Fredonia.
A. W. Tuttle, Fredonia.
W. H. Van Scoter, Fredonia.
H. F. Weaver, Fredonia.
E. I. Wilcox, Fredonia.
R. D. Luther, Fredonia.
S. T. Lyne, Fredonia.
C. J. Mason, Fredonia.
Thos. Moran, Fredonia.
E. J. Oakes, Fredonia.
Dr. Wm. Parks, Fredonia.
Dr. A. P. Phillips, Fredonia.
Dr. N. Y. Richmond, Fredonia.
Lewis Roesch, Fredonia.
Mrs. M. H. Sackett, Fredonia.
David Scott, Fredonia.
Henry Smith, Fredonia.
Miss L. Smith, Fredonia.
Mrs. L. E. Southwick, Fredonia.
John W. Spencer, Westfield.
J. Spink, Fredonia.
N. A. Tambling, Fredonia.
Karl A. Thatcher, Fredonia.
I. A. Wilcox, Portland.
Mrs. I. A. Wilcox, Portland.
E. P. Wilson, Fredonia.
L. I. Young, Fredonia.

——— 45 students.

The synopses which have been used in the various meetings are as follows:

Theory of Tillage and Productivity of Land.

(Given at first Fredonia School.)

(BY PROFESSOR ROBERTS.)

I. Plant food in the soil.

II. Its availibility. Objects of cultivation:

1. To promote capillarity.
2. To bring fertility to the plant.
3. To set free the mineral plant food.
4. To hasten nitrification.
5. To aerate the soil, or to prevent too free aeration.
6. To present new surfaces to the rootlets.
7. To induce new root growth.
8. To conserve moisture.
9. To facilitate the drying of the land.
10. To form a mulch.

III. Treatment of the land.

How to cultivate.
When to cultivate.
Crimson clover.
Phosphoric acid.
Potash.

(*Students should consult Bulletin* 72, *Cornell Experiment Station.*)

Plows and Plowing.

(Given at Jamestown School.)

(BY I. P. ROBERTS.)

I. Why we plow.

Effects of plowing on moisture.
Drying and warming the land.
Conservation of moisture.
Preventing hard-pan.
Increased storage capacity.
Aeration of soil.
To promote nitrification.
To bury trash.
To prepare a home for plants.

II. When to Plow.

III. How to Plow.

IV. When and How not to Plow.

Stock, Silos and Soiling for Fruit-Growers.

(Given at the Second Fredonia School.)

(BY I. P. ROBERTS.)

1. Importance of the animal in the rotation. Manure. The animal enforces a change of cropping. The ideal farm is self-sustaining, making its own fertility. Gives continuous employment. Value of the stock itself.
2. How stock may be kept without permament pastures or meadows.

a. *Silage.* The value of silage, and how to use it. Crops which may be made into silage. Silage rations for various animals,—horses, milch cows, steers, sheep, hogs, poultry.

How to make the silo.
How to fill it.

b. *Soiling.* What it is, and what are its uses. Crops which may be grown for soiling purposes. Yield of soilage crops. Soiling in catch crops. Soiling in the rotation. Can soiling be substituted for pasturage?

3. What stock, and how many, can the fruit-grower with 80 acres of land keep with profit? How to procure good stock.

Chemistry of the Soil and of the Grape.

(Given at first Fredonia School.)

(BY PROFESSOR CALDWELL.)

I. *The Chemistry of the Soil.*

(a) An arable soil in its best condition for producing crops contains seven essential parts:

(1) Clay; (2) sand; (3) assimilable plant food; (4) moisture; (5) humus; (6) air; (7) micro-organisms.

(b) Clay furnishes the substantial medium required by the plant as a root-hold, and is also a storehouse for preserving some of its food from waste.

(c) Sand is required to make more friable and porous the too stiff and compact soil that clay alone would yield.

(d) The most important part of the food of the plant that is in the soil consists of nitrogen, lime, potash and phosphoric acid forming a very small part of the soil, and mostly insoluble, or unassimilable.

(e) Plant growth involves unceasing chemical change in the soil as well as in the plant itself, and this cannot go on without water, nor can plant food be taken up without it.

(f) Humus or decaying vegetable and animal matter is, as it decays, a source of carbonic acid, which is an important solvent of plant food; humus also itself contains plant food, and it is a loosener of the soil.

(g) Air is necessary in the soil for its oxygen, without which the humus is not formed, and cannot decay.

(h) An important feature of this decay is the progress of nitrification; this does not go on without the assistance of micro-organisms.

II. *The Chemistry of the grape.*

(a) The vine as a whole is composed of three parts: Water, combustible matter, and incombustible matter.

(b) The largest part of the *dry* plant is combustible, consists of what is called carbonaceous matter, and is derived from the air.

(c) The rest of the combustible matter, forming but a small portion of it, contains nitrogen, and is called nitrogenous matter or proteids. Though small in proportion it is very important. The nitrogen for it must come from the soil.

(d) The production of starch, sugar, cell-walls and acids is the chief work accomplished in the growth of the vine and its fruit.

(e) The quality of the grape for eating depends largely on the relative proportions of sugar and acid. The ripening of the grape consists largely in changes in these proportions.

(f) Can the grape grower modify these proportions by fertilizing or other treatment of the plant?

(g) The fermenting of the grape juice depends on its sugar, the access of air and the assistance of micro-organisms.

How can the Farmer tell what Fertilizer his Soil Needs?

(Given at the Jamestown School.)

(BY G. C. CALDWELL.)

Nitrogen, phosphoric acid and potash, are the only plant foods that need any special looking after in the management of manuring the soil.

The old-time management compared with more modern methods. In some respects the modern method better, in others not. Neither method is based on any real knowledge of what any particular crop growing on any particular soil requires. No royal road to this knowledge. The chemical analysis of the soil will not give a reliable answer to the question in hand, because the soil of a field cannot be fairly sampled. A recent striking illustration of the difficulty.

The question must be put to the soil and crops together in each case, by plot experiment. The difficulties of this method discussed.

How the experiment should be conducted,—

a : Selection and preparation of the field.

b : Size, shape and arrangement of the plots.

c : Fertilizers to be used, and when and how to be applied.

d : Cultivation of the crop.

e : Harvesting and measurement of the crop.

f : Corrections that may be made to even up the results.

The use of the results as an answer to the question put. Concerning the repetition of the experiment.

The Nutrition of Plants.

(Given at first Fredonia School.)

(BY PROFESSOR ROWLEE.)

1. Nutrition is one of the two primary functions of all organisms. The other is reproduction.

2. There are different methods of taking food. Amoeba absorbs its food through the walls of its body. In higher forms a body cavity is developed and food is absorbed only through its walls. The culmination of complexity of structure is reached in the highly complicated respiratory and digestive systems of the higher animals.

3. To understand the relation of nutrition in plants to nutrition in animals, one mnst go back to primitive methods of taking food.

4. There are two great operations going on in living beings, one a building up process (constructive), the other a tearing down process (destructive).

5. These processes may be distinguished,—(a) by the materials used as food, (b) by the structure of the operating organs, (c) by the product of the operation.

6. There is no hard and fast line separating animals from plants. The method of nutrition prevailing among plants is one of the most decisive characters.

7. The chlorophyll function (photosynthesis).

8. The content of the vegetable cell is primarily protoplasm. This in active cells is differentiated in two parts,—the nucleus, at the center, and the ectoplasm, the lining membrane of the wall. The former displays greater activity in the process of reproduction, the latter, in those of nutrition.

9. The green pigment, chlorophyll, which gives the green color to plants is fixed in minute differentiated masses of protoplasm, called chlorophyll bodies.

10. Various forms of chlorophyll bodies,—Oscillaria,—Spirogyra,—Chara,—Coleus.

11. Movement of the chlorophyll bodies occurs in all plants so far as known. It is rapid in Elodea and Vallisneria.

12. Conditions best suited to activity of these workers. Importance of sunlight. Pruning to avoid waste of energy.

13. Plants without chlorophyll.

14. General conclusions.

Outline of the Nutrition of Plants.

(Given at the Jamestown School.)

(BY E. J. DURAND.)

All plants built up of cells.—Various forms of cells in different parts of the plant.

The green coloring matter of plants (*chlorophyll*).

The essential elements of plant food.—These are obtained (1) from the soil, (2) from the air. The food of the seedling; of the mature plant.

What is sap?—Water and certain soluble portions of plant food are absorbed from the soil by the root hairs. Forced up through the sap-wood or inner bark by root pressure. Most of the water is evaporated from the leaves through the stomates. The constant current of water from the roots to the leaves. Some of the water combined with the carbon dioxide of the air forms starch.

Assimilation.—This process can take place only in the presence of chlorophyll and light. Parasitic plants containing no chlorophyll cannot assimilate carbon dioxide.

The diffusion of the assimilated food.—It may be used at once; or stored up, usually (1) roots, *e. g.*, carrot, maple, or (2) underground stems, *e. g.* potato—This stored up material forms the food of many plants in spring before the leaves start.

Respiration, the breaking down of tissue and its burning up with oxygen.

Pollen: What it is, and what it does.

(Given at the second Fredonia School.)

(BY E. J. DURAND.)

1. *Stamens and Pistils.*—The essential part of a flower; their sexual function.

   Pollen.—The floury mass of minute grains borne in the anther, the sack at the upper end of the stamen.

2. *The pollen-grain* consists of a rounded bit of fluid, *protoplasm*, surrounded by two membranes. Some of the forms of pollen. After being scattered by the anther, the pollen is carried by the wind or by insects, or other agencies, to the pistils of other plants of the same species.

3. *Office of the pollen.*—The pollen-grain germinates by sending out a minute tube, which grows down through the pistil, finally entering the ovary to fertilize the egg-cell. How fecundation takes place.
4. *Close-fertilization and cross-fertilization.*—The most healthy and hardy seed is borne by the plant whose flowers have been fertilized by pollen from a different plant.
5. *Some devices of plants to insure cross-fertilization.*—The stamens and pistils may be borne in different plants, e. g. Maples and Willows. The stamens may mature before the pistils on the same plant, e. g. Sunflower. Pollen may be impotent when applied to the pistil of the same plant, or of the same variety, as in some varieties of fruits. The case of Pears. Special devices to insure fertilization.
6. *The agency of insects in cross-fertilization.*—Why flowers are colored. The office of nectar (honey). Importance of bees in orchards. Some flowers fertilized by special insects, e. g. clover. Some adaptations of insects for carrying pollen.

Fungi and Fungous Diseases.

(Given at the Jamestown School.)

(BY E. G. LODEMAN.)

I. Bacteria.

What are they?

Some of their characters.

Effects upon plants. Pear-blight.

Methods of treatment.

Methods of study in the laboratory. Illustrated by specimens and photographs.

II. Fungi Proper.

The principal groups, respecting their habit of life:

1. Feeding upon living tissues (Parasites).
2. Feeding upon injured or dying tissue.
3. Feeding upon dead tissue (Saphrophytes).

Consideration of the first group (Parasites).

How they injure plants; 1, by growing on the surface of host plant; 2, by growing within the tissue of the host.

External indications of their presence. Illustrated by examples and photographs.

How they pass the winter.

Conditions favoring their development.

Methods of dissemination.

Methods of study in the laboratory. Illustrated by specimens.

Methods of treatment.

Potato Diseases.

(Given at the second Fredonia School.)

(BY E. G. LODEMAN.)

A. *Scab.*— Due to a fungus (*Oospora scabies*).

Nature of the fungus. It lives both in the tubers and in the soil.

Treatment of the tubers; of the soil.

Where it is worst; effects of much stable manure; often worse where lime or ashes have been used, probably because these materials modify the acidity of the soil.

Clean seed, clean land, and rotation are the soverign remedies.

There is a scab which is produced by insects.

B. *Early Blight.*— Caused by a fungus (*Macrosporium Solani*).

Features of the disease; appears early in the season, in small spots, and causes the leaf to shrivel as if suffering from drought; spreads slowly; tubers do not rot. It is the commonest disease of potato tops.

The flea-beetle and its relation to the disease.

The remedy. Spraying with Bordeaux mixture.

C. *Late Blight, Rot.*—Caused by a fungus (*Phytophthora infestans*).

This is the potato disease of history, and it once caused a famine in Ireland. Known for a half century.

Usually appears after the middle of July; attacks large areas of the leaf; spreads rapidly, causing vines to wilt down; tubers contract a dry rot.

How it is treated. Bordeaux mixture is a specific. Treatment of tubers in the cellar; lime and plaster; heating.

Insects and Insect Enemies.

(Given at the Jamestown, Lockport and the second Fredonia Schools.)

(BY M. V. SLINGERLAND.)

Illustrated by large models, diagrams and specimens.

1. What is an insect?
   Its near relatives.
   How many insects are known?
2. How they are built.
   External features. Appendages of the body and their use.
   Internal structure; muscular system; how they breathe; the blood and its circulation; their nerves.
3. How they feed.
   Striking differences in their mouth parts.
4. Their sensations.
   The five senses, their form, location and range in insects.
5. The story of their life.
   How it begins. How they grow. Their wonderful transformations.
6. Injurious insects.
   Questions answered, and discussion of any specimens which may be brought in.

The Nursery; from the Seed to the Setting of the Plantation.

(Given at the first Fredonia School.)

(BY NELSON C. SMITH, Geneva.)

I. *Cuttings.*— The kinds: hardwood, softwood, long, short, single eye, root cuttings. How and when they are taken. How stored and how planted. What plants are thus propagated. Commercial propagation of currants, gooseberries, grapes.

II. *Layers.*— How made and when. Tip layering. The raspberry. Mound or stool layering. The English gooseberry and quince.

III. *Budding.*— The method: the stock, cutting the cions, setting the buds, tying, subsequent treatment. What plants are budded, and when.

IV. *Grafting.*— The kinds : root, top, crown, cleft, whip. Uses of each. What plants are grafted in the nursery, how and when.

V. *General nursery practice.*— Lands and fertilizers. Method of cultivating. Raising the stocks. Importing them. Transplanting. Trimming. Stripping. Double-working.

VI. *Advice to purchasers.*—Age of trees and vines to plant. Points of first-class stock. Trimming the young trees at planting time. How to plant. When to buy and plant.

The whole to be illustrated with operations and specimens. (*Students are referred to Bulletins 69 and 77, Cornell Experiment Station.*)

DEFINITIONS.—*Cutting.*—A severed portion of a plant which is inserted in soil or water with the intention that it shall grow. A softwood or herbaceous cutting is often called a *slip*. *Layer.*—A shoot or portion of a plant bent down and covered with earth with the intention that it shall take root at the covered part, when it can be severed from the parent plant. *Mound layer* (or *stool layer*) is an erect stool or sucker with earth heaped about its base. *Stock.*—A plant or part of a plant upon which a bud or cion is set. *Grafting.*—The operation of inserting a cion in a stock. *Cion.*—A portion of a plant bearing one or more buds and a piece of stem, which is inserted into a plant (the *stock*) with the intention that it shall grow. *Budding.*—The operation of inserting a bud, with little or no wood attached, in a plant with the intention that it shall grow.

Vegetable Gardens Under Glass.

(Given at the second Fredonia School.)

(BY W. M. MUNSON.)

Illustrated with photographs and specimens of vegetables.

1. Why vegetables are grown under glass.
   The nature and extent of the markets.
   Who may engage in the business.
   The profits.
2. What vegetables are grown under glass.
   1. Lettuce. 2. Tomato. 3. Cucumbers (two types). 4. Asparagus. 5. Rhubarb. 6. Beans. 7. Radish. 8. Cauliflower. 9. Melon. 10. Pepper. 11. Eggplant. 12. Miscellaneous, as cress, sweet herbs, etc.

3. The houses which are used for winter gardens.
    a. The lean-to house.
    b. The uneven span house.
    c. The even span house.
    d. How they are made:—foundations, sides, roof, ventilators, glass.
    e. How much they cost.
    f. How they are heated:—flues, steam, water.
    g. How hot they must be:—the cool house, for lettuce and the like; the warm house, for tomatoes and cucumbers.
    h. How the sunlight is managed:—clear roofs and shaded ones.
4. Internal arrangement, and general management.
    a. The beds or benches.
    b. The soil.
    c. The water.
    d. Insects and fungi.
    e. It all depends upon the gardener.

Flower-Growing for Amateurs; or Flowers in and Around the House.

(Given at the second Fredonia School.)

(By Ernest Walker.)

1. *Propagation of plants.*
    (a) By seeds. Seed pans or trays. Soil. The conditions of germination. Soaking seeds. Filing. Depth to sow. Watering. Temperature. Light. "Drawing up." "Damping off."
    (b) By buds, Tubers, Corms, Scales, Root-cuttings, Budding, Grafting, Layers, Leaf-cuttings, Head-wood cuttings, Soft-wood cuttings, Saucer-system, Close-system.
2. *Transplanting plants.*
    Potting soil.
    Seedlings and cuttings, potting, boxing, larger plants shifting, "Setting out."

3. *Window Gardening.*

Difficulties, selection of plants, unsuitable plants, preparation for winter bloom. Bulbs, potting, rooting. Watering plants. How roots absorb. Loss of water. How roots behave in pots. How often to water. Leaf surface. Size of pots. Pots in saucers. Sickly plants. Dust. Insects.

4. *The Yard.*

Lawn. Concealing the unsightly objects. Foliage. Flowers. The location and planting of borders, and beds. Vases. Simplicity. Shrubs. Trees. "Come 'round and see my back yard."

Commercial Grape Culture in Chautauqua County.

(Given at the first Fredonia School.)

(BY S. S. CRISSEY and G. SCHOENFELD.)

I. MODERN METHODS AN OUTGROWTH.—Examples; pruning and training; distances for planting; varieties; culture; extent of acreage.

II. MODIFYING INFLUENCES.—Varieties modified by climate; cultivation modified by extent; the educational work of societies and institutes.

III. PHYSICAL TOPOGRAPHY.—Natural superiority for grapes due to climate; theory of thermal strata; formation of northern Chautauqua; land and lake air currents; freedom from fungi; exemption from frosts; high summer temperature; dryness of the atmosphere.

IV. PRUNING.—Philosophy of; physiological effects; grape vine periodically extends its structure; evil effects of improper methods.

V. GREEN MANURING.—Plant food available by nitrification; green crops in fall and spring prevent loss of nitrogen; improvement of mechanical condition; comparative value of fertilizers furnished by green manuring; effect on cultivation.

Picking and Packing Grapes.

(Given at the first Fredonia School.)

(BY J. A. TENNANT.)

I. Time to pick; what to pick in; how to pick; how to remove to packing house; how to store; when to pack; how to pack; what to pack in; how long to keep when packed, before marketing.

Above applying to common methods of marketing.

II. Suggestions as to shipping-crates.

III. New scheme concerning handling and marketing grapes.

A Brief of the Evolution of Plants.

(Given at the first Fredonia School.)

(BY L. H. BAILEY.)

1. Conception of an organic evolution. Its relation to philosophy, history, sociology, theology.

2. Reasons for the belief in evolution. Struggle for existence. Constant changes in the external world.

3. Explanations of evolution. Lamarckism. Darwinism. Neo-Darwinism or Weismannism. Neo-Larmarckism.

4. Divergence of the animal and plant. Individuality. Theory of the phytomer. Bud variation. Philosophy of pruning.

5. Variants of domestication. Climate. Food supply: (a) character of soil; (b) thin planting; (c) fertilizing; (d) tillage. Change of seed. Greenhouses.

6. Philosophy of sex. It exists for the purpose of making variable off-spring. Crossing and hybridizing amongst plants.

7. Selection as a means of contemporaneous evolution.

DEFINITIONS: — *Family*, *Order* in botany.— A group of genera and species; as *Cupuliferæ*, the oak family, *Rosaceæ*, the rose family.

Genus (plural, *genera*). — A group or kind comprising a greater or less number of closely related species; as *Acer*, the maples, *Fragaria*, the strawberries.

Species (plural, *species*).— An indefinite term applied to all individuals of a certain kind which come or are supposed to come from a common parentage. A perennial succession of normal or natural similar individuals perpetuated by means of seedage. "All the descendants from the same stock."— *Gray*.

Variety.— A form or series of forms of a species marked by characters of less permanence or less importance than are the species themselves.

Sport.— A variety or variation which appears suddenly and unaccountably, either from seeds or buds.

Cross.— The offspring of any two flowers which have been cross-fertilized.

Hybrid.— A cross between two distinct species.

Environment.— The conditions or circumstances in which an organism lives, comprising climate, soil, and all other external conditions.

The Philosophy and Practice of Pruning.

(Given at the second Fredonia School.)

(By L. H. Bailey.)

A. Why we prune.

1. To produce larger and better fruit.
2. To keep the plant within manageable shape and limits.
3. To change the habit of the plant from more or less wood-bearing or fruit-bearing.
4. To remove superfluous or injured parts.
5. To facilitate spraying.
6. To facilitate tillage and to improve the convenience of the plantation.

B. The philosophy of pruning.

1. The argument from philosophy.
   The struggle of existence amongst the branches.
2. The argument from physiology.
3. The argument from experience.
4. How nature prunes.

C. How and when to prune.

1. The position of the fruit bud.
2. How wounds heal.
   (a) The cork cells and their mission.
   (b) The cambium and its office. The tension in stems. The callus.
   (c) The form of the wound in relation to the healing process. The wound parallel to the parent branch. The wound at right angles to the severed branch. The shoulder. The direction of the wound. The length of the stub. The edges of the wound.

(d) The time to prune, with reference to the healing of the wound. More depends upon the position of the wound than upon the season in which it was made.

(e) Dressing for wounds. The vegetable parasites of the wounds; bacteria; toadstool-fungi; punk-fungi.

3. Pruning for wood and pruning for fruit.
4. Practical considerations. Allow the tree to take its habitual form. How much and how often it is advisable to prune. Heading-in. Tools.

The Management of Orchard Lands.

(Given at the Youngstown School; also followed essentially in meetings at Dickensonville, Morton, Dansville, Clyde, Ridgeway, Williamson, Palmyra, Lyndonville, Dundee and other places.)

(BY L. H. BAILEY.)

1. *The soil.*

Its origin. Its mechanical texture and physical characters.

Soil moisture. Its source. Its importance. Movements. How conserved. Its relation to vegetable covers. Mulches.

Tillage. Spring or fall plowing. The harrow. Management of clay lands.

2. *Fertility.*

Amount of fertility in the soil. Where it comes from. Tillage and fertility. Nitrification. Humus. Loams.

Manuring. Feed the plant rather than the soil. Nitrogen. Potash. Phosphorus. Stable manures. Green manures. Commercial fertilizers.

How to tell what the land needs. Ask the plant not the chemist.

At the first Fredonia School, an eight-page folder was printed for the use of the participants, containing extracts and abstracts of various local essays touching the grape-growing of the Chautauqua region. There are so many suggestive things in this circular, not only to Chautauqua County, but also to many other parts of Western New York, that an abstract of it is published here:

Grapes: Development of Methods on Large Areas.

(Used at the first Fredonia School.)

INTRODUCTION.

Modern methods in vineyard management are an outgrowth or development. Consider, for example, pruning and training. We began with stakes; first one stake per vine, then two stakes per vine, then post and wire trellis. At first, we used posts six and one-half feet and two wires, then posts seven and eight feet and three wires, and now in some instances posts nine and ten feet and four wires. Distances of planting are also an outgrowth. In an early day, Concord vineyards were in some few cases put as close as six feet each way. Thousands of acres have been set eight feet by eight, and later, thousands of acres more at the now commonly received distance of nine feet between the rows. The development in varieties is equally marked. For many years Catawba and Isabella were the standard, then came Clinton and Delaware, then the Concord and its well-known seedlings; then Brighton, Niagara, Diamond, Moyer, Vergennes, Jessica, and last some new early varieties not yet fully disseminated but from which much is expected. Methods of cultivation are a development. The first cultivation was in small garden plantings, tilled by hand or the one-horse cultivator, and in a slow, laborious and comparatively costly way.

The grape industry has outgrown the garden period and has become a farm crop. Methods of cultivation which are well enough for a quarter acre, are too slow and costly for twenty-five acres. Vineyardists have been obliged to widen the rows, put on two horses, use the gang plows and the latest improved spring tooth harrows and horse hoes. We have introduced this line of thought, which is perfectly familiar to all of you, and which might be extended to many other branches of the industry, for the purpose of calling your attention, in this introductory part of to-day's study, to some of the causes which have led to this rapid development.

As we study the philosophy of vineyard management, we are impressed with the interdependence and modifying influence of one branch or condition upon others. To illustrate: the species and varieties we can profitably grow are determined by our climate. Attempts to raise varieties grown exclusively in Europe and California have been repeated failures. Again, the production of grapes on the large scale now demanded, has greatly modified the entire farm economy. As we have said, the grape has become a farm crop. We can with as equal propriety speak of grape farms, as we say dairy farms, stock farms or grain farms, and the question of boarding houses, packing houses, machinery, spraying apparatus, etc., becomes a legitimate and necessary branch of our farm study.

The development of modern methods in grape growing has not been carried forward independently of the principles involved. The men who first began extensive vineyard planting were men who had already had, many of them, years of experience as fruit growers and market gardeners. They had long been members of farmers' clubs and leaders in its discussions. August 28, 1886, the present Horticultural Society was formed. This society had in its beginning a membership from the best fruit growers. Its first president, Ira Porter, deceased, had for years been the president of the Pomfret Farmers' Club. Lincoln Fay, originator of the Fay currant, was a charter member. This society has persistently, and as we think, wisely, adhered to its original mission as stated in section second of article first: "Its object shall be the advancement of its members in a knowledge of the theory and practice of horticulture." From the first, we have kept to the original mission, "talking it out winters and working it out summers," along the line of advancement in the knowledge of the theory and practice of horticulture. We have held our meetings, discussing old questions, and, as fast as they came to the front, new questions, eagerly sending for and reading all the bulletins of the experiment stations, reports of the department at Washington, transactions of horticultural societies, and standard fruit journals. In twenty years there has been rapid progress, here and in other fruit growing centers, not only in making history but in the development of the fundamental principles of scientific management. It has become a broad field. The Chautauqua grape belt has to-day 26,000 acres of vines, and the crop for 1894 was 3,600 cars, or 10,800,000 nine pound baskets. The special papers brought before the class for to-day's study will be one on "Topographical formation and its relation to climate" (reprint), "Conditions of climate favoring the grape" (reprint), "Why I sow rye in the vineyard" (reprint), "Pruning," by Mr.

Shoenfeld, "Picking and packing," by Mr. Tennant, and perhaps other papers. The reprints are made to save time and for the convenience of the class.

Grape Growing in Northern Chautauqua, by E. S. Bartholomew.

The question is often asked, why it is that the valley lying along the south shore of Lake Erie, within the border of Chautauqua county, is so much better for grape growing than very many other sections of the United States, for it is a fact that the grape vine is found growing wild in almost every part of the country, and the cultivated varieties have been tried almost everywhere.

I will answer, first, negatively, that it is not in the soil, neither is it in the fact that the valleys of Chautauqua and Bear Lakes lie elevated and south of Lake Erie at a distance of seven to eight miles. Then why do not the vines perfect fruit as well in so many other locations, and as regularly as in this valley? It is the climate. This peculiar condition of the climate is the result of two prominent causes: the great body of water of Erie on the north, furnishing by its evaporation just the necessary hygrometrical condition of the atmosphere; and the lake helps to form a thermal belt, or stratum of warm air, furnishing a more even temperature during the night, thus aiding the early and perfect maturing of the grape, and affording immunity from frost. * * * Thus we have a more uniform temperature during the 24 hours, so essential to the earlier maturing of the fruit.

This thermal stratum is intensified by the peculiar topographical formation of the earth forming the south boundary of the valley. The northern end of the Alleghany mountains forms a ridge of high land of a somewhat circular form, with its highest point nearest the lako, about two miles west of the gorge of Chautauqua creek, at an altitude of about seven hundred feet above the lake and about two miles from it. From this point westward it rounds off from the lake, and begins to break down in its altitude until it is lost in the great plain of the Ohio and Mississippi rivers. Eastward it retains its nearness to the lake to a point about three miles east of the village of Westfield, when it begins to recede from the lake, and to slowly reduce its altitude, until south of Fredonia it is from five to six miles from the lake. In the towns of Sheridan and Hanover its trend is changed to the east. As soon as its altitude decreases, and the distance from the lake increases, the thermal stratum thins by widening, and much of its benefits are lost to the grape grower.

It will be found by careful observation that the soil of almost the entire United States is as favorable for the growth of the grap vine as is that of this location, and the success in grape culture would be just as remunerative if the same climatic conditions existed as with us. Hence it is found that the peculiar influence we have is worth to us four times as much per acre as the soil is.

Conditions of Climate Favoring the Grape.

[From the Transactions of the Chautauqua Horticultural Society.]

1. Exemptions from frost, especially in the fall months. The vine begins to leaf about May 10th; it is in blossom June 15th to 20th; in 90 days from the blossoming the early, and in 120 days the late grapes are ripe. In southern Chautauqua and in parts of Cattaraugus and Allegany counties the vine will grow, but three years ago in all that section there was a killing frost on September 24. In this lake shore section, with one exception, there has not been a damaging frost before October 20 in twenty-five years. In 1887 the first killing frost did not occur until after the first week in November.

2. The high mean temperature of the summer months. In the fierce heat and drought of mid-summer, the surface vegetation of the garden suffers, the pastures are scorched as by fire, but the vine, sending its roots three, four and even five feet into the earth, is able to withstand the severe trial if the tillage is good.

3. Conditions securing dryness of the atmosphere and perfect circulation of air. Lake Erie is by far the most shallow of the five great lakes, having an average depth of only 70 feet. In consequence, it is sooner affected by the summer heat. In mid-summer we have in the latter part of the day a constant lake breeze blowing inland, and during part of the night a contrary current. Going back from the water, the land gradually rises in a succession of terraces. June, July and August are the dangerous months for disease, and just then is experienced this climatic condition of dryness and high temperature. Bulletin No. 7, Botanical Division, Department of Agriculture, 1888, says: "At Sandusky, on the shore of

Lake Erie, the loss from black rot in 1887 was only four or five per cent.; the same was true at Fredonia, Dunkirk and Brocton in New York, and in all these places the absence of dews or fogs during this year was marked. In Tennessee grape culture is really not remunerative except above the limit of fogs. Thus, upon the plateaus of the Cumberland there is a Swiss colony that cultivates the vine successfully, and upon the lower hills of Ashland county, Ives seedling gives moderately good crops, although black rot is more frequent; but upon the Cumberland river, where thick morning fogs are frequent, and where the temperature is high, vine products amount to almost nothing."

In the discussion which followed, Mr. Christy, of Hanover, said that wherever the lake breeze strikes the inland without any interruption, we do not have serious frosts.

Mr. Rathbun, living near Smith Mills, said he planted a Delaware vineyard in 1863. Delawares have never failed to produce a crop and have never been injured by the frosts.

Mr. Ryckman, of Brocton, said that Hanover is a larger town than Portland, and there is much good land for grapes in it. I should select the land back upon the foot hills, even if it should be, as much of it is, very poor for ordinary farming. On the foot-hills, the Salem does well. In planting, he preferred grass or sod ground to stubble. You need not hesitate to set a vineyard because the land is not broken up.

* * * * * * *

From the address of Hon. R. P. Marvin (late Justice of the Supreme Court in the Eighth District) at the meeting of the society in Brocton:

"In 1850, before grape growing had started much, while holding court in Cattaraugus county, I met young Mr. Deveraux, the son of a prominent Utica man, who to my great surprise told me that we had in northern Chautauqua a great grape country. He had traveled through all the great grape regions of Europe. I asked him why he considered the lake region good for grapes. He said that Lake Erie is a shoal lake and consequently in winter freezes over. The ice in the spring keeps vegetation back and gives a later spring than farther west around deeper lakes. Thus we avoid late spring frosts. During the summer, owing to its shallowness, the lake becomes warmer than either of the other lakes, and this warm water gives to this section a long, beautiful autumn with plenty of time to ripen the grape to perfection."

Why I Sow Rye in the Vineyard, by G. Shoenfeld.

In the months of July and August, when the vineyards should be clean and exposed to the sunlight the organic matter in the soil is broken up, and nitrification proceeds rapidly. Nitrogen being the most valuable and costly as well as the most subtle element of plant food, is then easily lost by leaching during our fall and spring rains. To prevent this, in the latter part of August I sow rye in the rows of the grapes. The rye will thoroughly penetrate the ground with its roots during the wet season, take up and store available plant food for the next season, when the vine will appropriate it, besides putting the land in just that mechanical condition, when plowed under, to make the plants thrive. The plants want organic matter to work upon and plenty of heat, a moderate amount of moisture, just the right conditions in which the vineyard should be during June and July to the middle of August.

By adding potash and phosphoric acid, if not in abundance already in the soil, the plant food for the vines is complete. I consider such a course better and safer than using stable manure instead. The valuable parts of manure are precisely the same as in fertilizers, viz., nitrogen, potash and phosphoric acid. Its value over commercial fertilizers lies in its fiber, or vegetable substance; but this fibre can be added by the rye.

Following this paper Mr. Shoenfeld read a statement of a vineyard of one and one-half acres, which, before being improved by plowing under rye for a term of years, produced a crop hardly worth harvesting. In 1892 the yield was 1,184 nine pound baskets.

3. PUBLICATION.

The character of the publication which has been made under the auspices of the Experiment Station Extension Bill has already been discussed. After conferring with the Commissioner of Agriculture, it was decided to number these extension bulletins consecutively in our regular series, thus avoiding the complications which would arise from two independent series. Fifteen bulletins (comprised between Nos. 69 and 87, inclusive) were published from the first grant (1894). Fifteen bulletins have also been published from the second fund, but several more, for which the work is already completed, are awaiting publication from the unexpended funds now in our hands. The complete list of these bulletins to date is as follows:

No.	Title.	Author.	Engravings.	Pages.
69.	Hints on the Planting of Orchards	L. H. Bailey	7	16
70.	The Native Dwarf Cherries	L. H. Bailey	6	12
71.	Apricot Growing in western New York	L. H. Bailey	12	28
72.	The Cultivation of Orchards	L. H. Bailey	4	22
74.	Impressions of the Peach Industry in western New York	L. H. Bailey	16	30
75.	Peach Yellows	L. H. Bailey	8	20
76.	Some Grape Troubles in western New York	E. G. Lodeman	7	46
77.	The Grafting of Grapes	E. G. Lodeman	17	22
79.	Varieties and Leaf-Blight of the Strawberry	L. H. Bailey	11	26
80.	The Quince in western New York	L. H. Bailey	13	28
81.	Black-Knot of Plums and Cherries, and Methods of Treatment	E. G. Lodeman	7	24
83.	A Plum Scale in western New York	M. V. Slingerland	6	24
84.	The Recent Apple Failures of western New York	L. H. Bailey	11 (1 colored)	34
86.	The Spraying of Orchards, Apples, Quinces, Plums	E. G. Lodeman	9	34
87.	The Dwarf Lima Bean	L. H. Bailey	15	24
90.	The China Asters; with Remarks upon Flower Beds	L. H. Bailey	12	24

No.	Title.	Author.	Engravings.	Pages.
91.	Recent Chrysanthemums.	Michael Barker.	6	32
93.	The Cigar-Case-Bearer in western New York....	M.V. Slingerland.	12	20
95.	Winter Muskmelons.....	L. H. Bailey....	12	20
96.	Forcing-house Miscellanies.	L. H. Bailey.... E. G. Lodeman..	11	44
98.	Cherries	L. H. Bailey.... G. H. Powell...	15	24
99.	Blackberries..	L. H. Bailey....	15	26
100.	Evaporated Raspberries in western New York....	L. H. Bailey....	28	40
101.	Notions about the Spraying of trees; with remarks on the Canker-Worm	L. H. Bailey....	8	24
102.	General Observations respecting the Care of Fruit Trees; with some reflections upon Weeds.	L. H. Bailey....	4	26
103.	Soil Depletion in Respect to the Care of Fruit Trees................	I. P. Roberts...	3	22
104.	Climbing Cutworms in western New York....	M.V. Slingerland.	21	50
105.	Revised Opinions of the Japanese Plums.......	L. H. Bailey....	14	30
109.	Geological History of the Chautauqua Grape Belt.	R. S. Tarr......	24	38
110.	Extension work in Horticulture...............	L. H. Bailey....	1	42
	Total		335	862

This report is necessarily but the merest outline of the work which has been undertaken in fulfillment of the requirements of the bill. A large part of such work lies in the visiting of farms and communities where some difficulty demands attention, in the giving of advice everywhere by person and by letter, and of sending an entomologist, botanist, or other expert to investigate such dangers as seem to threaten any horticultural interest. The bill has virtually carried the experiment station to every horticulturist's plantation, and every constituent has been at liberty to call for personal aid whenever his troubles are of such a character that others, as well as himself, are interested therein. All this work does not admit of publication, and its value is all the greater for being done in a quiet, unostentatious way, with no thought of public recognition.

A word should be said respecting the attitude of Cornell University towards this grant of funds for extension work. The reader will already have noticed that the movement originated wholly with the people. If the movement has value to the people of western New York, the advantage must necessarily be in proportion to the public desire and demand for it. It is in every sense a popular movement. Its prosecution has imposed great burdens upon the officers who have had it in charge, and it has demanded important changes and considerable sacrifice in the accustomed work of the university. On the other hand, the university exists to serve the people of the state, and if the people desire that it undertake or continue such an enterprise and are satisfied that it can help them, then the university, on its part, stands ready to lend its men, equipment and influence to assist the rural population, so far as such undertakings do not jeopardize its more legitimate work. But it must be distinctly understood that this is not a grant to Cornell University, but a grant to the people to be administered by Cornell University, and that the university has refused, and must continue to refuse, to take any part, directly or indirectly, in forwarding any legislation connected with the work.

Respectfully submitted,

L. H. BAILEY.

January 10, 1896.

BULLETIN 111—February, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

By L. H. Bailey and A. P. Wyman.

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E. J. DURAND.................*Botany.*

Office of the Director, 20 Morrill Hall.
The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plum.
107. Wireworms and The Bud Moth.
108. The Pear Psylla and The New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.

Cornell University, Ithaca, *February* 1, 1896.

Honorable Commissioner of Agriculture, Albany:

Sir.—A good friend once wrote us that it might be well enough to make a bulletin on chrysanthemums for florists, but that what the people really want is a bulletin on cabbages. We replied that if we make a bulletin on cabbages, the florist will write that such literature may be allowable, but that the people want a bulletin on sweet peas. And the florist may add, with much force, that whilst there are bulletins enough on cabbages, there are none whatever on sweet peas. All this simply means that the constituencies of a government experiment station are exceedingly various, and that all, alike, help to support it. There are probably more persons in this state who grow sweet peas than there are who grow cabbages; at least, such ought to be the case. There is a wide-spread feeling that flower-growing is not a commercial occupation, but simply a sentimental one; yet people who buy and sell flower seeds and cut flowers and flower plants, have reason to hold a contrary opinion. Flower-growing, both for home and for market, is rapidly increasing in the east; and of all horticultural occupations, this has received the least scientific attention in this country. We shall be sorry to offend our correspondent a second time, but we shall lay the blame upon the sweet pea. The plant is so attractive that we cannot help it.

In this study of the sweet pea, I have associated with me one of my students, who is fitting himself to be a landscape gardener. Mr. Wyman has made a faithful record of our varieties during the season, and I am convinced that he has good taste in matters of flower-growing. All the detail work in Part II. is his.

The bulletin is submitted for publication under Chapter 230 of the Laws of 1895.

L. H. BAILEY.

72. Countess of Radnor. One of the most popular Sweet Peas; lavender-purple. ~~Full~~ Natural size.

Sweet Peas.

I. General Sketch of the Sweet Pea.

The improved sweet peas hold a leading place in the returning tide of the good old flowers. The varieties now number many over a hundred, where but a few years ago they were less than a dozen. The sweet pea has long been a favorite, for it has beauty of form and color, attractive habit, and delightful perfume; it needs only a variety of colors, shapes, sizes and seasons to perfect it for the amateur's and florist's use, and all this has now been added to it. The sweet pea is one of those fortunate flowers which can never be developed into stiffness and formality, for the shape is irregular and the plant is a free and random grower. However much the desire for oddity or formalism may conduce to the popularizing of other flowers, it can effect little with the sweet pea. It is unique and wayward, and if it once loses its old-time freedom, it is no longer a sweet pea.

Yet there is a tendency to develop the sweet pea beyond its characteristic limits of simplicity and daintiness. The most apparent fault with some of the novelties, if one may judge from the pictures of them, is their arrogant size; but, fortunately, I have never seen such peas in the garden. If I were really assured that I should raise such amazing flowers as I see in the catalogues, I should certainly never buy the seed of them. I should still give my affections to the modest Painted Lady, whose presence still graces the unconventional old gardens. But I do not desire to complain of the trade cuts, for I know what a powerful magnifier a silver dollar is when it is placed behind a flower; and I simply "make allowances," and buy. If I get the color and the shape and the texture, the degree of bigness is a trifling matter. Another heresy in sweet peas is the desire for a double flower. The form of the pea flower is its peculiar beauty. The broad trim standard is the most perfect surface for the display of color, and an effective shield and foil for the contrasting pigments of the wings and keel.

When that simple standard is displaced by two or three, and the shield becomes shapeless and contorted and contrary, the flower is no longer the sweet pea of the dear old gardens, but is apt to be a mussy and impudent thing. We want not bigger flowers and more petals, but we want more sweet peas. That is, we want more productive plants—if that is possible—and more flowers in the cluster. We need, also, more very early and more very late varieties, a still greater range in color, and some improvement in the texture of the flowers. But let us keep to the sweet pea type. Those contrary individuals who are always trying to grow tomatoes on potato plants and strawberries on blackberry bushes, would leave the world a better legacy if they were to grow more tomatoes on tomato plants and better strawberries on strawberry plants.

My reader wants to know how these new sweet peas are obtained. The process is simple enough, but, like most simple things, it is hard to learn and harder to perform. The most important part of the process is a well laid plan of action on the part of the operator. He must determine what improvement the plant needs. Then he must study the plant closely to learn its habit of variation, and how it adapts itself to the different conditions in which it is grown. He will then put himself in sympathy with the plant, simply trying to improve or augment the little differences which appear, and not set himself squarely against the line of evolution of the plant by attempting the impossible. He has a picture in his mind of a deep clear pink flower. Very well; he goes through the rows of his pink-flowered varieties and marks those plants whose flowers are nearest his ideal. The seeds of these plants are separately saved, and sown. Amongst the offspring, he again selects, and he again sows, taking care that his stock does not become crossed with some other type. Presently, his new color is obtained, the seeds have got in the habit of "coming true," and the brood is given a new name and introduced to the trade. More often, however, the operator has no distinct ideal in his mind, but he watches his plants carefully and every marked departure or "sport" from the type is saved and sown. From such sports the greater part of our novelties, of all annual plants, have come. The sports are frequent enough, but it requires rare judgment to distinguish those which will likely perpetuate themselves, and to carry on the subsequent selection by means of which they are freed of their impurities or the tendency still to sport. If desired variations do not appear, then the operator may endeavor to start it off by a radical change of soil or treatment, or possibly by crossing. All this means that the cultivator must become intimately familiar with his subject before he can expect to make much headway in the origination of novelties. So it has come that the modern improved plants owe their development largely to one or two careful and patient persons in each generation.

The sweet pea has had but one genius. He is Henry Eckford, who for twenty years has given his attention to this plant upon his

73.—Henry Eckford.

garden-farm at Wem, in Shropshire, England. He has given us the greater number of our best improved varieties. "When I first took up the sweet pea," he writes, "there were six or eight distinct varieties in cultivation, and experts in the art, as far as I could learn, had come to the conclusion that it could not be further improved, and in the first two or three generations of the work it appeared a fair conclusion; but I should say that I had been for many years working on the improvement of various florist flowers, and which had proved so eminently successful that a first rebuff did not deter me from further attempts." In our own country, the work has now been taken up by Rev. W. T. Hutchins, of Indian Orchard, Massachusetts; and it has remained for him to make the first important attempt to write any account of the modern sweet pea. His booklet, "All About Sweet Peas," appeared in 1894; and he has been and is still the most devoted grower and champion of sweet peas upon this side of the Atlantic. This is not saying that he is the largest grower, for this honor is held by C. C. Morse & Co., of California, whose crop of sweet peas covered 250 acres in 1895, and this firm has also produced a number of excellent varieties. But Mr. Hutchins is an amateur sweet pea critic, whilst Mr. Morse grows the seeds for market. W. Atlee Burpee & Co., of Philadelphia, were amongst the first retail seedsmen to take up the sweet pea. The first sweet pea show of any note in this country was held under the inspiration of Mr. Hutchins at Springfield, Mass., in 1893.

Although this great improvement in the sweet pea is so recent, the plant has been long in cultivation. It is native to Italy, and was introduced into England about 1700. Its Latin name, *Lathyrus odoratus*, was given by Linnæus in 1753. In 1754, Philip Miller, a famous English garden-botanist, speaks of two distinct varieties in the fourth edition of his "Gardener's Dictionary": "One of these has pale-red Flowers, which is commonly called by the Gardeners, Painted-lady Peas; the other hath intire white Flowers: both these may be allowed a Place in the Borders of the Flower-garden, for the sake of Variety." William Curtis had a colored plate of a purple form in his "Botanical Magazine" in 1788, and speaks as follows of the plant: "There is scarcely a plant more generally cultivated than the Sweet Pea, and no wonder, since with the most delicate blossoms it unites an agreeable fragrance. Several varieties of this plant are enumerated by authors, but general cultivation extends to two only, the one with blossoms perfectly white, the other white and rose-colored, commonly called the Painted Lady Pea. * * * They have both been introduced since the time of Parkinson and Evelyn."

In America, M'Mahon mentions the sweet pea amongst his "hardy annual flower-seeds," in his "Gardener's Calendar," in 1806. He knew five varieties, as follows:

Var. albis (white).

Var. carneo, old Painted Lady.

Var. roseo, new Painted Lady or Scarlet.

Var. cæruleis (blue).

Var. atropurpureo (dark purple).

Thomas Bridgeman, in his "Young Gardener's Assistant," 1838, mentions "Sweet Peas, of various descriptions and colors. Lathyrus odoratus, var. alba, purpurea, rosea, striata, etc." Edward Sayers, in "American Flower Garden Companion," 1838, speaks of sweet peas, "purple, scarlet, white, pink, pink and white or painted lady." Buist, of Philadelphia, writes that they are "well deserving of culture," and says that there are "many varieties," in his "Flower Garden Directory," 1845. Yet they could not have been very widely grown at this time, for Eley's "American Florist," which appeared in the same year at Hartford, does not mention them. In 1851, Breck writes in his "Book of Flowers" that sweet peas are "deservedly one of the most popular annuals which enrich the flower-garden. The varieties are white, rose, scarlet, purple, black and variegated. Every variety should be sown by itself in circles about a foot in diameter, three or four feet from any other plant." The custom of giving designative personal or descriptive names to varieties of annual flowers was scarcely known forty or fifty years ago, and we do not know just what types were then in cultivation. The loose vernacular or Latin names were used rather more for groups or strains of color than for any particular minor variation as the names are in these days, when we have so greatly refined the choice and descriptions of garden plants. The first distinct note of the recent popularizing and diffusion of named sweet peas in this country came in 1889 with the introduction of the Blanche Ferry, which is an improvement of the old Painted Lady, and which is still one of our best varieties when grown from carefully selected seeds. This variety was found in a garden in northern New York by W. W. Tracy, of the firm of D. M. Ferry & Co. C. L. Allen writes as follows of its evolution, in "American Agriculturist," for September 7, 1895: "The farmer's wife had for years been in the habit of saving her own seeds, starting with the old and well-known Painted Lady. In the heavy loam of her garden, and with the much shorter season of growth there than in Europe, this made a more rapid growth, and annually became more dwarf in habit. At the same time it became a 'cropper,' that is, all the flowers, that in other climates would have a much longer period in which to develop, here appeared nearly all at the same time if not cut. Thus in a few years a dwarf and very free

74.—Tangier Scarlet Pea (Lathyrus Tingitanus). Half size.

flowering type was established, which remains constant in our country. The success that greeted the introduction of this variety, and the fact of its having been developed here, stimulated our growers to extra exertion, not only to grow sweet peas as a crop, but to watch for variations which a change of climate is sure to produce. The result is we have found that sweet peas can be about as cheaply grown here as the common field pea. But more important still is the fact that all our well-known sorts are more prolific when the seeds have been grown here. The introduction of new varieties, as well as new types, is one of the marked features of our industry."

Before going further, the reader should be reminded that there are two other closely related species of peas in cultivation for their flowers, and one of them, the Tangier Scarlet, is even called a sweet pea. This Tangier pea is *Lathyrus Tingitanus* (Fig. 74). It has been in cultivation longer than the sweet pea, having been introduced into England as early as 1680. Curtis figures it in the "Botanical Magazine" in 1790, and speaks of it as follows: "The Tangier Pea, a native of Morocco, cannot boast the agreeable scent, or variety of colors of the sweet pea; nor does it continue so long in flower; nevertheless there is a richness in the color of its blossoms, which entitles it to a place in the gardens of the curious." It bears an attractive purple flower, with a large standard and small wings, and blooms earlier than the true sweet peas. It is also known for its very narrow and long leaflets, generally 2-flowered peduncles, and long, flat, hairless pods.


75.—Perennial or Everlasting Pea. (Lathyrus latifolius.)

The other pea to which I wish to refer is *Lathyrus latifolius* (Fig. 75), the perennial or everlasting pea. This plant, a native of Europe, has been long in cultivation, although it appears never to have received special attention, since there are only three or four well marked varieties of it. Its leading forms are simply known as the red and the white. It is at once distinguished from the sweet pea, aside from its perennial nature, by the many-flowered clusters, the very large standard, the thick and stiff texture of the scentless flowers, the broad and strongly veined leaflets, and the broad hairless pods. It is an excellent hardy plant for a mixed border or for clambering over rocks or other low objects. I have several plants of it growing against a tennis screen, and they bloom most profusely in late spring and early summer. It is a profuse seeder, and the pods should not be allowed to form if continued bloom is desired. It propagates readily by seeds and by cuttings.

Where and How to Grow Sweet Peas.

The sweet pea is such an unconventional and domestic flower that it is unsuited to formal beds or to an obtrusive position on the lawn. It is one of those flowers which we enjoy the more if it is somewhat hidden from the public view, and is restricted to the more private and personal parts of the grounds. It is preëminently a flower for the back yard. A rear or side border, against a fence or other background, is a good position for it. The plant is always attractive when seen clambering over bushes, but it rarely thrives well when planted close under shrubbery unless it is grown in a box or large pot of rich earth plunged into the ground, to remove it from the competition of the roots. If one is to raise a considerable quantity of sweet peas, they may be planted in rows and allowed to run up a screen of chicken-wire; or, if one can take the pains to tie them occasionally, a trellis may be made of four or five strands of fence-wire, like a half-size grape trellis. On good soil most varieties will reach a height of four or five feet.

If sweet peas are to continue to bloom throughout the season, the soil must be rich and capable of holding moisture. A thin, dry soil will not grow good peas. In light soils it is well to apply a liberal dressing of manure to the soil in the fall, plowing it under very early in the spring; and in addition to this, a dressing of some concentrated fertilizer in the spring will be useful. But the chief thing is moisture. The land must be well and deeply fitted, to increase its water-holding capacity. It is ordinarily advised to till the soil frequently after the peas are planted until they begin to bloom, at which time all cultivation should cease. I do not believe that this is safe advice. The land becomes hard by constant tramping of visitors when the plants are in bloom, and the evaporation from the soil is thereby greatly increased. A heavy mulch of straw or litter may be placed on the soil when the plants begin to bloom, to conserve the moisture; but if the rows are far enough apart to allow of it, a frequent stirring of the soil all through the season with a horse or hand cultivator will be found to be the most efficient conservator of moisture. The plants also endure dry weather better when thinly planted. We like to have the plants six or seven inches apart in the row. Our own test in 1895 comprised four rows each 150 feet long, and three feet asunder, in heavy clay loam. The vines were trained on five horizontal wires, making a trellis three or four feet high. The land was stirred with a horse and cultivator about every week all summer long. The result was, that although we had a prolonged drought, we had sweet peas in abundance from early July until October.

Deep planting also enables the sweet pea to resist dry weather. It is a good plan to make furrows four or six inches deep, drop the peas in the bottom and cover an inch or so. Then, as the plants grow, the earth is gradually filled in about the plants, until the furrow is full. If there is danger that these furrows will fill with water, and hold it for some time, the peas should be planted more shallow and the furrows filled at once. Early planting is also desirable. In this latitude we can plant as early as the first of April, on warm soil,—that is, a month before hard frosts have ceased. The sweet pea is a hardy plant, and the seed is not injured by much cold weather. I have known good results from planting seeds in the fall, but this practice is unreliable in the northern states. I doubt if it can be recommended with full confidence north of Norfolk. But even if the seeds are got in late and shallow, the plants may be carried through by a little extra attention to tillage. Our test of 1895, of which I have spoken, was inaugurated so late that we thought it inadvisable to delay matters by deep planting. So we planted the seed about two to three inches deep, on the last day of April, and our sweet peas were the admiration of the community. If there are any secrets in the growing of sweet peas, they are these: A rich, well-prepared soil, early and rather deep planting, picking of the pods as soon as they form, and the judicious selecting of seed and varieties.

There is some inquiry as to the forcing of sweet peas. Our experience in this matter is very limited. It is generally thought to be best to sow the peas early in winter in a cool house amongst other things — as carnations — and let them take their time for growing. When the sunny days come in March and April, they may be expected to bloom.

The Varieties of Sweet Peas.

All the foregoing requirements are easy enough to meet save the last — the selection of varieties. The kinds are now so numerous and so various that the amateur may be perplexed in the choice. Of course much depends upon the taste of the grower. One should always be sure, also, to have enough. The beauty of flowers lies largely in the generosity and profusion of them.

The grower should also have a good variety in color and shape, and this is best obtained by purchasing the best named varieties, and making the mixture to suit. If I were confined to six varieties, I think that I should choose the Improved Painted Lady or a pure type of Blanche Ferry, Apple Blossom, Emily Henderson, Mrs. Gladstone, Butterfly and Countess of Radnor. But there are twenty varieties which even the average flower-lover may grow with great satisfaction. F. Schuyler Mathews, in his "Beautiful Flower Garden" (1894), speaks as follows of his method of growing sweet peas and his choice of varieties. I am glad to transcribe his account, because Mr. Mathews regards the subject from the artist's standpoint. "My own method of arranging sweet pea vines is confined to a fence or hedge row, which I create out of chicken-yard wire and rustic posts. This fence serves the double purpose of a thing of beauty, and a barrier against the roaming cow, who by the way, frequently takes toll in the shape of a fine bunch of my favorite Boreattons. The varieties which are most attractive in color are:

Boreatton, red-purple and violet.
Mrs. Sanky, white.
Lottie Eckford, white, blue-edged.
Orange Prince, scarlet pink and rose pink.
Blanche Ferry, pink and white.

Cardinal, red-crimson and red-scarlet.

Grand Blue, ultramarine-purple and purple-crimson.

Primrose, cream-yellow.

. . . . . . With all deference to a perfect harmony of color, I may add that there is really very little discord to be found in an indiscriminate mixture of all varieties."

A more detailed account of the merits of the various sweet peas which we have grown will be found in the descriptive list in Part II. But, after all, it does not matter so much, as I have said, what varieties one plants as it does that he plants, and plants generously. One can scarcely obtain such a profusion of color and fragrance throughout the season from any other flower. Mr. W. N. Craig contributes to "Garden and Forest," the following record of the productiveness of sweet peas: "We have never tested individual plants, but last year we kept a record of the spikes cut from a row sixty feet long, partly composed of the Eckford varieties and partly of good mixed sorts. The first flowers were cut on June 11th, and the last on October the 20th. The number gathered for each month was as follows: June, 2,000; July, 17,600; August, 18,000; September, 6,400; October, 3,500; total, 47,500. Besides this, large numbers went to seed, and probably the row would have yielded 60,000 spikes if it had been carefully picked over."

The varieties of sweet peas with which Mr. Eckford began his work, as given by Mr. Hutchins, are seven, as follows: Light Blue and Purple, Painted Lady, Common White, Scarlet, Scarlet Striped, Dark Striped, Black. Most or all of these Mr. Hutchins would now discard; and he also adds (1894) the following to the list of those which are superseded by better varieties: Adonis, Crown Prince of Prussia, Vesuvius, The Queen, Carmen Sylva, Queen of England, Empress of India, Isa Eckford, Bronze Prince, Black, Purple Brown Striped, Scarlet Invincible. Yet several of these varieties are still favorites with us; and for myself, I should place Empress of India in a list of my second or third half-dozen. This simply illustrates the old aphorism that there is no accounting for tastes. So long as one likes the varieties which he grows it does not matter what names they bear.

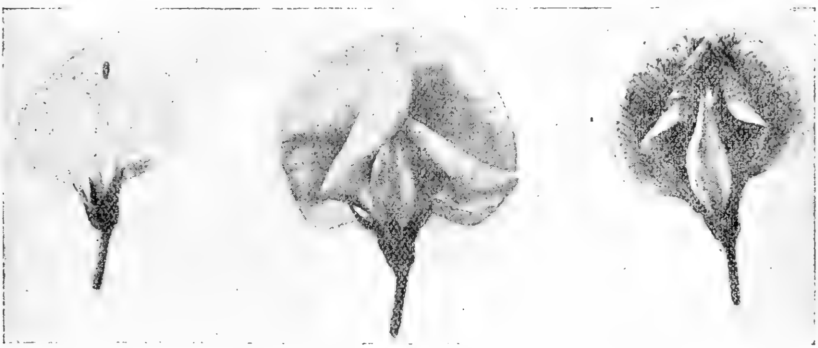
76.—The Sweet Pea flower.

Before going further the reader should stop long enough to notice the architecture of the sweet pea flower (Fig. 76). The broad orbicular upper petal, s, is the standard, banner, vexillum, or shield; the two mid-sized pieces, w, are the wings, and these close over the smallest central portion, comprised of two connivent parts, called the keel, k. When the sweet pea attempts to become double the duplication usually appears in the standard, which, instead of comprising but a single piece, may be formed of two or three or four petals. This is well shown in Fig. 77, in which the expanded flower is seen to have three standards. There is no double variety

77.—Double pea. The Splendor.

of sweet pea, but most of the improved types tend to duplicate the standard, and some varieties will give from 20 to 50 per cent. of these monstrosities, when grown upon strong soil. In other words, there is a general and cumulative tendency towards doubling, as the species is improved, but the seeds of double flowers of any particular variety do not necessarily produce double flowers. There is every reason to expect, however, that the time will soon come when double peas will reproduce themselves as reliably as many other annual flowers do; but unless the product is more shapely than any thing which I have yet seen, I shall be ready to quit sweet peas when I am obliged to grow double ones.

Another word may be said upon the size of the sweet pea flower. The accompanying engraving (Fig. 78) shows three types of peas, exactly natural size. All illustrations of objects which have depth and rotundity in them, look smaller than the objects which they represent, until the eye becomes trained to see the perspective and the solidity in the picture. The small flower, on the left, is the Rising Sun. It is about the size of the sweet peas of the last generation. The flower on the right is Etna, and is of good size, as sweet peas go. The middle flower is Dorothy Tennant, and is one of the modern grandiflora type. The flower is large enough for a good sweet pea, in my opinion, although it might be somewhat enlarged without losing its daintiness. Yet this flower measures only an inch and a quarter across, whilst a catatalogue illustration before

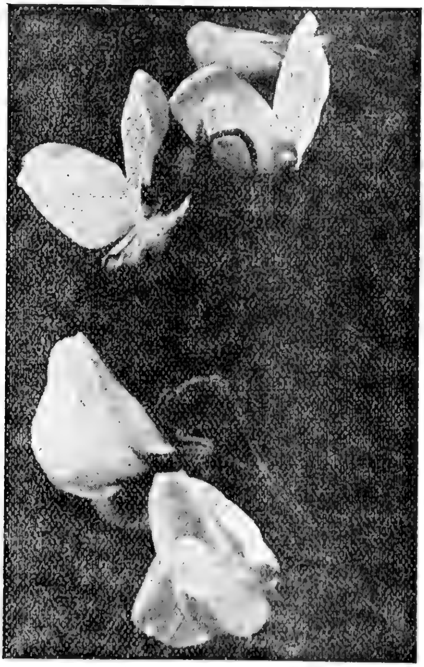


78.—Three typical sizes of sweet pea flowers.

me has them two inches across. I do not deny that such peas are possible, with high culture and pruning, but it is a fair question if they are desirable. The Apple Blossom, Fig. 80, is one of the grandiflora type, a development from the old Painted Lady, but the illustration is the merest trifle oversize. All the other pictures of varieties in this bulletin, except Fig. 74, are exactly natural size, and are made from flowers grown in ordinary conditions, in too thick planting.

Along with the increasing tendency towards doubling of the flowers, the sweet pea has also developed a tendency to enlarge the flower cluster. This often comes as a result of fasciation or abnormal broadening of the stem. As many as eight perfect flowers were developed in some clusters of Apple Blossom in our plantation last year, with no diminution in the size of the flowers, whilst the normal number is only three. Fig. 80 shows this augmentation of the flower cluster. Like the doubling, this enlargement of the cluster is not perpetuated by seeds, but it is not too much to expect that a permanent modification in this direction may come in the future.

Another interesting development of the sweet pea is the recent appearing of dwarf or non-climbing forms. These have appeared



79—Two types of flowers. Alba magnifica (above), and Emily Henderson (below).

in Germany, England and California. This is one of those peculiar accumulative effects of domestication which is apt to appear somewhat simultaneously in widely separated regions, evidently largely because an equal degree of domestication tends to produce similar effects in any number of regions. The same thing is illustrated in the dwarf Lima beans (see our Bulletin 87), and it transpired long ago in the common garden beans. The California dwarf, which is introduced this spring (1896) by Burpee as Cupid, was found in a field of peas in C. C. Morse & Co.'s plantation in 1893. There was a single plant of it. This original plant was strong and apparently normal in every way except in its diminished size. In 1895, Morse & Co. grew seven acres of this Cupid, and all the plants came true to seed. We have not grown the plant, but Burpee pulled up two entire full-grown plants and sent them to us last year. One of them measured seven inches high, and the other eight inches. The flowers were of medium size, pure white, and of good form.

It is difficult to construct any classification of the varieties of sweet peas. The best scheme for popular use is thought to be one founded on the color of the flowers. Yet there are various well-marked types of form in the sweet pea flower, which should be recognized in classifying them. The old-time type has a broad plane standard, as in Apple Blossom (Fig. 80), and Countess of Radnor (Fig. 72). In many of the recent varieties, the standard is variously curled or rolled. One of the best of these newer forms is that in which the standard is inrolled or hooded. This is shown to perfection in the dainty and exquisite Butterfly (Fig. 82, best seen in the central flower and in the uppermost flower at the right), An opposite form of standard is the reversed or revolute, well shown in Imperial Blue (Fig. 83). The form of the flower also varies when seen sidewise. Consider Fig. 79. The upper flowers are Alba Magnifica, in which the standard and wings stand nearly at right angles to each other, and, therefore, present a want of connection and homogeneity which is displeasing to many persons. In the lower spray, which is Emily Henderson, this fault does not exist. and the flowers present a more united and shapely effect.

A Seedman's Account.

The reader will be interested to know something of the methods and trials of seed-growers in growing and breeding varieties. The following account is written by Mr. Waldo Rohnert, one of my former students, who is associated with C. C. Moore & Co., of California:

" Eight or nine years ago the sweet pea was little known as a garden flower. It then had little merit to attract public attention. At that time, Mr. Eckford had done considerable work and his efforts and perseverance were becoming apparent. From the ordinary type and colors he has improved the flower to its present high standard. Cross-fertilization and selection, keeping the size, form, substance and color constantly in mind, have had a wonderful effect. We depend somewhat upon sports for new varieties, however. As each variety is brought up to the grandifloral type, its liability to sport is also increased.

" As the six new varieties of C. C. Morse & Co. have resulted from sporting and selections, you may be interested in their history. America is a sport of Queen of the Isles. It was selected to a deep crimson-scarlet upon a white ground, large size, good substance, bold and upright standard. It runs about ninety-five per cent true. Its deep and contrasting color gives it a striking appearance. Ramona is a selection out of Blushing Beauty. It is a delicate pink stripe upon creamy-white ground, perfectly hooded form, good substance and grandiflora size; very effective. Oddity was found in a mixed lot, so its parentage is unknown. It is odd because wings and standard are peculiarly hooded, a feature new in the sweet pea. It comes perfectly true from seed. Juanita is a selection out of Countess of Radnor. It has a delicate appearance and as its parent is a back-slider, only a part of it comes true. Grey Friar also adds a departure. Both wings and standard are peculiarly shaded or marbled-purplish mauve. It is a selection out of Senator and has taken some time and critical selection to bring it to its present standard. The vine is vigorous, and, as a rule, has four flowers to the truss.

" The profesional growers of sweet pea seed have a good deal of trouble to contend with in the matter of keeping their stock pure. Some varieties are very hard to keep true to type, while other varieties almost take care of themselves. As a rule, nearly all small-flowered varieties come true, while the grandiflora types run off more or less.

" Countess of Radnor and Dorothy Tennant are very hard to keep true. Two years of careless work in growing these varieties will run them into stripes and poor forms. Her Majesty reverts to Princess Victoria; Duke of Clarence runs into Her Majesty and Dorothy Tennant; Mrs. Eckford runs into Primrose and poor whites, while Primrose will lose its primrose effect; Mrs. Sankey runs into poor Lemon Queen; Mrs. Joseph Chamberlain passes into Ovid and weak stripes; Stanley goes into Boreatton and to

Boreatton with purple wings; Peach Blossom varies into Isa Eckford; Blanche Burpee into Mrs. Eckford; Mrs. Gladstone into pink stripes; Emily Henderson has strong light blue and purple and Blanche Ferry tendencies; Apple Blossom runs into Splendor; Royal Robe into Ovid and delicate pinks; Captain of the Blues into Monarch and stripes; Monarch into Duke of Clarence and stripes; Waverly into Apple Blosom.

"There are now about one hundred distinct varieties of sweet peas, and the question arises if the limit of improvement in color and form is not already reached. In what direction are the growers working to keep the public interested in this flower? In the first place, all the present varieties could be improved by having four flowers on each truss. The clear blue, lemon-yellow and fiery scarlet varieties are still to come. A flower having a blue standard with white wings, to correspond with Blanche Ferry, would be a decided acquisition. Such varieties as Meteor, Lady Beaconsfield and Blanche Ferry should be brought up to the grandiflora type. New ranges of colors, as the apricot shades, are not out of the question. Even the size of the present grandiflora type could be increased to a larger and bolder flower. Our work with the sweet pea is really only fairly begun.

"One feature which should be impressed upon the public is that there are types of form in the sweet pea. We should classify the varieties into forms, not into colors. When we speak of a certain color we convey but a vague meaning. From a description of color, no two persons receive the same impression.

"In my experience, crossing has produced some unlooked for results. Cupid on Venus produced a weak Painted Lady of no value. Penzance on Venus has produced an exceptionally fine pink of solid color and good form. It corresponds with Royal Robe, but is larger and holds form and color better. Ovid on Venus had the same result, except that the color was a trifle stronger. Stanley on Venus produced a Boreatton; Ignea on Venus produced something close to Princess Victoria; Bronze King and Primrose on Venus made a weak pink or no value; Beaconsfield on Venus produced Beaconsfield. The conclusion from these crosses is that the stronger color predominates in the cross. We cannot foresee what the result will be.

"Of Eckford's 1895 novelties, Blanche Burpee certainly takes the lead. It is the finest white to date. While Emily Henderson may be considered a little purer in color, and, on account of its free blooming habits, a better variety for florists, yet it does not possess the size or gracefulness of the Blanche Burpee. The stiffness or formality has always been against the Emily Henderson. Eliza Eckford comes second in value of Eckford's 1895 novelties and possesses considerable merit. Mrs. Joseph Chamberlain is also a decided acquisition. Meteor is a decided improvement on Orange Prince, but will not be appreciated until it is brought up to the grandiflora type. Duke of York, Novelty and Duchess of York come next in order of value."

A Student's Opinion of the Sweet Peas.

Mr. Wyman, who has studied our sweet peas in the field day by day, has given me the following impressions of their merits and adaptabilities: "There is much to interest the careful observer in the different types of sweet peas. In the flower only three colors appear, white, red and blue, or rather purple, although the bud is always yellow. While the habit of the plant is much the same in all varieties, the various colors and forms of the blossoms present a series of transitions throughout the species. One type, represented by the Improved Painted Lady, seemingly the foundation of many of the improved sorts, is widely known. It has pink wings and a peculiar pink-reddish banner, upon both of which numerous changes have been wrought. The pink wings may become whiter and whiter, until only the slightest tinge of pink is apparent, while the banner retains most of its lurid hue. The type, on the other hand, may run to deep colors, the wings pasing into purple and the banner also becoming darker. When both banner and wings become strongly purple, another type is obtained, of which Cardinal Wolseley is an example. Here the banner is crimson and the wings maroon. The darkest and purplest flowers belong to this class, and are, also, the least beautiful. In other cases the flower retains the purple, but it assumes a distinctly lighter cast. Still another form of the Painted Lady type is a red-purple, blotched with lavender, like the Countess of Radnor. Going back to our original type of the pink and red, we may start again in the first direction, towards a loss of color. When both banner and wings become very light, as in the Empress of India, we have a beautiful salmon, one of the softest shades in the species.

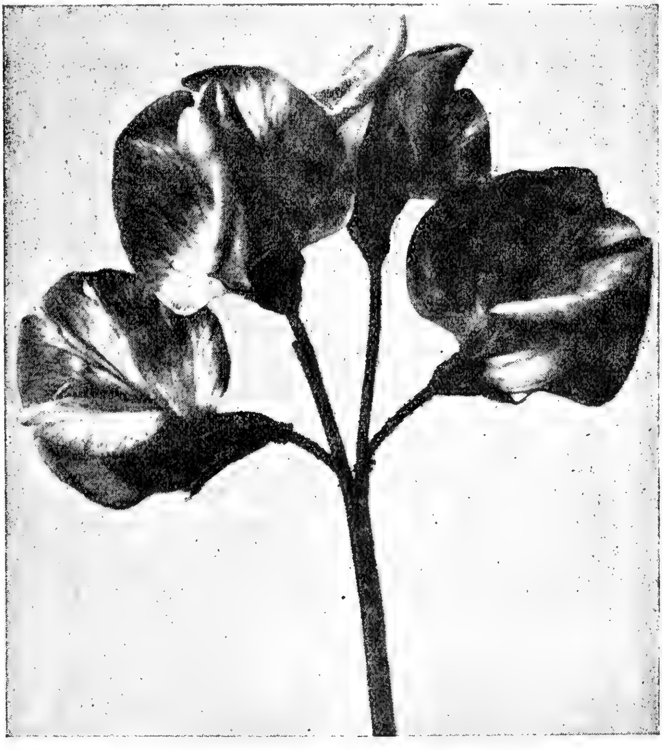
"While the greatest variations of the blossoms appear in the color, there is also, though in a lesser degree, a variation in form. One type spreads out a broad, rigid banner; another, more fragile, folds its banner together slightly, while another bends it backward. Still another class, perhaps the most remarkable, folds over the lateral edges of its banner and forms a hood. The student loves to contemplate the flower and attempt to construct some hypothesis of the means by which these variations are brought about. Here a delicate fibre has strengthened itself, and holds a petal rigidly in place. In another flower the fibre is less sturdy, and allows its banner to curl and plait itself. In another a notch is taken from the side of the banner, weakening the rigidity of the structure. Of necessity the edge then curls forward and we have the hooded form. One can imagine a change in color, too, by a cell losing or retaining its characteristic pigment; and even in health there may come the deathly purple which is always sure to appear as the blossom fades.

"There are so many attractive varieties that it is difficult to say which are the leading ones. If a flaming color is wanted, one may choose the Apple Blossom, of the old pink and red type, which surpasses all in brilliancy and uniformity of color. It gives the prettiest mass to be found in all the varieties which we have grown. Another form of the same type, the Improved Painted Lady, combines much of the brilliancy of the Apple Blossom with a softer and much more pleasing finish. It is also earlier and more profuse in its bloom. The Empress of India gives a delightful salmon which, in the beauty of its mass, approaches the Apple Blossom, and at the same time is one of the prettiest varieties for cutting for single specimens. The Countess of Radnor is an expression of a dark lilac color and a hooded form. Notwithstanding its remarkable characteristics, it is by no means a beautiful flower, because the color seems to lack character. The Butterfly, of a much lighter type of azure, is perhaps the most charming of all. It is pale lilac and delicate.

Its single flower is effective, and in mass it gives a shade of which one never tires. It, too, is an early and profuse bloomer. Of the whites, Mrs. Langtry is, perhaps, the most pleasing, but is surpassed in earliness and productiveness by the Fairy Queen. Of the purples, Cardinal Wolseley stands foremost both in richness and harmony of color. Nevertheless, it has a rival in earliness and bearing qualities in the Imperial Black, but it is not equalled in quality. The Orange Prince, while only a moderate bloomer, must not be overlooked. It approaches the Painted Lady type, but is characterized by its orange banner and rose-pink wings. It is pretty, but not the best. It is different from all the rest, and the collection would be incomplete without it. As to which sweet pea is best of all, the Improved Painted Lady seems to me to be most satisfactory, and I am willing to cast our lot with it.

"It is a common practice to show together a number of varieties and to call them mixed, but when one tries it, he finds that it does not give the satisfaction which comes of a single variety. Although the colors may be related, the mixtures do not produce the harmony which is essential to the best effects. If there must be a mixture, it is much better to follow the pattern of a single flower by giving a decided tone to the mass with some one characteristic variety, of a profuse bloom, as the Invincible Scarlet, and then touch it up slightly in the two directions of light and shade,—with a light pink, as Mrs. Gladstone, and a white, as Fairy Queen, and perhaps with a moderately dark pink and purple,—the less purple the better,—as the Captain of the Blues, discarding lilacs—which may be good in themselves,—and also all striped purples, which seem to be inappropriate to any ornamentation whatever.

"The use of the sweet pea in ornamental work can be best understood by considering its natural character and adaptability. It is a common and rather cheap plant. It seems to have something in common with weeds as well as with refined exotics. It is naturally modest and retiring. It is not improved by the society of other flowering plants. It is beautiful when growing by itself in masses in half-secluded places, but does not bear great prominence. I remember to have seen one place where it looked uncommonly well, and that was on a rough wooden trellis, surrounded by half-grown grass, a few feet from a dingy uninteresting wooden house, on the side where no one ever came. In an ordinary well-kept flower-garden, where the beds are laid out by themselves, it may sometimes appear to advantage, but it seems wholly out of place in a strictly formal bed.



80.—Apple Blossom. An abnormal 4-flowered truss.

"All that has been said refers to the growing plant and flower. More properly, the use of the sweet pea bloom is in the bouquet. No place then is so exalted but that it adds an extra light, and none is so humble that it is not at home."

II. Varieties Grown at Cornell in 1895.

An attempt was made the past season to obtain all the sweet peas which were offered by American seedsmen. Nearly all of them were planted April 30th, but a few later arrivals were sown in the first days of May. The soil was a stiff clay loam. The area was about 150 feet long, and one end of it was naturally more moist than the other, yet this difference in soil did not appear to exercise a great influence upon the season of bloom. The entire area was well tilled throughout the season (as explained on page 219). The vines were tied up as they grew to a trellis of five horizontal wires, and the pods were removed as they formed. The plants continued to bloom throughout September, and even on the 8th of October, when the last notes were taken, several of the varieties were still producing good flowers.

In rating the merits of the flowers in this list, we have called those varieties "good" which rise to the accepted standard of excellence of the modern improved sweet peas. A variety which rises above this level, or has some superlative merit, is designated "very good." Varieties which fall below this level are variously designated, usually as "fairly good." These are varieties of indifferent merit. Below these are the varieties which were distinctly poor. The reader should remember, however, that these opinions are founded solely upon the behavior of the varieties upon our own grounds last year. They are not intended to serve as a general or infallible estimate of the varieties. The accounts of these varieties are all made directly from the plants as they grew on our grounds, uninfluenced by published descriptions.

One who is sensitive to inelegant or pretentious expressions must deplore many of the names of the sweet peas. Ambitious names are always in bad taste, but nowhere more so than in the sweet pea, of which the most pronounced characteristic is modesty and indifference. We cannot expect to control the names which come to us from abroad, but our own originators should exercise a care to give names at least worthy the plant which is to bear them.

The name in parentheses in the following list is that of the dealer who suplied us with the seed. The varieties marked with an asterisk (*) were originated by Mr. Eckford, and to some of these the date of introduction is added. Several dealers have kindly contributed to this test of varieties, and Mr. Hutchins sent us a good collection of seeds "for the good of the cause."

1. *Adonis.* (Gardiner.)

Very good. Flowers small. Standard convex, apex rounded, base wedge-shaped. Color, rose-pink, soft. Bloom profuse.

Began to bloom July 17.

Continued until September 1.

Profuse July 29.

2. *Alba Magnifica.* (Burpee.) Fig. 79, top.

Good. Flowers small. Standard flat, notched. Color, pure white. Bloom somewhat profuse.

Began to bloom July 17.

Continued throughout the season.

At best August 5.

3. *American Belle.* (Burpee.)

Good. Flowers large. Standard hooded to almost flat. Color, rose-pink. Bloom medium, uniform the whole season.

Began to bloom July 19.

Continued throughout the season.

4. *Apple Blossom.* (Gardiner.) * Fig. 80.

Very good. One of the best. Flowers above medium size. Standard slightly hooded. Color, rose-pink. Bloom profuse. Beautiful growing in a mass.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

5. *Black and Brown Striped.* (Breck.)

Fairly good. Flowers medium size. Standard flat, notched. Color, standard white striped with pink, wings white striped with rose. Bloom profuse.

Began to bloom July 29.

Continued throughout the season.

At best August 12.

6. *Black Purple.* (Breck.)

Not a success. Flowers medium size. Color, standard dark pink, wings reddish purple. Bloom sparse.

Began to bloom July 23.

Continued throughout the season.

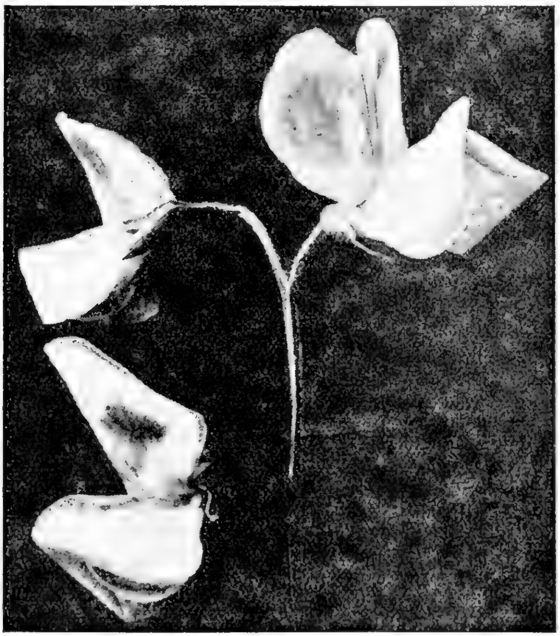
7. *Blanche Burpee.* *1894.

Received from two dealers. The seed from one source did not grow; that from the other was received so late that the plants failed to bloom.

8. *Blanche Ferry.* (Gardiner.) Fig. 81.

Very good. Flowers medium size. Standard convex. Color, scarlet, the wings with large white blotches. Somewhat brilliant. Bloom profuse.

Began to bloom July 13.



81.—Blanche Ferry.

Continued throughout the season.

Profuse from July 29.

9. *Blue Bell.* (May & Co.)

Not a success. Flowers small. Standard convex, wedge-shaped. Color, standard pink, wings purple-rose. Bloom sparse.

Began to bloom August 9.

Continued throughout the season.

10. *Blue Bird.* (C. B. Strong.)

Fairly good. Flowers medium size. Standard hooded. Color, dark purple-red. Bloom medium.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

11. *Blue Edged.* (Vick's Sons.)

Good. Flowers large. Standard hooded, with two sinuses at the sides. Color, purple lilac. Bloom profuse. Evidently the same as Butterfly.

Began to bloom July 15.

Continued throughout the season.

At best July 29.

12. *Blue Invincible.* (Childs.)

Same as Imperial Blue.

13. *Blushing Beauty.* (Hutchins.) *1893.

Good. Flowers small. Standard convex, notched. Color, soft, pure salmon. Bloom always sparse.

Began to bloom August 12.

Continued throughout the season.

14. *Blushing Bride.* (Childs.)

Fairly good. Flowers large. Standard flat. Color, standard pink, wings white blotched with purple-rose. Cheap. Bloom profuse. Evidently a strain of Painted Lady.

Began to bloom July 13.

Continued throughout the season.

15. *Boreatton.* (Gardiner.)*

Very good. Flowers medium size. Standard convex. Color, standard crimson, wings maroon, deep and rich. Bloom profuse.

Began to bloom July 16.

Continued throughout the season.

Profuse from July 22.

16. *Bronze King.* (Burpee.)

Good. Flowers medium size. Standard flat, stiff, notched. Color, standard light pink, wings white. Bloom medium.

Began to Bloom July 16.

Continued until September 15, quite uniformly.

17. *Bronze Prince.* (Burpee.)*

Good. Flowers large. Standard flat. Color, purple-red, the wings the more purple. Bloom medium.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

18. *Butterfly.* (Burpee.) Fig. 82.

Very good and dainty. Flowers medium size. Standard hooded, with two sinuses at the sides. Color, purple-lilac, one of the prettiest. Bloom profuse.

Began to bloom July 17.

Continued throughout the season.

Profuse from August 5.

82.—Butterfly.

19. *Captain Clarke.* (Burpee.)*

Poor quality, but prolific. Flowers small. Standard flat, stiff. Color, standard white merging into pink and purple, wings white with a purplish cast. Bloom profuse. Far from being beautiful.

Began to bloom July 16.

Continued throughout the season.

At best August 5.

20. *Captain of the Blues.* (Gardiner.)*

Very good. Flowers large. Standard flat. Color, purple-red, the wings more purple. Bloom profuse.

Began to bloom July 18.

Continued throughout the season.

At best August 12.

21. *Captain Sharkey.* (Breck.)

Flowers small. Standard flat. Color, standard pink, wings dark rose. Bore only one flower. Evidently not a fair test.

Bloomed August 8.

22. *Cardinal Wolseley.* (May & Co.)

Very good. Flowers large. Standard flat, slightly wedged. Color, standard crimson, wings maroon, rich. Bloom somewhat profuse. Same as Cardinal?

Began to bloom July 19.

Continued throughout the season.

At best August 12.

23. *Carmen Sylva.* (Hutchins.)

Not a success. Flowers medium size. Standard convex, notched. Color, standard pink, wings dark rose-purple. Bloom very sparse.

Began to bloom August 5.

Bloom of short duration.

24. *Countess of Radnor.* (Gardiner.)* Fig. 72.

Very good, unique. Flowers large. Standard hooded. Color, lavender blotched with red-purple. Bloom medium in quantity.

Began to bloom July 17.

Continued throughout the season.

At best August 12.

The same from Hutchins, except that the bloom was profuse, beginning with July 22.

25. *Crown Princess of Prussia.* (Burpee.)

Good. Flowers medium size. Standard convex. Color, standard pink, wings rose-pink. Bloom profuse.

Began to bloom July 15.

Continued throughout the season.

At best August 12.

Cupid: See page 182.

26. *Dark Red.* (Childs.)

Same as Painted Lady.

27. *Delight.* (Breck.)*

Good. Flowers small. Standard concave, stiff. Color, white. Bloom medium.

Began to bloom July 24.

Continued throughout the season.

