FUTURE TOTAL SOLAR ECLIPSES IN THE UNITED STATES

AFTER the total solar eclipse of August 31, 1932, when will there be another visible in the United States? A number of advertising circulars and newspaper articles have appeared with the statement that "there will not be another total eclipse of the sun visible in this country until the year 2024." Others have set the date as 2017 or 1970. But as recently reported in *Science News*,[1] Dr. Robertson, of the Nautical Almanac Office, U. S. Naval Observatory, has pointed out that the total eclipse of July 20, 1963, will be favorably located for observation from certain points in Maine.

Perhaps it will do no harm to repeat that the next four total solar eclipses visible in the United States will occur on July 9, 1945, June 30, 1954, October 2, 1959, and July 20, 1963. The first three of these will be visible at or near sunrise in the United States and consequently will not be favorably located in the sky for professional observation. The fourth will be favorable for observation from certain points in Canada and Northern New England.

The information contained in the following paragraphs is based on computations made using the elements given in Oppolzer's "Canon der Finsternisse." This very valuable book (now out of print) contains elements for every eclipse, solar or lunar, occurring between 1207 B. C. and 2162 A. D., and in addition contains maps showing the approximate paths of the moon's shadow on the earth for each solar eclipse visible in the northern hemisphere and for a few others. It is the approximate character of these maps which is responsible for many of the erroneous statements about coming eclipses. For instance, an excellent book on astronomy which appeared in 1931 has a map showing the paths of total solar eclipses from 1918 to 2000 A. D. in which the path of the 1932 eclipse is shown as passing down between Labrador and Greenland and not crossing New England at all! The elements given by Oppolzer are somewhat more accurate than his maps. For a discussion of the accuracy of Oppolzer's elements and maps, one may refer to "A Test of the Accuracy of Oppolzer's Eclipse Predictions," by Mrs. Isabel M. Lewis.[2]

It may be of some interest to give approximate central lines of the paths of totality for the four eclipses mentioned above. For the eclipse of July 9, 1945, the moon's shadow will strike the earth at sunrise just north of Boise, Idaho. It will sweep across Manitoba passing near Winnipeg, across the northwestern section of Ontario, over Hudson Bay and across the northern part of Quebec. For a point just south of Hudson Strait, the duration of totality will be about a minute. The sun will be about 24° above the horizon there.

For the eclipse of June 30, 1954, the moon's shadow will strike the earth at sunrise in north central Nebraska. It will pass over Lake Superior, going near the southern end of James Bay and on out near the southern tip of Greenland. For a point in Northern Quebec, the duration of totality will be about two minutes. The sun will then be about 27° above the horizon. For the eclipse of October 2, 1959, the moon's shadow will strike the earth at sunrise in southern New England and will move at once out over the Atlantic Ocean.

For the eclipse of July 20, 1963, Oppolzer's elements indicate that the moon's shadow will come down out of the northwest, passing near the southwestern edge of Hudson Bay and James Bay, crossing Maine near Belfast. The accurate computations made at the Nautical Almanac Office were based on modern elements and consequently their determination of the path of totality of this eclipse will be much more accurate than this. It is interesting to note that, though the maximum duration of totality for the eclipse as given by Dr. Robertson is 100 seconds, the duration of totality for points in Maine will be in the neighborhood of 70 seconds. In this connection, it may be mentioned that for a point in Maine, Oppolzer's elements indicate a duration of totality of 113 seconds instead of 98 seconds as predicted on the basis of modern elements.

For points in Maine, totality in the 1963 eclipse will begin about 5:40 P. M., Daylight Saving Time, but because it will be near the middle of the summer, the sun will be almost as high above the horizon as it will be at Fryeburg, Maine, at this year's eclipse.

CHARLES H. SMILEY

BROWN UNIVERSITY

OBITUARY

GRAHAM LUSK

GRAHAM LUSK died in New York on July 18, after a brief illness. He had just completed writing the obituary notice of his old friend, Max Rubner. These two great pupils of Carl Voit had extended the work of their former master and had placed on a strong foundation the modern science of nutrition. Dr. Lusk had not only made important additions to our knowledge by his own investigations but also had been the chief means of disseminating in this country

[1] SCIENCE, n. s., 75, 1956, viii.

[2] Publ. Amer. Astr. Soc., 7, 3, 92–93, February, 1932.