The Bays Mountain Astronomy Club Newsletter

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Cosmic Reflections Greg Penner - BMAC Interim Chair



reetings fellow BMACers!

As Adam said in the November newsletter, since it

may be a while before William returns, I have agreed to be the interim chair for the club. For my first article in the "Cosmic Reflections" section of the newsletter, I'll give you a little of my background.



I've been a BMAC member since 2018 when I moved to the Tri-Cities area from Houston, Texas. I grew up in central California, but I lived in Texas since pursuing an architecture degree at Texas A&M University. During my 28 years in Houston, I really developed my passion for astronomy as a hobby while working as an architect. My pursuit of astronomy has mainly consisted of observational astronomy as opposed to astrophotography. I use a 12.5 inch "Starsplitter" truss-tube reflector and a 3.5 inch Takahashi refractor for my observing. I occasionally snap some photos through these telescopes for fun, sometimes sketch what I see, but mainly just enjoy the act of being under the starry skies hunting down celestial objects. I've always liked using maps of all kinds, so I really enjoy the act of using a star atlas at the telescope to "star hop" my way to objects in the night sky.

More recently, since joining BMAC and becoming an official Bays Mountain volunteer, I really enjoy helping out at events like StarWatch. I know that not everyone has the ability to own and be proficient with a quality telescope, so I almost feel a sense of duty to offer the public a chance to look through a telescope to see things that are always right there above their heads if they only had the opportunity! Just recently at one of our November StarWatch programs, I had the telescope on Saturn, and a young girl got her first look at the majestic ringed planet. She squealed in delight, "I see it! I see it! I see the rings!" and then she ran and grabbed her parents to come look, and they were equally impressed. Perhaps her Christmas list just got a little longer!

My hope for our club is that we can always be encouraging each other to pursue our varied interests in astronomy, and that we can share our enthusiasm with the public, friends and family. However long I am in the position of chair for our club, please let me know if there is something I can do that will help you in these pursuits, and if there are any topics you would like to explore in our club meetings.

BMAC Notes

Bays Mountain StarFest 2023



ere are some photos from our annual StarFest 3-day astro event. The theme was cultural astronomy and everyone really enjoyed the four speaker

presentations that all focused on this topic. Of course, there was great food, activities, camaraderie, T-shirt and more! A major pride point is our high student attendance, about 34%!



The group photo. Image by Adam Thanz.



The panel discussion is always fun. Pictured from left to right: Jason Dorfman, and speakers: Kayla Jenkins Jones, Amie Gallagher, Woodrow Grizzle and Paul Curnow. Image by Adam Thanz.



Our last speaker, Amie Gallagher, provided activities that all focused on her presentation's, topic, "Follow the Drinking Gourd." The Big Dipper, along with quilts, songs and more, helped slaves escape and travel north to freedom. Image by Robin Byrne.

BoBfest 2024



To learn all about the fellowship, friends and fun learning, click <u>here</u>.

The event will take place at the <u>Catawba Science Center</u>, Hickory, NC on Saturday, January 27, 2024. Doors open at 8:30a. Come join us for FREE!

You can purchase drawing tickets for the door prizes. Take your chance on winning great items and help support BoBfest!

There will be food trucks for lunch (and maybe a morning food truck). Snacks, drinks and coffee will be in the main hall all day. There will also be a photo display, photo contest, swap table in the BoBfest Marketplace room, solar observing and **planetarium** shows will be available.

Sky News from the Astronomical League

Τ

he Astronomical League has a plethora of educational content to help you learn and enjoy the night sky more. The following inserts are just a tiny

bit of what they provide.

Navigating the December Night Sky



Navigating the December night sky: Simply start with what you know or with what you can easily find.

- 1 Face south. Almost overhead is the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend an imaginary line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the southwest. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second bright star in the south.
- 2 Draw another line, this time westward following the southern edge of the Square. It strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the "Summer Triangle. Vega is its brightest member while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

A and B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters.

C: The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. D: Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas.



Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.

