

The ECLIPSE

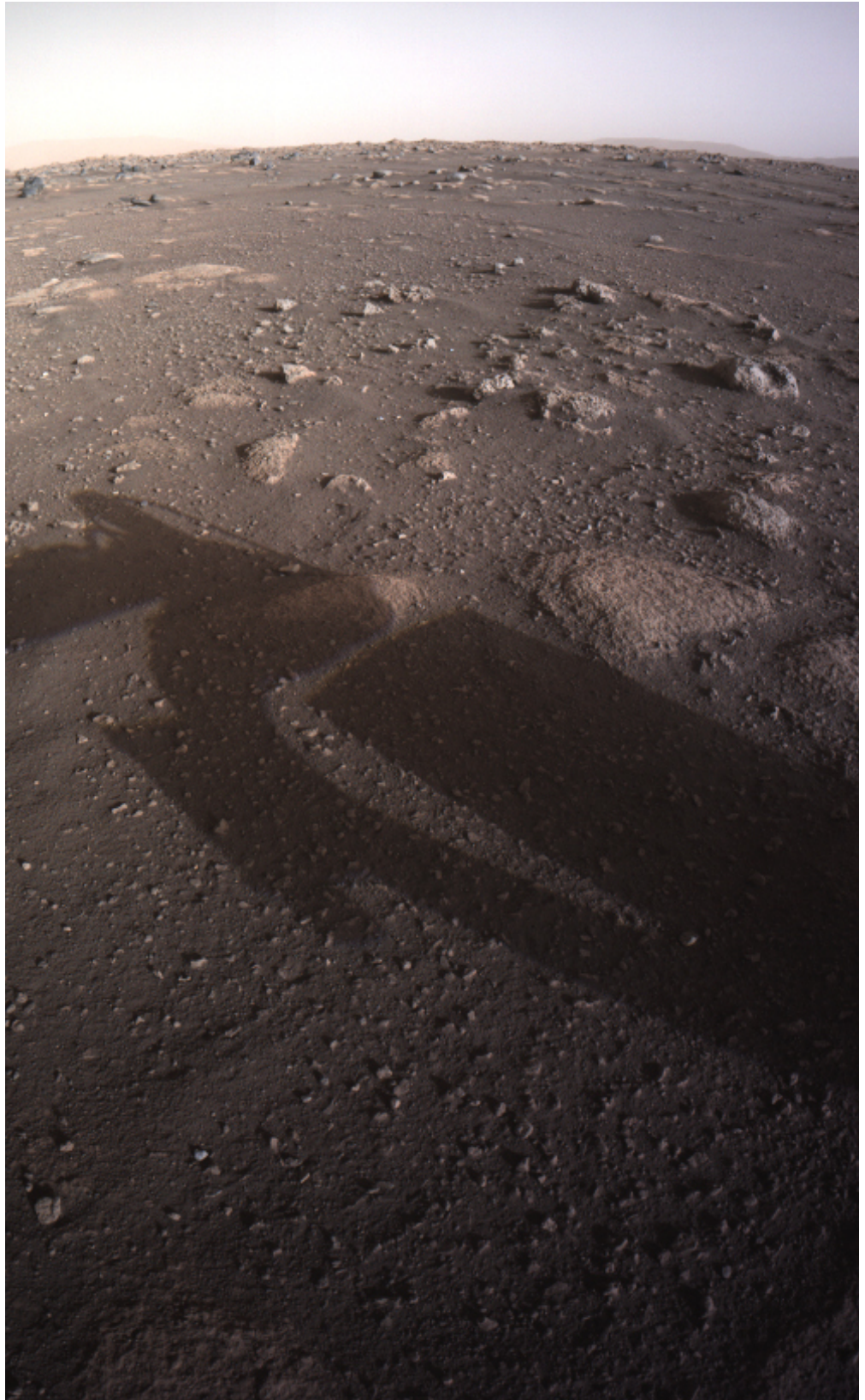
March
2021

The Newsletter of the Barnard-Seyfert Astronomical Society

Next Membership Meeting:

March 17, 7:30 pm
Online meeting

Topic TBD



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From the President

Did you get to watch the Perseverance rover landing? It was something to see, watching NASA and the team at JPL stick another landing. The landings seem to get more and more complicated for each rover. Hopefully this rover will be able to stay active on Mars for a long time. My favorite part of the rover is the rover “family portrait” of past rovers on a little plaque. I think that was a nice touch by NASA and a little tongue in cheek homage to the family stickers you see on so many vehicles. Did you also see that the parachute for the rover contained a hidden message? Someone with way too much time on their hands and way too much brain power figured out that there is a binary message on the parachute for the rover. It was confirmed by a NASA engineer later in the week. I won’t put the message here just in case you want to try your luck at decoding it! If you don’t want to try your decoding skills out, just Google “Parachute secret message” and you will find a few news stories about it. Another pretty cool addition to the rover.

