

Hercules

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Hercules is a prominent constellation in the northern celestial hemisphere, named after the legendary hero from Greek mythology known for his incredible strength and courage. It is the fifth-largest of the 88 modern constellations.

astronomy

IAU

constellation

globular cluster

stars

galaxy

1. Introduction

Hercules, named after the legendary hero of Greek mythology, is a prominent constellation located in the northern celestial hemisphere. Spanning an area of approximately 1225 square degrees, Hercules is one of the largest constellations in the night sky. It is bordered by several other notable constellations, including Draco, Lyra, and Bootes. The celestial coordinates of Hercules lie between approximately 16h 30m and 21h 30m of right ascension and $+14^{\circ}$ to $+51^{\circ}$ of declination (**Figure 1**). This places Hercules in a favorable position for observation from northern latitudes, although portions of it can also be seen from southern latitudes during certain times of the year.

One of the distinguishing features of the Hercules constellation is its association with the mythological figure of Heracles, known for his incredible strength and heroic exploits. In Greek mythology, Heracles was tasked with completing twelve labors, which included slaying mythical beasts and retrieving legendary artifacts. As a tribute to his extraordinary deeds, Heracles was immortalized in the stars, with the constellation Hercules serving as a celestial homage to his legendary feats.

The constellation Hercules is characterized by its distinctive shape, which is often likened to a kneeling figure or a sideways letter "H." Its brightest star, Alpha Herculis (also known as Rasalhague), serves as the head of the hero in some depictions. Other notable stars in the constellation include Beta Herculis (Kornephoros), Gamma Herculis (Haris), and Delta Herculis. Hercules is also home to several interesting deep-sky objects, including the Hercules Cluster (Messier 13), a globular cluster located approximately 25,000 light-years away from Earth. Additionally, the constellation boasts several other star clusters, nebulae, and galaxies that are popular targets for observation.

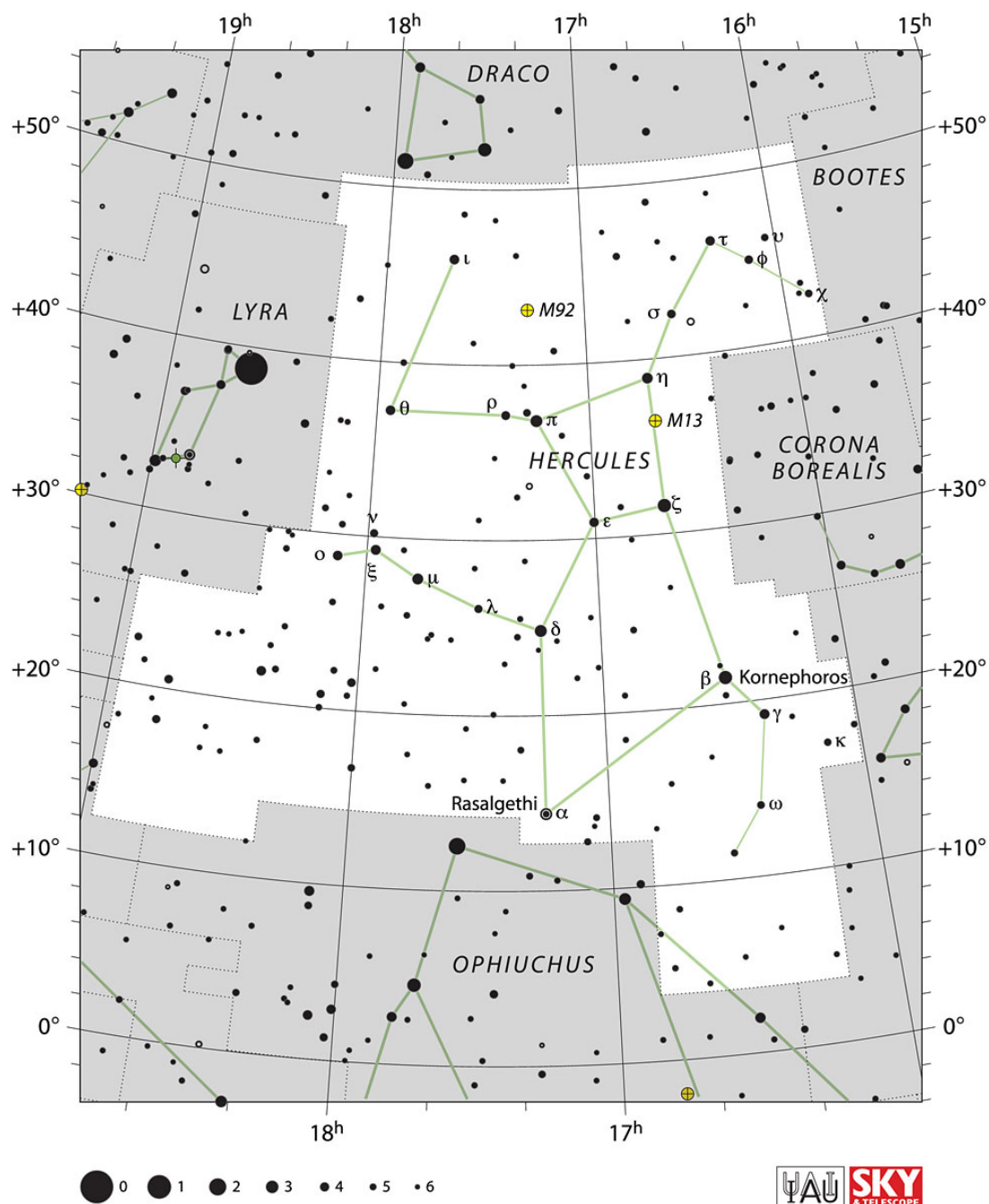


Figure 1. IAU chart of Hercules. Source: <https://www.iau.org/static/archives/images/screen/her.jpg>. Credit: IAU and Sky & Telescope. Reproduced under CC BY 4.0 license.

