



# Temecula Valley Astronomer

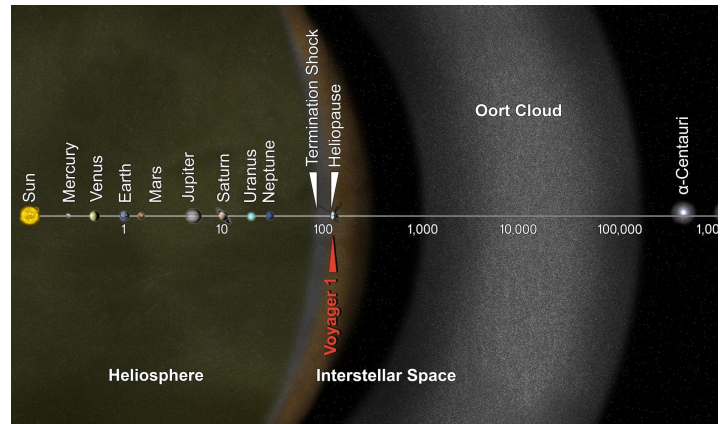
The monthly newsletter of the Temecula Valley Astronomers Feb 2020

## Events:

### General Meeting :

**Monday, February 3rd, 2020 at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, at 7:00 PM. On the agenda this month is “What’s Up” by Sam Pitts, “Mission Briefing” by Clark Williams then followed by a presentation topic : “A History of Palomar Observatory” by Curtis Croulet. Refreshments by Chuck Dyson.**

**Please consider helping out at one of the many Star Parties coming up over the next few months. For the latest schedule, check the Calendar on the [web page](#).**



*Oort Cloud in Perspective. Credit [NASA / JPL-Caltech](#)*

### General information:

Subscription to the TVA is included in the annual \$25 membership (regular members) donation (\$9 student; \$35 family).

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Club Librarian: Vacant

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## WHAT'S INSIDE THIS MONTH:

### Cosmic Comments

by President Mark Baker

### Looking Up Redux

compiled by Clark Williams

### Darkness

by Mark DiVecchio

### Betelgeuse and the Crab Nebula: Stellar

Death and Rebirth

by David Prosper

Send newsletter submissions to Mark DiVecchio [<markd@silologic.com>](mailto:markd@silologic.com) by the 20<sup>th</sup> of the month for the next month's issue.

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## Cosmic Comments by President Mark Baker

As I mentioned in January, the key word for me this year will be MISSIONS...!!! There are currently over 100 missions from above our atmosphere to out past the edge of the heliosphere, and they are the work of diverse countries, corporations, and cooperatives...all driven by the desire to not just look up anymore, but to go and see and touch for ourselves!! But all inspired because we DID look up...

Soooo...how many missions can you name and even describe their purpose?? How about:

CHEOPS  
Chang'e 4  
EXOMars  
Hera  
OSIRIS-Rex  
Dragonfly  
Lightsail  
SDO

Any ring a bell?? Are you ready to [google](#) them and find out more about them and all the others not listed?? What you don't look into or hear about, we hope to bring to you this year in the mission segment of the monthly TVA meetings, so don't despair...there are wondrous things abroad!!!

The best part about TVA, for me, is that we have Club meetings and events, do Star Parties, mentor school clubs, and WE get to turn around and inspire many to jump in and get involved...we are every bit a part of the ever growing big picture, and how can you not be excited??!!!

So here's to, again, an awesome 2020, where TVA will get to learn about humanities efforts off-planet and hopefully share those exciting and inspirational activities with family, friends, and community...and yes, "The Stars Are Calling, So We Must Go"!!

Clear, Dark Skies my Friends...





## Looking Up Redux compiled by Clark Williams

from these sources:

SeaSky.org

Wikipedia.com

in-the-sky.org

The American Meteor Society, Ltd.

cometwatch.co.uk

NASA.gov

TVA App (2.0.1296)

FullAndNewMoon App (2.0)

Starry Night Pro Plus 7 (7.6.3.1373)

SkySafari 6 Pro (6.1.1)

