

Moreover, as already noted, in any event the chances favor rain this summer.

Next, who is Mr. Hatfield? The standing of the United States Weather Bureau at Washington can not be doubted. A request for information, addressed to the Bureau, elicited the following reply:

"Mr. Hatfield attained considerable notoriety in the United States last fall as a pretended rain maker, operating in southern California. The judgment of the Weather Bureau as to this pretension may be found in the accompanying extract contained in the closing paragraph of a letter written by the Chief of the Bureau, October 20, 1905, in reply to a request for information relative to Mr. Hatfield:

"It is, therefore, apparent that the rainfall which was supposed to have been caused by the liberation of a few chemicals of infinitesimal power was simply the result of general atmospheric conditions that prevailed over a large area. It is hoped that the people of Kansas and of other regions in the subarid West will not be misled in this matter, and give undue importance to experiments that doubtless have no value. The processes which operate to produce rain over large areas are of such magnitude that the effects upon them of the puny efforts of man are inappreciable."

In another letter on the subject, to be found in the issue of the MONTHLY WEATHER REVIEW for April, 1905, Mr. Willis L. Moore, the Chief of the United States Weather Bureau, corrected some statements put forward on Mr. Hatfield's behalf. "Your dispatch," he wrote, "stated that the heaviest rain fell in the region of the rain maker, and that the rainfall had not been large in any of the other regions of the subarid West. This statement is erroneous, as during the same period general and excessive rains occurred throughout Arizona and New Mexico. It is known that when barometric pressures for a month are low in the Southwest, the period is one of frequent and heavy rains in that region, and this barometric condition prevailed over New Mexico, Arizona, and southern California during the 3-month period under consideration."

It is rather disagreeable to reflect that at the very time that these warnings were being issued against Mr. Hatfield, the administration of the Yukon was proving so easy a mark for his efforts. What makes this the more striking is that the Yukon Council is not a particularly democratic institution. It is a strongly official body, perhaps a majority of its members being selected from Ottawa—presumably on account of their intelligence, general information, and administrative fitness.

OUTLINE FOR THE STUDY OF METEOROLOGY IN THE NEW YORK STATE NORMAL SCHOOL.

The Education Department of the State of New York gives

considerable attention to the study of meteorology, as a part of the course in geography. The special development of this subject, at the State Normal and Training School in Oswego, is explained by Prof. Amos W. Farnham in the Journal of Geography for February, 1906. We select the following items from his schedule of the study of that subject.

After a series of studies on the earth as a planet, covering the subject of its shape and motion, there comes the section bearing on the gaseous atmosphere, to be followed by physiography, and commercial and political geography. We conclude Section II as follows:

- II. The gaseous envelope.
 - A. Atmosphere. 1. Origin. 2. Function.
 - B. Composition. 1. Oxygen. 2. Nitrogen. 3. Carbon dioxide. 4. Water vapor. 5. Dust—inorganic and organic. 6. "Precious" gases (argon, krypton, helium).
 - C. Temperature—degree of heat. 1. Measurement of temperature. 2. Heat. 3. Various elements affecting temperature. 4. Isotherms. Isothermal charts studied. Heat equator, cold pole. 5. Thermograph. 6. Heat belts—their areas and boundaries by isotherms.
 - D. Pressure and density. 1. Relation of pressure to density. 2. Relation of density to temperature. 3. Density diminished by diminished gravity, by increased temperature, and by increased amount of water vapor. 4. Measurement of pressure.
 - E. Movements of air—currents. 1. In vertical plane. 2. In horizontal plane—wind. 3. Origin of currents—unequal density of adjacent masses. 4. Classification of winds; planetary; cyclonic winds; tropical hurricanes; western tornadoes; diurnal winds; seasonal winds—monsoons. 5. Deflection of winds—Ferrel's law. 6. Velocity—measured by anemometer. 7. Classification of winds based on velocity.
 - F. Humidity—measured by hygrometer. 1. Absolute and relative. 2. Condensation; causes; forms; distribution—unequal.

CORRIGENDUM.

MONTHLY WEATHER REVIEW for December, 1905, Vol. XXXIII, page 535, column 2, in Table 1, year 1882, losses paid, for "52,112" read "52,122."

