

# The ECLIPSE

August  
2015

*The Newsletter of the Barnard-Seyfert Astronomical Society*

## Next Membership Meeting:

August 19, 2015, 7:30 pm  
Cumberland Valley  
Girl Scout Council Building  
4522 Granny White Pike

Topic: Todd May, "NASA's Space  
Launch System: A Million Horses  
for Mars."

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## From the President:

I want to challenge all of you to join me in a project this month... although hopefully you will stick with it a bit longer than that.

One of the things you will hear at any star party is the lament, "I can't find any of the constellation pictures in the sky!" The advent of "go to" telescopes has not helped. With some of the new telescopes, a built in camera looks at the sky and self aligns! So you can just let the telescope do all the work. This is very cool, and useful, but you haven't learned the sky. I begin every tour around the sky like this: I want to convince you that it is easy and fun to find your way around the night sky!

Where to start? To motivate you, I want you to work toward the goal of earning the Constellation Hunter's award from the Astronomical League. I'm going to do it along with you, there are always a few constellations that we just haven't really learned... like both halves of Serpens. So let's go! There are 39 constellations to look for, and of course we'll have to wait a bit for the stars of winter to come around. But now is a great time to start.

What do we need to do? To quote, "observe and sketch all of the constellations on the included on the checklist that you are pursuing. No equipment is required other than a planisphere and reference information of the names of major stars and constellation boundaries." The checklist is [here](#):



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## Observing Highlights August and September

### Open Clusters

Mel111 (*Coma Star Cluster*),  
M6 (*Butterfly*), M7, M23,  
M21, M18, M25, M26, M39,  
M11 (*Wild Duck*), M29, M73

### Galaxies

M98, M99, M106, M61, M100,  
M84, M85, M86, M49, M87, M88,  
M91, M89, M90, M58,  
M104 (*Sombrero Galaxy*),  
M59, M60, M94,  
M64 (*Black-Eye Galaxy*),  
M63 (*Sunflower Galaxy*),  
M51 (*Whirlpool Galaxy*),  
M83, M101/M102,  
NGC 6822 (*Barnard's*)

### Globular Clusters

M68, M53, M3, M5, M80, M4,  
M107, M13, M12, M10, M62, M19,  
M92, M9, M14, M28, M69,  
M22, M70, M54, M56, M55,  
M71, M75, M72, M15, M2, M30

### Multiple Star Systems

Gamma Virginis (*Porrima*),  
Alpha Canum Venaticorum,  
Zeta Ursae Majoris (*Mizar*),  
Epsilon Bootis, M40,  
Mu Bootis (*Alkalurops*),  
Beta Scorpii (*Acrab*),  
Alpha Herculis (*Rasalgethi*),  
Epsilon Lyrae (*Double Double*),  
Beta Cygni (*Albireo*)

### Nebulae

NGC6302 (*Bug*), NGC6309 (*Box*),  
NGC6543 (*Cat's Eye*),  
M20 (*Trifid*), M8 (*Lagoon*),  
M16 (*Eagle*), M17 (*Swan*),  
M57 (*Ring*), NGC6818 (*Little Gem*),  
NGC6826 (*Blinking Planetary*),  
M27 (*Dumbbell*),  
NGC6888 (*Crescent*),  
NGC6905 (*Blue Flash*),  
NGC6960/6974/6979/  
6992/6995 (*Veil*),  
NGC7000 (*North America*),  
NGC7009 (*Saturn*),  
IC 5146 (*Cocoon*)

## Upcoming Star Parties

Friday 8/14 8:30 - 10:30 pm	Public Star Party <a href="#">Bells Bend Outdoor Center</a>
Saturday 8/15	Private Star Party <a href="#">Natchez Trace Parkway mile marker 433.5</a>
Saturday 9/12	Private Star Party <a href="#">Natchez Trace Parkway Mile Marker 412 (Water Valley Overlook)</a>
Saturday 9/19	Public Star Party <a href="#">Long Hunter State Park</a>



Aug 18  
Sep 20



Aug 25  
Sep 27



Aug 3  
Sep 4



Aug 11  
Sep 13

## Happy Birthday Phobos and Deimos by Robin Byrne

This month, we celebrate the discovery of two of the smallest moons in our solar system. The story of their discovery begins with the opposition of Mars in 1877, which occurred when Mars was also closest to the Sun, allowing astronomers to see even more detail than during a typical opposition.

