

# The ECLIPSE

April  
2019

*The Newsletter of the Barnard-Seyfert Astronomical Society*

## Next Membership Meeting:

April 17, 2019, 7:30 pm

Cumberland Valley  
Girl Scout Council Building  
4522 Granny White Pike

Topic: TBA

## In this Issue:

Happy Birthday Apollo 13 by Robin Byrne	3
Mars the Wanderer By David Prosper	6
BSAS Board Minutes March 6, 2019	9
Membership Meeting Minutes March 20, 2019	10
Membership Information	12

## From the President

Two strikes and we are out! We tried to have our Messier Marathon over two weekends in March and were shut down by the weather. It's pretty disappointing to have to stay in on a night that I was planning to see the stars. What do you do on those cloudy/rainy nights when you should be outside enjoying the stars? I like to browse the forums on [cloudynights.com](http://cloudynights.com). It's a nice place to see what people of all experience levels are asking or teaching and I see it as a great way to spend those nights where the weather just doesn't cooperate. It's also a great time to perform some maintenance on the equipment; cleaning lenses, collimating scopes, removing dust, that sort of thing. Of course, with all of the cloudy weather we have had this year, my scopes are immaculate!

Bell's Bend Park, one of our regular star party locations is holding its annual Nashville Outdoor and Recreation Festival and Expo on Saturday April 6th from 9:00 AM – 3:30 PM. BSAS will have a booth, along with dozens of other organizations and companies. If you would like to help us out that day, please let me know. One of our volunteers has had to back out so any help would be appreciated!

April is also the time for the annual Lyrid meteor shower. This year the shower will peak on the morning of April 23. Don't get too excited though, because if the weather happens to cooperate, the skies will be bright as a result of the waning gibbous Moon. On the 11th, Mercury will be at its Greatest Western Elongation of 27.7 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 morning sky. Look for the planet low in the eastern sky just before sunrise.

Clear skies and have a great month!

Keith Rainey



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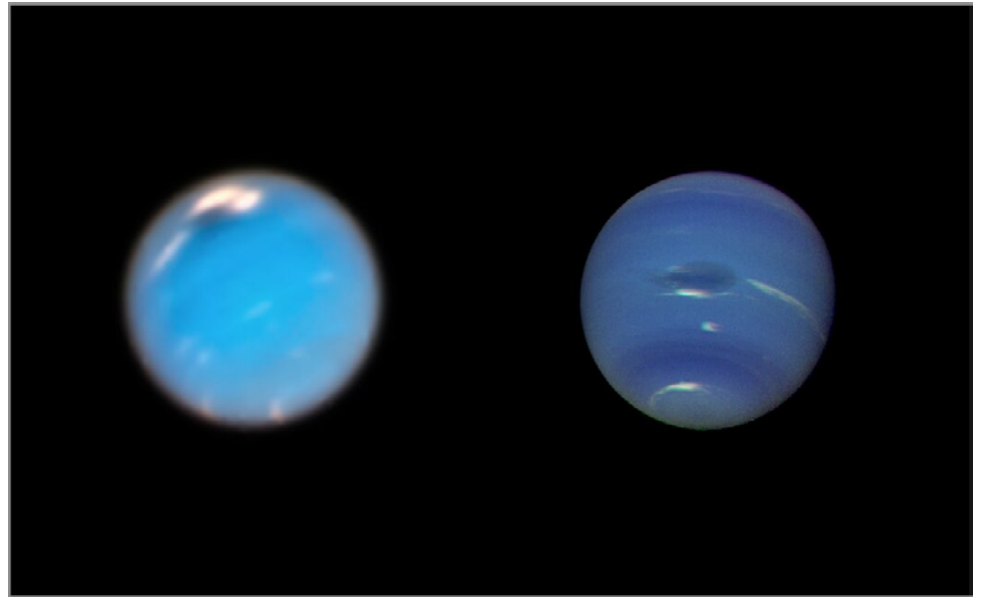
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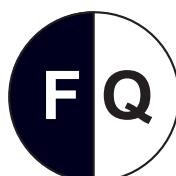
This composite picture shows images of storms on Neptune from the Hubble Space Telescope (left) and the Voyager 2 spacecraft (right). The Hubble Wide Field Camera 3 image of Neptune, taken in Sept. and Nov. 2018, shows a new dark storm (top center). In the Voyager image, a storm known as the Great Dark Spot (GDS) is seen at the center. It is about 13,000 km by 6,600 km in size -- as large along its longer dimension as the Earth. The white clouds seen hovering in the vicinity of the storms are higher in altitude than the dark material. Credit: [NASA/ESA/GSFC/JPL](https://www.nasa.gov/mission/voyager/NEPTUNE/).

## Upcoming Star Parties

Saturday Apr 6	BSAS Private Star Party <a href="#">Natchez Trace Parkway mile marker 435.3</a>
Saturday Apr 13 8:30 to 10:30 pm	BSAS Public Star Party <a href="#">Edwin Warner Park</a>
Saturday May 4	BSAS Private Star Party <a href="#">Natchez Trace Parkway mile marker 412 (Water Valley Overlook)</a>



Apr 5  
May 4



Apr 12  
May 11



Apr 19  
May 18



Apr 26  
May 26

## Happy Birthday Apollo 13 by Robin Byrne

With the 50th anniversary of the first moon landing coming up this summer, it seems appropriate to recall other Apollo missions. This month we look at one of the most harrowing space missions to date.

Apollo 13 was the third mission to the Moon. Interest was low and there was very little news coverage. Other stories that got more news coverage included the introduction of L'Eggs, the break-up of the Beatles, and the opening of baseball season. The only true interest concerned the number 13. People looked for various numerological omens: The launch date was 4/11/70, which, if you add the digits  $4+1+1+7 = 13$ ; lift-off was at 13:13 Houston time; and they would enter the Moon's gravitational field on April 13.

During the first 2 days, the crew ran into a couple minor surprises, but generally, it was one of the smoothest flights so far. At 46 hours 43 minutes Joe Kerwin, the CapCom on duty said, "The spacecraft is in real good shape as far as we are concerned. We're bored to tears down here." They wouldn't be bored again for a while.

At 55 hours 46 minutes, the crew had finished a TV broadcast. Nine minutes later, at 21:08 hours on April 13, Oxygen tank No. 2, while being stirred, exploded. They were about 200,000 miles from Earth. Thirteen minutes after the explosion, Lovell looked out the left-hand window and saw that they were venting a gas.

One hour after the explosion, Jack Lousma, the CapCom on duty called up and said, "...we are starting to think about the LM lifeboat." Using the Lunar Module as a life boat had been done in a simulation a few weeks before the launch.

To conserve their minimal resources, they had to cut back on water consumption, and they had to power down all unnecessary systems, including the heat. Discomfort is an understatement for what the crew felt during the mission. Sleep was almost impossible due to the cold. They discovered that if they remained perfectly still, then they would become surrounded by a blanket of air warmed by their body heat. In the absence of gravity, the hot air would not rise. As long as they didn't move, the warm air would stay right next to their body.

Fred Haise became sick near the end of the mission with a kidney infection. It was due to having to conserve water. Besides the rationing that had already been devised, the men had voluntarily cut back their water consumption even more, but due to a different reason. Shortly after the explosion, they were told to no longer dump their waste overboard for fear of it shifting their course. They had to store all waste. Bags of urine quickly filled the cabin, even with the reduced water consumption. All three men stopped drinking much at all.

Four hours before landing, the damaged Service Module was released and gave the crew their first chance to see what had gone wrong. Photos showed one whole panel missing, and

## Apollo 13, continued

wreckage hanging out. Where the oxygen tank should have been, there was a large charred space with nothing there. One hour later, the crew left the Lunar Module, and moved back into the Command Module. During reentry, they started to feel Earth's gravity. With gravity now present, all the condensation on the walls started to fall. Lovell described it as being like rain. Splashdown took place in the Pacific Ocean, near Samoa.

The Apollo 13 Review Board conducted an exhaustive investigation. They discovered that in 1965 the Service Module had undergone many improvements, including raising the allowable voltage to the heaters in the Oxygen tanks from 28 to 65 volts. However, the thermostat switches on the heaters were not modified to tolerate the higher voltage. The thermostat on the heater was designed to prevent it from going above 80 °F. Originally, the No. 2 oxygen tank had been installed in the Service Module of Apollo 10, but was removed for modifications. During removal, it was dropped a small amount. It was examined, upgraded, and OK'd for flight on Apollo 13. During a test on the launch pad, the tanks were to be emptied to half capacity. The No. 2 tank only emptied to 92% of capacity. Apparently, when it was dropped, it put one of the drain tubes out of alignment. It was



decided to “boil off” the remaining oxygen by using the heater in the tank. The thermostat, which couldn't handle the higher voltage, most likely fused shut, so the heat would not turn off. The readout for the tank temperature didn't go above 80 (since the tanks weren't supposed to get any hotter than that), so no one realized how hot it was getting. The wires were heated to 1000 °F for 8 hours, which melted the Teflon insulation. During the normal tank stir, the exposed wires arced, causing the explosion. It could have occurred at any point in the mission.

