

Louis—the lowest noted for that date and place in seventy-one years. On the same day the temperature was below freezing in southwestern Kansas. From the 20th to 22d a frost-bearing cool wave swept from the Northwestern States over the Lake region, Ohio Valley, and the Middle Atlantic States.

In the second decade excessive rainfalls occurred in the central and lower Mississippi Valley and the east Gulf States. In the third decade heavy rains caused the overflow of many streams in Texas, and heavy rains on the 18th and 19th caused flood stages in the Willamette River. On the 3d and 4th snow fell from the States of the lower Missouri Valley over the upper Lake region, northern Illinois, and northern Ohio, breaking generally thruout that region the snowfall record for May. At Omaha 4 inches fell on the 3d, and at Chicago the fall amounted to 0.8 of an inch. In the second decade snow fell in the lower Missouri Valley on the 14th, and in the upper Mississippi and Ohio valleys and the Lake region on the 15th. Snow was reported in the third decade of May from the middle and northern Rocky Mountain districts over the Great Lakes.

The first important storm of the month advanced from Texas over the Ohio Valley, lower Lakes, and the Canadian Maritime Provinces during the 3d and 4th. From the 11th to 16th a barometric trough that extended from Canada to the Gulf of Mexico moved slowly from the Rocky Mountain districts to the Atlantic coast. The third notable barometric depression of the month advanced from the southern Rocky Mountain region to the middle and northern Atlantic coasts from the 24th to 27th. In all cases vessels were forewarned of the approach of dangerous gales in ample time to seek shelter.

On the 6th a tornado was reported 40 miles west of Mount Pleasant, Tex., and the towns of Ridway, Birthright, and Antioch suffered damage. On the 19th severe thunderstorms with heavy rain and hail occurred in the Middle Atlantic States. On the 24th and 25th severe rain and local storms were reported in Texas and Oklahoma.

BOSTON FORECAST DISTRICT.

The average temperature was the lowest recorded for May since observations have been compiled in the present form, beginning in 1888. Precipitation was unevenly distributed, but was, as a whole, below the normal. At a number of stations having long records snow has never been known to fall at so late a date as in May, 1907. There were no gales, and no storm warnings were ordered. Frost warnings were issued to cranberry growers on the 11th and 21st, the temperature in the bogs falling to 25° or below on the 11th, and to 28° or below on the 21st. Berries that were not protected doubtless suffered damage.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

The month was abnormally cold and precipitation was excessive generally thruout the district. On the 3d frost warnings were issued for the northwestern portion of the district and warnings of freezing temperature for the Texas panhandle. Subsequent conditions justified the warnings. No general gales occurred on the coast.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The month was remarkably cold and, with the exception of three periods of one to three days each, the temperature continued below the normal. On the 5th, 12th, 21st, and 28th frost occurred over the whole or the greater portion of Kentucky, and on the 5th over northern Tennessee. Frost warnings were in each instance issued in advance of the occurrence of frost.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

Abnormally low temperature continued thruout the district. Frost warnings that were issued on several dates were justified at practically all stations. Storm warnings were issued on the 11th, 12th, 13th, 14th, and 26th. The warnings were well in advance of approaching storms and, as no casualties occurred,

were evidently of material benefit to navigation.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

Precipitation, often in the form of snow, was frequent, and as a rule in excess of the normal, while low mean temperatures were noted at all stations. In southern Wyoming, Colorado, and northern New Mexico the month was the coldest May on record. Freezing temperatures occurred at intervals, except in southern portions of New Mexico and Arizona. The frosts and freezes were covered by the forecasts and special warnings.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

