

Night Visions

December 2019

Newsletter of the **Baton Rouge Astronomical Society**

Monthly Meeting December 11th at 7PM at HRPO

(Monthly meetings are on 2nd Mondays, Highland Road Park Observatory).

Annual Christmas Potluck, and election of officers.

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Like this newsletter? See [PAST ISSUES](#) online back to 2009
Visit us on Facebook – [Baton Rouge Astronomical Society](#)

President's Message

I would like to thank everyone for having me as your president for the last two years . I hope you have enjoyed the past two year as much as I did.

- ✚ We had our first Members Only Observing Night (MOON) at HRPO on Sunday, 29 November,.
- ✚ New officers nominated for next year: Scott Cadwallader for President, Coy Wagoner for Vice-President, Thomas Halligan for Secretary, and Trey Anding for Treasurer. Of course, the nominations are still open. If you wish to be an officer or know of a fellow member who would make a good officer contact John Nagle, Merrill Hess, or Craig Brenden.



We will hold our annual Baton Rouge "Gastronomical" Society Christmas holiday feast potluck and officer elections on Monday, December 9th at 7PM at HRPO. I look forward to seeing you all there.

ALCon 2022 Bid Preparation and Planning Committee: We'll meet again on December 14 at 3:00pm at Coffee Call, 3132 College Dr F, Baton Rouge, LA 70808,

UPCOMING BRAS MEETINGS:

Light Pollution Committee - HRPO, Wednesday December 4th, 6:15 P.M.

Business Meeting – HRPO, Wednesday December 4th, 7 P.M.

Monthly Meeting – HRPO, Monday, December 9th, 7 P.M.

BRAG Meeting: Nothing currently scheduled.

BRAS ZAZZLE SHOP We opened a shop on Zazzle, with lots of neat items with the BRAS logo. Please consider shopping there for Christmas. The shop can be found at:

https://www.zazzle.com/store/br_astronomical

VOLUNTEER AT HRPO: If any of the members wish to volunteer at HRPO, please speak to Chris Kersey, BRAS Liaison for BREC, to fill out the paperwork..

MONTHLY SPEAKERS: One of the club's needs is speakers for our monthly meetings if you are willing to give a talk or know of a great speaker let us know.

VOLUNTEERS: While BRAS members are not required to volunteer, if we do grow our volunteer core in 2019 we can do more fun activities without wearing out our great volunteers. Volunteering is an excellent opportunity to share what you know while increasing your skills.

SALE: BRAS is having a surplus telescope/equipment.

Articles: I want to invite members to write articles for our newsletter. And, use the Members Corner to share your interesting astronomy related trips, events, awards, and experiences by sending a write-up to Michele at newsletter@brastro.org

Member Pins: If you have not reserved yours yet, please come to a meeting to pick one up.

Outreach: Please check below for Ben's Outreach Requests. Also, be on the lookout for periodic email notices. Remember, Outreach to our community is a lot of what we do.

Clear Skies

A handwritten signature in black ink that reads "Steven M. Tilley".

Steven M. Tilley, President



Secretary's Summary of November Meeting

- President, Steven Tilley, calls the meeting to order at 7:04pm.
- 14 members in attendance.
- Steven thanks everyone in attendance for coming to the meeting.
- ALCon 2022 committee meeting will be at Coffee Call on November 16th at 3:00 PM.
- Outreach Chair, Ben Toman, gives an outreach update.
- David Campbell from the Baton Rouge Scale Modelers introduces himself.
- Members only night will be held November 22nd following the Natural Sky Conference at HRPO.
- Raffle held.
- General Meeting adjourns at 7:36pm to work on the Light Pollution Diorama.

Submitted by Krista Reed, Secretary

After the meeting, BRAS members work on the Light Pollution Diorama, 11/11/19 More pics here:

<https://www.facebook.com/steveareno5/posts/2758237520887538>



Shop Zazzle for Christmas

https://www.zazzle.com/store/br_astronomical



2019 Officers:

President: Steven M. Tilley
Vice-President: Thomas Halligan
Secretary: Krista Reed
Treasurer: Trey Anding

BRAS Liaison for BREC:

Chris Kersey

BRAS Liaison for LSU:

Greg Guzik

Committees/Coordinators:

Light Pollution:

John Nagle

Newsletter:

Michele Fry

Observing Notes:

John Nagle

Outreach:

Ben Toman

Webmaster:

Frederick Barnett





BRAS Outreach Report

Hi Everyone,

We made it through to end of 2019 and now we're going to restart the Roaring 20's! We have so many materials to use for various Outreach events and the only thing lacking is some simple training to figure out how to implement them. So far, our continued participation with the Night Sky Network has gotten us the following Toolkits free of charge: ***Moon Mini-Toolkit: Apollo 11; Our Galaxy, Our Universe; Shadows and Silhouettes; Life In The Universe; Exploring The Solar System; Space Rocks; Glass and Mirrors: An Inside Look At Telescopes; Our Magnetic Sun; Telescopes: Eyes On The Universe; and SUPERNOVA!***

In case you weren't counting, that's TEN toolkits! We currently only use 2 on a regular basis. We've been trying to get some training sessions underway so we can begin to implement the others whenever we can. (Or at least give us options to use other things, especially when visiting places multiple times.)

We'll be starting out a new year, so let's get the ball rolling. I for one would love to get the Life In The Universe kit going. Nothing like a little E.T. talk to get kids (and parents) excited about space.

Looking back at November, we hit 4 for 5 with our Outreach events. **Sidewalk Astronomy** was booming with yet another clear night. **The Dunham School's Middle School STEAM Night** was another great event. Our **Outreach in Hammond** was a fun affair and some great discussion was had at the **Free Thinkers** meeting. Unfortunately, though, we ended up cancelling our appearance at White Light Night downtown. The forecast was just too high for rain and clouds. It seemed to break up a bit in some areas, but it's better safe than sorry when you are looking at 50% or higher rain chances. Hopefully we'll get out there soon to make up for it.

Thanks go out to Coy, Krista, Scott C., Chris K., Chris R, Craig, Merrill, Roz, Ben, John, and anyone else that I so hope I didn't miss!

We have a couple more scheduled BRAS outreaches for 2019. Come on out for them!!

Upcoming Outreach Events to wind up 2019:

Tuesday, December 3rd

6:30pm-8:30pm

Sidewalk Astronomy at Perkins Rowe

(telescope veiwing)

Saturday, December 14th

6pm-10pm

Mid City Makers Market (Baton Rouge off Government St.)

(telescope viewing)



Our setup at the Dunham School for STEAM Night
(Science, Technology, Education, Art and Math)



Chris K. at The Dunham School for STEAM Night



David Taylor (former BRAS member), here representing the Civil Air Patrol and sharing a tent with BRAS at the Hammond Eastside Fall Festival on Saturday, November 9th.

Photo by Merrill Hess

Clear skies,

Outreach Chairperson





BRAS Light Pollution Committee Report

This committee meets at 6:15, same day as the 7:00 BRAS Business Meeting
(normally on Wednesday before the Monthly Meeting)

Everyone is welcome to join in..

Meeting called to order by John Nagle

No new members, with 6 members in attendance

Old Business:

1. Discussed work to be done on the diorama.
2. Discussed the Third Natural Sky Conference, and the need for volunteers.

New Business:

Discussed the November membership meeting of BRAS to be devoted to working on the diorama.

Minutes of this meeting read and approved

Meeting adjourned.

Submitted by John Nagle, Chairman

John R. Nagle



Globe At Night

Target for the Globe At Night program is **Perseus** from December 18th through the 28th.

If you would like to participate in this citizen scientist program, you can find instructions at

<https://www.globeatnight.org>

P.S. There is an app called “**Loss of the Night**” that can be used for information and reporting your observations.



BRAS FORUM NOTICE:

The BRAS Forum has a Members Only section, where we post notices or have discussions pertaining to members or the club that the general public can't see. If you would like to join the Members Only section, all you need to do is sign up for the forum (if you haven't already), and then send an email to **fred at eatel dot net** with your forum username and email address, and ask to be added to the members only section. In your User Control Panel, you can set your preferences to receive email notification anytime a post is made.

