

# Taurus

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Taurus, Latin for "the Bull," is a prominent constellation in the northern celestial hemisphere, easily recognizable for its V-shaped cluster of stars that form the bull's face and horns. Positioned along the ecliptic, Taurus holds cultural significance dating back to ancient civilizations, with associations ranging from agricultural symbolism to mythological tales of gods and heroes. Among its most famous features is the bright red star Aldebaran, known as the "Eye of the Bull".

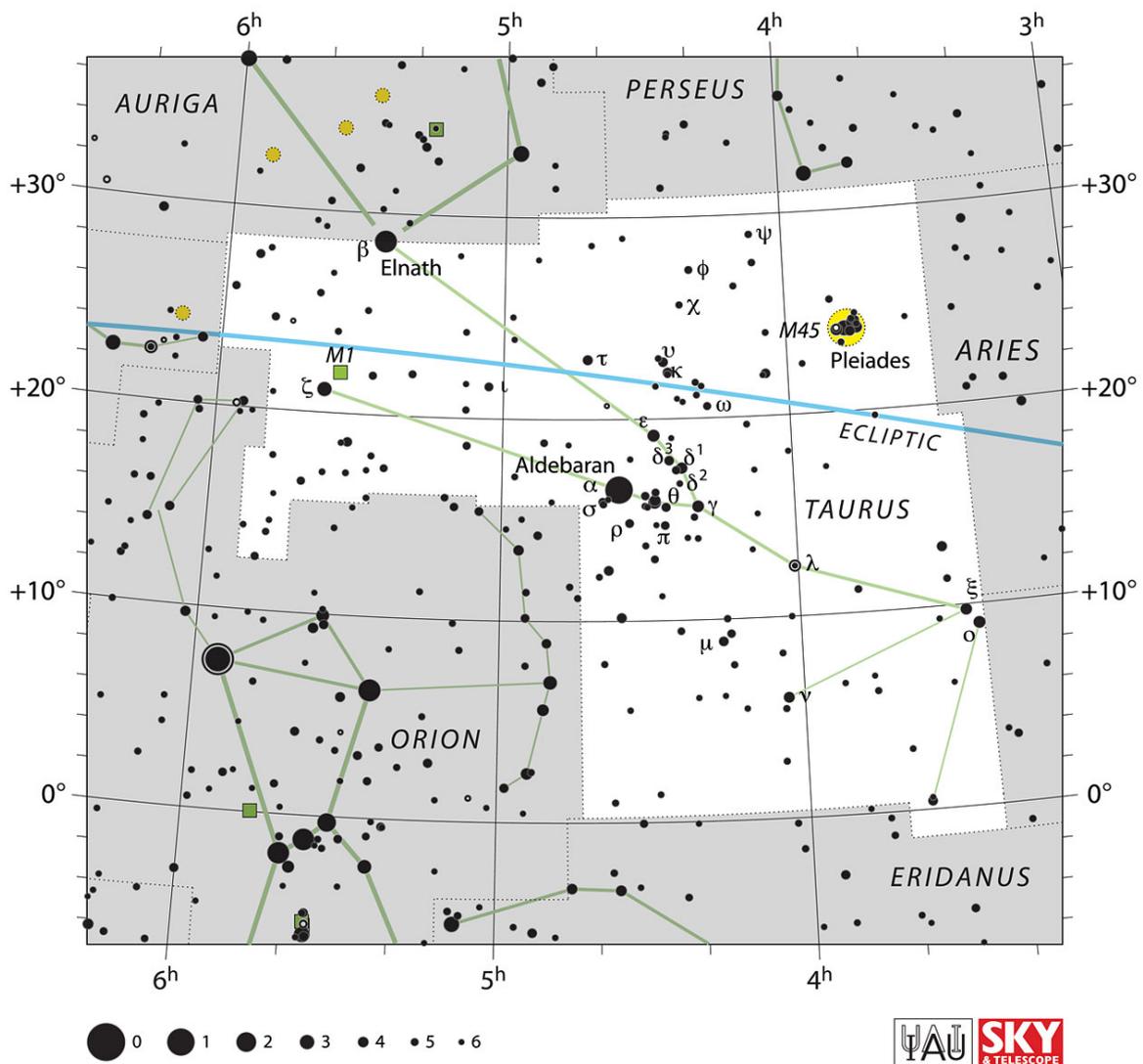
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## 1. Introduction

Taurus, derived from the Latin word for "the Bull," commands attention as one of the oldest and most recognizable constellations in the night sky. Positioned in the northern celestial hemisphere, Taurus captivates observers with its distinctive shape, characterized by a prominent V-shaped cluster of stars representing the bull's face and horns. At the heart of Taurus lies the bright red giant star Aldebaran, often referred to as the "Eye of the Bull." Aldebaran serves as a prominent marker within the constellation, illuminating the bull's eye and guiding observers in their celestial exploration. Surrounding Aldebaran are several notable stars and deep-sky objects, including the Hyades star cluster and the Pleiades star cluster, which add to the constellation's allure and beauty. Taurus is also home to the Crab Nebula (M1), a supernova remnant that serves as a reminder of the dynamic and ever-changing nature of the cosmos.

Located between the constellations Aries and Gemini, Taurus occupies a region of the night sky defined by celestial coordinates approximately ranging from 3 to 6 hours of right ascension and 10 to 30 degrees of declination. Its strategic position along the ecliptic, the apparent path of the Sun across the sky, ensures its visibility from both hemispheres throughout the year (**Figure 1**).



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

## 2. Historical Background and Mythology

In ancient Mesopotamia, Taurus was associated with the spring equinox and the renewal of life and fertility. The constellation's appearance in the eastern sky marked the beginning of the agricultural season, signaling the time for planting crops and tending to livestock. Taurus was often depicted as a powerful bull, symbolizing strength, abundance, and the natural cycles of the earth.