At best August 12.

Same from Burpee, but bloom very profuse.

28. *Dorothy Tennant.** 1892. Fig. 78, center.

Good. Flowers large. Standard hooded. Color, red purple, the wings more purple, somewhat heavy. Bloom medium.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

29. *Duchess of Edinburgh.** (Burpee.)*

Good. Flowers small. Standard flat, stiff. Color, standard pink, wings rose pink. Bloom profuse.

Began to bloom July 19.

Continued throughout the season.

At best August 5.

30. *Duchess of Marlboro.* (May & Co.)

Very good. Flowers small. Standard flat. Color, standard pink, wings rose-pink. Bloom profuse.

Began to bloom July 22.

Continued throughout the season.

At best August 5.

31. *Duke of Clarence.* (Hutchins.)* 1893.

Fairly good. Flowers large. Standard somewhat hooded, with two sinuses in the sides. Color, purplish red, the wings strongly purple. Bloom profuse.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

32. *Duke of Kent.* (May & Co.)

Good. Flowers small. Standard flat, wedge-shape. Color, rose-pink. Bloom medium.

Began to bloom July 27.

Continued throughout the season.

At best August 5.

33. *Emily Eckford.* (Hutchins.)* 1893.

Good quality. Flowers medium and large. Standard hooded. Color, red-purple, bright. Bloom always sparse.

Began to bloom July 15.

Continued throughout the season.

34. *Emily Henderson.* (Burpee.) Fig. 79, bottom.

Very good. Flowers medium size. Standard flat, notched. Color, pure white. Bloom profuse, early.

Began to bloom July 13.

Continued throughout the season.

At best July 22.

35. *Empress of India.* (Burpee.)*

Very good. Flowers large. Standard flat, stiff. Color, salmon, soft, bright, one of the most beautiful. Bloom medium.

Began to bloom July 17.

Continued throughout the season.

Profuse from August 12.

36. *Etna.* (Hutchins.) Fig. 78, right.

Good. Flowers medium size. Standard flat, wedge-shaped. Color, standard pink, wings rose, brilliant. Bloom medium.

Began to bloom July 13.

Continued until September 1.

At best August 5.

37. *Fairy Queen.* (Burpee.)

Rather poor. Flowers small. Standard flat, stiff. Color, white, streaked or shaded with pink, the soft color almost pure. Bloom very profuse.

Began to bloom July 11.

Continued throughout the season.

At best August 5.

38. *Firefly.* (Hutchins.)* 1893.

Good in quality. Flowers small. Standard flat, stiff, spreading. Color, standard, crimson, wings rose-pink.

Bloom very sparse.

Began to bloom August 7.

Continued throughout the season.

39. *Flesh-Colored.* (Caldwell and Jones.)

Of no great value. Flowers small. Standard flat, notched. Color, standard pink, wings rose-pink. Bloom sparse. Much like Painted Lady.

Began to bloom July 17.

Continued throughout the season.

40. *Gaiety.* (Hutchins.)* 1893.

Fairly good. Flowers medium size. Standard slightly convex. Color, white, heavily streaked with pink, bright and somewhat fickle. Bloom profuse.

Began to bloom July 20.

Continued throughout the season.

At best August 12.

41. *Grand Blue.* (Gardiner & Co.)

Same as Imperial Blue.

42. *Her Majesty.* (Hutchins.)* 1892.

Good quality. Flowers medium size. Standard flat. Color, rose-pink. Bloom always sparse.

Began to bloom July 31.

Continued throughout the season.

43. *Ignea.* (Burpee.)*

Good. Flowers large. Standard flat. Color, standard pink, wings, rose-pink, brilliant, one of the richest colors. Blooms sparse.

Began to bloom July 15.

Continued throughout the season.

At best August 12.

44. *Imperial Black.* (Perry Seed Store.)

Fairly good. Flowers large. Standard hooded with two sinuses at the sides. Color, purplish red. Bloom profuse. Probably same as Imperial Blue.

Began to bloom July 20.

Continued throughout the season.

At best August 5.

45. *Imperial Blue.* (Burpee.)* Fig. 83.

Not a success. Flowers medium. Standard somewhat rolled. Color, purple-red. Bloom medium.

Began to bloom July 18.

Continued throughout the season.

At best August 12.

46. *Improved Painted Lady.* (Landreth & Sons.)

Very good. Flowers medium size. Standard flat, somewhat wedge-shaped. Color, standard pink, wings light pink, or white blotched with rose-pink. Bloom profuse.

Began to bloom July 13.

Continued profuse from July 22.

47. *Indigo King.* (Burpee.)*

Fair quality. Flowers large. Standard hooded with two sinuses at the sides. Color, standard, dark purple-red, wings, dark plum. Bloom medium.

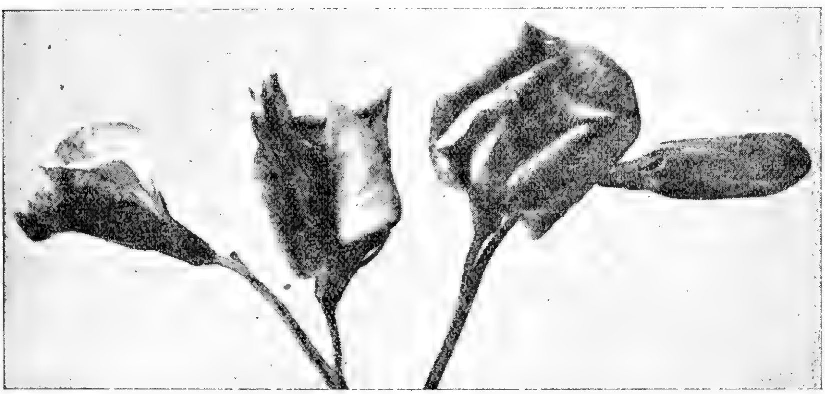
Began to bloom July 22.

Continued throughout the season.

At best August 12.

48. *Invincible carmine.* (Burpee.)

Not a success. Flowers small. Standard flat, wedge-shaped.



83.—Imperial Blue.

Color, standard dull pink, wings rose-pink. Bloom always sparse.

Began to bloom July 31.

Continued until September 1.

49. *Invincible Scarlet.* (Gardiner.)

Good. Flowers small. Standard convex, base wedge-shaped. Color, scarlet. Bloom profuse. Brilliant, but somewhat cheap, from becoming white about the edges as it fades.

Began to bloom July 15.

Continued throughout the season.

Profuse from August 5.

50. *Invincible Striped.* (Burpee.)

Fairly good. Flowers medium size. Standard slightly convex, notched. Color, white streaked with pink, rather cheap. Bloom profuse.

Began to bloom July 20.

Continued throughout the season.

At best August 12.

51. *Isa Eckford.* (Burpee.)*

Very good. Flowers medium size. Standard sometimes hooded. Color, light rose-pink, delicate. Bloom profuse.

Began to bloom July 19.

Continued throughout the season.

At best August 12.

52. *Joanna Theresa.* (Breck.)

Good. Flowers medium size. Standard flat, stiff, notched. Color, standard dark pink, wings reddish purple, rich. Bloom profuse.

Began to bloom July 19.

Continued throughout the season.

At best August 12.

53. *Lady Beaconsfield.* (Hutchins.)* 1894.

Not a success. Flowers small. Standard convex, wedge-shaped. Color, standard dull pink tinged with lavender, wings lavender and a very light yellow. Bloom medium.

Began to bloom July 13.

Continued until September 1.

At best August 12.

54. *Lady Penzance.* (Hutchins.)* 1894.

Good. Flowers large. Standard slightly hooded. Color, cherry. Bloom moderately profuse.

Began to bloom July 24.

Continued throughout the season.

At best August 12.

55. *Lemon Queen.* (Burpee.)* 1892.

Very good. Flowers medium size. Standard flat, stiff. Color, white with a slightly pinkish cast, soft, bright. Bloom medium.

Began to bloom July 13.

Continued throughout the season.

Profuse from August 5.

56. *Light Blue and Purple.* (Burpee.)

Not wholly a success. Flowers small. Standard convex, stiff, notched. Color, standard dark pink, wings purple. Bloom sparse.

Began to bloom August 3.

Continued throughout the season.

57. *Lord Derby.* (May & Co.)

Fairly good. Flowers small. Standard slightly concave, wedge-shaped. Color, standard pink, wings purple-pink. Bloom medium.

Began to bloom July 17.

Continued throughout the season.

At best August 5.

58. *Lottie Eckford.* (Burpee.)*

Not a success. Flowers medium size. Standard hooded. Color lilac. Bloom sparse.

Began to bloom July 29.

Continued until September 1.

See also New Lottie Eckford.

59. *Madame Carnot.* (Hutchins.)

Same as Imperial Blue.

60. *Minnie Keepers.* (May & Co.)

Good. Flower large. Standard Hooded. Color, standard pinkish lilac, wings lilac. Bloom medium.

Began to bloom July 19.

Continued throughout the season.

At best August 12.

61. *Miss Hunt.* (Burpee.)*

Good. Flowers medium size. Standard flat, slightly wedged. Color, light cherry. Bloom medium.

Began to bloom July 13.

Continued throughout the season.

At best August 12.

62. *Mixtures—*

Alneer's Invincible. (Alneer.)

A fairly good mixture. The lilac and pink do not harmonize any too well. Bloom medium.

Began to bloom July 19.

Continued throughout the season.

At best July 29.

Boston Beauties. (Rawson.)

A fairly good mixture. Bloom somewhat profuse.

Began to bloom July 23.

Continued until September 10.

Breck's Mixture. (Breck.)

Almost all white, though the combinations are good. Bloom medium.

Began to bloom July 20.

Continued throughout the season.

At best July 12.

Eckford's Gilt Edge or *Surpassing.* (Burpee.)

Not a good combination, but better than some others.

Began to bloom July 17.

Continued throughout the season.

At best August 12.

Eckford's New Mixed. (Burpee.)

Not a good combination, the contrasts of color too strong. Bloom profuse.

Began to bloom July 13.

At best August 12.

Fine Mixed. (Burpee.)

A mixture of the darker colors, giving a heavy effect. Bloom very profuse.

Began to bloom July 13.

Continued throughout the season.

At best August 5.

Huckins' Bouquet. (Geo. A. Huckins.)

None too good. Bloom profuse.

Began to bloom July 18.

Continued throughout the season.

At best August 5.

Invincible Mixture. (Vick's Sons.)

Not a good mixture. Too dark. Bloom profuse.

Began to bloom July 18.

Continued throughout the season.

At best August 5.

New Varieties Mixed. (Burpee.)

Combination poor; too great contrasts. Bloom profuse.

Began to bloom July 15.

Continued throughout the season.

Profuse from August 5.

Special Colored Plate Mixture. (Burpee.)

Good, but for the presence of an objectionable striped purple.

Profuse August 12. Out of bloom September 1.

Splendid Hybrid. (Perry Seed Store.)

Evidently consisted mainly of one pink variety. Bloom profuse.

Began to bloom July 13.

Continued throughout the season.

At best August 5.

63. *Monarch.* (Burpee.)*

Not a success. Flowers medium size. Standard flat. Color, light rose pink, soft. Bloom always sparse.

Began to bloom July 22.

Continued throughout the season.

64. *Mrs. Eckford.** 1892.

Not a success. Flowers small. Standard flat, stiff. Color, white. Bloom always sparse.

Began to bloom August 6.

Continued throughout the season.

65. *Mrs. Gladstone.* (Gardiner.)* Fig. 84.

Very good. Flowers medium size. Standard convex, rounded apex. Color, a light rose-pink, soft and delicate. Bloom profuse.

Began to bloom July 13.

Continued throughout the season.

Profuse from July 29.

66. *Mrs. Langtry.* (May & Co.)

Fairly good. Flowers medium size. Standard flat, notched. Color, pure white, rich. Bloom medium.

Began to bloom July 30.

Continued until September 15.

At best August 12.

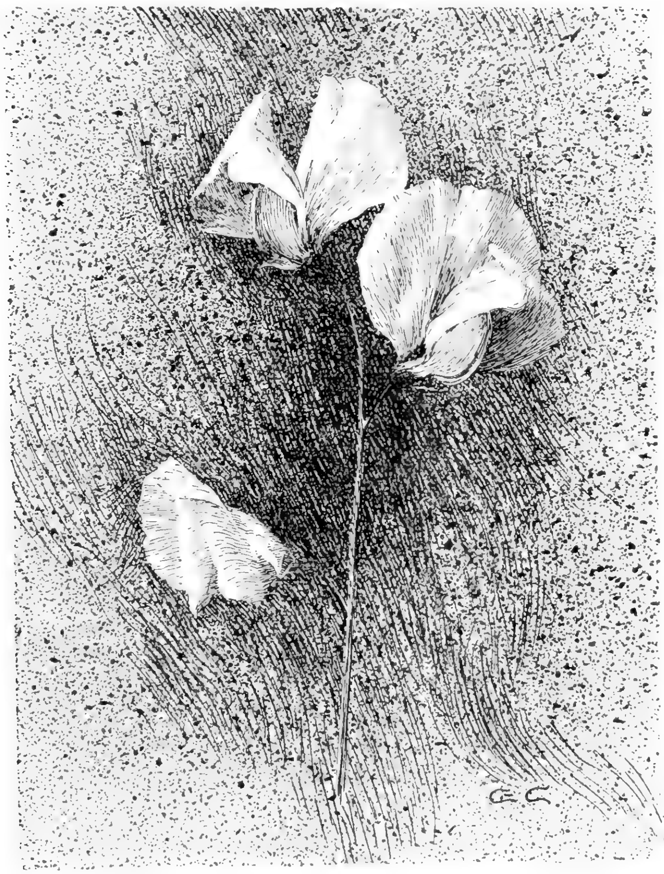
67. *Mrs. Sankey.* (Burpee.)*

Fairly good. Flowers medium. Standard flat. Color, light pink. Bloom rather sparse.

Began to bloom July 22.

Continued throughout the season.

At best August 12.



84.—Mrs. Gladstone. One of the best pinks.

68. *Nellie Jaynes.* (Barteldes & Co.)

Same as Painted Lady.

69. *New Lottie Eckford.* (Hutchins.)

Good. Flowers large. Standard hooded. Color, lilac. Bloom medium.

Began to bloom August 3.

Continued until September 1.

At best August 12.

70. *Orange Prince.* (Burpee, Breck.)*

Good, unique. Flowers small. Standard convex. Color, standard bright orange-pink, wings light rose. Bloom sparse.

Began to bloom July 29.

Continued throughout the season.

71. *Ovid.* (Hutchins.)*1894.

Good quality. Flowers large. Standard slightly hooded. Color, a bright reddish pink, brilliant, well diffused. Bloom always sparse.

Began to bloom July 20.

Continued throughout the season.

72. *Painted Lady.* (Burpee.)

Good. Flowers medium size. Standard nearly flat, slightly notched. Color, standard rose-pink, wings light pink, or else dark pink blotched with white. Bloom profuse. Bright.

Began to bloom July 13.

Continued until September 15.

At best August 12.

See Improved Painted Lady.

73. *Peach Blossom.* (Hutchins.)* 1894.

Grew to a height of forty inches, but did not bear a single blossom, although it produced buds at various times throughout the season.

74. *Primrose.* (Gardiner.)*

Good. Flowers medium size. Standard quite convex, notched, base wedge-shape. Color, white with a slightly yellowish tinge. Bloom sparse throughout the season.

Began to bloom July 22.

Continued throughout the season.

75. *Princess Beatrice.* (Burpee.)

Not a success. Flowers medium size. Standard concave, stiff. Color, soft pink. Bloom sparse.

Began to bloom July 22.

Continued throughout the season.

76. *Princess Louise.* (Burpee.)

Same as Violet Queen.

77. *Princess May.* (Hutchins.)

A failure. One blosom August 5.

78. *Princess of Wales.* (Gardiner.)*

Good. Flowers large. Standard flat, apex round. Color, drab strongly streaked with purplish red, dull. Bloom profuse.

Began to bloom July 17.

Continued throughout the season.

Profuse from July 29.

79. *Princess Victoria.* (Burpee.)*

Good. Flowers medium size. Standard flat. Color, standard pink, wings rose-pink. Bloom medium.

Began to bloom July 18.

Continued throughout the season.

At best August 12.

80. *Purple.* (Price & Read.)

Grew thirty-six inches high. First flower August 9. Did not bloom again.

81. *Purple Brown.* (Caldwell and Jones.)

Not a success. Flowers large. Standard somewhat hooded. Color, standard purple-red, wings purple. Bloom sparse.

Began to bloom July 23.

Continued throughout the season.

82. *Purple Prince.* (Burpee.)*

Not a success. Flowers large. Standard flat, stiff. Color, standard dark pink, wings purple. Bloom sparse.

Began to bloom July 30.

Continued until September 15.

83. *Purple Striped.* (Burpee.)

Good. Flowers medium size. Standard flat. Color, purplish-red streaked with lilac. Bloom medium.

Began to bloom July 13.

Continued throughout the season.

At best August 12.

84. *Purple Striped.* (Caldwell and Jones.)

Not like *Purple Striped* (Burpee), but like *Black and Brown Striped* (Breck).

Of little value. Flowers large. Standard flat. Color, white striped with rose-purple. Bloom scarcely any.

One blossom appeared August 5.

85. *Queen.* (Gardiner.)*

Good. Flowers medium size. Standard convex, base wedge-shaped. Color, standard light pink, wings a pink-purple. Bloom profuse.

Began to bloom July 17.

Continued throughout the season.

At best August 5.

86. *Queen of England.**

Medium quality. Flowers medium size. Standard convex, notched, base wedge-shape. Color, white. Bloom medium.

Began to bloom July 18.

Continued throughout the season.

At best August 12.

87. *Queen of the Isles.* (Burpee.)

Fairly good. Flowers large. Standard flat, stiff, wings at right angles to it. Color, white striped with pink. Bloom somewhat sparse.

Began to bloom July 25.

Continued throughout the season.

At best August 5.

88. *Red and White Striped.* (Breck.)

Poor. Flowers medium size. Standard convex. Color, white strongly streaked with pink. Bloom sparse.

Began to bloom July 23.

Continued until September 15.

89. *Rising Sun.* (Burpee.) Fig. 78, left.

Thrifty but not beautiful. Flowers small. Standard flat, slightly notched. Color, standard white streaked with cherry, wings white and cherry; brilliant. Bloom profuse.

Began to bloom July 13.

Continued throughout the season.

At best August 5.

90. *Royal Robe.* (Hutchins.)* 1894.

Fair quality. Flowers large. Standard slightly hooded. Color, pink, not well diffused.

Began to bloom July 20.

Continued throughout the season.

Blossoms always sparse.

91. *Senator.* (Burpee.)*

None too good. Flowers large. Standard flat. Color, lilac streaked with purplish red. Bloom medium.

Began to bloom July 23.

Continued throughout the season.

At best August 12.

92. *Scarlet.* (Vick's Sons.)

Fairly good. Flowers medium size. Standard flat, notched. Color, standard pink, wings purple-rose. Bloom somewhat sparse. Probably same as Invincible Scarlet.

Began to bloom July 24.

Continued throughout the season.

93. *Scarlet Striped.* (Burpee.)

None too good. Flowers large. Standard flat, wedge-shape. Color, white strongly streaked with pink, cheap. Bloom medium.

Began to bloom July 20.

Continued throughout the season.

At best August 12.

94. *Scarlet Winged.* (Vick's Sons.)

Did not grow.

95. *Snowflake.* (C. B. Strong.)

Did not bloom.

96. *Splendid Lilac.* (Burpee.)

Good. Flowers medium. Standard convex, slightly notched. Color, standard pink edged with red purple, wings lilac. Bloom profuse.

Began to bloom July 17.

Continued throughout the season.

At best August 5.

97. *Splendor.* (Burpee.)* Fig. 77.

Good. Flowers medium size. Standard flat. Color, bright pink.

Bloom sparse.

Began to bloom July 22.

Continued throughout the season.

98. *Stanley.* (Hutchins.)* 1894.

Good quality. Flowers large. Standard flat. Color, standard, dark pink, wings, rose-purple. Bloom always sparse.

Began to bloom August 2.

Continued throughout the season.

99. *Tangier Scarlet.* (Price & Reed.) Fig. 74.

Very good at a distance from the sweet pea. If both are together, the sweet pea is smothered, this species maturing very much the earlier. Flowers medium size. Standard, sometimes flat, stiff, obcordate, pointed, at others closely hooded so as to overlap itself and enclose the wings. Wings very small. Bloom profuse. A strong grower.

Began to bloom July 1.

Continued through most of the season.

Profuse from July 13.

A variety of Lathyrus Tingitanus. See p. 174.

100. *Venus.* (Hutchins.)* 1893. Fig. 85.

Good to very good. Flowers large. Standard slightly hooded. Color, soft pink, delicate. Bloom rather sparse.

Began to bloom July 19.

Continued throughout the season.

Blossoms always scattered.

101. *Vesuvius.* (Burpee.)

Good. Flowers small. Standard flat, stiff, notched. Color, standard pink with a shade of purple, wings reddish purple. Bloom somewhat profuse.

Began to bloom July 18.

Continued throughout the season.

Profuse from August 5.

102. *Victoria Regina.* (May & Co.)

Not a success. Flowers medium size. Standard flat, broad. Color, standard white heavily blotched with pink, wings blotched with purple-rose, cheap. Bloom medium. Much like Invincible Striped.

Began to bloom July 24.

Continued throughout the season.

At best August 12.

103. *Violet Queen.* (Burpee.)

Fairly good. Flowers small. Standard flat, wedge-shaped. Color, standard light pink, wings pink-rose. Bloom medium. (Princess Louise.)

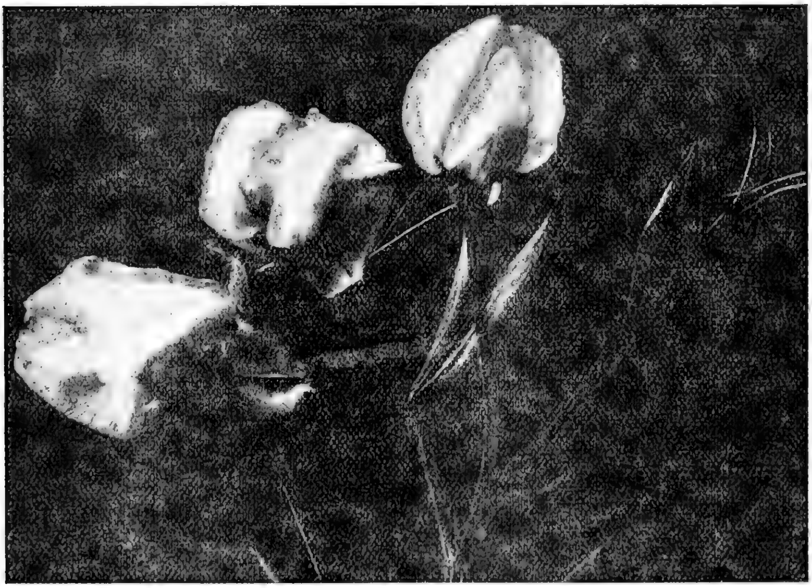
Began to bloom July 26.

Continued throughout the season.

At best August 12.

104. *Waverly.* (Burpee.)* 1892.

Good. Flowers small. Standard flat, wedge-shape. Color, standard light pink, wings light purple-pink. Bloom somewhat profuse.



85.—Venus. Soft and delicate pink.

Began to bloom July 22.

Continued throughout the season.

At best August 12.

105. *White.* (Burpee.)

Fair. Flowers medium. Standard, slightly convex, notched. Color, pure white. Bloom always sparse.

Began to bloom July 18.

Continued until September 1.

Same from another dealer. Not a success. Flowers medium size. Standard flat, deeply notched. Color, pure white. Bloom sparse.

Began to bloom July 30.

Continued throughout the season.

At best August 12.

106. *White Invincible.* (Childs.)

Fairly good. Flowers small. Standard flat, stiff. Color, white. Bloom medium.

Began to bloom July 22.

Continued throughout the season.

At best August 5.

The superlative ("very good") varieties in this test are the following:

Adonis,
Apple Blossom,
Blanche Ferry,
Boreatton,
Butterfly,
Captain of the Blues,
Cardinal Wolseley,
Countess of Radnor,
Duchess of Marlboro,
Emily Henderson,
Empress of India,
Improved Painted Lady,
Isa Eckford,
Lemon Queen,
Mrs. Gladstone,
Tangier Scarlet.

A. P. WYMAN.
L. H. BAILEY.

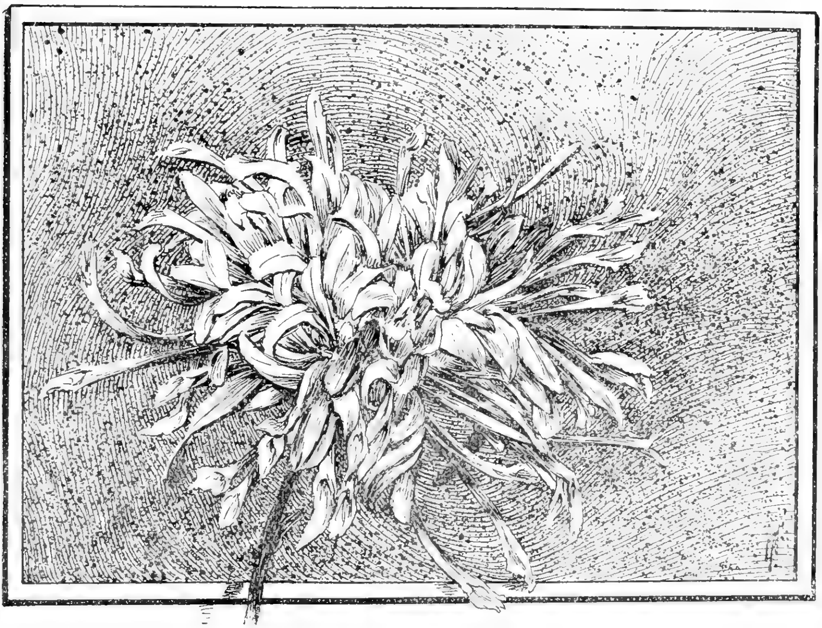
BULLETIN 112—February, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

THE 1895 CHRYSANTHEMUMS.



J. E. Lager. See page 282.

By L. H. Bailey, Wilhelm Miller, and C. E. Hunn.

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Office of the Director, 20 Morrill Hall.
The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and The Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.

CORNELL UNIVERSITY, ITHACA, N. Y., *February* 8, 1896.

Honorable Commissioner of Agriculture, Albany :

Sir.—This account of our cultivation of chrysanthemums in 1895, is submitted for publication under Chapter 230, of the Laws of 1895.

In our former report (Bulletin 91) of chrysanthemums, made nearly a year ago, we took the opportunity of a fly-leaf to explain our position upon the vexed question of the testing of novelties. We made the following statement: "We refuse to test varieties simply because they are new. Our basis of study is the monograph—the investigation of a particular subject, rather than the indiscriminate growing of things which chance to be put upon the market in a given year, and which have no relationship to each other aside from a coincidence in date. When we take up a certain group of plants for study, we endeavor to secure every variety of it, old or new. These varieties are studied not only in the field, but botanical specimens are invariably made of every one, so that the experimenter has specimens before him for leisurely study when the hurry of field work and the excitement of bug-catching are done. We are always glad to receive the seed novelties of any year, but we do not agree to report upon them or even to grow them. If we were to attempt to grow them all, we should simply be making a museum of curiosities, and we should have no time left for investigation and experiment."

This seems to be plain enough to allow of no mistake as to our position, yet we have been half accused of an unwillingness to aid dealers and buyers in the determining of synonyms and the discarding of duplicate and unworthy varieties. This is exactly the opposite of the truth. We are so desirous of aiding in this direction that we have refused to make any effort except when we believed that we could really accomplish the purpose. We are free to say that we have no sympathy with the ordinary "variety test," which simply grows a lot of things and then sets down a few unrelated measurements of them. One must make a comprehensive and detailed and prolonged study of his subject, with all the factors before him, before he is able to judge of such an apparently simple thing as the merits of varieties. All estimates of varieties must be comparative. One can not grow an onion, and then say that it is or is not the same as others, nor can he likely give any accurate measure of its comparative merits, for he has no other varieties with which to compare; and he can not carry even such emphatic subjects as onions in his mind from year to year. One can not file away specimens of all garden varieties, as they grow in all soils and all seasons, as he can dried plants and bugs. If the station officer is to be able to identify and to judge all varieties sent to him, he must attempt to grow every variety of plant every year. And even if he should grow them all, he would likely gain little, save experience, from his effort, for the subject is too large for instant study. In 1896 we expect to make a study of Brussels sprouts, dahlias, sweet corn, chrysanthemums, cannas and tuberous begonias, and any person who has varieties of these things which he wants tested may send them to us. Of these things, especially the ornamentals, we should receive the novelties in advance of their general introduction, if possible.

In this chrysanthemum study, I have been fortunate in my associates. Mr. Miller is a special student in horticulture, a graduate of the University of Michigan, and has given most enthusiastic attention to our chrysanthemum test. Mr. Hunn is a gardener of much experience, well known for his long and earnest connection with experiment station work.

L. H. BAILEY.

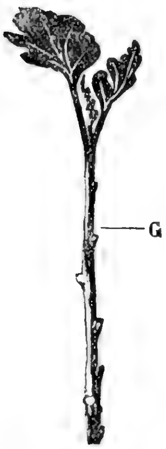
86.—Chrysanthemums grown for specimen blooms.

The 1895 Chrysanthemums.

I. Sundry Remarks upon the Subject.

It is charged that the rapid popularization of the chrysanthemum is mere fashion. It may be so; but if fashion were henceforth always to produce so many beauties as it has in the chrysanthemum, it might be forgiven its endless record of follies. The transcendent merit of the chrysanthemum lies in its almost limitless variety of form, texture and color of flowers. There is no plant known to American gardens which approaches it in these respects, not even the rose. Such variety of form is possible only in compositous flowers, in which each floret is a distinct element and capable of independent development. One cannot feel the truth of these remarks until he has an opportunity to study a large collection of varieties growing together. He will then see that almost every form of compositous flower which the mind can picture has here arisen.

Yet, various as the chrysanthemums are, there are limitations to the development of the species in certain directions. For example, it is idle to look for a blue chrysanthemum. This is not because of any assumed or theoretical incompatibility of the blue and yellow series of colors, but simply because no true blue varieties have ever yet appeared, to our knowledge. The only guide in the breeding for particular characters is experience, or the observed behavior of the species. The chrysanthemum has been cultivated for some thousands of years, but amongst all its departments it has given no blue flowers. It is reasonable to expect that if no hint of such variation has occurred in all this eventful evolution, we can have little hope for its appearing in the future. The same remark will apply to the much-coveted but ever-evasive blue rose. It is a fundamental tenet of plant-breeding that the operator must put himself in line with the natural tendencies of the plant and work harmoniously along with nature, rather than to set himself against her. Man's power lies more in improving or augmenting tendencies which already exist than in creating new tendencies. There is a tradition, to be sure, that a blue chrysanthemum was once produced, under political pressure, in the orient, but there is no exact knowledge of the matter; and if the King of Japan really did receive such a tribute, I am willing to believe that some one connected with the transaction forestalled the modern flower "artist" and dyed the flower. It is possible, of course, that a blue chrysanthemum may appear, but the probabilities are all against it; and if it does come, it will probably originate as a sport or bud-variety rather than as a definite attempt thereat on the part of the operator.



87.—'Mum cutting. Half size.

One must remember, too, in this connection, that the heavy colors of chrysanthemums are nearly always associated with heaviness and gracelessness of habit. We have no pure deep red with the cut of Mrs. Rand, for example. But even the same form, particularly if it inclines strongly to regularity, has a heavier appearance in dark colors than in light ones. There is no more fertile field for the development of new types than in the combining of light and graceful forms with dark colors.

A word about the culture of chrysanthemums.— Our own tests of chrysanthemums have been made for the purpose of obtaining specimen or exhibition blooms. The plants are, therefore, trained to a single stem and a single flower. Fig. 86 shows our house as it looked last November. When so many varieties are grown, the house is not at its best at any one time, but there is a progressing exhibition. The house therefore, lacks the full appearance of an ordinary commercial house. These plants were made from cuttings taken the previous spring, the plants having been grown in pots until late July, when they were taken from the pots and set in the bed.

This growing of the plants to a single bloom does not produce the most decorative or satisfactory results. It simply gives large specimen blooms. I much prefer to grow from three to six blooms on a plant, and shall do so this year. The plants may be flowered in pots, or in a solid soil bench. Very good small plants may be brought to perfection in 6-inch pots, but the best results, in pot plants, are to be obtained in 8-inch or 10-inch pots. If the plants are to be used for decoration, they should, of course, be grown in pots, but the best results for cut flowers are usually obtained by growing in the earth. In any case, the cuttings are made from the tips of basal or strong lateral shoots, late in February, to May. One form of cutting is shown in Fig. 87. It is inserted in the soil to the point C. If the plants are to be flowered in pots, in which case they usually mature earlier, the cuttings may be started as late as April, or even June; but if they are grown in the soil and large plants are desired, the cuttings should be taken in February or March. The plants which are flowered in the soil are generally grown in pots until July. The grower must decide how many blooms he desires on a plant, and then train the plant accordingly, bringing up the different branches so that they will all bloom at the same time. A well-grown chrysanthemum, in an 8-inch pot and bearing five or six perfect blooms, is one of the most decorative plants which the florist can produce.

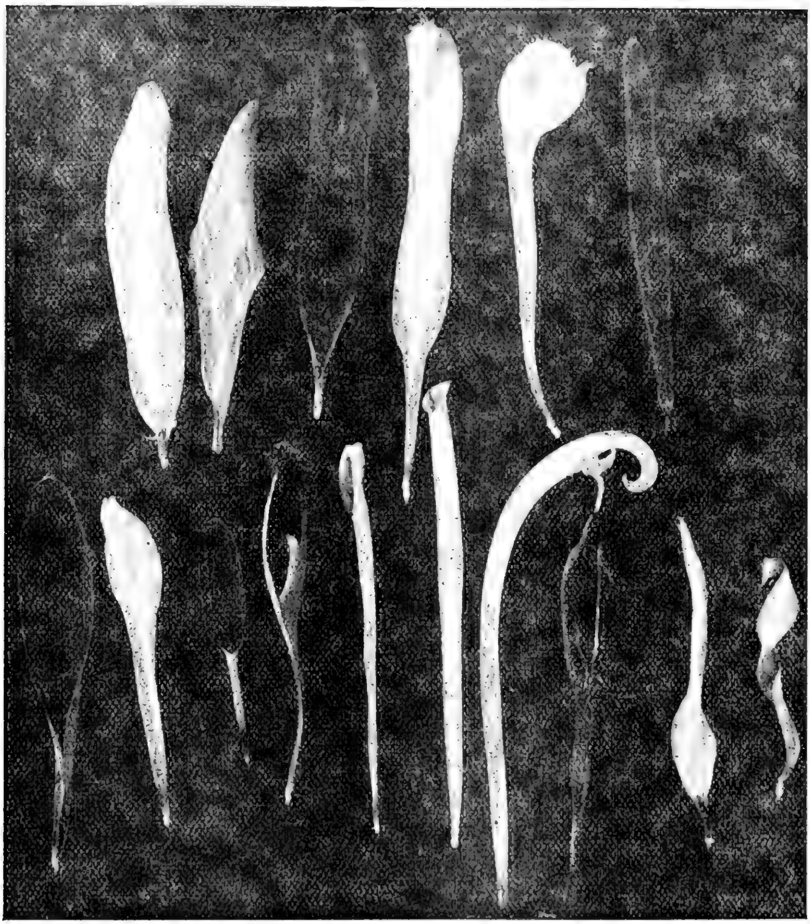
Reflections upon nomenclature, classification and variation (*Mr. Miller*).—There is need for reform in three important matters relating to chrysanthemums—nomenclature, synonomy and classification. New varieties of chrysanthemums often bear absurd, bombastic and vulgar names. Many are named after society leaders and prominent persons. There are always practical reasons why novelties are named after popular men and women, and these reasons are often unworthy ones. The poor quality of cigars named after election candidates is notorious. Those who buy new flowers, because of the attractive names, usually feel defrauded of their sympathies. The criticism is often made that our monthly magazines are dealers in attractive titles; that the matter is rarely as spicy as the caption. The disseminators of new horticultural varieties take advantage of waves of popular enthusiasm. They name flowers after actors, base-ball players, barons, saints and society leaders. Almost is realized one of Dean Swift's dissonant combinations, "lords, fiddlers, judges, and dancing masters." The only consistent course is to abolish the whole system of naming varieties after living persons. So long as this system continues, the element of disappointment and bad taste will persist. It is a constant reproach to horticulture that the art lacks dignity. Need it also be pointed out that we seem to be deficient in imagination?

The reform would be sweeping if made all at once, but there is a preliminary step in this direction that can easily be taken. All such titles as Mr., Mrs., Miss, General, Judge, Count, Baron, etc., should be dropped. These titles cause endless confusion. What makes the case peculiarly hopeless is that the National Chrysanthemum Society of England, in its Official Catalogue, has set the example of indexing varieties according to these titles, in defiance to the established rules adopted by librarians, indexers and cataloguers. It frequently happens that the *pater familias* is not the only popular member of the family. In verifying varieties by English catalogues (whose methods have been tamely copied in America) it is often necessary to remember which is Miss Blank, and what are the first names of the other daughters. Label-writers are usually careless, and their " M " may stand for Mr., Mrs., Miss, Monsieur or a Christian name. According to the trade journals it is not uncommon to order a " Miss " and get a " Mr." The use of titles ought to be discontinued.

There are other problems of nomenclature which are coming up constantly. Many of them have been considered by societies devoted to other flowers or to fruits. The only real attempts to solve any of these problems have been made by the American Pomological Society, and, for vegetables, by a committee of Experiment Station horticulturists. The Pomological Society has drawn up a set of rules, but, unfortunately, the other societies do not follow them. What is really wanted for progress is a national horticultural society in which professional growers of plants, amateurs and botanists may work together. The societies devoted to the culture of a single flower could coöperate with the national society. Of course, a society, as such, might not deal with problems of synonomy and classification, but its members could do so either as committees or as individual students. Records of hybridization are worth keeping, as well as many other data for a study of the botany of cultivated plants. It is a pity that we have no horticultural society of the dignity of the Royal Horticultural Society. The American genius for organizing ought to be able to create a better society than this for our own needs. Commercial men could supply materials for history and science, and botanists could instruct plant-breeders at almost every point of their work.

There is this distinction between botanical classification and horticultural classification: The world can wait for the first; the second has a daily practical bearing. Prizes often do harm in this—that they encourage production of flowers that conform to arbitrary and fallacious standards and discourage informality and freedom. This is strongly illustrated in the case of the Mrs. Alpheus Hardy chrysanthemum. The hairiness of that variety was no novelty in the western world. It had repeatedly appeared in England and had been patiently, if not sorrowfully, repressed. The florists did not want a hairy flower, nor was it absolutely new, and the success of the florist who sold it for $1,500 and the dealer who is supposed to have made $10,000 out of it in one year, must be explained in some other way. The lesson of this is that conventional standards and horticultural classifications are often tyrannical. It is certain that in 1886 no hairy chrysanthemum could have won a prize before the National Chrysanthemum Society of England. If florists want a good example of the tyranny of classifications they can examine the centenary catalogue of that society and see the ten artificial sections that the English have made and Americans too often follow. The English have more rigid classifications, a more severe system of scoring by points, bigger prizes and less individuality in their flowers.

The danger of suppression of individualism can be averted for the present, so far as the American Chrysanthemum Society is concerned, by a more liberal interpretation of what "incurved" and "Japanese" may mean. The Japanese section should be made broad enough to include most types which do not fit elsewhere. The English "incurved" chrysanthemums are compact, round, formal and regular. The florets are carefully arranged in mathematical order by means of forceps. The "dressing" of



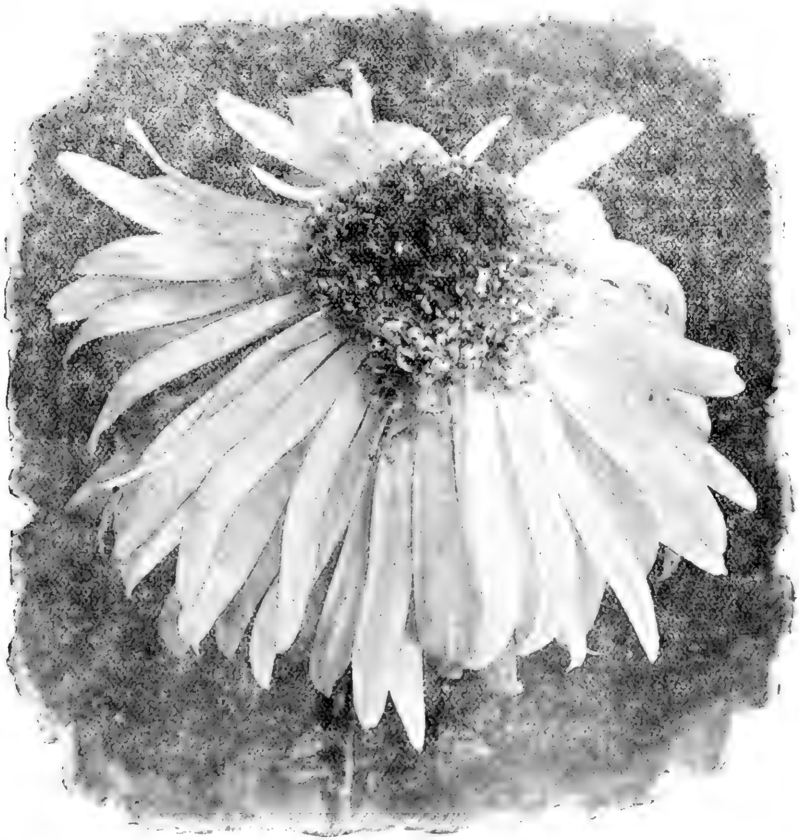
88.—Forms of chrysanthemum florets. (See pages 265.)

Floret incurved, 13,
Floret reflexed, 2,
Margin incurved, 7, 10,
Margin revolute, 2, 15,
Ligulate, 1, 6,
Tubular, 12, 13,
Various degrees of tubularity, 7-13,
Doubly curved (*i. e.*, twice curved, *not* "recurved"), 3.
Incurved and cupping, 4,
Incurved and hooded (cucullate), 5,
Laciniate, or cut, 13, 14,
Twisted, 15, 16,
Hairy, 4, 5,
Quilled, 11,

petals is unpopular in this country. The guard petals of exhibition carnations in England used to be pasted down on cardboards. There are perfectly estimable people who still take pleasure in the stiffest incurved chrysanthemums. Indeed, it is the wonder and the glory of the chrysanthemum that it can be varied to suit all tastes. This variability is a thing inherent and essential. It is the peculiar genius of the composites. Asters have it, dahlias have it, and chrysanthemums most of all. It is capable of reflecting the fleeting frivolities and fashions of the age as well as certain deeper and dearer things. Chrysanthemums can be formal as well as fanciful, but we have plenty of other formal flowers. Incurved chrysanthemums were popular in a hoop-skirt age, but the Japanese are truly *fin de siecle.* They are informal, fanciful, quaint, odd, individual, and, therefore, a more complete expression of the times than single, incurved, anemone or pompon-flowered sections.

Descriptions of the florets (*Mr. Miller*).—The greatest confusion exists in commercial catalogues as to descriptive terms for chrysanthemums. For example, the word "recurved" is used by some dealers to mean twice curved or doubly curved, *i. e.*, the second curve being in a direction opposite to that of the first. (See No. 3 in the plate illustrating different types of florets, Fig. 88.) Botanists, however, use "recurved" to mean a single curve of greater extent that that expressed by "reflexed." Descriptive catalogues are hard to write and harder still to order from. Illustrations are preferable in this day of cheap mechanical processes of engraving. A "half-tone" gives one an idea of the bloom which no words can convey. Sometimes, however, the individuality of the floret needs special notice, and it is often impossible to tell from the loose description of florists whether they are describing the blossom or the floret. Illustrations are needed to give general effect, and botanical terms to describe particular effects. No descriptions can convey the idea of the form, compactness or looseness, regularity or irregularity of the blossom so well as a picture does. The floret, however, can sometimes be described by words that are helpful to the imagination. "Ostrich plume" is a fanciful and attractive name, but it has no place in botany. "Hairy" is the proper term. A head of florets like No. 13 (Fig. 88) gives the general effect of hairiness, and it takes a second look to determine that the individual florets are irregularly cut, but do not have hairs or trichomes, as do florets 4 and 5.

Cataloguers should distinguish between a floret and its margin. For example, a reflexed floret may also have its margins reflexed



89.—W. W. Astor. Four-fifths natural size.

(No. 2); an incurved floret may be ligulate (No. 6), tubular (No. 13), or have its margins incurved (No. 7). Unfortunately, it is impossible to indicate such various degrees of tubularity as are successfully presented by the florets No. 13 to 7. Nos. 12 and 13 are properly called tubular and No. 11 quilled. The ligulate form of petal is conceived to have been originated by the splitting of a tubular form. This theory is well illustrated by florets 13 to 6. In No. 9, half of the floret shows the tubular origin, and half is ligulate. Whether the opposite tendency for ligulate to produce tubular forms exists, is a question. Possibly Nos. 7, 15 and 16 might be regarded as transitional forms from the ligulate to the tubular. It is often important to distinguish whether a floret is ligulate or whether the margins are incurved. For example, single, intense, vivid colors are probably best displayed by a ligulate floret. Crimsona (No. 6) is a case in point. The color of Miss Helyett is a similar shade, but the general effect is ruined (for some at least) by a distracting element: the margins of the florets are turned in so much that florists would say, "it shows the under side."

Various types of chrysanthemum florets are shown, natural size, in Fig. 88. No. 1 is a ligulate floret which was incurved in the bloom; No. 2 stood reflexed in the flower, margins revolute; No. 3, floret doubly curved, is cupped at base and top and high in the middle; No. 4, incurved as it stood in the flower, hairy-tipped, cupped, but the character not showing well in the cut (Mrs. Higinbotham); No. 5, incurved in the flower, hooded and hairy-tipped; No. 6, ligulate floret (Crimsona); No. 7, tubular below, broadly ligulate above, the margin incurved; No. 8, greater part of the floret tubular; No. 9, to be compared with No. 7; No. 10, a partially tubular floret, with very slender base and strongly involute blade; No. 11, quilled floret; No. 12, tubular, straight (Iora); No. 13, tubular and curved or hooked, the apex cut or laciniate (Mrs. R. W. E. Murray); No. 14, deeply cut or laciniate (Mrs. W. H. Rand); No. 15, broad at base, twisted above (Ezeta); No. 16, floret twisted throughout (Shavings).

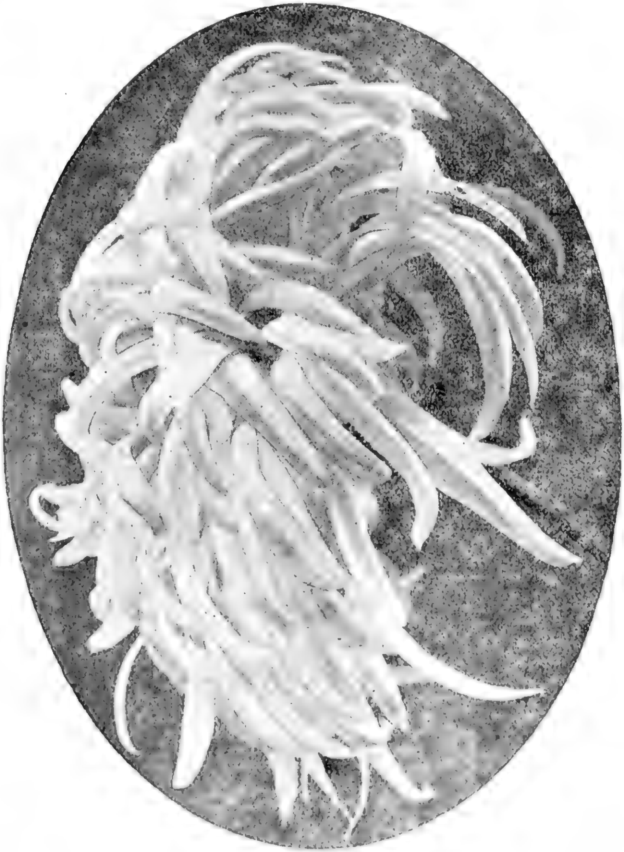
Color problems (*Mr. Miller*).—In consulting catalogues of chrysanthemums for the purpose of verifying new varieties, some very perplexing color problems were encountered. Much of this confusion can never be straightened out, because color is a subjective phenomenon. It exists in the minds of men, rather than in nature. But there are certain practical suggestions which can be made to flower dealers, and it is to be hoped that some general principles can be educed. Cataloguers of new varieties should not attempt to make very fine and subtle distinctions, nor should

90.—M. Georges Biron. Natural size.

they use such seductive phrases as "soft dove colored," "fawn colored," etc. Men who write of colors should be examined for color blindness, so that they may know their own limitations. The great practical reason against using words expressing fine shades of color is that these words mean very different things to different persons. It is hard enough to get people to agree on such staple colors as red, blue, green and yellow. What the florists of the country need is a cheap chart of colors, containing simply the common names and the common colors. This matter has been agitated for several years. Mr. F. Schulyer Mathews, a well-known artist and colorer, prepared a chart for the use of florists, which was published as a supplement to the American Florist of August 17, 1895. It is an excellent and worthy attempt, and is a distinct gain to the profession; but it has the fault of containing too many uncommon and unimportant colors and names of colors. "Dull ultramarine (blue, grayish)" is too long for ordinary use. Even if the florist were capable of distinguishing between Mr. Mathews' "salmon," "salmon pink" and "reddish salmon," these names would never be attractive names for the description of flowers. It is very doubtful whether people would care to distinguish lilac and light lilac. Horticulturists ought to agree upon twenty or thirty common names of colors and then secure the preparation of a chart to correspond with these common names. We need colors for the names in common use.

People must not expect too much of color charts. They should realize (as Mr. Mathews does) that pigments cannot compete with the colors of nature. Pigments are dead, petals are alive. Moreover, neither pigments nor petals correspond with the colors of the solar spectrum. It is doubtful if Mr. Mathews is warranted in calling his colors "absolutely true." They may be correct from the pigmental or chemical standpoint, or from the standpoint of technical or trade nomenclature, but it is a question if these are to be the standards of absolutely true colors. The fact is that there is no absolute standard of color. Lapis lazuli and bichromite of potash may furnish very stable and constant pigments, but these materials and all others have decided limitations. These limitations must be understood, or there will always be disappointment, no standard in common use, and the consequent mutual charges of dishonesty and color blindness.

There are one or two suggestions which I offer in the hope that they may be of some practical help to those selecting varieties. The first suggestion is intended for those who grow chrysanthemums on a small scale, who wish the best of the new



91.—Madame Carnot. Half size.

varieties, and cannot afford to experiment with many. This suggestion is that such growers select of new varieties only those which have a single color. It is early enough to get those varieties containing combinations of two or more colors after they have stood the test of a year's experience with the market. People like strong, vivid and highly individualized single colors in chrysanthemums. There are only two sides to the question when a single pure color is considered. People either like or dislike it. But when two colors are combined there are infinite possibilities for difference in taste. For example, here is a list of eight recent chrysanthemums, all of which have combinations of only two colors—Fred Walz, Mme. O. Mirabeau, Mrs. Potter Palmer, Genevieve, Sunset Pink, Mrs. C. Harmon Payne, Edith Smith and Burt Eddy. Now, who is to decide which one of these is an inharmonious mixture and which a happy combination? But the problem is even more complicated than this. Let us suppose that the variety Burt Eddy contains seventy per cent. of red (to avoid confusion I shall not attempt to describe the shade) and thirty per cent. of white, on each floret. Do you suppose that this proportion can be maintained year after year? Florists know that combinations of colors are very unstable. I do not mean to condemn these varieties out of hand. Some of them may prove stable as to their proportions, and artistic in effect, but the ordinary florist can afford to wait a year. The point is, that these are typical of a class which it is safer for him not to buy while they are new.

Other mixtures of doubtful value are Gilt Edge, Evening Star, Miss Sylvia Shea and Mrs. Moses Wentworth.

To illustrate how variable the amount of color is, the case of the new variety, Miss M. M. Johnson, may be cited. This is advertised as a pure yellow, but some of the many blossoms grown this year showed varying amounts of red. Radiance is another yellow that should be made "red proof" before being sent out as a pure yellow. Secondary colors appear with age in many new varieties that have only one color at their best. The pink that comes with age to Crystallina (white) is attractive, but that which spreads over Miss Georgiana Pitcher (yellow) makes a melancholy spectacle. Often there is a chance for difference of opinion. In any case, would it not be well for disseminators in their introductory notices to state the fact of secondary color appearing with age? An analogous case is that of varieties which show the center. Mrs. J. M. Parker, Jr., and Mme. Carnot are two of many new examples of this latter class. The center is objectionable in one; not objectionable in the other. It is a matter of dollars and cents to cut the flowers of the former and sell them before the center shows. But such judgments are essentially personal. What buyers want is the fact. If the center shows, the disseminator should state the fact.

A blue chrysanthemum is not impossible. It was formerly taught that red, yellow, and blue flowers could never be gotten in the same species. Scientists no longer believe in the incompatibility of the cyanic and xanthic series of colors. A blue chrysanthemum may arise either from seeds or "sports." As far as seedlings are concerned, one would naturally be tempted to save the seeds of varieties approaching purple. Blue is perhaps most easily reached through purple, but when the blue is once obtained the difficulty is to keep out the purple. Probably we shall never have an azure-blue chrysanthemum. Even the fringed gentian, which is the standard for azure-blue among wild flowers, is not always free from purple. The tendency among chrysanthemums is to sport towards white, instead of away from it. Of course, sports, like men of genius, have a way of disregarding prophecies, but the tendency is worth pointing out. The story is often repeated that in the year 386 A. D. the King of Corea had to pay to the Japanese Emperor a tribute consisting of red, white, yellow, blue and black chrysanthemums. Even granting that the tribute was actually paid, what proof have we that the Japanese word for blue has meant the same thing for fifteen centuries? Moreover, how does the average person know that the Japanese word is properly translated? If those who are striving to produce a blue chrysanthemum, are also cherishing hopes of selling it for $1,500, they should be reminded that the public may not care for it when it is obtained. A green chrysanthemum was very rare, but when the two plants of the pink variety Viviand-Morel sported to a green simultaneously in different parts of England, the coincidence was barely mentioned in a British horticultural journal.

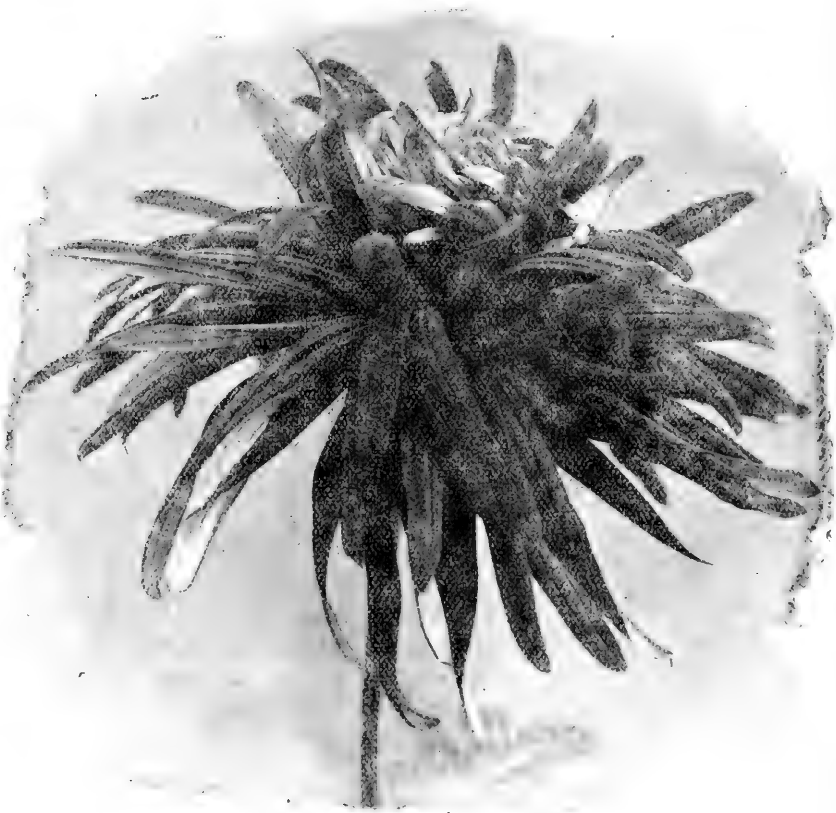
Fragrance (*Mr. Miller*).— Can chrysanthemums be made fragrant? Yes and no. Nymphæa is fragrant, but it is a small-flowered variety. There are at least half a dozen others. How much these can be developed is a question. At any rate, the large-flowered varieties will certainly never all be fragrant. They are valued for other things. If odor is associated with hereditary constitution, the chances are small for making the genus chrysanthemum a fragrant one. People are not looking to the chrysanthemums for odor, but simply for form, color, and texture. Fragrance would have to be very emphatic to make any impression beside a flower six or eight inches in diameter. And besides, whatever odor the flower might have would be overpowered by the heavy scent of the foliage. Yet there is nothing really incompatible with the development of odor in the large chrysanthemums. Nymphæa has been forced to grow flowers four inches across.

II. TEST OF NOVELTIES.

In judging new varieties, we have this year divided all the chrysanthemums into very good, good, poor, and intermediate. The word intermediate does not appear in the list, however, because it was thought best not to try to describe the shades of merit between "good" and "poor." When, therefore, there is no comment upon the merit of the variety, it is to be understood that, in our test, the variety seemed to be only intermediate or indifferent in quality. There are so many good and very good chrysanthemums on the market that it is necessary to measure new varieties by a high standard. If the present judgments seem to imply a rigorous standard, it is certainly not so severe as the test of time. It is safe to prophecy that most of the new varieties of 1895 will not be for sale five years from now.

The most complete adaptation to current wants is found among white and yellow chrysanthemums. There is great room for improvment in pinks and dark shades. There are plenty of quilled and hairy pinks, but the Japanese incurved section possesses no pink of the size and beauty of Mrs. Henry Robinson (white) or a dozen yellows that could be named. The trouble with delicate shades of pink is that the color is rarely evenly diffused and it often fades out. The lack of single, pure colors other than white, yellow and pink, is very noticeable. Dark reds are very popular, and yet there is no section in which so little improvement has been made as that represented by Cullingfordii, Geo. W. Childs, John Shrimpton, and Mrs. J. H. White.

In the description of varieties below, the name in the parentheses following the name of the variety signifies the dealer who sent us the cuttings; the name at the end of each description is that of the introducer, so far as we are able to determine from the current literature. The varieties are arranged alphabetically according to the customary rules of library catalogueing, except that whenever a name consists of two words, the first of which is an adjective, the variety is indexed according to the first letter of the adjective, — *e. g.*, Latest Fad is put under "L" and "Autumn Leaves" under "A." Varieties named for persons are catalogued under the sur-



92.—Crimsona. Four-fifths natural size.

name. All those varieties which were first introduced to the trade last year are marked "1895." Those few without dates are such as we have been unable to trace to the introducer; but they are all very recent.

There are several matters of great practical importance which an experiment station cannot determine for the forcing-house industry. Florists must decide amongst themselves the shipping qualities of different chrysanthemums and the length of time cut flowers will last. These matters are of great practical and momentary value, but of little scientific or permanent importance. The depot for such information should be the trade journals. It is surprising that greenhouse men do not supply these lists to their trade papers with greater frequency instead of going on year after year making avoidable mistakes, and purchasing experience dearly.

The following varieties described in Bulletin 91 have been grown again this year with results similar to those recorded last year. *Elizabeth Bisland*, *Georgienne Bramhall*, *Charlotte*, *Maud Dean*, *Golden Wedding*, *Mrs. Chas. Lanier* (better than we said), *L'Enfant des deux Mondes*, *Mrs. Geo. J. Magee*, *Mayflower*, *Mutual Friend*, *Niveus*, *Mrs. Howard Rinek* (worse than we said) and *Miss Florence Pullman.*

Some of the older varieties, not mentioned in Bulletin 91, have been grown again. Of these the following have done well:

Callendreau, Dr.—Similar to *Miss Georgiana Pitcher.*

Comley, Jas.—A very good late variety, dark red, changing to carmine and white.

Iora.—See Fig. 93, and page 234.

Lippincott, Mrs. Craig.

Queen, The.—Midseason, white.

Shrimpton, John.—Type of *Cullingfordii*, and the best red 'mum.

Sunderbruch, F. L.—Early yellow.

Viviand-Morel.—The standard pink of its class, and still to be excelled.

The following were intermediate in merit: *John Bunyan*, *Geo. S. Conover*, *Miss Heylett*, *Eva Knowles*, *Sautel's White.*

The following were poor or bad: *Mrs. Jas. Eadie*, *John M. Kupfer*, *Mrs. C. H. Payne*, *Sylvia Shea*, *Yellow Queen.*

The following descriptions and estimates of varieties are made up from notes taken by Mr. Hunn, Mr. Miller and myself.

The dates in the descriptions indicate when the flowers were at their best.

1. *Abbott, Marion* (Smith*)—Flower 6 inches wide, pink, "color of *La France* rose," incurved, and slightly hairy. Stem 46 inches, long jointed. Nov. 20. (Spaulding.) 1895.

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* Nathan Smith & Son, Adrian, Mich.

2. *Astor, W. W.* (Smith)—Good. (See Fig. 89.) Flower medium sized. The single row of ray florets white, edged with pink; disk flowers yellow, forming a high compact centre. Stem 36 inches, leaves small, deeply cut. Claimed to be an improvement in size. This belongs to an unpopular class. Considered by gardeners as of no value for commercial purposes. Keeps well. (Rob't Owen, Maidenhead, Eng. Introduced in America by Hill and Smith, 1895.)

3. *Atkins, F. L.* (Smith)—Flower 6 inches. Florets reflexed. Stem 40 inches, close jointed, leaves long and pointed. Considered by our gardener a good midseason white for commercial purposes. November 16. (Pitcher and Manda.) 1895.

4. *Autumn Leaves* (Smith)—Flower 6 inches wide; a combination of white, red and yellow, the yellow being confined to the tips of the florets. Habit half dwarf, stem close jointed, foliage thick and leathery. The combination of color is considered a pleasing one by our gardener. At best December 12. (Spaulding.) 1895.

5. *Bigelow, E. M.* (Dorner*)—Good. Flowers 5 to 7 inches, with general appearance of a red dahlia. Florets stiff, a few outer ones reflexed. Stem 50 inches, close jointed; leaves large, heavy, deeply cut. Considered by our gardener a fine, showy variety of a color that is scarce among chrysanthemums. Late. (Dorner.) 1895.

6. *Biron, M. Georges* (Beckert†)—Good. (See Fig. 90.) Flower 6 inches in diameter, bizarre, showing chiefly the reverse side of florets which are strongly whorled. Inner sides of florets maroon, reverse amber-colored. Stem 42 inches, habit slender, leaves long and deeply cut. This eccentric appearance may be incident to development or confined to rare cases, as the flower is advertised to belong to the *Viviand-Morel* type. This is recommended chiefly for its oddity and the attention it attracts. November 16. (Calvat.) 1895.

7. *Black, Miss Louise D.* (Beckert)—Flower 4 to 5 inches in diameter, regular and globular, orange-red. Florets small, semi-tubular and tending to incurve. Stem 36 inches, habit slender. A good variety for its type and color. 1895.

8. *Bloodgood, Helen* (Hill‡)—Good. Flower 7 to 8 inches, pink. Florets mostly incurved, the outer ones irregularly reflexed. Stem

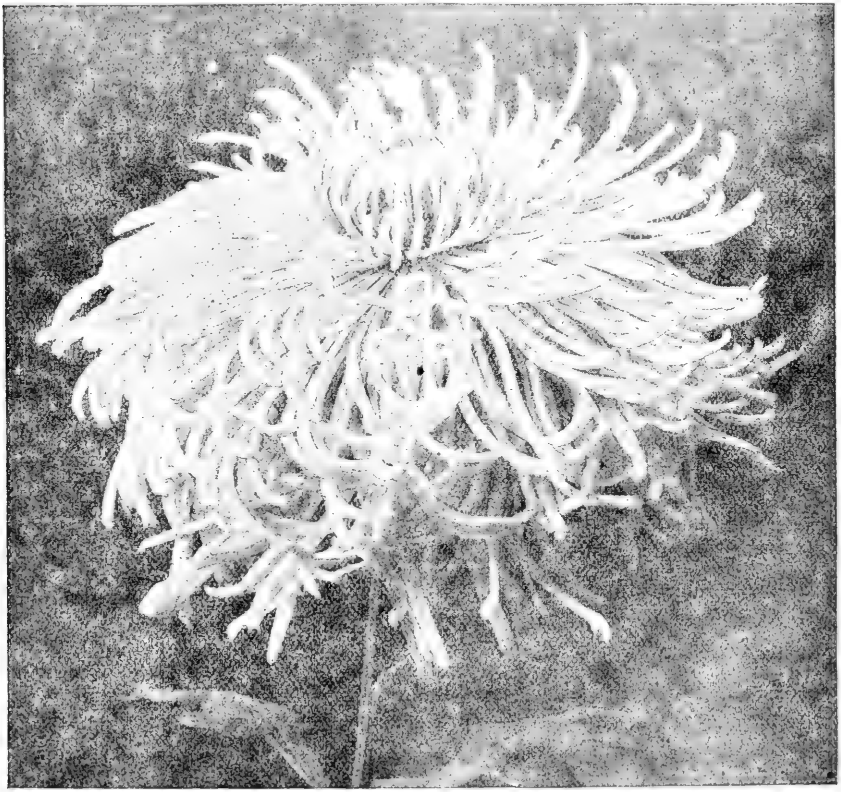
* Dorner & Son, Lafayette, Indiana.

† Beckert & Bros., Glenfield, Pa.

‡ E. G. Hill & Co., Richmond, Indiana.

52 inches, stout and short jointed; leaves deeply cut. An improvement in pinks. The shade is pure, and the color is quite evenly spread over the florets. November 10. (Spaulding.) 1895.

9. *Borel, Pres.* (Smith)—Flower 8 inches wide, loosely arranged, a striking combination of purple and silver. Stem 56 inches, long jointed, leaves long and narrow. Nov. 18. A French novelty. The colors are either liked or disliked at first sight. (Calvat.) 1895.



93.—Iora. Four-fifths natural size.

10. *Brigand* (Smith)—Flower 6 inches wide, deep crimson, slightly reflexed. Florets show yellow reverse. Stem 34 inches, close jointed, foliage large and light green. At best Dec. 12. (Spaulding. Raised by Hill.) 1895.

11. *Bronze Giant* (Smith)—Flowers 6 inches, compactly incurved. Florets yellow, shaded and splashed with dark red. Stem

30 inches, long jointed, foliage scant. At best Dec. 5. (Spaulding.) 1895.

12. *Bryant, Mrs. W. A.* (Pitcher & Manda*) — Flower 7 inches, yellow. Habit very tall and slender; stem 5 to 6 feet, long jointed, and strong though very thin; leaves small and very unhealthy. The color and form of the flower is similar to that of *H. L. Sunderbruch.* Nov. 27. (Pitcher & Manda.) 1895.

13. *Carnot, Madam* (Smith). Very good. (See Fig. 91.) Flower very large (8 inches wide), loose and free, the florets being very limp and graceful and ligulate, pure white. Outer florets reflexed or hanging, the inner ones variously placed. Very tall (4 ft. or over), the stem long jointed, and foliage rather scant. A long keeper and a most graceful and excellent white. Nov. 10. (Calvat, 1894. Introduced in America by Smith.)

14. *Carnot, Mademoiselle* (Becker). Good. Much like the last, fully as large or larger, but shows the center, although this defect is not greatly objectionable in a flower of this class. White. Stem 40 inches, long jointed, the foliage rather scant. Nov. 27. Variation of No. 13?

Burt, Eddy. (See *Eddy, Burt.*)

15. *Chipeta* (Smith)—Flowers 7 inches wide, closely incurved, showing only the reverse side of the florets, the color of which is compared to that of ripened oak leaves. Stem 46 inches, close jointed, leaves large. At best Nov. 16. (Smith.) 1895.

16. *Compton, Miss Georgie* (Spaulding†)—Flower in color and shade suggesting a double yellow tulip. Stem 40 inches, close jointed, leaves deeply cut, held well from stem. Nov. 10. (Spaulding.) 1895.

17. *Crimsona* (Beckert)—Very good. (See fig. 92.) Flowers 6 inches wide, dark crimson, the intense color well displayed by the ligulate florets. Stem 40 inches, close jointed, leaves large and deeply cut. Remarkable for the vividness of its deep color and the velvety finish of the florets. Reverse light colored. At best Nov. 27. (W. Jarvis Smith, Pittsburg.) 1895.

18. *Crosby, Emma N.* (Smith)—Flower 5 inches wide, golden. Florets slightly hairy, the outer ones reflexed back to the stem. Habit dwarf. Nov. 20. (Spaulding.) 1895.

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* Pitcher & Manda, Short Hills, N. J.

† T. H. Spaulding, Orange, N. J.

19. *Crystallina* (Smith). Very good. Flower 5 inches in diameter, globular and distinct in form, pure white. Florets are crisp, firm, and stand out radially. Stem 36 inches. At best Nov. 10. This is recommended for its earliness, purity of color, distinctness of form and keeping qualities. A secondary color appears with age, the pink being evenly diffused, and not displeasing. (Vaughan.) 1895.

20. *Darville, Camille* (Smith)—Flower 5 inches in diameter, same form as Ezeta, pure white. Stem 42 inches, short jointed, foliage light green. At best Nov. 10. (Spaulding.) 1895.

De Galbert (see *Galbert*).

21. *Diavola* (Smith)—Flower 6 inches wide, dark red, white and light yellow. Reverse of florets silvery red. Florets very wide and thick. Stem 40 inches, close jointed, foliage very thick, and dark green. At best Dec. 12. (Spaulding.) 1895.

22. *Dinsmore, W. B.* (Pitcher & Manda) — Flower 6 inches in diameter, regularly incurved, golden. Stem 40 inches, close jointed, leaves deeply cut. November 16. Midseason. (Pitcher & Manda.) 1895.

23. *Eddy, Burt* (Smith) — Flower 6 inches wide. Florets ligulate, purple and white. Stem 28 to 30 inches, very close jointed, foliage small. At best Nov. 16. (Vaughan.) 1895.

24. *Egyptian, The* (Hill) — Same as *Nellie Elverson* with us. (Hill.)

25. *Elverson, Miss Nellie* (Hill) — Good. Flowers 6 inches, incurving, showing the reverse. Inner side of florets dark red, reverse bronze. Stem 44 inches, close jointed, leaves large. Nov. 25. A good exhibition flower. (Hill.) 1895.

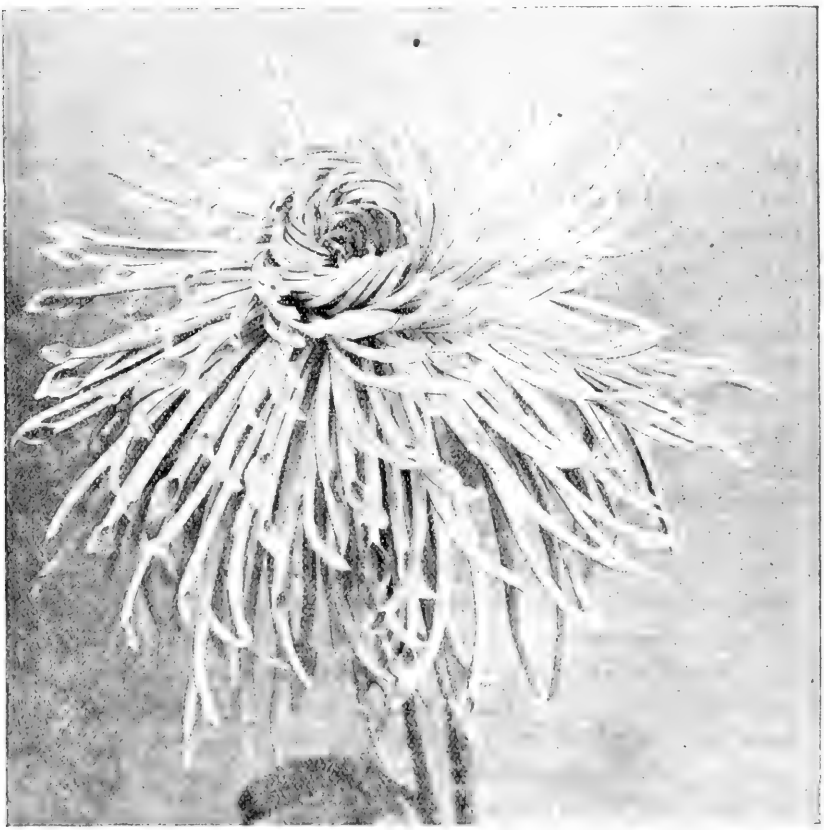
26. *Evening Star* (Beckert) — Flower large, 6 inches across. Outer florets reflexed, the inner ones spreading and whorled, showing the center, semi-double; color old gold and salmon. Stocky, 30 inches high. Nov. 16. Odd.

27. *Experiment* (Smith.) Flowers 6 inches wide, white, very loose and spreading. Florets narrow and twisted at the apex. Stem 46 inches, leaves small. Advertised "delicate shrimp pink." Dec. 23. (Spaulding.) 1895.

28. *Ezeta* (Smith.) Good. "An improved Rohaillon." Flowers 5 inches in diameter, pure yellow, and distinct in form. Stem 50 inches, close jointed, leaves large and thick. At best Nov. 16. The form of the flower head is globular, the general effect is one of

regularity. (See Fig. 88 floret No. 15.) Recommended for earliness, purity of color, distinctness of form, and lasting qualities. (Smith). 1895.

29. *Falconer, Jennie* (Smith) Flowers 6 inches in diameter, lemon yellow, globular. Florets broad, margins incurved and cupped. Nov. 25. Considered by our gardener a very good midseason yellow. (Spaulding.) 1895.



94.—Northern Lights. Three-fifths natural size.

30. *Fitzwygram, Lady* (Beckert)—Poor. Flower 4 inches, white. Half dwarf. Not equal to advertised merits. (H. J. Jones.) 1895.

31. *Galbert, Mlle. M. A. de* (Beckert)—Flowers 6 inches, pure white. Florets broad, incurved, a few outer ones reflexed. Stem 40 inches; foliage scant. Nov. 19. (D. Calvat.) 1895.

32. *Gardiner, Mrs. John* (Beckert) — Flowers 5 inches, yellow, incurved. Stem 32 inches, long jointed, leaves small. Early. Nov. 3. (H. J. Jones.) 1895.

33. *Genevieve* (Vaughan) — Flower medium in size, 5 inches across. Florets straight or slightly reflexed, the inner ones white and the outer ones splashed with pink. Stem 30 inches, weak, the foliage small. Nov. 10. (Vaughan.) 1895.

34. *Gilt Edge* (Smith) — Poor. Flowers medium in size, 5 inches across, the florets very narrow. Color yellow tipped bronze. Stem 30 inches, close jointed. Nov. 19. (W. Jarvis Smith, Pittsburgh, Pa.) 1895.

35. *Gold Dust* (Smith) — Flower 8 inches wide, pure yellow. Inner florets incurved, outer ones reflexed, and somewhat hairy. Stem 28 inches, short jointed, leaves deeply cut and of rank growth. Not as hairy as *L'Enfant des deux Mondes.* Nov. 20. (Hill.) 1895.

36. *Haggard, Rider* (Smith) — Good. Large-flowered anemone. Flower 9 to 10½ inches. Ray florets light pink, disk florets a darker pink, the inner ones tipped with yellow. Habit very tall. Stem 60 inches, leaves small. Nov. 10. Recommended for its striking oddity. *Mrs. F. Gordon Dexter.* (Picture on title page of Bulletin 91 gives an idea of the form.) This is not a new variety, but the size has been greatly increased. Attracted universal attention among visitors and much dislike. (H. J. Jones.) 1895.

37. *Hallowe'en* (Smith) — Very good. Flower head 7 inches wide and flat. Florets incurved and quilled, the tubular portion a lighter pink than the ligulate portion. This variety has as much individuality as *Northern Lights*, which has similar colors, but a somewhat different development. Nov. 25. (Hill.) 1895.

38. *Heacock Esther* (Smith) — Flower incurved, yellow. A sport from *Ada Spaulding.* Stem 30 inches, close jointed, foliage good. Nov. 10. (Spaulding.) 1895.

39. *Hersylea* (Sunset Seed and Plant Co.) — Flower large, 6 inches across. Outer florets slightly reflexed, the inner ones upright and cupped. Color good golden yellow. Growth rather slender : foliage oak-leaved. Stem 40 inches. Nov. 16. (Sunset Seed and Plant Co.) 1895.

40. *Higinbotham, Mrs.* (Smith) — Good. Flower 9 inches wide, incurving, showing the center, hairy, pink. Florets incurving, cupping, and even more hairy than those of *Louis Boehmer.* Stem 40

inches, close jointed, leaves large and very dark green. A gain in size over *L. Boehmer.* Nov. 16. (Spaulding. Raised by Hill.) 1895.

41. *Hole, Dean* (Smith) — Flower 8 inches, white and pink. Stem 36 to 40 inches, foliage large, drooping to stem. Nov. 26. (May.) 1895.

42. *Hurley, Mrs. Wm. H.* (Beckert) — Poor. Flower large, 6 inches across; florets slightly reflexed. Color buff. Growth slender, the stem 20 inches high. Nov. 10. (Graham.) 1895.

43. *Iora* (Smith) — Very Good. (See Fig. 93.) Not a new variety. Flower 6 inches in diameter. Florets tubular, pink. The color is a delicate shade evenly diffused throughout. Recommended for exhibition and pot culture. Nov. 16. (Smith.) 1894.

44. *Jayne* (Smith) — Flower 4 inches wide, dark rose color, the shade of *Mrs. Murdock.* Stem 30 inches, long jointed, leaves nearly entire. Nov. 27. (Vaughan.) 1895.

45. *Johnson, Miss M. M.* (Hill) — Very good. Flower 5 inches in diameter, loosely incurved, gobular, golden yellow. Florets wide, incurved. Stem 24 inches, foliage good. Recommended for purity of color, earliness, and dwarf habit. Nov. 5. (Hill.) 1895.

46. *Lager, J. E.* (Smith) — Good. (See title page.) Flower 6 inches wide, bright yellow, irregular in general form, and irregular as to florets, which show varying degrees of tubularity and are irregularly reflexed. Stem 40 to 45 inches and stout, leaves good. Recommended for earliness, and keeping qualities. This is not as good as *Mrs. W. H. Rand* (see Fig. 95), an early yellow of the same class. Nov. 23. (Pitcher & Manda.) 1895.

47. *Latest Fad* (Beckert) — Flower 8 inches wide, yellow. Florets tubular, the outer reflexed. Stem 30 to 36 inches, close jointed, leaves small. Dec. 5. Considered by our gardener a good variety for growing single blooms in pots. (Spaulding.) 1895.

48. *Leech, Katherine* (Beckert) — Good. Flower very large, 7 inches across. Florets loosely reflexed, the central ones erect or spreading. Color clear buff. Strong, short-jointed grower, 25 to 30 inches high. Nov. 16. (Graham.) 1895.

49. *Masse, Marie* (Beckert) — Flower medium in size, the florets reflexed. Color pink, with a purple tinge. Very early and dwarf. Stem 12 inches. Oct. 20. English.

50. *Meige, La* (Beckert) — Flower 5 inches wide, white. Florets

broad, waxy. Stem 28 inches, close jointed, deeply cut. Very late. Dec. 26. (Calvat.) 1895.

51. *Millbrook* (Dorner)—Very good. Flower 7 inches, tubular. The ligulate portion of florets a bright red, tubular portion a salmon bronze. Stem 40 to 55 inches, close jointed, leaves large and held well to flower. The combination of colors is unique and attractive. Nov. 20. (Dorner.) 1895.

52. *Mirabeau, Mme. Octavie* (Beckert)—Good. Flower rather large. Florets long and loose, color a delicate shade of silvery pink. Stem 30 inches high, long jointed. Nov. 28. Very attractive and odd.

53. *Molin, Mme. C.* (Beckert)—Flower 8 inches, loosely arranged, pure white. Outer florets reflexed. Stem 40 inches, close jointed, leaves light green, long. Nov. 25. (Calvat.) 1895.

54. *Mortillet, M. de* (Beckert)—Flower 5 inches wide, incurved. Outer florets red, inner bronze and yellow, reverse buff. Stem 44 inches, foliage unhealthy. (Calvat.) 1895.

55. *Murdock, Mrs. S. T.* (Dorner)—Flower 6 to 7 inches, incurved, pink. Stem 36 to 40 inches, very short jointed, leaves large, deeply cut, dark green. Nov. 25. (Dorner.) 1895.

56. *Murray, Mrs. R. W. E.* (Beckert)—Very good. Flower 5 inches wide, 4 inches deep, white, loosely incurved showing centre. Florets are cut or toothed in such a manner as to give the general effect of hairiness. (See Fig. 88, No. 13.) Stem 46 inches, close jointed, leaves small. A good late exhibition variety. Recommended for purity of color, individuality of form, and lateness. Centre not objectionable. Stands test of close scrutiny as well as that of general effect. Not to be confused with *Mr. R. W. E. Murray*. (*Syn. Mrs. Geo. W. Pullman.*) (H. J. Jones, England.) 1895.

57. *Noisette, Paul* (Vaughan*)—Flower of medium size, 4 inches across. Outer florets reflexed, the inner ones incurved. Color dull yellow. Dwarf (15 inches high). The foliage small. Nov. 10. (Vaughan.) 1895.

58. *Northern Lights* (Beckert)—Very good. (See Fig. 94.) Flower 8 inches in diameter, quilled, pink. Stem 46 inches, close jointed, foliage very good. Midseason. Nov. 25. Recommended for distinctness of form, and keeping qualities. The spiral condi-

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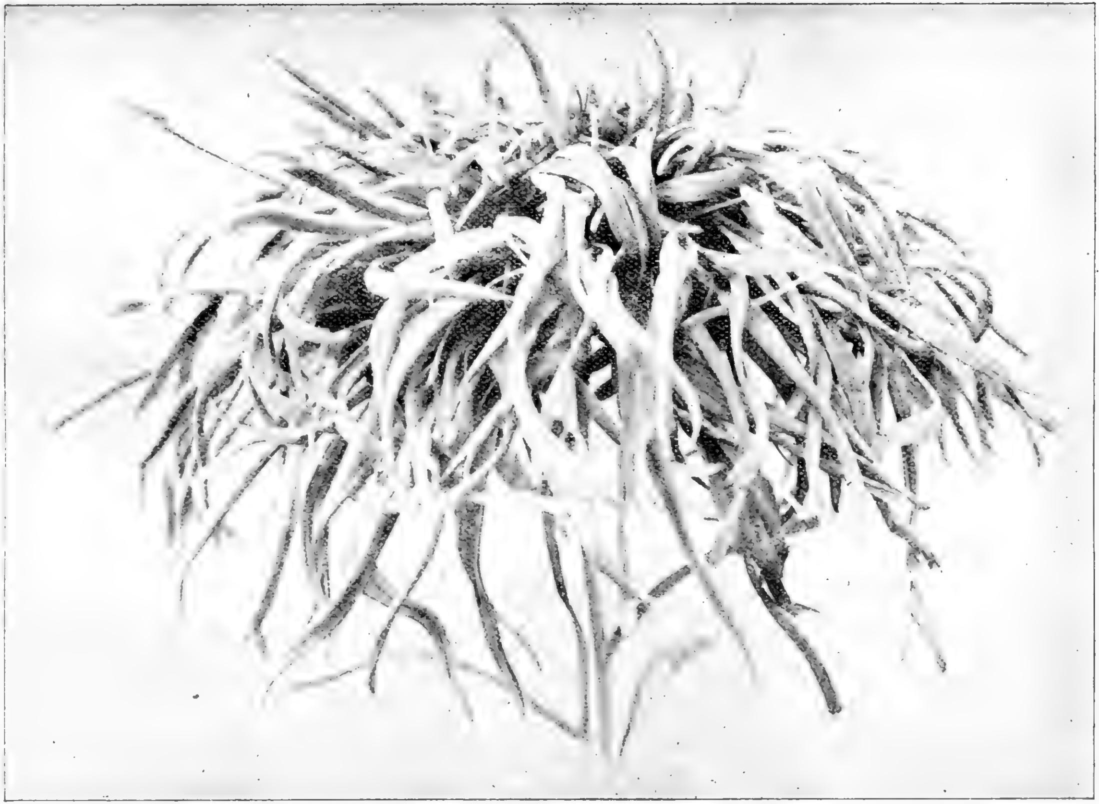
* J. C. Vaughan, Chicago.