Thanks, Frederick Barnett, Webmaster

Members/Community Corner

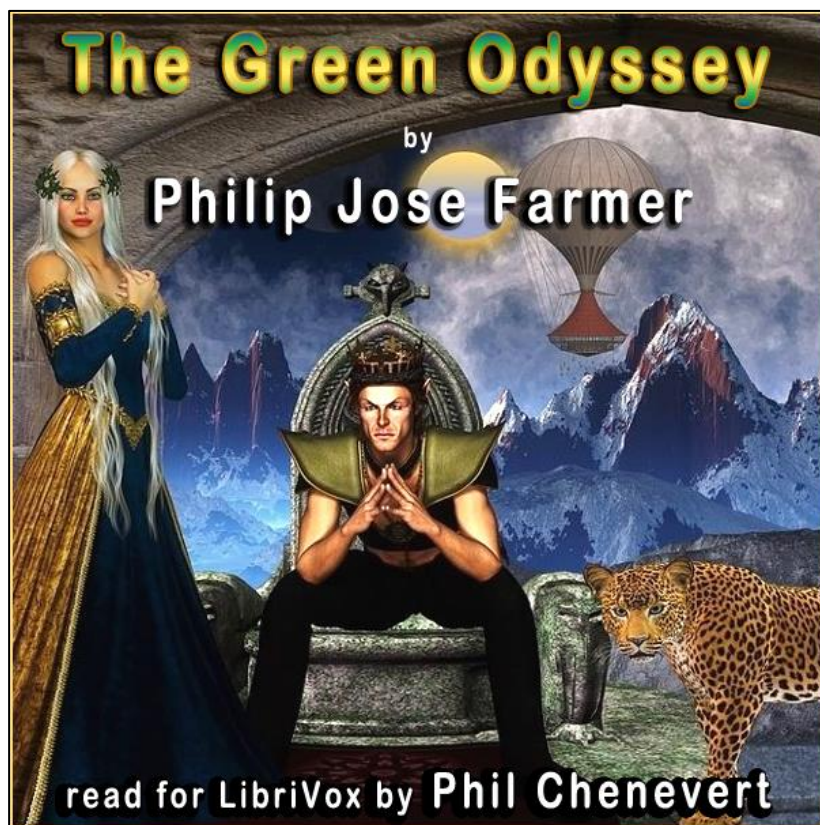
Here's where we feature articles and photos about BRAS members' astronomy-related accomplishments and adventures outside of BRAS activities (as if there were any spare time for such things!), and/or other astronomical happenings in our neck of the Universe. Send your contributions to Michele at newsletter@brastro.org

For you sci-fi space thriller fans:

As no member claimed this space for December, I am using my editorial privileges to promote a sci-fi adventure audiobook I think you might enjoy, just recorded by a good friend of mine, Phil Chenevert (a Baton Rougean who ought to be a BRAS member). It supposes that human-like life is probably scattered throughout the cosmos, evolving in endless cycle from primitive to highly advanced and back to primitive due to the usual reasons – intelligence, curiosity, love of adventure and hardiness, coupled with greed, lust, jealousy, short-sightedness, catastrophe and war. Enjoy! Michele Fry

Click on the link for the plot summary:

<https://librivox.org/the-green-odyssey-version-2-by-philip-jose-farmer/>



A few quotes from reviews:

....absolutely entertaining and capturing from the get go! The visual imagery was just cinematic!

.... a fairly well constructed novel of a far flung future where the empire of man has risen, fallen, and risen again. The story takes place from the view of a man of a technological society stuck on a back water planet....and trying to get home again.

.... the plot feels tight and moves along in a nice way.

The book stars John Green, a spaceman from Earth crashlanded on an alien planet populated by a species that appears to be a lost branch of humanity. Unluckily, he is cast into slavery. But when he hears about two more spacemen being held captive in the capital, he decides to flee....

Download it to your phone or MP3 player, for FREE, and listen to it during drive time, or while you dust, vacuum, chop vegetables and/or wash all those Christmas dishes after the cooking is done. It's a really fun listen.

All LibriVox audiobooks are FREE. CD cover designed by me!



Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

December 2019

Volume 1. Issue 11.

Amateur Astronomers Needed

The European Space Agency(ESA) is asking amateur astronomers from around the world to help in the selection of additional flyby targets for their Hera spacecraft. On the way to 65803 Didymos Hera may flyby more one other small body. for more information see: Amateur astronomers: help choose asteroid flybys for Hera http://www.esa.int/Safety_Security/Hera/Amateur_astronomers_help_choose_asteroid_flybys_for_Hera

The 2019 UN13 Halloween close approach

A 1 to 7 meters NEO made a close approach on Halloween it was ~ 4.60 (Metaphorical) Inches from a Basketball Size Earth. This asteroid discovered by the [Catalina Sky Survey](#) and given the [observer-assigned temporary designation](#). COPPEV1(Now 2019 UN13) So far there is 18 observations from four observing stations over 3.7 hours. This object has gone out of range telescopes so new observations runs will have wait until 2019 UN13 comes back in range(if ever). Given the fact it was the 2nd closest approach it is making buzz online ---by the way it is too small to do anything.

Naming (486958) 2014 MU69

[\(486958\) 2014 MU69](#) was set to be a New Horizons Flyby Target however it was not "named" yet so the public asked help come up with "Nickname" until "[a]fter the flyby, NASA and the New Horizons project plan to choose a formal name to submit to the International Astronomical Union, based in part on whether MU69 is found to be a single body, a binary pair, or perhaps a system of multiple objects. The chosen nickname will be used in the interim." -- [Help Nickname New Horizons' Next Flyby Target \(November 6, 2017\)](#) also see [Introducing "Ultima Thule": NASA's Ultimate Destination in the Kuiper Belt!](#) It was state plan was to work with [International Astronomical Union](#) on a permanent name after the flyby.

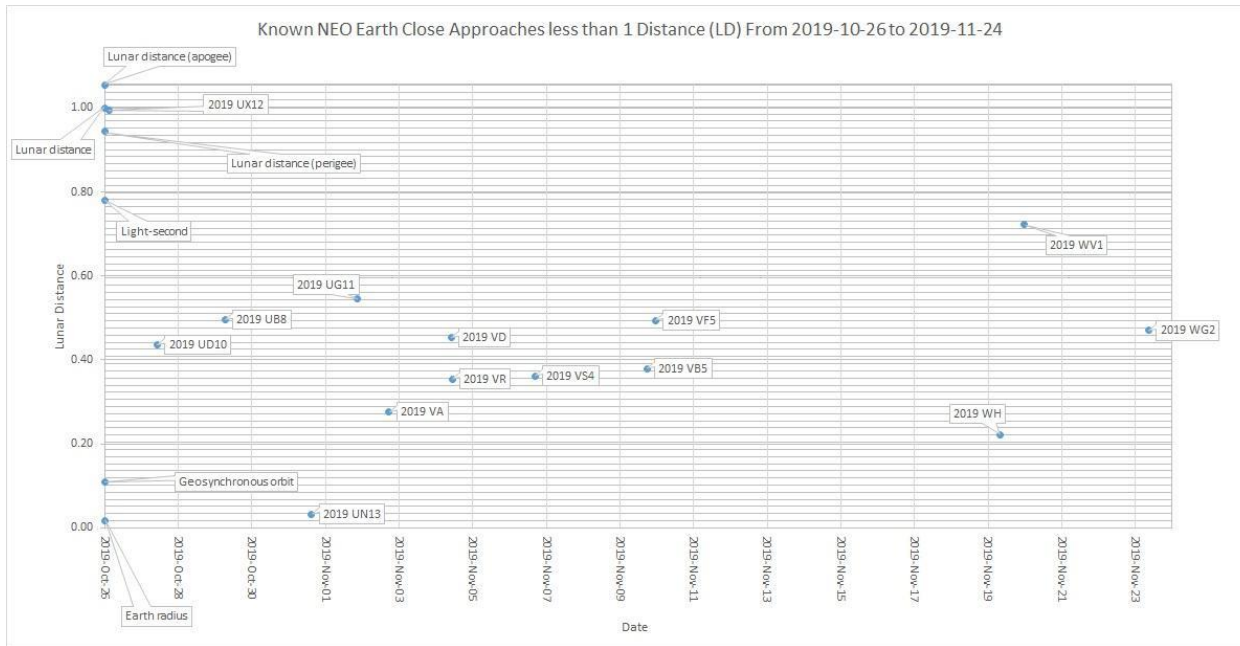
On [2019 November 8, Minor Planet Circulars 117229-118222](#) was published with a Official name and naming citation ---[\(486958\) Arrokoth = 2014 MU69](#) also see [New Horizons Kuiper Belt Flyby Object Officially Named 'Arrokoth'](#) Then stories of name changes started to fly around the internet

Precovery Images of 2I/Borisov found

Looking in image archives astronomers from around the world have been able to find precovery images of 2I/Borisov dating back to December 2018. For more information see:

- That Rogue Interstellar Comet Was Imaged Almost a Year Before Its Actual Discovery
<https://www.sciencealert.com/interstellar-comet-2i-borisov-was-imaged-almost-a-year-before-its-actual-discovery>
- Pre-discovery Activity of New Interstellar Comet 2I/Borisov Beyond 5 AU
<https://arxiv.org/abs/1911.05902>
- FAQ for gb00234 = C/2019 Q4 = 2I (Borisov) - Project Pluto <https://www.projectpluto.com/temp/2i.htm>

Known NEO Earth Close Approaches less than 1 Distance (LD) From 2019-10-26 to 2019-11-24



Known NEO Earth Close Approaches less than 1 Distance (LD) From 2019-10-26 to 2019-11-24

<https://ssd-api.jpl.nasa.gov/cad.api?dist-max=1.056LD&date-min=2019-10-26&date-max=2019-12-01&fullname=true&sort=dist>

