JPL Image of surface of Mars, and JPL Ingenuity Helicioptor illustration, (more info on Page 11)

Monthly Meeting April 12th at 7:00 PM, via Jitsijit

(Monthly meetings are on 2nd Mondays at Highland Road Park Observatory,
temporarily during quarantine at meet.jit.si/BRASMeet).

PRESENTATION: We welcome Melanie Templet, a past President of BRAS, who will speak on how her astronomy group established and built an observatory at Rio Rancho, New Mexico

What's In This Issue?

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

BRAS YouTube Channel

President's Message

Well, we made it. Happy Panda-versary. March made one year since we bugged out of the Observatory to try to slow down the spread of the Coronavirus pandemic, and now that the vaccines are eligible for every adult in Louisiana, we're slowly coming to the end of the darkest days of the crisis. But we're not quite done with it yet. After considering having our meeting outside at the observatory for April, we've decided that, given the speaker, and how the restrictions are being loosened as the vaccine rates go up, we may just as well hold off for another month before we try for an in-person meeting. We expect to hash out the protocols for the meeting at the next business meeting, which will probably be the familiar one's we've all grown accustomed to over the past year. Finger's crossed, we'll all be nodding our way through stories that never end again soon enough.

That said, there's more cause for celebration looking forward to the end of 2021. Not only should things start to seem a little more familiar around town, but we'll be marking 40 years of BRAS as an institution in the Baton Rouge area. To that end, we've started kicking around ideas on how to mark the occasion, beyond, you know, cake (yes, there will be cake). The two biggest ideas to hit the board so far have been to have some commemorative T-shirts made up and to have a nice, big raffle open to club members. At first, I thought this might be a great way to clean out the closet, but Ben put a stop to that: "No," he demanded, "We absolutely must purchase something new that club members will actually enjoy—let them enjoy the deep discounts from buying our used gear." So, now the question becomes, what should we raffle off? And this is the first question I'll put to the club. So far, the suggestion has been for an H-alpha scope, or a nice doublet refractor. I wouldn't mind a nice 10" dob, so I'll go ahead and suggest that. Let's keep ideas in the $500-$600 range—the idea is think of something we can recover the cost of through selling enough $5 tickets by the time the anniversary comes around in December. It was all Ben's idea, so go ahead and send him your ideas; he's easy to find, he's the newsletter guy. Other ideas regarding the anniversary are all up in the air, and we're setting up a committee to try to put the whole thing together, so let us know if you want in.

In the more immediate future, I'll remind you that we have some events coming up pretty quickly. Astronomy day is going to take place and HRPO in May, and we're setting up to celebrate Asteroid day in July. Both of these events would welcome your participation, even if it's just to hand out flyers at the front table. In the even more immediate future, I'll remind everybody that we're having club night at the Observatory after the April Meeting, weather permitting. Which, we'll probably keep open until about 12-1AM depending upon who shows up. All members and their families are welcome to come to HRPO during that 9-1 time slot to either set up scopes (bring your own or use one of ours) to view or image, or just sit around and talk with other members until their eyes glaze over. I've found these events to be a lot of fun in the past, and I encourage people to show up. In the past, we've prioritized clear skies over stability of scheduling for these events, with the results being that often the dates and times of these things are finalized at the last moment. But, it's been suggested we could do a rain-or-shine event out there and set aside like a movie or something to watch if its raining. Which is the second question I'd put to you: which do you prefer for the scheduling of these club nights at HRPO? Go ahead and email Thomas (see the website for the email) and let him know, and he'll report back to us. We've been trying to set these events up for at least once per season, so that's the jumping off point there. As a reminder, this is our club, so if you have any ideas on how to make it better, be sure to contact us or, better still, join in on the business meeting, which is the last Wednesday of every month at 7pm.

And lastly, a reminder that one of the essential elements of doing observational astronomy is that we can actually see the stars in the sky. In order to make sure the night sky stays viable for generations to come, we do have a light pollution committee who could use your help. One very easy way to help is to join the Globe at Night campaign and make monthly observations of the night sky. Pick a clear night when the moon is down, go outside and observe that month's constellation, and submit the report through the website—easy. Collection data is how the science gets done, and this is some good citizen science that benefits the activity we enjoy so much.

That's it. Happy galaxy season. I hope to see you all soon.

Scott Cadwallader, President 2021

March Member Meeting Minutes –March 8th, 2021
remotely via Jitsi

The March meeting was held virtually on March 8th.

- The speaker, Steven Tilley, talked on how to track asteroids.
- Steven has also been working on an all-sky camera.
- Scott C – The Globe at Night program needs reports. The project uses March of each year for comparisons.
- Still need a V.P. and a PIO.
- Chris K – The Move 2040 survey is up on the web. The government is asking the public what we want them to do. It is an easy survey to take.
- NANO Days will be back for one more year.
- Next Friday, if weather permits, there will be an Edge of Night program.
- Science Academy is going strong.
- HRPO will request a generator for HRPO.
- HRPO will help with the BRAS 40th Anniversary event.
- Coy W – Getting founding members would be a good idea.
- Scott C – Transitioning to a new generation is a good idea too. BRAS needs an Anniversary Planning Committee. I name Coy to be on the committee.
- Still trying to sell the 10" red Dob.
- Ben T – There is an outreach tomorrow – a video on the big screen.
- Chris K – HRPO is still under Phase 3 – 50 people max outside, 12 max inside.
- Scott C – There will be a MOON night after the April meeting.
- Dues can be brought to HRPO.

Meeting closed at 8:56 PM with 12 people attending.

Submitted by Thomas Halligan, Secretary

Thomas J. Halligan

INGENUITY MARS HELICOPTOR

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 –March 31st, 2021
remotely via Jitsi

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

- Scott opened meeting and said that the April speaker will be Melanie Templet, on how they established and built an observatory at Rio Rancho.
- The hardest part of having in person meetings is establishing an internet connection.
- The April meeting will be a jitzu meeting, and after the meeting is a MOON night.
- John N – we often have a back-up for the MOON night in case of bad weather.
- Outreach – Ben T said that the Zoo event had, as a safe estimate, 200 people, and that there are no details for any future events right now. He also said that the Night Sky Network is satisfied with our virtual events.
- Scott C – reminder that BRAS has a PO Box.
- HRPO – Chris K says he will not ask for volunteers during the business meeting.
- He added that LSU Physics department has a new staff member, Professor Eric Burns.
- HRPO can now have 25 people indoors, and 100 people outside.
- NANO Days was pretty good, and that they have the same activities every year.
- April Lectures and Science Academy is set, and all staff positions are now filled.
- Next big event at HRPO is the IAD. The NASA Stennis facility is sending staff members to the IAD!
- BRAS member pictures are touring various libraries in the area.
- A new air purifier and a new dehumidifier installed upstairs.
- Bids for the drop-out hydraulic cylinders are being requested.
- Steve T – Meteor Camera update – still a few bugs are being worked out. Kit may not be assembled for two months.
- BRAS Sales Book – Most eyepieces are set up, some might be in a raffle. BRAS and HRPO to use eyepieces in the lock box only. Will ask BRAS membership what they might want to see raffled off.
- BRAS 40th Anniversary Committee – Coy W. and John N are on it. Chris K says he will send a list of ideas for it.
- Scott C – BRAS Volunteer name tags will be given in the fall.
- Steven T is preparing for Asteroid Day (July 3rd) a similar set up as 2 years ago.
- Protocols for BRAS in-person meetings will be discussed at the next meeting.
- Meeting adjourned at 8:15 PM, 6 people attending.
-

Submitted by Thomas Halligan

Thomas J. Halligan

Upcoming BRAS Meetings:

Monthly Member Meeting: **7:00 Monday, April 12th**, via Jitsi remote access (open to the public).
Light Pollution Committee Meeting: **6 pm Wednesday, April 23th**, via Jitsi. (Open to the public), followed by…….
Monthly Business Meeting: **7 pm Wednesday, April 23rd**, (via Jitsi (Members Only)
MOON (Members Only Observing Night), **Monday, April 12th, immediately after the meeting.**

BRAS Outreach Report

Hi Everyone,

We did it! We had our first in-person outreach in over a year and it went well. We were out for the Baton Rouge Zoo's annual **Zippity Zoofest** the last weekend in March. It was well attended, but not so much that it felt crowded where we were set up.