95.—Mrs. W. H. Rand. Five-eighths natural size.

tion of development shown in Fig. 94 is succeeded by stages of growth that are perhaps even more attractive. (W. Jarvis Smith, Pittsburg.) 1895.

59. *Nyanza* (Smith)—Good. Flower 6 inches in diameter, high built. Florets incurved, cherry red, reverse golden, very broad and strong. Stem 45 inches, close jointed; leaves finely cut. Suitable for cutting Nov. 20. In fine condition Nov. 27. Striking form and color. Keeps well. (Smith.) 1895.

60. *Oakland* (Dorner)—Good. Flower 6 inches in diameter, dark red or terra cotta, very double and spherical. Outer florets reflexed, inner ones slightly incurved, the margins revolute in every case. Stem 50 to 60 inches. At best Nov. 5. Good Nov. 25. Recommended for distinctness of form and color, earliness and keeping qualities. (Dorner.) 1895.

61. *Octoroon* (Smith)—Flower resembles *Nellie Elverson.* Stem 40 inches, close jointed; leaves dark green, think and stiff. Dec. 5. (Smith.) 1895.

62. *O'Farrel, Miss Elma* (Dorner)—Good. Flower medium sized, very evenly reflexed, magenta red. Stem 36 to 40 inches, close-jointed, leaves deeply cut and drooping to stem, held well up to flower. Dec. 12. Recommended for those who desire a dark red, late in the season. (Dorner.) 1895.

63. *Orange Child* (Beckert)—Poor. Flower medium in size, 4 inches across, zinnia-shaped. Color dull yellow. Half-dwarf; foliage small. Nov. 16. (W. Piercy, Forest Hill, London.)

64. *Palmer, Mrs. Potter* (Hill)—Flower 7 inches wide. Florets incurved of heavy texture, rose pink with silver reverse. Stem 46 inches, long-jointed, foliage dark green. A show variety with good keeping qualities. Nov. 16. (Walz.) 1895.

65. *Parker, Jr., Mrs. J. M.* (Hill)—Flower 6 inches wide, pink, showing the centre. Outer florets somewhat tubular. Stem 30 inches. Must be cut early as the centre is a decided disadvantage. The shade of pink is equal to that of *Viviand-Morel*, but scarcely better. Very early. At best Nov. 8. (Spaulding.) 1895.

66. *Pauckoucke, M.* (Beckert)—Flower 10 inches, lemon colored, loose and sprawling, the outer florets drooping to the stem; inner florets twisting toward centre. Stem 44 inches, very stocky, close-jointed, leaves large. Nov. 10. (Calvat.) 1895.

67. *Pauckoucke, Mlle. Theresa* (Beckert)—Flower 8 inches wide, pure white. Stem 46 inches. Dec. 12. (Calvat.) 1895.

68. *Philadelphia* (Hill)—Good. Flowers 6 to 8 inches in diameter, light yellow, loosely incurved and whorled. The color changes with growth toward creamy white, the tips of florets being somewhat darker. Stem 36 inches, stiff, close-jointed. Nov. 16. Recommended for its class. (Graham.) 1895.

69. *Pitcher, Miss Georgiana* (Pitcher and Manda)—Very good. Flower 6 inches in diameter, globular, loosely incurved, bright yellow. Type of *Golden Dragon.* Stem 36 inches, unusually stout, foliage broad, thick and rank. Nov. 10. (Pitcher and Manda.) 1895.

70. *Radiance* (Hill)—Poor. Flower 6 inches in diameter, golden, loosely incurved. Florets wide. Habit dwarf. Stem 24 inches. Early. Keeps well, but is by no means pure yellow as advertised. Much red is irregularly distributed. Nov. 10. (Hill.) 1895.

71. *Rand, Mrs. W. H.* (Hill)—Very good. (See Fig. 95.) Flowers 8 inches wide, pure yellow, looking like a mass of tangled yellow thread. Florets show much irregularity especially in the degree of laciniation and tubularity. Stem 24 to 30 inches, leaves small. Recommended for earliness, purity of color, individuality of form, and remarkable keeping qualities. Comments on the form ranged from "informal," "free," "pleasing," and "irregular," to "odd," "fantastic" and "eccentric." It is worth noticing that the individual florets are far more irregular than the flower head in its general effect. Compare *J. E. Lager*, title page. Nov. 10. (Vaughan.) 1895.

72. *Reynolds, Maude D.* (Smith)—Flower 9 inches, high built, canary yellow. Outer florets reflexed irregularly. Stem 38 inches, close jointed. Nov. 25. (Spaulding.) 1895.

73. *Robinson, Mrs. Henry* (Beckert, Smith)—Very good. (See Fig. 96.) Flower 7 to 9 inches in diameter, globular, incurved, pure white. Florets wide. Stem 36 inches, foliage good. Nov. 10. Recommended for great size, purity of color, earliness and keeping qualities. A popular vote of visitors would probably have given this the first place over the entire collection. (Pitcher and Manda.) 1895.

74. *Rieman, W. H.* (Hill)—Flower 6 inches in diameter, incurved, very high built, yellow. Outer florets often tubular. Stem 30 inches, close jointed, foliage well up to flower. Nov. 24. (Hill.) 1895.

75. *Shavings* (Smith) — Good. (See Fig. 97.) Flowers small, only 3 inches in diameter, unique in form. Florets twisted and curled, inner side reddish, outer bronze or straw colored. Stem 36 inches, close jointed, foliage good. Midseason. Nov. 16. Recommended solely for its novelty and oddity. (Vaughan.) 1895.

76. *Smith, Mrs. A. W.* (Beckert) — Flower rather large. Florets reflexed. Color shell pink. Of *Viviand-Morel* type of color. Four feet high, close jointed, the foliage deeply cut. Nov. 19. (W. Jarvis Smith, Pittsburg.) 1895.

77. *Spaulding, Mrs. Gladys* (Hill) — Good. Flower 4 to 6 inches in diameter, high built, white, incurved. Stem 32 inches, long jointed, leaves small. At best Nov. 10. Good Nov. 25. (Spaulding.) 1895.

78. *Starin, Mrs. J. H.* (Smith) — Good to very good. Flower large, about 6 inches across and 5 inches high. A few outer florets reflexed, the remainder incurved. White. Stem nearly 4 feet, strong. Nov. 25. One of the best midseason and long-keeping whites. (Pitcher & Manda.) 1894.

79. *Sunrise* (Smith) — Flower 9 inches wide, showing centre. Florets broad, of heavy texture, terra cotta, reverse old gold. Stem 40 inches, close jointed; leaves large and thick. Nov. 10. Same class as *Eva Knowles*. (May.) 1895.

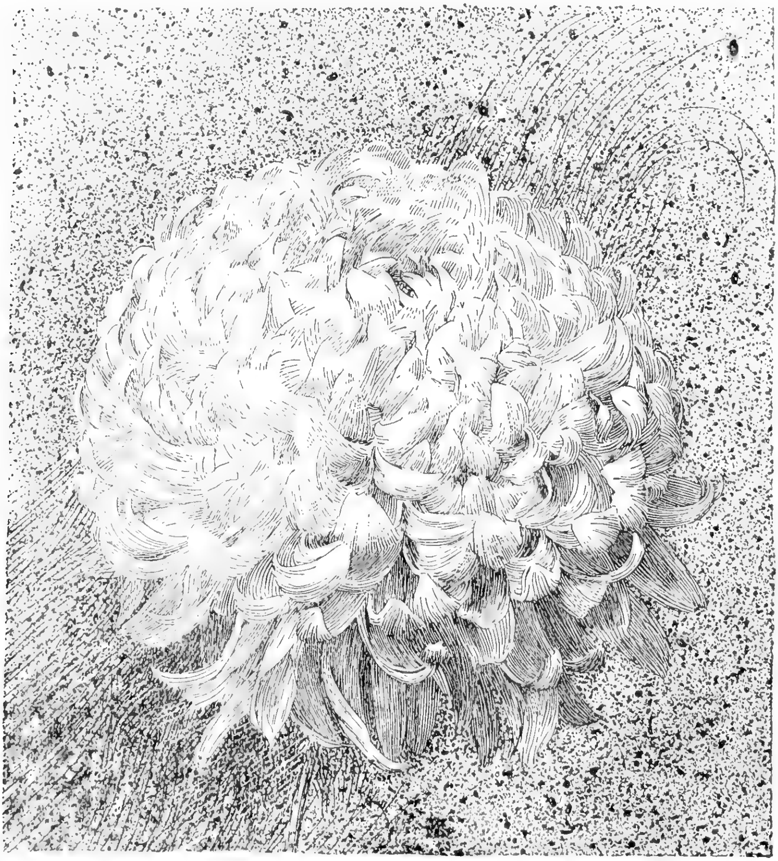
80. *Sunset Pink* (Sunset Seed & Plant Co.) — Flower large, 7 inches across. Outer florets horizontal, the inner incurved and making a high center. Color pink. Stem 40 inches high, short jointed. Nov. 19. 1895.

81. *Thalia* (Smith) — Flowers 6 to 7 inches in diameter. Florets lavender, opening loosely, but incurving to a firm head. Stem 40 inches, very close jointed, foliage large, drooping, completely covering the stem. Nov. 10. (Smith.) 1895.

82. *Trilby* (Smith) — Flower 6 inches wide, pure white. Florets of very heavy texture, the outer reflexed, Stem 36 inches, close jointed, foliage large, dark green, drooping to stem. Dec. 10. (May.) 1895.

83. *Troy, J. H.* (Smith) — Flower 5 inches in diameter, incurved Japanese, pure white. Stem 40 inches, close jointed, foliage scant. (Advertised to be ready for cutting Oct. 5 to 9.) This would rank very high among the early, pure white, incurved varieties if it were not so much exceeded in size and form by *Mrs. Henry Robinson*. Nov. 10. (Pitcher and Manda.) 1895.

84. *Valleau, Marie* (Smith) — Flower 6 inches in diameter, globular, light pink, slightly hairy. Florets broad, heavy texture, the outer reflexed. Stem 40 to 45 inches, short jointed, leaves large, deeply cut, and held well from the stem. Nov. 20. (Spaulding.) 1895.



96.—Mrs. Henry Robinson. Half size.

85. *Wakeley, Dr. A. W.* (Smith) — Flower 6 inches in diameter. Florets wide, incurved, loosely arranged, light red, with light pink reverse. Stem 24 inches; leaves small. At best Nov. 20. (Spaulding.) 1895.

86. *Walz, Fred* (Bock) — Flower 5 inches wide, pink and white. Reverse and tips of inner florets silvery. Stem 30 inches. Nov. 16. (Bock.) 1895.

87. *White, Mrs. J. H.* (Hill) — Flower 6 to 7 inches, reflexed, crimson. Stem 30 to 40 inches, short jointed, foliage very thick. It seems doubtful whether this is any improvement is the much desired dark shades of which *Cullingfordii* in the historic example. There was considerable variation among the specimens as to time and manner of blooming, color and stature. Neither was "extra dwarf." 1895.

88. *Wynne, Rose* (Smith) — Flower very large, 7 inches across, loose, silvery pink. Stem 3 feet, very stout and close jointed, and of distinct appearance. Nov. 16. (Rob't Owen, Maidenhead, Eng., 1894. Introduced in America by Hill, 1895.)

89. *Zipangi* (Smith) — Flower 6 inches wide, very high built. Outer florets reflexed showing dark red, inner ones incurved showing buff reverse. Stem 48 inches; leaves large. Nov. 16. (Smith.) 1895.

90. *Zulinda* (Smith) — Flower similar to that of *Hollowe'en*, but smaller. Stem 34 inches, very close jointed; leaves large, very dark green. Dec. 5. (Smith.) 1895.

Mr. Miller's synopsis of varieties.— The names of the varieties in the following selection are not arranged in a fashion that is designed to be complete or systematic, but simply helpful. The arrangement aims to save persons of limited time the labor of reading through a long list of new varieties alphabetically arranged. Florists, gardeners and others who visited our forcing-houses were constantly asking such questions as these: "Where is your biggest blossom?" "Have you any good pink varieties?" "What new colors are there in hairy varieties?" "Will you give me the names of some good quilled sorts?" The following list attempts to answer just such questions:

Varieties of great size.— Mrs. Henry Robinson, Rider Haggard, Mrs. Higinbotham, Helen Bloodgood, Mrs. W. H. Rand, Northern Lights.

Varieties of single, strong colors.—

White.— Mrs. Henry Robinson, Chrystallina, Mrs. R. W. E. Murray.

Yellow.—Mrs. W. H. Rand, Miss Georgiana Pitcher, Ezeta, Miss M. M. Johnson.

Pink.— Helen Bloodgood, Mrs. Higinbotham.

Crimson.— Crimsona.

Dark red.— Miss Elma O'Farrell, Oakland.

Good combinations of colors.— W. W. Astor, Millbrook.

Early varieties.—

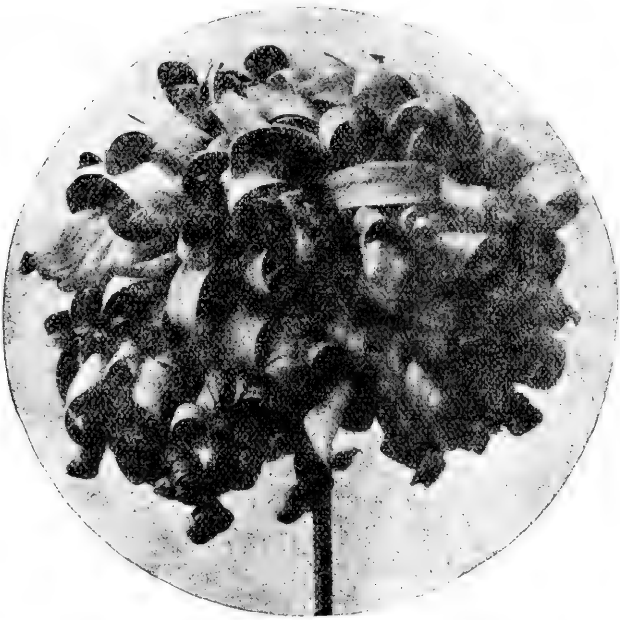
White.— Mrs. Henry Robinson, Chrystallina.

Yellow.— Mrs. W. H. Rand, Miss Georgiana Pitcher, Miss M. M. Johnson.

Light yellow.— Philadelphia.

Pink.— Mrs. Higinbotham, Marie Masse.

Dark red.— Oakland.



97.—Shavings. Natural size.

Midseason varieties.—

White.— F. L. Atkins.

Yellow.— Ezeta.

Crimson.— Crimsona.

Late varieties.—

White.— Mrs. R. W. E. Murray.

Red.— E. M. Bigelow, Miss Elma O'Farrell.

Tall.— Rider Haggard, Oakland.

Dwarf.— Miss M. M. Johnson, Marie Masse, Paul Noisette.

Hairy.— Mrs. Higinbotham.

Quilled.— Hallowe'en, Northern Lights, Millbrook.

Tubular. — Iora, Mrs. R. W. E. Murray.

Keeping qualities. — Crystallina, Ezeta, Oakland, Mrs. W. H. Rand, Mrs. J. H. Starin.

Good for exhibition blooms. — W. W. Astor, M. Georges Biron, Crimsona, Crystallina, Mrs. Higinbotham, Millbrook, Mrs. R. W. E. Murray, Miss Georgiana Pitcher, Mrs. Henry Robinson, Mrs. W. H. Rand, Northern Lights, Shavings.

Strong individuality of form. — Crystallina, Ezeta, Shavings, Mrs. W. H. Rand, W. W. Astor, Hallowe'en, Northern Lights, Millbrook.

Large Anemone. — Rider Haggard.

Varieties showing the reverse colors. — Miss Nellie Elverson, M. Georges Biron.

Velvety finish of florets. — Crimsona.

Odd, striking, fanciful, eccentric, etc. — W. W. Astor, M. Georges Biron, Rider Haggard, Mme. Octavie Mirabeau, Mrs. W. H. Rand, Shavings.

Mr. Hunn's choice of varieties.—It is a difficult matter among so many varieties of exceptional merit to name those possessing the greatest number of valuable points, as different methods of growing and varied soils will often so change the character of a variety that one is compelled to constantly revise his opinion.

The following list is not an arbitrary selection, but it simply gives the results obtained here in 1895 :

WHITE.

Early.	*Late.*
Mrs. Henry Robinson,	The Queen,
Madame Carnot,	Mlle. Carnot,
Crystallina,	F. L. Atkins,
Miss Gladys Spaulding,	Mrs. J. H. Starin,
	Mrs. R. W. E. Murray,

PINK.

Iora,	Northern Lights,
Helen Bloodgood,	Mrs. S. T. Murdock,
Mrs. Potter Palmer,	Marion Abbott,
Mrs. J. M. Parker, Jr.	Marie Valleau.

YELLOW.

Mrs. W. A. Rand,
J. E. Lager,
Miss Georgiana Pitcher,
Louise A. Black,
Mrs. M. M. Johnson.
W. B. Dinsmore,
Jennie Falconer,
Ezeta,
W. H. Rieman.

RED.

M. Georges Biron,
Mrs. J. H. White.
E. M. Bigelow,
Nyanza,
Crimsona,
Miss Nellie Elverson,
Millbrook,
Diavola,
Hallowe'en.

Mr. Bailey's choice of six.—

1. Mrs. Henry Robinson (Fig. 96).
2. Mrs. W. H. Rand (Fig. 95).
3. Crimsona (Fig. 92).
4. Iora (Fig. 93).
5. Madame Carnot (Fig. 91).
6. Miss Georgiana Pitcher.

In this test of 90 novelties, we thought that the following twelve showed superlative ("very good") merits (excluding the varieties which are simply odd or curious). Madame Carnot, Crimsona, Crystallina, Hallowe'en, Iora, Miss M. M. Johnson, Millbrook, Mrs. R. W. E. Murray, Northern Lights, Miss Georgiana Pitcher, Mrs. W. H. Rand, Mrs. Henry Robinson.

L. H. BAILEY,
WILHELM MILLER,
C. E. HUNN.

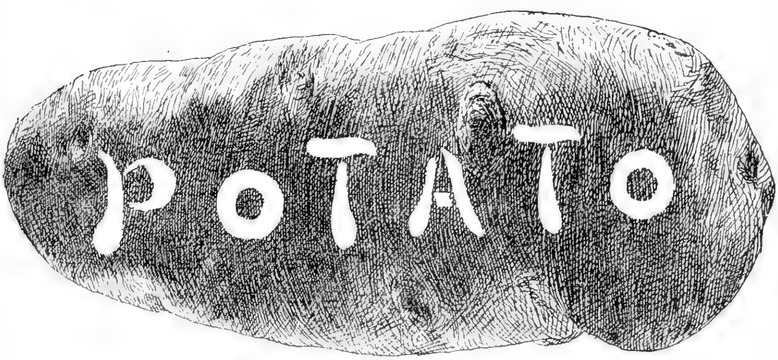
BULLETIN 113—February, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DEPARTMENT.

DISEASES OF THE



By E. G. Lodeman.

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The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plum.
107. Wireworms and The Bud Moth.
108. The Pear Psylla and The New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.

CORNELL UNIVERSITY, ITHACA, N. Y., *February* 20, 1896.

Honorable Commissioner of Agriculture, Albany:

Sir. — For a number of years the farmers of western New York have been asking for light upon the insidious and serious diseases of the potato crop. A special effort has been made during the past season to study these troubles, and although the season was unusually dry and therefore not very productive of some diseases, the results of the investigations seem to be so useful that they are submitted for publication and distribution under Chapter 230 of the Laws of 1895.

L. H. BAILEY.

SYNOPSIS.

Historical Notes on the Potato Disease.

"The most easy way to scourge the land, and force it to yield speedy returns, was by growing crops of potatoes, which are largely productive, but at the same time specially exhaustive of the mineral wealth of the soil. An average crop of potatoes robs the soil of the seed constituents of between three and four average crops of wheat. The tenants were too poor, and if they had been rich had no inducement, by the tenure of their land, to restore to the soil, through adequate manuring, the heavy demands which had been made on its fertility. At the time of the famine in 1846, nearly one-fourth of the land under crops was devoted to potatoes. And even now, out of every 100 acres devoted to green crops in Ireland, 71 are still given to potatoes — a proportion nearly three times greater than that in Scotland, and six times greater than that of England. * * *

"The striking deterioration of the potato produce in Ireland deserves much more attention than it has received, but can only be slightly alluded to in the present essay. From 1601, when Raleigh introduced it into Ireland, the crop grew steadily in favor with the Irish peasantry until 1845, in which year the largest amount of acreage was devoted to it, and fine crops of six and seven tons to the acre were habitually and persistently attained. The famine came, and, as Irish agriculturists assert, the nature of the potato was altered by the disease of 1846, and its productive power was lessened ; at least this is given as the explanation of its present low position among Irish crops. It is no longer the potato which is the farmer's chief source of profit in Ireland." ("Recess Studies," edited by Sir Alexander Grant, pp. 250–251.)

"If, then, the loss to Ireland is £3,500,000, we should be glad to know how much the total loss will have been when the destruction in England, Wales and Scotland is taken into account. To place the latter at £1,500,000 is no very extravagant assumption ; and if so, this country has lost five millions of money by the potato murrain." (*Gardeners' Chronicle*, 1846, pp. 217.)

"*Copper Smoke a Preventive of Potato Disease.*—In the district about Meath and Swansea 'wherever the copper smoke prevails,' was the expression of an intelligent inhabitant with whom I fell into conversation, the potatoes are sound, and the same person informed me it was also the case last year. I can verify the fact so far as the present appearance of the crop, as seen from the mail-coach roof can be considered a verification ; but I state it with a view of inducing more particular inquiry into it. You are, I dare say, aware the district I speak of is crowded with copper smelting furnaces."—(*Gardeners' Chronicle*, 1846, p. 582.)

Part I. Fungi.

A. DESCRIPTION OF FUNGOUS DISEASES.

1. Potato rot; late blight; downy mildew (*Phytophthora infestans*, DeBary).—The fungus causing the common potato rot is an old offender. It was undoubtedly introduced into Europe with some of the early importations of the potato, and has in certain years proved so destructive that famines have resulted from the entire loss of the potato crop. Such occurrences eventually lead to thorough study of the organism. As early as 1846, the fungus causing the trouble was very carefully described in an English publication,* and since that time other observers have given the disease much attention. It has spread to all regions in which potatoes are extensively grown, so that both scientists and farmers are very familiar with many of its characteristics.

The most interesting feature connected with the fungus is undoubtedly the wonderful energy which it exhibits, under favorable conditions, in the destruction of the potato plants. It sometimes spreads with such rapidity that a crop may be ruined in one or two days; and unfavorable conditions, or the total destruction of the plants, formerly appeared to be the only effectual agents in preventing or checking the spread of the dreaded disease. This rapid decay of both the foliage and tubers is perhaps the most distinctive of those characters which are commonly brought forward for the identification of the disease. It is almost invariably accompanied by a strong, disagreeable odor which is easily recognized by all who have once experienced it. When large fields have been attacked, the smell is particularly strong; it then arises entirely from the foliage, and is not produced by the tubers.

The conditions which favor such rapid decay are, as a rule, not generally present throughout this state. The fungus makes its

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*Rev. M. J. Berkeley, *Journal of the Royal Horticultural Society*, Vol. I.

most rapid growth in a temperature of about 70° F. when much moisture is present in the atmosphere. Cloudy days, with occasional showers, and a close damp air are especially favorable to its growth; and if such periods occur during August and September, the disease may appear at any time. But, on the contrary, if the season is dry and hot the fungus is unable to develop, and little or no injury of this nature can appear. It is for this reason that the potato rot is not a regular visitor in most parts of the state, but is more generally confined to certain localities. These are found in the more northern potato districts, in the regions near the sea coast, and in some parts which have a high altitude. In such places the fungus may develop regularly every year, and the severity of the attack will be modified chiefly by abnormal atmospheric conditions.

The fungus causing the late blight of potatoes passes the winter in two forms. The mycelium, or vegetative portion of the parasite, may retain its vitality until the following spring, when growth may again begin and further attacks of the fungus take place. These are followed perhaps by less serious results than those which result from the other form. This second method of surviving the winter is effected by means of a small fruiting body known as an oospore. It is surrounded by a comparatively hard covering and is able to resist considerable extremes of temperature and moisture. The spores are produced in the fall within the tissues of the potato plant, and here they remain until the following spring or summer. By the gradual decay of the surrounding tissues these spores become liberated and when dry may easily be spread over wide areas by means of winds and other natural agencies. Those which eventually rest upon potato foliage soon germinate under proper conditions, and reproduce the fungus at the new point of infection. Here the development of the parasite takes place so fast that in a very short time such places become centers from which the disease is rapidly disseminated.

The manner in which the germ tube of a spore penetrates the tissues is interesting. It is now generally believed that the ends of the tube secrete a ferment which has the power of dissolving the walls of the cells comprising the outer layer of leaf tissue. When such an opening has been made, the small thread of the parasite enters and it then rapidly extends to other cells, and soon the entire destruction of the leaf may be accomplished. A stoma, or breathing pore may also serve as a point of entrance.

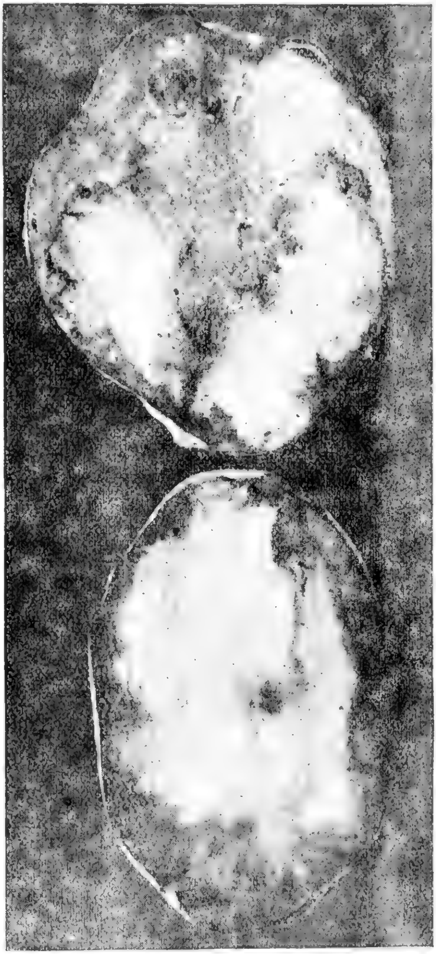
The rapidity with which the fungus advances within the leaf tissues depends very largely upon external conditions, and the appearances of the affected parts is also modified to a very considerable extent. Unfavorable conditions frequently render the identification of the parasite a difficult matter without the aid of a glass, but under such circumstances the disease may be fairly widespread and still cause little injury. In serious attacks, however, many characteristic symptoms may be easily recognized.

The colored plate represents a leaf which has been entered in several places by the fungus causing late blight, or potato rot. The growth of the parasite has been rapid, and the illustration may be considered as a typical example in which the normal development of the disease has taken place. The following points should be noted:

The diseased areas are of considerable extent, and possess a rich brown color. They may be situated in any part of the leaf, but the edges appear to suffer more from new infection than the more central portions of the leaflets. This is probably due to the fact that in case of rains these portions remain moist for a longer period than the center, since the water drains to the lower parts of the leaflets, and collects there in the form of drops of greater or less size. It is to be expected that under such conditions a fungus could gain an entrance more easily than in drier places. The decayed portions are inclined to droop; this is especially true in cases of rapid invasions, for at such times the parts do not dry so fast as the parasite advances. The rapid decay also prevents the edges of the leaflets from curling, although this takes place when the air becomes warm and dry.

The distribution of colors over the affected leaf is very suggestive. Under normal conditions, the unaffected parts retain a deep green color, while the diseased area may be yellowish-brown, dark brown, or nearly black. But whatever the color, each area is sharply outlined. There is no gradual merging of one into the other, but a distinct change of color marks the progress of the disease. Occasionally another peculiarity may be noticed. If the leaves are closely examined it will be found that the green and the brown areas are not directly in contact with each other; they are separated by a narrow strip in which the green has been destroyed, and the brown has not yet appeared. It consists of a colorless or at most a very pale yellow line in which the growth of the fungus is probably very active. But during periods which are unfavorable to the development of the parasite this line cannot be discerned, and the green and brown tissues are apparently in contact. Under such circumstances the identification of the disease without the aid of a microscope is an exceedingly difficult matter. Let us suppose that the fungus has succeeded in gaining an entrance, and that it has advanced a limited distance in the leaf tissues. If at this time the weather should turn dry and hot, the development of the parasites would be checked, and the result would be the formation of a small brown spot or area perhaps near the edge of the leaflet, and if several such spots exist the injury might be ascribed, without careful examination, to what is commonly known as the early blight fungus.

The name "downy mildew" has been given to the potato rot disease from the fact that there appears, under favorable circumstances, a downy or mouldy growth upon the under surface of the leaves. This is white in color and may be of considerable density. The upper surface of the foliage does not show it, but whenever this frost-like growth appears on the under side, it is almost certain that the potato rot fungus is present, especially if the other conditions mentioned above are also present. This external growth consists of spores and of the parts bearing them. The spores, or conidia, mature very quickly, and have the power of immediately propagating the fungus. They are small and light, and may be carried long distances by winds. It is largely owing to these bodies that the progress of this potato disease is so rapid. They are produced in countless numbers and are very energetic in attacking healthy tissue. It appears to be very probable, also, that these conidia, or summer spores, are the cause of the rotting of the tubers. After maturing upon the leaf, some fall to the ground and by means of water and other mechanical agents they are brought in contact with the tubers growing underneath the surface of the soil. Here they germinate and effect an entrance in the same manner as occurs above ground. The color of the affected parts also changes, a brown, dry rot taking the place of the normal white color (see Fig. 98). The more slowly the tubers decay, the less is the amount of moisture present; the contrary is also true. The decay does not take place in a uniform manner, but its progress varies in different tubers. In some it is mostly the parts near the surface that are affected, while in others the disease may advance rapidly towards the center of the tuber, causing the exterior to show a much smaller amount of disease than is actually present. The discoloration, however, generally presents a uniform appearance. Although it is by no means impossible for the mycelium to reach the tubers from the leaves by means of the stems, still it is the generally accepted opinion that infection does not take place in this manner. This belief was was held many years ago, for in some of the earlier writings recommendations may be found in which very high hilling is advocated so that the spores may be washed past the tubers and away from them, and not through the soil directly to them.



98.—Potato tubers affected with dry rot. (Plytophthora infestans.)

There is still another feature of the late blight which it is well to bear in mind. The disease generally appears during August and September, although earlier and later attacks are not very rare. Coming so late in the season, all the earlier varieties are comparatively free from attack, but the later ones are especially subject to the disease. This, however, is not necessarily due to the foliage of such varieties being more susceptible, but rather to the habits of the fungus. I have not observed that the age of the potato plants has a marked influence upon the spread of the disease; nor that the young foliage of the plants is less subject to the disease. It appears as if the parasite is able to thrive upon all potato foliage which is in a healthy condition at the time of the germination of the spores, and that old and young foliage or plants suffer practically to an equal extent. This matter is here emphasized because it will be considered again in connection with the early blight of potatoes.

2. EARLY BLIGHT; LEAF-BLIGHT (*Macrosporium Solani*, E. & M.).—It is only within the past five or six years that the early blight of potatoes has been recognized by scientists and farmers as a distinct disease.* The trouble has been known during a longer period, and its general character fairly well understood. But the attention which in former years was given to the potato rot fungus caused this second disease to be overlooked, or at least to be regarded as perhaps a peculiar condition resulting from the attacks of late blight, or from certain conditions unfavorable to the growth of the potato plant. But since 1891 the fact has been clearly established that two distinct evils have preyed upon potato foliage, and since that time the second trouble, or, as it has been popularly called, the "early blight," has received considerable study.

The one character which was probably the most valuable in distinguishing the two diseases is the fact that plants having the early blight do not necessarily have rotten tubers, but on the contrary these are almost invariably perfectly sound, although small. The slow progress of the disease, and the peculiar discoloration and shriveling of the plants also made it apparent that there were two distinct diseases affecting the crop.

But the real cause of this trouble has not been found with equal readiness and certainty as was the case with the potato rot. Although at first it appeared as if the entire trouble could be laid at

*For bibliographies of the earlier contributions concerning the early blight of potatoes, see Jones, 6th Ann. Rept. Vt. Agric. Exp. Sta. 1892, 66 et seq. Also Sturgis, 18th Ann. Rept. Conn. Agric. Exp. Sta. 1894, 127 et seq.

the door of the fungus *Macrosporium Solani*, yet later investigations have shown that the matter is not so simple as at first appeared. It is true that this fungus is almost invariably found in plants affected by this blight, and that the life of the plants is shortened perhaps to a considerable extent by the fungus, yet it may be doubted whether the whole trouble should be ascribed to the one organism. But, before entering into detailed discussion concerning the cause of the early blight of potatoes, it may be well to define as clearly as possible the trouble which is generally designated by this term.

Upon referring to the plate it will be seen that the leaf upon the right differs considerably from the one which has thus far been considered. This illustration also was made from a typical leaf in order that the more essential features of the trouble might be the more clearly brought out. It will of course be understood that many variations occur, and that these are so great that frequently it is impossible to distinguish with the naked eye whether the phytophthora or the macrosporium is present. Such cases are by no means rare, and I have seen a single leaflet suffering from the attacks of both fungi, as was proved by cultures, yet the two diseased areas were practically indistinguishable. Nevertheless, the following characters will be of assistance in determining which of the two fungi is responsible for the trouble.

Perhaps the most striking differences between the two leaves lie in the size, form and position of the diseased areas. In the leaflets affected with the early blight, it will be seen that these areas are small as a rule, and that they are almost circular in outline except where several have coalesced, in which case the entire area is of irregular outline; but all inequalities have rounded outlines. It appears as if infection occurred at a great number of points, instead of in a few, as shown in the other figure. And it is also interesting to notice that these many points of infection are, with but comparatively very few exceptions, placed along the outer edges or periphery of the leaflets. Although the same is to a certain extent also true with the other disease, still the fungus causing the potato rot does not confine itself nearly so persistently to the edges, but as soon as it is established it extends rapidly to all the softer tissues of the leaflets regardless of whether these are in one part of the leaflet or in another. It may also be stated of the early blight that frequently the leaf tissue situated along the larger veins succumbs to the disease more slowly than do those portions which are further removed from the veins.

If these diseased areas are very carefully examined, it will be found that it is a very common occurrence to find numbers of slight elevations or ridges arranged in circles about a common center. These may vary slightly in color, but they are perhaps most noticeable on account of their apparent elevation. Since such ridges are absent, so far as my observations go, in areas affected by the late blight, their presence is of considerable value in determining the character of the disease, the more so since the general color of the parts destroyed is very similar in the different cases.

When the colors of the green and apparently unaffected tissues in the figures are compared, another marked difference will instantly appear. The leaf affected with the late blight shows sound healthy tissues up to the region penetrated by the parasite. The leaflets appear to suffer only in those parts actually invaded by the mycelial threads of the fungus. Yet what is the meaning of the yellow color which pervades almost all parts of the other leaf? No parasite appears to have reached these portions, and yet they are manifestly unhealthy. Two explanations might be advanced; first, that the presence of the fungus has an injurious action extending beyond the parts in which it is growing, a supposition which may be said to have but very little support; and second, that the yellow color is due to a natural weakening or maturing of the plant, this in turn being brought about by untoward circumstances or by age. This point will be touched upon more fully under the causes of the early blight.

In the illustration, the edges of the leaflets are shown as having curled to a very marked degree. Such curling is not necessarily an indication of early blight, since whenever the leaf tissue dies, especially at the outer extremities of the leaflets, the tendency seems to be for the leaf to roll upon itself, as shown in the figure. Yet this character possesses a certain significance. In order that a leaflet should assume the position of those here represented, it is necessary that the death of the tissue shall occur more or less slowly, and that the change shall take place from the outer portions toward the center. As already stated, such conditions may or may not appear during an invasion of the late blight, and for this reason the curling of leaflets affected by early blight is of considerable value in identifying the present disease.

In addition to the characters above mentioned, there are several other factors which appear to be clearly connected with the early blight of potatoes. As the popular name of the disease implies, its appearance may be expected earlier in the year than the late blight; but from this it does not follow that later attacks may not take place as well. The growth of the fungus does not seem to depend so much upon the season as it does upon the condition of the plants exposed to infection. The writer has occasionally seen potatoes of the same variety growing side by side, but which were planted at different times, but were unequally affected by disease. The earlier plantings invariably showed much more injury than the later ones. In some cases the difference was so marked that it would scarcely be exaggerating to say that the younger plants were entirely free from disease, while the older plants, or those first set out, had lost about 50 per cent. of their foliage area. Other modifying conditions were sought, but no other conclusions could be drawn than that in these cases at least, the entrance of the fungus depended upon the plants having reached a certain age.

A similar circumstance has frequently been noted in various parts of the state, with this difference, however, that the plants growing side by side were not of the same varieties. The effect was especially marked when late and early varieties were grown in the same field. The earlier the potato the sooner did it show the effects of disease, the later varieties remaining free for a long time; or, in case of late plantings, the foliage may have escaped the trouble to a marked extent. A large number of fields have been examined with these points in mind, and such observations have led to the conclusion that young, vigorously growing plants are practically free from the disease, while those which have almost completed their growth of foliage, and are rapidly forming tubers, are much more subject to attack.

The time of the appearance of early blight may, therefore, depend upon questions of plant physiology fully as much as upon the season, or even more so. Since fully developed plants, regardless of variety, are more subject to disease than the younger and more vigorously growing ones, it would seem reasonable to conclude that conditions which would cause the plants to ripen prematurely, or that will check the normal growth, will at the same time favor the appearance of the early blight. Facts tend to support this view of the case.

It has been my observation that plants grown upon dry soils, those which are naturally warm and "quick," are more subject to the disease than those grown in moister places in the same field. That is, the early blight appeared first upon the high and dry knolls, and it is here also that the tubers mature the earliest. Seasons of protracted drought, therefore, might be supposed to have a similar effect, and the testimony of all observers bears out the supposition. It is in dry weather that the early blight progresses most rapidly, the late blight requiring a moist atmosphere for its best development. The falling of rain upon a field in which the tops are gradually yielding to the invasion of early blight has a tendency to freshen the plants and apparently to give them a new lease of life. Water seems to be the one thing most needed. Upon lower land the conditions are different, and, as a rule, such lands suffer less from drought, and the potato crops less from the early blight.

A curious exception to the above may here be noted. I have many times seen potatoes growing under trees in dry fields where all the potato plants were suffering severely from the early blight except those protected by the foliage of the trees. As a rule the thicker the foliage upon the tree, and the nearer the branches came to the ground, the less was the injury from blight to the potatoes below. This may be explained by supposing that the spores of the fungus (assuming it to be the sole exciting cause of the trouble) are unable to reach the plants, a scarcely warrantable belief; or, that the spores which do succeed in reaching the potato foliage are unable to germinate on account of lack of moisture. There are several arguments forming the second supposition, for, with the exception of the more or less complete absence of direct sunlight and rainfall, the plants growing under the trees are in practically the same condition as those growing within the area occupied by the feeding roots of the tree. They have about the same amount of soil moisture and of heat, and they also suffer to nearly the same extent from injury by insects. But they escape the moisture of light showers, and they are also free from dew. It appears probable, therefore, that the secret of their immunity from disease lies in this fact.

Although the character of the season exerts a great influence upon the prevalence of early blight, it is not the only great factor which has the power of seriously reducing the vitality of potato plants. A second agent is a small organism which often appears in countless numbers. It is generally known as the flea-beetle, on acount of its quick movements when disturbed. The injury done to the foliage by these little beetles is greater than was formerly supposed. They feed upon the tissues of the leaves, taking out small amounts at different points. Very frequently sufficient material is removed to cause the formation of small holes which extend through the leaf. The diameters of these holes are scarcely larger than that of a pin, yet a leaf is often riddled to such an extent that its vitality is seriously affected. In the plate the leaf affected with early blight shows the results of the work of these insects, yet only the more serious part of the injury could be represented. If a fresh leaf is closely examined it will be found that there are many places in which the beetles have begun to feed, yet when the epidermis of the leaf has been penetrated, and only a few of the cells underneath have been destroyed, the insect changed its base of operations, leaving scarcely a trace to bear witness of its presence. It is true that often when a leaf has been partially pierced, the color of the spot becomes much lighter, but the intensity of the color depends very largely upon the amount of injury done, and in certain cases the change can scarcely be distinguished.

The results of such repeated attacks of the flea-beetle cannot be otherwise than disastrous to potato foliage, and I have heard several growers maintain that the work of the flea-beetle is more to be dreaded than that of any other organism which injures the plants. In localities where these beetles are numerous, such statements do not exaggerate the matter, for the vigor of the entire plant is frequently much reduced by these insects.

From what has already been said regarding the physiological effect of other injurious influences, it would seem very probable that the work of the flea-beetle may also be considered as being a means of reducing potato plants to a condition which renders the development of the early blight fungus possible. This supposition is supported by facts. If a potato leaf is examined when the first traces of early blight appear, it will probably be found that the first browning of the tissue occurs about the edges of holes made by flea-beetles, or in places in which the tissues have been but partially injured. This is perhaps not always the case, but it has proved to be so in the vast majority of the leaves which I have examined. A reddish-brown zone of varying width is formed about a central point (see plate) and this gradually enlarges until other similar discolorations are met, and the gradual uniting of several of these originally distinct areas, causes the more or less continuous destruction of the tissues at the edges of the leaflets. When the discolorations start nearer the center of the leaf, they generally remain isolated for a longer period.

The later stages of the disease are well known to potato growers. The entire leaves gradually assume the brown and shrivelled appearance, and the stems in turn become yellow, dry and brown, so that nothing remains of a formerly green and flourishing plant except a few withered remnants of foliage and a number of small, partially developed tubers. These do not rot, but owing to the death of the tops they remain small from want of nourishment.

It follows from the preceding remarks on the early blight, that the fungus which is commonly held responsible for the injury is not a true parasite; that is, it will not attack healthy tissue, but only succeeds in obtaining a foothold after the potato foliage has become weakened by age, by unfavorable climatic conditions, or by mechanical injuries chief among which is probably the flea-beetle. This places the most effective lines of treatment upon a different basis from that generally followed with other fungous diseases; instead of preventing the entrance of the organism by means of protective substances, the constitution of the plant

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POTATO-LEAF BLIGHT

itself is to be strengthened, and the removal of as many injurious influences as posible is desired.

There appears to exist another trouble which is generally confounded with the early blight; in fact it is very difficult to distinguish the two without the aid of laboratory methods. This disease, which is entirely of a physiological nature, has been thoroughly discussed by Sturgis.* It has been found only to a limited extent in New York, for almost invariably cultures made from affected leaves freely developed the early blight fungus. According to Sturgis the same conditions which produce the early blight also bring about the death of certain parts of the leaf tissue in a manner almost identical with that of the macrosporium. He says: "Both classes of injury appeared in connection with the marks of the flea-beetle. Both were exhibited as brown spots and blotches marked with concentric rings; but in specimens characterized by the presence of the fungus, the spots were more sharply defined and darker in color. This difference was sufficiently marked to enable a close observer to distinguish either one in the field after a little practice, but a comparison between the two produced the impression that both classes of injury might have been caused by the same agency, and that the slight difference in appearance might be due to the fact that in the one case a fungus had ocupied the injured tissue, and in the other had not done so."

It seems, therefore, that the causes which lead to the appearance of these two diseases are the same, and the same lines of treatment are consequently indicated.

3. POTATO SCAB (*Oospora scabies*, Thaxter).—This disease is one which is well known to potato growers. Figure 99 represents affected tubers. The uneven, warty growths upon the surface of the potatoes are composed of material produced by the tubers in consequence of the irritation of parasitic organisms which live upon the substance of the potatoes. Under favorable circumstances these injuries are very extensive, for the entire surface of the tuber may be affected, and although the affected parts do not always penetrate very deeply, the blemished appearance of the tubers and the actual loss of material may become very serious.

*Ann. Rept. Conn. Agric. Exp. Sta. 1894, 127-134.

The causes of potato scab have been discovered only within recent years. The disease was carefully studied in 1889-90 by H. L. Bolley, who was then assistant botanist of the Indiana Experiment Station. The results of his work appeared in *Agricultural Science*, 1890, Nos. 9 and 10.* He ascribed the cause of the trouble to a certain bacterium which had the power of injuring tubers while they were in active growth, but later caused little injury. The injuries produced by the microbe are generally rather shallow, not extending deeply into the tissues of the tubers.

99.—Scab on potatoes.

Later in the year 1890, Dr. R. Thaxter, of the Connecticut Experiment Station, read a paper upon potato scab in which it was stated that potato scab is due to the work of a fungus.† More recent investigations have verified the work of Thaxter, and it is now the generally accepted belief that practically all the injury which is commonly known as scab is due to a fungus (*Oospora scabies*, Thax.). This frequently enters deeply into the potato, especially if the infection occurs early in the season when

*See also N. Dak. Agric. Exp. Sta. 1891, Dec. Bull. 4, which contains a record of Bolley's work and a full bibliography of the subject.

†The paper was read Nov. 12, 1890, at Champaign, Ill., before a meeting of the Association of Agricultural Colleges and Experiment Stations. See also a full account in the Ann. Rept. Conn. Agric. Exp. Station. 1890, pp. 80–95.

the tubers are small. When older tubers become affected, the injury generally assumes the form of a corky crust upon the surface.

The conditions which favor the growth of the potato scab fungus are dampness and an alkaline condition of the soil. It is a common experience that scab is more prevalent in soils rich in organic matter, and abundance of air and moisture allow a more vigorous growth of the parasite to take place.

The fact that an alkaline soil causes more severe attacks of potato scab has an important practical bearing. A soil may be made alkaline in a number of ways, especially by the addition of certain fertilizers. Lime has a very strong tendency in this direction, and stable manure exerts a similar influence. This fact has undoubtedly given rise to the popular belief that stable manure will increase the amount of scab upon potatoes. The appearance of the fungus may be favored merely by the alkaline condition of the soil, or it may actually be applied to soil which is free from the disease, and thus an entire field be infected by the fertilizer. If both the soil and the manure are free from disease, no scab will appear, unless it exists upon the tubers used for seed. All fertilizers which have a tendency to produce an acid condition of the soil may check the growth of the fungus, and by the proper selection of fertilizing material sometimes a very marked effect may be produced upon the crop.*

During 1894, a third cause for the injury generally known as scab was advanced by A. D. Hopkins, entomologist of the West Virginia Experiment Station. The first account of his investigation of this disease was read before the West Virginia State Horticultural Society April 6.† In this paper it was said that the larvæ of one or two species of insects (*Epidapus scabies*, Hopkins, and *Sciara* sp.) disfigure potatoes in a manner very similar to that of the scab fungus. In the more northern states, however, these insects do not appear to be so troublesome, and the methods

*An excellent account of the effect of various chemicals and manures upon the amount of scab upon potato tubers has been published by Wheeler and Tucker in Bull. 23, of the R. I. Agric. Exp. Sta. Oct. 1895.

† See Special Bull. 2. W. Va. Agric. Exp. Sta. pp. 97–111. Also Proceedings of the Washington Entomological Society, May 3, 1894; Insect Life, vii. p. 147.

of treatment recommended for the destruction of the fungus are generally very effective in controlling the disease.

B. TREATMENT OF FUNGOUS DISEASES.

1. POTATO ROT OR LATE BLIGHT. — Bordeaux mixture is the sovereign remedy for the rot or late blight. It was first successfully used by the French in 1886 and since that time innumerable experiments have been made with this fungicide in checking the trouble. Success has followed whenever the applications have been properly made, and it is no longer a question whether the mixture will prevent the blight; it is now entirely a matter of judgment and skill on the part of the grower. If the Bordeaux mixture is properly made*, and thoroughly applied at the right time, scarcely a decayed tuber should appear in the field. It is impossible to state when the first applications should be made, nor how many times the plants should be treated, for the conditions vary so much in different localities. As a rule it is unnecessary to begin spraying before the middle of July, and the first of August will prove none too late in the majority of cases. The character of the season, and the prevalence of the disease in former years must serve as guides as to the best time to begin spraying. In certain localities the late blight appears with considerable regularity, and in such cases it is well to spray about ten days before the period in which the trouble is generally first noticed.

Later applications may be made at intervals of one to three weeks, depending upon the weather. Even in years favorable to blight, three applications should be sufficient to protect the plants almost perfectly. The foliage should be thoroughly covered from above, and if the spray may be conveniently applied from below also, so much the better. A fine and abundant spray will be found most satisfactory (see page 325 for report upon spraying machinery).

2. EARLY BLIGHT. The successful treatment of the early blight is by no means an easy matter, as appeared in the discussion of its probable causes. It was shown that the early blight does not appear

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* A good mixture for use upon potatoes may be prepared by dissolving six pounds copper sulphate in about twelve gallons of water; slake four pounds quicklime and add to the copper sulphate solution. Dilute to forty gallons. If the ferocyanide of potassium test is employed, put in about one-fourth more lime than the test solution shows to be necessary.

until the period of active growth is passed, or until the plants have become weakened by some mechanical agency.

The first step towards checking the trouble, therefore, is to maintain the plants in as vigorous condition as possible. Proper fertilization, abundant cultivation, and close attention to the welfare of the plants become matters of prime importance. The selection of suitable land in favorable localities, and its thorough preparation will also prove of material benefit. This disease is an excellent example of the theory that disease in plants is not the prime cause of injury, but rather only an indication or symptom of weakness which existed before the injurious organism could gain an entrance, and which in fact must exist before such an entrance can be effected. The idea, however, does not apply so aptly to all cases of the disease.

The mechanical injuries to potato vines are mostly brought about by insects, and chief among these is the flea-beetle. The methods of treating this pest will be found on page 323.

The bulk of the injury done by the early blight has been ascribed to a fungus (*Macrosporium Solani*) which unduly hastens the destruction of plants that are already on the down-hill side of life. The fungus is widespread and is undoubtedly responsible for much of the injury done to potato crops.

During the summer of 1895 the writer endeavored to control the early blight by means of thorough application of the Bordeaux mixture. Four plots were selected for the work, I and II being upon the University farm where Professor Roberts kindly allowed me the use of certain portions of the potato field, and materially assisted in carrying on the work; plots III and IV were upon the farm of H. R. McNair, Dansville, N. Y. By distributing the plots in this manner it was hoped that more accurate and convincing results might be obtained.

Plot I.—The land selected for the experiment was divided into four sections, each covering an area of a little more than three square rods. Burbank potatoes were planted May 16 in rows $3\frac{1}{4}$ feet apart, the pieces being put in at intervals of 14 inches. At this rate it was estimated that about 10 bushels of seed would be used per acre.

Notes taken July 5 show that the plants were growing vigorously, and were scarcely troubled by flea-beetle. The first application was made at this time, the four sections receiving the following treatments: 1. Bordeaux mixture made May 18, it having been allowed to stand since that time and receiving only an occasional stirring; 2. Bordeaux mixture freshly prepared;* 3. No treatment; 4. Copper chloride mixture.† The materials were applied with a knapsack pump and Vermorel nozzle. It was found that the application could be made very satisfactorily in this manner with the exception of section 1, which received the old Bordeaux mixture. The sediment settled so fast that it was mostly applied before one-half of the required amount of liquid had been used, in spite of repeated shaking of the tank by the operator. This necessitated a second treatment immediately after the first, the work being started at the opposite end of the section.

On July 23 the above treatments were repeated with the exception that section 1 received but one application, the distribution being still more uneven than the first time. There was some indication of early blight, yet not enough to distinguish whether the treatments had been of value.

August 28, however, showed a marked difference in the appearance of the sections. The third, which was untreated, had fully 50 per cent of its leaves badly affected; the first was as bad as the check where little of the sediment had been applied, but where the spraying had commenced, and consequently upon that part which received most of the solid contents of the knapsack pump the foliage was much better, scarcely 10 per cent of the leaves showing serious injury. Section 2 also appeared very thrifty, since the foliage averaged fully as well as the best parts of section 1. Section 4, the one which was treated with the copper chloride mixture, appeared to have fully 25 per cent of its leaves seriously attacked. Section 2 was again sprayed with fresh Bordeaux mixture, the other sections remaining untreated.

Other observations were made September 12. At this time the relative amounts of early blight appeared to be about the same as two weeks previous. The part of section 1 which had received most of the sediment was in as thrifty condition as section 2, which

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*The Bordeaux mixture was made according to the "Normal" formula; copper sulphate, 6 pounds; quicklime, 4 pounds; water, 45 gallons. This mixture contains copper sulphate at the rate of 1.6 per cent of the weight of water used.

†This mixture was made by dissolving 3 ounces copper chloride in 24 gallons of water, and then to this solution was added 6 ounces of slacked quicklime.

had received the extra treatment. From this it would seem that the last application made to section 2 was of minor importance. The vines at that time had practically completed their growth, so that there was little new foliage exposed to the disease. The rainfall had also been slight, and the Bordeaux mixture could still be plainly seen upon all sections treated with it.

The potatoes were dug September 26. Since the sections varied somewhat in size, the yield of each has been estimated upon the proportionate yield per acre, this furnishing a more convenient basis for comparison. The result was as follows:

Section 1.	Old Bordeaux mixture,	332 bushels per acre.
" 2.	Fresh Bordeaux mixture,	350 bushels per acre.
" 3.	No treatment,	284 bushels per acre.
" 4.	Copper chloride mixture,	297 bushels per acre.

The apparent gains from the treatments of the sections were accordingly, 1–48 bushels; 2–66 bushels; 4–13 bushels. The advantage derived from the copper chloride mixture is so slight that it promises little practical value. The results obtained with the Bordeaux mixture, however, are more encouraging, and seem to indicate that it may be possible to spray for the early blight, although the margin may at times be close.

To what extent these gains were due to the prevention of injury to the flea-beetle it is difficult to say. The vines which were most thoroughly sprayed with the Bordeaux mixture did not escape the attacks of this insect, as could be seen by the many pits which remained as witnesses of its presence. Untreated plants suffered more severely, as they did also from the early blight. The probable action of the Bordeaux mixture thus appears to be two-fold. In the first place it prevents to a very considerable extent injury from the flea-beetle; in the second place it prevents the entrance of the macrosporium into tissues which have suffered from the work of the insect, and also protects those which are made susceptible to the disease in other ways. It is certain that the fungus was very abundant in the foliage of untreated plants, and it seemed probable that the value of the mixture was just as great in preventing injury from this source as it was in protecting the leaves from the attacks of insects.

Plot II. This plot was also upon the University farm. It contained just one-third of an acre, and was planted to several varieties of potatoes, some of which were considerably earlier than others.

The field was divided into two nearly equal parts, the line of division running across the rows so that each part should contain the same proportionate amount of each variety. One portion was sprayed with the Bordeaux mixture, the other part remaining untreated. Applications were made July 13 and August 12, fresh Bordeaux mixture being used each time.

At the time of the second spraying a remarkable difference could be seen between the two parts. The untreated portion showed fully 50 per cent of badly blighted foliage, while that of the sprayed part scarcely exceeded 5 per cent. This difference was especially marked in case of the earlier varieties, and it could be distinguished a considerable distance from the field. The untreated vines perished earlier in the season, and when scarcely a vestige of green could be found in the check section, the other portion was fairly green, at least the tops appeared to possess a decided ability to nourish the tubers which were dependent upon them for support. At this time the very late varieties, such as the Orphan, were all of a deep green color, apparently unaffected either by flea-beetles or by blight. Their turn came later in the fall, although the difference was never so clearly defined as in the case of the earlier varieties.

These potatoes were dug during the last days of September, and yielded at the following rate:

Section 1.	Fresh Bordeaux mixture,	311	bushels per acre.
" 2.	No treatment.	272	"

This represents a gain of 49 bushels per acre, a result apparently due more to the prevention of the macrosporium than to the destruction of the flea-beetle, for the latter was not conspicuous by its absence. The fungus was very prevalent, and the vines appeared to succumb rapidly when it had once gained a foothold.

Plot III. The figures relating to the experiments in plots III and IV were obtained from Mr. McNair, who very kindly looked after the work in such a thorough manner that the results are here published in full. The McNair farm is situated near the head of the famous Genesee Valley, upon the bottom lands. The potato rot is an occasional visitor, but during the summer and fall of 1895 practically no rot was discovered, as was also the case upon the University farm, so that the beneficial results of all applications must be due to the prevention of other troubles, these being commonly summed up in the term early blight.

Mr. McNair grew a number of acres of White Star potatoes, and in his field the plots and sections were laid out so that four rows extended from one end of the plantation to the other. Only the two central rows were considered when the yields were measured. The potatoes were planted May 28, and were sprayed with the Bordeaux mixture July 19 and August 5. This mixture was made of different strengths.

a. The most concentrated form contained 6 pounds copper sulphate, 4 pounds quicklime, and 40 gallons of water.

b. This mixture contained 5 pounds copper sulphate, with lime in the above proportions, in 40 gallons of water.

c. The amount of copper sulphate was reduced to 4.3 pounds in 40 gallons, with lime in proportion.

d. Only 3.5 pounds copper sulphate were used to 40 gallons, the amount of lime being likewise reduced.

Five sections were selected, each having four rows and containing 24 square rods. One section remained untreated, but the remainder were sprayed with the different mixtures. This was done by an efficient power sprayer which Mr. McNair had made. Vermorel nozzles were used, and very satisfactory work was done, although the amount of liquid applied might perhaps have been increased to advantage.

When the potatoes were dug in the fall the following yields were obtained, the figures again showing the proportionate amounts per acre:

Section	1,	Untreated,	209	bushels.
"	2,	Mixture *a*,	227	"
"	3,	" *b*,	234	"
"	4,	" *c*,	221	"
"	5,	" *d*,	191	"

These figures are not altogether encouraging for the sprayer. Sections 2, 3 and 4 on the average yielded an increase of only 18.3 bushels per acre, while section 5 produced 18 bushels less than the untreated one. These figures appear to represent the actual gains, yet no apparent reason exists for the decreased yield of section 5. Probably local conditions of the soil exerted this influence.

Plot IV. This plot was situated in another part of the field. Only two sections were made, these being still larger than in the preceding experiment. The most concentrated Bordeaux mixture above mentioned was applied to one, the other remaining untreated.

The plants were sprayed at the same time as in the preceding case, and the same machinery was used. When the crop was harvested it was found that

Section 1, untreated, yielded 252 bushels per acre.
" 2, Bordeaux mixture, yielded 298 bushels per acre.

In this plot, the gain was 46 bushels per acre. Apparently the conditions were exactly the same, and as this result corresponded fairly well with the results obtained in Ithaca it may be stated that spraying for the early blight is of advantage, and if the applications are properly made, the operation should be profitable.

In summing up the gains obtained by spraying with fresh Bordeaux mixture for the early blight, omitting section 5 in plot III in which an actual loss occurred, it is found that the average increase in the four plots is 44.8 bushels, by no means an insignificant amount. In order that such results may be obtained, it is essential that very thorough work shall be done, and that the operation shall take place at the proper time.

Mr. McNair also kindly furnished me with some interesting data regarding the value of having plants sufficiently thrifty to withstand early blight, a subject already discussed upon page 260. He found that in a certain portion of his field the addition of 10 loads of barnyard manure per acre produced an increased yield of 19 bushels. When there were also added 100 pounds of sulphate of potash and 100 pounds of Carolina rock, and the plants were in addition well cultivated and sprayed, the actual increase in yield was 100 bushels per acre, as was shown by an adjoining plot.

The early blight, therefore, should be treated by growing vigorous plants, and by protecting the foliage against the work of insects and fungi by the use of the Bordeaux mixture.

The early blight may also be avoided to a certain extent by planting early varieties, as these frequently mature before the blight does much harm ; and also by planting late, for in this case the plants will be in active growth during the season when the blight is most prevalent, and it has already been shown that such plants are practically free from the disease. During the fall, when the plants are maturing, there is less danger of attack.

3. POTATO SCAB.—The remedy proposed by Bolley* may be considered as almost a specific for this disease. His first recommenda-

*N. Dak. Agric. Exp. Sta. Bull. 4, p. 14.

tion was to soak the seed in a solution of corrosive sublimate for one and one-half hours. The solution was made by dissolving 2 ounces of the poison in 15 gallons of water. Potatoes treated in this manner are practically free from the scab fungus, as the latter is usually destroyed, unless the potatoes used for seed are very badly injured. In such cases it appears that some of the germs of the disease may escape and serve as sources of infection in the field. In order to overcome this defect the use of stronger solutions have been recommended, or the immersion of the tubers during a longer time. Bolley's latest recommendation is to dissolve 10 ounces of corrosive sublimate in 60 gallons of water, and the general tendency among experimenters is to use stronger solutions than the ones first recommended. The period of immersion also varies from one and one-half to three hours. Probably the period of treatment may vary with the amount of scab upon the tubers, and with the depth to which the tissues are diseased. The germinating power of potatoes is sometimes impaired if they are treated with the strong solutions for the long periods recommended. It is advisable, therefore, to get as clean seed as possible, but if the potatoes are scabby, to treat them with solutions whose strength increases with severity of the disease on the tuber, at the same time lengthening the period of immersion.

It has been my experience that it is fully as important to have clean land as it is to have clean seed. The fungus causing the trouble appeared upon potatoes which were grown from clean seed upon land that had not been used for this crop during five years, although two crops of beets had been grown upon it during this period. How long the disease may persist is not known, but it was sufficiently severe during the comparatively dry season of 1895 to obscure the results of several experiments designed to show the value of various treatments of Burbank potatoes for the destruction of the scab fungus. The soil selected is a moderately moist gravel loam.

Another portion of the field had not grown potatoes for eighteen years, and the land proved to be entirely free from the disease. The portion selected for the experiments is a comparatively dry gravel loam in a high state of cultivation. The attempt was here made to lessen the disease by means of copper and brass shavings, these being mixed with the soil in the drills. No beneficial results from the treatment were observed, however, even when enormous quantities of the shavings were used. It was evident that too small an amount of the metals entered in solution to affect the growth of the scab fungus, although the spores of other fungi are unable to germinate in water which has passed through a copper pipe only a few feet in length.

An attempt to increase the amount of scab was, however, entirely successful. A small handful of air-slaked lime was scattered in the drills where the pieces of potato were planted, and when these potatoes were dug it was found that the number of scabby potatoes was more than twice as great as in the rows which received no treatment; the individual tubers were also more seriously affected. Air-slaked lime, therefore, appears to have a decidedly favorable influence upon the growth of the fungus.

An alkaline or an acid condition of the soil becomes a serious matter in certain potato growing regions. This question has been very thoroughly studied by the Rhode Island experiment station* and several of the conclusions obtained are here given.

"Wood ashes (which, like air slaked lime, consists largely of calcium carbonate), pure calcium carbonate, calcium acetate and calcium oxalate, promote the scab in a high degree.

"Calcium chloride injured the potato plants but entirely prevented scab, although an abundance of germs was probably introduced.

"Calcium sulphate (known as land plaster and gypsum) is the only form of lime employed which has not injured the growth of the crops, and which has at the same time failed to promote with certainty the development of the scab.

"Upon our acid soil, which has been partially neutralized by air-slaked lime, the use of ammonia sulphate has, under otherwise like circumstances, resulted in producing tubers less scabby than where the same amount of nitrogen in form of sodium nitrate was used.

"Common salt has reduced the percentage of scab.

"Sodium carbonate acts in the same way as calcium carbonate, though perhaps not in the same degree, and promotes decidedly the development of disease.

"Barnyard manure, owing to its alkalinity or the production of carbonate from it, has probably in and of itself increased the scab.

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* Wheeler and Tucker. Bull. 33, pp. 58–79.

"Oxalic acid seems to have a tendency * * * to reduce the percentage of scab.

"By the use of ammonium sulphate and probably muriate and sulphate of potash, Kainit and common salt in connection with *dissolved* phosphate rock, dissolved bone, or dissolved bone black, soils which now tend to produce scabby tubers, would probably become less favorable to the disease. It is possible that a rational system of rotation of crops *which would include no beets or other root crops*, and perhaps no cabbages, would also help to alleviate the condition in such soils."

Part II. Insects.

1. Potato beetle. (*Doryphora decemlineata*, Say.) This insect is too well known to require description. During the past twenty-five years it has been very generally destroyed by the use of Paris green, and in more recent years also by London purple. These poisons were first applied in dry form, being mixed with flour, plaster, air slaked lime, and similar powders. The proportions of the ingredients varied greatly, one part of the poison being added to from one to fifty parts of the diluent. The mixture was then dusted upon the plants by means of perforated boxes, or bags made of coarse material. In recent years very effective machines have been invented for the purpose of making uniform applications of powder with great rapidity, and these have largely supplanted the older devices. The powder is driven forcibly from the machines by means of an air blast; when applied in this manner it is well to mix one part of poison with one to three parts of air-slaked lime. The lime makes the powder visible as it leaves the machine, and it also prevents injury from the poison; for these reasons it is probably the best diluent to use. One and one-half pounds of these arsenites per acre is sufficient for each application.

The more popular methods of applying arsenites at present is to mix them with one hundred and fifty to two hundred gallons of water. An equal weight of quicklime should be added to the mixtures, first slaking the lime in water. This prevents the caustic action of the arsenites, and yet does not interfere with the machinery. When poisons are applied in water with proper machinery, rapid applications may be made at all hours of the day, and with but little regard to the weather.

Paris purple* is another form of arsenic which has been sold during a number of years for the destruction of potato beetles. It resembles London purple, but is of a deeper color and mixes with

* Chemical analysis of Paris purple showed it to contain 34.1 per cent. arsenic trioxide, 40.7 per cent. of this being soluble in water. It is sold by Sykes & Street, 85 Water street, New York.

much greater difficulty with water. In our experiments it proved effective when used at the rate of one ounce to four gallons of water.

Within the past few years another form of arsenic, known as English purple poison,* has been offered for sale in this country. The results of various trials of the poison upon potato foliage show that when used at the rate of one ounce to four gallons of water it is effectual in destroying the insects. But it also possesses the serious objection of mixing slowly with water.

2. FLEA-BEETLES — The most serious insect enemy of potatoes is undoubtedly the flea-beetle. The insects are scarcely a tenth of an inch in length; they are nearly black in color, and the quickness of their movements has caused them to receive their popular name. There appear to be several broods each season, so their work is more or less continuous during the growing season.

Many remedies have been suggested for the destruction of this pest. Among them may be included the following: Paris green; London purple; decoction of tobacco; kerosene emulsion; air-slaked lime; land plaster; wood ashes; tobacco powder; Bordeaux mixture.

With the exception of the last named remedy, all the above appear to be without practical value for potatoes. I have tried Paris green, London purple, kerosene emulsion, tobacco powder and air slaked lime with no apparent benefit; and as others have failed in obtaining satisfactory results with these as well as with all the others except the Bordeaux mixture, their use cannot be recommended.

The Bordeaux mixture, however, appears to be a promising remedy. Jones has tested the material very thoroughly and the following is his opinion of the value of his treatments.† "The actual number of holes per leaflet, from the unsprayed row was found upon counting to be 262, which from the sprayed row the average was but 12. * * * These results bear out completely the conclusions of last year, and justify the claims that the Bordeaux mixture is the best practical remedy known for the flea-beetle as it occurs upon potatoes." The leaves examined by Professor Jones

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* The poison was introduced by Henry S. Ziegler, 400 N. Third street, Philadelphia, Pa. It contains 36.75 per cent arsenic trioxide, 14.58 per cent of which is soluble in water.

† *Ann. Rep. Vt. Agric. Exp. Sta.* 1894, 96.

appear to have been sprayed with the mixture June 16 and July 17, and the results obtained by him are decidedly encouraging. His work indicates that these early treatments are essential for obtaining the most thorough protection, but as applications of Paris green are generally made at this time for destroying potato beetles, very little extra work is required for treating the vines with the Bordeaux mixture also.

The results of my work during 1895 do not show such marked differences as those quoted above. The foliage of all the plants mentioned in the preceding pages was several times examined with particular regard to the work of the flea-beetle. The number of holes in the leaves was not counted, but the independent estimates of different observers practically agreed with those of the writer, and they may be considered as representing fairly well the amount of protection afforded by the Bordeaux mixture. Upon the university farm it was estimated that the amount of injury upon the sprayed foliage was from sixty to seventy per cent as much as upon untreated vines. The section which was treated with the old mixture showed less injury where the greatest amount of sediment was applied, and more at the other end where the mixture was much diluted.

The potato foliage on the farm of Mr. McNair was also protected, but to a less degree. His plants were treated the first time July 19. The foliage already showed considerable injury from the insect, but no blighting of the foliage was apparent. Five weeks later we estimated the amount of flea-beetle injury upon the section which received the most concentrated mixture to be about eighty-five per cent of that upon untreated vines. In the other sections the difference was still less marked. It would seem that in order to derive the greatest benefit from the Bordeaux mixture in preventing the attacks of flea-beetles, the applications must be made during June and July, and a strong mixture should be used.

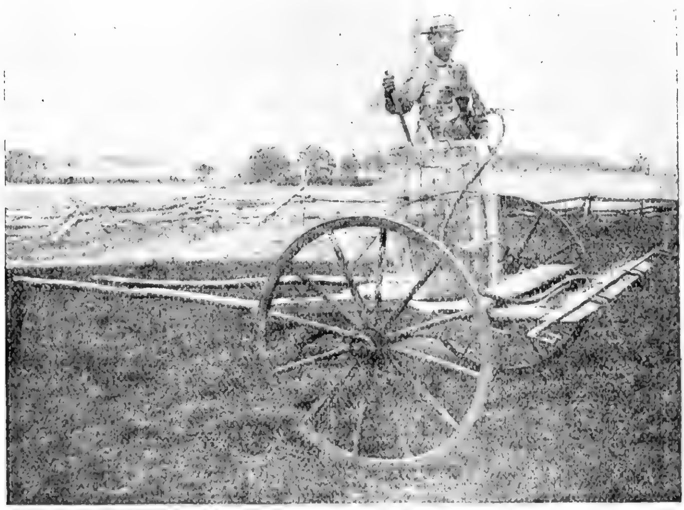
Part III. Spraying Machinery.

A trial of machinery suitable for the spraying of potatoes was made July 18 upon the farm of J. S. Coombs, Stafford, Genesee Co., N. Y. All manufacturers were invited to be present and to exhibit machines, for the field which Mr. Coombs kindly placed at their disposal was particularly well adapted for such a trial. The land was perfectly level, well cultivated, and the plants only about one-third grown. The farm is accessible from three railroads, and no more favorable conditions could have been desired. The circular letter addressed to the manufacturers stated that the normal Bordeaux mixture (see page 312) would be applied, as this would give them an opportunity to work their machines under actual field conditions.

Upon the appointed day, the following manufacturers were represented: Aspinwall Mfg. Co., Jackson, Mich.; Deming Co., Salem, O.; W. & B. Douglas, Middletown, Conn.; Excelsior Co., New Haven, Conn.; Leggett & Bro., 301 Pearl St., New York; F. E. Meyers & Bro., Ashland, O.; Potter & Ware, Batavia, N. Y. (exhibited a machine made for their own use); Seth K. Samms, Byberry, Philadelphia, Pa.; J. R. Steitz, Cudahy, Wis.; Studebaker Mfg. Co., South Bend, Ind. The machines shown by these ten exhibitors were of very varied nature; small bucket pumps, barrel pumps, power sprayers, gravity sprayers, and powder guns were to be found among them. Twenty machines were exhibited, and most of them were tried in the field, each manufacturer having at his disposal an acre of land.

Before the field work was commenced, a committee of local potato growers was appointed; this committee was to judge of the merits of the various machines, considering them from the standpoint of practical growers. The men selected by the local Grange were as follows: J. G. Fargo, E. D. Rumsey, J. H. Potter, C. E. Shepard, all of Batavia; and J. Lathrop, of Morganville. Following is the report of the committee:

"The first machines in the field were those in which no pumps were used for forcing the liquid. The only power used was the force of gravity, the fluids passing downward from the tank to the outlet orifices. The Steitz potato sprayer was soon found to be working under disadvantage. The agitator broke almost at the moment of starting. The machine is designed to spray two rows at once; the liquid runs over two broad pieces of galvanized iron, one being over each row, and then it is broken up into a fine spray by means of rapidly revolving brushes. The holes through which the liquid passed upon the iron were too small, so that the plants



100.—An excellent home-made potato sprayer, treating four rows.

were not properly covered. Another objection to the machine was found in the tank; this was too small, and it could be increased two or three times its present capacity to advantage.

"The Studebaker machine was built on the pattern of a street-sprinkler. The mechanism forming the discharge was designed to be so constructed that any desired amount of liquid could be thrown in a fairly fine spray. The machine could not be made to work satisfactorily, as too much or too little liquid was thrown, and the spray was altogether too course for efficient and economical work. Even clear water was not thrown satisfactorily.

"The Aspinwall sprayer was then tried, the result being somewhat similar to that produced by the preceding machine. It clogged repeatedly, and proved to be unsuited to throwing Bordeaux mixture.

"A change was introduced with the appearance of Samms' machine, this being known as 'Roberts' Improved Atomizer.' It is designed to spray four rows. Three small streams of liquid left the machine over each row, but immediately upon leaving the discharge pipes, they were broken by blasts of air into an exceedingly fine spray which was well distributed over the plants. The machine worked admirably, and demonstrated its capability of spraying 4 rows of potatoes as fast as a walking team could draw it. The amount of liquid leaving the discharge pipes was found to be too small, but this defect could be easily remedied. Another objection was the cost of the machine, the price being $65.00.

"Power sprayers were represented by Deming's 'Monarch.' This is constructed so that five rows may be sprayed at once. A double-acting brass pump is worked by gearing, and it is sufficiently powerful to supply the nozzles, which are held over each row, with the required amount of liquid. The work of this machine was also very satisfactory. The spray was produced continuously, it was forcibly applied to the plants, and the amount of liquid thrown could be varied by the use of different nozzles. The 'Monarch' was one of the most useful machines exhibited; but its high price, $75.00, is an item which may discourage some from using it.

"The greatest sensation of the day, however, was occasioned by the appearance of the home-made sprayer of Potter and Ware. Figure 100 represents the appearance of the outfit. An ordinary barrel spray pump was fastened to a barrel having a capacity of about fifty gallons. The liquid was pumped into a gas-pipe which was supported upon a light frame at the rear of the wheels. This pipe was fitted with four discharges to which nozzles could be attached. Four rows were sprayed at once, the work being fairly well accomplished as the horse walked across the field. Mr. Ware drove and pumped at the same time, and the machine worked without a break. The plants were uniformly although rather lightly covered, and the machine was pronounced a decided success by the four or five hundred people who saw it in operation. It should serve as a model to potato growers who desire this kind of an outfit.

"The Douglas and the Deming knapsack pumps were then brought into the field and both worked well. The pumps are sufficiently strong to force the Bordeaux mixture through Vermorel nozzles, and a very thorough application could be made. But the severe labor, and the slow rate of progress will prevent this type of machine from becoming popular for potato spraying. Myers' 'Fountain Knapsack Spray Pump' is a gravity sprayer, the liquid being forced through a perforated disk by means of a rubber bulb situated immediately behind it. Bordeaux mixture could not be applied with this device, as the holes in the disk clogged continually. When clear water is used, good work may be done.

"The powder guns of Leggett and of the Excelsior Co., did excellent work. They are easily worked and efficient. The only objection to them is that they treat but one or two rows at a time and this becomes a serious fault when large areas have to be treated. This objection is the more weighty when one considers that the most efficient applications of powders can be made only on a still day and when the foliage is wet.

"The other pumps which were exhibited were not tested in the potato field. The Deming and the Douglas pumps were found to be very strong, serviceable, and apparently durable, and with the proper attachments they could be made of service in spraying potatoes.

"In conclusion, it is the opinion of the committee that as a rule the best machines are those in which a pump forces the liquid through nozzles, so that a uniformly fine spray may be produced. Gravity machines, with the exception of 'Roberts' Improved Atomizer,' proved to be unsatisfactory, although the Steitz machine, if slightly modified, could be made serviceable.

"Signed J. G. FARGO, Chairman.
E. D. RUMSEY.
J. H. POTTER.
C. E. SHEPARD.
JAY LATHROP."

SUMMARY.

1 Potato rot, or late blight, is caused by a fungus which may develop with extreme rapidity under favorable circumstances; it may cause the decay of all parts of the potato plant, including the tubers. (Page 297.)

2. The conditions favoring the growth of the parasite are a temperature of about 70° F. and a moist atmosphere. Few sections of New York are every year seriously troubled by the disease. (Page 298.)

3. A leaf affected by late blight normally shows distinct brown and mostly large areas of varying form, but usually not circular spots; these may enlarge very rapidly, the under surface of the leaf showing a frost-like growth in the parts first attacked. Unaffected portions of the leaves retain their healthy green color. (Pages 299, 300.)

4. Tubers affected with potato rot assume a dark color where the fungus is found. Where decay takes place slowly, the dead portions become dry and shrivelled; during rapid invasions considerable moisture may be present in the rot. (Page 301.)

5. The early blight of potatoes does not cause the tubers to rot. A more or less rapid drying and curling of the leaves and stems mark the presence of the disease. The edges of the leaves are first visibly affected; the color changes to yellowish brown, while the central parts of the leaflets gradually become lighter green or even yellow and more or less spotted. Eventually all portions above ground turn brown. (Pages 302, 305.)

6. Young, vigorous potato plants do not appear to suffer from early blight. (Page 306.)

7. The probable causes of early blight, as found in New York, are the following: A fungus, this having the power of attacking only such tissues as have become weakened to a certain extent; unfavorable conditions of soil or atmosphere; mechanical injuries to the foliage, commonly produced by flea-beetles or other insects. (Pages 307, 309.)

8. Potato scab, as commonly found upon the tubers, is due to the presence of a fungus. Similar blemishes have also been ascribed to the work of bacteria, and to insect injury. (Pages 309, 312.)

9. The late blight of potatoes may be successfully treated by spraying the vines two or three times with the Bordeaux mixture. The first application should be made during the latter part of July; it may be repeated at intervals of one to three weeks. (Page 312.)

10. The early blight of potatoes may be treated with partial success by means of the Bordeaux mixture. The vines should be sprayed when about two-thirds grown, and the application should be repeated as necessary, the foliage at all times being well covered with the mixture. (Pages 312, 313.)

11. Proper methods of fertilization and cultivation have also proved to be of much value in reducing injury from early blight, as was shown by greatly increased yields. (Page 313.)

12. The apparent increased yield per acre of potatoes sprayed with the Bordeaux mixture was 44.8 bushels. (Page 318.)

13. The increased yield per acre of potatoes well fertilized and cultivated, as compared with partially neglected plants, was 100 bushels per acre. (Page 318.)

14. Seed potatoes affected with scab may be cleaned and made fit for planting by soaking them in a solution of corrosive sublimate. (Pages 318, 319.)

15. An alkaline condition of the soil favors the growth of the scab fungus; an acid condition checks it.

16. Land in which the fungus causing potato scab is known to exist should not be used for growing potatoes or beets except at in tervals of several years. Fertilizers which tend to produce an acid condition of the soil should be applied. Even treated seed will produce scabby potatoes, if the scab fungus is in the soil. (Pages 319, 321.)

17. Potato beetles may easily be destroyed by means of the arsenites. Paris green and London purple are the safest insecticides to use. (Pages 322, 323.)

18. Flea-beetles cannot be controlled satisfactorily. Bordeaux mixture thoroughly applied, appears to be the best practical remedy against these insects. This material probably does not kill the beetles, but simply keeps them away. (Pages 323, 324.)

19. In a comparative trial of many kinds of machines designed for spraying potatoes, it was found that those machines were unsatisfactory in which liquids are distributed wholly by the force of gravity.

20. Gravity sprayers are of value when the liquids are broken

into a spray after leaving the discharge pipes. This may be done by means of air blasts or by revolving brushes.

21. Pumps for driving the liquids through nozzles are on the whole most satisfactory. They can be arranged so that several rows may be sprayed at once.

22. Horse-power sprayers can be recommended for spraying potatoes. If the plants are sprayed for the potato beetle, one nozzle over each row is sufficient; for flea-beetles and for fungus diseases it is better to have two nozzles for each row, that a more thorough application may be made.

23. Powder guns are very satisfactory when insecticides are to be applied to potatoes, although wind and dry foliage may lessen the value of the treatment.

24. Fungicides should usually be applied in liquid form, using machinery which will treat the vines thoroughly as fast as a man or a horse can walk.

E. G. LODEMAN.

BULLETIN 114—February, 1896.

HORTICULTURAL DIVISION

OF

CORNELL AGRICULTURAL EXPERIMENT STATION.

I. P. ROBERTS, Director, Ithaca, N. Y.

SPRAY CALENDAR.

By E. G. Lodeman.

ORGANIZATION.

Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.

Spray Calendar.

In the preparation of this calendar the most important points regarding sprays have been selected and arranged in such a manner that the grower can see at a glance what to apply and when to make the application. The more important insect and fungous enemies are also mentioned, so that a fairly clear understanding of the work can be obtained by examining the table below. When making the application advised, other enemies than those mentioned are also kept under control, for only the serious ones could be named in so brief an outline. The directions have been carefully compiled from the latest results obtained by leading horticulturists and entomologists, and they may be followed with safety.

Notice.— In this calendar it will be seen that some applications are in parentheses and these are the ones which are *least important*. The number of applications given in each case has particular reference to localities in which fungous and insect enemies are most abundant. If the crops are not troubled when some applications are advised, it is unnecessary to make any. It should be remembered that in all cases success is dependent upon the exercise of proper judgment in making applications. Know the enemy to be destroyed; know the remedies that are most effective; and finally, apply them at the proper season. Be *prompt*, *thorough*, and *persistent*. Knowledge and good judgment are more necessary to success than any definite rules. See Bulletin 101.

Apple.

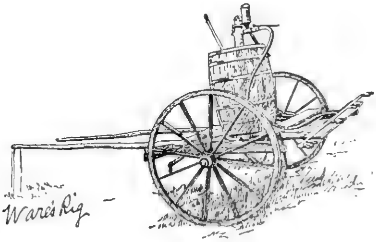
Scab. (1. Copper sulphate solution before buds break); 2. Bordeaux mixture when leaf buds are open, but before flower buds expand; 3. repeat 2 as soon as blossoms have fallen; 4. Bordeaux mixture 10 to 14 days after the third; (5, 6, repeat 4 at intervals of about two weeks). See Bulletin 84.—*Canker-worm.* 1. When first caterpillars appear apply Paris green very thoroughly; 2. repeat 1 after 8 to 10 days; (3, 4. repeat every 10 days if necessary.) See Bulletin 101.—*Bud-moth.* 1. As soon as leaf tips appear in buds, Paris green; repeat 1 before the blossom buds open; (3. repeat 2 when blossoms have fallen). See Bulletin 107.—*Codlin-moth.* 1. Paris green immediately after blossoms have fallen; 2. repeat 1, 7 to 10 days later; (3, 4, Paris green at intervals of 1 to 3 weeks after 2, especially if later broods are troublesome). Paris green may be added to the Bordeaux mixture and the two applied together with excellent effect.—*Case-bearer.* As for *bud-moth.* See Bulletin 93.

