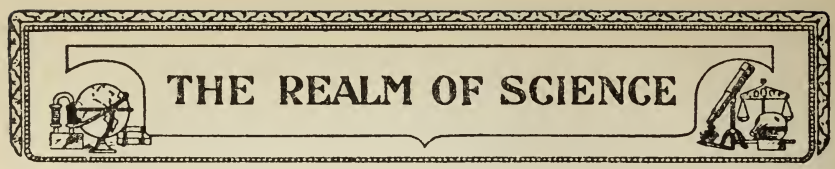

THE COMING TOTAL ECLIPSE OF THE SUN

*William. F. Rigge, S. J.

N next June 8th, a considerable section of the United States will enjoy a celestial spectacle for which astronomers often travel halfway round the earth. This will be a total eclipse of the sun, when the moon will appear to be placed centrally before it, hiding its brilliant disk completely, and thereby enabling us to see the sun's surroundings, and especially its magnificent corona, which the very abundance of its light always keeps from our view out of times of a total eclipse. The moon will look like an old-time cannon ball, an inky-black, perfectly round ball held up immovably and mysteriously in mid-air. Close about it will be a ring of effulgent light, interspersed with roseate tongues of flame like carbuncles, stretching out from which on all sides will be the glorious corona, like a halo of light about a saint's head, or like a bursting mass of fireworks fading gradually into invisibility.

This magnificent spectacle will not, however, be visible everywhere in the United States, but only along a strip about sixty miles wide extending, fortunately for us, along the greatest length of our country, from the state of Washington to beyond that of Florida. The path of totality will pass over Southbend in Washington, (Olympia being a few miles outside of it), Baker City in Oregon, Pocatello in Idaho, Green River in Wyoming, Denver in Colorado, Ashland in Kansas, (Dodge being just within the limits), Guthrie in Oklahoma, Warren in Arkansas, Jackson in Mississippi, Brewton in Alabama, Euchee and Orlando in Florida. The duration of the total eclipse will be only two minutes in Washington, and will diminish gradually to

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CREIGHTON MEN ABROAD—Top row: Leo J. Moore, ex-Arts; A G. Fletcher, Ph. G. 1912; Thomas R. Supe, Arts 1915. Bottom row: William H. McHale, LL. B. 1917; Frank Whalen, A. B. 1906; Harold Linahan, Arts 1917.

A GROUP OF CREIGHTON MEDICAL MEN ENGAGED IN ACTIVE SERVICE—All are First Lieutenants: Top row—A. H. Konigmacher, M. D. 1913; Camp Dodge, Iowa; H. E. King, M. D. 1903, Fort Riley, Kansas; W. G. Finley, M. D., 1903, Camp Beauregard, Louisiana; T. V. Golden, M. D. 1910, Camp Travis, Texas. Bottom row—John A. McAtee, M. D. 1910; Dr. V. L. Jones, Medical Faculty, Memphis, Tennessee; Wm. K. Fast, M. D. 1914, Fort Riley, Kansas.

only fifty seconds in Florida. The time of the occurrence will be at about five o'clock Central time, in Washington, or three o'clock, Pacific time, to 5:40 Central time in Florida, or 6:40 Eastern time. These times will probably all be a whole hour later by our clocks, if they are set that much ahead according to the Light-Saving Bill.

An eclipse of the sun is produced, as is hardly necessary to say, by the passage of the moon before it. If this passage is central, the eclipse will be total or only annular (ring-shaped) according as the moon is near the earth or farther away, thus appearing to be larger than the sun or smaller, and therefore concealing from our view the whole of the sun or only a part of it. This central passage of the moon across the sun's face is visible only along a narrow track on the earth's surface. For a considerable distance on either side of this track, the eclipse is partial, and its magnitude is measured in fractions of the sun's diameter that appears to be covered by the moon.

When the moon passes before the sun, we cannot, strictly speaking, at any time see the moon at all, first because it then turns its dark side toward us, and secondly on account of the extreme brilliancy of the sun which blinds us to everything near it. What we then see in a solar eclipse is only a part of the sun, or nothing at all in a total eclipse except the sun's surroundings, which cannot be seen except when the moon hides the sun proper from our view.

When the eclipse begins we see a small notch apparently cut out of the sun's disk by the advancing moon. This is called "First Contact", and takes place so gradually that it is impossible to notice it unless we know exactly when to expect it and where it will occur on the sun's face. For this purpose we mark the cardinal points NSEW on the sun's disk, N being towards the pole star, and locate the position of the point of first contact in degrees with reference to them. But as the north point on the sun cannot be determined except by means of a telescope equatorially mounted, the best way for the untechnical observer