We were well received and it was nice to hear people thanking us for helping bring science education to the community. Thank you to our volunteers on the day, Chris and Annette (pictured), Craig, Scott, Chris K. and Ben for taking the time to help out!

Zippity Zoofest on March 28th at the Baton Rouge Zoo. Pictured are Chris and Annette R. with our limited-due-to-COVID display.

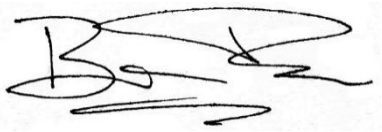
Over the summer, we will organize our outreach toolkits and try to resume training sessions.

While I haven't seen a huge influx of outreach requests as of yet, I do expect that things will start to get back to normal for us by the end of Summer. We usually have a bit of a hiatus during the Summer months anyway just because of the heat, humidity and late sunsets, so these next few months won't be out of the ordinary. We can use that time to prepare, though. We'll start **organizing our outreach toolkits** and maybe even **resume training sessions**. Keep an eye out for information in upcoming newsletters and email blasts!

Even as COVID has restricted our Outreach efforts for over a year, we've built up a nice virtual audience!!

In the meantime, we'll keep our eyes and ears open for other requests and maybe do some live streaming. We've built up a nice virtual audience and there are some great objects out there we have the capability to share now. Now we need to get some clear skies to help us out!

Clear Skies,
Ben Toman



BRAS Light Pollution Committee Report

This committee meets at 6:00, 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
3 members present, no new members
March minutes were published in March newsletter

Old Business:

1. Light Pollution Petition binder found in a file cabinet. Will be set out for HRPO visitors to see and sign up.
2. Chris K. working on getting the Entergy contact that BREC had.
3. Update given on the 7 year plan.
4. Thomas H. has not received any update from BREC on the Environmental Sustainability Program.
5. Paperwork/Application for an IDA Urban Park is being filled out.

New Business:

1. Idea was suggested to find an area/park in Louisiana (preferably in the center of the state) that could eventually become an IDA certified Dark Sky Park (for use by all astronomy clubs in the state).
2. Astronomy clubs in Louisiana will be contacted in regards to the proposal for a Dark Sky Park.

Minutes of this meeting read and approved
Meeting adjourned.

Submitted by John R. Nagle, Chairperson

John R. Nagle

Globe At Night

The target for the Globe At Night program is **Leo from April 3rd through the 12th..**
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 now has a subreddit and a Discord server.

There was an issue with link posted in March. See P.S. Below

From Amy Northrup: Our subreddit has been set up for us to reach out to the public. I'd love for you to join us on there.

https://www.reddit.com/r/BRAstro/

If BRAS members want to identify themselves as club members, PM me to add a Flair next to your username.

Our discord server is for Members only. It's a fun place for us to hang out. We've set up a channel in discord called techsupport-faq to help those who are new to Discord. If you have any problems you can message me or Justin. https://discord.gg/6N8r8DDj It also has voice channels so that you can speak to people through Discord. Discord requires the download of a free app.

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

P.S.

It has come to our attention that there was a problem with the Discord Link. To ensure there aren't issues like this in the future, we ask that those hoping to join the discord, please email ***safey2007@gmail.com*** *with the subject* ***BRAS Discord****. This way everyone will get a link that can work for them. Sorry for the inconvenience.*

Sincerely,
Amy & Justin Northrop

****

Flying "Rocks" and "Dirty Snowballs":

Asteroid and Comet News

April 2021
Volume 3, Issue 4.

JPL Close Approach Data from Feb 21, 2021 to Mar 23,2021, Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal (LD)	CA Distance Nominal (Earth Radii)	H (mag)	Diameter
(2021 DA2)	2021/02/21	0.51	30.73	29.2	3.9 m - 8.8 m
(2021 EA)	2021/03/02	0.24	14.46	28	6.7 m - 15 m
(2021 EF1)	2021/03/08	0.73	43.99	29.7	3.1 m - 6.9 m
(2021 EG3)	2021/03/09	0.38	22.90	29.2	3.8 m - 8.4 m
(2021 EN4)	2021/03/15	0.18	10.85	29.7	3.0 m - 6.8 m
(2021 EP4)	2021/03/15	0.97	58.45	29.3	3.7 m - 8.4 m
(2021 EQ3)	2021/03/16	0.72	43.38	26.1	16 m - 36 m
(2021 FM2)	2021/03/20	0.22	13.26	30.1	2.5 m - 5.7 m
(2021 FF2)	2021/03/21	0.83	50.01	28.1	6.4 m - 14 m
(2021 FO1)	2021/03/23	0.84	50.61	29.5	3.4 m - 7.6 m
(2021 FH)	2021/03/23	0.61	36.76	26.7	12 m - 27 m
(2021 FP2)	2021/03/23	0.84	50.61	30.1	2.5 m - 5.7 m

As of 2021-03-25 there is

1,150 objects listed on JPL's Sentry: Earth Impact Monitoring(JPL) (https://cneos.jpl.nasa.gov/sentry/)
2,655 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 2021-02-25 to 2021-03-25

Object Designation	Removed (UTC)
2021 FW2	2021-03-25 14:07:37
2021 ES5	2021-03-22 22:20:45
2021 FW	2021-03-21 14:48:12
2021 ED5	2021-03-21 14:29:50
2021 EM5	2021-03-20 14:07:12
2021 FH	2021-03-20 14:00:50
2021 EP2	2021-03-19 14:05:21

2021 EJ4	2021-03-18 14:46:46
2021 ER4	2021-03-18 14:33:53
2021 EQ3	2021-03-13 14:31:26
2021 EN3	2021-03-13 14:30:37
2018 YW2	2021-03-10 14:03:14
2021 ES1	2021-03-09 14:00:24
2021 EZ	2021-03-08 14:34:05
2021 EV	2021-03-07 14:52:56
2020 YB5	2021-03-06 15:03:49
2021 BW1	2021-03-04 18:36:55
2021 DM2	2021-03-04 15:01:30
2021 DS	2021-03-02 14:35:28
2020 SP	2021-03-01 19:03:15
2020 GE	2021-02-26 16:10:17
2020 TY1	2021-02-26 14:06:23
2021 DG2	2021-02-26 14:01:44
2021 DH2	2021-02-25 14:21:41

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)

****

Recent Entries in the BRAS Forum

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

Photography of BRAS Member Bill Buck Changing Venues
Still Time to Take MOVE2046 Survey
Mars and Pleiades Shone in Same Binocular FOV
Juno Sheds Light on Zodiacal Light
STARLINK Trains Zipped Through Baton Rouge March Sky
Shortwave Radio Storm at Jupiter Detected
Short-Lived Mountain Cloud at Mars Every Spring?
At Least Four G1 Storms in March
Vesta Reaches Opposition
Earth Safe from 99942 Apophis for At Least One Century
New Information About Comet 2I/Borisov
2021 NanoDays a Success

****

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.

Richard Rogers

The Witch's Face - reflection nebula in the far eastern portion of Eridanus – immediately adjacent to Rigel. This is an enormous but very faint carbon-rich supernova remanent of about 1x4 degrees or 8 times the apparent area of the full moon. The cloud is illuminated by Rigel.

The half-baked image of IC 2118, taken Jan 15, 2021 from Clinton, LA . Equipment was an unmodified Nikon D300s camera attached to a Nikon 70mm aperture, 300mm focal length lens stopped down to F5.6. The camera and lens was attached to a GSO 8 inch astrograph holding a Celestron NextStar guide camera running a Meade LX85 GOTO mount. The image is a stack of about 100, 2 minute images registered with Deep Sky Stacker and post-processed with StarTools and PaintNet. While the outline of the "witch" is visible, the image could easily use about 4 more hours of photons. Unfortunately, the moon, weather and the movement of this part of the sky into the Baton Rouge Zone of AstroImage Death means that these photons will need to be acquired next year.

Ingenuity is only days away from attempting its first powered helicoptor flight on Mars. Mid-April is the target date.

Watch WSJ/JPL's 4:27 minute video here:

NASA's Ingenuity Mars Helicopter Gets Set for Historic First Flight on Another World - WSJ

Here's a teaser for the WSJ article, by Robert Lee Hotz:

"Ingenuity reached Mars like a stowaway, folded up on the underside of NASA's Perseverance rover, which landed on the red planet in February after a seven-month, 293-million-mile voyage from Earth. For its maiden flight, the 4-pound, $85 million craft will simply rise about 10 feet above the surface and hover—no higher than the rim of a regulation basketball hoop—before returning to the surface. The whole flight should be over within 90 seconds."

