

## ASTRONOMY

# Equinox Brings Fall Stars

Jupiter and Venus will be the only planets visible in the September evening sky. Vega will be the brightest star to be seen in the evening.

By JAMES STOKLEY

► THE MONTH of September brings, on the 23rd, the autumnal equinox. This comes at 4:06 a. m., EST, the moment that the sun is directly over the earth's equator. For us in the northern hemisphere this is the beginning of autumn, though people in southern countries know it as the beginning of spring. In the evening sky the ever-changing constellations show us that this event is at hand, as groups that were conspicuous during the summer disappear, while others which will become more prominent during the fall and early winter have now become visible.

Jupiter and Venus continue in September to be the only planets visible in the evening sky—and only Jupiter is to be seen throughout the evening. It shines brightly in the constellation of Sagittarius the archer, low in the south for the times to which the accompanying maps have been prepared. These show the aspect of the heavens at about 10:00 p. m., your standard time, and an hour earlier at the middle of September. (Add an hour if you are on daylight time.) Jupiter has a magnitude on the astronomer's scale of minus 2.1, which makes it more brilliant than any nearby star, so it is easy to locate

## Venus Near Horizon

Venus is even brighter, of magnitude minus 3.5, but you have to look to the southwest, near the horizon, just after the sun has gone down, in order to see it. Since last April 16, when it passed the sun, it has been moving eastward through the sky. But at the same time it has been getting farther and farther south, and that is why, even though it has been drawing away from the sun, it still has not gotten higher in the evening sky. In countries of the southern hemisphere, however, it has now reached great prominence, as it will do for us by the end of the year.

Venus and Jupiter are both planets—bodies like the earth that revolve about the sun and shine by the sunlight they reflect to us. Of different nature are the stars, which are distant suns, shining by their own luminosity. Vega, high overhead these evenings in the constellation of Lyra, the lyre, is the brightest now visible. Also overhead is Cygnus, the swan, with brilliant Deneb, and nearby, toward the south, we can see another star of the first magnitude, which is Altair, in Aquila, the eagle. In the same region, just below Lyra in the west, is the large constellation of Hercules,

though it does not contain any stars of the first magnitude, it is easily recognized. Six of the principal stars in the group outline the shape of a butterfly.

The other first magnitude stars shown on the maps all happen to be near the horizon. Low in the northwest is Arcturus, in Bootes, the bear driver, which is just to the left of the familiar "great dipper," part of Ursa Major, the great bear. Farther to the right, low in the northeast, one may see Capella, in Auriga, the charioteer. During the coming months, this group will rise higher into a more prominent position, while Bootes is soon to disappear from the evening skies.

## Fomalhaut in South

Making its brief autumn visit to the evening heavens, Fomalhaut, in Piscis Austrinus, the southern fish, can be observed low in the south. It is just below the constellation of Aquarius, the water-carrier, with which it is associated in fable. The old star maps, which showed the imaginary figures that the star groups were supposed to depict, represented Aquarius as an old man, holding a jar from which water was flowing, into the mouth of the southern fish! This is a rather watery part of the sky, because to the left of Piscis Austrinus is Cetus, the whale, and above him are two more fishes, in the constellation of Pisces. This group, by the way, extends below and to one side of the "great square," an easily recognized part of the constellation of Pegasus, the winged horse.

Only one other planet, in addition to Jupiter and Venus, can be seen during the night in September. Mars, now in Cancer, the crab, rises in the east several hours

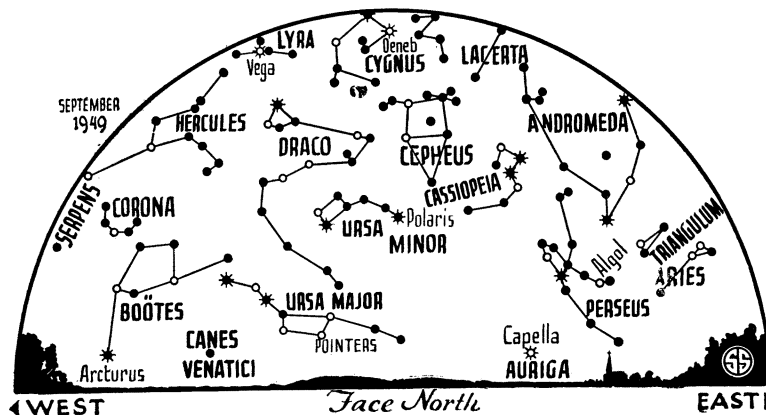
before sunrise. It is approaching but is still quite distant, and appears of the second magnitude, though its red color will help one to find it.

