

ASTRONOMY

Two Eclipses

Month of May Brings First Eclipses of 1938; Total Of Moon To Be Visible in U. S.; Solar One Unpromising

By JAMES STOKLEY

THE MONTH of May brings the first two eclipses of the year 1938, though only one is visible in the United States. This is a total eclipse of the moon, which will happen in the early morning hours of Saturday, May 14. At that time the moon will be darkened as it enters the shadow of the earth and its normal supply of sunlight is reduced.

Because the sun is not a mere point of light, but covers an appreciable area of the sky, the shadow of the earth is divided into two parts. There is an outer region, called the "penumbra," in which an observer in space would see the ball of the earth only partly hiding the sun. The core of the shadow is the "umbra," where the earth hides the sun completely. This is not, however, entirely dark. The air around the earth acts as a prism, to bend the light rays from the sun into the umbra. As these rays penetrate the atmosphere, some of the blue light is scattered, giving the sky its familiar blue color. The blue rays extracted, those which continue are predominantly red. These fall on the moon even while totally eclipsed and give it a coppery red hue. An observer on the moon at this time would see a brilliant ring of red light around the dark disc of the earth.

Time Table

Following is a time-table of the eclipse that occurs during the night of May 13, and in the early hours of the 14th:

12:44 a. m., E. S. T. 11:44 p. m., C. S. T. 10:44 p. m., M. S. T. 9:44 p. m., P. S. T. Moon enters penumbra, little change at first but after half an hour it begins to look noticeably fainter, especially at the eastern edge.

1:57 a. m., E. S. T. 12:57 a. m., C. S. T. 11:57 p. m., M. S. T. 10:57 p. m., P. S. T. Moon enters umbra, the curved edge of the earth's shadow across the moon, from east to west.

3:18 a. m., E. S. T. 2:18 a. m., C. S. T. 1:18 a. m., M. S. T. 12:18 a. m., P. S. T. Total eclipse begins as the moon is completely engulfed in the umbra and assumes the coppery color.

4:09 a. m., E. S. T. 3:09 a. m., C. S. T. 2:09 a. m., M. S. T. 1:09 a. m., P. S. T. Total eclipse over as the moon begins to emerge from the umbra. Again the curved edge of the earth's shadow can be seen on the moon's face.

5:31 a. m., E. S. T. 4:31 a. m., C. S. T. 3:31 a. m., M. S. T. 2:31 a. m., P. S. T. Moon leaves umbra, and the disc of the full moon gradually resumes its normal appearance.

6:43 a. m., E. S. T. 5:43 a. m., C. S. T. 4:43 a. m., M. S. T. 3:43 a. m., P. S. T. Moon leaves the penumbra, eclipse entirely over.

Only in the western half of the country will the eclipse be seen in its entirety, for the sun rises, and the moon sets, about 4:45 a. m. Twilight starts, on this date, about an hour and a half before sunrise in most parts of the country, so even in the west the sky will already be light before the eclipse ends.

Fascinating though they are to watch, eclipses of the moon are of relatively slight scientific importance. Quite different are total eclipses of the sun, for there are many observations that can only be made when the moon's shadow crosses the earth. On this account, astronomers often travel half-way around the earth to reach the narrow path where one can be seen.

The total eclipse of the sun on May 29, however, will not attract any ex-

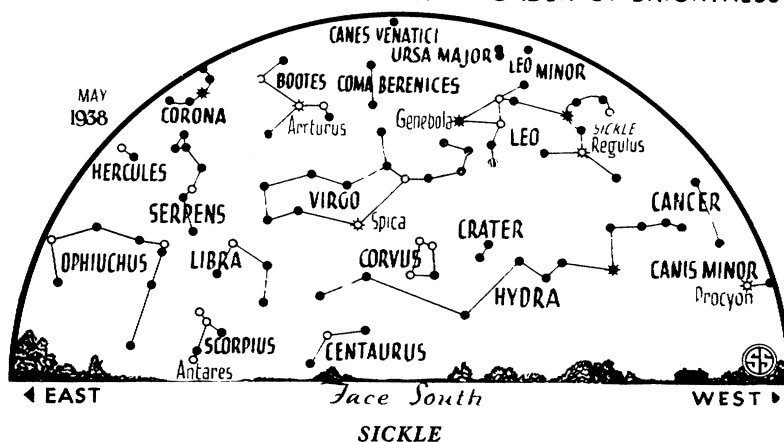
peditions, even though the sun will be covered at the central part of the path for more than four minutes, which is quite long. The trouble is that the path of totality is in the far south Atlantic Ocean. A few inaccessible islands, the Sandwich Group, the South Orkneys and South Georgia, are the only land from which the eclipse is visible, and none of these are placed so that the full duration will be obtained. Even this might not be a barrier, for Canton Island, to which the U. S. Navy sent an expedition on a special ship last year to observe the total eclipse in June, was scarcely more accessible, and the astronomical conditions not very much better.

