



**Monthly Meeting July 11<sup>th</sup> at 7:00 PM, in person**

*You may also join this meeting via [meet.jit.si/BRASMeet](https://meet.jit.si/BRASMeet)*

*(Monthly meetings are held on 2<sup>nd</sup> Mondays of the month, at Highland Road Park Observatory)*

**PRESENTATION: TBA.**

## ***What's In This Issue?***



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Outreach Report  
Light Pollution Committee  
Globe At Night**



**ALCON 2023**

**HRPO EVENTS**

**OBSERVING NOTES – Scorpius – The Scorpion**

***Like this newsletter? See PAST ISSUES online back to 2009***

***Baton Rouge Astronomical Society Facebook Page***

***BRAS YouTube Channel – Monthly Speakers via Jitsi***

## President's Message

- Hot weather, rain, furiously growing weeds/grass, and hurricane season are upon us. To top that off, Michele and I both came down with Covid the last week of June. So far it's no worse than a 2 week flu, no fever, just congested and tired. We avoided it for 2 and a half years, so not too bad. We'll grill burgers and dogs on the 4th, but lately it's been kinda cool to fix myself some Lipton's chicken noodle soup out of a dry packet when she's too tired to cook. Yummy!
- The contract between AL and BRAS for the 2023 ALCon has been signed. BRAS is now officially the Host of the 2023 ALCon! We still need volunteers for the committees, and 20% of our membership needs to commit to attending. If you want to help us pull this off successfully, contact Steven Tilley at [steveareno225@gmail.com](mailto:steveareno225@gmail.com).
- The new BRAS **Volunteer badges** are in. See Ben if you ordered one.
- BRAS has started the membership meeting raffles again. **Raffle tickets** are \$1 each, and if you win one somehow, like maybe emailing Michele you found another Tom Swifty hiding in a newsletter, you must be present to win! Nobody claimed the one from last month.
- The next **MOON** night is scheduled for August 19<sup>th</sup>, starting at 9 PM until ?
- Scott C. and Ben T. are working on the BRAS **New Member Kit**. If you have any ideas for it, let them know.
- **ALL MEETINGS ARE NOW IN PERSON AT HRPO!**
- As a reminder, the LPC Meeting is now at 6 PM on the second Monday of the month, 1 hour before the membership meeting. PLEASE hold conversations outside the building until the meeting ends! Thank You!



*Happy 4th of July. BRAS members. We hope everyone has some great barbeque and takes the time to relax, and celebrate going maskless among friends and family.*

Looking forward to the end of Covid, mask wearing and meeting via Jitsi, and life getting back to normal.

Clear Skies, and Happy 4<sup>th</sup>

*John R. Nagle*

John Nagle, 2022 President

### Upcoming BRAS Meetings:

**Light Pollution Committee: NEW TIME thru December: 6 pm Monday, July 11** before the monthly meeting. (In person only, Open to the public), followed by . . .

**Monthly Member Meeting – 7 pm Monday, July 11** at the Observatory, in person and via Jitsi

**Monthly Business Meeting: 7 pm Wednesday, July 25** (Members Only), in person and via Jitsi

**MOON (Members Only Observing Night)** (Quarterly) August 19<sup>th</sup>, starting at 9 PM

**ALCon 2023 (“Astronomical Gumbo”) Committee Meeting** Sunday, July 17, 2022, 7 PM online.



## Monthly Meeting Minutes – June 13<sup>th</sup>, 2022, 7 p.m.

- John introduced himself as the speaker for the evening. Relating his topic to the upcoming Asteroid Day, the title was **The Tunguska Event**. This was a discussion about what we know related to the explosion near the Stony Tunguska River at 7:17 am, June 30, 1908. Reference was made to similar events that have happened since then world wide.
- Ben has passed out the new volunteer badges to those that ordered them; please contact Ben if you ordered one and haven't received it yet (\$5 due cash on delivery). If you didn't order one, are going to be volunteering, and would like to purchase one, please see Ben; he should be working on a second print run soon.
- Our club gets 1 vote for all **Astronomical League Officers**. Since there is only 1 person running for each position, we agreed to send our vote in in favor of Carroll Iorg for president, Charles E. Allen III for vice president, and Maynard Pittendreigh for executive secretary.
- We are still gathering club member's signatures on Forrest Smith's sympathy card.
- John has a handout for position angle for the **AL Double Star Award** for 1.25" eyepieces; this is helpful for cardinal points.
- Craig is donating a sound bar for a raffle prize. This will not be raffled tonight but sometime in the near future.
- John brought microfiber cloths left over from the IPS convention as well as pins and pens he picked up from the Texas Star Party for anyone that wants them.
- There was a reminder that new members can pick up a club pin from Steven.
- Joel brought in a **Keurig** coffee maker to use at the meetings. 50 cents is now the suggested donation for a cup of coffee.
- Steven is still working on getting the contract signed for ALCON 2023. There will be a 5 minute presentation from our club at the end of ALCON 2022. We are still looking for people to work committees. Steven is looking for help in getting LA seasoning items for goodie bags out to Albuquerque.
- We are celebrating **Asteroid Day** at HRPO on July 2<sup>nd</sup>. We will be using the meteor drop demo as well as the meteorite/meteorwrong demo for this event.
- There is a separate contract with the Astronomical League that stipulates that 20% of the host club needs to register for their own ALCON event.
- Ben showed up online to discuss **Outreach**. There are two National Guard events at the end of June. The first one is on **June 24<sup>th</sup>**, two sessions starting at 10:00 am for 14-17 year olds, 18 kids in each session. The next one starts at 9:00 am on **June 30<sup>th</sup>** for the younger age group. If the weather is favorable, we can spend the night there with this group and do observing. Ben

### 2022 Officers:

**President:** John Nagle  
president@brastro.org

**VP:** Joel Tews  
vice-president@brastro.org

**Secretary:** Roz Readinger  
secretary@brastro.org

**Treasurer:** Trey Anding  
treasurer@brastro.org

### BRAS Liaison for BREC:

Chris Kersey

**BRAS Liaison for LSU:**  
Greg Guzik

### Committees/Coordinators:

al\_awards@brastro.org

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lightpollution@brastro.org

??????

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Michele Fry

observing@brastro.org

John Nagle

outreach@brastro.org

Ben Toman

public\_relations@brastro.org

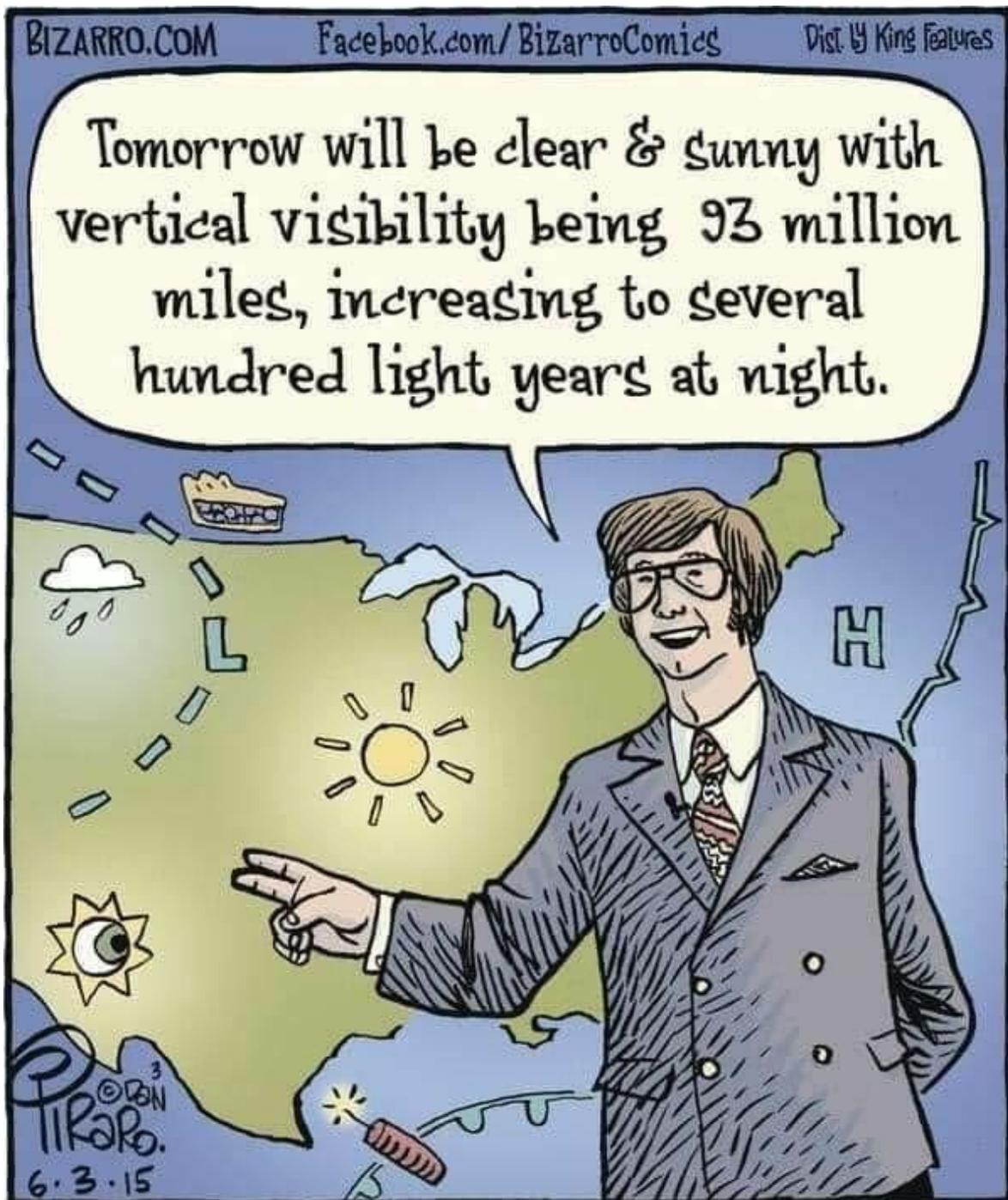
Scott Cadwallader

webmaster@brastro.org

Frederick Barnett

is looking for volunteers to help with both events. Also there are 1 hour **library outreaches** during the summer. Annette and Chris Raby are doing an outreach this coming Thursday at ULL in Lafayette.

- Thomas reminded John that the **LPC meeting is moving to the 2<sup>nd</sup> Mondays** at 6:00 pm, starting with the July meeting and running at least through December on a trial basis. People who are there early for the regular member's meeting are requested to keep idle noise level down for those who are attending the LPC meeting.
- Since no one contacted Michele with the location of the Tom Swifty in the newsletter this month, there was no extra ticket handed out for the raffle. Ruffled off were the two pictures by Chris Carlton and 3 books.
- Chocolate chip cookies were available to those onsite after the meeting.





## Business Meeting Minutes – June 29th, 2022, 7 p.m.

(meeting is the last Wednesday of the month, in person, at HRPO)

1. **BRAS Computer** – camera and/or cables. Ben has some time available now and will look into researching microphones, etc.
2. **Outreach** – Ben has been giving out new badges. Magnetic car signs? National Guard Camps? Chris K. has not heard back on the magnetic car signs; John will follow up on this. Ben wanted to check and make sure it was okay to create two generic “Volunteer” badges for new members to wear to events they’re volunteering at. This was okayed. He will double-check with Troy and Coy tomorrow about their new badges. It was suggested in the future to do an annual run for new badges in March or April after the membership has stabilized for the new members who want to volunteer.
3. **Library Telescopes** – have not yet contacted them. We have not yet contacted the libraries in the neighboring parishes of Livingston, Ascension, and Pointe Coupee to check and see if they would appreciate and support the donation of a telescope. John will follow up on this.
4. **BRAS Raffles.** There was a discussion about the sound bar that Craig donated; because of its value, this may be set aside as a consolation prize in a future raffle. Suggestions were made to limit the number of prizes offered as well as to assign a value to each of the items with the more expensive ones used for the Christmas raffle.
5. **MOON Night?** It was suggested to push this back into late August or September although it was noted that that is usually the peak of hurricane season then. Chris K. checked the HRPO calendar; we can use Friday, August 19<sup>th</sup>. Someone asked about the astrophotography group. As it is currently inactive, John will check to see if there is any interest in reviving it; this is also on Facebook.
6. **New Member Kit.** Scott C. has something written up on this; he will finish what he’s working on and will send this off (includes outline) to John within the next day or so.
7. **ALCON.** After checking with Marvin, John has signed the contract between the Astronomical League and BRAS. Steven has been checking with Carroll Iorg on the other contract with the Astronomical League and the venue. John is looking to get clear on this which will hopefully be signed within the next day or two.
8. **By-Law amendment** passed. This was handled in a prior membership meeting.
9. **Asteroid Day.** This will consist of a lecture given by Amy Northrup, demos, and attempts to view known asteroids. Demos will include the “flour/cocoa powder” drop, distance from the moon to the earth, and “Meteorites/Meteor-Wrongs”; these will be handled by BRAS members. This event will run until 11:00 pm. For next year Chris K. would like an outline ahead of time from BRAS; Scott C. suggested that it be submitted at least a month before the event.
10. **Final Questions.** Thomas suggested having by-laws copies available to new members. John already has this covered as one of the items in the New Members Kit. Thomas also had concerns about the audio in the online meetings; hopefully new microphones the club obtains will help with this.

Members attending were: John N., Ben T., Chris K., Scott C., Steven T., Thomas H., Trey A., and Roz R.

Submitted by Roz Readinger, Secretary



## Outreach Report

Hi Everyone,

Even though school is out and we're in the midst of a HOT Summer, we've still been able to get out and do some great educational outreach in the community. Chris K. has been busy presenting talks on astronomy at various libraries (there are still a few dates left that you can pass along to your friends and family that have young kids looking for something to do!) and we were able to get volunteers up to the Feliciana Retreat Center for the **LA National Guard's Camp Pelican Pride Youth Camps**.

A very big thank you to all those that helped out this past month which includes the **Summer Reading Kickoff** event at the Main Library back on June 1st. You know who you are, but for the rest of the club, let's have three cheers for Roz, Chris and Annette, John, Scott, Craig, Chris K., Troy and Ben. Even though we only had a couple of events, there were a LOT of hours put in! We couldn't do it without our volunteer support.

With that in mind, I'll once again say that volunteering for Outreach is a great way to learn more about astronomy in a fun way. I was

talking with Troy after our last outreach and remembering when I first started going along to Outreach events. No disrespect intended toward our monthly meetings, but I believe I've learned more about astronomy from volunteering for Outreach events than I have going to our meetings. I still learn 2 or 3 more astronomical facts each time I do an Outreach. Sometimes it's something I looked up before heading out to volunteer just to have some pertinent information on the Moon, planet, or deep space object. Other times I learn new tidbits listening to our other volunteers as they pass along astro knowledge to the community. My point is, you become much more knowledgeable in a relatively short time helping out with these Outreach events. You may feel like you don't know enough to be of much help, but I assure you that you probably already know more than the average person in our community (just based on the fact that you are so interested in astronomy that you've joined our club!), and you'll have a fun time learning more as you go along.

We have a couple more opportunities coming up this month. Please take a look at the list and let me know if you'd like to help out.



*Here's Troy on camera duty for a bit at Camp Pelican Pride! He made it up for both camp sessions and was a big help!!*



*Roz and John watching Scott apparently threaten to shoot his scope at Pelican Pride. I guess that'll teach it to be out of collimation!*

Clear Skies, Ben Toman



## Upcoming Outreach Events:

**Saturday, July 16th**  
5pm-9pm  
Independence Park Theater  
BREC 75th (ish) Birthday Party  
At least 3 or 4 people needed  
Demos, Light Pollution Education, Club/HRPO  
Info

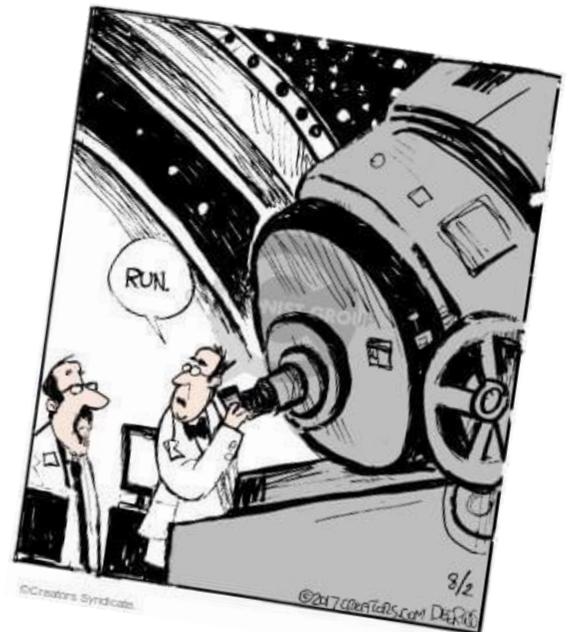
**Tuesday, July 19th**  
2pm-3pm  
Forest Community Park  
2-3 people needed to do some demos and talk  
about astronomy with about 40 kids ages 6-12



*Chris and Annette talking about meteorites, rocks and minerals with the Camp Pelican Pride campers*



*Scott educating the kids about the Solar System at the Youth Leadership session of Camp Pelican Pride*



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## LPC (Light Pollution Committee) Report

(NEW SCHEDULE thru December

: Meetings will be at 6 p.m. before the Monthly Meeting, which is held the 2<sup>nd</sup> Monday of each month. The public is welcome to join in.

There was an abbreviated meeting with only 3 present. The move of the meeting to the second Monday of the month, at 6 PM, before the Membership Meeting, was discussed. We ask that all conversations (before the meeting) be held outside the building, so as not to disrupt the meeting, until the meeting is over. Remember, everyone is welcome at the meeting.

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### Globe At Night

The target for the Globe at Night program is **Hercules from July 19<sup>th</sup> through July 28th**

If you would like to participate in this citizen science program, you can find instructions at <https://www.globeatnight.org>

P.S. The “Loss of the Night” app can be used for information and for reporting your observations.

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### BRAS subreddit and a Discord server.

**Our subreddit** has been set up for us to reach out to the public. Please join us on there. <https://www.reddit.com/r/BRAStro/>

**Our Discord server** is for Members only, and requires the download of a free app. It's a fun place for us to hang out. To join the discord, email **safey2007@gmail.com** with the subject **BRAS Discord**.

To add a Flair next to your username, PM Amy Northrop.

.For Discord help, access **techsupport-faq**,

or message Amy orJustin: <https://discord.gg/6N8r8DDj>

It also has voice channels so that you can speak to people through Discord.

The best part about both of these is that you can access them on your phone with the free apps. Hope to see you there. ~ Amy Northrop

## 2023 Astronomical League Convention in Baton Rouge!

BRAS has the honor of being the first to host an AL-CON in Louisiana since AL's inception in 1939.

### Our theme will be “Astronomical Gumbo”

This theme represents the blend of diverse subfields within the vast field of astronomy. People from all over the globe will be in attendance for the biggest yearly gathering of amateur astronomers in the nation. This convention will offer a large range of benefits not only to BRAS, but to HRPO, other nearby astronomy facilities, and the tourism industry of Baton Rouge. For example, the publicity will bring in many new club members and allow us to reach a much larger audience to share our love of astronomy with. There's not a better time than now to get involved, and lots of help will be necessary to make this event one to remember. Volunteers from all areas of any skill level are welcome to join any of the subcommittees: Scheduling, Finance, Publicity/Communications/Photography, Venue & Housing, Transportation, and Reports.

Next Full committee meeting: **Sunday, July 17, 2022, 7 PM Online**

If you would like to attend this meeting, and/or help by working on a subcommittee please send an email to Steven Tilley at [steveareno225@gmail.com](mailto:steveareno225@gmail.com).



**ALCON 2022**  
July 28 – 30  
**EMBASSY SUITES HOTEL**  
1000 Woodward Pl. NE  
Albuquerque, New Mexico 87102  
<https://alcon2022.astroleague.org/>  
(Website available by January 14, 2022)



Hosted by:  
**The Albuquerque Astronomical Society**  
[www.TAAS.org](http://www.TAAS.org)

## REGISTRATION FOR THE 2022 CONVENTION IN ALBUQUERQUE BEGAN ON MARCH 15, 2022

- \* Registration fees increase on May 25
- \* Cutoff date for mail-in registration is June 27
- \* Cutoff date for online registration is July 6

## RESERVE YOUR SPACE TODAY.

[ALCON 2022 Registration | Astronomical League Convention](#)

[Mail-In Registration Form 2022-02-23](#)  
([alcon2022.org](http://alcon2022.org))

## ASTROPHOTOS BY BRAS MEMBERS

### Coy Wagoner – “Sun Spots, Filaments and Solar Flares”



Inset: My setup at Ham Radio Field Day at HRPO

#### **CW\_220625\_Sun\_H-Alpha.jpg**

Solar imaging in hydrogen alpha. June 25, 2022. Sunspots, filaments, and solar flares. Taken with a 50mm Lunt hydrogen alpha scope and the ASI224mc camera via ASI Studio. Processed in Pipp, Autostakkert, ImPPG, and Photoshop CS5.

## Scott Louque, Trifid Nebula



### SL\_22-06-24\_Trifid Nebula

, On Friday June 24 I took this image of the Trifid Nebula. As some of you may know, I built a skybox right outside my house to image from and be shielded from car headlights and neighborhood lights. On Fridays I only work half a day so if the weather forecast is calling for clear skies that evening and no rain is near, I usually start setting up my equipment sometime after lunch, so when darkness arrives I can get right to polar aligning my scope and my initial 2 + 4 star alignment so my mount knows where it is. I use SGPro to control my imaging session.

For this object I setup a sequence to capture 36 – 5 min frames. I have a set of 5 min dark frames which I have been using now for a couple months and I do my flat frames the next morning, so I don't have to stay up all night. Also, I have TeamViewer installed on my laptop and desktop, so once I got my mount aligned and did a recalibration of phd2 and got my sequence up and running, I went inside and monitored the progress from my desktop to make sure everything looked good. After frame 15, I decided it was looking good, so I went to bed for the night. The next morning when I went to see if my sequence completed, I saw that it stopped on frame 16 so I was left with the decision to just stop with 16 frames or try again another night and see if I could finish the sequence. I ended up integrating and calibrating the 16 frames along with the darks, flats and superbias frames I had and then processed it in PixInsight and came up with this. Seeing how the image came out after just 16 frames, I decided it looked good enough!

**Equipment used: Orion 8" Astrograph; Celestron AVX mount PHD2 guiding software; SGPro software  
Processing software: PixInsight**



# Messages from HRPO

Highland Road Park Observatory



## **SCIENCE ACADEMY**

*Saturdays from 10am to 12pm*

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

2 July = “Exoplanets!” They have different Suns than ours. How do we find them? Will one of the Cadets grow up to find life on any exoplanet?

9 July = “Soaring on the Space Shuttle IV” Cadets have heard the tales of the launch system that brought satellites and experiments into orbit. This is the third in a long series of sessions bringing that glorious time alive, with never-before-seen activities!



## **ASTEROID DAY**

*Saturday 2 July from 8pm to 11pm.*

*No admission fee. For all ages.*

Spearheaded by BRAS, this very first celebration at HRPO of this worldwide event will provide for patrons information on the origins of asteroids, viewing them and their danger to Earth. Hands-on demonstrations and activities will focus on the “minor planets”.



## **EDGE OF NIGHT**

*Friday 8 July from 8pm to 10pm.*

*No admission fee. For all ages.*

It’s not light, it’s not dark. It’s that special time called twilight, and HRPO wants to introduce you to it! Are all sections of the sky the same shade of blue? Which stars are seen first? Are Mercury and Venus or the Moon out? Is that moving object a plane, a satellite or space debris? How much actual darkness should I expect in a light-polluted city when twilight has passed? There is no other time like twilight. Bring it into your life!



## **SOLAR VIEWING**

*Saturday 9 July from 12pm to 2pm.*

*No admission fee. For all ages.*

Weather permitting, viewing of the Sun's image in three different manners—transferred onto a white surface, directly with safely-filtered optical light, and directly in safely-filtered hydrogen-alpha wavelength—will take place for two hours. Protective clothing and sunscreen are recommended.



## **EVENING SKY VIEWING**

*No admission fee. For all ages.*

*Friday (9, 23 and 30 July) from 8:30pm to 10pm*

*Saturdays (15, 22 and 29 July) from 7:30pm to 10pm*

HRPO houses a 50-cm reflector, a 40-cm reflector and several smaller telescopes to bring the majesty of the night sky to the public. Trained operators, sharing duties via a rotating roster, work throughout the year in shifts. Each operator has a pre-planned list of objects to highlight. However, requests will be taken if there is time and if all present have viewed the previous target.



## **SUPERMOON RISING!**

*Wednesday 13 July from 10pm to 11:30pm.*

*No admission fee. For all ages.*

Our first experiment with viewing the rising of a Supermoon was a success! HRPO now plans to be open for the closest Supermoon in every calendar year that has one. The thrill comes from a combination of that actual closeness combining with the illusion that makes a Full Moon look closer still when it is near the horizon. Be part of the crowd to experience a Supermoon Rising at HRPO!



## **FRIDAY NIGHT LECTURE SERIES**

*All start at 7:30pm. All are for ages fourteen and older.*

15 July: "Wonders of the Summer Sky" The temperature heats up as July's constellations settle high overhead early in the night. BREC Education Program Specialist Amy Northrop takes the audience on a fascinating tour of Baton Rouge's summer season. She highlights the celestial gems that will sparkle throughout the next three months—gems that visitors will be able to see live if they continue to visit HRPO!

22 July: "The Heart of Pluto" Since 1930 this [tiny icy outpost](#) has been a proving ground

for national accomplishment, frustrating reclassifications and free inquiry. During this season in which it enters the night, ask yourself what Pluto means to you.

29 July: “The Psyche Mission” This journey to a [unique metal asteroid](#) will expand our knowledge of the core of the Earth. Metal objects such as 16 Psyche are remains of the violent collision-laden beginnings of the Solar System!



## **PLUS NIGHT: “Demonstration Overload”**

*Saturday 16 July from 9pm to 12am.*

*For all ages. No admission fee. Binocular recommended.*

During Plus Nights and extra features are available to the public...

\*The well-known marshmallow roast takes place at the campfire ring (weather-dependent).

\*Six to eight of HRPO’s collection of over fifty physical science demonstrations will be on hand to perplex and amaze. Which demos will it be?

\*An unaided eye sky tour takes place, showing the public major features of the sky for that month.

\*Filters are inserted into the viewing mechanisms, to show patrons “hidden” details of the Moon, Mars and Jupiter (when they are available).

\*Reveal your age, and be shown any “birth stars” in the sky at that time.



## **STEM EXPANSION: “American Space Exploration”**

*Saturday 23 July from 3:30pm to 7:30pm*

*For ages twelve to sixteen. / \$15 each per in-parish registrant; \$18 each per out-of-parish registrant. Advanced registration via [WebTrac](#) required [activity #531993].*

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. There are also giveaways and door prizes.

16 July = “Summer Day” A day off for Ms. Amy means a variety of catch-all demos and experiments not available for Cadets in the regular rotation. With a fresh influx of brand-new experiments and games, what will occur this morning?

30 July = “Names and Catalogs” Can one name a star? Are there enough names in our cultures to label all stars? How do catalogs act as address books for some of the most lovely objects in the sky for Cadets to find?





# OBSERVING NOTES JULY

## Scorpius – The Scorpion

Position: RA 16.8, Dec. -30.7°

*Note: For six years I wrote these Observing Notes, featuring the 60 constellations we can see before midnight from Baton Rouge, containing objects above magnitude 10. For the next three years I expanded that information and put all my research in the same format, ending last April. Beginning with last May, Named Stars, Deep Sky and Other Stars are repeated here, for convenience. Monthly updates will be made to Sky Happenings and all that appears below that title.*

### *Named Stars*

**Antares A** (Alpha A Sco), from the Arabic “*Qalb al-Akrab*” “The Scorpion’s Heart”, Latin – *Cor Scorpium*; one of the royal stars of Persia – *Satevis*, the Guardian of Heaven; *Luphratean* – “*Bilusha-ziri*” – the Lord of the Seed; “*Kakkab Bir*” – “The Vermillion Star”; Ptolemy’s “*Similar To*” or “*Rival to Mars*”; mag. 0.91, 16 29 24.47 -26 25 55.0, is a red supergiant binary star and the 16<sup>th</sup> brightest star in the night sky. The **Antares Nebula (IC 4606)** surrounds the star. The companion green star, **Antares C** – magnitude 6.5, has a separation of about 500 au at a PA of 275°. Also known as **HD 148478, HIP 80763, Gould 69 Scorpium, 21 Scorpium, and SAO 184415.**

**Antares B** (Alpha B Sco), mag. 5.2, 16 29 24.2 -26 25 51, is the binary star of **Antares A Scorpium**. Also known as **HD 148479.**

**Acrab** (Beta<sup>1</sup> Sco), from the Arabic “*al-Agrab*,” “The Scorpion,” *Elacrab*, *Graffias*, “The Claws,” *Graffias*, *Grassias*, mag. 2.62, 17 30 45.84 -19 48 19.4, is a six-star system divided into two parts of three stars each. **Beta<sup>1</sup> Scorpium** appears as a binary star with two components separated by 13.5 “. The brighter of two components is itself a binary star with an orbital period of 610 years, and its own brighter component is a spectroscopic binary, with the components separated by only 1.42 milli-arc seconds and orbiting each other every 6.82 days. **Beta<sup>2</sup> Scorpium**, mag. 4.90, 16 05 26.58 -19 48 06.6, has two sub-components with an angular separation of 0.1328 ° and an orbital period of 39 years. The dimmer sub-component is yet another spectroscopic binary star with an orbital period of 10.7 days. **Beta<sup>1</sup> Scorpium** is also known as **HD 144217, HIP 78820, Gould 18 Scorpium, H III 7, SAO 159682, and WDS 16054-1948.** Beta Scorpium is also known as **HD 144218, HIP 78821, Gould 18 Scorpium, 8 Scorpium, and SAO 159683.**

**Dschubba** (Delta Sco), from the Arabic “*Al Jabbah*,” “the Front or Forehead,” *Iclarkrau*, “*Ikli'l al 'Akrab*,” “The Crown of the Scorpion,” mag. 2.29, 16 00 20.01 -22 37 17.8, is a triple star system. There is a companion star orbiting every 20 days, and another star in an eccentric orbit around the primary with a period of 10 years. Also known as **HD 143275, HIP 78401, Gould 13 Scorpium, 7 Scorpium, and SAO 184014.**

**Wei** (Epsilon Sco), also called *Larawag*, mag. 2.29, 16 50 10.24 -34 17 33.4. Also known as **HD 151680, HIP 82396, Gould 95 Scorpium, SAO 208078, and 26 Scorpium.**

**Sargas** (Theta Sco), Sumerian origin, meaning unknown, mag. 1.86, 17 37 19.13 -42 59 52.2, is a bright yellow giant star with a magnitude 5.36 companion star at a separation of 6.47”. Just 1.7° to the south is **NGC 6388**, and 2.3° to the southeast is the planetary nebula **IC 4663**. Also known as **HD 159532, HIP 86228, Gould 160 Scorpium, and SAO 228201.**

**Apollyon (Iota<sup>1</sup> Sco)**, mag. 2.99, 17 47 35.08 -40 07 31.7, is an evolved star on the verge of becoming a supergiant star. It has a 10<sup>th</sup> magnitude companion at a separation of 37.5". **Iota<sup>2</sup> Scorpii**, mag. 4.78, 17 50 11.11 -40 05 25.5, is a supergiant star with an 11<sup>th</sup> magnitude companion at a separation of 32.6". **Iota<sup>2</sup> Scorpii** lies 15" to the east of **Iota<sup>1</sup> Scorpii**. The galactic star cluster **H17** is about 1.2° to the west. **Iota<sup>1</sup> Scorpii** is also known as **HD 161471**, **HIP 87073**, **Gould 169 Scorpii**, and **SAO 228420**. **Iota<sup>2</sup> Scorpii** is also known as **HD 161912**, **HIP 87294**, **Gould 173 Scorpii**, and **SAO 184429**.

**Girtab (Kappa Sco)**, from the Sumerian for "Scorpion," mag. 2.39, 17 42 29.28 -39 01 47.7, is a spectroscopic binary star that cannot be resolved with a telescope. They have an orbital period of 196 days. Located 2.5° southeast of **Lambda Scorpii**. The faint galactic star cluster **H17** is 1° to the south-southwest and **Iota Scorpii** is about 1.4° to the southeast. Also known as **HD 160578**, **HIP 86670**, **Gould 165 Scorpii**, and **SAO 209163**.

**Shaula (Lambda Sco)**, from the Arabic "Al Shaulah," "The Sting," also called "Mushālah," "Raised," mag. 1.62, 17 33 36.53 -37 06 13.5, is a triple star system and the 25<sup>th</sup> brightest star in the night sky. **Lambda Scorpii B** has an AB separation of 42", with **Lambda Scorpii C** (12<sup>th</sup> magnitude) at an AC separation of 95". The small galactic star cluster **H16** is 0.5° to the northwest, and **NGC 6400** is 1.3° to the east and slightly north. **Lambda Scorpii** and **Upsilon Scorpii** are so close to each other, they have been nicknamed "Cat's Eyes." Also known as **HD 158926**, **HIP 85927**, **Gould 156 Scorpii**, **SAO 208954**, and **35 Scorpii**.

**Denebakrab (Mu<sup>1</sup> Sco)**, also called **Xamidimura**, and from the Polynesian "Piri-ere-ua," "a little Girl, inseparable with her little brother," mag. 3.00, 16 51 52.24 -38 02 50.4, is a binary system – an eclipsing binary with a period of 1.44027 days. The primary is a main sequence star with the separation of **Mu<sup>1</sup> Scorpii** from **Mu<sup>2</sup> Scorpii** being 55,000 au or 0.88 light years. **NGC 6281** is 2.3° to the east, and **NGC 6242** is about 1.5° to the south-southeast. Also known as **HD 151890**, **HIP 82514**, **Gould 98 Scorpii**, and **SAO 208102**.

**Pipirima (Mu<sup>2</sup> Sco)**, also called "Shéngōng," mag. 3.56, 16 52 20.15 -38 01 02.9. Also known as **HD 151985**, **HIP 82545**, **Gould 99 Scorpii**, and **SAO 208116**.

**Jabbah (Nu Sco)**, "Forehead," also called **Jabah**, mag. 4.0, 16 11 59.74 -19 27 38.3, is a quintuple star. Component A is a spectroscopic binary composed of two groups of stars separated by 41", called A and C. Stars A (mag. 4.4) and B (mag. 5.4) have a separation of 1.2"; stars C (mag. 6.3, 16 11 58.6 -19 26 59.0) and D (mag. 8.0) are separated by 2.3". **Nu Scorpii** is a midst of a large, but faint nebulosity, **IC 4592**, and illuminates it. Also known as **HD 145502**, **HIP 79374**, **HV 6**, **Gould 38 Scorpii**, **SAO 159764**, **WDS 16120-1928**, and **14 Scorpii**.

**Girtab (Xi Sco)**, is a sextuple star system. The A star – mag. 4.77, 16 04 22.10 -11 22 23.0, forms a close binary with the B star (mag. 5.07, 16 04 22.3 -11 22 18), having a separation of 0.39" and a period of 45.7 years. The C star is separated from AB by 7.4," and is an orange dwarf star at magnitude 7.2 and is a slow retrograde motion around the system with a period that probably exceeds 1000 years. The double star **Σ1999**, located 283' to the south, is a physical member of the **Xi Scorpii** system. The Struve components are 11.4' apart, at magnitudes 7.4 and 8.1, with a projected separation from AB of about 7,000 au. Flamsteed calls this star **51 Librae**. **Xi Scorpii A** is also known as **HD 144070**, **HII 20**, **Gould 17 Scorpii**, and **WDS 16044-1122**. **Xi Scorpii B** is also known as **HD 144069**, **HIP 78727**, and **SAO 159666**.

**Iclil (Pi Sco)**, also called **Fang**, **Nur**, and **Vrischika**, mag. 2.89, 15 58 51.12 -26 06 50.6, is a triple star – an eclipsing double-line spectroscopic binary with a period of 1.571 days with both stars being hot, blue-white dwarf main-sequence stars that are rapid rotators and separation believed to be only 15 solar radii. The companion star (**β622**) is at 12.2 magnitude with a separation of 51" at a PA of 132°. Also known as **HD 143018**, **HIP 78265**, **Gould 12 Scorpii**, **SAO 183987**, and **6 Scorpii**.

**Iklil (Rho Sco)**, mag. 3.87, 15 56 53.09 -29 12 50.4. Also known as **HD 142669**, **HIP 78104**, **Gould 9 Scorpii**, **SAO 183957**, and **5 Scorpii**.

**Al Niyat (Sigma Sco)**, from the Arabic "an-niyāt," "the arteries," shares its name with **Tau Scorpii** (these two stars mark the arteries around the scorpion's heart), mag. 2.90, 16 21 11.32 -25 35 33.9, is a multiple star system. The brightest in the system is a spectroscopic binary, composed of two

unresolved stars orbiting each other every 33.01 days. The primary is a giant star with the other a main sequence star. There is another companion orbiting the main pair at a separation of 0.5.” There is also a dwarf star (at magnitude 8.7) also orbiting the main pair at a separation of 20”. **M4** is located about 1° to the south-southeast. Also known as **HD 147165, HIP 80112, HIV 121, Gould 61 Scorpii, SAO 184336, WDS 16212-2536, and 20 Scorpii.**

**Al Niyat (Tau Sco), also called Alniyat and Paikauhale** mag. 2.82, 16 35 52.96 -28 12 57.5. is a hydrogen fusing blue-white dwarf star with a strong complex magnetic field. About 1° to the east-northeast lies the faint double star **h4878**, a pair of stars at magnitude 8.5 each and a separation of 8” from **Tau Scorpii**. The southern components are a very close and equal pair of about 0.1” separation. Also known as **HD 149438, HIP 81266, Gould 75 Scorpii, SAO 184481, and 23 Scorpii.**

**Lesath (Upsilon Sco), also called Lesuth, from the Arabic “Al Laśah,” “The Sting,” also “Iasá,” “pass (orbiting) of a poisonous animal,”** mag. 2.70, 17 30 45.84 -37 17 44.7, is a blue sub-giant star, located in the scorpion’s stinger, close to **Lambda Scorpii**, with the two forming a pair sometimes known as the “Cats Eyes” (a separation of 35’ between them). Galactic cluster **H16** is 0.5° to the north. Also known as **HD 158408, HIP 85696, Gould 152 Scorpii, SAO 208896, and 34 Scorpii.**

**Jabhat al ‘Akráb (Omega Sco), from the Arabic “The fore-head or the front of the scorpion,” also called “Know Kin,” from the Chinese for “a hook and latch,”** is a binary system. **Omega<sup>1</sup> Scorpii** - mag. 3.93, 16 06 48.43 -20 40 08.9, is a blue-white dwarf star. **Omega<sup>2</sup> Scorpii** – mag. 4.31, 16 07 24.30 -20 52 07.2, is a giant yellow star. The separation between the two is 0.24°.

**Omega<sup>1</sup> Scorpii** is also known as **HD 144470, HIP 78933, Gould 28 Scorpii, SAO 184123, and 9 Scorpii.** **Omega<sup>2</sup> Scorpii** is also known as **HD 144608, HIP 78990, Gould 21 Scorpii, SAO 184135, and 10 Scorpii.**

**Fuyue (G Sco),** mag. 3.19, 17 49 51.45 -37 02 36.1. Also known as **HD 161892, HIP 87261, Gould 172 Scorpii, and SAO 209318.**

**Rapeto (HD 153950),** mag. 7.39, 17 04 30.87 -43 18 35.2, has one planet in orbit. Also known as **HIP 83547.**

**Sharjah (HIP 79431)** mag. 11.34, 16 12 41.71 -18 52 31.8, has one planet in orbit.

**Diwō (WASP-17),** mag. 11.79, 15 59 50.95 -28 03 42.3, has one transiting planet.

**Rapid Burster,** 17 33 24.61 -33 23 19.8, is a low-mass X-ray binary star.

## *Deep Sky:*

**M4 (NGC 6121),** mag. 5.4, 16 23 36 -26 32, 26.3’ in size, is a globular cluster with a low concentration of stars; very well resolved; interior appears to contain a line of stars; elongated vertically; brightest star is magnitude 10.8. The total number of stars down to magnitude 19.3 has been counted to 10,300. A millisecond pulsar was found in 1987, the first observed in a globular cluster, that spins 10 times faster than the **Crab Nebula** pulsar. In 1995 a white dwarf star was found with a planet orbiting it – it is believed to be as old as the cluster itself (13 billion years). **M4** is located about 1° west of **Antares (Alpha Scorpii)**. **NGC 6144** is 50’ to the east-northeast (30’ northwest of **Antares**). Also known as **Mel 144, Lac I.9, ESO 517-SC001, EQ 1620-264, and C1620-264.**

**M6 (NGC 6405), “The Butterfly Cluster”,** mag. 4.2, 17 40 18 -32 15, 20’ in size, is an open cluster of 80 stars; detached, no concentration of stars; moderate range in brightness; magnitude of brightest star is 6.2. The age of the cluster is believed to be about 95 million years. **NGC 6383** is 1.2° to the west-southwest, **NGC 6416** is 50’ to the east, **NGC 6404** is 1° to the south, and **M7** is 3.5° to the southeast. Also known as **Cr 341, Lund 769, OCL 1030, OCL 1030.0, NGC 6416, Lac III.12, Dunlop 612, vdB-Ha 242, Mel 178, ESO 4554-SC030, GC 2010, and C1736-321.**

**M7 (NGC 6745), “The Ptolemy’s Cluster”,** mag. 3.3, 17 53 54 -34 48, 80’ in size, is an open cluster of 80 stars; detached, weak concentration of stars; moderate range of brightness; very large, very bright; magnitude of brightest star is 5.6. The cluster is about 220 million years in age. This cluster was first reported as a glowing region of faint stars by Ptolemy circa 130 AD. **NGC 6453** is 20’ to the northwest and the galactic cluster **H18** is 45’ to the southeast. Also known as **Mel 183, Lac II.14,**

**mf 1088, Cr 354, Raab 125, vdB-Ha 254, OCL 1028, OCL 1028.0, Lund 791, C1750-348, and ESO 394-SC009.**

**M80 (NGC 6093)**, mag. 7.2, 16 17 00 -22 59, 8' in size, is a globular cluster with a high concentration of stars; large, very bright, well resolved, extremely rich. The cluster contains hundreds of thousands of stars. Located halfway between **Antares (Alpha Scorpii)** and **Acrab (Beta Scorpii)**, and just below the parallel of **Delta Scorpii**. **M4** is 4° to the southeast. Also known as **Mel 142, ESO-SC011, 1WGA J16170-2258, EQ 1614-228, and C1614-228.**

**Cr 302, "The Antares Moving Cluster"**, mag. 1.0, 16 27 24 -26 16 02, 500' in size. Also known as **OCL 1011, Lund 702, OCL 1011.0, and C1623-261.**

**NGC 2631, "The Table of Scorpius", "The Northern Jewel Box", "Baby Scorpion"**, mag. 2.6, 16 54 12 -41 49, 15' in size, is an open cluster of 120 stars; detached, strong concentration of stars; large range in brightness; magnitude of brightest star is 4.7; bright, quite large. The cluster is believed to be around 3.2 million years old. This cluster is involved in a very large (about 6°) emission nebula that is best seen with a nebula filter. The brightest star in the cluster is **van den Bos 1833**, a splendid binary star. The cluster is located less than 1° north of **Zeta Scorpii**. Also known as **Dunlop 520, ESO 332-SC006, C76, Cr 315, Ha 1.7, Halley 20, Gum 55, Mel 153, Dunlop 499, Lac II.13, Lund 729, OCL 997, Mrk 31, and vdB-Ha 201.**

**Cr 316**, mag. 3.14, 16 55 30 -40 50, 105' in size. Also known as **Lund 731, OCL 998, OCL 998.0, vdB-Ha 203, and C1652-407.**

**NGC 6227**, mag. 5.0, 16 51 36 -41 13, 18' in size. Also known as **V973 Scorpii, HD 151804, CD-41 10957, HIP 82493, and ESO 332-005.**

**NGC 6281**, mag. 5.4, 17 04 42 -37 59, 200' in size, is an open cluster of 70 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 7.9; large cluster; involved in a large, faint emission nebula. Also known as **OCL 1003, ESO 332-SC019, Dunlop 555, Dunlop 556, Mel 161, Cr 324, Gum 57b, Lund 739, Raab 118, C1701-378, and vdB-Ha 213.**

**NGC 6383**, mag. 5.5, 17 34 42 -32 35, 20' in size, is an open cluster of 40 stars; not well detached from the surrounding star field; large range in brightness; magnitude of brightest star is 5.6. Involved in a faint (80'x30') emission nebula. Also known as **NGC 6374, ESO 393-SC007, OCL 1026, OCL 1026.0, h 3687, Cr 334, Cr 335, C-1729-325, C1731-325, Lund 759, Mrk 33, and vdB-Ha 232.**

**NGC 6416**, mag. 5.7, 17 44 18 -32 22, 14' in size, is an open cluster of 40 stars; not well detached from the surrounding star field; small range in brightness; magnitude of brightest star is 8.4; very large cluster. Also known as **OCL 1031, OCL 1031.0, ESO 455-SC032, Dunlop 612, Cr 344, Lund 771, and C1741-323.**

**NGC 6124**, mag. 5.8, 16 25 18 -40 39, 29' in size, is an open cluster of 100 stars; detached, weak concentration of stars; large range in brightness; magnitude of brightest star is 8.7; bright, large. Cluster is 51 million years old. Also known as **OCL 990, Dunlop 514, ESO 331-SC003, C75, LacI-8, Mel 145, Cr 301, Lund 701, Raab 117, and C1622-405.**

**NGC 6322**, mag. 6.0, 17 18 24 -42 56, 10' in size, is an open cluster of 30 stars; detached, strong concentration of stars; moderate range in brightness; magnitude of brightest star is 7.5; very large cluster; 10 million years old. Also known as **OCL 1000, ESO 278-SC006, Cr 326, Lund 743, vdB-Ha 229, C1714-429, and IRAS 17141-4256.**

**NGC 6242**, mag. 6.4, 16 55 36 -39 28, 9' in size, is an open cluster of 40 stars; detached, strong concentration of stars; moderate range in brightness; magnitude of brightest star is 7.3; 51 million years old. Also known as **OCL 1001, ESO 332-SC010, Dunlop 520, LacI.10, Mel 155, Cr317, Lund 732, Raab 115, vdB-Ha 204, and C1652-394.**

**Tr 27**, mag. 6.7, 17 36 12 -33 29, 7' in size, is an open cluster of 35 stars; detached, strong concentration of stars; moderate range in brightness; magnitude of brightest star is 8.4. Also known as **Cr 336, OCL 1021, Lund 761, ESO 393-009, vdB-Ha 237, C1732-334, and C1733-335.**

**NGC 6388**, mag. 6.8, 17 36 18 -44 44, 8.7' in size, is a globular cluster with a high concentration of stars; very bright, large, and round. Also known as **GCL 70, ESO 279-SC002, Dunlop 457, Mel 174,**

**vdB-Ha 234, EQ 1732-447, C1732-447, and 2MASX J17361746-4444.**

**NGC 6178**, mag. 7.2, 16 35 48 -45 39, 4' in size, is an open cluster of 12 stars; detached, strong concentration of stars; large range in brightness; magnitude of brightest star is 8.4; small, bright. Also known as **ESO 276-SC006, OCL 980, Cr 308, Lund 712, and C1632-455.**

**NGC 6425**, mag. 7.2, 17 47 00 -31 32, 10' in size, is an open cluster of 35 stars; detached, strong concentration of stars; small range in brightness; magnitude of brightest star is 10.2, pretty small. Also known as **OCL 1033, ESO 455-SC038, Cr 348, Lund 777, vdB-Ha 246, C1743-315, IRAS 17437-3128, and IRAS 1743-3131.**

**Bocham 13**, mag. 7.2, 17 17 18 -35 33.

**NGC 6441, "Silver Nugget Cluster"**, mag. 7.4, 17 50 12 -37 03, 7.8' in size, is a globular cluster with a high concentration of stars; very bright, pretty large, round. Located less than 3' east of the star **G Scorpil** (3.3 magnitude). Also known as **GCL 78, ESO 393-SC034, vdB-Ha 248, JaFu 2, Dunlop 557, Mel 180, C1746-320, and 1RXS J175012.8-370306.**

**Tr 29**, mag. 7.5, 17 41 36 -40 07, 9' in size, is an open cluster of 30 stars; detached, weak concentration of stars; large brightness range. Also known as **Cr 343, Harvard 17, Lund 768, OCL 1009, OCL 1009.0, and C1738-400.**

**Tr 28**, mag. 7.7, 17 36 54 -32 28, 8' in size, is an open cluster of 30 stars, detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 9.8; involved in nebulosity. Also known as **Cr 337, Lund 762, OCL 1029, vdB-Ha 238, C1733-324, and C1738-400.**

**NGC 6259**, mag. 8.0, 17 08 48 -44 39, 10' in size, is an open cluster of 120 stars; detached, no concentration of stars; moderate range in brightness; magnitude of brightest star is 11.6; bright, very large; 220 million years old. Also known as **OCL 996, ESO 277-SC002, Dunlop 456, Mel 158, Cr 322, Lund 737, Raab 117, vdB-Ha 209, and C1647-446.**

**Cr 338**, mag. 8.1, 17 38 12 -37 34, 25' in size, is an open cluster of 40 stars; detached, no concentration of stars; moderate brightness range. Also known as **OCL 1013, OCL 1013.0, Lund 764, C1734-375, and IRAS 17349-3730.**

**NGC 6249**, mag. 8.2, 16 57 42 -44 49, 6' in size, is an open cluster of 30 stars; detached, weak concentration of stars; small brightness range; magnitude of brightest star is 9.8. Also known as **OCL 994, Dunlop 456, ESO 277-SC019, Cr 319, Lund 734, and C1654-447.**

**NGC 6192**, mag. 8.5, 16 40 24 -43 22, 9' in size, is an open cluster of 60 stars; detached, strong concentration of stars; moderate range in brightness; pretty large, irregularly round; brightest star is magnitude 11.0 photo. Also known as **OCL 988, ESO 277-SC003, Dunlop 483, Dunlop 470, Mel 149, Cr 309, Lund 715, Raab 113, vdB-Ha 194, and C1636-432.**

**NGC 6356**, mag. 8.5, 17 37 36 -35 02, 3' in size, is an open cluster of 30 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 9.8. Also known as **ESO 393-SC010, Cr 339, Lund 765, vdB-Ha 239, and C1734-349.**

**PK 357-04.3**, mag. 8.5, 17 58 12 -33 48, 2" in size. Also known as **He2-313.**

**NGC 6496**, mag. 8.6, 17 59 00 -44 16, 6.9' in size, is a globular cluster with a low concentration of stars; pretty large and elongated. Also known as **GCL 80, Dunlop 460, ESO 279-SC013, Mel 185, EQ1755-442, and C1755-442.**

**Tr 24**, mag. 8.6, 16 57 00 -40 38, 12' in size, is an open and poor cluster; not well detached from background stars; moderate range in brightness; involved with nebula **IC 4628**. Also known as **OCL 999, Harvard 12, Cr 318, Lund 733, OCL 999.0, Mrk 32, and C1653-405.**

**NGC 6400**, mag. 8.8, 17 40 12 -36 57, 12' in size. Also known as **OCL 1014, ESO393-SC014, Mel 177, Dunlop 568, Raab 121, Cr 342, OCL 1030, vdB-Ha 241, Lund 767, C1736-369, C1737-365, and IGR J17402-3656.**

**Antalova 2**, mag. 8.8, 17 29 50.9 -32 32 28, 3' in size.

**Ru 127**, mag. 8.8, 17 37 48 -36 18. Also known as **OCL 1015, Lund 763, and C1734-362.**

**Tr 30**, mag. 8.8, 17 56 30 -35 19, 10' in size. Also known as **OCL 1025, Harvard 18, Cr 355, Lund 792, and C1793-353.**

**Cr 332**, mag. 8.9, 17 31 21 -37 05 58, 2' in size, 25 stars. Also known as **OCL 1010, Harvard 16,**

**Lund 755, and C1727-370.**

**NGC 6374**, mag. 9.0, 17 34 42 -32 35, 20' in size. Also known as **NGC 6383**.

**NGC 6144**, mag. 9.1, 16 27 12 -26 01, 6.2' in size, is a globular cluster with a low concentration of stars; quite large and well resolved. Also known as **GCL 42, H6-10, ESO517-SC006, Mel 147, EQ1624-259, and C1624-259.**

**NGC 6139**, mag. 9.2, 16 27 42 -38 51, 5.5' in size, is a globular cluster with a high concentration of stars; large range in brightness; magnitude of brightest star is 9.3; quite large; 630 million years old. Also known as **GCL 43, Dunlop 536, ESO 331-SC004, EQ 1624-387, C1624-387, and 2MASX J16273998-3850570.**

**NGC 6302**, “The Bug Nebula”, “The Butterfly Nebula”, mag. 9.6, 17 13 42 -37 06, 49” in size, is a bipolar planetary nebula, pretty bright; an elongated figure eight. The central star (a white dwarf) is 10<sup>th</sup> magnitude, but due to the huge amounts of dust within the nebula, it is fainter than magnitude 21. Also known as **Bernes 149, C69, Gum 60, RCW 124, He2-204, and PK 349+01.1.**

**Pismis 24**, mag. 9.6, 17 24 42 -34 12. Also known as **Sharpless 11, RCW 131, and Gum 66.**

**Lynga 14**, mag. 9.7, 16 55 03.4 -45 14 20, 3' in size. Also known as **OCL 992, Lund 730, C1651-452, and IRAS 16513-4515.**

**Cr 333**, mag. 9.8, 17 32 49 -34 05 57, 8' in size, 8 stars. Also known as **OCL 1017, Lund 756, and C1728-340.**

**Tr 25**, mag. 9.9, 17 24 30.3 -39 01 16, 4' in size, 40 stars. Also known as **OCL 1007, Harvard 14, Dunlop 533, Cr 329, Lund 747, vdB-Ha 225, and C1721-389.**

**NGC 6334**, “Cat’s Paw Nebula”, “Bear Claw Nebula”, 17 20 30 -35 43, 39’x30’ in size, is an emission nebula that has numerous stars involved in several faint, very large patches of nebulosity. It is a vast star forming region and one of the most active stellar nurseries containing some of the most massive stars known in the Milky Way. It is believed to contain tens of thousands of stars. Also known as **Gum 64.**

**NGC 6357**, “War and Peace Nebula”, “Lobster Nebula”, 17 24 36 -34 10, 50’x39’ in size, is a faint, large, elongated, mottled, and irregularly shaped diffuse nebula, containing many proto-stars and young stars. Contains **Pismis 24**. Also known as **Gum 66, Sharpless 11, and RCW 131.**

**CRL 6815, IRAS 17150-3224**, “Cotton Candy Nebula”, mag. 14.3, 17 18 20 -32 27 22, 6.6”x2.4” in size, is a planetary nebula. The central star is **GSC2 S222330241876**. Also known as **GLMP 540 and RAFGL 6815.**

**IRAS 16342-3814**, “Water Fountain Nebula”, mag. 15.7, 16 37 40 -38 20 17, 4”x2.5” in size, is a planetary nebula. Central star is **GSC2 S230321328946**.

**IRAS 17106-3046**, “Spindle Nebula”, 17 13 51 -30 49 40. Central star is **GSC2 S222332178351**. Also known as **GLMP 531, and PNG 354.6+04.7.**

**IRAS 17163-3907**, “Fried Egg Nebula”, mag.12.5, 17 19 49 -39 10 38, 2.25” in size, is a planetary nebula. Also known as **He3-1379.**

**IRAS 17245-3951**, “Walnut Nebula”, mag. 15.5, 17 28 05 -39 53 44, 2.23”x0.6” in size, is a planetary nebula. Central star is **GSC2 S222031027823**. Also known as **Preite-Martinez 2-27.**

**K1-3**, “Shark’s Jaw Nebula”, 16 23 18 -31 45, is a planetary nebula. Also known as **PK 346+12.1 and PNG 346.9+12.4.**

**IC 4606**, “Antares Nebula”, 16 32 58 -26 06 15. Also known as **ESO 517-009, LBN 1107, and LBN 351.76+15.00.**

**IC 4628**, “Prawn Nebula”, False Comet Nebula”, 16 56 54.6 -40 30 44.4, is an emission nebula and part of the tail of the “False Comet” – **NGC 6231**. Main star is **HD 152723, HIP 82936, SAO 227479, CD-40 10986, GC 22819, and GSC 07872-02169**. Also known as **Ced 137, ESO 332-EN014, and Gum 56.**

## *Other Stars:*

**Zeta Scorpii, Zeta<sup>1</sup> Scorpii**, mag. 4.70, 16 53 59.73 -42 21 43.3, is a luminous blue hyper-giant

variable star. **Zeta<sup>2</sup> Scorpii**, mag. 3.62, 16 54 35.11 -42 21 38.7, is a suspected variable star. The stars are not physically related, but in our line of sight appear to form a naked eye double star with a separation of 7'. Located in **NGC 6231**. **Zeta<sup>1</sup> Scorpii** is also known as **HD 152236**, **HIP 82671**, **Gould 103 Scorpii**, and **SAO 227375**. **Zeta<sup>2</sup> Scorpii** is also known as **HD 152334**, **HIP 82729**, **Gould 104 Scorpii**, and **SAO 227402**.

**HD 147513**, mag. 5.37, 16 24 01.24 -39 11 34.8, has one planet in orbit. Also known as **HIP 80337**, **Gould 62 Scorpii**, and **SAO 207622**.

**Gliese 667** is a triple star system. **667A**, mag. 5.91, 17 18 56.36 -34 59 22.5, is a main sequence suspected variable star. **667B**, mag. 7.24, 17 19 01.94 -34 59 33.3, with an orbital period of 42.15 years. **667C**, mag. 10.22, 17 18 58.69 -34 59 48.3, is a red dwarf star orbiting AB at a separation of 30" and has two planets in orbit. **667A** is also known as **HD 156384A**, **HIP 84709**, **Gould 142 Scorpii**, and **SAO 208670**. **667B** is also known as **HD 156384B**, and **667C** is also known as **HD 156384C**.

**HD142250**, mag. 6.15, 15 54 30.12 -27 20 18.9, has one planet in orbit. Also known as **HIP 77900**, **Gould 6 Scorpii**, and **SAO183907**.

**HD 151932**, mag. 6.49, 16 52 19.25 -41 51 16.2, is a Wolf-Rayet star in **Trumpler 24**. Also known as **HIP 82543**, and **V919 Scorpii**.

**4U 1700-37**, mag. 6.51, 17 03 56.77 -37 50 38.9, is a rotating ellipsoidal variable and high-mass X-ray binary star. Also known as **HD 153919**, **HIP 83499**, and **V884 Scorpii**.

**HD 160529**, mag. 6.66, 17 41 59.03 -33 30 13.7, is a luminous blue variable star. Also known as **HIP 86624**, **Gould 164 Scorpii**, **SAO 209151**, and **V905 Scorpii**.

**HD 143567**, mag. 7.18, 16 01 55 -21 58 49, has one planet in orbit. Also known as **HIP 78530**.

**HD 159868**, mag. 7.27, 17 38 59.53 -43 03 43.8, has two planets in orbit. Also known as **HIP 86375**.

**HD 147873**, mag. 7.96, 17 30 48.38 -33 36 36.0, has two planets in orbit. Also known as **HIP 80486**.

**AH Sco**, mag. 8.10, 17 11 17.02 -32 19 30.7, is a semi-regular variable star and one of the largest stars known. Also known as **HIP 84071**.

**HD 145377**, mag. 8.12, 16 11 36.45 -27 04 41.4, has one planet in orbit. Also known as **HIP 79346**.

**HD 144432**, mag. 8.19, 16 06 57.95 -27 43 09.8, is a Herbig Ae/Be star in a triple star system. Also known as **HIP 78943**.

**HD 326823**, mag. 9.03, 17 06 53.91 -42 39 39.7, is a luminous blue variable star. Also known as **V1104 Scorpii**.

**HD 162020**, mag. 9.12, 17 50 38.35 -40 19 06.1, has a brown dwarf star companion. Also known as **HIP 87330**.

**GSC 06214-00210**, mag. 9.15, 16 21 55 -20 43 07, has one planet in orbit.

#### Stars of interest beyond magnitude 10:

**Pismis 24-1**, mag. 10.43, 17 24 43.41 -34 11 56.5, is one of the most luminous stars known. Located in **Pismis 24**. Also known as **HD 319718**.

**Scorpius X-1**, mag. 11.1, 16 19 55.07 -15 38 24.8, is a low-mass X-ray binary star. Also known as **V818 Scorpii**.

**1RXS J160929.1-210524**, mag. 12.97, 16 09 30.31 -21 04 57.6, has one planet in orbit.

**IRAS 17163-3907**, mag. 13.1, 17 19 49.33 -39 10 37.9, is a yellow hypergiant star in the **Fried Egg Nebula (Henize 3-1379)**.

**GRO J1655-40**, mag. 14.2, 16 54 00.14 -39 50 44.9, is an X-ray nova containing a black hole. Also known as **V1033 Scorpii**.

**Wray 17-96**, mag. 17.8, 17 41 35.2 -30 06 39.6, is a luminous blue variable star – one of the most luminous stars known.

**PSR B1620-26**, mag. 21.30, 16 23 38.22 -26 31 53.8, is a pulsar/white dwarf binary star in **M4** that has a planet in orbit.

There are 3 more stars with planets in orbit, 11 low-mass X-ray binary stars, 4 high-mass X-ray binary stars, 1 luminous red nova star, 1 X-ray nova star, 2 pulsars, and 1 millisecond pulsar star in Scorpio.

## Sky Happenings: July, 2022

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

- July 1<sup>st</sup>** - Venus passes 4° north of **Aldebaran** at 7 PM CDT.
- July 2<sup>nd</sup>** - Dusk: In the west the waning crescent **Moon** is 6.5° to the right of **Regulus**.
- July 4<sup>th</sup>** - **Earth** is at aphelion (94.5 million miles or 152,098,455 km from the **Sun**) at 2 AM CDT.
- July 6<sup>th</sup>** - **First Quarter Moon** occurs at 9:14 PM CDT.
- July 7<sup>th</sup>** - Dusk: High in the southwest the **Moon**, one day past first quarter, is in **Virgo**, 5° to the upper left of **Spica**.
- July 10<sup>th</sup>** - Evening: The waxing gibbous **Moon** is in **Scorpius**. If you look to the south, it will be a little more than 2° to the upper left of **Antares**.
- July 12<sup>th</sup>** - Asteroid **Vesta** is stationary at 1 AM CDT.
- July 13<sup>th</sup>** - The **Moon** is at perigee (221,993 miles or 367,264 km from **Earth**) at 4:06 AM CDT Large tides expected,  
**Full Moon** occurs at 1:38 PM CDT (Largest of 2022).
- July 15<sup>th</sup>** - The **Moon** passes 4° south of **Saturn** at 3 PM CDT.
- July 16<sup>th</sup>** - **Mercury** is in superior conjunction at 3 PM CDT.
- July 17<sup>th</sup>** - Dawn: **Venus, Aldebaran, Mars, Jupiter, the waning gibbous Moon, and Saturn** are along the horizon from the east-northeast to the south-southwest before sunup,  
The **Moon** passes 3° south of **Neptune** at 8 PM CDT.
- July 18<sup>th</sup>** - The **Moon** passes 2° south of **Jupiter** at 8 PM CDT.
- July 19<sup>th</sup>** - Morning: The **Moon and Jupiter**, high in the southeast, are 3° apart,  
**Venus** is 1.5° south of **M35** at 8 PM CDT,  
**Pluto** is at opposition at 9 PM CDT.
- July 20<sup>th</sup>** - **Last Quarter Moon** occurs at 9:19 AM CDT.
- July 21<sup>st</sup>** - Dawn: High in the southeast the **Moon and Mars** are 2.5° apart,  
The **Moon** passes 1.1° north of **Mars** at 12 Noon CDT,  
Dwarf planet **Ceres** is in conjunction with the **Sun** at 8 PM CDT.
- July 22<sup>nd</sup>** - The **Moon** passes 0.2° north of **Uranus** at 1 PM CDT.
- July 23<sup>rd</sup>** - Dawn: The waning crescent **Moon**, in the east, is between the **Hyades** and the **Pleiades**.
- July 24<sup>th</sup>** - Dawn: **Venus, the Moon, Mars, Jupiter, and Saturn** are in a long line before sunrise.
- July 26<sup>th</sup>** - The **Moon** is at apogee (252,447 miles or 406,274 km from **Earth**) at 5:22 AM CDT,  
Dawn: The thin lunar crescent and **Venus** are 3.5° apart in **Gemini** in the east-northeast,  
The **Moon** passes 4° north of **Venus** at 9 AM CDT.
- July 27<sup>th</sup>** - Dawn: The **Moon**, just one day before new, **Castor**, and **Pollux** form a right triangle above the east-northeast horizon.
- July 28<sup>th</sup>** - Asteroid **Juno** is stationary at 5 AM CDT,  
**New Moon** occurs at 12:55 PM CDT (Lunation 1232).
- July 29<sup>th</sup>** - **Southern Delta Aquariid** Meteor Shower peaks at 5 AM CDT,  
**Jupiter** is stationary at 7 AM CDT.
- July 29<sup>th</sup>/30<sup>th</sup>** - All night: The **Southern Delta Aquariid** meteor shower.
- Aug. 1<sup>st</sup>** - **Mars** is 1.4° south of **Uranus** at 4 AM CDT.

### Planets:

**Mercury** – **Mercury** will lead anchor a line to include **Aldebaran, Venus, Uranus, Mars, Jupiter, Neptune, and Saturn** stretching 118° along the ecliptic. **Mercury** will be only 6° high (at magnitude -0.8) above the eastern horizon 30 minutes before sunrise. By the 5<sup>th</sup>, the planet is at magnitude -1.1 and only 4° high 30 minutes before sunrise. The planet will be in superior conjunction on the 16<sup>th</sup> and will then pass into the evening sky. You might can finally spot the planet on the 25<sup>th</sup> when it is 10° east of the **Sun** and sets 40

minutes after the **Sun**. It will shine at magnitude -1.2, just 2° high, 25 minutes after sunset. On the 29<sup>th</sup>, the planet will be 2.7° below the crescent **Moon**. Find the **Moon** by 8:30 PM local daylight time (ldt) and search for the planet slightly below and to its left. On July 31<sup>st</sup>, the planet will be 5° to the lower right of **Regulus** at around 8:40 PM ldt – you will have about 20 minutes before the pair descends into the evening haze.

**Venus** – **Venus**, on July 1<sup>st</sup>, will stand 4° due north of **Aldebaran**. The planet will rise about 3:45 AM ldt and by 4:30 AM is well clear of the horizon, adjacent to the stars of the **Hyades**. On the 13<sup>th</sup>, the planet passes 24' north of **M1** in the morning. The planet will cross the extreme northern edge of **Orion** from the 16<sup>th</sup> through the 18<sup>th</sup>, then move into **Gemini**. On the 20<sup>th</sup>, the planet will be 1.5° south of **M35**. On the 26<sup>th</sup>, a waning crescent **Moon** will be less than 4° north of the planet. On the 1<sup>st</sup>, the planet will be 86% illuminated, spanning 12", and by the 31<sup>st</sup> it will be 91% illuminated and 11" wide. The planet's magnitude will stay at -3.9 all month.

**Mars** – **Mars** will rise among the faint stars of **Pisces** shortly before 2 AM ldt on July 1<sup>st</sup>. The planet will slowly brighten from magnitude 0.4 to 0.2 this month. The planet starts the month 20° east of **Jupiter** and will drift eastward. On the 2<sup>nd</sup>, the planet is 13' due south of **Omicron Piscium**. The planet will cross into **Aries** on the 9<sup>th</sup>, with a waning crescent **Moon** joining it on the 21<sup>st</sup>, less than 3° apart by sunrise. On the 31<sup>st</sup>, the planet will rise soon after midnight and will stand 11° north of **Menkar (Alpha Ceti)** in **Cetus**.

**Jupiter** – **Jupiter** spends the entire month in **Cetus**, reaching a stationary point on July 29<sup>th</sup>. The planet starts the month at magnitude -2.4, brightening by 0.2 magnitudes by month's end. The planet will rise nearly an hour after midnight on July 1<sup>st</sup>, and just over an hour before midnight on July 31<sup>st</sup>. The planet's disk will grow in apparent size from 41" to 45". On the morning of the 4<sup>th</sup>, **Ganymede** will transit the planet starting at 4:41 AM CDT. On the 5<sup>th</sup>, **Europa** will transit starting at 12:17 AM CDT. On the 11<sup>th</sup>, **Ganymede's** shadow will transit starting at 2:55 AM CDT – the shadow will take just over 3 hours to transit. On the 12<sup>th</sup>, **Europa** will transit starting at 2:50 AM CDT. **Io** and its shadow will transit in a repeating sequence on the mornings of July 8<sup>th</sup> (from 1:19 AM CDT), July 15<sup>th</sup> (from 3:11 AM CDT), and on the 22<sup>nd</sup> (from 5:02 AM CDT) – **Ganymede** will reappear from behind the planet at 4:58 AM CDT. On the 31<sup>st</sup>, **Io** and its shadow will transit the planet at 1:20 AM CDT. On the 17<sup>th</sup>, at about 12 AM CDT, **Callisto** will lie south of the planet's south pole.

**Saturn** – **Saturn** will rise in the east just before 11 PM ldt on July 1<sup>st</sup>. The planet is approaching opposition and is moving west (retrograde) against the background stars. During the month of July, the planet will brighten to magnitude 0.3 and will remain less than 2° from **Deneb Algedi (Delta Capricorni)**. On the 15<sup>th</sup>, the planet will be 6° northeast of a waning gibbous **Moon**. The planet's disk is 18", with the rings doubling that size with a tilt of just under 13° to our line of sight. Titan, the planet's largest moon, is at magnitude 8.5 and will be north of the planet on July 4/5 and 20/21, and due south on the 11/12 and 27/28. **Tethys, Dione, and Rhea**, 10<sup>th</sup> magnitude moons, are closer to the planet with orbital periods ranging from two to five days.

**Uranus** – **Uranus** will be 0.2° south of the **Moon**, in **Aries**, at 1 AM CDT on the 22<sup>nd</sup> of July.

**Neptune** – **Neptune**, in **Pisces**, will stand 5° due south of **Lambda Piscium**, shining at magnitude 7.7. The planet will rise soon after midnight in early July. The planet will be about 12° west of **Jupiter**. The planet is a dim bluish disk spanning a mere 2".

**Pluto** – **Pluto** will be at opposition on July 20<sup>th</sup> in eastern **Sagittarius**, at magnitude 14.3. On the night of July 20<sup>th</sup>, the planet is located about 2° southwest of the magnitude 8.6 globular cluster **M75**.

**Moon** – The **Moon** is a little more than 2° to the upper left of **Antares** on July 10<sup>th</sup>. On the 17<sup>th</sup>, at dawn, the **Moon** joins a planetary chain, and at 8 PM CDT will pass 3° south of **Neptune**. On the 22<sup>nd</sup>, the **Moon** passes 0.2° north of **Uranus** at 11 AM CDT.

Favorable Librations: **Catena Sylvester** on July 13<sup>th</sup>; **Petermann Crater** on July 14<sup>th</sup>; and **Hayn Crater** on July 15<sup>th</sup>.

Greatest North Declination on the 26<sup>th</sup> (+26.9°)

South 13<sup>th</sup> (-26.9°)

Libration in Longitude: East Limb Most Exposed on the 19<sup>th</sup> (+7.9°)

West 7<sup>th</sup> (-7.4°)

Libration in Longitude: North Limb Most Exposed on the 16<sup>th</sup> (+6.6°)

South 3<sup>rd</sup> (-6.7°) and the 30<sup>th</sup> (-6.6°)

**Asteroids / Minor Planets – Pluto – Pluto’s positions in Sagittarius and estimated from the star SAO 188829 (southwest of M75), by my estimates, are as follows:** On July 3<sup>rd</sup> about 1.5’ due west of the star; on the 7<sup>th</sup> just under 2’ due west and a touch south of the star; on the 11<sup>th</sup> about 2.1’ due west and a touch south of the star; on the 15<sup>th</sup> about 2.3’ due west and a little south of the star; on the 19<sup>th</sup> about 3.1’ due west and a little south of the star; on the 23<sup>rd</sup> about 3.6’ due west and a little south of the star; on the 27<sup>th</sup> just under 4’ due west and a little south of the star; on the 31<sup>st</sup> about 4.3’ due west and a little south of the star; and on August 4<sup>th</sup> about 4.7’ due west and a little south of the star.

**Asteroid 3 Juno – Juno’s positions, according to the *RASC Observer’s Handbook, 2022 USA Edition*, are as follows:** On July 10<sup>th</sup> – 22 42.44 -14 41.0, magnitude 6.6 in **Aquarius**; on the 20<sup>th</sup> – 22 41.60 -15 40.3, magnitude 6.4 in **Aquarius**; and on the 30<sup>th</sup> – 22 37.76 -16 55.2, magnitude 6.2 in **Aquarius**.

**Asteroid 4 Vesta – Vesta’s positions, according to the *RASC Observers Handbook, 2022 USA Edition*, are as follows:** On July 10<sup>th</sup> -22 42.44 -14 41.0, magnitude 6,6 in **Aquarius**; on the 20<sup>th</sup> – 22 41.60 -15 40.3, magnitude 6.4 in **Aquarius**; and on the 30<sup>th</sup> – 22 37.76 -16 55.4, magnitude 6.2 in **Aquarius**.

**Asteroid 9 Metis - Metis’s positions, according to the *RASC Observer’s Handbook, 2022 USA Edition*, are as follows:** On July 10<sup>th</sup> – 20 15.27 -26 32.7, magnitude 9.8 in **Capricornus**; on the 20<sup>th</sup> – 20 05.13 -27 22.2, magnitude 9.6 in **Sagittarius**; and on the 30<sup>th</sup> – 19 54.54 -28 02.7, magnitude 9.7 in **Sagittarius**.

