

Newsletter of the Baton Rouge Astronomical Society



**September, 2014**

**Next Meeting Sept. 8<sup>th</sup>, 7:00 PM at HRPO**

**GLOBE AT NIGHT 2014**

[WWW.GLOBEATNIGHT.ORG](http://WWW.GLOBEATNIGHT.ORG)  
 Get Out and Observe the Night Sky!

Engage people worldwide in observing the nighttime sky.  
 Encourage students and families to participate in citizen science with a hands-on learning activity.  
 Gather light pollution data from an international perspective to monitor sky brightness and its effects.

Can you see the stars?

January	20 to 29	July	16 to 25
February	19 to 28	August	15 to 24
March	21 to 30	September	15 to 24
April	20 to 29	October	14 to 23
May	19 to 28	November	12 to 21
June	17 to 26	December	11 to 20

Calendar on the Globe At Night website. Click on it to go there!!

# What's In This Issue?

## President's Message

## Astroshort: 'Smoking Gun' ...

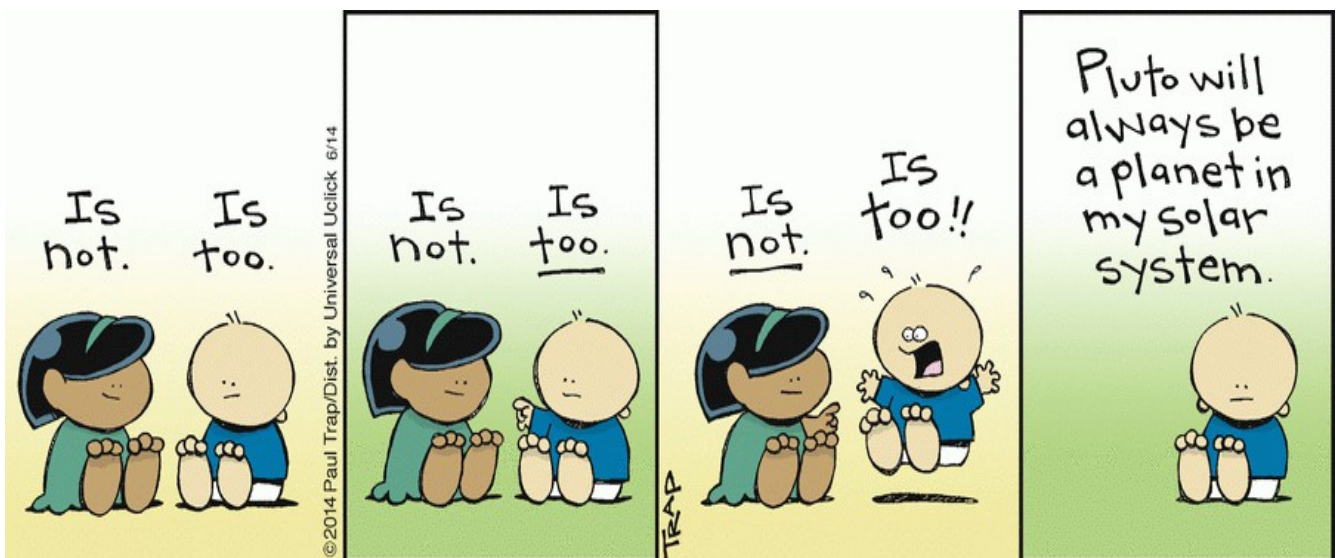
## Secretary's Summary

## Message From HRPO

## Recent Forum Entries

## Globe At Night

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# President's Message

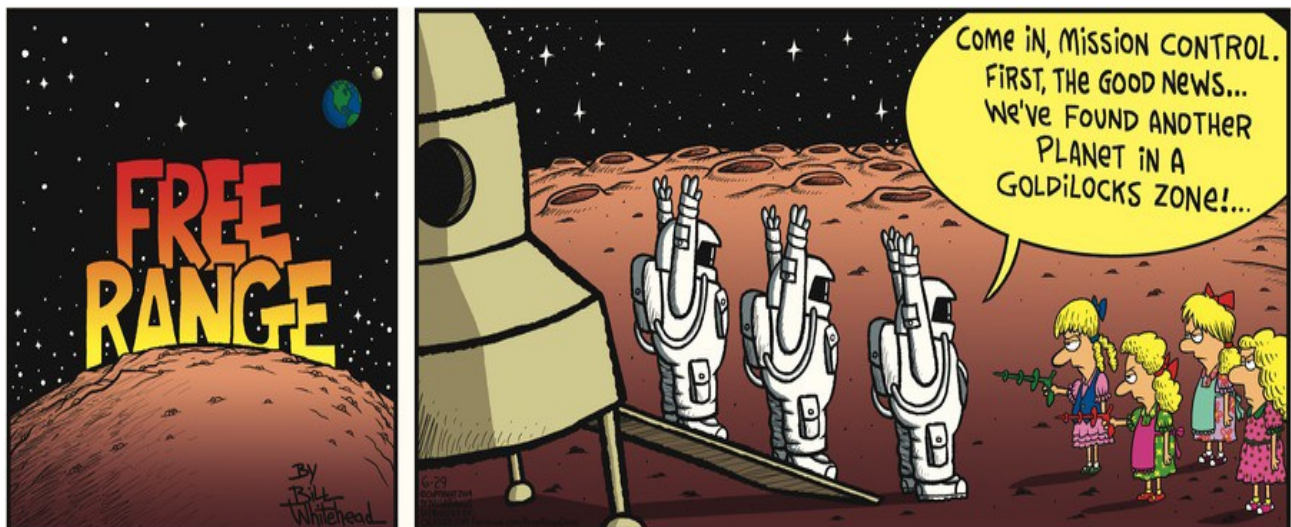
We are still about \$100 off from our target to draw a winner for our Lunt 35mm solar telescope. If we keep selling tickets like we have been we might be able to draw for the winner at the October BRAS meeting. Remember, \$5 per ticket or 5 for \$20. In the meantime we will continue to draw for other prizes. This will allow you to pick from an assortment of prizes and still have your ticket in the drawing for the solar scope.

As you probably heard our former Outreach Coordinator (OC) Trevor McGuire moved to North Dakota. That leaves the position open. The OC's role is to be the focal point of communication for outreach activities and requests for BRAS volunteers from outside groups. That usually takes the form of some organization, a scout or school group for example, requesting someone from BRAS to do a presentation or to bring scopes to allow their members or guests to view the skies. It doesn't mean you have to do the event yourself or even organize the event. It just means you act as a liaison between BRAS and the community. Trevor set up a BRAS Outreach email address to receive requests. He also created a contact group so that once you have the details, you could send an email request for manpower to the group. If you decide this is a role for you let me know and we can discuss the details.