"The brief excursion—one of five planned for a one-month period expected to start on or about April 11—is a short hop by the measures of interplanetary travel. But agency officials said it would be a giant leap for Mars exploration. In the future, they said, autonomous drones like Ingenuity could . . . . "

Learn more about Ingenuity here: Ingenuity Landing Press Kit | Introduction (nasa.gov)

Messages from HRPO

Highland Road Park Observatory

HRPO MANAGER'S STATEMENT: HRPO HYDRAULIC CYLINDER REPLACEMENT

HRPO on-site personnel have been told by BREC HQ that the cylinders can be replaced in fiscal year 2021. I am attempting to insure that will be accomplished during the first half of 2021. I appreciate the patience and loyalty of our partners.

HRPO MANAGER'S STATEMENT: HRPO AS A NON-LIGHT PROPERTY

Next year, HRPO will celebrate its twenty-fifth anniversary. In 1997 the mission's three owners (BREC, LSU and BRAS) assured taxpayers, stakeholders and other visitors that the singular purpose of giving over the property to such a mission would be to allow it to be successful as a non-light place—no artificial light whatsoever from superfluous, non-STEM activities. That's the only way the views of the sky can be as organic, natural and detailed as possible. The distance of the viewing grounds from Highland Road is very deliberate. None of the grounds can be used for any non-STEM, light-creating activity without hindering the HRPO mission. Onsite BREC personnel will continue to enforce this to all of our abilities.

REMOTE DISCUSSIONS

All are for ages fourteen and older.
Fridays at 6:30pm.

2 April = "Magnetars"

Eric Burns, a brand-new astrophysicist at LSU is bringing to his new home of Baton Rouge a special gift-a never-before-seen presentation for HRPO patrons concerning neutron stars with intense magnetic fields.

9 April = "Titanic: Fire and Ice"

It has been 109 years…the stately craft lies deteriorating in its grave several kilometers below the surface of the Atlantic. BREC Education Program Specialist Amy Northrop reveals an evocative picture of the lonely high seas, acts of desperation and courage, mounting panic that places the audience at the scene of the tragedy.

16 April = "Wonders of the Spring Sky"

The temperature is mild as April's constellations settle high overhead early in the night. HRPO Education Curator Amy Northrop takes the audience on a fascinating tour of Baton Rouge's spring 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!

23 April = "The Saga of Daylight Time"
From intriguing beginnings this bizarre policy has been with us throughout our entire lives. Now we are asked serious questions. Does Daylight Time even give anything of value to modern society? What happened in the 1970s when the United States attempted to go to Daylight Time year-round?
30 April = "H.M.S. Hood: Pride of a Nation"
As with HRPO's other current Program Aide, James DeOliveira began his career at the facility as a kid. One of his first tasks as PA was to put together two incredible new presentations detailing two of the most memorable incidents of WWII. The story will be used to describe the importance of celestial navigation and radio in defeating the Axis. [The tale continues with the 7 May presentation.

SOLAR VIEWING

Saturday 10 April from 12pm to 2pm / No admission fee.

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.

PLUS NIGHT

Topic: "The Navigational Stars"
Saturday 17 April from 7pm to 10pm
Binoculars recommended.

Taking place several times per calendar year, Plus Night is the same program as "Evening Sky Viewing" with the following additions—
--marshmallow roast
--filtered views of the Moon, Mars and Jupiter (when those objects are available)
--physical science demonstrations
--unaided eye sky tour
--binocular sky tour
We will also showcase those currently visible stars used in times of exploration and times of war.

INTERNATIONAL ASTRONOMY DAY

Saturday 15 May from 3pm to 11pm / No admission fee.

It's back—the greatest IAD event in the region returns. The hugely popular Adventure Quest game, delicious food and drink, and a passport to the stars. Mark your calendar and don't miss it.

AMERICAN RADIO RELAY LEAGUE FIELD DAY

Saturday 26 June from 2pm to 10pm / No admission fee.

One section of the electromagnetic spectrum gets all the love, as tens of thousands of "hams" ascend to the radio waves with "phone" (voice) and CW (Morse) in this exciting contact contest that stretches from coast to coast!

BRAS and HRPO are wishing our entire community a Happy Easter, and we look forward to seeing you all in person beginning in May.

OBSERVING NOTES APRIL

by John Nagle

Leo – The Lion

Position: RA 11, Dec. +15°

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

Regulus (Alpha Leo), "Little King", "Cor Leonis", "Lion's Heart", "Al Kalb al Asad", mag. 1.36, 10 08 22.46 +11 58 01.9, is a four star system composed of a spectroscopic binary (**Regulus A**) and two more stars. The spectroscopic binary is a blue-white main sequence star and a companion star that can't be resolved – believed to be a white dwarf star and the two have an orbital period (around their common center of mass) every 40 days or so. The **B** star is a dwarf star at magnitude 7.7, and the **C** star has a magnitude of 13.2. The separation of **A-BC** is 176.9", while the separation of **B-C**, a close double star, is 2.5" with an orbital period of 2,000 years. There is a fourth star, **D**, a 13th magnitude star, that is separated from **A** by 217". The primary is an extremely fast rotator, with a rotational period of only 15.9 hours, and, as a result, has an oblate shape. **Regulus A** is the 21st brightest star in the night sky. Also known as **HD 87901**, **HIP 49669**, **Σ 118**, **HdO 127**, **ADS 7654**, **HR 3982**, **SAO 98967**, and **32 Leonis**.

Denebola (Beta Leo), "denab al-asad", "the Lion's Tail", also "Datirah", and "Serpla", from the Arabic "Al Sarfah", "The Change or Governor of the Weather", and "Deneb Aleet", mag. 2.14, 11 49 03.88 +14 34 20.4, is a main sequence blue-white star with several optical only components – One at 13.0 magnitude at a separation of 77'; one at 15.5 magnitude at a separation of 40"; one at 8.5 magnitude at a separation of 264", and β 603 at 5.9 magnitude and a separation of 1134" – a double star difficult to resolve because the secondary is magnitude 10.0 at a separation of less than 1.0", and having an orbital period of 134 years. **Denebola** is a rapid rotator, at 120 km/second, resulting in an oblate shape with a bulge at the equator. It also exhibits a strong infra-red excess, suggesting that it may have a circum-stellar debris disk of dust in its orbit. It belongs to the **IC 2391** super cluster, a stellar association also known as the **Omicron Veloram Cluster**, located in the **Vela** constellation. Also known as **HD 102647**, **HIP 57632**, **HR 4534**, **SAO 99809**, and **94 Leonis**.

Algieba (Gamma Leo), "Al Gieba", "Al Jab'hah", "The Forehead 9of the Lion)", "Juba", "The Lion's Mane", is a double star. **Gamma¹ Leonis**, mag. 2.37, 10 19 58.16 +19 50 30.7, is a gold-yellow giant star that has one confirmed and one unconfirmed planet in orbit. **Gamma² Leonis**, magnitude 3.80, 10 19 58.60 +19 50 26.0, is a dimmer yellow star at a separation of about 125 a.u., and an orbital period of 500 years. The **ADS** says there is a third star (optical), 11th magnitude with a separation of 4.9' to the east-northeast of **Gamma¹ Leonis**. There is a close pair of galaxies, **NGC 3226** and **3227**, 50' to the east. Some 2º to the northwest is the radiant point of the famous **Leonid Meteor Shower** – a product of the **Temple-Tuttle Comet (1866-I)**. **Gamma¹ Leonis** is also known as **HD 89484**, **HIP 50583**, **ADS 7724**, **Σ 1424**, **SAO 81298**, **HR 4057**, and **41 Leonis**. **Gamma² Leonis** is also known as **HD 84485**, **ADS 7724**, **Σ 1424**, and **41 Leonis**.

