time when it will also be a part of the work in our engineering courses. We think these students would readily take to such instruction, and that as soon as it is commenced there will be a strong demand for it.

I think meteorology is just as strong a disciplinary as any other study in the course. I am not advised as to the professional career that is offered along that line, but it seems to me that there would be a reasonable demand for men trained in this line of work. I am anxious to see the time when more instruction can be given in meteorology, and that the same may become a part of the courses of study in all of our agricultural and mechanical colleges.

An article published in the Chattanooga News states that more courses in meteorology have been offered in the colleges of the United States than ever before, and probably still more will be offered next year. Yet the instruction now given is almost insignificant compared with the commercial importance of the subject. There are two reasons for this. Often none of the faculties care to study or have time to teach the subject. In fact, meteorology has not been developed by school men, but by a few scholarly men at the demand of commercial interests, and therefore from a utilitarian rather than a scientific standpoint. These men are more like business men than teachers, and do not come in touch with the youth of the land as the teacher does. Again, the demand for meteorological experts has been too small to cause a large demand for instruction in this science. The business man accepts what good he can get from weather forecasts, without realizing that increased attention to the subject in institutions of learning means more competent specialists and also a more intelligent use of the specialist's work. Of more than four hundred institutions in the United States authorized to give collegiate degrees, less than one-third offer a course of instruction in meteorology, and in only one of these does a teacher give all his time to this subject. Often the course is given in the form of lectures, without any attempt at practical work. Under such conditions no department of instruction can become large or efficient or contain enthusiastic students.

To increase the general knowledge of meteorology is to increase the efficiency of the Weather Bureau. Can this increased knowledge be accomplished best by an undergraduate or a postgraduate course? There is only one answer. An undergraduate course is essential; the postgraduate course will come in time if the first is successful.

The undergraduate course must be sufficient, but not require too much of the student's time, and must cover the subject so completely that the student will feel that his time has been well spent. The planning of the courses in meteorology is, we fear, often responsible for the small classes. Young people are critical, and they desire to spend their time where it can be done to the best advantage. A shorter course with a large class is better than a long, complete course and a small class. In the former case, the few who wish the more extended course can take it in the next term.

In very much the same strain is the introduction by Prof. J. W. Gregory of the University of Melbourne, Australia, to his recent memoir on the Climate of Australasia, from which we take the following extracts:

The great educational controversy of the nineteenth century was whether study of literature and philosophy was of higher educational value than reasoning that can be checked by experiment and observation. The results of the battle were the admission of science into the old schools of learning and its predominant influence in all the new, a revolution in the methods of primary education, and a remarkable revival in classical research.

With the vast growth of the extent of science no student can keep in touch with it all. The problem that is now pressing upon us is the selection of the subjects that are of the most educational value. There are branches of science in which any progress is at once turned to practical account; while there are industries whose work is hampered because science does not give them as much help as it would had important lines of research not lagged far behind the rest.

Many teachers believe that the principles of a science can, in most cases, be best taught by the study of those branches of it that are of most practical service to man. To justify that belief the teaching of the technical subjects must be improved, and must give at all costs a rigorous training in scientific method. Most branches of applied science afford excellent educational material, for their results are tested daily by experiment on a scale vastly larger than science could afford.

I venture to introduce these general educational principles because they have especial application to geography. While in Australasia geography should be one of the chief subjects in elementary education, it should also receive more recognition as a good subject for the teaching of research. Geography on land has made excellent progress, owing to its practical value. The need for irrigation has caused the study of our rivers, which in some states, such as Victoria, have been investigated with unusual detail and accuracy. Interest in the rainfall has enlisted an army of volunteer observers, who collect rainfall statistics with admirable intelligence and patience.

Meteorology is that branch of geography in which, at present, the widest interest seems to be felt in Australasia, and in which well-directed research promises the richest reward.—*C. A.*

SILAS WEST.

[From the June report of the New England section of the Climate and Crop Service.]