BEAN.

Anthracnose, Pod-rust. Bordeaux mixture, when first true leaf has expanded; 2, 3, etc., the same, at short intervals to keep the foliage covered by the mixture.

BEET.

Leaf spot. 1. When 4 or 5 leaves have expanded, Bordeaux mixture; 2, 3, etc., the same every 10 to 14 days.



CABBAGE AND CAULIFLOWER.

Aphis. 1. Upon young plants, kerosene emulsion or arsenites, when worms are first seen; 2. if plants are not heading repeat 1 when necessary; 3. when beginning to head, hot water (130°F.) or hellebore; 4. repeat 3 when necessary.—*Cabbage-worm.* 1. If plants are not heading, kerosene emulsion or arsenites; 2. repeat 1 at intervals of 7 to 10 days; 3. if plants are heading, hellebore, or water at 130° to 135°F.; 4, 5, etc., repeat 3 when necessary.—*Plusia.* 1. Make very thorough applications as recommended under *cabbage-worm.* For *Root-maggot,* see Bulletin 78.

CARNATION.

Anthracnose, Rust, Spot. 1. At first appearance of disease, Bordeaux mixture thoroughly applied in *fine* spray; 2, 3, etc., if plants are not blooming, Bordeaux mixture; ammoniacal copper carbonate to avoid staining the flowers. Keep foliage covered with a fungicide. *Red spider.* Syringe freely with clear water; kerosene emulsion.

CELERY.

Leaf blight, Rust. 1. Ammoniacal copper carbonate at first appearance of disease; repeat 1 to keep foliage protected.

CHERRY.

Black-knot. See PLUM. — *Rot.* 1. When buds break, Bordeaux mixture; 2. when fruit has set, repeat 1; 3. when fruit is grown, ammoniacal copper carbonate. — *Aphis.* 1. Kerosene emulsion when insects appear; 2, 3, repeat at intervals of 3 to 4 days if necessary. — *Slug.* 1. When insects appear, arsenites, hellebore or air-slaked lime; 2, 3, repeat 1 in 10 to 14 days if necessary.

CHRYSANTHEMUM.

Leaf-spot. 1. Bordeaux mixture, or ammoniacal copper carbonate at intervals of 10 to 14 days, to keep foliage protected.

CRANBERRY.

Fire-worm, Fruit-worm. 1. When larvæ first appear, arsenites, kerosene emulsion, or tobacco water; 2, after 10 to 14 days repeat 1; 3, repeat if necessary.

CURRANT.

Leaf-blights. 1. When injury first appears, before the fruit is harvested, ammoniacal copper carbonate, to avoid staining the fruit; 2. After fruit is harvested, Bordeaux mixture freely applied; 3, repeat 2 when necessary. — *Worm.* 1. When first leaves are nearly expanded, arsenites; 2. After 10 to 14 days, hellebore; 3, repeat 2 if necessary.

EGGPLANT.

Leaf-spot. 1. As soon as plants are established in the field, Bordeaux mixture; 2, 3. repeat 1 at intervals of 2 to 3 weeks till first fruits are ½ grown; 4. ammoniacal copper carbonate, repeat when necessary.

GOOSEBERRY.

Mildew. 1. Before buds break, Bordeaux mixture; 2, when first leaves have expanded, Bordeaux mixture or potassium sulphide;

3, 4, etc. repeat 2 at intervals of 7 to 10 days, if necessary throughout the summer. Avoid staining the fruit. — *Currant-worm*, see under Currant.

GRAPE.

Anthracnose. 1. Before buds break in spring, sulphate of iron and sulphuric acid solution; 2. Repeat 1 after 3 or 4 days to cover untreated portions. — *Black-rot.* (1, as soon as first leaves are fully expanded, Bordeaux mixture). 2. after fruit has set, Bordeaux mixture; 3. repeat 2 at intervals of 2 to 3 weeks until fruit is ¾ grown; 4. ammoniacal copper carbonate when fruit is nearly grown. 5, 6, etc. repeat 4 at intervals of 7 to 14 days as required. — *Downy mildew*, *Powdery mildew*, the first applications recommended under *Black-rot* are of especial importance. See Bulletin 76.—*Ripe-rot*, apply very thoroughly the later applications recommended under *Black-rot*. — *Steely-bug*. 1. As buds are swelling, arsenites; 2, after 10 to 14 days, repeat 1.

HOLLYHOCK.

Rust. 1. In spring, when foliage expands, Bordeaux mixture; 2, 3, etc., apply a good fungicide at short intervals to keep new growths covered.

NURSERY STOCK.

Fungous diseases. 1. When first leaves appear, Bordeaux mixture; 2, 3, etc., repeat 1 at intervals of 10 to 14 days to keep foliage well covered.

PEACH, NECTARINE, APRICOT.

Brown-rot. 1. Before buds swell, copper sulphate solution; (2. Before flowers open, Bordeaux mixture); 3. When fruit has set, repeat 1; 4. Repeat after 10 to 14 days; 5. When fruit is nearly grown, ammoniacal copper carbonate; 6, 7, etc., repeat 5 at intervals of 5 to 7 days if necessary. For *Yellows*, see Bulletin 75.

PEAR.

Leaf-blight or Fruit-spot. (1. As buds are swelling copper sulphate solution); 2. Just before blossoms open, Bordeaux mixture; 3. After fruit has set, repeat 2; 4, 5, etc., repeat 2 at intervals of 2 to 3 weeks as appears necessary.—*Leaf-blister.* 1. Before buds swell in spring, kerosene emulsion, diluted 5 to 7 times—*Psylla.* 1. When first leaves have unfolded in spring, kerosene emulsion diluted 15 times; 2, 3, etc., at intervals of 2 to 6 days repeat 1 until the insects are destroyed. See Bulletin 108.—*Slug.* See under CHERRY.

PLUM.

Brown rot. See under PEACH.—*Leaf-blight.* (1. When first leaves have unfolded, Bordeaux mixture); 2. When fruit has set, Bordeaux mixture; 3 4, etc., repeat 2 at intervals of 2 to 3 weeks, use a clear fungicide after fruit is $\frac{3}{4}$ grown.—*Black-knot.* 1. During first warm days of early spring, Bordeaux mixture; 2. Repeat 1 when buds are swelling; 3. During latter part of May, repeat 1; 4. Repeat 1 during middle of June (5. Repeat 1 in July). See Bulletin 81.—*Curculio*, spraying is not always satisfactory; jar the trees after fruit has set, at intervals of 1 to 3 days during 2 to 5 weeks.—*Plum Scale.* 1. In autumn when leaves have fallen, kerosene emulsion, diluted 4 times; 2 and 3. In spring before buds open, repeat 1. See Bulletin 108.—*San José Scale.* Thorough applications of kerosene emulsion as recommended under Plum Scale may prove effective if followed later in the season by others, diluting the emulsion to avoid injuring foliage.

POTATO.

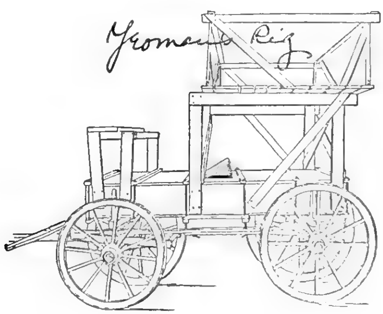
Early blight. 1. When vines are $\frac{2}{3}$ grown, Bordeaux mixture; 2 and 3, repeat 1 at intervals of 2 to 3 weeks (only partially successful).—*Rot.* 1. During middle of July, Bordeaux mixture; 2 and 3, at intervals of 1 to 3 weeks, repeat 1.—*Scab.* Soak uncut seed potatoes $1\frac{1}{2}$ hours in solution of 1 ounce corrosive sublimate in 8 gallons water.—*Potato beetle.* 1. When beetles first appear, arsenites. 2 and 3, repeat 1 when necessary. See Bulletin 113.

QUINCE.

Leaf-blight, or *Fruit-spot*. (When blossom buds appear, Bordeaux mixture); 2, when fruit has set, repeat 1; 3, 4, etc., repeat 1 at intervals of 2 weeks until fruit is ¾ grown; if later treatments are necessary, ammoniacal copper carbonate. See Bulletin 80.

RASPBERRY, BLACKBERRY, DEWBERRY.

Anthracnose. 1. Before buds break, copper sulphate solution, also cut out badly infested canes; 2, when growth has commenced, Bordeaux mixture; 3, 4, etc., repeat 2 at intervals of 1 to 3 weeks, avoid staining fruit by use of clear fungicide. (Partially successful.)—*Orange-rust*. Remove and destroy affected plants as soon as discovered. See Bulletin 100.—*Saw-fly*. 1. When first leaves have expanded, arsenites; 2, after 2 to 3 weeks repeat 1, or apply kerosene emulsion (unsatisfactory).



ROSE.

Black-spot. Spray plants once a week with ammoniacal copper carbonate.—*Mildew*. Keep heating pipes painted with equal parts lime and sulphur mixed with water to form a thin paste. Spray with copper fungicides.—*Aphis, Leaf-hopper*. Kerosene emulsion or tobacco water applied to the insects' bodies at short intervals, is effective.—*Red spider*. Spray as for APHIS, or with forcible streams of clear water.

LEAF-BLIGHT.

Leaf-blight. 1. When growth begins in spring, Bordeaux mixture; 2. when first fruits are setting, repeat 1; 3. during fruiting season, ammoniacal copper carbonate; 4. after fruiting, or on non-bearing plants, Bordeaux mixture at intervals of 1 to 3 weeks. See

Bulletin 79.—*Saw-fly.* Spray plants when not in bearing with arsenites, repeating application if necessary.

TOMATO.

Leaf-blight. 1. As soon as disease is discovered, Bordeaux mixtur or a clear fungicide. 2, 3, etc. repeat 1 at intervals of 7 to 10 days.— *Rot.* Spray as directed under *leaf-blight* (unsatisfactory in many cases).

VIOLET.

Blight; Spot. 1. When disease is first seen in summer or fall, Bordeaux mixture; 2, 3, etc., repeat one at intervals of 1 to 2 weeks, using ammoniacal copper carbonate to avoid staining blossoms. (Not always satisfactory as good culture must also be given.) Remove affected leaves.

FORMULAS.

PARIS GREEN.

Paris green	1 pound
Water	150–300 gallons

If this mixture is to be used upon fruit trees, 1 pound of quicklime should be added, and repeated applications will injure most foliage, unless the lime is used. *Paris green and Bordeaux mixture can be applied together with perfect safety.* Use at the rate of 4 ounces of the arsenites to 50 gallons of the mixture. The action of neither is weakened, and the Paris green loses all caustic properties. For insects which chew.

LONDON PURPLE.

This is used in the same proportion as Paris green, but as it is more caustic it should be applied with two or three times its weight of lime, or with the Bordeaux mixture. The composition of London purple is variable, and unless good reasons exist for supposing that it contains as much arsenic as Paris green, use the latter poison. Do not use London purple on peach or plum trees unless considerable lime is added. For insects which chew.

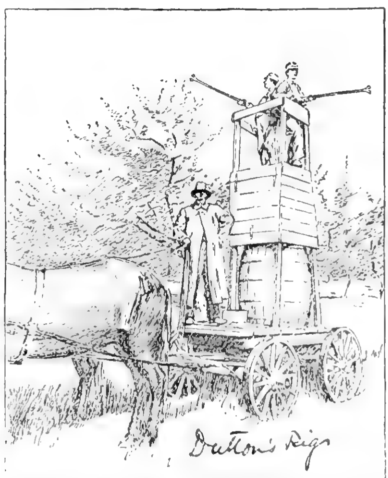
NORMAL OR 1.6 PER CENT. BORDEAUX MIXTURE.

Copper Sulphate	6 pounds
Quicklime	4 pounds
Water	40–50 gallons

Dissolve the copper sulphate by putting it in a bag of coarse cloth and hanging this in a vessel holding at least 4 gallons, so that it is just covered by the water. Use an earthen or *wooden vessel.* Shake the lime in an equal amount of water. Then mix the two and add enough water to make 40 gallons. It is then ready for immediate use. If the mixture is to be used on peach foliage it is advisable to add two pounds of lime in the above forumla. When applied to such plants as carnations or cabbages it will adhere better if about a pound of hard soap be dissolved in hot water and added to the mixture. For rots, moulds, mildews, and all fungous diseases.

IRON SULPHATE AND SULPHURIC ACID SOLUTION.

Water (hot).. 100 parts
Iron sulphate, as much as the water will dissolve.
Sulphuric acid (commercial)..... .... 1 part



The solution should be prepared just before using. Add the acid to the crystals, and then pour on the water. Valuable for grape anthracnose, the dormant vines being treated by means of sponges or brushes.

POTASSIUM SULPHIDE SOLUTION.

Potassium sulphide.... .... $\frac{1}{2}$–1 oz
Water... 1 gallon

This preparation loses its strength upon standing, so should be made immediately before using. Particularly valuable for surface mildews.

AMMONIACAL COPPER CARBONATE.

Copper carbonate .... 1 oz.
Ammonia, enough to dissolve the copper.
Water .... 9 gallons

Before making the solution, the ammonia should be prepared as follows: Use 26° ammonia, and dilute with 7 to 8 volumes of water. Then gradually add the necessary amount to the copper carbonate until all is dissolved. It is best treated in large bottles, and in them it will keep indefinitely. Dilute as required. For same purposes as the Bordeaux mixture.

COPPER SULPHATE SOLUTION.

Copper sulphate .... 1 pound
Water .... 15 gallons

Dissolve the copper in the water, when it is ready for use. *This should never be applied to foliage, but must be used before the buds break.* For peaches and nectarines use 25 gallons of water. For fungous diseases.

HELLEBORE.

Fresh white hellebore .... 1 ounce
Water .... 3 gallons

Apply when thoroughly mixed. This poison is not so energetic as the arsenites, and may be used a short time before the sprayed portions mature. For insects which chew.

KEROSENE EMULSION.

Hard soap .... ½ pound
Boiling water .... 1 gallon
Kerosene .... 2 gallons

Dissolve the soap in the water, add the kerosene, and churn with a pump for 5–10 minutes. Dilute 4 to 25 times before applying. Use strong emulsion for all scale insects. For such insects as plant lice, mealy bugs, red spider, thrips, weaker preparations will prove effective. Cabbage worms, currant worms, and all insects which have soft bodies, can also be successfully treated. It is advisable to make the emulsion shortly before it is used.

TOBACCO WATER.

This solution may be prepared by placing tobacco stems in a water-tight vessel, and then covering them with hot water. Allow to stand several hours, dilute the liquor from 3 to 5 times and apply. For soft bodied insects.

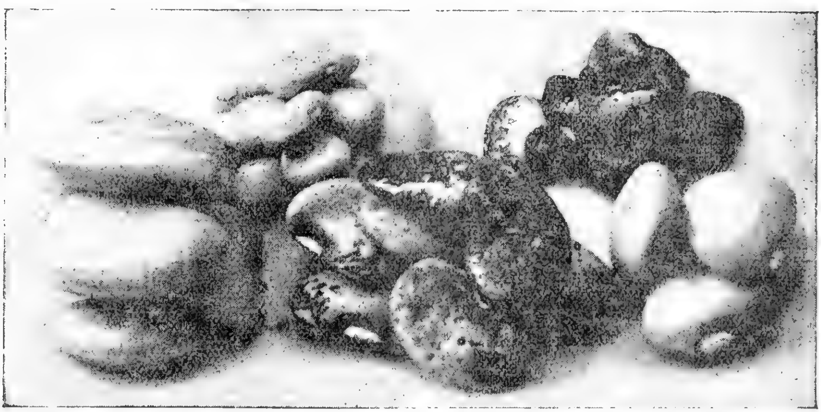
BULLETIN 115—February, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DEPARTMENT.

THE POLE LIMA BEANS.



By L. H. Bailey.

ORGANIZATION.

Board of Control—The Trustees of the University.

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The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.

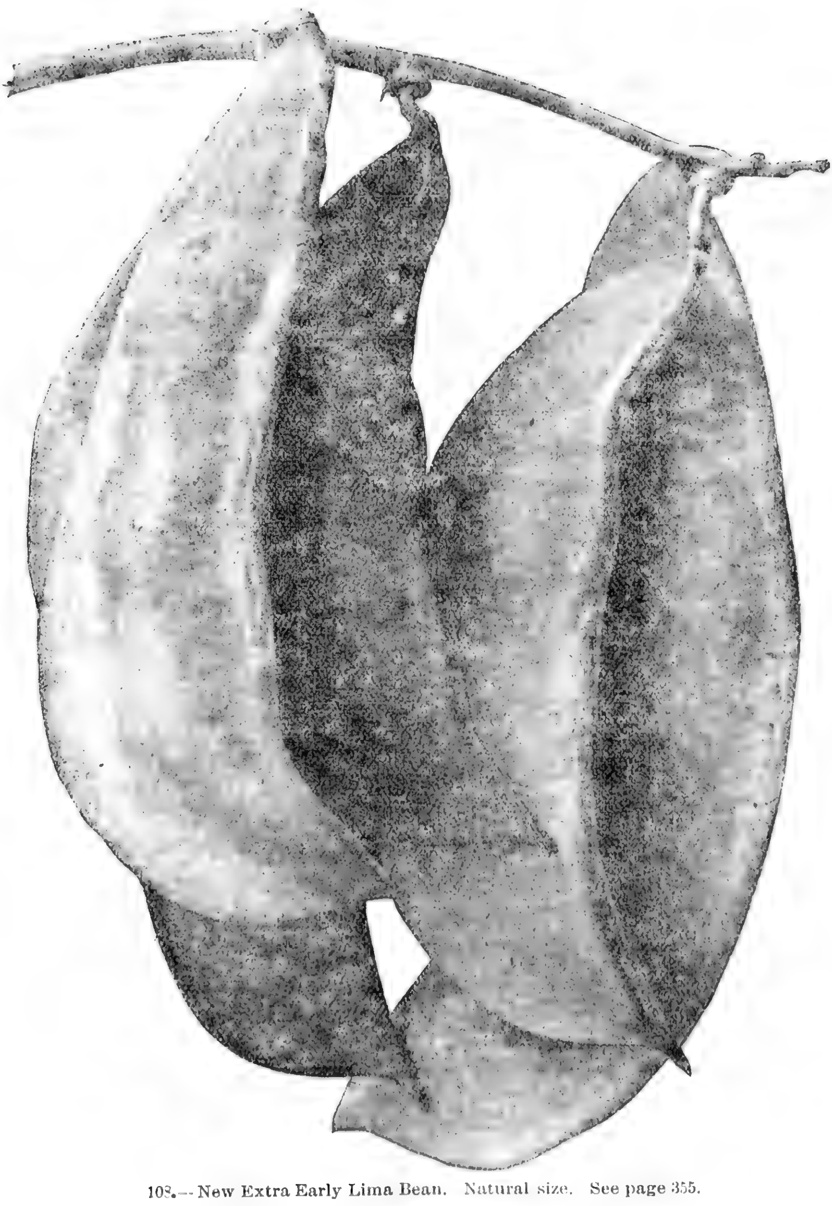
CORNELL UNIVERSITY, Ithaca, N. Y., *February* 29, 1896.

Honorable Commissioner of Agriculture, Albany.

Sir.— The following paper — a complement to No. 87, upon the Dwarf Lima beans — is submitted for publication and distribution under Chapter 230 of the Laws of 1895.

L. H. BAILEY.

SYNOPSIS.



108.—New Extra Early Lima Bean. Natural size. See page 355.

The Pole Lima Beans.

I. Types and Varieties.

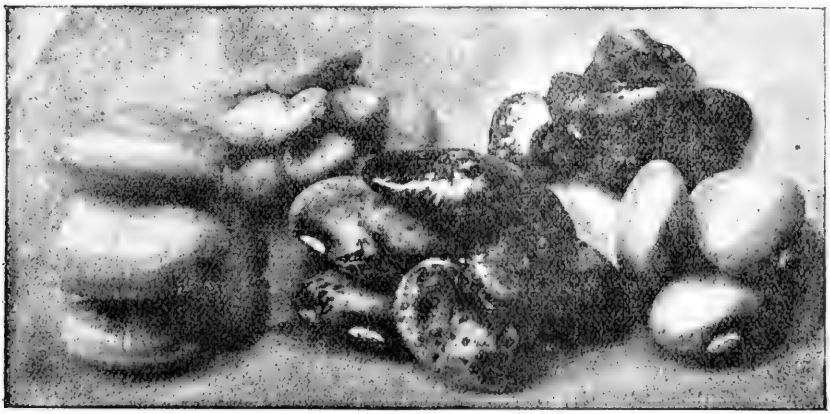
About a year ago we tried to say something (Bulletin 87) about the dwarf Lima beans. We found that those beans are all modern developments from the pole Limas, and that they represent each of the three types or tribes of Lima beans, — the Sieva, Flat and Potato Lima types. A discussion of the botanical features and the history of these groups was then given, and it is therefore unnecessary to repeat the account here. We need only recapitulate the leading marks of the groups.

The Sieva or Carolina bean is a small and slender grower as compared with the large Limas, early and hardy, truly annual, with thin, short and broad (ovate-pointed) leaflets, numerous, small papery pods which are much curved on the back and provided with a long upward point or tip and which split open and twist when ripe, discharging the seeds; beans small and flat, white, brown, or variously marked with red. This, like the true Lima, is a native of South America, and was early cultivated by the aborigines of North America and countries to the southward. It is the plant which Linnæus meant to designate by the name *Phaseolus lunatus*. The distinguishing marks of the pods of the Sieva beans may be seen in Figs. 102 and 103; and the beans of two of the varieties are shown in Fig. 101. The reader may consult Bulletin 87 for fuller information of the botany and history of the Lima beans.

The true Lima bean is distinguished from the Sieva by its tall growth, lateness, greater susceptibility to cold, perennial in tropical climates, large thick often ovate-lanceolate leaflets, and fewer thick fleshy straightish (or sometimes laterally curved) pods with a less prominent point and not readily splitting open at maturity; seeds much larger, white, red, black or speckled. The botanical name of this plant is *Phaseolus lunatus* var. *macrocarpus*. Of this true or large Lima there are two types in cultivation:

The Flat or Large-seeded Limas, which have large, very flat and more or less lunate and veiny seeds, very broad pods with a distinct point and broad ovate leaflets. See Figs. 107 and 109 for foliage; 106, 108 and 110 for pods; and 101 for the beans.

The Potato Limas, with smaller and tumid seeds, shorter and thicker pods with a less prominent point, and long ovate leaflets tapering from a more or less angular base into a long apex. See Figs. 112 for foliage; 111 and 113 for pods; and 101 for the beans.



Kaighn. Willow-Leaf. Speckled. Black. Dreer.

101.—Types of Lima beans. Natural size.

A. The Sievas.—

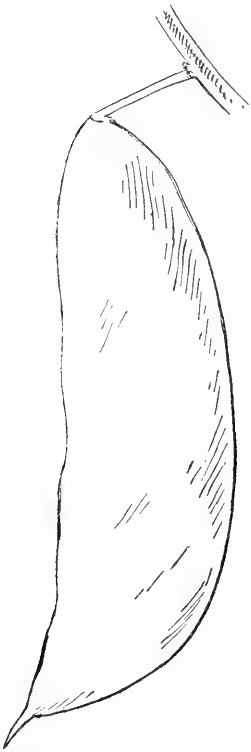
There are four dwarf varieties of the Sieva type, the Henderson, Jackson, Dwarf Carolina, and Northrop, Braslan and Goodwin Dwarf Lima. The Sievas are valuable chiefly because of their earliness. The beans are not so rich as those of the large Limas, and seem to us to be scarcely worth the growing where the latter can be successfully raised.

Last year we made an effort to grow all tall Lima beans. The seeds were all started in good garden soil on the 31st of May, and kept in very clean cultivation throughout the season. Amongst the pole or running Limas, the following in our test, are Sievas:

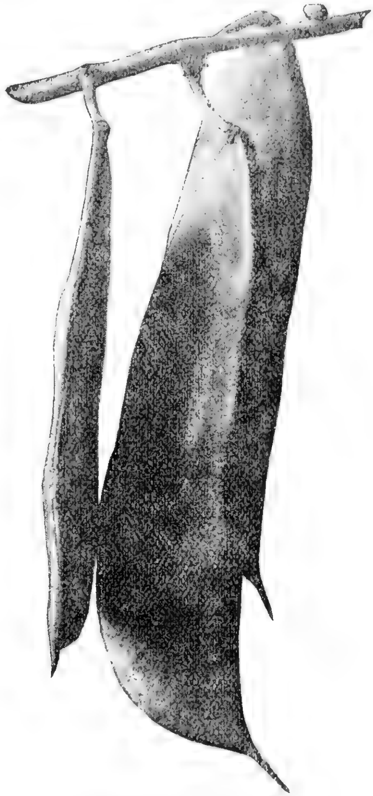
1. *Small Carolina* or *Sieva Lima.*—An early variety which began to bloom July 29, and ripened its crop before frost. Green beans were ready for the table late in August. The beans are

small, clear white, three or sometimes four in the small and profuse papery pods. It is a heavy grower, a tall climber and very productive. Henderson Dwarf is like this except in stature. Seeds from Burpee.

2. *Black* or *Early Black.*—(Figs. 101, 102)—Differs from the last chiefly in the color and shape of the beans, which are black (or



102. Black Lima. Natural size.

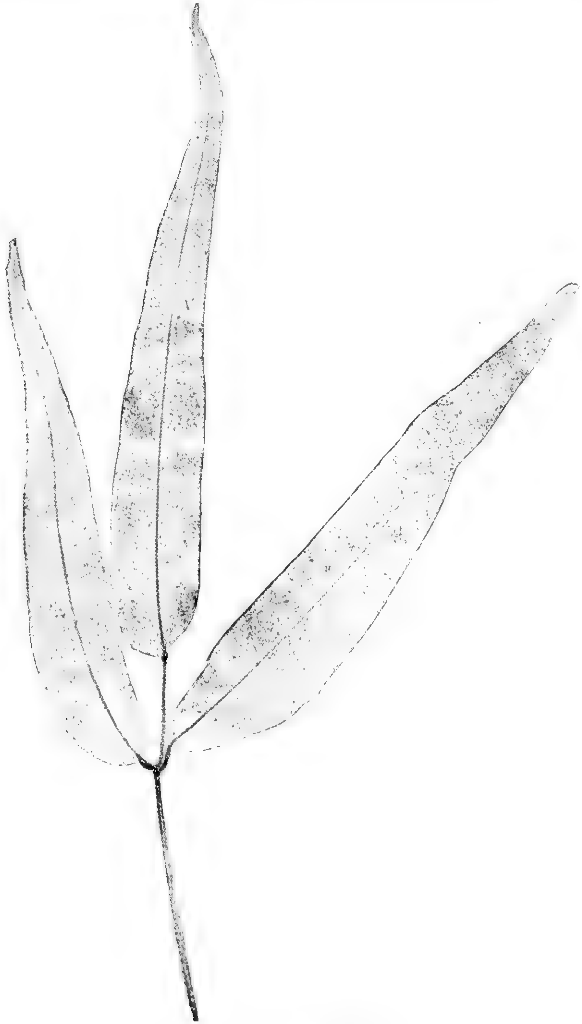


103. Willow-Leaf. Full size.

deep purple black) blotched and stained with white near the ventral edge, more or less angular or irregular in shape. Ripened its crop well. Very productive. The beans are in every way as good in quality as the white Sievas. Sent out for trial by Burpee in 1892 and introduced by him in 1893. Various purple spotted Sievas have long been known. Seeds from Thorburn and Burpee.

3. *Willow-Leaf* (Figs. 101, 103, 104, 105).—Later than No. 1, with which it is practically identical in the beans and pods. The

distinguishing feature of this interesting bean is the very curious foliage. The typical form of leaf is shown in Fig. 104, but the bean is not well fixed, and many plants bear leaves as shown in Fig. 105 or even as broad as those of the ordinary Sieva. The Willow-

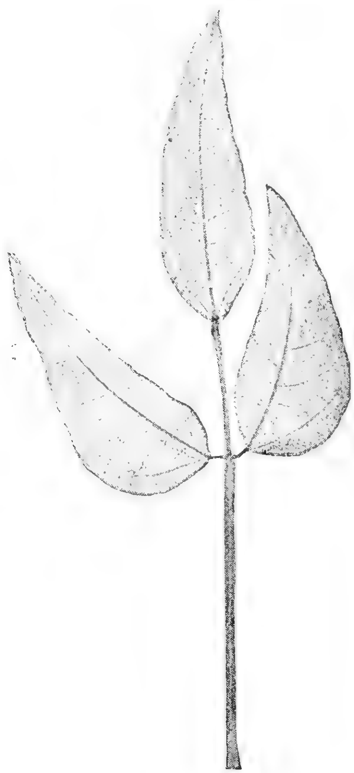


104.—Willow-Leaf. Half size.

Leaf Lima is a very ornamental plant, and is worth growing for its attractive foliage and habit. It is a tall grower, and if given a moist soil would make an effectual screen until frost comes. We have grown it two or three years, but have never prized it greatly for the vegetable garden. It is a sport or offshoot of the common Sieva type. It was introduced in 1892 (but distributed for trial in 1891) by Burpee, who received it from the south. Seeds from Burpee.

B. The large flat Limas.

Of the large white or flat Limas there are several important varieties. This type of bean is the one which chiefly represents the spe-

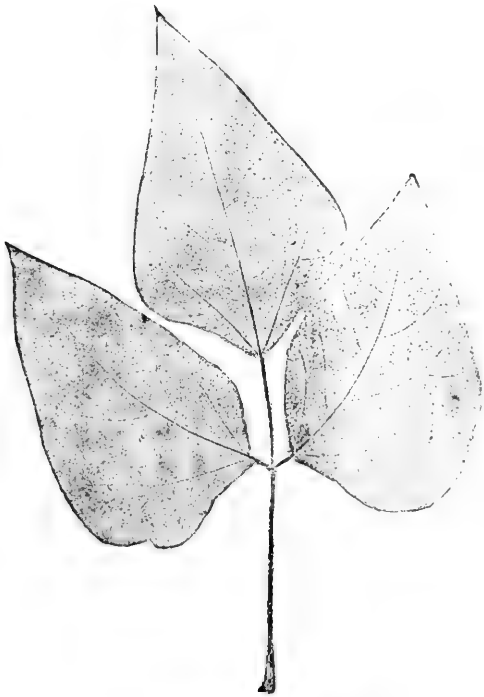


105. Willow Leaf. Half size.

106. Bliss. Natural size.

cies in the gardens. It is much superior to the Sieva type in bearing larger and much richer beans. The earlier strains mature most of their crop in central New York, if properly grown. The filled green pods which remain when frost comes yield excellent green beans for the table. Burpee Dwarf is an offshoot of this type of Lima.

4. *Large White.*— The old stock of Lima bean, from which most other varieties have sprung. It was catalogued by Dreer as long ago as 1838. It has probably been somewhat improved in the meantime, however. As we grew it last year, it had little value. The growth was short or medium (not climbing strongly), and it was late and unproductive. Although it began to bloom as early as the Sievas, it had ripened very few beans by the first of October.



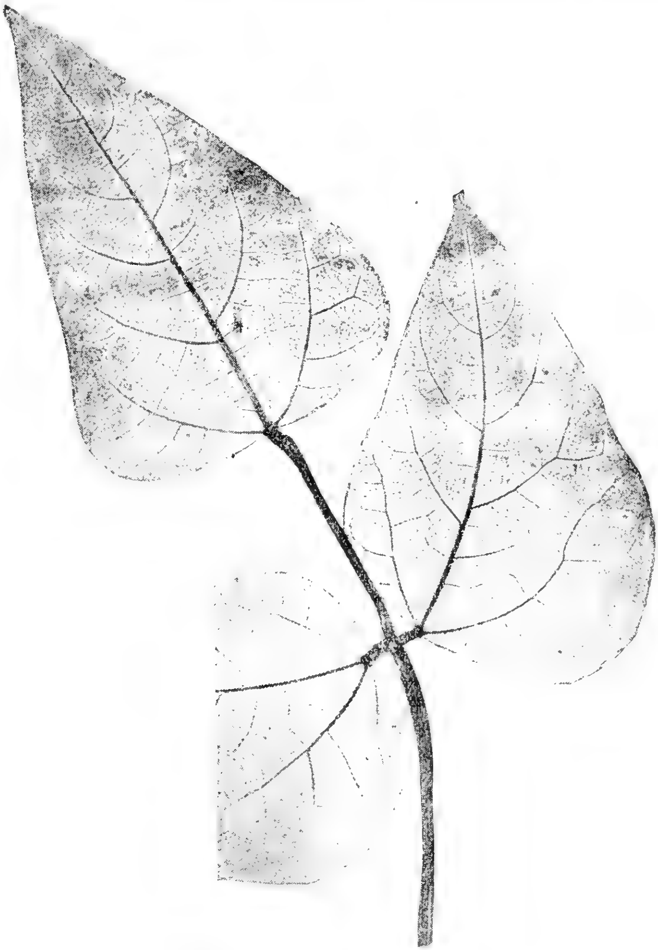
107. New Extra Early. Half size.

The pods were medium large, flat and curved, with a short tip. Beans flat, clear white, two to three in a pod. Of a variety which has been so long cultivated, there are certain to be strains of varying merit. Very likely the exact type cultivated twenty years ago is now unknown. Seeds from Burpee.

5. *Jersey.* — A good early strain of the Large White Lima, usually a week or ten days earlier. A strong, tall grower. Pods medium size, much curved when ripe, and strongly tip-pointed.

Beans medium size, flat, greenish white, averaging two or three in a pod. Seeds from Landreth.

6. *Bliss* (*Bliss's Extra Early, Extra Early, Extra Early Jersey*) Fig. 106. — A good early bean, fully as early as No. 5, and



109.—Mammoth Kidney-Shaped. Half size.

more productive. Tall, bearing broad pods of medium length with three to five large flat greenish white beans in each. One of the very best of the early strains of the large Limas. Introduced by B. K. Bliss & Sons, 1878. Seeds from Rawson, and May.

7. *New Extra Early* (Figs. 107, 108). — A low plant (2 to 4

feet high), mostly not disposed to climb, with large pods, each containing three or four rather large white beans. Began to bloom the 19th of July, but was not so early in maturing fruit as No. 6. It is probably the same as No. 6, however, the difference being due to seeds or other incidental circumstances. Seeds from Burpee.

8. *Platt*, or *Platt's King of the Garden* (also called *King of the Garden*).— A very large podded bean, late, producing very large and excellent white kidney-shaped beans. A short and slender grower, and not very productive with us last year. Sent out by Frank S. Platt, New Haven, Conn., as early as 1886, and said to be a cross of the Large White Lima and Dreer Improved. Seeds from Burpee, and Perry (Syracuse).

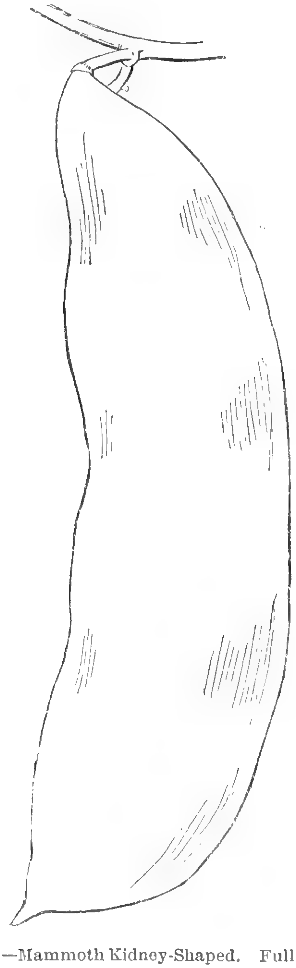
9. *Mammoth Kidney-Shaped* (Figs. 109, 110).—A good selection of the Large White Lima, the strain we grew being a medium tall grower, bearing broad and short-tipped pods of medium size, and white, flat, kidney-shaped medium sized beans. Productive, and ripens most of its crop before frost. A kidney-shaped form of the Large White Lima was catalogued as early as 1846 by Coates. Seeds from Livingston's Sons.

10. *Kaighn, or Kaighn's Improved* (Fig. 101).—The best large Lima on our grounds last year. Medium strong grower, bearing heavily of very large curved and pointed pods. Beans three or four to the pod, very large and flat, white, of most excellent quality. Ripened well before frost. The variety is a selection out of the Long White Lima by John M. Kraighn, Camden, N. J. Seeds from Landreth.

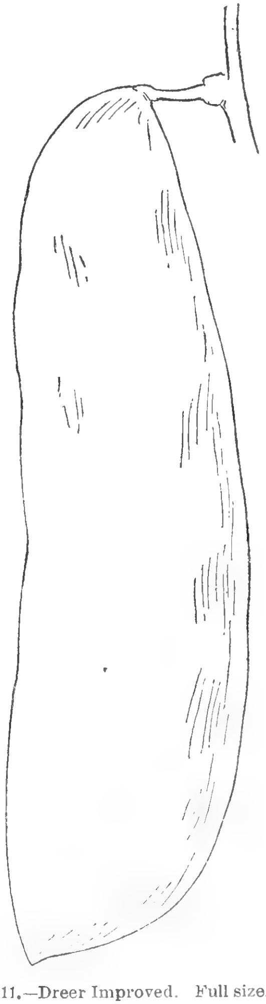
11. *May Champion.*—An extra good strain of Large White Lima, with very large and broad curved tip-pointed pods, and large white very broad kidney-shaped white seeds, of which there are two or three in each pod. A large part of the crop ripened up before frost. A tall, strong grower, and altogether a good bean. Seeds from May.

12. *Speckled Lima* (Fig. 101).—An early form of Lima, with handsome, medium sized flat beans which are speckled and blotched with very dark red-brown. Pods rather long and slender, tipped, containing three or four beans. A tall grower, ripening about all its crop before frost. A good bean, but the color is objectionable to most persons. The Speckled Lima originated in 1867, and is said to be a cross of the common Lima with Red-Seeded Giant Wax Pole Bean, but I fail to discover any evidences of hybridity. It is

possible that there are different breeds of this Speckled or "striped" bean, and that our strain is not a direct descendant of the form introduced in 1867. Seeds from Thorburn. Red Lima is evidently the same.



110.—Mammoth Kidney-Shaped. Full size.



111.—Dreer Improved. Full size.

C. The Potato Limas.—

The Potato Lima type was represented in our text by two kinds. The Kumerle, Thorburn or Dreer Dwarf Lima belongs to this type. The beans are perhaps the richest in quality of all the Limas.

13. *Dreer Improved* (Figs. 101, 111).— A most excellent bean, producing almost straight pods of medium size, lacking the tip, thick and without the thin edges of the common large Limas. Beans three to four in each pod, of medium size, irregular in shape, turgid and rounded on the edges, dull or greenish white, of best quality.

112.—Challenger. Half size.

A strong grower, productive, and ripening a large part of the crop before frost, although not so early as two or three of the varieties of the large Lima. This variety can be strongly recommended for its quality and for the large yield of shelled beans in proportion to the bulk of pods.

This bean was offered first time in Dreer's Garden Calendar of 1875. This is the description then given: "This bean is the product of the green wrinkled variety obtained from Mr. H. Kimber, of Kimberton, Chester County, Pa , about thirty years ago. Selections of the best specimens were annually made for seed until the bean has increased in early maturity and size, and established the present standard character.

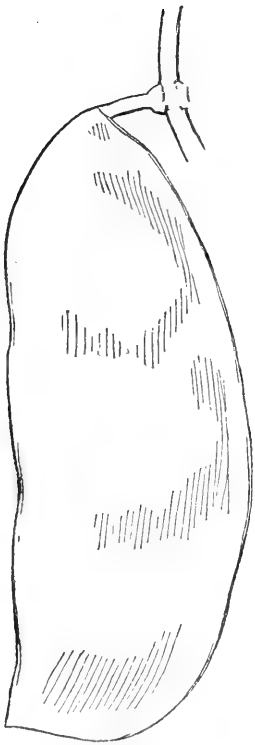
"The distinctive features of this sort are early maturity, prolificness and extra quality of bean; containing more saccharine matter and producing one-third more shelled beans to the pole than the Large Lima, while the shelling becomes an easy matter, from the fact of the pods being entirely full of beans, forming one against the other like peas in a pod.

"The *American Agriculturist* of November 1874, says: 'In these beans the pods are not only full, with no spaces between, but are as full as they can stick, the seeds so crowding one another that the ends of the central beans are square; the bean is also much thicker than the ordinary kind. A vine of this kind bearing the same number of pods as one of the ordinary variety would, we should judge, yield nearly if not twice as much in shelled beans. The pod being so completely filled, the shelling becomes an easy matter, and the beans when cooked are much superior to the ordinary ones, as the amount of skins is much smaller in proportion to the enclosed nutriment.

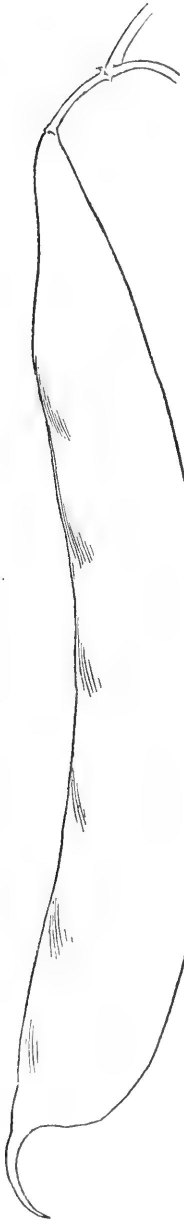
"'We regard the improving of this bean as one of the most important of the recent contributions to horticulture.'"

14. *Challenge* or *Challenger* (Figs. 112, 113). — So like Dreer Improved that I cannot distinguish any constant differences, but the pods are perhaps shorter. Introduced some years ago by J. M. Thorburn & Co. Seeds from Livingston's Sons.

John W. Kumerle, Newark, New Jersey, a well known Lima bean grower and the originator of the Kumerle or Thorburn dwarf Lima, writes me as follows respecting this bean: "I have sold this variety for a number of years under the name of Hedden Lima bean. It is the same as J. M. Thorburn & Co. of New York City sell as Challenge. I receive my supply from V. J. Hedden, Esq., of East Orange, N. J. This bean has been in the Hedden family for at least eighty years and they have been very particular in selecting them every year for seed until they have succeeded in producing a bean that yields from five to six beans in the pod."



113. Challenger. Full size.



114. Horticultural Lima. Full size.

D. Varieties not tested.—

Other varieties of true Lima beans which were catalogued last year but which we did not grow, are the following:

Ford's Mammoth podded—"Selected by James Ford of Philadelphia from Large Lima, with reference to five and six beans in pod of large size; the pod is also very and unnecessarily large."

Salem Mammoth—A greenish Lima, similar to the Ford, from Salem Co., New Jersey.

Stokes' Evergreen or *Mammoth Green Jersey*—"A very large green seeded Lima. Valuable because it retains its green color even after ripening." Our seeds of this variety failed to grow.

Washington Market.—We know is only by name (catalogued by Perry Seed Store, Syracuse).

E. The Horticultural Lima.—

There are two other species of beans which are sometimes known as Limas, which should be mentioned in this connection. The Horticultural Lima (Fig. 114) is one of these. This is not a Lima bean at all, but simply a form of the common garden pole bean (*Phaseolus vulgaris*). It is not a vigorous climber, reaching only three or four feet high, ripening its slender pods very early. The beans are dun-colored with pretty brown markings. A good and early bean (maturing before any of the Limas), valuable either for a "shelled" bean or for use when fully ripe. A Horticultural Lima was raised some years ago by O. H. Alexander, Charlotte, Vermont, and I suppose that the current stock passing under this name is the same bean. Mr. Alexander describes the variety as follows: "This is a cross from the Boston Horticultural bush bean on Dreer's Extra Early Lima, and I find it, after testing it several years, to be the best of all pole beans. In color and foliage it resembles the Horticultural; in form it resembles the Lima. The quality I find is superior to either of its parents. It is very prolific, and throws out handsome green pods from five to six inches long." It is also known as Child's Horticultural Lima. We grew the variety last year from seeds obtained from Burpee and from Childs. The two stocks were identical, and neither of them gave the least suggestion of a cross with the Lima. I have never yet seen any evidence of hybridity between *Phaseolus lunatus* and *P. vulgaris*.

F. The Chickasaw Lima.—

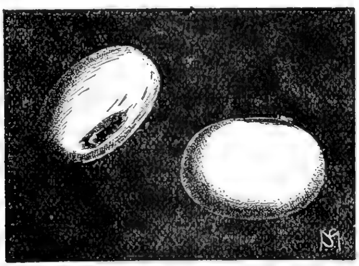
The Chickasaw Lima, Jack Bean, or Horse Bean (Figs. 115, 116) is a curious bean which I mention here only because it is sometimes called a Lima. It is *Canavalia ensiforis*, a tropical species which is widely cultivated. It has become generally distributed in the southern states during the past few years, where it is generally known as the Jack Bean. I have not been able to trace its

115. The Chickasaw Lima or Jack Bean (Canavalia ensiformis). One-third size.

introduction into this country, nor have I found any recent American literature describing it. It has probably come into the United States from the West Indies or Mexico. Griesbach and others speak of its cultivation in Jamaica, and we are growing it from there at the present moment.

The Jack Bean will probably not ripen in the north. We have grown it under glass, where it makes a twining vine four to eight feet high. In warm countries, it is a bushy plant with little tendency to climb. The pods reach a length of ten to fourteen inches, the walls being very hard and dense when ripe. The halves of the pod, when split apart, roll up spirally, often into an almost perfect cylinder. The large white turgid beans, bearing a very prominent brown seed-scar, are packed crosswise the pod, imbedded in a very thin white paper lining. The flowers are small and light-purple, resembling those of the Cow-pea (though larger), and of various species of dolichos. The leaflets are three, large and broad (5 to 8 inches long and half or three-fifths as broad), strong veined and dull dark green, abruptly pointed and smooth.

This Canavalia seems to be a rather coarse bean when fully matured, but some of my correspondents commend its culinary qualities when green. Naudin and Müller in "Manuel de l'Ac



116. Chickasaw Lima. Full size.

climateur," remark that "it is said that the seeds, whilst not poisonous, are digested with difficulty by those persons which are not accustomed to using them." Mr. John Dehoff, Tabor Lake, Florida, sends specimens for determination and writes: "The bean makes a large bush two and a half to three and a half feet high and broad. It stands all kinds of weather except frost, and blooms and bears unremittingly. The beans are quite acceptable as a 'snap bean,' when the pods are not more than four or six inches long." Alex. Raff, Orange Grove, Mississippi, who sent me the seeds for a name says: "The plant is a bush about thirty inches in height. The blossom is pink, and the seed pods average about twelve inches in length, containing from twelve to fourteen beans. They were grown this season on poor piney-wood sandy soil, fertilized with a little barnyard manure, and I think would average in yield from twenty to twenty-five of these large pods to the plant. In quality for table use, we think it is fully equal to the Lima bean." A. Jones Taylor, Vernon, Texas, sends the bean to me under the name of Chickasaw Lima. It is said to be cultivated by the Chickasaw Indians. Professor Georgeson describes and figures it as one of the economic plants of Japan in "American Gardening," for February, 1893.

Professor S. M. Tracy, of the Agricultural College of Mississippi, wrote me as follows about this bean in August, 1895: "I know very little about Jack beans. I suppose them to be *Canavalia ensiformis*. A few Mexicans who have sent them say that they are common in that country, where they are used for food. One of my assistants saw them at a county fair in the southern part of this state five years ago, and brought a couple of pods home with him. I grew them on small plots three years, and last year had about half an acre, which yielded at the rate of twenty-three bushels per acre. A neighbor claims to have had thirty bushels, which I think is reasonable, as my crop of this year appears as though it would be even heavier. I have eaten the beans, and find them quite edible, though rather coarse. I have not fed them to cows, but chemical analysis shows them to be fully equal to other beans. We have ten acres this year, and propose to give them a thorough test in feeding next winter. I do not know any one who has used them, or who has grown them in any quantity."

The result of this last crop, Professor Tracy now reports, this month, as follows: "The Jack Beans yielded thirty to forty bushels per acre. We have used the beans this winter in feeding steers, cows and hogs, and I am greatly surprised to find them of almost no value. Cattle soon learn to eat the meal made from the beans, but it appears to be very difficult of digestion. We have used it constantly for ten weeks until yesterday, when I decided that there was no occasion for any further work. Next week I shall commence feeding the cooked meal, and if I get satisfactory results from that, shall try cooking some of the beans also."

I have grown this Jack Bean only as a curiosity and have not tested its culinary qualities. It fruits freely under glass. I report it here because there is considerable inquiry concerning it and because there is no accessible literature of it.

II. Remarks on the Growing of Lima Beans.

1. *Methods for New York.*

The Lima beans are amongst the most delicious of all our garden vegetables. There are no beans grown in this climate which approach them in richness. They are excellent either when used green as "shelled" beans, or when used ripe and dry during the winter season. The merits of the green or shelled Limas are nearly everywhere known and appreciated, but comparatively few people seem to understand that the ripe beans are just as excellent in the winter time as the green beans are in the summer. At the present time, the writer is using the ripe Lima beans in the same way that the common field beans are cooked for the table, and they are the most satisfactory of any beans which can be served. These beans may be shelled in the fall after the pods are fully ripe, or they may be put away in the attic or other dry room in the pod and shelled as occasion requires. If they are stored in the pod the only caution is that these pods should be thoroughly dried and cured.

The Lima beans are natives of warm countries. The large flat Limas are perennials, or at least plur-annuals, in their native countries. They therefore require a long season, and one who expects, to grow them in the north should endeavor in every way to shorten the period of growth. This may be done, in the first place, by planting the earlier varieties; and, in the second place, by exercising great care in the selection of soil and in giving particular attention to cultivation. Light and so-called "quick" soils are best. Soils which are naturally sandy and loose, but which have been enriched in previous years by the addition of manure, are excellent for Lima beans, especially if they have a warm exposure. The soil should also be dry. Coarse, raw manure should be avoided on Lima beans, because it tends to make too rank and too late growth. If any fertilizer is applied the year in which the beans are planted, it should be such as will become available very quickly and therefore tend to hasten the maturity of the crop. We prefer, therefore, to use some of the concentrated fertilizers, especially those which are rich in potash and phosphoric acid, and avoid those which contain very much nitrogen. If nitrogenous fertilizers are used at all, they should be applied in comparatively small amount and be of such kind that they will give up their fertility early in the season. If ordinary stable manure is used, it should be applied in the fall in order that it may become thoroughly incorporated with the soil and be ready for use at the earliest moment in the spring.

We had an excellent chance last year to study the effects of moist soil upon Lima beans. Our experimental plantation ran through a low place on to a dry, sandy elevation. The soil was the same formation throughout the plantation, but in the sag it had become somewhat enriched by the washings of the higher lands. This sag was so dry and so well drained that it never held water, and the season was characterized by a prolonged drought; yet, in spite of these facts, the beans in this sag were at least three or four weeks later than those upon the dryer end of the plantation, and some varieties did not ripen a single pod in this spot. It should be said, however, that the soil throughout this plantation was very thoroughly tilled all during the season so that the moisture upon the high land was conserved to the greatest possible extent. Lima beans delight in hot, dry weather, if only they have an opportunity of getting their roots deeply into the soil before dry weather comes on, and if they are given frequent shallow tillage for a time.

Whilst it is essential that the Lima beans should be given the longest season possible, it is nevertheless futile to plant them before the weather is thoroughly settled; for, even though the seeds may germinate, the young plants will be seriously checked by inclement weather. We prefer to plant them a week or ten days after it is safe to plant the ordinary bush garden beans. We have our ground very thoroughly prepared, plant them about an inch deep in about twice the quantity which we desire to have them stand, and then expect to keep them growing rapidly until they have reached the tops of the stakes or trellis. If we use stakes, we plant the beans in hills about three feet apart and the rows about four feet apart, dropping seven or eight beans in each hill. When the beans are well up, and danger from bad weather and cut-worms is past, we pull out all but three or four. The poles should not be more than six feet high. If they are taller than this, they are not only expensive to procure and hard to keep in place, but the beans will run too high and grow too late. When the beans reach the tops of poles which are five or six feet high, the ends of the vines swing out horizontally and the growth is checked, and the setting of fruit is thereby, no doubt, hastened. It is the practice of many persons to clip back the ends of the vines when they have reached a certain height. For myself, I doubt the efficiency, or at least the necessity, for this practice. It seems to me that it is better to prevent too rapid growth by withholding the strong fertilizers and then by the use of comparatively short poles. Some persons prefer to grow the beans upon a trellis, and this is the most economical of room. In this way the beans can be planted more or less continuously, so that the vines will eventually stand about a foot apart. The trellis can be made very cheaply by placing a very strong braced post at each end of the row and then running a strand of fence wire from one post to the other about eight or nine inches above the ground, and another strand about five feet above the ground. These wires can be kept from slacking by placing stakes at intervals of ten or fifteen feet. Ordinary wool twine is then run from the bottom to the top wire and thence to the bottom wire again, and so on, in a zigzag fashion, throughout the length of the row, placing it in such manner that the strands of string will be no more than a foot or fifteen inches apart. This makes a very cheap and serviceable trellis and is, no doubt, better than stakes.

Our Lima beans were planted in 1895 on the 31st day of May. They might have been planted a few days earlier, no doubt, with perfect safety. If one desires to get his beans ahead very early, he can plant them in a forcing-house or cold-frame in pots or on inverted sods, or in refuse berry boxes, about two weeks in advance of the time they are to be set out of doors. From these receptacles they can be transferred easily to the ground. One of our constituents says that he always greases his Lima beans thoroughly with lard when he plants them and is thereby able to plant his crop a week or ten days ahead of the usual time, because the grease preserves the beans from rotting. We have not tried this method and do not know what value it has. It is an easy matter to transplant Lima beans, even when they are not grown in pots or boxes, if the ground is moist when they are taken up so that a large lump of earth adheres to the roots and if the weather is somewhat humid following the transfer. But, in spite of all that can be done, nearly every variety of the large Lima beans will fail to mature its full crop in the north before frost. If half the pods which the vines have set should mature before frost comes, the grower may feel that he has been very successful. The green pods which remain at frost time, if the beans are partially grown, can be picked, the beans shelled out and dried, and these can be used in the winter time to as good advantage as if they were thoroughly ripe. If these dried beans are soaked in water some time before they are cooked, they are scarcely inferior to green beans directly from the vine.

It is generally considered that the richest of all the Lima beans are those of the Potato Lima type, like Dreer's Improved and Challenge. This type of beans makes a smaller and less showy pod than many of the large white Lima type, but the pods are usually closer packed with turgid seeds. To the person who buys Lima beans in the pod, these are much the more economical, whilst the one who sells beans in the pod would secure a larger bulk by growing some of the very large-podded flat Lima type, like Kaighn, Jersey, May Champion and the like. For ripe beans, the large white flat Limas usually sell the best, but there are many persons who prefer a green Lima. A number of the varieties are greenish even when they are fully ripe, and therefore have the appearance of being more fresh and tender. The red and speckled Limas are in every way as good in quality, as the white or green ones, but most persons do not like this dark color. In our own test of last year, we thought that the best six beans, considering earliness, productiveness and quality, were the Jersey, Extra Early or Bliss, Kaighn, May Champion, Dreer Improved and the speckled Lima.

It is difficult to state what the yield of Lima beans may be. As a rule they are not grown much for market in the dry state in the east, for the California product can be grown with more certainty and more cheaply and is shipped east in very large quantities. Mr. C. J. Pennock, of Kennett Square, Pa., one of our former students, writes that upon a half acre he gets a yield of about 120 $\frac{5}{8}$-bu. baskets of pods, and the price runs about fifty cents per basket. He uses poles seven feet long, stuck three and one-half by four and one-half feet apart, and he cultivates twice before setting the poles, hoes the beans about once, and trains the vines to the poles by hand.

2. *The California Practice.*

In the East, the Lima bean is much grown in New Jersey, but southern California is undoubtedly the largest producer of Lima beans in the world. The following estimates show the enormous output of Lima beans from this region :

	Ventura County.	Santa Barbarba County.
1893..............	1,500 car loads.	250 car loads.
1895..............	1,100 " "	120 " "

A car load is about ten tons.

It is a question if Lima bean seed which is grown continuously in the long seasons of California is as reliable for our short seasons as home grown seed is. For myself, if I were expecting to grow Limas for market in central New York, I should prefer to select and grow my own seed or else be sure, if it were California grown, that the "stock" were annually grown in my own geographical region.

A most instructive account of the interesting Lima bean industry of southern California was printed in the "American Florist," for December 28, 1895, written by L. B. Hogue, Santa Paula, California. J. C. Vaughan, of Chicago, who has given considerable attention to this western bean interest, writes me commending the article. In order to complete the contemporaneous history of the Lima bean as well as to instruct our own people in some of the essentials of the cultivation of these plants, I append the larger part of the article:

"More than twenty years ago a farmer in the Carpenteria valley experimented with the Lima bean. None of them had been grown on this coast for market at that time. The experiment proved a perfect success. Every requisite for producing this variety in its perfection seemed to be supplied here. A remunerative price was readily obtained for the mature bean. From this time others began to grow them. The demand grew with the increase of the product. The profits became much greater than were those of any other farm crop, which proved a great stimulus to improved methods. Something like exact science was finally reached in the matter of the preparations and cultivation of the soil. The primitive way of harvesting by hand, where one man could cut one acre per day by hard work, was superseded by a simple horse power device, with which one man could cut fifteen acres per day. Also implements were invented for cultivating the land before planting, which facilitated the work in like manner. To the credit of these farmers let it be said that the machinery for the successful cultivation and harvesting of this crop was invented by them.

"As a matter of course the success of the industry in the Carpenteria soon attracted wide attention, and farmers in other parts of the state began to make trials to grow the Lima bean. Their efforts, though, proved to be failures. Our section, however, that of the Santa Clara valley of the south, in Ventura county, and only about twenty miles from the Carpenteria, would seem to possess nearly all the requirements in soil and climate. But some way the business did not 'pan out' right as the 'forty-niner' would say. Carpenteria farmers had their eyes on the operations in Ventura county, however. They noticed that their own farms were usually from ten to twenty acres, while the Ventura farms averaged at that time about one thousand acres to each farmer. They noticed also that the farming was done in a slipshod out-of-season fashion that would not succeed even in their own section. Finally some of them rented small tracts of land in the Santa Clara valley and instituted their methods of farming. When lo! Dame Nature smiled upon them. Ye rancher on a thousand acres came around to see how it happened that the despised 'small farming' had resulted in as much clear gain from a few acres as he had received from his thousand. Other practical bean growers settled in the valley and the shipments of Limas from southern California doubled, trebled, and quadrupled — when finally improved facilities had rendered large farming practicable. However, the average yield per acre, about one ton, continues larger in the Carpenteria valley than in most other places. Although numerous attempts are made to grow the Lima bean in other sections of the state the fact remains that nearly all of this variety shipped from California came from the extreme southern part of Santa Barbara county, and from the valley of Ventura county lying near the coast. The little valley of the Carpenteria sends out about one hundred car loads, and those of Ventura about twelve hundred car loads annually. (Estimate of 10 tons each.)

"The methods adopted here in growing and harvesting the Lima bean could not be pursued in countries where rain falls during the summer season. The cultivation proper is all done during the winter and spring and before the beans are planted. The cultivation is very thorough and by the best of implements.

"After all danger of rain is passed in the spring, say from the 1st to 20th of May, the seed is put into the ground in rows about forty inches apart and from six to fourteen inches in the row with machines that plant from two to four rows at a time. After the crop is well up and growing, some weeds will have started too.

These are destroyed by using a horsepower weed knife, which passes just under the surface of the ground, killing the weeds in one or two rows at a time without disturbing the soil, which is by this time perfectly dry on top. As the season advances the plants send out their vines over the dry surface, until the ground is finally hidden from sight, and thus, all through the latter part of our rainless summers, thousands of acres may be seen covered with beautiful light green foliage.

"In the latter part of September the beans are all cut loose from the ground a little below the surface and are forked into piles convenient for pitching onto wagons. They are then allowed to dry in the sun for about two weeks before threshing. Formerly all threshing was done in the following manner: A round space on the ground sixty to eighty feet is made quite wet, then it is wagoned over, packed and smoothed down and allowed to dry hard. Two or three big wagon loads are placed in a ring on this floor during very dry clear weather. Formerly horses attached to light wagons were driven over the beans (usually two or three teams at a time), till they were all shelled from the pods. The vines are then thrown off and more beans from the field placed on. This process is continued until there are many tons of beans on the floor under those that are being threshed out. After this the whole mass of chaff and beans is run through winnowing and screening machines and the beans placed in sacks of seventy-five to eighty pounds each and are ready for market. Of late years the teams on the floor are attached to disc machines instead of wagons, which greatly facilitates the work.

"The process of threshing by large steam machines which clean up from fifty to seventy-five acres of beans per day, has more recently been adopted by most of the large growers. It is a singular fact, however, that while the expense to the farmer who employs the steam thresher is usually five dollars per ton, the work is done by the first named method at about four dollars per ton. The machine threshed beans have also to be recleaned before they are marketed, and are broken so much that they are never fit for the seed trade. Yet there is one great advantage with the steam thresher. The rainy season, so called, is approaching and a shower is liable to fall in October while the threshing process is in full blast, so that any beans that are caught on the floor are ruined if they do not manage to cover them in some way, while by the machine process all beans are sacked as they are threshed.

"Nineteen years ago an eastern seed firm having learned of the successful culture of the Lima bean in this section, made arrangements to have a small lot grown, to be used in his business. The project proved to be a feasible one. Other wholesale seedsmen gradually came into this field and made contracts for seed. Some of them were at first unfortunate in dealing with careless farmers, the business proving unsatisfactory. The demand upon careful seed growers, however, increased until they virtually held a monopoly of that branch of the seed business in the United States, the writer having had contracts with eastern seed houses amounting to nearly one hundred and fifty tons in a single year. Within the past two or three years the extensive wholesale dealers in beans for all purposes have been securing the contracts of seed houses and farming them out to whoever would grow them for the lowest price, with the result that an inferior grade for less money is now being supplied, while the careful and successful seed growers have mostly gone out of the business into other horticultural pursuits which promise better returns for their skill.

"For the benefit of some readers it might be well to state even at this late date in the history of agriculture in California that these crops are grown without irrigation and without any rain from the time the seed is planted till the beans are harvested, unless it be that an unwelcome shower is liable to come in the harvesting season in the month of October."

III. Index.

L. H. BAILEY.

BULLETIN 116—May, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

DWARF APPLES.

See page 391

By E. G. Lodeman.

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The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.
116. Dwarf Apples.

Cornell University, Ithaca, N. Y., *May* 11, 1896.

Honorable Commissioner of Agriculture, Albany.

Sir.— The interest in dwarf pears continues to be unabated in this State, and one of the questions which comes to us very frequently is a request for information as to why dwarf apples may not also be a source of profit. Unfortunately, we are unable to answer these questions from any American experience, for dwarf apples have been grown in this country chiefly as single or specimen trees and not in plantations of commercial extent; and even as specimen trees, they are comparatively little known. Yet the inquiry concerning them is so great that we have thought it wise to collect and publish as much as possible of the scattered experiences of New York people. The Experiment Station Extension Law, under the auspices of which this bulletin is published, has for one of its leading objects, as we interpret it, the collecting and publication of the very valuable experiences of horticulturists in the Fifth Judicial Department of the state, which experiences are commonly lost to the public, but which are intrinsically as valuable as similar work which may be taken up by the station. In fact, they may be more valuable. The law is designed to promote the spread of information amongst the horticulturists of its territory. Its motive is distinctly educational. We have, therefore, no hesitation in presenting this average of experiences as a bulletin, even though it is not all founded upon experiments actually made at the station at Ithaca. To wait for the maturing of experiments would mean the delay of publication and a refusal to satisfy inquiry for several years to come. The reader must bear in mind, however, that we make no recommendation respecting the setting of dwarf apples for commercial purposes. We have simply given the gist of what evidence we have been able to collect in a two years' inquiry, and the reader must draw his own conclusions. The present writer has been more or less familiar with dwarf apples for twenty years, and has known some good commercial results to be obtained; but he is of the opinion that if dwarf apples are to be planted at all for market they should comprise only those varieties which are suitable for a very fancy or dessert trade.

The bulletin is submitted for publication under Chapter 230 of the Laws of 1895.

L. H. BAILEY.

Opinions of Dwarf Apples by American Writers.

Patrick Barry : "The apple, worked on the Paradise, makes a beautiful little dwarf bush. We know of nothing more interesting in the fruit garden than a row or a little square of these miniature apple trees, either in blossom or in fruit. Those who have not seen them may imagine an apple tree four feet high and the same in width of branches, covered with blossoms in the spring or loaded with magnificent golden and crimson fruit in the autumn. They began to bear the third year from the bud, and the same variety is always larger and finer on them than on standards." — *Fruit Garden, New Edition*, 1883.

W. C. Strong : Dwarf apples are "well adapted for garden culture, giving the advantage of early fruitfulness, an increase in the number of small trees, and consequently in the number of varieties, when this is desired . . . . . Constant watchfulness will be required in the culture of dwarfs to give annual supplies of food, to preserve the form by pruning, and also to prevent rooting above the dwarf stock and thus destroying its character." — *Fruit Culture*, 1885.

John A. Warder : "Such are very appropriate for the small garden, or for the specimen grounds of a nursery establishment, and they sometimes make beautiful objects on the lawns or among the shrubbery, but they are wholly unsuited for orchard planting." — *Apples*, 1867.

John J. Thomas : "For summer and autumn sorts, dwarf apples are valuable in affording a supply to families. They begin to bear in two or three years from setting out, and at five or six years, if well cultivated will afford a bushel or so to each tree. A portion of a garden as large as the tenth of an acre, may be planted with forty or fifty trees, without crowding. All the different varieties of the apple may be made dwarfs by working on the Paradise or Doucin stock — the former are smaller and bear soonest ; the latter are larger and ultimately afford the heaviest crops. Among the handsomest growers as dwarfs, are Red Astrachan, Jersey Sweet, Porter, Baldwin, Dyer, Summer Rose, Benoni, and Bough." — *The American Fruit Culturist, Revised Edition*, 1885.

George Jaques : "No one, we suppose, will attempt to cultivate these little trees in this country, excepting for ornamental purposes. They are very pretty garden pets in the midst of a flower-bed, or at the corners of alleys, or elsewhere where fancy may locate them. They seldom bear more than a dozen or twenty apples, and therefore the economical orchardist, looking to profit alone, ought not to consider them as worthy of his attention . . . . . There is nothing very peculiar in the management of the dwarf apple. Its place is the garden, not the field ; still less will it answer to put these little trees in grass-ground, or to subject them to rough usage." — *A Practical Treatise on the Management of Fruit Trees. Worcester, Mass.*, 1849.

Dwarf Apples.

I. Dwarfing in General.

Effect of checking the movement of sap.— All fruit trees are provided with certain well-defined courses through which the sap passes to every part of the plant. After the roots have taken in the water with its freight of dissolved plant food, the crude sap, as it may then be termed, enters a definite course which eventually brings the nourishment to the parts in which the materials are used for constructing plant tissue. There is no circulation of sap in plants in the sense in which there is in animals, no definite tubes through which it flows. It passes through the plant tissues by a process of absorption. The regions in which this transfer takes place will become apparent upon consideration of a few common facts.

Let us suppose a very common case. Labels are frequently secured by means of a wire which surrounds either a branch or the trunk of the tree. It is no unusual occurrence that such labels are neglected, and as the stem increases in size, the wire becomes imbedded in the bark. This forms a constriction about the stem, and the connection between the parts above and below the wire is more or less effectually destroyed, especially in the outer portions. As the wire becomes more deeply buried, an unequal growth takes place in the adjoining tissue. The stem immediately above the wire becomes abnormally enlarged, while the rate of growth below is greatly lessened or almost entirely checked. If the wire is not removed, union of the tissues separated by the wire may take place, and the tree will be little the worse for the check. More frequently, however, young trees are so severely cut that the increased weight of the top forces the stem to break where it is surrounded by the wire, causing a total loss of this portion.

Another familiar example may be named. When the trunk of a plant has been entirely girdled, as frequently occurs with orchard trees, and as is sometimes purposely done with grapevines when particularly large fruit is desired, it is interesting to note that the plant makes little attempt to cover the wound from below, but the healing takes place from above. At the same time the foliage does not wilt as if suffering from water, unless the cut has been made very deep, but it frequently remains green and apparently healthy for a long time.

The above facts lead to but one conclusion: the sap upon entering the plant rises through the inner tissues to the extremities of the branches, or to the leaves; from here it descends, choosing for its path, however, the tissues which lie between the outer bark and the wood. The part through which the sap rises is well known under the name sap-wood. In many plants this wood is very conspicuous in sections of the stem on account of its light color. The sap descends through what for convenience may be loosely termed the inner bark, which consists of the soft tissues that lie directly underneath the hard, corky covering of the stem.

Endogenous plants, such as the palm, corn, and others, do not have these tissues separated from each other as above described. The tissues which correspond to the sap-wood and to the inner bark are arranged in the form of long, slender, thread-like bundles which are readily distinguished as coarse fibers, thinly scattered in the pith as seen in corn stalks, and more thickly at the edges of the stems. The sap rises and descends in each of these many bundles of fibre, so that the girdling of this class of plants is not followed by such abnormal growths as occur on our fruit trees; the primary result of such injury is that the amount of sap which reaches the foliage is reduced in proportion to the number of these fibres which are cut.

The reason why the sap passes directly to the foliage before it returns to the growing parts of the plant is obvious; in the tissues of the leaves the crude sap is acted upon by various agents, with the result that the nourishment which was carried to the leaves is made available for use by growing cells. The process of changing the unavailable food to that which is of use to the plant is known as assimilation; the green portions of the plant are the only parts in which this change can take place, and it can proceed only in the presence of light. The leaves may, therefore, be considered as one of the most important factors in the nourishment of plants. An injury to them is not merely a local matter, but it affects the entire plant economy.

After the sap has been elaborated by the foliage, it is in proper condition for nourishing any of the growing cells of the plant. It passes to the growing tips and there assists in lengthening the shoots, in forming new leaves, and in producing buds — some of which may be fruit-buds — which remain dormant until the following year. It passes to the main branches and the trunks of the plant, and supplies the cells which are forming wood and those which are forming the tissues of the inner bark with the materials necessary to their support and growth. It passes down into the root system of the plant and furnishes the roots with the food required for their proper growth; but if an insufficient amount of food is present the roots are the first to suffer, for it seems that only the part which is not needed by the parts above ground is allowed to go as far as it may towards the nourishment of the roots.

We are now prepared to consider the effect upon a plant of any injury or other abnormal modification. When a plant is girdled, the nourishing sap is prevented from returning to the roots; these must suffer and eventually die. But when only a part of the top of a plant is girdled, the roots need not necessarily be deprived of their proper amount of food, since the remaining branches may perform their duty without the aid of the girdled portion. This part, however, may show very marked effects of the treatment. The sap is allowed to enter the branch freely; but when it is returning from the foliage it cannot pass the point of injury and we, therefore, find the abnormal growth of tissue which so commonly results from such mutilation. Yet all the food is not deposited at the girdle. Girdled branches are frequently the most fruitful ones; in fact, they may be the only ones upon a tree which produce fruit. The branch may be said to be congested with food, and relief from this condition is sought in the production of fruit.

Girdling may have other effects than to promote fruitfulness. Grapes are girdled not in order to make them more fruitful, but that the fruit may be larger, and that it shall mature a little earlier. These are results which naturally follow from the abundance of the food supply.

The girdling of trees has been considered in connection with dwarfing because the two subjects appear to be closely connected. The results of checking the flow of sap are very pronounced in girdled trees. Figure 117 represents a union of a Fallawater apple upon the dwarf Paradise stock. The stock was budded about 22 years ago, and an enormous swelling has been

117.—Union of Fallawater apple upon Paradise stock. The swelling, in which the knife is placed, is of the cion. The earth is removed in order to show the malformation.

formed at the point of union. The slow growth of the stock, as compared with that of the cion, prevents the free passage of sap from the foliage to the roots. The stock in such cases may be said to form an obstruction to the descending sap, much as the wire does upon improperly labeled trees. If in spite of such an obstacle, the roots receive all the prepared sap which they require, the tree should prove to be very fruitful.

Dwarfing a tree is done primarily for the purpose of growing a certain variety of fruit upon a slow-growing stock so that the top may never attain its normal size. Other things being equal, this dwarfing need not necessarily cause it to be more precocious or more fruitful. Yet dwarf trees do, as a rule, bear earlier than standards; this is especially true in the case of apples. Fruitfulness depends largely upon a proper food supply. The reason that a tree bears earlier when it is dwarfed may probably be ascribed to the fact that it comes to an earlier maturity, and that certain buds receive better nourishment than when growing as standards. A dwarf tree never makes a rank growth, so in this respect it may be said to be at all times more inclined to bear fruit than the standard. If, in addition, the stock serves as a check to the return passage of sap, we have the condition which we suppose will produce fruit in standard trees.

In the case of pears, there is less difference between the bearing periods of standards and dwarfs than there is in apples. The difference that does exist may be caused by the same conditions which were advanced above as causes for the earlier fruiting of apples. Dwarf pear trees are also supposed to produce larger and handsomer fruit than standard trees, but I know of no experiments which have shown this to be the case, although the truth of the statement is highly probable. All pear growers seem to agree that dwarf trees bear more regularly than standards, and it is the general impression that they bear more abundantly in proportion to their size.

The entire subject of plant dwarfing is an extremely intricate one. Directly connected with it are all the questions relating to the formation of leaf and fruit buds, the effects of more or less active vegetative growth upon fruitfulness, the kinds and proportionate amounts of food which are most influential in producing a desired effect, the influence of certain mechanical disturbances which were advanced above as causes for the earlier fruiting of important points still require investigation. Laws controlling such behavior of plants undoubtedly exist, but continued observation and wide experience must be had before these laws may be formulated with any degree of certainty.

Fruits grown as dwarfs..— The pear is the fruit most commonly dwarfed. It might be said that in the eastern states fully 50 per cent. of the trees are grown in this manner. The quince is used for stock. Such trees are very productive and under proper treatment they are long lived. One interesting point to consider in connection with dwarf pears is the fact that some varieties do not grow well upon the quince, while others behave better when dwarfed than when grown upon free stocks. Apple varieties, however, are supposed to grow with equal readiness upon Paradise or upon Doucin stock.

Cherries may also be grown as dwarfs. The stock most generally used in such cases is *Prunus Mahaleb*, but the top must be kept severely pruned, otherwise large trees will be formed; but the dwarf trees are rarely grown in this country.* In Europe, however, the small cherry bushes have the reputation of being exceedingly productive, the fruit at the same time being of very fine quality. These plants are grown mostly by amateurs.

Plums have long been dwarfed by pruning the roots severely every year or two, so that the top growth of the tree may be checked. Such trees bear regularly and abundantly; cherries may be treated in a similar manner with the same result.

II. DWARFING THE APPLE.

Apples are at present regularly dwarfed by grafting or budding the desired variety upon some small form of the common apple species, *Pyrus Malus*. The species is extremely variable, having produced the bulk of the varieties now in cultivation (all save the crabs are of this species) as well as the dwarf forms, the Doucin and Paradise apples, which at present serve as stocks to check the growth of the more vigorous sorts. These dwarf apples were originally seedlings, the same as our present varieties are; and no doubt similar varieties appear at the present day, but we do not look for them and save them. Gardeners have known the dwarf varieties of apples for many centuries, and the introduction of these forms into cultivation can no longer be traced with certainty. The subject is made the more difficult because of the repeated transfer of the same name to different varieties of apples; this has been done so frequently that the term "Paradise apple" may more properly be considered to refer to a class of apples rather than to a single variety.

* As a matter of fact, the sour cherries, and very often the sweet ones, are grown upon Mahaleb stock in New York state. The Mahaleb stock is more easily worked and managed than the Mazzard or Sweet Cherry stock. The trees which are grown upon Mahaleb ordinarily reach their full stature. They are made dwarf only by judicious pruning. L. H. B.

The Paradise apple.— Early botanists considered as different species many forms of apples which are at present recognized as mere varieties of one species. The Paradise apple, as now known, is probably similar to the plant described by Bauhin as *Malus pumila*, "whose fruit is the apple of Adam."* It was said to bear both red and white fruits. Linnæus classed it as *Pyrus Malus*, var. *Paradisiaca*,† while Roemer called it *Malus Paradisiaca*.‡ The plant is distinguished, aside from dwarfness, according to Koch, by its smooth, shiny branches, both the old and the newly matured wood having a dark brown color. The leaves are finely serrated and taper at both ends. One of the most important characters of this apple as well as other dwarf forms, is the production of underground stems, and of stolons by means of which the plant may be rapidly propagated. These forms are also easily grown from cuttings, in which they differ from most strong growing varieties. In southern Europe, and especially in France, the roots are said to be extremely brittle, although in northern Germany this character is not always very marked. The fruit as a rule is small with a yellow skin and white flesh; it generally ripens during late summer or early fall.

Bauhin mentions two explanations for the origin of the common names of this variety.|| They are not entirely satisfactory, but the first probably contains a hint of the truth. He says: "Tragus, who describes the Argentinæ, describes certain kinds of apples from Germany. Some are sweet, white, oblong, etc., and are called Paradise apple. It is seen that Tragus, according to the common opinion, believed that this apple is from the tree

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* 1. "Malus pumila, que potius frutex quâ arbor.
Mala præcocia, Trag. Tab.
Malus humilus, cujus fructus pomum Adami.
Gesn. Hort." [Py. and g. malus paradisiana].

"Fruit both red and white"

The name in the brackets has been written in the volume of Bauhin's Pinax owned by Harvard University. The writing is old and whose it is has not been determined. The copy at the congressional library at Washington contains no specific mention of the Paradise apple.

† "Species Plantarum," 1753, 479.

‡ "Synopses Monographicæ," iii, 1847, 195.

|| "Historiæ Plantarum Universalis," i, 1650, 7.

whose fruit the great Jehovah forbade our first parent, Adam, to eat. * * *

"Hieron Brunsch calls that apple the Paradise in which the bite of Adam and Eve can be seen." * * *

"Gesnerus * * * says there are two kinds of dwarf apples, one of which is called the Paradise apple. This variety, * * * is similar to that which Matthiæ Curtius calls the Paradise. It is white, and ripens late in July. The plant is a bush not more than 4 cubits [6 feet] high, propagating itself from the roots."

Parkinson describes the Paradise apple in the following brief terms:* "The Paradise apple is a faire, goodly yellow apple, but light and spongy, and of a bitterish sweet taste, not to be commended."

No single variety can, therefore, have been considered as the true apple of Paradise, or Adam's apple, by those early writers. Their descriptions include those apples which grow upon bushes or low trees, these having the power of propagating themselves rapidly by suckers or underground stems, and whose fruit is light colored, often tinged with red on the sunny side. Even in more modern times, the name Paradise has been very loosely used. Koch speaks as follows regarding its present significance in Germany.† "By the name Paradise apple we now designate, as was formerly done by the Italians especially, a considerable number of different varieties, all of which are especially handsome. In northern Germany the name applies to *Pyrus spectabilis*. The pomologolist Henne considered it as belonging to the White Winter Kalvill, while the Red Fall Kalvill was called by Diel the Red Paradise. In the Netherlands, the Eiser also bears the name of the Double Sour Paradise. We also have a yellow Paradise; and the Red Stettine is frequently termed Paradise. Many other cases might be mentioned."‡

These examples will suffice to show with what freedom the name Paradise was applied to apples which possessed such beauty that their beholders were brought under the same spell as

* "Paradisus Terrestris," 1629, 588.

† "Die Duetschen Obstgehölze," Stuttgart, 1876, 62.

‡ See volume 1. of Dochnal's "Führer der Obstkunde."

that once exerted by the forbidden fruit of the Garden of Eden.

Three forms of apples which are suitable for stocks are mentioned by Philip Miller in his Gardener's Dictionary.* They are all included under *Malus pumila*. They are as follows:

"The Crab [*Malus sylvestris, acido fructo albo*, Tourn.], which is the first sort here mentioned, has been generally esteemed as the best stock for grafting apples upon, being very hardy, and of long duration; but of late years there have been few persons who have been curious enough to raise these stocks, having commonly sown the kernels of all sorts of cider apples for stocks without distinction, as these are much easier to procure than the other; so the gardeners generally call all those crabs, which are produced from the kernel, and have not been grafted; but were the kernels of the crabs sown, I should prefer those for stocks; because they are never so luxuriant in their growth, as those from apple-kernels; and they will continue longer sound; besides, these will preserve some of the best sorts of apples in their true size, color and flavor; whereas the other free-stocks produce larger fruit, which are not so well tasted, nor will they keep so long.

"The Paradise-apple hath, of late years, greatly obtained for stocks to graft or bud upon; but these are not of long duration; nor will the trees grafted upon them ever grow to any size, unless they are planted so low as that the Cyon may strike root into the ground, when it will be equal to no stock; for the graft will draw its nourishment from the ground, so that it is only by way of curiosity, or for very small gardens, that these stocks are proper, since there can never be expected any considerable quantity of fruit from such trees.

"These trees have been much more esteemed in France, where they were frequently brought to the table in the pots growing with their fruit upon them; but this being only a curiosity, it never obtained much in England; so that the gardeners do not propagate many of them here at present.

"There is another apple which is called the Dutch Paradise-apple, much cultivated in the nurseries, for grafting apples upon in order to have them dwarfs; and these will not decay or canker

*Sixth edition, 1752.

as the other, nor do they stint the grafts near so much; so are generally preferred for planting espaliers or dwarfs, being easily kept within the compass usually allotted to these trees.

"Some persons have also made use of Codlin-stocks, to graft apples upon, in order to make them dwarf; but the fruits which are upon these stocks are not so firm, nor do they last so long; therefore the winter fruits should never be grafted upon these."

The Dutch Paradise mentioned by Miller is at present unknown in England under that name. From the description given above it would appear that this variety, or class, is the same as the stock now known as Doucin (see page 387). His Paradise apple, on the other hand, is very similar to that which at present is more definitely termed the French Paradise. The following extract will indicate clearly what the nature of this variety is:

"At the same time will be forwarded to that gentleman 500 specimens of '*the dwarf apple of Armenia*.' They are all much past the age of puberty, though only 18 inches high. I received them two years ago from Armenia, and they do not appear to have grown at all. They increase slowly in thickness. I have often seen them planted in pots and cases on the terrace in the city of Aleppo, of 40 and 50 years' growth, never exceeding 2 feet in height, nor in the thickness of their stems, that of your forefinger, without their ever having been pruned. To test the fact that their diminutiveness was not caused by their being always kept in pots and boxes, I planted out three of full 15 years' growth, and after keeping them 18 years in the open ground, found they had made no perceptible progress. I remarked that they bear best when their roots are cramped. They are very easily propagated, as they make abundant offsets, and take remarkably well from cuttings. Among the trees now sent, there are seventeen which were made from cuttings two years ago; and 10 budded, at the same time, with the Ribston pippin, and other sorts."* By the use of such stocks, plants could easily be grown in pots and set upon the table, as stated by Miller; but they can possess little practical value.

The French Paradise was known in France as early as the beginning of the 15th century.† It was considered as one of the

* Jour. of the Hort. Soc., London, 1848, iii. 116.