[JPL Close Approach Data](#) from Oct 26, 2019 to Nov 24, 2019 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal LD (au)	H (mag)	Estimated Diameter
(2019 UD10)	2019-Oct-27	0.44 (0.00112)	28.1	6.3 m - 14 m
(2019 UB8)	2019-Oct-29	0.50 (0.00127)	28.9	4.3 m - 9.7 m
(2019 UN13)	2019-Oct-31	0.03 (8.43e-5)	32.1	1.0 m - 2.2 m
(2019 UG11)	2019-Nov-01	0.55 (0.00140)	26.7	12 m - 28 m
(2019 VA)	2019-Nov-02	0.28 (0.00071)	28.3	5.8 m - 13 m
(2019 VD)	2019-Nov-04	0.45 (0.00117)	27.4	8.7 m - 20 m
(2019 VR)	2019-Nov-04	0.35 (0.00091)	28.1	6.4 m - 14 m
(2019 VS4)	2019-Nov-06	0.36 (0.00093)	27.3	9.2 m - 21 m
(2019 VB5)	2019-Nov-09	0.38 (0.00097)	31.7	1.2 m - 2.7 m
(2019 VF5)	2019-Nov-09	0.49 (0.00127)	27.6	8.1 m - 18 m
(2019 WH)	2019-Nov-19	0.22 (0.00057)	26.2	15 m - 35 m
(2019 WV1)	2019-Nov-19	0.72 (0.00186)	28.1	6.3 m - 14 m
(2019 WG2)	2019-Nov-23	0.47 (0.00121)	25.0	26 m - 59 m

As of 2019-11-26 there is

851,094 discovered asteroids (MPC)(<https://www.minorplanetcenter.net/>)

[541,155 have been numbered]

21,554 discovered Near-Earth Objects (MPC) (<https://www.minorplanetcenter.net/>)

4,257 discovered Comets (MPC)(<https://www.minorplanetcenter.net/>)

954 objects listed on JPL's Sentry: Earth Impact Monitoring(JPL) (<https://cneos.jpl.nasa.gov/sentry/>)

2,386 objects have been removed from Sentry(JPL) (<https://cneos.jpl.nasa.gov/sentry/removed.html>)

For more information read Jon Giorgini's "Understanding Risk Pages"

(<http://www.hohmanntransfer.com/by/giorgion.htm>) (i.e. "A risk-page listing is not a *prediction* of impact")

The following objects were removed from NASA JPL's Sentry: Earth Impact Monitoring list from 2019-10-28 to 2019-11-25

Object Designation	Removed (UTC)
2019 UW8	2019-11-26 13:33:10
2019 WC	2019-11-25 13:28:27
2019 TF2	2019-11-24 13:33:41
2019 UO8	2019-11-20 13:30:51
2019 VV	2019-11-19 17:16:51
2019 UC14	2019-11-17 13:30:08
2019 VL4	2019-11-16 09:31:24
2019 VS4	2019-11-11 13:31:00
2019 SP3	2019-11-10 13:28:38
2019 VF1	2019-11-09 14:13:54
2019 VC	2019-11-09 14:13:54
2019 VE1	2019-11-09 13:58:40
2019 VT3	2019-11-08 14:36:32
2017 SQ2	2019-11-07 17:05:32
2019 VC1	2019-11-05 23:56:07
2019 UU2	2019-11-04 13:32:43
2019 UA3	2019-11-01 16:01:06
2019 UN4	2019-10-30 15:55:24
2019 AC3	2019-10-30 15:34:29
2019 SD	2019-10-29 14:02:55
2010 GD37	2019-10-28 16:10:21
2019 UK6	2019-10-28 13:58:44

Useful Links:

Guide to Minor Body Astrometry (<https://www.minorplanetcenter.net/iau/info/Astrometry.html>)

How Are Minor Planets Named? (<https://www.minorplanetcenter.net/iau/info/HowNamed.html>)

New- And Old-Style Minor Planet Designations (<https://www.minorplanetcenter.net/iau/info/OldDesDoc.html>)

The Tracking News

(<http://www.hohmanntransfer.com/news.htm>)

Accessible NEAs

(<https://cneos.jpl.nasa.gov/nhats/intro.html>)

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Messages from HRPO

Highland Road Park Observatory



FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

6 December: “Buying Binoculars and Telescopes” BRAS members will reveal winning tips for making your [binocular](#) or [telescope](#) purchase as smooth, efficient and successful as possible.

20 December: “Protecting Our Power Grid” There are several different ways entire sections of [our nation’s Grid](#) can be damaged or destroyed. Indeed, it’s happened before...at least on a small scale. What about a large-scale event? Many believe it’s a matter of when, not if. Are we prepared?



SCIENCE ACADEMY

Saturdays from 10am to 12pm

For ages eight to twelve. \$5/\$6 per child.

7 December: “Introduction to Astrobiology” As we investigate curious signatures of oxygen and methane in the Solar System and beyond, [Cadets](#) will learn what that means. How would we react if we found proof of extraterrestrial life tomorrow?

21 December: “[Earth Orbit Trips I](#)/[Electronic Behavior I](#)” This standalone, never-to-return-again series of sessions (each about a month apart) will focus on the space stations and satellites that orbit our home planet, and a collection of electricity demonstrations. Cadets who participates in sessions I, II and III will receive a special notation on their next certificates!



Solar Viewing

Saturday 14 December from 12pm to 2pm.

For all ages. No admission fee



STEM Expansion

“Science, Technology, Engineering, Math”

Saturday 28 December from 3:30pm to 7:30pm

Primary Topic: Astrobiology

Secondary Topic: The Dragonfly Mission

For ages twelve to sixteen. \$15/\$18 per kid.

This program offers advanced topics, topic extensions and all-new games and activities to an older crowd. Certificates will be earned, and a section of archived experiments, some not seen in over fifteen years (and some *never* performed on site) take place.



Geminid Meteor Shower

Friday, 13 December from 9pm to 1am

No admission fee. For all ages.

ABOUT THE GEMINIDS

The Geminid meteors, in addition to being part of one of the most reliable showers of the year, are quite intriguing. The first Geminids were noticed in the 1860's. Astronomers searched for the comet which left behind the debris field responsible for the Geminids. In the 1980's (after over a century of searching) scientists pinpointed an asteroid now known as Phaethon as the originator of the debris. Any meteors that are part of this shower seem to radiate from a point in the sky near the star Castor, in the constellation Gemini.

THE GEMINID PEAK VIEWING EVENT

For this *one* night HRPO will be open for four hours, during which time members of the public are welcome. Due to the light pollution problem here in East Baton Rouge Parish, it is feasible to attempt viewing of this major shower only during its peak time, which according to the American Meteor Society will be the evening of the 13th through to the morning of the 14th. Earth's Moon will be in its waxing crescent phase and will have set by 11pm. Patrons *must* follow pertinent rules and regulations if they expect to stay on park property.



2020 Preview Party

Friday, 27 December from 6pm to 10pm

No admission fee. For all ages.

Drinks and refreshments. Marshmallow roast.

Physical science demos. Binocular recommended.

For the last open Friday of 2019, HRPO preempts the Lecture Series to invite regulars and newcomers alike to preview the fantastic programming for 2020!

These programs include (but are not limited to)...

- Pluto Discovery 90th Anniversary Celebrations [13/14 February]
- The Edge of Night (spring session) [13 March]
- NanoDays [4 April]
- Apollo 13 50th Anniversary Lecture [10 April]
- International Astronomy Day [2 May]
- American Radio Relay League Field Day [26 June]
- The Edge of Night (summer session) [3 July]
- Perseid Meteor Shower [12 August]
- The Edge of Night (fall session) [6 November]
- Spooky Spectrum [3 October]
- Natural Sky Conference [13 November]
- Geminid Meteor Shower [13 December]

Dates are tentative.

Check with actual webpage of each event.

AVAILABLE CELESTIAL OBJECTS

- 6pm to 6:45 pm = Venus
- 6:45 pm to 8pm = Neptune
- 6:45 pm to 10pm = Uranus
- 7pm to 10pm = Vesta
- 7:15 pm to 10pm = Pleiades Star Cluster
- 8pm to 10pm = Orion Nebula
- 8:30 pm to 9:45 pm = scintillation of Sirius

**Support your local
observatory with our
2019 HRPO T-Shirt,
all sizes, \$7.00**

**To place your order,
Call
225-768-9948 or email
observatory@brec.org**



White and blue on black, the design takes its inspiration from the legendary Apollo 8 "Earthrise" photo.



Adult Astronomy Courses

Saturday from 3:30pm to 7:30pm

For ages eighteen and older.

\$15 per in-parish registrant; \$18 per out-of-parish registrant.

4 January: Learn Your Telescope

18 January: Learn Your Sky

1 February: Learn Your Binocular





Observing Notes: December

by John Nagle

Perseus – Rescuer Of Andromeda, or the Hero

Position: RA 03.71, Dec. +41.77°

Note: For six years I have been writing these Observing Notes, featuring the 60 constellations we can see before midnight from Baton Rouge, that contain objects above magnitude 10. Beginning with the February 2019 newsletter, I began to recycle and update the constellations, but the Sky Happenings calendar and associated information are new each month.

Named Stars

Mirfak (Alpha Per), “the elbow” from the Arabic “Marfik al Thurayya”, also called “Algenib”, “the side” from “Al Janb”, mag. 1.79, 03 24 19.35 +49 51 40.5, is a super-giant yellow-white star. It is the brightest member of the **Alpha Persei Cluster** (also known as **Melotte 20** and **Collinder 39**), an open star cluster with some of the nearby members being the Be stars **Delta**, **Psi**, **Epsilon**, and **29**, **30**, **31**, **34**, and **48 Persei**. Also known as **HD 20902**, **HIP 15863**, and **33 Persei**.