The section director regrets to chronicle the death of Mr. Silas West, Voluntary Observer at Cornish, Me., who was one of the pioneers in meteorological work in this country. He was born July 29, 1820. He began his observations of the weather in 1856, and has continued, without a break, to the present time. He was greatly interested in the work, always punctual, and very faithful, as his complete forms will testify. During his service as a volunteer in the Federal Army—from September, 1862, to July, 1863—the work was carried on by his wife, and, in compliance with his expressed wish, it will now be carried on by his son, Mr. T. H. West.

CORRIGENDA.

MONTHLY WEATHER REVIEW for May, 1904, p. 213, column 2, fig. 76, 2d line of legend, for "great on the right lines" read "great on the circle as on the right lines."

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

The mean pressure for the month was highest over the north Pacific and northern Plateau regions, with a maximum mean of 30.16 inches. A secondary area of high mean pressure, but lower readings, overlay the States east of the Mississippi River. The mean pressure was low over the middle and southern Plateau regions and interior California, with the lowest pressure over southern Arizona, where mean monthly pressures of 29.72 inches occurred.

The mean pressure for the month was above the normal everywhere, except in southern Arizona, southern and central California, and southwestern Florida. Departures ranging from +.10 to +.14 inch occurred over southeastern Maine and the middle slope and north Pacific regions. The greatest deficiencies in pressure were —.03 inch.

In North Dakota and the northern portion of the Missouri Valley, central and southern California, and southern Arizona the mean pressure diminished slightly from that of May, 1904. In all other districts the pressure increased, and the increases, as a rule, were more marked than the negative changes.

TEMPERATURE OF THE AIR.

The mean temperature was slightly above the normal in New York near lake Erie, southeastern Virginia, northeastern North Carolina, southeastern Louisiana, extreme southern Texas, southeastern Washington, and western Montana, and from +1.0° to +4.0° in central Idaho, Oregon, California, except the northwestern coast, western Nevada, and southern Arizona. In all other portions of the United States the mean

temperature for the month was below the normal, the greatest deficiencies ranged from —2.0° to —4.8° and occurred in the States from northwestern Ohio and southern Wisconsin northwestward to southeastern Montana and southwestward to central Arizona, also in the District of Columbia, central Maryland, north-central New England, extreme eastern Georgia, and northeastern Florida.

By geographic districts the mean temperature for the month was below the normal in all districts, except the northern Plateau and middle and south Pacific districts.

Maximum temperatures of 100°, or higher, occurred in central Alabama, central Texas, southeastern New Mexico, southern and western Arizona, and interior California; and 110° to 117° in southeastern California, and southern and western Arizona. Freezing temperatures were reported from scattered localities in interior New England, northeastern New York, western Wisconsin, northern Minnesota, the eastern portion of the Dakotas, eastern Oregon, and the mountain districts of Montana, Idaho, Wyoming, Colorado, Utah, Arizona, eastern Nevada, and east-central California.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	61.0	— 2.1	—13.7	— 2.3
Middle Atlantic	12	69.9	— 1.0	—14.8	— 2.5
South Atlantic	10	75.8	— 1.0	—10.8	— 1.8
Florida Peninsula*	8	79.4	— 0.4	+ 2.3	+ 0.4
East Gulf	9	78.7	— 0.1	— 4.8	— 0.8
West Gulf	7	78.5	— 0.5	+ 4.2	+ 0.7
Ohio Valley and Tennessee	11	72.9	— 1.1	—13.9	— 2.3
Lower Lake	8	66.3	— 0.8	—17.4	— 2.9
Upper Lake	10	61.5	— 1.1	—18.0	— 3.0
North Dakota*	8	61.6	— 2.1	—16.0	— 2.7
Upper Mississippi Valley	11	69.0	— 2.2	—16.9	— 2.8
Missouri Valley	11	68.1	— 2.5	— 6.0	— 1.0
Northern Slope	7	61.3	— 1.7	+ 3.8	+ 0.6
Middle Slope	6	68.6	— 2.9	+ 5.3	+ 0.9
Southern Slope*	6	75.2	— 1.1	+ 9.8	+ 1.6
Southern Plateau*	13	71.6	— 1.3	+ 7.2	+ 1.2
Middle Plateau*	8	63.2	— 1.3	+ 3.8	+ 0.6
Northern Plateau*	12	61.7	+ 0.8	+12.5	+ 2.1
North Pacific	7	58.9	— 0.8	— 0.1	0.0
Middle Pacific	5	63.2	+ 1.2	+ 3.3	+ 0.6
South Pacific	4	68.0	+ 1.4	+ 4.8	+ 0.8

