

caused much damage to corn and cotton. A Southern Railway train had all the windows on the windward side broken in.

Similar storms occurred in North Carolina on May 24. At Raleigh a severe storm passed over the city between 3:30 and 4 p. m. The rainfall was 1.09 inch and the wind reached a velocity of 39 miles an hour. A few small buildings were unroofed and trees were blown down at various points, but the damage was comparatively small. Severe thunderstorms occurred at Rockingham and Wake Forest on the same date.

#### RIVER CONDITIONS.

At a large number of stations the mean river stages fell much below the normal stages for May. The rivers of Virginia and North Carolina experienced no important changes during the month. The Cape Fear at Fayetteville rose from 4.3 feet on the 8th to 21.0 feet on the 10th, followed by a fall to 8.5 feet on the 13th. In South Carolina the stream flow was about an average for the month in the Broad, Catawba, Santee, and Saluda rivers, but was decidedly below normal in the Pedee and Waccamaw. A marked rise took place in the up-country streams from the 9th to the 14th, and later, as the water approached the coast in the low country portions of the river basins. The Saluda River rose to slightly above flood stage on the 11th at Chappells, but no damage resulted. The Santee rose to 1 foot above flood stage at Rimini on the 14th. The moderate rises in the Broad, the Catawba, and the Great Pedee rivers were beneficial to water-power interests.

The average stages in the Pedee and Waccamaw rivers, as well as in the rivers of Georgia, were unusually low. The following comparative records illustrate this marked feature of the river conditions during May, 1910:

TABLE 1.—Mean river stages for May, 1910, compared with average stage.

Stations.	May, 1910.	Average for May.	Length of record.
	Feet.	Feet.	
<b>Pedee River.</b>			
Cheraw, S. C.	3.6	5.2	18
Smiths Mills, S. C.	2.9	7.6	15
Effingham, S. C.	4.1	5.2	18
Kingstree, S. C.	0.7	4.3	17
<b>Waccamaw River.</b>			
Conway, S. C.	1.6	3.2	17
<b>Flint River.</b>			
Albany, Ga.	1.4	4.4	17
Bainbridge, Ga.	4.5	7.1	9
Woodbury, Ga.	0.9	1.2	10
<b>Chattahoochee River.</b>			
Eufaula, Ala.	5.9	6.3	17

In Alabama the Coosa watershed received on an average by far the largest amount of rainfall, and the Chattahoochee the least. The heavy rains on the 20th and 21st caused a rapid rise in the south-flowing rivers of the State during the last decade, but no very high stages were attained. In Mississippi also the river stages were much below the normal.

#### MISCELLANEOUS PHENOMENA.

The prevailing winds were from the southwest in the Atlantic States, except in Florida where the southeasterly winds were most frequent. In Alabama and Mississippi southerly winds prevailed. Comparatively few stations reported maximum winds exceeding 40 miles an hour. At Columbia, S. C., during a brief squall on the 22d, the wind reached for 5 minutes a velocity of 52 miles an hour. At Atlanta, during the thunderstorm on the 12th, a velocity of 60 miles an hour from the northwest was registered. Savannah reported 43 miles from the southwest on the 24th; Macon, 40 miles from the southwest, on the 22d; Augusta, 40 miles northwest, on the 12th; Jacksonville, 48 miles from the south, on the 8th; and Pensacola, 40 miles north, on the 23d. The following regular Weather Bureau stations registered an average wind movement exceeding 10 miles an hour during the month: Hatteras, average hourly wind movement, 15.0 miles; Charleston, 11.0; Atlanta, 11.6;

Savannah, 12.4; Jupiter, 12.2; Pensacola, 17.9. The wind movement was very high at Pensacola.

The amount of sunshine was above normal over perhaps three-fourths of the district, but there was much less sunshine than usual in the mountainous portions, especially in northern Georgia. It was also below the normal in Mississippi. The number of clear days was almost exactly 15 in every State in the district; the number of cloudy days varied from 9 in Mississippi and 8 in Georgia to 4 in Florida and 5 in Virginia.

#### HALLEY'S COMET.

No special atmospheric phenomena of any kind were visible to the most attentive observer on May 18 when the earth was supposed to have passed through the tail of Halley's comet. It has been suggested, as an afterthought, that such an event may really be impossible. The tail of a comet is formed of most highly rarefied gas repelled from its nucleus by the repulsive force of the solar radiation, the particles being so small that gravitation is entirely overcome. The earth, though a dark body, has a very high temperature as compared with interplanetary space and it must necessarily be sending out in all directions at all times radiant energy differing only in intensity from that emitted by the sun. The repulsive force of these waves is quite sufficient to dissipate the extremely tenuous matter composing the tail of a comet and thus prevent its touching the earth.

