

Ursa Minor

Subjects: **Astronomy & Astrophysics**

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Ursa Minor, Latin for "Lesser Bear," is a constellation in the northern celestial hemisphere. It is best known for containing the North Star, Polaris, which marks the position of the north celestial pole and aids in navigation. Despite its small size and dim stars, Ursa Minor holds significant cultural and navigational importance throughout human history.

astronomy

constellation

IAU

Polaris

pole star

1. Introduction

Ursa Minor, the Lesser Bear, graces the northern celestial hemisphere with its modest yet storied presence. This constellation, though diminutive in size, holds immense navigational significance as the host of the North Star, Polaris. Characterized by its distinctive shape and rich cultural associations, Ursa Minor has long captivated the attention of skygazers. Spanning a relatively small area of the night sky, Ursa Minor is delineated by a distinct pattern of stars that form the shape of a bear with an elongated tail. Its most prominent feature, Polaris, shines brightly at the end of the bear's tail, serving as a guiding light for sailors, travelers, and astronomers navigating the northern hemisphere.

Located between the constellations Draco and Ursa Major, Ursa Minor occupies a region of the celestial sphere with coordinates approximately ranging from 14 to 22 hours of right ascension and 65 to 90 degrees of declination. Polaris, the North Star, lies within one degree of the celestial pole, making it a crucial reference point for celestial navigation and astronomical observation (**Figure 1**). Ursa Minor's strategic position near the north celestial pole ensures its visibility year-round in the northern hemisphere, making it a familiar sight to observers across the globe. Its compact size belies its significance, as it serves as a cornerstone of celestial navigation and a source of inspiration for cultural myths and legends.

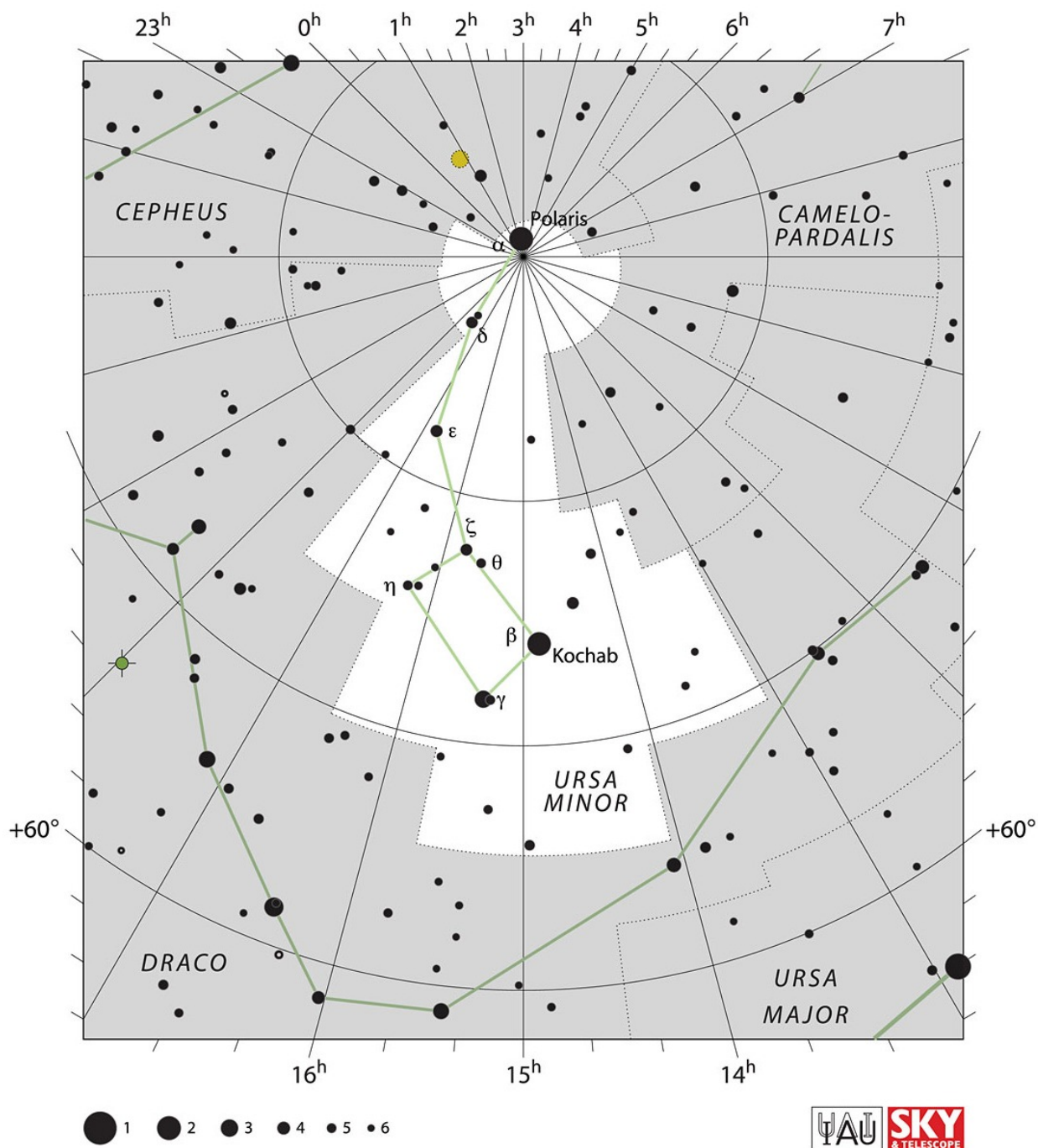


Figure 1. IAU chart of Ursa Minor. Source: <https://www.iau.org/static/archives/images/screen/umi.jpg>. Credit: IAU and Sky & Telescope. Reproduced under CC BY 4.0 license.