Navegando por el cielo nocturno de Diciembre



- 1 Hacia el sur. Casi arriba está el "Gran Cuadro" con cuatro estrellas con el mismo brillo que las de la Osa Mayor. Extiende una línea imaginaria hacia el sur siguiendo las dos estrellas más occidentales del Gran Cuadro. La línea lleva a Fomalhaut, la estrella más brillante del sur. Una línea que se extiende hacia el sur desde las dos estrellas más orientales, lleva a Deneb Kaitos, la segunda estrella más brillante del sur.
- **2** Dibuja otra línea, esta vez hacia el oeste siguiendo el borde sur del Gran Cuadro. Lleva a la estrella Altair.
- 3 Ubique a Vega y Deneb, las otras dos estrellas del "Triángulo de verano." Vega es su miembro más brillante, mientras que Deneb se localiza en el medio de la Vía Láctea.
- **4** Salta a lo largo de la Vía Láctea desde Deneb hasta Cefeo, que se asemeja al contorno de una casa. Continúa saltando a la "W" de Casiopea, a Perseo y finalmente a Auriga con su brillante estrella Capela.

Destacan con Binoculares. A y B: examina las estrellas de las Pléyades y las Híades, dos cúmulos de estrellas a simple vista. C: Las tres estrellas más occidentales de la "W" de Casiopea apuntan hacia el sur hasta M31, la Galaxia de Andrómeda, un óvalo "borroso." D: Barrer a lo largo de la Vía Láctea desde Altair, pasar Deneb, a través de Cefeo, Casiopea y Perseo, y luego a Auriga para visualizar muchos intrigantes cúmulos de estrellas y áreas nebulosas. E. Cúmulo Doble de Perseo.



Traducción al español por Dr. Salvador Aguirre www.astroleague.org/outreach; Duplicación permitida y fomentada para toda distribución gratuita.

ASTRONOMICAL LEAGUE Double Star Activity



Other Suns: Eta Tauri (Alcyone)

How to find Eta Tauri on a December evening

Face east. Look for the Pleiades star cluster. Eta Tauri is the cluster's brightest member. It is a quadruple star.

Eta Tauri

A-B separation: 118 sec A magnitude: 2.8 B magnitude: 6.3 Position Angle: 290°

A-C separation: 182 sec C magnitude: 8.2 Position Angle: 313°

A-D separation: 192 sec D magnitude: 8.7 Position Angle: 296° Suggested magnification: >20x Suggested aperture: >3 inches





Otros Soles: Eta Tauri (Alcyone)

Cómo encontrar a Eta Tauri en una tarde de Diciembre

Mira al Este. Busque el cúmulo de estrellas de las Pléyades. Eta Tauri es el miembro más brillante del grupo. Es una estrella cuádruple.

Eta Tauri

A-B separación: 118 sec A magnitud: 2.8 B magnitud: 6.3 PA: 290°

A-C separación: 182 sec C magnitud: 8.2 PA: 313°

A-D separación: 192 sec D magnitud: 8.7 PA: 296°





An "Oh! Wow!" moment through your telescope

Imagine seeing a world emerge in the darkness, taking several minutes to fully appear. Such a body is Io, Europa, or Ganymede on multiple occasions this December.

Aim a telescope at Jupiter shining in the south a few minutes before the event is predicted to take place. Look away from the planet's bright disk, about one planet diameter from its eastern edge. At the designated time, a faint speck can be discerned. As the seconds pass, that speck grows brighter and brighter.

This is one of the large Galilean moons, slowly leaving Jupiter's shadow while orbiting the giant planet. December is a good month this year to witness an event like this in the evening sky, because Jupiter's shadow angles to the east of the planet, putting the emerging moon relatively far from the planet's glare. Each moon takes a different time to fully emerge, because of its diameter and of its orbital velocity around the planet.

