

RIGEL

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Astronomy 100

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Science

Overview

- Rigel is a blue supergiant, weighing 17 solar masses (17 times more massive than the Sun)
- Rigel is very far away from the Earth (700-900 light years, or 210-280 parsecs)
- Despite its distance, Rigel is 40,000 times more luminous than the Sun so it is the sixth brightest star in the night sky (magnitude of .18)
- It has the Bayer Designation of Beta Orionis (β Ori)

Bayer Designations

- The German astronomer Johann Bayer began a stellar classification system in 1603 by giving each star a Greek letter (α, β , etc.) followed by the Latin name of its constellation
- In general, Bayer designated the brightest star in a constellation alpha, the second brightest beta, and so on (for example α Tauri is the Bayer designation for the star Aldebaran, the brightest star in Taurus)
- Rigel is given a beta designation, yet it outshines Betelgeuse (alpha Orionis)
 - ▣ Astronomers believe that in Bayer's time, Betelgeuse was brighter, yet this is no longer the case

Blue Supergiants

- They have surface temperatures of 30,000-50,000 K (54,540 – 89540 Fahrenheit)
- They are rare stars with short lifespan and are often seen in places such as open clusters (giant groups of stars from the same molecular cloud) or irregular galaxies
- Blue Supergiants make up a sizeable amount of visible stars, because while rare, their brightness is substantial
- Rigel is the best known Blue Supergiant

Current Status

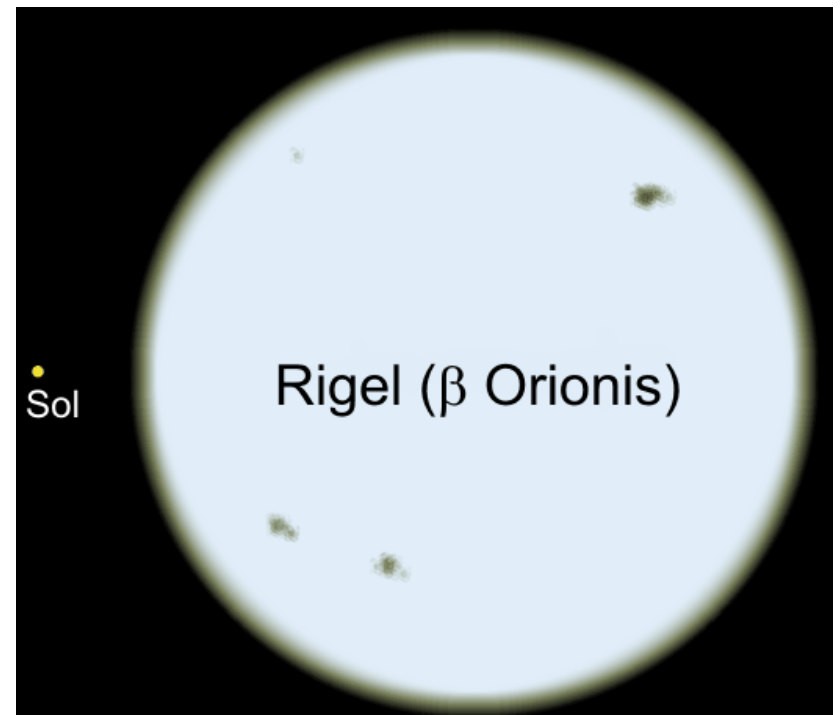
- Rigel is only 10 million years old, which is somewhat young for a star
- It is burning its hydrogen shell, and has a core of helium
- Soon, Rigel will be a Red Supergiant like its neighbor Betelgeuse
- Rigel will be a supernova when it dies

Neighbors

- Rigel is known to be part of a multiple star system
 - ▣ Rigel B is approximately 2000 AUs from Rigel
 - ▣ Rigel B a binary system with two stars, which are seldom differentiated and referred to collectively as Rigel B
 - ▣ Rigel B consists of two small main-sequence stars

