

# Skylights

Newsletter of the Astronomical Society of Northern New England



SEPT 2016



Member of NASA's



Astronomical League

## ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

- 1) To have fun sharing our knowledge and interest with others.
- 2) To provide basic education in astronomy and related sciences to all who are interested.
- 3) To promote the science of Astronomy.

## What's Up In September

By Bernie Reim

September always marks the beginning of fall for us in the northern hemisphere. This year that will happen at 10:21 a.m. on Thursday the 22<sup>nd</sup>. This is a critical point in helping to understand our orbit around the sun and the relative positions of the earth and the sun on the ecliptic, which is the path that the sun, moon, and all of the planets are always on as we all orbit the sun.

The autumnal equinox and the vernal equinox are the only two days each year that the sun actually rises due east and sets due west for everyone on earth. The very next day after fall starts the sun will already rise a little farther south of east, on the way to its lowest point, which will be the winter solstice in 3 months.

The word equinox means "equal night". That is always true on the equator, but you will see that the days will not be exactly 12 hours long until about 3 days after the fall equinox and they are already 12 hours long about 3 days before the spring equinox. That is a proof that the earth orbits in ellipses and not perfect circles around the sun.

The sun on the ecliptic crosses the celestial equator on a downward path as fall starts and on an upward path as spring starts half a year later. These are imaginary extended planes, but they are important to visualize if you want to better understand how the dynamic inner solar system works and how mathematical it really is.

This is a great month to get out under the night sky to enjoy and appreciate all it has to offer because we tend to have more clear nights this month and it is less humid and there will be fewer bugs. There are several interesting highlights this month, but it is always well worth any effort you make just to get out under a clear sky and to keep learning and to be surprised and to share the same sky that is above all of us with others. A perfect example of this was the Perseid meteor shower last month. We saw several hundred meteors at its peak after the

moon set after midnight. Along with attaining a better sense of the vastness and dynamic nature of the sky just above us, we also heard elemental terrestrial sounds like the plaintive hoots of two owls communicating in the woods and the exciting yelps and howls of a pack of coyotes racing through the field.

We will lose Mercury and Jupiter this month, but all of the other planets will still be visible in the evening sky. There will be some nice conjunctions of planets with the moon, another meteor shower from Perseus called the Epsilon Perseids, the Aurigid meteor shower, a faint comet in Cancer the Crab, the third largest asteroid, Pallas, traveling through Equuleus the Little Horse, and even a lunar and a solar eclipse, but those two will not be visible for us in this country.

As the terrestrial seasons are changing this month on the earth, so are the celestial seasons above us. You will see the Pleiades in Taurus and the top of the Winter Hexagon emerge once more over the eastern horizon only a few hours after sunset as fall begins.

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## What's Up "Continued from page 1"

You can already see this now if you stay out late, like we did for the Perseids.

Then keep watching Venus and Jupiter after their great conjunction at the end of last month. Look low in the southwestern evening sky half an hour after sunset and you will see Venus getting a little higher in the sky each evening even as Jupiter slowly sinks out of sight. A very slender waxing crescent moon joins the pair on the second and third of this month.

Then travel 3 constellations to the east along the ecliptic and you will see orange Mars extending its distance from golden Saturn a little more each evening. They still form a nice, ever-changing triangle with the red supergiant star Antares in Scorpius. A first quarter moon will join the trio on the 8<sup>th</sup> and 9<sup>th</sup> of the month. Last month it appeared like Mars was being sling shotted through the sky by an imaginary slingshot that you can create by connecting Saturn and Antares. All three lined up perfectly on the 23<sup>rd</sup>, and then Mars slowly proceeded eastward each night after that, as it still continues all of this month. That is a great way to look at this part of the sky to get a better sense of true motions and speeds of those three objects along with the earth.

Mars takes nearly 2 years to orbit the sun and it lines up with the earth at opposition every 26 months. Its average speed around the sun is 15 miles per second, or just a little slower than our own speed of 18.6 miles per second. Based on Kepler's laws of planetary motion, you would expect that as well as Saturn traveling much slower since it is about 10 times farther away than Mars. Saturn travels at 6 miles per second and takes nearly 30 years to orbit the sun once. The real surprise comes with Antares. It is traveling at nearly 500,000 miles per hour around the center of our galaxy, just like our sun is doing. It is about 600 light years away, instead of just over one light hour away like Saturn. So that places Antares about 5 million times farther away. Shining at first magnitude, its distinct orange color looks only a little less bright than Mars, which is now about zero magnitude, so you gain a much better appreciation of how intrinsically bright and large Antares has to be. It is 700 times larger than our sun, which means that if you could place Antares where our sun is in the sky, the earth and Mars and even the asteroid belt would all be orbiting inside this massive star. Antares is 15 times as massive as our sun, which makes it 50,000 times more luminous than our sun since a star's luminosity is the fourth power of solar mass. If a star is twice as massive as our sun, it would be only 16 times as bright.

