

## ASTRONOMY

# Venus Most Brilliant

Venus, rapidly approaching us, reaches its height of brilliance in the May evening skies, while Saturn, Mercury, Mars and Jupiter are dimly visible in the early morning horizons.

By JAMES STOKLEY

► VENUS, the planet which has been shining so prominently in the western evening sky for the past few months, reaches greatest brilliance during May. But it will soon vanish from evening view. In June it passes between earth and sun; during the summer it will shine brightly in the east before sunrise.

Soon after the sun has gone down in May Venus can be seen in the west, long before any star or any other planet appears. It sets, at the beginning of May, more than three and one-half hours after sunset but by the month's end it follows the sun below the horizon by some two hours.

At the same time it is rapidly approaching us. Its distance of 51.2 million miles on May 1 will be reduced to 41.4 million on the 15th and to 31.6 million at the month's end. This represents an average approach speed during that time of some 27,000 miles per hour. But after it reaches a minimum distance of about 27 million miles on June 19 it will move away, swinging around to the far side of the sun.

The place of Venus among the stars of the May evening is shown on the accompanying maps of the northern and southern halves of the sky. This is the way they appear about 11:00 p.m., your own kind of daylight saving time at the first of May, an hour earlier at the middle of the month and two hours earlier at the end.

## Venus Low in West

Venus stands low in the west, in the constellation of Gemini, the twins.

Three of the most prominent stars appear in the south. Although these are of the first magnitude on the astronomical scale of brightness, they are only about a hundredth as bright as Venus.

High in the southwest is Regulus, in Leo, the lion. This is part of a subgroup called the "Sickle," six stars which outline the shape of that agricultural implement. Also in Leo, but not first magnitude, is Denebola.

Just below this star is the western end of the constellation of Virgo, the virgin. In it you can see the bright star Spica. A little higher in the southern sky you come to Bootes, the herdsman, with Arcturus, the brightest of these three stars.

Below the eastern (left) end of Virgo is the faint constellation of Libra, the scales. And below this, part of Scorpius, the scorpion, is visible above the horizon, including the red star Antares. Now it is faint because it is so low but on summer evenings it will be conspicuous in the south.

In Gemini, where Venus stands, are Castor and Pollux, the former a star of the

first magnitude. And to the right is Auriga, the charioteer, with Capella.

Over in the northeast stands Vega, in Lyra, the lyre; while Cygnus, the swan, is below it, with Deneb. This also is a first magnitude star, so dimmed by its low altitude that it is shown as second magnitude. During the coming months, Deneb and Vega will become more prominent.

In the early morning hours another planet, Saturn, is visible in the east, in Aquarius, the water-carrier. It rises about three hours ahead of the sun. Also, during the month, Mercury, Mars and Jupiter rise less than an hour ahead of sunrise. They will be so low that they will be hard to see and, being morning stars, do not appear on the maps.

If, during May, you have the opportunity to look at brilliant Venus with a small telescope, you may be surprised when you see its shape. Perhaps you expect to see a round object—instead it now appears as a crescent. On May 13, at its greatest brilliance, it will have the same shape that the moon will have on May 16, when it is five days after new.

Venus and the moon change in phase for exactly the same reason. With each body (like the earth) the half turned toward the sun is bright while the opposite half is dark. When the illuminated hemisphere is

turned toward us, we see the complete circle—a full moon or Venus. When only a narrow sliver of the bright half is visible, we see a crescent. That's the way Venus looks in May, and the way the moon will look about May 13 through 16.