Zosma (Delta Leo), from the Greek for "Girdle", Duhr" from the Arabic "Al H'arätän Asad", "The Lion's Back", and "Shang Siany" from the Chinese for "The High Minister of State", mag. 2.56, 11 14 06.41 +20 31 26.5, is a white main sequence star located on the Lion's hip. It is a rapid rotator with a projected rotational velocity of 180 km/second, and having an equatorial bulge and an oblate shape. In about 600 million years it will become a red giant star. The close double star **Σ 1517** lies about 23' to the south, and the faint spiral galaxy **NGC 3646** (magnitude 11.1) is about 2º to the east and slightly south. Also known as **HD 97603**, **HIP 54872**, **HR 4357**, **SAO 81727**, and **68 Leonis**.
Ras Elased (Epsilon Leo), "Ras Elased Australis", "Algenubi", from the Arabic "Ras al-asad al-ganubi ", "The Southern Star of the Lion's Head", and "Al Ashfar", "The Eyebrows", mag. 2.47, 09 45 51.10 +23 46 27.4, is a giant yellow star. Also known as **HD 84441**, **HIP 47908**, and **17 Leonis**.
Adhafera (Zeta Leo), from the Arabic "al-dafirah", " the braid/curl (of hair)", "Aldhafera", "Aldhafara", mag. 3.43, 10 16 41.40 +23 25 02.4, is an optical triple star. It is a white giant star with its first optical component being **39 Leonis**, magnitude 5.81, 10 17 14.80 +23 06 23.2, with a separation of 5.5' to the south; and the second optical component is **35 Leonis**, magnitude 5.95, 10 16 32.42 +23 30 10.8, with a separation of 325". Also known as **HD 89025**, **HIP 50336**, **SAO 81265**, **HR 4031**, and **36 Leonis**.
Al Jabhah (Eta Leo), "The Front", "The Forehead", "Al Jabbah", "Al'Dzhab Khakh", mag. 3.48, 10 07 19.95 +16 45 45.6, is a white supergiant star and a suspected binary star. It is a highly luminous star. Also known as **HD 87737**, **HIP 49583**, and **30 Leonis**.
Chertan (Theta Leo), from the Arabic "al-kharatan", "Two Small Ribs", "Coxa", "Hip", and "Chort" from the Arabic "Kharat or al-Khurt", "Small Rib", from the Chinese "Taze Seang", "The Second Minister of State", mag. 3.33, 11 14 14.44 +15 25 47.1, is a white main sequence dwarf star with a relatively high projected rotational rate of 23 Km/second. It exhibits an excess emission of infra-red, which indicates a circum-stellar disk of dust. The estimated age of the star is 550 million years old. Also known as **HD 97633**, **HIP 54879**, **HR 4359**, **SAO 99512**, and **70 Leonis**.
Tsze Tseang Tau (Iota Leo), from the Chinese for "The Second General", mag. 4.00, 11 23 55.37 +10 31 46.9, is a spectroscopic binary star that appears to be a yellow-tinged star, with the secondary at magnitude 6.7, a separation of 1.7", and an orbital period of 192 years. Also known as **HD 99028**, **HIP 55642**, **ADS 8148**, and **78 Leonis**.
Al Minliar (Kappa Leo), from the Arabic "Minkhir al-Asad", "The Muzzle of the Lion", mag. 4.47, 09 24 39.28 +26 10 56.8, is a binary star. Also known as **HD 81146**, **HIP 46146**, and **1 Leonis**.
Al Terf (Lambda Leo), "Glance", "Al-tarf", "The View of the Lion", mag. 4.32, 09 31 43.24 +22 58 05.0. Also known as **HD 82308**, **HIP 46750**, **SAO 80885**, and **4 Leonis**.
Rasalas (Mu Leo), "Ras Elased Borealis", from the Arabic "ra's al-asad as-samali", "the northern star of the Lion's head", also called "Ras al Asadal Shamaliyy", and "Alshemali", mag. 3.88, 09 52 45.96 +26 00 25.2, has one planet in orbit. Also known as **HD 85503**, **HIP 48455**, **HR 3905**, **SAO 81064**, and **24 Leonis**.
Subra (Omicron Leo), is a double star. **Omicron Leonis A**, mag. 3.52, 09 41 09.12 +09 53 32.6, is a giant main sequence yellow star, with a companion, a blue star, at magnitude 9.5 and a separation of 85.4". **Omicron Leonis B**, magnitude 3.70, 09 41 13.40 +09 54 35.0, is a giant blue main sequence star. The **A** star is also known as **HD 83808**, **HIP 47508**, **ADS 7480**, **HR 3852**, and **14 Leonis**. The **B** star is also known as **HD 83809**, **ADS 7480**, and **14 Leonis**.
Shir (Rho Leo), is a binary star in a system with 5 other stars (**Rho^{1}** through **Rho^{5}**). The primary, mag. 3.84, 10 32 48.68 +09 18 23.7, is a blue supergiant star with a companion at magnitude 4.8 and a separation of 0.11". Also known as **HD 91316**, **HIP 51624**, **14 Gould**, and **47 Leonis**.
Shang Tseang (Sigma Leo), from the Chinese for "The Higher General", mag. 4.05, 11 47 59.23 +06 01 45.7. Also known as **HD 98664**, **HIP 55434**, **Gould 46**, and **77 Leonis**.
Täizĭ (93 Leonis), mag. 4.50, 11 47 59.23 +20 13 08.2, is a double star. The secondary is at magnitude 9.6, and has a separation of 74.3". Also known as **HD 102509**, **HIP 57565**, **DQ Leonis**, and **93 Leonis**.

Hübēn (72 Leonis), mag. 4.56, 11 15 12.24 +23 05 43.9. Also known as **HD 97778**, **HIP 54951**, **FN Leonis**, and **72 Leonis**.
Cóngguān (92 Leonis), mag. 5.26, 11 40 47.11 +21 21 10.2. Also known as **HD 101484**, **HIP 56975**, and **92 Leonis**.
Formosa (HD 100655), mag. 6.45, 11 35 03.79 +20 26 29.6, has one planet in orbit. Also known a **HD 100655**, and **HIP 56508**.
Scheiner's Star (HD 83225), mag. 8.04, 09 37 17.3 +15 15 09.2. Also known as **HD 83225**, and **HIP 47211**.
Dingolay (HD 96063), mag. 8.37, 11 04 44 -0230 48, has one planet in orbit. Also known as **HD 96063**, and **HIP 54158**.
Sagarmatha (HD 100777), mag. 8.42, 11 35 51.53 -04 45 20.5, has one planet in orbit. Also known as **HD 100777**, and **HIP 56572**.
Shama (HD 99109), mag. 9.1, 11 24 17.0 -01 31 44, has one planet in orbit. Also known as **HD 99109**, and **HIP 55664**.
Caffau's Star (SDSS J012915+172927), mag. 16.92, 10 29 15.15 +17 29 28. It is a **Population II** star in the galactic halo seen in **Leo**. It is about 13 billion years old, making it one of the oldest stars in the galaxy. It has the lowest metallicity of any known star.

Deep Sky:

M65 (NGC 3623), mag. 9.3, 11 18 54 +13 05, 10.0'x3.3' in size, is a bright, very large, and very elongated galaxy; small, diffuse, very bright nucleus. A member of the **Leo Triplet**, along with **M66** and **NGC 3628**. **M66** is 21' from **M65**, and is located about 2.5º to the south-southeast of **Theta Leonis**, with **M65** being the western of the pair. Also known as **UGC 06328**, **Arp 317**, **CGCG 067-054**, **CGCG 1116.3+1322**, **MCG +02-29-018**, and **IRAS 11165+1322**.
M66 (NGC 3627), mag. 9.0, 11 20 12 +12 59, 8.0'x2.5' in size, is a bright, very large, and very elongated galaxy; small, very bright nucleus. A member of the **Leo Triplet**, along with **M65** and **NGC 3628**. It has heavy dust lanes and thick spiral arms studded with coarse masses of star clouds. The brightest arm, on the southeast side, resembles a huge crab's claw; fainter arms can be traced out for vast distances. The edge of galaxy **NGC 3628** is just 35' to the north, a little over 1º to the west and slightly south is **NGC 3593**. Also known as **UGC 06346**, **Arp 016**, **VV 308a**, **CGCG 067-057**, **CGCG 1117.6+1316**, **MCG +02-29-019**, and **IRAS 11176+1315**.
M95 (NGC 3351), mag. 9.7, 10 44 00 +11 42, 6.1'x3.9' in size, is a large, bright, and round galaxy; extremely bright nucleus; internal ring with a bar. A member of the **Leo Galaxy Group**. Has a faint, outer ring 6' in diameter, encircling the whole system, contacting the inner pattern on the northwest side. Located 2.5º north and 3º east of **Rho Leonis**. **M96** is 42' from the western member of the pair, **M95**. Also known as **UGC 05850**, **CGCG 066+004**, **CGCG 1041.4+1158**, **MCG +02-28-001**, and **IRAS 10413+1158**.
M96 (NGC 3368), mag. 9.2, 10 46 48 +11 49, 7.1'x5.1' in size, is a very bright, very large, and slightly elongated galaxy; small, bright nucleus; has visible dark lanes. Ultra-violet emissions from the central regions suggest that it has a supermassive black hole at its core. It is the brightest member of the **Leo Galaxy Group**. About 48' to the north-northeast is **NGC 3379** (sometimes called **M105**), and it has two companions **NGC 3384** and **NGC 3389**. Also known as **UGC 05882**, **CGCG 066-013**, **CGCG 1044.1+1205**, **MCG +02-28-006**, **SDSS J104645.67+114911.8**, and **IRAS 10441+1205**.
M105 (NGC 3379), mag. 9.5, 10 47 48 +12 35, 4.5'x4.0' in size, is a very bright, large, and round galaxy; very bright nucleus. Paired with **NGC 3384**. A member of the **Leo Galaxy Group**. Has a supermassive black hole at its center. Also known as **UGC 05902**,**CGCG 066-018**, **CGCG 1045.2+1251**, **MCG +02-28-011**, **KTG 35A**, and **H1-17**.
NGC 2903, mag. 9.0, 09 32 12 +21 30, 11'x4.6' in size, is a quite bright, very large, and elongated galaxy; very bright nucleus; a multi-arm spiral galaxy. Located 1.5º due south of **Lambda Leonis**. Also known as **UGC 05079**, **CGCG 122-014**, **CGCG 0929.4+2144**, **MCG +04-23-009**, **KIG 0347**,

