

ASTRONOMY

Total Eclipse of Sun May 30

May's most important astronomical event will be a total eclipse of the sun, best visible from islands in the Pacific where scientists plan to study it.

By JAMES STOKLEY

➤ Although the planet Mars is rapidly drawing away from earth and decreasing in brightness, it is still prominent on May evenings. In fact, it is more easily observed than the other planets, which are low on the horizon.

Its position in the southwest in the constellation of Leo, the lion, is indicated on the accompanying maps. These depict the sky as it looks about 11:00 p.m. (your own kind of daylight saving time) at the first of May, 10:00 p.m. on the 15th and 9:00 p.m. on the 31st. It is two and a half times as bright as the star Regulus, which is to the right.

Mars has already withdrawn from its nearest 1965 approach of a distance of 62 million miles from earth on March 11. On May 1 its distance will be 82.5 million miles; on May 31, 103 million miles.

There is another planet in the same part of the sky. This is Uranus, which is not ordinarily considered one of the naked-eye planets and therefore not shown on the map. Actually, however, it does get a little brighter than the sixth magnitude, generally considered the faintest visible without optical aid in a dark, clear sky. Mars is moving through the sky toward the left. On May 6 it will be directly above Uranus, at a distance a little more than twice the apparent diameter of a full moon. Perhaps on that evening, or the one before or after, you can pick up Uranus with binoculars or opera glasses by looking a little lower than Mars.

Jupiter Visible

At the beginning of May, Jupiter will also be visible—low in the west at dusk, and shining more brightly than Mars. It will soon disappear, however, for on May 30 it passes behind the sun.

Arcturus in Bootes, the herdsman, is the brightest star visible. Standing high in the southeast, it is brighter than Mars. Below Bootes is Virgo, the virgin, with the star called Spica, fainter than Mars.

In the northeast is Vega in Lyra, the lyre, which is between Arcturus and Mars in brightness. Below it is Cygnus, the swan, with first magnitude Deneb, which is so low in the sky that atmospheric absorption dims it considerably. The light from Antares, low in the southeast in Scorpius, the scorpion, is also dimmed by earth's atmosphere.

Three stars characteristic of the skies of a winter evening remain visible in the west. One is Procyon in Canis Minor, the lesser dog; another is Pollux in Gemini, the

twins; while the third is Capella in Auriga, the charioteer.

Also low in the west is the planet Venus. Since it moved to the east of the sun in April, Venus now remains visible for less than an hour after sunset. But in the coming months, it will set later and later. Before long, it will be the prominent "evening star," outshining any other planet.

During May Saturn rises in the east some two hours ahead of the sun, about as Mars is setting in the west.

About May 6 Mercury will be a little above the eastern horizon at sunrise, but very hard to see.

Total Eclipse Due

The month's most important astronomical event, the total eclipse of the sun on May 30, will not be visible from the U.S. or Canada. However, Mexico, Central America and the Pacific Coast of South America will see a partial eclipse.

May 30 is the date of the new moon, when the moon passes between sun and earth. Ordinarily at this phase the moon does not come exactly between the other two bodies, and the lunar shadow misses the earth. This month there are two new moons.

One is on May 1, with no eclipse. At

the next new moon, 29 days and nine hours later, the tip of the moon's tapering shadow will sweep across the earth from a point in the Tasman Sea, just west of the North Island of New Zealand, to the coast of Peru.

It will trace out a long, curved path, less than 150 miles wide, from which the total eclipse will be visible. That is, an observer in this "path of totality" would see the dark disc of the moon pass directly in front of the sun.