Altho the mean temperature was normal at many stations, in the matter of storm frequency, amount and frequency of precipitation, and air circulation the month was unlike the normal May. There was a well-marked tendency for depressions originating apparently over the Valley of the Colorado to pass eastward over northern Texas, the lower Mississippi Valley, and thence northeastward.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was slightly warmer than usual, and rainfall was deficient. There were but two periods of general rains, on the 10-11th and 18-19th. The first was attended by high winds. There were a number of light frosts in the eastern portion of the district, and two mornings of heavy frost in southern Idaho. The annual rise in the Columbia River began on the 10th and the rise thereafter was slow and steady. Timely warnings were issued for all storms and for most of the frosts that occurred.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The slow drift from Texas northeastward of a poorly defined depression from May 5 to 8, inclusive, was attended over the Southern States by the general rains usually incident to depressions of this type. Over eastern Texas, Louisiana, Arkansas, Mississippi, Alabama, and western Tennessee, the rainfall, altho not evenly distributed, was heavy, especially over the lower Red and lower Arkansas valleys, and the States of Louisiana and Mississippi generally. The resulting floods were moderate, except in the Blue and White rivers of Arkansas, where the crest stages ranged from 4 to 18 feet above the flood line, the greatest excesses occurring over the upper portions of the rivers. In the lower Mississippi River the crests were slightly above the flood stages; in the rivers of southeastern Mississippi from 3 to 5 feet above, and in the lower Tombigbee River 12 feet above.

Over portions of eastern Texas considerable damage was done, especially along the creeks and smaller rivers; but elsewhere the losses were moderate and in some localities the high waters were of great assistance in moving logs to the mills. However, a large amount of property was saved by removal in accordance with the Weather Bureau warnings, which were issued with the usual promptness and were fully justified.

Special commendations of the work of the Bureau have been received from southeastern Mississippi, where the service is of comparatively recent establishment, one observer reporting that there has been no loss of stock since the service was inaugurated.

Warnings on the 23d and 26th for rises in the Rio Grande between Albuquerque and El Paso were also correct to within a small fraction of a foot.

The annual rise of the Columbia was well in progress by the 17th of the month, and the usual forecasts and warnings began on that date.

The river district of Phoenix, Ariz., was established on May 1, 1907, with territory comprising the watershed of the Gila River. Special river stations have been located at Tempe,

Ariz., on Salt River, and at the crossing of the Maricopa, Phoenix, and Salt River Valley Railroad over the Gila River; and special rainfall stations at Benson, Flagstaff, Jerome, San Carlos, and Seligman, Ariz.

Service has also been inaugurated along the Colorado River, under the supervision of the local office of the Weather Bureau at Denver, Colo., and special river stations have been located at Fruita, Colo., on the Grand River, at Elgin, Utah, on the Green River, and at Grand Canyon and Topock, Ariz., on the Colorado River.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

DR. ALEXANDER BUCHAN.

When Gen. Albert J. Myer was ordered by the Secretary of War to carry out the provisions express in the act of Congress of February 9, 1870, establishing what we now know as the United States Weather Bureau, it was necessary for him to begin by educating a corps of practical meteorologists. To do this he organized a school of instruction at Fort Whipple, Va. (now Fort Myer), adjoining Arlington, near Washington, D. C. The only two text-books available at that time were Loomis's *Treatise on Meteorology* and Buchan's *Handy Book of Meteorology*, the second edition of which had just been published. Professor Loomis himself past away in 1889, and now we are called upon to record the death, on the 13th of May, 1907, of Dr. Alexander Buchan, at the age of 78. This removes from the world of science a man of world-wide reputation—an indefatigable worker in meteorology, and one whose influence has been widely felt. We are indebted to his colleague, B. T. Omond, esq., honorary secretary of the Scottish Meteorological Society, for a beautiful tribute to the memory of Doctor Buchan which has furnished material for the following lines.

Doctor Buchan was born in 1829, at Kinnesswood, in Kinross-shire, not far from Edinburgh; and in due time he found his way to that center. He graduated at the university and devoted himself to teaching until 1860, when an affection of the throat compelled him to lay aside the profession of his choice; but he always retained his interest in it, as well as in field botany. In 1860 he was appointed secretary to the Scottish Meteorological Society, in whose journal he published many of the results of his labors, until the time of his death. In 1869, in Volume XXV of the *Transactions of the Royal Society of Edinburgh*, there appeared one of the most famous papers of the day, entitled "The mean pressure of the atmosphere and the prevailing winds over the globe". Doctor Buchan had accomplished the Herculean task of coordinating the available data for the whole world. He had brought order out of chaos. He had accomplished a feat that had been declared by many to be impossible, of which Supan has said: "If Buchan had been more cautious we might still to-day be without the isobars of the globe". It is worth recording that an equally great work was being carried on at almost exactly the same time by the eminent Prof. James Henry Coffin, under the auspices of the Smithsonian Institution, "On the Winds of the Northern Hemisphere", embracing all the available records up to the end of the year 1869, but its publication was delayed by the death of Professor Coffin, in 1873. The areas of high and low pressure with their seasonal changes were first made known to the world thru this great work of Buchan's, and no revision of that work was published or perhaps possible until he himself made it in his monograph of 1889, "On Atmospheric Circulation", published in Volume II of the physical and chemical series of the *Challenger Reports*.

