

thought that the retardation might in the end prove beneficial. The air and ground warmed up rapidly beginning with the 26th, and moderately high day temperature obtained the rest of the month.

PRECIPITATION.

The precipitation for the month varied in amount from 2.5 to 4 inches over the upper watersheds of the Allegheny River in Pennsylvania and New York, and from 3 to 4 inches over the upper drainage area of the Muskingum and Great Miami Rivers in Ohio, to from 10 to 15 inches in the Tennessee River Basin and the upper watershed of the Cumberland River in southeastern Kentucky. Six inches or more of rain fell over the southern portions of Illinois and Indiana, the greater portion of Kentucky, practically all of Tennessee, and over the area of the district lying south of that State. From 4 to 6 inches fell over the remainder of Illinois, Indiana, and Kentucky, over nearly all of Ohio, West Virginia, southwestern Virginia and western Pennsylvania, and from 2.5 to 4 inches over the small remainder of the district.

Precipitation was above the normal for April at all stations where the amounts were 4 inches or more. In Kentucky, Tennessee, and the portions of Alabama, Georgia, and North Carolina located in the Ohio River drainage area the rainfall was the greatest for any April during the past 25 years, except in 1892, and at some stations in this area it surpassed that of April, 1892. The greatest amount of rainfall at any station in the district occurred at Chattanooga, Tenn., 15.29 inches, which is the heaviest on record for April in Tennessee. In Ohio the average rainfall of the month, 4.61 inches, while not large in comparison with the amount in the southern section of the district, is greater for that State than that of any other April of record, except in 1893. Excessive rains, 24-hour amounts, ranging from 2.50 to 4.14 inches fell in Alabama on the 4th, 5th, and 7th. In connection with the remarkably heavy rains in Tennessee the section director says:

The monthly rainfall was the heaviest on record for April during the last 29 years, and in only one instance (that of 1892) has the average for April come anywhere near the amount for the present month. While the number of rainy days was as large as ever before recorded, the heavy monthly totals were due largely to the excessive amounts on the 4th-5th, when 28 stations received 24-hour amounts in excess of 2.50 inches; the amounts ranged, in fact, from 2.50 to 6.60 inches, mostly above 3 inches. Many streams overflowed, washouts occurred on railroad tracks in east Tennessee, some trestles were badly damaged or swept away, bottom lands were overflowed, hillsides and county roads badly washed, fences damaged, and along the rivers logs and other property were carried away by the high waters. This occurred mostly in the middle portions of the Tennessee River Valley, especially in the vicinity of and below Chattanooga where the heaviest rains fell. At Chattanooga 1.17 inches of rain fell in 32 minutes, 2.30 inches in 2 hours and 10 minutes, and 6.60 inches in 9 hours and 59 minutes on the 4th, and on the 7th 1 inch fell in 26 minutes.

In Kentucky the rainfall was largely in excess, averaging 7.06 inches, or 3.41 inches above the normal for the whole State, while excesses at individual stations ranged between 1.5 and 9 inches. Heavy rains occurred generally during several days in each decade, and excessive rains fell over a large area of the State on the 30th. On this date 24-hour amounts of from 2.5 to 5 inches occurred at a number of stations, while at one station there were 6.27 inches and at another 9.05 inches. The latter amount occurred at Edmonton and is one of the heaviest rainfalls in 24 hours on record in the State. Great and widespread damage was done by these excessive rains in the west central and southern portions of the State, but particularly in the south-central section. In Barren,

Metcalf, Adair, and bordering counties great damage was done to farms, crops, fences, buildings, and bridges by the floods.

Precipitation occurred with unusual frequency even for the month of April, in fact there were but 4 or 5 days at most when precipitation in considerable amount did not occur over large areas. The principal periods with precipitation, when more or less large amounts occurred, were the 2d-9th, 11th-15th, 19th-23d, and the 28th-30th. In each of these periods the rains were not only general but often heavy.

SNOWFALL.