Algol (Beta Per), “El Ghou, The Demon Star”, from the Arabic “Rā’s al Ghūl”, “The Deamon’s Head”, mag. 2.09, 03 08 10.13 +40 57 20.3, is a blue-white binary main sequence star and part of a triple star system. This is the first eclipsing binary star ever discovered and one of the first variable stars to be found. The primary, **Beta Persei A**, is eclipsed by **Beta Persei B**, an orange sub-giant star with a magnitude that varies from 3.5 to 2.1 over a period of 2 days, 20 hours and 49 minutes (2.867 days), with the eclipse lasting about 10 hours. **Algol** is the prototype for a class of stars known as **Algol** variables. **Algol A** and **B** are separated by only 0.062 AU, with **Algol B** already in the sub-giant evolutionary stage. **Algol C**, a main sequence star, has an average separation of 2.69 AU from the other two stars. The **Algol** system emits X-rays and radio wave flares. There is a fourth component suspected. Also known as “**Gorgona Prima**”, “the Ghou Star”, **HD 19356**, **HIP 14576**, and **26 Persei**.

Atik (Zeta Per), “Menkhib”, mag. 2.84, 03 54 07.92 +31 53 01.2, is a blue-white super-giant star with three companions – one at 9.5 magnitude and a separation of 12.9”, a second at 11th magnitude and a separation of 33”, and the third at 9.5 magnitude and a separation of 94”. **Zeta Persei** is the brightest star of a moving group of bright blue-white giant and super-giant stars called the **Perseus OB₂ Association** or the **Zeta Persei Association**. Some of the members are **Omicron**, **Xi**, **40 Persei**, and the variable stars **X** and **AG Persei**. Also known as **HD 24398**, **HIP 18246**, and **44 Persei**.

Miram (Eta Per), mag. 3.77, 02 50 41.79 +55 53 43.9, is a double star with color contrasts of gold and blue stars. The primary is magnitude 3.8 with the secondary at magnitude 8.5 and a separation of 28.3”. Also known as **HD 17506**, **HIP 13268**, and **15 Persei**.

Misam (Kappa Per), mag. 3.79, 03 09 29.63 +44 51 28.4, is a triple star system comprised of a spectroscopic binary (primary star a red to orange star), and a companion in a wider orbit. Also known as **HD 19476**, **HIP 14668**, and **27 Persei**.

Menkib (Xi Per), from the Arabic “Mankib al Thurayya”, “the Shoulder”, mag. 3.98, 03 58 57.90 +35 47 27.7, is a blue giant star and one of the hottest naked eye stars known (surface temperature of 37,000 Kelvin’s). This is the star that illuminates the **California Nebula** (NGC 1499). Also known as

HD 24912, HIP 18614, and 46 Persei.

Al Atik (Omicron Per), from the Arabic “Al’Atik”, mag. 3.84, 03 44 19.1 +32 17 17.8, is a spectroscopic double star system consisting of a giant blue star and a dwarf blue-white star. The two orbit each other with a period of 4.5 days. The stars are called **Atik** and **Ati**, and are involved with **IC 438**. This is a familiar star that has been featured in the TV series *Futurama*, in the *Transformers*, *Star Trek*, and the *Mystery Science Theater 3000*. Also known as **HD 23180, HIP 17448, and 38 Persei**.

Gorgonea Secunda (Pi Per), mag. 4.68, 02 58 45.65 +39 39 46.2, is a blue star. Also known as **HD 18411, HIP 13879, and 22 Persei**.

Gorgonea Tertia (Rho Per), mag. 3.32, 03 05 10.50 +38 50 25.9, this red star (helium has been fused into heavier elements and its core is composed of carbon and oxygen) has reached the asymptotic giant branch stage of evolution, and is near the tip of the red giant branch. Also known as **HD 19058, HIP 14354, and 25 Persei**.

Seif (Phi Per), also called **Alseiph**, mag. 4.06, 01 43 39.62 +50 41 19.6, is a double star composed of a main sequence blue star and a sub-dwarf star. Also known as **HD 10516, and HIP 8068**.

Misam al Thurayya (Chi Per), “the Wrist”, mag. 5.99, 02 18 04.6 +57 30 58.8, is a white to yellow star. **Chi Persei** usually is used to refer to **NGC 884**, an open cluster (**Chi Persei Cluster**). Also known as **HD 13994, HIP 10729, and 7 Persei**.

Gorgonea Quarta (Omega Per), mag. 4.61, 03 11 17.40 +39 36 41.7. Also known as **HD 19656, HIP 14817, and 28 Persei**.

Deep Sky:

M34 (NGC 1039), mag. 5.2, 02 42.0 +42 47, 34’ in size, is an open cluster of about 400 stars; detached, no concentration of stars; moderate range in brightness; very large and bright; magnitude of brightest star is 9.5. Estimated to be about 200 to 250 million years old. **IC 348** is contained within this cluster. This cluster can be found due south of **Theta Persei** just north of a line between **Algol** and **Gamma Andromedae**. Also known as **Cr 31, Mel 17, Lund 91, OCl 382, Raab 13, and CGCG 0238+425**.

M76 (NGC 650 and 651), originally thought to be two separate items, hence two NGC numbers, **NGC 650**, mag. 10.1, 01 43 37 +51 40 44, 4.8’x4.8’ in size, is a planetary nebula and a half of **M76**; **NGC 651**, mag. 10.1, 01 43 37 +51 40 44, 2.7’x1.8’ in size, is the 2nd half of **M76**. To find, look just under 1° north and slightly west of **Phi Persei**. Also known as the **Little Dumbbell**, the **Cork Nebula**, the **Barbell Nebula**, the **Butterfly Nebula**, **PK 130-10.1, PNG 130.9-10.5, 3C 050, and HI-193**.

Mel 20, mag. 1.20, 03 24 19 +49 51.7, 300’ in size, 100+ stars. Also known as the **Alpha Persei Moving Cluster** (containing **Alpha, Delta, Epsilon, and Psi Persei** among other stars), the **Perseus Cluster**, the **Perseus Moving Cluster**, **Cr 39, Lund 106, OCl 392, 392.0, and CGCG 0318+484**.

C 14, mag. 4.3, 02 21 27 +57 13 31, 70’x70’ in size, is the **Double Cluster**.

Double Cluster, mag. 4.3, is composed of **NGC 869** and **NGC 884**, a pair of very close, very bright clusters, each of which contains more than 300 super-giant stars.

NGC 1499, mag. 5.0, 04 04 34 +36 25 18, 140’x140’ in size, huge, very faint and very elongated; shaped like the state of **California**. A reflection nebula illuminated by **Xi Persei**. Also known as **LBN 756**.

NGC 869, mag. 5.3, 02 20 25 +57 12 50, 30’x30’ in size, is the western component of the **Double Cluster**. Detached, strong concentration of stars; large range in brightness; very large; magnitude of brightest star is 6.6. Also known as **Mel 13, Cr 24, Raab 9, Mrk 4, Lund 73, H6-33, CGCG 0215+569, part of C14, and the h Persei Cluster**.

NGC 1333, mag. 5.6, 03 29.3 +31 25, 6’x3’ in size, is a reflection nebula that is faint and large, brightest at the ends. Also known as **LBN 741** and **[LAL96]1 and 2**.

Tr 2, mag. 5.9, 02 36 45.9 +55 55 48, 20’ in size, 109 stars; detached, no concentration of stars, moderate range in brightness; magnitude of brightest star is 7.4. Also known as **Cz 29, Lund 88,**

H6-34, OCI 365, OCI 365.0, and CGCG 0233+557.

NGC 884, mag. 6.1, 02 24 00 +57 14 07, 30'x30' in size, is the eastern component of the **Double Cluster**. Detached, strong concentration of stars; large range in brightness; very large; magnitude of brightest star is 8.1. Also known as **Mel 14, Cr 25, Raab 10, Mrk 5, Lund 76, H6-34, OCI 353, OCI 353.0, CGCG 0218+568**, part of **C14**, and the **Chi Persei Cluster**.

NGC 1545, mag. 6.2, 04 22 28 +50 18 03, 18'x18' in size, 20 stars, detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 7.1. Also known as **Cr 49, Lund 131, OCI 399, OCI 399.0, H8-85**, and **CGCG 0417+501**.

Ced 17, mag. 6.3, 03 31.4 +43 45.

NGC 1528, mag. 6.4, 04 16 52 +51 15 34, 24'x24' in size, 165 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 8.8. Also known as **Mel 23, Cr 47, Lund 126, OCI 397, OCI 397.0, Raab 16, H7-61**, and **CGCG 0411+511**.

NGC 1444, mag. 6.6, 03 51 01 +52 42 53, 4'x4' in size, 40+ stars; not well detached from surrounding star field; small range in brightness; magnitude of brightest star is 6.8. Also known as **Cr43, H8-80, Lund 119, OCI 394, OCI 394.0, Mrk 9**, and **CGCG 0345+525**.