† Koch. "Die Deutschen Obstgehölze," 63.

most highly flavored varieties then grown, and according to Champier, who lived about a hundred years later, it was identical with two of the best varieties grown in his day. The first published account of the fruit, according to Koch, appeared in Jean de Ruelle's "De Natura stirpium, libri tres." This fruit was of a red color on the side exposed to the sun,* and for this reason could not have been identical with other forms classed in the group.

The Doucin apple.— The introduction of the Doucin stock can be traced with more accuracy than that of the Paradise. According to Koch,† "It appears that the Doucin is of Italian origin and was first brought to notice by Agostino Gallo during the first century following the middle ages [probably the 16th century.] He mentioned two forms, Dolciano nano and Dolciano Mezzano, meaning the dwarf and the semi-dwarf sweet-apple. We do not know when the Doucin was brought to France, but it was probably introduced soon after it became known in Italy." The time of its first use in England is also a matter of doubt, and judging from the writings of Philip Miller, it does not appear to have retained its original name. (See page 386.) Yet Parkinson briefly mentions it:‡ "The Deusan or apple John is a delicate fine fruit, well relished when it beginneth to be fit to be eaten, and endureth good longer than any other apple."

The Doucin is a stronger growing stock than the French Paradise, forming a bush or small tree intermediate between the latter and a standard tree. It also is said to have the power of throwing out underground stems or suckers, although it does not have stolons, and it may be propagated from cuttings of ripened wood. The wood is more or less covered with fine hairs, or tomentum. The fruit resembles the Paradise in size, but the color is more red, especially on the sunny side. The sweet flavor has caused it to receive its common name, Doucin.

Koch states‖ that the plant apparently grows wild in southeastern Russia, where it forms thickets, especially in the region of the lower Don and Danube rivers. It was called *Pyrus prae-*

* Bauhin, "Historia Plantarum" I. 18.
† "Die Deutschen Obstgehölze," 66.
‡ "Paradisus Terrestris," 1629, 587.
‖ Die Deutschen Obstgehölze. 65.

cox by Palas, and may be identical with *P. Sieversii* of Ledebour, who found a similar plant growing in southern Siberia. As the botany of the apple is as present understood, however, the Doucin and Paradise, as I have already said, are held to be simply forms of the common apple.

The Rennette apple (*Pommier nain de Rennette*).—A third stock, one mentioned by Duhamel,* is rarely named in horticultural writings. Duhamel compared it with the two more common forms: "The Doucin apple forms but a large shrub, the Paradise rises to a less height, while the Rennette apple scarcely exceeds a gilly flower in size; and thus it is that the size and the habit of apples vary with the different forms."

The Rennette of Duhamel seems to resemble the Paradise, and also the "Apple of Armenia" mentioned on page 386. The characters which distinguish the Paradise from the Doucin, the Doucin from the Codlin, the Codlin from the Crab, and the Crab from our named cultivated varieties, are by no means satisfactory or reliable. One form gradually approaches another as regards stature, and seedlings which are more or less dwarf have undoubtedly been referred to the class which they most closely resembled. All who have observed the height reached by seedling apples will have seen that they vary exceedingly. Some plants grow slowly and remain small; others start off from the beginning and make a clean rapid growth. As all such seedlings are generally the offspring of vigorous sorts, it is rather surprising that some should remain as small as they do. If the seed of smaller varieties were to be planted, undoubtedly still more dwarf forms would appear, and eventually the small French Paradise stock might be reproduced.

The power of producing offsets and stolons, which has been emphasized by some of the writers mentioned above, need not necessarily be considered as an essential character of the dwarf forms at present grown. Local conditions probably exert considerable influence upon this habit, for we have a plant of the so-called Paradise apple which has been growing upon the station

* Traité des Arbres Fruitiers, 1768, I. 273.

grounds for six years, and it has as yet failed to produce a single creeping or under ground stem which could be used in forming an independent plant. Neither is the power of growing from hard wood cuttings, limited to dwarf trees. Some of our orchard varieties may be propagated readily in this manner, even with little care, so that this character also may be considered as possessing only relative importance.

Propagation of dwarf apple stocks.—When the stock plants sucker freely, the suckers may be detached with a certain amount of root system, and then be transplanted and grown as independent plants. A very common nursery practice, however, is to subject the plants to mound-layering. This is performed by growing the plant or "stool" until it has become well established. It is then cut off within a few inches of the ground and all the shoots which are thrown out are allowed to grow. These shoots are made to root by heaping the earth about their bases, thus burying their lower half. This may be done the first year and rooted plants will be formed by fall, especially if the shoots have been partially cut or injured near the stock; such plants, however, are weak, and it is better to allow the shoots to grow unmolested during the first year, the mound being formed in the spring of the second.

The rooted shoots are removed in the fall of the second year, and if sufficiently vigorous they may be grafted with the desired variety during the following winter, or budded the next summer. Small stocks should be grown on in the nursery until they have reached the desired size for working.

Pruning.—Dwarf apple trees should be very thoroughly pruned from the time they are set. The object of this pruning is threefold: the wood which is capable of bearing fruit will be more freely produced, the fruit spurs will be distributed evenly over all the lower parts of the trees as well as the top, and the tree will be kept in a dwarf habit. These results may not be obtained if too little wood is removed. Each year's growth, if vigorous, should be cut back at least one-half or two-thirds, and generally more may be removed with perfect safety. Occasionally, dwarf trees will be found in which the natural vigor of the cion seems to have stimulated an undue growth of roots, so that the tree, instead of remaining small, increases rapidly in size,

118.—Dwarf Ben Davis six years from planting ; before pruning.

and soon it bears little resemblance to the plants frequently illustrated in books to show how a dwarf apple tree ought to appear. The annual growths may be from one to two feet in length, and at this rate good sized trees are formed in a short time.

Figure 118 represents a Ben Davis apple upon Paradise stock; the tree has been growing in the Cornell plantation six years and although it is considerably smaller than a standard tree of the same age, still it can scarcely be considered as more than a half dwarf. A true dwarf tree, as described in most writings, would have a top hardly one-third as large. In past years this tree has been pruned with but moderate severity, so that it reached a height of fully eight feet. In this case, no material disadvantage resulted from such treatment, for an abundance of fruit spurs may be found distributed in all parts of the tree. A Maiden Blush dwarf which received similar prunings was affected differently; the buds which were near the point at which the annual growth was cut back were the only ones that started, and their growth was so rapid that practically no fruit spurs were formed during the first two or three years, and those which have appeared since that time are so high up in the tree that the lower parts of the main branches are bare and therefore unproductive. This defect frequently becomes exaggerated as the tree grows older. An excellent example of the ruinous effect of continually removing the lower branches from a dwarf apple is shown in Fig. 120. This tree, an Early Joe, was planted in its present position fully thirty years ago (not upon the Cornell plantation). It has been pruned gradually higher until at present the lowest fruiting branches are at least five feet from the ground, and a total height of practically twelve feet has been reached. This is not an ideal dwarf! The tree shown on the title-page represents a much better type. The original from which the drawing was made was five feet in height, the lowest leaves being but eighteen inches from the ground. The top has been allowed to assume its natural spreading form, but a firm control has continually been exercised over any too ambitious efforts of the branches. The tree has practically the same form and size which it will retain during its entire existence. The main branches will increase in circumference, the outer limbs will gradually lengthen, and the fruit spurs will become more crooked, yet the tree will always be low and spreading. The one criticism which might be made is that the lowest fruiting branches are still too high. The foliage of the ideal dwarf apple tree almost touches the ground; it has all its main branches

119.—Same as Fig. 118, after pruning.

well studded with smaller ones, or with fruit spurs, so that, when in full leaf, it shall appear "feathered" from bottom to top.

The tree represented in Fig. 118 is worthy of careful study. The lower branches spring from the trunk at a height of less than ten inches from the ground. Several large branches rise in an upward and outward direction, and these form an almost perfect framework for supporting the smaller limbs, which bear the fruit. The wood is well distributed, and its amount is more than ample for clothing the entire top with an abundance of leaves; it is well that this should be so, for it allows a greater choice of branches when the tree is being pruned.

The same tree is shown in Fig. 119, after having been pruned. The pruning has been severe, as the tree has already reached such size that further increase should be made slowly. Much wood is allowed to remain near the ground and in the center of the tree, for it is always easier to remove superfluous branches than it is to insert them where they are wanted. The form of the pruned tree is that of a rather broad vase, this being the shape which the tree naturally assumes. During the coming season, it should be well provided with foliage so that none of the main branches shall be exposed to the full glare of the summer sun. The fruit produced will also receive proper shade and the specimen as a whole may be considered as a good type of dwarf apple tree which has not been forced to assume a form which is unnatural to it.

The summer pruning of dwarf apple trees is, as a rule, unnecessary when the plants are grown as above described. If branches are desired in certain parts of the tree, a more or less severe pruning during early summer will have a strong tendency to force growth to appear from dormant or adventitious buds. It will cause the appearance of "water-sprouts," which, if checked in turn, may be converted to useful purposes. Another advantage of summer pruning is that it probably induces the formation of fruit-buds, but as dwarf trees rarely possess the fault of bearing too little fruit for their size, this end need seldom be sought.

The study of the fruit-buds of an apple tree is an interesting one, the more so on account of the mystery which will be found connected with their formation. One who studies fruit-buds, will not conduct his investigations very far before he is puzzled first by one question, then by another, and eventually he may feel lost in a sea of doubt. Dwarf apple and pear trees are excellent subjects for the inquisitive to begin with; later speculations may include all the other fruits. The method in which fruit-buds are formed is illustrated in Fig. 121, the spurs having been taken from a dwarf Ben Davis tree.

The twig *a* in the figure shows a stem which is nearly all two

120.—Neglected dwarf apple about 30 years from planting.

years old. The growth of the past year may be seen only near the top, starting just above the upper spur. The terminal bud of the shoot, therefore, grew straight on and may have reached a length of 12 or 15 inches. But it was not so with the lower side buds. These made a growth of scarcely half an inch, yet they are perfectly strong and healthy. What they would have done had no fruit been borne the following season may be discovered by examining *b*. The two spurs upon the twig are each two years of age, the twig being three years, for it made one year's growth before the spurs broke from the buds. These spurs average scarcely over half an inch in length, and their diameters are probably but little larger than they were the year before. In *d*, in the center of the plate, we also find two-year-old spurs, but one became ambitious during the second year of its existence, and grew outward, probably in search of more light. The portion *c* represents a spur which has seen four summers. The small irregular line at its base shows where the first year's growth stopped; those an inch higher mark the increase of the second year; the third year added about an eighth of an inch and the fourth applied the top story to the structure. The spurs of *e* on the lower side of the plate, have the same age, but the annual growths are of more uniform lengths.

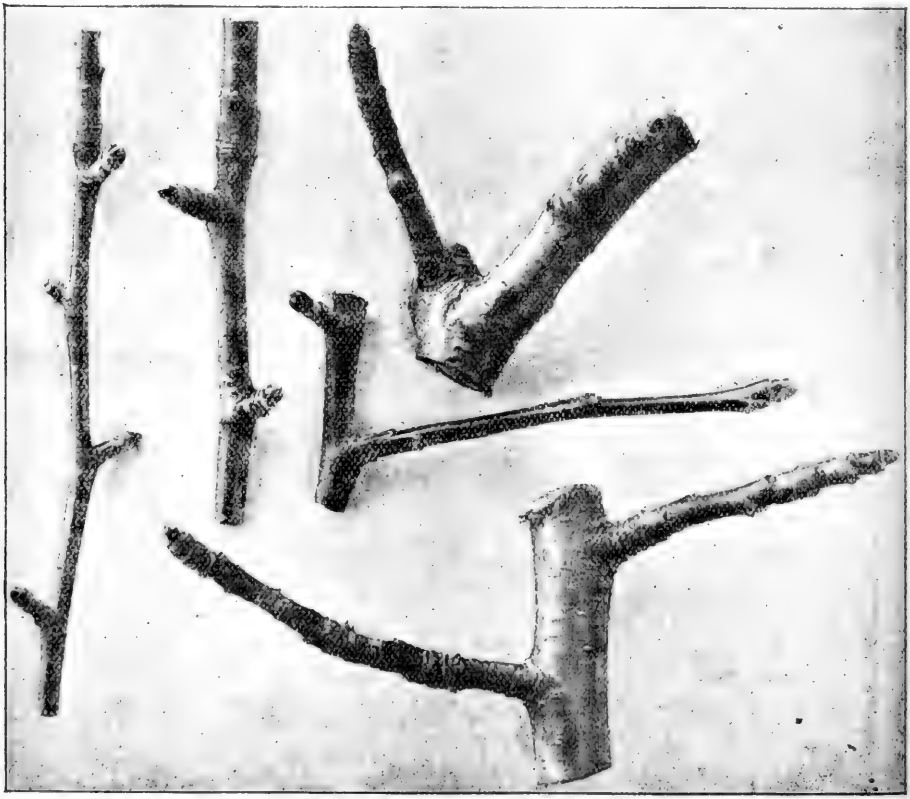
By examining the buds upon these spurs, it will be found that some are smaller than others and that they vary also in form. Such buds as are borne at the ends of the long spur upon *d*, *e* and the two upon *b* are pointed and they have a diameter which is less than that of the twig upon which they are borne. Larger and more spherical buds may be found upon *a*, *c*, and *d*. These are what are generally termed fruit-buds, as they contain minute blossom buds which, with the coming of spring, will develop flowers as well as leaves. No blossom buds will be found in the smaller buds, but only leaves, and during the coming season a leafy shoot will be produced, and the terminal bud may prepare for flowering the next year.

Young fruit-bearing wood, therefore, appears as shown in the illustration, and such wood should be well distributed throughout the entire tree. Its removal means the removal of fruit, although the fruit may not appear for a year or two or three; still it will appear sometime upon spurs, and such small branches should always be removed cautiously. The same remarks apply also to standard trees, and these should never have their branches pruned so that they resemble long-handled brooms, the brush of which projects from certain parts of what should be a symmetrical tree.

III. COMMERCIAL VALUE OF DWARF APPLES.

Yield of dwarf orchards.—The first thought which naturally arises when the commercial value of dwarf apples is considered,

a *b* *d* (center.) *c* *e* (bottom.)



121.—Spurs of Ben Davis apple showing leaf buds upon *b*, *c*, *d* and *e*; blossom buds are upon *a*, and also upon *c* and *d*.

is the amount of fruit produced by such trees. The statement is generally accepted that such fruit is larger, handsomer, and perhaps a little earlier and of better quality than that produced by standards. The extent to which this is true has not yet been clearly defined, and careful investigation may modify the force of the assertion; but even granting its entire truth, there still remains the consideration of the ultimate yield of fruit, in bushels, per acre. The question is, unfortunately, answered with difficulty. There are at present extremely few dwarf apple trees growing in New York, and those which do exist are mostly of different varieties so that comparative yields can not be made with entire satisfaction. Methods of pruning, or of not pruning, as well as differences of soils, location, etc., also enter as modifying circumstances. Nevertheless, some data are available for estimating approximate yields.

The following remarks refer entirely to trees grown on Paradise stock; they do not include such trees as have taken root above the point of union of cion and stock. Dwarf trees which have been set so that the union is several inches below ground, are apt to form roots at the lower end of the cion, and then more active growth takes place. Such trees are no longer dwarfs, but they must be considered as standards or at least as half-dwarfs.

The first estimates here given are based largely upon actual observation of dwarf apple trees, and also partly upon theoretical grounds. The printed descriptions for growing dwarfs almost invariably state that the trees should be set at intervals of about six feet each way for ordinary culture. In Thomas' *American Fruit Culturist* the distance named is eight feet for round-headed trees upon Paradise stock; and "for pyramids or dwarf standards on Doucin stock, ten feet." Doucin stock is at present neither grown nor used in this country except to a very limited extent, and I have as yet been unable to find a bearing tree growing upon it. Practically all trees now sold by New York nurserymen are upon Paradise stock, and the trees scattered about the State are also said to be growing upon this variety. The Doucin stock must therefore be omitted from this discussion; only the plants growing upon the so-called Paradise stock can be considered in detail, the value and characters of plants growing upon the Doucin resting upon the statements of correspondents (see page 402).

I am lead to believe that even eight feet is too close for dwarf apples when grown in a closed vase form, or when allowed to assume their most natural shape, as shown in the frontispiece, these two methods being the only ones followed to any extent in New York. Upright growing varieties are trained according to the first system, while those of spreading habit are allowed to grow in their natural form. Ten feet appears to be none too much for either form of tree, and probably twelve feet would frequently be preferable. On rich soils and with vigorous varieties, a distance between the trees of fifteen feet will prove advantageous, and it thus appears that the number of trees which may profitably be planted upon an acre depends largely upon the habit of the variety, and upon the character of the soil; similar variations occur also in the case of standard trees. Assuming, however, an average distance of twelve feet between the trees, there may be set 300 trees per acre. During the first five years of their growth, these trees may yield some fruit, or they may not; the dwarf apples growing upon the Cornell grounds have been set six years, and none of the trees have borne over a dozen apples during any one season. The fruit which was produced was in no particular extraordinary; size, color, and quality were apparently identical with fruit from standard trees. Thus far, therefore, our dwarfs have not distinguished themselves as possessing superiority of any kind, except possibly early fruiting, yet we have several standard trees of other varieties which have borne more fruit than these.*

When dwarf apples have reached the age of ten or fifteen years, they become more useful. Such trees seem to average in this State from three to four pecks of apples annually. Assuming the average annual yield of these trees to be three pecks per tree, about seventy-five barrels of fruit would be obtained from each acre of orchard, every year, by no means a poor yield. But after a tree has passed its twentieth year still larger returns may be expected. I have seen dwarf trees over thirty years of age which were bearing from three to four bushels of fruit, but

* These trees, however, were removed after they had been set two years, so that their behavior may be somewhat abnormal. L. H. B.

such trees are rare exceptions. From four to six pecks may be stated as representing approximately the annual yield of mature trees of naturally productive varieties which are grown as dwarfs, and which have been well fertilized and pruned. It will be found that the apples must be borne with considerable regularity that such an average shall be maintained; one year's partial failure, and such do occasionally occur, means a heavy crop for the succeeding year or two, and that in turn leaves an exhausted tree. A yield of about one hundred and twenty-five barrels per acre would be obtained from a uniform plantation, at the rate here assumed, and I believe this amount represents the present production of dwarf trees which have been well grown.

Yield of standard orchards.— In estimating the yield of standard apple trees, the same difficulties are encountered as in the case of dwarfs, but the uncertainty of the crop is here even more pronounced. The natural fruitfulness or barrenness of a variety expresses itself unequivocally, for the modifying circumstance of dwarfing does not obscure these characters. Soil and location are also free to exert a direct influence, and methods of cultivation, differing widely from each other, also play an important part. In considering standard orchards, the two extremes in their powers of bearing must be avoided, as has also been done in the discussion of dwarf trees.

An apple orchard which is composed of vigorous-growing varieties should be set so that the trees shall be at least forty feet apart each way. This allows twenty-seven trees upon an acre. If the varieties are but moderately productive, and the trees have been fairly well cultivated, a yield of about three barrels may be expected as the average annual crop per tree while the orchard is from 15 to 25 years of age. From this period until the trees begin to fail from old age, an average yield of five barrels per tree is more than is generally obtained. At this rate, the total returns from an acre would be about 135 barrels, a crop which exceeds the estimate of the dwarf trees by only 10 barrels. When orchards are composed of the less vigorous varieties of apples, the trees may be set closer together; the yield per tree will be less than that of the larger growing sorts, but the greater number of trees may bring the average for standards to practically the same figure.

It would appear, therefore, that the yields from well grown standard and dwarf trees do not differ essentially, but such difference as does exist is in favor of standards. Definite data of undoubted accuracy are extremely difficult to obtain. The above figures, however, are founded mainly upon my own observation. Fortunately the estimates of others are also at hand, and a comparison of these conclusions should be made.

Other estimates of yields and profits.—Rivers writes* as follows regarding the returns from a plantation of 100 trees of Cox's Orange Pippin grown as bushes upon Paradise stock: "These trees will this season (1864), the third of their growth in their present quarters, and the fourth of their age, give an average of a peck from each tree, so that we might have from 4,840 [set 3 x 3 feet], growing on an acre of ground, 302 bushels of fine apples, worth 5s. per bushel, or £75. In 1866, the trees then averaging half a peck each, would double this sum, and make an acre of apple trees a very agreeable and eligible investment." It was the plan of this writer constantly to renew certain rows of trees so that the orchard should continue in regular bearing condition.

Another interesting account is that of Cheal. The yields cited by him were actually attained by one of his friends. The name of the stock is not mentioned. The tree was a Warner's King, of pyramidal form, and was planted at Ramsden, in Essex, in November, 1871:

	Pecks.
1872 Crop, 3 large apples.	
1873 Crop	1½
1874 Crop	2
1875 Crop	4
1876 Crop	6
1877 Crop	7

* "Miniature Fruit Garden." From 13th English Ed. 1866, p. 69 *et seq.*

† "Fruit Culture," London, 1892, p. 65.

1878	Crop, 2 or 3 apples.	Pecks.
1879	Crop	6
1880	Crop	5
1881	Crop	4
1882	Crop	3

"Thus the average crop for 10 years was 4 pecks per year. These he sold in Chelmsford market at an average of 1s. 6d. per peck.

"The tree occupies a space of not more than 3 square yards; and calculating an acre of such trees 8 feet apart, or 681 per acre, the gross return would be £204 per acre yearly."*

A valuable series of tables has been furnished me by P. Pederson, Huntingdon Valley, Pa. The figures refer to Danish orchards, not to experience in America; nevertheless, they serve to indicate what may be expected in this country where the conditions in many localities do not differ very materially from those existing in Denmark:

"Distances of planting:

Standard apples, 30x30 ft., (quincunx, 27x30 ft.).

Apples on Doucin, 10x12 ft., or 12x12 ft.

Apples on Paradise, 6x8 ft., or 8x10 ft.

"Expected longevity of trees:

Standard apples, 50 to 60 years.

Apples on Doucin, 30 to 35 years.

Apples on Paradise, 20 to 25 years.

"Yield per tree and per acre:

Standards, 30x30 ft., extra good, per tree, 6 bus.; per acre, 270 to 290 bus.

Standards, 30x30 ft., good, per tree, 4 bus.; per acre, 180 to 190 bus.

Standards, 30x30 ft., medium, per tree, 2 bus.; per acre, 90 to 100 bus.

On Doucin, 12x12 ft., extra good, per tree, 1 bus.; per acre, 290 to 310 bus.

* A pound (£) is equal to about $4.86.

On Doucin, 12x12 ft., good, per tree, 3 pks.; per acre, 210 to 230 bus.

On Doucin, 12x12 ft., medium, per tree, 2 pks.; per acre, 100 to 120 bus.

On Paradise, 8x10 ft., extra good, per tree, 2 pks.; per acre, 250 to 270 bus.

On Paradise, 8x10 ft., good, per tree, 1 pk.; per acre, 120 to 140 bus.

On Paradise, 8x10 ft., medium, per tree, ½ pk.; per acre, 60 to 80 bus."

Probably the most interesting feature of the above figures is the general uniformity in the yield of trees of an equal grade, regardless of the method of growth. The Doucin stock invariably shows greater fruitfulness than either of the others, but still the differences are not great. When the above yields are considered in connection with the condition existing in this country, one is involuntarily lead to the statement that methods of culture, pruning, etc., have more to do with the yield of an acre of apple trees than does the method of propagation; and it is by no means impossible that experience will prove the truth of the thought.

An extended correspondence with many American growers of dwarf apples has resulted in the receipt of letters which frequently express somewhat contradictory opinions. Upon one point, however, all the writers agree fairly well, viz.: that apple trees grown upon Paradise stock are unprofitable. A variety of causes for this opinion are advanced, chief among these may be mentioned unproductiveness, short life, amount of care required, want of uniformity in the stock, and that only few varieties (of which one is Gravenstein) do well upon it.

Even greater variety of opinion exists regarding the Doucin stock. The majority agree in saying that the Doucin is in no marked degree an improvement over our ordinary free stocks. The trees do not bear earlier, they grow equally large, and for these reasons they have no particular value. On the other hand, some who have had experience with these trees say that they possess value, perhaps not so great as that of standards, but that if properly grown they will produce good crops.

The general opinion is that all dwarf trees are more regular in bearing than standards, although the total yield is not so great. They also have advantage of being more easily pruned and sprayed, and the picking of the fruit is also more easily performed; and the fruit upon such trees should therefore be more uniform and of better quality than that ordinarily obtained from standards. Evidently the true value of dwarf apples has not yet been thoroughly investigated and proved in this country, and before the trees are wholly condemned for commercial plantings they should be carefully grown in some quantity.

Varieties suitable for dwarfing.—There appears to be much less difficulty in growing all varieties of apples upon dwarf stocks than is the case with pears. No variety appears to have shown itself useless for this purpose, although some are recommended above others. It may probably be said that varieties which are naturally shy bearers will do better when dwarfed; naturally prolific sorts may be better as standards.

Cheal has published* a list which includes the varieties most suitable in England for dwarfing:

1. "Dessert Apples. Red Astrachan, Duchess of Gloucester, Worcester Pearmain, Lady Sudeley, King of Pippins, Margil, Cox's Orange, Mother, Scarlet Nonpareil, Bradick's Nonpareil, Court Pendu Plat, Ross Nonpareil, Mannington's Pearmain, Duke of Devonshire, Sturmer Pippin.

2. "Kitchen Apples. Keswick Codlin, Professor, Lord Suffield, Duchess of Oldenburg, Ecklinville, Lord Grosvenor, Mank's Codlin, Pott's Seedling, Cellini, Stirling Castle, Frogmore Prolific, Hawthornden, New, Schoolmaster, Cox's Pomona, Lord Derby, Prince Albert, Striped Beaufin, Wellington, Northern Greening."

American varieties have not been sufficiently tested to allow very definite statements to be made. The firm of Ellwanger & Barry, Rochester, N. Y., has been most energetic in growing

* "Fruit Culture," London, 1892, p. 122.

dwarf apples, and the following list given by Barry* is probably the best now available:

"Red Astrachan, Large Sweet Bough, Primate, Beauty of Kent, Alexander, Duchess of Oldenburg, Fall Pippin, Williams Favorite, Gravenstein, Hawthornden, Maiden Blush, Porter, Menagère, Red Beitigheimer, Bailey Sweet, Canada Reinette, Northern Spy, Mother, King of Tompkins County, Twenty-ounce, Wagener." To this list might also be added Jonathan and Ben Davis, both doing well when dwarfed.

SUMMARY OF THE EVIDENCE.

The evidence shows that dwarf apple trees have been so little and so carelessly grown in this state that no definite evidence of their value can be obtained. Nearly all writers and correspondents agree in saying that they are unprofitable for commercial planting, although they are equally ready to admit that the trees may be satisfactory as single specimens or as ornaments in the garden. It is a general and apparently well founded opinion that apples grown on dwarf trees are handsomer and of better quality than those grown upon standards. This suggests that dwarf trees may be profitably employed for growing varieties which are suitable for very fancy or dessert uses. Dwarf trees can be easily sprayed and tended, and the fruit can be carefully thinned. They may be planted as close as eight feet apart each way, although a greater distance is probably preferable. A mature dwarf tree, which has been well grown, may average two or three pecks of apples each year. The Paradise is evidently the best stock to use, but this stock is not perfectly uniform in habit of growth or in the size which it may attain. In short, the name Paradise belongs rather to a class of very dwarf-growing apple trees than to any single and definite variety. These Paradise stocks are grown from layers, chiefly in France whence our nurserymen obtain them. From all the evidence which I have been able to collect, therefore, I cannot advise the planting of dwarf apple trees for commercial rewards, but it seems to me, nevertheless, that they are worth experimenting with for this purpose.

E. G. LODEMAN.

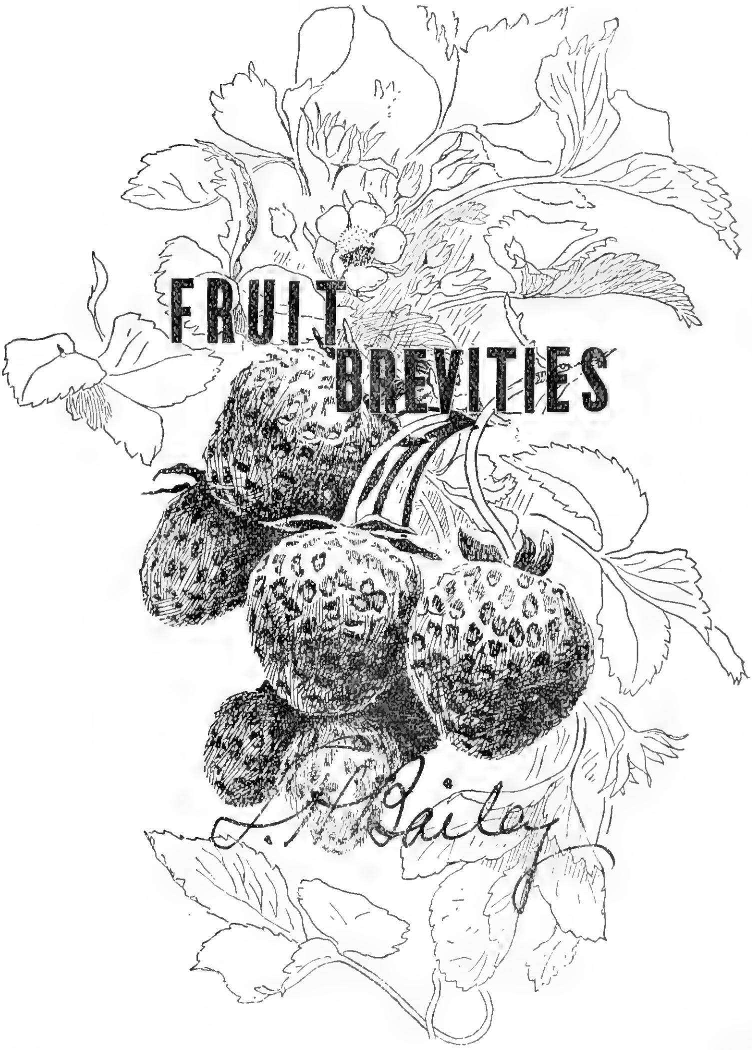
* "Fruit Garden," New York, 1890, p. 362.

BULLETIN 117—May, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.



ORGANIZATION.

Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and The Bud Moth.
108. The Pear Psylla and The New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.
116. Dwarf Apples.
117. Fruit Brevities.

CORNELL UNIVERSITY, ITHACA, N. Y., *May* 20, 1896.

Honorable Commissioner of Agriculture, Albany:

Sir: This bulletin is submitted for publication under the Experiment Station Extension Law (Chapter 437, Laws of 1896), which appropriates funds, "for the purpose of horticultural experiments, investigations, instruction and information, in the fifth judicial department" of the state, and for "disseminating horticultural knowledge by means of lectures or otherwise." The papers herein contained are incidents to our main lines of research, but they seem to be worth permanent record. The information contained in the first article is much called for by the fruit-growers of our district and the apparently increasing prevalence of root-galls on fruit trees is a subject of much apprehension. It is hoped that the remarks upon the treatment of winter-injured trees may be timely.

L. H. BAILEY.

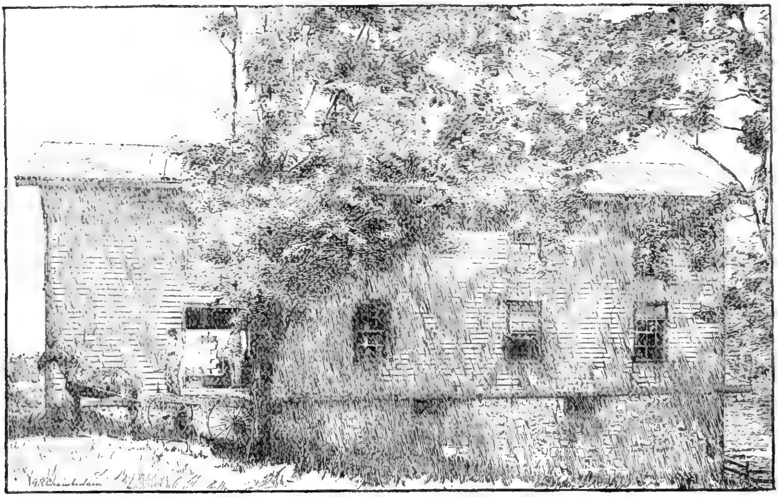
CONTENTS.

Fruit Brevities.

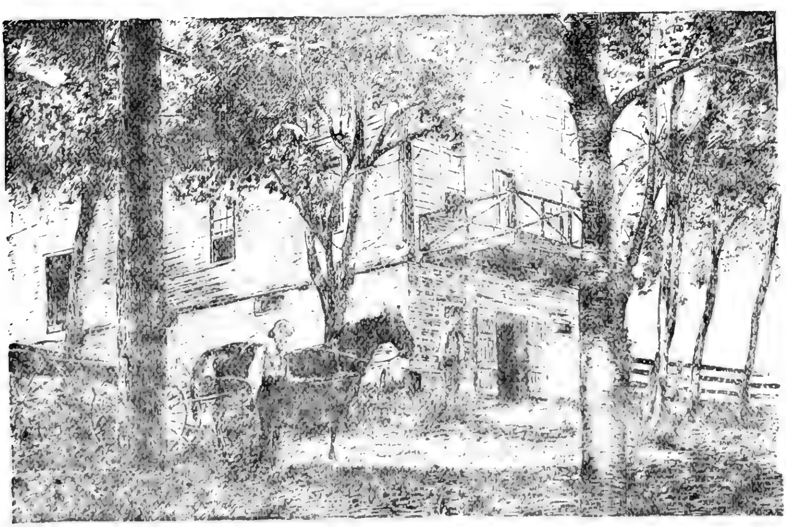
I. PACKING-HOUSES FOR FRUIT.

There is much demand for instruction upon the style of houses which are best suited for the packing and handling of fruits. The subject is one which cannot be treated specifically for each grower, from the fact that every person has a different ideal, and he may grow fruits for a market which demands particular treatment of the products. The packing-houses most frequently seen in western New York are those used by the grape men; and if one studies the question, he will find that there are two distinct types of packing-houses in use in the grape regions. One type is a combined packing and storage house, and is used very largely in the central lake region, where Catawbas are grown and where the grapes are often stored for some time before they are marketed. The other type of house is that which is used in Chautauqua County and which is simply a half-way station between the field and the railway station,—a shelter place for the packing of grapes,— and is not used for the storage of the fruit.

In the lake region, as about Keuka and Seneca lakes, the grape interest developed at a very early period, before the market could take large quantites of fruit, before the Concord was known, and the Catawba is still the dominant variety. This variety is a good keeper; so it has come that the packing-houses of this district are very largely such as have cellars or cool rooms connected with them, and in these cellars the grapes may be kept until winter or even until spring. One of the best of this type of packing-houses which I know is that of George C. Snow, at Branchport, on Keuka Lake. This house is illustrated in Figures 122 and 123. It is built on a side hill, and the basement or cellar is used for the storage of grapes, the first floor is used for packing, and the second floor or attic for the storage of baskets, crates, and the like. This building measures 25x60 feet over all.



122.—Packing-house of George C. Snow, showing the packing-room entrance.

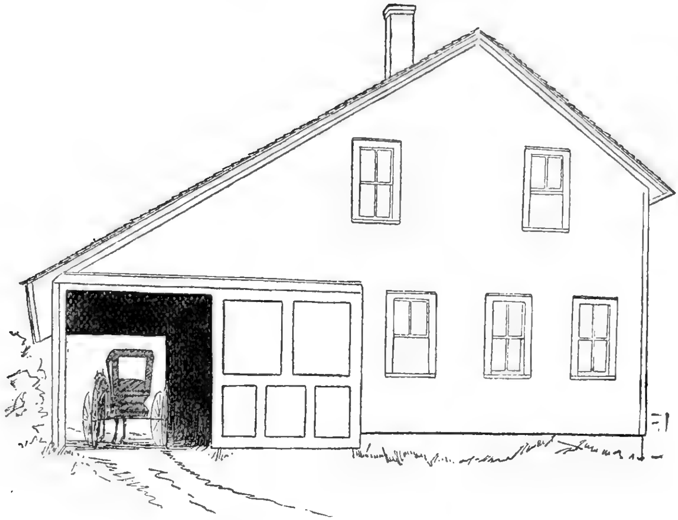


123.—Packing-house of George C. Snow, showing the basement entrance.

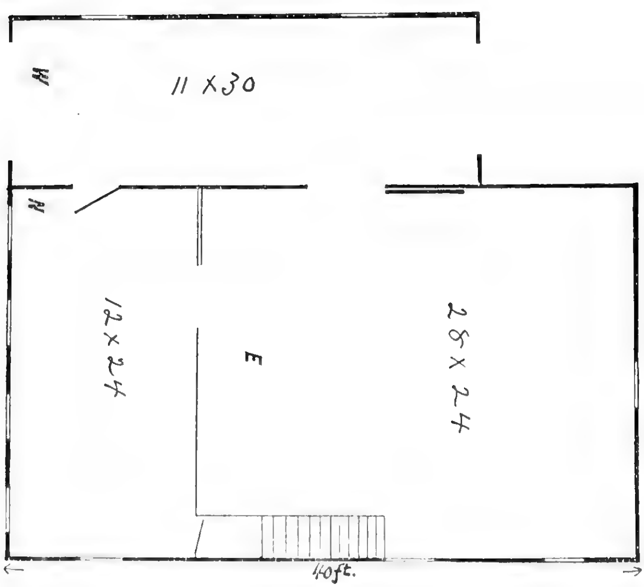
The foundation walls are 24 inches thick, and the cellar is provided with ample means of ventilation by outside windows, and also by means of a chimney which runs from near the middle of the cellar up through the roof. The floor is of dirt. By means of careful attention to ventilation, this cellar can be kept to 50 degrees or below during September and October, and is frost-proof during the winter. The windows are provided with close-fitting screens to keep out rats and squirrels. This cellar will easily hold fifty tons of grapes in the picking trays. The first floor is divided into two rooms, the front one being a packing-room 25 feet square, and the back room being a storage and shipping department 25x35 feet. This packing-room is provided with heat and is lighted by seven large windows. The floor above the cellar is double and made of 1¼ inch matched pine, with an abundant air space between the two layers. This, therefore, protects the cellar from sudden fluctuations of temperature. The building is also shaded, especially from the afternoon sun, by large trees. This building can be erected for about $1,200. It has 18 foot posts, a tin roof, the two rooms in the first floor ceiled with pine, but the top floor not ceiled.

The requisites for keeping grapes during the winter are given as follows by Mr. Snow in the *Rural New Yorker* for Feb. 1, 1896: "Any good building in which the temperature can be held even at about 35 degrees, with ventilation as may be required, this to be determined by noting how the fruit is keeping, will be found available for grapes. No positive rules can be laid down. A cooling room, in which the fruit can be first cooled, is a necessity; be determined by noting how the fruit is keeping, will be found to be raised rapidly by placing a quantity of warm fruit in the room. As even a temperature as possible is much the best. Grapes should not be packed in baskets for shipping before being stored. They should be ripe, as grapes do not mature after picking. Niagara or any other variety can be held only for a limited time, some varieties longer than others.

The Chautauqua type of packing-house is admirably illustrated by Figures 124 and 125, which are pictures of the house

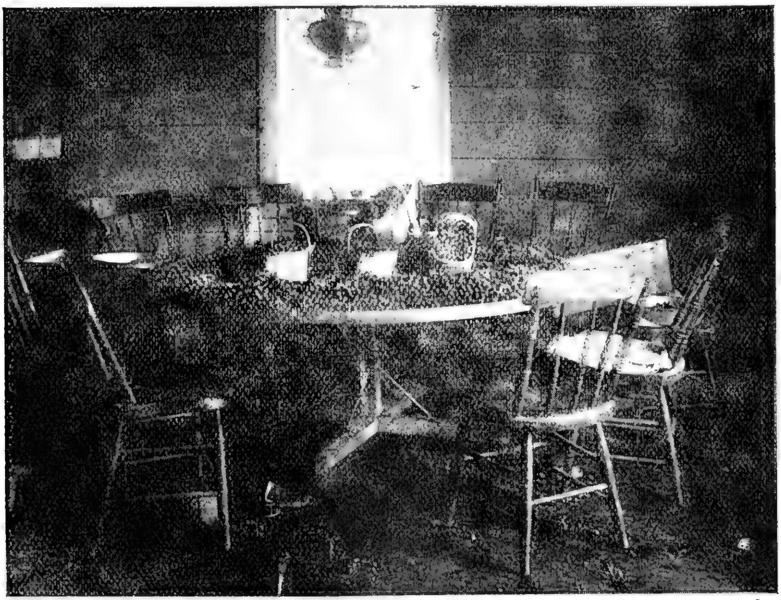


124.—Packing-house of W. W. Pettit, Brocton, N. Y.



125.—Plan of Mr. Pettit's packing-house.

of W. W. Pettit at Brocton. In this case there is no cellar, for the grapes are not to remain in the house more than a day or two at the farthest; and they ordinarily pass directly through it on their way to the railway station. This is a house which can be built for about $500. The main floor of the building is 24x40 feet in size, and aside from this there is a driveway under the same roof and which measures 11x30 feet. This driveway connects with the main floor by two doors. The front room, which is lighted by four windows in the front and one upon the side



126.—Mr. Snow's packing - table.

and is 12x24 feet in size, is the packing-room. In the rear of this is a store-room for the grapes. The half-story above is used for baskets and crates, and these are delivered into the packing-room by a shute. This building will accommodate ten packers and will easily handle the grapes from fifty acres of land. The main floor is ceiled, but the half story above is unfinished.

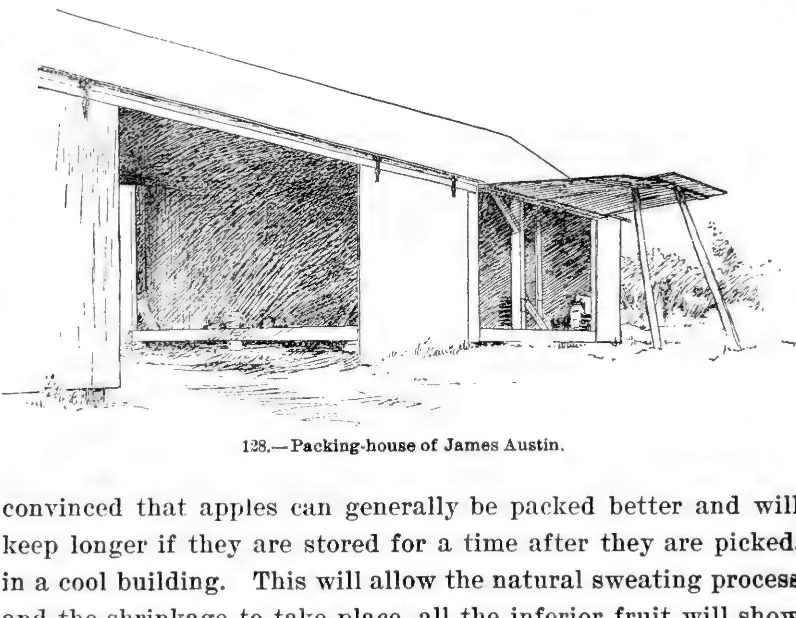
In the packing of grapes the greatest care is required to keep the fruit clean and fresh, to prevent the bunches from being broken, and to preserve the bloom upon the fruit. It is very es-

127.—Packing-room in Mr. Pettit's house.

sential that the house should be kept thoroughly clean and sweet at all times. It is especially important that the storage-room for the baskets and crates should be dry and airy, in order that the baskets may not become moldy or musty; and this room should also be kept darkened to prevent the baskets from coloring. Figure 126 shows a packing table in Mr. Snow's packing-room. This is a circular revolving table about which the packers sit. The packer holds the basket in her lap and takes the grapes off the table, which is turned as fresh fruit is put upon it. Figure 127 shows the packing-room in Mr. Pettit's house. In this case, the picking trays are set before the packers upon an inclined table, and the packer handles the grapes from this tray into a basket which she places at her left. When the basket is filled, it is placed upon a flat ledge in front of her, and is taken off by an attendant who places the baskets on a truck and rolls them into the back room, from which they are delivered to the wagon. When the tray is empty, it is slid through an opening just in front of the packer and underneath the flat ledge upon which she places her finished baskets. A quantity of empty baskets are kept upon a shelf just above this ledge and these are replenished by an attendant, as necessary.

Another type of packing-house is shown in Figure 128, which is a picture of a peach-house upon the farm of James Austin, at Morton, N. Y. The illustration shows one-half of the house. In the middle of the house is a driveway extending completely through it, which is closed by rolling doors. The fruit from the orchard is driven into this driveway, and is unloaded upon either side. The two ends of the house are opened by doors which are hinged at the top and the packed fruit is delivered through these doors or to the wagons in the driveway. This is a very convenient cheap type of house which may be used for peaches or apples during the fruit season, and for the storage of tools and barrels during the winter.

There is the greatest difference of opinion concerning the best ways of handling apples. These differences arise very largely from local conditions. If the apple grower sells his crop to the traveling buyer in the fall, he will handle his fruit in the manner which this buyer prescribes. Ordinarily, the fruit is handled from the trees into piles, from which the barrels are packed as opportunity offers. In other cases, the apples are placed directly upon a sorting-table and the barrels are filled immediately. In still others, the apples are placed directly from the picker's basket into the barrel without being sorted. Every grower must decide for himself how he shall handle his crop. If he desires to market his crop himself and to hold it for some time, awaiting the movements of the market, he will find it essential to have some temporary storage place for his fruit. For myself, I am



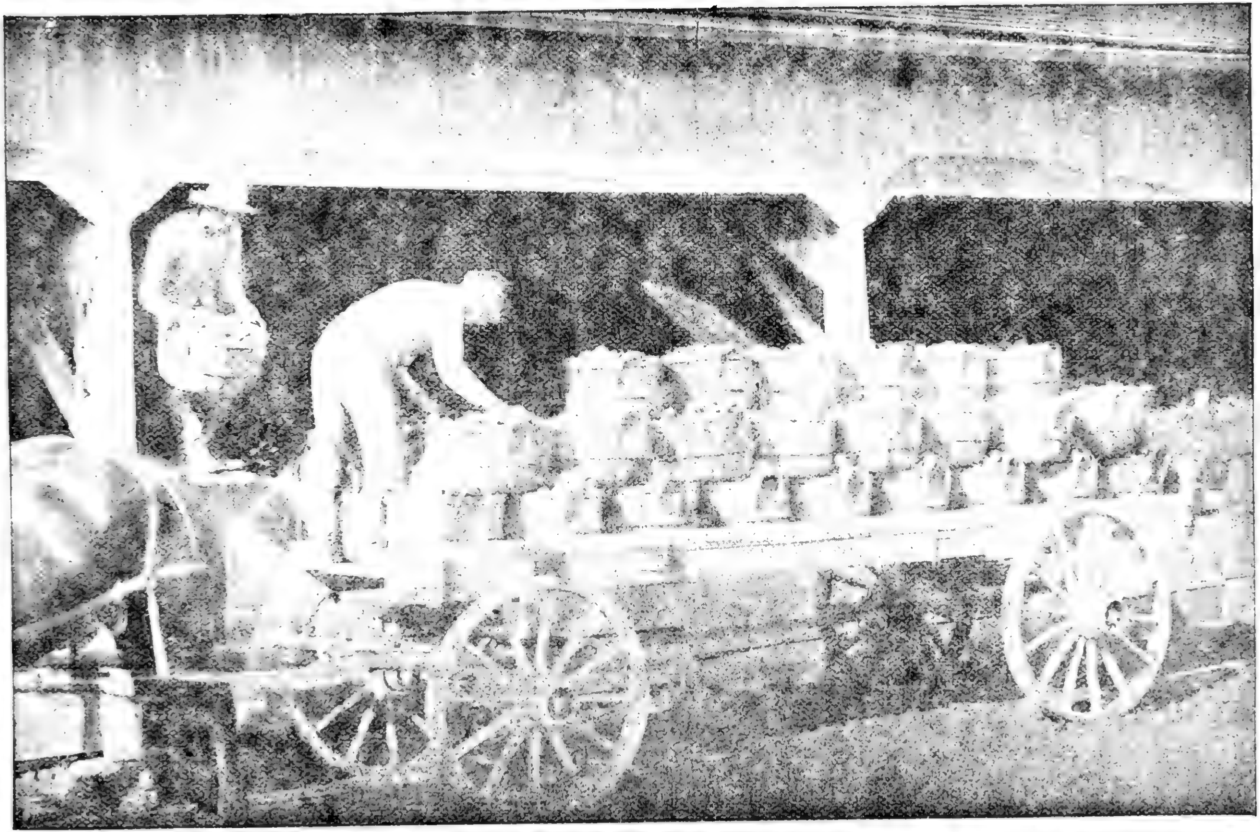
128.—Packing-house of James Austin.

convinced that apples can generally be packed better and will keep longer if they are stored for a time after they are picked, in a cool building. This will allow the natural sweating process and the shrinkage to take place, all the inferior fruit will show its blemishes, and the apples can be packed at leisure. If it should happen that the market will not pay for the handling of the fruit in barrels, it is in convenient shape for selling in bulk or for use in evaporators. Figure 129 shows a storage house for apples upon the fruit farm of T. G. Yeomans & Sons, of Walworth, Wayne County, N. Y. In this case the apples are picked in bushel baskets, and from these baskets they are turned into bins in a shed which has an open front. In these apple sheds it is important that the roof be well shaded in order to keep the building cool; or if that cannot be done, then there should be a story or half-story above the apples to keep the heat of the sun from the storage room.

I have been so much pleased with the thorough and systematic way in which the Yeomanses handle their fruits, that I have asked Mr. L. T. Yeomans to give me an account of their practice and which now follows: "We long ago found that it economized labor in the hurry of the gathering season, if we could put our apples under cover, where we could keep them much later than in the open orchard, and could work on rainy or very cold days, thus prolonging the season, for both the workman and ourselves, at the time when it is most difficult to secure plenty of help. We think it a great advantage, when it is desired to keep apples late, that they be packed in the barrels as late as possible. Allow them to sweat in the pile rather than in the barrel, and any which are disposed to decay early will have begun to show signs of decay and can be thrown out. The weather is also colder than when they are picked from the tree, especially where one has large orchards and must begin picking as early as possible.

"In gathering quinces and pears, we send all the packing force to the orchard during the latter part of the day, and by spreading the fruit thinly, on a little clean straw on the ground under the open shed, they become cooled during the night, and are in good condition for putting up the next morning; when, if left on the trees, they would be so wet from the dew that we could rarely pick them until they had become warmed by the sun and in an undesirable condition for packing.

"For a packing-house, we prefer an open shed, opening to the east, adjacent to a building in which the barrels can be stored. These barrels should have one head nailed and marked with the grower's brand, and the other taken out and placed in the open barrel before passing it out into the shed for filling. We use a ground floor covered with a little clean straw. Our shed is 20 feet in depth, in bents of 14 feet. Planks 2x10 or 12 inches are placed across the front from post to post as desired when filling,



129.— Packing-shed of T. G. Yeomans & Sons.

and are readily taken out as the packing progresses. When filling with apples, we use a plank for the man to walk on as he carries the fruit to the back of the shed. The empty barrels are set on one or more planks, which are not quite as wide as the heads of the barrels, where one person faces the bottom (which is to be the head), by placing the first course of fruit; the same person empties the half-bushel round baskets (in which we sort all of the No. 1) into the barrels in order as they stand on the plank, giving the barrel a vigorous shake for every basket, while the packers work constantly sorting from the piles, the apples rolling down to them. These half-bushel baskets should be of such shape and size that they can be readily turned over in the barrel in emptying, to avoid bruising the fruit as is done when poured into the barrel. All rejected fruit is put into bushel baskets and taken away. Each sorter uses a separate basket, so that it is easy to detect poor work when the baskets are emptied into the barrel. One man heads, nails and rolls out the barrels; another faces, and empties baskets. As far as possible, each person has his particular kind of work, and, if not satisfactorily done, the responsibility is readily located. We expect to pack our apples early in November. The first heads of the barrels are nailed on rainy days during the summer or early fall. When the barrels are packed, they are piled up outdoors, and if weather is dry, we sprinkle them thoroughly to prevent the barrel from absorbing the moisture of the fruit, thereby causing it to shrink and to rattle in the barrel.

"It is important that the quality shall be the same all through the barrel, and, as far as possible, that one barrel shall be a fair sample of a car load or more. Great care should be taken in all the stages of gathering and packing never to needlessly bruise the fruit. For picking, which for winter apples begins about October 1st, each man uses a half-bushel handle basket, which he empties when filled into one holding one and one-fourth bushels, by capping the latter over the former and inverting to avoid bruising in emptying the first basket. We use these bushel baskets in which to draw all of our fruit to the packing-house, drawing forty-six at a load, as illustrated. The wagon is a broad tire half-truck, with springs which raise the rack only about four inches above the bolster, and carries 4,500 pounds. When shipping, we draw 20 barrels on end on such a rack."

II. HISTORY OF THE OHIO RASPBERRY.

Confusion has arisen concerning the history of the Ohio raspberry which is so extensively grown in New York for the evaporating industry (see Bulletin 100), because of the fact that the Ohio raspberry of the books is a distinct variety. The history of this Ohio raspberry of New York is given in the report of the Iowa Horticultural Society for 1886 (page 88), but some of the details seem to be inaccurate. I now put on record the true history of this invaluable berry, as written for me by Dr. H. P. VanDusen, of Rochester, N. Y.:

"Some where in the sixties, my grandfather, Hiram VanDusen, of Palmyra, N. Y., bought a lot of Doolittle plants of Mr. Purdy, of same place, enough to plant something less than an acre. When these plants were getting old and nearly worthless, he discovered a plant which was apparently as good as new. He also knew from previous observation that it ripened later, was firmer and always loaded. He took pains to get tips down, and secured a few plants, and from these still more, until he had two rows a few rods long. At this time, my father bought this stock of him, and my father and myself increased the stock rapidly. We had also Mammoth Cluster, Seneca Black Cap, Doolittle and others. Its value was more and more impressed upon us until about 1876, when I sent out a circular offering plants for sale. The circular increased in size from year to year, and in 1882 or 1883 I received orders for more than a million plants, nearly three times the stock I had on hand. The Doolittle plants amongst which this variety was found, came from Ohio, and to distinguish it from the Doolittle, grandfather called it the Ohio. Some years later another berry under the name of Ohio came to our notice, but it was worthless and never came into general cultivation."

Mr. A. M. Purdy, of whom the stock of Doolittle plants was obtained, writes me that this Ohio raspberry which the eldest VanDusen propagated was "precisely identical with what I grew at that time as the Miami, obtained from Ohio, and it was so decided by John J. Thomas and Patrick Barry, who saw them on my grounds."

All the true Ohio raspberry which is now grown in western New York seems to have come from this VanDusen stock, and the variety is now widely distributed in other states. Mr. L. T. Yeomans gives me the following note:

"There are two distinct kinds of the Ohios; one is a dead black berry, more prolific and sweeter, and the plant a stronger grower; the other a firm berry, and slightly reddish. The latter is much more common here. The former is by some supposed to be the same as Johnston's Sweet."

The Ohio Everbearing raspberry of the books, with which this New York Ohio has been confounded, is probably no longer in cultivation. It will be worth our while to inquire into its history, however, for we shall thereby recall how recently it was that the wild raspberry began to be impressed into cultivation. This Ohio Everbearing, or Monthly Black-Cap, was, so far as I know, the very first cultivated native black raspberry. It was brought to notice by Nicholas Longworth of Cincinnati, to whose enlightened and prophetic efforts American fruit-growing owes so much, particularly in the cultivation of the grape and strawberry. The earliest record of the variety seems to have been made in the *Genesee Farmer*, but I know this reference only by the following entry in Hovey's *Magazine of Horticulture*, 1837, page 154:

"*Everbearing Raspberry.*—The *Genesee Farmer* states that a new kind of raspberry has been found in New York state, near Lake Erie, by the Shakers residing there, and that it produces its fruit throughout the summer and autumn. It is also stated to be really a valuable variety, and worthy of extensive cultivation. The fruit in appearance is longer than the wild black raspberry, and approaches near, in size and excellence, to the White Antwerp, but is not so high flavored. The habit of growth is somewhat similar to the common purple raspberry, the shoots of which are very vigorous, bending over and touching the ground, and take root, by which mode it is rapidly increased. Its mode of producing its fruit is as follows: In the spring the old shoots throw out their new branches, as in other sorts upon which the first crop appears, but soon the new shoots begin to grow, and when they have attained a good size, which is generally just before the first crop is gone, they produce the second crop; to this latter circumstance it owes its name, and its peculiarity. The fruit of the second crop is considered the best. It is grown by Mr. Longworth, of Cincinnati, and by the Shakers near Lebanon, but has not yet found its way into any of our Atlantic cities."

The next account I find of this berry is in the *Magazine of Horticulture* for 1842:

"*The Everbearing Raspberry.*— In our Vol. III, p. 154, under our Miscellaneous Notices, we gave an account [quoted above] of this fruit which had then just been brought into notice: since then, we have heard very little of it till the past year. It is now attracting more attention, and as it is deemed a valuable acquisition, we have copied a further description of it below, which we find in the *American Agriculturist:*

"The Ohio Everbearing raspberry was first discovered some fifteen years ago, in the northern part of the state, near Lake Erie, but in what particular part is unknown. Mr. Longworth, of Cincinnati, introduced it into his garden in 1832, at which period he was driven into the back country by the cholera, where he found it growing. It has been little known, however, in Cincinnati, until within the last two years, but there is now great effort made by the gardeners to cultivate it for the market of that city. The fruit resembles the wild native raspberry, but is much larger, more fleshy, and of a much finer flavor, and is always a very profuse bearer. In Cincinnati, the wood of the previous year bears one crop in June, after which it soon dies; the young shoots then come into bearing, and continue doing so into October, till the frost cuts them off, when may be seen buds and blossoms, and the fruit in every stage from green up to full ripe, on the bush, stayed by the hand of nature in the midst of their productiveness. The fruit is preferred by many to the Red Antwerp, and with its large erect clusters of flowers, presents a beautiful appearance.

"Mr. Longworth, in a communication describing this fruit, in the *Gardener's Magazine*, states that the plants, in light dry soils, are not very productive in the autumn crop; but if grown on a stiff loam, on a clayey subsoil, bear profusely till destroyed by frost. From all that has been said in relation to it, it appears a desirable fruit, and we hope soon to test its qualities ourselves."

One is not quite sure, after reading the above extracts, whether this variety came from New York or Ohio. It is first said that the plant was "found in New York state, near Lake Erie," but it was growing only in the garden of Mr. Longworth and with the Shakers at Lebanon, which is thirty miles from Cincinnati. In the second extract it is said that the plant was found "in the northern part of the state," but the name of the state is not mentioned. All doubts are set at rest, however, if one consults Longworth's own account of the berry in the *Gardener's Magazine* of London, to which reference is made in the second article quoted above. Dating his communication at Cincinnati, Ohio, Sept. 30, 1841, Mr. Longworth says: "When driven into the interior of the state by the cholera, in September and October of 1832, I found a raspberry in full bearing, a native of our state, and the only ever-bearing raspberry I have ever met with." Longworth moved to Cincinnati about 1804 and lived there until his death, in 1863. In this letter to the London periodical, Longworth expresses the belief that this raspberry would succeed in England, and he sent plants of it there by James Howarth, who went to the old country "to purchase plants." The editor of the magazine adds a note that "plants of this raspberry are in a London nursery, but none of them will be sold till the worth of the variety is tested."

Indigenous raspberry growing began with this Ohio Everbearing variety; but the contemporaneous Ohio has no connection with this historical berry save an accidental similarity of name.

III. THE "MISTLETOE DISEASE" OF THE BLACKBERRY.

During the last fall, we were asked about a curious disease or malformation of blackberry canes by a fruit-grower in Delaware, which is known locally as the "mistletoe disease," because of the mistletoe-like bunches of foliage. We asked for specimens, which, upon examination showed the work of a psylla-like insect

130.— "Mistletoe" of the blackberry.

known as the "Bramble Flea louse." This disease has long been known in New Jersey, and is also reported from New York. It therefore seems to be desirable to mention and illustrate the disease so that our own berry growers may recognize it, if it should invade their plantations. Our Delaware correspondent writes that the disease is "found on Early Harvest, Erie, Taylor, Minnewaski, and several other blackberries, but not much on the Wilson. I notice it most on neglected patches and on poor land."

Professor F. W. Card, of the University of Nebraska, to whom I mentioned the disease, gives me the following references to it: Bulletin 45, Ohio Experiment Station, p. 209; American Entomologist, i. 225, iii. 62; Illinois Entomological Report, viii. 17; Strong, Fruit Culture, 3d ed. 179; Saunders, Insects Injurious to Fruit, 320.

The specimens were referred to Mr. Slingerland who reports as follows: "The curling of the shoot is caused by a psylla known as the blackberry flea-louse (*Trioza tripunctata*). The insect was discovered by Dr. Fitch in 1851, and was common in New Jersey in 1869 and for several years after. The insect is said to be common on pine trees from Florida to Canada. There are said to be at least two generations annually. I do not know how it winters. It is recommended to cut out and burn all infested tips as soon as discovered. Doubtless much of the curling of the leaves is also due to the psylla, but a plant-louse (species unknown) had also contributed to this injury."

This insect is sometimes called *Psylla rubi* and *Psylla tripunctata*. Thorough spraying with kerosene emulsion before the injury has been wrought will probably keep the psylla in check; but in ordinary attacks the collecting and burning of the deformed clusters as soon as the disease is apparent will be sufficient to check the trouble.

IV. ROOT-GALLS.

We have many inquiries respecting galls upon the roots of various kinds of fruit trees. These galls are irregular swellings or excrescences upon the roots or upon the main stem just below the ground, ranging in size from that of a pea to one's fist, or even to several inches in diameter upon large trees. They are best known upon nursery stock, because the roots of the tree are exposed for observation. Specimens of affected apple roots are shown in Fig. 131. The galls are probably common upon old trees, however. In our Bulletin 74 ("Impressions of the Peach Industry in Western New York"), I made a discussion and illustration of galls taken from large peach trees. Since that time, one pear grower has complained to us that his young standard orchard is gradually failing and that the difficulty seems to be the abundance of galls which he finds upon the roots.

Unfortunately, the cause of these galls is unknown, and it is also uncertain as to just how much damage they do. They seem to be widely spread in many countries, and they are known to be abundant in some of the nurseries of New York state. No one has ever been able to discover any insect or fungus which seems

131.—Root-galls upon apple trees from a nursery.

to be the cause of the mischief.* We are now making experiments with the affection; but in the meantime we desire to give our fruit-growers the latest information which we possess on the subject, because the extent of the injury in this state seems to demand that the attention of every tree-planter should be drawn to it. We always advise that trees with galls shall not be planted; or if they are planted, that all galls should be removed. We do

*The root-knot of the southern states and of greenhouses is a wholly different trouble and is the work of a nematode worm. There is also a root swelling or gall on raspberries due to the work of an insect.

not know if the trouble is communicable from tree to tree, but the fact that great numbers of trees sometimes become infested in the nursery rows, seems to show that it may spread from tree to tree. However, one of the most distinguished German authorities upon plant diseases, Sorauer, thinks that these galls are simply abnormal deposits of woody tissue consequent upon the abrupt bending or injury of the roots when the trees are planted. A portion of his account is here translated (Sorauer, "Handbuch der Pflanzenkrankheiten," 1886, p. 737):

"These swellings have been seen by me mostly upon apples and pears. They appear generally at the crown of the roots of young trees, the enlargements having the size of hazel nuts or walnuts. In older specimens they may attain the size of one's fist. Their appearance upon the younger nursery stock is generally limited to the crown, but not unfrequently they are found lying deeper in the earth, or even upon slender one-year-old roots. In older trees they are much less frequent. The swellings have been found only upon those roots which lie near the surface of the soil. In those cases in which the galls have attained considerable size, a decreased growth of the branches of the trees may be noticed. Apparently, the gall absorbs so large a part of the nourishing material that the branches suffer. An unfavorable effect of these galls upon the roots appears to be a decreased development of small fibrous roots. This is especially noticeable in older trees.

"The color of the gall is similar in its younger stages to that of the sound root. Later, a darker color appears, in consequence of a deposit of dead material which forms the bark of the gall. If one examines the galls which are produced upon the smaller roots, it will be seen that they are generally located upon one side of the root body; that they have a softer tissue than the root, but that their color within is perfectly normal; and that they also possess an equal amount of starch. The large galls are composed of hemispherical growths which are superseded upon each other in such a manner that the surface has a very irregular granular and warty appearance. In the springtime the more prominent of these elevations possess a light brown appearance and a perfectly herbaceous consistence. . . A cross-section of the gall shows an irregular fibrous mass. In the smallest swellings on the most slender roots, there may be recognized a small dead portion in the center, and it is also the case in large roots that a properly made cut will show that the swelling originated from an injury to the woody cylinder of the root during the first year of its existence. The injury may consist of a small crack which extends from the outside to the center of the root at the time when the latter was small, or the root during its first year may have been torn and thereupon a callus appeared over the wounded surface and this callus eventually developed into a root-gall. The manner in which the first cracks appear has not been clearly shown, but certain indications lead to the belief that they may be caused by extremes of expansion and contraction. There may be frequently found wedge-shaped bodies of parenchymatous tissue in the rings formed during the first and second years' growth of the root. These bodies (which may have the power of forming adventitious buds) must show fairly deep crevices by the alternate expansion and contraction of the tissues. The circumstance that such parenchymatous wedges may also appear upon uninjured roots leads to the conclusion that the root-gall may also arise without injury to the roots, but this is always a more rare case. . . .

"I therefore consider the root-gall as a swelling which appears either upon the body of the root, or at the crown, but which is not caused by the action of any parasite. In the decayed surface tissues of the galls, many organisms may be found; but in the sound tissues I have been unable to discover any parasite. I have also looked in vain for a form of plasmodium. They appear to be caused merely by an abnormal flow of sap. Instead of the uninterrupted return, to the ends of the roots, of the sap which has been modified by the stems above ground, it finds a constriction. This may be due to an injury of the root, or to its having been bent at an acute angle. In such places the accumulation of nourishing sap leads to the excessive growth which appears to consist of a rich callus over the places of injury, and in the case of bent roots, the growth appears to be an abnormal development of tissues of wood and bark. The younger the root is, which has been bent, the more easily the crevices may appear which lead to the formation of the above mentioned parenchymatous wedges; an expansion, of the medullary sheath may occur, and the formation of adventitious buds be induced. . . I have frequently found woody bodies entirely isolated from the woody cylinder of the branches of various trees, especially in apples and in conifers. These bodies were buried in the tissues of the bark. Adventitious buds may be formed easily upon the roots of apples and pears since root cuttings of these plants will frequently produce shoots. Such shoots may also be found upon the more horizontal-growing roots of these trees, even when they are not separated from the parent plant.

"The formation of root-galls, therefore, does not appear to me more strange than similar swellings which are so commonly seen above ground. At first thought, it would seem strange that these root swellings should appear so much more frequently in certain nurseries. The prevalence of the attacks and the season of their appearance seem to indicate a parasitic origin, but I have been unable to find any plants or animals to which the trouble may be ascribed. The examination of many seedlings from nurseries upon which root-galls had been commonly observed lead me to what I believe to be the true explanation of this disease, which has appeared during recent years in so many different localities. Specimens of diseased and healthy roots which were taken from the upper part of the root system show that they have been well nourished and also that they bear many sharp angles, which, in some cases, have led to the growing together of roots that have been closely pressed together. In other cases, it will be seen that the early root system was cut back closely and a great many side roots have been produced near the cut surfaces. Since the young plants, in a vast majority of cases, show by their root systems that they have been well nourished, it may well follow that this good nourishment is also favorable to the formation of root-galls.

The disturbing influence may be ascribed either to the short cutting of the roots, or to the bending of the roots when the plants were set into the ground. If one watches the practices of the workman in transplanting seedlings in nurseries, an explanation for these crooked roots may be very easily found, frequently the holes are too shallow to receive the deeper roots of the plants. The plant is therefore pressed into the soil so that the trunk may be set at the desired depth, and many of the roots are more or less seriously bent. If, at the same time, the roots are pressed in a horizontal direction, or if they are bent upon a large curve, this shallow method of planting is not followed by any serious consequences. The steady return flow of the nourishing sap should thereby be diverted toward a more free production of side roots, especially from the main roots which have been but moderately bent; but in case the plant has been pressed into the soil so that the root makes a short and sharp turn, then the flow is so great that an abnormal deposit of material may easily induce the formation of root-galls.

"It is, therefore, just these improved methods of culture, the fertilizing and cultivation of the soil used for nursery purposes, and the methods which nurserymen have of growing seedlings rapidly (because in this manner stronger trees are produced), which bring about the conditions under which the root-gall is found.

"The experiment should be made of growing stock after it has been pruned in various ways, and with different methods of transplanting."

It seems to have been generally assumed that this root-gall is a specific disease and due to some fungous parasite, and upon this assumption various fungicidal dressings of the roots have been advised (see, for example, Bulletin 74). The only actual experiments which I know to have been reported, in this country, are by W. E. Smith, Napa, California, and W. A. Yates, Brenham, Texas. Mr. Smith presented his results before a recent meeting of the Fruit Growers' Convention. I reprint the paper as it was published in the *California Fruit Grower* (Dec. 15, 1894, p. 481):

"The principal damage from root-knot appears to occur only when the knots approach the crown of the root; when they encircle the crown of the root the tree is hardly worth saving. Hence, where root-knots exist they should be destroyed early, at least before they encompass the root crown.

"Methods of Work.— As to the method of the work I will say, that as fast as the knots were uncovered by the man with shovel and trowel, I followed with brace and bit and a large bottle of concentrated solution of bluestone [sulphate of copper]. In the cork of the bottle a quill is fixed to guide the fluid easily into the bored holes. After two days' work the method of treatment was modified.

"A Phenomenon.— A curious and interesting thing occurred. I noticed that the leaves on certain branches of trees treated the first day had turned very dark, with a sort of coppery tint which was very noticeable. The leaves dried up shortly and fell off, leaving the branches naked, while other branches on the same tree retained their green leaves. Not one tree only, but a score of them were showing this strange effect of the cupric solution. With those dead, copper-hued leaves before my eyes, there was little room for doubting that the cupric fluid had thus quickly entered into the circulation of the tree. It must have done so to produce the effect observed. And it must have gone up at a season when we speak of the sap as going down. I was a little scared at this phenomenon and modified my treatment by striking off the knots and puncturing the diseased wood, especially the core of the knot, with a sharp, pointed iron, then applying the cupric solution with a swab, in this way avoiding a too excessive quantity of the fluid penetrating the fiber of the tree. However, in the light of future events, there seemed to be no need of this precaution. The trees thus curiously, and, it would seem seriously affected, were all right in bud, leaf, blossom and fruit in the spring and summer following. They have shown no signs of injury since, but on the contrary seem to have taken on a healthier tone than the other trees, so that I now believe the treatment by boring is perfectly safe, if done in September or October. I could not vouch for it at other seasons of the year.

"Final Results.— After two years, not one of the 200 trees has died. Every tree treated was marked by tying a strip of cotton cloth on a south side branch next to the trunk of the tree. These marks still remain. Only last week I dug away the earth from about twenty of these marked trees, and found dead knots only—a specimen of which I brought with me, that members of this convention interested might see for themselves. The trees treated for root-knot now look as clean and healthy as those not treated — no difference can be seen — they all made a splendid growth last year and no finer trees can be seen in our section of the same age. In the light of these facts, I consider the treatment with bluestone, in the manner herein described, a success. Even if the knots should reappear after three or four years, it would still be profitable to apply this remedy to keep the knot growth in check. The cost of application need not be more than three to five cents a tree, and the bluestone used is so trifling in quantity that it need not be considered in the bill of expense. My treatment of root-knot has always been in the fall months of the year. Whether other seasons would do as well or better I am not prepared to say.

"Suggestions.— In using this remedy, my advice is to make the bluestone solution as strong as the water will dissolve.

"In applying the solution be sure that it penetrates the core of the root-knot.

"If the knot is on the main stem of the root, so as to be easily accessible, I would advise to knock it off and puncture the soft core repeatedly with any pointed implement. Then apply the solution with a swab. Be sure to have the solution penetrate the diseased wood."

This experiment, as here reported, is by no means a proof that the sulphate of copper is a cure for the root-gall. Mr. Smith simply reports that the treated roots did not again develop galls; but if Sorauer's hypothesis of the formation of these galls is correct, we should expect that they would not return if once removed. Mr. Smith should have left some trees untreated from which the knots had been removed; and he should also have determined if trees from which the knots were not removed, tend to develop still more knots. Mr. Smith's paper brought out a discussion from Mr. Yates, the larger part of which I am glad to quote (*California Fruit Grower*, Feb. 9, 1895, 111), particularly as his conclusions are essentially like those of Sorauer:

"In common with many other horticulturists, Mr. Smith assumes the root tumor to be a disease, which in the strictest sense of the word it is not, as the tumors when first formed are composed of healthy cellular tissue; disease being afterwards superinduced by the abnormal condition of the enlargements interfering with the proper functions of the sap in regard to circulation.

"My first investigations of tumor were made with the idea that possibly such curious growths resulted from an inherited cause, or were perhaps the work of minute fungi and therefore contagious; so I budded, grafted and inoculated unaffected from affected trees, but all to no purpose; the tumors refused to be reproduced.

"But while investigating along this line, I noticed that wherever the free circulation of sap under certain conditions had been checked or impeded, it was no uncommon thing to see some of these tumors commence to form, and several years' observation has but served to convince me that they are primarily caused, either by impeded circulation of sap and consequent disorganization of the sap vessels and surrounding tissues, or by a lack of equality in the absorption of moisture by the roots and its transpiration by the leaves and branches.

"In the first instance, the sap being forced out of its regular channels and unable under these changed conditions to perform its proper functions, commences to throw out callus formations, which enlarge very rapidly owing to the amount of sap forced into them through what is generally known as the core of the knot. This mass of callused matter thus irregularly formed becomes after a time diseased, and it is at this stage that the fungus growths have been found which have led many investigators into the error of supposing these tumors to be the result of fungi. The causes of this impeded circulation are many;

among which may be mentioned, grafting and budding, when there exists, as is often the case, a disparity in size or lack of affinity between scion and stock; and abrasions or wounds of any kind made on the tree beneath the ground surface.

"In the second instance the lack of harmony between root and branch may be caused by an unseasonable loss of foliage, either through severe summer pruning, or the killing of the young growths by a late freeze. The means of transferring the moisture absorbed by the roots being thus suddenly cut off, the sap cells in the lower portion of the tree become congested, resulting in the ruptures that cause the formation of the callus knots, or tumors.

"As to the remedy for these tumors, I have always found cutting them off quite effective if taken in time, and when the work has been well done I have seldom seen a return of the knots; it is well to cover the wounds thus made with grafting wax or any substance that will answer the purpose of excluding the air without injuring the tree.

"From my present knowledge of root tumors I fail to see where Mr. Smith's solution of bluestone remedy can be of much benefit. Regarding the dead knots he found on trees previously treated with this remedy, I may say I have frequently noticed the same thing, as in many cases the tumors when partly rotten became detached from the tree, often, however, leaving a canker spot that later may endanger the life of the tree affected, if not attended to.

"I have more commonly met with these tumors on peach, plum and apple, but also occasionally on over thirty other species of fruits, shade trees and evergreens."

The conclusion of the whole matter, then, as we now understand it, is that these root-galls are not the work of a parasite, but are a malformation following some injury of the root or some uncongenial condition in soil or treatment. The galls may seriously interfere with the nutrition of the plant, in many cases causing it to become weak and sickly. It is probable that the trouble is not communicable, and that cutting off the gall averts further trouble from that source. As a precautionary measure, however, we much prefer to plant only trees with perfectly clean and normal roots.

V. ARE DEWBERRIES WORTH GROWING?

Nearly five years ago, we published a bulletin (No. 34) upon the dewberry and concluded, from the results of our experiments and inquiry, that there is a future for the berry for commercial purposes. There was a brisk demand for the bulletin, largely due, it seems, to the novelty of the subject; but it ap-

132.— Lucretia dewberries trained to stakes.

pears to have had comparatively little immediate effect in encouraging the cultivation of the fruit. The dewberry is so unlike all other small fruits in its habit of growth, that growers seem to be slow to learn how to handle it; and many of them are no doubt prejudiced against it because the species is so common, and often so troublesome, in old fields and vineyards. The raspberry and blackberry have had a similar history, and the prejudices against them are only recently outgrown. Here and there, a person has studied the dewberry and has found it to be a valuable addition to the market fruits of early summer. I. A. Wilcox, of Portland, Chautauqua County, is one of these, and he read a paper commending the berry to the Western New York Horticultural Society last winter. I know Mr. Wilcox's plantation, and am convinced that the dewberry is an acquisition to him. As our bulletin is now out of print, I shall make a few extracts from it and give some further directions for the growing of the plant.

Of the dozen or twenty varieties of dewberries which have been named and introduced, only two, the Lucretia and Bartel, have gained wide prominence. In fact, there may be said to be only one leading variety, and that is the Lucretia, and it is the only one which has been well tested in New York. The full history of this and others is given in the Bulletin 34. The dewberry bears the fruit upon the canes of last year's growth, the same as raspberries and blackberries do. These canes are long and weak and naturally lie perfectly prostrate on the ground. "There are several methods of training the Lucretia dewberry," we wrote in 1891. "It is commonly allowed to lie upon the ground. The canes are cut back to three or four feet in length in the same manner as blackberry and raspberry canes are treated, and if the best results are expected the canes should be thinned to four or five in a hill. The canes are usually allowed to branch freely, although it is evident that some checking of the growth may often be essential to good results. A mulch is often placed under them to keep the berries clean and to retard the weeds. When this is applied, the vines are raised with a fork. A. M. Purdy* recommends two stakes, one to hold the bearing cane, and one the growing cane. This implies that only one cane is to be allowed to fruit each year. This method does not appear to be in practice and it is doubtful if it has anything to recommend it. Trellises and racks of various kinds have been devised. In our plantation of Lucretia we have tried three methods of training. In one portion of the plantation the plants are allowed to lie upon the ground without mulch, and the canes are cut off when three or

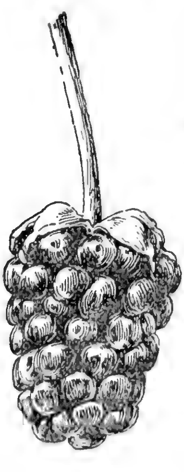
*Small Fruit Instructor, 94 (1887); Pop. Gard. ii. 100, 160.

four feet long. Another portion is trained upon a common grape trellis of three wires, the canes being tied to the wires the spring of the bearing year by means of wool twine. In the third portion the vines lie upon a flat rack standing 18 inches above the ground, and made of light slats laid crosswise the row and resting upon bents at the sides. There has been no gain in productiveness or earliness upon the trellised or racked plants; the only advantages have come from the greater ease of picking and cultivating and the less amount of room occupied. And these advantages are considerable, and seem to me to warrant the adoption of some simple trellis, preferably a wire trellis, in garden culture. Whether it would pay in field or market culture is a question which must be determined by the grower himself. The labor of tying the canes to the wires is somewhat onerous, but it is needed only once in the season. This training does not interfere with covering for winter protection, for the young or growing canes are allowed to lie upon the ground and are tied up the following spring. If the canes interfere with cultivation while growing they can be placed lengthwise the row with a rake or they can be thrown over the lowest wire. After the

133.—Dewberries on a wire screen.

canes have borne, they are cut out, in the same manner as the canes of raspberries and blackberries." Mr. Wilcox trains to three strands of No. 13 wire, the top strand being three feet from the ground.

Upon several accounts, however, I prefer tying the canes to stakes as shown in Fig. 132. Three or four canes may be allowed to grow from each plant, and these are tied to the stakes, with wool twine or willow thongs, two or three times during the season, as they grow. The canes may be left on the stakes all winter, although it is better, particularly in exposed localities, to lay them down late in fall. Whilst the year-old canes are bearing fruit, the new ones are growing on the ground. As soon as the fruit is removed, the old canes are cut out and the new ones are tied up for the remainder of the season. To prevent the breaking of these young canes by the early cultivating, it is necessary to turn them lengthwise the row with a fork. If they become very strong and if the land gets weedy, it may be advisable to tie up these young canes along with the old ones before the fruit is picked. On the other hand, if the land is clean, so that much cultivating or hoeing is unnecessary, the new canes may be allowed to lie on the ground throughout the entire season. This is scarcely advisable, however, for they are likely to make a weak and soft growth in weeds and grass and shade, and the ground cannot receive the attention which it should have. Some persons tie dewberries to a woven wire screen, as seen in Fig. 133. This is a neat practice for a few vines in the garden, but is too expensive for the field, and the spaces in the screen are not large enough to allow of the easy movement of the hand through it when tying and picking.



131. Lucretia dewberry, natural size.

The one great merit of the dewberry is the earliness of the fruit. The fruit is indistinguishable from the blackberry by the general public, and it is ten days and often two weeks earlier than the standard varieties of blackberries. "Dewberries, raspberries, and blackberries grow side by side in our plantations, and we have had, therefore, a good opportunity to observe the earliness of the Lucretia. This year (1891) the first ripe raspberries — Marlboro and Rancocas — were obtained July 4. At this time a few dewberries were about fully grown and had turned red. July 8 a few dewberries were secured. July 11 dewberries on some of the vines were ripening rapidly, and at this time Ada raspberry was just ripening and Doolittle and Souhegan were in their prime. July 16 Early Harvest blackberry, our earliest sort, gave its first ripe fruits, while the first picking of Agawam was not obtained until July 22. July 16 there were no flowers to be found upon the dewberries, but the blackberries were still blooming freely. A week later, pickings from the dewberries had practically ceased. It will be seen, therefore, that the dewberries ripen with the earliest black raspberries. But it must be said that there is a great variation in the time of ripening between different plants," a fact which is due to natural variation in the character of the variety. In propagating the dewberry, it is important that only those plants which bear large and uniform fruits shall be chosen for parents.

In quality, the Lucretia dewberry is probably inferior to the best blackberries. The canes are also rather more tender, but they are so easily laid down and covered that this is not a serious objection. The berries, on well grown plants, are large and handsome, glossy-black, and firm enough for shipping. The dewberry is not so heavy a cropper as the blackberry. Fifty to sixty bushels per acre may be considered to be a fair crop. To secure this yield, the rows should stand about three and a half feet apart, and the plants from two to three feet in the row.

The Lucretia is the only variety which I can confidently recommend for this state, although I should like to see the Bartel given some attention. All the dewberries propagate by rooting at the tips and joints of the canes, and they are therefore easily increased by any grower.

In order to bring the gist of the entire dewberry question to the reader's attention, I will reprint the conclusions of Bulletin 34, adding the results of later experience:

1. The cultivated dewberries represent three distinct species of rubus or bramble, and two well marked botanical varieties. It is therefore reasonable to expect that different managements may be required in the different classes, or at least that various results will be obtained from their cultivation.

2. The botanical types to which the cultivated dewberries belong are these:

I. The northern dewberry, or *Rubus Canadensis.* To this type belong the Windom, Lucretia's Sister, and Geer.

(a) The Lucretia sub-type, or variety *roribaccus,* comprising the Lucretia.

(b) The Bartel sub-type, or var. *invisus.* To this belong Bartel or Mammoth, General Grant, and Never Fail.

II. Southern dewberry, or *Rubus trivialis.* Here belong Manatee, Bauer, Wilson's White, and Austin, and probably Fairfax.

III. The western dewberry or *Rubus vitifolius* (known also as *R. ursinus*). Here belong the varieties known as Aughinbaugh (one of the reputed parents of the Loganberry), Skagit Chief, Belle of Washington, and Washington Climbing. None of these berries have been well tested beyond the Pacific coast region.

