

CONSTELLATION LYRA, THE LYRE

Lyra (Latin for lyre) is a small constellation in the northern sky. It is one of 48 listed by the 2nd century astronomer **Ptolemy**, and is one of the 88 constellations recognized by the International Astronomical Union. **Lyra is bordered by Vulpecula to the south, Hercules to the east, Draco to the north, and Cygnus to the west.** Covering 286.5 square degrees, it ranks 52nd of the 88 modern constellations in size. It appears prominently in the northern sky during the Northern Hemisphere's summer, and the whole constellation is visible for at least part of the year to observers north of latitude 42°S. Its main asterism consists of six stars, and 73 stars in total are brighter than magnitude 6.5. The International Astronomical Union (IAU) adopted the three-letter abbreviation "Lyr" for the constellation in 1922.

Lyra is often represented on star maps as a vulture or an eagle carrying a lyre, and hence sometimes referred to as *Aquila Cadens* or *Vultur Cadens*.

THE STARS

Alpha Lyrae, the *lucida* or brightest star – and one of the brightest stars in the sky and by far the most well-known star in the constellation – is the white main sequence star Vega, which forms a corner of the Summer Triangle. Only 7.7 parsec distant, is a *Delta Scuti* variable, varying between magnitudes -0.02 and 0.07 over 0.2 days. It is the second brightest star of the northern hemisphere (after Arcturus in Bootes) and the fifth brightest star in all. **Vega was the pole star in the year 12000 BCE, and will again become the pole star around 14000 CE.**

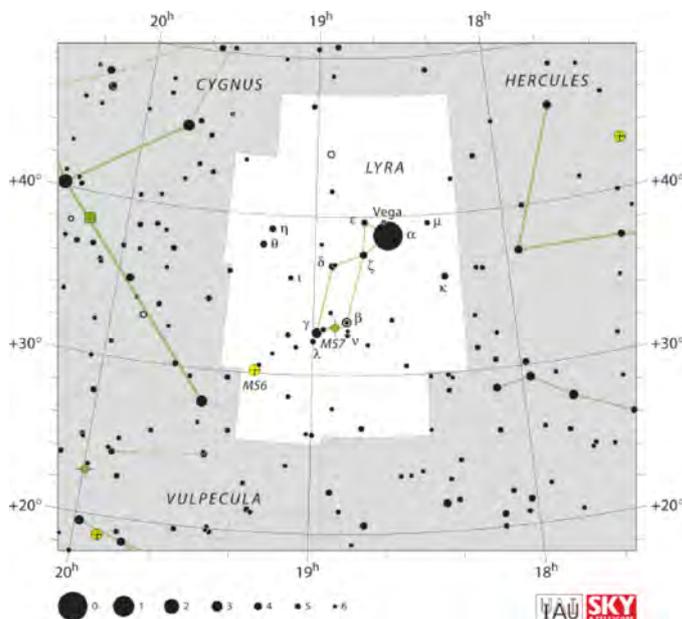
Beta Lyrae is the prototype of a class of stars known as Beta Lyrae variables. These binary stars are so close to each other that they become egg-shaped and material flows from one to the other.

Epsilon Lyrae, known informally as the Double Double, is a complex multiple star system. Lyra also hosts the Ring Nebula, the second-discovered and best-known planetary nebula.

HISTORY

In Greek mythology, Lyra represents the lyre of **Orpheus**. Made by the god **Hermes** (Mercury) from a tortoise shell, it was said to be the first lyre ever produced. Orpheus's music was said to be so great that even inanimate objects such as trees, streams, and rocks could be charmed. Joining Jason and the Argonauts in their quest for the Golden Fleece, his music was able to quell the voices of the dangerous Sirens, who sang tempting songs trying to attract the Argonauts onto their treacherous reefs.

At one point, Orpheus married Eurydice, a nymph. While fleeing from an attack by Aristaeus, she stepped on a snake that bit her, killing her. To try and reclaim her, Orpheus entered the Underworld, where the music from his lyre charmed Hades, who relented and let Orpheus bring Eurydice back on the condition that he never once look back until outside. Unfortunately, near the very end, Orpheus faltered and looked back, causing Eurydice to be left in the Underworld forever. Orpheus spent the rest of his life strumming his lyre while wandering aimlessly through the land of Thrace, and on his death the lyre was placed among the stars by the Muses, Vega and its surrounding stars are also treated as a constellation in other cultures. The area corresponding to Lyra was seen by the Arabs as a vulture or an eagle carrying a lyre, either enclosed in its wings, or in its beak. In Wales, Lyra is known as King Arthur's Harp (Talyn Arthur), and King David's harp. The Persian Hafiz called it the Lyre of Zurah. It has been called the Manger of the Infant Saviour, *Praesepe Salvatoris*. In Australian Aboriginal astronomy, Lyra is known by the Boorong people in Victoria as the Malleefowl constellation.