Did you get through the ice/snow storms OK? There was quite a bit of ice at my house and then some snow on top of that but we didn’t lose power or water. The kids loved going out in the snow but I think their favorite part was no school for a week. There were a couple of clear nights sprinkled in to the bitter cold and I had never set my scope up in the snow and ice but I chickened out and decided to stay in the warm house instead. Now we are getting into more rain and clouds but hopefully they will clear up for a day or two to allow some good telescope viewing.

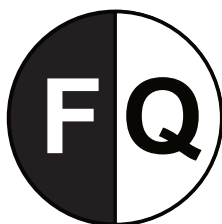
Stay safe out there!

Clear skies,

Keith Rainey



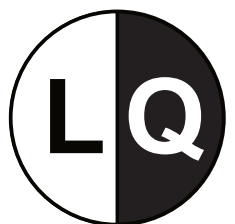
Mar 13
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Apr 20



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Apr 26



Mar 5
Apr 4

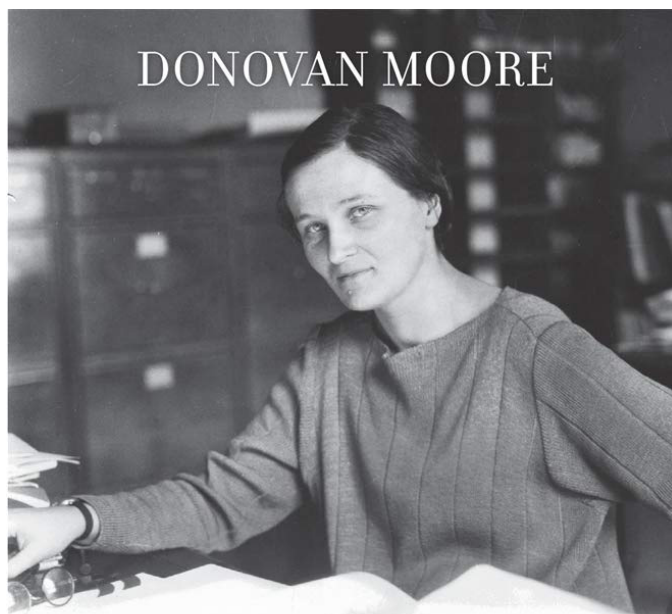
Book Review: What Stars are Made Of Reviewed by Robin Byrne

I've been reading a number of books about early female astronomers, so, of course, Amazon knows just what to recommend I should buy. What Stars Are Made Of: The Life of Cecilia Payne-Gaposchkin by Donovan Moore fit nicely into my collection.

In the book, we learn about the entire life of Cecilia. During her childhood, she developed an early interest in science, though it was primarily botany that fascinated her, with the other sciences of some interest. The schools she attended, however, were more focused on teaching young women how to be eloquent wives rather than scientists. Fortunately for Cecilia, she encountered a few teachers who helped nurture her interest in understanding the natural world.

In college, Cecilia was still planning to pursue botany as a career until she heard Arthur Eddington give a talk about his recent expedition to observe a solar eclipse to confirm Einstein's Theory of Relativity. After that, Cecilia knew that astronomy would be her life's passion. And she was definitely in the right place at the right time. Although she was officially attending school at Newnham College, the women's school connected to Cambridge, her science classes were all at Cambridge, which meant that Cecilia took courses from some of the greatest scientists of the time, including Bohr, Rutherford, and Eddington. The foundation for a budding astrophysicist was being solidly built.

