

them. It is notably true that the ordinary climatic tables often give a very imperfect idea of many of the features of a climate which most impress themselves upon one's mind in the course of actual experience of the climate in question. A recent paper by Prof. R. DeC. Ward, entitled "Suggestions concerning a more rational treatment of climatology,"⁴ reinforces the recommendation of others that the cyclonic control of the weather be more fully exhibited in climatological statistics. The following extracts indicate the line of argument pursued in this paper:

In the past, climatology has been too much concerned with averages and too little concerned with the units, i. e., the individual weather changes which go to make up the average. These changes, being actually experienced from day to day, and affecting man's activities, his crops, his health, his mode of life, are of the greatest interest and importance to him.

Regular diurnal changes are very frequently overshadowed by the larger irregular changes which are due to the passage of cyclones and anticyclones. The essence of the cyclonic control being its irregularity, it is obvious that the cyclonic effects must very largely disappear when the usual time units are taken as the basis for averaging climatic data. Thus, the usual means, the ranges, the extremes, for a day, a month, a year, can not adequately emphasize the irregular cyclonic changes in the different elements, and yet these very changes are of the greatest importance in their effects on man, and really give a climate its character.

In other words, typical weather is as worthy of a place in climatological tables and descriptions as average weather. Professor Ward states that he is now engaged in making up diagrams illustrating weather types for various parts of the United States.

CLIMATE OF CENTRAL ASIA.

The climate of central Asia is still so little known that every scrap of meteorological information from that quarter is welcome. Even the hasty observations of travelers give us a valuable insight into some of the broader climatic features. It will be remembered that the British Mission to Lhasa, in 1903-4, dispelled the illusion that southern Tibet was an inhospitable frozen desert; the historians of the Mission paint alluring pictures of a rich agricultural country, which Colonel Waddell goes so far as to call "one of the most delightful residential places in the world."

Of the scientific results of Dr. Sven Hedin's journey of

1899-1902 to western and central Tibet and the adjacent regions to the north, the first section of the part devoted to meteorology has recently appeared,⁵ and contains all the meteorological observations made during this journey, together with those made during Doctor Hedin's journey of 1894-1897. Most of these observations are from regions for which absolutely no meteorological data were previously available. A second section will contain an account of the methods of observation and a general discussion of the results from a climatological point of view. Doctor Hedin expects that this discussion will throw light upon several phenomena connected with the meteorology of the earth's greatest continent, such as the violent and constant east-northeast winds that blow in spring in the Lop-nor region, and that have wrought such marked changes, within historic times, in the configuration of that country.

It is interesting to note that much important meteorological work was carried on by the expedition of the Imperial Russian Geographical Society to Mongolia and Kham, including over a year of observations at a fixed station in Ts'aidam, contemporaneously with part of the work of Doctor Hedin. A preliminary report on the results was given by A. Kaminski in his recent paper on "The climate of Ts'aidam."⁶ As Ts'aidam borders on the region explored by Doctor Hedin, it would be a matter of the highest interest to coordinate the observations of the two expeditions, supplemented by the results obtained at the permanent stations in adjoining countries, such as Leh, in Ladak, and Kashgar, in East Turkestan.

STATIONS IN GERMAN EAST AFRICA.

A recent paper by Dr. P. Heidke,⁷ besides communicating the results of observations at the climatological stations in German East Africa during the years 1899-1902, furnishes very full particulars regarding the history and topographical conditions of each station, exposure of instruments, methods of observation, etc. It is a pity that this kind of information is not more generally given in connection with the results of observations. The value of much climatological material is impaired by a lack of information regarding the conditions under which it was obtained.

FORECASTS AND WARNINGS.