Snow fell quite generally over the more northerly and the more easterly sections on the first two or three days of the month and in Ohio and over the mountain sections of Pennsylvania and West Virginia at infrequent intervals as late as the 23d. The total amounts for the month over the States or portions of States in this district where the snowfall was worth regarding at all were as follows: In western New York, 6.5 to 8.5 inches; in western Pennsylvania it averaged slightly over 5 inches and ranged from 1 inch to 18.3 inches, the latter amount being measured at Somerset, elevation 2,250 feet above sea level; in western Maryland, 6 to 12 inches; in West Virginia, 0 to 6 inches; in Ohio, 2 to 6 inches fell in the early part of the month over northern and middle counties, but none in southern counties; in Indiana, trace to 5 inches; and in Illinois, trace to 3.6 inches. Rather severe thunder and lightning attended a snowstorm in northeastern Illinois on the 2d. At Hoopeston, where nearly 4 inches of snow fell during the progress of this storm, a barn was struck by lightning and burned.

RIVERS AND FLOODS.

The following notes are extracted from the reports of section directors and other officials in charge of river districts in the Ohio River Basin:

Pennsylvania and West Virginia.—Streams maintained good stages and reservoirs were well supplied with water in Pennsylvania during the month, while in West Virginia rivers were low or at moderate stages.

Ohio.—Heavy rains on the 3d, 4th, and 5th caused high water in the rivers of the State, but there were no overflows, except along the Scioto in Pickaway County.

Kentucky.—The Kentucky River reached a high stage about the 8th, but did not pass the flood stage at any station. Freshets from the heavy rains occurred in other rivers of the State at several different times, but especially in the rivers whose drainage areas occupy the western and southern portions of the State.

Wabash River.—A moderate rise began in the Wabash River and tributaries about Mount Carmel on the 3d. Flood stage was passed on the morning of the 9th and a stage of 16.1 feet was reached on the 11th, after which there was a fall during two days. Heavy rains over the watershed on the 13th and 14th started another rise, which continued until the 22d, when a stage of 19.6 feet was reached. The river was above flood stage at Mount Carmel from the 9th to the 26th, inclusive, notwithstanding the fact that Elliston, on the West Fork of the White River, was the only station in the river system above Mount Carmel that reported any flood stages. The amount of damage done in the Wabash River sections is estimated at about \$10,000. Nearly half of this damage was done in and about Mount Carmel, Ill.

Cumberland and Tennessee Rivers.—The excessive rains of the 4th-5th caused rapid rises during the following 10

days in the Cumberland and Tennessee Rivers, with unusually high waters at various points from the 6th to the 16th. Flood stages occurred in the Tennessee River at Knoxville, Tenn., on the 6th and 7th and at Clarksville, Tenn., on the Cumberland River, on the 15th. The sudden rise and high stages caused considerable loss of property at some places. The Cumberland River fell steadily after the passing of the crest of this flood and was getting quite low in the upper portion near the end of the month when, on the 29th, very heavy rains occurred at the headwaters of the river, causing a remarkable rise. At Burnside the increase was from a stage of 3.8 feet at 7 a. m. of the 29th to 50.3 feet at 7 a. m. of May 1, making a rise of 41.9 feet within 24 hours. Interested persons along the Cumberland were kept informed of the rises by the forecasts issued by the official in charge of the Nashville River district. The initial rise in the Tennessee River was due to heavy rains over the entire watershed on the 4th and 5th. It was accentuated and protracted by the additional heavy rains of the 8th, 9th, 15th, 18th, and 19th. Taken as a whole this flood was the most important that has occurred in the Tennessee River in a number of years. At Florence, Ala., the river was above flood stage from the 6th to the 16th and from the 20th to the 22d; at Riverton, Ala., from the 6th to the 24th, and at Johnsonville, Tenn., from the 8th to the 26th. Warnings were issued promptly in advance by the officials in charge of the various sections into which the Tennessee River is divided and enabled much property to be saved which would otherwise have been lost.

