Coma Berenices

Subjects: Astronomy & Astrophysics
Contributor: Encyclopedia Editorial Office

Coma Berenices, Latin for "Berenice's Hair," is a constellation in the northern celestial hemisphere. Named after the ancient Egyptian queen Berenice II, it is renowned for its distinctive asterism resembling a flowing mane of hair. Coma Berenices contains several notable celestial objects, including the Coma Cluster of galaxies.

astronomy constellation IAU

1. Introduction

Coma Berenices, Latin for "Berenice's Hair," is a constellation located in the northern celestial hemisphere. It is notable for its association with the ancient Egyptian queen Berenice II, who sacrificed her hair to the goddess Aphrodite in exchange for her husband's safe return from war. Coma Berenices is distinguished by its unique asterism, which resembles a flowing mane of hair, and its rich concentration of galaxies and star clusters. The celestial coordinates of Coma Berenices lie between approximately right ascension 11h 30m to 13h 00m and declination +15° to +30° (**Figure 1**). Positioned between the constellations Leo, Virgo, and Canes Venatici, Coma Berenices occupies an area of the sky known for its abundance of galaxies and deep-sky objects.

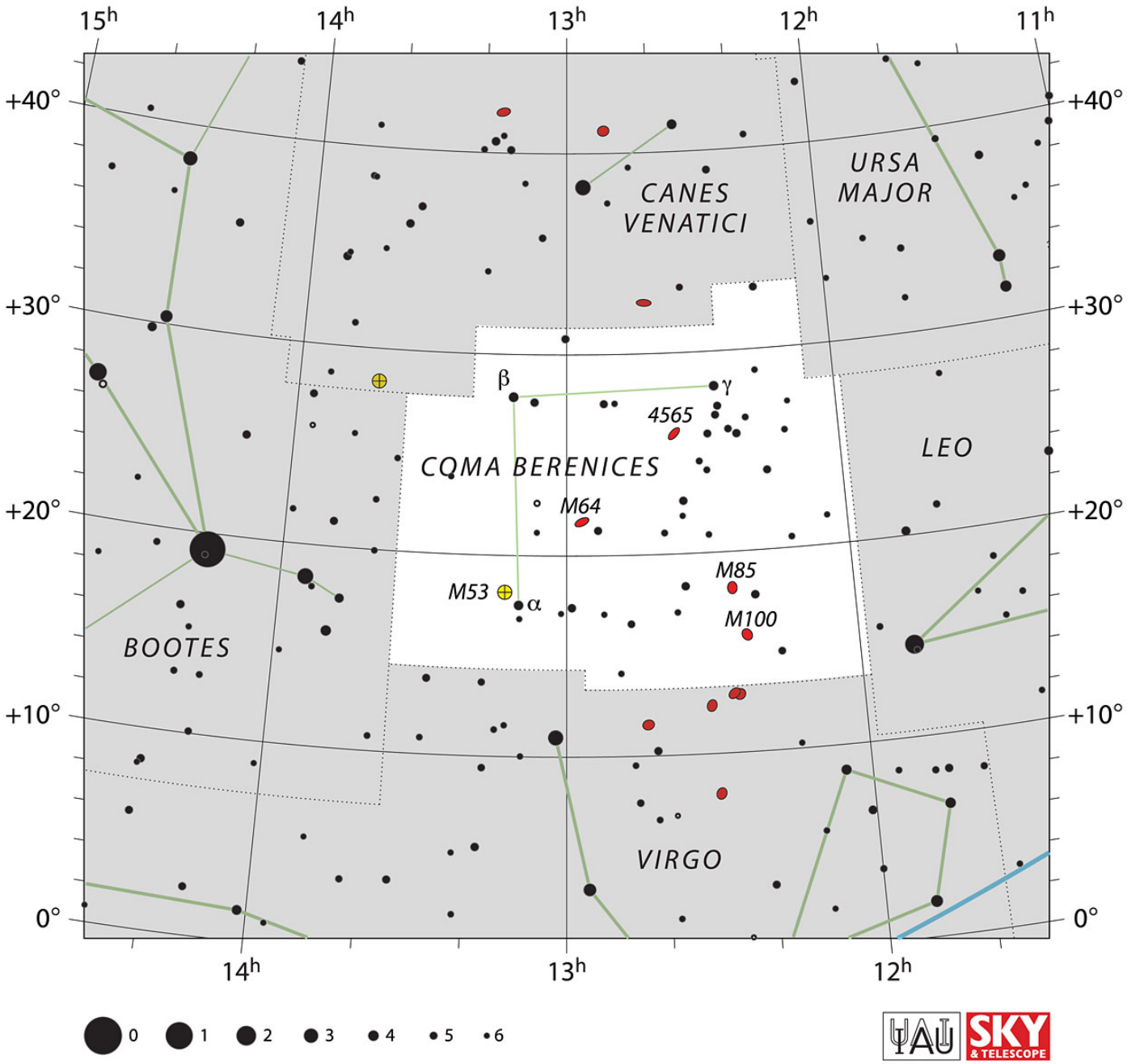

Figure 1. IAU chart of Coma Berenices. Source: https://www.iau.org/static/archives/images/screen/com.jpg. Credit: IAU and Sky & Telescope. Reproduced under CC BY 4.0 license.

Coma Berenices is home to several notable celestial objects, including the Coma Cluster, also known as Abell 1656. This cluster is one of the richest known galaxy clusters, containing over a thousand galaxies bound together by gravity. The Coma Cluster is a popular target for astronomers studying galaxy evolution, dark matter, and the large-scale structure of the universe. In addition to the Coma Cluster, Coma Berenices contains a variety of other deep-sky objects, including numerous galaxies, star clusters, and nebulae. These objects offer astronomers

valuable insights into the formation and dynamics of galaxies, the life cycles of stars, and the structure of the cosmos on both large and small scales.