A total eclipse of the moon was observed on the evening of May 23.

#### LOW WATERS IN THE RIVERS OF SOUTHERN MISSISSIPPI DURING THE SPRING OF 1910.

By FRANK MONTGOMERY, Observer, Meridian, Miss.

The months of March, April, and May, 1910, constitute the driest spring in southern and central Mississippi since 1871, with the sole exception of the similar period of 1898. Although no river gages existed on the Pearl and Pascagoula rivers prior to 1905, it is probable that, with the exception of 1898, these rivers were never before so low during the entire spring. From 1905 to 1909, inclusive, from 1 to 4 damaging floods occurred each spring. It is true that the flood stage was reached in the lower Pearl River this year, but no damage whatever resulted.

In 1909 the Pearl River at Jackson, Miss., was above the flood stage on 42 days during March, April, and May, and the heavy rains of the closing days of May and the first 2 days of June kept the river in flood until June 18. The average number of days that the Pearl River was in flood at Jackson during the spring months, from 1905 to 1909, inclusive, is 28. During the spring of 1910 the highest stage reached was 16.4 feet, or 3.6 feet below flood stage, and with the exception of 19 days, the river was less than half way from zero to flood stage. The fall being greater on the Chickasawhay River, the average number of days that the water was above flood stage at Shubuta during the 5 spring months, from 1905 to 1909, is 12. The highest stage reached in 1910, however, was only 15.4 feet, which is 9.6 feet below flood stage, and the river was less than half way from zero to flood stage on all but 4 days.

Table 1 gives the total rainfall and resulting river stages during the past 6 years (March to May) at Jackson, Miss., and Pearl River, La., on the Pearl River, and at Merrill, Miss., on the Pascagoula River and at Shubuta, Miss., on the Chickasawhay, which is joined by the Leaf River, just above Merrill, to form the Pascagoula.

Table 1 reveals most clearly the remarkable deficiency in rainfall in southern and central Mississippi and the resulting low stages in the rivers of the district. In every case the mean stage, as well as the highest and lowest, are the least on record during the period of 6 years. While the growth of vegetation was retarded, there was in general ample moisture in the ground for the needs of vegetation except during one or two short

periods, and, as compensation, farmers were able to thoroughly cultivate crops and kill grass and weeds.

On the whole, the dry spring was beneficial to the extensive logging interests of southern Mississippi. While rafting has been impeded to some extent, the low water has enabled lumbermen to work with scarcely any interruption in the low lands where inundations are ordinarily of frequent occurrence.

TABLE 1.—Total rainfall and resulting river stages on the Pearl and Pascagoula river systems during six successive spring seasons.

Year.	River stages.			Total rainfall.
	Average.	Highest.	Lowest.	
	Feet.	Feet.	Feet.	
JACKSON, MISS. (Flood stage, 20 feet.)				
1905	13.0	21.3	6.5	16.10
1906	12.1	29.6	3.2	17.28
1907	12.8	27.3	3.0	18.66
1908	18.2	28.6	4.0	20.19
1909	18.5	35.3	5.8	22.05
1910	5.5	16.4	1.5	10.89
PEARL RIVER, LA. (Flood stage, 12 feet.)				
1905				
1906				
1907	11.0	15.2	4.7	24.53
1908	12.3	15.5	8.0	14.88
1909	12.3	15.3	8.9	15.51
1910	7.8	13.3	4.3	4.99
SHUBUTA, MISS. (Flood stage, 25 feet.)				
1905	8.1	24.1	3.0	16.22
1906	13.3	39.2	3.0	22.36
1907	16.0	34.5	4.4	21.98
1908	10.9	28.5	4.8	21.32
1909	12.3	43.0	2.2	29.43
1910	4.4	15.4	1.4	8.14
MERRILL, MISS. (Flood stage, 20 feet.)				
1905	12.1	19.6	6.2	21.33
1906	11.3	21.6	3.3	18.14
1907	13.8	21.7	3.5	32.32
1908	12.9	20.4	5.9	17.50
1909	11.2	20.0	3.2	23.52
1910	5.1	15.0	0.4	5.38

**STREAM FLOW OF THE OCMULGEE AND OCONEE RIVERS IN GEORGIA.**

By W. A. MITCHELL, Observer, Macon, Ga.