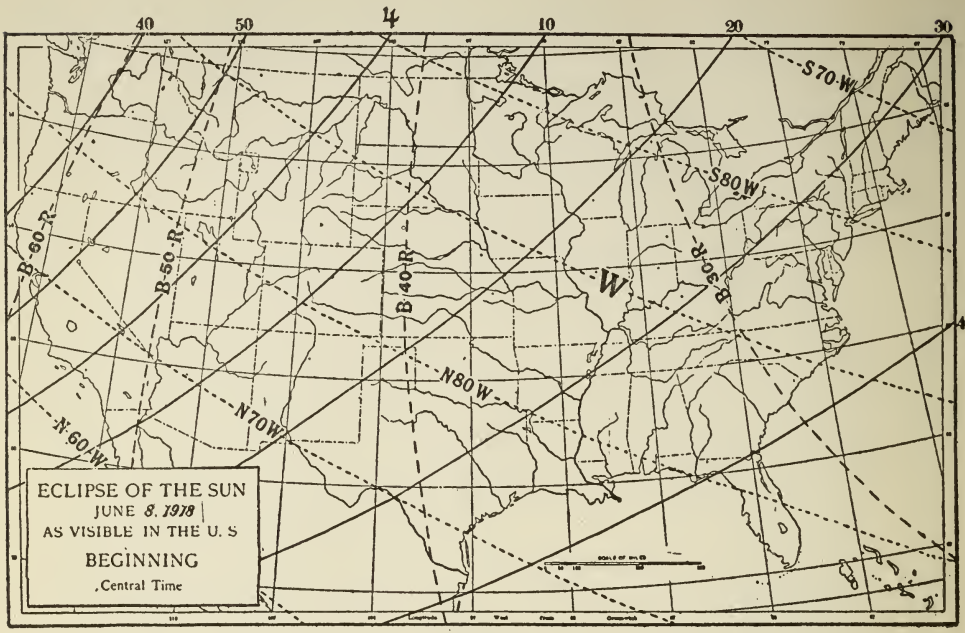

FIGURE 1.

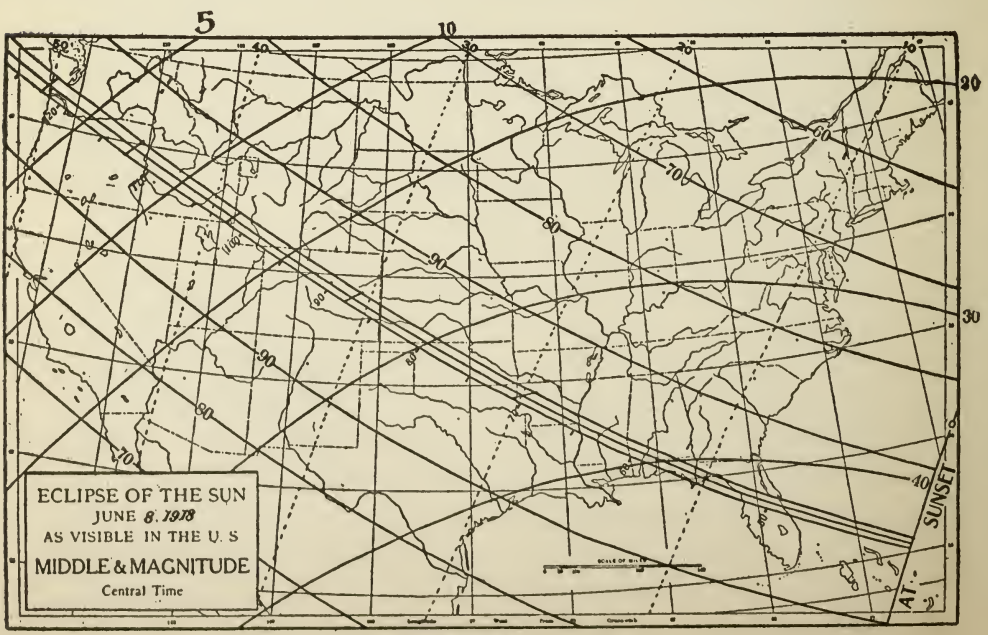

FIGURE 2.

will be to use the points T, B, L, R, top, bottom, left, right, which may either be estimated or determined by a plumb line.

In Figure 1, which like Figures 2, 3, 4, is taken from the writer's article in the November issue of Popular Astronomy, we have all the data necessary to observe the beginning of the eclipse in any part of the United States. In this figure, or map, the full lines give the Central times of first contact for every ten minutes from 3:40 to 4:40 P. M. If we estimate the distance of a place from a time line in tenths of the interval between it and the next one, we can find the time to the nearest minute. We may find that the eclipse will begin at Omaha at 4:17.

The dotted lines from S70W to N60W locate the point of first contact on the sun's disk with reference to its north or south point. The dashed lines from B60R to B30R give it with regard to the sun's lowermost point. Thus for Omaha we find N89W and B37R, that is, one degree north of the sun's west point, or 37 degrees from the bottom of the sun towards the right.

If we wish to try our hand at observing the beginning of the eclipse with all the scientific accuracy within our reach, we may proceed in this way. First, we fasten a piece of pasteboard in a convenient spot and punch a small hole through its middle. The sunlight streaming through this hole will form on a piece of white paper an image of the sun as large and as bright as we may determine by holding our paper nearer to the cardboard or farther away from it. We draw a circle on this paper as large as the sun's image we intend to use, mark on it a vertical diameter TB (top, bottom) and note the position angle (B37R for Omaha). We then turn the circle halfway round so that B is on top, and hold the paper to the sun's image. Watching the marked point of first contact very closely at the predicted time, we may be rewarded by observing the moment of actual contact within a couple of seconds. If we have the necessary skill we may even dispense with all marks of any sort on the paper. This method of "Images by Small Apertures" may be used during the entire eclipse. It is decidedly superior to a smoked glass in many ways.