It is absolutely amazing that those three men made it home safely. This mission is a testament to the skill and abilities of not only the crew, but everyone at Mission Control who worked out how to get them back. So far, no one has lost their life while in space. However, it is not a matter of “if” it will ever happen, but “when” it will happen. Inevitably, the more we explore space, the more likely someone will lose their life in that exploration. That is the price for exploration. With plans to return to the Moon, or even travel to Mars, we need to be prepared for a disaster that doesn't end happily. Remembering what happened on Apollo 13 should remind us how lucky we have been so far.

### References:

[NASA Apollo Mission Apollo-13 Web Page:](#)

“Lost Moon” by James Lovell and Jeffrey Kluger

# xkcd

## LIGHT POLLUTION AND THE DISAPPEARING NIGHT SKY

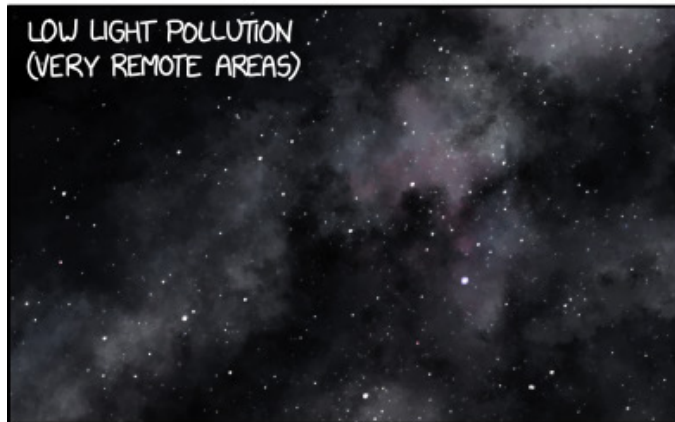
HIGH LIGHT POLLUTION  
(CITIES)



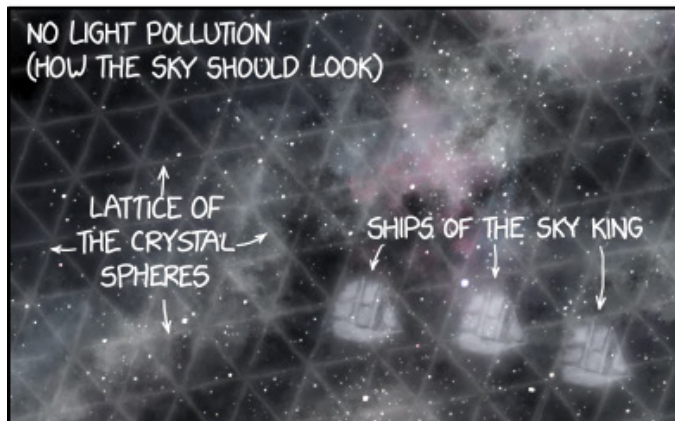
MODERATE LIGHT POLLUTION  
(SUBURBS)



LOW LIGHT POLLUTION  
(VERY REMOTE AREAS)



NO LIGHT POLLUTION  
(HOW THE SKY SHOULD LOOK)





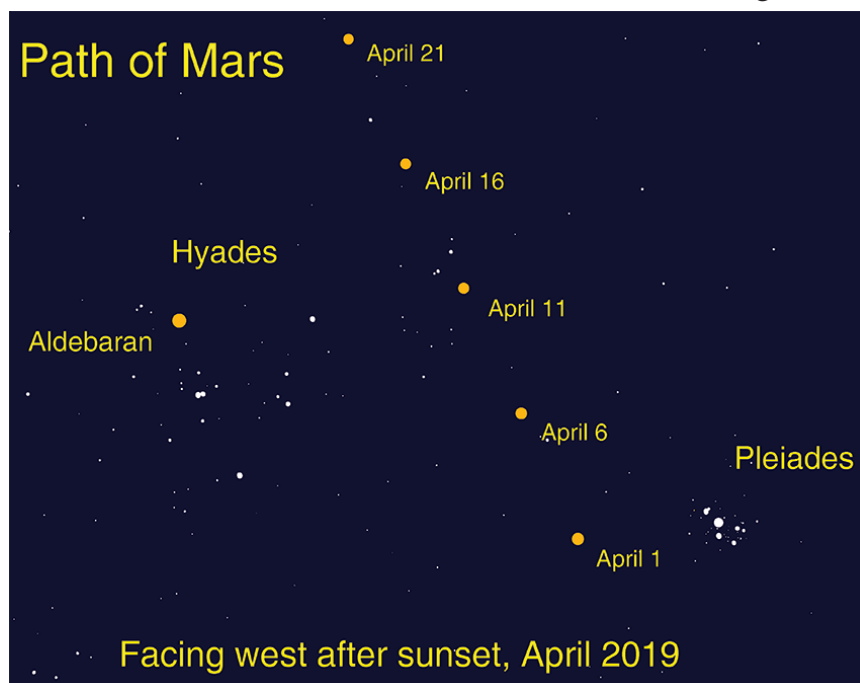
## Mars the Wanderer by David Prosper

April's skies find Mars traveling between star clusters after sunset, and a great gathering of planets just before sunrise.

**Mars** shows stargazers exactly what the term “planet” originally meant with its rapid movement across the evening sky this month. The ancient Greeks used the term *planete*, meaning *wanderer*, to label the bright star-like objects that travelled between the constellations of the zodiac year after year.

You can watch Mars as it wanders through the sky throughout April, visible in the west for several hours after sunset. Mars travels past two of the most famous star clusters in our night sky: the **Pleiades** and **Hyades**. Look for the red planet next to the tiny but bright Pleiades on April 1st. By the second week in April, it has moved eastward in Taurus towards the larger V-shaped Hyades. Red Mars appears to the right of the slightly brighter red-orange star **Aldebaran** on April 11th. We see only the brightest stars in these clusters with our unaided eyes; how many additional stars can you observe through binoculars?

Open clusters are made up of young stars born from the same “star nursery” of gas and dust. These two open clusters are roughly similar in size. The Pleiades appears much smaller as they are 444 light years away, roughly 3 times the distance of the Hyades, at 151 light years distant. Aldebaran is in the same line of sight as the Hyades, but is actually not a member of the cluster; it actually shines just 65 light years away! By comparison, Mars is practically next door to us, this month just a mere 18 light minutes from Earth - that's about almost 200 million miles. Think of the difference between how long it takes the light to travel from these bodies: 18 minutes vs. 65 years!



**The path of Mars between the Pleiades and Hyades in April.**  
Image created with assistance from Stellarium.

## Mars the Wanderer, continued

The rest of the bright planets rise before dawn, in a loose lineup starting from just above the eastern horizon to high above the south: **Mercury**, **Venus**, **Saturn**, and **Jupiter**. Watch this month as the apparent gap widens considerably between the gas giants and terrestrial planets. Mercury hugs the horizon all month, with Venus racing down morning after morning to join its dimmer inner solar system companion right before sunrise. In contrast, the giants Jupiter and Saturn move away from the horizon and rise earlier all month long, with Jupiter rising before midnight by the end of April.

The **Lyrids** meteor shower peaks on April 22nd, but sadly all but the brightest meteors will be washed out by the light of a bright gibbous Moon.

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.org](https://nightsky.jpl.nasa.org) to find local clubs, events, and more!

You can catch up on all of NASA's current and future missions at [nasa.gov](https://nasa.gov).

With articles, activities and games NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](https://spaceplace.nasa.gov) to explore space and Earth science!

**Next BSAS meeting**  
**April 17, 2019, 7:30 pm**

**Cumberland Valley**  
**Girl Scout Council Building**  
**4522 Granny White Pike**

*Topic to be announced*

*Note: The May 15 membership meeting will be held  
in the Sudekum Planetarium at Adventure Science Center*



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](http://bsasnashville.com). Frame not included.



