The Bays Mountain Astronomy Club Newsletter

November 2022

Kingsport, TN

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Cosmic Reflections

William Troxel - BMAC Chair

reetings Fellow BMACers!

StarFest is HERE! We will not have a regular club meeting in November due to the timing of StarFest. I will be taking pictures of the event and will share them in the next issue.

Last month we enjoyed "Sun Struck" in the planetarium theater along with a quick overview of the night sky to get ready for fall observing.

I look forward to seeing you in December. Details of that meeting will be forthcoming, so be looking for them. For now, I can share that we'll have a great meeting learning from one of our own university educators, Nate Wentzel from Milligan University. Have a great month of November!

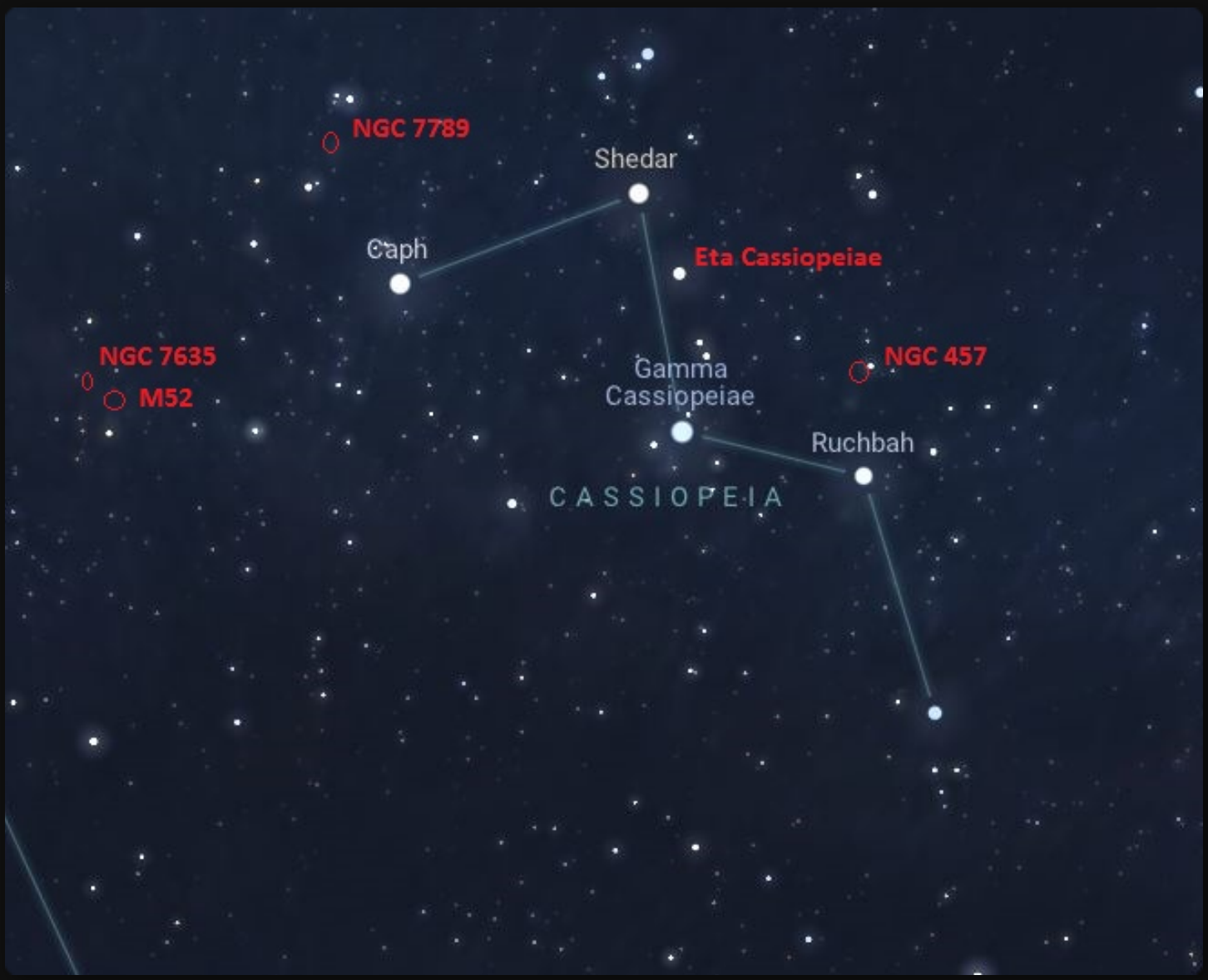
Until next time, Clear Skies....