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

During the first seven days of May the barometer was low over the British Isles and the western Atlantic and high over the Azores. From the 9th to 16th a barometric depression covered Spain and Portugal, the barometer was high over the British Isles and the western Atlantic, and there was a gradual breaking up of the Azores area of high barometer. From the 18th to 21st, the barometric depression that had covered southwestern Europe apparently moved northeastward over France and Germany, the barometer fell rapidly in the vicinity of the Azores, and a disturbance appeared south of the Florida Peninsula. From the 22d until the close of the month the pressure was generally low over the British coasts. Over the Azores the barometer continued low from the 19th to the 28th and reached a reported minimum of 29.50 inches, with a wind velocity of 48 miles an hour, on the 26th, after which the disturbance in that region appeared to move northeastward toward the British coasts. From the 22d to 25th a disturbance moved northward over the Florida Peninsula, and on the 27th and 28th a storm moved eastward off the middle Atlantic coast of the United States.

During the first half of the month, and from the 19th to 29th, the weather was cool in the United States, and heavy frost and temperature near the freezing point occurred in the

Middle Atlantic States and the Ohio Valley on the morning of the 11th, and light frost in the upper Mississippi Valley and the Lake region and at points in the interior of the Middle Atlantic States on the 29th. From the 17th to 19th a warm wave swept the middle and northern districts east of the Rocky Mountains, attended by temperatures that rose to and slightly above 90° from the upper Mississippi Valley over the Ohio Valley and Middle Atlantic States on the 17th and 18th.

At the close of the second decade of the month dry weather had prevailed nearly two weeks from the Mississippi River over the Ohio Valley and the Middle and South Atlantic and east Gulf States. During this period precipitation had been in excess from the valley of the Red River of the North to the Pacific coast. During the third decade of the month the drought in the Middle, Eastern, and Southeastern States was broken by copious rains.

There were four well-defined storm periods in the United States. From the 1st to 5th low areas I, II, and V caused

⁴ Hedin, Sven. Scientific results of a journey in central Asia, 1899-1902. Vol. 5, part 1, a. Meteorologie von Dr. Nils Ekholm. 1. Die Beobachtungen, 1894-1897 und 1899-1902. Stockholm, 1905.

⁵ Report of the Eighth International Geographic Congress. Washington, 1905. Pp. 380-385.

⁷ Heidke, P. Meteorologische Beobachtungen aus Deutsch-Ostafrika. Mitteilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten. Bd. 19, Hft. 1, pp. 40-106.

⁶ Report of the Eighth International Geographic Congress. Washington, 1905. Pp. 277-293.

rain and thunderstorms from the Missouri Valley to the middle Atlantic and New England coasts. From the 7th to 10th low area VI produced precipitation from the Missouri Valley to the north Atlantic coast, and on the 10th snow was reported as far south as the mountains of northern Virginia. Under the influence of low areas VII, VIII, IX, and X rain fell from the Pacific coast to the upper Lakes from the 10th to 19th, and snow was reported during this period in locations from the northern Plateau region to Michigan. From the 22d to 25th low area XIV caused heavy rains in the Southeastern States, and at Jacksonville, Fla., 12.86 inches of rain fell during the seventy-two hours ending at 8 a. m., of the 25th. Low area XV, that appeared over Arizona on the 22d and reached the middle Atlantic coast the night of the 27th, was attended by rain generally east of the Rocky Mountains. During the closing days of the month practically all sections of the country were visited by occasional rains.

Coast and Lake ports were advised regarding storms that threatened to inconvenience or damage shipping.

BOSTON FORECAST DISTRICT.

The chief weather feature of the month was the storm of the 27th to 29th, during which general and heavy rain fell throughout New England; at several points in central and southern New England the rainfall was between four and five inches. Freshets were caused in rivers and streams and in many sections lowlands were flooded. The storm was attended by high winds on the southern New England coast, but no damage to shipping has been reported. Thunderstorms were more frequent than usual and in a number of instances were severe, buildings being struck by lightning and burned and a number of persons injured. Frosts occurred frequently and at a later date than usual. Frost warnings were issued to cranberry growers on the 10th and 29th. During the night of the 10-11th the temperature in the bogs ranged from 25° to 28° and killing frosts occurred. Frosts, less severe, were noted on several other dates.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

