

Happy
New
Year

Night Visions

January 2021

Newsletter of the **Baton Rouge Astronomical Society**

[Quadrantid meteor shower kicks off 2021 | wltx.com](https://www.wltx.com)

Monthly Meeting January 11th at 7:00 PM, via Jitsi
(Monthly meetings are on 2nd Mondays at Highland Road Park Observatory,
temporarily during quarantine at meet.jit.si/BRASMeets).

GUEST SPEAKER: Marty McGuire, a NASA/JPL Solar System Ambassador Volunteer and social media personality "Backyard Astronomy Guy", presenting "**Mars 2020 Mission Overview: Perseverance Rover**"

What's In This Issue?



NEW!

[President's Message](#)
[Member Meeting Minutes](#)
[Business Meeting Minutes](#)
[Outreach Report](#)
[Asteroid and Comet News](#)
[Light Pollution Committee Report](#)
[Globe at Night](#)
[Astro-Photos by BRAS Members](#)
[Messages from the HRPO](#)
REMOTE DISCUSSION
[Solar Viewing](#)
[Geminid Meteor Shower](#)
[Extreme Jupiter-Saturn Conjunction](#)
[Recent Entries in the BRAS Forum](#)



Observing Notes: [Taurus the Bull](#)

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

NEW!

[BRAS YouTube Channel](#)

President's Message

Happy New Year everyone. Let's take this again, from the top. Last year was a pretty busy year, between Mars, the conjunction, the comet, and a few other notable events, and I'm sure we'll have plenty to do over the course of this new year as well. It looks like things are going to start off a bit slowly, but they'll pick up over time, I'm sure. For the time being, we're going to continue to keep our monthly meetings online. I know a lot of people are getting a little stir crazy and really want to meet up in person again, and I can sympathize with that sentiment: isolation is terrible. The board has been tossing around some ideas to try to allow more people to meet up in person, but until we get them hammered out, the only thing I can suggest is for you come help out at one of our outreaches or club viewing opportunities: these take place outside and allow for better distancing. The observatory is also open with restrictions and, soon, I'm told, patrons will, once again, have access to the big dome, too. With luck, we will have regular meetings sometime in 2021. At the very least, we'll try to move the chairs outside and have a meeting on the viewing pads or the pavilion at HRPO once it warms up a little. And, for those who are a little more comfortable with the digital universe, we've added some spaces online for members to regularly interact. There are now forums on the BRAS website, Facebook, Reddit, and Discord where members can get together to chat or just hang out and post interesting stuff. Some of these forums are closed, so if you want in, just message one of us and we'll be sure to invite you. A lot of us have taken up photography lately, and these can be great places to show off what you've put together. Speaking of which, if anybody has images they've taken of the Great Conjunction, be sure to send them in to Fred, our webmaster: a lot of people have taken an interest in seeing these images, and they can't seem to get enough of them. As always, any astrophotos you've taken can get put up on our website and/or be submitted to Michele for the newsletter.

December's Fall viewing night was fairly successful, and plans are already in the works for the winter viewing session for sometime in February. And, jumping ahead quite a bit, we've even started looking at dates in April for the Spring event. Unfortunately, our winter start party at Rockefeller had to be cancelled due to damages to the park during one of the storms from last year. We were toying with the idea of putting together a winter or spring mini-star party (for perhaps a weekend), at one of the old haunts in the area: if you're interested, get go ahead and let us know. Provided we get enough interest, we'll start seeing what we can do to secure a location.

One last note: as everybody knows, the light pollution in Baton Rouge is getting impossible. Even finding and counting the brightest of the Pleiades with the naked eye has become difficult thanks to the LED revolution. If we don't act now, we won't have much of a hobby left in the near future. Chris Kersey has put together an ambitious plan to help us cut back on light pollution in and around the community surrounding HRPO. In order to put this plan in motion, we need volunteers to send emails, make phone calls, and attend meetings to help persuade people to our cause: all that's needed is a desire to help and some time, we'll train you for the rest. You won't even need to attend one of the dreaded LPC meetings unless you're so inclined.

Look through the newsletter to see what else is going on. We're still looking for a permanent VP for the year. Steven Tilley has offered himself as the interim VP for at least January, which just goes to show that we're willing to take people on a month by month basis if they even think they might be able to do it: this is very light commitment. Nobody wants to see 12 VPs for the year, but, if it comes to that, it comes to that. Step up, try it on for a month: you might like it.

That's the lengthy introduction to the new year: I hope it will be a good one, and I'll see you around.

Scott Cadwallader, President 2020

December Member Meeting Minutes

President Scott Cadwallader called meeting to order on Jitsi, on December 14th, 2020

- Coy introduced the guest speaker, Dr. Matthew Penny from LSU Astronomy Department. The topic of the presentation was “Mishaps – What Goes into The Creation of Large Planets”.
- Scott reminded everyone that yearly dues are due, and Trey has the Astronomy calendars – set up a time to meet at HRPO if you want one.
- Scott reminded people that HRPO is under Phase 3 restrictions, and that the “MOON” night is on Wednesday, but Thursday would be better.
- Chris K says that the HRPO Preview party is Friday night, and that there will be no “Learn to Use Your Telescope” class unless there is enough interest in it. The upcoming conjunction between Jupiter and Saturn will be at the Burbank Park on the 21st, and that it has gotten some attention. (Note: There was an estimate of about 400 people and Channel 2 News in attendance, and 6 telescopes were used – 3 from BRAS Members, and 3 from HRPO).
- Ben says there is not much of any Outreach right now. Scott said that there are Observing Certificates for the Conjunction – Ben added that they were from NASA, not AL. Ben added that if anyone wants to do an individual outreach, let people know about it on Facebook and other social media before the outreach. Scott added that if possible; try not to take business away from HRPO.
- Scott reported that Rockefeller has been damaged by the hurricanes, so no outing there this year. He also said that BRAS may try to make an informal star party somewhere else in the spring.
- Scott said that members should consider joining the Light Pollution Committee.
- Elections: All officers, except Coy (Vice-President) were re-elected for another year.
- Ben will give out the NSN pins to all of the 2020 Outreach participants.
- Both Ben and Scott C received their AL Messier Awards.

Meeting was closed.



Submitted by Thomas Halligan, Secretary

**Merry Christmas
and
Happy New Year!**



2021 Officers:

President: Scott Cadwallader

Interim VP: Steven Tilley

Secretary: Thomas Halligan

Treasurer: Trey Anding

BRAS Liaison for BREC:

Chris Kersey

BRAS Liaison for LSU:

Greg Guzik

Committees/Coordinators:

AL Awards

Merrill Hess

Light Pollution:

John Nagle

Newsletter:

Michele Fry

Observing:

John Nagle

Outreach:

Ben Toman

Webmaster:

Frederick Barnett



BRAS Business Meeting Minutes –December 30th, 2020, **remotely via Jitsi**

(This meeting is now scheduled to come early enough to be included in each monthly newsletter.
See President's Message)

- Scott Cadwallader opened the meeting with appointing Steven Tilley as the interim Vice President.
- Chris K talked to his supervisor, who agreed to a limited opening of the HRPO dome starting with the January Plus Night. Chris reported that two work orders have been completed – vine control and a new heater and thermostat for the ground floor of HRPO, a new work order to fix the sagging front gate was issued. Amy stated that HRPO may use temporary glow paint on certain nights, and that the display for the asteroid Apophis is finished. Chris said that there are currently 5 telescope operators – two from LSU, two from BRAS, and one from HRPO.
- Outreach – Ben says that an on-line event (the conjunction) with HRPO went really well, with Scott saying that it shows that BRAS can do on-line outreaches.
- MOON night – Scott said we will decide later whether to do one in January or February.
- Telescope sale – Pricing of excess eyepieces and other equipment is ongoing, with the Wally scope as a possible donation to WHAM. Pictures of Big Blue and the red Dob are to be taken by John N. and sent to Coy. The SCT needs the collector plate cleaned – it will be recorded and put on the BRAS You Tube channel. The cleaning of a mirror will also be recorded and placed on the BRAS channel.
- Social Media Plan – Scott says that it is hoped that the BRAS Discord will help with younger patrons, and Reddit just points to established on-line BRAS sites. Scott added that BRAS needs to be flexible with its digital presence, and that we need a “Field Marshal” over our various social media presences.
- New Member Kits – Scott said that a Jitsi meeting about this. Send any ideas to him.
- Steven Tilley has offered to provide an All-Sky/Meteor camera to HRPO. It automatically films and uploads to the American Meteorological Society along with providing a “real time” view. This will add another scientific aspect to HRPO. Once permission to connect to the LSU equipment is obtained (along with permission for the donated SQM to also be connected), and BRAS ready to have it installed at HRPO, we will go to BREC with it.
- Hybrid In-person/Virtual Meetings – Scott says not for now, we will revisit this idea at a later time.

Meeting ended at 8:14 PM

Submitted by Thomas Halligan

Upcoming BRAS Meetings:

Monthly Member Meeting: **7:00 Monday, January 11th**, via Jitsi remote access (open to the public).

Light Pollution Committee Meeting: **6 pm Wednesday, January 27th**, via remote access. (Open to the public), followed by

Monthly Business Meeting: **7 pm Wednesday, January 27th**, (via Jitsi remote access (Members Only)

MOON (Members Only Observing Night), **TBA**



BRAS Outreach Report

Hi Everyone,

Happy New Year to all! I'm going to start the new year out by focusing on the positive from the past year and on the potential for the upcoming year.

The positive from last year was our further steps in being able to provide online content for our community. In fact, our online content reaches far beyond our community, as well. We've had viewers in Wales, Australia, Germany, France, Syria, Japan, Canada and all over the United States. Of course, our main focus is on our local surroundings, but it's fun to be a part of a global community, too!