The constellation's boundaries, as set by **Eugène Delporte** in 1930, are defined by a 11-sided polygon.



Vega is one of the most-studied of all stars, and has been called "arguably the next most important star in the sky after the Sun". Vega was the first star other than the Sun to be photographed, as well as the first to have a clear spectrum recorded, showing absorption lines for the first time. The star was the first single main-sequence star other than the Sun to be known to emit X-rays, and is surrounded by a circumstellar debris disk, similar to the Kuiper Belt. **Vega forms one corner of the famous Summer Triangle asterism; along with Altair and Deneb, these three stars form a prominent triangle during the northern hemisphere summer.**



One of the most peculiar systems in Lyra is MV Lyrae, a nova-like star consisting of a red dwarf and a white dwarf. Originally classified as a VY Sculptoris star due to spending most time at maximum brightness, since around 1979 the system has been dominantly at minimum brightness, with periodic outbursts. Its nature is still not fully understood. Another outbursting star is AY Lyrae, an SU Ursae Majoris-type dwarf nova that has undergone several superoutbursts. Of the same type is V344 Lyrae, notable for an extremely short period between superoutbursts coupled with one of the highest amplitudes for such a period. The true nova HR Lyrae flared in 1919 to a maximum magnitude of 6.5, over 9.5 magnitudes higher than in quiescence. Some of its characteristics are similar to those of recurring novae.

DEEP-SKY OBJECTS

Messier 56 is composed of a large number of stars, tightly bound to each other by gravity. M56 is a rather loose globular cluster at a distance of approximately 32,900 light-years, with a diameter of about 85 light years. Its apparent brightness is 8.3m.

M57, also known as the "Ring Nebula" and NGC 6720, has a diameter of one light-year and is at a distance of 2,000 light-years from Earth. It is one of the best known planetary nebulae and the second to be discovered; its integrated magnitude is 8.8. It was discovered in 1779 by **Antoine Darquier**, 15 years after **Charles Messier** discovered the Dumbbell Nebula. Astronomers have determined that it is between 6,000 and 8,000 years old; it is approximately one light-year in diameter. The outer part of the nebula appears red in photographs because of emission from ionized hydrogen. The middle region is colored green; doubly ionized oxygen emits greenish-blue light. The hottest region, closest to the central star, appears blue because of emission from helium. The central star itself is a white dwarf with a temperature of 120,000 Kelvin. In telescopes, the nebula appears as a visible ring with a green tinge; it is slightly elliptical because its three-dimensional shape is a torus or cylinder seen from a slight angle. It can be found halfway between Gamma Lyrae and Beta Lyrae.



EXOPLANETS

Lyra is one of three constellations (along with Cygnus and Draco) to be in the Kepler Mission's field of view, and as such it contains many more known exoplanets than most constellations. One of the first discovered by the mission is Kepler-7b, an extremely low-density exoplanet with less than half the mass of Jupiter, yet nearly 1.5 times the radius, it orbits in an eccentric orbit with a period of 390 days. A second planet closer to the star was discovered in 2011. Visible to the naked eye are HD 173416, a yellow giant hosting a planet over twice the mass of Jupiter discovered in 2009; and HD 176051, a low-mass binary star containing another high-mass planet. Just short of naked-eye visibility is HD 178911, a triple system consisting of a close binary and a visually separable sunlike star. The sunlike star has a planet with over 6 Jupiter masses discovered in 2001, the second found in a triple system after that of 16 Cygni. In April 2013, it was announced that of the five planets orbiting Kepler-62, at least two—Kepler-62e and Kepler-62f—are within the boundaries of the habitable zone of that star, where scientists think liquid water could exist, and are both candidates for being a solid, rocky, earth-like planet. The exoplanets are 1.6 and 1.4 times the diameter of Earth respectively, with their star Kepler-62 at a distance of 1,200 light-years.