3. The dewberries are distinguished from the blackberries by a true trailing habit, cymose and few-flowered inflorescence, and the habit of propagating by means of "tips." Like the blackberries and raspberries, they bear their fruit upon canes of last year's growth, and these canes die or become weak after they have fruited. They are propagated by means of "tips" and root cuttings.

4. The peculiar merits of the dewberries as cultivated fruits are earliness, large size and attractive appearance, and the ease with which they may be protected in winter.

5. The peculiar demerits of the dewberries are the failure of the flowers to set, the formation of nubbins, and the difficulty of picking the fruit. There is no positive method known by which the first two difficulties can be overcome, and the causes of them are unknown, but there is reason to believe that tying up the canes, and pruning and thinning will tend to make the plant productive. The labor and unpleasantness of picking may be

avoided by training the plants on a rack or trellis, or upon stakes, and by keeping them well pruned.

6. Various methods of training and cultivation are advised. In the earlier methods, the plants were generally set about the same distance as blackberries (3x7 or 4x7) and the canes are allowed to lie upon the ground, being headed in when they reach about three feet in length. A mulch of straw beneath the canes was sometimes used to keep the berries clean and render picking pleasanter. At present, the canes are either trained on a two-wire or three-wire trellis, or tied to stakes, and the plants are set in rows which are three or four feet apart. Only three to six fruiting canes should be allowed to the plant. Some varieties, particularly Windom and Bartel, appear to do best if the fruit is shaded.

7. About twenty varieties of dewberry have been named and more or less disseminated during the last twenty years. Of these four have gained more or less prominence east of the Rocky Mountains, and are found to possess decided merits in certain places. This is a fair proportion of good varieties to inferior ones, as indicated by the annals of other fruits. These four are Lucretia, Bartel, Windom and Manatee.

8. Many persons have found dewberry culture to be profitable. This is evidence that the fruit is an acquisition. But it has not yet found general favor, and it is probable that it will never become as popular as the blackberry. Only the Lucretia is well known in New York.

9. The Windom possesses promise for the northwest. It is a native of Minnesota. It has not yet been tested to any extent elsewhere. It appears to demand partial shade for the best success.

10. The Lucretia has been found to be a desirable and profitable fruit in many places over a large extent of territory, and it is therefore safe to conclude that its range of adaptation is large. Many, however, have failed with it. It appears to be variable and many of the plants are worthless. It is sometimes seriously

attacked by anthracnose and by a bramble rust. The Lucretia is a native of West Virginia.

11. Bartel has found great favor with some growers in the west, from Wisconsin to Nebraska. It has not succeeded well in the east so far. The variety known as Mammoth appears to be identical with Bartel. It is native to southern Illinois.

12. Manatee is said to be valuable for the south. It is a form of *Rubus trivialis*, and was found in Florida. Other types of this southern species are no doubt destined to be very useful.

VI. THE GOUMI. *ELÆAGNUS LONGIPES.**

Much has been said,† during the past five years, about the goumi, all of which is deserved. It is a graceful and handsome bush of five or six feet high, bearing a profusion of silvery-white leaves and most abundant crops of cinnabar-red and gold-flecked berries. Whether considered for ornament or for fruit, it is one of the best of the many excellent shrubs which have come to us from Japan. Its silken-gray foliage is of a kind which is always desirable in shrubberies, and of which we have little in our native flora. The bush is as hardy as an apple tree. It stood the past winter in western New York without a blemish. It is enormously productive of fruit, and the berries are a delight to look upon, even if one does not desire to eat them. At first, these berries are very astringent, but when they are fully ripe and soft, they have a juicy piquancy which I enjoy. I have not tried them for culinary purposes, but it is said that they may be used for sauces and pies and in the many ways in which cranberries are so delicious. The fruits begin to ripen the first days of July in western New York, and they continue upon the bush for three weeks, much to the delight of birds.

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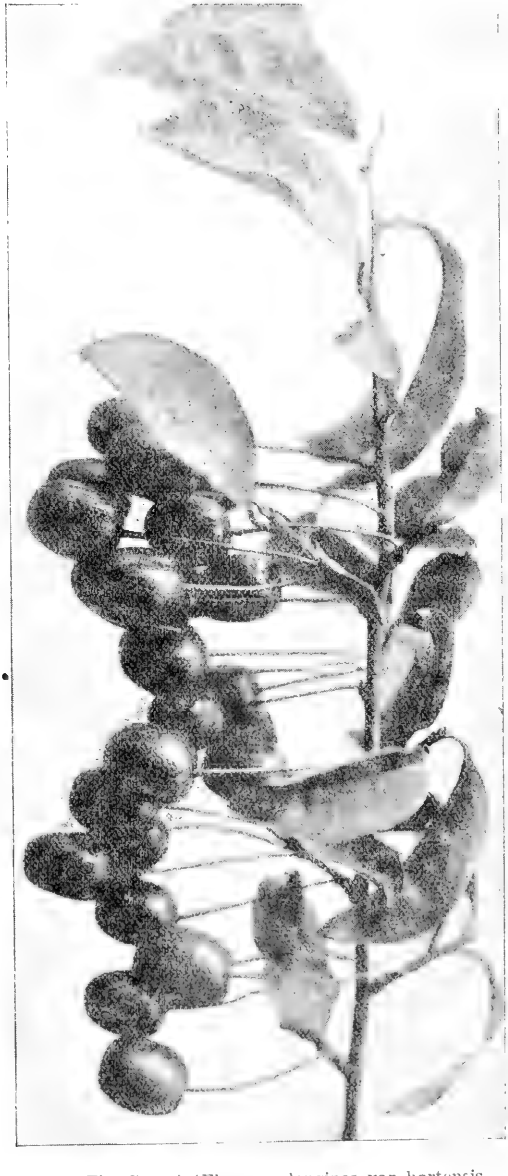
* Pronounced lon-gi-pees. The name means "long-footed," that is, long-stemmed, and refers to the fruit stems.

† For illustrated accounts of it, see *Garden and Forest*, i. 499 (1889); *American Garden*, xi. 565 (1890); Van Deman, Rept. Dept. Agric., 1890, 423, colored plate (under the name of *Elæagnus pungens*); *Orchard and Garden*, xiv. 157 (1892); *Gardening*, i. 275, 277 (1893).



135. The Goumi. (Elæagnus longipes, var. hortensis Natural size).

I do not know when this delightful bush first came to this country. William Falconer wrote in 1893 (*Gardening*, i. 275) that "although it has long been cultivated in gardens, it is only within the last few years that its merits have been generally appreciated, and it has become in much demand." It could not have been a very old resident of American gardens. It seems to have been first brought prominently to notice in England in 1873, by an illustration and description in *Gardener's Chronicle*, by Maxwell T. Masters. The species was described by Asa Gray in 1859. Maximowicz (Bull. Acad. Imper. Sci. St. Petersburg, vii. 560, 1870) divides the species into four varieties, two of which bear edible fruit. The form which is grown in this country is the variety *hortensis*, characterized by spineless branches, elliptical leaves, very long fruit-stems, and large edible fruit. In nurseries, the plant is sometimes called *Elæagnus edulis*.

The goumi grows readily from seeds. These should be sown or stratified in summer, before they become dry, and allowed to freeze the following winter. The next spring, they should germinate freely. Cuttings of the half-ripened wood strike readily in June or July, if handled in frames. As soon as attention is given to cultivation and selection, we may expect the goumi to become prized for the edible qualities of its fruit.

VII. THE WINTER INJURIES.

The past winter was unprecedentedly severe upon vegetation throughout the state. In most parts, all stone fruits were much injured. Only sour cherries seem to have escaped the havoc, and even they are not a heavy crop. Pears were also seriously hurt.

The University premises are not ideal lands for the tenderer fruits. The location is too high and bleak, and it is too far removed from the influence of Cayuga lake. The condition of the stone fruits, particularly of peaches, in the Cornell plantations is not an accurate guide to the conditions in the more favored fruit sections; yet a brief discussion of the winter injuries to fruits at this place may have some points of usefulness.

RAINFALL AT CORNELL UNIVERSITY, IN PERIODS OF JULY TO DECEMBER INCLUSIVE, FROM 1889 TO 1895.

	July.	August.	September.	October.	November.	December.	Total for the period.	Total for the year.	Temperatures below zero in the various winters.
1889	6.73 in.	3.32 in.	2.57 in.	3.62 in.	3.35 in	2.46 in.	22.05 in.	41.04 in.	3°, March 8, 1890.
1890	1.24 in.	4.92 in.	6.62 in.	4.66 in.	1.93 in.	3.47 in.	22.84 in.	46.39 in.	2°, March 2, 1891.
1891	4.25 in.	3.24 in.	2.13 in.	5.25 in.	2.25 in.	3.85 in.	20.97 in.	38.05 in.	6.5°, January 20, 1892.
1892	4.93 in.	6.91 in.	1 88 in.	1.52 in.	3.50 in.	0.85 in.	19.59 in.	40.49 in.	4°, December 27, 1892. 12°, January 17, 1893.
1893	5.13 in.	3.86 in.	4.38 in.	2.15 in.	1.25 in.	2.03 in.	18.80 in.	37.58 in.	1°, February 20, 1894. 14°, February 25, 1894.
1894	3.17 in.	0.59 in.	5.17 in.	4.91 in.	1.94 in.	2.39 in.	18.20 in.	40.15 in.	1°, December 28, 1894. 5°, January, 1895. 9°, February 7 and 8, 1895.
1895	1.96 in.	4.12 in.	2.03 in.	0.99 in.	2.69 in.	4.07 in.	15.86 in.	28.66 in.	2°, December, 1895. 15°, January 6, 1896. 18°, February 17, 1896. °3, March 24, 1896.

At the outset, it should be said that the phenomenal injury wrought by last winter was probably not wholly the result of low temperature. The drought of the last summer and fall no doubt augmented the injury. It is well known that trees suffer more from cold weather when the ground is very dry. I have compiled some figures from the reports of our meteorological bureau to show the conditions existing last winter. It will be seen that the total rainfall for last year was about twenty-eight and a half inches, whilst the normal precipitation is thirty-five to forty inches. During the period from July to December, inclusive, of 1895, the rainfall was less than sixteen inches, which is two and a third inches below the rainfall of the like period of 1894, even though that period was also a very dry one.

There are probably two ways in which the effects of a drought augment winter injuries. In the first place, the tree is probably weakened in vitality by an excessively dry season, and is thereby unable to endure so great exposure to cold. In the second place, there is evaporation of moisture from trees during the winter season, and if the ground is very dry this loss cannot be readily met; and the tree thereby "freezes dry," a condition which every nurseryman knows is generally fatal to trees. The extent to which loss of moisture may take place through the bark of dormant twigs may be determined by cutting off the twigs and quickly sealing over the ends with wax, weighing them, and then detecting the loss in weight from time to time. The following figures of such measurements will serve to emphasize the fact that moisture is lost from winter twigs, although they are not designed to show the actual rate of this loss when the twigs occupy their natural position on the tree.

April 7th, a cion of apple weighing 4.425 grams was placed on a balance, and the loss by evaporation measured at intervals during three days. The cut end of the cion was sealed with wax to confine evaporation to that which may take place through the bark. The balance or scales was placed in a living room, where the readings could be taken at frequent intervals. It will be noticed that the rate of evaporation was nearly constant, averaging about ½ centigram per hour.—

	Lost in 2 hrs.	Additional loss in 12 hrs.	In 18 hours.	In 24 hours.	In 26 hours	In 36 hours.	In 44 hours.	In 48 hours.	In 51 hours.	In 60 hours.	In 64 hours.	In 68 hours.	In 77 hours.	Total loss.	Per cent loss.
Twig weighing 4.425 grams.	1 cg.	5 cg.	2 cg.	5 cg.	2 cg.	5 cg.	4 cg	2 cg.	2 cg.	4 cg.	2 cg.	2 cg.	3 cg.	39 cg.	.088

It has been said that the rate of the loss of moisture from trees in winter determines the relative hardiness of different varieties of apples, and of some other fruits. The following table shows studies of twigs of varieties of different degrees of hardiness, but it will be seen that the per cent. of loss of moisture bears no relation to the supposed hardiness of the varieties:

VARIETIES.	Original weight.	Weight at the expiration of two days.	Loss.	Per cent of loss.
	Grammes.	Grammes.		
Seek-no-further, Twig No. 1	1.07	.985	.085	.0794
Seek-no-further, No. 2	1.3275	1.255	.0725	.0546
*Fameuse, No. 1	1.095	1.025	.07	.0639
*Fameuse, No. 1	.82	.725	.085	.103
Fall Jennetting, No. 1	1.0475	1.	.0475	.0453
Fall Jennetting, No. 2	1.45	1.3875	.0625	.0431
*Northern Spy, No. 1	1.38	1.3125	.0675	.0489
*Northern Spy, No. 2	1.155	1.0925	.0625	.054
*Oldenburg, No. 1	1.595	1.55	.045	.028
*Oldenburg, No. 2	1.8475	1.7475	.1	.053
*Oldenburg, No. 3	1.3725	1.265	.1075	.078
Baldwin, No. 1	2.11	2.0025	.1075	.0509
Baldwin, No. 2	1.34	1.26	.08	.059
Baldwin, No. 3	.93	.87	.06	.064
Rhode Island Greening, No. 1	1.1825	1.11	.0725	.061
Rhode Island Greening, No. 2	1.055	.99	.065	.061
*Titovka	1.8075	1.7075	.1	.055
*Red Astrachan, No. 1	1.45	1.3425	.1075	.074
*Red Astrachan, No 2	1.4825	1.4075	.075	.051

*Supposed to be the hardiest varieties.

Early in April, twigs, from the previous year's growth were taken from several varieties of apples, which vary much in their ability to endure our climate. The twigs were carefully weighed, and the cut ends were then sealed with wax to prevent evaporation save through the bark. At the expiration of two days the wax was removed and the twigs again weighed. The twigs were kept in an open shed.

The following table shows that there is great variation in the rate of water loss between twigs of the same variety of apple:

VARIETIES.	Original weight.	Weight at the expiration of three days.	Loss.	Per cent of loss.	Average per cent of loss.
	Grains.		Grains.		
Baldwin, Twig No. 1	19.	16.9	2.1	.110	
Baldwin, No. 2	19.425	17.2	2.225	.114	
Baldwin, No. 3	18.9	16.75	2.15	.113	
Baldwin, No. 4	29.25	26.4	2.85	.0974	
Baldwin, No. 5	24.2	21.4	2.8	.115	.1098
Oldenburg, No. 1	31.3	29.4	1.9	.0607	
Oldenburg, No. 2	34.65	31.35	3.3	.0952	
Oldenburg, No. 3	15.8	14.3	1.	.0949	
Oldenburg, No. 4	28.95	26.6	2.35	.0812	
Oldenburg, No. 5	9.5	8.25	1.25	.131	.0926

PEACHES, AND THE TREATMENT OF INJURED FRUIT TREES.— Not only the fruit buds of peaches were killed, but the trees themselves were very seriously injured upon the University place. Most of the last year's growth was wholly killed, and in many instances vigorous branches an inch in diameter were destroyed. All peach wood was markedly browned and discolored.

The proper treatment for any trees so seriously injured as this is to cut them back very heavily. This severe heading-in — sometimes to the extent of three or four feet — removes the driest and weakest portions and concentrates the energy of the tree into a comparatively small area of top. Heavy pruning always tends towards the production of wood, and this wood production is probably never more needed than in winter-injured trees, for it tends to renew the vitality of the tree. The philosophy of this becomes apparent upon a moment's reflection. The browned and injured wood can never regain its former usefulness. New tissue must be developed as quickly as possible in order to carry forward and to maintain the vegetative energies. This new tissue is laid on over the old, and the old, thereby, quickly becomes sealed in, so to speak, and removed from the agencies of decay. Every observant fruit-grower knows that if a tree which is severely winter-injured in limb and trunk were to bear even a partial crop of fruit in the coming season, it would very likely die outright. If, however, all its energies were directed to the development of new tissue, the injury would soon be overgrown. The injured wood, like the heartwood of the tree, is soon removed from active participation in the vital processes. It therefore follows that the danger resulting from the browning or blackening of the wood by winter injury, depends very much upon the subsequent treatment of the trees.

PEARS.— In the Cornell plantation, pears will be a very light crop this year, largely as a result of the winter. There was no injury to the growth or to fruit-spurs, but many of the fruit-buds were killed.

There is much complaint of the blackening of the pear wood by the winter injury. Several varieties upon our own plantation show wood which looks to be lifeless, yet the trees are making good growth. Much of this wood really is irreparably injured, but the new layer which is now making may be expected to maintain the health of the trees in perfection, as explained above. I have observed this injury to pears from time to time for twenty years, and the trees have invariably recuperated if given good care. I recall making the experiment of setting cions of pear wood which was so completely blackened as to appear as if hopelessly injured. The grafts grew, and bore for many years, and were in no way inferior to ordinary pear grafts.

In some parts of the state, pear trees were ruined by the winter. In most instances, these trees will leaf out this spring and they may make some growth, but later on they will be found to droop and die much as if attacked by blight. The wood, upon being cut, will be found to be much discolored. This serious injury to pear trees will probably not be found in the well known fruit regions of the state, however.

PLUMS.— There are practically no plums upon the University place this year, except of native species. The trees had set profusely of buds, but the buds, and, in most instances, the entire fruit-spur, were killed outright. There is now and then a fruit on Lombard and a few other varieties. None of true domestica plum trees were injured in body or limb by the winter.

Of the Japanese plums we shall have no fruits, except now and then one on cions set two years ago in Lombard tops. The fruit-spurs of the Japanese varieties were killed in about the same degree as those of the domesticas. Georgeson and Abundance, however, were somewhat injured on the top growths, but the trees do not appear to have been damaged. Burbank, Red June, and Yosebe (of our Bulletin 106, Fig. 13), were wholly uninjured, save the loss of the fruit-spurs. Yosebe even bore a few flowers, but they did not set fruit. Judging from the behavior of the Japanese plums upon our grounds last winter, they are about as hardy in tree and bud as the common run of the domesticas.

In contrast to the domestica and the Japanese varieties, the Americana types stood the winter without a blemish and are now carrying a full setting of fruit. Even one or two of the Chicasaws blossomed, but they will probably mature no fruit. Wild Goose was not injured.

APRICOTS.— The winter totally destroyed the entire fruit-spurs of all the apricots upon the Cornell plantation, including the Russian varieties (Budd, Gibb, Catherine, Nicholas), and the Russian almond of Lovett (which is an apricot). The only variety which was seriously killed back in limb is the Royal, but the wood of nearly all apricots is discolored. Early Golden and Moorpark did not kill back; and young trees of the *Prunus Mume* type (see Bulletin 71) were only slightly injured. The Russian varieties were least injured in wood of any of our apricots. When pruning the trees this spring, it was very noticeable that the wood of the Russians was hard and firm and comparatively little discolored. Yet, I should not advise the growing of Russian apricots in this region, because other kinds bear so much better fruit, and it is only at long intervals that we have such winters as the last one proved to be.

DWARF CHERRIES.— We have three types of dwarf cherries (see Bulletin 70) growing together in a border alongside a lawn. One of these is the common sand cherry (*Prunus pumila*) of the east. This was uninjured. Another is the western dwarf cherry (*Prunus Besseyi*). The form of this known as the the Improved Rocky Mountain dwarf cherry was very severely injured, and one bush of it was killed back to within six or eight inches of the ground. Bushes which we have grown from Nebraska and Manitoba seeds were wholly uninjured and are now laden with fruit. The third type is the Utah Hybrid cherry, which wholly escaped injury and which is now bearing a very heavy crop of fruit. This cherry is a hybrid of *Prunus Besseyi* and *Prunus Watsoni*. The latter is the sand plum of Nebraska. A small bush of it, growing with the above cherries, was practically uninjured.

NUTS.— Spanish and Japanese chestnuts were set in the spring of 1889, in a protected location. They were from a northern nursery. The Spanish have been killed back by every winter, sprouting out from the trunk or the crown each year. Last winter they were killed to the ground.

The Japanese chestnuts have stood fairly well, although they are not fully hardy. The trees are now only eight feet high, however, because of the killing back of the leading shoots nearly every winter. They are well branched and broad-headed, but look as if they would always be weak and poor trees.

The European or English walnut rarely escapes winter injury at Cornell. Last winter the branches froze back a foot or two.

The filbert (variety known as Prolific Cob) lost all its fruit buds and male catkins, and the young growth froze back severely.

The Japanese walnut (*Juglans Sieboldiana*) passed the winter without injury and is now in full bloom.

VIII. CRIMSON CLOVER IN ORCHARDS.

The experience with crimson clover in western New York is now sufficient to show that it is capable of enduring the winter under favorable conditions, but that the failures are quite as numerous as the successes. It is probable that we have not yet learned just how to grow it. Yet even now, there appears to be as uniform success with crimson clover sown in July and August as there is with the common red and mammoth clovers sown at the same time.

There are certain misapprehensions respecting crimson clover which I desire to correct. In the first place, we recommend it only for orchards, not as a forage or hay crop. The common clovers, sown in the spring, are much more useful in the general farm rotations. This crimson clover is an annual and is capable of living over winter. It may, therefore, be sown after the summer cultivation is done, and afford some benefit to the land at a time when the trees are comparatively quiescent. The various uses of crimson clover in the orchard are discussed at some length in our Bulletin 102. Persons err in looking for a too heavy stand of crimson clover. It must not be expected to give the amount of herbage which the ordinary clover seeding does. Even a thin covering, if it passes the winter, is very useful in improving the conditions of the land; and a good fall stand which wholly kills out during the winter is also worth the growing upon the greater part of our fruit lands. We are convinced that crimson clover has come to stay, but we are equally convinced that it is unwise to rely upon it year by year for a cover crop. It will find its place in a judicious alternation of cover crops, the particular alternation to be determined by every farmer for himself.

Crimson clover is often sown too late. We think that the last week in July or the first week in August is as late as it can be sown with safety in the average year. If sown later, it obtains too little root-hold; if sown in June, it becomes too ripe before winter. The latest sowing which we know to have successfully passed last winter was made for us in a nursery at Dansville (by F. M. Hartman) on the 17th of August. Upon the drier portions of the area, the stand was very poor, but in the moister places it made an excellent show this spring. Mr. George A. Sweet, of Dansville, sowed a large area upon the 8th of August. In parts of the field there was an excellent stand this spring, but in large portions of it there was none. There are many experiences like this, and most of them are traceable to a poor catch of seed in the fall. What agencies underlie these poor catches it is difficult to determine, but they are probably such as are associated with the mechanical preparation of the seed-bed, and are undoubtedly of the same kind as those which are responsible for so many poor stands of common clover.

We made an experiment last year upon crimson clover upon hard clay land, sowing it at four intervals, July 25, August 14, August 29 and September 9. Only the first sowing passed the winter. The details of the experiment are as follows:

A strip of land in the Cornell pear orchard was sown to crimson clover July 25, 1895, the seed being harrowed in. A second sowing was made August 14; a third, August 29; and the fourth, September 9. At the time of the third sowing the soil, which is a heavy clay, was in excellent condition; it was moist and well pulverized, while the first two lots of seed did not have equally favorable conditions. The stand from the first sowing was fairly good during the latter part of August, the plants being from one to five inches high. The growth in the moister parts of the plat was the most vigorous. Seedlings from the second sowing were also slowly appearing, but not uniformly.

When the last sowing was made September 9, the plants of the first lot stood from one to eight inches high; the strongest growth was made by a few plants upon the more moist soil. The plants of the second lot were from one to three inches high, only a few, however, measuring the greatest height. Most of the plants were small, and the growth was weak. The seed leaves were appearing upon the third plot, and a few plants, again in the more moist places, had each produced a true leaf.

Notes taken October 18 show that the plots differed greatly. The plants from the first sowing averaged about six inches in height in the more favorable spots, and they covered the ground thickly, the remainder of the plot having fewer and smaller plants, some spots being entirely bare.

The stand of the second plot proved to be fairly good, but the plants were all small, those in the drier places being not more than an inch or two in height, while in the most favorable places the average height was scarcely over four inches.

The growth upon the third plot was unexpectedly poor considering the favorable circumstances under which the seed had been sown. Only a few seedlings had survived, and these were small and very spreading, in this respect resembling those which were making a poor growth in plot 2.

The fourth sowing, made September 9, showed a better stand of plants, and the growth had been so rapid that they fully equaled in size those of plot 3.

Such was the condition of the plots when winter set in. A slight growth was made late in the fall, but no material change took place in the appearance of the plants. But in the spring of 1896 the effect of the winter was very plainly to be seen. April 17, all the plants which were growing in the dry places of plot 1 had been killed, as well as those whose roots had been exposed more or less by the wash of water during rain; these probably suffered from drought when the land began to dry, and were consequently unable to withstand the cold of the winter or of early spring. In uniformly moist places fully 90 per cent. of the original stand passed the winter in good condition, and growth was vigorously continued as the weather became warmer.

In plot 2 apparently not more than 1 per cent. lived through the winter. One place, much favored by uniform conditions of moisture, contained many small but healthy plants; the remainder of the plot was almost totally bare.

Plots 3 and 4 showed no trace of the presence of crimson clover. Every plant appeared to have been destroyed, and only the bare soil and an occasional weed were visible.

Experiments made, partially under our supervision, by T. G. Yeomans and Sons, well known fruit growers at Walworth, Wayne County, are reported below. These plots were upon good dark orchard loam, which is in a good state of cultivation, and the test was in every way as fair as we could wish to have tried. The season, of course, was exceptional.

"*Plot No. 1.*— Early in May we sowed a plot of crimson clover which was in bloom July 29th, after having been cut back to cut off the weeds growing with it. The clover on this plot was all dead this spring.

"*Plot No. 2.*—June 23, 1895, sowed three strips in orchard, one each of crimson, medium red, and alsike. The seed was harrowed in by a Breed's weeder, and rolled. We had a fine shower the day previous. It came up quickly, and on September 4th, the crimson had a few blossom heads. At this time the red and the crimson were about the same size, and covered the ground. The alsike was only about half as large as the other two. All of these plots had a good deal of barnyard grass at this date, while that sown one month later had none, and was quite free from all weeds. The crimson clover of this plot is all dead in the spring of 1896, while the red and alsike are about the same size, and both cover the ground nicely.

"*Plot No. 3.*—July 16, 1895. Sowed three and one-half acres of crimson clover in orchard. It came up quickly and covered the ground completely, and was admired by all. Much of it was killed during the winter, although it was in a sheltered place where the snow did not blow off. The ground was rather low. It was plowed under about May 15, 1896, leaving the ground in finer and better condition than we have ever seen it on that plot.

"*Plot No. 4.*—July 16, 1895. Sowed three more strips of the three clover orchards, as in plot No. 2. This all came up well, and did not have weeds growing in it, as did plot No. 2. In the spring of 1896 the strip of crimson is nearly all killed, while the red is as large as the red of plot No. 2, and the alsike about half as large.

"*Plot No. 5.*— On July 18th, plowed under five acres of stubble in open field, after cutting off a crop of hay. Sowed it all to crimson clover, which came up quickly and covered the ground well before winter. This spring it was in fine condition and covered the ground completely, except a small strip through one side, where the snow had evidently been blown off from a ridge. This plot is located on the east side of a large piece of woods, which shelters it from the west winds, which are our prevailing winds. This plot was plowed May 11th this year and planted to corn.

"*Plot No. 6.*—August 17th. Sowed three more strips in orchard similar to plot No. 2, but a shower, just as we were finishing the harrowing, prevented our rolling it. Neither of these strips grew in the fall of 1895, and it is apparently a failure.

"As the result of our experiments last season with these clovers, we will not sow any more crimson on any large scale until we have experimented further with it, but will try medium red, sown in our orchards about June 15th to July 20th. Our objects will be to secure a covering for the ground during the latter part of the summer, fall and winter to improve the mechanical condition of the soil, and to add fertility. Our intention would be to plow under the clover in May and June following. We refer to orchard purposes entirely. We think the red is worthy of further experiments, and would advise others to try it for themselves. We have long felt the need of something which will give us the results we have attained the past season with the red clover, and if results are generally as satisfactory as they have been this time, we will be satisfied;" but we are not yet ready to give any final opinion upon the question.

L. H. BAILEY.

BULLETIN 118—July, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

CHEMICAL DIVISION.

FOOD PRESERVATIVES

AND

BUTTER INCREASERS.

By Geo. W. Cavanaugh.

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Board of Control—The Trustees of the University.

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

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118. Food Preservatives and Butter Increasers.

Food Preservatives and Butter Increasers.

The subject of the preservation of articles of food against decay is one of no little importance. Decay or fermentation is known to be due to the action of living germs or ferments. If in any way these germs can be destroyed or their development prevented, without any change in the food product itself, it seems possible that food might be preserved almost indefinitely.

Two conditions that are absolutely necessary for the growth and multiplication of these germs are a moderate temperature and moisture. The methods most generally used for the preservation of food aim to destroy these germs by depriving them either temporarily or permanently of one or the other of these conditions. These methods may be grouped as follows:

1st. Those depending upon the use of heat for the destruction of the germs and subsequent sealing to exclude other germs. This principle is illustrated in the process of canning fruits and vegetables.

2d. Those depending upon the use of cold to prevent the multiplication of the germs for lack of sufficient heat. An example of this is found in our extensive systems of cold storage.

3d. Those in which the food product is dried in order that the germs present may not multiply for lack of sufficient moisture. The production of evaporated fruits illustrates this principle.

Where it is impossible to employ any of the above methods, or where their use might injure or destroy some desirable quality of the food resource is often had to the direct addition to the food of some substance that is detrimental to germ life. The familiar process of preserving meats, especially pork, by salting illustrates this class. There seems to be little or no objection to the use of foods preserved by any of the first three general methods, nor to this last provided that the substance added has itself no bad physiological effect. Besides common salt the following substances are often used: borax, boric acid, salicylic acid, benzoic acid, sulphate of soda, saltpeter and formalin. There is no doubt that they possess the power of arresting the action of germs, but there is some question about the advisability of the continued use of foods containing them. Inasmuch as there is some prejudice on the part of dealers and consumers against their use, frequent attempts are made to introduce preparations of these substances under new forms and names. Two of these preparations have been recently examined at this Station.

The first bore the name

"Preservitas, a Special Cream Preservative."

It is a fine white powder that dissolves readily in water. The following directions are given for its use: "Add $\frac{1}{2}$ oz. to one oz. of the preservitas to each gallon (Imperial) of cream, according to the length of time it is desired to keep it fresh. The smaller proportion will keep cream sweet and with full flavor for a fortnight, and the larger proportion for a month if the cream is quite fresh at the time of the addition. It is advisable to make a paste of the preservitas with a little of the cream, rubbing it into the cream, and then to add the paste to the bulk of the cream.

Note: This preservative is suitable for cream only.

(Signed) The Preservitas Co.,
Managers Burton, Baker & Co.,
110-112 Southwork St.,
London, S. E."

An analysis showed that it contained 30 per cent. borax, a small proportion of salicylic acid; the remainder was sugar. Its preserving power is due, of course, to the borax and salicylic acid. The sugar helps to bring the borax into solution, as borax has the peculiar property of dissolving more readily in water containing sugar than in water alone.

The second preparation is called

"Callerine, the Ideal Food Preservative."

It is a colorless liquid having a disagreeable pungent odor. It is a little heavier than water. The following are some of the recommendations and directions which accompanied the sample: "Callerine is efficient, *cheap* and reliable. One ounce of callerine is equal to one pound of salicylic or boracic acids. Not only is callerine harmless to human life, but when any article of food which has been treated with callerine is cooked, the callerine is completely eliminated by the heat.

General Directions.

For Milk:—Add 1 ounce (2 tablespoonfuls) Callerine to 14 gals. milk. This will keep it three days at a temperature of 75° F. For longer keeping or warmer weather, use more Callerine.

A solution of 2 ounces of Callerine to 1 quart of water will be found an efficient wash for preserving meat, poultry, game, fish, vegetables, etc. Articles should be carefully washed with the above solution, or, better still, allowed to remain in solution for a few minutes.

Price: Gallons, $6.00.

We are putting up a Special Working Sample (16oz.) which we will forward on receipt of $1.25.

(Signed) Callerine M'f'g. Co.,
44 North St.,
Philadelphia, Pa."

An analysis showed it to be a 7 per cent. solution of formalin, or formic aldehyde. Formalin is the name under which this substance is ordinarily sold, while formic aldehyde is its strictly chemical name. The use of two names for the same substance may be sometimes misleading, but in this case the two names are used similarly to the terms blue vitriol and copper sulphate. Blue vitriol is the common commercial name while copper sulphate is the chemical name for the same substance. Formalin is at present much used as a germicide and general antiseptic and preserving agent. It is sold as a 40 per cent. solution and quoted at $.60 per pound.

There is no doubt that formalin is a most effective preserving agent. Prof. R. T. Thomson (*Analyst*, xxi, p. 65) shows that it is more effective than boracic acid, borax, salicylic or benzoic acids. According to his experiments 17½ grains per gallon kept milk sweet 11 days.

The 40 per cent. solution of formalin has a specific gravity of 1.080. Since a gallon of water weighs about 8 1-3 lbs. a gallon of the formalin weighs 8 1-3 times 1.080, or 9 lbs. At $.60 per lb. a gallon of this 40 per cent. solution costs $5.40. From one gallon of the 40 per cent. solution 5 5-7 gallons of a 7 per cent. solution can be made. Therefore the difference in cost between formalin bought as such and callerine at $6 per gallon is:

1 gal. formalin..............................	$5.40
5 5-7 gal, callerine at $6 per gal.............	34.28

If bought in the Special Working Sample (16 oz.) at $1.25 the difference in cost is:

1 lb. formalin	$.60
5 5-7 lbs. callerine at $1.25....................	7.14

Or in other words $34.28 and $7.14 are asked, respectively, for $5.40 and $.60 worth of formalin. By purchasing the original material at $.60 per lb. and adding water at the rate of 4 4-7 lbs. to each pound of formalin a solution of the same strength as callerine is obtained.

As to the effects of formalin on digestion Prof. R. T. Thomson in the article above referred to quotes from Dr. Leffmann " Processes of digestion are allied to processes of decomposition, in so far that the latter are frequently preceded by transformation under the influence of ferments. We may infer then that whatever prevents putrefaction at least delays digestion." While there is no evidence that evil effects have followed from the use of such small quantities of formalin as are necessary to preserve milk, it seems advisable from Dr. Leffmann's statement to be cautious about its use in any considerable quantity.

It would seem unwise to endanger the healthful condition of the stomach and diminish the digestibility of cream and milk, naturally rated among the most digestible food products. That milk and cream treated with formalin are injured, is not founded upon theory but upon facts. Digestion experiments have been made upon milk with and without the presence of formalin. In the cases so far reported the milk containing the formalin required a longer time for digestion than that which contained no formalin. Furthermore, the behavior in the Babcock test of milk which had been preserved by formalin shows that its composition is in some way affected. Ordinarily, the curd of milk is dissolved by the sulphuric acid that is used in this test. Where formalin is used the curd often fails to dissolve and becomes a compact mass. If this preservative can so alter milk that sulphuric acid may fail to dissolve its curd, is it not at least probable that the action of the gastric juices of the stomach may be rendered less effective?

CHASE'S BUTTER INCREASER.

Agents have been busy throughout different parts of the State attempting to introduce the above named substance. It was guaranteed to bring about an increased yield of butter in churning. A sample of this substance was examined at this Station. It was a liquid having the general appearance of vinegar and a slight odor of oil of wintergreen. The label bore no name of the firm manufacturing it nor any address showing where it might be obtained. It guaranteed to double the yield of butter from cream if added in small proportions to the cream before churning.

It was a 25 per cent. solution of acetic acid, which is the acid of vinegar, and a small amount of salicylic acid. (Salicylic acid is a constituent of the oil of wintergreen.)

The action of acids on milk is to curdle the casein. This is shown in the souring of milk itself when lactic acid is formed from the milk sugar; or by adding vinegar or other acids to milk. Hence it is plain what the effects of Chase's Butter Increaser would be. The acetic acid would curdle the casein which would become mixed with the fat, and yield a product that would be neither good butter nor poor cheese.

A second article of an even more fraudulent nature has also been sold by agents. It goes under the name of "Gilt Edge Butter Compound." It guarantees to make two pounds of butter from one pound of butter and a quart of sweet milk. In general the directions were to warm the butter until soft, mix in the milk and add as much of the compound as could be placed on a one cent piece and mix all together. The resulting butter (?) will weigh two pounds. This "Gilt Edge Butter Compound" is a mixture of about equal parts of alum and soda with a little pink coloring matter. It was sold in ounce packages for $1.

These substances would act in a similar way to the acid in the "Increaser," *i. e.*, by incorporating the casein and also a considerable amount of water with the cream. This incorporated casein furnishes a medium for the growth and multiplication of millions of organisms. It is to remove this casein and so get rid of these germs that butter is so carefully washed.

While the food preservatives may have some valuable uses, as keeping milk samples for composite tests, there is absolutely no excuse for "Butter Increasers" in an honest community. They are fraudulent in that they pretend to teach the producer how he can get more butter from cream than there is in it. They promote dishonesty by throwing in the way of an unscrupulous producer a means of defrauding his customers; and worse than all, the use of these "Increasers" is an attempt to put on the market a product which not only cheats the producer but may possibly endanger the health of the consumer.

GEORGE W. CAVANAUGH.

BULLETIN 119—August, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

THE TEXTURE OF THE SOIL.

"Men of the greatest Learning have spent their Time in contriving Instruments to measure the immense Distance of the Stars, and in finding out the Dimensions, and even Weight of the Planets: They think it more eligible to study the Art of plowing the Sea with Ships, than of Tilling the Land with Ploughs; they bestow the utmost of their Skill, learnedly, to prevent the natural Use of all the Elements for Destruction of their own Species, by the bloody Art of War. Some waste their whole Lives in studying how to arm Death with new Engines of Horror, and inventing an infinite Variety of Slaughter; but think it beneath Men of Learning (who only are capable of doing it) to employ their learned Labours in the Invention of new (or even improving the old) Instruments for increasing of Bread."—*Jethro Tull.*

By L. H. Bailey.

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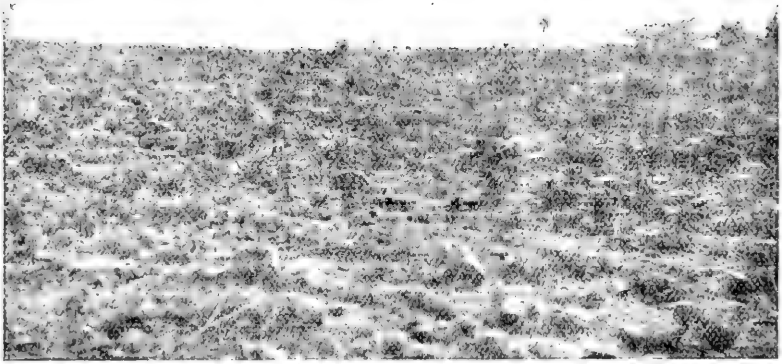
117. Fruit Brevities.
118. Food Preservatives and Butter Increasers.
119. The Texture of the Soil.

CORNELL UNIVERSITY, ITHACA, N. Y., *August* 1, 1896.

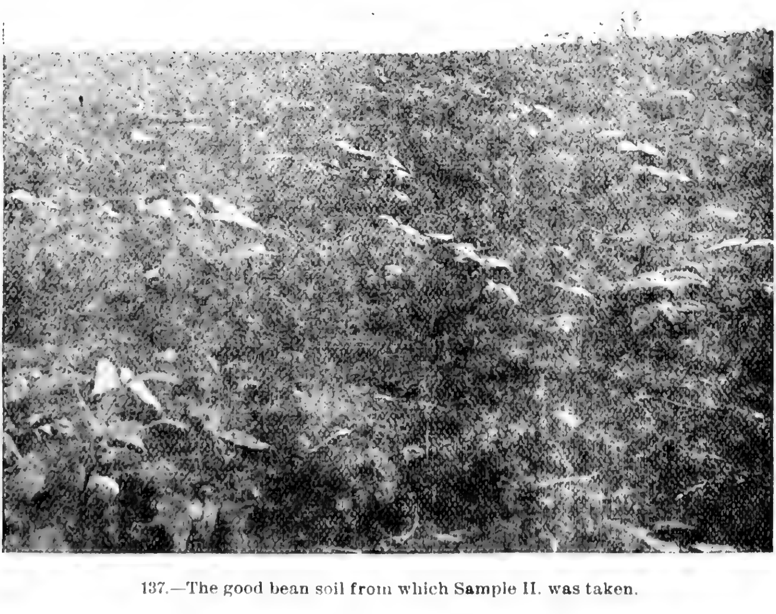
The Honorable Commissioner of Agriculture, Albany:

Sir.—This bulletin and its successor (No. 120) are designed to inaugurate a new type of experiment station publication. They are written for the purpose of giving their readers a few simple and primary lessons in some of the most fundamental subjects connected with the cropping of the land. It is hoped that they do not contain a single new fact. It is their sole ambition to teach, not to discover or to record. The writers hope that they may be used as texts in horticultural societies, granges and farmers' clubs. It is wished that they may inspire some persons to read further into the subjects, and especially that they may suggest the reading of King's book upon "The Soil," from which the bulletins themselves have heavily drawn. These bulletins are published by the State appropriation which was given, (chapter 437, Laws of 1896), in part, for "disseminating horticultural knowledge" in the Fourth Judicial Department of the State. We expect to use them in the schools of horticulture which are to be held under the auspices of this State grant. If the simple principles which they attempt to enunciate were to be clearly apprehended by our farmers, all the money and effort expended in experimentation in this State would be many times repaid.

L. H. BAILEY.



136.—The unproductive clay from which Sample I. was taken.



137.—The good bean soil from which Sample II. was taken.

The Texture of the Soil.

The other day I secured one sample of soil from a very hard clay knoll upon which beans had been planted but in which they were almost unable to germinate, another sample from a contiguous soil in which beans were growing luxuriantly, and as a third sample, I chipped a piece of rock off my house, which is built of stone of the neighborhood. All of these samples were taken to the chemist, Mr. Cavanaugh, for analysis. The area from which I took the hard and unproductive clay (Sample I.), is shown in Fig. 136. The reader will not be able, I think, to discover any bean plants upon it, although the seed was drilled into it at the same time as in the soil which furnished Sample II. Fig. 137 shows the area from which Sample II. was taken. This area is only twenty feet removed from the other, and is of the same original formation, but it differs in being in a slight depression or "draw" and the soil is in a fairly fine degree of division. It is really a good bean soil. The samples of soil which were actually taken to the chemist are shown in Fig. 138. The rock (Sample III.) was hard limestone, known to geologists as the Tully formation.

The chemist reports as follows:

	Moisture.	Nitrogen.	Phosphoric acid.	Potash.	Lime.	Organic matter.
I. Unproductive clay	13.25	.08	.20	1.1	41	3.19
II. Good bean land	15.95	.11	.17	.75	.61	5.45
III. Lime rock	....	....	.08	2.12	2.55	....

In other words, the chemist says that the poorer soil—the one upon which I cannot grow beans—is the richer in mineral plant food, and that the rock contains a most abundant supply of potash and about half as much phosphoric acid as the good bean soil.

All this, after all, is not surprising, when we come to think of it. Every good farmer knows that a hard and lumpy soil will not grow good crops, no matter how much plant food it may contain. A clay soil which has been producing good crops for any number of years may be so seriously injured by one injudicious plowing in a wet time as to ruin it for the growing of crops for two or three years. The injury lies in the modification of its physical texture, not in the lessening of its fertility. A sandy soil may also be seriously impaired for the growing of any crop if the humus, or decaying organic matter, is allowed to burn out of it. It then becomes leachy, it quickly loses its moisture, and it becomes excessively hot in bright sunny weather. Similar remarks may be applied to all soils. That is, *the texture or physical condition of the soil is nearly always more important than its mere richness in plant food.*

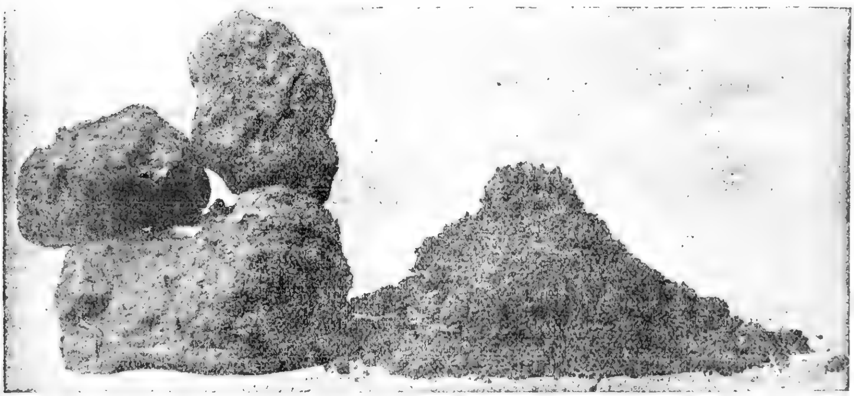
A finely divided, mellow, friable soil is more productive than a hard and lumpy one of the same chemical composition because:

It holds and retains more moisture; holds more air; presents greater surface to the roots; promotes nitrification; hastens the decomposition of the mineral elements; has less variable extremes of temperature; allows a better root-hold to the plant.

In all these ways, and others, the mellowness of the soil renders the plant food more available and affords a congenial and comfortable place in which the plant may grow.

The reader will now see the folly of applying commercial or concentrated fertilizers to lands of poor texture. He will see that if potash, for example, were applied to the hard lumps of Sample I. (Fig. 138), it could not be expected to aid in the growth of plants, because plants cannot grow on such soil. If the same quantity were applied to Sample II., however, the greater part of it would be presented to the roots of plants at once, and its effects would no doubt be apparent in the season's crop. The reader will readily understand that *it is useless to apply commercial fertilizers to lands which are not in proper physical condition for the very best growth of crops.*

The poor or lumpy soil contained a greater percentage of potash and phosphoric acid, no doubt, because, of the lack of humus in the sample. As it contains less organic matter, it therefore has less nitrogen than the good soil (Sample II.). Probably because of this less percentage of organic matter, this lumpy soil also contains less moisture than the other. As a matter of fact, however, these differences which the chemist found in the organic matter, nitrogen and moisture, are not sufficient to account for the very great differences in the productivity of the two soils. The chemical examination would have thrown more light upon the value of these soils if a determination had been made of the amount of potash and phosphoric acid which is soluble; but even then, the chemist could not have told, from analysis alone, how



138.—Sample I. Sample II.

valuable this land might be for any particular crop. Analysis does not show how agreeable or comfortable the land may be to the plants. There is sufficient potash in the rock (Sample III.), and even enough phosphoric acid, to grow a crop of beans; and yet, even if I add the nitrogen and water and make the mineral plant food soluble, I cannot hope to grow a crop on the walls of my house. In brief, *a chemical analysis of soil is only one of several means of determining the value of land, and in the general run of cases it is of very secondary value.*

How can the texture of lands be improved? In general, by three means—by judicious plowing and tillage, by the incorporation of humus, and by the use of underdrains. The value of simple tillage or fining of the land as a means of increasing its productivity was first clearly set forth in 1733 by Jethro Tull, in his "New Horse Hoeing Husbandry." The premises upon which Tull founded his system are erroneous. He supposed that plant roots actually take in or absorb the fine particles of the earth, and, therefore, the finer and more numerous these particles are, the more luxuriantly the plant will grow. His system of tillage, however, was correct, and his experiments and writings have had a most profound influence. If only one book of all the thousands which have been written on agricultural and rural affairs were to be preserved to future generations, I should want that honor conferred upon Tull's "Horse Hoeing Husbandry." It marked the beginning of the modern application of scientific methods to agriculture, and promulgated a system of treatment of the land which, in its essential principles, is now accepted by every good farmer, and the appreciation of which must increase to the end of time. These discursive remarks will, I hope, emphasize the importance which simple tillage holds in agricultural practice.

Farmers do not appreciate the importance of humus as an ameliator of land. In farm lands it is usually supplied in the form of green crops, stubble or sward, and barn manures. When humus is absent, sandy soils become too lose and leachy and hot, and clay soils bake and become lumpy. The different physical characteristics of our Samples I. and II. are largely due to the greater amount of humus in the good soil, and yet we have seen that the chemist pronounced the other soil richer in native plant food.

The writer has much of this hard, unproductive land, like Sample I. What is to be done with it? To cover it with commercial fertilizer would be of little benefit. It must first be put in fit condition for the growing of crops. A crop of clover plowed under would quickly improve it, but the land is newly planted to orchard and he does not care to seed it down. The next recourse is stable manure. Of this enough can be had to cover the hardest spots. For the rest, catch or cover crops must be used. Following beans or potatoes, he can sow rye and plow it under very early in the spring (see Bulletin 102). Now and then he can use a fall crop of sowed corn or oats, or something of the kind. After a time, he may be able to get the land in such a condition of tilth as to secure an occasional stand of crimson clover. This practice, continued judiciously for a few years, ought to radically change the character of the land; but all this will be of little avail unless the plowing and cultivation—which are now so inadequate—can be done in a timely and intelligent way. All this will take time and patience. He wishes that there were some short-cut and lazy way of improving this land by making some application of fertilizer to it, but there is not. The most he can do is to slowly bring it into such condition that it will pay to put concentrated fertilizers on it. In short, *the first step in the enrichment of unproductive land is to improve its physical condition by means of careful and thorough tillage, by the addition of humus, and perhaps by underdrainage. It must first be put in such condition that plants can grow in it. After that, the addition of chemical fertilizers may pay by giving additional or redundant growth.*

L. H. BAILEY.

BULLETIN 120—August, 1896.

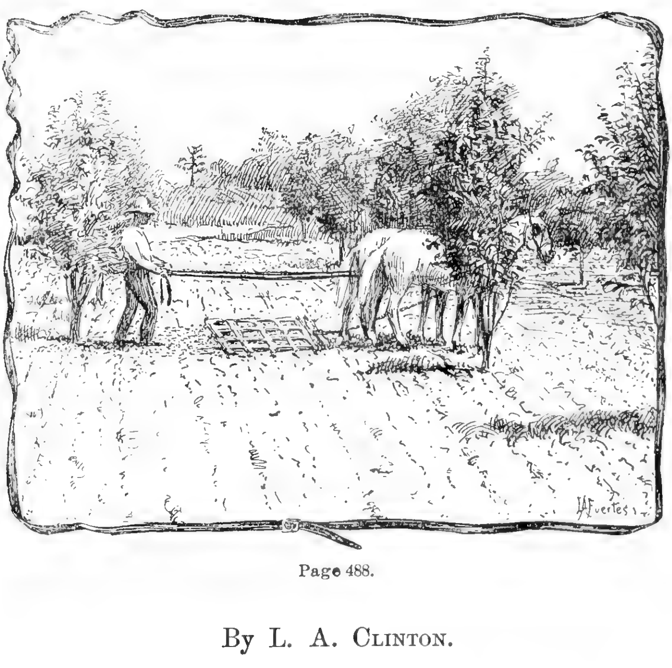
Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

AGRICULTURAL DEPARTMENT.

THE MOISTURE OF THE SOIL

AND ITS CONSERVATION.



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By L. A. Clinton.

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E. G. LODEMAN.. *Horticulture.*
L. A. CLINTON.. *Agriculture.*
B. M. DUGGAR.. *Cryptogamic Botany.*

Office of the Director, 20 Morrill Hall.

The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

THE LESSON OF THE DAISIES.

No one who has chanced to make a somewhat extended tour through the farm-lands of any part of the middle states during the last of June or the first of July can have failed to notice how large a fraction of the area was white for the harvest—a harvest not of grain, but of Ox-eye Daisies. Fields of buckwheat at the height of their bloom were never whiter than many lowlands which once were rich meadows, and many hillsides which once were rich pastures. The daisies are so prevalent and luxurious this year that a stranger might suspect that all the farmers had gone into the business of floriculture, but a few questions will soon dispel this illusion, for the growers of the daisies very rarely appreciate their beauty. It is a genuine and destructive invasion, and yet the daisies have not conquered the meadows; they have merely stepped in to occupy and possess the soil which the grass had abandoned. The worst of it is that the great majority of the tillers of the soil do not apprehend the true condition of things, and while they bewail the fate which forces them to harvest daisies instead of grain or hay, they do not realize the fact that they have invited the attack and encouraged the invaders.

Occasionally a farmer is heard to ask how these weeds can be killed, but he does not realize that if by some rapid process they could all be dispatched new legions would fill their places at once if the conditions which they enjoy remain. What farmers need to comprehend is that without some radical mistake in the management of their land the daisies never would have gained such a foothold. All plants, including weeds, settle and thrive where the competition for life is such that they can enter into it and prosper. A good stand of grass leaves no room nor any hope for weeds. It is not in well-tilled fields that Canada thistles flourish, but in neglected pastures and by the roadsides. In the contest with the best agricultural practice they cannot prevail. It is in the untilled plains of the west or in the tilled regions where there is mile after mile of plowed land producing only eight or nine bushels of wheat to the acre year after year, without any rotation, where the Russian thistle is a natural and inevitable intruder.

The remedy for weeds is to keep the land busy with a good crop on it, and this means that the farmer must give persistent and connected thought to his business. If the daisies crowd out the grass, it is because the meadow has been neglected and the grass has begun to fail, and wherever there is a vacancy by the failure of the grass every enterprising weed finds a rightful opportunity to establish itself. If the farmer asks, therefore, what will kill the daisies, there is one answer; better farming. Weeds find nourishment and a home wherever there is waste ground, which means ground not properly occupied. Widespread areas of daisies, buttercups, wild carrots, mustards and the like are, therefore, the types and measures of the prevailing ignorance of farmers respecting the very fundamental principles of their calling. The one good thing that weeds can accomplish is to prove by their presence that there is a weak point in the established system of agriculture: the only way to turn their visits to advantage is to heed this instruction by revolutionizing farm practice and organizing some profitable rotation which will exclude them.

If farmers cannot interpret the teachings of the weed it certainly would be advisable for the agricultural experiment stations to help them in this particular. The existence of these invaders means that what the farmers of these states primarily need is more instruction in fundamental matters concerning the handling of their land. We are glad, therefore, to see that many of the stations are turning to this subject, and that they are doing more than merely furnishing botanical descriptions of the various noxious plants. The Cornell Station, for example, in a bulletin entitled Reflections Upon Weeds, gives some sound primary instruction in agricultural science. It is to be hoped that both this station and others will continue work of this sort even if they forego to some extent experimentation in higher fields. So long as the farmer needs elementary teaching it ought to be furnished to him, even if it takes the time of officials who ought to be searching for scientific truth. A late bulletin of the Geneva Experiment Station upon the principles which underlie the application of commercial fertilizers deals with the simplest matters, matters with which every intelligent farmer ought to be familiar, and yet there is no doubt that every word of it is needed. The time may come in America, as it has come in some older countries, when the common schools instruct children in the principles of agriculture—so that in fundamental points of practice the ordinary farmer will know what to do, and will be able to tell why he does it. Until that day arrives every effort to increase his knowledge of principles deserves encouragement.—*Editorial in Garden and Forest, July 22, 1896.*

The Honorable Commissioner of Agriculture, Albany:

Sir.—This expository bulletin is submitted, as explained in the prefatory note of Bulletin 119, for publication under Chapter 437 of the Laws of 1896.

L. H. BAILEY.

The Moisture of the Soil, and Its Conservation.

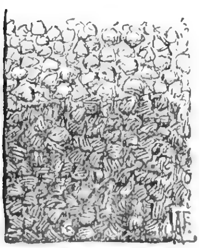
The conservation of soil moisture is one of the most important problems presented to the farmer and gardener. Hardly a season passes in which some important crop is not reduced in yield from twenty-five to seventy-five per cent. because of lack of sufficient moisture to bring it to maturity. The soil may have been put in proper condition, plant food may have been supplied in the form of fertilizers, and all other conditions may have been favorable for the development of a full crop, yet with the supply of moisture deficient all this labor and expense count for little or nothing. The questions, therefore, arise, "To what extent can the amount of soil moisture be controlled?" "Is it possible to do anything to save crops from the oft-recurring droughts?"

The insufficient water supply is not due to lack of rainfall, but to its unequal distribution. The average annual rainfall in New York for the last seventeen years is 34.31 inches. The lowest rainfall ever recorded in the state was in 1879 when only 19.74 inches fell. In 1895 there was also a deficiency, only 28.66 inches being recorded. In the arid portions of Kansas, a rainfall of 20 inches which is well distributed, is reasonably sure of making a good crop. The loss there by surface drainage is, however, very slight, it being estimated at not more than ten per cent. or about 2 inches, leaving 18 inches for crop growth. In New York, with a rainfall of from 34 to 40 inches, nearly one-half passes off by surface drainage and is lost so far as immediate plant growth is concerned. Not only is the water lost to the crops, but it carries with it much of the soluble plant food of the surface soil. This, then, would suggest one important step in the attempt to store up moisture. This surface flow of water must be prevented and caused to sink into the soil to supply a reservoir from which plants can secure moisture during the period of growth.

How the soil holds its water.

That a proper understanding of the question may be reached, it is necessary to have a knowledge of the conditions under which water exists in the soil, and of the part it plays in the mysterious operations of plant growth. Water may be in one of three forms, —as free, capillary, or hygroscopic water. The free water of the soil is that which flows under the influence of gravity. It is the source of supply for wells and springs. It is not directly used by plants and its presence in the soil within eighteen inches of the surface is detrimental to the growth of most cultivated crops. It is valuable, however, because it is the supply from which capillary water is drawn.

The capillary water does not flow by gravity. It is the direct source of moisture for plants. It may be either drawn upwards or it may pass downwards depending upon whether the soil is drier at the surface or below. In time of droughts, the capillary action of the soil may be sufficient to raise the water through a distance of five or six feet, its power in this respect depending directly upon its physical condition. If the soil is coarse and cloddy and the particles are not compact, then the water can not rise to take the place of that which is carried off by evaporation or used up by plants in their growth. If, however, the soil is fine, in good condition, and homogeneous, the water passes freely and continuously to the surface. Notice the track of the horse on the plowed ground, or the foot-print of the driver, and see how the moisture comes directly to the surface, because the soil has been compacted and there is intimate capillary relation between its particles. This moist surface shows that the water is passing off from it into the air. This observation should teach a lesson. The soil may be pulverized and made compact, but the capillary pores near the surface must be enlarged by tillage so as to break the capillary connections and stop the water in its upward course, and thus force it to pass off through the tissues of the plant. This loose surface stratum, two or three inches deep, is the "soil mulch" (Fig. 139) of which so much has been said



139.—The soil mulch.

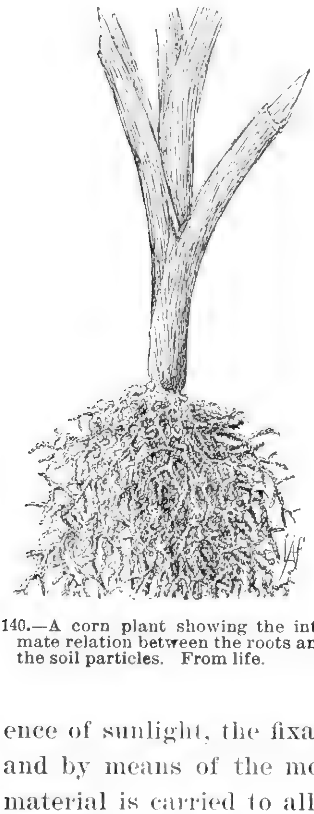
in recent writings. It is one of the most important means of preventing the loss of water from the soil. It breaks off the capillary pores in the soil structure and interposes between the lower moist soil and the air a layer so loose that the water can not rise through it. This mulch may itself dry to dust, but it nevertheless protects the soil below. When soils become baked, the minute capillary pores connect directly with the atmosphere and the evaporation of water is very rapid. Hence it is exceedingly important that the crust be broken after every rain.

The hygroscopic water of the soil flows neither under the influence of gravity nor capillarity. It is held firmly in place upon the particles of soil and can only be driven off by a high degree of heat. Just how important this water is in the growth of plants has not been determined, but it is probable that during severe droughts it may assist in carrying the plant over, enabling it to maintain itself until capillary action is restored.

The necessity of water for growing plants.

The importance of water to the growing plant can only be undestood when we apprehend and appreciate how large a part of its structure is composed of water, and that even this large percentage of its composition is but a fraction of the total amount used in its development. The quantity of water entering into the structure of plants varies from sixty to as high as ninety-eight per cent. of their total weight. During the entire period of growth, there is a constant giving off of moisture by the foliage, and it must be made good by that which is taken up by the roots. By experiments conducted at the Wisconsin Experiment Station, it has been found that in raising oats, for every ton of dry matter produced there were required 522.4 tons of water; for every ton of dry matter of flint corn there were required 233.9 tons of water; for dent corn, 309.8 tons of water for every ton of dry matter. On plots at this Station, 1.8 tons of dry matter of oats per acre represented an expenditure of 940.32 tons of water. Potatoes used 422.7 tons of water per ton of dry matter. The yield of potatoes on the experiment plots of 450 bushels per acre during the dry season of 1895 represented an amount of water equal to 1310.37 tons.

Just why so much water is required by the growing plant and how it obtains this supply is not usually understood. It has been the subject of considerable research and even now presents interesting problems for further study. The roots of the plant are its feeders and all of the water ordinarily used by it passes in through these channels. The particles of soil hold a film of water in firm contact. The roots and rootlets of the plant, in burrowing through the soil, come into intimate relation with these soil particles (Fig. 140). The finer the soil, the closer the relation estab lished between it and the roots. The The roots are thus surrounded by a thin film of water, a portion of which they are able to absorb. The water passes up through the tissues of the plant, carrying with it soluble plant food which is conveyed to the manufacturing or elaborating organs, the leaves. There, in the presence of sunlight, the fixation of carbon from the air takes place and by means of the movement of the sap the now organized material is carried to all growing parts of the structure. That part of the water no longer required passes off through the breathing pores of the leaf, called stomata. As evaporation is a cooling process, there is no doubt that this loss of water has an important influence in lowering the temperature of foliage and in promoting the fixation of carbon.



140.—A corn plant showing the intimate relation between the roots and the soil particles. From life.

As already stated, the plant roots can absorb food only in the soluble form, and the passage of a large quantity of water through their tissues is necessary to furnish the supply of mineral elements required by growth. Not only is a large quantity of moisture demanded for the direct use of the plant, but its presence in the soil is necessary in order that the plant food may be rendered available. Few soils are so lacking in fertility that they would not grow crops could the mineral plant food which they contain be unlocked and brought into fit condition for use. This important operation, as well as nitrification,— or the conversion of nitrogen compounds into the form of nitrates,—can proceed only in the presence of moisture. Crops plowed under for green manuring, and barn manures, can be made available only when there is sufficient moisture in the soil to cause breaking down and decomposition. With moisture in the soil, there is a constant movement towards the plant roots to restore the equilibrium, or to make good that used by the plant. This movement of the moisture brings to the roots the soluble plant food.

The living root itself has the power of disintregating and decomposing the particles of soil and of dissolving and extracting some of the plant food. This powerful action, by which the solid rock is broken down and its plant food liberated and by which even polished marble can be corroded, goes on only in the presence of moisture. Supply the plant with moisture, and its roots are able to set free from the particles of the soil a part of the mineral elements required for its growth. Supply even our sandy desert plains with abundant moisture and immediately they change from a desert to a garden.

An acre of soil to the depth of one foot weighs approximately 1,800 tons. If 25 per cent. of this is moisture, we should have 450 tons of water per acre. An acre of soil to the depth of eight inches weighs about 1,200 tons. If 25 per cent. of moisture were found here it would contain per acre 300 tons of water. Plants can maintain themselves with as low as 5 per cent. of water, but their growth seems to go on most rapidly in soils whose water content is from 13 to 25 per cent.

The conservation or saving of moisture.

The annual rainfall in New York is sufficient for the requirements of plants, could it be distributed or conserved during the growing season. The experiments conducted by the U. S. Dept. of Agriculture with a view to controlling the distribution of rainfall, proved that it was beyond control by any means known at present. Dependence must then be placed upon irrigation or conservation of moisture to overcome the disastrous effects of drought. In the arid and semi-arid regions of the West, where irrigation is successfully practiced, the problem is apparently solved, or is at least reduced to a mere matter of co-operation and cost. But in the Eastern states, entirely different conditions are met. To supply the enormous amount of water required for growing crops means an outlay of money entirely beyond the individual means of most farmers and gardeners. In the West where irrigation is practiced most uniformly, farmers are not required to take into consideration the possibilities of rain. They know that there will be no heavy downpour immediately after flooding their crops. But here there is no such guarantee, and to flood the fields by irrigation and have that followed immediately by a heavy rain might mean the entire destruction or serious injury of the crop. Although irrigating systems may be introduced in special cases, yet the great dependence, in this State, must be the rainfall and the conservation of the moisture of the soil.

The means by which moisture may be conserved are as follows:

By plowing and tillage,
mulches,
underdrainage,
lessening the influence of winds,
applications of lime, salt, etc.,
rotation of crops to increase humus,
adapting the crop to the soil.

Plowing to save moisture.—As already indicated, the first step in the conservation of moisture must be the preparation of the soil so that the rain will sink down and not be carried off by surface drainage. In many sections of the country, especially in the Southern States, the great bane to agriculture is the surface washing of the soil. Owing to shallow plowing and shallow cultivation, the water is unable to settle into the hard soil with sufficient rapidity and is carried along the surface, producing those gullies which are there so destructive to farm lands.

The improvements in the plow have done much towards remedying these defects, but there is still a large amount of ignorance as to the proper use of this implement. As an implement to be used in the preparation of the soil for the reception of moisture, it stands pre-eminent. Good plowing does not consist — as ordinarily supposed — in merely inverting a portion of the earth, but in pulverizing and fining it and burying the sod or refuse which may be on the surface. The amount of water which a soil is capable of holding depends directly upon the fineness of its particles. Then that plow which will break and pulverize the soil most thoroughly is the one best adapted to fit the soil for holding moisture. This point is well illustrated by King in his book on "The Soil." He says, "Since each independent soil grain of a moist soil is more or less completely surrounded by a film of water, it is evident that, other conditions being present, the largest aggregate surface area may retain the most water per cubic foot. Now, a cubic foot of marbles one inch in diameter possesses an aggregate surface of 27.7 square feet while if the marbles were reduced in diameter to one-thousandth of an inch, then the total area per cubic foot is increased to 37,700 square feet." From this it is evident that the total amount of water capable of being absorbed by a soil which is cloddy and lumpy is very slight in comparison with what it would be were it in a finely divided state; and not only is its absorbing power less, but its power of holding moisture is also greatly reduced. King found the rate of percolation from soils of different degrees of fineness to be as follows, the column of soil being eight feet in height:

TIME OF PERCOLATION.

SIZE OF GRAINS.	Per cent. lost in 1 hour	Per cent. lost in 2 hours.	Per cent. lost in 24 hours.	Per cent. lost in 48 hours.
.186 inch	9.10	10.45	13.05	13.52
.073 inch	7.95	9.47	12.31	12.72
.061 inch	6.22	9.21	11.71	11.53
.045 inch	1.76	2.83	7.64	8.44
.032 inch	1.28	1.91	5.83	6.79

This striking difference in the rate of percolation from soils of different degrees of fineness shows most forcibly the importance of thorough pulverization of soils to increase their water absorbing and moisture holding capacity.

A large amount of water is lost during the winter and spring months owing to the surface drainage of melting snows and heavy rainfalls. To prevent this loss, fall plowing should be extensively practiced, and where the subsoil is very hard and compact the use of the subsoil plow may prove most beneficial. Should the ground break up in clods, then it may be allowed to remain during the winter without harrowing to more thoroughly subject it to the beneficial action of the elements. But should the soil be in good mechanical condition, then some plants should be growing on it during the winter. The importance of keeping growing plants on the soil during the winter can hardly be overestimated. They serve to bind the soil, to take up the plant food which may be soluble and liable to loss by drainage. If these plants are plowed under in the spring, organic matter is added to the soil. In corn fields, wheat or rye may be drilled in without plowing and it will obtain sufficient growth to act most beneficially upon the soil during the winter and it may be plowed under in the spring, having served its purpose as a soil protector. The use of cover crops for orchard lands is fully discussed in Cornell Bulletin 102.

It should be said, however, that hard land which is bare or devoid of humus is very apt to become puddled or cemented during the winter if plowed in the fall. In such cases, all that is gained by fall ploughing is more than lost by this running together of the soil.

On land that has been fall plowed, work can begin in the spring several days earlier than on unplowed land. It should be the practice to stir the surface soil just as early in the spring as conditions will permit, that a soil mulch may be formed which will serve to prevent the escape of the water from below. On clay land it is of special importance that work be commenced early, and yet on account of its peculiar nature it is the slowest in drying out and the last to be plowed. This delay may mean the difference between a success and a failure of the crop. Clay soils, owing to their fine state of division and their tenaciousness, are but slowly permeated by water (Fig. 141).

141.—Clay soil, showing its impermeable character.

But once saturated, unlike sandy soil, it does not permit the water to pass off by percolation and must wait until the sun's rays and the winds have dried off the surface sufficiently to permit of its being worked. Then, to conserve the moisture, frequent shallow tillage should be given and crops should be sown before the water has become exhausted. The slow passage of the water towards the surface, by means of capilliary action, furnishes plants with moisture and insures a successful start, which is half the battle towards securing a successful crop. King found that the loss of moisture during seven days from April 29th to May 6th was 9.13 lbs. of water per square foot greater on the unplowed than plowed land, equal to a rainfall of 1.75 inches, or 198 tons of water per acre. Can it be afforded to thus delay the spring plowing and the preparation of the soil mulch? Then, the very evaporation is a cooling process and the soil, instead of becoming warm and of a proper temperature for the germination of seeds, remains cold and uncongenial as long as this wasteful process goes on. With sandy and gravelly soils the difficulty experienced in the spring is not so great. They are both permeable to water and furnish another means for its escape besides evaporation. The water passes off by percolation and the soil soon becomes warm and ready for the reception of the seeds. But moisture can be conserved better on clay lands than on sandy lands, because the loss occurs chiefly through evaporation. It is upon clay or heavy lands, therefore, that the value of the soil mulch is markedly apparent.

Harrowing to save moisture.—The harrow, besides pulverizing and fining the soil for the seed-bed, is most efficient in furnishing a soil mulch. The spring-tooth harrow is in reality a cultivator, and its action is similar to that of the cultivator. When used as an instrument to conserve moisture, the teeth should penetrate to the depth of about three inches, and to produce the best effect the ridges left by it should be leveled off by a smoother which can now be purchased as an attachment to the harrow. The tillage of orchards by the harrow is now practiced extensively, and nothing short of irrigation will so nearly meet the demands of trees for moisture, particularly upon the heavier soils.

The Acme harrow is a most excellent implement on soils which are comparatively free from stones and rubbish. The plow-like action of its blades serves to pulverize the surface soil, to spread the loose mulch evenly, and it leaves a most excellent seed-bed.

The cutaway or disc harrows may be either beneficial or of absolute injury. If the discs are so set that they cover but a portion of the surface with the mulch, they leave a ridge exposed to the action of the wind and sun, and the rate of evaporation is greatly increased. The discs should be set at such an angle that the whole surface shall be stirred or covered. Their chief value lies in their cutting and pulverizing action on clay soils, but as conservers of moisture they are inferior to the Acme or the spring-tooth. Soils which need the disc harrow should generally be gone over again with some shallower tool.

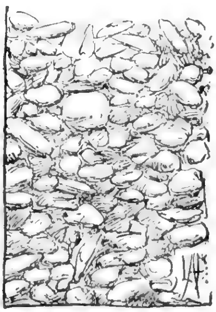
The mellower the soil the lighter should be the work done by the harrow. On most heavy orchard soils it will be found necessary to use the heavy tools, like the spring-tooth and disc harrows, in the spring, but if the land is properly handled it should be in such condition as to allow the use of a spike-tooth or smoothing harrow during summer. This light summer harrowing, as shown in the cut on the title page, should be sufficient to keep down the weeds, and it preserves the soil mulch in most excellent condition. With such a tool, and on land in good tilth, a man can harrow ten or more acres a day.

Cultivators and conservation of moisture.—The action of cultivators is not materially different from that of the spring-tooth harrow. The size of the teeth should be regulated by the work to be performed, a many small-toothed implement being preferable to a few large teeth, where the object is to conserve moisture. It must be borne in mind that in a dry time the less surface exposed the less will be the evaporation. If a large toothed-implement is used to destroy grass and weeds, then it should be followed by a smoother to reduce the ridges and prevent loss of moisture. Ridge culture is only allowable when the object is to relieve the soil of moisture on bottom lands where the water comes very near the surface, or for some special crops, where a high degree of warmth is required early in the season. In these cases it may be necessary to throw up ridges to produce the proper degree of warmth for germination, but even then the ridges should be slight. Nothing could be better calculated to dry out a potato field or a corn field than throwing the ground up in high ridges, leaving a large surface exposed to the action of sun and wind.

In fruit plantations which are in a proper state of cultivation, a small-toothed or even spike-toothed cultivator will be found sufficient to maintain the surface mulch.

The following figures show how much the use of the cultivator may do to save moisture: In our determinations of soil moisture we found, on July 1st, in a plot where 14,080 lbs. of green forage per acre had been cut from one-half of it but 6.73 per cent. of moisture, while on the open cultivated space between plots, within five feet from where the other sample was taken, 10.54 per cent. of moisture was found. July 6th samples were again taken. The percentage of moisture in the standing oats was 4.07, and in the open cultivated space 13 per cent. This clearly illustrates the difference in the amount of soil moisture retained by frequent surface tillage compared with that which is found where a crop of grain covers the soil.

The roller in its relation to soil moisture is an implement whose value depends largely upon local conditions. There is no tool which requires more judgment as to its proper use. On light, loose sandy or gravelly soils, where every effort must be made to solidify and pack the particles closely together, the roller must be used repeatedly. The difficulty of such soils is that the spaces between the grains are so large that the water is permitted to pass through freely and is lost by percolation. The capillary openings are so large that there is very feeble rise of the water to take the place of that used by plants and lost by evaporation (Fig. 142). The roller lessens the size of these pores in solidifying the soil and the capillary force is then strong enough to draw the water to the surface (Fig. 143). If,

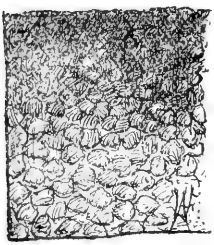


142.—Coarse gravelly soil, showing its loose structure.

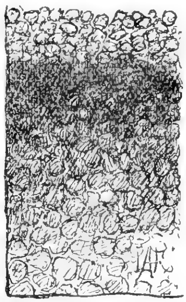
now, the soil is left in this condition, it has been put in the best possible form for parting with its moisture, and it will take advantage of the opportunity unless prevented by establishing a surface mulch. In seeding land in a dry time the soil should be rolled in order to bring sufficient moisture to the seeds to insure germination. Where circumstances will permit, the roller should be followed by a smoothing harrow that the surface mulch may be restored and the moisture stopped before reaching the atmosphere (Fig. 144). On clay lands the roller must be used with much caution. If used immediately after grain is sown, and a heavy rain following, there would be danger of the soil becoming so compact on the surface that the tender shoots would be unable to get through, and the most direct connection would be established between the soil moisture and the air. A good method of treatment for clay is to roll before the seed is sown, then harrow and make a good seed-bed, and then drill in the grain. After the plants are well up the roller may be used again, which will bring the water to the surface, where the growing plants can make use of it before it passes off by evaporation.

Herbage mulches.—The covering of the soil by a mulch of leaves or decaying vegetable matter is nature's way of conserving moisture and of restoring fertility to the soil. Go to any forest where the leaves have not been burned annually and notice the mulch which covers the soil (Fig. 145). The soil will be found to be moist and loose. Humus has been stored up and the covering of leaves prevents the escape of the moisture by surface evaporation. Many persons conclude that because nature tills by mulching, man should do the same, but the conclusion is fallacious. Farm areas are too open and to much exposed to searching winds to allow of the good results which nature obtains in the seclusion and coolness of the forest. Even our largest orchards do not give us forest conditions. This herbage mulch also induces shallow rooting of trees, as sod land does (see Bulletin 102). In most farm lands, also, it is necessary to plow or move the land at least once a year in order to sow the seed and harvest the crop, and this would destroy an herbage mulch. Aside from all this, it is impossible, except in very special cases, to secure sufficient herbage to afford an adequate mulch.

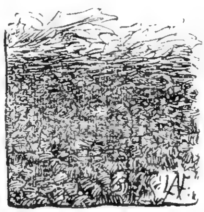
The humus of the soil is the great store-house for nitrogen and moisture. It is the accumulation of decaying vegetable or animal matter, and its presence in the soil, while not absolutely necessary to the growth of plants, is the factor which makes the land congenial for the very best development of the crop. The constant use of commercial fertilizers, without being supplemented by barn manures or green manuring, will so reduce the percentage of humus in the soil that its water-holding capacity will be considerably diminished. This humus should be liberally supplied by means of cover crops, rotations, and stable manures.



143.—Showing the effect of the roller in compacting the surface layer.



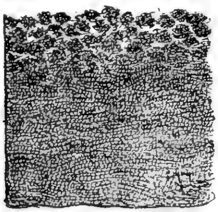
144.—Showing how the soil mulch should be restored by tillage after the roller has been used.



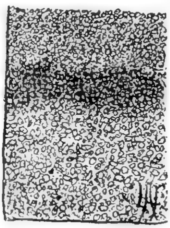
145.—The loose mulch on forest soils.

Underdrainage and how it acts as a conserver of moisture is popularly misunderstood. It is usually supposed that underdrains, instead of acting as conservers of moisture, produce exactly the opposite effect. It has already been noticed that water may exist in the soil as free or capillary and that the presence of the free water within eighteen inches of the surface is positively detrimental to the growth of most cultivated plants. Not only is it necessary that moisture be supplied, but also that the soil shall be in such condition that the air may have access to it, for a supply of oxygen is necessary to the breaking down and decomposition of organic matter and the making of plant food available. The underdrain removes only the free water which may come too near the surface and it leaves the soil above in a porous condition, so that the water of rainfall may sink down instead of being carried off by surface drainage. This rainfall water is not caught and removed by the drains in its downward course, but the drainage flow begins only when, by the accumulation of the rainfall the level of the free water has been brought up to the level of the drain. Thus the reservoir for the supply of capillary water is kept nearer the surface during a drought and is removed a proper distance from the surface during a wet time to insure a healthy and proper development of the roots of plants.

Mineral substances as conservers of moisture.—Among the materials of commerce which are applied to soils as indirect fertilizers, are lime, gypsum and salt, all of which are thought to act as conservers of soil moisture. The application of quick lime to certain soils has been found to have a most beneficial action. When used upon a heavy clay it causes a certain adhesion or



146.—The flocculation of the surface of clay soils by the addition of quick lime.



147.—The action of lime, at a few inches in depth, in sandy soil.

flocculation, a binding together of the minute particles, and prevents their running, at time of rains, into a compact, hard crust (Fig. 146). It causes a more granular condition, making the soil looser and more porous, allowing the water of rainfall to permeate it more readily. As a result of flocculation, the pores of the soil near the surface are enlarged, and it thus better serves the purpose of a mulch to hold in reserve the moisture underneath.

On sandy soils the difficulty in conserving moisture arises from the fact that they are so open and porous that the water passes through and is lost to the plant. It would seem that an application of lime here would tend to aggravate the difficulty. On clay, the action of the lime takes place at or near the surface, the soil being so compact that it is not washed down through the soil. In sand, the pores are so large that the lime sinks readily into the soil, and instead of finding the effects of its application at the surface we must look for it below. The binding property of lime is well known from its use in the trades. In its passage down through the particles of sand, it does not proceed far before it probably begins to bind the grains together, and there is formed a layer somewhat impervious to water (Fig. 147).

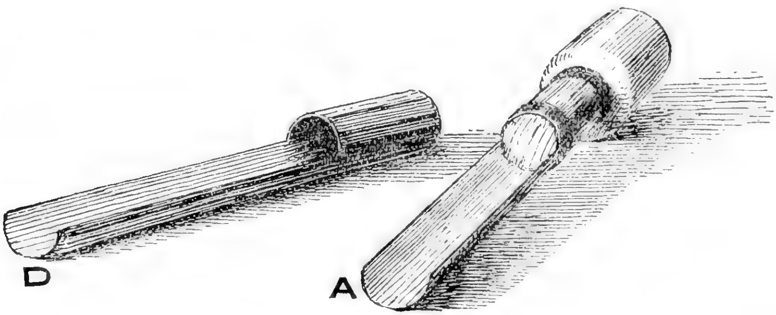
Frequent and small applications of lime have been found most beneficial. From twenty to forty bushels per acre will usually be found to give the best results. On marshy and boggy lands which have recently been drained, but still remain sour and full of undecomposed organic matter, the benefit derived from applying lime is very great. It breaks down the vegetable matter, neutralizes the acid and makes plant food available. In this case, its action upon the plant food in the soil is more important than its agency in the conservation of moisture.

Windbreaks to save moisture.—The drying effects of the wind are well known, when it has unbroken sweep over a farm. The loss of moisture from this cause is very great. Windbreaks are not only a protection in winter, but they serve equally well in summer to protect the fields. The hedge-row around a field is not, then, entirely useless, since it serves its purpose as a conserver of moisture. (See our Bulletin IX.)

Selection and management of crops in relation to soil moisture.—Crops should, as far as possible, be adapted to the conditions best calculated to furnish them with a sufficient supply of moisture. The grasses and grains thrive best on loamy or clay soils where the moisture is held and not allowed to pass away by percolation. On sandy and gravelly soil crops should be grown to which frequent culture can be given, for in this way we may aid in bringing water to the reach of plants. On sandy soils so treated, some catch crop should be grown which can be plowed under for green manure, thus serving to keep up the humus of the soil. The practice of growing crops, especially grains and grasses, in an orchard, cannot be too strongly condemned. (See Bulletin 102.) The soil should be left bare in early summer, not only that we may harrow and cultivate and thus conserve moisture and set free plant food, but because the loss of moisture from the growing grain crop is so great as to deprive the fruit trees of the amount necessary for their use. Crop an orchard only for the purpose of green-manuring. If nitrogen is needed, then crimson clover or common clover may be sown and allowed to remain as a covering for the soil during the winter and may be plowed under in the spring. The surface tillage should begin and continue faithfully through the growing season.

Suggestions for determining the amount of moisture in soils.

It is a very easy matter to determine the amount of moisture in a soil. The only apparatus required is a pair of scales which will weigh to grains and a tube which can be driven into the soil for taking the sample. Such a pair of scales can be purchased for a small sum,* and the tube may consist simply of a piece of boiler pipe about one and one-half inches in diameter which has had the outer edge at one end bevelled down to enable it better



148.—The soil sampler.

to be driven into the soil. Have a mark on the outside of the tube indicating eight inches or one foot from the sharpened end, according to the depth to which it is desired to take the sample. The sampler used by the United States Department of Agriculture (Figs. 148 and 149) is described as follows: "The soil sampling tubes are made out of brazed brass tubing about seven-eighth inch internal diameter and fifteen inches long. The tubing is No. 21 Stubb's gauge. On one end a brass collar about one-fourth of an inch wide is sweated in. The end of the tube is then turned off in a lathe giving a rather long taper but letting the point be the full thickness of the collar. A mark is cut into the tube twelve inches from this cutting edge." We have used this implement with much satisfaction.

*Eimer & Amend, New York, make a balance which, with weights, can be purchased for about $3.00.