Our last outreach for 2020 was a livestream of the Jupiter/Saturn conjunction on December 21st. The stream reached almost 4,000 people and currently has over 1,500 views. (For your information, Facebook tells you how many individual newsfeeds our stream showed up on. That is the "reach". If someone actually clicked on the feed/video and watched it for more than 30 seconds, that is counted as a "view". In sidewalk astronomy, 30 seconds to a minute is what you would expect per person walking by that stops to look through the eyepiece.) Another great thing about our livestream is the fact that it is now archived on the page and will just continue to be watched and shared.

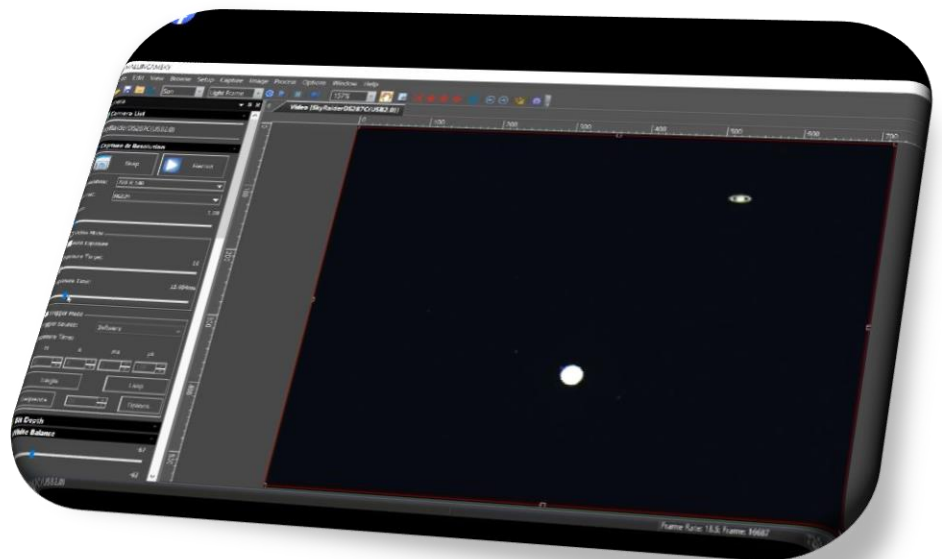
Now, on to the potential of the coming year. **Hopefully, we'll be getting better and better at this internet thing.** I'm looking forward to a time where we're able to conduct in-person and online events simultaneously and start achieving maximum outreach. More and more members are capable, ready and willing to do Electronic Assisted Astronomy while we wait for things to return to (relative) safety.

I'm also looking forward to a time when we can resume **group learning sessions on how to use/utilize the outreach toolkits we continue to receive from the Night Sky Network.** We were just getting started with that when we were shut down, but I think we were starting to get a hang of it and it should be easy to jump back in once restrictions are lifted.

Best of luck to us all in the coming year! I hope it finds you all safe, happy and healthy and ready to share your love of astronomy with others!!

Clear Skies,

Ben Toman



Here is a screenshot I took of the FB livestream of Jupiter/Saturn



BRAS Light Pollution Committee Report

This committee meets at 6:15, same day as the 7:00 BRAS Business Meeting
(NEW SCHEDULE: Meetings will be the Wednesday before the 1st Monday of the month.)

Everyone is welcome to join in..

Meeting called to order by Chairperson. John Nagle not able to attend meeting

Three members present, no new members

November minutes were published in November newsletter

Old Business:

1. Light Pollution Petition – the master list is to be kept in the BRAS locked cabinet. Take it to all BRAS outreach events not at HRPO, and petition sign-up sheets to be at HRPO for visitors to sign.
2. The letter to Utilities about Light Pollution was approved last March, John to deliver the letters next week.
3. Merrill will codify BRAS's stand on Light Pollution to be incorporated into the CEA with BREC and LSU.
4. Contacting other groups about Light Pollution – make up list by next week – no suggestion submitted.
5. Natural Sky Conference – Chris said HRPO would need more lead time and some particulars on what BRAS will be doing for the next conference.
6. Still need to contact utilities and Public Works Department about who controls which street lights in the greater Baton Rouge area.
7. Install of SQM at HRPO. Need the contact at LSU to obtain permission to connect up to the LSU server at HRPO.
8. Contact home school groups to help/participate in the Globe at Night program. Still need to do so.

New Business:

1. Multi-Year Natural Sky Reclamation Project – Chris explained it a little more and gave us a list of the incorporated municipalities within the 75 km service area of HRPO.
2. New research into the causes of light pollution – experiments involving Tuscon and satellite pictures indicate that only 20% or so of the light pollution comes from street lights.

Minutes of this meeting read and approved

Meeting adjourned.

Submitted by John R. Nagle, Chairperson

Globe At Night

The target for the Globe At Night program is **Orion from January 4th – 13th**

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

<https://www.globeatnight.org>

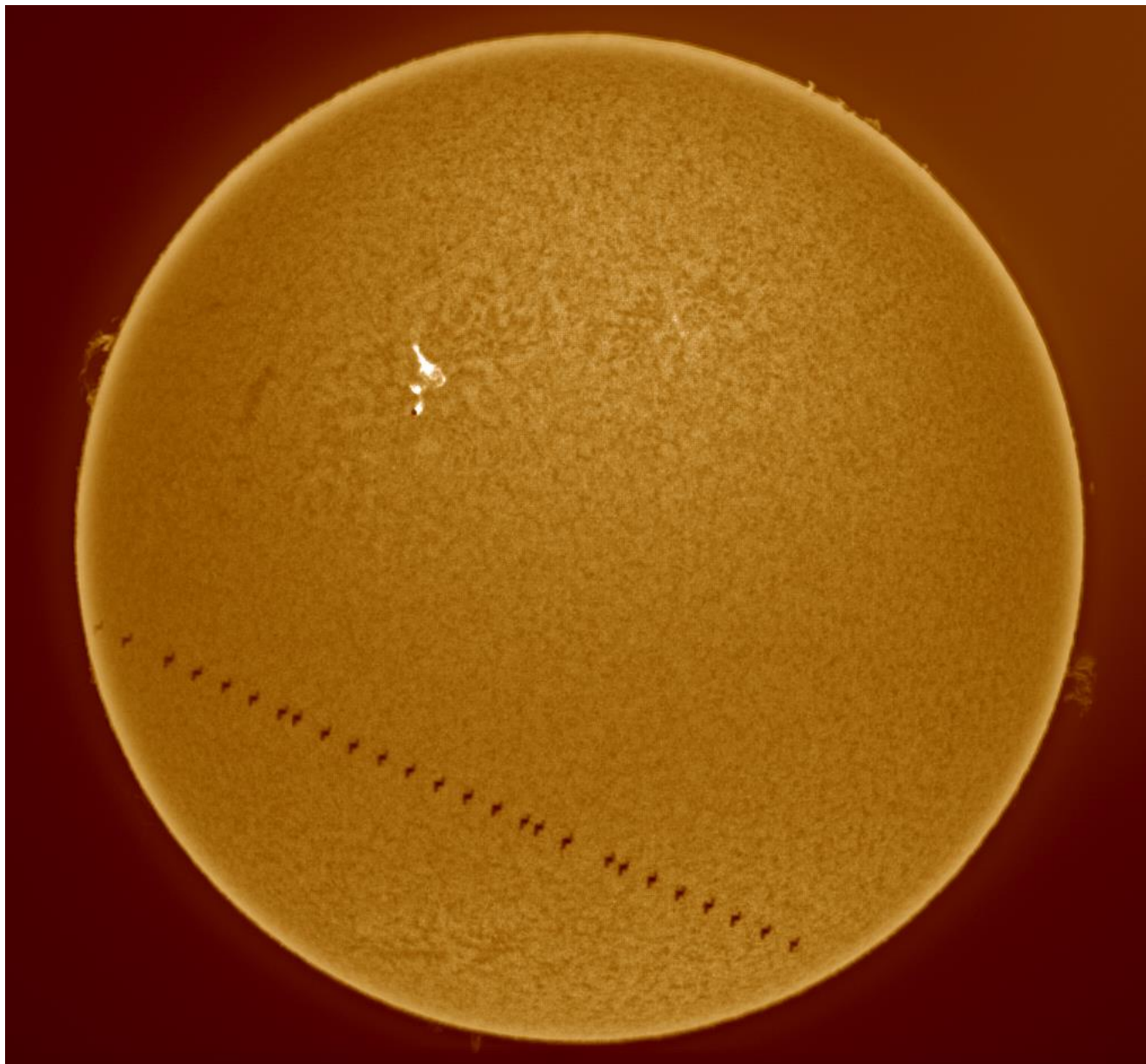
P.S. The “Loss of the Night” app can be used for information and for reporting your observations



BRAS MEMBER ASTROPHOTOS

If you want your astrophotos included here, send a .jpg to Michele at newsletter@brastro.org by the 25th. Be sure to name your file thus: your initials/date taken (yearmonthday)/image name. Ex. RR 20201126 M33. Include a brief discription in the email.

COY WAGONER



ISS transit across the face of the Sun from December 7. Taken with a 50mm Lunt hydrogen alpha scope and the ASI224mc camera. Location: LSU Lakes at May Street. POI, I'm fairly certain those white spots are called plages after the French word for beach -- part of an active region around a sun spot. I'm not sure which was the active region on that day.

SCOTT CADWALLADER



Great Conjunction of Jupiter and Saturn

JAMES ERNEST



Horeshead Nebula, taken December 17th with Stellina

Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

**January 2021
Volume 3, Issue 1.**

Surveyor 2 Centaur rocket booster returns to Earth for a visit

The “NEO” 2020 SO has become a temporary mini-moon of Earth. It was first discovered in September 2020. It will orbit the Earth from October 2020 to late May 2021. There is now enough data to tell “that is no moon” it is the Surveyor 2 Centaur rocket booster launched on 1966-09-20. 2020 SO made a close approach on 2020-12-01.

