



☼ \* ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

ASTRONOMY

# Starry Skies for Autumn

Vega, in Lyra, the lyre, is autumn's brightest star and can be seen high in the sky a little west of Deneb, and Cygnus, the swan

By James Stokley

► SEPTEMBER brings the beginning of autumn in the Northern Hemisphere, and the evening skies show the star groups that are characteristic of this time of year.

High in the south shines the star Altair, marking the constellation of Aquila, the eagle. Still higher is Cygnus, the swan, with Deneb as the brightest star. A little to the west stands Vega, in Lyra, the lyre.

These stars can be located with the aid of the accompanying maps, which depict the heavens as they appear about 11:00 p.m., your own kind of daylight saving time, at the beginning of September. By the middle of the month they will look the same about 10:00 p.m. They present a similar aspect around 9:00 p.m. about Sept. 30.

Both Cygnus and Lyra are divided between the northern and southern sky maps. Vega is the brightest star shown, and it can be easily located high in the west. Deneb is almost directly overhead, and Altair is lower, slightly toward the southwest.

## Pegasus East of Cygnus

Just east of Cygnus is the figure of Pegasus, the winged horse, and in the eastern part of that group are the four stars that form the Great Square of Pegasus.

Below the Square are some of the stars that mark the figure of Pisces, the fishes, the constellation in which the only naked eye planet of the September evening sky is located. Saturn shines in Pisces as brightly as Altair.

Just to the right of Pisces is Aquarius, the water carrier, and below this group is the first magnitude star called

Fomalhaut, which is in the southern fish, Piscis Austrinus. Fomalhaut is about as bright as Deneb, but it looks a good deal fainter because it is so much lower in the sky.

The light from a star near the horizon has to pass through a greater thickness of atmosphere than when the star is overhead, resulting in atmospheric absorption that dims its brilliance considerably.

In the southwest, to the right of and lower than Aquila, stands Ophiuchus, the serpent holder, a large constellation with few bright stars. It portrays a man holding a serpent, represented by the constellation of Serpens, which is in two parts. The snake's head is to the right, in the west, and its tail to the left, near Aquila.

Low in the north you can see the Big Dipper, part of Ursa Major, the great bear. To the left of the Dipper is Boötes, the herdsman, with the bright star Arcturus. Like Fomalhaut,

this star's light is dimmed because it is so low on the horizon.

## Little Bear Above Great Bear

Above the great bear is the little bear, Ursa Minor, with the pole star, Polaris, close to the point around which the heavens seem to revolve. Cassiopeia, the queen, is farther right. The stars of this constellation now form a letter W, resting on one side. Perseus is low in the northeast, with the famous variable star called Algol.

Below Perseus is the star Capella, part of Auriga, the charioteer. This first appearance of Capella gives a warning of winter's approach. On January evenings it will stand at the zenith, one of a number of bright stars that make the winter evening sky so brilliant.

If you are looking at the heavens from within a large city—or near one—you will have a hard time seeing the

THE PLANETS IN SEPTEMBER		DISTANCE	
		Sept. 1	Sept. 30
Mercury	Not visible behind sun Sept. 10	119,000,000 miles	126,000,000 miles
Venus	Rises in east about one hour before sun—very bright	150,000,000	156,000,000
Mars	Rises in east about three hours before sun—bright as second magnitude star	217,000,000	204,000,000
Jupiter	Rises in east about four hours before sun—brighter than any star or planet except Venus	550,000,000	516,000,000
Saturn	Opposite sun Sept. 19—visible all night in Pisces	801,000,000	798,000,000

Milky Way. However, evenings at this time of year provide the best opportunity of viewing the Milky Way, which extends from the southwest through Cygnus, at the zenith, and down to the northeast. The farther you are from the city, with its glare of lights and hazy atmosphere, the more easily you will see it.

The Milky Way is famous in legend and poetry. Ovid called it "the high road paved with stars to the court of Jove." This was echoed by Milton, in "Paradise Lost," to whom it was "the Way to God's eternal house." He also referred to it as "A broad and ample road whose dust is gold, and pavement stars."

### Path of the Ghosts

The ancient Vikings thought it was the path of the ghosts going to Valhalla—the palace of their heroes slain in battle. The American Indians had a similar notion. Longfellow made use of this in one of his most famous poems, when the "wrinkled old Nokomis," teaching the boy Hiawatha,

"Showed the broad white road in heaven,  
Pathway of the ghosts,  
the shadows,  
Running straight across  
the heavens,  
Crowded with the ghosts,  
the shadows,  
To the kingdom of Ponemah,  
To the land of the hereafter."

But, even in antiquity, a few people suspected its true explanation. One was the Greek philosopher Democritus who, in the fifth century B.C., proposed that all matter consists of tiny units called atoms. He also believed that the Milky Way was a vast swarm of very distant stars, each so far that it could not be seen as an individual point of light.

### Confirmed by Galileo

This idea was confirmed in 1610 when Galileo, in Italy, examined the Milky Way with his newly made telescope. This revealed many of the separate stars which the unaided eye could not resolve. You, too, can see them if you look at it with a pair of binoculars.

Actually, the sun and all the stars that we can usually see are part of the whole Milky Way galaxy. Its shape is roughly that of a rather flat hamburger bun, its diameter such that light takes about 100,000 years to cross from one edge to the opposite side. Its diameter is thus 100,000 light years. (In miles this would be about 600 quadrillion—six followed by 17 zeroes.)

The sun and its planets are near the central plane, but well away from the

center. When we look toward the far edge, we see a vast concentration of stars, because there are so many in that direction, even though each is far from its neighbors. This is the Milky Way. Looking in the direction of the top and bottom of the bun, we see a much smaller number of stars. Altogether, there are about 100 billion stars in the galaxy.

This is our own stellar city, but beyond its limits there are millions of other galaxies, each another stellar system. The study of these objects, out to a distance of several billion light years, is one of the important tasks performed with great telescopes, like the 200-inch at Mt. Palomar, the largest in the world.

### Celestial Timetable for Sept.

SEPT.	EDT	
1	noon	Moon passes south of Saturn
2	12:30 a.m.	Algol at minimum brightness
4	9:20 p.m.	Algol at minimum brightness
7	10:08 p.m.	Moon at last quarter
10	3:00 a.m.	Mercury on far side of sun
	11:00 p.m.	Moon passes north of Jupiter
11	9:00 p.m.	Moon passes north of Mars
13	noon	Moon passes north of Venus
14	1:00 p.m.	Moon nearest, distance 221,800 miles
	3:14 p.m.	New moon
19	noon	Saturn in opposite direction from sun and nearest earth; distance 795,200,000 miles
21	10:25 a.m.	Moon in first quarter
23	7:43 a.m.	Sun over equator; autumn begins in Northern Hemisphere
24	11:00 p.m.	Algol at minimum
27	7:50 p.m.	Algol at minimum
27	9:00 p.m.	Moon farthest, distance 252,400 miles
28	2:00 p.m.	Moon passes south of Saturn
29	12:48 p.m.	Full moon. Harvest moon

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