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During the first half of February a succession of areas of low barometric pressure of moderate intensity crossed the British Isles, two well-defined disturbances moved from the southeastern portion of the Gulf of Mexico northeastward near the Atlantic coast line of the United States, and three areas of high barometer of great magnitude, attended by pronounced cold waves, advanced from the British Northwest Territory to the Atlantic coast. About the middle of the second decade of the month the succession of barometric depressions over the Eastern Atlantic Ocean became slow, and during the latter portion of that decade pressures fell over the Azores, and stagnated barometric conditions and high temperatures set in over the United States east of the Rocky Mountains. The closing days of February were marked by rapid and pronounced weather changes over the United States and in the higher latitudes of the North Atlantic Ocean.

The month was warmer than usual over the Great Plains and thence to the Pacific coast and also over a great portion of the upper Lake region and New England, the departures above the normal exceeding 9° on the northeastern slope of the Rocky Mountains. In the Ohio and middle and lower Mississippi valleys and thence to the Gulf and middle and south Atlantic coasts, monthly mean temperatures were below the normal.

Precipitation was irregularly distributed, both as regards amounts and departures from the normal.

The paths of the more important areas of low barometric pressure, or general storms, of February are traced on Chart III.

The first storm of the month advanced from the eastern portion of the Gulf of Mexico to Nova Scotia during the 8th and 9th, attended by heavy rain in the east Gulf and South

Atlantic States, by snow in the Middle Atlantic and New England States, and by high easterly shifting to northwest winds along the middle Atlantic and southern New England coasts. During the 12th and 13th high winds off the Atlantic coast attended the northeastward advance of a disturbance from the Florida Peninsula. Three disturbances moved eastward from the extreme north Pacific coast during the second decade of the month, their influence in the United States being shown mainly in the warm southerly winds that prevailed over the northern districts from the 15th to 20th. Low area XII, that moved from British Columbia to the Carolina coast from the 24th to 28th, was attended by heavy snow from the middle Mississippi Valley over a great part of the Ohio Valley and in southern portions of the Middle Atlantic States. During the 27th and 28th a disturbance of marked strength advanced eastward over the middle Plateau and middle Rocky Mountain regions.

The first well-defined cold wave of the winter of 1905-6 advanced from Manitoba to the Atlantic coast from the 1st to 3d, with temperature 30° below zero at Winnipeg, Man., on the 1st, and 24° below zero at Sault Ste. Marie, Mich., on the 2d. On the morning of the 3d the temperature was below zero in the interior of New York and New England, the line of 10° was traced through the District of Columbia and southwestern Virginia, and the line of freezing temperature through northwestern Florida. From the 3d to 6th a cold wave advanced from the Rocky Mountains over the central valleys and the Middle Atlantic and New England States, carrying the line of zero temperature to Kansas, the Ohio River, and the interior of New York and New England. From the 13th to 15th a cold wave swept from British America to the Atlan-

tic and Gulf coasts, with zero temperatures in the States of the lower Missouri Valley on the morning of the 14th, and a fall in temperature of 20° to 30° in the interior of the Atlantic and east Gulf States by the morning of the 15th. A moderate cold wave overspread the central valleys and the Eastern and Southeastern States during the 26th, 27th, and 28th, attended by frost to the middle and east Gulf coasts and northern Florida.

BOSTON FORECAST DISTRICT.

The month as a whole was less severe than the average February. Marked cold waves occurred on the 3d and 6th, during which the temperature fell almost to zero in the southern portions, and 20° to 36° below zero in interior and northern portions, of New England. The temperature was also very low at the close of the month. Snowfall was light to moderate and occurred chiefly on the 9th and 10th. At the close of the month snow lay only in the woods and on northern hill-sides. From the 26th to 28th gales of great force prevailed, the wind reaching velocities of 40 to 70 miles an hour at coast stations. During this storm several vessels were beached, but without great damage or loss of life; incoming vessels reported that the storm was of unusual severity at sea. Due announcement of the approach of the storm was given by the Weather Bureau, and the press commended the Bureau for the timely warnings to shipping and other interests.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Timely warnings were issued for all cold waves, and for freezing temperatures and frosts that occurred in the sugar and trucking districts. A pronounced cold wave reached Oklahoma and the northern part of Texas on the 4th, and crossed the district on the 7th. A second cold wave visited the northern portion of the district on the 14th and 15th. Storm warnings were issued on two dates for the Texas coast, and verifying velocities occurred at Galveston.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