Stellarium (0.18.2)

timeanddate.com/astronomy



### ALL TIMES ARE LOCAL PACIFIC TIME (PDT / PST) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)

hh:mm:ss or hhmmss

hhmm+ (time of the next day)

hhmm- (time of the previous day)

hhmm (seconds not shown)<sup>i</sup>

yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

#### Moon Phases for the month by date:

**Saturday** the 1<sup>st</sup> @ 1742 FIRST QTR in ARIES  
**Saturday** the 8<sup>th</sup> @ 2344 FULL in LEO  
**Saturday** the 15<sup>th</sup> @ 1418 THIRD QTR in LIBRA  
**Sunday** the 23<sup>rd</sup> @ 0733 NEW in AQUARIUS

Apogee comes on 2020-02-26 @ 1136 - 406,276 km (252,448 mi)

Perigee comes on 2020-02-10 @ 2032 - 360,463 km (223,982 mi)

2020 has: (12) new moons, (13) 1<sup>st</sup> Qtr moons, (13) Full moons, (12) 3<sup>rd</sup> Qtr moons

(1) Blue moon and (0) Black moons

**Daylight Savings:** Starts: 2020-Mar-08 : Ends: 2020-Nov-01

**Luna:** Luna is in First Quarter on the 1<sup>st</sup> of the month setting by **0036**. Luna by mid-month is 46% illuminated. Luna is rising late at 0059+ and setting in late morning at **1140+**. By the-end-of-the-month Luna is once again a waxing crescent moon, 34% illuminated setting by **2324**.



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**Highlights:** (distilled from: [SeaSky.org](http://SeaSky.org) and Clark's planetary Orrey program[s])

February 8 - Full Moon, Supermoon\*. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at **2344**. This full moon was known by early Native American tribes as the Full Snow Moon because the heaviest snows usually fell during this time of the year. Since hunting is difficult, this moon has also been known by some tribes as the Full Hunger Moon, since the harsh weather made hunting difficult. This is also the first of four supermoons\* for 2020. The Moon will be at its closest approach to the Earth and may look slightly larger and brighter than usual.

February 10 - Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 18.2 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

February 23 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at **0733**. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

\* Supermoon is an Astrology term not an Astronomy term.



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## Algol minima: (All times Pacific Time)

<b>02/03/20</b>	<b>0031</b>
<b>02/05/20</b>	<b>0921</b>
<b>02/08/20</b>	<b>1810</b>
<b>02/11/20</b>	<b>1459</b>
<b>02/14/20</b>	<b>1149</b>
<b>02/17/20</b>	<b>0834</b>
<b>02/20/20</b>	<b>0527</b>
<b>02/23/20</b>	<b>0217</b>
<b>02/25/20</b>	<b>2306</b>
<b>02/28/20</b>	<b>0959</b>

## Sun and Moon Rise/Transit/Set Times

		<b>Rise</b>	<b>Transit</b>	<b>Set</b>
<b>02/01/20</b>	Sun	064405	120246	172128
	Moon	110736	174948	003618+
<b>02/15/20</b>	Sun	063204	120321	173441
	Moon	235420-	052703	105921
<b>02/29/20</b>	Sun	061625	120136	174655
	Moon	093830	162855	232400

