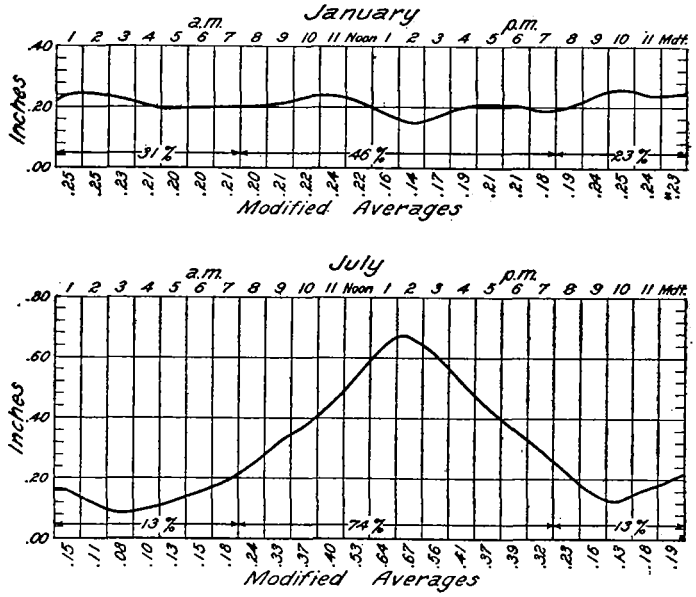
HOURLY DISTRIBUTION OF RAINFALL AT MOBILE, ALA.

By HARRY ARMSTRONG

[Weather Bureau Office, Mobile, Ala., June 28, 1934]

The rainfall data for this article cover a period of 20 years, 1913–32, inclusive. Hourly averages were prepared for each month. In some cases there were marked differences for adjacent hours, but these were traced to unusually heavy thundershowers or the passage of tropical disturbances. The averages were smoothed by adding to double the value of the hour in question that of both the previous and the succeeding hour and dividing the sum by four. From these modified hourly averages, seasonal and yearly averages were prepared, and monthly, seasonal, and yearly graphs drawn, of which figure 1 is for January and July, respectively.



Modified hourly precipitation averages (hundredths of inches) for the 20-year period, 1913–32.

In May, June, July, August, and September the probability of rain is greatest between 1 and 3 p.m. for any day. During May and September the probability of rain at 2 p.m. is two and a half times greater than at midnight. In June the likelihood of rain is three times as great at 2 p.m. as for a like period at night; during July, five times as great; and during August, eight times as great.

Through the summer months, June, July, and August, Mobile has about five times the chance of getting rain in mid-afternoon, mostly in the form of local thunderstorms, as for a like period at night. The peak of precipitation is between 2 and 3 p.m. The average time of greatest rainfall occurs, as theory indicates it should, after that (around 1 p.m.) of the maximum temperature for the day. The average number of thunderstorms for the summer is 38, which is about 60 percent of the yearly average. During summer about 72 percent of the rain occurs between 7 a.m. and 7 p.m., as compared with 58 percent for the year. Also, about 50 percent falls during the 6 hours from 11 a.m. to 5 p.m. Fair weather at night and showers during the day seems to be a good forecast, for this period, when rain is probable.

In January, February, and November the rain is heaviest during the 12 hours, 7 p.m. to 7 a.m., about 55 percent occurring in this period. For the other 9 months the precipitation is heaviest from 7 a.m. to 7 p.m., about 60 percent being the average predominance. During January rain is fairly well distributed through the 24 hours with a slight increase at night. February has its heaviest rain at about 2 a.m. and its lightest at 7 p.m., though the difference is only slight. March shows a tendency to rain at 7 a.m. and to slacken up at midnight. April shows only a small variation. During October the period of rain is from 5 a.m. to 1 p.m. November has the biggest percent of rain at night of any month. Its bulge in the rain curve is at midnight. For December the wettest time is about mid-morning and the driest about 9 p.m. For the whole year the greatest rain period is at 2 p.m. The 9-month period, September to May, inclusive, has the highest precipitation at 7 a.m. and the lowest at 7 p.m., though the difference is small. The hourly distribution of rainfall for these 9 months is fairly uniform, with the total amount about equally divided between day and night.