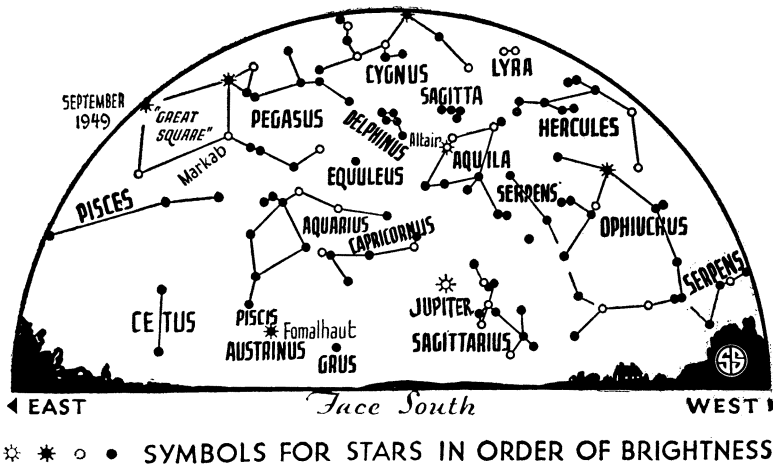
The constellation of Lyra, high in the west, has other points of interest, in addition to containing Vega, brightest star of the summer evening. If you look closely, you can see two fainter stars near it, toward the west, all three forming an equilateral triangle. The northernmost of these companions is called epsilon Lyrae, and if you have very keen eyes, or if you look at it through binoculars, you will see that it is really two stars. Through a still larger telescope, like those used by astronomers, each of these stars is also shown to be two. Thus, epsilon Lyrae is often called the "double double."

To the southeast of Vega, about three times as far as the epsilon and the other of the companions mentioned above are two more stars of the same constellation, known as beta and gamma Lyrae. Between them is a very interesting object, unfortunately not visible to the naked eye, which looks like a smoke ring when seen through a telescope. This is called the ring nebula in Lyra, and it is an example of a planetary nebula of which about 150 are known. This name is given not because they have any real relation to planets, but it was assigned by Sir William Herschel, great English astronomer of the 18th century. As he, and other early observers, scanned the heavens with their telescopes, they came across these objects, and were struck by the fact that they looked very much like the images of the planets.

## Glowing Gas

The "ring" nebula is not really a ring, but a shell of glowing gas. The ring appearance comes from the fact that the globe is translucent, and we see a greater thickness of gas at the edge than at the front or back. However, these gases are extremely rarefied. Two astronomers, Leo





Goldberg and Lawrence H. Aller, have illustrated this in a striking way in their excellent book, "Atoms, Stars and Nebulae." They ask you to imagine an ordinary tumbler filled with hydrogen at room temperature and pressure, to which is added a thimbleful of air and a few dust particles. If the glass were sealed, and then enlarged until it was as high as Mt. Everest and some two miles in diameter, the expanded contents would then represent a fairly accurate sample of a piece of a planetary nebula. Thus such a nebula is really a very high vacuum, better, in fact, than the best that can be secured in our terrestrial laboratories. The fact that they are so vast, averaging in diameter around a million million miles—more than 10,000 times the distance from earth to sun—means that they still contain enough atoms excited to luminescence that they can be observed.

At the center of the "ring" nebula, as with many of the planetaries, there is a star which cannot be seen even with large telescopes but which shows up plainly on the photographs. Such stars are very hot, with a surface temperature about 10 times that of the sun and shining mainly with invisible ultraviolet rays. When these rays strike the atoms of gas, they cause temporary changes in the positions of the electrons of these atoms. As these displaced electrons fall back into place, they give off energy in the form of light. This is the same as the familiar effect on earth known as fluorescence so these nebulae are actually shining by the same sort of process as that of the fluorescent electric lights which have become so popular in recent years.

**Time Table for September**

Sept.	EST	
2	5:00 a. m.	Saturn in line with sun
	11:29 p. m.	Moon passes Jupiter
7	4:59 a. m.	Full moon
	6:00 p. m.	Mercury farthest east of sun
10	6:00 a. m.	Moon farthest, distance 252,200 miles

15	9:29 a. m.	Moon in last quarter
18	4:56 p. m.	Moon passes Mars
22	7:21 a. m.	New moon
	11:00 p. m.	Moon nearest, distance 222,400 miles
23	4:06 a. m.	Sun over equator, autumn commences in northern hemisphere, spring in southern
25	5:17 a. m.	Moon passes Venus
28	11:18 p. m.	Moon in first quarter
30	4:46 a. m.	Moon passes Jupiter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, August 27, 1949

**AERONAUTICS**

**Gadget Prevents Swaying Of Plane's Tail in Flight**

➤ A GADGET to take the "Dutch Roll" out of speedy airplanes in flight was revealed by the Boeing Airplane Company. It holds the tail of the plane from swaying to right or left when side-swiped by sudden gusts of air. Its "brain" is a gyroscope out of an E-6 automatic pilot. Experimentally, it is in use on a Boeing speedy Stratojet, a plane with sweep-back wings in the 600-miles-per-hour class.

So-called Dutch Roll is not a very common occurrence, and seldom shows up until a plane is undergoing flight tests. It can be corrected by a design change, but such alteration might affect the speed. The term was applied because a plane going through the Dutch Roll looks like a Dutchman ice-skating on a Holland canal.

The gyroscope is supplemented by a turbosupercharger amplifier and a turbo waste-gate motor. The first two are on the frame of the plane, the motor is on the push rod that is used to move the plane's rudder to the right or left. When a side gust strikes the tail of the plane, the automatic gyroscopic device senses it immediately and pushes or pulls the rudder to right or left before the gust causes the plane to swerve.

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