IRAS 09293+2143, and **H1-56**.
NGC 3521, mag. 9.0, 11 05 48 -00 02, 6'x4' in size, is a quite bright, quite large, and elongated galaxy; many arms; very small, very bright nucleus. Also known as **UGC 06150**, **CGCG 010-074**, **CGCG 1103.3+0015**, **MCG +0-28-030**, **PKS 1103+002**, **IRAS 11032+0014**, **KIG 0461**, and **H1-13**.
NGC 3628, mag. 9.5, 11 20 18 +13 35, 12'x2' in size, is a very large, pretty bright, and very elongated galaxy; edge on. **NGC 3593**, 1º to the west-southwest, is gravitationally bound to **NGC 3628**. A member of the **Leo Triplet** along with **M65** and **M66**. Also known as **UGC 06350**, **Arp 317**, **VV 308b**, **CGCG 067-058**, **CGCG 1117.7+1352**, **MCG +02-29-020**, **IRAS 11176+1351**, **SDSS J112017.01+133522.9**, and **H5-08**.
UGC 5470, Regulus Dwarf Galaxy, mag. 9.8, 10 08 30 +12 18, 10'x7' in size, is a dwarf galaxy with low surface brightness. Also known as **LEO I**, **Cz 33**, **DDO 74**, **MCG +02-26-027**, **PGC 29488**, **CGCG 064-073**, **CGCG 1005.8+1233**, and **[RC2] A1005+12**.
NGC 3384, mag. 9.9, 10 48 18 +12 38, 5.9'x2.6' in size, is a very bright, large, and round galaxy; extremely bright nucleus. It is paired with **M105** (**NGC 3379**), and is a member of the **Leo Galaxy Group**. More than 80% of the stars in this galaxy's central region are very old – **Population II** stars. Also known as **UGC 05911**, **NGC 3371**, **CGCG 066-021**, **CGCG 1045.7+1254**, **MCG +02-28-012**, **SDSS J104816.88+123745.3**, **KTG 33B**, and **H1-18**.
NGC 3607, mag. 9.9, 11 16 54 +18 03, 4.6'x4.1' in size, is a very bright, large, and round galaxy; small, very bright nucleus. Also known as **UGC 06297**, **CGCG 096-021**, **CGCG 1114.3+1819**, **MCG +03-29-020**, **SDSS J111654.63+180306.3**, **KPG 278A**, **WBL 319-002**, and **H2-50**.
NGC 2905, mag. 10.0, 09 32 12 +21 31, 13.3" in size, is located on the northeast arm of **NGC 2903**. Also known as **UGC 05079**, **NGC 2903**, **CGCG 122-014**, **CGCG 0929.4+2144**, **MCG +04-23-009**, **IRAS 09293+2143**, **KIG 0347**, **BD+22 2103**, and **H1-57**.
Beyond magnitude 10:
Leo Triplet, mag. 10.14, 11 19 51 +13 16 51, 30'x0' in size, is three galaxies located within 0.5º of each other, located 2º south-southeast of **Theta Leonis**. Composed of **M65**, **M66**, and **NGC 3628**. Also known as **Arp 317**. For more in-depth information, see ***Sky and Telescope Magazine***, April 2021 Issue, pages 16 to 23.
NGC 3227, mag. 10.3, 10 23 30 +19 52, 5.6'x4.0' in size, is a pretty bright, quite large, and round **Seyfert** galaxy; two main arms; very small, extremely bright nucleus. A large, very faint loop extends to the nearby galaxy **NGC 3226** that it is paired with. Located 50' east of **Gamma Leonis**. Also known as **UGC 05620**, **Arp 94**, **VV 209a**, **CGCG 094-028**, **CGCG 1020.8+2006**, **MCG +03-27-016**, **KPG 234B**, and **IRAS 10207+2007**.
NGC 3489, mag. 10.3, 11 00 18 +13 54, 3.5'x2.2' in size, is a very bright, pretty large, and slightly elongated galaxy; very small, bright nucleus. Also known as **UGC 06082**, **PGC 033160**, **CGCG 066-084**, **CGCG 1057.7+1410**, **MCG +02-28-039**, **LGG 2171[G93]008**, **Leda 033160**, and **H2-101**.
NGC 3377, mag. 10.4, 10 47 42 +13 59, 1.9'x1.0' in size, is a very bright, quite large, and slightly elongated galaxy; very bright center. Paired with **NGC 3377A**. Also known as **UGC 05899**, **PGC 032249**, **CGCG 066-016**, **CGCG 1045.1+1415**, **MCG +02-28-009**, and **H2-99**.
NGC 3412, mag. 10.5, 10 50 54 +13 25, 2.4'x1.1' in size, is a bright, small, and slightly elongated galaxy; very bright nucleus. A member of the **Leo Group of Galaxies**. Also known as **UGC 05952**, **PGC 032508**, **CGCG 066-038**, **CGCG 1048.3+1341**, **MCG +02-28-016**, **SDSSJ105053.27+132443.6**, **USGC 323**, and **H2-99**.
Peanut Nebula (CW Leonis), mag. 10.96, 09 47 57.4 +13 16 44, is a carbon star with a dust shell. Also known as **PK 221+45.1**, **IRAS 09452+1330**, **IRC+10216**, and **RAFGL 1381**.
Frosty Leo, mag. 11.0, 09 39 54 +11 58 54, 0.4'x0.1' in size. Also known as **IRAS 09371+1212**.
Gamma Leonis Group of Galaxies, mag. 11.10, 10 18 05.6 +21 49 58.0, 4.4'x1.5' in size, is a group of galaxies – **NGC 3190=HCG 44A=Arp 316=NGC 3189=UGC 05559=MCG +04-24-026= CGCG 123-037=VV307=LGG 794-000=PGC 30083**. **NGC 3187** is 4.9' to the west of **NGC 3190**; **NGC 3193** is 5.8' to the northeast; and **NGC 3185** is 11' to the southwest.