If you missed the Perseid meteor shower last month, there will be another little shower emanating from Perseus this month. They are called the

Epsilon Perseid shower and they will peak after midnight on Friday the 9<sup>th</sup>. However, they will not be nearly as prolific as the Perseids, since they will only produce about 5 meteors per hour, which is just above the background rate of 3 to 4 meteors per hour that you could see on any clear night. The Aurigid meteor shower peaks on the first of the month, but it will not produce much more than the Epsilon Perseids. It is good to know about these showers and use them to get out under the sky and experience other wonders as well.

If you have access to a good telescope, you can see 12<sup>th</sup> magnitude comet 43P/Wolf-Harrington glide through Cancer the Crab this month. A close approach to Jupiter in 3 years will alter the path of this comet, so that next time around it will probably be twice as far away and 4 times fainter than it is now.

Since we are in an eclipse season again, the two eclipses this month will be an annular eclipse over Central Africa and Madagascar during the new moon on the 1<sup>st</sup> of the month and a penumbral lunar eclipse visible in the eastern hemisphere over Europe, Africa and Asia on the 16<sup>th</sup> during full moon. There will be a brilliant ring of sunshine visible around the moon during the annular eclipse because the moon will be a little too far away to completely cover the sun, and the moon will not even go into the deepest part of the earth's shadow, called the umbra, during the penumbral lunar eclipse on the 16<sup>th</sup>.

Sept.1. New moon is at 5:03 a.m. EDT.

Sept.2. Neptune is at opposition in Aquarius. The moon will be very close to Jupiter tonight.

Sept.3. Viking 2 lands on Mars on this day in 1976. The moon is near Venus tonight.

Sept.8. The moon is near Saturn tonight and Mars the next night.

Sept.9. First quarter moon is at 7:49 a.m. Viking 2 is launched in 1975.

Sept.12. Mercury is at inferior conjunction, or closest to earth tonight. The transit of Mercury happened on May 9 of this year during the last time our first planet was at inferior conjunction.

Sept.16. Full moon is at 3:05 p.m. This is the famous Harvest moon near the fall equinox.

Sept.22. The autumnal equinox is at 10:21 a.m. for us in the Northern Hemisphere.

Sept.23. J. Galle discovered Neptune on this day in 1846. It has made just over one orbit since.

Sept.28. Mercury is at greatest western elongation and makes its best appearance for the year in our morning sky.

Sept.30. The second new moon of this month happens at 8:11 p.m.

Moon Phases

- Sept 1**  
New
- Sept 9**  
First Quarter
- Sept 16**  
Full
- Sept 23**  
Last Quarter
- Sept 30**  
New

Moon Data

- Sept 2**  
Mercury 6° south  
of Moon
- Jupiter 0.4° south  
of Moon
- Sept 3**  
Venus 1.1° south  
of Moon
- Sept 6**  
Moon at apogee
- Sept 8**  
Saturn 4° south  
of Moon
- Sept 9**  
Mars 8° south  
of Moon
- Sept 15**  
Neptune 1.2° south  
of Moon
- Sept 18**  
Moon at perigee
- Uranus 3° north  
of Moon

Submitted by Glenn Chaple

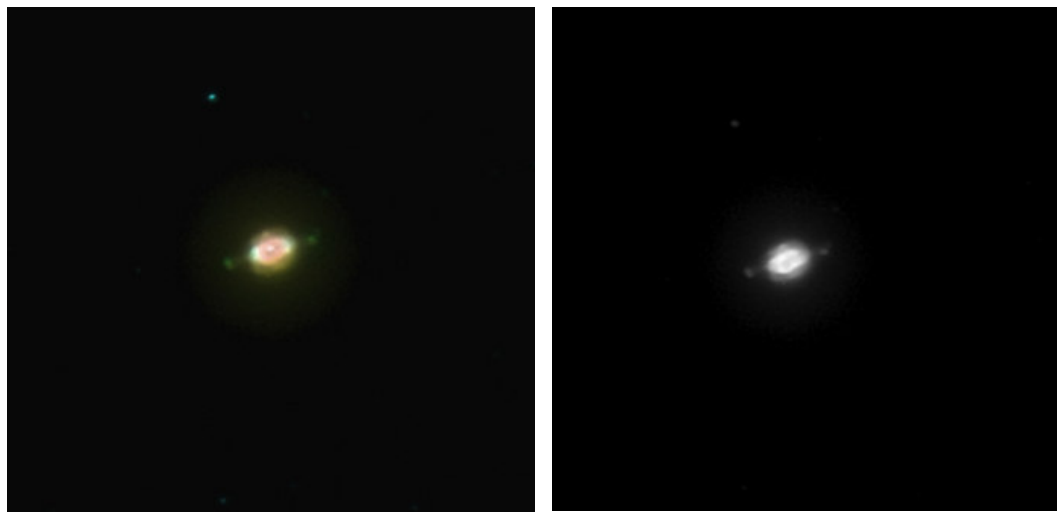


## Sky Object of the Month – September 2016 (Courtesy LVAS Observer's Challenge\*)

NGC 7009 "Saturn Nebula" –Planetary Nebula in Aquarius (Mag 8.0, Size 20")

Discovered in 1782 by William Herschel, NGC 7009 (the "Saturn Nebula") is located a little over one degree west of the 4.5 magnitude star nu (ν) Aquarii and just a few degrees northeast of the Messier objects M73 (a four-star asterism) and M72 (a small globular cluster). It gets its nickname from a pair of thin extensions, or ansae, that stretch out to the sides of the main nebula, giving it the appearance (and apparent size) of the planet Saturn.

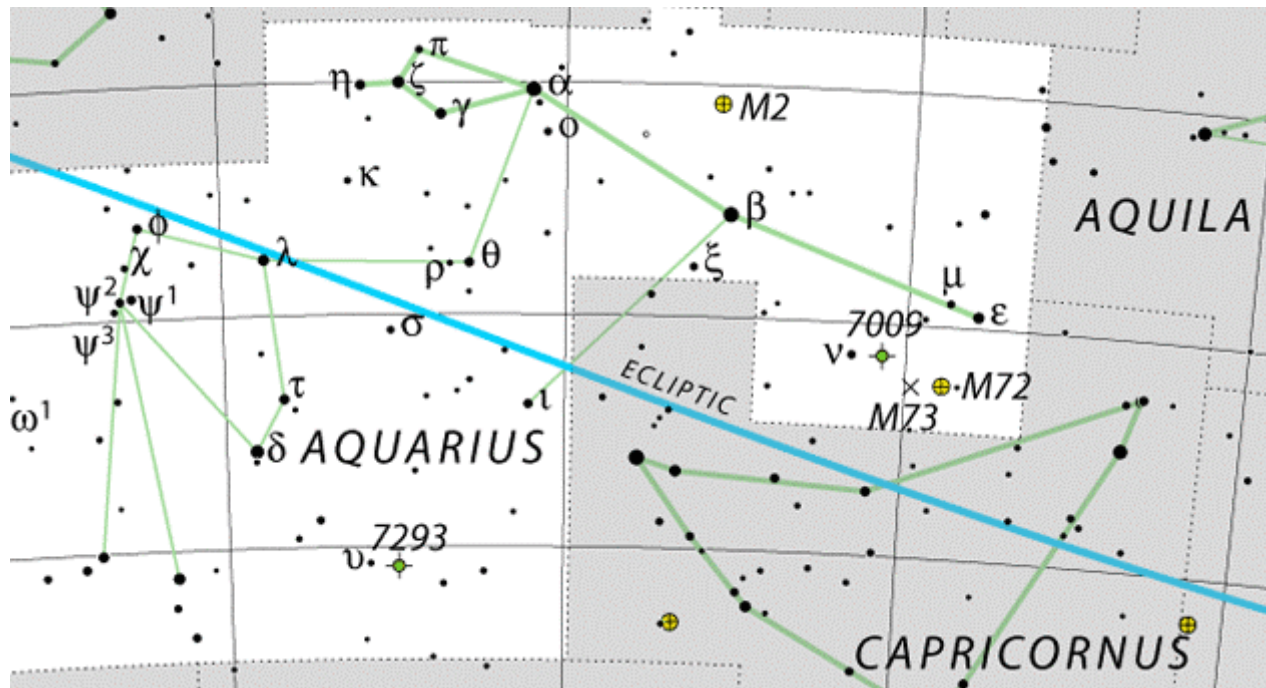
The Saturn Nebula is readily glimpsed in small-aperture scopes, appearing as a slightly oval object blue-green in color. The ansae require larger instruments. The challenge is to determine the smallest aperture needed to view them. Another challenge is to spot the central star which shines at magnitude 11.5, but which is masked by the surrounding nebulosity.



Images by Mario Motta MD

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*“Continued from page 3”*



[www.constellation-guide.com](http://www.constellation-guide.com)

\*The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either [Roger Ivester \(rogerivester@me.com\)](mailto:rogerivester@me.com) or [Fred Rayworth \(fred@fredrayworth.com\)](mailto:fred@fredrayworth.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to [lvastronomy.com/observing-challenge](http://lvastronomy.com/observing-challenge).

**Principal Meteor Showers in 2016**

**January 4**  
Quadrantids

**April 22**  
Lyrids

**May 6**  
Eta Aquarids

**July 30**  
Delta Aquarids

**August 12**  
Perseids

**October 9**  
Draconid

**October 21**  
Orionids

**November 9**  
Taurids


**November 18**  
Leonids

**November 26**  
Andromedids

**December 14**  
Geminids

**December 22**  
Ursids

*Note: Dates are for maximum*



The latest issue of the Space Place Newsletter: News and Notes for Formal and Informal Educators can be found at: <http://spaceplace.nasa.gov/en/educators> .

Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

**Check out our great sites for kids:**



The Space Place website (<http://spaceplace.nasa.gov>)



The *SciJinks Weather Laboratory* at <http://scijinks.gov>



*NASA Climate Kids* at <http://climate.nasa.gov/kids>

**Our Club has Merchandise for Sale at: [www.cafepress.com/asnne](http://www.cafepress.com/asnne)**



***ALL money raised goes to our operating fund.  
Any design can be put on any item.  
Just let our club member, David Bianchi, know.***

**This article is provided by NASA Space Place.**

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## Is there a super-Earth in the Solar System out beyond Neptune?

By Ethan Siegel

When the advent of large telescopes brought us the discoveries of Uranus and then Neptune, they also brought the great hope of a Solar System even richer in terms of large, massive worlds. While the asteroid belt and the Kuiper belt were each found to possess a large number of substantial icy-and-rocky worlds, none of them approached even Earth in size or mass, much less the true giant worlds. Meanwhile, all-sky infrared surveys, sensitive to red dwarfs, brown dwarfs and Jupiter-mass gas giants, were unable to detect anything new that was closer than Proxima Centauri. At the same time, Kepler taught us that super-Earths, planets between Earth and Neptune in size, were the galaxy's most common, despite our Solar System having none.

The discovery of Sedna in 2003 turned out to be even more groundbreaking than astronomers realized. Although many Trans-Neptunian Objects (TNOs) were discovered beginning in the 1990s, Sedna had properties all the others didn't. With an extremely eccentric orbit and an aphelion taking it farther from the Sun than any other world known at the time, it represented our first glimpse of the hypothetical Oort cloud: a spherical distribution of

bodies ranging from hundreds to tens of thousands of A.U. from the Sun. Since the discovery of Sedna, five other long-period, very eccentric TNOs were found prior to 2016 as well. While you'd expect their orbital parameters to be randomly distributed if they occurred by chance, their orbital orientations with respect to the Sun are clustered extremely narrowly: with less than a 1-in-10,000 chance of such an effect appearing randomly.

Whenever we see a new phenomenon with a surprisingly non-random appearance, our scientific intuition calls out for a physical explanation. Astronomers Konstantin Batygin and Mike Brown provided a compelling possibility earlier this year: perhaps a massive perturbing body very distant from the Sun provided the gravitational "kick" to hurl these objects towards the Sun. A single addition to the Solar System would explain the orbits of all of these long-period TNOs, a planet about 10 times the mass of Earth approximately 200 A.U. from the Sun, referred to as **Planet Nine**. More Sedna-like TNOs with similarly aligned orbits are predicted, and since January of 2016, another was found, with its orbit aligning perfectly with these predictions.

