

ASTRONOMY

Saturn Visible All Night

Two Other Planets, Venus and Mars, May Be Seen In The Early Morning At the Beginning of the Month

By JAMES STOKLEY

TWO PLANETS are now in the evening sky, though one, Jupiter, which has been with us for months, sets early, and will soon be out of sight for a while. Saturn is the other. On the eighteenth of the month it will be directly opposite the sun, and then will be visible all night, rising at sunset and setting at sunrise. It is in the constellation of Capricornus, shining low in the southeast, as indicated on the maps. Because of its brightness, greater than any nearby star, and its steady, yellowish light, it can be easily recognized. Jupiter is low in the west, and still brighter. Close to its left is the star Spica, in the constellation of Virgo, much fainter.

The Great Dipper this month hangs in the northwestern sky, the handle pointing upward, and it makes a good start from which to find the star groups now visible. It is well known how the pointers, the two stars at the bottom of the bowl, indicate the pole star, Polaris. If you imagine a line drawn through these stars to the right, it brings you to Polaris, itself at the end of the handle of the Little Dipper, which now extends upwards. In the northeast, directly opposite the pole star from the Great Dipper, is the group of Cassiopeia, shaped like a W on its side, the top of the W towards the pole.

Handle Points to Bright Star

By following the curve of the handle of the Great Dipper around to the west, one comes to Arcturus, in Bootes. Low in the southern sky, to the west of the south point, is a bright, reddish star. This is Antares and it is part of the scorpion, Scorpius. To the right is a vertical, curved row of stars, which form the claws of the insect. His tail extends the other direction like a great fishhook, with the point directed upwards. Next to Scorpius, just above and to the left of the tail, is Sagittarius, the archer. In this group can be found the third dipper of the skies, the little "Milk Dipper." The bowl, which is turned downwards, is formed by a

quadrilateral of stars and the handle comes from them to the right. This group also forms the outline of a well-shaped teapot. The bowl of the dipper forms the handle of the pot, the star at the end of the handle the lid, and a triangle of stars to the right the spout. It is said that the teapot is emptying its hot tea upon the tail of the scorpion, just below!

Next to Sagittarius is Capricornus, the sea-goat, already mentioned as the location of Saturn, but containing no very brilliant stars. Then comes Aquarius, the water-carrier, near the horizon. These last mentioned constellations, Scorpius, Sagittarius, Capricornus and Aquarius, as well as Virgo, in the west, are some of those that mark the zodiac, the path of the sun, moon and the planets.

Vega Overhead

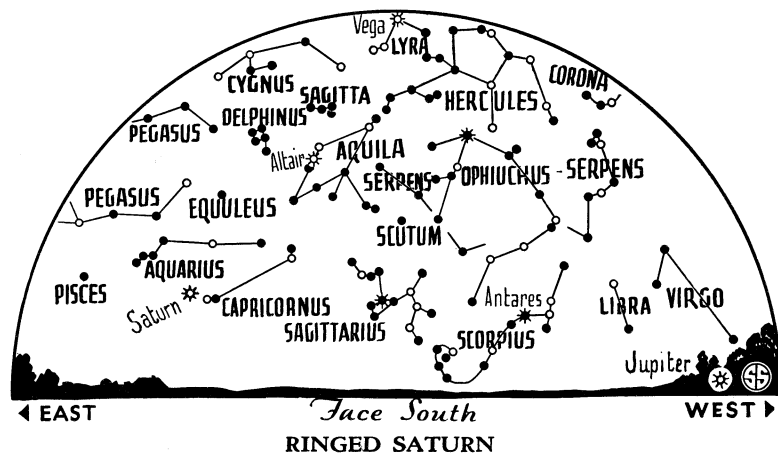
Directly overhead is a bright star, Vega, marking Lyra, the lyre. Below it to the southeast is a slightly fainter star, attended closely above and below by fainter stars, Altair, in Aquila, the eagle. Below Vega to the northeast is Deneb, in Cygnus, the swan, sometimes called the "Northern Cross." Deneb is at the head of the cross, or the tail of

the swan. The bird's long neck stretches between Lyra and Aquila, and his wings, on either side, are outstretched in flight. Below Cygnus, directly in the east, is the "great square," part of Pegasus, the winged horse. As seen now, the square stands upon one corner. The star at the left corner is not in Pegasus, but in Andromeda, the chained maiden, who extends northwards near Cassiopeia, her mother, in mythological lore. These are the principal groups of stars that appear in the evening skies in August. Learn to know them, and you will have friends that will greet you in widely scattered parts of the world, like a breath from home.