Bad Season

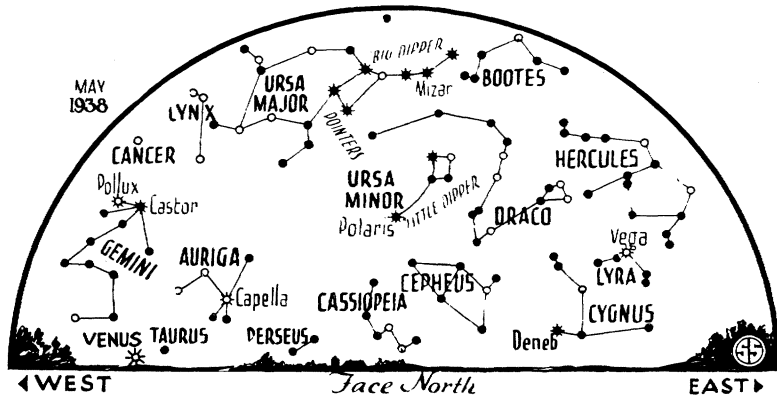
Added to its other disadvantages is the fact that there seems very little chance of good weather for the May 29 eclipse. It must be remembered that the seasons in the southern hemisphere are the reverse of ours. Instead of being almost the beginning of summer, down there it is approaching the beginning of winter. And these islands are as far south of the equator as Labrador is to the north. Labrador at the end of November would not offer very favorable chances for eclipse observations and neither do the South Orkneys in May.

This eclipse, however, marks the first total one in a long series which will be extraordinarily fine during the 21st and 22nd centuries. An eclipse recurs under somewhat similar conditions, after a period of 18 years 11 1/3 days, called the

☼ * ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



Now one of the most prominent constellations is Leo the lion with its famous Sickle.



STAR AND CRESCENT

Beautiful sight of the early evening sky on May 1 will be the close approach of the planet Venus and the narrow crescent of the new moon.

saros. Already about a dozen have occurred in the series of which this is part, the last in 1920, but all have been partial, with the moon's umbra missing the earth. Now, for the first time, the shadow touches the earth, and the eclipse is total. When it next happens, on June 8, 1956, it will be longer and farther north, and then, perhaps, men will begin observing it.

Early on the evening of May 1 an interesting sight will be seen low in the west, as the narrow crescent of the young moon passes close to the planet Venus. Then, at 7:00 p. m., E. S. T., on May 7, Venus will pass extremely close to the planet Mars. The two planets will then be separated by a distance of about a fifteenth of the moon's diameter. Mars is now quite faint, of the second magnitude, while Venus is getting bright, and is of magnitude minus 3.3, far more brilliant than any other star or planet. Therefore, Mars will not be very conspicuous to the naked eye, but a pair of binoculars will show it quite clearly. For several days before and after the seventh,

they will be fairly close, and worth looking at in case of bad weather on the seventh.

Most brilliant among the stars or planets visible in the evening skies during May is Venus. This planet can be seen in the west even while twilight is still fairly bright. By the time it is dark, Venus has descended close to the horizon, and it may be mistaken for a lighthouse or an air beacon, so brilliantly does it shine. During the spring and summer it will continue to brighten, until, in September, it will be more than twice its present splendor.

Mars is the only other planet visible in the evening sky, but it is very faint, and thus is not shown on the map. It is nearly on the opposite side of the sun from the earth, at a distance of 225,490,000 miles on the first of the month. Venus is moving rapidly toward the east, and it passes Mars on the seventh.

In the southeastern morning sky, just before sunrise Jupiter appears. Saturn and Mercury this month are too close to the sun to be seen.

Among the stars, which are really far distant suns, the constellation of Leo, the lion, is one of the most prominent. As shown on the accompanying maps, which give the arrangement of the skies at about 10:00 p. m., May 1; 9:00 p. m., May 15, and 8:00 p. m., May 31 (all in standard time), it is high in the southwest. The western part of the group forms the "sickle," which has Regulus at the end of the handle. To the left is brilliant Arcturus, in Bootes, the bear driver. Below is the figure of the virgin, Virgo, in which Spica shines. Still lower, and farther to the left, is Scorpius, the scorpion, which is just beginning to appear above the horizon. Its most brilliant orb is Antares, famous for its red color.

To the west one can see Procyon, in the constellation of the lesser dog, Canis Minor. Next to this group, to the right are the twins, Gemini, with the brightest stars called Castor and Pollux. Then, continuing around to the north, we find Auriga, the charioteer, with Capella. In the northeast are two more stars of the first magnitude. Vega, in Lyra, the lyre, is the most brilliant seen in this direction. Below the lyre is the swan, Cygnus.

The big dipper, part of the great bear, Ursa Major, is now high in the north. The pointers, the stars in the dipper's bowl away from the handle, show the direction of Polaris, the pole star, itself in Ursa Minor, the lesser bear, and forming the end of the handle of the little dipper. Below the pole star, in its poorest position of the year, is Cassiopeia, the queen, shaped like a letter W.

Phases of the Moon

	E.S.T.
First quarter	May 6 4:24 p. m.
Full moon	May 14 3:39 a. m.
Last Quarter	May 22 7:36 a. m.
New Moon	May 29 9:00 a. m.
Perigee	May 2 8:00 a. m.
Distance—225,900 miles.	
Apogee	May 18 4:00 a. m.
Distance—251,900 miles.	

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