See:

https://en.wikipedia.org/wiki/2020_SO

https://en.wikipedia.org/wiki/Claimed_moons_of_Earth

Pieces of Asteroid Ryugu

Japan Aerospace Exploration Agency (JAXA)’s Hayabusa2 has delivered a sample from the asteroid 162173 Ryugu. The sample was collected in 2019 and Hayabusa’s sample-return capsule (SRC) landed in Woomera, Australia on 2020-12-05.

See:

<https://en.wikipedia.org/wiki/Hayabusa2>

https://en.wikipedia.org/wiki/162173_Ryugu

[JPL Close Approach Data](#) from Dec 01, 2020, to Dec 28, 2020, Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal (LD)	CA Distance Nominal (Earth Radii)	H (mag)	Estimated Diameter
(2020 SO)*	2020-12-01	0.13	7.97	28.5	5.3 m - 12 m
(2020 XE)	2020-12-01	0.77	46.68	26.2	15 m - 33 m
(2020 XE1)	2020-12-03	0.85	51.13	26.6	13 m - 28 m
(2020 XF)	2020-12-03	0.23	13.84	26.7	12 m - 27 m
(2020 VZ6)	2020-12-03	0.91	54.65	25.1	25 m - 57 m
(2020 XK1)	2020-12-07	0.05	3.28	30.6	2.0 m - 4.6 m
(2020 XG2)	2020-12-07	0.13	7.74	27.9	7.1 m - 16 m
(2020 XF4)	2020-12-16	0.89	53.71	27.5	8.2 m - 18 m
(2020 XX3)	2020-12-18	0.15	8.91	28.5	5.4 m - 12 m
(2020 YR2)	2020-12-19	0.45	26.97	28.2	6.0 m - 13 m
(2020 YS2)	2020-12-20	0.23	13.60	31	1.7 m - 3.7 m
(2020 YJ2)	2020-12-21	0.89	53.71	27.3	9.1 m - 20 m
(2020 YS4)	2020-12-28	0.25	15.01	27.7	7.7 m - 17 m

*This object has been identified to be the Surveyor 2 Centaur rocket booster launched on 1966-09-20.

As of 2020-11-31 there is

1,105 objects listed on JPL's Sentry: Earth Impact Monitoring(JPL) (<https://cneos.jpl.nasa.gov/sentry/>)

2,600 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/giorgjon.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 2020-11-28 to 2020-12-31

Object Designation	Removed (UTC)
2020 YC3	2020-12-31 13:40:16
2020 YN4	2020-12-29 17:59:25
2011 CL50	2020-12-27 16:42:31
2015 UH52	2020-12-26 16:16:51
2020 YR2	2020-12-23 15:04:08
2020 XU6	2020-12-23 15:01:02
2020 MO1	2020-12-22 14:43:48
2020 YF	2020-12-19 15:22:53
2020 XB7	2020-12-19 15:12:47
2020 XE3	2020-12-19 14:29:55
2020 XK5	2020-12-18 15:09:06
2017 UK52	2020-12-18 14:48:42
2020 XE6	2020-12-17 14:19:03
2020 XD5	2020-12-15 14:32:29
2020 FN3	2020-12-14 21:04:59
2020 XZ2	2020-12-14 14:28:12
2020 XR	2020-12-13 16:04:01
2020 XH2	2020-12-12 14:32:02
2020 SU4	2020-12-12 14:00:20
2020 XZ	2020-12-12 13:59:46
2020 WU5	2020-12-10 14:29:02
2020 XG1	2020-12-09 14:24:02
2020 WL5	2020-12-03 13:59:56
2020 WB3	2020-11-28 14:12:20

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>)



Messages from HRPO

Highland Road Park Observatory



REMOTE DISCUSSIONS

All are for ages fourteen and older.

Fridays at 6:30pm.

8 January: "2020—The Space Year in Review"

15 January: "Wonders of the Winter Sky"

22 January: "Our Birth Stars"

29 January: "Apollo 14 Fiftieth Anniversary"



Solar Viewing

Saturday 9 January from 12pm to 2pm.

For all ages. No admission fee.

(Solar Viewers, \$2 each. Add-on Activity: \$2.50.)

Virus Shutdown Guidelines in effect.

The hobby of astronomy immediately brings to mind thoughts of darkened backyards and dimly-lit nighttime activities at HRPO. But patrons also have the option of visiting during daylight hours to see our parent star.

Weather permitting, once monthly HRPO personnel offers three views of the Sun...

12pm to 12:30pm - *indirect projection onto white viewing surface* // Patrons get a sense of the speed of Earth's rotation as they see the Sun's image slide on or off the projection device. [Learning Technologies Sunspotter]

12:15pm to 1:15pm - *safely-filtered optical light sent through standard telescope* // This option allows patrons to spy sunspots both small and large. [Orion 10" Skyquest Dobsonian Reflector]

12:30pm to 2:00pm - *hydrogen-alpha light* // Flares and prominences are seen easily in this wavelength. [Coronado Solar Max II 90mm]



Display Premiere: “Arrival of Apophis”
December 2020 – April 2029

Using an outline composed by the HRPO Manager, Education Program Specialist Amy Northrop and other personnel have created a natural sky display focused on the asteroid Apophis. Planetary scientists at one time thought 99942 Apophis might strike the Earth in 2029. We now know that Apophis will instead pass extremely close—within 32,000 kilometers, which is within the orbits of some spacecraft. The predicted magnitude as it passes over Baton Rouge will be about +7. This magnitude is certainly “doable” with a good binocular, and a natural sky. For the next 100 months, this display will stand to remind and encourage local citizens to demand a more natural sky, so that a majority of us will see the passing of Apophis.



Display Premiere:
“Free to Wonder, Free to Ask,
Free to Hear, Free to Decide”

Saturday 16 January to Tuesday 14 December

2021 is already going to be an amazing year. Could it possibly get better? We Americans are celebrating the 245th anniversary of the Constitution and the 230th anniversary of the Bill of Rights. Without the backing of those documents and an understanding of their purpose neither scientists nor amateurs nor anyone could wonder about things, then ask questions, then hear all sides, then make a decision. For 333 days (from the first Plus Night of the year, to the planned past-midnight end of Geminid Meteor Shower peak viewing) HRPO celebrates the wonderful concepts and tools that help us find the truth!



Plus Night: “I Have a Question!”
Saturday 16 January from 7pm to 10pm
For all ages. No admission fee.
Binoculars recommended.

Sky Viewing Plus takes place about a half-dozen times per calendar year. It is the same program as “Evening Sky Viewing”, with the following additions—

- filtered views of the Moon, Mars and Jupiter (when those objects are available)
- marshmallow roast
- physical science demonstrations
- unaided eye sky tour
- binocular sky tour
- quiz/scavenger hunt/task game for kids to earn prizes

The game this month will focus on those wonderful moments in STEM history when someone asked a question, and the answer changed our lives!



Mercurian Elongation

Saturday 23 January from 5:15pm to 6:45pm

at Burbank Soccer Complex

No admission fee; for all ages.

Periodically Mercury reaches its greatest angular separation in the sky (elongation) from the Sun. This is the safest way to view Mercury by amateurs. The planet will appear as a “half-Mercury”. The waxing gibbous Moon and Mars will also be seen.

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum, which has reached 7000 posts.

BRAS Member Gets Great Shot of [Jupiter-Saturn Conjunction](#)

ISS Wows with [Magnitude -3.8 Pass](#)

Final Weeks for [Martian Viewing](#) Conclude in February

The Perseverance rover is only a couple of months away from completing its 300 million mile journey to the surface of Mars, and NASA wants you to know about it. Here’s the heart-pounding teaser video:

<https://mashable.com/video/nasa-perseverance-rover-mars-landing-mission-trailer/>

“Should Perseverance's landing in Mars' Jezero Crater be successful, the little robot will be tasked with collecting climate and geology information, rock and soil samples, and signs of microbial life on the red planet. It launched back in July and is due to land on 18 Feb. 2021, with live commentary of the event kicking off at 11:15am PST on nasa.gov/live.





OBSERVING NOTES JANUARY

by John Nagle

Taurus the Bull

Position: RA 04 06, Dec. 17° 20'

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 update the constellations with new and expanded material, but the Sky Happenings calendar and associated information are new each month.

Named Stars

Aldebaran (Alpha Tau), from the Arabic “Al Dabarän”, “The Follower”, or “Nä’ir al Dabarän”, “The Bright One of The Follower”, and “Cor Tauri”, or “Parilicium”, mag. 0.87, 04 35 55.20 +16 30 35.1, is an orange giant star and the 13th brightest star in the night sky. There is a 13th magnitude red dwarf star companion at a separation of 31.4”. **Aldebaran**, although it appears to be the brightest star in the **Hyades Cluster**, is not part of it. Also known as **HD 29139**, **HIP 21421**, **SAO 94027**, **HR 1457**, **β550**, **ΣII 12**, and **87 Tauri**.

El Nath (Beta Tau), from the Arabic “Al Nätih”, “The Butting One”, also “Alnath” or “Nath”, mag. 1.65, 05 26 17.5 +28 36 28.3, is a white giant star that is on the **Taurus/Auriga** border, resulting in having a second designation of **Gamma Aurigae**. Also known as **HD 35497**, **HIP 25428**, **SAO 77168**, **HR 1791**, and **112 Tauri**.

Hyadum I (Gamma Tau), “First Hyad”, “Prima Hyadum”, “Primus Hyadum”, mag. 3.65, 04 19 47.53 +15 37 39.7, is a giant star in the **Hyades Cluster**. Also known as **HD 27371**, **HIP 20205**, and **54 Tauri**.

Hyadum II (Delta¹ Tau), “The Second Hyad”, “Secundus Hyadum”, and “Secunda Hyadum”, mag. 3.77, 04 22 56.0 +17 32 33.3, is in a triple star system, with the primary being a orange giant star with a 12th magnitude companion at a separation of 107”. **Delta² Tauri**, mag. 4.80, 04 24 05.69 +17 26 39.2, is a main sequence dwarf star at a separation of 0.23° from the primary. **Delta³ Tauri**, magnitude 4.30, 04 25 29.32 +17 55 40.8, is a white sub-giant star with two companions at 8th and 11th magnitudes. Separation between primary and tertiary is 0.72°. **Delta¹ Tauri** is also known as **Eudora**, **HD 27697**, **HIP 20455**, and **61 Tauri**; **Delta² Tauri** is also known as **HD 27819**, **HIP 20542**, and **64 Tauri**; and **Delta³ Tauri** is also known as **Kleeia**, **HD 27962**, **HIP 20648**, **Kui 17**, **V776 Tauri**, and **68 Tauri**.

Ain (Epsilon Tau), “The Eye”, also called “Oculus Borealis”, mag. 3.53, 04 28 36.93 +19 10 49.9, is an orange giant star with an 11th magnitude companion at a separation of 182”. There is one planet in orbit with a period of 1.6 years – this is the first and only known planet in an open cluster (**The Hyades**), **M1** is 67’ to the northwest. Also known as **HD 28305**, **HIP 20889**, **HR1409**, **SAO 93954**, and **74 Tauri**.

Tianguan (Zeta Tau), from the Chinese “Tien Kwan”, “The Gate of Heaven”, mag. 2.97, 05 37 38.68 +21 08 33.3, is a shell star. Also known as **HD 37202**, **HIP 26451**, and **123 Tauri**.

Alcyone A (Eta^A Tau), mag. 2.85, 03 47 29.0 +24 06 18.9, is an eclipsing binary star with three companions (C, D, and E). It is a blue-white, rapid rotator, and is separated from the B star by 0.031”. **Alcyone C** is a white dwarf star. **Alcyone D** is a yellow-white dwarf star at magnitude 8.3. **Alcyone** was an **Atlantid Nymph** – the mother of **Hyrieus** by **Poseidon**, and is one of the stars in the **Pleiades Cluster (M45)**. **Alcyone A** is also known as **HD 23630**, **HIP 17702**, **SAO 76199**, **HR 1165**, and **25**

Tauri.

Alcyone B (Eta^B Tau), from the Arabic “Al Wasat”, “The Central One”, and “Al Nair”, “Bright One”, mag. 8.30, 03 47 19.20 +24 08 22.0, is a white dwarf star. Also known as **HD 23607**.

Chamukuy (Theta² Tau), mag. 3.40, 04 28 39.67 +15 52 15.4, is a member of the **Hyades Cluster**. Also known as **HD 28319**, **HIP 20894**, and **78 Tauri**.

Pectus (Lambda Tau), “The Bull’s Chest”, mag. 3.41, 04 00 40.82 +12 29 25.4, is an eclipsing binary star with a period of 3.95 days, and magnitude changes of 3.3 to 3.8. Both primary and secondary stars (**AB**) are rapid rotators, with the secondary being a sub-giant star. The third component, **C**, orbits **AB** with a period of 33.025 days. Located about 6° southwest of **Gamma Tauri**, and **Xi Tauri** is 9° to the southwest. Also known as **HD 25204**, **HIP 18724**, and **35 Tauri**.

Ushakaron (Xi Tau), mag. 3.73, 03 27 10.12 +09 43 58.0, is a triple star system composed of three blue-white main sequence dwarf stars. It is a spectroscopic binary and an eclipsing binary system. Two stars are in a close orbit with a period of 7.15 days, while the third star has an orbital period of 145 days. Also known as **HD 21364**, **HIP 16083**, **Gould 4**, and **2 Tauri**.

Füër (Sigma² Tau), Chinese in origin, mag. 4.67, 04 39 16.45 +15 55 04.9, is a member of the **Hyades Cluster**. Also known as **HD 29488**, **HIP 21683**, and **92 Tauri**.

Atlas A (27 Tauri), mag. 3.62, 03 49 09.73 +24 03 12.7, is a triple star system named after the Titan **Atlas**, father of the **Pleiades** and the **Hyades**. The primary star, **Atlas A**, is a blue-white giant star and a spectroscopic binary, with the **A** component at magnitude 4.1, and the spectroscopic component (**C**) has a period of 1250 days and a magnitude of 5.6. The **B** component is a dim companion at magnitude 6.8 and a separation of 0.4” from the primary. Located in the **Pleiades Cluster (M45)**. Also known as **HD 23850**, **HIP 17847**, **SAO 76228**, **HR 1178**, **Σ 453**, and **27 Tauri**.

Electra (17 Tau), mag. 3.72, 03 44 52.52 +24 06 48.4, is a blue-white giant star and a rapid rotator that emits an excess level of infra-red radiation. One of the **Pleiades** sisters and it is located in the **Pleiades Cluster (M45)**. Also known as **HD 23302**, **HIP 17499**, **SAO 76131**, **HR 1142**, and **17 Tauri**.

Maia (20 Tau), mag. 3.87, 03 45 49.59 +24 22 04.3, is a blue-white giant star named after the eldest of the **Pleiades** sisters and is located in the **Pleiades Cluster (M45)**. It is a mercury-manganese star. Also known as **HD 23408**, **HIP 17573**, (**Bessel**) **c Tauri**, **SAO 76172**, **HR 1156**, and **20 Tauri**.

Merope (23 Tau), mag. 4.14, 03 46 19.56 +23 56 54.5, is a blue-white sub-giant star and one of the **Pleiades** sisters and is located in the **Pleiades Cluster (M45)**. Also known as **HD 23480**, **HIP 17608**, **V971 Tauri**, (**Bessel**) **d Tauri**, **SAO 76172**, **HR 1156**, and **23 Tauri**.

Taÿgeta (19 Tau), mag. 4.30, 03 45 12.48 +24 28 02.6, is a triple star system and one of the **Pleiades** sisters and is located in the **Pleiades Cluster (M45)**. The primary, **A**, is a binary star and a blue-white sub-giant star. Both binary components (**A** and **C**), magnitudes 4.6 and 6.1, are separated by 0.012”, with an orbital period of 1313 days. The **B** component is an 8th magnitude companion at a separation of 69” from **AC**. Also known as **HD 23338**, **HIP 17531**, (**Bessel**) **e Tauri**, **SAO 76140**, **HR 1145**, **Bayer’s q Tauri**, and **19 Tauri**.

Ruby Star (119 Tau), mag. 4.32, 05 32 12.75 +18 35 39.3, is a red super-giant star, a semi-regular variable star, one of the reddest and largest stars known. Also known as **HD 36389**, **HIP 25945**, **CE Tauri**, and **119 Tauri**.

Yué (37 Tau), Chinese in origin, mag. 4.36, 04 04 41.66 +22 04 55.4. Also known as **HD 25604**, **HIP 19038**, **A¹ Tauri**, and **37 Tauri**.

Pleione (28 Tau), mag. 5.05, 03 49 11.20 +24 08 12.6, is a binary star in the **Pleiades Cluster (M45)**, named after the daughter of **Tethys** and **Oceanus**, and is the mother of the **Pleiades** sisters. It is an extremely fast rotator – rotating close to its break-up speed. Also known as **HD 23862**, **HIP 17851**, **BU Tauri**, **SAO 76229**, **HR 1180**, and **28 Tauri**.

Celaeno (16 Tau), mag. 5.45, 03 44 48.20 +24 17 22.5, is a blue-white sub-giant star and a rapid rotator. Sometimes called “The Lost Pleiad” because it is the most difficult to see – it can only be seen with optical aid. Located in the **Pleiades Cluster (M45)**. Also known as **HD 23288**, **HIP 17489**, **SAO 76126**, **HR 1140**, and **16 Tauri**.

Sterope I (21 Tau), “Asterope”, mag. 5.76, 03 45 54.46 +24 33 16.6, is a binary system with

Sterope II, and a main sequence dwarf star, separated by 0.04° . Named after one of the **Pleiades** sisters, it is in the **Pleiades Cluster (M45)**. Also known as **HD 23432**, **HIP 17579**, **SAO 76159**, **HR 1151**, and **21 Tauri**.

Sterope II (22 Tau), “**Asterope**”, mag. 6.43, 03 46 02.89 +24 31 40.8, is a binary system with **Sterope I**, and is a main sequence dwarf star named after one of the **Pleiades** sisters, located in the **Pleiades Cluster (M45)**. Also known as **HD 23441**, **HIP 17588**, and **22 Tauri**.

Hoggar (HD 28678), mag. 8.54, 04 31 25 +04 34 31, has one planet in orbit. Also known as **HD 28678**, and **HIP 21109**.

Baade’s Star (CM Tau), **PSR B0531+21**, mag. 16.5, 05 43 31.95 +20 00 52.1, is the pulsar star in the **Crab Nebula (M1 – NGC 1952)**. Also known as **NP 0532**.

Deep Sky:

M1 (NGC 1952), “**The Crab Nebula**”, mag. 8.4, 05 34 30 +22 01 00, 6’x4’ in size, is the supernova remnant from 1054 AD, and is located 67’ northwest of **Zeta Tauri (Tianguan)** – the star that marks the southern tip of the **Bull’s Horn**. This supernova was bright enough to be observed during the day, and is mentioned in Chinese historical texts. There is a neutron star at the center of the nebula, known as the “**Crab Pulsar**” emitting pulses of radiation ranging from gamma rays to radio waves, and rotates 30.2 times a second. Orange filaments are the tattered remains of the star and consist mostly of hydrogen. The blue light comes from electrons whirling at nearly the speed of light around magnetic field lines from the neutron star. The nebula is about 11 light years (ly) in diameter, and is expanding at the rate of 1500 km/second. **M1** is a strong source of X-rays, and was the first identification

(**Taurus X-1**) of an X-ray source with an optically visible object outside the solar system. A pulsating radio source was detected in the central region, and in 1968 it was suspected that this source derived from one of the faint stars which appear near the center of the nebula. In 1969, the south preceding component – a blue, 16th magnitude star – was pulsating in optical wavelengths also, and at the same frequency (0.033 seconds) as the radio pulsar, now designated as **NP 0532 (PSR 0532+21)**. Also known as **Taurus A**, **SN1054**, **Ced 53**, **Sh2-244**, **3C144**, **LBN 833**, **SIM 0531+21**, and **CM Tauri**.

M45 (The Pleiades), **Subaru**, **The Seven Virgins**, **The Seven Atlantic Sisters**, **The Daughters of Pleione**, mag. 1.2, 03 47 29 +24 06 18, 100’x100’ in size, is an open cluster containing over 300 stars, with the brightest seven stars going under the name of “**The Seven Sisters**”. From brightest to dimmest, they are named as follows: **Alcyone (Eta Tauri)**; **Electra (17 Tauri)**; **Maia (20 Tauri)**; **Merope (23 Tauri)**; **Taygeta (19 Tauri)**; **Celaeno (16 Tauri)**, and **Asterope (21 and 22 Tauri)**. Added is their mother – **Pleione (28 Tauri, BU Tauri)**, and the father - **Atlas (27 Tauri)**. The **Pleiades** are half-sisters to the **Hyades** with **Atlas** the common parent. **Alcyone** is the center star at magnitude 2.9. Contained in the **Pleiades** is the **Merope Nebula**, **NGC 1435**, also called **Temple’s Nebula**; and the **Maia Nebula**, **NGC 1432**. Also known as **Mel 22**, **Ced 191**, **vdB 22**, **Cr 42**, **OCL 421**, **Lund 117**, **C0344+239**, and **NGC 1432** is also known as **LBN 772** and **Ced 19f**. See the list of stars in the **Pleiades** after other stars.

Hyades, mag. 0.5, 04 28 13 +16 02 47, 5.5° in size, is an open cluster with at least 400 stars; detached, weak concentration of stars; large range in brightness; magnitude of brightest star is 3.4. The **Hyades**, the daughters of **Atlas** and **Aethra**, are mentioned in the works of **Homer**, **Virgil**, and other early writers. The prominent members of the **Hyades** form an asterism of stars in a “V” or “A” shape, forming the profile of the **Bull’s face** – **Gamma**, **Delta**, **Epsilon**, and **Theta Tauri** – all are red giant stars. Although **Aldebaran (Alpha Tauri)** is the “**Eye of the Bull**”, it is not part of the **Hyades**. The five (of seven) names that we know of the stars in the **Hyades** (one has been lost, one is being debated) are as follows: **Eudora (Delta¹ Tauri)**; **Koronis**; **Phaen**; **Kleia (Delta³ Tauri)**, and **Phaen**. They had one brother, named **Hyas**. Also known as the **Taurus Moving Cluster**, **C 41**, **Cr 50**, **Mel 25**, **Lund 128**, **OCL 456**, **OCL 456.0**, **PK 171-25.1**, and **C0424+157**. See the list of stars in the **Hyades** after **Other Stars**.

Cr 65, mag. 3.0, 05 25 05 +15 41 59, 220’ in size, 30 stars.

[AO84] IV, mag. 3.83, 03 24 +04 00, 11,000" in size, 20 stars are moving in a cluster with a very large angular size.

NGC 1746, mag. 6.1, 05 03 36 +23 49 00, 45'x45' in size, is an open cluster of 20 stars; detached, no concentration of stars; small range in brightness; large; magnitude of brightest star is 8.0. **NGC 1746** is in two sections – the eastern section is **NGC 1758** (also known as **OCL 454**, and **C0501+237**), and the western section is **NGC 1750** (also known as **C0500+235**). Also known as **Cr 57**, **OCL 452**, **Lund 148**, **Raab 20**, and **Mel 28**,

NGC 1647, **The Pirate Moon Cluster**, mag. 6.4, 04 45 42.2 +19 07 09, 40' in size, is an open cluster of 200 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 8.6. The central star is **PPM 12021.4**, at magnitude 8.8. Note: **SZ Tauri** is probably not a member. Also known as **Cr 54**, **Lund 139**, **Mel 26**, **OCL 457**, **OCL 457.0**, **Raab 18**, **H8-06**, and **C0443+189**.

NGC 2045, mag. 6.6, 05 45 00 +12 53 00, is one star. Also known as **Ced 58**.

NGC 1435, **The Merope Nebula**, **Tempel's Nebula**, **Pleiades Reflection Nebula**, mag. 6.8, 03 46 12 +23 46 00, 20'x15' in size, its brightest star is magnitude 4.2. It is a large and extremely faint patch of luminosity surrounding the star **Merope (23 Tauri)**, located in the **Pleiades (M45)**. Also known as **C 5**, **Ced 19l**, and **IC 349**.

NGC 1807, mag. 7.0, 05 10 42 +16 32 00, 17' in size, is an open cluster of 37 stars; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 8.6. Located about 0.5° west-southwest of open cluster **NGC 1817**, or about 8° southwest of **M1 (Crab Nebula)**. Also known as **OCL 462**, **Mel 29**, **Cr 59**, **Lund 154**, **Raab 21**, and **C0507+164**.

NGC 1817, mag. 7.7, 05 12 07 +16 42 00, 16' in size, is an open cluster of 60 stars; detached, no concentration of stars; small range in brightness; large; magnitude of brightest star is 11.2. Located about 0.5° east-northeast of open cluster **NGC 1807**, or about 8° southwest of **M1 (Crab Nebula)**. Also known as **OCL 463**, **H7-4**, **Cr 60**, **Lund 156**, **Raab 22**, and **C0509+166**.

Objects beyond magnitude 10 that are of interest:

NGC 1514, **The Crystal Ball Nebula**, mag. 10.8, 04 09 18 +30 47 00, 2'x2' in size, is a planetary nebula that is irregular, has a smooth disk involved in a large, faint nebulosity. It appears more like a nebulous star than a planetary nebula because the 9.4 magnitude central luminary (**HD281679**) dominates the view. Also known as **Ced 28**, **H4-69**, **ARO 21**, **PK 165-15.1**, and **PNG 165.5-15.2**.

NGC 1554/1555, **Hind's Variable Nebula**, **Struve's Lost Nebula**, 04 21 54 +19 32 00, 0.5' in size, is a faint, small, roundish reflection nebula associated with the star **T Tauri** that is 40' to the east. This is not the Taurus Nebula. **NGC 1555** is also known as **Burnham's Nebula**. Also known as **LBN 817**, **Sh2-238**, **DG 31**, **Ced 32b**, and **Be 84**.

NGC 1432, **The Maia Nebula**, 03 45 48 +24 22 00, 60' in size, is a relatively bright emission nebula or reflection nebula. Also known as **LBN 772**, and **Ced 19f**.

B 22, 04 38 00 +26 03 00, 120' in size, is a part of the **Taurus Dark Cloud**, along with **B 19**.

vdB 20, **Electra Nebulosity**, mag. 11.6, 03 46 00 +24 10 00, 70' in size. Also known as **IC 349**, and **Ced 19d**.

vdB 23, **Acyone Nebulosity**, mag. 11.9, 03 47 30 +24 06 00, 27' in size.

Simeis 147, **The Spaghetti Nebula**, 05 41 00 +28 06 14, 3.3'x3', is a supernova remnant containing the pulsar **PSR J0538+2817**. Also known as **Sh2-240**, and **LBN 822**.

Baade 1, mag. 13.9, 03 53.49 +19 27.8, 48" in size, central star is magnitude 17.2, has a ring structure, and is located in the **Hyades**. Also known as **C 41**, **Cr 50**, **ARO 87**, **PK 171-25.1**, **PNG 171.3-25.8**, and **Ba 1**.

Asterisms in Taurus:

Davis's Dog, mag. 5.0, 04 22 30 +21 25 00, 3.5'x1.5' in size, comprised of **Upsilon, 51**, and **53 Tauri**.

Ally's Braid, mag. 7.0, 03 47 00 +23 57 00, 42' in size, is comprised of 7 stars in a chain running from **Acyone** to the southeast.

Spermatozoon, mag. 8.0, 05 43 00 +21 30 00, 30' in size, is a chain of stars 0.5° long, located 35' east of **Zeta Tauri**.

Choo Wang, “The Many Princes”, is composed of 97 (i), 98 (k), 102 (l), 109 (n), and 114 (o) Tauri, located between the **Horns of the Bull**.

Al Kalbain, “The Two Dogs” of Aldebaran – the driver of the Pleiades, is composed of Chi, Upsilon, and Psi Tauri.

Li Shih, “a Coarse Sandstone”, is comprised of Phi, Chi, and Psi Tauri.

Tien Keae, “The Heavenly Street”, is comprised of Chi and Upsilon Tauri.

In Taurus are the following objects:

51 NGC; 38 IC; 93 UGC; 57 MCG; 22 B; 31 Ced; 2 DoDz; 1 Do; 1 BE; 13 OCL; 17 H; 52 LDN; 11 LBN; 5 Mel; 9 vdB; 1 [AO84]; 2 Cz; 1 [PKL98]; 1 [DB01]; 7 Cr; 7 Sh2; 3 FSR; 2 HARO; 1 Min; 2 C; 1 Teu; 1 Kro; 1 Frr; 1 Lor; 1 Magakian; 1 Simeis; 1 Al; 1 Pat; 1 A; 1 Str; 1 O’Neal; 1 Arp; 1 Al-Teu; 1 HCG; 3 Ku; 1 Kro; 1 ZwG; 2 HBC; 1 LKHA; 1 Pu; 2 DG; 3 VV; 4 Variable Galaxies; 15 Radio Galaxies; 7 Quasars; 22 CGCG; 6 PNG; 25 PGC; and 6 PK, for a total of 542 objects.

Other Stars:

46 Tauri, mag. 5.29, 04 13 33.11 +07 42 57.7, is a solar sibling candidate. Also known as **HD 26690**, **HIP 26064**, and **41 Gould**.

120 Tauri, mag. 5.67, 05 33 31.63 +18 32 24.8, is a Be star. Also known as **HD 36576**, **HIP 26064**, and **V960 Tauri**.

HD 24496, mag. 6.81, 03 54 28.03 +16 36 57.8, is a binary star with one planet in orbit. Also known as **HIP 18267**.

HD 24040, mag. 7.52, 03 50 22.97 +17 28 34.9, has one planet in orbit. Also known as **HIP 17960**.

HD 32963, mag. 7.6, 05 07 56.0 +26 19 41, has one planet in orbit. Also known as **HIP 26381**.

HD 37124, mag. 7.68, 05 37 02.49 +20 43 50.8, has three planets in orbit. Also known as **HIP 23884**.

HD 283668, mag. 9.44, 04 27 53.0 +24 26 41, has one planet in orbit. Also known as **HIP 20834**.

HD 284149, mag. 9.63, 04 06 39.0 +20 18 11, has one planet in orbit. Also known as **HIP 19176**.

HD 286123, mag. 9.8, 04 55 04.0 +18 39 16, has one planet in orbit.

Gliese 176, mag. 9.97, 04 42 35.78 +18 57 29.4, has one planet in orbit. Also known as **HIP 21932**.

Stars beyond magnitude 10 that are of interest:

HD 285507 (HIP 19207) at mag. 10.5, and **HD 283869 (HIP 22271)** at mag.10.6, both have one planet in orbit

V830 Tauri and **WASP 132**, both have transiting planets.

CL, **CI**, and **FW Tauri** has one planet each in orbit.

2M J044144 has one planet in orbit.

Main stars in the Pleiades Cluster: Alcyone A (Eta A Tauri); Alcyone B (Eta B Tauri); Atlas A; Electra; Maia; Merope; Taygeta; Pleione; Celaeno; 81 Tauri; and Asterope (Sterope I and II).

Main stars in the Hyades Cluster: Gamma; Delta¹; Epsilon; Theta²; Iota; Kappa¹; Rho; Sigma²; Upsilon; Theta¹; Delta³; Delta²; Sigma¹; and Kappa². Also included are 21 numbered stars; 10 HD stars; 4 Gould stars; 2 V (variable) stars; and more.

Stars in the Taurus Constellation:

25 Named; 69Σ; 15 OΣ; 8 OΣΣ; 3 ΣI; 1 ΣII; 5 h; 25β; 10 A; 5 Hu; 3 Ho; 2 SW; 2 Sh; 4 AG; 3 Kui; 1 XM; 1 Cou; 1 Bgh; 1 LDS; 1 LB; 1 H4; 1 H5; 2 H6; 80 Numbered; 11 Gould; 41 Lettered; 7 Variable; and 25 Greek.

Sky Happenings: January, 2021

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

Jan. 1 st -	Dusk: Jupiter and Saturn are a little more than 1° apart above the southwest horizon after sunset.
------------------------	--

Jan. 2nd -	Earth is at perihelion (91.4 million miles or 147,093,162 km from the Sun) at 8 AM CST, Evening: The waning gibbous Moon rises in the east-northeast in Leo , with Regulus some 4° to its right.
Jan. 3rd -	Double transit of Jupiter starts at 11:34 AM CST (see Jupiter in the next section), All Night: The brief Quadrantid meteor shower peaks at around 8:30 AM CST, with the best viewing between midnight and dawn on the 4 th . The waning gibbous Moon will interfere, and wash out the dimmer meteors.
Jan. 6th -	Last Quarter Moon occurs at 3:37 AM CST, Double transit of Jupiter starts at 11:40 PM CST (see Jupiter in the next section).
Jan. 9th -	Venus , 4° high 45 minutes before sunrise, will be between M20 (Trifid Nebula) and M8 (Lagoon Nebula) , The Moon is at perigee (228,224 miles or 367,387 km from Earth) at 9:37 AM CST, Mercury is 1.7° south of Saturn at 3 PM CST.
Jan. 10th -	Double transit of Jupiter starts at 1:06 PM CST, Dusk: Jupiter , Saturn , and Mercury form a tight triangle (within a 2.3° circle) as they set in the west-southwest.
Jan. 11th -	Mercury passes 1.5° south of Jupiter at 5 AM CST, The Moon passes 1.5° south of Venus at 2 PM CST.
Jan. 12th -	New Moon occurs at 11 PM CST (Lunation 1213).
Jan. 13th -	The Moon passes 3° south of Jupiter at 7 PM CST.
Jan. 14th -	The Moon passes 2° south of Mercury at 2 AM CST, Uranus is stationary at 8 AM CST, Pluto is in conjunction with the Sun at 8 AM CST.
Jan. 15th -	Morning: Venus is 46' due north of M22 , Evening: Just after sunset, over the southwest horizon, a very slender Moon , along with Mercury , Jupiter , and Saturn form a shallow arc about 15° long.
Jan. 17th -	The Moon passes 4° south of Neptune at 12 AM CST.
Jan. 20th -	First Quarter Moon occurs at 3:02 PM CST, Evening: The first-quarter Moon and Mars are about 6° apart high above the southwest horizon. With binoculars, you should be able to spot Uranus 1.5° to the lower left of Mars .
Jan. 21st -	The Moon passes 5° south of Mars at 12 AM CST, The Moon passes 3° south of Uranus at 12 AM CST, The Moon is at apogee (251,258 miles or 404,360 km from Earth) at 7:11 AM CST, Asteroid Eunomia is at opposition at 1 PM CST, Mars passes 1.7° north of Uranus at 6 PM CST.
Jan. 23rd -	Asteroid Vesta is stationary at 4 PM CST, Evening: High above the southwest horizon, the waxing gibbous Moon is in Taurus , some 4° above Aldebaran , Mercury is at greatest eastern elongation (19°) at 8 PM CST, Saturn is in conjunction with the Sun at 9 PM CST.
Jan. 24th -	Asteroid Irene is at opposition at 11 AM CST.
Jan. 25th -	The Moon is 0.3° north of M35 at 5 PM CST.
Jan. 26th -	Evening: The almost-full Moon is now in Gemini , with Pollux roughly 7° to the upper left.
Jan. 28th -	Full Moon occurs at 1:16 PM CST,

	Jupiter is in conjunction with the Sun at 8 PM CST.
Jan. 29th -	Evening: The Moon , one day past full, is in Leo with 4° separating it from Regulus , Mercury is stationary at 8 PM CST.
Feb. 3rd -	Dawn: High in the south-southwest, before sunrise, the waning gibbous Moon is about 6.5° From Spica , The Moon is at perigee (229,980 miles or 370,116 km from Earth) at 1 PM CST.
Feb. 4th -	Last Quarter Moon occurs at 1:37 PM CST.

Planets:

Mercury – **Mercury** will be 1.9° due south of **Saturn** on January 9th, and on the 10th, **Mercury**, **Saturn**, and **Jupiter** will lie within a 2.3° wide circle. On the 11th, **Mercury** will move to 1.4° to the south (lower right) of **Jupiter**. On the 13th, **Mercury**, at magnitude -0.9, will lie 3.3° to the upper left of **Jupiter** in the evening twilight. On the 14th, **Mercury** and the **Moon** are about 7° apart, with **Jupiter** 4.6° to the lower right (due west) of **Mercury**. On the 23rd, **Mercury** reaches greatest eastern elongation (19°), and will set 1.5 hours after the **Sun**.

Venus – **Venus** will rise more than an hour before the **Sun** on January 1st, located 12° east of **Antares**. It will be low in the southeast as twilight develops. The planet is currently moving along its orbit on the far side of the **Sun**, and shows a 94% lit disk, which will grow to 98% by the 31st, shining at magnitude -3.9 in the morning twilight. On the 9th, the planet will stand 4° high 45 minutes before sunrise, and will be located between **M20** (the **Trifid Nebula**) and **M8** (the **Lagoon Nebula**). On the 11th, a delicate 3% lit crescent **Moon** will rise about 4° to the right of the planet. On the morning of the 15th, **M22** (magnitude 5.0) will be 46' due south of the planet. The planet drops lower in the sky each morning, and will be lost to view after the end of the month.

Mars – **Mars** starts the month with an apparent size of 10", and a magnitude of -0.3, in **Pisces**. The planet crosses into **Aries** on January 5th, and makes its way across the sparse southern region of the constellation. From the 18th through the 22nd, **Mars** and **Uranus** are less than 2° apart. **Uranus** is exactly 1.7° due south of **Mars** on the 21st –do not confuse **Uranus** with the star **19 Arietis** (magnitude 5.8) that is at the same magnitude standing due west of **Mars**. **Uranus** will offer a blue-green hue to contrast with the red glow of **Mars**. **Mars** will fade to magnitude 0.4 as the disk shrinks to 8" by the end of the month.

Jupiter – **Jupiter** and **Saturn** start the month 1.3° apart, and by the 7th, **Mercury** (magnitude -0.9) joins them in the twilight scene 3.7° below the magnitude 0.6 **Saturn**, with **Jupiter** at magnitude -2.0. The pair of gas giant planets will remain within 2° of each other until the 8th. **Jupiter** is in conjunction with the **Sun** on the 29th.

According to *Sky and Telescope*, page 51 of the January 2021 issue says there will be multiple double transits of **Jupiter** during the first half of the month. On the 3rd, **Europa** starts ingress (I) at 11:34 AM CST, with its shadow following at 12:28 PM CST. **Io** joins **Europa** with (I) at 1:05 PM CST, and its shadow (I) at 1:31 PM CST. **Europa** starts egress (E) at 2:28 PM CST with **Io** (E) at 3:22 PM CST. **Europa's** shadow will (E) at 3:22 PM CST, with **Io's** shadow (E) at 3:48 PM CST.