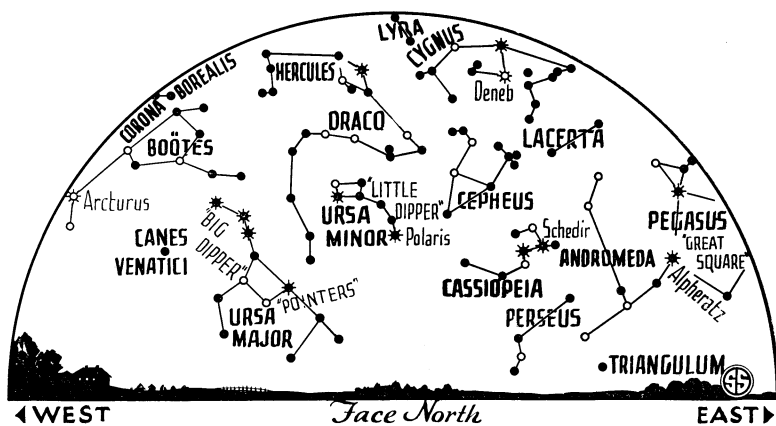
Partial Eclipse

A very interesting astronomical event of August is, unfortunately, not visible from any part of the United States. On August 10 people living in central and southern Africa will see a partial eclipse of the sun. From a belt passing across Rhodesia the moon will be seen to pass directly in front of the sun. Despite this, however, there will not be a total eclipse, because this happens when the moon is nearly at its greatest distance from the earth, and its apparent diameter is smaller than that of the sun. The result is that the moon fails completely to cover the sun, but a ring, or "annulus," of sunlight remains visible around it. Thus, it is called an annular eclipse. Such eclipses, while interesting to

☼ * ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



If you have a small telescope, look this month for the rings of Saturn, visible from sunset to sunrise. If you have no instrument, you may distinguish this planet by its steady yellowish light.



HEAVENLY "LANDMARK"

The Great Dipper in the northern skies is a convenient starting point for discovering other familiar stars. The pointers carry your eye to the pole star; the curve of the handle to Arcturus.

watch, are of practically no scientific value in making possible observations which can not be made at other times. Consequently no expeditions of astronomers are going to Africa, as they would if the eclipse were total. Even the small remaining ring of sun is enough to blot out the faint light of the corona, its outermost layer.

An Elliptical Orbit

Every 29 1/2 days, approximately, the moon travels once in its orbit around the earth. This orbit is not circular, but elliptical, and so the distance between the two bodies varies. This month the moon is most distant from the earth, at "apogee," on August 8 at 4 p. m., eastern standard time. Then it will be 252,510 miles from the earth. At 3 p. m. on the twenty-third, the moon will be closest, or at "perigee," and then only 226,650 miles will separate us. One effect of this is on the tides in our oceans. Tides are caused by the attractions of the moon and of the sun. As the intensity of this tide-producing force varies with the cube of the distance of the source, this difference of approximately 26 million miles produces a considerable effect. So the tides are greater at perigee than at apogee.

Now the moon plays a large part in causing the tides, but many ages ago, according to a widely held theory, the tides caused the moon. This was suggested late in the nineteenth century by Sir George Darwin, whose place in physical science is nearly as great as that of his father, Charles, in biology. This tidal theory is quite mathematical in its details. It assumes that the earth was originally a globe of liquid, with no moon, and which turned once in five

hours instead of twenty-four. The tides set up on this liquid earth by the attraction of the sun gradually became larger and larger, finally becoming so high that a piece broke off. This piece eventually formed the moon.

As the tides travel around the earth, pulled now by the attraction both of the moon and the sun, there is a certain amount of friction, especially where they pass over shallow areas like the Bering Sea or through narrow straits. Slight as it is, it causes a braking action which is gradually making the earth turn more slowly. On the other hand, the tides formed on the earth, also attract the moon in such a way as to make it speed up slightly. The faster a sling-shot is whirled about, the farther the stone tries to get from the center of the motion. So the speeding up of the moon makes it move a little farther from the earth. But when a celestial body that is revolving around another is farther away, it moves more slowly in its larger orbit, and so the net effect of the speeding up of the moon is to make it move more slowly around the earth. According to the theory of Darwin, this process still continues, even though it is exceedingly slow, and the time will come when the day and the

month will both be about fifty-five of our days, the earth always keeping the same face towards the moon just as the moon does now towards the earth.

During August the moon, then in a crescent phase, passes by Jupiter on the fifteenth, with the planet about thirteen moon diameters to the south. On the twenty-fourth it passes Saturn more closely at about half that distance. The planet Mercury may, perhaps, be seen low in the western sky just after sunset at the very beginning of the month, for it was at its greatest distance east of the sun on the last day of July. Venus and Mars are close together, and may be seen in the eastern sky just before sunrise. The moon, again a crescent, passes them on the seventh, and the three objects will be an interesting spectacle that morning. Venus is the more brilliant, and Mars is red in color, so there should be little difficulty in distinguishing them.

Science News Letter, August 4, 1934

PHYSICS
Magnetic Objective For Electron Microscope

A MICROSCOPE which uses electrons instead of light rays to "see" tiny objects has been developed by Dr. E. Ruska and reported in the German scientific publication *Zeitschrift für Physik*. By magnification in two stages the German scientist has obtained a device capable of enlarging the apparent size of things some 10,000 times. The maximum magnification usually possible with ordinary optical instruments is 3,500 times.

Whether electrons or light rays are used in a microscope they must be brought to a focus. For electrons a magnetic field is used for this purpose since the electron's charge makes it react in a magnetic field.

The electron microscope, developed by Dr. Ruska, has theoretically a resolving power a thousand times greater than that of a microscope using light,

| Phases of the Moon | | E. S. T. |
|--------------------|-----------|---------------|
| Last Quarter | August 2 | 1:26.9 a. m. |
| New Moon | August 10 | 3:45.6 a. m. |
| First Quarter | August 17 | 11:32.9 p. m. |
| Full Moon | August 24 | 2:36.7 p. m. |
| Last Quarter | August 31 | 2:39.9 p. m. |