ASTRONOMY

Jupiter, Saturn Shine in August

The planet Jupiter is the brightest object in the sky next to the moon during August. Saturn is as bright as a first magnitude star, James Stokley reports.

➤ TWO BRIGHT PLANETS—Jupiter and Saturn—have joined with the stars normally visible at this time of year to make the evening skies of August especially brilliant.

Both planets, and the stars as well, are shown on the accompanying maps. These depict the skies as they appear about ten p.m. your own kind of standard time (add one hour for daylight saving time) at the first of August, an hour earlier at the middle of the month and two hours earlier as the month comes to an end.

Jupiter has a magnitude of minus 2.3, on the scale used by astronomers for rating the brilliance of celestial objects. Thus is far brighter than any other object in the evening sky except the moon, so Jupiter is easy to identify. It has been in the constellation of Capricornus, the horned goat, but in August moves next door into Sagittarius, the archer, in the southern sky.

About five degrees to the west (right) is Saturn. Its magnitude is plus 0.4 so it ranks with the first-magnitude stars; however, it is about a twelfth as bright as Jupiter. Both of these planets are visible as soon as it gets dark, and remain in view until shortly before sunrise.

The stars in Sagittarius outline a teapot. The handle is toward Saturn, and the spout to the right, toward the next constellation of Scorpius, the scorpion. In the left-hand end of this group, the stars are in a curved line, which forms the scorpion's tail. That is the way the figure was pictured in the old star maps. The modern astronomer, of course, ignores these picturesque old figures, of lions, bears and dogs as well as scorpions.

At the center of the scorpion is a bright star, red in color, called Antares, which is about half as bright as Saturn.

Looking higher in the southern sky, you can see two other stars of the first magnitude. Directly above Jupiter is Aquila, the eagle, with brilliant Altair. And still higher —virtually overhead, in fact—you find Vega, in Lyra, the lyre. Below this group, toward the east, is Cygnus, the swan, shown partly on the southern map, partly on the northern. It is on the latter that Deneb, the brightest star in Cygnus, is shown.

The big dipper, which is a part of Ursa Major, the great bear, shines in the northwest. In it are the pointers, the two stars in the dipper's bowl that show the direction of Polaris, the pole star. Although of second magnitude, this is a well-known orb, because it always stands in about the same position in the north.

If you follow the handle of the dipper, and continue its curve to the left, it will bring you to another star of the first magnitude. This is Arcturus, in Bootes, the herdsman.

Stay up late on August nights and you may see another planet, for Venus rises in the east about three hours before the sun. Its magnitude is now about minus 3.5 which makes it about three times as bright as Jupiter. Venus, Jupiter and Saturn are the only planets now visible; the other two that are sometimes visible without a telescope, Mercury and Mars, are too nearly in the sun's direction to be seen.

From about the middle of August to the end, the moon will shine in the sky during evening hours. On Friday, Aug. 25, it will be full, rising in the east as the sun is setting in the west.

During that night the moon will pass through the shadow of earth, producing a lunar eclipse. At 10:09 p.m., EST, the eclipse will be at its height. It will not be quite totally eclipsed as a narrow sliver of the moon's surface will remain illuminated by the direct rays of the sun.

The shadow of our planet actually has two parts. That shown is the inner part, the umbra, where the globe would completely hide the sun. But around it is a larger region, called the penumbra, where the sun is only partly hidden. At 7:37 p.m. EST the moon starts to enter the penumbra. In the western part of the United States, of course, the moon will not have risen when this happens.

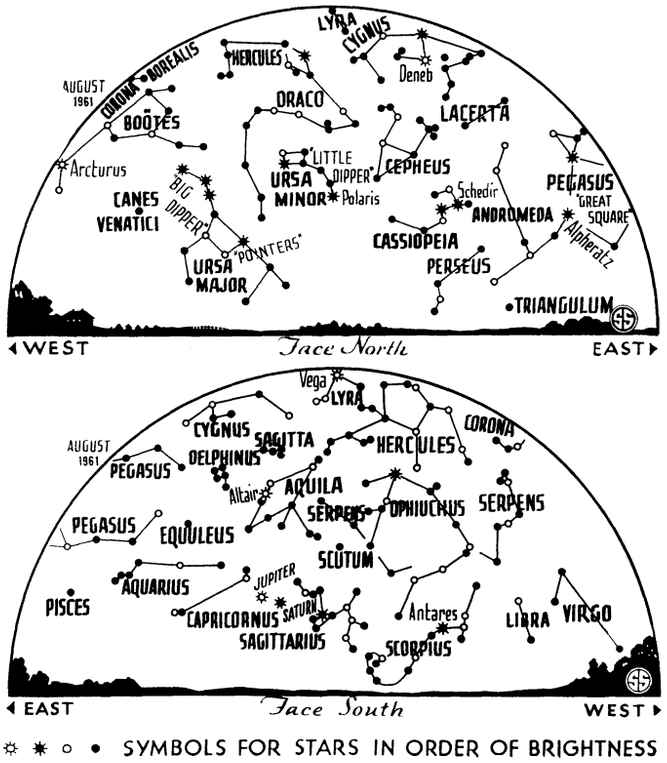
But even in the east, where the moon will be in the sky, nothing will be seen until later when the eastern edge of the lunar disc may seem to be a little fainter than normal.