Ohio River.—Good stages were maintained in all sections of the Ohio River during the entire month. There was no high water worth mentioning above Cincinnati, Ohio, or, in fact, above the falls of the Ohio River at Louisville, Ky. The highest water of the month at Cincinnati, Ohio, 41.6 feet or 8.2 feet below flood stage, was reached on the 14th, and at Louisville, Ky., 20.2 feet or 7.8 feet below flood stage on the 15th. Heavy rains in the early part of the month and again about the middle of the second decade caused a flood of moderate proportions in the lower Ohio River, extending from about Owensboro, Ky., to Cairo, Ill., and lasting from about the 14th to the 23d. The high water created considerable inconvenience by flooding country roads in the bottom districts; caused the removal of live stock and other movable property from some of the lower bottom farms, and will necessitate incurring some slight additional expense for clearing sloughs and bottoms of stranded drift, but no serious damage as far as can be learned resulted from these floods. Flood warnings enabled the people to lay in supplies and move stock, thus preventing much discomfort and also preventing some considerable damage which might have resulted without timely warnings.

MISCELLANEOUS.

Thunderstorms were unusually frequent. They occurred quite generally over the district during the period 4th–7th, 14th, 19th, and the 29th–30th.

Very remarkable phenomena were the simultaneous occurrence of snowstorms and thunderstorms in Indiana on the 1st, in Illinois and Indiana on the 2d, and in Illinois, Indiana, Ohio, and West Virginia on the 3d. Hail occurred on the 6th in Pennsylvania and North Carolina, on the 7th in Kentucky and Alabama, on the 14th and 19th in Kentucky, on the 22d in Indiana and West Virginia, and on the 29th in Tennessee. Much damage was done locally in Tennessee by the hailstorms of the 29th. Sleet fell in Kentucky on the 2d and the early morning

of the 7th, in Maryland on the 4th, and in West Virginia on the 22d. Many varieties of weather phenomena were experienced in West Virginia on the 22d, rain, hail, sleet, snow, and thunderstorms all occurring on that day. High winds occurred at frequent intervals during the month, and damage from this cause was reported from various localities.

Damage from storms.—A barn was struck and destroyed by lightning in Jefferson County, Ky., on the 3d. At the same time several horses, mules, and other head of stock were killed or injured. A local storm of considerable severity occurred at Shelbyville, Ind., on the night of the 4th–5th. The cooperative observer at that station, Mr. Edgar G. Hodson, reports as follows regarding the storm:

Between 10 and 11 o'clock p. m., April 4, heavy thunder accompanied by lightning occurred in the southwest. A high wind was blowing from that direction. The clouds moved rapidly and continually changed in form. The wind blew with increasing velocity and was accompanied by a hard, beating rain, which fell in torrents for 20 minutes. In the central portion of Shelbyville many buildings were unroofed, trees blown down, and limbs of others broken. Four houses, seven barns, and many small outbuildings were blown down. A Mr. Lewis and daughter were killed by being crushed under a falling house, and several animals were killed by falling bars. The storm seemed to have a rising and falling motion, as some buildings in the line of the storm were not damaged. The storm seemed to dip to the earth about every three-fourths of a mile. The length of the region of destruction was about 10 miles, and the path was from one-fourth to one-half mile in width. Nearly all telephone wires were blown down. The storm was followed by cloudy and colder weather. The total damage was estimated at fully \$100,000.

During this same night severe windstorms did thousands of dollars damage in the blue-grass region and eastern counties of Kentucky, the injury to tobacco barns being especially heavy. The deluge of rain which fell over the southeastern counties of Kentucky during the 4th and 5th resulted in great destruction of property in the Yellow Creek Valley of Bell County, Ky. Railroad and county bridges and roadbeds were washed away. In the business section of Middlesboro, Ky., every house suffered from the flood. During the night the water had risen so high in the streets that a general alarm was sounded and people awoke to step from their beds into several feet of water that had flooded their houses during the two or three hours preceding. Heroic work was called for to convey the distressed people from their homes to safety.

Considerable damage was done to barns, outbuildings, and trees in southeastern Ohio by a gale that swept over that part of the State on the night of the 4th. Some minor damage was done in the vicinity of Columbus, Ohio, by high winds on the 15th. At Lexington, Ky., on the 19th a thunderstorm accompanied by a very high wind occurred from 3.25 to 3.55 p. m. The high wind lasted 10 minutes and caused a large amount of damage in the vicinity of the station and in neighboring towns. Chimneys were blown down, houses were unroofed, plate-glass windows were blown in, and trees and crops damaged. Many people were injured by flying débris and one man was killed.