Stellar Observations

Greg Penner

A "W" For November

If you are a sports fan, you know that in the sports world "getting a W" means getting a win. If you enjoy astronomy, you can have a winning night of stargazing by scanning the objects in and around a stellar "W" in the November night sky. The constellation Cassiopeia represents a queen of Greek mythology sitting on her throne. The primary stars of the constellation form a distinctive "W" shape high in the northern sky this time of year. The stars that make up the "W" are all in the +2 to +3 magnitude range, although the star at the middle point of the "W", Gamma Cassiopeiae, is an eruptive variable star with an apparent magnitude varying between +1.6 and +3.0. The eruptive nature of the star comes from the fact that it rotates incredibly fast, 900,000 miles per hour! The forces caused by this fast rotation cause the star to occasionally eject matter which forms a disk of orbiting material, thereby causing temporary changes in the star's observed brightness.



Cassiopeia - Stellarium image annotated with objects mentioned in article.

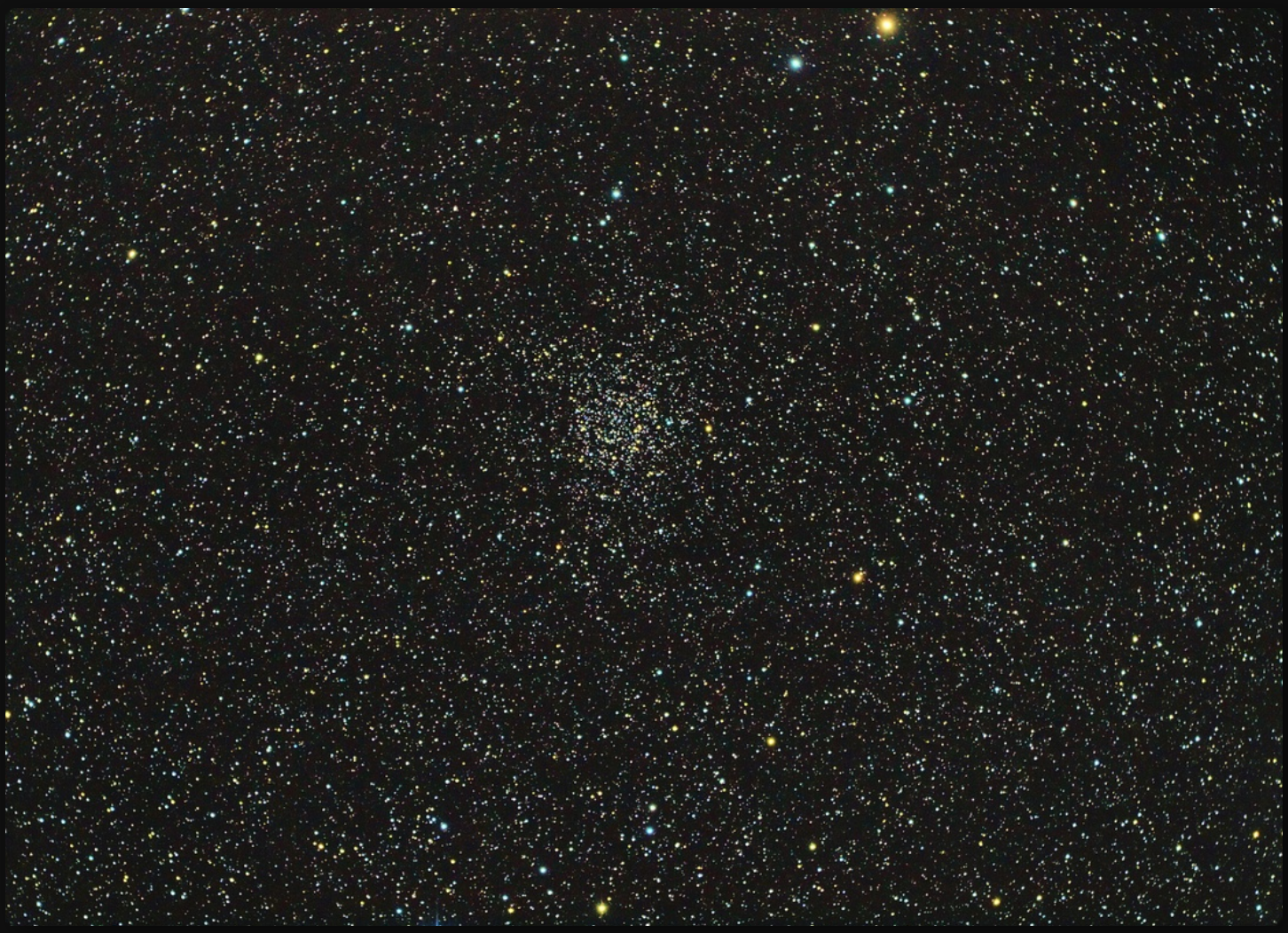
Another interesting star near the "W" is Eta Cassiopeiae. Eta is an attractive double star with some notable characteristics. First, it is only about 19 light years distant. There are only a few dozen stars closer to our Solar System. Second, the main component is a star that is nearly the same size and brightness as our Sun. Finally, the pair display some nicely contrasting colors described as yellow and reddish-purple. The apparent magnitudes of the components are +3.4 and +7.4 and are separated by 13 arc-seconds. The Cambridge Double Star Atlas describes Eta as the "Easter Egg" double because of the nice color characteristics. I have viewed Eta in my 90mm refractor and can definitely attest to the attractive color combination (see attached photo).

Eta Cassiopeiae - image by Greg Penner.

Going deeper to see beyond the brightest stars can also be a win. Cassiopeia is situated in the direction of the Milky Way plane in the outward direction and thus contains many galactic star clusters worth observing. NGC 457 is an open cluster of about 80 stars and is also referred to as the "Owl Cluster" or the "E.T. Cluster" because it looks like an owl's face or skinny figure with 2 bright eyes. The two bright eyes are the brightest components of multiple star Phi Cassiopeiae. The distance to Phi is still not a confirmed figure, so it is unclear whether it is a physical member of the NGC 457 group or a foreground star.

*NGC 457 - from **Wikipedia***

NGC 7789 is a very rewarding star cluster to view through any size telescope. Located about 3 degrees southwest of Beta Cassiopeiae (halfway between two 4th magnitude stars) this open cluster is fairly large with an apparent diameter nearly the same as the Moon and contains about 300 stars. Discovered in the late 18th century by astronomer Caroline Herschel, this cluster is also known as Caroline's Rose in her honor. Through a telescope of modest aperture (6" or more) the cluster's pattern of stars and dark voids gives an appearance of rose petals. Another description noted by observers is that of a crab due to the rays of stars. What pattern or shapes can you see in this fine cluster?



*NGC 7789 - from **Wikipedia***

Finally, we can visit a Messier object that resides in Cassiopeia by following a line connecting the two brightest stars of the "W." Following a line from Alpha Cass to Beta Cass takes you to M52, a sparkling open cluster with about 100 stars. This cluster is somewhat more condensed than other open clusters so that it almost resembles a globular cluster.

*M52 - from **Wikipedia***

Only about ½ degree southwest of M52 is the very interesting nebula NGC 7635, also known as the Bubble Nebula. The Bubble Nebula is 7,100 light-years from Earth and was discovered in 1787 by William Herschel. The central bubble is seven light-years wide. The star is about 4 million years old and in 10 million to 20 million years it will likely detonate as a supernova. This nebula will be quite a challenge to observe visually. I plan to make an attempt with my 12.5" reflector using various filters to see if I can capture a glimpse.

NGC 7635 - NASA HST image

Whatever type of equipment you have for observing this part of the sky, the area around the "W" of Cassiopeia will result in a winning night of stargazing. Hopefully you can enjoy some or all of these objects on a cool, crisp November evening!

The Queen Speaks

Robin Byrne

Happy Birthday Louis Daguerre

This month we celebrate the life of a man whose work would start the field of astrophotography. On November 18, 1787, Louis Daguerre was born to Louis and Anne Daguerre in Cormeilles-en-Parisis, France.

Not long after his birth, the Daguerre family moved to Orléans, France. The early education of Louis is not known, but he must have shown a talent for art. With what little money his family had, they made sure that Louis could pursue his abilities. He was sent to Paris to be an apprentice for Pierre Prévost. During this apprenticeship, Louis learned about architecture, theatre design, and painting panoramas.

After his apprenticeship, Louis remained in Paris, working as a painter for opera companies, creating scenic designs and sets. It was during this time that he met Louise Georgina Arrow-Smith. They married on November 10, 1810. It is not known if they had children.

Daguerreotype of Louis Daguerre (1787-1851) by Jean-Baptiste Sabatier-Blot.

In the 1820's Daguerre began experimenting with painting on semi-transparent materials and using different lighting effects. By painting different images on opposite sides of the canvas, and changing whether it was lit from the front, back, or at different angles, you could create the effect of a changing image, resulting in the illusion of motion. This led to his first major venture. With Charles Marie Bouton, a skilled painter, they opened a diorama theatre in a building connected to Daguerre's studio. The grand opening occurred on July 11, 1822. The audience of about 300 people entered into a round room, facing an opening in the wall. Behind the opening was a painting measuring 45 feet tall and 70 feet wide. For the next 15 minutes, the image would appear to slowly transform before the audience's eyes. At the end of the transformation, the floor and wall opening would slowly rotate to reveal a second tableaux with similar changing effects. Some of the scenes included paintings that looked like a train moving across the image, or a town before and after an earthquake. Typically, one of the tableaux would be painted by Daguerre, and one by

Bouton. Eventually, Bouton moved on, and Daguerre continued alone.

Around the same time that Daguerre was presenting his dioramas, Nicéphore Niépce developed the process of creating the first photographs. This initial process required exposures of hours to days, which was not practical for photographing anything other than stationary buildings or landscapes. In his work on the diorama paintings, Daguerre frequently used a camera obscura, which made use of a lens to project an image onto a frosted piece of glass for viewing, but this process did not record the image. In 1829, Daguerre began working with Niépce in the hopes of developing a better way to preserve images. After three years of work, they had developed a process, called Physautotype, that could take a picture with an exposure time less than eight hours. Still a long time, but an improvement.

In 1833, Niépce unexpectedly died. Daguerre continued with the experiments they had begun. He started working with a

sheet of copper that was coated with a thin layer of silver. This was exposed to vapor from iodine crystals, which reacted with the silver, creating silver iodide, which is sensitive to light. However, this material still required long exposure times for an image to appear. Unlike more modern photography, there was no development process. The plate was exposed until an image could be seen, at which point the remaining silver iodide was washed off. What Daguerre discovered was a way to cause an invisible image to appear through the process of development. Legend has it that an accident in the lab led to Daguerre's breakthrough. According to the story, a broken thermometer resulted in a partially exposed plate being subjected to mercury vapor. The mercury vapor caused an image to "magically" appear on a plate that still looked blank. This new technique led to the ability to capture an image in 30 minutes, instead of many hours. The Daguerrotype was born!

Daguerre had hoped to interest investors in backing the production of his invention, but couldn't find anyone willing to financially support him. So, instead, on January 7 1839,

Daguerre presented his invention at an assembly of the French Academy of Sciences and the Académie des Beaux Arts. Careful to protect his intellectual property, Daguerre described the process in vague terms, but did invite the members to his studio to view examples of the images he captured. Later, Daguerre privately explained everything in detail to the Academy's secretary, the astronomer François Arago. Arago was also a member of the French legislature and he was able to work out an arrangement in which the rights to the process were purchased by the French government. For this work, Daguerre, as well as the son of Niépce, would receive a lifetime pension. The details of the process were then made public by the French government on August 19, 1839. Only a few days prior to this announcement, Miles Berry, on behalf of Daguerre, had applied for a patent on the process in England. Because of this, while France released the Daguerrotype process "free to the world," England was excluded from the deal and was required to pay license fees to use the method. Daguerrotypes quickly became

all the rage around the globe - except in England, where other photographic techniques were implemented instead.

Boulevard du Temple, Paris, IIIe arrondissement, Daguerreotype. The first surviving picture of a living person, taken in 1838. The image shows a busy street, but due to exposure time of more than ten minutes, the traffic was moving too much to appear. The exception is the man at the bottom right, who stood still getting his boots polished long enough to show. Look closely and you will also see another man sitting on a bench to the left reading a newspaper. Also, in the upper right hand side, you can see another man standing under the awning of the 3rd building from the right. Speculatively, there could be a woman standing under the street lantern at 2 o'clock from the man getting his shoes shined and another one in the big white building, right column, 3rd window down as well as a face in the top floor window of the white building in front.

While Daguerrotypes were used mostly for portraits and landscapes, they also opened up the possibility to photograph something never before possible - astronomical objects. It is thought that Daguerre himself was the first to use this method to photograph the Moon, to the great surprise of Arago. His image was reportedly taken on January 2, 1839. Sadly, this and most of his first images were destroyed in a fire that burned down his studio and diorama theatre in March of that year. In America, John William Draper took the first Moon image on a Daguerrotype that is still preserved. Draper also partnered with William Cranch Bond to take a Daguerrotype of the star Vega in 1850. A pair of physicists took a Daguerrotype of the Sun which had enough detail to even show sunspots.

As he got older, Daguerre chose a quieter life in the Paris suburbs, where he worked painting dioramas for churches. On July 10, 1851, Louis Daguerre suffered a fatal heart attack at the age of 63. He was buried in Bry-sur-Marne.

Louis Daguerre is not a typical household name, but his contributions to society are well known. His name lives on, not only in the form of his photographic process, but also as one of only 72 notable names chosen to be inscribed on the Eiffel Tower. Now thought of as the father of modern photography, Daguerre could also be called the father of astrophotography. Whether taking a shot of the Moon with your cell phone, or creating amazing stacked images of nebulae and galaxies, take a moment to thank the man who gave us the first tools used to record the beauty of the night sky - Louis Daguerre

References:

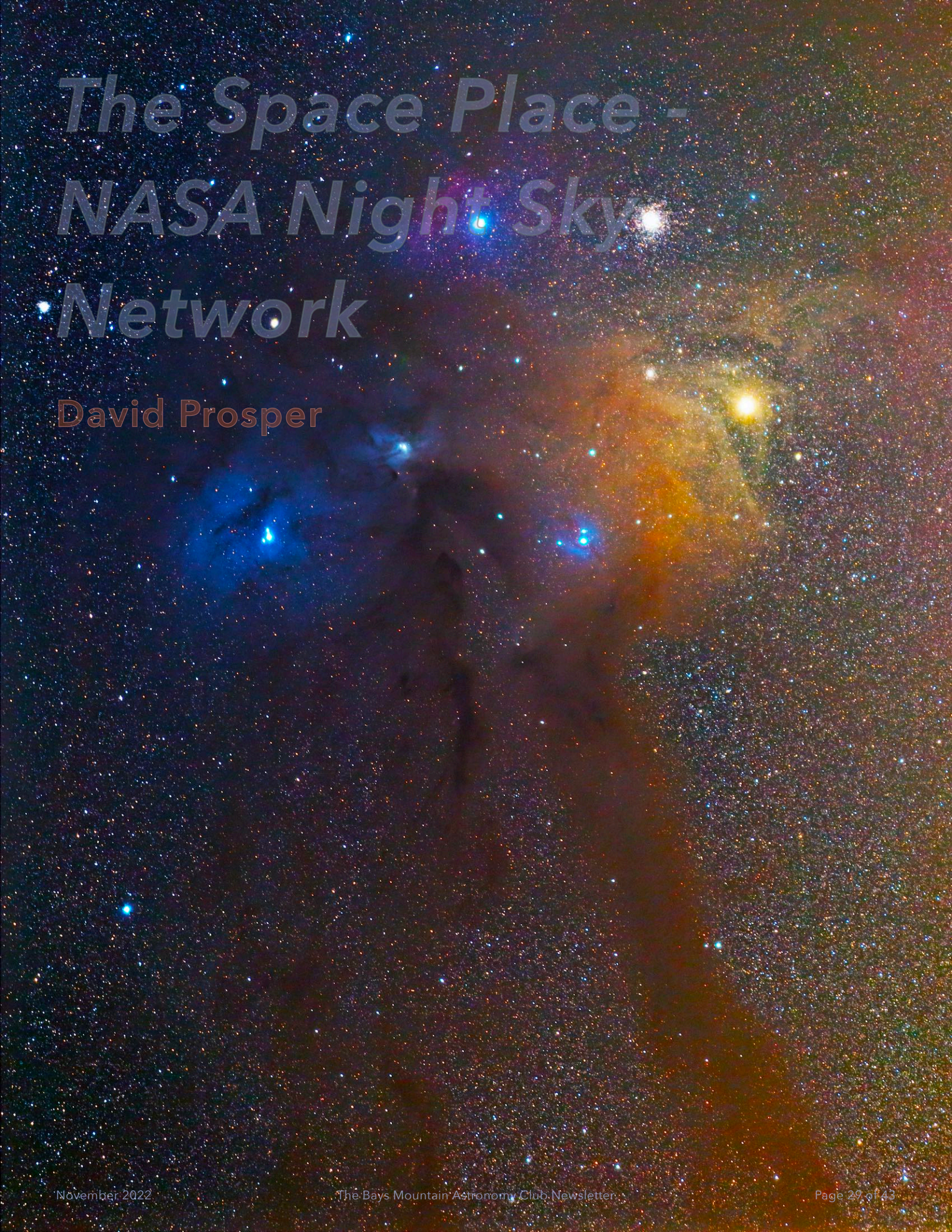
Louis Daguerre - Wikipedia

Daguerre (1787-1851) and the Invention of Photography by Malcolm Daniel, Department of Photographs, Metropolitan Museum of Art, October 2004

Louis Daguerre Biography - Invention of Daguerreotype, Photography History Facts

Biography of Louis Daguerre, Inventor of Daguerreotype Photography, ThoughtCo.

This Month in Physics: January 2, 1839: First Daguerrotype of the Moon, January 2013 by Michael Lucibella