NGC 1342, mag. 6.7, 03 32 59 +37 26 48, 14'x14' in size, 40+stars; detached, no concentration of stars; large range in brightness; very large; magnitude of brightest star is 8.8. Also known as **Mel 21, Cr 40, H8-88, Lund 110, Raab 15, OCI 401, CGCG 0328+371**, the **Stingray Cluster**, and the **Little Scorpion Cluster**.

NGC 1582, mag. 7.0, 04 33 13 +43 49 33, 37'x37' in size, 20+ stars; not well detached; moderate range in brightness; magnitude of brightest star is 9.0 photo. Also known as **Cr 51, H8-70, Lund 133, OCI 407, OCI 407.0, CGCG 0428+437**, and **IRAS 0428+4344**.

IC 348, mag. 7.3, 03 45 51 +32 13 30, 10'x10' in size, 20+ stars, is a pretty bright and large reflection nebula that contains this cluster; not well detached from the surrounding star field; magnitude of brightest star is 8.5. Also known as **IC 1985, HDE 281159, BD +31 0643, HIP 017465, Ced 20, Cr 41, OCI 409, OCI 409.0, CGCG 0341+321**, and the **Omicron Persei Cluster**.

NGC 957, mag. 7.6, 02 34 49 +57 39 27, 10'x10' in size, 119 stars in a 12'x7' area; detached, no concentration of stars; moderate range in brightness; pretty large; magnitude of brightest star is 9.5. Also known as **Cr 28, Lund 84, OCI 362, OCI 362.0**, and **CGCG 0230+573**.

h Persei, mag. 7.9, 02 16 49 +57 02.6, 1.7' in size, 2 stars. Is not **NGC 869**. Also known as **HD 13841, HIP 013854**, and **CGCG 0215+569**.

NGC 744, mag. 7.9, 01 59 52 +55 34 22, 11'x11' in size, is a loose, irregular scattering of 99 stars; not well detached from the surrounding star field; moderate range in brightness; large cluster; magnitude of brightest star is 10.4. Also known as **Cr 22, Lund 65, OCI 345, OCI 345.0**, and **CGCG 0155+552**.

NGC 1245, mag. 8.4, 03 16 06 +47 18 44, 10'x10' in size, 200+ stars; detached, no concentration of stars; small range in brightness; magnitude of brightest star is 11.2; pretty large. Also known as **Mel 18, Cr 38, H6-25, Lund 103, OCI 389, Raab 14, CGCG 0311+470**, and the **Patrick Star Fish Cluster**.

NGC 1513, mag. 8.4, 04 11 25 +49 34 04, 9'x9' in size, 50+ stars; detached, weak concentration of stars; small range in brightness; large; magnitude of brightest star is 11.2. Has a crown of larger stars around it, somewhat in the form of the letter D. Also known as **Cr 46, H7-60, Lund 125, OCI 398**, and **CGCG 0406+493**.

vdB 24, mag. 8.8, 24 03 49.6 +38 59, 5'x3' in size, is a nebula whose brightest part is comet shaped and fans away from an 8.8 magnitude star located immediately to the north.

NGC 1491, mag. 9.0, 04 04 46 +51 22 10, 3'x3' in size; is a small and very bright nebula; has a fainter, extended envelope (about 25'x25'). Two strong wisps form a narrow V shape with the north-northeast end open. Also known as **Ced 25, LBN 704, H1-258**, and the **Fossil Footprint Nebula**.

NGC 1023, mag. 9.3, 02 41 41 +39 08 57, 8.7'x3.3' in size; is a very bright, very large, and very elongated galaxy; extremely bright nucleus. Galaxy is in two parts – **NGC 1023**, known as the **Perseus Lenticular Galaxy**, and **NGC 1023A**, at magnitude 13.0 and a size of 1.6'x1.4'. Also known as **Arp 135, PGC 010123, UGC 2154, H1-156, MCG +6-06-073**, and **CGCG 0523+083**.

Ced 12, mag. 9.4, 03 26 06.0 +31 40, 10'x2' in size, is also known as **DG 14**, and **Ced 12**.

LBN 749, mag. 9.4, 03 40 04 +32 15 52, 60'x150' in size, also known as **Ced 18a**.

Bas 10, mag. 9.5, 02 19 27.5 +58 18 01, 2' in size, 23 stars, located 1° north of the **Double Cluster**.

Also known as **Lund 40**, **OCI 349.1**, and **CGCG 0215+580**.

Ced 18b, mag. 9.5, 03 44.2 +32 17.

Ced 23, mag. 9.5, 03 53.7 +32 30.

Ru 148, mag. 9.5, 04 46.5 +44 44, 8' in size, 100+ stars. Also known as **Basel 9**, **Lund 140**, **OCI 408**, **CGCG 0442+1446**, and **IRAS 04429+4437**.

IC 2067, mag. 9.6, 04 32 11 +35 29 16, 3'x2' in size. Also known as **Ced 36**.

NGC 1496, mag. 9.6, 04 06 06 +52 42 51, 6'x6' in size, 10 stars. Also known as **Cr 44**, **Lund 122**, **OCI 396**, and **CGCG 0400+524**.

NGC 1579, mag. 9.6, 04 31 34 +35 18 41, 12'x12' in size, is several stars involved in a pretty bright, very large nebula of irregular shape; extended north-south; brighter toward the center; dark lanes.

Stands nearly in the center of a trapezium of stars. Also known as **IRAS 04269+3510**, **Sharpless 222**, **Ced 35**, **H1-217**, **LBN 766**, and **CI[BW88]1** – an infra-red cluster.

Cz 8, mag. 9.7, 02 32 58.4 +58 45 47.7, 7' in size, 18 stars. Also known as **Lund 82**, **OCI 359**, and **CGCG 0229+585**.

Berk 68, mag. 9.8, 04 44.5 +42 04, 12' in size, 100+ stars. Also known as **Lund 137**, **OCI 413**, and **CGCG 0441+419**.

Bas 9, mag. 9.9, 04 46.5 +44 44, 3' in size. Also known as **Ru 148** (see above).

Beyond magnitude 10 items of interest:

NGC 1275, mag. 11.9, 03 21 05.98 +41 34 51.1, 2.6'x1.9' in size, is a faint and small Seyfert galaxy.

Also known as **C 24**, **H2-603**, **PGC 12429**, **MCG +7-07-63**, **CGCG 0540+103**, **3C84** radio source, **IRAS 03164+4119**, **Abell 426**, and **Perseus A**.

3C 83.1B, is a radio galaxy in **NGC 1269**. Its size is 2.04'x1.74'.

Perseus II, is a group of bright O and B type stars. Comprised of **Zeta**, **Omicron**, **Xi**, **40** and **42 Per**, and **Σ 448**. **Zeta Persei** is the brightest of the group. Also known as the **Zeta Persei Group**.

Perseus Molecular Cloud – is a giant molecular cloud, or stellar nursery that is 6'x2' in size. Contains **IC 348** and **NGC 1333**.

Abell 426, is a cluster of galaxies located in **Perseus**. It is home to thousands of galaxies and is one of the most massive objects known in the universe (mass equivalent of trillions of solar masses). Also known as the **Perseus Cluster**.

Below magnitude 10 are the following objects: 77 NGC; 186 UGC; 34 IC; 32 MCG; 6 radio sources; 1 Quasar; 1 HtDe; 1 HtWe; 1 Stock; 1 BV; 3 HaWe; 2 Outters; 1 IsWe; 2 Ju; 1 Al-Teu; 1 SAI; 1 ASCC; 3 Sh; 1 Wein; 1 Magakian; 2 King; 1 Kg; 1 SZw; 3 Pat; 2 Frr; 2 FSR; 1 Simeiz; 1 Ru; 9 LBN; 2 Kro; 2 Teutsch; 4 Berkley; 1 10 Ced; 4 Cr; 17 PNG; 15 PK; 44 CGCG; 2 Kohoutek; 1 PGC; 1 Kr; 1 Arp; 33 Herschel; 2 Abell PN; 11 Barnard Dark Nebulas; 3 Cz; 2 AGC; 2 VV; 7 Mel; 3 Galaxy Trios; 1 Flat Galaxy; 41 LDN; and 2 [LAL96].

Other Stars:

Epsilon Per, mag. 2.90, 03 57 51.22 +40 00 37.0, is a multi-star system. The primary star is a main sequence B type star. The stars orbit each other with a period of 14 days. A third component has not yet been verified. Also known as **HD 24760**, **HIP 18532**, and **45 Persei**.

Theta Per, mag. 4.10, 02 44 11.69 +49 13 43.2, is a system composed of a yellow dwarf star (magnitude 4.12) and a red dwarf star (magnitude 10). Separation is 250 au. Also known as **HD 16895**, **HIP 12777**, and **13 Persei**.

Psi Per, mag. 4.32, 03 36 29.36 +48 11 33.7, is a main sequence blue Be type star, showing prominent hydrogen emission lines in its spectrum. It is a shell star, surrounded by a disk of gas at the equator line, and is also a rapid rotator with an estimated rotational velocity of 390 km per second or more along the equator. Also known as **HD 22192**, **HIP 16826**, and **37 Persei**.