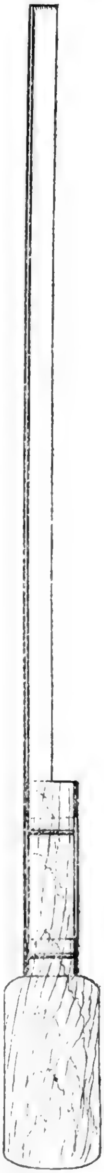
In determining the moisture in a given soil, several samples should be taken and these samples thoroughly mixed and then accurately weighed. Then subject the sample to a heat of 212 degrees Fahrenheit for a few hours, then weigh and heat again for one hour, then weigh again, and continue this operation until there is no further loss of weight by heating. The difference in weight between the original and the heated sample will indicate the amount of moisture which was present. Divide the difference in the weights by the first weight of the sample, to determine the per cent. of moisture in the original sample and multiply by 100. The following case will illustrate:

Original weight of sample	2	lbs.
Weight after drying	1.5	lbs.
Loss in drying	.5	lbs.

Per cent. of moisture in original sample = .5 ÷ 2. = .25 × 100 = 25 per cent.

An interesting line of work for granges and farmers' clubs would be the investigation of soil moisture.

The importance of thorough culture to conserve moisture is so great that if its value was fully realized we should experience less trouble from droughts. Far better is a season with a deficiency of rainfall if continuous surface culture be given than a season of abundant rains with little culture. Much wiser is he who cultivates a small farm and cultivates it intensively than he who attempts to spread over a large area and allows his crops to suffer from droughts, because the moisture which they so much need has not been saved by frequent tillage. Neglect the soil, allow the orchard to care for itself, and when the time of harvest comes the reward shall be according to the labor; but treat the soil as a living thing, care for it faithfully and intelligently, study the plants and learn their ways and the conditions under which they thrive and give them congenial surroundings, and they will respond with a readiness that will abundantly repay the best efforts in their behalf.



149.—The soil sampler.

SUMMARY.

1. The average annual rainfall in New York is sufficient for the growth of profitable crops. Owing to its unequal distribution and to the loss of nearly one-half of it by surface drainage, crops usually suffer from droughts.

2. The first step towards conserving moisture is to put the soil in such a physical condition that it will be pervious to water, or afford a reservoir for it.

3. Water exists in the soil as free, capillary or hygroscopic. The free water within eighteen inches of the surface is injurious to the growth of cultivated plants. The capillary water is the direct source of their supply and should be conserved by all possible means.

4. Capillary action of the soil depends upon the fineness of its particles and the closeness of their relation to each other. In coarse, loose, sandy or gravelly soils the action is weak; in fine, well-compacted soils it is strong.

5. When the capillary interstices or pores in the soil are continuous from the moist under soil to the surface, the moisture rises uniformly and passes off into the atmosphere by evaporation. If, however, these interstices or pores are made very much larger near the surface, the moisture is arrested in its upward movement, a result which is accomplished by light surface cultivation which produces a "soil mulch." This mulch of loose soil answers much the same purpose as a board or carpet would in cutting off the direct connection of the capillary soil with the atmosphere. As soon as the soil becomes baked or encrusted, the capillary connection with the atmosphere is renewed, and another tillage is required to re-establish the soil mulch.

6. A large amount of water is necessary for the plant, as its food is in a very dilute solution, and water is also used in building plant tissue.

7. Moisture in the soil is necessary that nitrification and decomposition of organic matter may take place. Without it the action by which the roots are able to corrode the solid rock and set free plant food cannot take place.

8. The distribution of rainfall cannot be controlled by any

known means. Dependence must be placed upon irrigation and the conservation of soil moisture.

9. Irrigation is expensive, and while entirely practicable in arid regions, yet in our section if flooding by irrigation should be followed by heavy rainfall, the effect might be disastrous. Where irrigation is not a common necessity, it must be secured by individual enterprise, and is, therefore, expensive. In New York we must depend largely upon conserving or preventing the loss of the moisture.

10. The means by which moisture may be conserved are: judicious plowing and tillage, mulches, underdrainage, windbreaks, applications of lime, salt, etc., and adaptation of crop to the soil.

11. The absorbing or capillary power of a soil depends upon the fineness of division of its particles.

12. The plow is a most valuable implement for pulverizing and fining the soil. Fall plowing is recommended for heavy clays, the surface to be left rough and unharrowed. Fall-plowed lands catch and hold the water.

13. Surface tillage should begin early in the spring, as every day's delay after the soil is in fit condition means a loss of many tons of water.

14. The harrow is valuable as an implement with which to establish and maintain a surface mulch. Frequent harrowing of an orchard will greatly lessen the evaporation from the surface.

15. Where cultivators are used as conservers of moisture, many fine teeth are preferable to a few coarse teeth.

16. Ridge culture is calculated to promote evaporation. To conserve moisture, practice level culture and so reduce the area exposed.

17. The roller brings moisture to the surface by compressing the soil. On loose, sandy soils it is useful by compacting the particles. On clay its use may prove injurious if followed by heavy rains. Where possible it is well to follow it with a smoothing harrow to restore the mulch.

18. A surface mulch of leaves and decaying vegetable matter is nature's way of conserving moisture. It also adds humus to

the soil, which is the great store-house for nitrogen and moisture. An herbage mulch can rarely be used in farm areas, however.

19. Underdrains act beneficially in making soils porous above them and thus increasing their permeability, and in removing the free water and thus allowing the access of air, which is as necessary as moisture.

20. Lime, gypsum and salt are all used as conservers of moisture. An application of lime seems to have a beneficial effect on heavy clay and on light sand. It also acts favorably on marshy, sour lands.

21. Grasses and grains should be grown on clay and loamy soils, leaving sandy and gravelly lands for cultivated crops. The humus of tilled lands may be kept up by barn manures and by green manuring.

22. The space between the trees in orchards should be left free for tillage. A growing crop makes such a demand upon the supply of moisture that the trees may be seriously injured.

23. Determinations of soil moisture may be easily made by anyone. The importance of this line of work is called to the attention of granges, farmers' clubs and horticultural societies.

24. The importance of thorough tillage to conserve moisture cannot be made too emphatic. Deficiency in rainfall with intensified agriculture is preferable to abundant rains and neglect by the cultivator. The soil will respond in a large measure according to the treatment it receives. Neglect it and it will fail to bring forth liberal increase, but cultivate intelligently and thoroughly and it responds quickly.

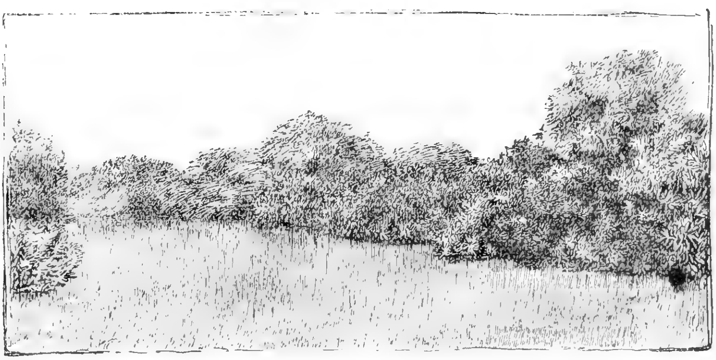
L. A. CLINTON.

BULLETIN 121—September, 1896.

Cornell University—Agricultural Experiment Station,
ITHACA, N. Y.

HORTICULTURAL DIVISION.

SUGGESTIONS FOR The Planting of Shrubbery.



By L. H. Bailey.

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BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.
116. Dwarf Apples.
117. Fruit Brevities.
118. Food Preservatives and Butter Increasers.
119. The Texture of the Soil.
120. The Moisture of the Soil.
121. Suggestions for the Planting of Shrubbery.

CORNELL UNIVERSITY, ITHACA, N. Y., *September* 1, 1896.

Honorable Commissioner of Agriculture, Albany :

Sir.—The writer hopes that this paper may contain some suggestion for the betterment of home grounds in rural communities; it is therefore submitted for publication under Chapter 437 of the Laws of 1896.

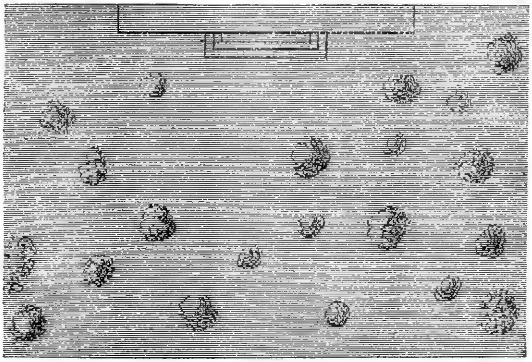
L. H. BAILEY.

156.—An effective piece of planting. See page 513.

Suggestions for the Planting of Shrubbery.

I. *Some general considerations.*

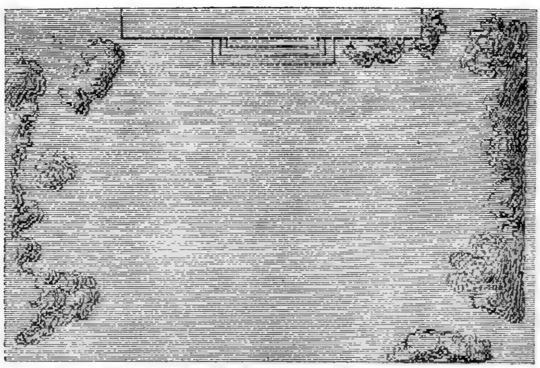
The trouble with home grounds is not so much that there is too little planting of trees and shrubs, but that this planting is meaningless. Every yard should be a picture. That is, the area should be set off from every other area, and it should have such a character that the observer catches its entire effect and purpose without stopping to analyze its parts. The yard should be one thing, one area, with every feature contributing its part to one strong homogeneous effect.



150.—The common or nursery type of planting.

These remarks will become concrete if the reader turns his eye to Figs. 150 and 151. The former represents the common type of planting of front yards. The bushes and trees are scattered promiscuously over the area. Such a yard has no purpose, no central idea. It shows plainly that the planter had no constructive conception, no grasp of any design, and no appreciation of the fundamental elements of the beauty of landscape. Its only merit is the fact that trees and shrubs have been planted; and this, to most minds, comprises the essence and sum of the ornamentation of grounds. Every tree and bush is an individual, alone, unattended, disconnected from its environments, and therefore meaningless. Such a yard is only a nursery.

The other plan (Fig. 151) is a picture. The eye catches its meaning at once. The central idea is the residence, with a warm and open greensward in front of it. The same trees and bushes which were scattered haphazard over Fig. 150 are massed into a framework to give effectiveness to the picture of home and comfort. This style of planting makes a landscape, even though the area be no larger than a parlor. The other style is simply a collection of curious plants. The one has an instant and abiding pictorial effect, which is restful and satisfying: the observer



151.—The proper or pictorial type of planting.

exclaims, "What a beautiful home this is!" The other piques one's curiosity, obscures the residence, divides and distracts the attention: the observer exclaims, "What excellent lilac bushes these are!"

If the reader catches the full meaning of these contrasts, he has acquired the first and most important conception in landscape gardening. The conception will grow upon him day by day; and if he is of an observing turn of mind, he will find that this simple lesson will revolutionize his habit of thought respecting the planting of grounds and the beauty of landscapes. He will see that a bush or flower-bed which is no part of any general purpose or design—that is, which does not contribute to the making of a picture—might better never have been planted. For-

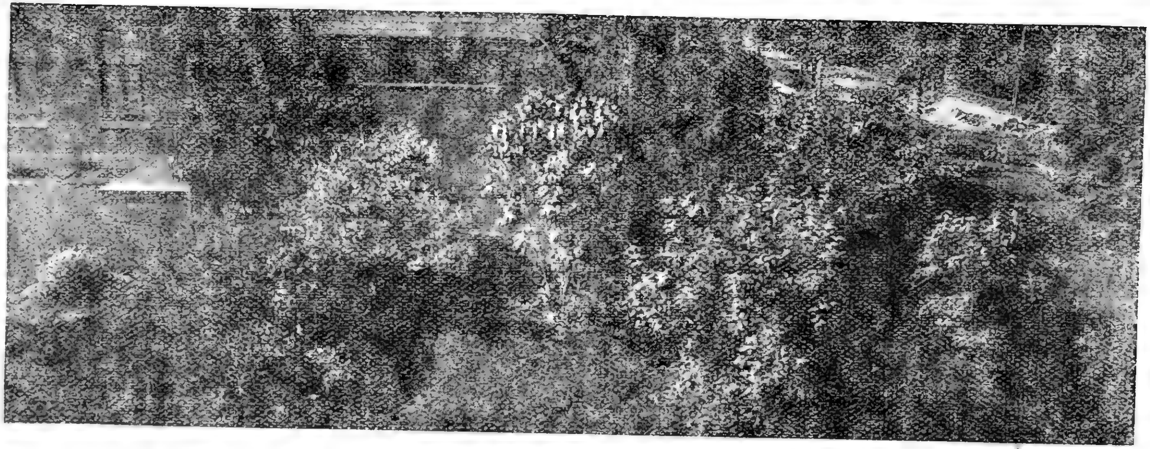
152.—A native mass of shrubbery, of elders, hawthorns, brambles, and the like.

myself, I had rather have a bare and open pasture than such a yard as that shown in Fig. 150, even though it contained the choicest plants of every land. The pasture would at least be plain and restful and unpretentious. It would be nature-like and sweet. But the yard would be full of effort and fidget.

Reduced to a single expression, all this means that the greatest artistic value in shrubbery lies in the effect of the mass, and not in the individual shrub. A mass has the greater value because it presents a much greater range and variety of forms, colors, shades and textures, because it has sufficient extent or dimensions to add structural character to a place, and because its features are so continuous and so well blended that the mind is not distracted by incidental and irrelevant ideas. A couple of pictures will admirably illustrate all this. Fig. 152 is a picture of a natural copse. It stretches across a vale, and makes a lawn of the bit of meadow which lies in front of it. The landscape has become so small and so well defined by this bank of verdure that it has a familiar and personal feeling. The great, bare, open meadows are too ill-defined and too extended to give any domestic air; but here is a portion of the meadow set off into an area which one can compass with his affections.

This mass in Fig. 152 has its own intrinsic merits, as well as its office in defining a bit of nature. One is attracted by the carelessness of its arrangement, the irregularity of its sky line, the bold bays and promontories, and the infinite play of light and shade. The observer is interested in it because it has character, or features which no other mass in all the world possesses. He knows that the birds build their nests in it, and the rabbits find it a happy covert.

Now let the reader turn to Fig. 153, which is a picture of an "improved" city yard. Here there is no structural strength to the planting, no defining of the area, no continuous flow of the form and color. Every bush is what every other one is or may be, and there are hundreds like them in the same town. The birds shun them. Only the bugs find any happiness in them. The place has no fundamental design or idea, no lawn upon which a picture can be constructed.



153.—A typical city lot cramped and crowded by impertinent bushes.

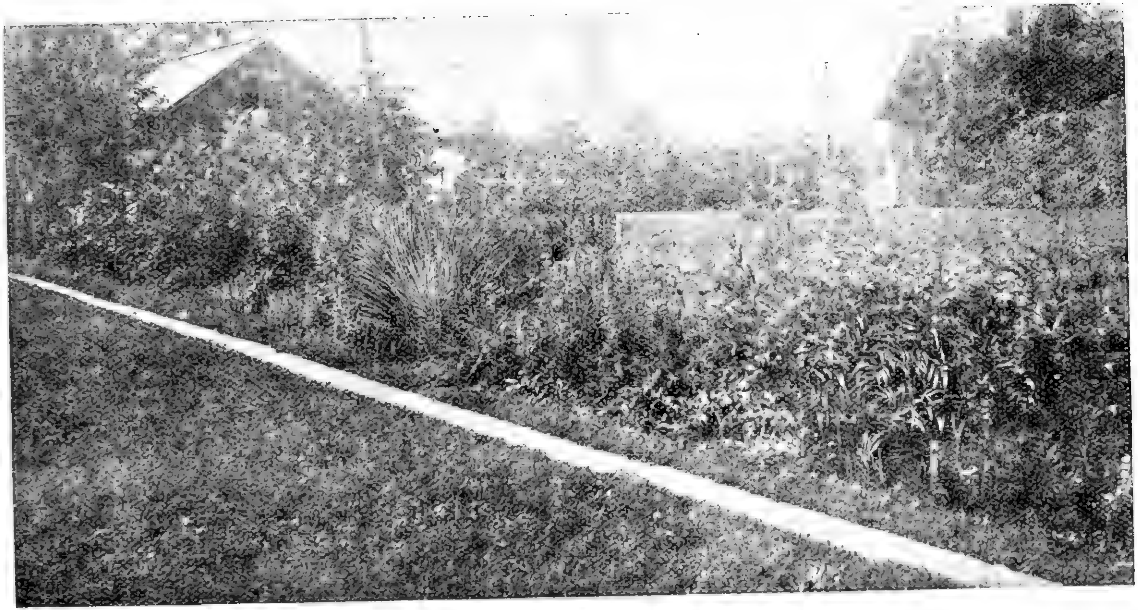
154.—Well conceived but badly treated.

This leads me to say that if a landscape is a picture, it must have a canvas. This canvas is the greensward. Upon this, the artist paints with tree and bush and flower the same as the painter does upon his canvas with brush and pigments. The opportunity for artistic composition and structure is nowhere so great as in the landscape garden, because no other art has such a limitless field for the expression of its emotions. It is not strange, if this be true, that there have been few great landscape gardeners, and that, falling short of art, the landscape gardener too often works in the sphere of the artisan. There can be no

155.—The three guardsmen.

rules for landscape gardening, any more than there can be for painting or sculpture. The operator may be taught how to hold the brush or strike the chisel or plant the tree, but he remains an operator; the art is intellectual and emotional and will not confine itself in precepts.

The making of a good and spacious lawn, then, is the very first practical consideration in a landscape garden. This provided, the gardener conceives what is the dominant and central feature in the place, and then throws the entire premises into subordination with this feature. In home grounds this central feature



157.—A little weedland alongside a rear walk.

is the house. To scatter trees and bushes over the area defeats the fundamental purpose of the place,—the purpose to make every part of the grounds lead up to the home and to accentuate its homelikeness. Keep the center of the place open. Plant the borders. Avoid all disconnected, cheap, patchy, and curious effects.

It is not enough that the bushes be planted in masses. They must be kept in masses by letting them grow freely in a natural manner. The pruning-knife is the most inveterate enemy of shrubbery. Pictures 154 and 155 illustrate what I mean. The

158.—A front yard before planting.

former represents a good group of bushes so far as arrangement is concerned, but it has been ruined by the shears. The attention of the observer is instantly arrested by the individual bushes. Instead of one free and expressive object, there are several stiff and expressionless ones. If the observer stops to consider his own thoughts when he comes upon such a collection, he will likely find himself counting the bushes; or, at least, he will be making mental comparisons of the various bushes and wondering why they are not all sheared to be exactly alike. Fig. 155 shows how the same "artist" has treated two deutzias and a juniper.

159.—The same front yard (Fig. 158) after planting

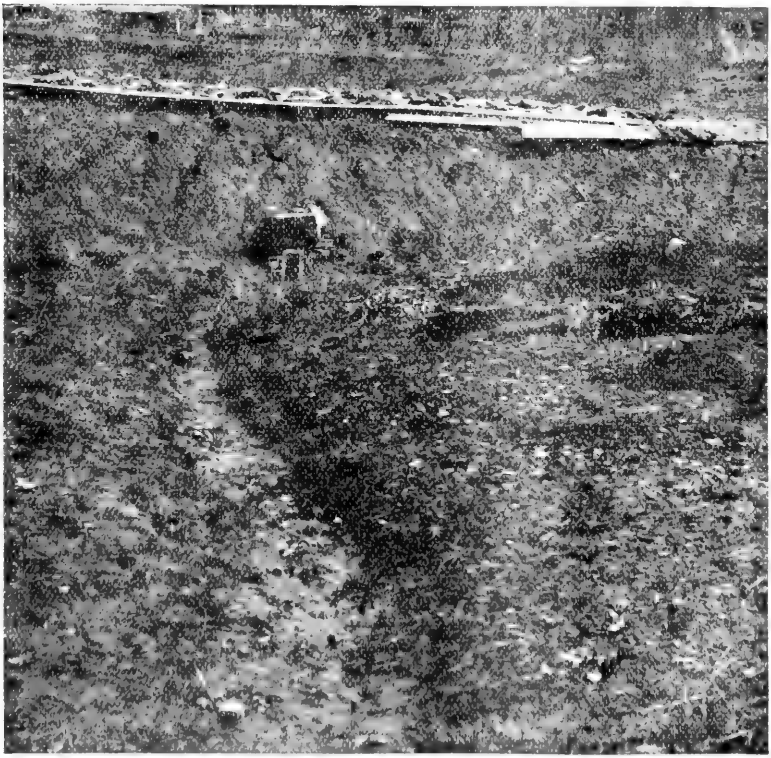
Much the same effects could have been secured, and with much less trouble, by laying two flour barrels end to end and standing a third one between them.

I must hasten to say that I have not the slightest objection to the shearing of trees. The only trouble is in calling the practice art, and in putting the trees where people must see them. If the operator simply calls the business shearing, and puts the things where he and others who like them may see them, objection could not be raised. Some persons like painted stones, others like iron bulldogs in the front yard and the word "welcome" worked into the door-mat, and others like barbered trees. So long as these likes are purely personal, it would seem to be better taste to put such curiosities in the back yard, where the owner may admire them without molestation.

160.—A good combination.

I do not mean to discourage the use of flowers and bright foliage and striking forms of vegetation; but these things are never primary considerations in a good place. The structural elements of the place are designed first. The flanking and bordering masses are then planted. Finally, the flowers and accessories are put in, in just the same way that a house is painted after it is built. Flowers appear to best advantage when seen against a background of foliage, and they are then, also, an integral part of the picture. The flower garden, as such, should be at the rear or side of a place, the same as all other strictly personal appurtenances are; but flowers and bright leaves may be freely scattered along the borders and near the foliage masses. Fig. 156 (at the beginning of the bulletin) is a model in this respect.

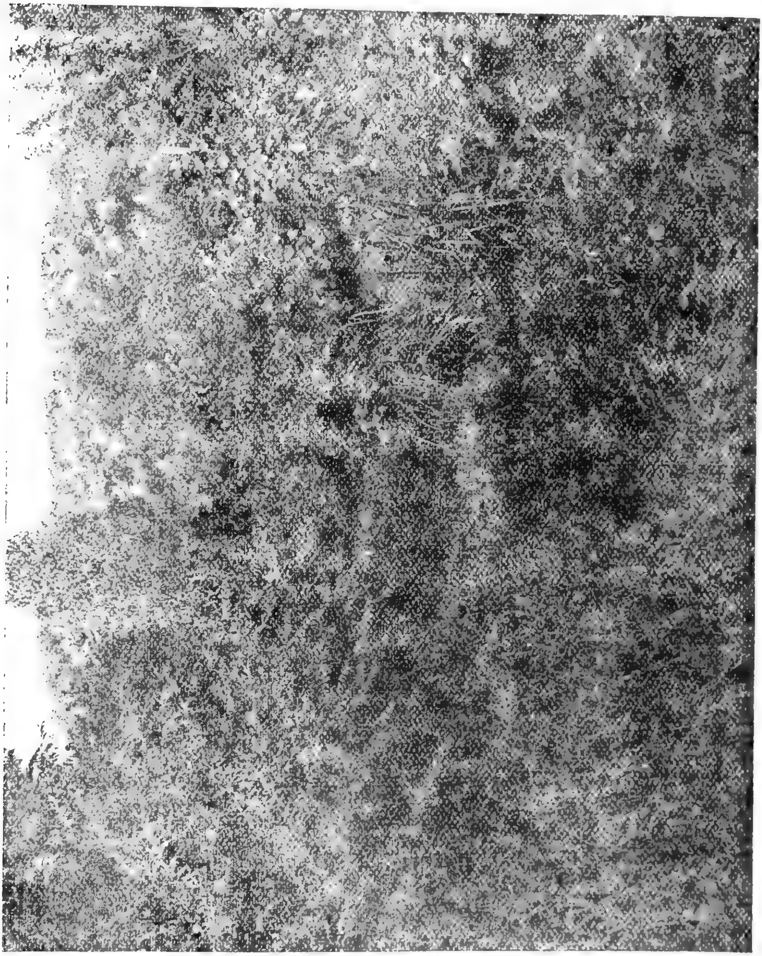
What kinds of shrubs and flowers shall I plant? This is a wholly secondary and largely personal consideration. Be sure that the main plantings are made up of hardy and vigorous species, and have lots of them. Then get the things which you like. I like bull-thistles, lilacs, hollyhocks, burdocks, rhubarb, dogwoods. spireas, elders and such careless things. But others have



161.—A "fill" in a back yard.

better tastes. There is endless merit in the choice of species, but the point I want to emphasize is that the arrangement or disposition of the plants is far more important than the kinds.

It should be said that the appreciation of foliage effects in the landscape is a higher type of feeling than the desire for mere color. Flowers are transitory, but foliage and plant forms are abiding. The common roses have very little value for landscape planting, because the foliage and habit of the rose bush are not attractive, the leaves are inveterately attacked by bugs, and the blossoms are fleeting. Some of the wild roses and the Japanese Rosa rugosa, however, have distinct merit for mass effects. Wild bushes are nearly always attractive when planted in borders and



162.—The same "fill" four years later.

groups. They improve the appearance under cultivation, because they are given a better chance to grow. In wild nature, there is such a fierce struggle for existence that plants usually grow to few or single stems and they are sparse and scraggly in form; but once given all the room they want and a good soil, and they become luxurious, full and comely. In most home grounds in this state, the body of the planting may be very effectively made by the use of bushes taken from adjacent woods and fields. The masses may then be enlivened by the addition here and there of cultivated bushes, and the planting of flowers and herbs about the borders. It is not essential that one know the names of these wild bushes, although a knowledge of their botanical features

163.—The beginning of a back yard.

will add greatly to the pleasure of growing them. Neither will they look common when transferred to the lawn. There are very few people who know even the commonest wild bushes intimately, and the bushes change so much in looks when removed to rich grounds that few people recognize them. I have a mass of shrubbery which is much admired, and visitors are always asking me what the bushes are; yet I dug the roots in the neighborhood.

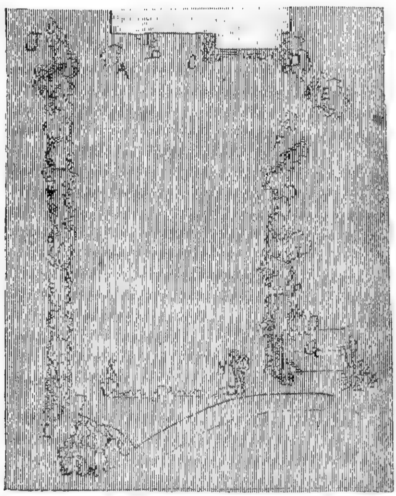
Wholly aside from any artistic value, a simple collection of common wild plants is always full of interest and merit. Fig. 157 shows a plantation which answers the double purpose of a wild garden and a border mass-planting. The area is about three feet wide and ninety feet long, and lies along one side of a small back yard (seen in Fig. 164). The soil was originally a most tough and obstinate clay, so hard that even yet annual plants can scarcely be made to grow in it. Plants have been brought from the wild at odd times and set promiscuously in the border, and it now contains over one hundred distinct species. Every day from April to October there are flowers in it, and every spring it renews itself with scarcely a care on the part of the owner. To be sure, there are some weeds in it, but then, the weeds are a part of the collection! A well grown bull-thistle in such a place is worth more than a bushel of potatoes. These plants have been lifted from the fields in the most careless fashion. A noble plant of the pink-hearted Spiræa lobata was pulled from a swamp in July when it was in full bloom; the bluebells have been stolen from cliffs without regard to time or season; some of the roots were carried in the pocket for hours before the opportunity came for planting, and this, too, in the height of summer. Of course, some plants have resented this treatment, but the border is a happy family and it is all the better and more personal because it is the result of moments of relaxation.

I have spoken of this choice little weedland to show how simple and easy a thing it is to make an attractive mass-plantation. Just set aside a bit of ground in the right place, spade it up and make it rich, and then set plants in it. That is all there is of it. You will not get it to suit you the first year, and perhaps not the second one. You can always pull out plants and put more in. I should be sorry if it did perfectly suit you, for I should then feel that you had lost interest in it. I should never want a lawn-garden if I could not change it a little or plant something new each year.

A word should be said about just how to make a group. Dig up the entire area. Never set the bushes in holes dug in the sod. Spade up the ground, set the bushes thick, hoe them, and then let them go. If you do not like the bare earth between

164.—The same back yard (Fig. 163) four years later.

them, sow in the seeds of hardy annual flowers, like phlox, petunia, alyssum and pinks. The person who plants his shrubs in holes in the sward does not seriously mean to make any foliage mass, and it is likely that he does not know what relation the border-mass has to artistic planting. I have said to plant the bushes thick. This is for quick effect. It is an easy matter to thin the plantation if it becomes too thick. I should generally plant all common bushes as close as two feet apart each way, especially if I get most of them from the fields so that I do not have to buy them.



165.—Diagram of Fig. 164. 50 x 90 feet.

II. *Some specific examples.*

All these remarks will mean more if the reader is shown some concrete examples. I have selected a few cases, not because they are the best or even because they are good enough for models, but because they lay in my way and illustrate what I desire to teach. We will first look at a very ordinary front yard. Fig. 158 shows the yard as it looked before the shrubbery was planted. The large tree seen in the foreground at the left, and the spruce, were removed. A little sprig of exochorda had been planted the year before and is now carefully guarded by stakes. Four years later sees the yard as shown in Fig. 159. The little

166. The vine-covered cabin in which drawings for Cornell bulletins are made.

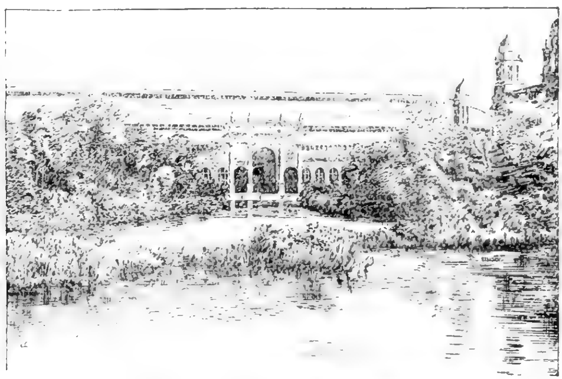
exochorda has now grown to be the large bush in the very foreground with the child's tricycle behind it, and the porch foundation is screened and a border is thereby given to the lawn. The length of this planting from end to end is about fourteen feet, with a projection towards the front, on the left, of ten feet. In the bay at the base of this projection the planting is only two feet wide, and from here it gradually swings out to the steps,

167.—A rustic corner.

eight feet wide. The prominent large-leafed plant near the steps is a bramble very common in the neighborhood, Rubus odoratus, and it is a choice plant for decorative planting. The plants in this tangle in front of the porch are all from the wild, and comprise a prickly ash, several plants of two wild osiers or dogwoods, a spice bush, rose, wild sunflowers and asters and golden-rods. The promontory at the left is a more ambitious but less effective mass. It contains the exochorda, a reed, variegated elder, sacaline, variegated dogwood, tansy, and a young tree of wild crab. At the rear of the plantation, next the house, one sees a tall pear tree.

The best single part of the planting is the reed (Arundo Donax) overtopping the exochorda. The photograph (Fig. 159) was taken early in summer before the reed had become conspicuous, but Fig. 160 shows it as the artist saw it in September.

It became necessary to fill a little "run" in a back yard. Fig. 161 shows how it looked. The soil was the hardest clay. Rubus cratægifolius was planted on the bank, which it soon covered with an impenetrable tangle. Wild osiers, some asparagus



168.—The central open space and the mass-flanked sides.

plants, sedges, a sumac bush, and other common things were put in, and the aspect changed to that of Fig. 162.

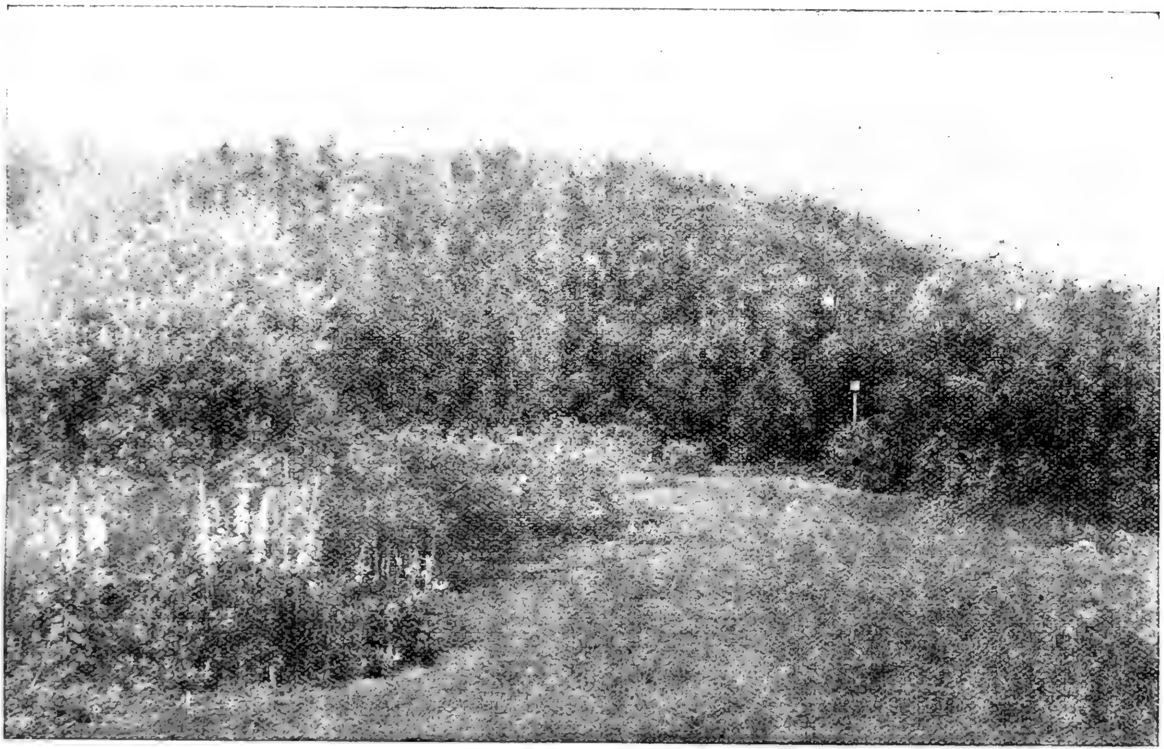
A person had a back yard shown in Fig. 163. It was an unpromising subject. The clay was of the vilest kind. The owner wanted a tennis court, and the yard is so small as not to allow of wide planting at the borders. However, something could be done as shown in the sequel (Fig. 164). Upon the left is the weedland border, shown from the other end in Fig. 157. A diagram (Fig. 165) will show what has happened. In the first place, a good lawn was made. In the second place, no walks or drives were laid in the area. The drive for grocer's wagon and coal is seen in the rear, ninety feet from the house. From I to J is the weedland, separating the area from the neighbor's premises. Near I is a clump of roses. At K is a large bunch of golden-rods.

H marks a clump of yucca. G is a cabin, of which I will speak later. From G to F is an irregular border, about six feet wide, containing barberries, forsythias, wild elder, and other bushes. D E is a screen of Russian mulberry, setting off the clothes yard from the front lawn. Near the back porch, at the end of the screen, is an arbor covered with wild grapes, making a playhouse for the children. A clump of lilacs stands at A. At B is a vine-covered screen, serving as a hammock support. The lawn made and the planting done, it was next necessary to lay the walks. These are wholly informal affairs, made by sinking a plank ten

169.—A newly made landscape garden, ready for the border planting.

inches wide into the ground to a level with the sod. The border plantings of this yard are too straight and regular for the most artistic results, but this was necessary in order not to encroach upon the central space. Yet the reader will no doubt agree that this yard is much better than it could be made by any system of scattered and spotted planting. Let him imagine how a glowing carpet-bed would look set down in the center of this lawn.

The cabin which stands at G in Fig. 165 is shown in perspective in Figs. 166 and 167. This is a rustic bark-covered structure which was built to add picturesqueness to the area. The front view, Fig. 166, shows the use of the two best arbor vines yet in-



170.—Five years' growth upon the area shown in Fig. 169. On the Cornell horticultural grounds.

troduced into this country,—the Japanese actinidia and akebia. These vines are most vigorous, perfectly hardy, free of insect and fungous injuries and of extraordinary attractiveness in foliage and habit. The picture also shows the yucca group which is located at H in Fig. 165. The cabin is shown at rear view in Fig. 167; and the reader will be interested to know that the planting in the rear of this cabin is a part of the shrubbery shown in Fig. 162.

These various pictures will fix in the reader's mind the importance of a simple structural design for the home grounds. The essential elements of this design are the open center and the well-planted sides. It is particularly important that the view to and from the front of the dwelling house be kept open, for otherwise there can be little conception of pictorial effect in the composition. It is a grave mistake to cover up or to obscure the one central and important feature of the place. This principle is well shown in Fig. 168. This architectural composition would have little place or merit in the landscape if the foreground were promiscuously planted.

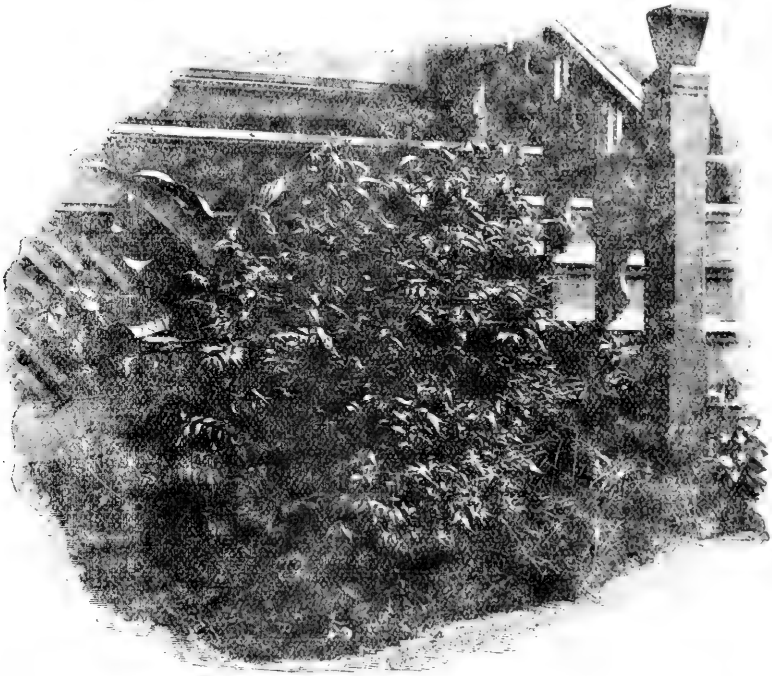
Let us now see how this principle may be applied to a very ordinary area. Fig. 169 shows a small clay field (75 ft. wide and 300 ft. deep), with a barn at the rear. In front of the barn is a screen of willows. The observer is looking from the dwelling house. The area has been plowed and seeded for a lawn. The operator has then marked out a devious line upon either border with a hoe handle, and all the space between these borders has been gone over with a garden roller to mark the area of the desired greensward. The borders are now planted with a variety of small trees, bushes and herbs. Five years later the photograph shown in Fig. 170 was taken.

The reader may now begin to appreciate the value of foliage masses in the landscape, and the comparatively trivial and weak effects of mere flower-beds in any rural picture. Let me illustrate again the uses of mass-effects by photographs taken in one of our most famous metropolitan parks. Fig. 171 is one of that common type of water pieces in our city parks, in which the artificial and ugly borders are wholly bare. It is difficult to con-

171.—A water piece devoid of effective planting.

172.—A water piece well planted.

ceive of any use or beauty which is served by the butter ladle promontory at the right. The other view, Fig. 172, shows a similar structural design with the borders planted with elders and dogwoods and other common things. The one picture is a harsh and ambitious attempt at design; the other is as sweet and restful as a glimpse from paradise.



173.—Kerria, canna and wild sunflower, and the grass not too scrupulously sheared, in the corner by the steps.

But if one has no area which he can make into a lawn and upon which he can plant such verdurous masses, what then may he do? Even then there may be opportunity for a little neat and artistic planting. Even if one lives in a rented house, he may bring in a bush or an herb from the woods and paint a picture with it. Plant it in the corner by the steps, in front of the porch, at the corner of the house, almost anywhere except in the center of the lawn. Make the ground rich, secure a strong root and plant it with care; then wait. The little clump will not only have a beauty and interest of its own, but it will add immensely to the furniture of the yard. About its base one may plant stray bulbs of glowing tulips or dainty snowdrops and lilies-of-the-valley; and these may be followed with pansies and phlox and other simple folk. Very soon one finds himself deeply interested in these random and detached pictures, and almost before he is aware he finds that he has rounded off the corners of the house,

174.—A careless corner. The growth came from a sod dug in a swale in early spring. Clematis and purple cupatorium, and lesser weeds, comprise the colony.

made snug little arbors of wild grapes and clematis, covered the rear fence and the outhouse with actinidia and bitter-sweet, and has thrown in dashes of color with hollyhocks, cannas and lilies, and has tied the foundations of the buildings to the greensward by low strands of vines or deft bits of planting. He soon comes to feel that flowers are most expressive of the best emotions when they are daintily dropped in here and there against a background of foliage. Presently he rebels at the bold, harsh and impudent designs of some of the gardeners, and grows into a pure and subdued love of the plant forms and verdure. He may still like the weeping and cut-leaved and party-colored trees of the horticulturist, but he sees that their best effects are to be had when they are planted sparingly, as flowers are, as borders or promontories of the structural masses.

It all amounts to this, that the best planting, like the best painting and the best music, is possible only with the best and

175.—A corner and doorway draped with honeysuckle.

tenderest feeling and the closest living with nature. One's place grows to be a reflection of himself, changing as he changes, and expressing his life and sympathies to the last.

L. H. BAILEY.

BULLETIN 122—December, 1896.

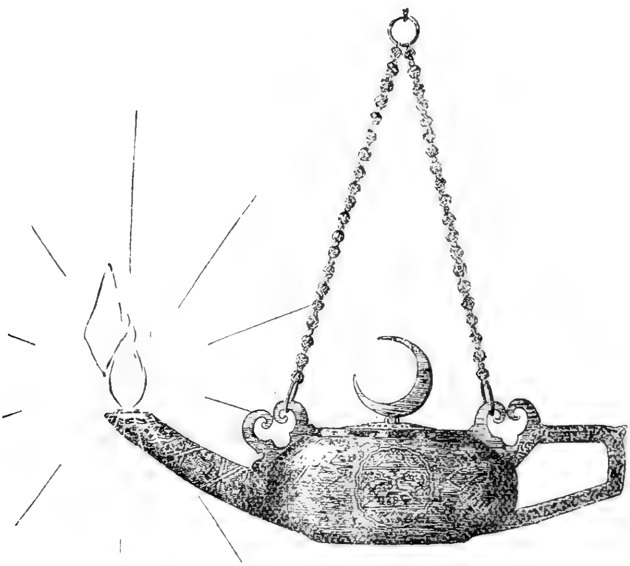
Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

HORTICULTURAL DIVISION.

SECOND REPORT UPON

Extension Work in Horticulture.



By L. H. Bailey.

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Office of the Director, 20 Morrill Hall.
The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.
116. Dwarf Apples.
117. Fruit Brevities.
118. Food Preservatives and Butter Increasers.
119. The Texture of the Soil.
120. The Moisture of the Soil.
121. Suggestions for the Planting of Shrubbery.
122. Second Report upon Extension Work in Horticulture.

Extension Work in Horticulture.

The Honorable Commissioner of Agriculture, Albany:

Sir.—About a year ago (in Bulletin 110), I made an official report of the progress of the work which had been undertaken by this institution in furtherance of the purpose of the Experiment Station Extension, or Nixon bill. That report was made at the expiration of the second year's work under that law. A third year has now been added to our experience, and we have also made some departures in the character of the work; and since the undertaking has now grown to such proportions that it can no longer be handled by any of the regularly organized departments of the College of Agriculture of Cornell University, it has seemed to us to be worth the while to address you another report of progress.

1. General Scope of Work.

In the former report, it was explained that the work of extending the influence and usefulness of the Experiment Station has been thrown into three more or less separate lines,—research or experiment, direct teachings, and the publication of the results of investigation. The animus of the entire enterprise has been an attempt to inquire into the agricultural status, to discover the causes of the rural depression, and to suggest means for improving the farmer's position. This attempt has been specifically directed to a single great branch of rural industry, horticulture, in pursuance of the provisions of the law; but what is true of the horticultural communities is essentially true of other agricultural regions, and, moreover, these two types of agricultural industry cannot be separated by any arbitrary lines. The work, therefore, has practically resulted in a broad study of rural economics. We conceive that it is impossible to really extend the Experiment Station and University impulse to the people in such manner that it shall come to them as a living and quickening force, without first studying the fundamental difficulties of the farmers' social and political environment.

It is not necessary to the present report that I make any discussion of the agricultural status. I may only say that, as the result of the most painstaking study which I have been able to make, I am convinced that there is no agricultural disease. That is, there is no political condition which is peculiar to agriculture and which can be remedied by legislation. By reason of their inherent conservatism, the agricultural people have not yet adjusted themselves to the recent social and economic movements, and they have not fully assimilated the knowledge and impulses of the time; and I am also convinced that grave errors have been committed in forcing the development of western lands. If these general conclusions are sound, then it follows that the solution of our agrarian difficulties is to be sought in better education. By education, I mean literally what I say,— by means of a general waking up, a shaking out of all the old habits of thought, an injection of new conceptions of life, an intellectual stirring up of every rural community. I do not mean the simple giving of information, the cramming in of carefully assorted facts. We need to shake out the snarls and kinks of prejudice and indifference before giving great attention to the dissemination of more direct information. There is already enough popular knowledge of better agricultural methods to greatly improve our rural conditions, if only the farmers would assimilate it and apply it. This knowledge is of little account when it is a mere extraneous possession. It must be worked into the fibre of the man until he is not aware that he possesses it.

In this extension work, therefore, we have sought not so much for new facts as for some way of driving home the old facts. We have tried to set forces at work which would silently extend themselves when we had left them. Fortunately, we have been greatly aided by the hard times and the multitudes of bugs and special difficulties. These things have driven people to thinking and to asking for information. The agricultural communities are thoroughly aroused, and now is the time to teach. When one is thoroughly prosperous in his business, there is little chance—as, in fact, there is generally little need—of teaching him other methods.

I must hasten to say that the agricultural status in Western New York is not such a deplorable one as my reader may suppose, or as he may infer from my preceding remarks. Those farmers who grow various and difficult crops are wide awake, intelligent, aggressive and for the most part contented. The man who grows only a few and staple crops is very apt to fall into stereotyped ways of thinking, which may mean that he drops behind the times. Just as fast as more varied farming is forced upon the agricultural communities by the inexorable struggle for existence, will the farmer's horizon and sympathies enlarge; and with the progress of this broadening and educative impulse—which now, fortunately, is rapidly rising—the farmers will find themselves in position to correct whatever minor faults of legislation that may have occurred, and to direct and control the social forces with which they are concerned.

We might classify our efforts to reach the people, in the progress of our work, under five general heads. These efforts have all been experiments in methods of extension teaching as applied to horticulture. We have tried to ascertain the value of:

1. The itinerant or local experiment as a means of teaching.
2. The readable expository bulletin.
3. The itinerant horticultural school.
4. Elementary instruction in the rural schools.
5. Instruction by means of correspondence and reading courses.

Unless all signs are deceptive, the greatest good which has yet been accomplished has come through the bulletins. We have wished that we might be able to make bulletins which would interest the reader aside from the information which they contain. We should have liked to put juice into them, for pemmican, whilst exceedingly nutritious, is difficult of digestion.

Aside from the reporting of definite experiment work, these bulletins have taken the form of surveys of the status of certain industries; and an effort has also been made to give a new flavor to country life by writing upon subjects of floriculture and ornamental gardening. Whilst it seems to us that the publications have been useful in furthering the work which we have had in mind, we are nevertheless convinced that an unlimited issue or even a very large number of such expository bulletins would not be proportionately useful at the present time. There are still a number of horticultural subjects which we desire to treat in this spirit; but it is evident that the real fundamental work of extension teaching must be prosecuted along other lines in connection with publication of a distinctly didactic kind. It may be said, before leaving this subject, that the entire number of bulletins thus far published under the auspices of the Nixon bill, including the present report, is forty. The experimental and investigational work which is still going forward—of which there is considerable—will be reported in forthcoming bulletins. For the present report, it is only necessary to explain the work of direct teaching which we have undertaken during the present year, and to draw certain conclusions from the general work of the Nixon bill.

2. Experiments in Extension Teaching.

During the past season, we have made an especial effort to determine the best methods of reaching the rural communities by means of personal teaching, and our work has fallen into three general lines. In the first place we have carried forward one month's work of consecutive teaching by means of the horticultural schools which we have heretofore held and which are somewhat fully reported in Bulletin 110; we have made another experiment of a month's duration in teaching nature-study and object lessons in the rural schools of the Fourth Judicial Department; and at the present time, we are endeavoring to carry forward the instruction which has been thus begun by means of correspondence and an attempt to establish reading courses in the various school districts and rural organizations.

The horticultural schools held during the month of September were as follows, the names of the teachers being in italic:

1. Aug. 28, 29, *F.*, *S.* Jamestown, Chautauqua Co., Y. M. C. A. Hall, *Bailey, Slingerland & Lodeman, Roberts Powell & Cavanaugh, Clinton.*
2. Aug. 29, *S.* Ellington, Chautauqua Co. Case & Frisbee's Hall. *Lodeman, Slingerland, Powell.*
3. Aug. 31, Sept. 1, *M.*, *T.* East Randolph, Cattaraugus Co. Hall's Opera House. *Clinton, Cavanaugh, Powell. Lodeman & Slingerland, Bailey.*
4. Sept. 2, 3, *W.*, *Th.* Cuba, Allegany Co. Fireman's Hall. *Bailey, Cavanaugh, Powell. Slingerland, Powell and Clinton.*
5. Sept. 2, 3, 4, *W.*, *Th.*, *F.* Brocton, Chautauqua Co. Evenings only. *Bailey. Lodeman. Powell.*
6. Sept. 4, 5, *F.*, *S.* Lyndonville, Orleans Co. Methodist Church. *Lodeman, Cavanaugh, Bailey. Clinton, Powell.*
7. Sept. 7, *M.* Romulus, Seneca Co. Romulus Hall. *Lodeman, Clinton, Roberts.*
8. Sept. 7, 8, *M.*, *T.* North Rose, Wayne Co. I. O. G. T. Hall. *Powell, Duggar, Cavanaugh. Slingerland, Bailey.*
9. Sept. 8, 9, *T.*, *W.* Williamson, Wayne Co. Grange Hall. *Powell, Duggar. Bailey, Slingerland, Cavanaugh, Clinton.*
10. Sept. 10, *Th.* Webster, Monroe Co. *Lodeman, Cavanaugh, Clinton.*
11. Sept. 9, 10, *W.*, *Th.* Hilton (N. Parma), Monroe Co. F. W. Baptist Church. *Lodeman, Cavanaugh, Powell. Slingerland & Duggar, Bailey.*
12. Sept. 11, 12, *F.*, *S.* Dansville, Livingston Co. Grange Hall, near Stone's Falls, Friday; farm of H. R. McNair, below Woodsville, Saturday. Basket picnics. *Bailey, Lodeman, Roberts. Cavanaugh & Duggar, Clinton.*
13. Sept. 12, *S.* Wyoming, Wyoming Co. *Powell & Slingerland, Roberts, Powell.*
14. Sept. 14, 15, *M.*, *T.* Le Roy, Genesee Co. G. A. R. Hall. *Powell & Duggar, Clinton, Bailey. Cavanaugh, Mrs. Comstock.*
15. Sept. 15, *T.* Dundee, Yates Co. G. A. R. Hall. *Lodeman, Clinton, Slingerland.*
16. Sept. 16, *W.* Hall's Corners, Ontario Co. *Lodeman & Slingerland, Clinton, Lodeman.*
17. Sept. 16, 17, *W.*, *Th.* Skaneateles, Onondaga Co. Library Hall. *Powell, Cavanaugh, Mrs. Comstock, Clinton, Roberts.*
18. Sept. 17, *Th.* Fayetteville, Onondaga Co. *Powell & Duggar, Cavanaugh, Bailey.*

19. Sept. 17, 18, *Th.*, *F.* Oswego, Oswego Co. Court House. *Lodeman, Slingerland, Powell. Roberts, Cavanaugh.*
20. Sept. 18, 19, *F.*, *S.* Mexico, Oswego Co. Town Hall. *Lodeman, Slingerland, Clinton, Cavanaugh, Powell.*
21. Sept. 21, 22, *M.*, *T.* Lowville, Lewis Co. Court House. *Powell, Duggar & Slingerland, Bailey. Clinton, Cavanaugh.*
22. Sept. 22, 23, *T.*, *W.* Poland, Herkimer Co. F. B. Church. *Bailey, Duggar & Slingerland, Powell. Clinton, Cavanaugh.*
23. Sept. 23, 24, *W.*, *Th.* Trenton, Oneida Co. Grange Hall. *Bailey, Slingerland & Duggar, Powell. Cavanaugh, Clinton.*
24. Sept. 24, 25, *Th.*, *F.* Clinton, Oneida Co. Scollard Opera House. *Bailey & Slingerland, Mrs. Comstock & Morrill, Bailey. Cavanaugh & Duggar, Powell.*

These schools were designed to impart specific horticultural instruction, and, more particularly, to awaken closeness of observation, and careful reasoning therefrom, upon the part of the attendants. These schools were arranged for in the various places through a local committee which was appointed by the person who applied for the school in that community. Posters were distributed some time in advance of the meetings, the subject matter of one of which is presented herewith:

A SCHOOL OF HORTICULTURE

WILL BE HELD IN THE

Y. M. C. A. HALL, JAMESTOWN, CHAUTAUQUA COUNTY, N. Y.,

Friday and Saturday, August 28 and 29, 1896, beginning at 10 o'clock, sharp.

This school is held under the auspices of the Experiment Station Extension, or Nixon Law, which, for three years, has given funds for the promulgation of horticultural knowledge in Western New York. Its territory is the Fourth Judicial Department, comprising twenty-two counties, of which the easternmost are Jefferson, Lewis, Herkimer, Oneida, Onondaga, Cayuga, Seneca, Yates and Steuben. The demands of this law are met by conducting experiments, by publishing the results of these researches in bulletin form, in sending agents or experts to examine orchards and plantations when advice is needed, and in the holding of schools in which the various matters of science and practice pertaining to fruit-growing, gardens and green-houses are discussed. The force of instructors who take part in these schools are Mr. George T. Powell and teachers in Cornell University:

Teachers upon General Subjects: Professor I. P. Roberts, George T. Powell, Professor L. H. Bailey.

Representing Spraying, Vineyards and Small Fruits: E. G. Lodeman, Instructor in Horticulture.

Representing Entomology: M. V. Slingerland, Assistant Entomologist in the Experiment Station.

Representing Tillage, Conservation of Moisture, Farm Tools, and the like: L. A. Clinton, Assistant Agriculturist in the Experiment Station.

Representing Chemistry, Plant Foods, Fertilizers: G. W. Cavanaugh, Assistant Chemist in the Experiment Station.

Representing Plant Diseases and Botanical Matters: B. M. Duggar, Assistant Botanist in the Experiment Station.

Instruction for Children: Mrs. J. H. Comstock.

Some or all of these persons will be present at every school.

These schools are free to everyone. It is especially desired that the women and young men should attend them. Each session will be devoted to one general subject, and all questions upon that subject should be reserved for that occasion. It is the purpose of these schools to awaken an interest in rural affairs and to inspire correct methods of observation and thinking, quite as much as to give explicit direction for horticultural work.

It will conduce to the interest of the occasion if the citizens make displays of flowers, fruits and vegetables. Participants are requested to bring in all specimens of insects, diseased plants, and the like, concerning which they desire information.

Come prepared to learn, not to criticize. Bring note-book and pencil. If forty or fifty earnest persons are in attendance at all the sessions, the school will be a success; but it is desired to reach as many people as possible.

A course of reading will be laid out, at the school, for all who desire to take it up. The local rural societies should further this work. The value of the school will depend greatly upon the extent to which it stimulates further reading and study.

Whenever practicable, it is desired that one session, or a part of a session, be given to the children of the public schools.

Please circulate this information widely.

For further information consult the local committee: Newell Cheney, Poland Center; A. A. Van Vleck, Jamestown; W. C. Gifford, Jamestown; M. Wample, Jamestown;

Or address L. H. Bailey, Cornell University, Ithaca, N. Y.

Programs will be ready before the school opens.

One of the most useful exercises in connection with these schools, and which we have uniformly employed from the beginning of our work, consists in observation lessons. Some small object, like leaves or roots, flowers or seeds, is put in the hands of all the attendants, and, after they have examined it for a few minutes, the instructor begins to ask questions concerning it. This exercise drills every participant in observation, in the drawing of proper inferences from what he sees, and the exercise has always been productive of the greatest interest and good. A sample program of one of these horticultural schools is herewith submitted:

Everyone interested in Rural Affairs is invited to attend a

SCHOOL OF HORTICULTURE

TO BE HELD IN

SCOLLARD OPERA HOUSE, CLINTON, ONEIDA CO.,

Thursday and Friday, September 24 and 25, 1896.

The school is held under the auspices of the Nixon, or Experiment Station Extension Bill, which appropriates funds for the dissemination of horticultural knowledge in the Fourth Judicial Department of the State. The work is in charge of Cornell University (Ithaca), and the instruction is given chiefly by teachers in that institution, under the immediate supervision of L. H. Bailey.

Local Committee: E. P. Powell, Clinton; T. T. Thompson, Clinton; H. B. Sykes, Clinton; Ira F. Ellenwood, Clinton; J. H. Marvin, New Hartford.

THURSDAY, 10 A. M. (SEPT. 24).

Lesson upon *Flowers* — (Conducted by L. H. Bailey).

M. V. Slingerland — Insects: What they are and How they Live. Illustrated by specimens and models.

After this exercise questions may be asked about spraying.

THURSDAY, 2 P. M.

Lesson upon *Leaves* — (Conducted by L. H. Bailey).

E. P. Powell — Orchard Culture: How to secure healthy trees and healthy crops.

Mrs. J. H. Comstock — What bright-eyed children may see in their walks. Illustrated by original colored drawings.

It is hoped that the school children may be present at this latter exercise.

THURSDAY, 7:30 P.M.

Lesson upon *Branches* — (Conducted by L. H. Bailey).

L. H. Bailey — The Philosophy and Practice of Pruning. Illustrated by specimens.

This exercise will consider certain phases of evolution, as well as of the pruning of trees.

FRIDAY, 10 A. M. (SEPT. 25).

Lesson upon *Buds* — (Conducted by Professor Morrill).

A. D. Morrill — The Leaf-bud and Budding and Grafting.

B. M. Duggar — Fungi: What they are and How they Live.

At this point persons may ask questions about diseases of plants.

FRIDAY, 2 P. M.

Lesson upon *Matches* — (Conducted by George W. Cavanaugh).

George W. Cavanaugh — The Chemistry of Some Plant Foods. Illustrated by chemical tests.

George T. Powell — How to Pick, Pack and Export Apples.

Will some one bring in a barrel of apples properly packed?

Be on hand promptly at the opening hour. Time is precious.

Bring note-book and pencil.

Bring all the family. The introductory lessons will be especially interesting to children, and there should be a good turnout.

Come prepared to ask and to learn, but do not come to criticize. The school is intended for those of an inquiring mind, not for those who wish simply to be entertained.

Each regular attendant will be enrolled as a scholar.

Printed synopses of each regular talk or lecture will be distributed.

Bring in specimens of fruits, insects, plants, and whatever else interests you.

It is more needful to learn first to think correctly than to perform correctly; for all accurate labor is the child of accurate thought.

☞ Bring this program with you.

We have taken up this experiment in teaching with the same spirit in which we would take up an investigation in natural science; that is, we have not attempted to prove any preconceived notions but have wished to seek for the truth. We have desired chiefly to know what is the best means of reaching the farming communities with the new educational impulses. In respect to these September schools, I may say that they were uniformly well received by the communities in which they were held. As an experiment, all of them are considered to have been successful, although it should be said that one of them was not held because of a conflict with a county fair. These schools have drawn a limited number of participants, ranging all the way from twenty to two hundred. I presume that an average attendance would run from forty to sixty. The participants have almost uniformly been the most influential horticulturists and farmers of the neighborhood — persons who extend a wide influence and who will give great popularity to any work in which they are interested. In distinctively fruit-growing regions, and especially in those localities where farmers' institutes, grange meetings and other like assemblages have been held, these schools have been immediately worth many times more than they have cost. In certain other communities, however, especially those in which farmers' meetings have not been held energetically, and in grazing regions, these schools have, in my opinion, been of too technical or special character to produce the greatest amount of good. As a result of the holding of many of these schools, I am now of the opinion that they cannot be used as primary factors in university extension; they are capable of accomplishing a great amount of good when the community has been awakened by simpler and more elementary means. I should therefore consider that they could serve their best uses when they are given as a reward to those communities in which the greatest amount of interest in reading courses, in horticultural clubs, institutes and such other public factors has been developed. There are centers enough in New York State where such schools can be held with distinct advantage at the present moment; but they should be rather the culmination of a series of extension teaching efforts rather than a primary or preliminary means of awakening the rural communities.

During October a series of meetings was held in the schoolhouses of various parts of the Fourth Judicial Department. These were under the immediate supervision of Mr. George T. Powell, who was assisted throughout the month by Mr. John W. Spencer, of Westfield. These meetings were of the type which had been so successfully inaugurated in Westchester county a year ago under the auspices of the Committee for the Promotion of Agriculture, a work which had been carried to its practical demonstration by Mr. Powell. The itinerary of the October meetings, together with some statistics thereof, are herewith submitted:

Oct. 1. A. M. Charlotte Centre, Chautauqua Co., Geo. R. Mathewson, teacher; 36 pupils.
P. M. Sinclairville High School, Chautauqua Co., Professor F. L. Hannum, principal; 165 pupils.
2. A. M. Thornton, Chautauqua Co., Bates District, Blanche Stone, teacher; 37 pupils.
P. M. Ellington, Chautauqua Co., High School, Professor E. W. Storms, principal; 130 pupils.
3. P. M. Kennedy, Chautauqua Co., Mrs. Millie Lathrop Williams, teacher.
5. A. M. Ashville, Chautauqua Co., D. H. Findley, principal; three departments; 60 pupils.
P. M. Blockville, Chautauqua Co., J. C. Smith, teacher; 34 pupils.
6. A. M. North Collins, Erie Co., High School, L. L. Shore, principal; 130 pupils.
P. M. North Collins, Eugene Willitt's District, Elizabeth E. Kingsland, teacher; 23 pupils.
7. — East Aurora, Erie Co., Jewett District, Miss Luella Malon, teacher; 18 pupils.
A. M. Youngstown, Niagara Co., Henry Lutts' District, Cora A. Bradley, teacher; 27 pupils.
P. M. Youngstown, district near Model City, Elizabeth M. Berkley, teacher; 29 pupils.
8. A. M. Knowlesville, Orleans Co., Graded School, J. F. McNall, principal; 85 pupils.
P. M. Millville District, Orleans Co., Ernest A. Roll, teacher; 34 pupils
9. A. M. Spencerport, Monroe Co., Graded School, F. W. Hill, principal; 170 pupils.
P. M. Medina, Orleans Co., High School (Evening), Adams Basin, Monroe Co., W. H. Clark, principal; 50 pupils.
12. A. M. South Livonia District, Livingston Co., W. Arthur Turner, teacher; 47 pupils.
P. M. Livonia, Livingston Co., High School, W. H. Cone, principal; 200 pupils.
13. A. M. East Palmyra School, Wayne Co.; 14 pupils.

Oct. 13. P. M. Palmyra, Wayne Co., High School, Professor S. D. Arms, principal; 600 pupils.
Evening lecture.
Conesus District, Livingston Co., S. L. McNinch, principal; 90 pupils.
Foot's Corners School, Livingston Co., Josephine Stalee, teacher; 21 pupils.

14. A. M. Boughton Hill District, Ontario Co., Miss Mary T. O'Neil, teacher; 30 pupils.
P. M. East Victor School, O. Smith, teacher; 23 pupils.
Victor, Ontario Co., High School; 300 pupils. (Evening.)

A. M. and P. M. Naples, Ontario Co., Naples High School, Professor W. C. Noll, principal; 225 pupils.

Oct. 15. A. M. Phelps District No. 2, Ontario Co., Miss Emma Saulsbury, teacher; 27 pupils.
P. M. Phelps Union School, Ontario Co., Professor D. D. Edgerton, principal; 330 pupils.
A. M. Canandaigua, Ontario Co., District No. 17, Lucretia Adams, teacher; 22 pupils.
A. M. Canandaigua, District No. 15, Mabel Mersereau, teacher; 11 pupils.
Canandaigua, District No. 14, Cora Parker, teacher; 20 pupils.
P. M. Reed's Corners School, Ontario Co., Julia C. Caplise, teacher; 31 pupils.

16. P. M. Geneva School, Ontario Co., Miss Ellen Beach in charge; 40 to 50 in room.

19. Fayetteville, Onondaga Co., Union School, Professor T. J. House, principal; 338 pupils.
P. M. Manlius Union School came to Fayetteville, Professor E. Neeley, Manlius, principal.
Dwight Stone's District, Oswego Co., Mrs. Francis Gilbert, teacher; 25 pupils.
Lansing, Oswego Co., F. D. Bradley, teacher; 60 pupils.

20. A. M. Oswego Falls, Oswego Co., Maud Marden, teacher; 87 pupils.
P. M. Fulton, Oswego Co., High School, Professor P. G. Clapp, principal; 1,000 to 1,100 pupils.

21. A. M. Volney District No. 7, Oswego Co., Mrs. Flora S. Davis, teacher; 27 pupils.
Volney District No. 4, Lilian Hollunbeck, teacher; 19 pupils.

Oct. 21. A. M. Volney District No. 3, Mrs. Anna Fradenburg, teacher; 30 pupils.

22. Mexico, Oswego Co., High School, Professor A. W. Skinner, principal; 300 pupils.

23. A. M. Allendale District, Adams P. O., Jefferson Co., Clarence Pitts, teacher; 35 pupils.

P. M. Adams, Jefferson Co., Miss M. J. Salisbury, principal; 250 pupils.

24. Watertown, Jefferson Co., Horticultural school.

26. A. M. New Hartford, Oneida Co., District No. 10, Leon E. Jinks, teacher; 33 pupils.

P. M. New Hartford, District No. 7, Miss Augusta Light, teacher; 14 pupils.

27. A. M. New Hartford Union School, Professor G. Spaulding, principal; 300 pupils.

P. M. New Hartford Union School.

Hornellsville, Steuben Co., District No 12, Miss Cassie Cunningham, teacher; 20 pupils.

28. A. M. Arkport, Steuben Co., High School, H. W. Harris, principal; 150 pupils.

P. M. Canisteo, Steuben Co., High School, Professor W. D. Hood, principal; 500 pupils.

Evening. Hornellsville High School, Professor W. R. Prentice, superintendent.

29. A. M. Rheims, Steuben Co., Pleasant Valley District, Miss Minnie E. Pierce, principal; 60 pupils.

P. M. Hammondsport, Steuben Co., High School, Professor E. L. Monroe, principal; 300 pupils.

The plan of effort in this teaching was to visit two schools during the day, one in the forenoon and one in the afternoon. The arrangements were made in advance with the school commissioner or the trustees, and the fact that the speakers were to be at the school-house was ordinarily announced some days in advance so that parents and friends could visit the school at that time if they chose. The teacher was in every case willing to omit the regular exercises for an hour or two in order that our instructors might take up the work of object teaching with the children. The motive in this work was to find out just how the pupils could be reached by means of object lesson teaching, and just how much interest they would be likely to manifest in agricultural matters in case it were ever found to be desirable to introduce such teaching as a part of the district school work. The instructor would first explain the reason for his coming and give the school to understand that no new text-books were for sale and that no new classes were to be required at the hands of the teacher. He then ordinarily took up some simple object lesson. It might be in one place a stalk of corn which he had in his hand and the process of growth of which he would explain from seed to harvest; it might be in another case the germination of a bean or a pumpkin seed; it might be in another case the habits or structure of a potato bug or some other insect; it might be, again, the reasons why there were knots and knot holes in the woodwork in the school-house; it might be a very elementary talk upon the different plant foods which are in the soil; it might be in other cases a very brief sketch, with charts, of some fungus; and so on. These exercises were uniformly well received by both the pupils and the teachers and this work has, I think, awakened more inspiration in the minds of our instructors than any other attempt which we have yet made to reach the people. The teachers in the schools have without exception expressed themselves as willing and desirous of taking up some such simple exercises as a rest for the pupils two or three times a week, if only they themselves could be instructed in the proper methods of carrying on the work. In order to afford this instruction to the teachers, we are now proposing to issue a series of experimental leaflets on object lessons and place these in the hands of the teachers.

There is no doubt of the necessity for work of this kind with the children. The love or antipathy of the farm is engendered at a very early age in the minds of the young. This has been demonstrated in these October meetings when we have asked those children who live on farms and who still desire to do so to raise their hands, and we almost uniformly find that the number who desire to live on farms is far less than those who actually do live on them. With these children, ranging from six to fifteen years of age, the question of pecuniary profits upon the farm has appealed very little, but they are influenced directly by the environments under which they are living. These environments must be improved; and if they are, there is every reason to expect that children will love the country better than the city. We have thought, therefore, that it is eminently worth the while to instill the love of nature and the knowledge of a multitude of living things in the minds of the children; and by so doing we are fully convinced that we shall also be spreading the very same knowledge and impulse to the parents of these children. In fact, all the instructors whom we have had in the field during the present year are fully convinced, I think, that the fundamental method in improving the agricultural status is to begin with genuine and attractive nature-education in rural schools. As soon as a genuine interest in these matters is awakened in the children and teachers, school gardens, cabinets of plants, insects and minerals, and other enterprises will cluster about the school-center, and the influence thereof will spread throughout the country side.

A report of this October work by Mr. Powell is herewith submitted:

"That the agriculture of New York state has been seriously depressed for several years, there is no question; that this has affected the condition of the rural population unfavorably is also recognized. It is, however, difficult to see wherein legislation can be obtained that will materially change the present conditions, except upon some educational lines that would enable those engaged in agriculture, through greater knowledge, to more successfully meet some of the difficulties attending production, the interests of consumers being here closely connected with that of producers of food supplies.

"There has been a belief that our educational system, excellent as it is, could be made of greater value to the individual by helping him to obtain a closer knowledge of some of the forces of nature which contribute so largely to the necessities and comforts of life. While our country schools have instructed children in the common and higher English branches, and, in instances, have taught some of the principles of natural science, but little attempt has been made to give science instruction with its application made to living things or to those pertaining to the active affairs of life.

"Under the auspices of the committee, known as the Committee for the Promotion of Agriculture, organized in New York in 1895, for the promotion of agriculture and of agricultural education, the experiment was tried of giving a course of lectures on natural sciences applied to agriculture in the district and high schools of Westchester county. The work proved of practical value, and a demand came upon this committee to extend it to many other sections in the state. It was thought by the New York committee that Cornell University, having such a complete equipment for scientific instruction and able teachers in agriculture, could render valuable service to the entire state by extending this line of instruction, and combining with its experiment and investigation work that of instruction in some of the principles of agriculture on the University Extension plan.

"During the month of October, 1896, this work was given to a number of schools in the different counties comprising the Fourth Judicial Department, under the provisions of the Nixon bill, for the extension of horticultural knowledge and instruction. Two classes of schools were reached: those in the rural districts and the union free schools. A district school would be visited in the morning, and in the afternoon a union or high school. Two lectures were given in each, namely, on plant and insect life. Observation lessons were given pupils, while methods of teaching these subjects were given the teachers. The most familiar objects were chosen from the plant life of the school district. Seeds representing familiar plants were germinated and placed in the hands of pupils for observation and study. The full corn in the ear was shown to illustrate what had taken place since the germination of the seed. Lectures on insects were given, choosing the familiar and injurious kinds of the district (those that do direct and serious damage to crops and to vegetation), giving their history, the different transformations through which they pass, and instruction on how to save the losses they cause. To the higher pupils, lectures were given on the beneficial insects, their relation to the flowers, and how they are an important factor in the fruitfulness of orchards and vineyards, in the distribution of pollen of different flowers, in cross-fertilization and formation of the seeds of plants; also on the relation of the soil to all forms of life, vegetable and animal, its important elements in plant food and how it can be studied in an elementary manner. Teachers were given instruction by objects and illustrations on how these subjects could be taught, without multiplying studies or exercises or without text-books, by dropping some regular exercise once or twice a week and putting in a twenty-minute natural science period as incidental work. Thus, during a term, much valuable instruction can be given on important topics without adding to the crowded demands upon teachers and pupils, and in so doing the entire work of the school will be advanced in interest and in efficiency.

"This work has been, without exception, received favorably and with interest by teachers, pupils, officers and patrons of the schools who have come to listen to this course of lectures. In some instances, in the rural districts, farmers have been present who were school trustees, and at the close of the exercises one said publicly in speaking of the work done that 'if he and his neighbors could have had that kind of instruction when they were boys, they would have been in a far more prosperous condition as farmers to-day.' In some places, notably in districts near where a horticultural school had been held the previous month, the school-house was beautifully decorated with autumn leaves, with boughs of apples hanging on the walls of the schoolroom, flowers and plants brought in for the occasion, while the fruits of the orchard and of the garden were piled upon the teacher's desk and on the floor to be correctly named and to ascertain the causes of some diseases and blights that were afflicting them; and in such cases there was a marked attendance of the patrons of the school. In several schools a vote was taken to ascertain the number of pupils who lived upon farms, both in district and high schools, and a further test vote taken to ascertain how many were satisfied to live on the farm and desired to do so when they had finished their school work. In some places the astonishing fact was met that not one hand went up or one vote was given in favor of living on the farm. This is a significant and vitally important fact brought out in this experimental educational work. These school children from the farm expressed the simple, honest convictions of their hearts that they were not satisfied with farm living and intended to get away from it in the future when opportunity might offer. Yet these children from the farms showed no lack of interest in the subjects as they were presented to them and showed an active interest in answering questions that pertain to some of the interesting things about the farm.

"This is but a corroboration of the facts obtained in the recent investigation touching the condition of the rural population made by the New York Committee for the Promotion of Agriculture—that seventy per cent. of the replies received in this inquiry indicated a tendency on the part of the rural population to go to the city. An important question here arises. What is to be the future of our rural schools and of the agriculture of the state if the present generation, as seems so clearly indicated, is not satisfied with rural life and feels no interest in maintaining or contributing to the agricultural and educational interests of the state? While many more rural school-houses must become deserted, there are thousands of children already in our cities who are deprived of school advantages because adequate room does not exist for them to get into the schools of the city. The further problem also arises of the difficult economic questions to be met in our cities as the result of congestion of population. The standard of teaching has been much improved in New York state. It has been gratifying to meet so universally teachers who are not only well qualified, but who are doing excellent work in their schools and who have the true teaching spirit. Our educational forces are thoroughly efficient and well equipped, but there is a need of different application of our school work in rural districts. The life of the district needs to be changed and it can in no way be so effectively done as through our schools. The best work cannot be done in schools with an attendance of only half a dozen children. School districts will be forced to even greater consolidation in the future, and it would be desirable if families could also be consolidated, for it is the lack of social opportunity that is felt. It is the isolation of the farm home that the boy and girl dislikes in these days of close communication and contact with the world which is brought about by steam and electricity. School grounds could be enlarged. They should furnish the opportunity for planting trees and shrubs; for the planting of seeds and growing of flowers; for having a nicely-kept lawn, and in time, these things, with their influences would extend to the homes of children who do not have them and bring with them those attractions and interest that make a home what it ought to be—pleasant and inviting in its surroundings. With some principles taught that apply to the life of the farm in its various forms, much that is to-day discouraging, unprosperous and almost hopeless will be gradually changed to better conditions, and general and permanent prosperity will follow.

"The great need in this work is teachers fitted for it. Many excellent teachers have felt their want of preparation for this kind of teaching, but our normal schools are already giving some instruction in nature-teaching, and by carrying the system somewhat further can render the state an invaluable aid in this direction.

"The instructors furnished by Cornell University in this work have shown excellent adaptability in it, and while scientific instruction has been given, it has been made to meet the understanding and interest of all, even the youngest in the primary grades. This work in the schools in the counties lying within the Fourth Judicial District has met with even a larger measure of interest than in Westchester county. In that county most farmers look upon their farms as holding a special value outside of farming purposes, hence most farms are for sale at any time; while out in the state the interest in land is more permanent and this has awakened a general and active interest in this line of instruction in every school and school district where it has been given. The plan has been accepted, not only as practical by those who have witnessed its workings, but as helpful to all whatever may be the work they will take up in life. As a system of instruction, it will bring experiences of delight to children in their school days, such as they have not before known, in the many interesting subjects in nature that will be brought out to them to know and to study about.

"The future value to the state of this kind of instruction can hardly be measured. With some exceptions, the farms of New York are in a condition of sadly depleted fertility of the soil. Nearly everywhere is to be observed the absence of that most valuable renovator of the soil—the clover plant—and in its place a low type of herbage of little value. The cost of production is thereby much increased and the profits in farming consequently largely reduced. Many of the children living on the farms of New York are practically disinherited from the soil upon which they have been born because of the mistakes of their fathers. But while the soil is depleted, it is by no means exhausted of fertility; and by the study of its necessities, and by the employment of skill and intelligence in the art of agriculture, it is capable of vast improvement, of maintaining a great population and adding to the greater prosperity of those who shall cultivate it while contributing to the general prosperity and wealth of the state. The future of the agriculture of the Empire State can be determined through educational forces, and our public schools can be made a most certain and powerful factor in its elevation to a much higher position of prosperity."

The following are samples of many unsolicited letters showing how this type of efforts appeals to teachers:

"Your visit to our school has been very pleasantly discussed by many of our students and teachers. I think that I may say by the more intelligent ones. I believe it sowed seed for thought and in good ground.

"We have perhaps seventy-five students from farms and presumably among the best of them, and I am of the opinion that a day or a half day spent by them under the instruction of your department, by coming to us, will be sowing seeds that will yield some sixty and some a hundred fold.

"I want to express myself in favor of such work being done in schools like ours in the state.

Most respectfully yours,
B. G. CLAPP,
Principal Fulton High School."

Fulton, Oct. 28, 1896.

"I send you under separate cover a number of letters written by some of the children whom you addressed. They are sent you just as written by the pupils without assistance and are self-explanatory.

"We will be pleased to use whatever help you can give us for our general work which comes about once in two weeks.

"The impression you made upon the boys and girls here was excellent.

Yours with respect,
WM. C. NOLL,
Principal Naples Union School."

Naples, November 16, 1896.

"Our children and teachers were so interested in the work presented by Mr. Powell and his assistants, that we write to thank the Horticultural Department, through you, for the incentive to work along the lines they so ably indicated, and the many hints as to ways and means. We wish we might have still further instruction.

"Thanking the Department again, for the added interest we shall take in the teaching of noxious insects, the necessity for fresh air, and plant life of the region,

I am, sincerely,
MARY J. SALISBURY,
Principal."

Adams, November 3, 1896.

"It is with pleasure that I express to you my hearty approval of the work presented to our school by your instructors.

"The pupils were much interested and I believe that the introduction of the study into our schools must certainly meet with very practical results.

Very truly yours.
H. W. HARRIS,
Principal Union School."

Arkport, November 2, 1896.

Intimately associated with these two attempts to teach the rural communities by personal means, has run the effort to awaken a living interest in the reading of bulletins and books.

We have therefore recommended, in every one of our schools and meetings, that the farmers procure certain reading matter for study and reflection during the winter time. We have printed circulars of suggestions for these courses of reading, a copy of which is here reprinted:

SUGGESTIONS FOR

A COURSE OF READING

UPON SUBJECTS RELATING TO HORTICULTURE (MORE ESPECIALLY TO FRUIT GROWING).

(SECOND EDITION.)

Most of the reading of farmers is of such a scattered and haphazard character, that the reader is unable to obtain any consecutive or fundamental ideas upon the various subjects. It is suggested that each local farmers' club, grange or horticultural society—or a neighborhood gathering, when other organizations do not exist—take up a prescribed line of reading and thinking for the coming winter.

The company which desires to take up such a course should be thoroughly organized, and each reader should secure and own the various bulletins and books which are to be read. At each meeting a prescribed number of pages is laid out to be read before the next gathering. Upon coming together, the leader asks a member to read the first paragraph of the exercise or lesson, and to give his opinion of the same. Discussion is then called for. Each paragraph is treated in similar manner.

It is obvious that one of the best subjects to select for the first readings is the soil and its management. Three or four meetings could be very profitably spent upon this general topic. From this, it would be well to pass to the fertilizing of the land. After this, various special topics could be taken up, depending upon the interests in the locality.

The course of reading suggested in this circular is designed for introduction following the Schools of Horticulture which are held in western New York (the Fourth Judicial Department), under the auspices of the Nixon or Experiment Station Extension Bill, which provides funds for disseminating horticultural knowledge in this territory. The circular, therefore, has no suggestions for reading in subjects pertaining to general farming and stock farming, although the silo has been mentioned because it may become such a valuable adjunct to the maintaining of the fertility of many horticultural farms. The readings are designed to be merely elementary and introductory. The time cannot be far distant when a well-organized series of agricultural reading circles, and correspondence instruction, will be demanded. The present suggestions cannot be more than temporary expedients; and as soon as any company or club desires more extended study, other bulletins and books will be recommended.

Only such bulletins have been recommended in this list as are published in this state (by the State Experimental Station at Geneva, and the Cornell Experiment Station at Ithaca), and only those, too, which are of a general nature, or those which can be called reading bulletins rather than reference or technical bulletins. There are other reading bulletins published by these stations which have not been recommended because they are out of print. It is hoped that the reading of these bulletins may lead to the reading of books, where the subjects are set forth in more fullness.

L. H. BAILEY,
Ithaca, N. Y.

SOILS AND TILLAGE:

- Bulletin 119, Cornell. The Texture of the Soil (L. H. Bailey).
- Bulletin 120, Cornell. The Moisture of the Soil and its Conservation (L. A. Clinton).
- Bulletin 72, Cornell. The Cultivation of Orchards (L. H. Bailey).
- "The Soil," by F. H. King. The Macmillan Co., New York. 75c.

MANURES AND FERTILIZERS:

- Bulletin 94, State Station. The Composition and Use of Fertilizers (L. L. Van Slyke).
- Bulletin 103, Cornell. Soil Depletion in Respect to the Care of Fruit Trees (I. P. Roberts).
- Bulletin 102, State Station. Silage and Silos (W. P. Wheeler).
- "The Fertility of the Land," by I. P. Roberts. (In press).

FRUITS AND THEIR CULTIVATION:

- Bulletin 69, Cornell. Hints on the Planting of Orchards (L. H. Bailey).
- Bulletin 102, Cornell. General Observations Respecting the Care of Fruit Trees (L. H. Bailey).
- "Fruit Culture," by W. C. Strong, Rural New Yorker, N. Y. $1.
- Bulletin 84, Cornell. The Recent Apple Failures of Western New York (L. H. Bailey).

Bulletin 74, Cornell. Impressions of the Peach Industry in Western New York (L. H. Bailey).

Bulletin 100, Cornell. Evaporated Raspberries in Western New York (L. H. Bailey). Gives a general account of evaporators, and of raspberry growing.

Other writings upon special fruits will be recommended if desired.

SPRAYING, INSECTS, DISEASES:

Bulletin 86, Cornell. The Spraying of Orchards (E. G. Lodeman).

Bulletin 101, Cornell. Notions about the Spraying of Trees; with Remarks on the Canker-worm. (L. H. Bailey).

"The Spraying of Plants," by E. G. Lodeman. The Macmillan Co., New York. $1.