Note: December 12 and 19 have Ganymede disappearing into the shadow and reappearing. December 21 and 28 have Io and Europa both disappearing near the same time.			
Make sure that Jupiter is sufficiently above the horizon at your location and that the evening twilight has sufficiently darkened. Begin viewing a few minutes before the listed times.			
Event commencement: (all times CST)			
lo	Dec 5, 11:34 pm		
lo	Dec 7, 6:04 pm		
Ganymede	Dec 12, disappearance 5:41 pm	n, reappearance 7:48 pm	
lo	Dec 13, 1:30 am		
∥ Europa	Dec 14, 6:24 pm		
// lo	Dec 14, 7:58 pm		
Ganymede	Dec 19, disappearance 9:45 pm	n, reappearance 11:49 pm	
🔪 🧹 🚺 Europa	Dec 21, 9:03 pm		
	Dec 21, 9:53 pm		
🥆 🥇 Europa	Dec 28, 11:42 pm	llse a "high"	
L lo	Dec 28, 11:48 pm	magnification	
lo	Dec 30, 6:18 pm	maynmeation	

Stellar Observations

Greg Penner

A Vesta Vista

uring the month of December, let the asteroid Vesta be your guide to a variety of beautiful celestial views. The brightest and second-largest asteroid in the Solar System, Vesta will be as bright as magnitude +6.4 when it reaches opposition on December 21st. However, don't wait until then to begin observing this rocky traveler. Vesta starts off the month of December just under the feet of Gemini "the twins" and above the raised club of Orion "the hunter." Traveling between two such recognizable constellations will make this asteroid easy to find in a pair of binoculars or any size telescope. Sky & Telescope magazine has a nice chart on page 49 of its December issue showing where Vesta will be throughout December and early January.



Vesta's December location between Orion and Gemini - Stellarium image



Vesta's path in December - chart from Sky & Telescope, December 2023

If you venture outside on chilly December evenings to follow Vesta's progress, you can undertake a few observing projects. First is to follow the asteroid's progress against the 4th and 5th magnitude stars of Orion's club and Gemini's feet. If you observe it from a fairly dark sky location, see if you can find Vesta with your naked eye around December 13th - 16th when it's near opposition but before bright moonlight interferes. Observing Vesta might be more meaningful if you know a little more about this asteroid's significance in our Solar System. NASA's Dawn spacecraft circled Vesta in 2011 and 2012 and made some very interesting discoveries, leading scientists to the conclusion that this asteroid is the only remaining example of the rocky protoplanets that formed planets like Earth and Mars 4.6 billion years ago! You can learn more about these discoveries in a really fun video here.



Vesta near deep sky objects - Stellarium image annotated by Greg Penner

The celestial neighborhood that Vesta traverses in December includes a couple of faint nebulae with intriguing names and a sparkling open star cluster. The Jellyfish Nebula (IC 443) and the Monkey Head Nebula (NGC 2174) will require dark skies, larger apertures, and likely an oxygen III filter, Ultra High Contrast filter, or nebula filter to observe. They are great targets for astrophotographers and NASA space telescopes as you will discover searching the internet. The open star cluster M35 is an excellent target for all types of instruments. This cluster's brightest stars can be resolved in 10x50 binoculars. Small telescopes reveal some of the fainter stars, while 6-inch and 8inch telescopes at low magnifications will show dozens of stars. Personally, this is one of my favorite star clusters to observe in the winter sky. Let's learn about each of these cosmic wonders.



Hubble Telescope images of Monkey Head Nebula - NASA

The Jellyfish Nebula (IC 443) is a supernova remnant about 5,000 light years from Earth and spans a distance of approximately 70 light years. NASA's Chandra X-Ray Observatory spotted a pulsar on the southern edge of the nebulosity that could be the source of the supernova explosion that created the remnant tens of thousands of years ago. You can read more details about this nebula at the Chandra X-Ray Observatory website <u>here</u>.



Jellyfish Nebula - Wide Field Optical: Focal Pointe Observatory/B.Franke, Inset: X-ray: NASA/CXC/MSFC/D.Swartz et al, Inset: Optical: DSS, SARA

The Monkey Head Nebula (NGC 2174) is an H II emission nebula associated with open star cluster NGC 2175. The estimated distance from Earth is about 6,400 light years, and it spans about 15 light years. In celebration of the Hubble Telescope's 24th anniversary in 2014, astronomers took infrared images of the Monkey Head, showing this dynamic region of star birth in a new light. The images reveal knots of gas and dust indicative of the active star formation occurring in this nebula. Newly formed massive stars are blasting away dust in the nebula, which is mostly composed of hydrogen gas. As the dust particles are warmed from radiation, they heat up and glow at infrared wavelengths. As amazing as these images from Hubble are, we wait in anticipation for the JWST to target this nebula with its much higher resolution infrared capabilities!

