

# VILLAGE VIEW

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Midsummer is the pleasantest time of year to watch the sunsets, see the first stars come out, enjoy the twilight, and later look up to the heavens to discover how different are the summer skies from those of winter and spring.

August and September twilights are particularly spectacular this year because of the bright planets we can see in the west, those we call the Evening Stars. Early in August you may have noticed the magnificent array of the crescent moon, hanging low on the western horizon, with Venus, appearing as a very bright "star," Jupiter, and Saturn, all in a line to the left of the moon. If you missed that display, look again around September 1st shortly after sunset.

Although these evening "stars" seem close to each other, they are really great distances apart. Earth is about 93 million miles from the sun; the orbit of Venus is between the earth and the sun, about 67 million miles from the sun. Because Venus is nearer the sun than to the earth, it always sets within three hours of the sun. Incidentally, our moon is a mere 1/4 million miles from earth.

Jupiter, on the other hand, is a tremendous 483 million miles from the sun. It looks bright and fairly large because it's an immense planet with a diameter nearly eleven times that of Earth, but it is so far away that the sun's light takes nearly 3/4 of an hour to reach it.

Saturn appears the least bright of these three planets, only because it's so far from the sun. Look for Saturn slightly above and to the right of Jupiter. Saturn is nearly 900 million miles from the sun, and sunlight takes nearly an hour-and-a-half to get to Saturn. More than nine times as large as Earth,

Saturn is a giant planet; its diameter is 73,000 miles.

Looking now at real stars, as opposed to planets, and remembering they are all much, much further away than any planets, we must think in much larger numbers. When we talk about distances to stars, we are thinking in terms of light traveling for years. Light from the nearest star takes approximately four years, four months to reach earth. These distances are almost unimaginably huge. The only other experience we have with these kinds of numbers is when we hear about our annual deficit and the national debt.

A million seconds is 11-1/2 days; a billion seconds is around 32 years; a trillion seconds is 32 thousand years. In one year, light travels nearly six trillion miles. The nearest star is about twenty-five trillion miles from us. Think about it for a minute...

Back to star-gazing, let's face north and look for the Big Dipper. This time of year, the Dipper is at the left of the Pole Star. Its handle points up and to the left at an angle of about 60°. (All the positions we are considering are for Eastern Daylight Time between 9 and 10 p.m.)

Follow the curve of the handle around to the left; nearly overhead is a bright yellow star, Arcturus. By December, at this time in the evening, Arcturus will be below the northern horizon. Arcturus is about 41 light years away from Earth.

Look to the right, past the Dipper and past Polaris, about an equal distance, to see, rather low on the northern horizon, a constellation shaped like a W. This is Cassiopeia. The Milky Way passes through this constellation. The Milky Way is the edge-on view of the great spiral galaxy within which the earth, our sun, and about 100 billion other stars are located. The next nearest galaxy is an enormous distance away, yet we can see it with the naked eye when viewing conditions are good! A clear dark night on a mountaintop is ideal.

The other galaxy is in the constellation of Andromeda and appears to be about the same size as our moon. It is the most distant object visible to man's unaided eye.

From Cassiopeia's "Chair" (the W), look towards zenith and slightly to the right (or northeast). We see a fairly bright (but not brilliant) star, Deneb, in the constellation of Cygnus, the Swan. The swan's head points south, and its wings are spread wide, nearly as wide as the Dipper is long. Looking a little further toward zenith, we see a very bright blue-white star, Vega, in the constellation of Lyra, the Lyre of Orpheus, who used his lyre and music to win his wife, Euridice, from the underworld. Vega is found to be a double star when viewed with instruments of moderate power.

Turn now to the south and east to see another fairly bright star, Altair, in the constellation of Aquila, the Eagle. These three stars, Deneb, Vega and Altair, form a large triangle which appears to be about twice the size of the Big Dipper. Altair, the nearest of these three, is about 14 light years (80 trillion miles) distant.

If we look between the handle of the Dipper and Vega, we find the constellation Hercules which takes up much of the space between them. He is quite a complete figure and together with his raised "club" of four stars, makes a long triangular figure. The handle of his club points towards Vega; its other end points towards Arcturus. Hercules faces south.

If we, too, face south, we will see Scorpio, the most spectacular of all the summer constellations. According to mythology, the scorpion stung and killed Orion, the Hunter, he who dominates the southern sky in winter. Look for a large red star about 30° above the southern horizon. This will be Antares, a red giant star so enormous that if placed where our sun is, the earth would be inside it. When viewed through telescopes of moderate power, a tiny emerald companion, very close to Antares, is visible.

The constellation of Scorpio is easily defined. To the right and slightly above Antares is a line of three stars running roughly north and south; below, and to the left of Antares, is the curving tail of the scorpion, and, running down and ending near the horizon, is the venomous barb of its tail. Scorpio is a truly impressive constellation dominating the southern summer sky.

Just to the left of Scorpio we find the constellation of Sagittarius, the archer. The Milky Way runs generally between Sagittarius and Scorpio. The center of the Milky Way (our galactic system, you will recall) is located in Sagittarius and is about 30,000 light years away. Our sun travels in its orbit

around this galactic center (just as the moon travels around earth) at a speed of approximately 480,000 miles an hour, but even at this great velocity, our galaxy is so enormous that it takes 200 million years to make one revolution.

This means that the last time the sun and earth were roughly in the same positions they are now, dinosaurs roamed the face of the earth, and there were no men in existence. Man had not yet evolved.

If the weather cooperates and gives us clear skies on the nights of August 12, 13, and 14, stargazers will witness the annual Perseid meteor showers, a display of "shooting stars" that will make neck-craning and even the mosquito bites that are an inevitable part of watching the night skies at this time of year well worth the temporary discomfort. It's a free show you'll long remember.