

Stars over Sisters

By J. Thomas Jeffrey
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One of the most interesting deep-sky objects is the supernova remnant. It is the structure that results from the explosion of a massive star that has run out of nuclear fuel at its core. Perhaps the best example of such an object is the Crab Nebula in the constellation Taurus, which rides high the sky this time of year.

The Crab Nebula is a supernova remnant located about 6,500 light-years from the earth. It was discovered in 1731 by the English astronomer John Bevis. The nebula was independently rediscovered in 1758 by Charles Messier as he was looking for Halley's Comet. Messier catalogued it as the first entry in his catalog of comet-like objects and it is known today as M1 on his famous list.

Its current name comes from William Parsons, who observed the object in 1840 using a 36-inch telescope and produced a drawing that looked somewhat like a crab.

The nebula cannot be seen with the naked eye, but can be observed with binoculars from a dark location. It looks like a small round glow. The nebula lies in the Perseus Arm of the Milky Way galaxy. Its current diameter spans some 11 light-years and is expanding at the rate of 930 miles per

second.

The supernova must have become visible on Earth about 1054. Historical records revealed that Chinese astronomers had seen the supernova in that year. There is also a 13th-century Japanese reference to this "guest star." The event was long considered unrecorded in Islamic astronomy, but in 1978 a reference was found in a 13th-century copy made by Ibn Abi Usaibia of a work by Ibn Butlan, a Nestorian Christian physician active in Baghdad.

The Ancestral Puebloans of the American southwest also observed the supernova. In Chaco Canyon in New Mexico there is a petroglyph of the supernova next to the Moon. The late astronomer Carl Sagan visited the site during filming of an episode of his "Cosmos" television show.

Recent analysis of historical records have found that the supernova that created the Crab Nebula probably appeared in April or early May, rising to its maximum brightness of between apparent magnitude 7 and 4.5, which would mean that it was brighter than everything in the night sky except the Moon by July.

The supernova was visible to the naked eye for about two years after its first observation. Thanks to the recorded observations of Far

Eastern and Middle Eastern astronomers of 1054, the Crab Nebula became the first astronomical object recognized as being connected to a supernova explosion.

A supernova is caused when nuclear fusion at the core of a massive star stops. This results in a core collapse because the radiation pressure pushing out is overwhelmed by the force of gravity. The star explodes in a supernova which can outshine all of the billions of other stars in the galaxy.

At the center of the Crab Nebula is a pulsar. A pulsar is a neutron star. Neutron stars are composed almost entirely of neutrons. The star is 17-19 miles in diameter with a spin rate of 30.2 times a second. It is all that remains of the star that exploded. The pulsar emits pulses of radiation from gamma rays and radio waves.

The last-quarter moon will be on New Year's Day, and the new moon will be on January 9. The first-quarter moon will be on January 16. The full moon, called the Old Moon or Moon After Yule, occurs on January 23.



PHOTO COURTESY NASA

The Crab Nebula is a supernova remnant of expanding gas located in the constellation of Taurus.

The shortest day of the year was on December 21, when daylight lasted only 8 hours and 51 minutes. In January the days will be getting longer. On January 1, the sun will rise at 7:42 a.m. PST and set at 4:38 p.m. making the length of daylight 8 hours and 56 minutes. By the end of the month the sun will rise at 7:26 a.m. and set at 5:14 p.m., increasing the daylight to 9 hours and 48 minutes.

The only naked-eye planet in the evening sky is Mercury, which is very low in the southwest after sunset. Jupiter, Mars, Venus, and Saturn are all in the morning sky.

Comet C/2013 US10 (Catalina) will appear very close to the bright star Arcturus on January 1, 2016. The comet can be seen with binoculars. Look to the northeast after midnight, local time.

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