As the eclipse progresses, the sun's disk will be more and more hidden by the moon until the maximum is reached. This is shown in Figure 2 for the whole United States. The three close parallel curves running from Washington to Florida, enclose the path of totality. We must take up our position somewhere in this strip if we wish to see the sun totally eclipsed. The curves parallel to the track of totality which are marked 90, 80, etc., show the magnitude of the eclipse for the places through which they pass. They mean the maximum percentage of the sun's diameter covered by the moon. For Omaha the magnitude is 87 per cent according to the map.

The time of the maximum obscuration is given for every ten minutes from five o'clock to 5:40, Central time. It is 5:26 for Omaha. The dotted curves marked from 50 to 0 give the sun's altitude in degrees at the time. At Omaha the sun will be 26 degrees high at mid-eclipse.

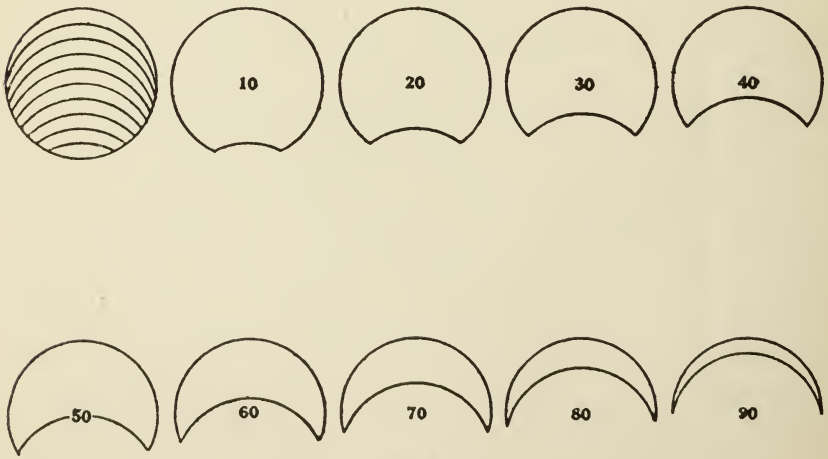

FIGURE 3.

Figure 3 gives the appearances of the sun for every ten per cent of obscuration. At Omaha, for the magnitude 87 per cent, the sun's crescent will be intermediate in size between those marked 80 and 90, and very close to the latter.

Figure 4 gives the minutes after six o'clock and the posi-

tion angles for the last contact, when and where the moon finally leaves the sun. Thus at Omaha the time will be 6:25 and the

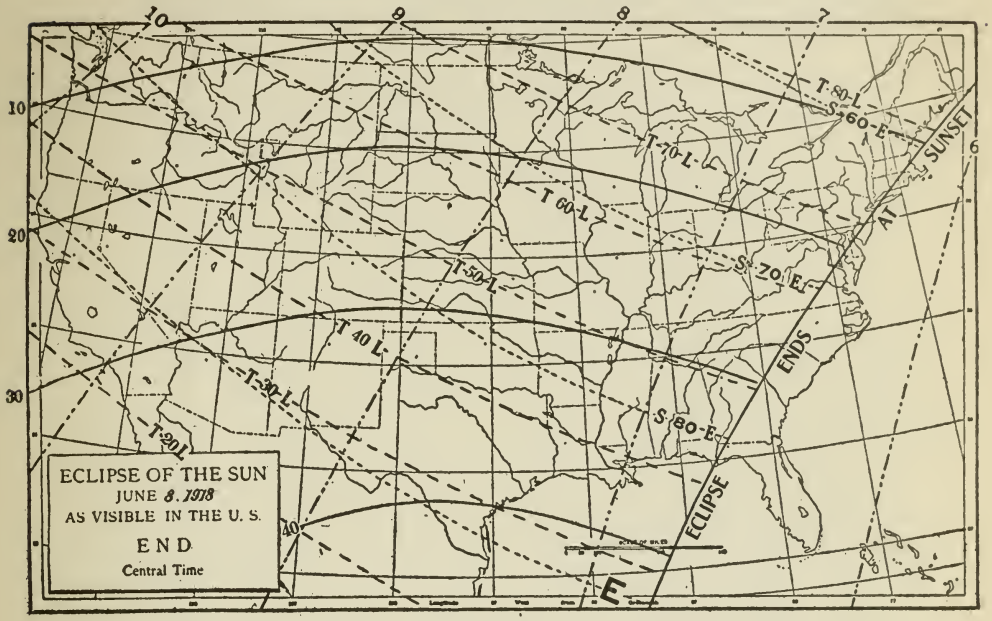

FIGURE 4.

angles S74E and T55L. The curves marked from 10 to 6 on the upper margin indicates the full hours of the Central times of sunset. This is 7:55 for Omaha.