

Venus Races With Jupiter in May

Astronomy

First American Planetarium Will Open in Chicago

By James Stokley

EVERYTHING in the heavens is moving. Not only do the sun, the moon, and the stars move across the sky once a day because the earth itself is turning from west to east, but all these things are moving among themselves. Every year the sun makes a complete circuit of the stars. Every twenty-eight days the moon makes a similar round trip. And in periods of varying lengths, the various planets move among the stars. Even the stars themselves are moving, though much more slowly, so that at a time many thousands of years in the future, our familiar constellation figures will no longer exist.

Ordinarily, the motion of the planets is not easily apparent. Though Jupiter, for instance, makes a circuit of the sky in about twelve years, as you watch it from night to night you do not notice any appreciable movement. It has been visible in the evening sky for months in the constellation of Taurus, the bull, just above the bright red star Aldebaran. Just now it is moving slowly to the east, but during the whole month of May it will only move a distance about equal to the diameter of the full moon.

This month, however, the planet Venus will run a race with Jupiter, overtaking it on May 17. On the first of the month, you can see Venus as a brilliant star low in the western sky shortly after sunset. To the left is Aldebaran, though much inferior in brightness. Brighter than any star in the vicinity, you should have no

trouble identifying Venus. Higher up is Jupiter.

As the month advances, keep your eye on these two planets, checking their positions every clear night. Each night Venus will appear a little higher, and the distance separating it from Jupiter will become smaller. On May 15, it will pass the place where Jupiter was on the first, but that planet itself will have advanced a little farther. Not until two days later, on May 17, will it actually pass. At about noon, Eastern Standard Time, on that day the two objects will be closer together, when Venus will be a little less than three moons' diameters to the north of its big brother. The astronomer calls this a conjunction of Venus and Jupiter. By evening, the two planets will have separated slightly, but they will still be close together, making a brilliant couple in the western sky; Jupiter on the left, and the even more brilliant Venus to the right.

But not for long will they be in this close proximity. Venus will continue on its way, until, by the end of the month, it will have passed over into the next constellation, Gemini, the twins, characterized by the two bright stars Castor and Pollux. By that time, the moon will have entered the race. The moon is new on the 28th, which means that it is on line with the earth and sun. The next evening, if you look carefully in the gathering dusk, you will see the narrow crescent moon to the north of Jupiter. Luna requires but a single day to traverse the space covered by Venus in two weeks, and on the 30th

it will pass Venus. The conjunction of the moon and Venus takes place on the afternoon of the 30th, but in the evening they will still be close enough to make an interesting sight.

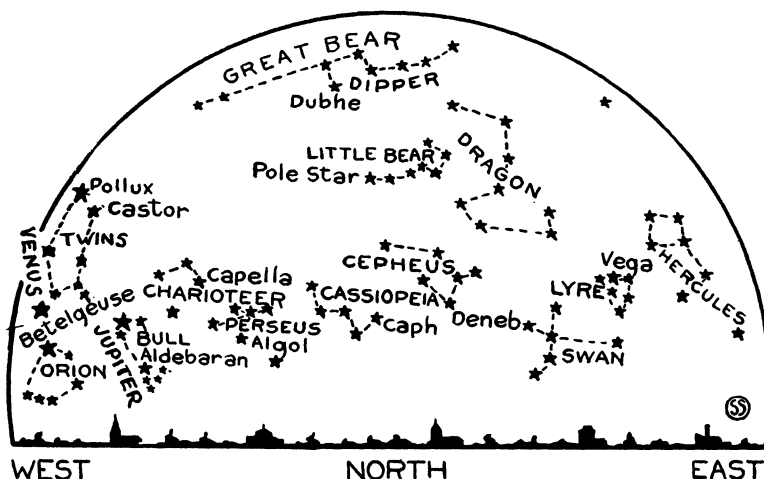
After this month, Venus will continue to rise in the evening sky, until on the 13th of September, it will be more than forty-five degrees east of the sun and visible for several hours in the western evening sky. After that it will approach nearer to the sun, but will increase in brilliancy until the 18th of October. Then it will rapidly approach the sun until, on the 22nd of November, it will again be on line with the sun and earth, soon afterwards to reappear as a morning star before sunrise.

Slow though these motions are, they are readily apparent if you watch the skies night after night. But after this month, visitors to Chicago will have the chance of seeing the thing repeated at will. During May there is to be opened the first American planetarium. This is the remarkable German instrument which has been installed in a number of European cities and which is a realistic representation of the skies at any time as seen in any part of the world. Another such instrument has been ordered for Philadelphia, but it will be a year or more before it is opened to visitors.

With Venus attaining such prominence in the evening sky, you may wonder what sort of a body it is. Astronomers know a good bit about the planet and, on the basis of what they do know, they are able to surmise even more. Recent months have brought the solar system into the public eye more than it has been for a long time.

