ASTRONOMY

Daylight Planet

You can see Venus, now very brilliant, in the late afternoon if you know just where to look. Venus passes Jupiter on June 1.

By JAMES STOKLEY

➤ STILL GETTING BRIGHTER, and now so brilliant that it can even be viewed in daylight if you look in the right direction, is the planet Venus. As dusk falls, it is the first star or planet to be seen, and appears high in the west. But about four o'clock in the afternoon it is directly south and, for the United States, a little more than two-thirds of the way from the horizon to the zenith. For an observer farther north, the planet is lower. So if, some June afternoon, you look carefully at the southern sky, particularly if you stand so that the sun is not shining directly in your face, you may be able to pick up this brilliant body.

There is another planet in the evening sky, too, and while quite bright also, it is about one-ninth as bright as Venus. This is Jupiter, which Venus passes on June 1. The accompanying maps show their relative positions for June 15. They are both in the constellation of Cancer, the crab, which is a group of rather faint stars between Gemini, the twins, and Leo, the lion.

Of the other naked-eye planets, only Mars can be seen during the night. It is quite prominent in the east, appearing about three hours before the sun. Mercury and Saturn are too close to the sun to be visible.

Shown on Map

The June stars are shown on the maps as they appear at 11:00 p.m. on June 1 and 10:00 p.m. on June 15. Most brilliant is Vega, in Lyra, the lyre, high in the east. Below Lyra is Cygnus, the swan, in which first magnitude Deneb can be found. To the right of Cygnus is Aquila, the eagle, with Altair, which has the same magnitude.

The Great Dipper, in the northwest, is useful for finding several other groups. Almost everybody knows the pointers, the two lower stars in the dipper's bowl which show the direction, to the right, of the pole star, which stands almost over the north pole of earth. But you can also follow to the south the curved handle of the dipper. The first bright star you come to is Arcturus, in the figure of Bootes, the bear driver. And still farther the same curved path will guide you to Spica, in Virgo, the virgin.

In addition to Vega, Deneb, Altair, Arcturus and Spica, there are four others shown on the map which the astronomer classes as first magnitude. There is Regulus, in Leo, the lion, to the west, and Antares, in Scorpius, the scorpion, a red star in the south. Low in the northwest is Pollux, one of the twins, Gemini. Finally, there is Capella, in Auriga, the charioteer, which is still visible from 40 degrees north latitude or more northerly points. Farther south, however, it cannot be seen at this time. Even where it is visible, the absorption of the earth's atmosphere diminishes its light so greatly that it looks no more brilliant than a star of the third magnitude. That is why the symbol for it on the map is one of the smaller ones.

Look at Venus

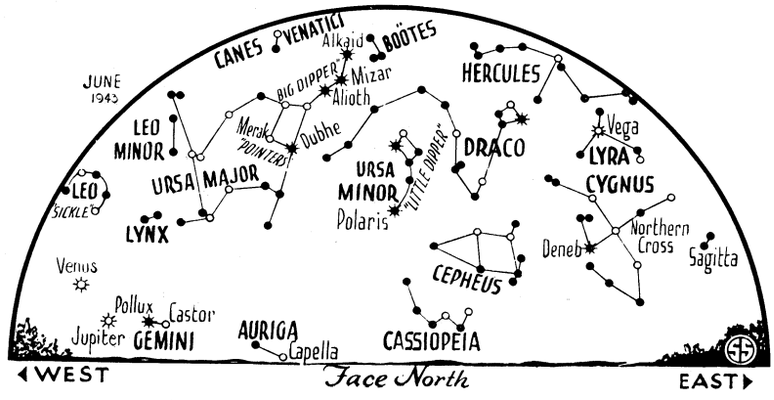
If you have any opportunity to look at Venus through a telescope now or later in the summer, take advantage of it. Probably you will be very much surprised, for you may think, at first, that you are looking at the moon. This month, through a telescope, Venus looks like the moon around first quarter. That is, it appears as a semicircle. And during July and August it will be a crescent. On the other hand, if you had looked at it several months back, it would have been seen as almost circular, like the moon in a gibbous phase, nearly full.

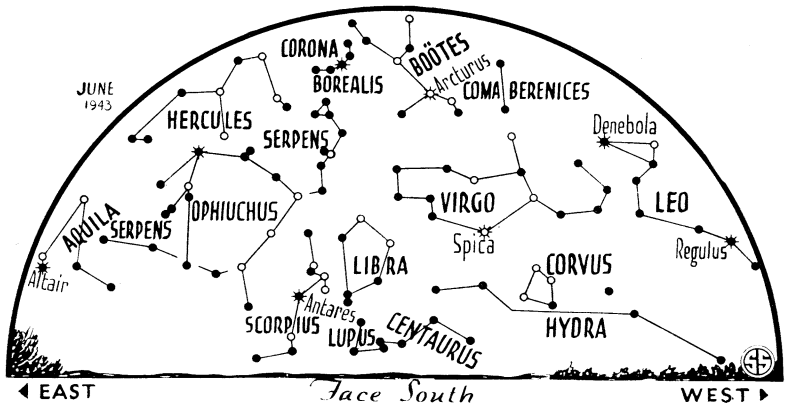
In May scientists celebrated the four hundredth anniversary of the death of the Polish astronomer, Copernicus, and the publication of his great work which first proposed, as a carefully worked out scientific theory, that the earth revolves around the sun. This theory finally displaced the older Ptolemaic universe, in which the earth was at the center.