Leo I, mag. 11.16, 10 08 24 +12 18 27, 5.1'x3.5' in size, is a dwarf galaxy located 8º east of the **Leo Triplet**. Also known as the **Regulus Dwarf Galaxy**, **UGC 05470**, **PGC 2800957**, **CGCG 061-073**, **PGC 29488**, **MCG +02-26-027**, **DDO 074**, and **[RC2] A1005+12**.
Leo II, mag. 11.9, 11 13 29 +22 09 12, 10.1'x9.0' in size, is a dwarf galaxy of very low surface brightness. Also known as **Leo B**, **UGC 06253**, **PGC 34176**, **MCG +04-27-005**, **KDG 077**, **DDO 93**, and **[RC2] A11109+22**.
Leo III, mag. 12.6, 09 59 25 +30 44 34, 5.3'x3.4' in size, is a dwarf irregular galaxy. Also known as **Leo A**, **UGC 05364**, **PGC 028868**, **CGCG 153-010**, **MCG +05-24-008**, **BTS 014**, **DDO 069**, and **[RC2] A0956+30**.
Silverado Galaxy, mag. 12.3, 10 47 04 +17 16 25, 3.2'x1.8' in size. Also known as **NGC 3370**, **UGC 05887**, and **PGC 032207**.
Segue 1, mag. 14.7, 10 07 04 +16 04 35, is a dwarf spherical galaxy or a globular cluster, a satellite of the **Milky Way** galaxy that is estimated to have over 1000 stars, 7 of which are red giant stars. Also known as **PGC 4713559**.
Copeland's Septet, mag. 15.2, 11 37 50 +21 59 45, 0.4'x0.0' in size, is a group of seven galaxies, Composed of **NGC 3753**(14.5 magnitude, **UGC 06602**); **NGC 3746** (15.0 magnitude, **UGC 06597**); **NGC 3750** (14.9 magnitude, **MCG +04-26-008**); **NGC 3754** (15.0 magnitude, **MCG +04-28-011**); **NGC 3746** (15.8 magnitude, **UGC 06597**); **NGC 3751** (15.2 magnitude, **UGC 06601**); and **NGC 3745** (16.2 magnitude, **MCG +04-28-004**). Also known as **HCG 57**.
Leo I Cloud is part of the **M96** subgroup. Consists of **M65**, **M66**, **M105**, **NGC 3377**, and **NGC 3384**.
Leo Ring, 10 48 19 +12 41 21, 650 thousand light years in diameter, is a cloud of hydrogen and helium gas that was created after **NGC 3384** and **M96** collided.
Contained within Leo are the following objects: 427 NGC; 136 IC; 522 UGC; 319 MCG; 207 CGCG; 29 Arp; 11 HCG; 16 PGC; 23 Abell; 15 Radio galaxies; 15 Quasars; 1 Caldwell; 154 Herschel; 1 [Ao84]; 33 VV; 16 ZwG; 3 Shk; 2 IRAS; 5 Messier; 1 PKS; 1 KUG; 1 CRL; 1 GC; 2 Mrk; 4 Ray; 3 Dwarf Galaxies; 4 Rose Galaxies; 2 NPM1G; 16 Trio Galaxies; 2 Gravitationally Lensed Galaxies; 13 Flat Galaxies; 2 Variable Galaxies; 6 Small Galaxies; and 13 Ring galaxies for a total of 2,006 objects.

Other Stars:

67 Leonis (53 Leonis Minoris), mag. 5.70, 11 08 49.08 +24 39 30.4. Also known as **HD 96738**, and **HIP 54487**.
HD 97658, mag. 6.27, 11 14 33 +25 42 37, has one planet in orbit. Also known as **HIP 54906**.
83 Leonis A, mag. 6.44, 11 26 45.75 +03 00 45.6, is a binary star. The secondary, at magnitude 7.9, is separated by 28.5". Also known as **HD 99491**, **HIP 55846**, **ADS 8162**, and **57 Gould**.
83 Leonis B, mag. 7.57, 11 26 46.28 +03 00 22.8, has two planets in orbit. It is separated from **83 Leonis A** by 90.3". Also known as **HD 99492**, **HIP 55848**, and **ADS 8162**.
HD 89307, mag. 7.06, 10 18 21.28+12 37 16.0, has one planet in orbit. Also known as **HIP 50473**.
HD 94834, mag. 7.6, 10 57 15.1 +24 08 34, has one planet in orbit. Also known as **HIP 53545**.
HD 81040, mag. 7.74, 09 23 47.04 +20 21 52.0, has one planet in orbit. Also known as **HIP 46076**.
HD 87646, mag. 7.95, 10 58 47.74 +01 43 45.2, has one planet in orbit. Also known as **HIP 53666**.
HD 95089, mag. 8.0, 10 06 40.8 +17 53 42, has one planet in orbit. Also known as **HIP49522**.
HD 88133, mag. 8.06, 10 10 07.68 +18 11 12.7, has one planet in orbit. Also known as **HIP 49813**.
HD 98736, mag. 8.52, 11 21 49.0 +18 11 24, has one planet in orbit. Also known as **HIP 55486**.
HD 102272, mag. 8.71, 11 46 23.54 +14 07 26.3, has two planets in orbit. Also known as **HIP 57428**.
HD 89345, mag. 9.4, 10 18 41.0 +10 07 45.0, has two planets in orbit. Also known as **HIP 50496**.
BD+20º 2457, mag. 9.73, 10 16 44.8 +19 53 29, has one planet and a brown dwarf star in orbit.
Stars of interest beyond magnitude 10:
GL 436, mag. 10.68, 11 42 11.09 +26 42 23.7, has one transiting planet. Also known as **HIP 57087**.
CW Leo, mag. 11.0, 09 47 57.38 +13 16 43.6, is an AGB star and a carbon star.

WASP 104, mag. 11.12; **WASP 106**, mag. 11.21; **WASP 183**, mag. 12.78 – all have one transiting planet.
Wolf 359 (CN Leonis), mag. 13.45, 10 56 28.99 +07 00 52.0, is a red dwarf flare star, and the 3rd nearest star system to our solar system. Located 1.4º northwest of **59 Leonis**. Also known as **LFT 750**.
DP Leonis, mag. 17.5, has one planet in orbit.

Asterisms:

The Sickle – Composed of **Alpha**, **Eta**, **Gamma**, **Zeta**, **Mu**, and **Epsilon Leonis**. It is in the shape of a backwards question mark.
Al Jabhab – "The Forehead", composed of **Alpha**, **Gamma**, **Zeta**, and **Eta Leonis**.
Woo Ti Tso – "The Seat Of the Five Emperors", composed of **Beta**, and 4 small neighboring stars.
Asphulis – Coptic "The Tail"?, composed of **Beta** and **Theta Leonis**.
Al Zubrah – "The Mane", composed of **Delta** and **Theta Leonis**.
Al Kähilal Asad – "The Space Between the Shoulders of the Lion" and "Al H'urütan" – "The Two Ribs", composed of **Theta Leonis (Chartan or Chort)**
Al Ashfür – "The Eyebrows", composed of **Epsilon** and **Mu Leonis**.
Taze Fe – "The Crown Prince" composed of **Epsilon** and **Mu Leonis**. **Epsilon** was **"Taze".**
Taze Tseang – "The Second Minister of State", composed of **Delta** and **Theta Leonis**.
Ling Tue – "A Wonderful Tower", composed of **Chi**, **c (59 Leonis)**, and **d (58 Leonis) Leonis**.
Tsen Ke – "A Wine Flagon" – composed of **Psi**, **Xi**, and **Omega Leonis** with **Kappa** and **Xi Cancri**.

Some Chinese names for stars in Leo:

Shang Seang – "The Higher Minister of State" is Zosma (Delta Leonis)
Ta Taze – "The Crown Prince" is Ras Elased (Epsilon Leonis)
Yu Neu "The Honorable Lady" is Pi Leonis

From Babylon – Maru-sha-ar Kat-Sharru – "The Fourth Son Behind the King" is Shir (Rho Leonis)

The star in Leo include the following: 64Σ; 14 OΣ; 1 OΣΣ; 1 ΣI; 1ΣII; 16β; 100 Numbered; 12 Gould; 7 with other constellation designations; 84 Lettered; 12 Small Lettered; 29 Greek; 1 HN; 3 h; 2 Hu; 3 S; 1 WAS; 1 Herschel; 1 Sh; 7 A; 1 Ho; and 1 Rst for a total of 310.

