

# Reflector

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# DEEP-SKY OBJECTS

## THE WHALE AND THE PUP

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diffuse corona around the galaxy that emits x-rays.

Swimming through the cosmos with the Whale Galaxy is the Pup, NGC 4627. NGC 4627 is a bright dwarf elliptical galaxy, which may or may not be gravitationally bound to NGC 4631. NGC 4627 is located just

north of the Whale Galaxy's dusty yellowish core.

Researchers think that the Pup's gravitational pull is responsible for the asymmetric shape of the Whale. NGC 4627 is 13th magnitude and is 2.6 by 1.8 arcminutes in size. In 2015, a very faint dwarf galaxy was discovered in the halo of NGC 4631. Like NGC 4627, this galaxy is most likely associated with NGC 4631.

My image of the Whale and Pup

was taken with a 102 mm f/7.9 apochromatic refractor using a SBIG ST-2000XCM CCD camera. The exposure was 90 minutes. In an 8-inch telescope, the shape of NGC 4631 is readily apparent and NGC 4627 is a faint smudge just north of the Whale. Much larger reflectors under transparent, steady skies may bring out some of the dust and emission features seen in the image. ☀

**For those of you who are not aware of it, the Astronomical League is now on Facebook. We continue to build followers week by week, and we are becoming better known as the word spreads. We are also on Twitter: @AstronomyLeague.**



**C**anes Venatici is a faint constellation located at mid-northern declinations. The constellation was established by Johannes Helvelius in 1690 and is favorably positioned for evening viewing during the spring and summer months. In Latin, *canes venatici* means hunting dogs; the dogs, Asterion and Chara, are held on leashes by Bootes the Herdsman.

The constellation contains only one star brighter than 4th magnitude, Cor Caroli (Alpha Canem Venaticorum, magnitude 2.9). Named to honor King Charles II of England, Cor Caroli—"Heart of Charles"—is a splendid double star composed of components of magnitudes 2.9 and 5.6 separated by 19 arcseconds.

Canes Venatici contains a plethora of deep-space objects, including the popular globular cluster M3 and the Whirlpool Galaxy, M51, with its companion galaxy, NGC 5195. In this column I want to cover a less-known galaxy pair in Canes Venatici known as the Whale (NGC 4631) and the Pup (NGC 4627).

NGC 4631 is an edge-on spiral galaxy. Magnitude estimates range from 8.9 to 9.8. The galaxy is 6.5 degrees south-southwest of Cor Caroli. The galaxy also lies roughly just past the midway point on a line from Cor Caroli to 4th magnitude Gamma Comae Berenices. NGC 4631 measures 15.5 by 2.7 arcminutes with the major axis oriented almost due east-west. The galaxy is nearly 30 million light years away and similar in actual size to the Milky Way.

The galaxy is asymmetric in appearance due to gravitational interactions with the nearby

galaxy NGC 4627. The east end of the galaxy appears brighter and thicker. The west side is not as thick or bright, but the visible disk on the west extends farther from the apparent core than it does on the east side. The galaxy has the shape of the profile of a whale, thus its nickname. The east side represents the whale's head, with a small pectoral fin not far away. A bright foreground star is positioned where the dorsal fin would be found and the west side of the galaxy ends at the fluke.

NGC 4631 was originally classified as an Sc galaxy, where the "S" means it is a spiral galaxy and the lower case "c" means the galaxy's spiral arms are loosely wound and its central bulge is not very large (Sa and Sb galaxies have more tightly wound spiral arms and larger central bulges). More recent studies have classified

the Whale as SBd. The added "B" indicates NGC 4631 is a barred spiral galaxy, like the Milky Way. The "d" means very loosely wound spiral arms and little to no central bulge. High-resolution images of the Whale Galaxy taken with large research telescopes reveal myriad regions of intense star formation, bright emission nebulae, and massive dust clouds. It does not appear to have a prominent dust lane, like those in galaxies such as M104. Tidal streams of visible material connect NGC 4631 to NGC 4627.

The immense central starburst region of NGC 4631 has resulted in so many supernova explosions that large amounts of galactic gas are being blown out of the plane of the galaxy. This superwind is indicated by large Doppler shifts in the gas's spectral lines and has produced a hot, giant,