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of June was average, or very slightly below, over the greater portion of Canada, in the more northern parts of Manitoba, Ontario, and Quebec, however, it was very slightly above average. The temperature was fairly equable throughout the month; there were no periods of extreme heat, and on the other hand the cool periods, while tolerably pronounced, did not bring frost except very locally.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

By States the area in which the precipitation for the month was either in excess or deficient is very ill defined, but generally it was in excess from 2.0 to 4.2 inches in southern Florida, 1.0 to 2.7 inches in southwestern Pennsylvania, Maryland, District of Columbia, and central Virginia and North Carolina, and from 2.0 to 4.8 inches in central Arkansas, southwestern Missouri, northwestern Texas, eastern Colorado, and north-central Tennessee, and as much as 8.8 inches in north-central Kansas, and 9.6 inches in Oklahoma. Deficiencies in precipitation ranging from 2.0 to 5.0 inches were reported from eastern North Carolina, eastern Tennessee, Georgia, northwestern Florida, southern Alabama, southeastern Mississippi, northern Ohio, north-central Kentucky, Indiana, southern and western lower Michigan, northeastern Wisconsin, northern and central Illinois, eastern and southern Iowa, and east-central Nebraska.

Generally west of the one hundred and tenth meridian, and in eastern Montana the precipitation was deficient, but as a rule the departures were slight, and at no station equaled 2.0 inches.

By geographic districts the precipitation for the month was in excess in the Middle Atlantic and west Gulf States, North Dakota, Missouri Valley, and slope regions, and deficient in the remaining districts.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 6. Arkansas, 2, 4, 5, 15, 19, 20, 26, 29, 30. Colorado, 2–4, 7–9, 11–18, 20–24, 26, 29, 30. Connecticut, 22. Florida, 17, 23, 24. Georgia, 5, 18–22, 28. Idaho, 2, 3, 10,16, 18, 30. Illinois, 3, 15, 24, 26, 28–30. Indiana, 14, 15, 27, 29, 30. Indian Territory, 2, 4. Iowa, 13, 18, 19, 20, 23, 28, 29, 30. Kansas, 1–3, 14, 16, 19, 23–25, 28–30. Kentucky, 15, 21, 22, 24, 25. Louisiana, 22. Maine, 18. Maryland, 5, 6, 9, 15, 16, 19. Massachusetts, 15, 22, 25. Michigan, 4, 29, 30. Minnesota, 14, 16–19, 23, 28, 29. Mississippi, 7, 18, 19, 21, 29. Missouri, 1–3, 13–15, 19, 21, 24, 26, 28–30. Montana, 2, 3, 7, 9, 10, 16–18, 24. Nebraska, 1, 2, 14, 15, 18–20, 24, 28, 29. New Mexico, 5, 7, 11–13, 21, 22, 24–26, 30. New York, 1, 4, 5, 9, 14–16, 20, 22, 30. North Carolina, 6, 17–22, 30. North Dakota, 15–17, 19, 21–24, 27, 28. Ohio, 14, 24, 28–30. Oklahoma, 1–4, 9. Oregon, 2, 9, 10, 22, 30. Pennsylvania, 2, 4, 6, 7, 9, 15, 19, 21, 24, 26, 30. Rhode Island, 22, 26. South Carolina, 7, 18, 19, 21, 28. South Dakota, 14, 17, 19, 20, 22–25, 27–29. Tennessee, 2, 6, 18–21, 26, 28, 30. Texas, 2, 3, 11, 24, 29, 30. Utah, 2–4, 8, 16, 21–23, 25. Virginia, 4, 9, 15, 16, 18–20, 26. Washington, 2, 9, 18. West Virginia, 2, 4, 16, 22, 30. Wisconsin, 1, 29, 30. Wyoming, 1, 2, 3, 7, 8, 16, 19, 20, 23, 24, 30.