Remember, the Deep South Regional Stargaze is in October. It's coming up quickly. Be ready.

Clear skies,

**Merrill Hess**  
**President**



# 'Smoking Gun' for Stellar Explosion Mystery

Some stars end their lives in cataclysmic explosions: spectacular supernovae, which briefly become the most brilliant objects in their home galaxies, visible from millions or even billions of light-years away. Supernovae are of several distinct types, as is evident from their spectra—the graphs astronomers plot showing the distribution of colors of the supernova light.

One major category is core-collapse supernovae, where a very massive star becomes unstable and explodes. The most mysterious of these are known as Type IIb. Theory and computational simulations suggested that some may be stars that have entered the Wolf-Rayet phase of their final existence.

In Wolf-Rayet stars—behemoths over 20 times as massive as our Sun and at least five times as hot—nuclear reactions have produced carbon, oxygen, and heavier chemical elements. Some of these elements are mixed to the surface and help produce powerful winds that shed part of the star's outer layers into space. After the Wolf-Rayet star's core turns to iron, evidence suggested that protons and electrons merge and the core collapses, releasing a flood of energy and neutrinos, and powering a shock wave that explodes the star. But until recently, no definitive observations confirmed that hypothesis, in part because dense clouds of stellar winds often obscure Wolf-Rayet stars.

Thanks to the intermediate Palomar Transient Factory (iPTF) pipeline, however, the definitive answer came on May 3, 2013, illuminated in a brilliant flash of ultraviolet light from a supernova dubbed SN 2013cu, in a galaxy 360 million light-years away in the constellation Boötes.

## **Fast discovery pipeline**

The iPTF is a computationally beefier upgrade to the original Palomar Transient Factory (PTF) launched in 2008, which contributed to the enormously productive field of time-domain astronomy by catching supernovae within hours after their initial light reaches Earth. Atop Palomar Mountain in southern California, the 1.2-meter Samuel Oschin Telescope acts as an automated wide-field survey camera, snapping sequential exposures of 7 square degrees across the night sky. Every minute, its sensitive 96-megapixel CCD camera records stars and galaxies down to 21st magnitude, 2.5 million times fainter than the human eye can see.