1 Aurigae, mag. 4.89, 04 49 54.67 +37 29 17.5, is an orange giant star and was originally in **Auriga**

(John Flamsteed entered it as such in his catalogue of stars), but was re-assigned to **Perseus** in 1930 when Eugène Joseph Delporte simplified the border between the two constellations. The star is now usually referred to as **HR 1533**. Also known as **HD30504**, and **HIP 22453**.

1 Per, mag. 5.53, 01 51 59.31 +55 08 50.7, is a blue star and an eclipsing binary star. Also known as **V436**, **HD 11241**, and **HIP 8704**.

X Per, mag. 6.79, 03 55 23.08 +31 02 45.1, is a binary system composed of a blue main sequence star and a neutron star, **X Persei B**. It is an X-ray source. Also known as **HD 24534**, and **HIP 18350**.

HD 23596, mag. 7.24, 03 48 00.37 +40 31 50.3, has one planet in orbit. Also known as **HIP 17747**.

HD 16175, mag. 7.28, 02 37 01.91 +42 03 45.5, has one planet in orbit. Also known as **HIP 12191**.

HD 17092, mag. 7.73, 02 46 22.12 +49 39 11.1, has one planet in orbit.

HD 16760, mag. 8.74, 02 42 21 +38 37 07, has one planet in orbit. Also known as **HIP 12638**.

HD 22781, mag. 8.78, 03 40 59 +31 49 35, has one planet in orbit. Also known as **HIP 17187**.

Stars beyond magnitude 10 that are of interest is as follows:

DY Per, mag. 10.6, 02 35 17 +53 11 47, is a carbon star.

GK Per, mag. 12 to 13, 03 31 12 +43 54 15.48, is an orange to red star. Also known as **Nova Persei 1901**. The star was a bright nova that peaked at magnitude 0.2. It faded to magnitude 12 or 13, but has occasional outbursts of 2 or 3 magnitudes, and the last 30 years the outbursts have become pretty regular and last about two months every three years or so. Also known as **V410**.

V718, 03 44 37.99 +32 11 37.02, is a young red star located in the young open star cluster **IC 348**. The star is occulted by an unknown body every 4.7 years, possibly a planet more than six times the mass of **Jupiter**, at a separation of 3.3 au.

GRO J0422+32, is an X-ray binary star composed of a red dwarf star which orbits a mysterious dense and heavy object – possibly a black hole – every 5.1 hours. If the system does indeed contain a black hole, it would be the smallest one ever recorded. Further analysis in 2012 calculated a mass of 2.1 solar masses, making it appear to not be a black hole. There are questions as to what the object really is.

There are three HAT planets that have transiting planets in orbit around them.

Other stars in Perseus are as follows: 98 V; 3 h; 52 Σ; 12 OΣ, 3 OΣΣ, 2 K; 3 S; 1 Ku; 5 A; 1 Ross; 4 β; 4 Es; 2 Hu; 1 Hld; 1 AG; and 2 Arg.

Sky Happenings: December, 2019

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



- Dec. 1st -** Dawn: **Mercury** and **Mars** are on the southeast horizon before sunrise,
Dusk: **Saturn**, **Venus**, and **Jupiter** form a string of pearls some 18° long above the southwest horizon after sunset, with the waxing crescent **Moon** overlooking from the upper left.
- Dec. 2nd -** Asteroid **Pallas** is in conjunction with the Sun at 8 PM CST.
- Dec. 4th -** **First Quarter Moon** occurs at 12:58 AM CST,
The **Moon** passes 4° south of Neptune at 6 AM CST,
The **Moon** is at apogee (251,311 miles or 404,446 km from **Earth**) at 10:08 PM CST.
- Dec. 8th -** The **Moon** passes 5° south of **Uranus** at 5 AM CST.
- Dec. 10th -** Dusk and Evening: **Venus** and **Saturn** are less than 2° apart as they sink below the horizon in the southwest,
Venus passes 1.8° south of **Saturn** at 11 PM CST,
The waxing gibbous **Moon** is in **Taurus**, to the upper right of **Aldebaran**.
- Dec. 11th -** **Full Moon** occurs at 11:12 PM CST.
- Dec. 12th -** Dawn: **Mars** is ¼° or less from **Alpha Librae (Zubenelgenubi)** in the southeast,
The **Moon** is 1.5° south of **M35** at 11 PM CST.
- Dec. 13/14** The **Geminid Meteor Shower** peaks, but the waning gibbous **Moon** will hide all but the brightest meteors.

- Dec. 15th** - **Mercury** passes 5° north of **Antares** at 10 AM CST,
The **Moon** is 1° north of **M44 (Beehive)** at 10 AM CST.
- Dec. 17th** - Morning: The **Moon**, almost at last quarter, is in **Leo**, some 3° to 4° from **Regulus**.
- Dec. 18th** - The **Moon** is at perigee (230,072 miles or 370,265 km from **Earth**) at 2:25 PM CST,
Last Quarter Moon occurs at 10:57 PM CST.
- Dec. 20th** - Morning: The waning gibbous **Moon**, now in **Virgo**, is about 5° from **Porrima** and about twice that distance from **Spica**.
- Dec. 21st** - **Winter Solstice**, the longest night of the year in the **Northern Hemisphere**, occurs at 10:19 PM CST, and is the official start of winter in the **Northern Hemisphere**.
- Dec. 22nd** - The **Moon** passes 4° north of **Mars** at 8 PM CST,
The **Ursid Meteor Shower** peaks.
- Dec. 25th** - **New Moon** occurs at 11:13 PM CST, and an annular solar eclipse occurs (not visible in **North America**).
- Dec. 27th** - The **Moon** passes 1.2° south of **Saturn** at 6 AM CST,
The **Moon** passes 0.6° south of **Pluto** at 9 AM CST,
Jupiter is in conjunction with the **Sun** at 12 noon CST.
- Dec. 28th** - The **Moon** passes 1° south of **Venus** at 8 PM CST.
- Dec. 30th** - The **Moon** passes 4° south of **Neptune** at 3 PM CST.
- Jan. 1st** - Asteroid **Vesta** is stationary at 3 PM CST,
The **Moon** is at apogee (251,394 miles or 404,580 km from **Earth**) at 7:30 PM CST.
- Jan. 2nd** - **First Quarter Moon** occurs at 10:45 PM CST.
- Jan. 4th** - **Quadrantid Meteor Shower** peaks,
The **Moon** passes 5° south of **Uranus** at 12 noon CST.
- Jan. 5th** - **Earth** is at perihelion (91.4 million miles or 147,091,144 km from the **Sun**) at 2 AM CST.

Planets:

Mercury – **Mercury**, at magnitude -0.6, starts December in central **Libra**, some 11° east of **Mars**, and rises about 1½ hours before the **Sun**, but on the 10th by only about 1 hour. On the 15th, the planet stands only 6° high ½ hour before sunrise, with **Antares** 5° to its lower right. On the 17th, the planet will be too low in bright twilight to see. The best views of **Mercury**, through a telescope, will be on December's first few mornings when it will show a 6" diameter disk with a gibbous phase.

Venus – On December 1st, **Venus** shines at magnitude -3.9, at 8° to the upper left of **Jupiter**, with **Saturn** (magnitude +0.6) 11° to the upper left of **Venus**. On the 2nd, **Venus** will be less than 1° south of **M22**, with all three planets evenly spaced. **Venus** will be in the middle with 8° to 9° to each planet. On the 6th, **Venus** and **Saturn** are 5° apart, with the 2nd magnitude star **Nunki (Sigma Sagittarii)** less than 2° from **Venus**. On the 10th and 11th, **Venus** and **Saturn** are less than 2° apart with **Saturn** to the upper right. In telescopes, **Venus** will display a 12" wide disk that is about 87% illuminated, and **Saturn** a 15" wide disk with 35" wide rings. Both planets will set about 2 hours after the **Sun**. **Venus** ends the month setting 2½ hours after the **Sun**. On the 12th, **Venus** is only 1.3° south of the 18th magnitude **Pluto**. On the evening of the 28th, the **Moon** will pass 1° south of **Venus**.

Mars – **Mars** rises around 4:30 AM local time, less than 3 hours before the **Sun** as December opens, at magnitude 1.7 near the western edge of **Libra**. The planet will brighten a bit from magnitude 1.7 to 1.6 this month, but its disk is only about 4" wide. As the month begins, the planet is almost 20° high in the east-southeast at mid-twilight. The planet moves eastward toward the third magnitude star **Zubenelgenubi (Alpha Librae)**. On the morning of the 12th, the planet stands just 13' north of **Alpha Librae**. The waning crescent **Moon** will stand 9° above **Mars** on the 22nd, and 6° to the planet's lower left on the 23rd.

Jupiter – **Jupiter** hangs just 7° above the southwest horizon 30 minutes after sundown on December 1st, shining at magnitude -1.8. The planet will sink lower and lower with each passing day, disappearing into the **Sun**'s glare during the 2nd week of December, on its way to a conjunction with the **Sun** on December 27th.

Saturn – **Saturn**, at magnitude 0.6, will be 11° to the upper left of **Venus** on December 1st. On the 10th and 11th, **Venus** will pass 1.8° to the south of **Saturn**. The planet will display a 15" wide disk and 35" wide rings, setting about 2 hours after the **Sun**. The planet will continue to lose altitude and will become lost in

the **Sun's** glow before Christmas.