SLEET.

The following are the dates on which sleet fell in the respective States:

Colorado, 2, 3, 4. North Dakota, 27. Wyoming, 17.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	2.56	86	—0.4	— 0.7
Middle Atlantic	12	3.96	108	+0.3	— 5.4
South Atlantic	10	4.01	83	—0.9	— 8.0
Florida Peninsula*	8	6.52	93	—0.5	+ 0.3
East Gulf	9	2.88	55	—2.4	—13.0
West Gulf	7	4.60	121	+0.8	— 3.8
Ohio Valley and Tennessee	11	3.24	76	—1.0	— 4.5
Lower Lake	8	1.95	55	—1.6	+ 1.2
Upper Lake	10	2.32	62	—1.4	— 1.2
North Dakota*	8	5.15	145	+1.6	+ 1.3
Upper Mississippi Valley	11	3.28	73	—1.2	— 1.7
Missouri Valley	11	4.37	102	+0.1	+ 0.2
Northern Slope	7	2.72	104	+0.1	+ 0.3
Middle Slope	6	6.71	223	+3.7	+ 2.9
Southern Slope*	6	8.16	250	+4.9	+ 1.7
Southern Plateau*	13	0.30	75	—0.1	— 2.2
Middle Plateau*	8	0.27	57	—0.2	+ 1.8
Northern Plateau*	12	0.87	59	—0.6	— 0.1
North Pacific	7	1.17	54	—1.0	+ 0.5
Middle Pacific	5	0.11	22	—0.4	+ 4.5
South Pacific	4	T.	0	—0.1	— 0.5

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The rainfall was in excess of the average mean amount for June in the northern portions of Alberta and Saskatchewan, and throughout Manitoba, also in the central and more northern counties of Ontario; in all other portions of the Dominion there was a deficiency.

The deficiency was most marked in Ontario, near Lake Erie, and in the extreme eastern and extreme western portions of the Maritime Provinces where, in many localities, the fall was scarcely equal to half the average. In Quebec, in general, it was about two-thirds of the average, and the same may be said of Assiniboia and southern Alberta.

HUMIDITY.

The relative humidity was normal in the west Gulf States, and northern Plateau and south Pacific regions; below normal in New England, Florida Peninsula, South Atlantic and east Gulf States, and the middle and southern Pacific regions, and above normal in the remaining geographic districts.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	78	− 1	Missouri Valley	71	+ 4
Middle Atlantic	76	+ 3	Northern Slope	63	+ 6
South Atlantic	75	− 3	Middle Slope	70	+10
Florida Peninsula	79	− 1	Southern Slope	65	+ 5
East Gulf	71	− 4	Southern Plateau	32	+ 2
West Gulf	76	0	Middle Plateau	38	+ 1
Ohio Valley and Tennessee	73	+ 3	Northern Plateau	51	0
Lower Lake	73	+ 2	North Pacific	74	− 2
Upper Lake	74	+ 1	Middle Pacific	59	− 3
North Dakota	70	+ 2	South Pacific	66	0
Upper Mississippi Valley	72	+ 2			

CLEAR SKY AND CLOUDINESS.