Upon graduation in 1923, Payne knew that a woman would not find work as an astronomer in England because of the way women were viewed and expected to behave. Fortunately, she had met Harlow Shapley, the new director of the Harvard College Observatory, at a recent astronomical conference, and he implied that he might be able to use her on his staff. After much correspondence, and a lot of scraping together of funds, Payne had enough money to sail for America to a Fellowship funded by the observatory. Shapley did have an ulterior motive for bringing Payne to Harvard. He wanted to establish a graduate program in astronomy at Harvard, so he created Payne's Fellowship to support her financially while she worked toward a doctoral degree in astronomy.



What Stars Are Made Of

The Life of Cecilia Payne-Gaposchkin

Continued on next page

Book Review, continued

And that's just what Payne did, becoming not only the first woman to receive a doctorate from Harvard, but the very first person to earn an astronomy doctorate from the school. She combined all she had learned at Cambridge about atomic physics with the voluminous spectroscopic records kept by the Harvard Observatory. After years of effort, she discovered something unexpected. Prior to her discovery, everyone "knew" that the entire universe would have a composition that's the same as Earth, and in the same relative amounts. Payne's labors revealed that stars were primarily composed of Hydrogen. She was sure she had done something wrong. Henry Norris Russell was considered America's foremost expert on stars. When Payne shared with him her work, he essentially told her to include in her doctoral thesis that while these are the results of her calculations, they are most likely wrong. She did include that statement, and regretted doing so for the rest of her life. When Eddington heard of her results, he, too, was sure that she had misinterpreted her results. So here she was, with a major discovery, and the greatest astronomers of the time all dismissed it as erroneous. It took another decade for the rest of the astronomical community to accept what Payne already knew was true.

Meanwhile, now that she was Dr. Payne, her Fellowship was over and she needed an actual job. Shapley offered her a position at the observatory. The pay scale was insulting, but Payne felt a strong connection to the place and people, so she accepted it. The other down-side, she discovered, was that now that she was actually working for Shapley, instead of being a student doing research, meant that Shapley told her what projects to work on. So, instead of continuing her study of stellar spectra, Payne found herself investigating variable stars, instead. But her drive and passion for knowing and understanding the world around her meant that Payne approached the project with the same energy as she had the spectra.

As the astronomical community caught up with Payne in their understanding of the compositions of stars, her reputation grew. Now she was being invited to give talks around the country and around the world. Payne also started publishing books about stars that became popular text books at the time. It was at an astronomical conference in Germany in the 1930's that a young man approached her begging for help. Sergei Gaposchkin had been born in Russia, but attended college in Germany, only to discover he was no longer welcome in Germany with war on the horizon, but post-revolution Russia wouldn't welcome him either. He needed help to move to another country. He hoped the famous Cecilia Payne would be his savior. It turned out that she was. It took time, and a lot of help from Shapley, but Gaposchkin was eventually able to leave Germany for the United States to a job at Harvard Observatory.

Continued on next page

Book Review, continued

With Payne and Gaposchkin now both working at the observatory, Shapley assigned them to work together on variable stars. Gaposchkin concentrated on eclipsing binary systems (the subject of his doctoral thesis), while Payne took the rest. At the same time, the two continued the friendly companionship that had begun in Germany. Eventually, they decided to run off and get married. Reportedly, Annie Cannon fainted at the news of the marriage, though that may be an "old astronomer's tale." Soon the Gaposchkin family began to grow, but that didn't stop Payne from continuing to work, much to the horror of her contemporaries. She was a role model for working women, maintaining her career while still raising a family.

During all this time that Payne worked at the Harvard Observatory, and even taught classes at the university, she was not allowed to be a member of the faculty. That FINALLY changed in 1956, when she was appointed a professorship. So adding to her list of "firsts" at Harvard, now she was the first woman to become a full professor at Harvard. Very impressive accomplishments.

Sadly, Cecilia Payne-Gaposchkin died in 1979 of lung cancer, the result of a lifetime of being a very heavy smoker. Owen Gingerich was one of Payne's graduate students, and he described her smoking during her lectures as starting with a pack of cigarettes and just a single match, literally chain smoking continuously through to the end of class.

The author, Donovan Moore, did a nice job of sharing Cecilia's life with the reader, though there were times where I felt he was stretching to fill the book up by going into detail about the atmosphere of college life at Newnham. Once she arrived at the Harvard Observatory, the pace picked up, but that was already half-way through the book. All-in-all, though, I found the story of Cecilia Payne-Gaposchkin's life to be very interesting and inspiring, and I would definitely recommend reading this book to learn more about this very note-worthy woman.

References:

What Are Stars Made Of: The Life of Cecilia Payne-Gaposchkin by Donovan Moore; Harvard University Press, 2020

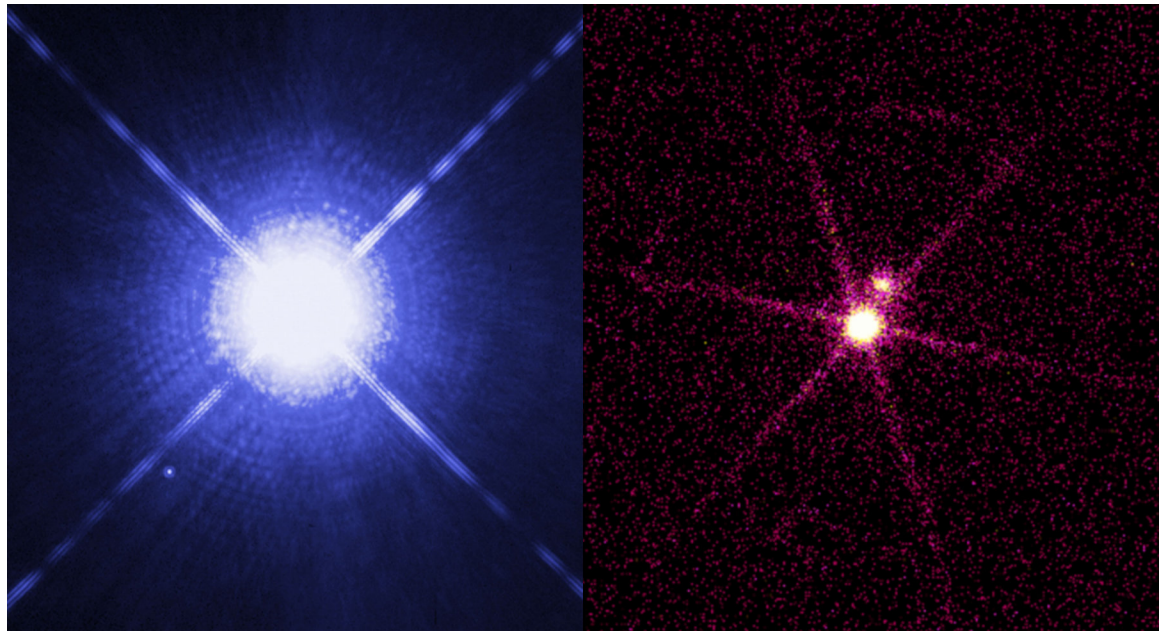
Taking the Dog Stars for a Springtime Walk: Sirius and Procyon!

David Prosper

March skies feature many dazzling stars and constellations, glimmering high in the night, but two of the brightest stars are the focus of our attention this month: Sirius and Procyon, the dog stars!

Sirius is the brightest star in the nighttime sky, in large part because it is one of the closest stars to our solar system at 8.6 light years away. Compared to our Sun, Sirius possesses twice the mass and is much younger. Sirius is estimated to be several hundred million years old, just a fraction of the Sun's 4.6 *billion* years. Near Sirius - around the width of a hand with fingers splayed out, held away at arm's length - you'll find Procyon, the 8th brightest star in the night sky. Procyon is another one of our Sun's closest neighbors, though a little farther away than Sirius, 11.5 light years away. While less massive than Sirius, it is much older and unusually luminous for a star of its type, leading astronomers to suspect that it may "soon" - at some point millions of years from now - swell into a giant star as it nears the end of its stellar life.

Sirius and Procyon are nicknamed the "Dog Stars," an apt name as they are the brightest stars in their respective constellations - Canis Major and Canis Minor - whose names translate to "Big Dog" and "Little Dog." Not everyone sees them as canine companions. As two of the brightest stars in the sky, they feature prominently in the sky stories of cultures around the world. Sirius also captures the imaginations of people today: when rising or setting near the horizon, its brilliance mixes with our atmosphere's turbulence, causing the star's light to shimmer with wildly flickering color. This vivid, eerie sight was an