Uranus – **Uranus**, at magnitude 5.7, lies in the southeast after darkness falls and climbs 60° above the southern horizon by around 9:30 local time in early December. The planet will reach the same position two hours earlier by month's end. The planet lies in a sparse region of southern **Aries**, near the border with **Pisces**. To find the planet, start at the magnitude 2.0 star **Hamal** (Alpha Arietis), then locate the 3.8 magnitude star **Alrescha** (Alpha Piscium) 21° due south of **Hamal**. **Uranus** will be about 1° from the midpoint of these two stars in the direction of **Alpha Piscium**. The planet will span 3.7" this month with a disk a delightful blue-green color.

Neptune – **Neptune**, at magnitude 7.9, lies among the background stars of **Aquarius**, riding 45° above the southern horizon as twilight fades to darkness, and does not set until near midnight local time. The planet is in the same binocular field as the 4th magnitude star **Phi Aquarii**. On December 1st, the planet is 1.5° west-southwest of **Phi Aquarii**. By the 31st, the planet is within 1.1° of **Phi Aquarii**, appearing 2.3" across and having a blue-gray color.

Pluto – **Pluto**, on December 15th, will be at coordinates 19 33.7 -22 20 (in **Sagittarius**), glowing at magnitude 14.4, and having an angular size of 0.1".

Sun – The **Sun** will reach the **Winter Solstice** at 10:19 PM CST on December 21st. This is the shortest day and longest night of the year, and marks the official beginning of winter in the **Northern Hemisphere**.

Moon – The **Moon** is full on December 12th, largely washing out all but the brightest meteors at the peak of the **Geminid Meteor Shower** on the next few nights. On the 22nd, the waning lunar crescent is some 8° to 9° above **Mars**, and the next morning 5° to 6° to the lower left of the planet. On the 24th, 'low in the southeast about 45 minutes before sunrise, a very thin **Moon** is several degrees to the left or upper left of **Antares**. On the 27th, the very thin waxing crescent **Moon** is about 5° to the upper left of **Saturn**. On the 28th, the lunar crescent is a little more than 2° below **Venus**.

Greatest northern declination – on the 14th (+23.2°)

Greatest southern declination – on the 27th (-23.2°)

Libration in longitude east limb most exposed on the 26th (+5.0°)

west limb most exposed on the 12th (-4.7°)

Libration in latitude north limb most exposed on the 7th (+6.8°)

south limb most exposed on the 20th (-6.8°)

Favorable Librations: **De Sitter Crater** on December 5th; **Von Braun Crater** on the 12th;

Lacus Autumni on the 14th; and **Gauss B Crater** on the 30th.



Asteroids – Asteroid **15 Eunomia** is in the starry backdrop of **Aquarius** during December. **Eunomia** spends the month within a binocular field of **Alpha Aquarii**, a magnitude 2.9 star that lies about 20° southwest of the southwest corner of the **Great Square of Pegasus**. The asteroid glows at 10th magnitude. **Eunomia** will slide 0.8° south of **Alpha Aquarii** on the 17th. During the final week of 2019, the asteroid passes through the **Water Jug** asterism, a group of 4th and 5th magnitude stars comprised of **Gamma**, **Pi**, **Zeta**, and **Eta Aquarii**.

Eunomia's position, *by my estimates*, is as follows: On December 1st – just over 7° southwest of **Omicron Aquarii**; on the 6th – just over 3½° due west and a little south of **Omicron Aquarii**; on the 11th – just under 2° due west and a little north of **Omicron Aquarii**; on the 16th – about 1° south-southwest of **Alpha Aquarii**; on the 21st – about 1¾° due east and a little south of **Alpha Aquarii** or just a little less than 2° northwest of **Gamma Aquarii**; on the 26th – about 1½° and a little west of due north of **Gamma Aquarii**; and on the 31st - 1° due north of **Zeta Aquarii**.

Asteroid **9 Metis** will be in **Pisces** at 01 39.11 +06 16.1 on December 3rd at a magnitude of 9.5; on

December 13th at 01 38.49 +06 57.2 at a magnitude of 9.7.

Asteroid **4 Vesta** will be in **Cetus** at 02 58.26 +08 01.7 on December 3rd at a magnitude of 6.8; on

December 13th at 02 51.36 +08 11.1 at magnitude 7.0; and on December 23rd at 02 47.12 +08 34.8 at a magnitude of 7.2

Comets – Comet **PANSTARRS (C/2017 T2)** is expected to be at 9th or 10th magnitude in December. The comet will spend most of the month among the background stars of **Perseus**. On December 14th or 15th, the

comet will share a low power field of view with **NGC 1528**. On the 21st and 22nd, the comet will drift across the face of **Sharpless 2-205**, a sprawling emission nebula. The comet's position per *ALPO* is as follows: On December 10th – 04 33.7 +49 35 at magnitude 9.8; on the 20th – 04 03.7 +52 39 at magnitude 9.5; and on the 30th – 03 31.7 +54 52 at magnitude 9.4. The comet's position, by my estimates, is as follows: On December 1st – just over 6° east and a little south of **Mu Persei** (just over the border in **Auriga**); on the 6th – about 4½° due east of **Mu Persei**; on the 11th – just over 3° east of **Lambda Persei**; on the 16th – not quite 2° northeast of **Lambda Persei**; on the 21st – about 4½° north-northwest of **Lambda Persei** at **Sharpless 2-205**; on the 26th – about 5° northeast of **Alpha Persei**; and on the 31st – just over 5° due north and a little east of **Alpha Persei**.

Comet **C/2018 W2 (Africana)**, per *ALPO*, will be in **Grus** at 21 42.6 -44 58 at magnitude 13.2 on December 10th; on the 20th – at 21 50.2 -45 36 at magnitude 13.8; and on the 30th – at 21 59.4 -46 07 at magnitude 14.3.

Meteor Showers – The **Geminid** meteor shower peaks on December 14th, less than 2 days after a full moon. Since the radiant of the shower (near **Castor** in **Gemini**) rises just ahead of the **Moon**, one should consider going out in the early evening when you might be lucky enough to catch a few **earthgrazers** – slow, bright meteors that angle upward from the eastern horizon – before or as the **Moon** makes its appearance. The parent object of the **Geminids** is the semi-dead “rock comet”

3200 Phaethon, which acts as both a comet and an asteroid. It releases enough material (the rocky surface cracks in response to the intense solar heating) as it comes close to the **Sun** to produce a modest dust trail.

The **Ursid** meteors (radiant is in **Ursa Minor**) peak on the night of December 22nd/23rd when the **Moon** has waned to a thin crescent and no longer interferes. The shower typically produces only about 10 meteors per hour, but experts are predicting a surge of up to 30 meteors per hour could happen this year.

When to View the Planets:

Evening Sky

Venus (southwest)
Jupiter (southwest)
Saturn (southwest)
Uranus (southeast)
Neptune (south)

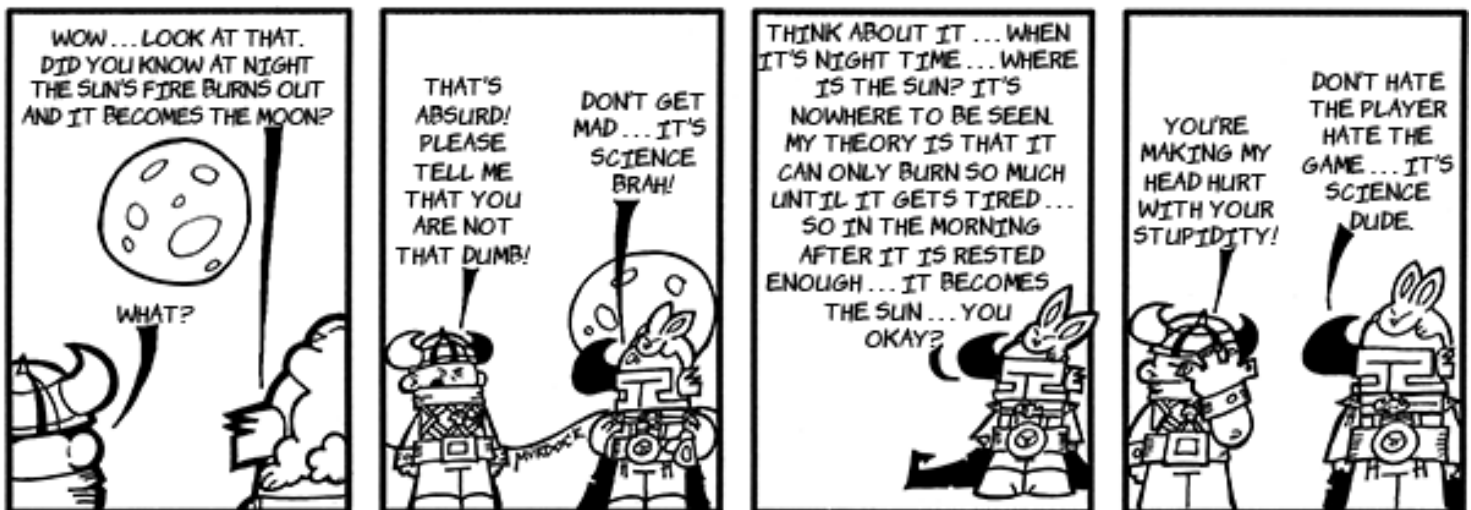
Midnight

Uranus (west)

Morning Sky

Mercury (southeast)
Mars (southeast)

DARK SKY VIEWING - PRIMARY ON DECEMBER 28TH, SECONDARY ON DECEMBER 21ST^H



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mythology

Perseus – Rescuer of Andromeda, or the Hero

Perseus is one of the most famous Greek heroes. The characters in the story of Perseus are represented by six constellations that occupy a substantial portion of the sky.