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Ten meter class telescopes like Keck and Subaru, plus NASA's NEOWISE mission, are currently searching for this hypothetical, massive world. If it exists, it invites the question of its origin: did it form along with our Solar System, or was it captured from another star's vicinity much more recently? Regardless, if Batygin and Brown are right and this object is real, our Solar System may contain a super-Earth after all.



*A possible super-Earth/mini-Neptune world hundreds of times more distant than Earth is from the Sun.  
Image credit: R. Hurt / Caltech (IPAC)*

## August Club Picnic & Meeting

Photos Submitted by Editor





## ASNNE 2016 Weekend Starfest Starparty

Come for a few hours or camp out overnight  
 On site Camping - No running water or electricity. Porta potty on site -  
 TYO Trash please  
 BYO seating

### Weekend line up

#### Friday

Starfield Observatory Gates open Friday am  
 Meeting Tent set-up during the afternoon  
 Observatory open for Solar viewing during daylight and open all night.  
 Friday and Saturday night for observing, or hang out under the stars or the tent , or next to the fire for a  
 chat...or perhaps a walk thru the constellations of glow worm lights (if they return this year).  
 Perhaps Aurora will show up again this year

#### Saturday

Am - Daylight Solar viewing H-alpha on Zeiss ,and perhaps some Coronados of attendees.  
 10-12 Raffle tables and BBQ setup  
 12-2 pm Starlady Joan - Astronomy Jeopardy Game

2-5 pm BBQ -6\$  
 -Hot Dogs, Hamburgers, sweet corn, chips  
 -BYO deserts

5-9 Tent Talks - order not fixed  
 Raffle prizes awarded

Bernie Reim Whats Up

Guests TBD

Open show and tell- astro images

Open Discussion Topics:  
 -Astro Shorts  
 -In the Astro news  
 -Pluto New Horizons Misson update and discussion

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Date: Friday, 9/9/2016 - Sunday, 9/11/2016

Location: Starfield Observatory, 918 Alewife Road (Rt 35) Kennebunk, ME, Kennebunk, ME 04043

## Club Meeting & Star Party Dates

Date	Subject	Location
Sept 9-11	<p style="text-align: center;"><b>ASNNE's Annual Weekend Starfest Starparty.</b></p> <p style="text-align: center;"><b>See page 9 for details</b></p>	Starfield Observatory, West Kennebunk, Me.
TBD	Club/Public Star Party (Check List-serve / website for updates or cancellations)	Starfield Observatory, West Kennebunk, Me.

### Directions to ASNNE event locations

#### **Directions to The New School in Kennebunk** [38 York Street (Rt1) Kennebunk, ME]

For directions to The New School you can use this link to the ASNNE NSN page and then click on "get directions" from the meeting location. Enter your starting location to generate a road map with complete directions. It works great. [http://nightsky.jpl.nasa.gov/club-view.cfm?Club\\_ID=137](http://nightsky.jpl.nasa.gov/club-view.cfm?Club_ID=137)

#### **Directions to Starfield Observatory** [Alewife Road, Kennebunk, ME]

##### **From North:**

Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

##### **From South:**

Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.

To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website: <http://www.asnne.org>



Astronomical Society of Northern New England  
 P.O. Box 1338  
 Kennebunk, ME 04043-1338

**2016 Membership Registration Form**

(Print, fill out and mail to address above)

Name(s for family): \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Telephone # \_\_\_\_\_

E-mail: \_\_\_\_\_

Membership (check one):

Individual \$35 \_\_\_\_\_ Family \$ 40 \_\_\_\_\_ Student under 21 years of age \$10 \_\_\_\_\_ Donation \_\_\_\_\_

Total Enclosed \_\_\_\_\_

Tell us about yourself:

1. Experience level: Beginner \_\_\_\_\_ Some Experience \_\_\_\_\_ Advanced \_\_\_\_\_

2. Do you own any equipment? (Y/N) And if so, what types?  
 \_\_\_\_\_

3. Do you have any special interests in Astronomy?  
 \_\_\_\_\_

4. What do you hope to gain by joining ASNNE?  
 \_\_\_\_\_

5. How could ASNNE best help you pursue your interest in Astronomy?  
 \_\_\_\_\_

6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?

Yes \_\_\_\_\_ No \_\_\_\_\_

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes \_\_\_\_\_ No \_\_\_\_\_