The second double transit is on the night of the 6th/7th. **Europa** starts (I) at 12 AM CST, and its shadow (I) at 12:46 AM CST. **Io** starts (I) at 12:05 AM CST, with its shadow (I) at 12:28 AM CST. **Europa** will (E) at 1:54 AM CST, with **Io** (E) at 2:22 AM CST. **Europa's** shadow (E) at 2:41 AM CST, and **Io's** shadow (E) at 2:45 AM CST.

The third transit is on the 10th, with **Europa** starting at (I) 12:27 PM CST, and its shadow (I) at 1:06 PM CST. **Io** follows (I) also at 1:06 PM CST, and its shadow (I) at 1:25 PM CST. **Europa** (E) at 3:21 PM CST, with **Io** (E) at 3:23 PM CST. **Europa's** shadow (E) at 3:42 PM CST, with **Io's** shadow (E) at 4 PM CST.

The fourth transit occurs on the 12th. **Ganymede** starts (I) at 6:32 AM CST, and **Io** follows (I) at 7:37 AM CST. **Ganymede's** shadow (I) at 7:41 AM CST, with **Io's** shadow (I) at 7:54 AM CST. **Io** will (E) at 9:54 AM CST, with **Ganymede** (E) at 10:06 AM CST. **Io's** shadow (E) at 10:11 AM CST, with

Ganymede's shadow (E) at 11:17 AM CST.

The last transit occurs on the 14th. **Europa** starts (I) at 1:53 AM CST, with **Io** (I) at 2:07 AM CST. **Io's** shadow (I) at 2:22 AM CST, with **Europa's** shadow (I) at 2:24 AM CST. **Io** will (E) at 4:24 AM CST, with its shadow (E) at 4:40 AM CST. **Europa** will (E) at 4:47 AM CST, with its shadow (E) at 5:19 AM CST.

Saturn – After appearing with **Jupiter** and **Mercury** on the 7th, **Saturn** fades into the sunset, officially reaching conjunction with the **Sun** on January 24th. The planet will reappear at dawn in the latter part of February.

Uranus – **Uranus** and **Mars** will stand within 2° of each other from January 18th through the 22nd. **Uranus** (spanning 4'') will stick close to the star **19 Arietis** as **Mars** flies by, and will be in south central **Aries** throughout 2021. **Uranus** will reach its second stationary point on the 14th.

Neptune – **Neptune** is an easy binocular object for the first few hours of January evenings, shining at magnitude 7.8 in eastern **Aquarius**. On the 1st, it is 1° east of Phi Aquarii. There is a pair of 6th magnitude stars forming a triangle with **Phi Aquarii** 1.5° to its east and northeast (**96 Aquarii**). The planet spends the first three weeks of the month within this triangle. From the 17th through the 23rd, the planet's eastward motion will place it midway between the two stars for easy identification. The planet sets by 11PM local time on the 1st, and before 9 PM on the 31st. The planet will show a 2'' wide disk with a subtle bluish hue.

Pluto – On January 31, **Pluto** will be located at 19 45 30 -22 33 00 in **Sagittarius**.

Moon – On the 11th, the Moon will be 4° to the right of Venus, and will be just a bit more than 3% illuminated – both will be low in the southeast and will rise just one hour before the Sun. A New Moon occurs at 11 PM CST on the 12th, and on the 13th, the sunset will show a less than 1% illuminated crescent. Search for it between 20 and 25 minutes after sunset when the Moon is about 1° above the horizon in the southwest. On the 14th, early in the morning, the Moon and Mercury stand about 2° apart.

Favorable Librations: Inghirami Crater on the 3rd; Kircher Crater on the 8th; Bel'Kovich Crater on the 19th; and Pingre Crater on the 31st.

Greatest North Declination on the 27th (+24.8°)
 South 12th (-24.8°)

Libration in Longitude: East limb most exposed on the 16th (+5.4°)
 West limb 1st (-5.2°) and on the 28th (-5.3°)

Libration in Latitude: North limb most exposed on the 17th (+6.7°)
 South limb 4th (-6.7°)

Asteroids – Asteroid **4 Vesta** – **Vesta's** positions, according to the *RASC Observer's Handbook, 2021 USA Edition*, are as follows: On January 6th – 11 35.47 +0955.8, at magnitude 7.2; on the 16th – 11 39.04 +1023.2, at magnitude 7.0; and on the 26th – 11 39.87 +11 10.4, at magnitude 6.8.

Asteroid **10 Hygiea** – **Hygiea's** position, according to the *RASC Observer's Handbook, 2021 USA Edition*, on January 26th be 08 44.59 +15 39.0, at magnitude 9.9.

Asteroid **15 Eunomia** – **Eunomia's** positions, according to the *RASC Observer's Handbook, 2021 USA Edition*, are as follows: On January 6th b-08 29.83 +17 17.8, at magnitude 8.8; on the 16th – 08 19.26 +17 03.0, at magnitude 8.6; and on the 26th – 08 08.26 +16 50.4, at magnitude 8.6.

Asteroid **16 Psyche** – **Psyche's** positions, *by my estimates*, are as follows: On January 1st – just over 1.5° northeast of **Aldebaran**; on the 5th – just under 1.5° north-northeast of **Aldebaran**; on the 10th – about 1.3° due north of **Aldebaran**; on the 15th – 1.5° north and a little west of **Aldebaran**; on the 20th – 1.7° southeast of **Epsilon Tauri**; on the 25th – 1.5° southwest of **Epsilon Tauri**; and on the 30th – about 1.6° southwest of **Epsilon Tauri**.

Asteroid **18 Melpomene** – **Melpomene's** position's, according to the *RASC Observer's Handbook, 2021 USA Edition*, are as follows: On January 6th – 09 22.04 +08 26.5, at magnitude 9.9; on the 16th – 09 14.38 +09 31.5, at magnitude 9.7; and on the 26th – 09 04.83 +10 52.6, at magnitude 9.5.

Asteroid **29 Amphrite** – **Amphrite's** positions, according to the *RASC Observer's Handbook, 2021 USA*

Edition, are as follows: On January 16th – 10 54.62 +12 03.1, at magnitude 9.9; and on the 26th – 10 50.27 +12 22.3, at magnitude 9.7.

Comets – Comet **38P/Howell** – **Howell** will spend most of January in **Aquarius**. **Howell’s** positions, *by my estimates*, are as follows: On January 1st - 7° east-northeast of **Delta Capricorni**, or about 6° due south and a little east of **Theta Aquarii**; on the 5th – just over 5° southeast of **Theta Aquarii**, or just over 5° northwest of **Delta Aquarii**; on the 10th – just over 3° northwest of **Tau Aquarii**, or about 4.5° southwest of **Lambda Aquarii**; on the 15th – about 2° south and a little east of **Lambda Aquarii**, or about 3.5° north and a little west of **Tau Aquarii**; on the 20th – About 2.5° southwest of **Phi Aquarii**, or about 2.5° due west and a little north of **Chi Aquarii**; on the 25th – about 1.5° southeast of **Phi Aquarii**, or about 0.75° northeast of **Chi Aquarii**; and on the 30th – just over 4° east and a little north of **Phi Aquarii** – just over the border into **Pisces**.

Meteor Showers – The **Quadrantid** meteor shower will be affected by moonlight this year. The shower is active from December 28th through January 12th, peaking on the 3rd at around 8:30 AM CST. The best time to observe will be in the early morning hours of the 3rd, but a bright gibbous **Moon** is also in the sky from about 9 PM CST on the evening of the 2nd, affecting the visibility of most of the meteors except the brightest. The maximum zenith hourly rate (from a dark sky area) at peak is 120 meteors/hour. The radiant is in **Bootes** – look east around 4:30 AM CST on the 3rd. The **Quadrantid** meteors are associated with the periodic comet **96P/Machholz** and the minor planet **2003EH**.

When to View the Planets:

Evening Sky

Mercury (southwest)
 Mars (south)
 Jupiter (west)
 Saturn (west)
 Uranus (south)
 Neptune (southwest)

Midnight

Mars (west)
 Uranus (west)

Morning Sky

Venus (southwest)

DARK SKY VIEWING - PRIMARY ON JANUARY 16TH , SECONDARY ON JANUARY 9TH



Taurus – The Bull

The identification of the constellation of Taurus with a bull is very old, certainly dating to the Chalcolithic (the Copper Age), and perhaps even to the Upper Paleolithic. Taurus is represented in a cave painting at the Hall of Bulls in the cave at Lascaux (dated to roughly 15,000 BC), and is accompanied by a depiction of the Pleiades (M45). The name “The Seven Sisters” has been used for the Pleiades in the languages of many cultures, including indigenous groups in Australia, North America, and Siberia. This suggests that the name may have a common ancient origin.



Taurus marked the point of the vernal equinox (spring) in the Chalcolithic and early Bronze Age, from about 4,000 BC to 1,700 BC, after which it moved into the neighboring constellation Aries. The Pleiades were closest to the Sun at vernal equinox around the 23rd century BC. In Babylonia (Sumerian) astronomy, the constellation was listed in the “mul.APIN” as GU.AN.NA, “The Heavenly Bull”. As this constellation marked the vernal equinox, it was also the first constellation in the Babylonian Zodiac, and they described it as “The Bull in Front”. The Akkadian name was ALU.

In the Mesopotamian “Epic of Gilgamesh”, one of the earliest works of literature, the goddess Ishtar sends Taurus, “The Bull of Heaven”, to kill Gilgamesh for spurning her advances. Gilgamesh is depicted as the neighboring constellation Orion, and in the sky they face each other as if engaged in combat. In early Mesopotamian art, the “Bull of Heaven” was closely associated with Inanna, the Sumerian goddess of sexual love, fertility, and warfare. One of the oldest depictions shows the bull standing before the goddess’s standard; since it has 5 stars depicted on its back (the cuneiform sign for “star constellation”); there is good reason to regard this as the constellation later known as Taurus.

