

of dangerous gales on Lake Michigan were sent to ports maintaining winter navigation, vessel masters being warned not to leave port.

On the 4th additional disturbances appeared in Alberta and the southern Plateau region, the former moving southeastward and the latter northeastward, joining forces finally over the Ohio Valley, not however, causing any conditions in the Chicago Forecast District that justified special warnings, with the exception of cold-wave warnings in the northern Lake Region.

On the morning of the 10th low-pressure areas were centered in the Northwest and in the Southwest, which, by the morning of the 12th, had combined into a storm of remarkable energy, passing over Lake Michigan as a single storm accompanied by snow, sleet and rain, and heavy gales. The lowest barometer of record, 28.70 inches, was registered at Chicago at 2 a. m. of the 12th. Advisory messages were sent on the night of the 11th to all open ports on Lake Michigan of impending gales, and vessel masters were cautioned not to leave port. In addition advisory messages were sent on the morning of the 12th.

Before the last-named storm had disappeared down the St. Lawrence Valley, another, which appeared in British Columbia, was moving in a southeasterly direction across the Rockies. On the morning of the 13th the center had reached western Colorado and at the same time an area of high pressure (anticyclone) had advanced from the MacKenzie River basin to Alberta. This storm took a circuitous route, but finally reached the eastern limits of the Chicago Forecast District by the 15th and 16th, attended by widespread snow and rain and shifting gales, and followed by a sharp fall in temperature, reaching cold-wave proportions at several points. Livestock warnings were issued on the morning of the 14th for Nebraska, Kansas, and southern Wyoming; and advices of strong winds were sent to Lake Michigan ports on the night of that day. Advisory warnings for Lake Michigan were again sent on the morning of the 15th, and frost warnings were sent to the strawberry interests in southwestern Missouri.

On the morning of the 16th still another barometric depression had appeared in Alberta. This moved directly southward over the Rockies and was followed by an anticyclone of remarkable magnitude for the season of the year. The low (cyclone) finally recurved and passed eastward over the Chicago district on the 18th. Warnings of cold waves were sent on the evening of the 16th to the Dakotas, and northeastern Wyoming; and on the morning of the 17th the warnings were carried to the eastern limits of the forecast district, the cold wave to reach those points within 48 hours. Livestock warnings were also disseminated to points interested, and advices of gales generally throughout the district, including the open ports on Lake Michigan. The cold-wave warnings were justified at every station in the district, bringing to many points on the 17th and 18th record-breaking minima for the season after abnormally high maxima. The snow was heavy at several points in the middle West, and the storm, generally speaking, especially the cold-wave feature, was quite remarkable.

On the a. m. map of the 22d, a barometric depression of only moderate energy was centered in Alberta, and this was followed by an anticyclone that brought decided falls in temperature over the northern portion of this forecast district from North Dakota eastward. Warnings were issued to the area threatened.

On the p. m. map of the 23d a storm had reached British Columbia from Alaska, and this moved in a south-

easterly direction over the Chicago Forecast District. The center on the morning of the 25th was in the middle Mississippi Valley with an anticyclone to the north with extremely low temperatures for the season. Cold-wave warnings were then issued for a considerable area in the Central States and these were verified; in fact, a few stations outside the area showed verifying falls in temperature.

Cold-wave warnings were again issued on the night of the 26th and the morning of the 27th, from Minnesota eastward over northern Wisconsin and lower Michigan, with ensuing temperature falls which reached the point of verification.

The month closed with another anticyclone of great magnitude moving southeastward over the forecast district from Alberta. On the morning of the 31st the lowest minima of record for the season of the year were registered at an unusually large number of stations in the middle West. It was, in fact, the coldest weather for the final day in March for more than a half century, and warnings of the cold were issued well in advance. The cold was not severe in the western portion of the forecast district, and warnings, therefore, were not necessary.