The month was abnormally dry over the southern portion of the west Gulf States. No general disturbance occurred and no special warnings were issued.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

No storms of unusual severity occurred in the North-Central States. Warnings were, however, issued in advance of several well-defined storms, and as no casualties were reported it is probable that they were of great service. Frost warnings were issued on several dates and were verified. Special warnings for the cranberry marshes of Wisconsin were also in every case verified, and were important for the reason that the owners were enabled to flood the marshes in anticipation of frost.—*H. J. Cox, Professor and District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

With the exception of cool periods from the 6th to 10th, and on the 20th-21st and 28th the temperature in Kentucky and Tennessee was abnormally high. Frost warnings were issued for Kentucky on the morning of the 6th and for Kentucky and Tennessee on the mornings of the 7th and 9th, all of which were verified. During the first five or six days thunderstorms occurred, after which a period of dry weather continued practically until the 25th. From the 25th until the 28th copious showers fell in both States, and on the 31st thunderstorms, with excessive rains, occurred, and damaging wind squalls visited a large portion of Kentucky.—*F. J. Walz, District Forecaster.*

DENVER FORECAST DISTRICT.

May presented no unusual weather features. Temperature was below the normal, except in eastern Colorado; heavy frost

was confined to the high stations, and the damage by frost at lower altitudes was slight. No special warnings were issued or needed. Precipitation was in excess in southwestern Wyoming, western Colorado, Utah, and southern New Mexico, and a corresponding deficiency was noted east of the mountains and in northern portions of New Mexico and Arizona.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The noteworthy features of the month were unusually heavy rains during the last week, with surface winds in California from the south and southwest, essentially rain-bearing winds, and rainfall at San Francisco heavier for the season than at any time since 1884.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

May was unusually stormy. The principal disturbance made its appearance off the Washington coast the morning of the 25th, and storm warnings were immediately ordered at all seaports. The following night a maximum wind velocity of 68 miles occurred at North Head, Wash., and high winds were reported in the Puget Sound country. This disturbance moved slowly eastward, and, besides the high winds detrimental to navigation, it caused a rainy period of several days that, on the whole, was very beneficial to agricultural interests; but along the northern slope of the Blue Mountains the rains were excessive, and much damage was done by floods in the small streams rising in those mountains.

Both the Umatilla and the Walla Walla rivers overflowed their banks and inundated the neighboring lowlands. Many bridges were washed away or seriously weakened, and numerous washouts occurred along the track of the Oregon Railroad and Navigation Company between Meachem and Umatilla. Railway traffic over this stretch of road was entirely suspended for several days. The cities of Pendleton, Oreg., and Walla Walla, Wash., were greatly inconvenienced by floods and some property was damaged, but the losses were not heavy.

Frosts occurred frequently in the intermountain section of the district, for all of which timely warnings were issued.

Although May is the month for high water in the Columbia River, due to the melting of snow in the Rocky Mountains, the river rose very slowly, and at the close of the month it was below the danger stage at all points where observations are taken.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

River conditions were comparatively quiet and uneventful during the month. The crest of the April rise in the lower Mississippi River reached Baton Rouge on the 1st and New Orleans on the 3d, and by the 7th a general fall was in progress. There was a moderate flood in the Arkansas portion of the Red River from the 6th to the 13th, with a maximum stage of 31.2 feet at Fulton, Ark., 3.2 feet above the flood stage. The flood was well forecast by warnings issued on the 3d and 6th, and extended only a short distance below Fulton. A flood of similar character also occurred in the Chickasawhay River of Mississippi about the same time. The warnings, issued a few days in advance, were fully justified, and proved of much value to interests affected by flood waters. Heavy rains during the first ten days of the month over the headwaters of the Rio Grande caused a general rise in that river below the mouth of Rio Chama, for which advices were issued on the 13th. There were additional rains from the 19th to the 21st, inclusive, necessitating advices of a similar character on the 23d. The crest stages were in both instances somewhat below the flood lines.

The highest and lowest water, mean stage, and monthly range at 283 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown