Newsletter of the Baton Rouge Astronomical Society

Next Meeting: Monday, June 12th at 7PM at HRPO

(2nd Mondays, Highland Road Park Observatory)

Presenter: Dr. Gabriela Gonzalez, spokesperson for the LIGO Scientific Collaboration, on **"Einstein, Gravitational Waves and Black Holes".**

What's In This Issue?

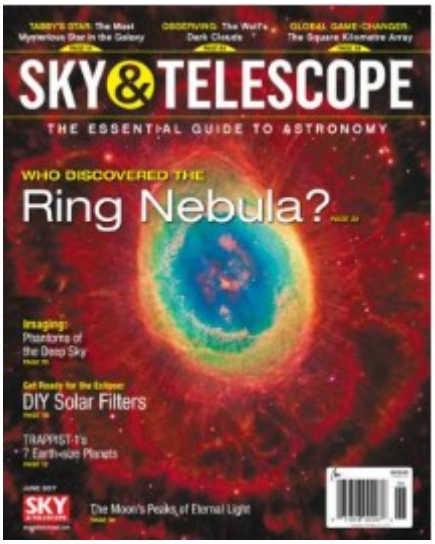
Like this newsletter? See past issues back to 2009 at
http://brastro.org/newsletters.html

President's Message

Summer is upon us. On June 21st, at 11:24 AM CDT, summer officially begins for the Northern Hemisphere. We have a lot of outreach requests for June; the July BRAS meeting will be our annual picnic at LIGO; and one week after the August BRAS meeting is the total eclipse of the Sun. What are your plans for the summer? Will you go somewhere to see the eclipse? The band of totality runs from Georgia across the continental US to Oregon.

Last month we did outreach at the Bluebonnet Swamp's FAE Fest/20th Anniversary event. Due to a cloud cover most of the day, there was little solar viewing, but we did interact with close to 300 people, including a former member of BRAS (about 20 years ago) who expressed interest in re-joining us.

The Astronomical League has awarded Comet Observing (#91) to Coy Wagoner. Congratulations Coy!



In step with the April BRAS meeting's speaker, Dr. Tabetha Boyajian, on the subject of "The Most Mysterious Star in the Galaxy", *Sky and Telescope* magazine's June issue (on page 16) has an eight page article about "Tabby's Star". If you are subscribed but have not read the article, you should.
http://www.skyandtelescope.com/sky-and-telescope-magazine/inside-june-2017-issue/

The speaker for the June BRAS meeting will be Dr. Gabriela Gonzalez, the spokesperson for the LIGO Scientific Collaboration. The title of her talk is "Einstein, Gravitational Waves and Black Holes". Come hear her talk!

On a final note, the ESO's (European Space Organization) Extremely Large Telescope (ELT), with a 39 meter diameter primary mirror, has started construction in Chile, and the large secondary mirror has been cast.

Clear Skies,

John R. Nagle

John R. Nagle
President of BRAS and Observing Chairperson

P.S. Below, our Editor has posed a question pertinent to the content of this newsletter. The first 3 members to find and email me the correct answer will receive one FREE $1 raffle ticket to spend at the next meeting. (Must attend meeting to qualify,) Email me at jonagle@cox.net if you find it.

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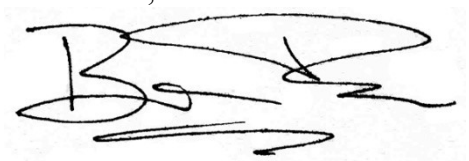
Question:

Re the Superman series - What is the type and name of the star Krypton orbited?

.Secretary's Summary of May Meeting

- John Nagle (President) opens meeting
- Ben talks about past and upcoming outreach
- John mentioned the ongoing raffle for the ETX 90 scope
- Chris Kersey talked about upcoming Friday night lectures at HRPO
- Craig Brenden introduced Don Weinell as our guest speaker
- Don gave a talk about his experience biking the Oregon Trail
- Thomas Halligan spoke about a bad light at the watch house across the street from HRPO. Request for volunteer to look at it and make recommendations
- Roz, Bart, and Susan won the raffle tickets for correctly reporting the riddle answer in the last newsletter.
- Raffle held
- Meeting adjourned

Clear Skies,



Ben Toman
BRAS Secretary (For all the good I'm worth!)

2017 Officers:

President: John Nagle
Vice-President: Craig Brenden
Secretary: Ben Toman
Treasurer: Trey Anding

BRAS Liaison for BREC:
Chris Kersey
BRAS Liaison for LSU:
Greg Guzik

Committees/Coordinators:
Outreach:
Ben Toman
Observing:
John Nagle
Light Pollution:
Thomas Halligan
Webmaster:
Frederick Barnett
Newsletter:
Michele Fry

Observing Clubs & How To Earn Awards

(excerpt from our website) **www.brastro.org**

"Astronomical observing is the primary activity of most amateur astronomers. . . . In order to bolster interest . . . and provide some observing goals for novice and advanced observers alike, the **Astronomical League**, of which all B.R.A.S. members are a part of, offers their **Observing Club Awards**.

Inspired by their idea, **B.R.A.S. is now offering our own Observing Club Awards.** Many of these clubs are simply scaled down versions of the same clubs offered by the Astronomical League. By following the same guidelines and recording procedures outlined by the AL clubs but requiring fewer observations, obtaining an Observing Award from B.R.A.S. should be within reach of even the busiest part-time observer. Also, in most cases, any observations made towards a B.R.A.S. Observing Award will count toward the same award for the Astronomical League."

Want to get started? Check out **Observing Clubs** on our website menu.