Each digital image is instantly beamed to the San Diego Supercomputing Center at UC San Diego, and then 400+ miles north to the National Energy Research Scientific Computing Center (NERSC) at Lawrence Berkeley National Laboratory (LBNL). Within minutes, supercomputers subtract reference images from each incoming image, comparing new sources of light to all public databases to tag known variable stars and asteroids. Every night, on average, iPTF discovers one to two new supernovae.

## Caught in the act

Less than 30 minutes after images are taken, coordinates of suspected supernovae are sent to astronomers worldwide. The iPTF alert triggered researchers at the Weizmann Institute of Science to capture a spectrum with the 10-m Keck-I telescope only 10 hours after SN 2013cu was first imaged, just 15.5 hours after light from the explosion reached Earth.

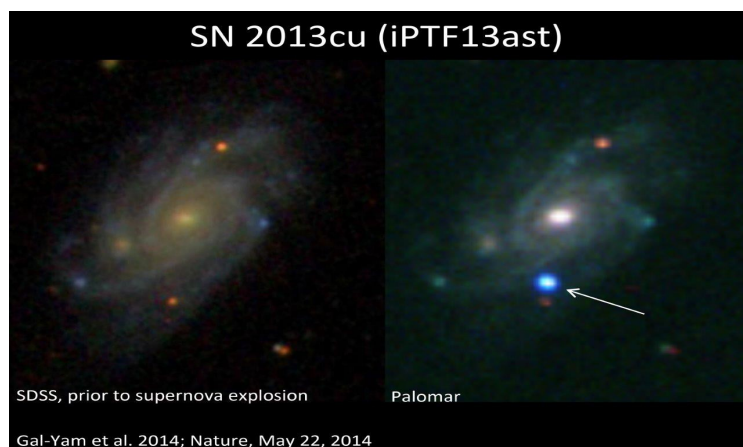
“Shortly after the star exploded, an ultraviolet flash from the shock wave heated and lit up the wind,” explained Peter Nugent, head of the Computational Cosmology Center at LBNL and a coauthor of the study. The UV flash was brilliant enough for the iPTF team to analyze the wind’s chemical makeup—which revealed the composition of the star before it exploded, confirming it to be similar to that of a Wolf-Rayet star.

“This is the smoking gun!” Nugent exulted. “For the first time, we can directly point to an observation and say that this type of Wolf-Rayet star leads to this kind of Type IIb supernova.”

“We are gradually determining which kinds of stars explode, and why, and what kinds of elements they produce,” added coauthor Alex Filippenko, professor of astronomy at UC Berkeley. “These elements are crucial to the existence of life—so we are figuring out our own stellar origins.” —*Trudy E. Bell, M.A.*

**Further reading:** “A Wolf-Rayet–like progenitor of supernova SN 2013cu from spectral observations of a wind,” appeared in *Nature*, May 22, 2014, <http://www.nature.com/nature/journal/v509/n7501/full/nature13304.html>. The LBNL press release is at <http://newscenter.lbl.gov/2014/05/21/confirmed-stellar-behemoth-self-destructs-in-a-type-ii-b-supernova/>. More on PTF is at <http://hipacc.ucsc.edu/AstroShorts/February2012AstroShort.html>.

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory). UC-HIPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at <http://hipacc.ucsc.edu>



While observing a galaxy known as UGC 9379 (left; image from the Sloan Digital Sky Survey) about 360 million light-years away from Earth, the iPTF team used a 1.2-meter robotic telescope at Palomar Observatory to discover a new supernova, SN 2013cu (right, marked with an arrow; image from a 1.5-meter robotic telescope, also at Palomar).

## Secretary's August Meeting Summary

-Announcements included the news that Trevor and Angela had moved to North Dakota; Murali received a job promotion and is moving to Florida in the next week or two. The Supermoon that occurred Sunday generated a lot of misinformation in newsprint; Merrill read some examples of this. He also mentioned that this week Astronomy magazine is offering a digital article collection which you can download for \$2.00. This includes some old periodicals of theirs (Deep Sky, Telescope Making) that have some pretty good information.

- Barry Simon and John Martinez were visiting from the Pontchartrain Astronomical Society. They talked about the history of Deep South Regional Stargaze which is scheduled this fall for October 21<sup>st</sup> through the 26<sup>th</sup> at the Feliciana Retreat Center north of Clinton. This will be the 32<sup>nd</sup> year for it. Barry had a slide show with the highlights from last year's event along with forms for signing up for this year. They have a website that connects to more information at Yahoo.com.

- Don Weinell announced that he had put in the paperwork for the Hodges Gardens Star Party next year. This will occur from March 18th through March 22nd, 2015, and will cost participants \$10 per person to attend (entry fee for the park, food, and lodging are extra). Don also said that he had talked to the people at the Rockefeller Wildlife Refuge in Cameron Parish. Everything has been cleaned up and repaired since the last storm, so there is a stargazing event being planned there for the nights of January 16<sup>th</sup> and 17<sup>th</sup>. There will be a fee of \$10 per person per night. Keep in mind for this that stargazing may be secondary to birding as well as other activities, especially if the weather is inclement.

- There was a raffle scheduled for the evening. The Lunt 35mm solar telescope is still being raffled; we are within about \$50 of the money we need to have to draw for a winner for this. Craig has checked the scope out and says that it is easy to use. There were books available for raffle prizes as well as a copy of the movie Moon (starring Sam Rockwell), a fiber optics kit, and some ear syringes (these are good for scope cleaning).

- Murali gave a 45-minute presentation on Tool Evolution which was history of what he had done to get started with developing a 3-D printer.

- After the presentation Chris mentioned about checking with the lady at Baton Rouge Gallery about a sketching class for those astronomers who might want to learn to sketch the night sky better. He was asking for names of those who would be interested. He thinks now that there will probably be a one-day class at Baton Rouge Gallery sometime in November.

- The meeting adjourned with a raffle.

**Roslyn Readinger**

**BRAS Secretary**

# HRPO

## FRIDAY NIGHT LECTURE SERIES

*all start at 7:30pm*

5 September: "Journeys to the Moon"

12 September: "Comets"

19 September: "Neutron Stars"

26 September: "LIGO—The Fantastic Search"

## CALL FOR VOLUNTEERS

\*Saturday, 6 September from 7:30pm to 10:30pm. *Two volunteers.* **Observe the Moon Night.** Small telescope; refreshments; games. Easy.

\*Saturday, 20 September from 7pm to 10pm. *Two volunteers in addition to regular BRAS compliment.* **Evening Sky Viewing Plus.** Marshmallow roast, demonstration tables; small telescope; setup and takedown. Easy; training provided.

\*Saturday, 27 September from 12pm to 2pm. *One volunteer.* **Solar Viewing.** Small telescope. Easy; training provided.

## **Recent Entries in the Forum**

*Below are selected recent additions to the BRAS Forum. There are also nine active polls.*

[Phase Change Fabrics](#) a Descendant of American Space Program  
New Book on [Atchafalaya Basin](#), Location of BRAS Dark-Sky Site

Nice [Airglow](#) Picture from Grand Teton National Park

[Curiosity](#) Celebrates Second Birthday

[Neptune Viewing](#) for Next Six Weeks

Results of 2014 [Perseid Meteor Shower](#)

High Schooler Gets APOD with [Andromeda Galaxy](#) Image

[Buckyballs and Nanotubes](#) Listed in *National Geographic* Volume

Request for Used [Celestron Omni XLT](#)

[Baton Rouge Culmination Times for the Iris Nebula, the Horsehead Nebula and the Orion Nebula.](#)

# GLOBE At Night

*15 September to 24 September*

Everyone's favorite winter light pollution exercise is back...except it's no longer just for winter. During 2014 the GLOBE at Night staff will collect observations during *all twelve* New Moon periods!

This is an excellent time to start compiling a good historical record of sky glow in Baton Rouge. Each BRAS member should take at least one measurement per season during 2014. The GLOBE at Night website makes it as easy as possible, with step-by-step instructions and an downloadable instruction manual.

*September is the only month during which participants use the constellation Cygnus.*

[The heading on this page hyperlinks to the BRAS Forum thread devoted to GLOBE at Night. Visit there regularly for updates and answered questions.](#)





## Aquila – The Eagle

Position: RA 18H 41', Dec. 18

### **Named Stars:**

**Altair (Alpha Aql)**, “an-nasr attair”, “The Flying Eagle”, mag. 0.77, 19 50 46.68 +08 52, is the 12<sup>th</sup> brightest star in the sky, and has three visible companions. This white main sequence dwarf star is a rapid rotator – one of the fastest known – its speed amounts to 160 miles/sec., or a complete turn in about 6 ½ hours, forcing its shape into an oblate spheroid.

