ASTRONOMY

Venus and Saturn Race

Moon Also Enters January Event; 1937 Brings Notable Eclipse Visible for More Than Seven Minutes

By JAMES STOKLEY

A RACE between two planets, Venus and Saturn, as well as the moon, will be one of the features of the evening skies in January. It will be a race reminiscent of the tortoise and the hare, because Venus is one of the most rapid planets in its motion through the sky, while Saturn is the slowest of the naked eye planets. In this case, however, the race will really be to the swift.

At the beginning of the month the two will be visible in the southwestern sky as soon as it is dark. The identity of Venus is unmistakable, for it will be far brighter than any other object in the sky. Higher, farther to the south, will be seen Saturn, much fainter but brighter than any star in that direction.

During the first half of January it will be easy to watch Venus drawing closer to Saturn, but before she overtakes him the moon will dash by. New on January 12, the moon will be seen as a narrow crescent in the southwest a day or two later. At 9:39 a. m., Eastern Standard Time, on the 16th (when, of course, they will all be below the horizon and invisible) the moon will pass Venus. At 10:33 p. m., Eastern Standard Time, on the same date, the moon will pass Saturn, well to the north, but then it will have set in the eastern part of the country. In the West they will be visible when closest. Eastern observers will thus see the crescent moon between the two planets, in the early evening of the 16th.

On the 23d, when the moon is in the eastern sky, Venus will pass Saturn, about four times the moon's diameter to the north. This happens at 9:00 p. m., Eastern Standard Time, again after the planets have set in the eastern states, but in the middle and western states they will be seen at their closest approach.

Only one other planet is visible through the January nights. This is Mars, which rises in the east in the early morning hours. Jupiter and Mercury are both too near the sun to be visible.

The brilliant stars of the winter evening sky now shine above us. The accompanying maps show their aspect for 10:00 p. m., January 1; 9:00 p. m. on the 15th and 8:00 p. m. on the 31st. Like all the stars, of course, these are distant suns, quite different from the planets, which are bodies like the earth, relatively close, and shining by reflected sunlight. To the southeast shines Sirius, the dog star, part of Canis Major, the great dog. This is the most brilliant star in the sky. To the south is Orion, with the characteristic three stars in a row forming this warrior's belt. Higher, and to the right, is Taurus, the bull, with Aldebaran marking the eye. Canis Minor, the lesser dog, with Procyon, is to the east, and also Gemini, the twins, with Castor and Pollux. Capella shines high overhead in Auriga, the charioteer.

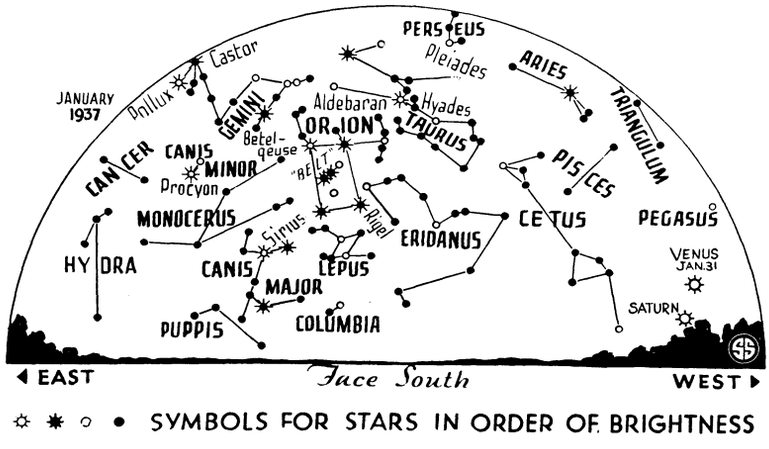
The year 1937 will be an interesting one for both the amateur and professional astronomer. As so often happens, the chief event on the program is a total eclipse of the sun, but this will be no ordinary eclipse. The last eclipse seen in the United States, in August, 1932, lasted for a little over a minute and a half.

Some eclipses last longer than this. The longest possible, when conditions are just right, is seven minutes and forty seconds, but not since 1803 has an eclipse lasted as long as seven minutes. On June 8, however, there will be one that will last for seven minutes and four seconds!

But, unfortunately for the plans of astronomers who might see in this extreme duration chances for many unusual observations, the path of visibility carefully avoids land. It crosses the Pacific Ocean from the vicinity of the New Hebrides, where the sun rises eclipsed, to Peru, where the sun sets while still covered. There the sun will be low in the sky, and the duration much shorter than at the center. Christmas Island and Fanning Island are situated, the one on the northern, the other on the southern edge of the path, but at the former location the duration is a little over two minutes.

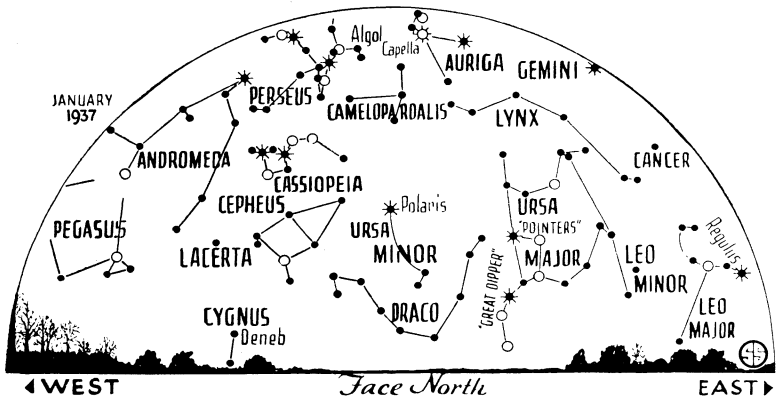
Good eclipse photographs, however, have been made from airplanes and a large ship would be a much more stable support. Undoubtedly that day will find many observers in the ocean at the vicinity of 9 degrees 54 minutes north latitude, 130 degrees 40 minutes west longitude, where the length is greatest. From these locations and also from Christmas Island, excellent records of the eclipse and the form of the corona will surely be made.

But one of the chief advantages of the long totality would be in long exposure photographs, with infra-red light and long focus lenses, to record the



PLANETS IN THE WEST

Swift Venus overtakes Saturn in the early evening sky and the moon adds beauty to the scene.



WINTER STARS

High overhead shine the characteristic bright stars of winter. Capella in Auriga, the charioteer, is one of these.

faintest and outermost parts of the corona, which is all the time changing. In seven minutes some beautiful results would be possible. However, even the slightest motion of a ship, hardly perceptible to the worst landlubber, would be enough to blur such pictures.

There are other observations that can be made which do not need such firm support, and these can be successfully accomplished. Some relate to the behavior of radio waves as they penetrate the moon's shadow.

Not until 1955 will there be another chance to see an eclipse lasting as long. Then, the path of one lasting seven minutes and ten seconds will cross the Philippine Islands.

The second eclipse in 1937 will come on Dec. 2, again in the Pacific Ocean, but it will be of little scientific importance. A total eclipse occurs when the moon completely covers the sun's disc, and the tip of its shadow reaches earth. There are times when the moon passes in front of the sun while it is farther away from earth than usual. Then it does not completely hide it and the shadow does not reach us. A ring of the sun's bright surface is visible around the dark circle of the moon and so it is called an annular eclipse.

Such is the one that comes in December, and the slight remaining amount of sunlight is enough to prevent any of the observations for which astronomers would be willing to travel thousands of miles. The path in which this eclipse will be seen crosses the Pacific from a point south of Japan, over Fanning Island again, to within a few hundred miles of the coast of lower California.

Both the June and December eclipses will be seen as partial over a much larger area, including parts of the United States. South of a line crossing the country from Cape Mendocino, in northern California, to Palm Beach, Florida, the moon will partly cover the sun on June 8. A similar effect will be seen in the western states on December 2 as the sun is setting.

The third eclipse of the year is one of the moon, on November 18, and this can be seen from all over the country. Then the moon will partially enter the shadow of the earth, which will cover it to the extent of about a tenth of its diameter.

Just as the moon can occasionally come in front of the sun, so can the planets Venus and Mercury, but they are so small that they can only be seen as specks on the sun's surface. In fact, when Mercury so "transits" the sun, it can be seen only with a telescope. Such transits of Venus are extremely rare. The last occurred in 1882 and the next will come in 2004.

While Mercury has an interesting transit on May 11, 1937, it will be invisible in the United States and can only be seen in southern Asia, the Philippines, West Australia, the Indian Ocean, Central and South Africa.

More fortunate will be residents of the United States in the matter of some other "eclipses" of the year—those by the moon of stars or planets, technically called occultations. Early in the morning of March 4 the moon, then a crescent after last quarter, will occult a second magnitude star in the constellation of the scorpion. On July 17 it will pass in front of the planet Mars, but this will happen in daylight hours when the planet will not be visible to the naked eye. Even then it will only be visible in the East, for Mars will have emerged by the time the moon rises farther west. On August 3 Venus, then shining brilliantly before sunrise as a morning star, will be occulted. This again will only be visible in the eastern states. And on November 19, shortly before midnight, Eastern Standard Time, the nearly full moon will occult a third magnitude star in Taurus. This will be observable from all parts of the country.

During the year Mars will shine in the evening sky from May to December. On May 28 it will be only 47,280,000 miles away, closer than for many years, and many observatories will have their telescopes aimed at it, to study the mysterious "canals" and other markings. Mercury will be seen in the evening about April 20, August 18, and December 12; Venus from January to the end of March. Jupiter will appear in the evening after July, and Saturn until February and after December.

During January the moon will go through its phases as indicated below. Apogee, when it is farthest from the earth, will occur at 10:00 a. m., Eastern Standard Time, on the 6th, and it will be 245,280 miles away. It will be nearest, at perigee, on the 21st, at 10:00 p. m., Eastern Standard Time, at a distance of 229,320 miles.

Phases of the Moon

	Eastern Standard Time
Last Quarter	Jan. 4, 9:22 A. M.
New Moon	Jan. 12, 11:47 A. M.
First Quarter	Jan. 19, 3:02 P. M.
Full Moon	Jan. 26, 12:15 P. M.

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About 1,000 wild boars roam Santa Cruz Island, California.

A foot measure commonly used in ancient Rome was about a third of an inch shorter than our modern foot measure.

Soldiers of ancient Greece used to make votive offerings in the form of soldier statuettes to the god credited with protecting them in battle.