

# THE BLUE MOON OBSERVER

## NOVEMBER, 2017

Join us for the November general meeting of DPAS at 7 PM on Tuesday, November 7 at the Ray & Ruthie Stonecipher Astronomy Center. Dave Lenius will give a presentation on Processing Images. Astronomy Basics talk will be given by Gary Henkelmann.



### Door Peninsula Astronomical Society

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#### Notes from our Meeting October 3, 2017

**President Gary Henkelmann** opened the meeting of 27 members and guests by introducing seven new members, thanking **John Beck** for his preparation of our refreshments and mentioning the Dark Ranger and his meeting with various school, public and Girl Scout groups. He then spoke about Astronomy Day on the 14<sup>th</sup> of this month with **Susan Basten** and others as volunteers from 1 until 4 and activities from solar viewing to the planet walk, plus viewing at Newport on the 19<sup>th</sup>, parking lot #3, with good skies promised a couple of days after the New Moon, and the month going out on the 21<sup>st</sup> right here, with three viewing objects: Andromeda, the Owl cluster and Saturn.

Tonight, we began with **John Beck** on **Tips for Viewing Preparation:**

- **Clothing:** remembering our feet and that too heavy socks

may deprive them of needed warmth, *gloves* and *mittens* for better warmth;

- a *SkyMap* or *Planisphere*, preparing in advance so you know your guideposts and what it is you want to see; consider the *Moon phase*, too;
- *Extra Batteries* for such as your finder, laser pointer, red flashlight, telescope power drive, a heated dew shield and extension cords if you plan to use external power;
- *Binoculars* as well as the laser pointer, to help find the object you or others with you want to view – binocs open up so much more of the sky;
- a *Notebook* and *Pencil* to log in such as the time and date, the object(s) you plan to see, the time and the date, how good the seeing sky is (like the number of stars – the twinkling *continued on page 3*)



### Who We Are

DPAS is a local club and chapter of the Astronomical League. We are also a club member of the International Dark-Sky Association and the Night Sky Network, teaching arm of the Astronomical Society of the Pacific. We meet on the first Tuesday of every month, with rare exception. Meetings are held at the Ray & Ruthie Stonecipher Astronomy Center unless otherwise announced. We operate and maintain the Leif Everson Observatory which houses a 14" Celestron Schmidt-Cassegrain telescope on a sophisticated tracking mount controlled by computer, a weather station housed in the observatory with current readings shown on our web site:

[www.doorastronomy.org](http://www.doorastronomy.org)

The StarGarden near the observatory is used for viewing the sky with unaided vision, binoculars and members' telescopes. There are also binocular mounts set in concrete which allow viewers of different heights to view an object through the same binocular.

The Ray & Ruthie Stonecipher Astronomy Center, shown on the right at the top of this page, provides for storage, projects, meetings, warm-up and toilet facilities. It also houses a StarLab, an inflatable planetarium with a sophisticated projection system. The planetarium is available for group presentations.

An Analemmatic Sundial was dedicated on October 20, 2012.

The "astronomy campus" as described here is reached by taking Utah Street east to the stop sign and turning left through the gate onto Stargazer Way. Set your GPS to 2200 Utah.

### Finding Mercury

Mercury is difficult to spot in the sky because, being the innermost planet in the solar system, it is usually very close to the Sun or behind it or in front of it. Its year is not quite 88 Earth days and its mean orbital radius is about 39% that of Earth. This means that Mercury's greatest *elongation* - the angular distance between it and the Sun as viewed from Earth - is at maximum  $28^\circ$  (a 12" ruler held at arm's length) and usually less. **November 23, 2017 is a good time to look for Mercury in the evening sky.** With an elongation of  $22^\circ$  east of the sun [see Figure], it will be visible for 1+ hours after sunset in our area. How long after sunset depends on one's latitude; a little more than an hour at mid-northern latitudes and over 1 & 1/2 hours at the equator. BE CAREFUL NOT TO LOOK AT THE SUN when trying to find Mercury - best to wait for the Sun to set completely. Use binoculars if you have them. Mercury's *apparent magnitude* ranges from -2.6 (brighter than Sirius) to 5.7 (dim for an inner planet).