In Greek myth, Perseus was the son of Danae, daughter of King Acrisius of Argos. Acrisius had locked Danae away in a heavily guarded dungeon when an oracle foretold that he would be killed by his grandson. But Zeus visited Danae in the form of a golden rain that fell through the skylight of the dungeon into her lap and impregnated her. When Acrisius found out, he locked Danae and the infant Perseus into a wooden chest and cast them out to sea.

Inside the bobbing chest Danae clutched her child and prayed to Zeus for deliverance from the sea. A few days later, the chest washed ashore on the island of Seriphos, its cargo still alive but starved and thirsty. A fisherman, Dictys, broke the chest open and found the mother and child. Dictys brought up Perseus as his own son.

The brother of Dictys was King Polydectes, who coveted Danae as a wife. But Danae was reluctant and Perseus, now grown to manhood, defended her from the king's advances. Instead, King Polydectes hatched a plan to get rid of Perseus. The king pretended that he had turned his attentions instead to Hippodameia, daughter of King Oenomas of Elis. King Polydectes asked his subjects, including Perseus, to provide horses for a wedding present. Perseus had no horse to give, nor money to buy one, so Polydectes sent him to bring the head of Medusa the Gorgon.

The Gorgons were three hideously ugly sisters called Euryale, Stheno, and Medusa. They were the daughters of Phorcys, a god of

the sea, and his sister Ceto. The Gorgons had faces covered with dragon scales, tusks like boars, hands of brass and wings of gold. Their evil gaze turned to stone anyone who set eyes on them. Euryale and Stheno were immortal, but Medusa was mortal. She was distinguished from the others because she had snakes for hair. In her youth Medusa had been famed for her beauty, particularly that of her hair, but she was condemned to a life of ugliness by Athene in whose temple she had been ravished by Poseidon.

A Gorgon's head would be a powerful weapon for a tyrannical king to enforce his rule, but King Polydectes probably thought that Perseus would die in his attempt to obtain it. However, the king had reckoned without Perseus's family connections among the gods. Athene gave him a bronze shield which he carried on his left arm, while in his right hand he wielded a sword of diamond made by Hephaestus. Hermes gave him winged sandals, and on his head he wore a helmet of darkness from Hades that made him invisible.

Under the guidance of Athene, Perseus flew to the slopes of Mount Atlas where the sisters of the Gorgons, called the Graeae, acted as lookouts. The Graeae were poorly qualified for the task, since they had only one eye between the three of them, which they passed to each other in turn. Perseus snatched the eye from them and threw it into Lake Tritonis.

He then followed a trail of statues of men and animals, all of whom who had been turned to stone by the gaze of the Gorgons. Unseen in his helmet of invisibility, Perseus crept up on the Gorgons and waited until night when Medusa and her snakes were asleep. Looking only at her reflection in his brightly polished shield, Perseus swung his sword and decapitated Medusa with one blow. As Medusa's head rolled to the ground, Perseus was startled to see the winged horse Pegasus and the armed warrior Chrysaor spring fully grown from her body, the

legacy of her youthful affair with Poseidon. Perseus rapidly collected up Medusa's head, put it in a pouch and flew away before the other Gorgons awoke.

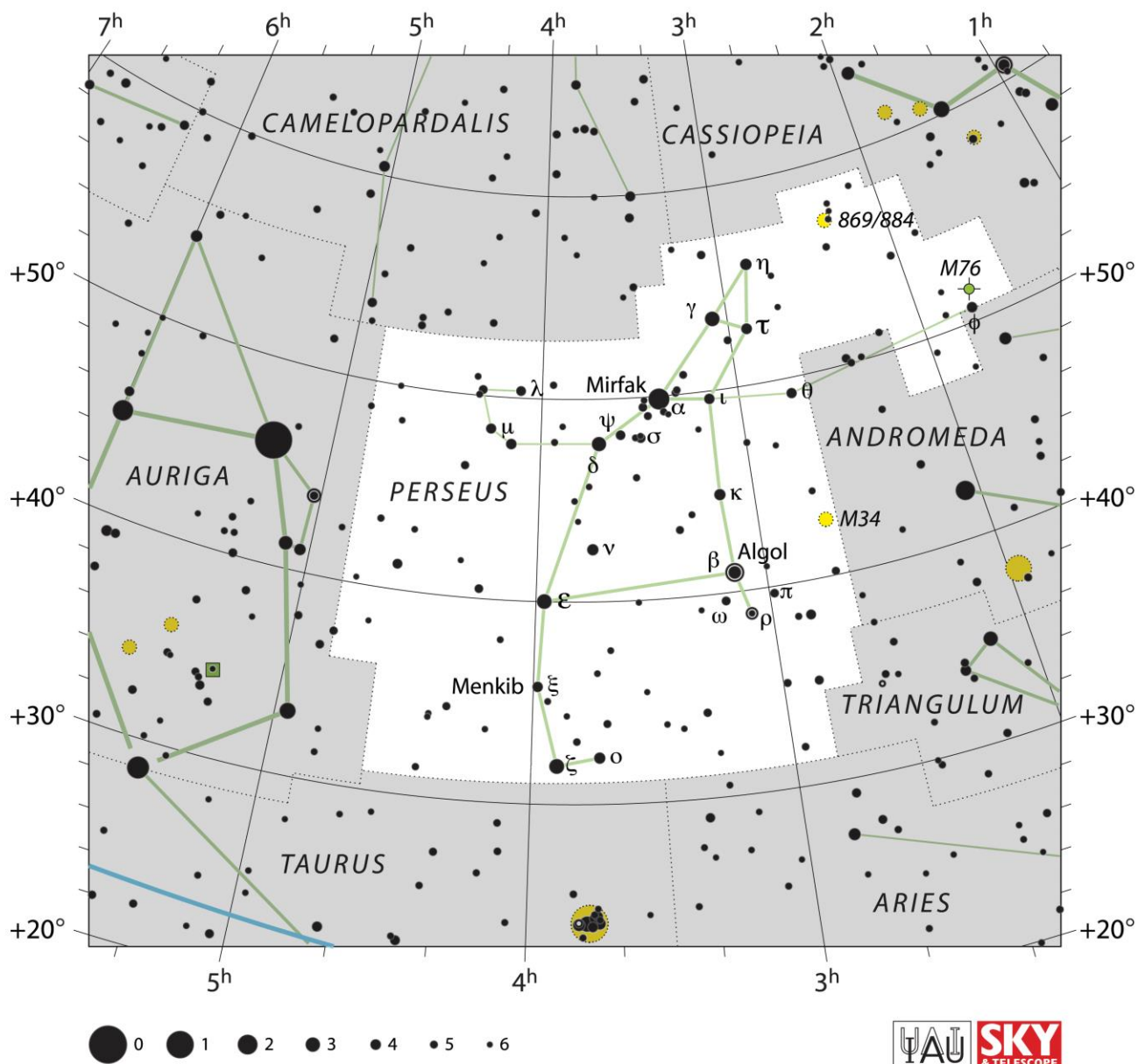
Drops of blood fell from the head and turned into serpents as they struck the sands of Libya below. Strong winds blew Perseus across the sky like a raincloud, so he stopped to rest in the kingdom of Atlas. When Atlas refused him hospitality, Perseus took out the Gorgon's head and turned him into the range of mountains that now bear his name.

The following morning Perseus resumed his flight, coming to the land of king Cepheus, whose daughter Andromeda was being sacrificed to a sea monster. Perseus's rescue of the girl is one of the most famous themes of mythology (see the story in the Observing Notes for Andromeda of November 2016 and Cetus of November 2019). Perseus returned with Andromeda to the island of Seriphos, where he found his mother and Dictys sheltering in a temple from the tyranny of King Polydectes. Perseus stormed into the king's palace to a hostile reception. Reaching into his pouch, Perseus brought out the head of Medusa, turning Polydectes and his followers to stone. Perseus appointed Dictys king of Seriphos. Athene took the head of Medusa and set it in the middle of her shield.

The prophesy that was the start all these adventures eventually came to pass. During an athletic contest a discus thrown by Perseus accidentally hit Acrisius, one of the spectators, and killed him. Perseus and Andromeda had many children, including Perses, whom they gave to Cepheus to bring up. From Perses, the kings of Persia were said to be descended.

In the sky, Perseus lies next to his beloved Andromeda. Nearby are her parents Cepheus and Cassiopeia, as well as the monster Cetus, to which she was sacrificed. Pegasus the winged horse completes the tableau. Perseus himself is shown holding the Gorgon's head.





The End