LIGHTNING BRANCHES ON THE GROUND

By R. H. WEIGHTMAN

[Weather Bureau, Washington, D.C., July 1934]

On June 6, about 5 p.m., in the northwestern suburbs of Washington, D.C., about 6 miles from that city, a thunderstorm occurred in the warm sector of a depression with center over the Gulf of St. Lawrence. At that time a cold front was advancing southward over Pennsylvania, extending from the Maine coast west-southwestward to southern Ohio.

There were a number of lightning discharges in connection with this storm and it is desired to invite attention to one in particular that struck on the edge of the eighteenth putting green at the Kenwood Golf and Country Club, located on River Road. The course is undulating with trees bordering many of the fairways. The eighteenth green, which is roughly 90 feet in diameter, rises from the fairway as you approach the green to an elevation of about 7 feet at the back, with a rather sharp down slope at the rear to the general level of the surrounding terrain. The discharge, preceding and during which it was raining moderately, struck on this down slope at *B*, figure 1, about 2 feet below the putting surface. From that point two branches, *BK* and *BL*, extended down slope with an angle of about 75° between them. A third branch, *BEJ*, pursued a course up the slope as indicated in the diagram. A fourth branch, *IGH*, was distinctly traceable on the green but not connected along the surface at least with the main discharge at *B*. Soil was scattered about at the back of the green, on the down slope below *B* and even beyond *K* and *L* on the level terrain as much as 20 or 25 feet from *B*. The most disturbed condition of the ground was at *C*, where the earth had been exploded out to a depth of 8 or 10 inches, leaving a kind of funnel about 10 inches along the track

FIGURE 2.—Lightning path on putting green.

and about 6 inches wide at the surface, tapering off to nothing at the bottom. The main discharge apparently was at B, as all connected branches radiate from that point. A^1, A^2, and A^3 are gaps in the branches where the turf is not disturbed in any way. Apparently at these places the discharge passed underneath the surface to resume its course again on the surface later on. There was no connection at the surface between B and I. Careful probings at I with a 6-foot collapsible carpenter's rule, which is in 6-inch sections, failed to reveal any hole.

By probing at B a hole was found, almost perpendicular, 43 inches in depth, but slanting a little with descent to the east-northeast, which must have been nearly straight throughout its course, otherwise the rule having flexibility in only one direction and a width of five-eighths inch in the other direction, could not have followed it. With the facilities at hand it could not be determined how much deeper, if any, this hole extended.

At C a hole was found 31 inches long, directed down slope toward K, 6 inches to 8 inches below the surface and nearly parallel to it. At D a hole was discovered extending 22 inches in the general direction of B but nearly horizontal.

The sod at F was severed in a clean-cut line for about 2 feet. The turf was carefully laid back by hand on each side of the line exposing a cavity about 1½-inches deep and 2 inches across. At J the terminus of a branch, there was a spot about three-eighths inch in diameter but prodding with the rule failed to indicate any depth to it. The branches GHI, and all ramifications on the green had no depth, the only evidence of the discharge being the searing of the grass which was changed to a yellowish brown color down to the roots, the path having a width decreasing from about three-eighths inch in the early part of its course to three-sixteenths of an inch at the ends. In the cavities at C and F, the grass roots were whitish, nearly their natural color, but were not scorched or blackened at all. Examination at B and other places where the sod was broken failed to reveal any fusing or discoloration of the soil.

The cloud layer from which the lightning discharge took place moved from the WSW to ENE and the hole at B, made by the discharge, had a slight inclination to the ENE.

The nearest trees to the eighteenth green are roughly 60 feet in height and distant about 150 feet. It seems somewhat strange that the discharge missed these inviting trees. It is perhaps more remarkable, however, that the flag marking the eighteenth hole, on a pole about 10 feet long, which was distant about 25 feet from the point where the lightning struck, should have escaped.