**Asteroid 192 Nausikaa – Nausikaa’s positions, according to the *RASC Observer’s Handbook, 2022 USA Edition*, are as follows:** On July 10<sup>th</sup> – 20 28.21 -28 45.0, magnitude 9.8 in **Sagittarius**; on the 20<sup>th</sup> – 20 17.91 -29 02.0, magnitude 9.5 in **Sagittarius**; and on the 30<sup>th</sup> – 20 06.38 -29 05.4, magnitude 9.5 in **Sagittarius**.

**Asteroid 387 Aquitania – Aquitania’s positions, by my estimate, are as follows:** On July 1<sup>st</sup> – about 2° east-southeast of **Zeta Scuti**; on the 5<sup>th</sup> – about 2.6° due north and a touch east of **Tau Ophiuchi**; on the 10<sup>th</sup> – about 1.5° due north and a touch west of **Tau Ophiuchi**; on the 15<sup>th</sup> – about 1.3° due west and a bit north of **Tau Ophiuchi**; on the 20<sup>th</sup> – about 1.3° due west and a bit north of **Tau Ophiuchi**; on the 25<sup>th</sup> – about 1.4° due west and a bit south of **Nu Ophiuchi**; and on the 30<sup>th</sup> – about 2° southwest of **Nu Ophiuchi**.

**Comets – Comet 19P/Borrelly - Borrelly’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 09 38 +36 57, magnitude 13.6 in **Lynx**; and on the 6<sup>th</sup> – 09 50 +35 57, magnitude 13.8 in **Lynx**.

**Comet 22P/Kopff – Kopff’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 01 00 +02 40, magnitude 11.5 in **Pisces**; and on the 6<sup>th</sup> – 01 07 +03 08, magnitude 11.5 in **Pisces**.

**Comet 45P/Honda-Mrkos-Pajdušáková – 45P’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 09 09 +19 10, magnitude 10.8 in **Cancer**; and on the 6<sup>th</sup> – 09 27 +17 52, magnitude 11.1 in **Leo**.

**Comet 73P/Schwassmann-Wachmann – 73P’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 10 59.5 +14 07.6, magnitude 12.5 in **Leo**; on the 11<sup>th</sup> – 11 21.9 +10 14.6, magnitude 12.2 in **Leo**; on the 21<sup>st</sup> – 11 46.8 +05 50.7, magnitude 11.9 in **Virgo**; and on the 31<sup>st</sup> – 12 14.3 +00 53.6, magnitude 11.7 in **Virgo**.

**Comet 169P/NEAT – 169P’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 04 24 +20 09, magnitude 12.1 in **Taurus**; and on the 6<sup>th</sup> – 04 58 +20 10, magnitude 12.0 in **Taurus**.

**Comet C/2017 K2 (PANSTARRS) – K2’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 17 26.2 +01 55.0, magnitude 7.8 in **Ophiuchus**; on the 11<sup>th</sup> – 17 05.3 -01 54.2, magnitude 7.7 in **Ophiuchus**; on the 21<sup>st</sup> – 16 45.8 -06 04.0, magnitude 7.6 in **Ophiuchus**; and on the 31<sup>st</sup> – 16 28.8 -10 18.8, magnitude 7.6 in **Ophiuchus**.

**K2’s positions, by my estimates, are as follows:** On July 1<sup>st</sup> – about 3° due south and a touch west of **Sigma Ophiuchi**; on the 5<sup>th</sup> -about 5° southwest of **Sigma Ophiuchi** or about 7.5° northwest of **M14**; on the 10<sup>th</sup> – about 5° due east of **M12**; on the 15<sup>th</sup> – about 1° due west of **M10**; on the 20<sup>th</sup> – about 2.5° due west of the star **23 Ophiuchi** or about 5.5° north-northeast of **Zeta Ophiuchi**; on the 25<sup>th</sup> – about 2.5° due north of **Zeta Ophiuchi** or about 2.4° due east of **Upsilon Ophiuchi**; and on the 30<sup>th</sup> – about 2.5° due west of **Zeta Ophiuchi**.

**Comet C/2019 L3 (ATLAS) – L3’s positions, according to *ALPO*, are as follows:** On July 1<sup>st</sup> – 08 03.7 +04 54.0, magnitude 10.1 in **Canis Minor**; on the 10<sup>th</sup> – 08 14.2 +03 25.1, magnitude 10.2 in **Hydra**; on the 20<sup>th</sup> – 08 24.7 +01 52.1, magnitude 10.3 in **Hydra**; and on the 30<sup>th</sup> – 08 35.1 +00 14.7, magnitude 10.4 in **Hydra**.

Comet C/2019 T4 (ATLAS) – T4’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 12 04 -05 07, magnitude 11.8 in **Virgo**; and on the 6<sup>th</sup> – 12 07 -04 43, magnitude 11.8 in **Virgo**.

Comet C/2020 V2 (ZTF) – V2’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 09 52.6 +55 26.6, magnitude 12.5 in **Ursa Major**; on the 11<sup>th</sup> – 09 55.0 +54 37.0, magnitude 12.4 in **Ursa Major**; on the 21<sup>st</sup> – 09 58.6 +53.54.3, magnitude 12.3 in **Ursa Major**; and on the 31<sup>st</sup> – 10 03.8 +53 19.7, magnitude 12.2 in **Ursa Major**.

Comet C2021 E3 (ZTF) – E3’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 08 49 -60 13, magnitude 9.4 in **Carina**; and on the 6<sup>th</sup> – 09 01 -56 35, magnitude 9.5 in **Vela**.

Comet C/2021 03 (PANSTARRS) – 03’s positions, according to *ALPO*, is as follows: On July 1<sup>st</sup> – 14 33 +59 36, magnitude 17.3 in **Draco**; and on the 6<sup>th</sup> – 14 41 +56 55, magnitude 17.7 in **Draco**.

Comet C/2021 F1 (Lemmon-PANSTARRS) – F1’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 03 40 -19 17, magnitude 13.1 in **Eridanus**; and on the 6<sup>th</sup> – 03 48 -22 34, magnitude 13.4 in **Eridanus**.

Comet C/2021 P4 (ATLAS) – P4’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 08 34.9 +37 24.2, magnitude 10.0 in **Lynx**; on the 11<sup>th</sup> – 09 07.3 +29 53.8, magnitude 9.8 in **Cancer**; on the 21<sup>st</sup> – 09 35.5 21 57.2, magnitude 9.6 in **Leo**; and on the 31<sup>st</sup> – 10 00.8 +13 49.1, magnitude 9.6 in **Leo**.

Comet C/2022 E3 (ZTF) E3’s positions, according to *ALPO*, are as follows: On July 1<sup>st</sup> – 19 01.5 +31 42.3, magnitude 14.1 in **Lyra**; on the 11<sup>th</sup> – 18 35.2 +33 58.1, magnitude 13.8 in **Lyra**; on the 21<sup>st</sup> – 18 06.5 +35 53.0, magnitude 13.6 in **Hercules**; and on the 31<sup>st</sup> – 17 37.7 +35 29.9, magnitude 13.4 in **Hercules**.

**Meteor Showers** – There are two **Major (Class I) Meteor Showers** active in July: The **Southern Delta Aquarids**, active from July 18<sup>th</sup> through August 21<sup>st</sup>, peaks on July 31<sup>st</sup> with a maximum zenith hourly rate (mzhr) of 20; and the **Perseids**, active from July 14<sup>th</sup> through September 1<sup>st</sup>, peaks on August 13<sup>th</sup> with a mzhr of 100.

There are two **Minor (Class II) Meteor Showers** active in July: The **July Pegasids**, active from July 4<sup>th</sup> through August 8<sup>th</sup>, peaks on July 11<sup>th</sup>, mzhr of 5; and the **Alpha Capricornids**, active from July 7<sup>th</sup> through August 5<sup>th</sup>, peaks on July 31<sup>st</sup> with a mzhr of 4.

There are no **Variable (Class III) Meteor Showers** active in July.

There are nine **Weak (Class IV) Meteor Showers**, with a mzhr of <2, active in July; The **Phi Piscids**, active from June 13<sup>th</sup> through July 5<sup>th</sup>, peaked on June 25<sup>th</sup>; the **Microscopids**, June 25<sup>th</sup> through July 6<sup>th</sup>, peaks on July 6; the **July Chi Arietids**, active from June 26<sup>th</sup> through July 22<sup>nd</sup>, peaks on July 7<sup>th</sup>; the **Phi Piscids**, active from July 2<sup>nd</sup> through July 22<sup>nd</sup>, peaks on July 10<sup>th</sup>; the **c-Andromedids**, active from June 21<sup>st</sup> through July 28<sup>th</sup>, peaks on July 12<sup>th</sup>; the **Northern June Aquilids**, active from June 26<sup>th</sup> through July 22<sup>nd</sup>, peaks on July 15<sup>th</sup>; the **Zeta Cassiopeiids**, active from July 7<sup>th</sup> through July 22<sup>nd</sup>, peaks on July 16<sup>th</sup>; the **July Gamma Draconids**, active from July 23<sup>rd</sup> through August 3<sup>rd</sup>, peaks on July 28<sup>th</sup>; and the **Eta Eridanids**, active from July 10<sup>th</sup> through September 10<sup>th</sup>, peaks on August 6<sup>th</sup>.

# Mythology:



## Scorpius – the Scorpion

‘There is a certain place where the scorpion with his tail and curving claws sprawls across two signs of the zodiac’ said Ovid in his *“Metamorphoses.”* He was referring to the ancient Greek version of Scorpius, which was much larger than the constellation we know today. The Greek scorpion was in two halves; one half contained his body and its stinger, while the front half comprised of the claws. The Greeks called this front half *“Chelae,”* meaning “claws.” In the first century BC, the Romans made the claws into a separate constellation, Libra, the Balances.

In mythology, this is the scorpion that stung Orion the Hunter to death, although accounts differ as to the exact circumstances. Eratosthenes offers two versions. Under his description of Scorpius, he says that Orion tried to ravish Artemis, the hunting goddess, and that she sent the scorpion to sting him, an account that is supported by Aratus. But in his entry for Orion, Eratosthenes says that the Earth sent the scorpion to sting Orion after he boasted that he could kill any wild beast. Hyginus also gives both stories. Aratus says that the death of Orion happened on the island of Chios, but Eratosthenes and Hyginus place it in Crete.

In either case, the moral is that Orion suffers retribution for his hubris. This seems to be one of the oldest Greek myths, the origin of which may lie in the sky itself, since the two constellations are placed opposite each other so that Orion sets as his conqueror, the Scorpion, rises. But the constellation is much older than the Greeks, for the Sumerians knew it as GIR-TAB, the Scorpion, over 5,000 years ago.