2. Historical Background and Mythology

The constellation Hercules is one of the oldest recognized in human history, with its origins dating back to ancient Mesopotamia and Egypt. In Greek mythology, Heracles, also known by his Roman counterpart Hercules, is the son of Zeus, the king of the gods, and Alcmene, a mortal woman. Hercules is best known for his incredible strength and his legendary twelve labors, which he performed as punishment for killing his wife and children in a fit of madness.

induced by Hera, Zeus's wife and Hercules's stepmother. The tale of Hercules's labors is one of the most enduring and celebrated stories in Greek mythology. The labors include tasks such as slaying the Nemean Lion, capturing the Golden Hind of Artemis, and retrieving the Apples of the Hesperides. These labors are often depicted in ancient art, literature, and later adaptations, showcasing Hercules's bravery, determination, and prowess as a hero.

One of Hercules's most famous exploits is his battle with the Hydra, a fearsome serpent-like creature with multiple heads. In this myth, Hercules is tasked with defeating the Hydra as one of his labors. Despite the Hydra's ability to regenerate heads, Hercules successfully defeats the monster with the help of his nephew Iolaus, who cauterizes the Hydra's neck stumps to prevent them from growing back. After completing his twelve labors, Hercules is granted immortality and ascends to Mount Olympus, where he becomes a god and joins the ranks of the Olympian pantheon. In addition to his labors, Hercules is also associated with other heroic feats and adventures, including his participation in the Argonaut expedition and his role in the Trojan War.

The constellation Hercules is often depicted as a kneeling figure holding a club and wearing the skin of the Nemean Lion. His head is represented by the star Rasalhague (Alpha Herculis), while his outstretched arm holds the head of the slain Hydra. Other stars in the constellation form the hero's legs, body, and club. Throughout history, Hercules has been revered as a symbol of strength, courage, and resilience. His legendary exploits have inspired countless works of art, literature, and cultural expressions, serving as a timeless reminder of the triumph of the human spirit over adversity.

3. Notable Stars

Rasalgethi (Alpha Herculis): Rasalgethi is a multiple star system consisting of at least three stars: a red supergiant primary star (Rasalgethi A) and two companion stars (Rasalgethi B and Rasalgethi C). The primary component, Rasalgethi A, is a massive red supergiant star with a luminosity around 3000 times that of the Sun. It is one of the largest stars known, with a radius estimated to be over 500 times that of the Sun. Rasalgethi A exhibits variability in its brightness, with its magnitude fluctuating between approximately 3.0 and 4.0 over a period of about 128 days. This variability is believed to be caused by pulsations in the star's outer layers, leading to changes in its size and temperature. The name Rasalgethi is derived from the Arabic phrase "ra's al-jaθiyy," meaning "the head of the kneeler." This name likely refers to Rasalgethi's position in the Hercules constellation, where it is often depicted as marking the head of the mythical hero Hercules.

Kornephoros (Beta Herculis): Kornephoros is the brightest star in the Hercules constellation, with a visual magnitude of about 2.77. It is a yellow giant star located approximately 140 light-years away from Earth. Kornephoros is notable for its relatively high metallicity and serves as a standard reference star for astronomers studying stellar evolution and properties. Its name, Kornephoros, is derived from the Greek word for "club bearer," reflecting its association with the mythological figure of Hercules.

Sarin (Delta Herculis): Sarin is a binary star system located approximately 80 light-years away from Earth. It consists of two main-sequence stars orbiting each other in a close binary system. Sarin shines with a visual

magnitude of about 3.13 and serves as a notable stellar feature in the Hercules constellation. Its name, Sarin, is derived from the Arabic word for "the front part," referring to its position in the constellation.

4. Deep-Sky Objects

Hercules Cluster (Messier 13): The Hercules Cluster, also known as Messier 13 or M13, is one of the brightest and most impressive globular clusters in the northern sky. Located approximately 22,200 light-years away from Earth, M13 is composed of hundreds of thousands of stars densely packed together in a spherical shape. It has a visual magnitude of 5.8 and is easily visible to the naked eye under dark sky conditions. Through a telescope, M13 appears as a dense concentration of stars with a bright core surrounded by a halo of fainter stars.

Great Globular Cluster in Hercules (Messier 92): Messier 92, also known as M92, is another globular cluster located in the constellation Hercules. It is smaller and fainter than M13 but still a spectacular sight for observers. M92 is situated approximately 26,700 light-years away from Earth and contains hundreds of thousands of stars. With a visual magnitude of 6.4, M92 appears as a condensed ball of stars through a telescope, with a bright core and a fainter outer region.

Hercules Galaxy Cluster (Abell 2151): The Hercules Galaxy Cluster, designated as Abell 2151, is a large cluster of galaxies located in the constellation Hercules. It is one of the richest galaxy clusters known, containing hundreds of galaxies spread over a vast region of space. Abell 2151 is situated approximately 500 million light-years away from Earth and spans several million light-years across. Observers with large telescopes can detect numerous galaxies of various shapes and sizes within the cluster, including spiral, elliptical, and irregular galaxies.

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