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The cloudiness was normal in the Ohio Valley and Tennessee; above normal in New England, west Gulf States, Lake region, North Dakota, upper Mississippi and Missouri valleys, and the middle slope and southern Plateau regions; elsewhere by geographic districts, the cloudiness was below normal.

The average cloudiness for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.3	+ 0.2	Missouri Valley	5.8	+ 1.0
Middle Atlantic	4.9	− 0.1	Northern Slope	4.6	− 0.2
South Atlantic	4.1	− 0.8	Middle Slope	5.5	+ 1.8
Florida Peninsula	5.2	− 0.3	Southern Slope	4.2	− 0.2
East Gulf	4.6	− 0.2	Southern Plateau	2.4	+ 0.5
West Gulf	5.0	+ 0.4	Middle Plateau	2.9	− 0.1
Ohio Valley and Tennessee	5.0	0.0	Northern Plateau	3.4	− 1.7
Lower Lake	5.2	+ 0.3	North Pacific	5.1	− 1.0
Upper Lake	5.4	+ 0.2	Middle Pacific	2.9	− 0.3
North Dakota	5.4	+ 0.2	South Pacific	2.3	− 1.0
Upper Mississippi Valley	5.1	+ 0.1			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Chicago, Ill	4	50	s.	Point Reyes Light, Cal	6	70	nw.
Cleveland, Ohio	30	56	sw.	Do	7	58	nw.
Duluth, Minn	3	63	ne.	Do	8	53	nw.
Fort Smith, Ark	4	74	s.	Do	9	72	nw.
Mount Tamalpais, Cal	1	50	nw.	Do	10	56	nw.
Do	2	67	nw.	Do	16	50	nw.
Do	3	64	nw.	Do	23	50	nw.
Do	4	52	n.	Sioux City, Iowa	24	57	sw.
Do	6	59	nw.	Do	28	58	nw.
Do	18	50	nw.	Southeast Farallon, Cal	2	54	nw.
New York, N. Y	5	58	w.	Do	3	53	nw.
Oklahoma, Okla	2	52	sw.	Do	9	50	nw.
Point Reyes Light, Cal	2	80	nw.	Williston, N. Dak	10	63	nw.
Do	3	69	nw.	Winnemucca, Nev	6	59	nw.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 8502 thunderstorms were received during the current month as against 6045 in 1903 and 5131 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 30th, 547; 20th, 513; 29th, 508; 21st, 504.

Reports were most numerous from: Missouri, 507; Nebraska, 399; Kansas, 396; New York, 375.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the dates of full moon, viz, May 25 to June 2, inclusive, and June 23 to July 1, inclusive.

In Canada: Thunderstorms were reported from St. Johns, N. B., 18, 21; Halifax, 15; Grand Manan, 22; Yarmouth, 25; Father Point, 16, 21, 30; Quebec, 21, 25, 30; Montreal, 15; Ottawa, 21, 25; Kingston, 4, 22, 25; Toronto, 4, 20, 21, 24, 28; Port Stanley, 14, 30; Saugeen, 21, 24, 30; Parry Sound, 4, 6, 9, 18, 25, 26, 30; Port Arthur, 17, 29; Winnipeg, 17, 19, 23, 27, 28; Minnedosa, 11, 17, 22, 27, 28; Qu'Appelle, 10, 18, 27, 28; Medicine Hat, 18, 27; Swift Current; 6, 7, 18; Banff, 5, 9, 30; Edmonton, 6, 9, 13, 16, 18, 21, 27; Prince Albert, 18, 19, 22, 29; Battleford, 7, 9, 10, 18, 22, 23, 24, 27; New Westminister, 22, 23; Barkerville, 21; Dawson, 7; Hamilton, Bermuda, 24, 28.

Auroras were reported from Sydney, 15; Halifax, 15; Quebec, 15, 16; Parry Sound, 15; Winnipeg, 15; Qu'Appelle, 16; Swift Current, 15.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

For description of tables and charts see page 136 of REVIEW for March, 1904.