Because of the abnormal weather conditions prevailing during the month of March, the forecasts and warnings were doubtless of great service to transportation interests and shippers of perishable goods. Special forecasts were made for long periods, covering the considerable portion of a week whenever practicable, and this service invited much favorable comment. In the *Chicago Evening Post* of March 20, the following editorial appeared:

With the tingle of yesterday's zero drop still sharp in memory, the moment is opportune to speak a kind word for the local weather bureau and Henry Cox, the efficient and accommodating forecaster. They may feel the need of kind words under what appears to be a conspiracy on the part of wind and temperature to make them unpopular.

If you have been checking up on Mr. Cox and his assistants lately you will realize that they have a high batting average. It is pretty safe to bank on their predictions when you are figuring out what to wear, how to stoke the furnace, and the chances of getting home dry if you have left umbrella and rubbers behind. Up in the top of the Federal building it is something more than a guessing contest which is being operated by the vaticinatory gentlemen who consult barometers and compile bulletins from all parts of the continent. There is an uncanny accuracy about their ability to say in advance which way the wind will blow when it listeth, and just about where the mercury will stand in Mr. Fahrenheit's well-known column at a certain hour.

And what we who work on a newspaper appreciate, and what our readers should appreciate, is the fact that Mr. Cox recognizes the high news value of the information he gathers and the deductions he makes, and takes care to see that no weather development of interest escapes our attention. His readiness to communicate all he learns and to answer questions no matter how often he may be bothered, constitute the weather bureau a public service bureau of great efficiency and value. An official who conducts his office with this idea of making it widely useful to the people deserves commendation.

—H. J. Cox.

NEW ORLEANS FORECAST DISTRICT.

Unseasonably cold weather occurred in March on the West Gulf coast. Cold-wave warnings were issued at 2:20 p. m. on the 3d, for Oklahoma and northwestern Arkansas; were repeated at 8 p. m.; and were extended at 8 a. m. on the 4th, over Arkansas and northern Louisiana. The warnings were verified over the greater portion of the area.

A moderate cold wave overspread the greater portion of the district, reaching the northern part on the night of the 15th, and the southern portion on the morning of the 17th, for which timely warnings were issued on the 15th.

An exceptionally severe cold wave for the season overspread the district during the 18th and 19th, for

which timely warnings were issued beginning for the northwestern portion of the district on the morning of the 17th; they were extended over the interior of the district at 8 p. m. of the 17th, and to the Gulf Coast on the morning of the 18th. The temperatures predicted for the different parts of the district occurred almost exactly as forecast.

Moderate cold waves occurred over the northern portion of the district on the 21st, 22d, and 29th, for which warnings were issued. No cold wave occurred without warning.

Moderate storm winds occurred on some portion of the West Gulf coast on the 6th, 12th, 15th, 16th, 18th, and 19th. Warnings were issued for some portion of the coast as follows: Small-craft warnings on the 3d, 11th, 15th, 17th, 18th, 20th, and 21st; storm warnings on the 6th, 11th, 14th, 15th, and 18th. Warnings were issued for all storm winds except at Galveston and Port Arthur on the 6th.

Fire-weather warnings were issued for Arkansas and Oklahoma on the 3d, and for Arkansas on the 14th and 18th.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

The month was cold and stormy, with an excess in precipitation in about all of the district, except the extreme southern portion.

On the morning of the 3d, when a disturbance of marked intensity was central over southeastern Colorado, warnings of heavy snow and much colder weather were issued to stockmen in eastern and southern Colorado and northwestern New Mexico. Light snow occurred throughout the region indicated, attended by a sharp fall in temperature that amounted almost to a cold wave.

Live-stock warnings were issued on the morning of the 9th to interests in southwestern Colorado, northwestern New Mexico, northeastern Arizona, and southern Utah, when heavy snow was expected to attend a low of considerable intensity that was central over southern Nevada. Moderately heavy snow occurred in southwestern Utah during the night of the 9th–10th, and light snow fell in the remainder of the region in which warnings were distributed.

A cold-wave warning was issued for north-central Arizona on the morning of the 10th. Although an area of decidedly low pressure which was central near Flagstaff moved rapidly eastward, a fall in temperature of only about 10 degrees occurred at that station.

