

Three bright stars lead to other discoveries in summer skies

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The Neowise comet as seen on July 17 from a roadside near the Wapsi River Environmental Education Center, Dixon, Iowa. Dana Taylor, Quad Cities Astronomical Society

This summer there are many interesting objects in the night sky that can be viewed for their beauty and targeted for closer examination in telescopes. Particularly interesting has been a relatively bright comet (Comet C/2020-F3 NEOWISE) and the planets Jupiter and Saturn. These objects are all members of the solar system and are neighbors to Earth. This means they are nearby and continually in motion as they orbit the sun. Jupiter and Saturn appear very near each other in the southern sky this summer. Both appear to be bright stars, with Jupiter being the brighter of the two. Both planets can be seen without any optical aid even from light polluted urban environments. In mid-July, Comet NEOWISE put on a splendid show in the early evening sky, but as with all comets, one needed to seek dark county skies to be able to see it well.

Of course all objects (including the sun and moon) move in the sky due to the earth's daily rotation on its axis and yearly revolution around the sun in its orbit. Everything we see in the sky moves together in response to earth's motion. However objects like stars are so far from us, we do not perceive them shifting position compared to each other in the sky. They are indeed moving, but the distances involved are so great, we don't see them moving around compared to each other (unlike nearby objects in our solar system). This is why the Big Dipper and the other constellations still look the same year after year. Constellations move around due the Earth's motion but the individual stars never appear to move compared to each other.

The movement of the earth in its orbit causes different constellations to be visible at different times of the year. Every summer there is a grouping of three very bright stars which form an easily recognizable triangle high in the sky. The stars forming the vertices of this great triangle in the sky, called The Summer Triangle, are Vega, Altair and Deneb. These stars are so bright, they can be seen even from an urban environment. During the late summer months, take an opportunity to view these stars about an hour after sunset. Once the sky darkens, The Summer Triangle will be directly overhead.

To identify the main stars of the Summer Triangle, depending on how much light pollution you have, you will see Deneb and four or more slightly dimmer stars forming what is known as The Northern Cross. Deneb is the brightest of these stars which reside in the constellation Cygnus. You will also notice the very bright stars Vega and Altair. Vega is the brightest and Deneb is the dimmest of the three stars forming The Summer Triangle, but all three should be visible even with a bit of light pollution.

Vega resides in the constellation of Lyra and is one of the most luminous stars in the Sun's neighborhood. It radiates about 60 times as much energy as the Sun does. At a distance of 25 lightyears from earth, Vega is "relatively" close. Realize at this distance, the light from Vega has been en route to your eyes for 25 years. Vega, a very hot bluish-white star, is three times the size and more than twice as massive as the sun.

Altair is the brightest star in the constellation of Aquila and is the twelfth brightest star in our sky. At a distance of 16.7 light-years from Earth, Altair is one of the closest stars visible to the naked eye. Altair is also a large star weighing in at 1.8 times the mass of our Sun and 11 times as luminous. Altair is one of the fastest rotating stars clocking in at only 9 hours to spin once on its axis. For comparison, the Earth requires 24 hours and the Sun nearly a month to make one rotation. This means Altair's spin speed at its equator is roughly 600,000 miles per hour! As a result, Altair is squished way down by centrifugal force and would appear very oval shaped if viewed from a nearby planet.

Deneb, the brightest star in the constellation Cygnus, the swan, and the 19th brightest star in our sky is a very large, blue-white supergiant star. Deneb is probably the most distant star visible to the unaided eye. In fact, Deneb is so far away from us that it is difficult with existing technology to accurately measure its distance. It may be as much as 3000 light years or more distant from Earth and if so, it would have to be one of the largest and most luminous stars in the Milky Way Galaxy. If so, Deneb would be roughly 300,000 times as luminous as our Sun! To have this much radiative power, Deneb must be a stupendous leviathan so large that were it to be substituted for the Sun in our solar system, the Earth would be engulfed within it!

Within the boundaries of the Summer Triangle, formed by these amazing stars (Vega, Altair and Deneb), there are a number of other fascinating objects. About a third of the way between Altair and Vega is a small cluster of stars known as The Coathanger. Using a pair of binoculars should reveal this grouping of stars, which most people agree does indeed look like a coat hanger. Give it a try and see what you see!

If you have access to a small telescope, use it to target Albireo, the bottom star in the Northern Cross. This star, which is visible to the unaided eye in a dark sky, is actually a splendid blue and gold colored double star. In my opinion, this is the most beautiful double star in the sky and one you won't want to miss as you search the wonders of the sky this summer. Another double star located very near Vega is The Double-Double, which is in fact, a quadruple star. Any small telescope reveals the double, but if you have access to a good quality scope and high magnification, you will notice that each of the doubles is in fact a double—a quadruple star!

If you have access to a good telescope, use it to seek out two other very interesting residents of the Summer Triangle known as planetary nebulas. A planetary nebula actually has nothing to do with a planet at all. In fact a planetary nebula is formed when an average sized star (like the Sun) runs out of nuclear fuel. When this happens, the star “burps” off stellar material in the form of wispy shells of gas which expand out into space. The Summer Triangle has two very fine examples of planetary nebulas: M27 (The Dumbbell Nebula), and M57 (The Ring Nebula). The Ring Nebula is just a little south of Vega and in a good telescope looks like a little gossamer bubble or smoke ring floating in space. The Dumbbell is somewhat larger and depending on how active your imagination is, it may appear like a two-lobed, fuzzy patch of light resembling a dumbbell. Another name for the Dumbbell is the Apple Core—some people with active imaginations see an apple core, others a dumbbell shape. What do you see?

Using your telescope again, there are three noteworthy star clusters within the Summer Triangle. One of them, M29 is an open cluster also known as The Cooling Tower because it sort of resembles the parabolic contours of a power plant cooling tower. It should be obvious by now that astronomers have active imaginations and love to name objects according to what they think they see in the sky. In any event, the other two clusters in the vicinity are M56 and M71. These are classified as globular clusters, and in fact, they look like tight, little, globe-like groupings of stars. These globular clusters are mini satellite galaxies of the Milky Way. Typically they are on the order of a hundred light years in diameter but consist of thousands of stars all gravitationally involved with each other. In a globular cluster, there are so many stars so tightly packed together, that on a planet orbiting one of the component stars, it would never be dark—there would be so many bright stars in the sky that it would never be night! By the way, M71 is also known as the Angelfish Cluster—I guess because some astronomer with an overactive imagination saw an angelfish? As far as I know, M56 does not have a moniker, so here's an opportunity for you to observe an object and give it a name. Who knows, it might just be adopted by the astronomical community!

When the Covid-19 pandemic subsides enough to again permit public gatherings, I invite you to join the Popular Astronomy Club in the parking lot of Niabi Zoo on the third Saturday of every month from March to November. We can show you these and many other spectacular objects. Watch our club calendar (www.popularastronomyclub.org) and Facebook for information about public observing sessions.