2. Historical Background and Mythology

Its name, Latin for "Berenice's Hair," is derived from a legendary tale associated with Queen Berenice II of Egypt, wife of Ptolemy III Euergetes. This tale, which has been passed down through various cultural traditions, intertwines elements of love, sacrifice, and divine intervention. According to the legend, Queen Berenice II made a vow to the goddess Aphrodite, promising to sacrifice her luxurious hair if her husband, King Ptolemy III, returned safely from war. When Ptolemy indeed returned unharmed, Berenice fulfilled her promise and offered her hair to the temple of Aphrodite as an expression of gratitude and devotion. However, the next day, Berenice's hair mysteriously disappeared from the temple. The court astronomer, Conon of Samos, reassured the distraught queen by declaring that Aphrodite had placed her hair among the stars as a celestial offering. Conon identified the new constellation as Coma Berenices, depicting Berenice's flowing locks in the night sky for all to admire. This tale of divine intervention and the transformation of a mortal sacrifice into a heavenly tribute captured the imagination of ancient civilizations and became intertwined with the mythological lore of the stars.

The tale of Coma Berenices has been celebrated in various forms of art and literature throughout history, from ancient Greek poetry to Renaissance paintings and modern-day adaptations. It symbolizes themes of devotion, sacrifice, and the enduring power of love, resonating with audiences across cultures and generations.

In addition to its mythological significance, Coma Berenices holds historical importance in the field of astronomy. The constellation was cataloged by the Greek astronomer Claudius Ptolemy in the 2nd century AD and has been recognized as one of the 88 modern constellations. Its association with the Coma Cluster, one of the richest galaxy clusters in the universe, further underscores its significance as a focal point for astronomical observation and study.

3. Notable Stars

β Comae Berenices (Beta Comae Berenices): β Comae Berenices is the brightest star in the constellation and is also known by its traditional name, Diadem. It is a white main-sequence star located approximately 30 light-years away from Earth. Diadem has an apparent magnitude of about 4.2, making it visible to the naked eye under favorable viewing conditions. This star has a spectral type of F5V and is slightly larger and more massive than the Sun. It is often used as a benchmark star for stellar classification and photometric studies due to its brightness and proximity.

α Comae Berenices (Alpha Comae Berenices): α Comae Berenices, also known as Alpha Comae Berenices, is another notable star in the constellation. It is a binary star system located approximately 60 light-years away from Earth. The primary star is a yellow-white main-sequence star with a spectral type of F5V. The secondary star is a red dwarf companion, orbiting the primary star with a period of about 5.1 years. This system is relatively close to the Solar System and provides astronomers with valuable insights into stellar evolution and binary star dynamics.

η Comae Berenices (Eta Comae Berenices): η Comae Berenices, or Eta Comae Berenices, is a multiple star system located approximately 59 light-years away from Earth. It consists of at least five stars, with the primary component being a yellow-white main-sequence star similar in spectral type to the Sun. The other components include binary and tertiary stars, making this system a complex hierarchical multiple star system. Eta Comae Berenices is of interest to astronomers studying stellar dynamics and the formation of multiple star systems.

21 Comae Berenices (21 Com): 21 Comae Berenices, also known as 21 Com, is a binary star system located approximately 280 light-years away from Earth. The primary star is a yellow dwarf with a spectral type of G8V, similar to the Sun but slightly cooler and less massive. The secondary star is a red dwarf companion, orbiting the primary star with a period of about 21 years.

4. Deep-Sky Objects

Coma Cluster (Abell 1656): The Coma Cluster is one of the richest and most massive galaxy clusters known, located approximately 320 million light-years away from Earth. It contains thousands of galaxies, making it a prominent target for astronomers studying galaxy clusters and large-scale structure in the universe. The Coma Cluster is characterized by its dense concentration of galaxies, including elliptical, spiral, and irregular types. This cluster offers valuable insights into the dynamics of galaxy clusters, dark matter distribution, and the evolution of galaxies within dense environments.

NGC 4565 (The Needle Galaxy): NGC 4565, also known as the Needle Galaxy, is a prominent edge-on spiral galaxy located approximately 42 million light-years away from Earth. It is renowned for its striking appearance, with a narrow, elongated disk of stars spanning over 100,000 light-years in diameter. NGC 4565 is a popular target for amateur astronomers due to its high surface brightness and its position near the border of the constellation Coma Berenices. Observations of NGC 4565 provide valuable insights into the structure and dynamics of spiral galaxies.

Messier 53 (M53) is a globular cluster situated in the constellation Coma Berenices, approximately 58,000 light-years away from Earth. This dense cluster is known for its tightly packed core and loose outer regions, spanning an impressive diameter of about 220 light-years. M53 contains hundreds of thousands of stars, primarily older and metal-poor, indicative of its advanced age and early formation within the Milky Way galaxy. Notable features within M53 include a significant population of variable stars and blue stragglers.

Messier 64 (M64), also known as the Black Eye Galaxy or Evil Eye Galaxy, is a striking spiral galaxy located in Coma Berenices, approximately 24 million light-years away from Earth. Its distinctive appearance is characterized by a prominent dark band of dust obscuring the light from stars behind it, giving the galaxy its "black eye" or "evil eye" appearance. M64 is classified as a type II Seyfert galaxy, indicating the presence of an active galactic nucleus powered by a supermassive black hole at its center. Observations reveal asymmetric spiral arms and regions of ongoing star formation within the galaxy's disk, suggesting past interactions or disturbances that have influenced its structure and dynamics.