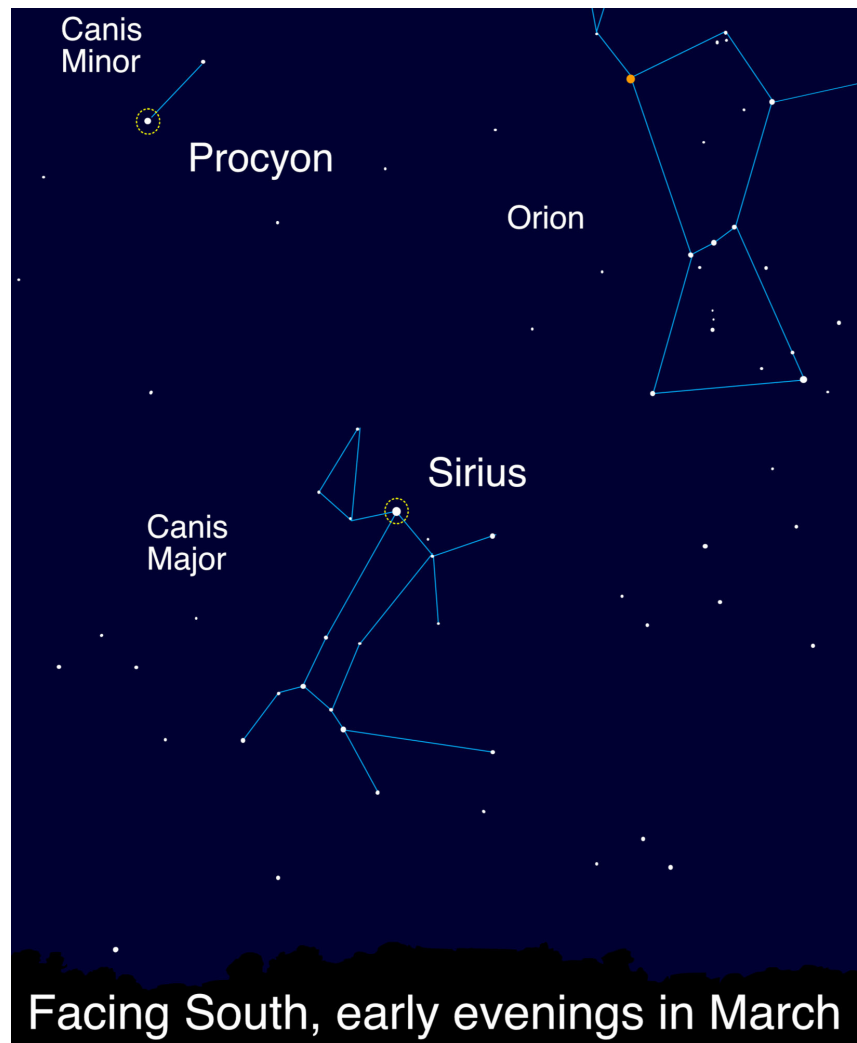


Sirius A and B imaged by two different space telescopes, revealing dramatically different views! Hubble's image (*left*) shows Sirius A shining brightly in visible light, with diminutive Sirius B a tiny dot. However, in Chandra's image (*right*) tiny Sirius B is dramatically brighter in X-rays! The "Universe in a Different Light" activity highlights more surprising views of some familiar objects. NASA, ESA, H. Bond (STScI), and M. Barstow (University of Leicester) (*left*); NASA/SAO/CXC (*right*)

Sirius and Procyon, continued

indication to ancient peoples of changes in the seasons, and even triggers UFO reports in the modern era!

