# Enjoy night sky without telescope

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Although Galileo is well-known as the first to use the new invention of the telescope for astronomy, he was not the first astronomer.

The Danish astronomer Tycho Brahe was born on Dec. 14, 1546, so we celebrate the anniversary of his birthday this month. Tycho Brahe became interested in astronomy at the age of 13 when there was an eclipse, but the prediction was off by a day. He thought that more accurate eclipse predictions could be made if there were more accurate astronomical observations.

Three years later, he noted that the predictions of a conjunction of Jupiter and Saturn were inaccurate, and he started keeping a journal of measurements of the positions of the planets every night.

There were no telescopes for astronomy then, but Brahe was able to do astronomy measurements using an observatory and instruments he designed and built to determine the precise positions of visible stars and planets. He was able to achieve accuracy approaching one arcminute, which is one-sixtieth of a degree (out of 360 degrees).

Johannes Kepler became an assistant to Brahe and carried the observations further with the use of a telescope, and then refined the model of the Solar System as we know it today. Kepler had great respect for Brahe's methods and accuracy and considered his observations to be providing the foundation for a restoration of the science of astronomy.

It is amazing to think of all that Brahe did without a telescope. We can also look up at the sky without a telescope in mid-December and see some interesting sights in the night sky and think about what the early astronomers accomplished.

The planet Venus is the brightest object in the night sky after the moon. Look low above the southwest horizon and you will easily find Venus. Venus sets soon after the sun sets, so to observe it you need to be looking up soon after sunset.

Jupiter is the next brightest planet and will be obvious high in the southwest after sunset. To the right of Jupiter and lower to the horizon is the much dimmer Saturn.

These two planets were much closer to each other, in conjunction, last December, but are still relatively close to each other in

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# Skywatch

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the sky, because they are 10 and 15 times as far from the sun as the Earth and therefore appear to move more slowly across the sky. As the night progresses, Saturn and Jupiter will seem to follow Venus across the sky and later set in the west-southwest.

The most well-known asterism now is the Big Dipper. An asterism is a group of stars forming a pattern in the sky, and in this case the Big Dipper is a part of the constellation Ursa Major, the big bear.

In December, the Big Dipper is very low in the northern sky, so you will need a good view of the northern horizon to see it as it rises above the horizon with the dipper bowl first to rise. The two right-most stars point up towards Polaris, the north star, which will be about 42 degrees above the horizon. This is because the Quad Cities is located at almost 42 degrees latitude north of Earth's equator.

Because Polaris is almost exactly (to within less than one degree) above the North Pole, all other stars and objects in the sky appear to rotate around it as we are turning on the Earth below. Polaris is also the end of the handle of the Little Dipper, which is part of Ursa Minor, the little bear. In December, it is positioned in the early evening as if it could be pouring into the big dipper.

Soon after sunset at this time of the year, we see the constellation Orion rising in the east, easily identified by the three stars forming his belt. Orion appears leaning to the left from our point of view, so his belt stars appear almost in a vertical row.

The bright star Betelgeuse represents his shoulder and the brighter star Rigel his leg. Below his belt, you will see three dimmer stars in a row forming what is known as his sword. The fuzzy area around the middle star of the sword is one of the most interesting objects that can be seen with the naked eye, the Orion Nebula.

This is a region of stellar debris that is condensing to form new stars, and appears as a fuzzy spot to the naked eye. It is 1,344 light years from earth and 24 light years across.

Back at the Big Dipper, look at the visible star next to the end of the handle. It is Mizar, but it also has a companion Alcor, which makes the pair a double star. It is one of a very few double stars that can be resolved without using a telescope.

Later in the evening, after Orion rises higher, you may see the bright star Sirius rise above the horizon. This is the "Dog Star," the brightest in the constellation Canis Major, and is one of the closest stars to Earth at only 8.6 light years away.

Following up from Orion's belt past a bright star, Aldebaran, and again as far, you can see up to seven stars of the Pleiades, an area of new star formation 444 light years from earth. There are many more stars in this cluster, and depending on your viewing location and surrounding light background, you may be able to see a few more.

The farthest object that can be seen without a binoculars or a telescope is the Andromeda galaxy, named for the constellation we see it in. If you are in a dark area with little or no light pollution, look from Polaris, then look higher in the sky, past the "M" in the sky that is Cassiopeia, and continue to look almost straight up. You could see a dim fuzzy spot that is the center of the Andromeda Galaxy.

**GEMINIDS:** December also will have the Geminids meteor shower. With its peak predicted for early morning on December 14, looking for a Geminid meteor would be a perfect way to celebrate Tycho Brahe's birthday, as you look up into the sky and think about all he could see without a telescope.

*The Popular Astronomy Club does not have public viewing programs in the winter, but will resume its monthly public program at Niabi Zoo on March 19, 2022. Visit popularastronomy club.org for more information on club activities and events.*