A quite destructive storm, attended by high winds and heavy hail, occurred in Montgomery County, Tenn., on the 29th. The storm track was about 1 mile wide and 20 miles in length. Some houses were damaged by the wind and much damage resulted from hail. About 60 hogs were reported killed on the farm of Joe Dunlop. On the same day a workman was seriously injured by lightning at Mounds, near Cairo, Ill.

An unusually interesting lunar halo was observed at Columbus, Ohio, on the evening of the 10th. It lasted

with varying intensity from about 7.40 p. m. until after midnight. A corona appeared at 8.45 p. m. and at 11.30 p. m. a second halo appeared making three concentric circles about the moon. The diameter of the outer halo was 45° and of the inner $11\frac{1}{4}^\circ$, while the corona was about twice the diameter of the moon. A brilliant meteor was observed at several places in middle and western Tennessee on the night of April 23 between 8 and 9 o'clock.

FORESTS AND FLOODS.

By J. WARREN SMITH, Section Director.

An article recently appeared in the Ohio State Journal relative to floods in Europe, and in it the statement was made that there had been excessive rains and serious floods in Europe since the spring of 1909, and the surprising theory was advanced that the cause is the deforestation in the United States.

The theory is so ridiculous and so far beyond reason that no person would give it a second thought if it were not for the scientific standing of its author, Prof. Camille Flammarion. I will quote the following extract, which is itself a quotation from Flammarion:

Deforestation in America is chiefly responsible, for whenever the barometric pressure is low we are subject to west winds which blow direct from America across the Atlantic, practically following the course of the Gulf Stream. These winds collect vapors on the way and these, when coming in contact with our damp and chilly land, condense, thus causing our continuous downpour.

These winds have always existed, but it is only of late that we have noticed them in Europe. Why only of late? The reason is to be found in the wholesale deforestation in the United States.

It is admitted that the west winds, as a rule, touch the earth in America, and in times past the luxurious vegetation of that country served as a very effective obstruction to their violence, in many cases arresting them, and always retarding them. Now nothing stands in their way and that is why Europe suffers.

A very pretty theory but based on a statement that has no foundation in fact: that is, that wet seasons and floods are entirely new for Europe, which of course is not true.

In a book entitled "Record of Seasons, Prices, and Phenomena in the British Isles," Mr. T. H. Barker, a fellow of the Royal Meteorological Society, has collected

a record of unusual weather conditions and effects in England since 720 B. C.

There are only two entries for the period preceding the Christian era, but beginning about 50 A. D. the record is very complete.

It appears to the author that the English climate was always much the same as at present. Periods of famine have occurred at various times and were invariably caused by wet and cold seasons.

One of these lasted through nearly the whole of Edward II's reign, when for 20 years or more, incessant rains were noted to have fallen every summer, with only two or three exceptions. At that time the people were dependent on their home produce, and their sufferings were very great, and the death of the cattle and sheep was a national calamity.

Fifty years later corn was dear for some years owing to the wet seasons. From 1542 there was a continuation of wet summers and bad crops of corn till the end of the century, with occasionally a more fruitful year than its neighbors.

In 1692 commenced a series of extraordinarily bad seasons. The author says they have been traditionally referred to as the barren years at the close of the seventeenth century.

Again in 1773 he quotes from Gilbert White: "Such a run of wet seasons as we have had for the last 10 or 11 years would have produced a famine a century or two ago," meaning of course that at this time transportation facilities had improved to such an extent that foodstuffs could be imported from the Continent, which was not true in the earlier times.

Another cycle of bad seasons commenced in 1792 and continued with few intermissions up to 1817. After that time the wet and dry years were evenly balanced until 1875 when another wet period began, through which the author states they were passing in 1883, when the book was published.

His record of great floods began with the year 353 A. D. Some were due to the melting of heavy snow and some to heavy rains.

The forestry problem in the United States is an important one, and it should not be made to bear the burden of such unreasonable theories as that given above.