**Barnard-Seyfert Astronomical Society**  
**Minutes of a Regular Meeting of the Board of Directors**  
**Held On Wednesday, March 6, 2019**

The regular meeting of the Board of Directors of the Barnard-Seyfert Astronomical Society was held March 6, 2019, at the Girl Scouts Center, 4522 Granny White Pike, Nashville, TN 37204. Present were Tom Beckermann, Chip Crossman, Gary Eaton, Drew Gilmore, Bud Hamblen, K C Katalbas, Johanna Keohane, Keith Rainey and Andy Reeves. Lacey Criss and Derrick Rohl were visiting from the Adventure Science Center. A quorum being present, Keith called the meeting to order at 7:30 PM. Lacey and Derrick introduced themselves. Keith asked for a motion to adopt the minutes of the February board meeting as printed in the March edition of the Eclipse. Tom so moved, Andy seconded and the minutes were adopted without further discussion by a unanimous voice vote. Theo had given a report to Keith that there was \$8,277.11 in the bank and \$129.26 in the PayPal account. \$165 was deposited since the last report. Keith reported that there were 143 members. 135 were current on dues.

Derrick and Lacey described the way the Adventure Science Center and the BSAS were currently cooperating and expressed a wish for further partnering, including ASC participation in star parties and hosting some BSAS meetings. The venue for the May meeting was moved to the ASC. The security company needed a \$100 fee to open the building.

Resolution 2019-03-06, to pay ASC \$100 for security at the May meeting, was moved by Gary, seconded by Johanna and passed by unanimous voice vote. Theo will give the ASC a check in that amount.

The NSN had trouble with the newsletter this time.

There was further discussion of meeting topics and outreach events.

There being no further business the meeting was adjourned at 8:30 PM.

Respectfully submitted,

Bud Hamblen

Secretary

**Barnard-Seyfert Astronomical Society  
Minutes of the Monthly Membership Meeting  
Held On Wednesday, March 20, 2019**

The Barnard-Seyfert Astronomical Society held its monthly meeting in the City Room of the Girl Scout Center, Nashville, Tennessee, on Wednesday, March 20, 2018. Twenty members and guests signed in. Keith Rainey called the meeting to order at 7:30 PM and asked for a motion to approve the minutes of the February 20, meeting, and the minutes were approved by a unanimous voice vote. Theo reported that there was \$8,277.11 in the bank and \$129.26 in the PayPal account. Keith reported that there were 135 members. Keith recognized new member Scott.

Keith announced that the May 15 meeting will be at the Adventure Science Center. He announced that Caleigh Dennis won the BSAS award for “Measuring the Rotation of Galaxy Groups in the Universe” at the Middle Tennessee Science and Engineering Fair”. Because the March 9, Messier Marathon was rained out, another attempt will be made on March 30 at Ron Ladd’s property near Leipers Fork. The March 16 star party at Shelby Bottoms Nature Center had about 100 attending. Additional events are March 28 at Smyrna (“A Universe of Stories”), April 13 at Edwin Warner Park (public star party), August 2 at Timberland Nature Area (Williamson County Public Library), September 14 and 15 (Humanities Symposium at Belmont University).

Keith mentioned a number of celestial and space related events that will occur in late March and April.

Dr. Matt Muterspaugh presented “The History and Future of Exploring New Worlds” on the search for planets in and beyond the Solar System. There being no further business the meeting was adjourned at about 8:30 PM.

Respectfully submitted,

Bud Hamblen

Secretary





Star clusters are commonly featured in cosmic photoshoots, and are also well-loved by the keen eye of the NASA/ESA Hubble Space Telescope. **Messier 2** is located in the constellation of Aquarius (The Water-Bearer), about 55 000 light-years away. It is a globular cluster, a spherical group of stars all tightly bound together by gravity. With a diameter of roughly 175 light-years, a population of 150 000 stars, and an age of 13 billion years, Messier 2 is one of the largest clusters of its kind and one of the oldest associated with the Milky Way.

This Hubble image of Messier 2's core was created using visible and infrared light. Most of the cluster's mass is concentrated at its center, with shimmering streams of stars extending outwards into space. It is bright enough that it can even be seen with the naked eye when observing conditions are extremely good.

Credit:

[ESA/Hubble & NASA, G. Piotto et al.](#)





Become a Member of BSAS!  
Visit [bsasnashville.com](http://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](http://bsasnashville.com). If you need more information, write to us at [info@bsasnashville.com](mailto: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](mailto:info@bsasnashville.com).