In Greek mythology, Taurus is often linked to the story of Zeus and Europa. According to legend, Zeus, the king of the gods, transformed himself into a magnificent white bull and seduced Europa, a Phoenician princess. He carried her away across the sea to the island of Crete, where she became the queen and bore him several children. Taurus is also associated with the myth of the Cretan Bull, a powerful creature sent by Poseidon to terrorize the island of Crete. King Minos, the ruler of Crete, was commanded to sacrifice the bull to appease the gods, but he chose to spare its life instead. In retaliation, Poseidon cursed Minos's wife, Pasiphae, causing her to fall in love with the bull and give birth to the Minotaur, a monstrous half-man, half-bull creature. This myth underscores themes of hubris, fate, and the consequences of defying divine will.

In ancient Egyptian mythology, Taurus was associated with the goddess Hathor, who was often depicted with the head of a cow. Hathor was revered as a goddess of love, beauty, and fertility, embodying the nurturing and life-giving aspects of the bull symbol. Temples dedicated to Hathor were built throughout Egypt, where she was worshipped as a benevolent protector and provider.

## **| 3. Notable Stars**

### **3.1. Aldebaran (Alpha Tauri)**

Aldebaran, also known as the "Eye of the Bull," is the brightest star in Taurus and one of the brightest stars in the night sky. Located approximately 65 light-years away from Earth, Aldebaran shines with a distinctive reddish-orange hue, owing to its status as a red giant star. With a visual magnitude of 0.85, Aldebaran serves as a striking beacon in the constellation, marking the bull's fiery gaze.

### **3.2. Elnath (Beta Tauri)**

Elnath, also known as Beta Tauri, is a binary star system located at the tip of one of the bull's horns. It is composed of a blue-white giant star and a fainter companion star. Elnath is notable for its high proper motion, indicating that it moves relatively quickly across the sky compared to other stars. With a visual magnitude of 1.65, Elnath adds to the brilliance of Taurus's stellar ensemble.

### **3.3. Alcyone (Eta Tauri)**

Alcyone is the brightest star in the Pleiades star cluster, also known as the Seven Sisters, which lies within the boundaries of Taurus. It is a blue-white main-sequence star located approximately 440 light-years away from Earth. Alcyone is surrounded by a cluster of hot, young stars, making it a dazzling sight in the night sky and a popular target for astronomers and stargazers.

### **3.4. Ain (Epsilon Tauri)**

Ain, also known as Epsilon Tauri, is a binary star system located near the tip of the bull's southern horn. It consists of two components, Ain A and Ain B, which orbit each other in a close binary system. Ain A is a yellow-white subgiant star, while Ain B is a fainter companion star. Together, they create a visual magnitude of approximately 3.53, adding to the celestial splendor of Taurus.

### **3.5. Theta Tauri**

Theta Tauri is a multiple star system located in the northern part of Taurus, near the bull's shoulder. It consists of three main components, Theta-1, Theta-2, and Theta-3 Tauri, which form a hierarchical triple system. Theta Tauri is known for its variable brightness, with Theta-1 Tauri being the brightest of the three stars. Its variability is caused by pulsations in its outer layers, making it a fascinating object of study for astronomers.

## **| 4. Deep-Sky Objects**

### **4.1. The Pleiades (Messier 45)**

The Pleiades, also known as the Seven Sisters, is a prominent open star cluster located in the constellation Taurus. This cluster consists of several hot, young stars surrounded by reflection nebulae, giving it a striking appearance resembling a small dipper. The Pleiades is one of the nearest star clusters to Earth, lying approximately 444 light-years away. It has been revered by various cultures throughout history and features prominently in mythology and folklore around the world.

### **4.2. The Hyades**

The Hyades is another notable open star cluster situated in Taurus, located relatively close to the Pleiades. It is one of the nearest open clusters to Earth, lying approximately 153 light-years away. The Hyades is easily recognizable by its V-shaped pattern of stars, which forms the head of the celestial bull in Taurus. This cluster contains hundreds of stars, including several bright giants and main-sequence stars. It is an important target for astronomers studying stellar evolution and galactic dynamics.

### **4.3. The Taurus Molecular Cloud (TMC)**

The Taurus Molecular Cloud is a vast complex of interstellar gas and dust located in the constellation Taurus. This region is one of the nearest and most active star-forming regions in the Milky Way galaxy, giving rise to numerous young stars and stellar nurseries. The Taurus Molecular Cloud is home to several notable objects, including the Hind's Variable Nebula and the Barnard 211 dark nebula. It is a rich area for scientific study, offering insights into the processes of star formation and the evolution of planetary systems.

#### **4.4. The Crab Nebula (Messier 1, NGC 1952)**

The Crab Nebula is a supernova remnant located in the constellation Taurus, the result of a massive stellar explosion observed by astronomers in the year 1054 AD. This nebula is one of the most studied objects in the night sky, offering valuable insights into the physics of supernova explosions and the formation of neutron stars and pulsars. The Crab Nebula emits radiation across the electromagnetic spectrum, from radio waves to gamma rays, making it a target for observations across multiple wavelengths.

#### **4.5. NGC 1647**

NGC 1647 is an open star cluster located in the constellation Taurus, situated approximately 6,500 light-years away from Earth. This cluster contains dozens of stars, primarily hot, young blue giants and main-sequence stars. NGC 1647 is notable for its relatively loose arrangement of stars, making it an attractive target for amateur astronomers and binocular observers. Its proximity to the Pleiades makes it a convenient reference point for locating other deep-sky objects in the region.

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