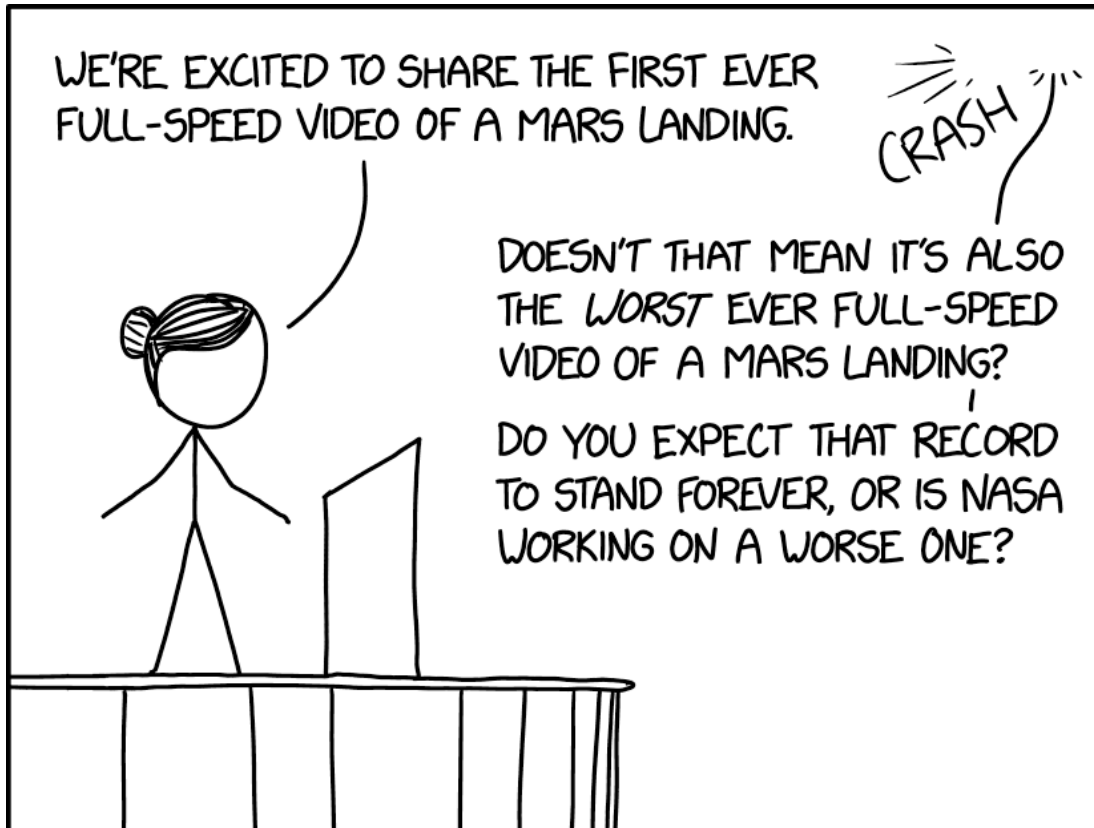
Both of these bright stars have unseen companions: tiny, dense white dwarf stars, the remnants of supermassive companion stars. Interestingly, both of these dim companions were inferred from careful studies of their parent stars' movements in the 1800s, before they were ever directly observed! They are a challenging observation, even with a large telescope, since their parent stars are so very bright that their light overwhelms the much dimmer light of their tiny companions. The white dwarf stars, just like their parent stars, have differences: Sirius B is younger, brighter, and more energetic than Procyon B. Careful observations of these nearby systems over hundreds of years have helped advance the fields of: astrometry, the precise measurement of stars; stellar evolution; and astroseismology, the study of the internal structure of stars via their oscillations. Discover more about our stellar neighborhood at nasa.gov!



Sirius and Procyon, the loyal hunting dogs of nearby Orion the Hunter! What other stories can you imagine for these stars? Learn about “Legends in the Sky” and create your own with [this activity](#). Image created with assistance from Stellarium.

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.jpl.nasa.gov to find local clubs, events, and more! You can catch up on all of NASA's current and future missions at nasa.gov. With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

xkcd



NASA TRIED TO BAN ME FROM THEIR PRESS BRIEFINGS, BUT IRONICALLY THEIR SECURITY WAS TOTALLY UNPREPARED TO DEAL WITH A SKYCRANE.

Next Membership Meeting:

Wednesday, March 17, 7:30 pm Central
online on Zoom

Topic TBD

Zoom link will be posted to bsasnashville.com

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Wednesday, February 3, 2021

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held February 3, 2021, online. Logged in were Tom Beckermann, Tony Drinkwine, Gary Eaton, Bud Hamblen, Keith Rainey and Theo Wellington. A quorum being present, Keith called the meeting to order at 7:30 PM. Keith asked for a vote to adopt the January 6, 2020, minutes as printed in the February, 2021, issue of the *Eclipse*. Theo made the motion, Keith seconded and the minutes were adopted by voice vote. Theo reported that the Suntrust balance was \$11,545.78 and the PayPal balance was \$119.85. Theo reported that there were 2,033 follower on Facebook and 267 followers on Twitter, and mentioned that a virtual star party was scheduled for February 20. Keith noted that there were 180 members.