The Space Place - NASA Night Sky Network

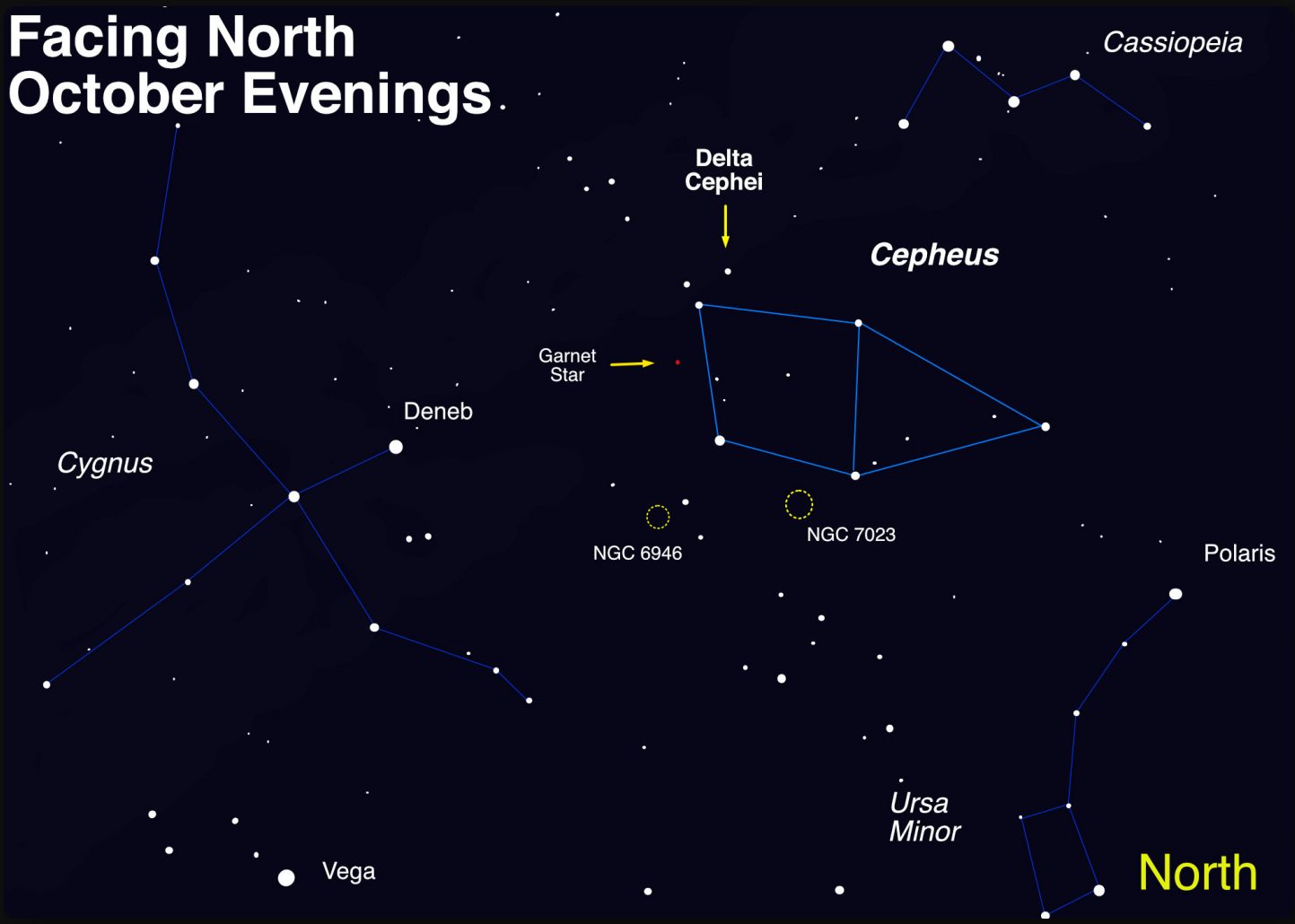
David Prosper

Cepheus: A House Fit for a King

ometimes constellations look like their namesake, and sometimes these starry patterns look like something else entirely. That's the case for many stargazers upon identifying the constellation of Cepheus for the first time. These stars represent Cepheus, the King of Ethiopia, sitting on his throne. However, many present-day observers see the outline of a simple house, complete with peaked roof, instead – quite a difference! Astronomers have another association with this northern constellation; inside its borders lies the namesake of one of the most important types of stars in modern astronomy: Delta Cephei, the original Cepheid Variable.

Cepheus is a circumpolar constellation for most observers located in mid-northern latitudes and above, meaning it does not set, or dip below the horizon. This means Cepheus is visible all night long and can be observed to swing around the northern celestial pole, anchored by Polaris, the current North

Star. Other circumpolar constellations include Cassiopeia, Ursa Major, Ursa Minor, Draco and Camelopardalis. Its all-night position for many stargazers brings with it some interesting objects to observe. Among them: the “Garnet Star” Mu Cephei, a supergiant star with an especially deep red hue; several binary stars; several nebulae, including the notable reflection nebula NGC 7023; and the “Fireworks Galaxy” NGC 6946, known for a surprising amount of supernovae.



The stars of Cepheus are visible all year round for many in the Northern Hemisphere, but fall months offer some of the best views of this circumpolar constellation to warmly-dressed observers. Just look northwards! Image created with assistance from ***Stellarium****.*

Perhaps the most famous, and certainly the most notable object in Cepheus, is the star Delta Cephei. Its variable nature was first discovered by John Goodricke, whose observations of the star began in October 1784. Slightly more than a century later, Henrietta Leavitt studied the variable stars found in the Magellanic Clouds in 1908 and discovered that the type of variable stars represented by Delta Cephei possessed very consistent relationships between their luminosity (total amount of light emitted) and their pulsation period (generally, the length of time in which the star goes through a cycle of where it dims and then brightens). Once the period for a Cepheid Variable (or Cepheid) is known, its luminosity can be calculated by using the scale originally developed by Henrietta Leavitt, now called “Leavitt’s Law.” So, if a star is found to be a Cepheid, its actual brightness can be calculated versus its observed brightness. From that difference, the Cepheid’s distance can then be estimated with a great deal of precision. This revolutionary discovery unlocked a key to measuring vast distances across the cosmos and in 1924, observations of

Cepheids by Edwin Hubble in what was then called the Andromeda Nebula proved that this “nebula” was actually another galaxy outside of our own Milky Way! You may now know this object as the “Andromeda Galaxy” or M31. Further observations of Cepheids in other galaxies gave rise to another astounding discovery: that our Universe is not static, but expanding!