Continuing the study of the stream flow of the rivers of Georgia, as begun in the March issue of the MONTHLY WEATHER REVIEW, the following records are given relating to the Altamaha River system. This system comprises the Altamaha and its 2 main tributaries, the Ocmulgee and Oconee rivers. Both tributaries rise in the north-central portion of the State and flow southeastward through narrow valleys, parallel most of the way, and unite about 130 miles from the Atlantic coast to form the Altamaha. River gages are maintained at Macon, Hawkinsville, Abbeville, and Lumber City on the Ocmulgee, and at Milledgeville and Dublin on the Oconee. The records at Hawkinsville and Lumber City are for only about 2 years and are not given.

A proper discussion of the stream flow of any river includes mention of the amount of rainfall and the manner of its occurrence, the temperature, and the topography of the country drained. As to topography, the upper portions of the basins of both the Ocmulgee and Oconee rivers lie among the hills, and there is considerable fall from their headwaters to what is known as the "fall line," which passes near Macon and Milledgeville and which marks the line of transition from the Piedmont Plateau to the Coastal Plain. In this upper portion of both rivers the fall is nearly 500 feet and there are many fine power possibilities, some of which are being utilized. From the fall line southward the slope is more gradual and the flow of the river slow and regular.

A knowledge of the effect of topography is very essential in forecasting the flow of these streams because, whereas a rise will move from the upper portions of both rivers to the fall line, one-third the length of the valley, in 36 to 48 hours, it will require nearly 3 weeks to move over the other two-thirds of the distance to the coast. The mean river stages for 2 stations on the Ocmulgee and for 2 on the Oconee are given in the tables, together with data in regard to the length of record, etc.; also the normal rainfall for both basins as determined from 12 stations.

*Mean stages of the Ocmulgee River.*

MACON, GA.

This station is 203 miles from the confluence of the Ocmulgee and Oconee rivers and 333 from the coast. Record, 10 years. Flood stage, 18 feet.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
4.7	8.0	7.6	6.3	4.4	5.0	4.0	4.6	3.3	2.6	2.7	4.9

ABBEVILLE, GA.

This station is 91 miles from the confluence of the Ocmulgee and Oconee rivers and 224 from the coast. Record, 6 years. Flood stage, 11 feet.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
7.0	9.2	8.5	6.6	5.6	4.3	3.8	4.7	3.2	2.5	2.4	5.1

*Mean stages of the Oconee River.*

MILLEDGEVILLE, GA.

This station is 147 miles from the confluence of the Oconee and Ocmulgee rivers and 277 from the sea. Record, 6 years. Flood stage, 25 feet.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
5.4	7.4	6.7	5.1	4.1	4.2	4.2	5.2	3.2	2.8	3.0	5.2

DUBLIN, GA.

This station is 79 miles from the confluence of the Oconee and Ocmulgee rivers and 209 from the sea. Record, 10 years. Flood stage, 30 feet.

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
4.9	8.7	7.9	6.1	3.2	3.5	2.8	2.9	1.8	0.9	1.1	3.6

*Normal precipitation over Ocmulgee and Oconee basins.<sup>1</sup>*

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
4.10	5.29	5.08	3.52	3.17	4.25	4.95	5.40	3.40	2.37	2.76	4.24

<sup>1</sup>Computed from the normal rainfall at Athens, Abbeville, Atlanta, Covington, Dublin, Eatonton, Forsyth, Greensboro, Hawkinsville, Macon, Milledgeville, and Monticello.

The average rainfall is practically the same in the basins of both rivers. It contains two periods of maximum, one in February and March, and a second one in August. A period of minimum rainfall occurs in October and November, and another not quite so small in April and May. The highest average stage of water in both rivers is coincident with the period of maximum rainfall in February and March, but at the time of greatest summer rainfall only a slight average rise in the rivers occurs, showing the influence of temperature as increasing evaporation, as well as the greater absorption of moisture by plants in summer than in winter; the soil being in a state of cultivation also holds more water. Occasionally high stages are reached in summer. The highest stage ever recorded at Macon occurred in August, 1887, when a height of 24 feet was attained. Summer floods, however, are exceptional. At the time of the minimum rainfall in October and November very low river stages are reached and such conditions interfere seriously with traffic on the streams, which has to be suspended during the fall months.

Then, too, the character of the rainfall plays an important part in the flow of the streams. On account of the very narrow