During this appearance, Asaph Hall was in charge of the U.S. Naval Observatory's 26-inch refractor. His decision to search for moons around Mars began with his observations that showed that the published rotation rate of Saturn was incorrect. This led Hall to wonder what other "accepted" astronomical facts were wrong. So, he decided to test the idea that Mars had no moons.

Hall was not the first to search for moons around Mars. William Herschel had tried in 1783, and H.L. d'Arrest had looked in 1862 and 1864. Hall realized, though, that neither had tried to look very close to Mars - they had, instead, concentrated on regions much farther away.

Hall had wanted to make this attempt at discovery alone, so that he would get full credit. Fortunately for him, his assistant, Holden, was working with Henry Draper at the time, so Hall was on his own. Hall's technique involved placing Mars just beyond the field of view, and scanning the periphery of the planet (still within the glare from Mars) for any star-like object that Mars didn't pass-by (as it would pass-by background stars). His first night of observations was on August 10, but the seeing was very bad, and he found nothing. He was very discouraged, but his wife, Angelina, encouraged him to keep trying. The next night, he did see a good candidate, but fog came in before he could be sure. Cloudy weather prevented him from checking again until the night of August 15, but the seeing was horrible again. Finally, on August 16, 1877, he spotted the object again. He showed it to another assistant, George Anderson, for confirmation. Asaph Hall had



[Phobos](#)



[Deimos](#)

## Phobos and Deimos, continued

discovered Deimos. The next night, he spotted Phobos.

Asaph Hall announced his discovery to the world a few days later. Others tried to get into the act by claiming they had discovered even more moons around Mars. In particular, Hall's assistant, Holden, and Henry Draper announced that they had found a third and fourth moon. These were later shown to not exist, and, in fact, one of the alleged moons had an orbit that didn't even obey Kepler's Laws!

It was Hall who named the two moons after the attendants of Mars, as described in Homer's "The Iliad." Phobos means "fear", but the translation of Deimos is not as exact, and has been listed as meaning "flight" or "panic". By observing the orbits of the two moons, Hall was able to determine the mass of Mars to be 0.1076 times the mass of Earth, very close to the current value.

Very little is known for sure about Deimos, and most of what we know comes from a fly-by of Viking 2, which took the spacecraft within 30 km (18 miles) of the surface. The size and shape has led some to speculate that it is a captured asteroid, although some people doubt that this could occur with Mars' low gravitational pull.

Deimos is one of the smallest moons in the solar system, with dimensions of 7.5 x 6.1 x 5.5 km (4.7 x 3.8 x 3.4 miles). The surface of Deimos is very dark, and seems to be similar to a C-type asteroid (composed mostly of carbonaceous chondrites). Deimos is much smoother in appearance than Phobos. It is thought that when something impacts Deimos, because it is so small and has such a low surface gravity, that most of the

continued on next page

Next BSAS meeting  
August 19, 2015, 7:30 pm  
Cumberland Valley  
Girl Scout Council Building  
4522 Granny White Pike

*Topic: "NASA's Space Launch System: A Million Horses for Mars."  
Todd May is Program Manager of the Space Launch System from NASA's Marshall Space Flight Center. The Space Launch System is NASA's development of heavy lift capability to send both large robotic spacecraft and humans beyond low Earth orbit. Learn what it will be able to do and where the program is in current development.*



## Phobos and Deimos, continued

debris gets blown off into space, while the lightest dust goes into orbit. Over time, the very smallest dust-sized particles slowly filter back down, filling in the craters and smoothing them out. Like most moons, Deimos is in synchronous orbit around Mars, with the same side facing the planet at all times (actually, its longest axis points to the planet's surface). This means that its orbital and rotation rates are the same, with a value of 1.26 days.

Phobos is almost 3x larger than Deimos with dimensions of 27 x 22 x 18 km (16.8 x 13.7 x 11.2 miles), about 7x more massive than Deimos, but is closer to Mars, with an orbital period of only 0.3 days (7h 39m). Such a short orbital period means that it orbits Mars faster than Mars rotates. This causes Phobos to rise in the west and set in the east, crossing the sky twice per Martian day. As its orbit decays, it continues to get closer to Mars, with an expected impact occurring in about 50 million years. Phobos is also composed of dark material, which may be similar to what is found in carbonaceous chondrite meteorites. Phobos has many craters, the largest of which is Stickney, which was named after Asaph Hall's wife, Stickney being her maiden name. The impact that created Stickney came just shy of breaking the small moon apart. Mars Global Surveyor discovered that the surface of Phobos is covered with a 100 meter thick layer of regolith created by all the impacts the moon has experienced.

Some people have proposed that man's first mission to Mars should be a mission to either Phobos or Deimos. With a lower surface gravity, less fuel would be needed for landing and takeoff. Another advantage would be that by landing on the Mars-facing side, the astronauts would be shielded from harmful solar radiation. This could then be used as a launching point for unmanned probes, but which could be controlled in real-time by people on the moon, and for short Mars trips by people.

With recent news and images coming in about Pluto and its tiny moons, excitement about small bodies is at an all-time high. Take a moment to appreciate all of the unique objects in our solar system, including Mars' two diminutive satellites: Phobos and Deimos.v

### References:

[The Planet Mars: A History of Observation and Discovery. Chapter 5: 1877. University of Arizona Press Web Page](#)

[Forgotten Moons: Phobos and Deimos Eat Mars' Celebrity Dust](#)

[Mars' Moon Deimos Web Page](#)

[Phobos \(moon\) - Wikipedia](#)

## From the President, continued

you can print it out as well. For each constellation, you need to note: “Local date and time, latitude and longitude of observation, constellation name, sky conditions: transparency, and seeing, a sketch of all stars that were visible to the unaided eye, out to the limits of the constellation’s boundary. Named stars should be identified on the sketch. The sketch should include other objects that are visible within the boundaries of the constellation, including but not limited to: galaxies, open clusters, globular clusters, and nebulas.” Unless you travel, the latitude and longitude will not change. You can get transparency and seeing conditions roughly from our [Clear Sky Clock](#). Both of these are generally assigned a number from 1 (cloudy) to 10 (like the atmosphere wasn’t even there). A handy form to record all this information is [here](#).

Tonight I’m going out and looking for a couple of easy ones and some not so easy... so take a few minutes and do these to get started. While we still have the Big Dipper, use the arc of the handle stars to “arc to [Arcturus](#).” That’s the bright star in the <http://imgs.xkcd.com/comics/dimensions.png> constellation of [Boötes](#). Start there! Right next to Boötes (which does look like an ice cream cone) is the arc of faint stars that are [Corona Borealis](#), the Northern Crown (or the scoop of ice cream that fell off). Then have fun with the Summer Triangle Trio... [Cygnus](#) the Swan, [Aquila](#) the Eagle, and [Lyra](#) the Harp. That’s five and we are well on our way.

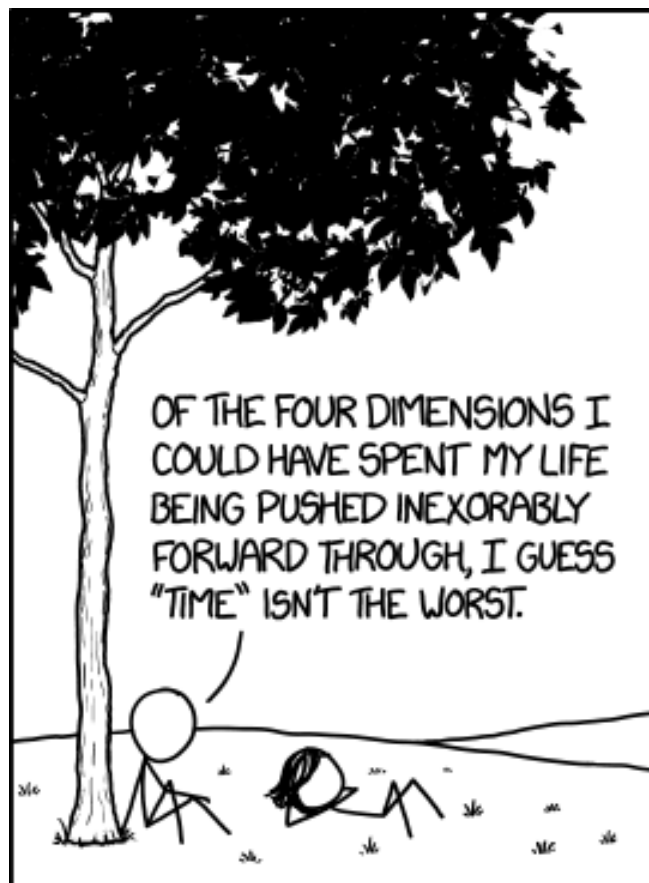
When you are finished, send in the sketches to the [the AL website](#). You get an award certificate and a great pin! Mention in the AL magazine the Reflector! Most importantly, you’ll know your way around the night sky.

Clear skies,

Theo Wellington

Send your cool astrophotos to [eclipse@bsasnashville.com](mailto:eclipse@bsasnashville.com)!

xkcd



[xkcd.com/1524/](http://xkcd.com/1524/)

**Barnard-Seyfert Astronomical Society  
Minutes of the Monthly Membership Meeting  
Held On Wednesday, July 15, 2015.**

The Barnard-Seyfert Astronomical Society held its monthly membership meeting for January at the Girl Scouts of Middle Tennessee, 4522 Granny White Pike, Nashville, Tennessee, on Wednesday, July 15, 2015. 17 members and guests signed in. Theo Wellington called the meeting to order at 7:33 PM. Bob Norling reported that there was \$1,547.31 in the regular account and \$1,619.54 in the equipment account.

Theo reported that the star party sponsored by Pickett State Park on July 11 was a success. Sky conditions were good, if dewy. Paul Lewis from UT Knoxville was present, and they had some visitors who did not know about the stary party, but had come to Bowie because of its designation as a Dark-Sky Park. About 5 or 6 telescopes were set up.

Theo announced upcoming star party dates: July 18 at Water Valley Overlook (private), July 25 at Bowie Nature Park, and August 14 at Bells Bend Outdoor Center. BSAS members are urged to sign up with the Night Sky Network. Kris McCall reminded members of the upcoming lunar eclipse. "Blood Moon" is now banned from conversation.

Mitzi Adams, NASA/Marshall Space Flight Center, solar astronomer and self-described "solar dermatologist", presented a talk on the Sun, including her recent research on solar x-ray jets, and answered questions after her talk.

There being no further business the meeting was adjourned at 9:00 PM.