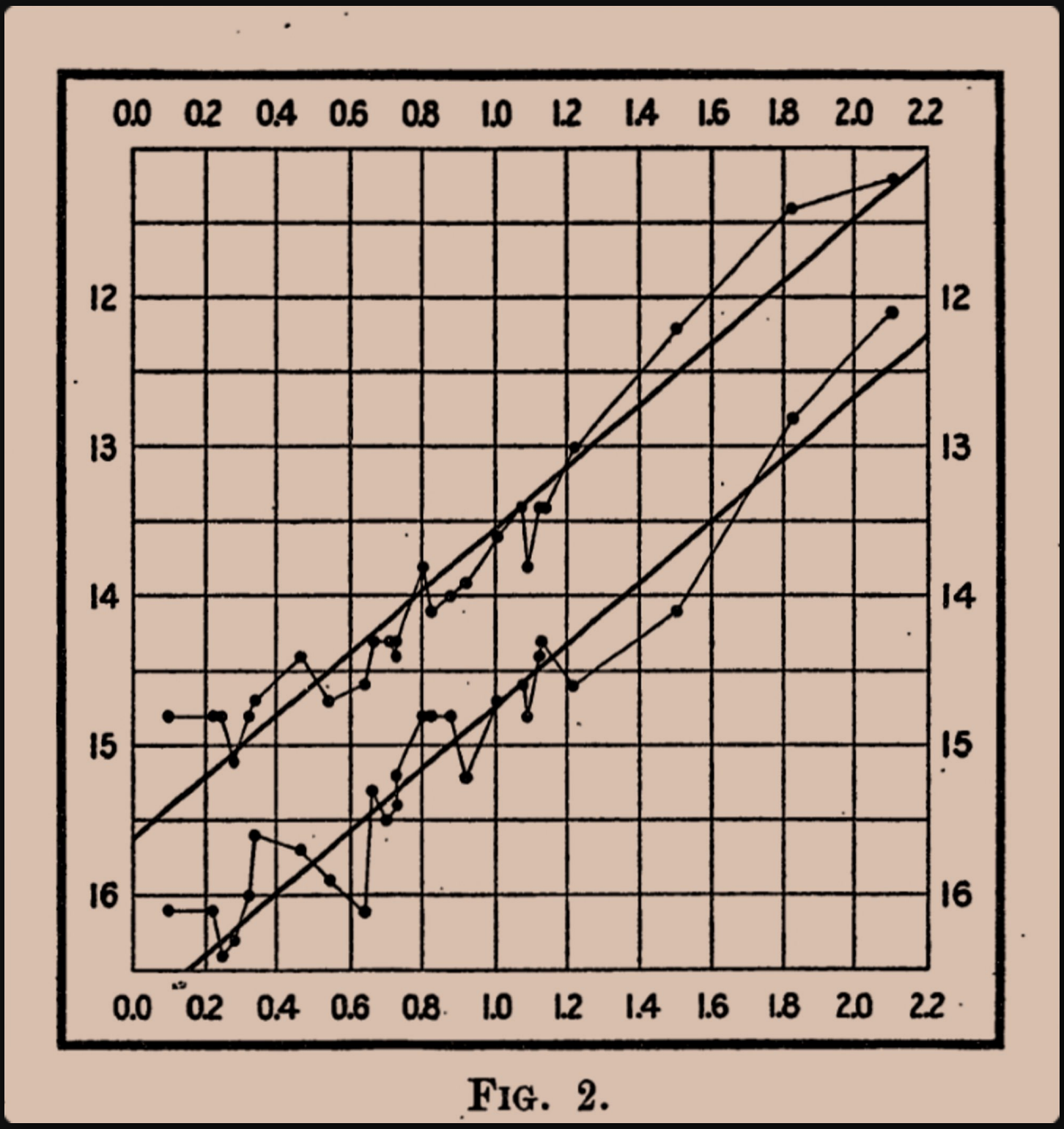


FIG. 2.

This historical diagram from Henrietta Leavitt's revolutionary publication shows the luminosity of a selection of Cepheid Variables on the vertical axis and the log of their periods on the horizontal axis. The line drawn through these points shows how tight that relationship is between all the stars in the series. From Henrietta Leavitt and Edward Pickering's 1912 ***paper****, "Periods of 25 Variable Stars in the Small Magellanic Cloud."*

Because of their importance as a “standard candle” in measuring cosmic distances, astronomers continue to study the nature of Cepheids. Their studies revealed that there are two distinct types of Cepheids: Classical and Type II. Delta Cephei is the second closest Cepheid to Earth after Polaris, and was even studied in detail by Edwin Hubble’s namesake telescope, NASA’s Hubble Space Telescope, in 2008. These studies, along with others performed by the ESA’s Hipparcos mission and other observatories, help to further refine the accuracy of distance measurements derived from observations of Cepheids. What will further observations of Delta Cephei and other Cepheids reveal about our Universe? Follow NASA’s latest observations of stars and galaxies across our Universe at **NASA**.