Sky Happenings:April, 2021

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

April 1st - **Ganymede** occults **Io,** with a magnitude change of 0.6, from 8:17 to 8:23 AM CDT.
April 4th - **Last Quarter Moon** occurs at 5:02 AM CDT,
Asteroid **Metis** is at opposition at 7 AM CDT.
April 5th - Dawn: The waning crescent Moon, Saturn, and Jupiter are lined up above the southeast horizon.
April 6th - The Moon passes 4º south of Saturn at 3 AM CDT,
Dawn: The **Moon** is now 4.5º below **Saturn**, with **Jupiter** to its left.
April 7th - **Jupiter** passes4º north of the **Moon** at 2 AM CDT,
Dwarf planet **Ceres** is in conjunction with the **Sun** at 2 AM CDT,
Dawn: The **Moon** is 5º below **Jupiter**, with **Saturn** to their upper right.
April 9th - The **Moon** passes 4º south of **Neptune** at 6 AM CDT.
April 11th - **New Moon** occurs at 9:31 PM CDT (Lunation 1216),
Io eclipses **Callisto**, with a 0.4 magnitude change, from 5:01 to 5:11 AM CDT.
April 12th - Asteroid **Juno** is stationary at 9 PM CDT,
Io eclipses **Callisto**, with a 0.5 magnitude change, from 6:51 to 7:12 AM CDT.
April 13th - The **Moon** passes 2º south of **Uranus** at 3 AM CDT,
Asteroid **Eris** is in conjunction with the **Sun** at 9:55 PM CDT.
April 14th - The **Moon** is at apogee (252,351 miles or 406,119 km from **Earth**) at 12:46 PM CDT.
Ganymede eclipses **Europa**, with a magnitude change of 0.5, from 5:08 to 5:16 AM CDT,

April 15th - Dusk: The waxing crescent **Moon** is in the western sky**,** 5º to the right of **Aldebaran**.
April 16th - Dusk: The **Moon** is between the **Horns of the Bull**, with **Mars** 5º above it.
April 17th - The **Moon** passes 0.1º south of **Mars** at 7 AM CDT, with an occultation visible in parts of the **Southern Hemisphere**,
Dusk: The **Moon** is 0.9º north of **Mars** at 7 PM CDT,
Minor planet **Haumea** is at opposition at 7:11 PM CDT.
April 18th - **Io** eclipses **Europa**, with a magnitude change of 0.6, from 4:52 to 4:58 AM CDT,
Mercury is in superior conjunction at 9 PM CDT.
April 19th - Dusk: After sunset, high in the west-southwest sky, the **Moon**, **Pollux**, and **Castor** will emerge from the gloaming in a line.
April 20th - **First Quarter Moon** occurs at 1:59 AM CDT,
Dusk: The first quarter **Moon** is less than 7º from **M44** (**The Beehive**).
April 22nd Morning: The **Lyrid Meteor Shower** is predicted to peak in the pre-dawn hours, but the waxing gibbous **Moon** may interfere with the viewing before it sets at about 4 AM.
April 25th **Io** eclipses **Europa**, with a magnitude change of 0.6, from 7:06 to 7:11 AM CDT,
Asteroid **Vesta** is stationary at 1 PM CDT.
April 26th Dawn: The almost full **Moon** and **Spica**, in the west, are separated by 5º,
Full Moon occurs at 10:32 PM CDT.
April 27th **Mars** is 0.5º north of **M35** at 2 AM CDT,
The **Moon** is at perigee (222,064 miles or 357,378 km from **Earth**) at 10:22 AM CDT.
April 28th **Pluto** is stationary at 2 PM CDT.
April 29th Dawn: The **Moon** is less than 4º from **Antares**, in **Scorpio**, above the southern horizon,
Ganymede eclipses **Callisto**, with a magnitude change of 0.4, from 7:13 to 7:27 AM CDT.
April 30th **Uranus** is in conjunction with the **Sun** at 3 PM CDT.
May 2nd - Dawn: The waning gibbous Moon and Saturn are 6º apart, with Jupiter to the left of the pair in the south-southeast before sunrise.
May 3rd - **Last Quarter Moon** occurs at 2:51 PM CDT.

Planets:

Mercury – Mercury is in superior conjunction on April 18th. The planet will reappear in the evening sky with **Venus** on the 25th. **Mercury**, at magnitude -1.6, will be about 1.2º to the upper right of **Venus**, very low in the west early in the evening. On the last day of April, both planets are very low in the western sky 30 minutes after sunset. **Mercury**, at magnitude -1.2 and 6º above the horizon, will be 4.5º above **Venus** (2º high, magnitude -3.9). **Mercury** will set after 9 PM local time.

Venus – Venus, which was in superior conjunction in late March, is too close to the **Sun** to see until April 18th, when it ascends to its position as the **Evening Star**. The planet is only 4º above the horizon at sunset, shining at magnitude -3.9. Its dusk apparition does not end until January of 2022.

Mars- Mars is high in the western sky, in **Taurus**, after sunset shining at magnitude 1.3 on April 1st, fading to magnitude 1.6 by the end of the month. The planet slowly tracks through **Taurus**, where on the 12th and 13th, it passes between **Alheka** (**Zeta Tauri**) and **Elnath** (**Beta Tauri**) – the two stars marking the Horns of the Bull. On the 16th, the planet is 5º above the **Moon**, and spans only 4.9". The planet crosses into **Gemini** on the 24th, and then early on the 27th, at magnitude +1.5 and a span of 4.7", it will pass 0.5º north of **M35**, with **NGC 2158** only 0.5º to the southwest of **M35.**On the 30th, the planet forms a nice triangle with **Eta** and **Mu** Geminorum. The planet is now setting shortly after local midnight.

Jupiter – Jupiter, in early April, rises 35 minutes after **Saturn**, shortly before 5 AM local time, in the southeast sky, in the northeastern part of **Capricornus**. On April 7th, the planet stands 2º north of **Deneb Algedi** (**Delta Capricorni**). The planet will brighten by 0.1 magnitudes to -2.2 during the month, and will trek eastward, crossing into **Aquarius** on the 25th. The planet now rises nearly two hours before the **Sun**, and climbs to an altitude of 15º a half-hour before sunrise. Every six years, the orbital plane of **Jupiter's** four **Galilean** moons is edge-on with the **Sun** and **Earth**. We then enter into a mutual event season – when the moons occult and eclipse one another. The current season ends on November 16th. April mutual events happen on the 1st, 6th, 11th, 12th, 15th, 18th, 25th, and 29th. See the calendar for the events and timing.

Saturn – Saturn will rise shortly after 4 AM local time on April 1st in **Capricornus**, and stands more than 10º high at the onset of twilight. The planet will shine at magnitude 0.6 all month. Towards the end of the month, the planet is higher (above 20º) as twilight begins, with the rings open at an angle of slightly greater than 17º. The moon **Titan**, at magnitude 8.8, will lie 2.6' due east of the planet on the 1st, due south of the planet on the 5th and 21st, and due north of the planet on the 13th and 29th. **Iapetus**, between 10th and 12th magnitude, will reach its brightest western elongation on the 16th, when it will lie 8' due west of the planet.
Uranus – Uranus will be briefly visible low in the evening sky early in the month, fading into the evening twilight as it approaches a solar conjunction on April 30th.
Neptune – Neptune rises at the break of twilight at the end of April, having passes through superior conjunction in March. By 5:30 AM local time, the planet will stand 10º high in the eastern sky, nearly 5º east of **Phi Aquarii**. The planet is dim at magnitude 7.8, and you might be able to catch it before the sky brightens. Its visibility will improve through the summer.
Moon – On April 17th, the snaking **Serpentine Ridge** will capture one's attention, as it plays with light across the **Sea of Serenity**, just north of the lunar equator. On the 18th, sunlight brings out some young craters, strung out in a line from north to south – **Crater Linne' G**, **H**, **F**, **B**, and **A**, with **F** and **B** the biggest at 3 miles in diameter. The volcanic dome **Valentine**, tucked against the western flank of **Serenity**, is visible only at the lowest of **Sun** angles. On the 18th, the somewhat heart-shaped swelling crests less than 400 feet (122 meters) above the floor.

Favorable Librations: **Pingré Crater** – on the 26th, **Bailly Crater** - on the 27th, and **Boguslawsky Crater** - on the 28th.
Greatest North declination on the 19th (+25.5º)
Greatest South declination on the 4th (-25.4º)
Libration in longitude: East limb most exposed on the 6th (+6.3º)
West limb most exposed on the 22nd (-29º)
Libration in latitude: North limb most exposed on the 9th (+6.7º)
South limb most exposed on the 24th (-6.7º)

Asteroids **–** Asteroid **4 Vesta** – **Vesta's** positions, according to the ***RASC Observer's Handbook***, ***2021 USA Edition***, are as follows: On April 6th – 10 52.39 +18 43.1, at 6.5 magnitude; on the 16th – 10 48.86 +18 39.5, at 6.7 magnitude; and on the 26th – 10 48.34 +18 13.3, at 6.9 magnitude. **Vesta's** positions, ***by my estimates***, are as follows: On April 1st – just over 2º southwest of **60 Leonis**; on the 5th – 2.7º west-southwest of **60 Leonis**; on the 10th – 3.2º west-southwest of **60 Leonis**; on the 15th – 3.6º west-southwest of **60 Leonis**; on the 20th – 3.9º west-southwest of **60 Leonis**; on the 25th – 3.8º west-southwest of **60 Leonis**; and on the 30th – 3.6º west-southwest of **60 Leonis**.