**Alschain (Beta Aql)**, “The Peregrine Falcon”, mag. 3.71, 19 55 18.77 +06 24 28.6, this sub-giant star has a 12<sup>th</sup> magnitude red dwarf companion 12.8 arc seconds away from it.

**Tarazed (Gamma Aql)**, “sahin tarazu”, “The Beam of the Scales”, mag. 2.72, 19 46 15.57 +10 36 47.8, is a yellowish-orange giant star and a known source of x-rays. It is about 100 million years old and yet it is already burning helium into carbon in its core. Situated near the Milky Way’s Great Rift, dark nebula B143 is about 1 ½ ° to the west.

**Deneb el Okab Borealis (Epsilon Aql)**, “The Tail of the Eagle”, mag. 4.02, 18 59 37.39 +15 04 06.5, is a triple star. The primary is an orange giant with an atmosphere heavy with Barium, so it is often referred to as the “Barium Star”, with the companions, suspected optical binaries, at 10<sup>th</sup> magnitude.

**Deneb el Okab Australis (Zeta Aql)**, “The Tail of the Eagle”, mag. 2.99, 19 05 24.61 +13 51 49.4, is also a triple star system, with a main sequence white dwarf star for a primary and two 12<sup>th</sup> magnitude companion stars, one at 6.5 arc seconds from the primary.

**Bezek (Eta Aql)**, “Lightning”, mag. 3.87, 19 52 28.36 +01 00 20.4, is a yellow-white super-giant star – one of the brightest of Cepheid variable stars that can be seen with the naked eye, ranging in magnitude to 5.3 every 7.2 days.

**Al Thalimain (Iota Aql)**, “The Two Ostriches”, mag. 4.36, 19 36 43.28 -01 17 11.6, is a blue-white giant star and a spectroscopic binary with a period of 17.124 days, and a separation of 15 million miles.

**Al Thalimain Prior (Lambda Aql)**, “The Two Ostriches”, mag. 3.43, 19 06 14.95 -04 52 56.4, is a blue-white main sequence dwarf star. The wide optical double 15 Aql, is less than 1° to the north and slightly west, and the very red n-type variable star V Aql is 1° to the southwest near faint annular nebula NGC 6751.

### **Deep Sky:**

**NGC 6709**, mag. 6.7, 18 51.5 +10 21, 12', is an open cluster of 40 stars; detached, no concentration of stars; moderate range in brightness; mag. of brightest star is 9.1. The stars are loosely arranged into a diamond-like shape. It lies 5° southwest of Zeta Aql.

**NGC 6755**, mag. 7.5, 19 07.8 +04 14, 15', is an open cluster of 100 stars; not well detached from surrounding star field; moderate range in brightness; brightest star is mag. 10.2; very large, and is located 4.5° west of Delta Aql.

**Cr 401**, mag. 7.0 (photo), 19 38.4 +00 20, 1', is not well detached; moderately brightness range; moderately rich.

**NGC 6738**, mag. 8.3 (photo), 19 01.4 +11 36, 15', is an open cluster not well detached; moderate brightness range; a poor cluster.

**NGC 6760**, mag. 9.0, 19 11.2 +01 02, 8', is a globular cluster with a low concentration of stars; pretty bright and pretty large.

**PAL 11**, mag. 9.8, 19 45.2 -08 00, 3.2', is a globular cluster with a low concentration of stars.  
**NGC 6741**, "The Phantom Streak Nebula", mag. 11.4, 19 02.6 -00 27, 8", is a planetary nebula (PK 33-2.1), nearly stellar, with a central star at mag. 17.6.  
**B142-143** is a dark nebula spanning more than a degree in size, located 1.5° west of Gamma Aql, and is known as "Barnard's E, the photographic shape of the dark nebula.

### Other Stars:

**Delta Aql**, mag. 3.36, 19 25 29.75 +03 06 52.5, is a triple star system and an astrometric binary. Primary star is a yellow-white sub-giant star.

**Pi Aql**, mag. 5.75, 19 48 42.05 +11 48 57.3, is a triple star with a yellow-white giant star as the primary component. Pi Aql B, mag. 5.70, 19 48 42.10 +11 48 55.0, is a main sequence dwarf star, and a faint third component which might be optical. A-B separation is 1.4 arc seconds.