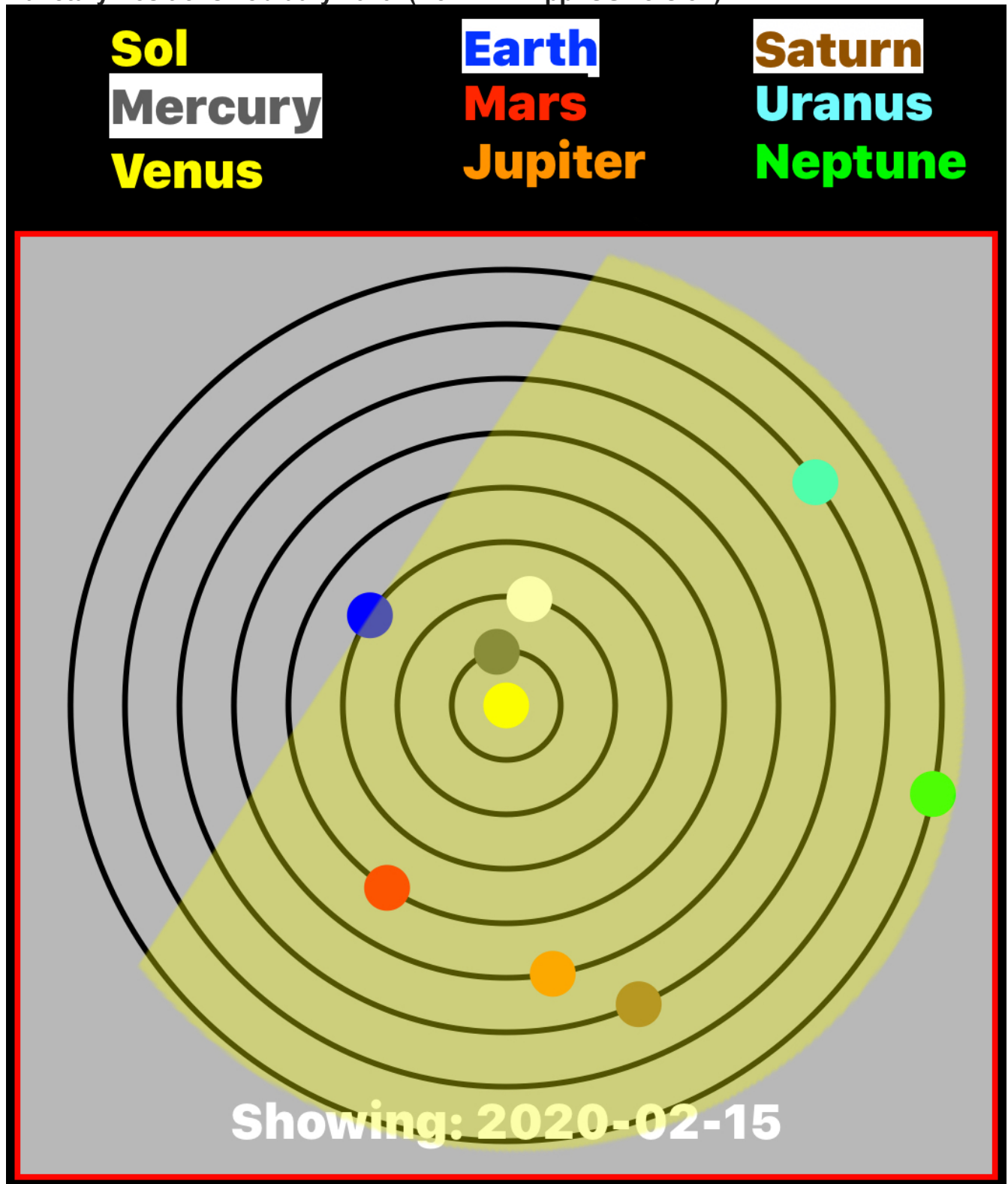


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Planets:

Planetary Positions February 2020: (from TVA App iOS version)





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- **Mercury:** Mercury is an evening object in the beginning of the month. It is well illuminated at 82% and -26.93 apparent magnitude and sets at **1831** with the sun preceding at **1721**. Mercury by mid-month is very close to Neptune within  $4^{\circ}.5$ , setting at **1851** following sunset at **1734**. By the 29<sup>th</sup> Mercury has become a morning object (sometime on the morning of the 24<sup>th</sup>) rising at 0543 preceding sunrise at **0616**.
- **Venus:** Is the Evening Star. Venus sets about **2033** following sunset at **1721** on the first. By mid-month Venus is setting at **2056** following Sol which set at **1734**. By the 29<sup>th</sup> Venus is setting at **2118** long after the **1746** sunset.
- **Mars:** Mars is a morning object. Leading the Sun, Mars rises at **0320** on the first. By mid-month Mars is rising at **0309**. End-of-month finds the Warrior rising at **0255**. So if you're a night-owl or an extremely early riser the Red Planet is coming back into view.
- **Jupiter:** Jupiter is a morning object on the first of the month rising at **0503** and preceding sunrise at **0644**. By mid-month Jove is rising at **0420** the sun follows at **0632**. Come the end of month Jupiter is peaking above the horizon by **0336** with sunrise at **0616**.
- **Saturn:** Saturn is trailing Jupiter and leading the Sun, Saturn rises about **0547** on the 1<sup>st</sup> while sunrise is at **0644**. Saturn by mid month is rising by **0457** preceding sunrise at **0632**. By the end-of-the-month Saturn is rising at **0408** followed by the sun at **0616**.
- **Uranus:** On the first Uranus doesn't set until **2341**. The apparent magnitude is 5.8 so we're right on the ragged edge of being naked-eye visible. Unfortunately the moon is only  $11^{\circ}.5$  east along the ecliptic. By the ides Uranus is transiting at **1611** and setting at **2247**. End-of-month finds Uranus setting at **2155**.
- **Neptune:** Neptune is trailing sunset at **1721**, setting at **2004** at the beginning of the month. Unfortunately there is a first quarter moon with 50% illumination sitting just  $55^{\circ}$  to the east along the Ecliptic. By the 15<sup>th</sup> Neptune is encroaching on the sun. Sunset is at **1734**. Neptune sets at **1911**. There is an 48% illuminated moon that night but it doesn't rise until **0059+**. By the end of the month Neptune is setting at **1818** and a waxing crescent moon is about  $62^{\circ}$  away with 33% illumination.
- **Pluto:** Pluto is lost to the glow of the sun during the first of the month. By mid-month Pluto is rising by **0450** preceding sunrise at **0632**. By the 29<sup>th</sup> Pluto is rising at **0356** followed by sunrise at **0616**. Pluto will be +14.39 apparent magnitude, so it will be difficult to find.

## Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2020 with a reasonable magnitude; say less than or equal to +10 in February there is nothing except the regulars: Juno, Vesta, Hebe, Eros and Herculina. So consult your local planetarium software or try <https://www.asteroidsnear.com/year?year=2020>.

## Meteors:

- Quadrantids  
Next period of activity: December 27th, 2019 to February 10th, 2020
- The Quadrantids have the potential to be the strongest shower of the year but usually fall short due to the short length of maximum activity (6 hours) and the poor weather experienced during early February. The average hourly rates one can expect under dark skies is 25. These meteors usually lack persistent trains but often produce bright fireballs. Due to the high northerly declination (celestial latitude) these meteors are not well seen from the southern hemisphere.





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Shower details: Radiant: 15:18 +49.5° - ZHR: 120

Velocity: 26 miles/sec (medium - 42.2km/sec) - Parent Object: 2003 EH (Asteroid)

Next Peak: The Quadrantids will next peak on the Jan 3-4, 2020 night. On this night, the moon will be 58% full.

- See Highlights above for more details. (SeaSky.org) (American Meteor Society)

**Comets:** come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The [Halley Types](#) are believe to come from the Kuiper Belt and have periods in excess of 20-years.
  - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
  - Short period comets February have a near circular orbit or an elliptical orbit. The latter being far more common.
- 2) Long Period comets – thought to originate from the [Oort cloud](#) these comets have periods of over 200 years and have random inclinations around the celestial sphere.

Nothing really available this month in comets.





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## Deep Sky:

Notes:

L/Z abbreviation for ALT/AZ

R/D abbreviation for Right Ascension/Declination

$\alpha$  is right ascension

$\delta$  is declination

In each case, unless otherwise noted, you should look for the following on or about the 15<sup>th</sup> Day of February 2020 at 2100 PDT and you will have about 20 minutes of viewing time total.

Lets look for some familiar objects:

### **Sigma Orionis:**



*Credit: ESO and Digitized Sky Survey 2 -*

<http://www.eso.org/public/images/eso0949k/>, CC BY 4.0,

<https://commons.wikimedia.org/w/index.php?curid=29936747>



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Sigma Ori ( $\sigma$  Orionis,  $\sigma$  Ori) is a multiple star system in the constellation Orion, consisting of the brightest members of a young open cluster. It is found at the eastern end of the belt, south west of [Alnitak](#) and west of the Horsehead Nebula which it partially illuminates. The total brightness of the component stars is magnitude 3.80.  $\sigma$  Orionis is a naked eye star at the eastern end of Orion's Belt, and has been known since antiquity, but it was not included in Ptolemy's Almagest. It was referred to by Al Sufi, but not formally listed in his catalogue. In more modern times, it was measured by Tycho Brahe and included in his catalogue. In Kepler's extension it is described as "Quae ultimam baltei praecedit ad austr." (preceding the outermost of the belt, to the south). It was then recorded by Johann Bayer in his Uranometria as a single star with the Greek letter  $\sigma$  (sigma). He described it as "in enfe, prima" (in the sword, first). It was also given the Flamsteed designation 48.

In 1776, [Christian Mayer](#) described  $\sigma$  Ori as a triple star, having seen components AB and E, and suspected another between the two. Component D was confirmed by FGW Struve who also added a fourth (C), published in 1876. In 1892 Sherburne Wesley Burnham reported that  $\sigma$  Ori A was itself a very close double, although a number of later observers failed to confirm it. In the second half of the twentieth century, the orbit of  $\sigma$  Ori A/B was solved and at the time was one of the most massive binaries known.

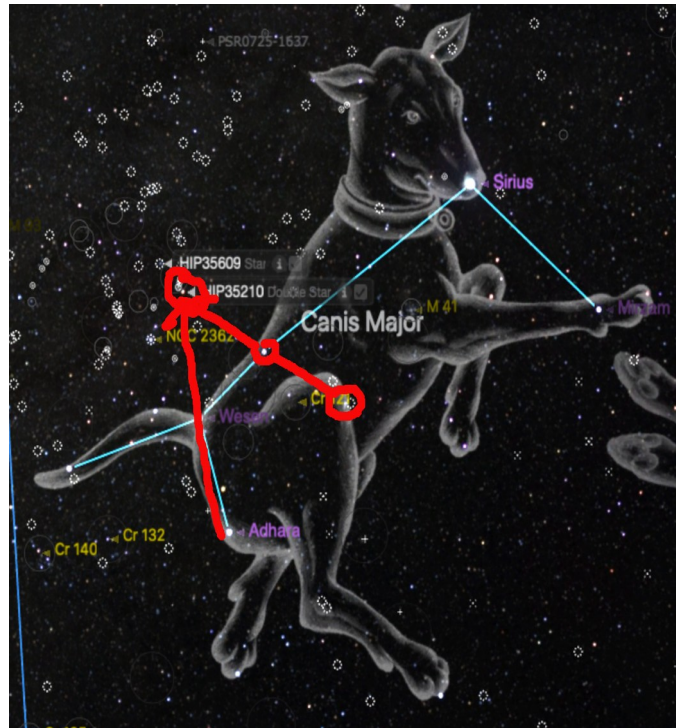
$\sigma$  Ori A was discovered to have a variable radial velocity in 1904, considered to indicate a single-lined spectroscopic binary. The spectral lines of the secondary were elusive and often not seen at all, possibly because they are broadened by rapid rotation. There was confusion over whether the reported spectroscopic binary status actually referred to the known visual companion B. Finally in 2011, it was confirmed that the system is triple, with an inner spectroscopic pair and a wider visual companion. The inner pair was resolved interferometrically in 2013.

[\$\sigma\$  Ori E](#) was identified as helium-rich in 1956, having variable radial velocity in 1959, having variable emission features in 1974, having an abnormally strong magnetic field in 1978, being photometrically variable in 1977, and formally classified as a variable star in 1979. In 1996, a large number of low mass pre-main sequence stars were identified in the region of Orion's Belt. A particular close grouping was discovered to lie around  $\sigma$  Orionis. A large number of brown dwarfs were found in the same area and at the same distance as the bright  $\sigma$  Orionis stars. Optical, infrared, and x-ray objects in the cluster, including 115 non-members lying in the same direction, were listed in the Mayrit Catalogue with a running number, except for the central star which was listed simply as Mayrit AB.  
(Wikipedia)

## Winter Alberio:



*The following photo of the Winter Alberio by Mario Motta of Massachusetts*



**HD 56577** AKA: **CD-23° 5189**, **HIP 35210**, **HR 2764**, **SAO 173349**, a star in the constellation Canis Major. Its apparent magnitude is 4.84. It is a double star. It is often referred to as **The Winter Alberio** as it is quite similar in appearance to the well-known double **Alberio** in Cygnus. Possibly the most underrated double star in the sky. This double star is a challenge to find but it is well worth the effort. It is stunning and quite beautiful. ([Wikipedia](#))

February is great for both viewing and imaging. Spend some time outside with your scope. Winter is here.

For now – Keep looking up.



## Darkness by Mark DiVecchio

One of my passions is astronomy. I moved to Rainbow because the skies here were fairly dark while being still close to civilization. I like to setup my telescope and just look at the sky. The Moon, planets, stars and galaxies are there for our amazement.

This 3 part series talks about darkness, why is darkness important (not just to astronomers) and what we can do to keep the sky dark.

Acknowledgment: This series was produced with help from the **International Dark Sky Association** [www.darksky.org](http://www.darksky.org) .

### Chapter 1 Darkness

Did you know that the stars are part of our common heritage!

For millions of years, homo sapiens and their ancestors lived with the rhythms of the natural light-dark cycle of day and night. Due to artificial light, most of us no longer experience truly dark nights

The nighttime environment is a precious natural resource. Uncontrolled outdoor lighting hides the stars and changes our perception of the night. Until recently, our ancestors experienced a night sky brimming with stars that inspired science, religion, philosophy, art and literature.