Many bolts of lightning strike the ground but relatively few accounts have been published regarding them. One case occurred at the Agricultural Experiment Station at College Park, Md., an account of which is published in

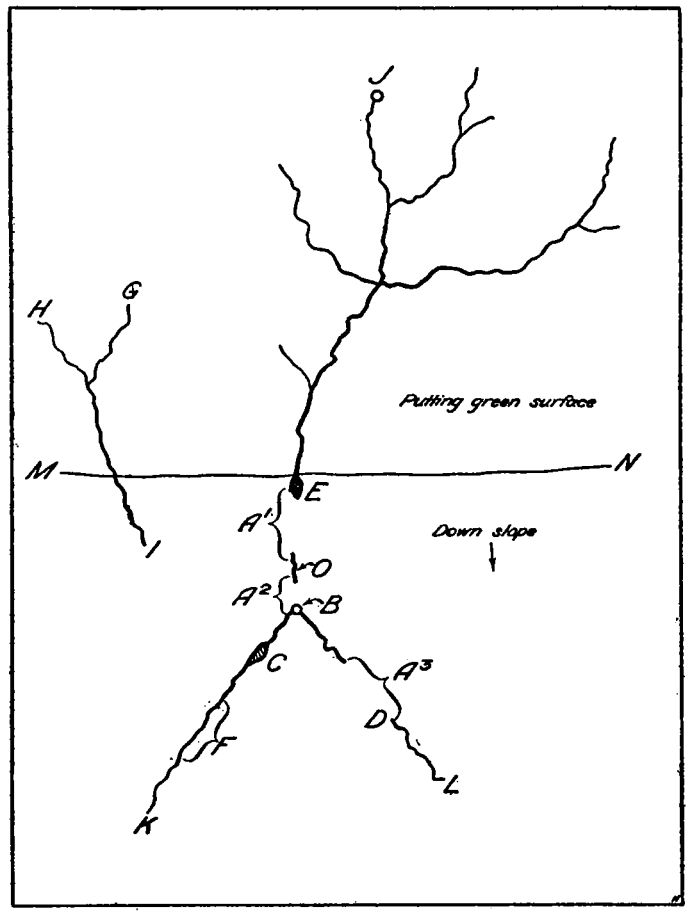


FIGURE 1.—Ramifications of lightning. B indicates point where lightning discharge struck the earth. MN delimits putting green surface.

the MONTHLY WEATHER REVIEW, volume 48, page 452, 1920.

Perhaps some of the most interesting cases are where the lightning strikes in sand and by its intense heat forms irregular glass tubes commonly known as "fulgurites" and which may have a diameter up to 2 inches or slightly more.

SOME OBSERVATIONS OF THE SUN THROUGH A DUST STORM

By C. T. ELVEY

[Yerkes Observatory, Williams Bay, Wis., June 1934]

The dust storm of May 10, 1934, presented an opportunity to the astronomer to make a comparison of a terrestial phenomenon with certain astronomical observations. An observer of the Milky Way sees that it is not uniform but cut in many places by dark patches. On photographs these dark areas and many others of smaller dimensions are evident, and a careful study of them shows that they are caused by the presence of cosmic dust clouds which cut out a part of the light of the stars which are behind them. A study of the character of the light that has traversed a cloud of dust gives some information concerning the particles composing the cloud. Particles which are less in diameter than the wave-length of the incident light scatter the light according to Rayleigh's law, that is in proportion inversely to the fourth power of the wave length, and consequently the transmitted light is redder than the incident light. If the particles are large in comparison with the wave-length of light, the scattering is independent of the wave-length and thus the color of the transmitted light is the same as that of the incident light. If the particles are of intermediate sizes the scattering is inversely proportional to the first, second, and third powers of the wave-length, but, as E. Schönberg [1] has shown, the range in size of such particles is small. Thus for a uniform mixture these intermediate powers may be neglected. Observations of the colors of the stars have shown some to be excessively reddened in

[1] Mitt. d. Sternwarte Breslau, 3, 53, 1932.