The final deep sky object to observe near Vesta's December path is the showpiece open star cluster M35. This star cluster is nearly 3,000 light years away with a true diameter of about 24 light years. M35 covers an area of sky almost as large as the full moon. The cluster is estimated to be 100 million years old and contains about 500 stars. Depending on the type of instrument being used, anywhere from a dozen stars to over 100 stars can be seen. Let your dark-adapted eye relax and scan the whole area in a wide angle eyepiece to see how many faint stars you can see. Try boosting magnification and zeroing in on the most concentrated area of stars to see how many more you can find. While using your wide angle eyepiece you might notice a fuzzy glow nearby. That glow is open star cluster NGC 2158. Although these two clusters appear to be near each other in the sky, NGC 2158 is 8,000 light years further away and 2 billion years old.



M35 and NGC 2158 - "Atlas Image [or Atlas Image mosaic] obtained as part of the Two Micron All Sky Survey (2MASS), a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology, funded by the National Aeronautics and Space Administration and the National Science Foundation." One last phenomenon can be observed in Vesta's neighborhood this month. The annual Geminid meteor shower peaks on the night of December 13-14. Under a dark and moonless sky, you could see as many as 100 meteors per hour! A nice feature of the Geminid shower is that the radiant, located near Castor in Gemini, will be nearly 30 degrees high by 9p. You can watch the show before the coldest hours of the night and get to bed at a reasonable hour.

In the midst of all your busy holiday festivities, hopefully you can make some time to visit Vesta and enjoy these celestial spectacles this December!

The Queen Speaks

Robin Byrne

Book Review: Feynman

'm not sure when I actually purchased Feynman by Jim Ottaviani and Leland Myrick, but it sat on my shelf long enough that I was pleasantly surprised to open it and discover that it was a graphic novel. So, instead of a book that could have been a dry telling of Richard Feynman's life, it was a joyous journey through his various escapades. (Though, let's be honest, even a regular biography of Feynman would be hard-pressed to come across as dry.)



The cover to "Feynman."

Written by Ottaviani and illustrated by Myrick, Feynman takes us, mostly, chronologically through his life and is written as though Feynman himself is telling the story via various recollections. For lack of a better word, each "chapter" begins with a title and year to set the scene, and then presents a brief story about that moment in Feynman's life.

We see the role Feynman's father played in sparking his interest in science. There are stories of his public school years, college, his first wife, and his role in the Manhattan Project. We also briefly meet his sister, who would later become an astrophysicist. For anyone who has seen the 1996 film Infinity with Matthew Broderick, this part of his life will be very familiar. (And if you haven't seen that film, you should.)

The next era in his life takes us through his teaching career, and his contribution to Quantum Electrodynamics (QED). We also see hints of his womanizing, plus some wild detours. Then the book takes us into Feynman's later, calmer years. We learn about his last marriage, his relationship with his children, and his receiving the Nobel Prize in Physics. This put him on a quest to find a way to explain QED in a manner that could be understood by anyone. Though, I don't think he ever fully achieved that goal. His reluctant role in the investigation of the Challenger explosion is also explored. Of course, scattered throughout are references to his bongo-playing, entertaining lectures, and the various books he wrote throughout his career. The journey ends with Feynman's diagnosis of cancer in both his liver and spleen, and his philosophical approach to this diagnosis and ultimate death.

Ottaviani definitely did his homework. The end of the book includes a long list of references used in the writing of the story. So even though it was written by another, it feels very much as though Richard Feynman truly did narrate this tale. The illustrations by Myrick do a wonderful job of capturing Feynman's look in every era of his life. In fact, all of the people illustrated are done well, and every face is quite expressive. Feynman is meant to be a fun, quick read, which it most definitely is. If you are looking for an in-depth retrospective of Richard Feynman's life, then this is not the book for you. But if, instead, you are interested in an enjoyable glimpse of who Richard Feynman was and what he did, then Feynman by Ottaviani and Myrick is a book I would highly recommend.

References:

Feynman by Jim Ottaviani and Leland Myrick, First Second, 2011

The Space Place MASA Nigh Network

Kat Troche

December 2023

The Bays Mountain Astronomy Club Newsletter

A Flame in the Sky - the Orion Nebula



t's that time of year again: winter! Here in the Northern Hemisphere, the cold, crisp sky offers spectacular views of various objects, the most

famous of all being **Orion the Hunter**.