Respectfully submitted,

Bud Hamblen, Secretary

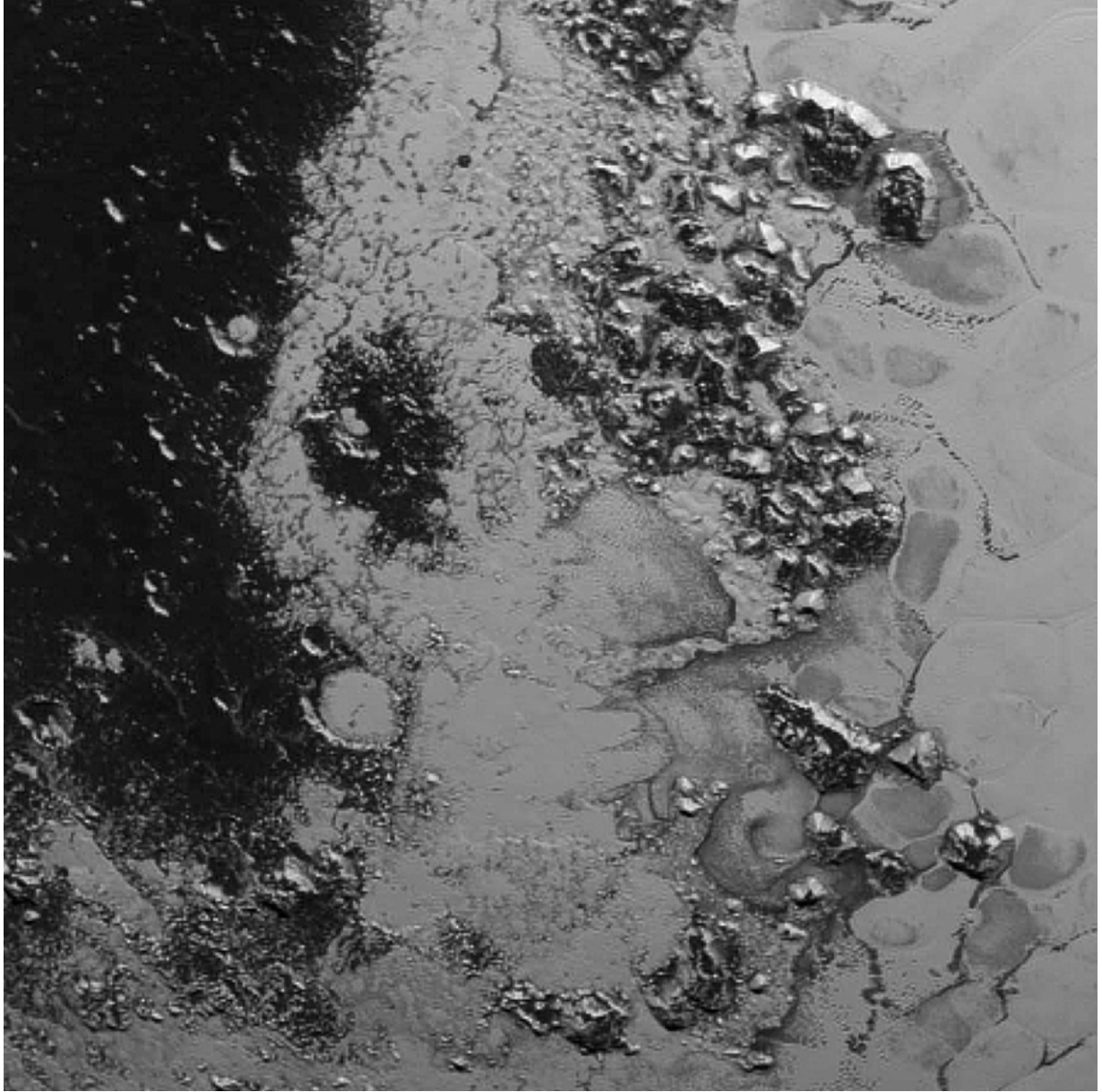
**There was no BSAS Board Meeting in July 2015.**



Four images from New Horizons' Long Range Reconnaissance Imager (LORRI) were combined with color data from the Ralph instrument to create this global view of Pluto. (The lower right edge of Pluto in this view currently lacks high-resolution color coverage.) The images, taken when the spacecraft was 280,000 miles (450,000 kilometers) away, show features as small as 1.4 miles (2.2 kilometers), twice the resolution of the single-image view taken on July 13.

[Credit](#): NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute





A newly discovered mountain range lies near the southwestern margin of Pluto's heart-shaped Tombaugh Regio (Tombaugh Region), situated between bright, icy plains and dark, heavily-cratered terrain.

This image was acquired by New Horizons' Long Range Reconnaissance Imager (LORRI) on July 14, 2015, from a distance of 48,000 miles (77,000 kilometers) and sent back to Earth on July 20. Features as small as a half-mile (1 kilometer) across are visible.

These frozen peaks are estimated to be one-half mile to one mile (1-1.5 kilometers) high, about the same height as the United States' Appalachian Mountains. The Norgay Montes (Norgay Mountains) discovered by New Horizons on July 15 more closely approximate the height of the taller Rocky Mountains.

The names of features on Pluto have all been given on an informal basis by the New Horizons team.

[Credit:](#) NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



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home schooled.

You can check the status  
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There will be a two month  
grace period before any  
member's name is removed  
from the current distribution  
list.

## 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) or call Theo Wellington at (615) 300-3044.

## 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).