Resolution 2021-02-03: Because the Middle Tennessee Science and Engineering Fair will be happening this Spring and the club traditionally offers cash prizes for the best astronomy-related projects, the society will provide a \$100 first place prize and a \$50 second place prize for the top astronomy-related project, In addition, the winners will receive a year's membership in the society. Gary made the motion to adopt the resolution, Theo seconded and the resolution was adopted unanimously.

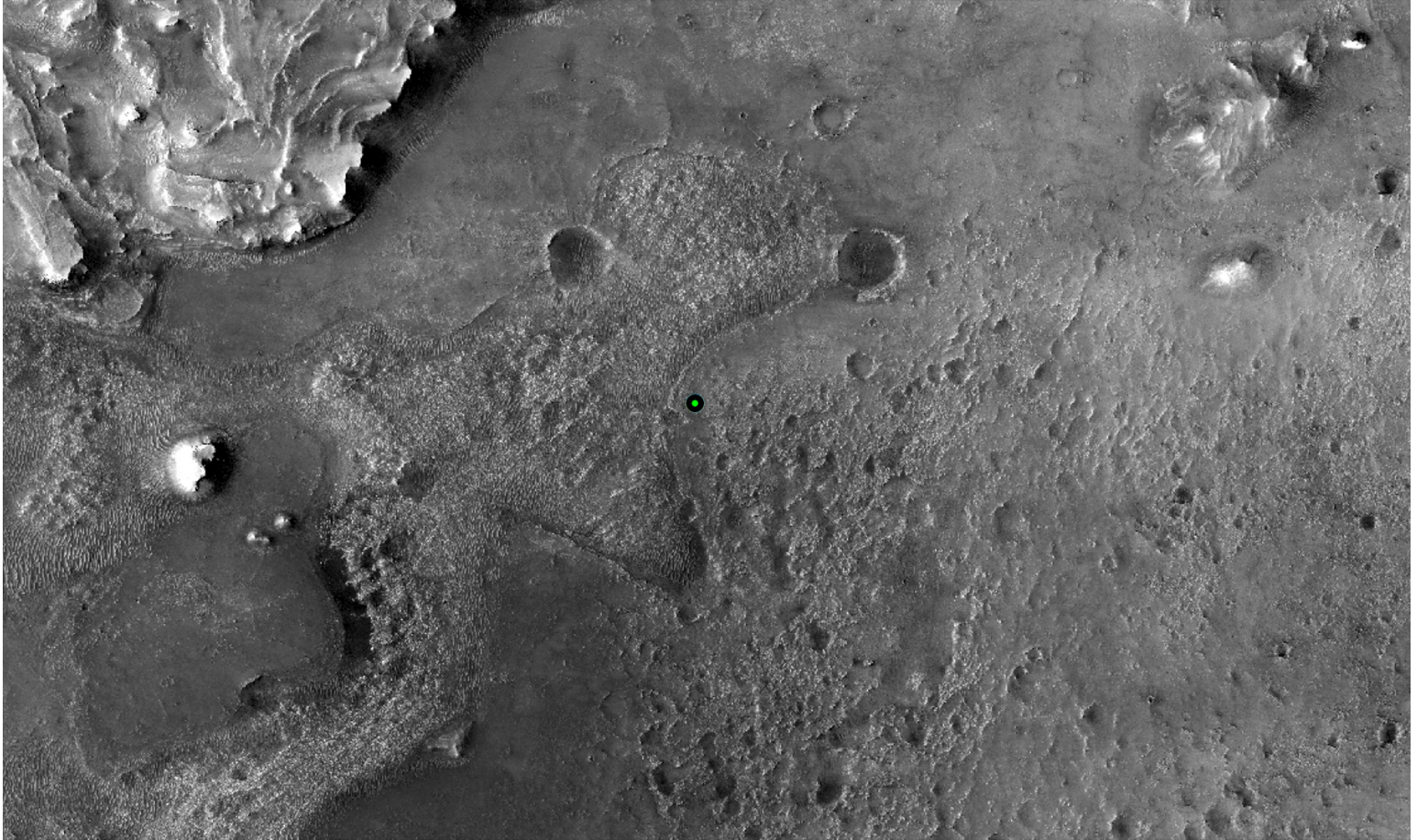
Theo reported that a new mounting is needed to replace the old fork and tripod on the society's loaner Celestron C8. Tom is updating the loaner equipment list.

