

ASTRONOMY

Jupiter Dazzles the Eye

Jupiter is nearly 20 times as bright as a first magnitude star in September. Seen in Sagittarius, the archer, it stands in the south next to Saturn, James Stokley reports.

► ONCE AGAIN we have two bright planets in the evening sky.

Jupiter is the more brilliant; shining nearly 20 times as bright as a typical first magnitude star, it is conspicuous in the south in the constellation of Sagittarius, the archer. No star, and no other planet seen at the same time, is as prominent, and this makes it easy to identify. Saturn is a short distance to the right, and in the same constellation. It is considerably fainter, although equal to a bright star of the first magnitude.

Both of these planets, as well as the stars, are shown on the accompanying maps, which depict the skies as they look about ten p.m., your own kind of standard time (add one hour for daylight saving time) on Sept. 1. They appear similarly about nine o'clock at the middle of the month and eight o'clock at the end.

The brightest star of these evenings is seen high in the west. It is Vega, in Lyra, the lyre. Still higher, almost directly overhead for the times of our maps, is Deneb in Cygnus, the swan. Part of this group is shown on the northern sky map, the rest (with Deneb) on the southern. And high in the south, in Aquila, the eagle, is the star called Altair.

Deneb, Altair and Vega are all of the first magnitude, or brighter. In addition, three other first magnitude stars are shown on the maps, but they all are so low that their light is considerably dimmed by the greater thickness of atmosphere it has to penetrate.

Capella Stands Low in Northeast

Low in the northeast is Capella, in Auriga, the charioteer. This will move into a more prominent position in the evening sky during the autumn. Arcturus, in Bootes, the herdsman, is low in the northwest. During the late spring and summer it was more prominent in the evening sky, and now it is about to disappear from view.

And low in the south in Piscis Austrinus, the southern fish, is Fomalhaut, now at about its best position for our latitude, and as high as it ever comes for us. From more southerly countries it rises higher. At Porto Alegre, in southern Brazil, it passes directly overhead.

In the eastern sky you will find Pegasus, the winged horse, and this contains a rather prominent figure, even though the stars are not so bright. This is the "great square," whose regular shape makes it easy to locate. Actually, the northernmost star, called Alpheratz, is not in Pegasus at all. It is in the next-door constellation of Andromeda, which represents the mythological princess who was chained to the rock.

Look toward the north. The great dipper, part of Ursa Major, the great bear, is near the horizon, and poorly placed. But extending upward from it is the long and winding constellation of Draco, the dragon. It winds around Ursa Minor, the lesser bear, of which the pole star, Polaris, is part. And to the other side of Polaris, in the northeast, stands Cassiopeia, the queen. A little higher is Cepheus, the king.

As for the other naked-eye planets, Venus is now visible in the eastern sky, for about two hours before sunrise. Mercury and Mars are too nearly in the same direction as the sun to be visible easily.

In the solar system, as far as we know, there are 31 natural satellites—smaller bodies accompanying planets. Earth has one, Mars two, Jupiter twelve, Saturn nine, Uranus five and Neptune two. None has been discovered attending Mercury, Venus or Pluto.

Our moon is the only satellite visible to the naked eye from earth. Most of the others require rather large telescopes in order to see them. But this is not true for the four larger satellites of Jupiter, which were the first astronomical objects to be discovered after the invention of the telescope in 1610.

It was in January of that year that an

Italian astronomer named Galileo Galilei turned his crude little instrument on Jupiter and saw what seemed to be three faint stars nearby. He thought, at first, that these were distant stars that happened to be in about the same direction as Jupiter, and thus were seen in the same part of the sky.

But, as he continued to watch, night after night, these "stars" behaved in a most peculiar way. Sometimes they were on one side of Jupiter, sometimes on the other. One night there were only two, and on another occasion he saw four.