**R Aql**, mag. 6.09, 19 06 22.25 +08 13 48.0, is a suspected Mira variable star with a minimum mag. of 12.0 and a period of approximately 9 months.

**15 Aql**, mag. 5.40, 19 04 57.66 -04 01 52.9, is an optical double star. The primary is an orange giant star, and the secondary is purple-hued at mag. 7.0, and a separation of 40 arc seconds.

**57 Aql**, mag. 5.70, 19 54 37.65 -08 13 38.0, is a binary star. The principle is blue-hued and the secondary is a white star at mag. 6.5, and a separation of 36 arc seconds.

**Xi Aql**, mag. 4.722, 19 54 14.882 +08 27 41.23, has one planet.

**HD 192699**, mag. 6.44, 20 16 06.03 +04 34 57.3, has one planet.

**V Aql**, mag. 6.78, 19 04 24.15 -05 41 05.4, is a carbon star and a semi-regular variable star.

**HD 183263**, mag. 7.86, 19 28 24.57 +08 21 29.0, has two planets.

**HD 179079**, mag. 7.96, 19 11 09.83 -02 38 18.2, has one planet.

**V1703 Aql**, mag. 8.10, 20 13 59.85 -00 52 00.8, is a double star with one planet.

There are 7 more stars below mag. 10 that have planets.

**SS433, W50, 19 11 49 -04 59 12.0**, is a unique binary system lying in the center of a supernova remnant. The stars cannot be resolved visually. Spectroscopes reveal emission lines red and blue shifted, showing jets – these jets precess and seem to sweep across the sky with a period of 164 days. The object is an eclipsing binary star with a period of 6.4 days, containing a very hot star with an invisible companion that is probably a neutron star because of the bizarre relativistic effects.

**Von Biesbroeck's Star**, LFT 1467, Ross 652b, Wolf 1055b, is a famous red dwarf star that is a distant companion of 9<sup>th</sup> magnitude BD+4°40.48, 19 14.5 +05 06, with a separation of 400 AU. The primary is a dwarf M3 star. VB's star has a magnitude of 18.0 visual.

There are 14 Barnard objects, 5 LDNs, and 1 IC object in this constellation. Aquila has 125 double or multiple stars, 67 variable stars, and 31 star clusters, nebulae, and galaxies.

**Asterism-** The Summer Triangle – Altair (Alpha Aql) is the southern one of the three stars that forms the triangle. The other two stars in the asterism are Deneb (Alpha Cygni) and Vega (Alpha Lyrae).

**Meteor Showers** – Two radiate from Aquila, but cannot be observed visually. The June

Aquilids have only been studied by radar – and are active between June 2<sup>nd</sup> and July 2<sup>nd</sup>. The Epsilon Aquilid shower is active in mid-May, but it can only be observed with optical aid.

### **Dark Sky Viewing - Primary Sept. 20<sup>th</sup>, Secondary Sept. 27<sup>th</sup>**

Aquila represents an Eagle, the thunderbirds of the Greeks. There are several explanations for the presence of this eagle in the sky. In Greek and Roman mythology, the Eagle was the bird of Zeus, carrying (and retrieving) the thunderbolts which the wrathful god hurled at his enemies. But the Eagle was involved in love as well as war.

According to one story, Aquila is the Eagle that snatched up the beautiful Trojan boy Ganymede, son of King Tros, to become the cup-bearer of the gods on Olympus. Authorities such as the Roman poet Ovid say that Zeus turned himself into an eagle, whereas others say that the eagle was simply sent by Zeus. Ganymede himself is represented by the neighboring constellation Aquarius, and the star charts show Aquila swooping down towards Aquarius. Germanicus Caesar says that the eagle is guarding the arrows of Eros (neighboring constellation Sagitta), which made Zeus love-struck.

The constellations of the eagle and the swan (Cygnus) are linked in an account by Hyginus. Zeus fell in love with the goddess Nemesis, but, when she resisted his advances, he turned himself into a swan and had Aphrodite pretend to pursue him in the form of an eagle. Nemesis gave refuge to the escaping swan, only to find herself in the embrace of Zeus. To commemorate this successful trick, Zeus placed the images of the swan and the eagle in the sky.