The discovery by Lowell Observatory astronomers of an unknown member of the solar system revolving in an orbit far beyond that of Neptune, previously the most distant known planet, has drawn attention to its brothers and sisters in the family to which our own earth belongs.

The new planet, if it is a planet, travels in an orbit that is a very much



These maps show you the sky as it appears these May evenings. Hold them in front of you, and face north or south, and you can identify the stars in the heavens.

pulled-out ellipse, according to the preliminary computations of the astronomers who made the discovery. All the planets move in ellipses, but some are nearly circular. Venus is the most circular of all, as shown by the value for what is called its "eccentricity." A circle has an eccentricity of zero. As it stretches out into a longer and longer ellipse, the eccentricity increases until, when it finally stretches to an infinite distance, its eccentricity is one. Then it is no longer an ellipse, but a parabola. The new planet appears to have the highest eccentricity of all, for it is 0.909. This, however, is rather uncertain, but that for Venus is very well known. The distance of Venus from the sun is, on the average, about 67,200,000 miles and it revolves about its orbit once in 225 days. This is the "year" of Venus, but a longer period is required for the same position of the planet, as seen from the earth, to reoccur. The earth itself is moving around its orbit once in $365\frac{1}{4}$ days, so once in 584 days does Venus pass us.

If you look at Venus now, through a moderate sized telescope, you will see that it does not present a complete circle, but is like the moon a few days before full. During the coming month Venus gradually narrows to a crescent until November, when it is between the sun and earth. These changing phases are caused in precisely the same way as those of the moon. When the moon, or Venus, is illuminated by the sun at its side, we only see half of the bright surface, and the effect is the half moon. When the sun and the earth are both on the same side of either Venus or the moon, then we see the entire illuminated surface, the full phase. When one of the two objects is between the earth and sun we see a very small piece of the bright hemisphere, or a narrow crescent.

The discovery of the phases of Venus was made by the Italian astronomer Galileo, shortly after he first applied the telescope to the heavens in 1610. It provided strong evidence in favor of the theory of Copernicus, that the earth revolved around the sun instead of the sun revolving around the earth, as previously supposed. Under the old Ptolemaic theory, Venus was always beyond the moon, and could, therefore, never show a crescent phase. When Galileo found that Venus imitated the phases of the moon in their entirety, it immediately proved that the Ptole-

maic theory was incorrect in at least one respect.

In 1924, when Mars approached within some thirty-five million miles of the earth, it attracted a great deal of attention, and many observatories made a careful study of its surface. Venus comes even closer, and when it reaches inferior conjunction this November, it will be only about twenty-six million miles from the earth. But no observatories will then be watching it, for it will be so close to the sun that it can not be seen with even large telescopes. Though Venus approaches nearer to us than any other of the planets, we do not know as much about its surface as we do of Mars. If there should happen to be any astronomers on Venus, however, at the time of inferior conjunction, they would see the earth as an extremely brilliant object high in the sky at midnight and extremely well adapted to observation. With instruments equivalent to ours, probably they would be able to see such evidence of human activities as the deforestation of large areas, or the growth of vegetation over large reclamation projects in the Southwest. Our moon would also be conspicuous to the people on Venus, and with the naked eye would be seen of about the same brilliance as Jupiter. The earth and the moon would appear really as a double planet, the moon swinging back and forth to one side or the other every twenty-eight of our days.

Of course, there is no evidence at all that there is any kind of life on Venus. Astronomers have to suspend judgment on this matter, and probably will have to continue to do so until a time in the far distant future, perhaps, when the problems of traveling through space can be solved. Even if Venus were as well placed as Mars, we could not learn much

about its surface conditions, because we cannot see the surface. It is surrounded, like the earth, with an atmospheric layer. One proof of this is that at times when it is close to the sun, on our side, instead of appearing merely as a narrow crescent, the bright circle of light extends more than half way around. This would be produced in the same way as twilight on the earth, by the spreading of the light in the atmosphere.

In watching it through the telescope we seldom see more than a vast area of white, completely lacking in detail. Probably this means that the planet is continually covered by clouds, which always hide the surface. Sometimes hazy marks are seen, though it is believed that these are in the cloudy layer and not on the surface. On account of these facts, it has been quite difficult to determine how rapidly Venus rotates on its axis.

Though no other naked-eye objects appear in the May evening sky, there are plenty of bright stars to be seen. In the northeast, the brilliant Vega, in Lyra, the lyre, is coming into view. Low in the southeast, rising higher as the night advances, is the red Antares, in Scorpius, the scorpion. Almost directly south is Spica, in Virgo, the virgin, and to the southwest is Regulus, in Leo, the lion. Regulus is at the bottom of the hook-shaped group of stars known as the sickle. Low in the west is Procyon, in Canis Minor, the little dog, while above it and to the right is Pollux, the brighter of the twins. To the southeast of the zenith is Arcturus, in Bootes; Capella, in Auriga, the charioteer, is low in the northwest; while quite low in the northeast, not far from Vega, is Deneb in Cygnus, the swan.