BRAS Outreach Report

Hi Everyone,

Another month has passed and we had some more successful outreach events. We did our last Sidewalk Astronomy event before we take a break for the Summer and it was well attended. We're getting to be pretty popular at Perkins Rowe! The FAE Fest/20th Anniversary of the Bluebonnet Swamp and Nature Center was a fun time, too. Once again we were pretty much clouded out the whole time so not much solar observing was done, but we interacted with nearly 300 people so it was well worth it. A big thanks to some of the usual suspects: Chris Kersey, Chris Raby, John Nagle, Susan Miller, Scott Louque, Charles Edwards, Craig Brenden, Ben Toman, Roz Readinger and Scott Cadwallader. Y'all are the best!!

We have received parts for two new Outreach Tool Kits from the Night Sky Network and expect the rest any day. They are called "Our Magnetic Sun" and "Space Rocks." Both tool kits should be perfect for some of the outreach events we do. More on those when they are in.

The Summer is upon us and that means a slew of library outreach opportunities throughout the area. (See below.) Chris Kersey heads these up, but he could always use a hand and some company. These would be a great introduction to outreach for anyone that has thought about helping out before but just felt a bit shy.

Please take a look at the upcoming opportunities and let me know as soon as you can if you would like to help out in some way.

Each of the following events takes place from 2:00pm-3:30pm

Monday, 5 June, Pride-Chaneyville Community Library, 13600 Pride-Port Hudson Road
Thursday, 8 June, Zachary Community Library, 1900 Church Street
Monday, 12 June, Greenwell Springs Regional Library, 11300 Greenwell Springs Road
Thursday, 15 June, River Center Community Library, 447 Third Street
Monday, 19 June, Fairwood Community Library, 12910 Old Hammond Highway
Thursday, 22 June, Jones Creek Regional Library, 6222 Jones Creek Road
Monday, 26 June, Central Community Library, 11260 Joor
Thursday, 29 June, Delmont Gardens Community Library, 3351 Lorraine Street
Monday, 3 July, Scotlandville Community Library, 7373 Scenic Highway
Thursday, 6 July, Eden Park Community Library, 5131 Greenwell Springs Road
Monday, 10 July, Carver Community Library, 720 Terrace Street

Thursday, 13 July, Bluebonnet Regional Library, 9200 Bluebonnet Boulevard

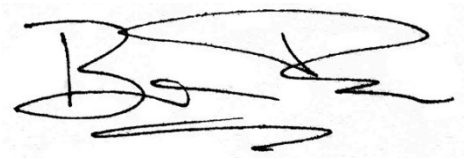
In addition to the Library outreach events, you will recall I sent notice about requests to do outreach for the Kidcams around town. We have committed to doing two of them next week. Again, headed by Chris Kersey, but he could use help if you are available. They are as follows:

Wednesday, June 7
New Song Church on Old Perkins Rd
10am-11:30am
Demos, info

Friday, June 9th
Our Lady of Mercy School
1pm-2:30pm
Demos, info

Clear Skies,
Ben Toman
Outreach Chairperson

Clear Skies,



Ben Toman
Outreach Coordinator

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Pic from May Outreach Event – FAE Fest

FAE Fest – Bluebonnet Swamp 20th Anniversary Event, Saturday, May 13th
Pictured L to R: Charles Edwards, John Nagle, Susan Miller, and Craig Brendan
Also in attendance: Chris Kersey, Chris Raby. Photo by Ben Toman

BRAS Light Pollution Committee Report

2nd Mondays, from 6:15 pm to 7:00pm, before the BRAS public meeting.
One does not need to be a BRAS member to attend.

Several items are on the agenda, including how to achieve in 2017 the goal of 200 GaN measurements that was *not* reached in 2016.

Thomas Halligan
Light Pollution Chairperson

Space is right overhead—double stars, nebulae, the Milky Way Galaxy and other galaxies. We can see it if we let it through.

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum. There are also nine active polls. The Forum has reached 4600 posts.

Rob Navias Receives Space Communicator Award
Jim Al-Khalili Guests on *Coast to Coast AM*
Galactic Cadet Cierra Wilson Goes to Scripps Spelling Bee
NASA Releases FY2018 Budget Documents
Plans Drawn for First Natural Sky Conference
Two Double-Shadow Transits Left This Spring
44 Virginis Spotted in Middle of Moon-Jupiter Conjunction
G2 Activity on Quieting Sun
HRPO Acquires Portion of Northwest Africa 6950
Vesta Passed by the Beehive Cluster
Arch of Spring is Now Rising

BRAS's 20/20 Vision Campaign

GLOBE at Night: 16 to 25 June [Hercules]

OBSERVATIONS NEEDED FOR SCHOOL PROJECT

BRAS is in the process of assisting yet another student at St. Joseph's Academy acquire raw data. This young lady (named Shreya) will need data concerning how light pollution affects the view of certain variable stars while they are at their minima.

Below is our suggested list of variable stars for Shreya. Dates are the times during which the star is at least thirty degrees above the horizon at 9pm Standard Time and 10pm Daylight Time. All periods (time from maximum to maximum) are fewer than ninety days. All chosen stars have a difference of at least 1.0 between maximum and minimum magnitude.

RX Leporis
Magnitude Range: 5.4 to 7.4 Period: 75 days Class: K
Dates: 11 December to 9 March

T Monocerotis
Magnitude Range: 5.6 to 6.6 Period: 27 days Class: G
Dates: 14 December to 12 April

S Leporis
Magnitude Range: 6.0 to 7.6 Period: 89 days Class: K
Dates: 12 January to 4 March

ST Ursae Majoris
Magnitude Range: 6.0 to 7.6 Period: 81 days Class: M
Dates: 12 February to 15 July

g Herculis
Magnitude Range: 4.4 to 6.0 Period: 80 days Class: M
Dates: 29 April to 28 September

R Lyrae
Magnitude Range: 3.9 to 5.0 Period: 46 days Class: M
Dates: 5 June to 6 November

Sheliak
Magnitude Range: 3.3 to 4.4 Period: 12.9 days Class: B
Dates: 8 June to 31 October

X Cygni
Magnitude Range: 5.9 to 6.9 Period: 16.4 days Class: F
Dates: 5 July to 29 November

Algol
Magnitude Range: 2.1 to 3.4 Period: 2.87 days Class: B
Dates: 9 October to 9 March

Observations should only be made when the Moon is below the horizon. Each observation should include the location's GLOBE at Night measurement or SQM measurement. Use all of these parameters to report your results to observatory@brec.org.