Confirmed by Galileo

So radical were the ideas of Copernicus, after he published them in 1543, that there was great opposition to them. But finally observations showed their truth. One of the most important of these was a discovery, by the Italian, Galileo. Late in the year 1609, at Florence, he heard of the invention of an optical device which made distant objects seem closer. Without details, he proceeded to make a small telescope, and in 1610 began to look at the stars and planets with its aid. He discovered the four largest moons of Jupiter. As he watched Venus, he found that it changed through a complete cycle of phases, like the moon, from full to new and back to full again.

According to the Ptolemaic theory, all the planets revolved around the earth. Innermost was the moon, then came Mercury, Venus and the sun; with Mars, Jupiter and Saturn beyond. Since this put Venus closer to earth than the sun, and since Venus always stayed in nearly the same direction as the sun, it meant





that her illuminated half would always be turned mostly away from us. Hence, it was expected that it would show a crescent phase. But when Galileo found that it went from crescent to full and back, it became obvious that it was going around the sun; that part of the time it was nearer to the earth than the sun was, and the rest of the time it was farther away. The Ptolemaic theory had no explanation for this, but it was exactly what Copernicus had said was the case.

Announced in Anagram

Scarcely believing what he saw and wanting to make further checks — yet fearful that someone else might anticipate his announcement—Galileo gave his discovery to the world in the form of an anagram, following a rather common practice of that time. He first published the following Latin sentence:

"Haec immatura a me iam frustra leguntur: c. y." This might be translated as, "These things not ripe are read, as yet in vain, by me," which was certainly true for those who read it. A few months later, when he felt surer, he announced the solution. The same letters, rearranged, made another Latin sentence:

"Cynthiae figuras aemulatur Mater Amorum." This means, "The Mother of the Loves imitates the phases of Cynthia." "The Mother of the Loves," of course was a poetic expression for Venus, while Cynthia referred to the moon.

During the coming months, anyone with a telescope can see what Galileo saw as he watched Venus in 1610. On the 16th of last November, it was exactly on the opposite side of the sun from us, and invisible. But, by the first of the year, it had swung far enough to the east of the sun to remain in the west for a short time after sunset. It was still far beyond the sun, and so most of its sunlit hemisphere was turned toward us. Through a telescope, it appeared as a circle.

On June 27, it will have swung to its greatest angular distance east of the sun, a little over 45 degrees away, and by now the planet is beginning to come nearer the earth than the sun's 93,000,000 miles. At the "greatest eastern elongation," on the 27th, a line from the sun to Venus will make a right angle with one from the earth to Venus. Thus, only one-half of the planet's illuminated hemisphere will be visible, and we have the "half-moon" effect. From then on, until Sept. 5, when it will come between earth and sun, and will be invisible, more and more of the bright half will turn from us, producing the crescent phase. But during the coming autumn, when Venus will have moved to the west of the sun, it will appear in the morning sky before sunrise, and the phases will be repeated, but in reverse order.

Venus Changes Size

There is one great difference however, between the Moon and Venus in their changes of phases. The distance of the moon ranges from about 221,000 to 253,000 miles, hardly enough to make any noticeable difference in its size, unless measured with instruments. Further, the times of perigee and apogee (when it is nearest to or farthest from the earth) can come at any phase. Hence, the moon's diameter in the sky looks about the same whether crescent or full.

With Venus, on the other hand, the full phase comes when it is beyond the sun, and the distances of the earth from the sun and Venus from the sun (67,170,000 miles) are added to get the distance of Venus from us. This is about 160,000,000 miles. But when Venus is approaching its narrowest crescent, it is vastly closer, about 27,000,000 miles away, and hence, with the same magnifying power of the telescope, it appears many times as big. To an astronomer on Mars, next planet out, the earth would be seen to undergo similar changes.

Celestial Time Table for June

June	EWT	
1	1:00 p.m.	Venus passes Jupiter.
2	6:33 p.m.	New moon.
6	9:49 a.m.	Moon passes Jupiter.
	7:38 p.m.	Moon passes Venus.
7	6:00 a.m.	Moon farthest distance 251,800 miles.
10	10:35 p.m.	Moon in first quarter.
18	1:14 a.m.	Full moon.
	2:00 a.m.	Mercury farthest west of sun; low in east at sunrise.
19	11:00 a.m.	Moon nearest, distance 223,700 miles.
22	3:13 a.m.	Summer solstice: sun farthest north, summer begins.
24	4:08 p.m.	Moon in last quarter.
25	12:40 a.m.	Moon passes Mars.
27	9:00 p.m.	Venus farthest east of sun.

Subtract one hour for CWT, two hours for MWT, and three for PWT.

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White paint applied to beehive covers keeps the inside temperature lower on hot summer days.