At 8:36 p.m. EST the moon starts to enter the umbra, or earth's shadow, and the eclipse really begins. Very soon afterwards there will be a noticeable dimming of the eastern edge of the disc. The darkened portion will gradually increase until the maximum eclipse at 10:09 when more than 99% of the lunar diameter will be in shadow. Then the shaded area will become smaller until at 11:42 p.m., the moon will be completely out of the umbra. As the eclipse comes to an end, the moon will have risen even on the Pacific coast, and the eclipse will be visible throughout all of North America except the northwestern tip of Alaska.

Even when immersed almost completely in the earth's shadow, the moon will still be visible, shining with a dull, coppery-red glow. This is an effect of the earth's atmosphere, which acts as a prism to bend sunlight around into the shadow. As the rays pass through the air above our heads, some of the blue light is scattered, and this is what gives the daytime sky its blue color.

White light consists of a mixture of several colors—red, orange, yellow, green, blue and violet. With the blue and other colors at that end of the spectrum reduced, red predominates, and so the light that is bent into the shadow is much more red than ordinary sunlight.

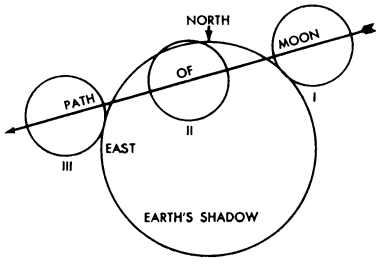
The lunar eclipse on Aug. 25 is not the



☼ ✷ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

only one for this month. Two weeks earlier, at the time of new moon, that body will come between the earth and the sun, producing a partial solar eclipse. To see it, you will have to be in southern Africa, along the coast of Brazil, in the South Atlantic or Antarctica. Over that general area, the moon will partially hide the sun. Along a belt that is mostly over the ocean there will be what is called an annular eclipse. Around the dark disc of the moon a ring of the sun's surface will be visible.

This happens because the moon will then be at about its greatest distance from the earth and its size, as we see it in the sky, will not be enough to cover the solar disc. A total eclipse of the sun occurs when the moon is closer. Then it covers the sun completely and the sun's outer envelope, the corona, flashes into view.



Partial Eclipse of Moon Aug. 25, 1961

The large circle represents the shadow of the earth, and the small circles—I, II and III—indicate the successive positions of the moon as it passes through the shadow. The three phases shown occur at the following times (all p.m.):

	EST	CST	MST	PST
I Moon starts into shadow	8:36	7:36	6:36	5:36
II Middle of eclipse	10:09	9:09	8:09	7:09
III Moon leaves shadow	11:42	10:42	9:42	8:42

Celestial Time Table for August

Aug.	EST	
3	6:48 a.m.	Moon in last quarter
7	1:00 p.m.	Moon passes Venus
11	5:36 a.m.	New moon, annular eclipse of sun
	noon	Moon farthest, distance 252,600 miles
12	early a.m.	Meteor shower visible, apparently radiating from constellation of Perseus in northeastern sky
19	5:52 a.m.	Moon in first quarter
23	10:00 a.m.	Moon passes Saturn
	6:00 p.m.	Moon passes Jupiter
25	2:00 p.m.	Moon nearest, distance 222,000 miles
	10:14 p.m.	Full moon, Lunar eclipse

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

Know the Sky

These star maps showing the positions of stars and planets can help you locate satellites when they flash briefly across the sky. Familiarity with the constellations and their relative positions makes locating artificial moons much easier whenever they are visible from your area.

• Science News Letter, 80:58 July 22, 1961