

# Bluffing your way in Astronomy: Taurus

By Colin Johnston, Science Communicator

It is Autumn, and there are plenty of easily visible and interesting things in the sky, so it is time to move your bluffery into top gear. Memorise this article, wait for a clear night in the middle of December and lead your audience outside about eight o'clock or so. Look south east, and find a rather pretty little tight group of stars, a bit below them and to their left and there should be a very bright orange star. Continue looking and you will see that there are other stars around them in a vaguely V-shaped constellation. When you are sure you have found them, announce to your audience that this is Taurus the Bull.

“the Aztecs and Mayans had gruesome human sacrifices when the Pleiades were highest in the sky”

Taurus is one of the ancient constellations and is of course one of the signs of the Zodiac. It contains the nicest-looking open star cluster in the sky, the Pleiades, a rather less-impressive open cluster, the Hyades, and the bright star Aldebaran. Open clusters are groups of stars which were born in the same molecular cloud and are still loosely associated and held together by gravity.

The Pleiades, alias the Seven Sisters, are just part of an open cluster of 400-500 young stars. They are called the Seven Sisters, but it is virtually impossible to see more than six, proving that real astronomers do a bit of bluffing too. Allegedly, sharp-eyed observers with clear skies can see about ten stars, but if you use binoculars

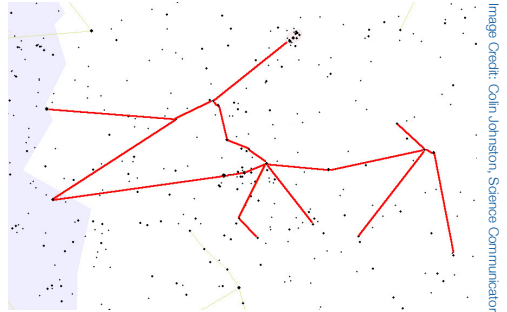


Image Credit: Colin Johnston, Science Communicator

**Taurus the Bull** In this diagram the Pleiades are at the tip of the right horn, the Hyades and Aldebaran are in the 'chin'. Image created with Starry Night software.

they will reveal over two hundred. The faint haze around the stars appears as a beautiful blue mist in photographs. Older astronomy books say this is a wispy remnant of the molecular cloud in which they were born. However astronomers now think the stars in the Pleiades are at least 100 million years old, old enough to have blown away any such residue, so we are actually seeing part of a cloud of interstellar dust and gas, called the Taurus Dark Cloud, which by coincidence lies between us and the cluster.

The Pleiades are about 380 light years from Earth. Most of the stars in the Pleiades are spectral classes A and B (big, bright white stars), recently both brown dwarf (tiny and dark stars) which are visible only at infrared wavelengths and, surprisingly, white dwarfs (very small and faint dead stars) have been discovered amongst them. These white dwarfs must be the remains of massive stars that went through their life very rapidly and have already ejected their outer layers. The stars in the Pleiades are only associated temporarily by cosmic standards; they are not locked together in orbits and will gradually drift apart until they resemble the Hyades. The cluster

will to all intents and purposes be gone in 250 million years.

The name Pleiades comes from Plione, the mythical mother of seven daughters by the giant Atlas. The seven brightest stars in the group are named for these daughters (their names were Alcyone, Asterope, Electra, Maia, Merope, Taygeta and Celaeno, if you really want to show off you should learn these names) and there are stars in the cluster named for Atlas and Plione too. The Pleiades' beauty has been celebrated by cultures all over the world. They are mentioned in the Book of Job, Homer's 'Odyssey' and Tennyson's poem 'Locksley Hall' (this is in danger of turning into a bluffer's guide to literature!) Remember to use a suitably scary voice when you tell your audience how the Aztec and Maya peoples timed gruesome rites of human sacrifice for when the Pleiades were highest in the sky. The best cultural reference to the Pleiades though is in the logo of the Subaru car company, the six stars in it represent the Pleiades.

The big name star in Taurus is Aldebaran. This name comes from the Arabic for 'the Follower' as the ancient Muslim astronomers saw it as trailing behind the Pleiades across the sky. By the way, be very careful not to get to get Aldebaran confused with 'Alderaan'. If you do, you will immediately lose all credibility as an astronomer and reveal yourself to be a sad Star

## "Aldebaran-not to be confused with Alderaan"

Wars fan rather than a serious Scientist.

Aldebaran is supposed to be the bull's eye and it is 65 light years from Earth. It is a very big star indeed, about forty times as wide as the Sun. Real astronomers call it a K class (the K means it is cooler than the Sun by about 2000°C) red giant star and about it is 350 times as bright as our Sun. It actually does appear reddish-orange in our sky. Now here is a potentially tricky bit: if Aldebaran isn't as hot as the Sun, how can it be brighter? Someone may ask you this, so it is as well to be prepared. The reason is because its size. If you compared one square metre of



Image Credit: NASA

**The Pleiades** A glorious sight in the Autumn sky for naked eye and binocular observers

our Sun's surface with one square metre of Aldebaran, the bit of Sun would be a blindingly-bright yellow, while the bit of Aldebaran would be a noticeably dimmer orange. However since Aldebaran has a surface area about 1600 the size of the Sun's, there is a lot more of it to shine light into space, so it still ends up brighter than the Sun.

It's an old star too, being much further through its lifecycle than the Sun, having exhausted its supply of hydrogen it is now generating energy by fusing atoms of helium into carbon. In other words, it isn't too well and is on the stellar equivalent of life support. Aldebaran is orbited by a dim red dwarf star which is much too faint to see and there may also be a large planet out there too but that is not confirmed yet.

There is a smattering of stars around Aldebaran, these are the Hyades. The Hyades are another open cluster. In Greek mythology, the Hyades were the five daughters of Atlas and half-sisters to the Pleiades. They are definitely not as impressive as their sisters and it can take a minute or two to pick out the Hyades. It does look as though Aldebaran is the biggest star in the Hyades, but this is misleading. At 150 light years, the Hyades are more than twice as far away, so they are actually behind the giant star.

Hopefully after you have shown your audience the wonders of Taurus they will be impressed and ready for more. Luckily, right beside Taurus is the very spectacular constellation of Orion. We'll show you how to bluff your way around Orion in another issue of Astronotes.