Mercury and Venus are the only *inferior planets*, meaning their orbits are inside that of Earth. Because Mercury never ventures far from the Sun, it can only be seen in the morning or evening sky. Like Venus and the Moon, it goes through the complete range of phases as it moves around its orbit. Seen from Earth, this cycle of phases reoccurs about every 118 days. Radar

observations in 1965 showed that Mercury is unique in the Solar System as it is gravitationally locked with the Sun in a 3:2 spin-orbit resonance. As seen relative to the fixed stars, it rotates on its axis exactly three times for every two revolutions around the Sun. An observer on Mercury, in a frame of reference that rotates with its orbit, would therefore see only one day every two Mercurian years. Of all the planets, Mercury's surface experiences by far the greatest range of temperatures: nearly  $900^\circ$  Fahrenheit on its dayside and  $-300^\circ$  F on its nightside.

All planets orbit the Sun in a path described by an ellipse, but usually have roughly circular orbits. Mercury's *orbital eccentricity* is the largest in the Solar System; it is about 1.5 times farther from the Sun at *aphelion* (off Sun) than at *perihelion* (near Sun). This is why Mercury's maximum elongation varies from orbit to orbit, which also depends on where Earth is in its orbit. Mercury's orbit is inclined  $7^\circ$  to the plane of Earth's orbit, the *ecliptic*. Transits of Mercury across the face of the Sun thus occur only intermittently, about seven years on average. The last occurred in May 2016 and the next transit is on November 11, 2019. The rare event when Venus and Mercury occult each other - as viewed from Earth - happens every few centuries. The last was in 1737 and the next is in 2133.

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### DPAS BOARD

Gary Henkelmann, President  
[president@doorastronomy.org](mailto:president@doorastronomy.org)

Thomas Minahan, Vice President,  
 Outreach Coordinator, and Board  
 Secretary

Susan Basten, Secretary, Treasurer,  
 ALCOR, and Membership Chairperson  
[treasurer@doorastronomy.org](mailto:treasurer@doorastronomy.org)

John J. Beck, Past President and  
 Editor  
[editor@doorastronomy.org](mailto:editor@doorastronomy.org)

Jim Maki, Academic Coordinator

John W. Beck, Webmaster

Mike Egan, David Lenius, Jacque  
 Axland, and Steve Ransom-Jones,  
 Members at Large

Ray Stonecipher, in spirit

In addition, Barbara Henkelmann  
 serves as the DPAS Archivist.

The business of the DPAS is largely  
 conducted at the Board meetings to  
 leave the general meetings open for  
 programs. The Board meetings are  
 scheduled for 7 PM on Monday, 8  
 days prior to the following general  
 meeting, at the Astronomy Center.  
 Members of DPAS are invited to  
 attend Board meetings.

### Meeting notes from page 1

ones – you can spot in the Little  
 Dipper), the phase of the  
 Moon, the eyepiece and  
 magnification, the wind  
 direction, and, after  
 drawing in a quick sketch  
 of the planned viewing  
 object, to put a penciled  
 circle around it;

- consider a *hairdryer* or  
 other defogging  
 equipment;
- a short *stepladder* if you  
 plan on showing the sky to  
 children, and an adjustable  
 viewing chair (bought or  
 homemade) if you plan on  
 drawing deep sky objects;
- know the direction of  
*North* before you find  
 Polaris (a compass in an  
 unfamiliar place);
- *Align* the finder with the  
 telescope by aiming it at  
 something like a distant  
 pole or tree; and, finally,  
*know* where your  
 eyepieces are so you can  
 locate them in the dark,  
 starting with your 40-60  
 power pieces.

Then, what John made and  
 brought – a fine addition to  
 viewing preparation – snacks!  
 Pumpkin cake with whipped  
 cream and filling trail-mix  
 cookies. All delicious: thank  
 you, John!

Then, the main attraction, *Steven  
 Ransom-Jones* with a  
 presentation on **The Crab  
 Nebula: its Beauty, Mystery and  
 History**. This was a masterful  
 PowerPoint presentation:  
 appreciative of all that he  
 mentioned – its beauty, its  
 mystery and its history, and  
 presented perfectly, in its  
 organization, message and  
 enthusiasm! It is a small and  
 difficult to see item, of 8.4  
 magnitude, located in Taurus (just  
 above Orion), a smudge in  
 binoculars and needing at least a  
 10” telescope to see and  
 appreciate its magnificent reality.  
 Found in 1731 by John Bevis and  
 thought to be a comet, but was  
 discovered not to be one because  
 it didn't move over some nights:  
 Messier looked at it through Lord  
 Rosse's 36” telescope, and made it  
 #1 in his catalog of not-to-be-  
 confused-with-a-comets, 6500  
 light years distant and 11 light  
 years wide, and, one of the  
 mysteries, still expanding at some  
 1500 kilometers/second!  
 Spectroscopy shows it with an  
 eerie blue light and rich in  
 helium, and radio waves reveal it  
 to have at its core a rapidly  
 spinning (about 30 times a  
 second) progenitor star of what  
 had been 8 – 10 solar masses. The  
 core gives off great amounts of  
*continued to page 4*



### Astronomy Quiz

True or False:

1. A star's coordinates (right ascension and declination) change as Earth rotates on its axis.
2. A binocular with a field of view of 340 feet at 1000 yards has an angular field of view of approximately 6.5 degrees.
3. Saturn's moons are tidal locked to Saturn like Earth's moon is tidal locked to Earth.
4. One of Jupiter's moons shares a mythological name with the bear we know as Ursa Major.
5. The four stars in the Trapezium in the Orion Nebula are more easily seen when using a nebula filter.

### Meeting notes from page 3

x-ray and gamma ray requiring a large energy source of 70,000 times the energy of the Sun. Reversing its expansion gave them 900 years ago, and, *voila!*, Edwin Hubble linked it to SN1054 – supernova 1054! in 1942, Rudolf Minkowski found a star with a very unusual spectrum: the core star of the Crab. Records showed the 1054 explosion to be brighter than anything except the Moon and the Sun, visible in daylight, visible for nearly two years, and giving off tremendous energy. Here Steve went into the nuclear dynamics of a star: it burns hydrogen for 5 billion years, then helium for 1 million years, then carbon for 100 years, oxygen for 100 days, silicon for 1 day and ... his recipe for an “anti-souffle”! Gravity at the core exceeds electron degeneracy, and the fight between the pressure of gravity and the heat of fission and fusion into a 5-mile wide pool of iron, there results an enormous explosion, ejecting 80% of what had been a star, and forming what Steve called the “neutron soup”, 18 miles wide, with only neutrinos escaping, and where an object the size of his little finger weighs a billion tons, the highest mountain on its surface is 2 to 3 millimeters above the smooth crust of 1 mile, and spinning at 30x a second from the preservation of its angular momentum! He then related that momentum to its huge magnetic field, with x-rays rotating like a

light house. All of this not just said, but shown in his excellent PowerPoint. And from the further research into all this comes such as a better understanding of Titan's atmosphere and other points of utility. He cautioned that the continual expansion will, one day, render it all invisible, so get it while you can!

So, the Crab Nebula gives us beauty, mystery, history and utility, all composited in a talk by Steve! Nice job!

Mike Egan

(With thanks for letting me have a copy of his Power Point slides so I could patch together what I did!)

**Viewing Nights:** November 18, December 16.

**Meteor Showers:** The Taurids should peak twice in November, first the night of the 5th and 6th, the second the night of the 12th and 13th.

The Leonids should be best viewed the night of the 17th and 18th.

**NCRAL 2018:** Chairperson Jacque Axland and her committee have already accomplished the bulk of planning for this major event. Keep the weekend of May 4th and 5th and cleanup on the 6th in mind. Plan to attend and volunteer to help.





## Poetry Corner

### November Morning

Fair Venus, how we'll miss your  
 morning light  
 When east horizon rises as you rise  
 While briefly Jupiter is at your side  
 So in your absence, 'round the dome  
 we scan  
 The hunter, with his belt and  
 scabbard, high  
 In southern view regards his prey  
 Above in western sky the sisters glow  
 Though counting six, it's seven in their  
 name  
 The queen directs my eyes to beta  
 star  
 The key to our bright sister galaxy  
 Two comet trails will shower sparks  
 and streaks  
 As if from lion's mane and horns of  
 bull  
 Mid month the moon will slink behind  
 the sun  
 Thus yielding brighter stars with  
 darker sky;  
  
 Like nighttime gazing, gaze the  
 morning sky.

John J. Beck

### *Finting Mercury from page 2*

*Mercury's orbit played an important role lending strong evidence for Albert Einstein's theory of gravity, General Relativity. In 1859, the french astronomer Urbain Le Verrier reported that the slow precession of Mercury's orbit around the Sun could not be explained by Newtonian mechanics and perturbations by other known planets. [Precession: the path around the Sun shifts slightly with each orbit; the advance of perihelion, the point in a planet's orbit when it is closest to the Sun.] Among possible explanations, he suggested another planet might orbit closer to the Sun and affect Mercury's orbit. The hypothetical planet was named Vulcan, but it was never found. Mercury's precession was satisfactorily explained by General Relativity. Newton's theory had predicted an advance only half as large as observed - Einstein's predictions exactly matched.*

Mercury most likely formed out of our star's proto-planetary disk along with the other planets. Its surface has extensive mare-like plains from magma flows in the past, but its heavily crated surface indicates it has been geologically inactive for billions of years. Nevertheless, its surface is more heterogeneous than either Mars's or the Moon's, both of which have large areas of similar geology, such as maria and plateaus. Observations from Earth and the only two spacecraft to visit Mercury, the 1975 *Mariner 10* flyby and the *Messenger* orbiter (2011 - 2015), show a wide variety of surface features including *dorsa* (wrinkle-

ridges), Moon-like highlands, *montes* (mountains), *planitiae* (plains), *fossae* (depressions), *dupes* (escarpments), and *valles*. The scarps found on the surface of the planet indicate that its huge iron core is slowly shrinking, so the crust buckles.

Mercury is too hot and small for its weak gravity to retain any significant atmosphere over time. The recent discovery that water ice exists inside permanently-shadowed craters at the north pole presents a puzzle. Close examination of the ice shows sharp boundaries and less erosion than expected, indicating it was deposited not that long ago, geologically speaking. No answer yet where it came from. Organics have also been found on Mercury's surface. While it is unlikely that life as we know it could exist there it demonstrates how these compounds are distributed throughout the solar system.

In the pre-Christian era, Mercury actually had two names, as people at the time did not realize that the planet could alternately appear on one side of the sun and then on the other. The planet was called Mercury when it was in the evening sky, but it was known as *Apollo* when it appeared in the morning. It is said that Pythagoras, in the fifth century B.C., pointed out that they were the same. In Roman legend, Mercury was the swift-footed messenger of the gods. The planet is well-named because of its rapid orbit. According to *Wikipedia*, Mercury was the Roman god of "financial gain, commerce, eloquence (and thus poetry), messages/communication (including divination),

*continued on page 6*



### *Finding Mercury from page 5*

travelers, boundaries, luck, trickery and thieves; he is also the guide of souls to the underworld." That's really anthropomorphizing a small battered and baked orb, barely bigger than our moon!