#### **September Sky Happenings:**

- Sept. 1<sup>st</sup> – Asteroid Harmonia is at opposition at 2:00 PM CDT.
- Sept. 2<sup>nd</sup> – First Quarter Moon occurs at 6:11 AM CDT.
- Sept. 5<sup>th</sup> – Venus passes 0.8° north of Regulus at 7:00 AM CDT, low in the east.
- Sept. 7<sup>th</sup> – The Moon is at perigee (222,692 miles from Earth) at 10:31 PM CDT.
- Sept. 8<sup>th</sup> – The Moon passes 5° north of Neptune at 7:00 AM CDT  
Asteroid Victoria is at opposition at 7:00 AM CDT  
Full Moon occurs at 8:38 PM CDT.
- Sept. 10<sup>th</sup> – The Moon passes 1.1° north of Uranus at 9:00 PM CDT.
- Sept. 12<sup>th</sup> – Saturn's 2<sup>nd</sup> largest satellite Rhea, at mag. 10.2, will occult star SAO 159034 (mag. 7.8) at around 7:38 PM CDT, with the occultation lasting up to 58 seconds.
- Sept. 15<sup>th</sup> – Last Quarter Moon occurs at 9:05 PM CDT.
- Sept. 17<sup>th</sup> – Algol shines at minimum brightness for about 2 hours centered on 10:06 PM CDT.
- Sept. 20<sup>th</sup> – The Moon passes 5° south of Jupiter at 6:00 AM CDT  
The Moon is at apogee (252,180 miles from Earth) at 9:22 AM CDT  
Mercury passes 0.6° south of Spica at 9:00 PM CDT  
Algol shines at minimum brightness for about 2 hours centered on 9:55 PM CDT.
- Sept. 21<sup>st</sup> – Mercury is at its greatest eastern elongation (26°) at 5:00 PM CDT.
- Sept. 21<sup>st</sup> to Oct. 6<sup>th</sup> – Zodiacal light is visible 120 to 80 minutes before sunrise from dark locations at mid-northern latitudes. Look for a huge pyramid of light stretching up through

Jupiter (in the east).

Sept. 22<sup>nd</sup> – Pluto is stationary at 8:00 AM CDT.

Autumn equinox occurs at 9:29 PM CDT.

Sept. 24<sup>th</sup> – New Moon occurs at 1:14 AM CDT.

Sept. 24<sup>th</sup> to 30<sup>th</sup> – At dusk, Mars passes less than 4° north of Antares. The planet is almost the same color as the star and just a little brighter. They appear closest (3.1°) on the 27<sup>th</sup> and 28<sup>th</sup>.

Sept. 26<sup>th</sup> – The Moon passes 4° north of Mercury at 5:00 AM CDT.

Sept. 27<sup>th</sup> – At dusk, the waxing crescent Moon floats just 1.5° to 3° to the lower right of Saturn in the southwest

Mars passes 3° north of Antares at 4:00 PM CDT

The Moon passes 0.1° south of asteroid Ceres at 8:00 PM CDT

The Moon passes 0.7° north of Saturn at 11:00 PM CDT.

Sept. 29<sup>th</sup> – The Moon passes 0.5° north of asteroid Vesta at 10:00 AM CDT.

Sept. 28<sup>th</sup>/29<sup>th</sup> – The Moon will float to the right of Mars and Antares on the 28<sup>th</sup>, and above them on the 29<sup>th</sup>.

Sept. 29<sup>th</sup> – The Moon passes 6° north of Mars at 12:00 noon CDT.

**Mercury** – Mercury has its worst evening apparition of 2014 for mid-northern latitudes.

Mercury reaches greatest elongation from the Sun on the 21<sup>st</sup>, when it lies 26' east of the Sun, but it stands just 3° high a half-hour after sunset. Its altitude remains nearly constant for a week on either side of that date. At magnitude 0.0, its light pierces the twilight glow, particularly if you look through binoculars. That optical aid should also reveal 1<sup>st</sup> magnitude Spica. Virgo's brightest star lies 0.6° due north of Mercury on the 20<sup>th</sup>, and remains nearby for a couple of days. A telescope will reveal the inner planet's disk, which spans 7" and appears slightly more than half lit at greatest elongation. A young crescent Moon stands to Mercury's upper left on the evening of Sept. 26<sup>th</sup>.

**Venus** – Venus rises only an hour before the Sun as Sept. begins, and a half-hour before as the month ends. Look for it down near the east horizon (at mag. -3.9) some 15° to Jupiter's lower left, with a nearly full disk spanning 10". On Sept. 5<sup>th</sup>, Venus passes 0.8° north of 1<sup>st</sup> magnitude Regulus in Leo. Venus will be very low in bright twilight at month's end, and by the 30<sup>th</sup>, it lies less than 7° from the Sun, reaching a superior conjunction with the Sun on Oct. 25<sup>th</sup>.