Compared to the Sun

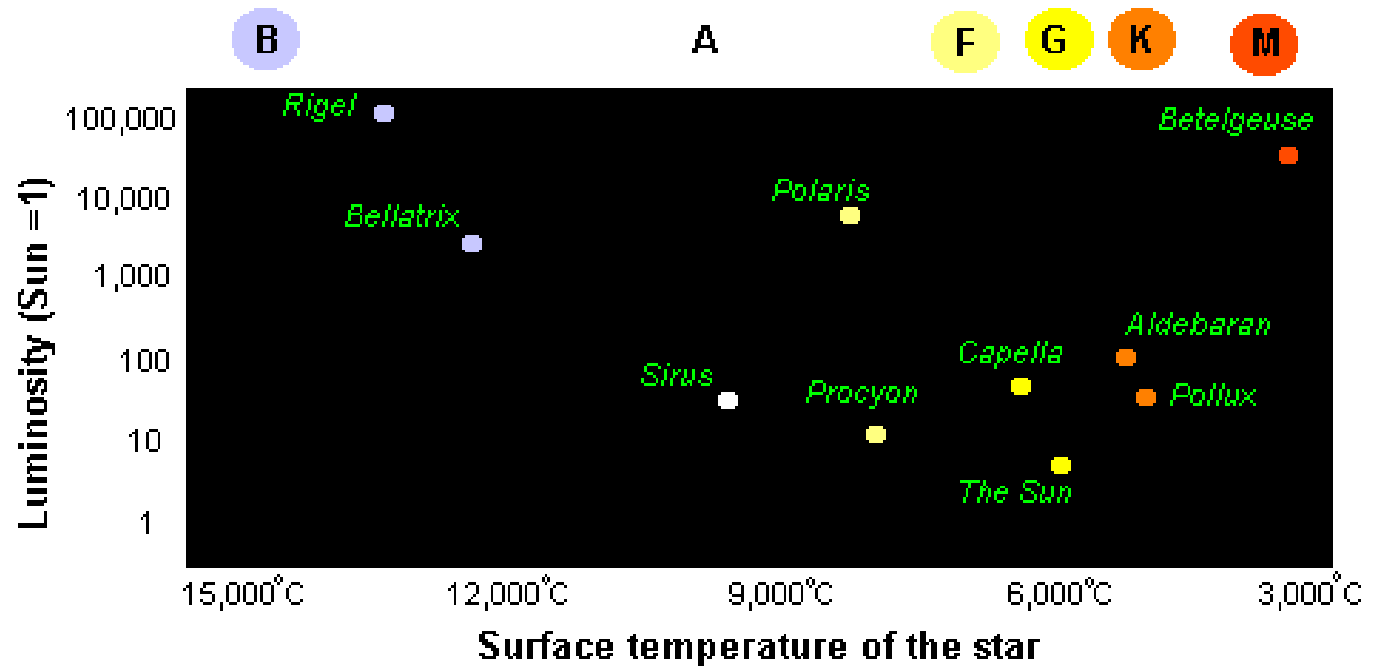
- If we orbited Rigel, we would need to be 200 times as far from the Sun as we are now to survive
 - ▣ The light would be “bluer”
- Rigel is 66,000 times more powerful than the Sun when all of its radiation (infrared, ultraviolet, etc.) is considered
- Rigel has a temperature of 11,000 K, which is low for Blue Supergiants



http://upload.wikimedia.org/wikipedia/commons/0/0c/Rigel_sun_comparison.png

Hertzsprung-Russell Diagram

Rigel is much hotter and brighter than the Sun, as seen on this HR diagram



http://www.synapses.co.uk/astro/hr_diag1.gif

How to Observe

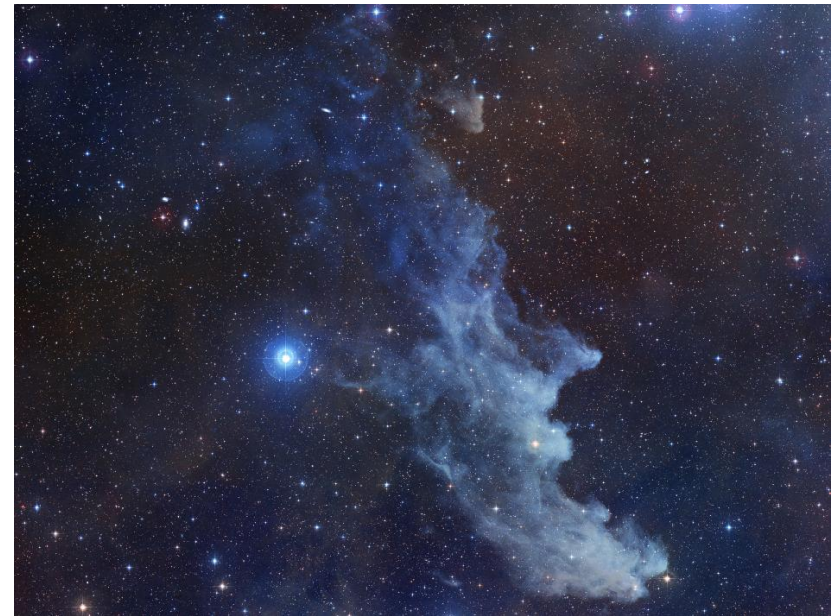
- Orion is visible in the east before dawn in late summer, but it is easiest to see soon after sunset in the early months of winter
- Look for three stars that form a short, noticeable line – this is Orion's belt
 - ▣ A line at a 90° angle from the belt will end in Rigel
 - ▣ Sirius is nearby, but more east and south. It is much brighter than Rigel



<http://earthsky.org/brightest-stars/blue-white-rigel-is-orions-brightest-star>

The Witch-Head Nebula

- This nebula is located ~40 light years from Rigel, and yet we can see it because of Rigel's light. That's how luminous Rigel is!