#### Inspired by the Night

[Van Gogh](#) painted “Starry Night” in Saint Rémy, France, where the Milky Way can no longer be seen. If alive today, would he be inspired to paint this masterpiece? The night sky provides perspective and inspiration, allowing us to reflect on our humanity and place in the universe.





*Photo Credit : Babak Tafreshi*

## Discovering the Cosmos

The histories of scientific discovery and human curiosity are indebted to the natural night sky. Because of [light pollution](#), all new major astronomical observatories are being built far from civilization. Without the natural night sky we could not have

- Navigated the globe
- Walked on the moon
- Learned of our expanding universe
- Discovered humans are made of stardust

Only 2 out of 10 people on Earth can see the Milky Way. 99% of the USA and Europe live under light polluted skies and light pollution is increasing at 2% per year

“All humans have a connection to the sky. People will talk about their first experience of a night sky with a sense of awe and passion. It’s a reminder of the connection we have to the stars, of how important they’ve been for us, as far back as you want to go. We losing our connection to the sky. We’re so busy looking

down at our screens, and even if we were to look up, we couldn’t see anything.” [Duane Hamacher](#).

Let’s protect the natural night sky for future generations.

Next time, Chapter 2 Why is darkness important (and not just to astronomers)?



## Betelgeuse and the Crab Nebula: Stellar Death and Rebirth

by David Prosper

What happens when a star dies? Stargazers are paying close attention to the red giant star **Betelgeuse** since it recently dimmed in brightness, causing speculation that it may soon end in a brilliant supernova. While it likely won't explode quite yet, we can preview its fate by observing the nearby **Crab Nebula**.

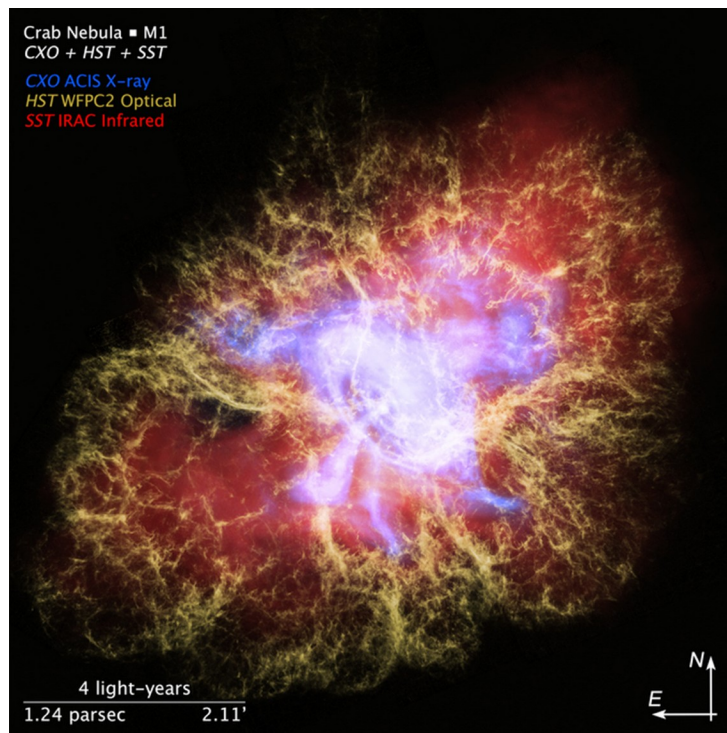
**Betelgeuse**, despite its recent dimming, is still easy to find as the red-hued shoulder star of Orion. A known variable star, Betelgeuse usually competes for the position of the brightest star in Orion with brilliant blue-white Rigel, but recently its brightness has faded to below that of nearby Aldebaran, in Taurus. Betelgeuse is a young star, estimated to be a few million years old, but due to its giant size it leads a fast and furious life. This massive star, known as a supergiant, exhausted the hydrogen fuel in its core and began to fuse helium instead, which caused the outer layers of the star to cool and swell dramatically in size. Betelgeuse is one of the only stars for which we have any kind of detailed surface observations due to its huge size – somewhere between the diameter of the orbits of Mars and Jupiter - and relatively close distance of about 642 light-years. Betelgeuse is also a “runaway star,” with its remarkable speed possibly triggered by merging with a smaller companion star. If that is the case, Betelgeuse may actually have millions of years left! So, Betelgeuse may not explode soon after all; or it might explode tomorrow! We have much more to learn about this intriguing star.