2. Historical Background and Mythology

In ancient Greek mythology, Ursa Minor is often associated with the story of Callisto, a nymph who caught the eye of Zeus, the king of the gods. Enraptured by her beauty, Zeus transformed himself into a bear to approach her discreetly. However, when Hera, Zeus's jealous wife, discovered their affair, she transformed Callisto into a bear as punishment. Later, Callisto's son, Arcas, unknowingly nearly killed his mother during a hunting expedition. To

prevent further tragedy, Zeus intervened and placed Callisto and Arcas in the heavens as the constellations Ursa Major and Ursa Minor, respectively, forever preserving their bond in the night sky.

In Norse mythology, Ursa Minor is associated with the tale of the Great Bear and the hunter, both of whom are pursued by the ferocious wolf, Fenrir. The constellation represents the hunter's protective role, as he defends the Great Bear from harm. This myth reflects the cultural importance of bears in Norse society, where they were revered as symbols of strength, courage, and protection.

Throughout history, Ursa Minor has also played a crucial role in navigation and maritime exploration. The North Star, Polaris, which lies at the end of the bear's tail, serves as a reliable marker for determining true north. This celestial landmark enabled sailors and explorers to navigate the seas with confidence, guiding them safely to their destinations. The importance of Polaris in navigation is evident in the cultural traditions of various seafaring peoples, from the ancient Phoenicians and Greeks to the Vikings and Polynesian navigators.

3. Notable Stars

3.1. Polaris (Alpha Ursae Minoris)

Polaris, also known as the North Star, holds a special place in human history and cultural mythology as the celestial marker of the north celestial pole. Located approximately 434 light-years away from Earth, Polaris is a multiple star system consisting of three stars. The primary component, Polaris A, is a yellow supergiant star with a luminosity over 2,000 times that of the Sun. Its close companion, Polaris Ab, orbits at a distance of 2,400 astronomical units, while Polaris B, a smaller main-sequence star, orbits at a distance of 18.5 astronomical units from Polaris A.

As the closest visible star to the north celestial pole, Polaris remains nearly stationary in the night sky, making it an invaluable navigational aid for determining true north. Its name, derived from the Latin word for "pole star," reflects its pivotal role in celestial navigation. Polaris has been revered by cultures around the world for millennia, symbolizing guidance, stability, and cosmic order.

3.2. Kochab (Beta Ursae Minoris)

Kochab, also known as Beta Ursae Minoris, is another notable star in the constellation Ursa Minor. It is a giant star located approximately 130 light-years away from Earth. Kochab is part of a binary star system, although its companion star is much fainter and is not visible to the naked eye. With a visual magnitude of around 2.08, Kochab is one of the brighter stars in the night sky and serves as a useful reference point for locating Polaris.

Kochab's name is derived from the Arabic word "kawkab," meaning "star," reflecting its prominence in the celestial landscape. Although it lacks the navigational significance of Polaris, Kochab is valued by astronomers for its spectroscopic properties and its role as a nearby stellar neighbor.

3.3. Pherkad (Gamma Ursae Minoris)

Pherkad is another notable star nestled within the constellation Ursa Minor, contributing to the celestial beauty and significance of the night sky. It is located approximately 487 light-years away from Earth. As a blue-white giant star, Pherkad boasts a luminosity approximately 1000 times that of the Sun, making it a striking presence in the celestial landscape. With a visual magnitude of around 3.05, Pherkad is easily visible to the naked eye under dark skies. Kochab and Pherkad have been called the "guardians of the pole star" or "Guardians of The Pole".

4. Deep-Sky Objects

4.1. Ursa Minor Dwarf

The Ursa Minor Dwarf is a dwarf spheroidal galaxy that lies within the boundaries of the constellation Ursa Minor. It is one of the smallest and closest satellite galaxies of the Milky Way, located approximately 225,000 light-years away. Despite its diminutive size, the Ursa Minor Dwarf is of significant interest to astronomers studying galaxy formation and the dynamics of the Local Group, the cluster of galaxies to which the Milky Way belongs.

4.2. NGC 6217

NGC 6217 is a spiral galaxy located approximately 67 million light-years away from Earth. It is known for its bright nucleus and prominent spiral arms, which exhibit intricate dust lanes and star-forming regions. NGC 6217 is classified as a Seyfert galaxy, meaning it contains a bright, active nucleus powered by a supermassive black hole.

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