There being no further business, the meeting was adjourned at 8:15.

Respectfully submitted,

Bud Hamblen
Secretary

There was no Membership meeting in February 2021.



This image shows with a green dot where NASA's Perseverance rover landed in Jezero Crater on Mars on Feb. 18, 2021. The base image was taken by the HiRISE camera aboard NASA's Mars Reconnaissance Orbiter.

A key objective for Perseverance's mission on Mars is astrobiology, including the search for signs of ancient microbial life. The rover will characterize the planet's geology and past climate, pave the way for human exploration of the Red Planet, and be the first mission to collect and cache Martian rock and regolith (broken rock and dust).

Subsequent NASA missions, in cooperation with ESA (European Space Agency), would send spacecraft to Mars to collect these sealed samples from the surface and return them to Earth for in-depth analysis.

Credit: [NASA/JPL-Caltech/University of Arizona](#)



On the Cover: This is the first high-resolution, color image to be sent back by the Hazard Cameras (Hazcams) on the underside of NASA's Perseverance Mars rover after its landing on Feb. 18, 2021.

Credit: [NASA/JPL-Caltech](#)



In honor of the club's 90th anniversary we partnered with Hatch Show Print to create a unique poster that would honor the achievement of the club. For those who don't know Hatch Show has been making posters for a variety of events and concerts for 140 years. In all that time we are their first astronomy club.

On the poster at the center is the moon. This was made from a wood grained stencil that the shop has used for over 50 years. To contrast that the telescope that the people are using is a brand new stencil made for our poster. The poster has three colors. First the pale yellow color of the moon was applied. Next the small stars, circles, and figures at the bottom were colored in metallic gold. The third color is

a blue for the night sky. Where it overlaps with the metallic gold it creates a darker blue leaving the figures at the bottom looking like silhouettes. This was a one time printing so the 100 that we have are all that will be printed.

The prints are approximately 13 3/4" x 22 1/4" and are available for \$20 at our membership meetings, or \$25 with shipping by ordering through bsasnashville.com. Frame not included.



Become a Member of BSAS!
Visit bsasnashville.com to join online.

All memberships have a vote in BSAS elections and other membership votes. Also included are subscriptions to the BSAS and Astronomical League newsletters.

Annual dues:

Regular: \$25
Family: \$35
Senior/Senior family: \$20
Student*: \$15

* To qualify as a student, you must be enrolled full time in an accredited institution or home schooled.

About BSAS

Organized in 1928, the Barnard-Seyfert Astronomical Society is an association of amateur and professional astronomers who have joined to share our knowledge and our love of the sky.

The BSAS meets on the third Wednesday of each month at the Cumberland Valley Girl Scout Building at the intersection of Granny White Pike and Harding Place in Nashville. Experienced members or guest speakers talk about some aspect of astronomy or observing. Subjects range from how the universe first formed to how to build your own telescope. The meetings are informal and time is allotted for fellowship. You do not have to be a member to attend the meetings.

Membership entitles you to subscriptions to *Astronomy and Sky & Telescope* at reduced rates; the club's newsletter, the *Eclipse*, is sent to members monthly. BSAS members also receive membership in the Astronomical League, receiving their quarterly newsletter, the *Reflector*, discounts on all astronomical books, and many other benefits.

In addition to the meetings, BSAS also sponsors many public events, such as star parties and Astronomy Day; we go into the schools on occasion to hold star parties for the children and their parents. Often the public star parties are centered on a special astronomical event, such as a lunar eclipse or a planetary opposition.

Most information about BSAS and our activities may be found at bsasnashville.com. If you need more information, write to us at info@bsasnashville.com.

Free Telescope Offer

Did someone say free telescope? Yes, you did read that correctly. The BSAS Equipment & Facilities Committee has free telescopes ranging in size from 2.6" to 8" that current members can actually have to use for up to 60 days at a time. We also have some other items in the loaner program such as a photometer, H-alpha solar telescope, educational CDs, tapes, DVDs, and books. Some restrictions apply. A waiting list is applicable in some cases. The BSAS Equipment Committee will not be held responsible for lost sleep or other problems arising from use of this excellent astronomy gear. For information on what equipment is currently available, contact info@bsasnashville.com.