Warnings of a moderate cold wave, issued on the 14th for southwestern Colorado, extreme northwestern New Mexico, northeastern Arizona, and extreme southeastern Utah, were justified, the temperature falling 16° to 20°, and to minima of 14° to 16°, over the area included in the warnings. Warning of a moderate cold wave for southern and extreme eastern New Mexico, issued on the evening of the 14th, was also justified, the fall in temperature east of the mountains in that State amounting to from 20° to 34°, with minimum temperatures at Santa Fe and Roswell of 8° and 22°, respectively, on the morning of the 16th.

Warnings of snow and a severe cold wave in eastern Colorado, and of snow and a moderate cold wave in northeastern New Mexico, including stockmen's warnings in eastern Colorado, were issued on the morning of the 17th, when a low of unusual intensity extended from the Southern Plateau States to the Upper Lakes, with its center over northeastern Colorado, while much higher pressures and severe cold weather prevailed over the sec-

tions to the northward. Cold-wave warnings, based upon 4 p. m. special observations, were extended to southeastern New Mexico on the afternoon of the 17th and were repeated on the evening of that date, when temperatures considerably below freezing were forecast for extreme southeastern New Mexico by the following morning. Moderately heavy snow fell in eastern Colorado during the afternoon and night of the 17th, with a severe cold wave overspreading northern and eastern Colorado by night and extending to extreme southeastern New Mexico by the morning of the 18th, when the temperature was below zero in northeastern Colorado and was but 16° above zero at Roswell, N. Mex. The fall in temperature in eastern Colorado amounted to from 34° to 40° during the 24 hours ending at 8 p. m. of the 17th, and at Roswell to 36° during the 24 hours ending at 8 p. m. of the 18th.

On the evening of the 20th, when an area of low pressure extended from southern California northeastward to the Upper Lakes, with its center near Pueblo, where the barometer had fallen to 29.22 inches, warnings of a moderate cold wave were issued for eastern Colorado and southeastern and extreme northeastern New Mexico. The fall in temperature during the following 24 hours amounted to from 20° to 36° over the region specified, with the minimum temperature on the morning of the 22d ranging from 4° at Cheyenne to 26° at Roswell.

Warnings of a moderate cold wave were issued on the morning of the 21st for northern and eastern New Mexico, with live-stock warnings for the northeastern portion of that State, due to expected snow and strong northerly winds. The cold-wave warnings were fully justified, as already indicated, with strong winds and rain, turning to light snow, in northern New Mexico during the 21st and the night of the 22d.

A cold wave, without warning, occurred at Grand Junction, Colo., on the 18th, and at Durango, Colo., on the 22d.

Frost warnings were issued as follows: 4th, extreme southern New Mexico and southwestern Arizona; 5th and 6th, extreme southern New Mexico and southern Arizona; 10th, 11th, and 14th, south-central New Mexico and southern Arizona; 12th, south-central New Mexico and south-central and southeastern Arizona; 15th, 21st, and 22d, southern Arizona; 16th and 23d, southern New Mexico and south-central and southeastern Arizona; 18th, southern Arizona; 19th, south-central and southeastern Arizona; 25th, 27th, and 30th, southern New Mexico; 31st, extreme southeastern New Mexico. These warnings were generally verified.

The following freezing-temperature warnings were also issued: 16th, 23d, and 26th, extreme southeastern New Mexico; 18th, south-central and southwestern New Mexico; 19th and 22d, southern New Mexico. All of the foregoing warnings were verified at Roswell, El Paso, or the fruit-frost stations in southern New Mexico, except that of the 26th, the lowest temperatures on the morning of the 27th being 36°.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT.

The dominant feature of March weather in this district was the persistence of a large and energetic area of high pressure off the northern coast. This condition deflected the storms from the north Pacific eastward at a high latitude, confined the areas of precipitation mostly to the western portions of Washington and Oregon, and caused a drought over the southern portion of the Pacific Slope.