ASTRONOMY

Venus, Queen of May Evening Skies

This Planet Reaches Its Maximum Brilliance on the 22d And Is So Bright as to Cast Shadows of Earthly Objects

By JAMES STOKLEY

BY FAR the brightest object in the May evening skies, except, of course, the moon, is the planet Venus. In recent months it has been a conspicuous feature of the western sky for a few hours after sunset. It has steadily been increasing in brilliance, and on the twenty-second it will be at its maximum brightness. In the astronomer's scale it will be of the minus 4.2 magnitude, which is within a tenth of a magnitude of the brightest that it can possibly be. Of the other planets, only Mars ever becomes nearly as bright. When it makes its closest approach to the earth, as it did in 1924, it attains a magnitude of minus 2.8, which is only a little more than a quarter as bright as Venus this month. Both Venus and Mars are planets, members of the sun's family. The brightest of the fixed stars is Sirius, the dog star, of minus 1.6 magnitude, one-eleventh as bright as Venus.

If you look at Venus now through a small telescope, magnifying perhaps twenty or thirty diameters, you will find that it is not a single point of light, like a star. Neither is it a round disc, like the appearance that Jupiter or Mars presents through the telescope. Instead, it now has a crescent shape, like the almost new moon. But if you had observed Venus through the telescope a few months ago, you would have seen, not a crescent, but a disc, and of considerably smaller diameter than the present crescent. Had you continued to observe it, you would have found that the diameter gradually increased. As it did so, the disc changed to a gibbous phase, like that of the moon between first quarter and full. Finally the shape of Venus was semi-circular, like a half moon. This happened on the nineteenth of April. Up to this point, the planet was moving away from the sun, appearing higher and higher in the western evening sky. Since April 19 it has been drawing towards the sun, but the telescope would show that it is still increasing in size, while the half-moon shape has changed to a crescent, which is gradually narrowing.

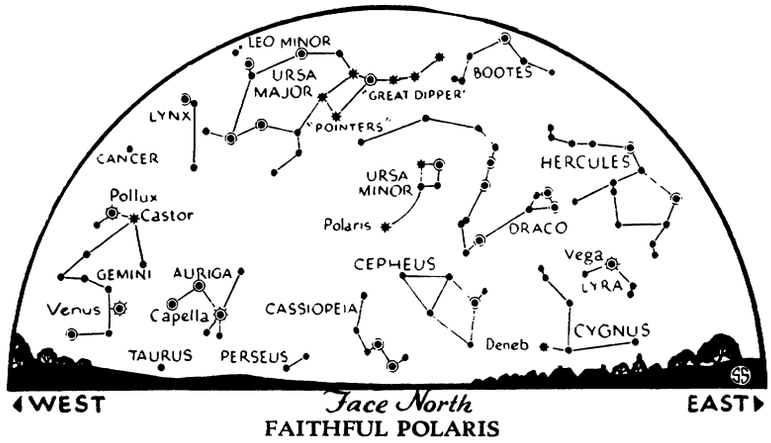
This change takes place because the orbit of Venus is within that of the earth. Venus revolves around the sun at a distance of about 67,170,000 miles in 225 days, while the earth, at a distance of 92,900,000 miles takes 365 days for one revolution in its orbit. Sometimes, therefore, Venus is directly between the sun and the earth, while on other occasions the earth and Venus are on opposite sides of the sun, and then the planet is invisible. But after it has passed superior conjunction, which is the name given to its position when on the opposite side of the sun from the earth, it comes into view. Then the light of the sun, which is the only illumination it has, shines on it in the same direction that we view it. We see almost all of the illuminated half, and it presents the appearance of a disc.

Half-Moon Shape

Then, as it moves farther around its orbit, it gets to the east of the sun, and so we see it after sunset. Finally it reaches a point where a line drawn from the earth to Venus would be at right angles to one from Venus to the sun. Then the planet is said to be at greatest eastern elongation, for after that it seems to draw toward the sun again. At this time we see just half of the illuminated hemisphere of Venus, so the planet has the half-moon shape.