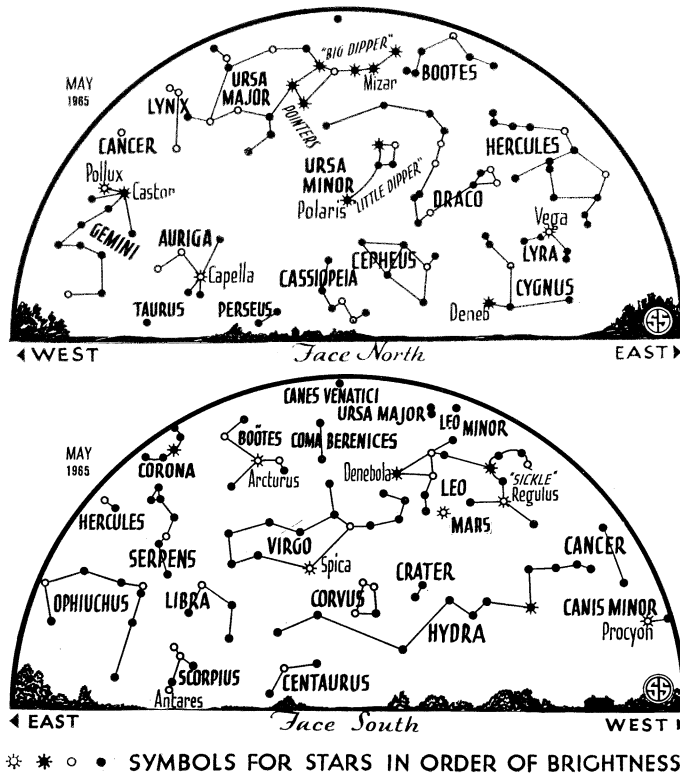
Duration of Eclipse

A partial eclipse will be visible over a much larger area, including the parts of North and South America mentioned above.

The longest possible duration of a total eclipse is $7\frac{1}{2}$ minutes. This happens only when all of a number of factors are simultaneously most favorable.

The May 30 eclipse will be considerably better than average, for at its maximum the sun will be hidden for 5 minutes 15.9 seconds. This will be at a point in the ocean about 2,000 miles southwest of Los Angeles. The nearest land is several hundred miles away. Thus there is no place for astronomers to set up the bulky apparatus they sometimes carry halfway around the world in order to observe an eclipse of this sort.

The most favorable land location is more than 2,000 miles farther west, where several tiny islands are in the shadow's path. A dozen U.S. scientific teams are preparing for eclipse observations from four island



sites—Aitutaki, Manuae and Rarotonga in the Cook Island group, and Bellingshausen in the Society Islands slightly to the east. At these locations, the eclipse will be visible about 10:00 a.m. local time on Sunday, May 30, and totality will last nearly four minutes.

In addition to the ground observations, led by Dr. A. Keith Pierce, Kitt Peak National Observatory, two other programs are planned. A Nike rocket will be fired to measure the intensity of coronal X-rays. And a balloon launching will seek to photograph high in the atmosphere phenomena connected with the eclipse.

Astronomers from New Zealand and Japan are setting up their instruments on Manuae Island for eclipse observations.

This will be considerably better than in New Zealand itself. The total eclipse will be visible from the North Island at 7:45 a.m., local standard time on the morning of May 31. (This is on the western side of the international date line, where the date is one day later than on the eastern side.) It will be just after sunrise, with the sun barely above the eastern horizon.

Path of Totality Ends in Peru

From the coast of Peru, where the path of totality ends, the total eclipse will occur just before sunset, with the sun only slightly above the sea horizon. Low clouds may interfere with observations, but from one of several mountain peaks back from the coast, conditions may be better.

Some observations formerly made only at a total eclipse can now be made without an eclipse using new equipment. However, a total eclipse still offers many opportunities not available at other times.

Scientists are now engaged in an international program, known as the International Years of the Quiet Sun (IQSY), during 1964 and 1965. This supplements the International Geophysical Year of 1958 and 1959, a cooperative study by scientists from more than 80 nations.

During IGY, the sun was unusually active. Now it is quiet, and the new studies will give a better idea of typical conditions. Astronomers are therefore greatly interested in the May 30 eclipse. They will observe it from the several land locations, and also from high-flying planes, racing along the eclipse path at 600 miles per hour, staying within the easterly moving shadow for at least nine minutes.

Celestial Timetable for May

MAY	EDT	
1	7:56 a.m.	New moon
2	8:00 p.m.	Moon passes south of Jupiter
4	9:00 p.m.	Moon nearest, distance 228,100 miles
6	9:00 a.m.	Mercury farthest west of sun
	11:00 a.m.	Mars passes north of Uranus
8	2:20 a.m.	Moon in first quarter
9	4:00 p.m.	Moon passes north of Mars
15	7:53 a.m.	Full moon
20	4:00 p.m.	Moon farthest, distance 251,500 miles
23	10:41 a.m.	Moon in last quarter
24	11:00 a.m.	Moon passes south of Saturn
30	3:00 a.m.	Jupiter behind sun
	5:13 p.m.	New moon, total eclipse of sun visible from South Pacific

Subtract one hour for CDT, two hours for MDT and three hours for PDT.

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