Messages from HRPO

Highland Road Park Observatory

FRIDAY NIGHT LECTURE SERIES
all start at 7:30pm

2 June: "Constellation Learning" The standardization of the sky into eighty-eight distinct named areas occurred in the early twentieth century, but some of these sections have their origins in antiquity! Patrons will learn the constellations that grace the Baton Rouge sky and receive advice on sketching these areas as a memory tool.
16 June: "Great American Eclipse Preview" The 21 August solar eclipse is talk of every town in America! Do you still have time to plan a trip to the path of totality? If you stay in Baton Rouge, what will you see? The presentation will also cover safety guidelines for viewing the Sun.
30 June: "Local Astrophotography" Glamour shots of the solar system, interstellar and intergalactic space will grace the screen as a variety of adept photographers exhibit their creations.

SCIENCE ACADEMY
Saturdays from 10am to 12pm
For ages eight to twelve. $5/$6 per child.
3 June: "Jupiter"
10 June: "Distances in Space"
17 June: "Temperature in Space"

ONE-TIME CALLS FOR VOLUNTEERS
***Friday 9 June, 7:45pm to 9:45pm**. *One or two volunteers.* **GLOBE at Night.** Descriptions to the public of visible passes, the Summer Triangle, the Big Dipper etc.; and front desk duty. Low difficulty.
***Saturday 24 June, 2pm to 10pm.** *Two or three volunteers.* **ARRL Field Day.** Solar and evening viewing, assistance with children's activities, front desk. Low to moderate difficulty.
***Friday 30 June, 7:30pm to 8:30pm**. *Three to four volunteers.* **Local Astrophotography.** "Show and tell" for amateur astrophotographers. Low difficulty.

ONGOING CALL FOR VOLUNTEERS
HRPO periodically needs BRAS volunteers for crafting (gluing, cutting, painting, etc.); training is offered for these easy to moderate tasks. We also have plenty of "grunt work". We are asking any members with the time to do so to assist. Thank you.

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American Radio Relay League Field Day

Saturday, 24 June from 2pm to 10pm

No admission fee. For ages eight and older.

The Baton Rouge Amateur Radio Club will take part in an exciting nationwide emergency exercise. Temporary stations will be set up at HRPO as BRARC joins similar clubs across the continent in an exciting emergency exercise. Some clubs use strictly battery power and solar power. Some clubs use low power outputs (five watts or less) to make contact with other stations all over North America. Field Day is a twenty-four-hour endurance session of skill and suspense.

The Amateur Radio Service, founded decades ago, is the original "social medium!" Ten of thousands of licensed hams—including high schoolers, college kids, parents and grandparents—communicate day after day from coast to coast.

What can people do in the Amateur Radio Service?

- Talk around the world without the Internet or cell phones.
- Send a message to another country using less electricity than a nightlight.
- Transmit your communication in code—Morse code!
- Speak to astronauts on the International Space Station.

What can adults do in the Amateur Radio Service?

- Earn various awards.
- Have more peace of mind knowing that, unlike the internet, federal law mandates sending identifying information during any communication.
- Increase the chances of their families having contact with the outside world during an emergency, simply by connecting radio equipment to a car battery.
- Collect weather and flight data from a launched balloon.

What can kids do in the Amateur Radio Service?

- Work toward specialized merit badges and patches.
- Steer radio-controlled cars and airplanes, or control robots, using ham-only frequencies.
- Keep a hand-held remote transceiver during camping trips.

Come learn more about amateur (or "ham") radio at this fantastic annual event. Remember, if you like what you see at Field Day, there will be plenty of friendly "hams" around to tell you exactly what you need to do to obtain your own amateur radio license and start transmitting!

NOTE: At these times telescope viewing will take place…
*2:30pm to 4:30pm, The Sun (with safety equipment)
*8:15pm to 9:45pm, Jupiter (in twilight and darkness)
*8:45pm to 9:45pm, Saturn (mostly in twilight)
Also, spot The Summer Triangle after 9:30pm!

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Observing Notes:

by John Nagle

Corvus – the Crow

Position: RA 12, Dec. -20°

Named Stars

Al Chiba (Alpha Crv), "al hibaa", "tent", "the beak", mag. 4.02, 12 08 24.75 -24 43 43.6, is a white-hued dwarf or sub dwarf star that exhibits periodic changes in its spectrum over a three day period, which suggests that it is a pulsating **Gamma Doradus** type variable star.
Kraz (Beta Crv), mag. 2.65, 12 34 23.23 -23 23 47.8, is a star marking the crow's breast. **Beta Corvii** has exhausted its core hydrogen and expanded and cooled to now be a yellow bright star. It likely spent most of it's roughly 206 million years as a blue-white main sequence star.
Gienah (Gamma Crv), "al-janāh al-ghirāb al-yaman", "the right wing of the crow", mag. 2.58, 12 15 48.47 -17 32 31.1, is a blue-white hued giant star that has largely exhausted its core hydrogen and begun expanding and cooling as it moves away from the main sequence. As a binary star, it has a companion orange or red dwarf star at around 50 AU distant from **Gamma Corvii A**, and is estimated to complete an orbit in 158 years.
Algorab (Delta Crv), "al-ghuraab", the crow", mag. 2.94, 12 29 51.98 -16 30 54.3, is a double star divisible in small amateur telescopes. The primary, **Delta Corvii A**, is a blue-white star at mag. 2.9. Warm circumstellar dust has been detected around it. **Delta Corvii B** is an orange dwarf star of mag. 8.51, and is also surrounded by circumstellar dust. **Delta Corvii B** is at least 650 AU distant from the primary, and takes at least 9400 years to complete an orbit. **Delta Corvii** is one of the two stars marking the right wing of the crow.
Minkar (Epsilon Crv), "almȧnxar", "the nostril of the crow", mag. 3.02, 12 10 07.53 -22 37 11.3, is a red giant star.

Deep Sky:

There are no Messier objects in Corvus.
There are no deep sky objects in Corvus above mag. 10. Here are a few notable objects below mag.10:
Antenna Galaxy (NGC 4038, Caldwell 60; and NGC 4039, Caldwell 61), NGC 4038, mag. 10.5, 12 01.9 -18 52, 6.0'x3.4' in size, is the northern part of the **Antenna Galaxy**; quite large, pretty bright, and round; bright nucleus; has a pair of long, thin streaming arms. **NGC 4039**, mag. 10.3, 12 01.9 -18 53, 5.0'x2.8' in size, is the southern part of the **Antenna galaxy**; pretty faint, and pretty large. **NGC 4038** and **NGC 4039** are interacting with each other. Both have extensive star formation due to the interaction of gas clouds. Each has multiple ultra-luminous X-ray sources, the source of which is unknown. **The Antenna Galaxy** is sometimes called the "**Ring Tail**", but **NGC 4027** is known as the "**Ring Tail Galaxy**". Two supernovas, SN2004gt and SN2007sr have occurred in the **Antenna Galaxy.**
NGC 4027, Arp 22, the Ring Tail Galaxy, mag. 11.2, 11 59.5 -19 16, 3.2'x2.5' in size, is a pretty faint, pretty large, and round galaxy; small, bright elongated nucleus, a member of the **NGC 4038** group of galaxies, and is located less than 1° southwest of the **Antenna Galaxy**.
NGC 4038 Group of Galaxies is a group of galaxies that consist of between 13 and 27 galaxies

located in both **Corvus** and **Crater** constellations.
There are two asterisms in Corvus;
Canali 1, Stargate, STF 1659, is composed of a six star system, 12 35 59 -1203 09; **Star A**, mag. 7.92,; **Star B**, mag. 8.34; **Star C**, mag. 11.46; **Star D**, mag. 9.91; **Star E**, mag. 6.69; and **Star F**, mag. 6.61. None of these stars are part of the same system; they are all at varying distances from Earth.
Spica's Spanker, consists of **Delta, Gamma, Epsilon**, and **Beta Corvii**. They form a quadrilateral asterism. **Gamma** and **Delta Corvii** serve as pointers toward **Spica.**
There are 25 more NGC objects, 1 Arp object, and 6 IC objects from magnitude 10.9 thru 15.0.

Other Stars:

Eta Crv, mag. 4.30, 12 32 04.48 -16 11 45.1, is a main sequence, hydrogen fusing dwarf star. **Eta Corvii** has two debris disks in its orbit, and emits an excess of infrared radiation.
Zeta Crv, mag. 5.17, 12 41 16.02 -13 00 50.1, is an emission-line double star.
VV Crv, mag. 5.17, 12 41 16.02 -13 00 50.1, is a quadruple star, with A-B being a binary with a period of 1.46 days.
31 Crt, mag. 5.28, 12 00 51.17 -19 39 32.4, is a spectroscopic binary, and a rotating ellipsoidal variable star that was once mistaken for a moon of **Mercury.** John Flamsteed designated this star in the constellation **Crater**, but it lies within **Corvus** once the boundaries of constellations were established in 1930.
6 Crv, mag. 5.66, 12 23 21.60 -24 50 26.2, is an orange giant star lying to the south of the quadrilateral (**Spica's Spanker**) between **Beta** and **Epsilon Corvii**.
HD 111031, mag. 6.88, 12 46 30.85 -11 48 44, has an unconfirmed planet in orbit.
HD 103774, mag. 7.12, 11 56 56.0 -12 06 23, is a yellow-white main sequence star with a planet in orbit with a 5.9 day orbit.
HD 104067, mag. 7.93, 11 59 10.01 -20 21 13.6, is an orange dwarf star with a planet in orbit that has a 55.8 day orbit.
HD 111980, mag. 8.38, 12 53 15.05 – 18 31 20.0, is a high velocity star.
TV Crv, **Tombaugh's Star,** 12 20 24.15 -18 27 02.0, is a binary star consisting of a brown dwarf star and a white nova dwarf star that orbit each other every 90 minutes.
WASP-83, 12 40 37.0 -19 17 03, has a transiting planet with a 5 day period.
DENIS-P-J1228.2-1547, 12 28 15.23 -15 47 34.2, is a binary star consisting of two brown dwarf stars.
Ross 695, is a red dwarf star.
VHS 1256-1257, is a brown dwarf star with a companion at 102 +/- 9 AU.
Note: In **Action Comics #14** (Jan. 2013), which was published in Nov. 2012, **Neil deGrasse Tyson** appears in the story, in which he determines that **Superman**'s home planet, **Krypton**, orbited the '*red dwarf star **LHS 2520'*** in the constellation **Corvus**, 27.1 light years from **Earth**. **Tyson** assisted **DC Comics** in selecting a real-life star that would be an appropriate "parent star" to **Krypton**, and picked the star in **Corvus**, because the mascot of **Superman**'s high school is the **Smallville Crow**s.

Sky Happenings: June/2017

(what follows pertains ONLY to the current month. Material above is good year after year.)