<http://jane.whiteoaks.com/wp-content/uploads/2009/10/Witch-Head-Nebula.jpg>



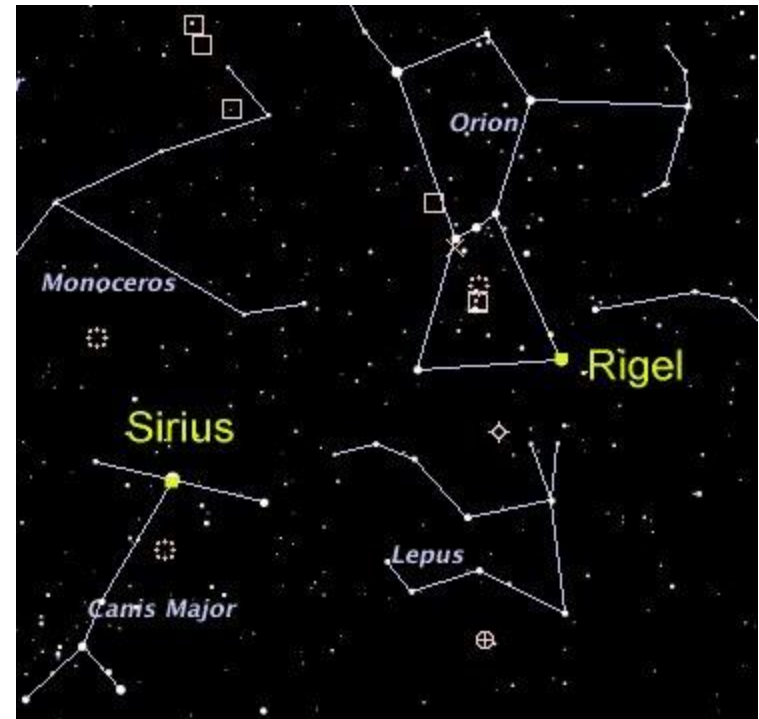
History, Myth, and Culture

History

- A 10th century Persian astronomer called Rigel a herdsman with Betelgeuse, Bellatrix, and others as camels
- Modern name first appeared in writing in 1521

Constellation

- ❑ Rigel is in the constellation Orion, and comprises the hunter's left foot
- ❑ Various cultures have different stories and names regarding Rigel



http://2.bp.blogspot.com/_N-36xJMPdm4/R8_sy1WpsLI/AAAAA AAAAVE/105GZzEa_rA/s400/rigel%2Band%2Bsirius%2Bwith%2Blabels.jpg

Various Names

Origins of Modern Name

- Two Arabic names:
 - *“Riġl Ġawza al-Yusra”* (left foot of the central one)
 - *“riġl al-ġabbār”* (the foot of the great one)
 - Has the alternate Arabic names *Algebar* or *Elgebar*

Chinese

- Called *“Shēnxiù Qī”* (The Seventh of the Three Stars)
- The ancient Chinese observed an asterism (an official constellation) of three stars, and the name remained unchanged when more were added

Other Cultures

Japan

- Called Rigel “Genji-Boshi” (the Star of the Genji Clan)
 - ▣ The Genji Clan were the sons and grandsons of emperors who were ineligible to rule the country

Koori (Aboriginal Australians)

- Called Rigel “Yerrerdet-kurrk,” and believed it to be the mother in law to another star called Altair. This distance between these two stars symbolized the taboo of a relationship between a man and his mother in law

Norse Mythology

- The ancient Norse identified the constellation Orion as Orwandil, and believed him to be traveling with Thor
 - ▣ When Orwandil was traveling with Thor (the king of Norse Gods), his big toe was frozen while crossing a river and Thor broke the digit off and threw it into the sky, becoming Alcor in Ursa Major. The remaining toe is Rigel

Greek Mythology

- Orion was an arrogant hunter who set out to kill every animal on earth, and was punished for his attitude by the Mother of the Earth, Gaia
- Gaia sent a scorpion to sting Orion, and after a quick battle the scorpion stung Orion in the heel, which we now see as Rigel

In Science Fiction

Books

- Rigel is so well-known that some authors have imagined its vicinity
 - ▣ E.E. Smith's *Lensman* series mentions a planet called Rigel IV which was home to "Rigellians"
 - ▣ Jack Vance imaged it to have 26 inhabited planets in *Demon Prince*

Star Trek

- Rigel has numerous mentions in the series, and the planets Rigel II, IV, V, VII, and XII are all mentioned, despite the fact that actual science does not believe that Rigel has any planets whatsoever



Rigel VII

<http://www.daviddarling.info/encyclopedia/R/Rigel.html>

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