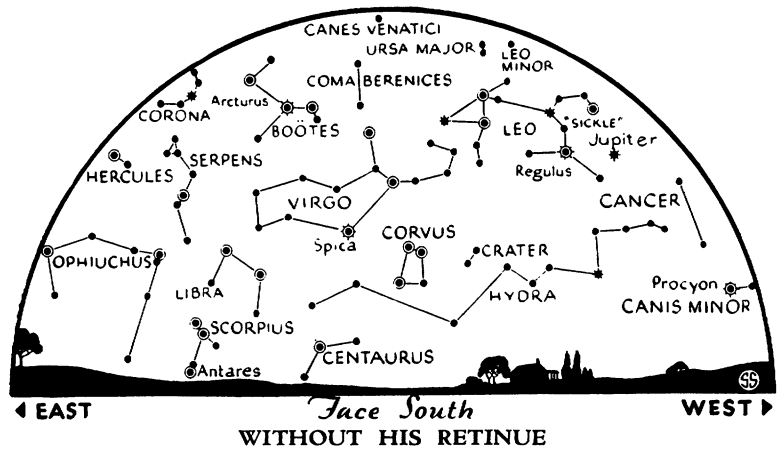
Now it is moving to a point between the sun and the earth, and is still approaching closer to us. On May 1 it is 58,000,000 miles from us. As it continues to approach, it appears larger and larger on succeeding nights. But now we see less than half of the illuminated hemisphere, and it presents the appearance of a crescent, just as the moon does, and for the same reason. The main difference between the phases of Venus and those of the moon, however, is that as the latter occur the moon remains at the same distance from the earth, about 239,000 miles, and so there is no corresponding change in diameter. The moon, therefore, is brightest when full, and we see the whole sunlit half. Venus is brightest when in the crescent phase. Then the illuminated part that we see covers the largest area of the sky, as happens on May 22. After that the diameter of the planet continues to increase, but the crescent becomes so much narrower that its light decreases, and at the same time it moves into line with the sun, where it is harder to view.

But even this does not account entirely for its great brightness at present. Venus, like the sun, moon and all the planets, moves along a path called the ecliptic, which is inclined to the celestial equator, an imaginary line in the sky directly above the earth's equator. It is for this reason that the sun is farther north in the summer than in the winter. In the same way, when Venus makes an appearance in the spring evening sky, it is farther north,



FAITHFUL POLARIS

Sharing the northern stage with Venus during May evenings are Gemini, the twins, with Pollux its brightest member. Just coming into view low in the northeast is Cygnus, the swan, and the star Deneb. A little higher is Lyra, the lyre, with bright Vega. Faithful Polaris, in line with the pointers of the Great Dipper, holds the axial position.



WITHOUT HIS RETINUE

The evening of May 3 will present an unusual sight. Jupiter will be visible but without the four satellites which ordinarily accompany him. They will be blotted from view as they pass either behind the planet or across its face or are hidden in its shadow. This phenomenon was last witnessed from the United States in 1914.

or higher, than when in the evening sky at other times of year. Therefore, its light is less dimmed in its passage through the earth's atmosphere. In fact, Venus is so bright now that it casts a perceptible shadow, a fact which you can verify if you go to a place where it is quite dark, and no artificial lights are near. By holding a piece of white paper so that the light from Venus falls upon it, and then moving your hand around in front of it, you can easily discern the shadow. Of course, this should not be tried when the moon is visible and flooding the earth with its own light.

The other bright planet in the May evening sky is Jupiter, now of the minus 1.5 magnitude, about the same as that of Sirius. Since Sirius is not now visible, Jupiter is the second brightest object in the evening sky, excepting the moon. It is in the constellation of Cancer, the crab, now in the southwest. The position of the planet is shown on the accompanying map, and its brightness makes it easy to identify.