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June 1st - **First Quarter Moon** occurs at 7:42 AM CDT.
June 2nd - **Venus** passes 1.8° south of **Uranus** at 10 AM CDT.
June 3rd - **Venus** is at greatest western elongation (46°) at 8 AM CDT,
The waning gibbous **Moon** passes 2° north of Jupiter at 7 PM CDT,
A double shadow transit occurs on **Jupiter** from 9:22 PM to 11:22 PM CDT.
June 5th - Dwarf planet Ceres is in conjunction with the sun at 7PM CDT.
June 8th - The Moon is at apogee (252,526 miles from Earth) at 5:21 PM CDT.

June 9th - Evening: As twilight deepens, look for zero magnitude **Saturn** about 3° to the right of the nearly full **Moon,**
The **Moon** passes 3° north of **Saturn** at 8 PM CDT,
Full Moon occurs at 8:10 PM CDT (smallest **Full Moon** of 2017).
June 10th - **Jupiter** is stationary at midnight CDT, and then resumes motion eastward towards **Spica**.
June 12th - **Mercury** passes 5° north of **Aldebaran** at 6 AM CDT.
June 15th - **Saturn** is at opposition at 5 AM CDT – **Saturn** reaches peak, shining at magnitude 0.0, and appearing 18.4" across in a telescope. The rings span 41.7" and tilt 27° to our line of sight.
June 16th - The **Moon** passes 0.7° south of **Neptune** at 8 AM CDT,
Neptune is stationary at 6 PM CDT,
Asteroid Hebe is at opposition at 10 PM CDT.
June 17th - **Last Quarter Moon** occurs at 6:33 AM CDT.
June 19th - The **Moon** passes 4° south of **Uranus** at 11 AM CDT,
Night: A double shadow transit occurs on **Jupiter** from 9:05 PM to 9: 39 PM CDT.
June 20th - The waning crescent **Moon** is about 7° to the right of **Venus**, low in the dawn sky,
The **Moon** passes 2° south of **Venus** at 4 PM CDT.
June 21st - The waning crescent **Moon** is about 7° to the lower left of **Venus**, low in the dawn sky,
Summer Solstice begins at 11:24 AM CDT,
Mercury is in superior conjunction at 9AM CDT.
June 22nd - The **Moon** passes 0.5° north of **Aldebaran** (or occults) at 10 AM CDT.
June 23rd - The **Moon** is at perigee (222,412 miles from **Earth**) at 5:52 AM CDT,
Asteroid Harmonia is at opposition at 6 AM CDT,
New Moon occurs at 9:31 PM CDT.
June 27th - The waxing crescent **Moon** passes 0.03° south of **Regulus** at 8 PM CDT,
The **Moon** occults **Regulus** for **Hawaii** and **Micronesia** in the daytime and west-central **South America** at night.
June 29th - **Asteroid Hygiea** is at opposition at 2 PM CDT.
June 30th - **First Quarter Moon** occurs at 7:51 PM CDT,
Evening: High in the southwest at nightfall, **Jupiter** will be about 4° to the west of the **Moon**.
July 1st - Evening: The waxing gibbous **Moon** forms a broad triangle with **Jupiter** and **Spica** in the southwest.
July 3rd - **Earth** is at aphelion farthest from the **Sun** for 2017 (152,092,504 Km)
July 3-7 Dawn: Brilliant **Venus** shines about 7° south (lower right) of the **Pleiades**, low in the east.
July 6th - All night long golden **Saturn** shines about 3° below the waxing gibbous **Moon**.

Planets:

Mercury – You might catch a glimpse of **Mercury** before dawn in early June. On June 1st, **Mercury** lies 4° high in the east-northeast a half hour before sunrise. Shining at a magnitude of -0.4, it should show up through binoculars, if you have an uncluttered horizon. **Mercury** disappears soon after, heading for a superior conjunction on June 21st. **Mercury** will have a low, modest evening apparition in July. Try for it on the last day of June with binoculars.

Venus – Venus gleams in the east on June mornings; arriving at greatest western elongation (46°) from the **Sun** on June 3rd. **Venus** then rises two hours before the **Sun** and climbs more than 10° high in the east an hour before sunup. **Venus** shines at magnitude -4.4 and appears far brighter than any other morning object. By month's end, **Venus** rises 2.5 hours before the **Sun**, and stands 5° higher than it did early in the month. **Venus** dims from magnitude -4.5 to -4.2 during June As its disk shrinks from about 24" to 18" wide – its phase thickens past 50 % sunlit around the time of greatest elongation. On June 20th and 21st, **Venus** stands 8° to the right of the **Pleiades** star cluster (**M45**). The two rise together in a dark sky.

Mars – For a last view of **Mars**, until September, look low in the west-northwest after sunset in early June. **Mars**, at magnitude 1.7, will likely need binoculars to spot it against the twilight glow. Scan for it well below and a little to the right of **Gemini**'s twin stars, **Castor** and **Pollux. Mars** disappears behind the **Sun** starting the second week of June.

