ASTRONOMY

Jupiter Comes into View

Mars and Saturn are disappearing from view, but Jupiter will be visible for about three months. Jupiter, the giant planet, is the only one that can boast 11 moons.

By JAMES STOKLEY

➤ ALTHOUGH three planets may be seen these August evenings, two of them are about to disappear from view for a while. The third, however, is just coming into sight and will be with us for the next few months.

This is Jupiter, largest of the planets, which is shown on the accompanying maps in the southeast in the constellation of Aquarius, the water carrier. These maps give the appearance of the heavens at about 10:00 p.m. at the beginning of the month, an hour earlier around the fifteenth and about 8:00 p.m. at the end. (Add one hour if you are on daylight time.)

The other two evening planets are Mars and Saturn which have been visible during the spring and early summer. Saturn is in the constellation of Leo, the lion. At the first of August it sets about an hour and three-quarters after the sun. Thus it is not shown on our maps, because it is below the horizon by the times for which they are made.

Mars is farther east in Virgo, the virgin, part of which is shown on the southern map toward the west. Thus Mars barely appears on the map. And it is so low that absorption by the greater thickness of atmosphere its light has to penetrate reduces the brightness considerably below first magnitude.

Jupiter Very Bright

Jupiter's magnitude just now is minus 2.4, brilliant enough to make it most conspicuous even though it, too, is somewhat dimmed by its relatively low altitude. It is about ten times the brightness of the most brilliant star now seen. This is Vega, in Lyra, the lyre. Vega is shown on the map of the southern skies almost directly overhead.

Our second brightest star on August evenings is Arcturus, which is about 90% of the brilliance of Vega. Arcturus is in the constellation of Bootes, the bear-driver, high in the west. A good way to locate it is to start with the great dipper which is part of Ursa Major, the great bear, in the northwest. In the lower part of the dipper are the pointers which show the direction of Polaris, the pole star. The curve of the handle, if followed, brings you to Arcturus.

Immediately below Lyra toward the east is the figure of Cygnus, the swan, in which there shines the first magnitude star Deneb. Part of Cygnus is shown on the map of the southern half of the sky and part on the northern. Deneb can be found in the northern section.

Just south of Cygnus are two interesting small constellations. These are Delphinus, the dolphin, and Sagitta, the arrow. South of them we come to Aquila, the eagle, with still another bright star, called Altair.

Fifth of the first magnitude stars now to be seen is low in the south in the constellation of Scorpius, the scorpion. The star is Antares, a name which means "rival of Mars," given on account of its red color which makes it resemble that planet. It is supposed to mark the heart of the scorpion, whose tail curls down and then up again in the south.

"Shooting Stars"

About Aug. 12 we will have an excellent opportunity to see meteors, or "shooting stars," belonging to the Perseid shower. They are so called because they seem to radiate from the constellation of Perseus, the champion, which rises in the northeast about midnight. With a dark and clear sky it is usually possible on any night to see two or three meteors every hour before midnight, and more in the early morning. However during the night of Aug. 11-12, the numbers seen may rise to one per minute.

At this time of year we meet a swarm of these particles, most of them no larger than a pinhead, and the frictional heat generated when they hit the atmosphere causes them to burn up in a flash of light. Actually they are moving through space in parallel paths, although they seem to converge in the distance, like the tracks of a railroad. That is why they appear to radiate from the point in Perseus. Since the moon will be new on Aug. 13, it will be out of the sky when these meteors are most numerous and its glare will not interfere with our seeing them as it sometimes does.

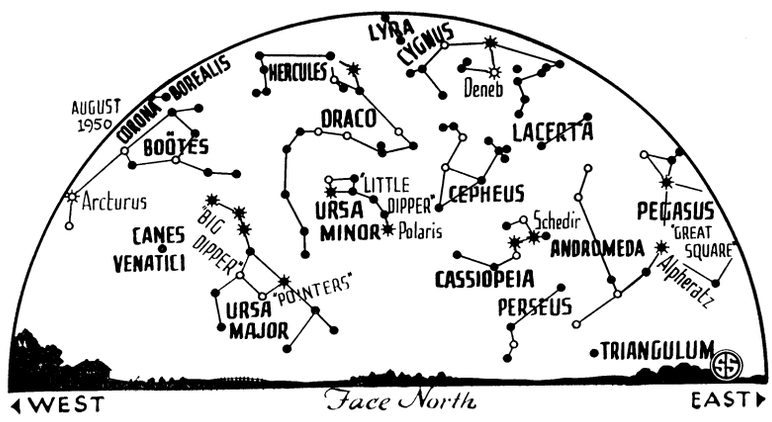
In addition to the three planets of the evening sky, another can now be seen in the early morning hours. This is Venus which is in the constellation of Cancer, the crab, and rises in the east about two hours before sunrise. It is even more brilliant than Jupiter. Mercury this month is too close to the sun to be seen.

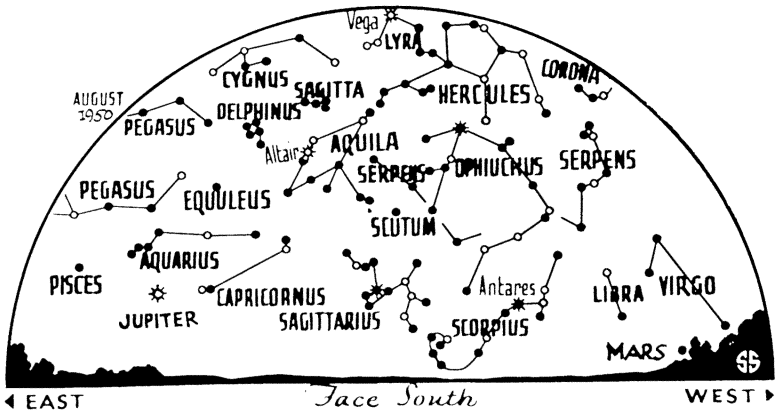
Jupiter and Earth Differ

Knowing that the earth is one of the planets that, with the sun around which they revolve, form the principal parts of the solar system, we are sometimes inclined to think of our globe as typical, and to assume that the others are more or less the same. However, Jupiter, which has now come into the evening sky, is very different from the earth. For one thing, the fact that it has 11 moons, some of them bigger than our lone satellite, is a mark of distinction. This is a larger number than for any other planet.