Invisible from America

Early in May it presents a very unusual aspect—on the evening of May 3 it will be seen without any of the satellites which almost invariably accompany it when seen in a small telescope. Not since 1914 has such a condition been seen from the United States. In that year it also happened in May. It also occurred on March 4, 1919, and on February 4, 1931, but at times when Jupiter was invisible from the United States. It will occur again on November 20, this year, but not at a time to permit America to see it. We shall have to wait until July 16, 1939, for the next appearance of Jupiter without satellites. Thus the phenomenon is considerably more rare than a total eclipse of the sun, though it is not nearly so important scientifically.

The four large satellites, or moons, of Jupiter were discovered by Galileo in 1610. They are bodies as large as the smaller planets, and easily visible in a small telescope. The other five satellites of Jupiter are much smaller bodies, seen only through powerful instruments. If you watch Jupiter from night to night through a telescope, you will see the four moons continually moving around the planet. One night three may be on one side and one on the other, then all may be on the other side.

Frequently one of the satellites may vanish from sight. This occurs for one of three reasons. Either it passes behind Jupiter; or it enters Jupiter's shadow, eliminating the sunlight by which we ordinarily view it; or it comes in front of Jupiter, when it cannot be easily distinguished from the planetary background. Sometimes two satellites may disappear simultaneously, still more rarely three may vanish together, and, at very rare intervals, all four may disappear, as they do this month.

Though these moons have names, Io, Europa, Ganymede and Callisto, they are frequently referred to by number, I, II, II and IV. At 7:45 p. m., eastern standard time, on the third, II is occulted as it passes behind Jupiter. At 8:51, IV is eclipsed as it enters the planet's shadow. At 9:04, I disappears as it transits across the planet's disc. Finally, before any of these have reappeared, at 10:25, III is eclipsed. From this time until 11:20, no satellites are seen. At 11:20, I emerges from its transit across the disc, and again is seen floating in space beside the planet. Soon after this Jupiter sets for observers in the eastern part of the country, but people in the West will see the reappearance of II at 1:07 a. m., eastern standard time, of IV at 1:43 and of II at 2:02.

Nine first magnitude stars can be seen in the May evening skies, though some of them are so close to the horizon that their light is considerably dimmed and they may appear even fainter than a star that is really not as bright, but is riding high in the heavens. The accompanying maps allow for this absorption, and show the stars as they appear.

Above and to the left of Jupiter is the "sickle," part of the constellation of Leo, the lion. The star Regulus is at the end of the handle. In the southern sky is the first magnitude star, Spica, part of Virgo, the virgin. Above her is Boötes, with the brilliant Arcturus. In the western sky, near Venus, is Gemini, the twins, with Pollux its brightest member. Below, and to the left, is Procyon, marking Canis Minor, the lesser dog. Capella, in Auriga, is low in the northwest. Low in the northeast Cygnus, the swan, with the star Deneb, is coming into view, while a little higher is Lyra, the lyre, with Vega. Scorpius, the scorpion, is low in the southeast with the star Antares close to the horizon.

During the month of May the moon is new on the fifth, at first quarter on the thirteenth, full on the twentieth and at last quarter on the twenty-sixth. Thus, moonlight evenings are indicated from the tenth to the twenty-third.

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CHEMISTRY

American Rediscovers Lost Chemical Compound

A CHEMICAL compound prepared for the first time seventy years ago, and since then "lost" in such uncertainty that chemists had concluded it did not really exist, has been rediscovered by Prof. W. A. Noyes of the University of Illinois.

The compound is nitryl chloride, represented by the formula NO_2Cl. It was first prepared by a German chemist, Richard Müller, in 1862. Afterwards a number of other chemists tried their hand at repeating Müller's work, with very uncertain success.

Nitryl chloride is a pale yellowish-brown gas, quite unstable chemically and very ready to break apart and enter into reactions with other substances. Because of the difficulty of preparing it and of its instability it has no practical uses.

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