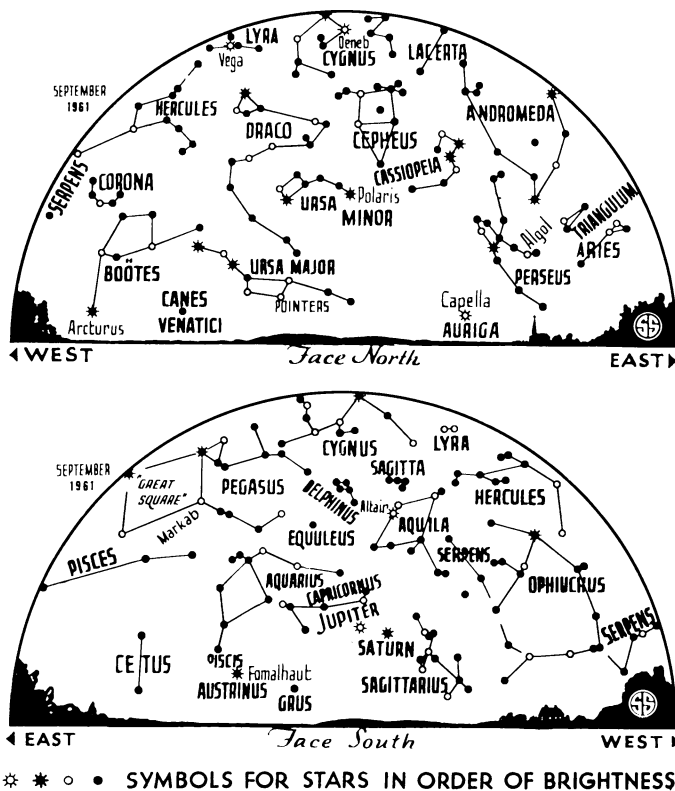
Soon he realized what they were—not stars, but satellites, or "moons," revolving around Jupiter just as the moon revolves about earth. Later they were given names. In order out from the planet, they are Io, Europa, Ganymede and Callisto.

Observe Jupiter's Satellites

You can see these four satellites with a good pair of binoculars, which is a considerably better instrument than Galileo's primitive telescope. They must be held very steady, however, perhaps with your arms resting on some firm support.

Io takes 1 day, 18 hours to revolve around the planet; Europa goes around in 3 days, 13 hours, Ganymede in 7 days, 4 hours, and Callisto in 16 days, 17 hours.

Europa and Callisto are of the sixth magnitude, just at the limit of naked eye visibility with a dark clear sky. Io and Ganymede are of fifth magnitude, enough



to make them visible without a telescope, were they not so close to the bright planet with its overpowering glare.

Because of its rapid revolution, Io changes position rapidly with regard to Jupiter, and Europa a little more slowly. Ganymede and Callisto, for several nights at a time, may be seen on the same side of the planet. Callisto will be to the west from Sept. 3 to 10 and from Sept. 19 to 27. It will be toward the east for the rest of the month. Ganymede will be to the west about Sept. 1, 8, 15, 22 and 29; and to the east around Sept. 4, 11, 19 and 26.

But if you watch these satellites you may find, as Galileo did, that sometimes only three, two or even one is visible. Sometimes they are eclipsed. These moons, like our moon, shine by reflected sunlight, so when they pass into Jupiter's shadow they disappear. Also, they may be occulted, when one goes behind Jupiter. Sometimes, also, a moon passes in front of the planet. Then, also, it is invisible, except with a good-sized telescope. And sometimes, with a telescope, one can see the shadow of a satellite, moving across the planet's disc.

Ganymede and Callisto are the largest of the satellites, each about 3,200 miles in diameter, so they are considerably bigger than our moon, with 2,160 miles. Io, with a diameter of 2,300 miles, is somewhat larger than the moon; Europa, with 2,000 miles, is a little smaller.

Celestial Time Table for September

Sept.	EST	
1	6:06 p.m.	Moon in last quarter
6	7:00 p.m.	Moon passes Venus
7	3:00 p.m.	Moon farthest, distance 252,400 miles
9	9:50 p.m.	New moon
10	1:39 a.m.	Algol (variable star in Perseus) at minimum brightness
12	10:27 p.m.	Algol at minimum
15	7:16 p.m.	Algol at minimum
17	3:24 p.m.	Moon at first quarter
19	5:00 p.m.	Moon passes Saturn Moon passes Jupiter
22	11:00 p.m.	Moon nearest, distance 223,600 miles
23	1:43 a.m.	Sun over equator, autumn commences
24	6:34 a.m.	Full moon
28	5:00 a.m.	Mercury farthest east of sun

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

Know the Sky to Watch Satellites

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, 80:138 August 26, 1961

Peaches take 140 days to mature, but over half of the total growth occurs during the last 10 days.

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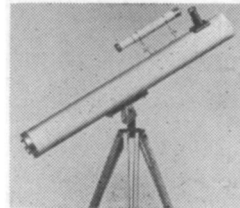
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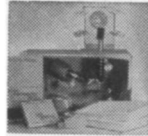
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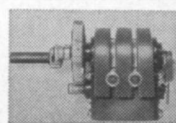
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