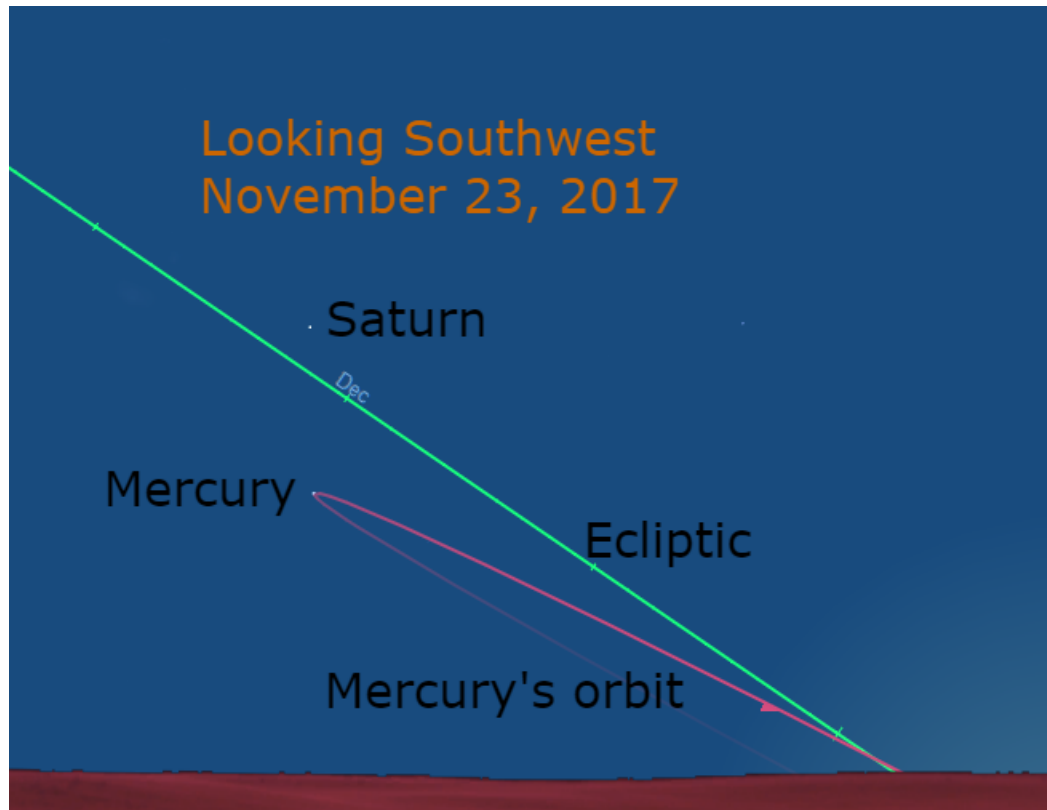
Miscellany: Mercury has no moons or

announcing he had AIDS. Mercury had an elongation of  $21^\circ$  that evening.

*The preceding article by Tom Minahan was published in the Peninsula Pulse in October and is used by permission of the Peninsula Pulse and doorcountypulse.com.*

## Astronomy Quiz Answers

1. False. The coordinates remain constant.
2. True.  $340 \text{ feet at } 1000 \text{ yards divided by } 52.5 = 6.476 \text{ degrees.}$
3. Partly true. Of Saturn's 57 confirmed moons, sixteen are tidal locked to Saturn.
4. True. Callisto is the name of one of Jupiter's "Galilean" moons. In Greek mythology, Callisto was changed into a bear and became the great bear, or Ursa Major.
5. False. A nebula filter renders the nebula more distinct against the background sky but partially hides the stars which constitute the Trapezium.



rings. The Hubble Space Telescope has never been aimed at Mercury for fear the Sun's nearby brightness would harm its optical and electrical components. The metallic element Mercury (atomic number 80) was named for the swift planet because it's a fluid at room temperature. Coincidentally, Freddie Mercury, lead singer for the rock band *Queen*, died on November 24, 1991, one day after

The image is from: <https://jeffreylhunt.wordpress.com/2017/01/25/2017-mercury-in-the-evening-sky/>