The Orion Nebula is south of Orion's Belt – the three stars that make a straight line across the sky.

BEAUTY and the BEAST

Wyoming winters can be brutal but these glittering companions brighten winter nights

Travis Laurance

The thought of spending time outdoors at night may not be appealing for those of us living through a Wyoming winter.

However, with the cold, clear air and lack of bright city lights, winter nights in Wyoming can be very beautiful for those who look up.

If willing to bundle up, head outside, and look south, the popular winter constellation Orion the Hunter may be seen. Find Orion by locating three stars of approximately the same brightness that make a straight line across the sky. This is the famous Orion's Belt. These stars seem close to one another, but they actually range 700 to 1,340 light years away from us. One light year is 5.8 trillion miles.

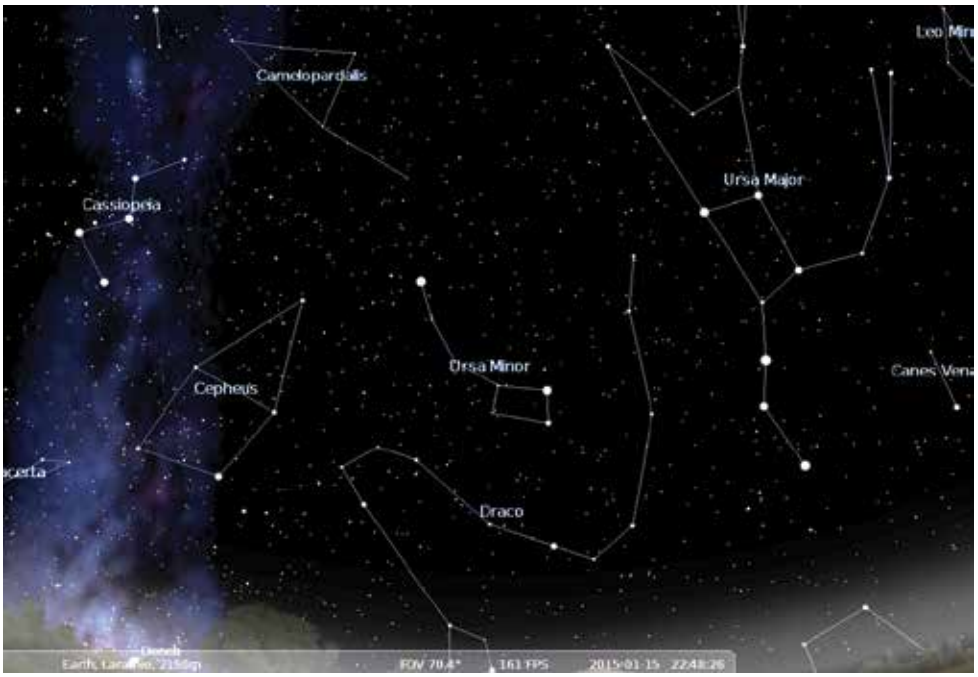
Take a Star Trek

Below Orion's Belt is the blue star Rigel. Blue stars are the hottest. Rigel is actually a three-star system that we see as one. Above the belt is the red star Betelgeuse. A red star is the coolest. This red supergiant is so large that, if we swapped it for the sun, Betelgeuse would extend past Mars. Betelgeuse is expected to go supernova someday and will be as bright as the full moon and visible during the day! That will last for around a month and will slowly fade. Keep your fingers crossed this may happen in our lifetime! Betelgeuse is over 600 light years away – so we should be safe.

Orion is full of interesting objects and with binoculars or a telescope, look under his belt for a picturesque object known as the Orion Nebula. Spanning 24 light years in diameter, the Orion Nebula is an active star-forming region. Over 700 have been observed within the early-life range of stars. More than 100 of these stars have dusty disks, which are indicators of a planetary system, around them.

Gaze east of Orion and see the star Sirius, a.k.a the dog star. Sirius is the brightest star in the sky (excluding the sun). Here in Wyoming, Sirius never travels very high in the sky. It rises in the east, grazes the horizon, and then sets in the west. Its light passes through a lot of atmosphere. Just as with a sunrise or sunset, the atmosphere scatters the light. When this happens, Sirius appears to be quickly flashing through colors and even jiggling about. Sirius is often mistaken for a UFO!