Jupiter – Jupiter blazes at magnitude -2.2, shining high in the south to southwest at nightfall, not setting until about 3 AM as June starts, and 1 AM as the month ends. **Jupiter** loses a little more luster and size, dimming from magnitude -2.3 to -2.0, and shrinking from 41" to 37" across it's equator during June. **Jupiter** starts the month 3 southeast of 3rd magnitude **Gamma Virginis**. **Jupiter** will remain about 11° west (right) of **Spica**, in **Virgo**, all month, halting its slight retrograde (westward) motion against the stars on June 9th, and slowly resumes direct (eastward) motion. **Jupiter** will spend the summer heading back toward **Spica**, passing it low in the twilight on Sept. 11th. **Jupiter** will span 39" at mid-month. **Jupiter**'s moons, **Io, Europa, Ganymede**, and **Callisto** appear in different positions relative to **Jupiter** every night. As darkness falls on the night of June 1st/2nd, **Io** and **Europa** both lie off the planet's eastern limb. **Europa** begins its transit at 12:18 AM CDT, and **Io** follows 80 minutes later. **Europa**'s shadow appears on the Jovian cloud tops starting at 2:31 AM CDT, with **Io**'s shadow trailing 11 minutes behind. **Io** teams with G**anymede**'s shadow the night of June 3rd/4th. **Io** strikes first, crossing in front of **Jupiter**'s eastern limb at 8:06 PM CDT. **Io**'s shadow appears beginning at 9:10 PM CDT. Eleven minutes later, **Ganymede**'s large shadow initially falls on the north polar region. **Io**'s transit ends at 10:16 PM CDT, with its shadow lifting back into space at 11:21 PMCDT, and **Ganymede**'s shadow follows 16 minutes later. Three moons take center stage the night of June 10th/11th. In eastern **North America**, in the early evening, **Ganymede** and **Io** appear against **Jupiter**'s disk. **Ganymede** exits at 11 PM CDT, five minutes before **Io**'s shadow appears at the opposite limb. **Io**'s transit ends at 12:07 AM CDT, while its shadow remains on the planet's disk, until 1:15 AM CDT. **Ganymede**'s shadow starts a transit five minutes after that. The night's final event occurs around 2:10 AM CDT, when **Europa** emerges from **Jupiter'**s shadow some 30" from **Jupiter**'s eastern limb.

Saturn – Saturn comes to opposition with the Sun on the night of June 14th, so it rises about sunset and shines almost all night throughout the month. **Saturn** is at its closest to **Earth** for the year, and therefore at its largest and brightest in telescopes. All month, the planet remains at, or very close to magnitude +0.0. This brightness is amazing because next year, **Saturn** will be at aphelion (farthest from the **Sun**) of its nearly 30 year orbit. The rings, at 26.5° open, are very close to their maximum possible tilt from our line of sight. On the other hand, for the next several years, observers at mid-northern latitudes must continue to deal with **Saturn** at essentially its most southerly and therefore lowest in the sky. The best observation comes when **Saturn** lies high in the south from late evening through early morning (about 12 midnight to 2 AM CDT).**Saturn** lies against the star fields of eastern **Ophiuchus** just over the border from neighboring **Sagittarius**. A telescope will deliver spectacular views of **Saturn**. The planet's disk measuresm18" across at mid-month, while the rings span 42" and tip 27° to our line of sight. This is their biggest tilt since 2003. The giant moon **Titan** shines at 8th magnitude, orbiting the planet in 16 days, passing north of the gas giant on June 8th and 24th, and south of it on the night of opposition, June 15th/16th. When **Titan** lies farthest east or west of the planet, it stands 3' away. Three 10th magnitude moons lie less than half that distance from **Saturn. Tethys, Dione**, and **Rhea** all show up through 4-inch or larger telescopes. You will need an 8-inch instrument to see 12th magnitude **Enceladus**.

Uranus – On June 1st, **Uranus** lies 2.4° northeast of **Venus** and appears in the same binocular field. As **Venus** wanders eastwards, it passes 1.8° due south of **Uranus** on the 2nd, and remains within 2° through the 4th. You will find **Uranus** just about the 9 o'clock position (from **Venus**) on June 1st; at 10 o'clock on the 2nd; at 11 o'clock on the 3rd; and at 12 o'clock on 4th. You will need to look carefully to spot magnitude 5.9 **Uranus**, with a disk of 3.5". On June 30th, **Uranus** will be 1° north and a touch west of magnitude 4.3 **Omicron Piscium**.

Neptune – Neptune rises in the east along with the stars of **Aquarius** around mid-night local time. Glowing at magnitude 7.9, it is an easy binocular target in the southeast sky an hour before morning twilight begins. Use the western side of the **Great Square of Pegasus** as a guide. Extend a line from **Beta** to **Alpha Pegasi** to the south about twice the distance between those stars and you will be in the planet's vicinity. **Neptune** will lay roughly mid-way between 4th magnitude **Lambda** and **Phi Aquarii**. Through binoculars, 6th magnitude **81 Aqr** is between them. **Neptune** lies about 15'east of this star throughout June.

Pluto – On June 15th, **Pluto** will be at RA 19 19.6 Dec. -21 22.

Sun – The **Sun** arrives at the June solstice at 11:24 PM CDT on June 20th, marking the shortest night of the year, and the start of summer in the **Northern Hemisphere**.

Moon – The waxing gibbous **Moon** passes about 2° to the upper left of **Jupiter** at nightfall on June 3rd, and

6° to the upper left of **Spica** on June 4th. On June 7th, as evening twilight deepens, look for **Beta Scorpii** about 3° below the **Moon**. The full **Moon** pairs with **Saturn** as they rise in the southeast on the evening of June 9th. At dawn of the next morning, June 10th, the **Moon** is 4° to the upper left of **Saturn**. On June 20th, the waning lunar crescent cuts the morning twilight about 7° to the right of **Venus**, its 8° to the lower left of **Venus** the next morning. A waxing lunar crescent hangs about 1° from **Regulus** for **North America** on the American evening of June 27th. The first-quarter **Moon** beams 4° to the right of **Jupiter** on June 30th.
Favorable Librations: Mare Smythii – June 1st; Humboldt Crater – June 3rd; Hausen Crater – June 11th; and Regnault Crater – June 21st.