The same iconic representation of the Heavenly Bull was depicted in the Dendera Zodiac, an Egyptian bas-relief carving in a ceiling that depicted the celestial hemisphere using a planisphere. In these ancient cultures, the orientation of the horns was portrayed upwards or backward. This differed from the later Greek depiction where the horns point forward. To the Egyptians, the constellation Taurus was a sacred bull that was associated with the renewal of life in spring. When the spring equinox entered Taurus, the constellation would become covered by the Sun in the western sky as spring began. This “sacrifice” led to the renewal of the land. To the early Hebrews, Taurus was the first constellation in their zodiac, and consequently it was represented by the first letter in their alphabet, Aleph.

Taurus is a distinctive constellation, with the head defined by a V-shaped group of stars and star tipped horns. Two Greek bull-myths were associated with Taurus. Usually it was said to represent Zeus in the disguise he adopted for another of his extra-marital affairs, this time as the bull that carried away Europa, daughter of King Agenor of Phoenia. Europa liked to play on the beach with other girls of Tyre. Zeus instructed his son Hermes to drive the king’s cattle from their pastures on the mountain slopes toward the shore where the girls were playing. Adopting the shape of a bull, Zeus surreptitiously mingled with the lowing herd, awaiting his chance to abduct Europa. There was no mistaking who was the most handsome bull. His hide was white as fresh snow, and his horns shone like polished metal. Europa was entranced by this beautiful, yet placid creature. She adorned his horns with flowers and stroked his flanks, admiring the muscles on his neck and the folds of skin on his flanks. The bull kissed her hands, while inwardly Zeus could hardly contain himself in anticipation of the final conquest. The bull lay on the golden sands and Europa ventured to sit on his back. At first, she feared nothing when the bull rose and began to paddle in the surf. But she became alarmed when it began to swim strongly out to sea. Europa looked around in dismay at the receding shoreline and clung tightly to the bull’s horns as waves washed over the bull’s back. Craftily, Zeus the bull dipped more deeply into the water to make her hold him more tightly still. By now, Europa had realized that this was no ordinary bull. Eventually, the bull waded ashore at Crete, where Zeus revealed his true identity and seduced Europa. He gave her presents that included a dog that later became the constellation Canis Major. The offspring of Zeus and Europa included Minos, king of Crete, who established the famous palace at Knossos, where bull games were held.

An alternative story says that Taurus may represent Io, another illicit love of Zeus, whom the god turned into a heifer to disguise her from his wife Hera. But Hera was suspicious and set the hundred-eyed watchman Argus to guard the heifer. At the request of Zeus, Hermes killed Argus and freed the heifer. Hera was furious at this and sent a gadfly to chase the heifer, who threw herself into the sea and swam away.

The face of Taurus is marked by the V-shaped group of stars called the Hyades. In mythology, the Hyades

were the daughters of Atlas and Aethra, the Oceanid. Their eldest brother was Hyas, the bold hunter who one day was killed by a lioness. His sisters wept inconsolably – Hyginus says they died of grief – and for this they were placed in the sky. Hence it seems equally likely that their name comes from their brother Hyas. In another story, the Hyades were nymphs who nursed the infant Dionysus in their cave on Mount Nysa, feeding him on milk and honey. The mythographers were massively confused about the names and even the number of the Hyades. They are variously described as being five or seven in number.

Astronomers have avoided the problem by not naming any of the stars of the Hyades.

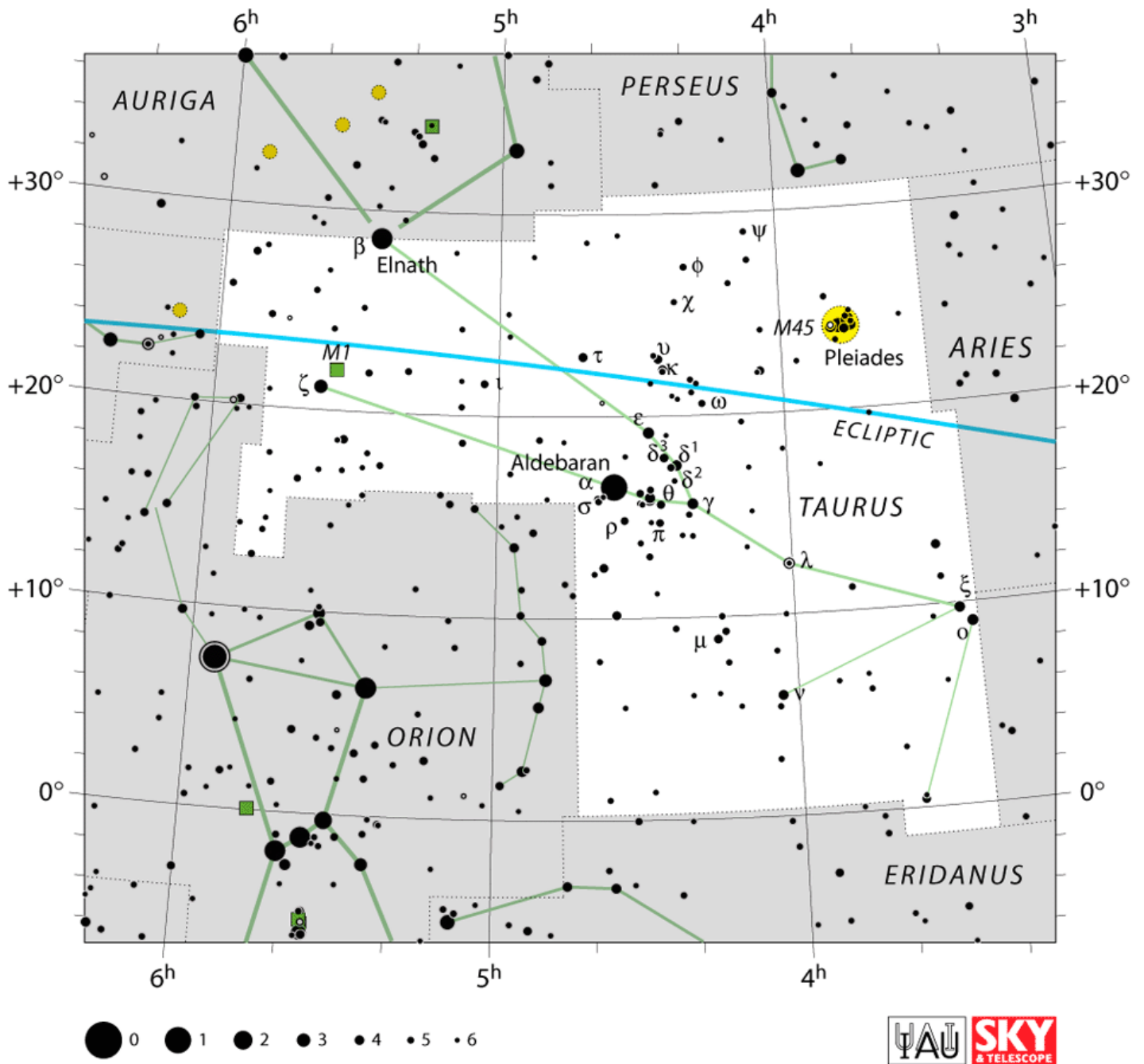
Even more famous than the Hyades is another star cluster in Taurus: the Pleiades, commonly known as “The Seven Sisters”. To the eye, the Pleiades cluster appears as a fuzzy patch like a swarm of flies over the back of the bull. So distinctive are the Pleiades that the ancient Greeks regarded them as a separate mini-constellation, and used them as a calendar marker. In mythology, the Pleiades were the seven daughters of Atlas and the Oceanid Pleione, after whom they were named. The name may come from the old Greek word *pleos*, “full”, which in the plural meant “many”, a suitable reference to the cluster.

According to other authorities, the name comes from the Greek word *peleidades*, meaning “flock of doves”. Unlike their half-sisters, the Hyades, the names of all seven Pleiades are assigned to stars in the cluster: Alcyone; Asterope (also known as Sterope); Celaeno; Electra; Maia; Merope; and Taygete. Two more stars are named after their parents, Atlas and Pleione. Alcyone is the brightest star in the cluster. According to mythology, Alcyone and Celaeno were both seduced by Poseidon. Maia, the eldest and most beautiful of the sisters, was seduced by Zeus and gave birth to Hermes; she later became foster mother to Arcas, son of Zeus and Callisto. Zeus also seduced two other Pleiades; Electra, who gave birth to Dardanus, the founder of Troy; and Taygete, who gave birth to Lacedaemon, founder of Sparta. Asterope was ravished by Ares and became the mother of Oenomaus, King of Pisa. Hence, six Pleiades became paramours of the gods. Only Merope married a mortal, Siphus, a notorious trickster who was subsequently condemned to roll a stone eternally up a hill.

Although the Pleiades are popularly termed “The Seven Sisters”, only six stars are easily visible to the naked eye, and a considerable mythology has grown up to account for the “missing” Pleiad. Eratosthenes says that Merope was the faint Pleiad because she was the only one who married a mortal. Hyginus and Ovid also recount this story giving her shame as the reason for her faintness, but both add another candidate: Electra, who could not bear to see the fall of Troy, which had been founded by her son Dardanus. Hyginus says that, moved by grief, she left the Pleiades altogether, but Ovid says that she merely covered her eyes with her hand. Astronomers, however, have not followed either legend in their naming of the stars, for the faintest named Pleiad is actually Asterope.

A famous myth links the Pleiades with Orion. As Hyginus tells it, Pleione and her daughters were one day walking through Boeotia when Orion tried to ravish her. Pleione and the girls escaped, but Orion pursued them for seven years. Zeus immortalized the chase by placing the Pleiades in the heavens, where Orion follows them endlessly.





The End