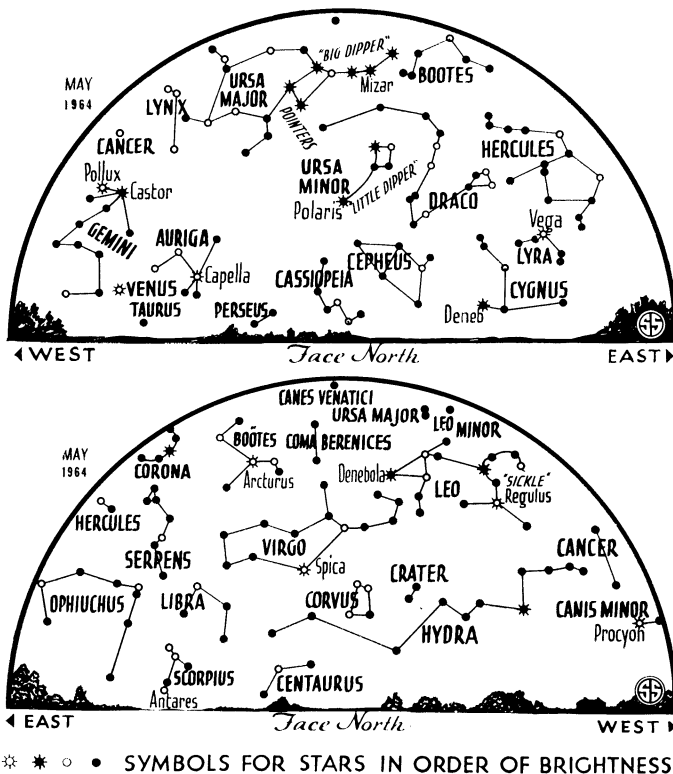
The moon revolves around the earth, at a distance that varies from 221,463 to 252,710 miles. Thus its apparent size does not vary a great deal. It appears about the same diameter whatever the phase.

When new, it is in the same direction as the sun, and the bright half is turned away from us. But a day or two later, having moved a little to the east of the sun, it remains visible low in the west for a little while after sunset and we see a small section of the bright half, which forms the narrow crescent that is the visible "new" moon.

## Phases of the Moon

A week after it is new, the moon is a quarter of the way around from the sun; half of the bright hemisphere, or a quarter of the complete lunar surface, is visible to us. This is the phase called "first quarter" which occurs on May 18.

After another week goes by, it is "full." That is, it is opposite the sun and the entire sunlit hemisphere is visible. After that, it approaches the phase called last quarter when again we see only half the disc. Then comes the narrow crescent again, this time visible low in the east just before sunrise. Then it is new again, and it starts another cycle.



But Venus is revolving around the sun, at a mean distance of 67.2 million miles. Last year, at the end of August, it was on the far side of the sun, about 160 million miles from earth. Then, of course, we could not see it. After a month or two it had moved far enough away from the sun, toward the east, that it began to appear low in the west just after sunset. But it was still far out beyond the sun, and had a nearly full phase.

Since then, its orbital motion has brought it closer to us. About April 10 it reached the quarter phase, with only half of the bright hemisphere visible. Then it was about 67 million miles away.

### Moon Rises Before Sunrise

Now it is swinging still closer, and we have the crescent phase, which will get narrower and narrower as it sets closer and closer to sunset. On June 19 it will be between us and the sun and invisible again. But in July it will be to the west of the sun, rising before sunrise and shining brilliantly as a "morning star." Then it will draw away, getting fainter and fainter as it returns to the full phase, and is once again on the far side of the sun in April 1965.

The moon is brightest when it is full, and presents all of its illuminated surface to us. But when Venus is full, it is far away. As it reaches the crescent phase, its proximity makes up for the fact that only a fraction of its bright surface is visible. Thus we have it at greatest brightness on May 13, when its phase is like that of the five-day old moon.

The changing phases of Venus were discovered by the Italian astronomer Galileo, whose 400th birthday is being celebrated this year. Before his time astronomers accepted the Ptolemaic theory—that the moon and other planets, and also the sun itself, revolved around the earth. Venus, according to this idea, was always nearer to earth than the sun, and never very far away from the sun's direction. Thus, any phases it showed would be crescents, and it could never be full.

When Galileo showed that it goes through a complete change in phase, he demonstrated that it moves around the sun. This was a powerful argument in favor of the new ideas which Copernicus had proposed in 1543—that the sun is the center of the solar system—now fully accepted.

### Celestial Time Table for May

MAY	EDT	
4	6:20 pm	Moon in last quarter
6	4:00 am	Moon passes Jupiter
	8:00 pm	Neptune opposite sun and nearest earth; distance 2,723 million miles. (Not visible to naked eye.)
11	5:02 pm	New moon
12	Noon	Moon nearest, distance 222,700 miles
13	3:00 pm	Venus at greatest brilliancy
14	Noon	Moon passes Venus
18	8:43 am	Moon in first quarter
19	3:00 pm	Mars passes Jupiter
24	4:00 pm	Mercury farthest west of sun
26	5:29 am	Full moon
27	5:00 am	Moon farthest, distance 252,400 miles

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

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