The **Crab Nebula** (M1) is relatively close to Betelgeuse in the sky, in the nearby constellation of Taurus. Its ghostly, spidery gas clouds result from a massive explosion; a supernova observed by astronomers in 1054! A backyard telescope allows you to see some details, but only advanced telescopes reveal the rapidly spinning neutron star found in its center: the last stellar remnant from that cataclysmic event. These gas clouds were created during the giant star's violent demise and expand ever outward to enrich the universe with heavy elements like silicon, iron, and nickel. These element-rich clouds are like a cosmic fertilizer, making rocky planets like our own Earth possible. Supernova also send out powerful shock waves that help trigger star formation. In fact, if it wasn't for a long-ago supernova, our solar system - along with all of us - wouldn't exist! You can learn much more about the Crab Nebula and its neutron star in a new video from NASA's Universe of Learning, created from observations by the Great Observatories of Hubble, Chandra, and Spitzer: [bit.ly/CrabNebulaVisual](http://bit.ly/CrabNebulaVisual)

Our last three articles covered the life cycle of stars from observing two neighboring constellations: Orion and Taurus! Our stargazing took us to the “baby stars” found in the stellar nursery of the Orion Nebula, onwards to the teenage stars of the Pleiades and young adult stars of the Hyades, and ended with dying Betelgeuse and the stellar corpse of the Crab Nebula. Want to know more about the life cycle of stars? Explore stellar evolution with “The Lives of Stars” activity and handout: [bit.ly/starlifeanddeath](http://bit.ly/starlifeanddeath) .

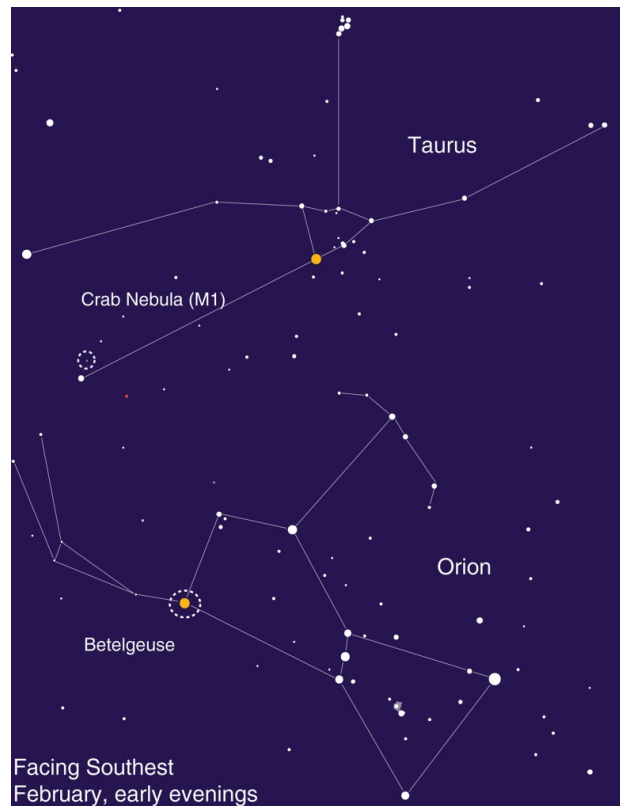


Check out NASA's most up to date observations of supernova and their remains at [nasa.gov](http://nasa.gov)



*This image of the Crab Nebula combines X-ray observations from Chandra, optical observations from Hubble, and infrared observations from Spitzer to reveal intricate detail. Notice how the violent energy radiates out from the rapidly spinning neutron star in the center of the nebula (also known as a pulsar) and heats up the surrounding gas. More about this incredible “pulsar wind nebula” can be found at [bit.ly/Crab3D](http://bit.ly/Crab3D) Credit: NASA, ESA, F. Summers, J. Olmsted, L. Hustak, J. DePasquale and G. Bacon (STScI), N. Wolk (CfA), and R. Hurt (Caltech/IPAC)*





*Betelgeuse and the Crab Nebula after sunset! A telescope is needed to spot the ghostly Crab.*

### **This article is distributed by NASA Night Sky Network**

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit <https://nightsky.jpl.nasa.org> to find local clubs, events, and more!





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The TVA is a member club of [The Astronomical League](#).