Six general disturbances of more or less severity affected the weather conditions of Kentucky and Tennessee. Heavy snow on the 4th was followed by a prolonged cold spell, during which temperatures below zero were reported over a large portion of Kentucky. General rains and high winds on the 13th and 14th were followed by a cold wave of short duration. Heavy rains fell on the 20th and 21st, and heavy showers and thunderstorms occurred on the 23d and 24th. On the 26th and 27th showers and some thunderstorms were followed by the heaviest snowfall of the winter. In western and southern Kentucky the snowfall ranged from four to six inches, and in the north-central portion of the State six to twelve inches fell. In Tennessee the precipitation was mostly in the form of rain. Cold-wave warnings were issued the night of the 3d and the morning of the 4th; also the afternoon of the 13th and the morning of the 14th.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The month, as a whole, was mild over the greater portion of the Middle Western and Northwestern States, and there were no considerable falls of snow or especially severe storms. Advisory messages were sent to open ports on Lake Michigan several times during the month in anticipation of high winds. No casualties of any kind were reported, and, because of the comparative freedom from ice, the traffic on the Lake was greater than is usual during February. With the exception of the 3d, when a marked cold wave appeared in the Northwest and swept thence southward and eastward, no general cold-wave warnings were ordered. On a few occasions cold-wave warnings were ordered for a portion of the district. Warnings hoisted on the 1st in the eastern portion were followed by a marked drop in temperature in that section. On the 13th warnings were ordered for a considerable portion of

the district and a cold wave gradually advanced to its eastern limits, although no very low temperatures occurred.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

February was dry, except in Arizona and New Mexico and portions of northern Utah, and mild temperatures prevailed.

On the morning of the 3d loops of a deep northern low pressure area embraced the eastern slope of the Continental Divide, and twelve hours later a depression was central in southeastern Colorado, and a marked rise in pressure, with decided falls in temperature, had occurred in the extreme north. Cold-wave warnings were sent out early in the afternoon to points in Wyoming and eastern Colorado, and at night to eastern New Mexico. The warnings were fully verified in Wyoming and eastern Colorado.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month, as a whole, was one of unsettled weather. A moderate disturbance on the 5th and 6th over the southern portion of California caused timely rain in moderate amounts south of the Tehachapi. On the 10th the first well-marked southeaster appeared on the northern coast of California; ample warning was given of the disturbance. Showery weather continued until the 14th, when a well-marked storm appeared on the coast of Washington, accompanied by high southerly winds and generous rainfall. On the 16th a coast storm moved slowly northward and eastward, and caused but little change in California. On the 20th the pressure fell rapidly on the coast, and a storm of considerable energy swept over the northern portion of California. The observer at Point Reyes Light reported a waterspout about three miles southwest of the station, forming at 4:58 p. m. and disappearing at 5:02 p. m. Heavy snow fell in the mountains during the passage of this storm. On the 26th another marked depression moved eastward, and caused general rain throughout northern California. Frost warnings were ordered for the interior of California on the morning of the 28th.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND FORECAST DISTRICT.

The month averaged warmer than usual; no cold waves occurred and no cold-wave warnings were issued. Fair weather prevailed in Washington and Oregon from the 1st to the 14th. A stormy period then began, which continued until the close of the month, the highest winds occurring on the 18th, 19th, and 24th. Warnings for all storms were issued.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

There was but little high water of consequence and no abnormally low water during the month. The heavy and warm rains of the 23d and 24th over northern Illinois caused moderate floods, with danger-line stages, in the Illinois River from the 26th to the 28th, inclusive, for which warnings were issued on the 25th. Rock River was also in flood at the same time, causing considerable damage in Whiteside County, Illinois.

The rivers of eastern South Carolina were slightly above the danger line throughout their lower portions from the 2d to the 4th, inclusive, but no damage was reported.

At the end of the month the Missouri River was open as far northward as Yankton, S. Dak., and the Mississippi as far as LeClaire, Iowa. There was a considerable increase in the quantity of ice during the first three weeks of the month, but the warm weather of the last week made serious inroads upon it. About the middle of the month floating ice was observed in the Mississippi River as far south as New Madrid, Mo. In New England there was a slight increase in the thickness of the ice during the month, but throughout all districts there were from four to twenty inches less ice on the last day of the month than on the corresponding date of the previous year.