Sirius is one of our neighboring stars at a little over 8 light years away. For comparison, the closest star to the sun is Proxima Centauri, which is 4.2 light years away. Unfortunately, Proxima Centauri is not visible this far north of the equator.



Look northward to view Cassiopeia (the Wyoming "W"), Ursa Minor, and Ursa Major.

Barking in the Sky

Sirius is in the constellation Canis Major, which translates to the "Greater Dog." Canis Major is often considered one of Orion's hunting dogs. Slightly north of Canis Major is Canis Minor or the "Lesser Dog." And yes, this mighty constellation is made of only two stars. It is always a fun one to point out when looking for a chuckle!

Moving back to Orion and then heading farther west is a tiny cluster of stars known as the Pleiades, or the Seven Sisters, or Subaru for the Japanese (check out the car emblem next time you see one). The Pleiades are an open star cluster. This means all of the stars in the Pleiades were formed around the same time and out of the same giant molecular cloud. The Orion Nebula is an example of a giant molecular cloud – it's just much younger than the Pleiades.

Nine stars within the Pleiades are visible with the eye; however, the last few are extremely hard to pick out. One trick when looking at faint objects is to use inverted vision. Look slightly away from the object and let your peripheral vision pick out the faint stars. Look directly at the faint stars and they will disappear. The outer regions of your eye are good at detecting contrast (but not color), and this allows you to see fainter objects.

Many more stars will be seen within the Pleiades with binoculars or a telescope. This open cluster contains over 1,000 stars in a region about 40 light years in diameter.

Big and Little Dips

Turn north to see two constellations visible year-round. The first shape noticed is the Big Dipper. The Big Dipper is not a constellation – it is an asterism, which means it unofficially looks like something. It is part of the constellation Ursa Major, which is Latin for the "Big Bear" (which, unofficially, does not look like a bear).

The North Star is easily found. Imagine a line connecting the two stars at the end of the dipper (opposite end of the handle) and continue the line in the direction the dipper would pour, you will intersect Polaris, the North Star. This is in the constellation Ursa Minor, which is Latin for the "Little Bear" – commonly known as the Little Dipper.

Polaris is not a very bright star (it's actually three stars that looks like one from our distance). A common misconception is that the North Star is the brightest star in the sky. Polaris is the North Star because it is the only star that does not move throughout the night. All of the other stars trace circles around it. Observers will always find it in the same spot – north and 41° above the horizon (for Laramie). Your latitude and the height above the horizon of the North Star are the same. For example, the latitude of Cody is 44.5°, so Polaris is directly north and 44.5° above the horizon there.

Continue the line from the Big Dipper through Polaris and the constellation Cassiopeia is seen. I once heard it referred to as the Wyoming constellation because it looks like a sideways W (or an M). It is actually Queen Cassiopeia, who spends half her night upside down. This is to punish her for boasting of her and daughter Andromeda's beauty. Cassiopeia and Ursa Major are always directly opposite each other with Ursa Minor in-between. Find one and you can usually find the other two.

Big, Very Big

Cassiopeia is a good marker to find one of the more difficult objects in the night sky. Go back to the line we have been drawing (although the line is becoming more of an arc) and continue it through the triangle formed by the three bright stars in Cassiopeia; you'll see the Andromeda galaxy. Hold your fist out at arm's length and the galaxy will be about one fist width from Cassiopeia. This is hard to see and may take some practice. Look for a faint fuzzy patch on the sky. Inverted vision here can really help.

Andromeda may not look that impressive, but it is another entire galaxy similar to our own Milky Way. The Milky Way has an estimated 100-400 billion

stars whereas the Andromeda Galaxy has 200-400 billion stars. Andromeda is the closest galaxy to our own at about 2.5 million light years away.

The light from that galaxy left 2.5 million years ago, which means you are looking 2.5 million years into the past. We have no way of determining what it looks like now. Information can only travel as fast as the speed of light.

The Wyoming winter night sky is full of beauty. Whether you find the shapes of the constellations jumping out at you, the subtle colors of the stars catching your attention, the outline of a stellar nursery capturing your heart, or the faint hint of an entire galaxy stirring your imagination, the night sky can be full of wonders for anyone.

The stars and constellations of Orion and the red giant Betelguese and the blue star Rigel.

Things are always looking up for **Travis Laurance**, *who is the laboratory coordinator in the Department of Physics and Astronomy at the University of Wyoming. He can be reached at (307) 766-4371 or at travis@uwyo.edu.*