**Mars** – Mars will dim from mag. +0.6 to +0.8 in Sept., and the disk shrinks from 6.8" to 6.1" across. Mars does make an interesting trek out of Libra, through the "fence" of stars marking the head of Scorpius, and ends the month just a few degrees from slightly fainter Antares. Mars will move swiftly eastward this month relative to the stars and almost keeps pace with the Sun. Mars sets just about 3 hours after sunset all month. On Sept. 12<sup>th</sup>, Mars will appear halfway between Saturn and Antares. On the 17<sup>th</sup>, Mars glides just 1/2° north of 2<sup>nd</sup> magnitude variable star Delta Scorpii (Dschubba). Mars will pass just 3.1° north of slightly dimmer Antares on Sept. 27<sup>th</sup> and 28<sup>th</sup>.

**Jupiter** – Jupiter climbs above the eastern horizon around 4:00 AM LDT in early Sept., nearly

an hour before twilight begins. It then lies 3° east-southeast of the Beehive Cluster (M 44) in Cancer the Crab. By month's end, the dazzling planet has moved to 8° from M 44 and rises before 3 AM. Jupiter shines at magnitude -1.8 (on the 15<sup>th</sup>) and spices up the rather dim region of the sky between Gemini and Leo. By Sept.'s final week, Jupiter stands 30° above the eastern horizon by the time twilight commences.

**Saturn** – Saturn lingers above the southwest horizon as the sky grows dark all month. On Sept. 1<sup>st</sup>, Saturn stands 20° high an hour after sunset with Mars 5° to its left, with both planets at magnitude 0.6. Saturn remains within the confines of Libra the Balance throughout Sept. By the 30<sup>th</sup>, the planet appears only half as high an hour after sundown as it did on the 1<sup>st</sup>. On the 1<sup>st</sup>, the planet's disk measures 16" across while the rings span 37" at a tilt of 22° to our line of sight. The waxing crescent Moon visits Saturn on Sept. 27<sup>th</sup>, with less than 1° separation.

**Uranus** – Uranus floats among the background stars of southern Pisces the Fish, and trails about 2 hours behind Neptune. Glowing at magnitude 5.7, Uranus can be found using binoculars, and under a dark sky can be seen with the naked eye. Uranus begins the month 2.6° south-southwest of 4<sup>th</sup> magnitude Epsilon Piscium and drifts along a southwesterly path throughout Sept. It ends 3.5° from Epsilon Piscium. Uranus is blue-green and its disk spans 3.7".

**Neptune** – Neptune reached opposition and peak visibility in late August. By mid-month, Neptune appears some 20° above the southeastern horizon at the end of twilight and climbs highest in the south around midnight LDT. Neptune slides just north of 5<sup>th</sup> magnitude Sigma Aquarii in central Aquarius. Neptune passes a full Moon's diameter (0.5°) north of Spica on Sept. 11<sup>th</sup>, and remains nearby for several days. The planet's slow westward motion keeps it within 41' of the star throughout Sept. At magnitude 7.8, Neptune is a deep blue-gray color and shows a disk of 2.4" in diameter.

**Pluto** – Dim Pluto is highest in Sagittarius as darkness falls and sets in the middle of the night.

**Comets: PANSTARRS (C/2012 K1)** will be at 6<sup>th</sup> magnitude as it climbs into view before dawn during the last half of the month. The comet slithers through Hydra, slightly south of the Serpent's head. You can find it with binoculars roughly a field east of M 48.

**Siding Spring (C/2013 A1)**, at 8<sup>th</sup> magnitude, can be seen in late Sept. , after making its way north to southern Scorpius, where it will appear low in the southwest after darkness falls in the southern states.

**Meteor Shower:** The Aurigid shower, derived from comet Keiss (C/1911 N1), generates a 6 meteors/hour rate at max, an hour before dawn on Sept. 1<sup>st</sup>.

### Where to find the Planets:

#### Evening Sky

Mercury (west)  
Mars (southwest)  
Saturn (southwest)  
Uranus (east)  
Neptune (southeast)

#### Midnight

Uranus(southeast)  
Neptune (south)

#### Morning Sky

Venus (east)  
Jupiter (east)  
Uranus (southwest)