THE MAKING OF HOME GROUNDS:

Bulletin 121, Cornell. Suggestions for the Planting of Shrubbery (L. H. Bailey).

Bulletin 90, Cornell. China Asters; with Remarks upon Flower-Beds (L. H. Bailey).

HELPS FOR TEACHERS:

"Elements of Botany," by J. Y. Bergen. Ginn & Co., Boston. "Familiar Trees and Their Leaves," by Schuyler Mathews. D. Appleton & Co., N. Y. "Plant Life on the Farm," by Maxwell T. Masters. Orange Judd Co., New York. "Chemistry of the Farm," by R. Warrington. Orange Judd Co., New York.

Every grange or farmer's club should be slowly accumulating a library of good rural books for purposes of reference. Advice will be given when desired.

This circular is simply an advisory one, although we are convinced that it has already awakened a genuine interest in many quarters in its subject. We find that there are very few rural books which are adapted to the needs of children or which can be put in the hands of teachers in the country schools. We have therefore conceived of a series of leaflets upon object lessons, dealing with common things, which may be put in the hands of teachers, and, when desired, of pupils as well. We have preferred that these little texts be not read to the pupils as stories, but that they shall answer as suggestions to the teachers who shall have the children perform the simple experiments and to make the direct observations which are there indicated. One of these leaflets is herewith reprinted:

TEACHER'S LEAFLETS
FOR USE IN THE RURAL SCHOOLS
PREPARED BY
THE AGRICULTURAL EXPERIMENT STATION
OF CORNELL UNIVERSITY,
ITHACA, N. Y.

No. 1.
DEC. 1, 1896.

Issued under the auspices
of the Experiment Station
Extension, or Nixon Law.
BY L. H. BAILEY.

HOW A SQUASH PLANT GETS OUT OF THE SEED.

BY L. H. BAILEY.


1. Squash plant a week old.

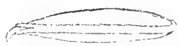
If one were to plant seeds of a Hubbard or Boston Marrow Squash in loose warm earth in a pan or box, and were then to leave the parcel for a week or ten days, he would find, upon his return, a colony of plants like that shown in Fig. 1. If he had not planted the seeds himself or had not seen such plants before, he would not believe that these curious plants would ever grow into squash vines, so different are they from the vines which we know in the garden. This, itself, is a most curious fact — this wonderful difference between the first and the later stages of all plants, and it is only because we know it so well that we do not wonder at it.

It may happen, however,—as it did in a pan of seeds which I sowed a few days ago—that one or two of the plants may look like that shown in Fig. 2. Here the seed seems to have come up on top of the plant, and one is reminded of the curious way in which beans come up on the stalk of the young plant. If we were to study the matter, however,—as we may do at a future time,—we should find a great difference in the ways in which the squashes and the beans raise their seeds out of the ground. It is not our purpose to compare the squash and the bean at this time, but we are curious to know why one of these squash plants brings its seed up out of the ground whilst all the others do not.

Note.—These leaflets are intended for the teacher, not for the scholars. It is their purpose to suggest the method which a teacher may pursue in instructing children at odd times in nature-study. The teacher should show the children the objects themselves—should plant the seeds, raise the plants, collect the insects, etc.; or, better, he should interest the children to collect the objects. Advanced pupils, however, may be given the leaflets and asked to perform the experiments or make the observations which are suggested. The scholars themselves should be taught to do the work and to arrive at independent conclusions. Teachers who desire to inform themselves more fully upon the motives of this nature-study teaching, should write for a copy of Bulletin 122, of the Cornell Experiment Station, Ithaca, N. Y.

In order to find out why it is, we must ask the plant, and this asking is what we call an experiment.

2. Squash plant which has brought the seed-coats out of the ground.



3. Germination just beginning.

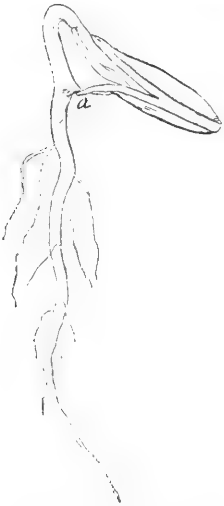
4. The root and peg.

5. Third day of root growth.

6. The plant breaking out of the seed.

We may first pull up the two plants. The first one (Fig. 1) will be seen to have the seed still attached to the very lowest part of the stalk below the soil, but the other plant has no seed at that point. We will now plant more seeds, a dozen or more of them, so that we shall have enough to examine two or three times a day for several days. A day or two after the seeds are planted, we shall find a little point or root-like portion breaking out of the sharp end of the seed, as shown in Fig. 3. A day later this root portion has grown to be as long as the seed itself (Fig. 4), and it has turned directly downwards into the soil. But there is another most curious thing about this germinating seed. Just where the root is breaking out of the seed (shown at *a* in Fig. 4), there is a little peg or projection. In Fig. 5, about a day later, the root has grown still longer, and this peg seems to be forcing the seed apart. In Fig. 6, however, it will be seen that the seed is really being forced apart by the stem or stalk above the peg for this stem is now growing longer. The lower lobe of the seed has caught upon the peg (seen at *a*, Fig. 6), and the seed-leaves are trying to back out of the seed. Fig. 7, shows the seed still a day later. The root has now produced many branches and has thoroughly established itself in the soil. The top is also growing rapidly and is still backing out of the seed, and the seed coats are still firmly held by the obstinate peg.

Whilst we have been seeing all these curious things in the seeds which we have dug up, the plantlets which we have not disturbed have been coming through the soil. If we were to



7. The operation further progressed.

8. The plant just coming up.

9. The plant liberated from the seed-coats.

10. The plant straightening up.

see the plant in Fig. 7, as it was "coming up," it would look like Fig. 8. It is tugging away trying to get its head out of the bonnet which is pegged down underneath the soil, and it has "got its back up" in the operation. In Fig. 9, it has escaped from its trap and it is laughing and growing in delight. It must now straighten itself up, as it is doing in Fig. 10, and it is soon standing proud and straight, as in Fig. 1. We now see that the reason why the seed came up on the plant in Fig. 2, is because in some way the peg did not hold the seed-coats down (see Fig. 13), and the expanding leaves are pinched together, and they must get themselves loose as best they can.

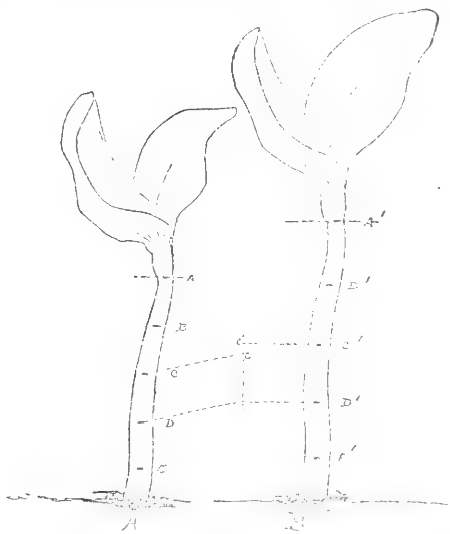
11. The true leaves developing.

12. Marking the root.

There is another thing about this curious squash plant which we must not fail to notice, and this is the fact that these first two leaves of the plantlet came out of the seed and did not grow out of the plant itself. We must notice, too, that these leaves are much smaller when they are first drawn out of the seed than they are when the plantlet has straightened itself up. That is, these leaves increase very much in size after they reach the light and air. The roots of the plantlet are now established in the soil and are taking in food which enables the plant to grow. The next leaves which appear will be very different from these first or seed leaves.

These later ones are called the true leaves. They grow right out of the little plant itself. Fig. 11 shows these true leaves as they appear on a young Crookneck squash plant, and the plant now begins to look much like a squash vine.

13. The root grown in the end portions.



14. The marking of the stem, and the spreading apart of the marks.

We are now curious to know how the stem grows when it backs out of the seeds and pulls the little seed-leaves with it, and how the root grows downwards into the soil. Now let us pull up another seed when it has sent a single root about two inches deep into the earth. We will wash it very carefully and lay it upon a piece of paper. Then we will lay a ruler alongside of it, and make an ink mark one-quarter of an inch from the tip, and two or three other marks at equal distances above (Fig. 12).* We will now carefully replant the seed. Two days

*Note.—Common ink will not answer for this purpose because it "runs" when the root is wet, but indelible ink, used for marking linen or for drawing, should be used. It should also be said that the root of the common pumpkin, and of the summer bush squashes, is too fibrous and branchy for this test. It should be stated, also, that the root does not grow at its very tip, but chiefly in a narrow zone just back of the tip; but the determination of this point is rather too difficult for the beginner.

later we will dig it up, when we shall most likely find a condition something like that in Fig. 13. It will be seen that the marks E, C, B, are practically the same distance apart as before and they are also the same distance from the peg, AA. The point of the root is no longer at DD, however, but has grown on to F. The root, therefore, has grown almost wholly in the end portion.

Now let us make a similar experiment with the stem or stalk. We will mark a young stem, as at A in Fig. 14; but the next day we shall find that these marks are farther apart than when we made them (B, Fig. 14). The marks have all raised themselves above the ground as the plant has grown. The stem, therefore, has grown between the joints rather than from the tip. The stem usually grows most rapidly, at any given time, at the upper or younger portion of the joint (or internode); and the joint soon reaches the limit of its growth and becomes stationary, and a new one grows out above it.

Natural science consists in two things—seeing what you look at, and drawing proper conclusions from what you see.

Respecting the general necessity and requirements for such reading course, I submit the following report from Mr. John W. Spencer, who has been intimately associated with this district school work and who is at the present time aiding us in conducting a correspondence instruction:

"As you well know, a reading course for farmers on agricultural topics, after the plan of the Chautauqua course, has long been a cherished plan of mine, and when you asked me to go with Mr. Geo. T. Powell during the month of October, I gladly accepted, for it seemed to be a good opportunity to test the practicability of the idea. I still think it a good one, but the month's experience has shown me another plan more expedient for the time and giving more lasting and practical results. I do not suggest the abandonment of the plan for a reading course, but that it be held in abeyance as a sequel to a second plan, which is this: That the College of Agriculture of Cornell University prepare papers for teachers in our common schools qualifying them to develop the powers of observation of pupils on subjects pertaining to the field, forest and household. For instance, give each child a piece of bread and the teacher draw out everything appealing to the child's eye. The teacher could supplement many points the child failed to observe. Then begin an inquiry as to why such and such points come to be so,—begin a study of the cause. The study into the cause of the porosity of the bread could be made to lead, step by step, to the whole chemistry of baking, and from that to starch and its frequency and great importance.

"I do not suggest that these exercises be made an added recitation, but a rest exercise of twenty minutes for once or twice each week. A clever teacher can give such subjects a wide range of adaptability from primary to nearly the highest grade. Themes can be made of some of the most familiar subjects involving chemistry, insect, plant life, and geology, arousing observation and a spirit of inquiry as to cause. It is not the superstructure that I think this plan would build, but the foundations for the superstructure, which is most important. Introduced into the schools, there would be a double benefit,—first upon the child, and then when he went home and talked about it with his parents they too would unconsciously become pupils. This last may seem merely incidental but I am sure that the aggregate results will be immense. It takes only five to eight years to raise a crop of boys and girls to the point where the majority of them are thinking of their qualification of getting their own living, and their preparation will be vastly enhanced, particularly for farm life, if they have developed an inquiring spirit to know the why of things.

"During the month of October I visited, either alone or with Mr. Powell, forty-two schools, representing an attendance of 4,687 pupils, located in the counties of Chautauqua, Erie, Niagara, Monroe, Livingston, Ontario, Steuben, Oswego, Jefferson and Oneida, and the schools have ranged from the brick temple of one thousand pupils to the little school-house of eleven. The children everywhere are alike,—all eager for instruction, and so are the teachers, except some with only one or two years' experience, who feel a lack of preparation and fear that they might not do the proper thing, but when assured that the plan of observation exercises was to reach the children only by fully equipping the teacher, all hesitation was banished. Not a single teacher has made an objection to the plan.

"In conclusion, I would suggest that your department prepare observation exercises in the spirit of the foregoing remarks. To schools employing the highest grade teachers, no solicitation will be necessary more than to present the literature. To the hamlet and district schools an exemplification of the work to the pupils will promote its adoption. I would advise pushing this last industriously during the present winter, depending for its future spread upon the popularity given by those schools visited this winter and by working through such centers as teachers' institutes in the next school year."

This correspondence-instruction is likewise experimental; that is, we are endeavoring at the present time to determine just how it can be carried on under our limitations and for New York state. We have no authority by law to establish a permanent or organic system of reading courses throughout our territory. We have kept the names of the participants in all of our September schools, and we have the names of the teachers and officers in the various rural and village schools which we have visited. In each of these public schools we have requested the teacher to have the pupils write their next compositions upon the subjects which were presented by our instructors, and to forward these compositions to us as samples of the kind and extent of interest which the children may be expected to take in this work. Both teachers and children have responded with surprising readiness, and the correspondence from this source which has already accumulated is large and is an indication that the work can be greatly extended with the most marked benefits. We have also taken the opportunity to write to the various correspondents who have been interested in our work, asking them certain specific questions upon certain bulletins which we have sent them and which have been used as texts in the schools, particularly upon Bulletins 119 and 120 (The Texture of the Soil, and The Moisture of the Soil). This correspondence has been the means of tying together the various agricultural interests of the Fourth Judicial Department and the College of Agriculture of Cornell University, and has resulted in a natural and organic union which, it seems to me, it would be violence to break.

All this work, as I have said, has been experimental,— an attempt to discover the best method of teaching the people in agriculture. We believe that the most efficient means of elevating the ideals and practice of the rural communities are as follows, in approximately the order of fundamental importance: (1) The establishment of nature-study or object-lesson study, combined with field-walks and incidental instruction in the principles of farm-practice in the rural schools; (2) the establishment of correspondence-instruction in connection with reading-courses, binding together the University, the rural schools, and all rural literary or social societies; (3) itinerant or local experiment and investigation, made chiefly as object-lessons to farmers and not for the purpose, primarily, of discovering scientific facts; (4) the publication of reading bulletins which shall inspire a quickened appreciation of rural life, and which may be used as texts in rural societies and in the reading courses, and which shall prepare the way for the reading of the more extended literature in books; (5) the sending out of special agents as lecturers or teachers, or as investigators of special local difficulties, or as itinerant instructors in the normal schools and before the training classes of the teachers' institutes; (6) the itinerant agricultural school, somewhat after the plan of our horticultural schools, which shall be equipped with the very best teachers and which shall be given as rewards to the most intelligent and energetic communities.

All these agencies, to be most efficient, should be under the direction of a single bureau wholly removed from partisan political influence and intimately associated with investigational work in agriculture. Such a bureau should also have most intimate relations with the Department of Public Instruction, for not only must the public schools be reached, but teachers must be trained. The teachers in our public schools are now of a high grade, and they will quickly seize opportunities to prepare themselves to teach the elements of rural science. There should be facilities placed at the disposal of every normal school in the state, whereby it may receive courses of lectures upon rural subjects from teachers of recognized ability, and teaching-helps, in the way of expository leaflets, should be placed in the hands of every teacher who desires them. All this work of carrying the modern university extension impulse to the country, is too important and too fundamental to be confined to any one particular agricultural interest or to any one district of the state; and it is a work, too, which should be treated as a teaching extension and not as an experiment station extension.

In conclusion, I must say that the farmers, as a whole, are willing and anxious for education. They are difficult to reach because they have not been well taught, not because they are unwilling to learn. It is astonishing, as one thinks of it, how scant and poor has been the teaching which has even a remote relation to the tilling of the soil; and many of our rural books seem not to have been born of any real sympathy with the farmer or any just appreciation of his environments. Just as soon as our educational methods are adapted to the farmer's needs, and are born of a love of farm life and are inspired with patriotism, will the rural districts begin to rise in irresistible power.

Respectfully submitted,

L. H. BAILEY,

In charge of the scientific and teaching work of the Nixon bill, Cornell University, December 1, 1896.

BULLETIN 123—December, 1896.

Cornell University—Agricultural Experiment Station,

ITHACA, N. Y.

ENTOMOLOGICAL DIVISION.

GREEN FRUIT WORMS.

By M. V. Slingerland.

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The regular bulletins of the Station are sent free to all who request them.

BULLETINS OF 1896.

106. Revised Opinions of the Japanese Plums.
107. Wireworms and the Bud Moth.
108. The Pear Psylla and the New York Plum Scale.
109. Geological History of the Chautauqua Grape Belt.
110. Extension Work in Horticulture.
111. Sweet Peas.
112. The 1895 Chrysanthemums.
113. Diseases of the Potato.
114. Spray Calendar.
115. The Pole Lima Beans.
116. Dwarf Apples.
117. Fruit Brevities.
118. Food Preservatives and Butter Increasers.
119. The Texture of the Soil.
120. The Moisture of the Soil.
121. Suggestions for the Planting of Shrubbery.
122. Second Report upon Extension Work in Horticulture.
123. Green Fruit Worms.

CORNELL UNIVERSITY, ITHACA, N. Y., *December* 23, 1896.

Honorable Commissioner of Agriculture, Albany:

Sir.—This bulletin contains a history of some insects which have recently caused considerable damage in our state. It is hoped that the description of the insects, with the methods of combating the same, will prove of value to our fruit growers. This paper is therefore submitted for publication under Chapter 437 of the Laws of 1896.

L. H. BAILEY.

CONTENTS.

Green Fruit Worms.

Xylina antennata Walk.
Xylina laticinerea Grt.
Xylina grotei Riley.
Order Lepidoptera; family Noctuidae.

In New York state, the year 1896 has been marked by the appearance in destructive numbers of several insects which have not been noticeably injurious here during the past decade or more. The army worm, which in July ravaged field crops in nearly every county in the state, is a familiar example; and the insects discussed in this bulletin also afford another illustration of this fact.

Most of our correspondence during May and June related to the cause of the large holes being eaten into the sides of young fruits, especially apples. The depredators proved to be large, light green caterpillars that have been popularly known as "green fruit worms." As these caterpillars had not seriously troubled New York fruit growers since 1877, they were a new insect pest to many. This year specimens were sent to the insectary from the following twelve counties: Niagara, Genesee, Orleans, Wayne, Oswego, Chautauqua, Ontario, Columbia, Clinton, Tompkins, Seneca and Saratoga. Judging from the reports accompanying the specimens, the caterpillars evidently did the most damage in the first five counties named. It was estimated that at least 25 per cent. of the apple crop was injured in many localities. Had there not been an unusually heavy crop of apples all over the state this year, the destruction of so large a percentage of the young fruit by these caterpillars would have been a much more serious matter. Fruit growers should acquaint themselves with these fruit-eating caterpillars so as to guard against their ravages in the future, when there may not be so many young fruits to spare as there were this year.

WHAT THEY ARE.

These green fruit worms are large, light yellowish or apple-green caterpillars, with a narrow cream-colored stripe down the middle of the back, a wide cream-colored stripe along each side, and many similarly colored mottlings or spots which sometimes form quite distinct stripes along the body above the broad lateral stripes. When fully grown they range from an inch to an inch and a half in length. Some of them are shown at work in the illustration on the title page, and at *a*, plate 2; figures *f* and *g*, plate 1, *c* and *d*, plate 3, and *b*, plate 2 are from photographs of the worms taken twice natural size. Like many other caterpillars, these green fruit worms are the offspring or younger stage of insects known as moths or millers. These adult forms are represented natural size at *b*, plate 1, at *a*, plate 3 and at *f*, plate 2; and also twice natural size in the same plates.

HABITS AND FOOD OF THE CATERPILLARS AND MOTHS.

For several years before the fruit-eating habit of these green fruit worms was discovered, they were known to feed upon the leaves of the apple and several forest trees; the leaves of poplar, hickory, wild cherry, box-elder, and the buds of roses are recorded among their food-plants. During the summer of 1870, however, the insects attracted unusual attention in Missouri and Illinois by being frequently found eating or boring into apples, peaches and the spongy oak-apple (a large apple-like swelling or gall often produced on oak-leaves by a minute gall-fly). This year, pears, peaches, plums, currants, and quinces were eaten in New York state, but the caterpillars confined themselves mostly to an apple diet. We have not observed the worms *boring* into the fruit. They simply begin eating on one side and often continue feeding until nearly half of the fruit is eaten, leaving a large cavity on that side (see illustration on title page, and figure *a*, plate 2). They work during May and the first half of June, and are not to be found on the trees again during the year. The insects go from fruit to fruit, one caterpillar thus ruining several fruits; an instance is recorded of one worm destroying six of the eight quinces on a tree. The caterpillars feed during the day, and probably also at night. When young, they doubtless feed upon the foliage or buds, for, when the fruit is large enough for them to eat, the worms are found to be half grown or more. One of our correspondents writes: "We grafted some young Dutchess pear trees this spring, and have had to watch them continually to keep these worms from destroying the buds."

We have found some of the caterpillars apparently resting during the day on a silken web spun on one side of a partly rolled leaf; some of our correspondents have also observed this. We suspect that this is not a normal habit of the insects, for the only occasion we saw it resorted to in our cages was in the case of the caterpillar shown in figure *d*, plate 4; it was suffering from a serious internal trouble in the form of a parasitic grub which finally came out and fastened the worm to the leaf with its silken cocoon (see the figure).

Dr. Riley has recorded that the caterpillars can pinch with their little jaws quite sharply, so as to draw a little blood from a tender part. The worms are easily disturbed at their work of feeding on the fruits, for if the tree or limb be suddenly jarred, they at once drop to the ground, not spinning down by a silken thread as do the canker worms.

The parents of these green fruit worms—the moths—are night-flyers, remaining concealed on the bark of the trees or in other secluded places during the day. Most of them appear during September and October, and, hibernating in sheltered places, appear again in March, April and May; some evidently remain in the ground as pupæ over winter, the moths not appearing until spring. They are readily attracted to lights or sweetened baits at night, and are "often found in maple groves while sugaring is going on. Sometimes sap-pails are found in the morning with the surface of the liquid completely covered with the moths."

THEIR HISTORY AND DISTRIBUTION.

These green fruit worms first attracted serious attention by boring into apples and pears in 1870, in Missouri and Illinois; Dr. Riley also states that he had seen them for several years previously on the foliage of different trees. A newspaper slip, written in 1872, states that the insects were very common and destructive in the South, where the worms made their appearance during April and May, in the latitude of Mobile and New Orleans. In 1877, the caterpillars appeared in large numbers in the orchards in the vicinity of Lockport, N. Y. Professor Comstock investigated this outbreak and found that much damage had been done in many apple and pear orchards. In the case of one young pear orchard, he counted the whole number of pears on several trees and found that 45 per cent. of them had been injured by the caterpillars. It was noted that this orchard was adjoining a forest from which the insects may have spread. It is a curious fact that although these green fruit worms were so numerous in 1877, they seem not to have attracted attention again anywhere in New York state until 1896, nineteen years later. In 1888, quite a number of apples were found apparently injured by these caterpillars in Maine.

The adult insects—the moths—are not uncommon in Canada and the northern and eastern portions of the United States; and the insects have been recorded as injurious in the South and as far west as Nevada. Collectors report the moths as common in, and we have this year received the caterpillars from, several widely separated localities in New York state. Thus, these fruit-eating caterpillars are very generally distributed throughout Canada and the United States.

THEIR LIFE HISTORY.

The green fruit worms do most of their damage to the young fruits in May, but some of them continue working until nearly the middle of June. During the first week in June most of the caterpillars get their full growth and then burrow into the soil beneath the trees to a depth of from an inch to three inches. Here they roll and twist their bodies about until a smooth earthen cell is formed. Most of them then spin about themselves a very thin silken cocoon; some spin no cocoon. Within the cocoon or the earthen cell, the caterpillar soon undergoes a wonderful transformation which results in what is known as the *pupa* of the insect. One of these dark brown, lifeless-looking pupæ is shown, natural size, at *c*, plate 2, and enlarged on the same

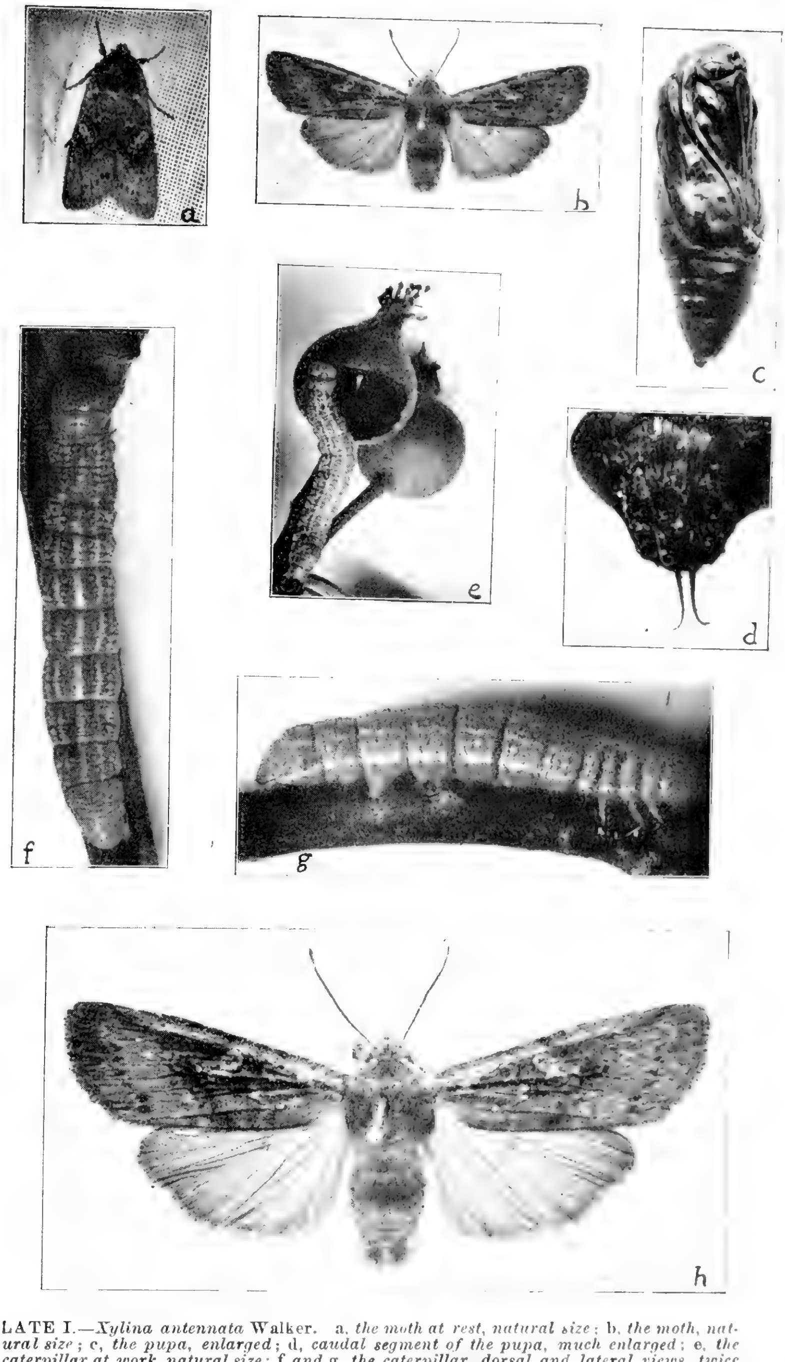

PLATE I.—*Xylina antennata* Walker. a, *the moth at rest, natural size*; b, *the moth, natural size*; c, *the pupa, enlarged*; d, *caudal segment of the pupa, much enlarged*; e, *the caterpillar at work, natural size*; f *and* g, *the caterpillar, dorsal and lateral views, twice natural size*; h, *the moth, twice natural size.*

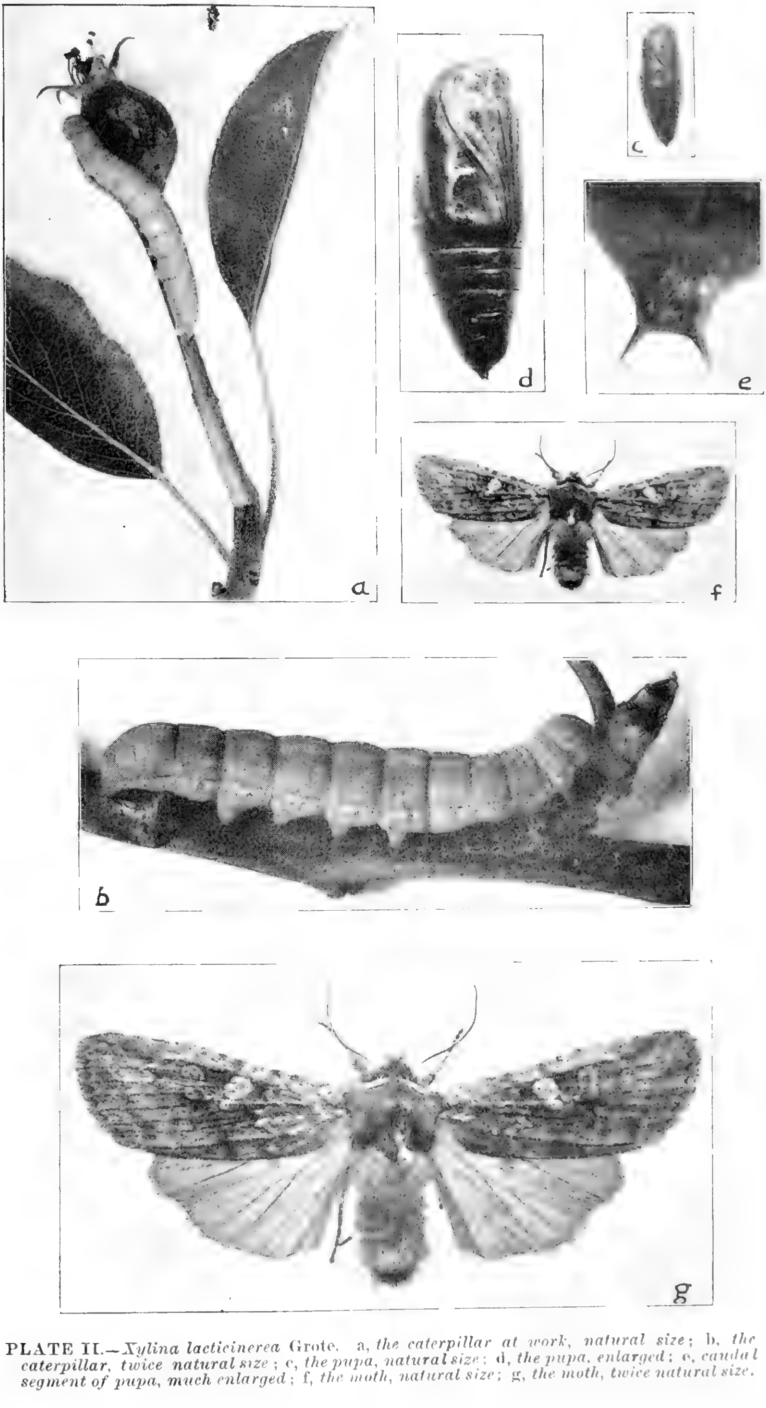

PLATE II.—*Xylina lacticinerea* Grote. a, *the caterpillar at work, natural size*; b, *the caterpillar, twice natural size*; c, *the pupa, natural size*; d, *the pupa, enlarged*; e, *caudal segment of pupa, much enlarged*; f, *the moth, natural size*; g, *the moth, twice natural size*.

plate. Most of these insects spend about three months of their life in the ground during the summer in this pupal stage. Some evidently hibernate as pupæ, and thus pass nine months or more of their life in this stage. Usually about September 15th, the moths break their pupal shrouds and work their way to the surface of the soil. Most of them emerge in the fall before October 15th, and pass the winter as moths in sheltered nooks; some evidently do not emerge until spring. Warm spells in winter sometimes arouse a few of them from their hibernation.

During the first warm days of early spring, all the moths appear, and doubtless the mothers soon begin laying eggs. No observations have been made on the eggs or young caterpillars in the North, but in a newspaper article published in the South in 1872, it is stated that the eggs are deposited in the spring on the undersides of the leaves. They hatch in a few days, and the young worms begin at once to eat the foliage, or the fruit, or both.

There is thus but one brood of these green fruit worms in a year. They work mostly in May, pupate in the soil in June, live as pupæ during the summer and sometimes all winter, and most of the moths emerge in the fall and hibernate, laying their eggs in the spring.

THE DIFFERENT SPECIES DISCUSSED.

In all previous discussions of an economic nature regarding these green fruit worms, they have been considered as comprising but a single species of insect, namely, the ash-gray pinion (*Xylina antennata*). However, when the specimens of the caterpillars began to arrive at the insectary last spring, it was soon evident that there were at least two quite different kinds. We grew the supposed two species separately in our cages. When the moths appeared in September, they were sent to an expert, Professor J. B. Smith, for determination. He returned them labelled as *three* distinct species! We had thus bred two species of moths in the cage where we thought we had only one kind of green fruit worm. As the moths of all three species showed remarkable resemblances to each other* (compare figures *b* and *h*, plate 1, figures *a* and *b*, plate 3, and figures *f* and *g*, plate 2), we at once began a search for characters which might separate the insects in their caterpillar or pupal stages. It had been an easy matter from the first to separate the caterpillars into two distinct kinds, as represented in figures *e*, plate 1 and *a*, plate 2, or *g*, plate 1 and *b*, plate 2. It was also found that the pupæ developed from these two kinds of caterpillars were quite different; this difference is well shown in figures *d*, plate 1, and *e*, plate 2. Very fortunately, through the kindness of Mr. L. O. Howard, U. S. Entomologist, we were able to examine the single specimen preserved of the caterpillars which Dr. Riley had under observation when he wrote of the insect in 1870. This specimen (figured at *c* and *d*, plate 3, twice natural size) revealed some characters which we had overlooked, and enabled us to separate the caterpillars we had had in one cage into two species. We were also able to connect each species of caterpillar with the moth of the same species. In the discussion of the three species whch follows, the differences mentioned above, and several others, are more fully brought out.

1. *Xylina antennata* Walk.

About three-fourths of all the green fruit worms sent to the insectary were of this species; from some localities, however, nearly as many of the next species discussed were received.

As early as 1858, a moth of this species (habitat unknown) found its way into the British Museum, and was there first described and named. When Dr. Riley discussed these green fruit worms in 1871, he also described the moths and named them *Xylina cinerea*. In 1879, specimens of *X. cinerea* were taken to England by Dr. Fernald and there compared with Walkers' *X. antennata*, and the identity of the insects thus established. In 1882, Dr. Riley stated (Papilio, II, 101), that his description of the moths of these insects included all three of the species to be discussed here; but he considered two of the forms as only varie-

* Professor Smith writes: "As I have them divided in my collection you can tell the difference between them; but if you undertake to locate it you will become lost in a short time."

ties, and not distinct species. Mr. A. G. Butler, of the British Museum, has recently also expressed his opinion (The Entomologist for 1891, p. 242), that all three forms were only variations of a single species, *X. antennata*. Our authorities on this group of moth, Professors Smith and Mr. Grote, however, have considered them as three distinct species; and our study of the earlier stages of the insects confirms this conclusion.

As all three species apparently occur in the same localities, and as the moths are so remarkably similar in size, color, and markings, it is not surprising that they should be classed as varieties of one species. We have never before seen three species of moths which showed such remarkable resemblance to each other, and yet were quite different in their caterpillar and pupal stages.

At *a* on plate 1 is shown a moth of *X. antennata*, natural size; the figure is reproduced from a photograph taken from life while the moth was at rest in the top of one of our cages. At *b*, plate 1, the moth is shown with wings expanded, natural size, and at *h* is shown same moth, twice natural size. These figures will show the size and markings of the moth, and also represent nearly its natural color. It usually differs from the moth of *X. laticinerea* in the ground color of its wings being of a more brownish cast; and from the moth of *X. grotei* in that its markings are not so bright and distinct. There may be slight antennal differences in the males of the three species, and there are certainly quite marked differences in the male genitalia of *X. antennata* and *X. grotei* as is shown, enlarged at *g* and *f*, plate 3.

The moth of *X. antennata* began to emerge in our cages September 13th, and all had appeared by October 6th; the specimens which Professor Comstock reared in 1877 emerged September 17th. In the following table the recorded captures of the moths, at lights or sweetened baits, are given:

PLACE.	Dates.
New York State	August 4, September 26, October 10, April 8, 20.
Clyde, N. Y.	September 10, *and warm spells in winter up to* April 15.
Schenectady, N. Y.	September 15, 30.
Newark, N. J	September.
Orillia, Ont	September 16, May.
St. Catherines, Ont.	September 16.
Newton, Mass	September, October, March, April and May.
Evanston, Ill.	October.
Maywood, Ill.	August 18, 26.

The above table shows that the adults have appeared in some localities in August, but most of the records agree in giving September or October as the months when they are usually seen in the fall. The fact that the moths hibernate, as shown by Mr. Devereaux's captures during warm spells in winter at Clyde, N. Y., explains the records of captures in March, April and May. In some localities or seasons, perhaps all of the moths of this species do not emerge in the fall, but hibernate as pupæ. Our breeding experiments, however, indicate that all emerge in the fall, differing in this respect from *X. laticinerea* as will be shown later.

As was stated in the general discussion of the life-history of these green fruit worms, doubtless egg-laying takes place early in the spring, and the young caterpillars feed upon the buds and leaves until May, when the fruit is large enough for them to eat. The further life-history of this species follows closely the general account just mentioned.

The caterpillar of this species is figured, natural size, eating the apple, on the right in the frontispiece, and twice natural size, both lateral and dorsal views, at *f* and *g*, plate 1. It is of a light, apple-green color, sometimes yellowish, with the head of nearly the same color, and the venter darker. As the figures show, the hair-bearing spots are white and very distinct. A narrow mesal cream-colored stripe, slightly wider near the middle of the body, extends along the dorsum; there is a slightly narrower, but distinct subdorsal stripe of the same color that is somewhat broken toward the extremities; there is also a wide, stigmatal, cream-colored stripe, mostly below the spiracles, with its lower or ventral edge sharply defined, but with its upper or dorsal edge much indented with the body color and irregularly extending to a much broken, narrow, lateral stripe of cream-colored spots a little above the spiracles. Most of these characteristic markings are well shown in the figures at *f* and *g*, plate 1. The caterpillars spin a very thin cocoon of silk about themselves in their earthen cell before they change to pupæ.

The brown pupa, shown enlarged at *c*, plate I, resembles in size and general appearance that of *X. laticinerea* shown at *c* and *d*, plate 2. But a close examination of the caudal end of the pupæ of these two species reveals striking differences. These are well shown in the enlarged figures of this portion of the pupæ at *d*, plate 1, and *e*, plate 2.

2. *Xylina laticinerea* Grt.

This green fruit worm was represented among the specimens received from each locality, and, in one or two instances, it seemed to be equally as numerous as the preceding species.

The moth of *X. laticinerea* was first described and named in 1874 from a Massachusetts specimen. The insect is illustrated on plate 2, figures *f* and *g* representing the moth, natural size and twice natural size, respectively. It seems to differ from the moth of *X. antennata* in the ground color of the wings being of a more decidedly ash-gray color and the markings are possibly a little more distinct; a comparison of the figures of the two species, shown on plates 1 and 2, will show that they are very similar. There may be antennal and genitalic differences in the males also; having bred no males of *laticinerea*, we cannot verify this.

Nothing has been recorded respecting the life-history or earlier stages of this species; the caterpillar described by Mr. Edwards (Papilio, III, 135) as belonging to this insect, was certainly another species, probably *X. grotei*, as we shall see later. Our observations show that the caterpillars appear in May with, and have the same habits as, those of *X. antennata*. Pupation takes place in earthen cells in the soil about the same time in June. But the caterpillars of *X. laticinerea* spin no trace of a cocoon. The insect remains in the pupa state until fall, when some of them give forth the moth, but in our cages most of the pupæ are now hibernating; one moth emerged September 26th. The following table, made up from the recorded captures of the moths this species, shows that they fly both in the fall and spring, many of them doubtless hibernating and others not emerging until spring.

PLACE.	Dates.
Schenectady, N. Y.	September 29, 30; October 4, 6, 10, 19, 21, 25.
Saranac Lake, N. Y.	April.
Orillia, Ont.	September 15.
St. Catherines, Ont.	October 8; May 2.
Newton, Mass.	September and October.
Evanston, Ill.	November and April.
Minnesota	September 16; October 3; April 21, 22.

A comparison of the figures of the caterpillars of this species at *a* and *b*, plate 2, with those of the other two species represented on plates 1 and 3, will at once show that it is quite different from either of the others. It is of a light apple-green color, sometimes with a slight bluish cast; the head is sometimes a little lighter, and the venter is but slightly darker. The whole body is very finely mottled with minute cream-colored spots, and the hair-bearing spots are small and not very distinct. There is a narrow cream-colored mesal stripe on the dorsum, wider near the middle of the body; the narrow light lemon-yellow stigmatal stripe, widest toward the extremities, runs just *above* the spiracles, except in the case of the spiracle nearest each extremity, where it runs *below;* there is also a very narrow, much broken, sometimes quite indistinct, cream-colored stripe midway between the mesal and stigmatal stripes. On some specimens the yellow stigmatal stripe was bordered above with a blackish shade, as shown on the parasitized caterpillar at *a*, plate 4. A comparison of this description of the caterpillar with that of Mr. Edwards, referred to above, will show that they cannot apply to the same insect; for the lemon-yellow stripe is *narrow* and *above* the spiracles, and not *broad* and *below,* as in Mr. Edwards' description.

The pupa of this species is not formed within a cocoon, and also differs from that of *X. antennata* very strikingly in the structure of the caudal segment, as is well shown by a comparison of the enlarged figures of this part at *d*, plate 1, and *e*, plate 2. Otherwise the pupæ are quite similar, as the enlarged figures at *c*, plate 1, and *d*, plate 2, show.

Although the moths of *X. antennata* and *X. laticinerea* are distinguished from each other with considerable difficulty, the above descriptions and the accompanying figures show that the caterpillars and pupæ of the two species are quite distinct and can be easily separated. Thus both insects are distinct and valid species.

3. *Xylina grotei* Riley.

Only a small percentage of the green fruit worms sent us proved to be of this species.

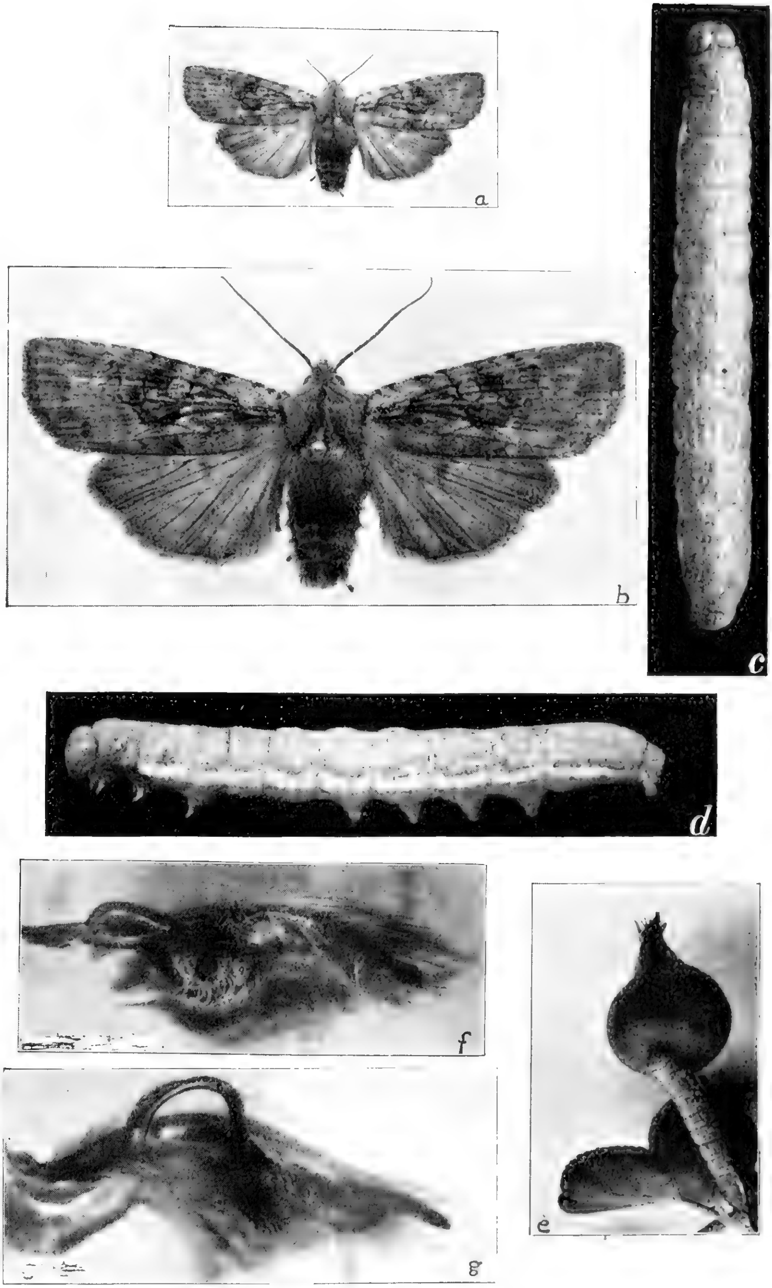

PLATE III.—*Xylina grotei* Riley. a, *the moth, natural size;* b, *the moth, twice natural size;* c *and* d, *the caterpillar, dorsal and lateral views, twice natural size;* e, *the caterpillar at work, natural size;* f, *genitalia (right half,) of the male Xylina grotei, much enlarged;* g, *genitalia (right half,) of the male of Xylina antennata, much enlarged.*

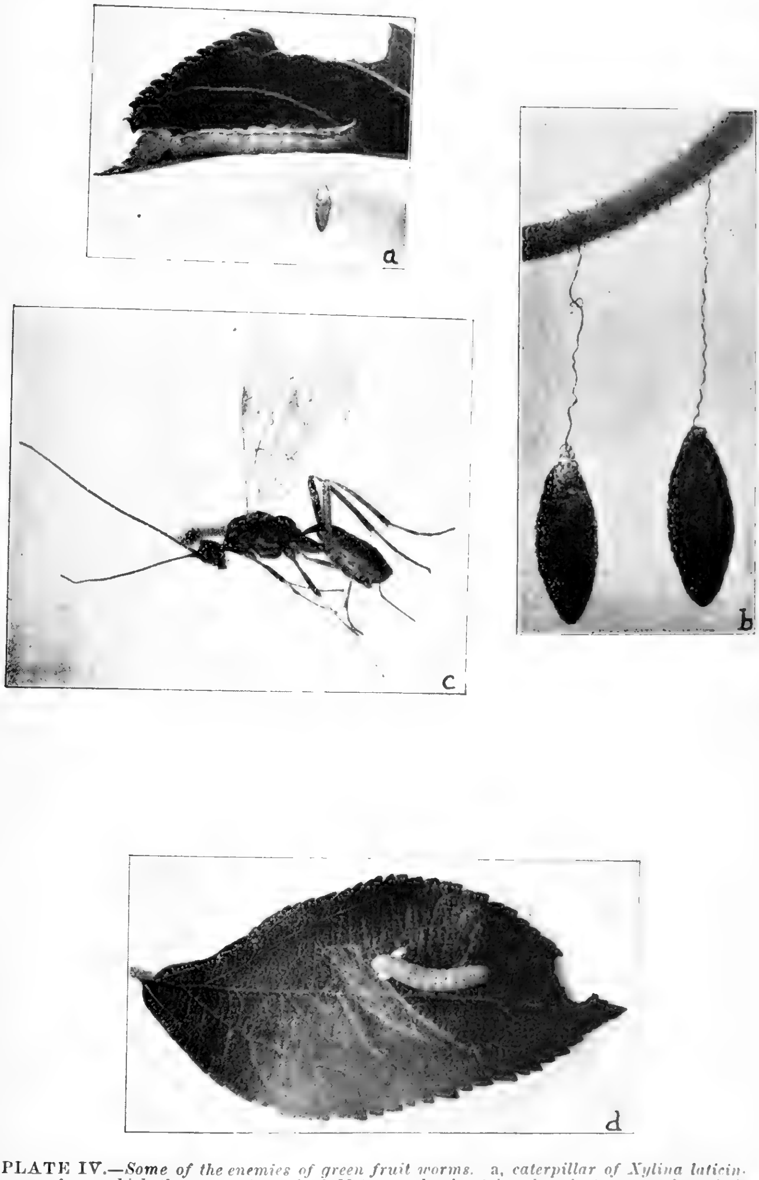

PLATE IV.—*Some of the enemies of green fruit worms.* a, *caterpillar of Xylina laticinerea from which the parasitic grub of Meteorus hyphantriae has just emerged and is spinning its cocoon, natural size* ; b, *two of the curious suspended cocoons of Meteorus hyphantriae, enlarged* ; c, *the adult parasite (Meteorus hyphantriae), much enlarged* ; d, *a caterpillar of Xylina lacticinerea killed by the parasitic grub of Mesochorus agilis which has spun its cocoon beneath the caterpillar, fastening the latter to the leaf, natural size.*

The moth was first described as *X. cinerosa* in 1879, from New York state specimens. In 1882, Dr. Riley pointed out that this name could not be used, as another insect belonging to the same genus had received the same name years before. He suggested the name *X. grotei* instead, but thought the insect was only a variety of *X. antennata*. Nothing has since been recorded about the species.

A comparison of the figures of the moth at *a* and *b*, plate 3, with the figures of the moths of the other two species on plates 1 and 2, will show how remarkably similar the insects are in the adult state. The moths of *X. grotei* have a much brighter appearance and their markings are more sharply defined than in either of the other two species. The ground color of their wings is much like that of *X. antennata*, but there is a decided difference in the male genitalia of these two species, as is shown in the enlarged figures at *f* and *g*, plate 3. Our specimens of the moths of *X. grotei* emerged from the 18th to the 26th of September. We have found no recorded captures of this species. Doubtless its life-history is very similar to that of *X. antennata*.

The caterpillars of *X. grotei* so closely resemble those of *X. antennata* that we did not notice their characteristic differences until the moths which appeared in one of our cages were determined as two distinct species; and until we had seen the only caterpillar preserved by Dr. Riley when he studied these green fruit worms in 1870. The caterpillar at the left in the frontispiece (the same one is shown at *e*, plate 3) is of this species; figures *c* and *d*, plate 3, are reproductions of photographs taken twice natural size, from Dr. Riley's preserved (blown) specimen. Compare these figures with those of the caterpillars of *X. antennata* at *e*, *f* and *g*, plate 1. The difference between the broad stigmatal stripes is readily seen; in *X. grotei*, both edges of the stripe are quite sharply defined, while in *X. antennata* the upper edge is much broken or indented with the body color. Anothr difference readily seen on the specimens, but not so evident in the figures, is that the subdorsal stripes in *X. grotei* are not so continuous as in *X. antennata*, but are made up of three or four irregular spots on each segment. Otherwise, as regards general color, size, etc., the caterpillars of these two species are practically alike. Dr. Riley's description of his green fruit worm agrees with his preserved specimen of *X. grotei*, and he states that the moth of this species (a variety, he then considered it) "heads his series." Mr. Edwards described a caterpillar of what he supposed was *X. laticinerea*, but his description applies to the caterpillars of *X. grotei*, and not to those of either of the other two species under discussion.

The indications are that the caterpillars of *X. grotei* spin slight cocoons within which they change to pupæ, as in the case of *X. antennata*. But we cannot say whether there are any differences in the pupæ of these two species or not.

NATURAL ENEMIES.

Fortunately for the fruit grower, these green fruit worms have several deadly enemies. One correspondent reported that red-winged blackbirds had been seen either catching and eating the caterpillars or carrying them away to feed their young. Doubtless other birds which frequent orchards also include the worms in their menu.

The indications are, however, that the caterpillars suffered much more from the attacks of at least two minute foes among their own kind. From the material sent to the insectary, we bred two minute hymenopterous parasites. Apparently the most numerous and efficient one of these little enemies is shown much enlarged at *c*, plate 4; they are only about 1-5 of an inch in length. It was named *Meteorus hyphantriæ* by Dr. Riley in 1886. That year it did valiant work in checking the fall web-worms (*Hyphantria cunea*). Its method of working is to deftly insert an egg into the body of an unwary and defenceless caterpillar. A grub hatches from this egg and proceeds to live on the internal fats and juices of its host—the caterpillar. The host leads a lingering existence, and finally, a short time before death ensues, the parasitic grub bores its way out through the skin of its host and proceeds to spin the curious brown cocoon, shown natural size at *a*, and much enlarged at *b*, plate 4. Just how the grub manages to make these suspended cocoons is not known. Apparently it first spins out the large suspending silken thread, and then, at the end of this, holding on in some manner (perhaps by its jaws), it proceeds to spin about itself a coarse, loose cradle of the same kind of silk. When secure inside this cradle it lets go its hold from the suspensory thread and spins its soft, dense, fine-threaded cocoon. These cocoons are attached to any part of the tree and the threads which suspends them vary in length from one-half an inch to four inches. From ten days to two weeks (in June) after the grub spins its cocoon the transformation through the pupal to the adult stage takes place. The little four-winged foe then emerges through a round hole made in the end of the cocoon, by deftly gnawing around the lower end and thus detaching a neatly fitting cap.

The other little enemy of these green fruit worms is about the same size as, and looks something like, the one just described. It also works inside the caterpillars in the same manner, gradually sapping out their life. But instead of undergoing its further transformations in a suspended cocoon, it bores its way out of the caterpillar, and crawling beneath its host, it proceeds to fasten the latter down to a leaf with its cocoon. This state of affairs is well shown at *d*, in plate 4. The two-thirds grown caterpillar is pinioned to the leaf by the cocoon of the grub which caused it to die a lingering death. This little parasitic foe is known to science at *Mesochorus agilis*.

Doubtless the efficient work of these little parasitic insects and the birds has been one of the main reasons why these green fruit worms have troubled New York fruit growers only at long intervals.

HOW TO COMBAT THESE FRUIT-EATING CATERPILLARS.

It is to be hoped that these caterpillars will not often visit our orchards in destructive numbers, for the past season's experience has shown that it is a difficult matter to check their ravages. It would seem at first thought that the pests might be readily killed with a Paris green spray. But several of our correspondents, who have a reputation for thoroughness in spraying and who successfully check fungi and other insects, reported that all of their efforts in this line did not noticeably diminish the crop of these caterpillars. Some sprayed with the poison three or four times during the time the worms were at work. Mr. Albert Wood, Carlton, N. Y., collected 60 live worms and placed 20 on each of three large branches loaded with young apples; the branches were cut off and nailed up somewhere. One branch was sprayed with kerosene emulsion, one with arsenate of lead and the third with hellebore. Two days after the worms were all lively and well, and had kept on eating apples. The orchard from which these worms were taken had received three thorough applications of Bordeaux mixture and Paris green.

It is possible that one or two thorough applications of Paris green, made before the blossoms open, when the caterpillars are small and feeding on the buds and leaves, might kill many of them. However, the concensus of opinion among our correspondents seems to be that they cannot be effectually reached with a spray at any time. It is probably true that it is practically impossible to sufficiently coat the outside of a young apple with a poison spray, so that one of the caterpillars would get enough to kill it when it eats into the fruit. For this reason we concur in the belief that the worms cannot be effectually checked with a spray of any kind after the fruit gets large enough for them to feed upon it. But the young worms must feed upon the buds and leaves for a time before the fruit gets large enough, and it seems plausible that a Paris green spray, thoroughly applied at least once before the trees blossom, must result in the death of many of the worms. We would like to see this tried, but there is one difficulty which will always arise; that is, one can rarely, if ever, tell whether the insects are present in his orchard in destructive numbers until they begin to eat the fruit. It is always a good practice, however, to spray orchard fruits at least *once* (where bud moths or case-bearers are thick, *twice*) before the blossoms open with the combined Bordeaux and Paris green.

One correspondent writes that the caterpillars were the most numerous in a cultivated orchard. This does not agree with the observations of Professor Comstock made during the outbreak in 1877; he states that the fruit was injured most in those orchards which were not cultivated. This fact led him to recommend that many of the insects could be destroyed by the cultivation of the orchards during July and August, while the worms are in the ground undergoing their transformations. We believe that thorough cultivation during the summer will tend to greatly lessen the crop of green fruit worms for the following year.

The fact, as reported by several correspondents, that the caterpillars will at once *drop* to the ground (not *spin* down as do canker worms) when the branch upon which they are at work is unnaturally jarred, affords a vulnerable point of attack against them. Why not jar them off into sheets and then kill them? We saw this successfully accomplished last spring in an orchard near Geneva, N. Y. "Curculio catchers" were in daily use to catch this most serious pest of stone-fruits, and hundreds of the green fruit worms were being caught at the same time, thus "killing two birds with one stone." On young trees this is the most efficient and practicable method of fighting these caterpillars we can suggest. Three or four good thorough jarrings ought to effectually check their ravages for the season. Of course, on old, large trees it would be a big undertaking to jar them, and when there was such a setting of fruit as we had last spring, it might not pay to do it. But with a small setting of fruit, it might mean the difference between a good crop and no crop at all, in which case it would certainly pay.

In brief then, our recommendations for fighting these fruit-eating caterpillars are to always spray the trees at least once with Paris green in the Bordeaux mixture before the blossoms open, to kill some of the worms while they are young. Later sprayings, after the fruit is large enough for them to eat, will avail but little. After the fruit sets, the only successful and practical way to fight them seems to be by jarring them off into sheets or "curculio catchers" and killing them. Follow this with thorough cultivation of the soil during the summer, and thus kill many of the insects while they are undergoing their transformations in the soil. They are difficult pests to fight, and it is to be hoped that at least another nineteen years may pass before our fruit growers receive a third visitation from destructive numbers of them.

MARK VERNON SLINGERLAND.

APPENDIX II.

Detailed Statement of receipts and expenditures of the Cornell University Agricultural Experiment Station, for the fiscal year ending June 30, 1896.

RECEIPTS.

From Horticultural Division.

1895.			
July	12.	Products sold	$59 35
Nov.	1.	Products sold	13 96
Dec.	2.	Products sold	22 88
1896.			
Jan.	4.	Products sold	6 32
	20.	Products sold	26 33
Feb.	1.	Products sold	28 25
		Hauling coal	18 04
March	3.	Hauling coal	37 25
April	1.	Hauling coal	32 41
		Hauling coal	5 72
			$250 51

From Office.

1896.			
Feb.	8.	Eighty bulletins	$4 00
	25.	Forty bulletins	2 00
			$6 00

EXPENDITURES.

For Salaries.

1895.			
July	31.	I. P. Roberts, director, one month.....	$125 00
		H. H. Wing, dairyman, one month......	104 16
		G. C. Watson, assitant agriculturist, one month..........................	100 00
		G. F. Atkinson, cryptogamic botanist, one month.........................	91 66
		G. W. Cavanaugh, assistant chemist, one month..........................	66 66
Aug.	31.	I. P. Roberts, director, one month......	125 00
		H. H. Wing, dairyman, one month.....	104 66
		G. C. Watson, assistant agriculturist, one month.........................	100 00
		G. F. Atkinson, cryptogamic botanist, one month.........................	91 66
		G. W. Cavanaugh, assistant chemist, one month.........................	66 66
		H. W. Smith, clerk, one month.........	62 50
Sept.	30.	I. P. Roberts, director, one month......	125 00
		H. H. Wing, dairyman, one month......	104 16
		G. C. Watson, assistant agriculturist, one month.........................	100 00
		G. F. Atkinson, cryptogamic botanist, one month.........................	91 66
		G. W. Cavanaugh, assistant chemist, one month.........................	66 66
		H. W. Smith, clerk, one month.........	62 50
Oct.	31.	I. P. Roberts, director, one month......	125 00
		H. H. Wing, dairyman, one month.....	103 66
		L. H. Bailey, horticulturist, one month..	166 66
		G. F. Atkinson, cryptogamic botanist, one month.........................	91 66
		G. W. Cavanaugh, assistant chemist, one month.........................	66 66

1895.			
Oct.	31.	M. V. Slingerland, assistant entomologist, one month	$125 00
		H. W. Smith, clerk, one month	62 50
		S. H. T. Hayes, assistant agriculturist, twenty-seven days	67 50
Nov.	30.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		L. H. Bailey, horticulturist, one month	166 66
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66
		M. V. Slingerland, assistant entomologist, one month	125 00
		H. W. Smith, clerk, one month	62 50
		S. H. T. Hayes, assistant agriculturist, twenty-six days	65 00
Dec.	31.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		L. H. Bailey, horticulturist, one month	166 66
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66
		M. V. Slingerland, assistant entomologist, one month	125 00
		H. W. Smith, clerk, one month	62 50
		S. H. T. Hayes, assistant agriculturist, twenty-six days	65 00
1896.			
Jan.	31.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		L. H. Bailey, horticulturist, one month	166 66
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66

1896.			
Jan.	31.	M. V. Slingerland, assistant entomologist, one month	$125 00
		H. W. Smith, clerk, one month	62 50
		L. A. Clinton, assistant agriculturist, one month	83 33
Feb.	29.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		L. H. Bailey, horticulturist, one month	166 66
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66
		M. V. Slingerland, assistant entomologist, one month	125 00
		H. W. Smith, clerk, one month	62 50
		L. A. Clinton, assistant agriculturist, one month	83 33
March	31.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		L. H. Bailey, horticulturist, one month	166 66
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66
		M. V. Slingerland, assistant entomologist, one month	125 00
		L. A. Clinton, assistant agriculturist, one month	83 33
April	30.	I. P. Roberts, director, one month	125 00
		H. H. Wing, dairyman, one month	104 16
		G. F. Atkinson, cryptogamic botanist, one month	91 66
		G. W. Cavanaugh, assistant chemist, one month	66 66
		L. A. Clinton, assistant agriculturist, one month	83 33
		E. A. Butler, clerk, one month	50 00

1896.			
May	31.	I. P. Roberts, director, one month.....	$125 00
		H. H. Wing, dairyman, one month......	104 16
		G. F. Atkinson, cryptogamic botanist, one month..........................	91 66
		G. W. Cavanaugh, assistant chemist, one month..........................	62 50
		L. A. Clinton, assistant agriculturist, one month..........................	83 33
		E. A. Butler, clerk, one month.........	50 00
June	30.	I. P. Roberts, director, one month......	125 00
		H. H. Wing, dairyman, one month......	104 24
		G. F. Atkinson, cryptogamic botanist, one month..........................	91 74
		G. W. Cavanaugh, assistant chemist, one month..........................	66 74
		L. A. Clinton, assistant agriculturist, one month..........................	83 37
		Total for salaries...............	$7,934 98

For Buildings.

1895.			
July	22.	Labor, painting insectary..............	$9 75
	30.	Lumber and labor.....................	6 62
	22.	Paint and sundry supplies.............	3 65
Aug.	14.	Labor, painting insectary..............	13 40
Feb.	14.	Fifty-two gallons oil..................	3 68
Oct.	2.	Plumbing.........................	3 15
		Total for building.................	$40 25

For Printing.

1895.			
June	22.	U. S. Express Co., expressage..........	$0 25
July	16.	U. S. Express Co., expressage..........	25
	17.	U. S. Express Co., expressage..........	80
	16.	Franklin Engraving Co., electros.......	32 56

1895.			
July	11.	Franklin Engraving Co., express on photos	$0 25
	25.	U. S. Express Co., expressage	30
Aug.	13.	L. V. R. R. Co., freight and cartage	1 58
	27.	U. S. Express Co., expressage	25
	3.	W. F. Humphrey, printing Bulletin No. 97	101 45
Sept.	7.	U. S. Express Co., expressage	30
	30.	I. C. Chandler, drawings	12 00
Oct.	21.	U. S. Express Co., expressage	25
	31.	U. S. Express Co., expressage	30
Nov.	8.	U. S. Express Co., expressage	25
	21.	George Small, lumber and labor	1 33
	29.	Lovejoy Co., electros	16
Dec.	9.	Lovejoy Co., electros	53
Nov.	23.	Franklin Engraving Co., electros	9 70
	30.	Franklin Engraving Co., electros	78
Dec.	7.	U. S. Express Co., expressage	15
	11.	U. S. Express Co., expressage	25
	23.	U. S. Express Co., expressage	80
	31.	L. V. R. R. Co., freight and cartage	1 84
	28.	W. F. Humphrey, printing Bulletin No. 105	113 05
1896.			
Jan.	1.	National Express Co., expressage	25
	2.	U. S. Express Co., expressage	75
	4.	Lovejoy Co., electros	1 09
	21.	W. F. Humphrey, printing Bulletin No. 107 and No. 108	339 50
	9.	L. V. R. R. Co., freight and cartage	3 41
	30.	E. G. Hance, cartage	1 00
	31.	National Express Co., expressage	40
Feb.	1.	National Express Co., expressage	40
Jan.	29.	Lovejoy Co., electros	84
	30.	U. S. Express Co., expressage	65
Feb	11.	U. S. Express Co., expressage	60
	24.	New York Engraving Co., electros	8 00

1896.			
Feb.	29.	U. S. Express Co., expressage..........	$0 25
March	10.	U. S. Express Co., expressage..........	40
	14.	U. S. Express Co., expressage..........	45
	13.	Lovejoy Co., electros..................	9 90
	20.	U. S. Express Co., expressage..........	35
	25.	E. G. Hance, cartage..................	25
April	6.	W. F. Humphrey, printing Bulletin No. 114............................	60 25
	8.	D. L. & W. R. R. Co., freight and cartage,	8 38
	17.	U. S. Express Co., expressage..........	25
	30.	U. S. Express Co., expressage..........	90
May	5.	E. G. Hance, cartage..................	50
	22.	U. S. Express Co., expressage..........	1 05
		Total for printing................	$719 20

For Office Expenses.

1895.			
July	11.	National Express Co., expressage......	$0 80
	15.	Andrus & Church, stationery..........	2 00
	24.	Andrus & Church, stationery..........	5 25
	26.	T. S. Buck, rubber stamps.............	6 57
	31.	L. V. Maloney, labor..................	40 50
Aug.	2.	G. F. Atkinson, expenses to Denver.....	108 50
	24.	W. E. Barnes, labor...................	1 75
	26.	U. S. Express Co., expressage..........	45
	29.	W. O. Wyckoff, stationery.............	2 35
		Andrus & Church, stationery...........	10 15
	21.	Rural Pub. Co., subscription Rural New Yorker...........................	1 00
Sept.	2.	L. V. Maloney, labor..................	40 50
	3.	M. A. Adsitt, stationery..............	3 10
	28.	L. V. Maloney, labor..................	37 50
	30.	Andrus & Church, stationery..........	2 62
Oct.	5.	Ithaca Gas Co., gas..................	2 00
	15.	Andrus & Church, stationery...........	4 50
	12.	Andrus & Church, stationery..........	13 27

1895.			
Oct.	18.	U. S. Post Office, stamps	$10 00
	30.	U. S. Post Office, stamped envelopes	10 90
	31.	L. V. Maloney, labor	40 50
	31.	Popular Science Monthly, subscription	1 00
	25.	M. A. Adsitt, typewriter ribbons	2 10
Nov.	7.	Ithaca Gas Co., gas	1 20
	12.	Andrus & Church, stationery	1 35
	30.	L. V. Maloney, labor	39 00
	30.	M. A. Adsitt, typewriter supplies	3 25
	26.	U. S. Post Office, postage	5 00
	22.	Andrus & Church, stationery	2 00
	23.	Andrus & Church, pencils	45
Dec.	9.	U. S. Post Office, postage	5 00
	6.	Ithaca Gas Co., gas	40
	17.	M. A. Adsitt, 1 doz. carbon	50
	24.	U. S. Post Office, postal cards	1 00
	28.	U. S. Post Office, stamps	5 00
	31.	L. V. Maloney, labor	39 00
		A. T. Stout, labor	6 20
1896.			
Jan.	3.	Andrus & Church, stationery	1 55
	4.	M. A. Adsitt, typewriter supplies	1 30
	9.	M. A. Adsitt, stationery	1 05
	7.	Ithaca Gas Co., gas	32
	14.	A. A. A. C. & E. S., fee	10 00
	17.	U. S. Post Office, stamps	7 00
	18.	Andrus & Church, stationery	1 25
	31.	L. V. Maloney, labor	40 50
Feb.	1.	A. T. Stout, labor	10 12
		Andrus & Church, stationery	2 50
Jan.	21.	M. A. Adsitt, carbon	25
Feb.	22.	U. S. Post Office, postage	5 00
	11.	Andrus & Church, stationery	3 15
	25.	Ithaca Stamp Co., rubber stamps	1 75
	29.	L. V. Maloney, labor	37 50

1896.			
March	2.	M. A. Adsitt, stationery	$1 75
	7.	Andrus & Church, stationery	5 20
	13.	M. A. Adsitt, stationery	3 35
	31.	E. A. Butler, labor	12 00
		L. V. Maloney, labor	39 00
April	2.	Balance on typewriter, M. A. Adsitt	62 50
		Ithaca Gas Co., gas	64
	7.	Andrus & Church, stationery	5 00
	17.	M. A. Adsitt, stationery	4 40
	22.	L. V. R. R. Co., freight and cartage	85
	24.	Tichenor & Son, repairs on typewriter desk	50
	28.	E. M. Hall, linoleum	45 00
		Library Bureau, book-case	17 50
	30.	L. V. Maloney, labor	39 00
		Andrus & Church, stationery	5 50
May	1.	W. R. Morey, cartage	25
	20.	Mary Miller, labor	75
	22.	I. P. Roberts, traveling expenses	20 73
		U. S. Express Co., expressage	35
		Andrus & Church, stationery	8 10
June	27.	U. S. Post Office, postage	8 95
May	26.	Ithaca Gas Co., gas	80
	30.	L. V. Maloney, labor	39 00
June	3.	E. M. Hall, door mat	65
		M. A. Adsitt, stationery	1 75
	9.	Andrus & Church, stationery	4 60
		M. A. Adsitt, stationery	1 05
	16.	U. S. Post Office, postage	5 00
May	22.	Bool Co., oil	1 50
June	22.	M. A. Adsitt, stationery	1 00
		M. A. Adsitt, stationery	1 60
	30.	Andrus & Church, stationery	5 43
		U. S. Post Office, postage	3 28
		L. V. Maloney, labor	39 00

1896.			
June	27.	James Seaman, labor	$83 21
	30.	M. A. Adsitt, carbon	50
		Total for office expenses	$1,059 51

For Agricultural Division.

1895.			
June	22.	D., L. & W. R. R. Co., freight and cartage	$1 48
July	20.	J. C. Stowell & Son, wool sacks	2 40
	31.	E. E. Lull, labor	27 26
Aug.	21.	National Express Co., expressage	90
	15.	L. V. R. R. Co., freight and cartage	1 11
	30.	Theo. VanNatta, labor	28 46
Sept.	9.	H. H. Wing, traveling expenses	9 70
	3.	Aermotor Co., galvanized tanks	14 68
	9.	Aermotor Co., galvanized iron	11 90
Aug.	31.	C. S. Baker & Co., pamphlets	2 00
Sept.	23.	H. H. Wing, traveling expenses	2 20
	28.	R. D. Roberts, labor	15 83
		J. W. Gilmore, labor	7 30
		Treman, King & Co., glass	30
Oct.	7.	D., L. & W. R. R. Co., freight and cartage	4 60
	31.	John Stout, labor	31 92
	24.	D., L. & W. R. R. Co., freight and cartage	1 00
Nov.	30.	F. P. Hatch, labor	18 75
Dec.	20.	Bush & Dean, cheese cloth	30
1896.			
Jan.	18.	D., L. & W. R. R. Co., freight and cartage	51
	23.	Andrus & Church, stationery	4 13
	11.	U. S. Post Office, postage	1 00
	17.	Farmer's Fertilizer Co., fertilizers	2 50
	31.	F. P. Hatch, labor	5 25
	18.	E. G. Allen, periodicals	8 70

1896.			
Feb.	26.	National Express Co., expressage......	$0 25
April	10.	U. S. Post Office, stamped envelopes....	10 80
	13.	U. S. Express Co., expressage..........	40
	14.	D. M. Thorburn & Co., seeds...........	1 94
	23.	Farmer's Fertilizer Co., fertilizers......	7 23
	28.	National Express Co., expressage......	2 05
May	2.	D., L. & W. R. R. Co., freight and cartage..............................	3 11
		I. P. Roberts, traveling expenses.......	5 32
		D. Hill, trees.........................	10 00
	7.	J. M. Johnson, labor..................	14 00
	11.	S. Raub, labor........................	3 90
	28.	National Express Co., expressage......	45
		L. V. R. R. Co., freight and cartage.....	72
June	3.	F. Ellis, hay..........................	12 93
	4.	J. J. Brown, mule....................	20 00
	11.	R. L. Speed, labor....................	14 00
	13.	E. A. Butler, tobacco plants............	1 80
	22.	J. M. Johnson, labor..................	28 00
	26.	National Express Co., expressage......	45
	23.	E. Hodge, labor......................	48
	29.	R. L. Speed, labor....................	18 40
		Farmer's Fertilizer Co., fertilizers.......	136 13
	30.	J. Shimada, labor.....................	23 50
		A. T. Stout, labor....................	3 20
		C. B. Tailby, labor...................	2 03
		G. W. Tailby, labor..................	2 19
		Total for Agricultural Division....	$527 46

For Horticultural Division.

1895.			
July	2.	American Gardening, subscriptions.....	$2 35
June	29.	James Seaman, lumber................	40 00
July	13.	Driscoll Bros. lime...................	2 05
	27.	Thos. Shea, labor....................	8 25
Aug.	1.	Ira Grover, labor....................	37 50

1895.			
July	1.	George Small, lumber	$14 03
1896.			
Jan.	17.	Bool Co., furniture	7 70
1895.			
Aug.	31.	Ira Grover, labor	38 42
June	27.	C. J. Rumsey & Co., hardware	78 78
Oct.	1.	Ira Grover, labor	37 00
Sept.	27.	U. S. Dept. Agr., index cards	2 00
Oct.	21.	U. S. Express Co., expressage	65
	28.	National Express Co., expressage	3 82
Nov.	1.	Ira Grover, labor	37 00
Oct.	12.	Andrus & Church, stationery	3 25
	5.	Dennison Mfg. Co., tags	2 50
Aug.	19.	G. E. Steihert, publications	21 75
Oct.	15.	Andrus & Church, stationery	75
Aug.	17.	J. J. McGowan, oats	10 18
Sept.	30.	Bool Co., frames	90
Nov.	15.	L. V. R. R. Co., freight and cartage	50
	2.	Phoenix Nursery Co., trees	50
Oct.	8.	Jamison & McKinney, plumbing	80
Nov.	30.	Ira Grover, labor	37 00
	11.	G. V. Nash, botanical specimens	7 50
Oct.	5.	American Dry Plate Co., plates	9 78
Nov.	20.	Selover & Atwood, plants	5 00
	23.	Dennison Mfg. Co., glue	2 50
1896.			
Feb.	2.	Andrus & Church, tags	75
1895.			
Dec.	20.	F. E. Ellis, hay	11 54
Oct.	9.	Driscoll Bros., lime	23 65
Sept.	28.	Slocum & Taber, sundries	4 10
Nov.	3.	Fall Creek Milling Co., feed	48 92
Dec.	14.	U. S. Express Co., expressage	30
Sept.	29.	Hook Bros., baskets and seeds	6 80
July	2.	Geo. Rankin & Son, glassware	5 26
1896.			
Jan.	1.	Ira Grover, labor	37 00

1896.			
Jan.	9.	U. S. Express Co., expressage..........	$0 60
	14.	Fall Creek Milling Co., sacks..........	96
1895.			
Dec.	21.	John Reidy & Co., sundries............	4 30
	19.	George Small, lumber and labor........	1 75
	31.	E. & H. T. Anthony, printing frames...	1 40
	20.	C. J. Rumsey & Co., hardware..........	69 11
	21.	Pritchard & Son, wagon repairs........	27 70
1896.			
Feb.	1.	Ira Grover, labor.....................	37 00
		A. Laurence, hay......................	15 58
Jan.	27.	U. S. Express Co., expressage..........	25
	18.	E. G. Allen, periodicals...............	9 85
	27.	E. D. Sturdevant, seeds...............	1 15
Feb.	29.	Ira Grover, labor.....................	37 00
	28.	U. S. Express Co., expressage..........	30
	26.	Slocum & Taber, sundries..............	5 95
	29.	L. V. R. R. Co., freight and cartage.....	50
March	7.	U. S. Dept. Agr., index cards..........	2 00
Jan.	7.	Reynolds & Lang, steam fitting........	108 24
July	26.	Rothschild Bros., netting..............	40
Feb.	25.	Burns Bros., horseshoeing.............	30 75
	15.	S. H. Bush, oats......................	42 98
March	25.	F. Ellis, hay..........................	15 00
April	14.	Repairs...............................	34 33
May	4.	Ira Grover, labor.....................	37 00
June	29.	Barr Bros., hardware..................	70
	30.	Seaman, labor and lumber.............	356 37
		Driscoll Bros., lime and stone..........	25 25
		J. B. Lang, labor and fittings..........	98 95
		Total for horticultural division....	$1,516 05

For Chemical Division.

1895.			
July	3.	Eimer & Amend, watch glasses and grinding.......................	$1 58

1895.			
Nov.	4.	J. K. Haywood, labor	$26 10
July	26.	Treman, King & Co., pans	2 00
Oct.	11.	Bush & Dean, toweling	92
Nov.	30.	J. K. Haywood, labor	20 55
1896.			
Jan.	3.	J. K. Haywood, labor	30 00
Feb.	8.	J. K. Haywood, labor	25 80
March	3.	J. K. Haywood, labor	13 80
April	1.	J. K. Haywood, labor	30 00
	14.	Repairs	20 63
May	2.	J. K. Haywood, labor	32 55
	5.	Eimer & Amend, retraction cartridges	1 73
	11.	Rothschild Bros., linen	73
June	3.	J. K. Haywood, labor	33 10
	22.	Supplies	142 15
	23.	Eimer & Amend, chemical supplies	96 47
		Total for chemical division	$478 11

For Botanical Division.

1895.			
July	26.	White & Burdick, chemicals	$3 20
June	7.	Reed & Montgomery, book binding	50
Aug.	19.	Bush & Dean, muslin	2 35
Sept.	2.	Campbell Bot. Supply Co., books	10 00
Nov.	1.	U. S. Express Co., expressage	55
Sept.	25.	Reed & Montgomery, book binding	80
Aug.	19.	G. E. Stechert, publications	1 00
July	17.	G. E. Stechert, publications	40
Nov.	8.	B. Stoneman, labor	2 00
Aug.	19.	G. E. Stechert, publications	14 31
Nov.	8.	M. A. Nichols, labor	1 00
		G. R. Chamberlain, drawings	1 50
Oct.	31.	Richards & Co., botanical supplies	24 50
	29.	Enz & Miller, stationery	3 15
	15.	Bool Co., lumber and labor	15 75
May	20.	Bausch & Lomb, chemical supplies	50 50

1895.			
Aug.	21.	E. McGillivray, photo supplies	$14 42
Oct.	5.	Botanical department, repairs	34 80
Nov.	16.	Treman, King & Co., hardware	8 40
Dec.	10.	Botanical department, repairs	23 90
Oct.	5.	Jamieson & McKinney, plumbing	41 36
	17.	Eimer & Amend, chemical supplies	46 66
Dec.	10.	Reed & Montgomery, book binding	1 00
Nov.	29.	G. E. Stechert, publications	3 08
1896.			
Jan.	18.	E. G. Allen, publications	1 48
Feb.	28.	Cambridge Bot. Supply Co., books	5 00
June	20.	Bausch & Lomb, botanical supplies	69 75
	23.	U. S. Express Co., expressage	65
	22.	G. E. Stechert, botanical supplies	126 72
	27.	Corning & Co., alcohol	21 88
		U. S. Post Office, postage	12 00
	30.	E. McGillivray, prints and photo supplies	56 91
		Bausch & Lomb, glass vials	4 50
		Rochester Optical Co., photo supplies	87 60
		Bool Co., cabinet case	25 00
		Eimer & Amend, glass tubes and express	7 15
		Richards & Co., chemical supplies	11 40
		Total for botanical division	$735 35

For Entomological Division.

1895.			
July	13.	U. S. Express Co., expressage	$0 50
	31.	E. E. Lull, labor	1 20
	36.	E. McGillivray, photo supplies	4 14
	31.	Rural Pub. Co., copy of article	1 00
June	7.	C. J. Rumsey & Co., wheelbarrow	3 00
Aug.	24.	U. S. Express Co., expressage	1 30
	17.	Cramer Dry Plate Co., photo supplies	4 13
Sept.	6.	E. McGillivray, photo supplies	10 15
	4.	M. V. Slingerland, labor	1 00

1895.			
Sept.	21.	G. W. Herrick, labor	$12 80
	30.	Peter Henderson, plants	4 36
	18.	Andrus & Church, stationery	1 40
Aug.	26.	Treman, King & Co., glass, etc	1 68
Oct.	18.	G. W. Herrick, labor	3 00
	17.	Treman, King & Co., hardware	3 25
	29.	E. McGillivray, photo supplies	2 41
Nov.	12.	Andrus & Church, stationery	21 05
Oct.	2.	Jamieson & McKinney, plumbing	1 96
Dec.	17.	U. S. Express Co., expressage	1 10
	2.	Treman, King & Co., hardware	1 10
	18.	Lawton & Co., supplies	3 77
	14.	G. Cramer, photo plates	7 10
	23.	G. W. Herrick, labor	6 10
	18.	E. McGillivray, camera and supplies	65 11
	21.	Blongren Bros., cuts and express	2 73
	7.	A. B. Brooks, drugs	5 69
1896.			
Jan.	27.	G. W. Herrick, labor	10 35
April	13.	C. J. Rumsey & Co., hardware	30
Jan.	29.	D. B. Stewart & Co., oil	5 13
Feb.	22.	G. W. Herrick, labor	11 40
March	6.	M. V. Slingerland, labor	1 00
	17.	G. W. Herrick, labor	12 00
	16.	M. V. Slingerland, labor	1 00
April	7.	G. W. Herrick, labor	8 15
	14.	Andrus & Church, stationery	80
		Platt Drug Co., drugs	35
	27.	Bausch & Lomb, supplies	4 50
May	4.	G. W. Herrick, labor	7 40
	5.	Treman, King & Co., hardware	3 10
		Bowker Fertilizer Co., fertilizers	2 88
	11.	Cramer & Co., photo supplies	6 62
	19.	G. W. Herrick, labor	7 90
June	9.	G. Cramer & Co., photo supplies	4 55
		W. Tetum & Co., aquariums	23 62
		Taylor & Preswick, book	1 44

1896.			
June	9.	Treman, King & Co., hardware	$0 80
		Bool Co., furniture	23 05
	15.	Eimer & Amend, camera and fixtures	26 50
	16.	G. Rankin & Son, glass jars	14 25
	19.	G. W. Herrick, labor	10 10
	19.	Library Bureau, furniture	15 00
	27.	James Seaman, lumber and labor	92 05
	29.	G. W. Herrick, labor	5 40
	30.	E. Curtis, chemicals	12 45
		Total for entomological division	$489 09

SUMMARY.

The Agricultural Experiment Station of Cornell University in account with the United States Appropriation.

1896.		
	To receipts from treasurer of the United States as per appropriation for the year ending June 30, 1896, under act of Congress approved March 2, 1887	$13,500 00
June 30.	By salaries	$7,934 98
	By buildings	40 25
	By printing	719 20
	By office expenses	1,059 51
	Equipment, labor and current expenses:	
	Agriculture	527 46
	Horticulture	1,516 05
	Chemistry	478 11
	Botany	735 35
	Entomology	489 09
		$13,500 00
	Receipts for produce sold:	
	Balance from 1895-96	$593 78
	Horticultural division	250 51
	Office	6 00
		$850 29
	By balance to 1896-97	$850 29

GENERAL INDEX.

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