Orion constellation Stellarium Web image

As we've previously mentioned, Orion is a great way to test your sky darkness. With your naked eye, you can easily spot this hourglass-shaped constellation. Known as an epic hunter in Greco-Roman, Orion and all its parts have had many names and meanings across many cultures. In Egyptian mythology, this constellation represented the god Sah. The Babylonians referred to it as The Heavenly Shepard. In most cultures, it is Orion's Belt that has many stories: Shen in Chinese folklore, or Tayamnicankhu in Lakota storytelling. The Maya of Mesoamerica believed that part of Orion contained The Cosmic Hearth - the fire of creation.

1,500 light years away from Earth sits the star-forming region and crown jewel of Orion - Messier 42 (M42), the Orion Nebula. Part of the "sword" of Orion, this cloud of dust and gas sits below the first star in Orion's Belt, Alnitak, and can easily be spotted with the naked eye under moderate dark skies. You may also use binoculars or a telescope to resolve even more details, like the Trapezium: four stars in the shape of a baseball diamond. These young stars make up the core of this magnificent object.

Of course, it's not just for looking at! M42 is easily one of the most photographed nebulae around by astrophotographers here on the ground, large ground-based observatories, and space telescopes alike. It has long been a place of interest for the Hubble, Spitzer, and Chandra X-ray Space Telescopes, with James Webb Space Telescope joining the list in February 2023. Earlier this year, NASA and the European Space Agency released <u>a new photo</u> of the Orion Nebula taken from JWST's NIRCam (Near-Infrared Camera), allowing scientists to image this early star forming region in both short and long wavelengths.



The **Orion Bar**

But stars aren't the only items photographed here. In June 2023, JWST's NIRCam and MIRI (mid-infrared instrument) imaged a developing star system with a planetary disk forming around it. That's right – a solar system happening in real time – located within the edges of a section called the **Orion Bar**. Scientists have named this planet-forming disk d203-506, and you can learn more about the chemistry found <u>here</u>. By capturing these objects in multiple wavelengths of light, we now have even greater insight into what other objects may be hiding within these hazy hydrogen regions of our night sky.

In addition to our Dark Sky Wheel, a fun presentation you can share with your astronomy club would be our <u>Universe</u> <u>Discovery Guide: Orion Nebula, Nursery of Newborn Stars</u> activity. This will allow you to explain to audiences how infrared astronomy, like JWST, helps to reveal the secrets of nebulae. Or, you can use public projects like the NASA-funded <u>MicroObservatory</u> to capture M42 and other objects. Learn more about what to spy in the winter sky with our upcoming mid-month article on the <u>Night Sky Network</u> page through NASA's website!

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 <u>nightsky</u> to find local clubs, events, and more!

BMAC Calendar & More

Calendar:



MAC Meetings:

- Friday, December 1, 2023 7p Discussion about future meetings and more.
- Friday, February 2, 2024 7p Topic TBA.
- Friday, March 1, 2024 7p Topic TBA.
- Friday, April 12, 2024 7p Topic TBA.
- Friday, May 3, 2024 7p Topic TBA.
- Friday, June 7, 2024 7p Topic TBA.
- Friday, August 2, 2024 7p Topic TBA.



- Every clear Saturday & Sunday 3p-3:30p March-October By 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.



tarWatch:

- March 2 & 9, 2024 7p
- March 16, 23 & 30, 2024 8p
- April 6, 13, 20 & 27, 2024 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.



• BMAC Dinner - January 2024 - Day & Time TBD

• Look for an e-mail with the latest information.

• Astronomy Day - May 18, 2024 - 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 2024

 Date and 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 2024 - November 2024

- Our 39th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt and more!
- Pre-registration by Oct. 2024 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:



Greg Penner



Robin Byrne



Adam Thanz

G reg 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.

obin 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).

dam 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:

B ays Mountain Astronomy Club:

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



- 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 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 <u>link</u>. If you want to add family members, then add them via the internal link. You can also pay at the gift shop, by mail or over the phone.

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.