During the last ten years of his life Doctor Buchan was an enthusiastic advocate of the establishment of mountain stations, especially the high-level station on the summit of Ben Nevis. This station was maintained with more or less completeness from December, 1883, to October, 1904, and a supplementary low station, at Fort William, from August, 1890, to October,

The highest and lowest water, mean stage, and monthly range at 293 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

1904. The complete record and discussion of these observations fills three volumes of the *Transactions of the Royal Society of Edinburgh*, which were compiled and edited by Doctor Buchan and Mr. Omond conjointly, forming a magnificent monument to one who served Science for her own sake—loving the work, and content with scant financial rewards.

An equally splendid monument to Buchan is the important chapter that he wrote in the compilation of *The Atlas of Meteorology*, published by Bartholomew in 1899. Doctor Buchan's work earned for him many recognitions in the shape of prizes and positions. During the last year of his life he received the well-deserved honor of election as a vice-president of the Royal Society of Edinburgh. For a considerable time he was a member of the Meteorological Council of the Royal Society at London. He was also inspector of stations for this council, and in that capacity traveled over the greater part of Scotland.

But it is not to his scientific worth alone that we must give testimony. He was a man of great simplicity of nature; he had a wide human sympathy and a singularly genial temperament. His wonderful memory and genial disposition placed his great store of knowledge at the service of others. He was also a valued elder in the St. George's Free Church. His wife died in 1900, but his only son, Dr. A. Hill Buchan, survives him.

We add the following extracts from a memorial article by W. N. Shaw, esq., as published in *Nature*, London, May 23, 1907:

A few words as to Buchan's scientific work must suffice. With Baxendell, of Manchester, he was largely instrumental in securing the general acceptance of Buys Ballot's principle of the relation of wind to air pressure. He had the faculty of statistical insight, and realized that by the appropriate combination of many observations it was possible to trace the interdependence of phenomena which might be affected separately by a number of independent causes. This insight is illustrated in a remarkable way by his papers with Sir Arthur Mitchell upon the relations of climate and health in London. Such a method of investigation does not always commend itself to the student of physics, who, fortunate in having the conditions under his own control, is accustomed to trace the direct connection between cause and effect in each separate experiment. But the remarkable results of Buchan's work, which still remains to be followed up, enable one to understand the enthusiasm for collecting observations, and more observations, that seem purposeless to some of those who look on.

His favorite method of meteorological investigation was the map. Beginning from the time when the reduction of the barometer to sea level for synchronous charts and the identification of closed isobars as cyclonic and anticyclonic areas were novelties, he was the first to trace the course of a "depression" across the Atlantic, and subsequently, by the collection and discussion of data from all parts of the world, to give, in a paper before the Royal Society of Edinburgh, "the mean pressure of the atmosphere and the prevailing winds over the globe".

This was followed by the monthly charts and tables representing the atmospheric circulation in the volume contributed to the *Challenger Reports* and published in 1889, and the corresponding results for "oceanic circulation" in 1895.

His monthly maps of forty-year averages for the British Isles developed likewise (with the assistance of Dr. A. J. Herbertson) into the compilation of the wonderful atlas of pictorial meteorology published by Bartholomew, in 1899. Therein is, indeed, a worthy representation of Buchan's meteorological method.

It was by the method of the map that he proposed to deal with the outstanding results of the Ben Nevis observations, which were collected largely under his own supervision, and have been already the subject of