Asteroids **–Asteroid 12 Victoria** lies within a 2.5° from 1st magnitude **Spica**. The asteroid is a 70 mile wide minor planet, and dims from mag. 10.5 to 11.0 this month. On June 7th and 8th, **12 Victoria** will be less than 0.2° from the star **56 Virginis**. On June 13th (my estimate), the asteroid will be about 0.5° northeast of **58 Virginis**. On June 28th and 29th (my estimate), **12 Victoria** will be about 1½° north of **Spica.**

Comets **–Comet Johnson (C/2015 V2)** should reach its brightest during June. This first time visitor to the inner solar system makes its closest approach to **Earth** on June 5th; one week before it passes closest to the **Sun. Comet Johnson** remains visible all night. The 6th magnitude object moves from **Boötes** into **Virgo** this month, passing east of magnitude 0.0 **Arcturus** on June 3rd and 4th.
Comet 41p/Tuttle-Giacobini-Kresak also stays out all night. Look for this 9th magnitude object once the **Moon** exits the evening sky on June 11th. The comet is then heading south along the eastern border of **Ophiuchus**. It skims west of the open star cluster **NGC 6633** (mag. 4.6, 18 27.7 +06 34, 26' in size, 30 stars in the cluster) from June 12th through 14th.
Comet PANSTAARS (C/2015 ER61) should reach 7th magnitude in June's morning sky. The best views come in June's first week as it speeds eastward against the backdrop of **Pisces.**

Meteor Showers **–**Two established meteor showers originate from within Corvus' boundary. German astronomer Cuno Hoffmeister discovered and named the "Corvids" in 1937, after observing them between June 25th and July 2nd. However, they have not been seen since, nor was there evidence of a shower when previous records were examined. Hoffmeister noted the trajectory of the shower was similar to that of **Comet 11P/Temple-Swift-LINEAR**, although this was not confirmed by Zhukov and colleagues in 2011. The shower has been tentively linked with **Comet 4015 Wilson-Harrington**.

In January of 2013, the **MO Video Meteor Network** published the discovery of the **Eta Corvids**, assigning some 300 meteors seen between Jan. 20th and 26th. Their existence was confirmed by data analysis later that year.

When to View the Planets:

Evening Sky		**Midnight**		**Morning Sky**	
Mars	(northwest)	**Jupiter**	(southwest)	**Mercury**	(east)
Jupiter	(southwest)	**Saturn**	(south)	**Venus**	(east)
Saturn	(southeast)			**Saturn**	(southwest)
				Uranus	(east)
				Neptune	(southeast)

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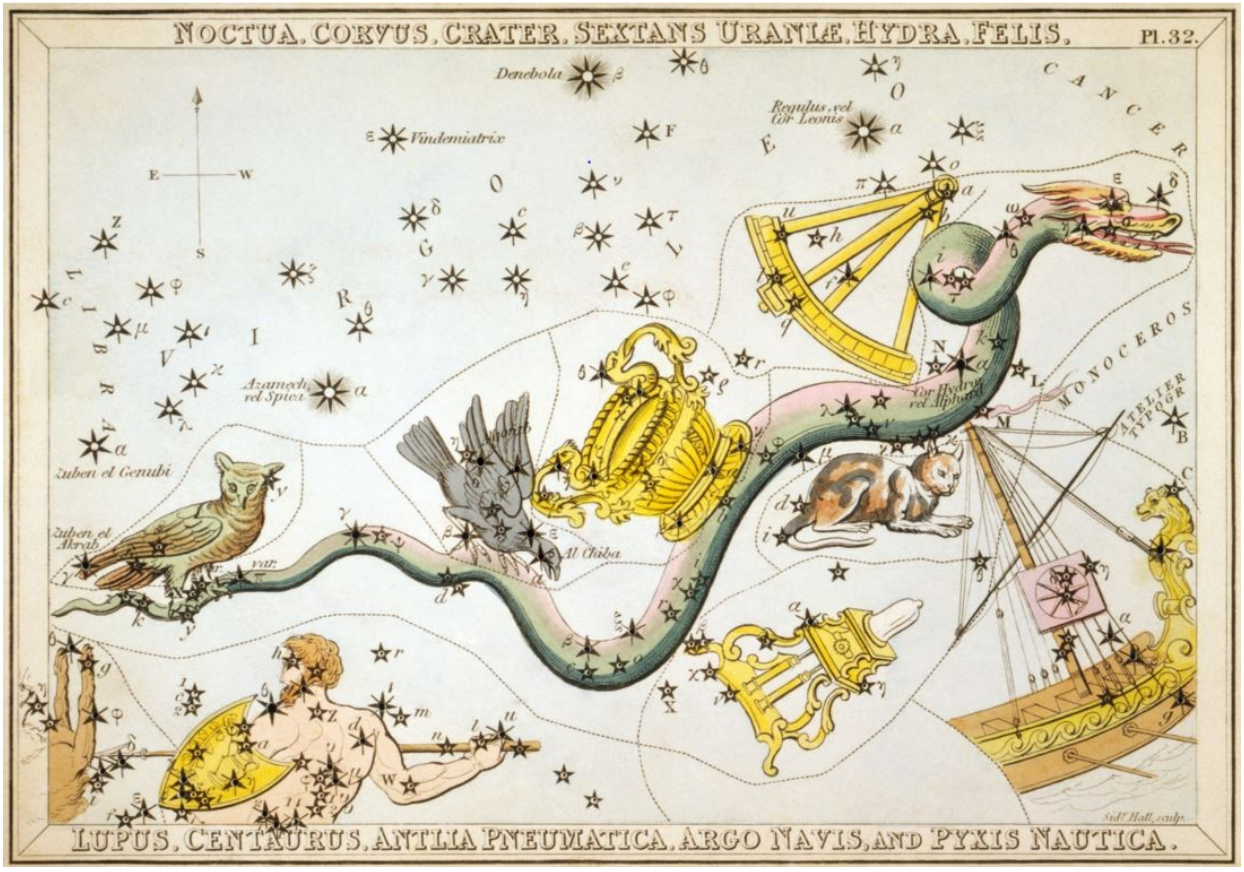
DARK SKY VIEWING - PRIMARY ON JUNE 24TH, SECONDARY ON JUNE 17