The globe of Jupiter differs considerably from earth. Whereas our diameter is about 7,900 miles, that of Jupiter is about 11 times as much, or 87,000 miles. This is a mean value, since it is nearly 6,000 miles less, measured from pole to pole, as it is across the equator of the planet. Looking at Jupiter, even through a medium-sized telescope, the elliptical shape is easily apparent.

The reason for this bulge at the equator is found in the rapid rotation of the planet, which takes place in a little less than 10 hours, causing considerable centrifugal force. This whirls the equatorial material several thousand miles farther from the center than at the poles, which is not subjected to such forces.





From the way that Jupiter pulls on the tiny planets called asteroids, as well as on its satellites, it is possible to determine its mass with considerable accuracy. It turns out to have about 318 times the amount of material making up the earth.

Knowing Jupiter's mass, and how fast it spins, astronomers can calculate the centrifugal force at the equator, and how much it would bulge if its material were distributed uniformly throughout its globe. On this basis, however, it turns out that it should bulge even more than it does, proving, therefore, that the material is not uniformly distributed. Instead, the bulk of the mass must be concentrated at the center core, with lighter kinds of stuff in the outer layers, so light in fact that they must be largely gaseous.

Jupiter Gaseous

Moreover, the gaseous character of the outer layers of Jupiter is confirmed by the remarkable changes that occur in its surface features. Most conspicuous of these, when it is viewed through a telescope, are the red and brown belts which cross its surface parallel to the equator. These are continually changing their details, with spots appearing and vanishing. The surface at the equator turns more rapidly than the parts nearer the planet's poles, additional evidence that we are not looking at a solid surface.

Analyzing, by means of a spectroscope, sunlight reflected by Jupiter, we find dark bands at certain wavelengths which have been absorbed by some material in the planet's atmosphere. These have been shown to be due to the gases we know as methane, or "marsh gas," and ammonia. Hydrogen, also, is probably most abundant in the atmosphere, but it causes no bands that can be observed. Nitrogen is the chief element in our atmosphere, but what there has been in that of Jupiter has probably combined with the hydrogen to form ammonia, which contains both these elements. Oxygen, that may once have been present, has likewise probably combined with the hydrogen to form water. At the low temperature prevailing there, because of its great distance from the sun, this would doubtless have frozen and fallen far out of sight.

Structure of Jupiter

According to Dr. Rupert Wildt of Yale University, who first showed the presence of ammonia and methane on Jupiter, the planet's structure is something like this: At the center is a rocky-metallic core, about six times as dense as water and about 34,000 miles in diameter. Over this is a frozen ocean—a layer of ice some 20,000 miles deep. On the outside, some 6,000 miles in thickness, is a layer of frozen ammonia crystals in an atmosphere of hydrogen and methane. There must also be some unfrozen, gaseous ammonia to cause the observed absorption bands.

Possibly, as Dr. Fred Whipple, of Harvard College Observatory, has suggested, there is no sharp transition between the atmosphere and the ice layer. The clouds may become thicker and thicker with depth, finally turning into a layer of ammonia slush, which becomes solid still farther down. A further suggestion is that since there are brown and red compounds of ammonia in combination with potassium and sodium, these may account for the coloration observed in the surface of Jupiter.

Time Table for August

Aug.	EST	
5	2:56 p. m.	Moon in last quarter
6	10:00 a. m.	Moon farthest, distance 251,200 miles
11	9:46 a. m.	Moon passes Venus
12	early morning	Meteors of Perseid shower visible
13	11:48 a. m.	New moon
15	3:01 p. m.	Moon passes Saturn
18	11:01 p. m.	Moon passes Mars
19	midnight	Moon nearest, distance 229,800 miles
	10:35 a. m.	Moon in first quarter
21	6:00 a. m.	Mercury farthest east of sun
26	2:00 a. m.	Jupiter opposite sun and nearest earth; distance 371,200,000 miles
27	6:31 a. m.	Moon passes Jupiter
	9:51 a. m.	Full moon

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

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CHEMISTRY

Mercuric Chloride for Better Watered Farms

➤ MORE water in U. S. farming areas where irrigation means the difference between prosperity and drought—that is the promise of the chemical mercuric chloride and a trick known as "water spreading."

In areas such as California's San Joaquin Valley, irrigation pumping is threatened by lowering water tables. More water is being pumped from wells than is being replaced each year. Yet in the spring as mountain snows melt—or during infrequent cloud bursts—there is so much water that local floods result.

Irrigation engineers are experimenting with "water spreading" to conserve this occasional heavy run-off of water. The idea is to divert it to shallow dike-enclosed reservoirs, where it will stand still long enough to soak into the subsoil.

But when soil is continuously submerged for a few weeks, micro-organisms in the earth multiply, choking the tiny channels through which the water can filter downward.

Mercuric chloride may be the answer. A very small amount of the disinfectant chemical added to water will kill the obstructionist microorganisms, and keep the water percolating into the subsoil storage layers.

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