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 **nightsky** to find local clubs, events, and more!

BMAC Calendar & More

Calendar:

MAC Meetings:

- Friday, December 2, 2022 - 7p - Planetarium Theater. Nate Wentzel, BMACer and Assistant Professor of Physics at Milligan University, will present.
- Friday, February 3, 2023 - 7p - Topic TBA.
- Friday, March 3, 2023 - 7p - Topic TBA.
- Friday, April 7, 2023 - 7p - Topic TBA.
- Friday, May 5, 2023 - 7p - Topic TBA.
- Friday, June 2, 2023 - 7p - Topic TBA.
- Friday, August 4, 2023 - 7p - Topic TBA.
- Friday, September 1, 2023 - 7p - Topic TBA.
- Friday, October 6, 2023 - 7p - Topic TBA.
- Friday, December 1, 2023 - 7p - Topic TBA.

SunWatch:

- Every clear Saturday & Sunday - 3p-3:30p - March-October - At the Dam
  - View the Sun safely with a white-light view if clear.; Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

StarWatch:

- October 15, 22, 29 & November 5, 2022 - 7p
- November 12, 19 & 26, 2022 - 6p
- March 4 & 11, 2023 - 7p
- March 18 & 25, 2023 - 8p
- April 1, 8, 15, 22 & 29, 2023 - 8:30p
  - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater. Free.
  - You must have completed the Park Volunteer Program in order to help with the public program. If you have, and have been trained, please show up at least 30 minutes prior to the official start time.

Special Events:

- **BMAC Dinner - January 2023 - Day & Time TBD**
  - Look for an e-mail with the latest information.
- **Astronomy Day - April 29, 2023 - 1p-4p; 8:30p-9:30p**
  - Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.
- **Annual Club Picnic - July 2023 - Day TBD - 6p?**
  - Site location will be sent directly to full BMAC members. BMACers and their families are welcome to enjoy an evening of astronomy-themed games and activities along with a potluck dinner and observing.
- **StarFest 2023 - November 3, 4 & 5, 2023**
  - Our 38th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 3 keynote speakers, unique T-shirt and more!
  - **Pre-registration by Oct. 13, 2023 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
  - Link for all the StarFest info including registration and hotel reservation links.

Regular Contributors:

William Troxel

Robin Byrne

Greg Penner

Adam Thanz

William is the current chair of the club. He enjoys everything to do with astronomy, including sharing this exciting and interesting hobby with anyone that will listen! He has been a member since 2010.

Robin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

Greg Penner is a semi-retired architect living in the Tri-Cities area since 2018. He has enjoyed astronomy since childhood when he received a “department store telescope” and viewed Saturn for the first time. He has been a member since 2018.

Adam Thanz has been the BMAC Newsletter Editor for all but a small number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

Connection:

Bays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 - **Park Site** - **Club Site**
- Newsletter edited by **Adam Thanz**

Dues:

- Dues are highly supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- $16 / person / year
- $6 / each additional family member
- Note: if you are a Park Association member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. The easiest way is to pay via the CivicRec online portal. If you are a current member, please log in with your e-mail address and reset your password if you have not already done so. You can then update your membership. Here's the direct **link**. If you want to add family members, then add them via the internal link. You can also pay, *through the gift shop*, by mail, over the phone or in person.

Chapter Background Image Credits:

- **Cover image of Southern Milky Way by Adam Thanz.**
  - *Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, August 9, 2020.*
- **Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz**
  - *Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, July 15, 2020.*
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
  - *Image captured July 23, 2016.*
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
  - *Painting based on a photograph of the Moon Christa captured July 2020.*
- **Stellar Observations image of Crescent Nebula by David Reagan.**
  - *This image was taken with a 140mm refractor in his suburban backyard using an AstroPhysics 900 mount, 8.7 hours of 5 minute Ha and OIII subexposures, combined in AstroPixelProcessor as an HOO image and processed in Lightroom and Photoshop. Image captured in 2022.*
- **The Queen Speaks image of a solar halo by Robin Byrne.**
  - *iPhone 7, June 8, 2020.*
- **The Space Place - NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.**
  - *Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, September 19, 2015.*
- **BMAC Calendar & More image of the Moon by Greg Penner.**
  - *iPhone shooting through a 9mm eyepiece and 12.5" Truss Tube Dobsonian @212x.*
- **All background images used with permission by their authors.**