Mythology:

Corvus – the Crow and Crater – the Cup

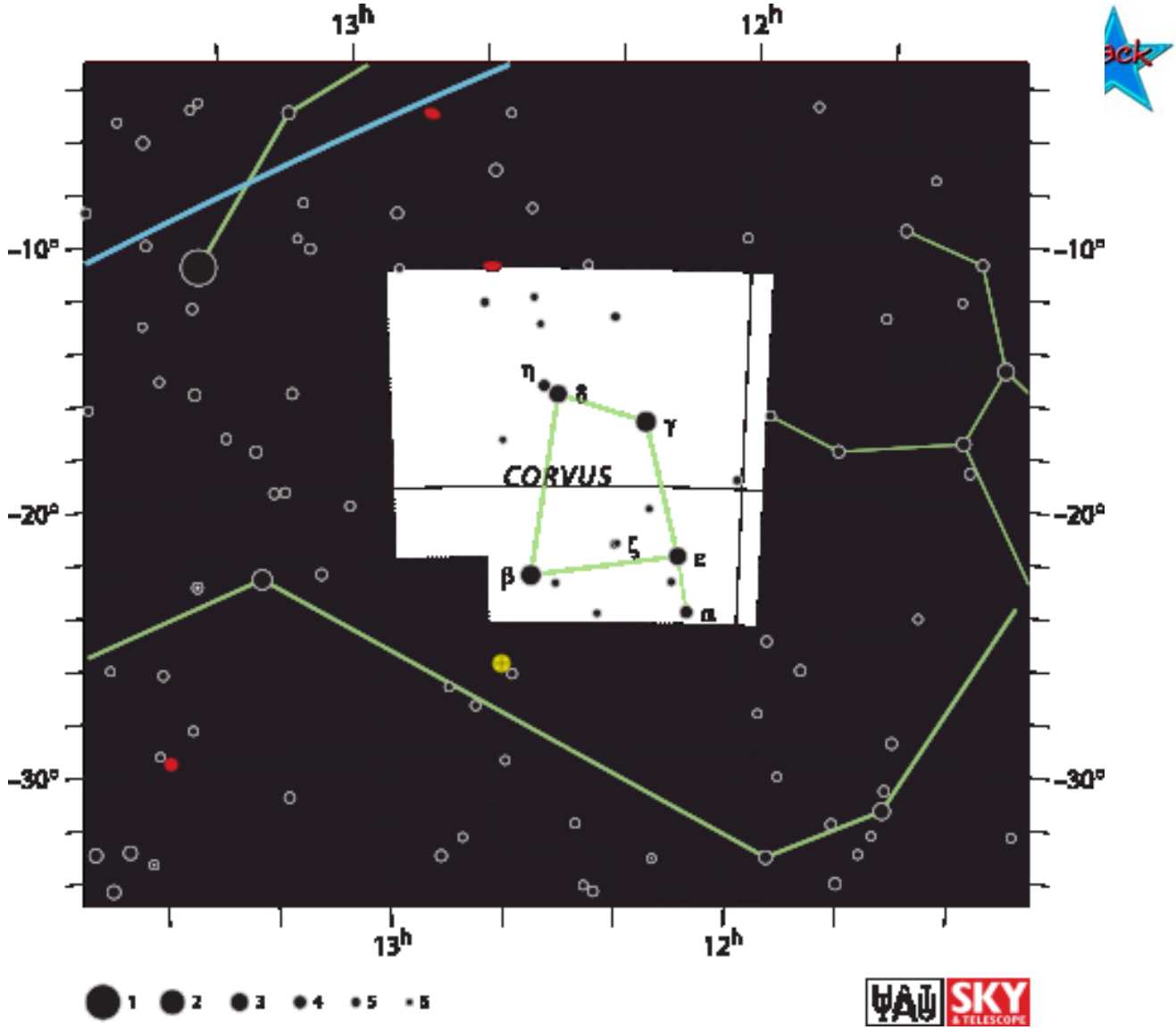
These two adjacent constellations are linked in a moral tale that goes back to at least Eratosthenes. As told by Ovid in his *Fasti*, Apollo was about to make a sacrifice to Zeus and sent the crow to fetch water from a running spring. The crow flew off with a bowl in its claws until it came to a fig tree laden with unripe fruit. Ignoring his orders, the crow waited several days for the fruit to ripen, by which time Apollo had been forced to find a source of water himself.



After eating his fill of the delicious fruit, the crow looked around for an alibi. He picked up a water-snake in his claws and returned with it to Apollo, saying the serpent had been blocking the spring. But Apollo, one whose skills was the art of prophecy, saw through the lie and condemned the crow to a life of thirst – which is perhaps one explanation for the rasping call of the crow.

In memorial of this incident, Apollo put the crow, the cup, and the water-snake together in the sky. The crow is depicted pecking at the water-snake's coils, as though attempting to move it, so that the crow may reach the cup to drink. The cup is usually represented as a magnificent double-handed chalice, and shown tilted towards the crow, but just out of the reach of the thirsty bird. The water-snake is the constellation Hydra which, in another legend, doubles as the creature slain by Heracles.

The crow was the sacred bird of Apollo, who changed himself into a crow to flee the monster Typhon when that immense creature threatened the gods. In another story, related by Ovid in his *Metamorphoses,* the crow was snow-white like a dove, but the bird brought news to Apollo that his love, Coronis, had been unfaithful. Apollo, in his anger, cursed the crow, turning it forever black.



The End