Asteroid **9 Metis** – **Metis's** positions, according to the ***RASC Observer's Handbook, 2021 USA Edition*****,** are as follows: On April 6th – 13 04.12 +01 17.7, at 9.5 magnitude; on the 16th – 12 54.61 +01 56.2, at 9.7 magnitude; and on the 26th – 12 46.28 +02 20.3, at 9.9 magnitude. **Metis's** positions, ***by my estimates***, are as follows: On April 1st – 4.5º southeast of **Delta Virginis**; on the 4th – 3.7ºsoutheast of **Delta Virginis**; on the 7th - 3º southeast of **Delta Virginis**; on the 10th – 2.2º southeast of **Delta Virginis**; on the 13th - 2º south-southeast of **Delta Virginis**; on the 16th – 1.5º due south and a little east of **Delta Virginis**; on the 19th – 1.5º due south and a little west of **Delta Virginis**; on the 22nd – 1.7º southwest of **Delta Virginis**; on the 25th – just over 2º west-southwest of **Delta Virginis**; on the 28th – 2.5º west-southwest of **Delta Virginis**; and on May 4th – 3.5º west and a little south of **Delta Virginis.**

Comets **–** Comet **7P/Pons-Winnecke** – **7P's** positions, according to **ALPO**, are as follows: On April 1st – 17 51.0 +09 04, at magnitude 14.3 in **Ophiuchus**; on the 11th – 18 22.7 +08 090, at magnitude 13.8 in **Ophiuchus**; on the 21st – 18 56.1 +06 33, at magnitude 13.3 in **Aquila**; and on May 1st – 19 31.5 +04 00, at magnitude 12.8 in **Aquila**.

Comet **15P/Finlay** – **Finlay** is faint in April, but should rapidly brighten to magnitude 11 at the end of June, and should be at its brightest – magnitude 9.9 - in early August. **Finlay's** positions, according to **ALPO**, are as follows: On April 1st – 20 33.3 _25 11, at magnitude 19.1 in **Capricornus**; on the 11th – 21 05.9 -23 36, at

magnitude 18.2 in **Capricornus**; on the 21st – 21 40.8 -21 05, at magnitude 17.3 in **Capricornus**; and on May 1st – 22 18.0 -18 02, at magnitude 16.4 in **Aquarius**.

Comet **141P/Machholz** – **Machholz's** position on April 1st, according to ALPO, is 06 49 48 +0540, at magnitude 18.9 in Monoceros.

Comet **C/2020 M3 (ATLAS)** – **M3's** position on April 1st, according to **ALPO**, is 07 07 00 +44 49, at magnitude 14.7 in **Lynx**.

Comet **C/2020 R4 (ATLAS)** – **R4** could start April at magnitude 9.9 and brighten to 9.1 on its nearest approach to **Earth** on April 23rd, the rapidly fade to 14th magnitude as it moves away from both the **Earth** and **Sun. R4's** positions, according to **ALPO**, are as follows: On April 1st – 19 49.2 -01 19, at magnitude 9.9 in **Aquila**; on the 11th – 18 58.8 +07 53, at magnitude 9.4 in **Aquila**; on the 21st – 16 59.8 +24 26, at magnitude 9.1 in **Hercules**; and on May 1st – 13 53.1 +33 14, at magnitude 9.7 in **Canes Venatici**. **R4's** positions, ***by my estimates***, are as follows: On April 1st – 2.5º due south and a little west of **Eta Aquilae**; on the 5th – just over 2º southeast of **Delta Aquilae**; on the 10th – just under 4º north and a little east of **Theta Serpentis Caudae**; on the 15th - 6º north-northeast of **71 Ophiuchus**, or 10º north and a little east of **NGC 6572**; and on the 20th - 2º southwest of **Delta Herculis**.

Comet **C/2021 A1 (Leonard)** – **Leonard's** positions, according to **ALPO**, are as follows: On April 1st – 12 49.5 +60 33, at magnitude 17.6 in **Ursa Major**; on the 11th – 12 23.3 +61 33, at magnitude 17.5 in **Ursa Major**; on the 21st – 11 56.7 +61 49, at magnitude 17.4 in **Ursa Major**; and on may 1st – 11 31.9 +61 24, at magnitude 17.3 in **Ursa Major**.

Meteor Showers – There is only one major meteor shower (Class I) in April. The springtime **Lyrids**, active from April 14th through April 30th, peaking on the 22nd, with a maximum zenith hourly rate of 18. The radiant rises in late evening and will stand 20º high at local midnight in the east. A 10 day old **Moon** will affect observations until it sets at around 4 AM local time.

There are no minor meteor showers (Class II) this month.

There is one variable meteor shower (Class III) in April. The **Pi Puppids** are active from April 16th through the 30th, peaking on the 23rd, with a variable zenith hourly rate.

There are three weak meteor showers (Class IV) this month. The **Zeta Cygnids**, active from April 3rd through the 10th, peaks on the 5th with a maximum zenith hourly rate (mzhr) of less than 2. The **April Rho Cygnids**, active from April 265th through May 4th, peaks on the 28th with a mzhr of less than 2. The **h Virginids**, active from April 20th through May 4th, peaking on the 30th with a mzhr of less than 2.

When to View the Planets:

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

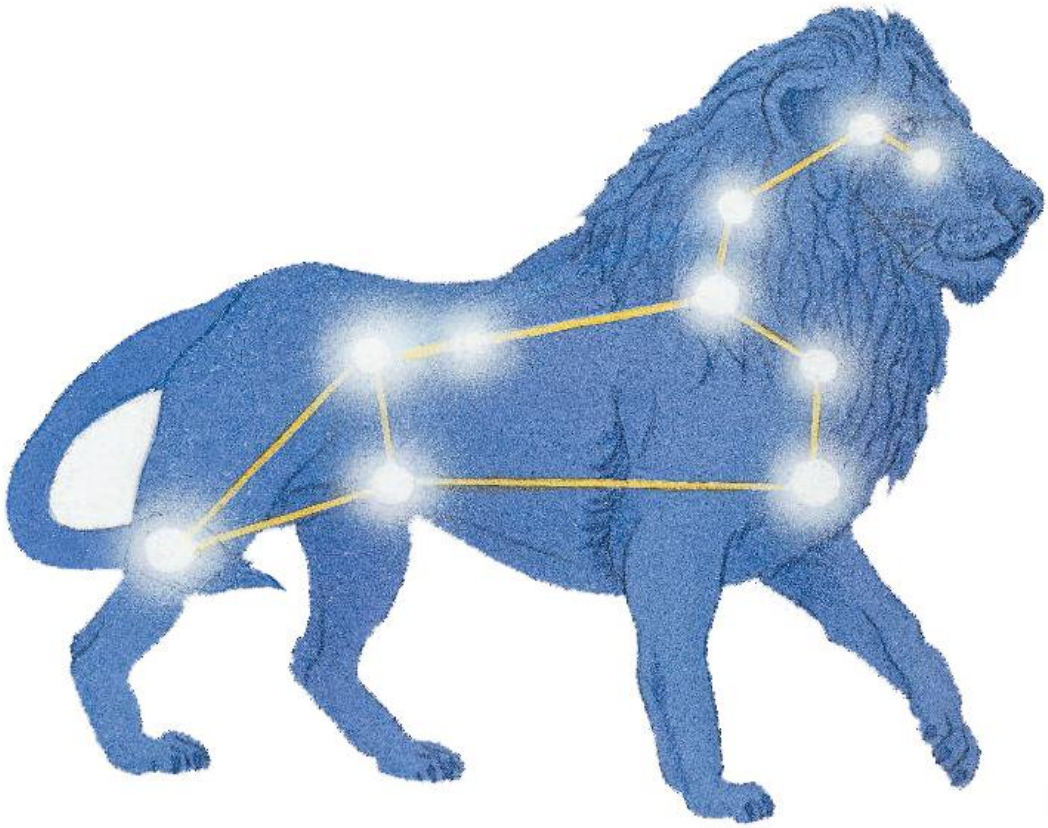
DARK SKY VIEWING - PRIMARY ON APRIL 10TH, SECONDARY ON APRIL 17

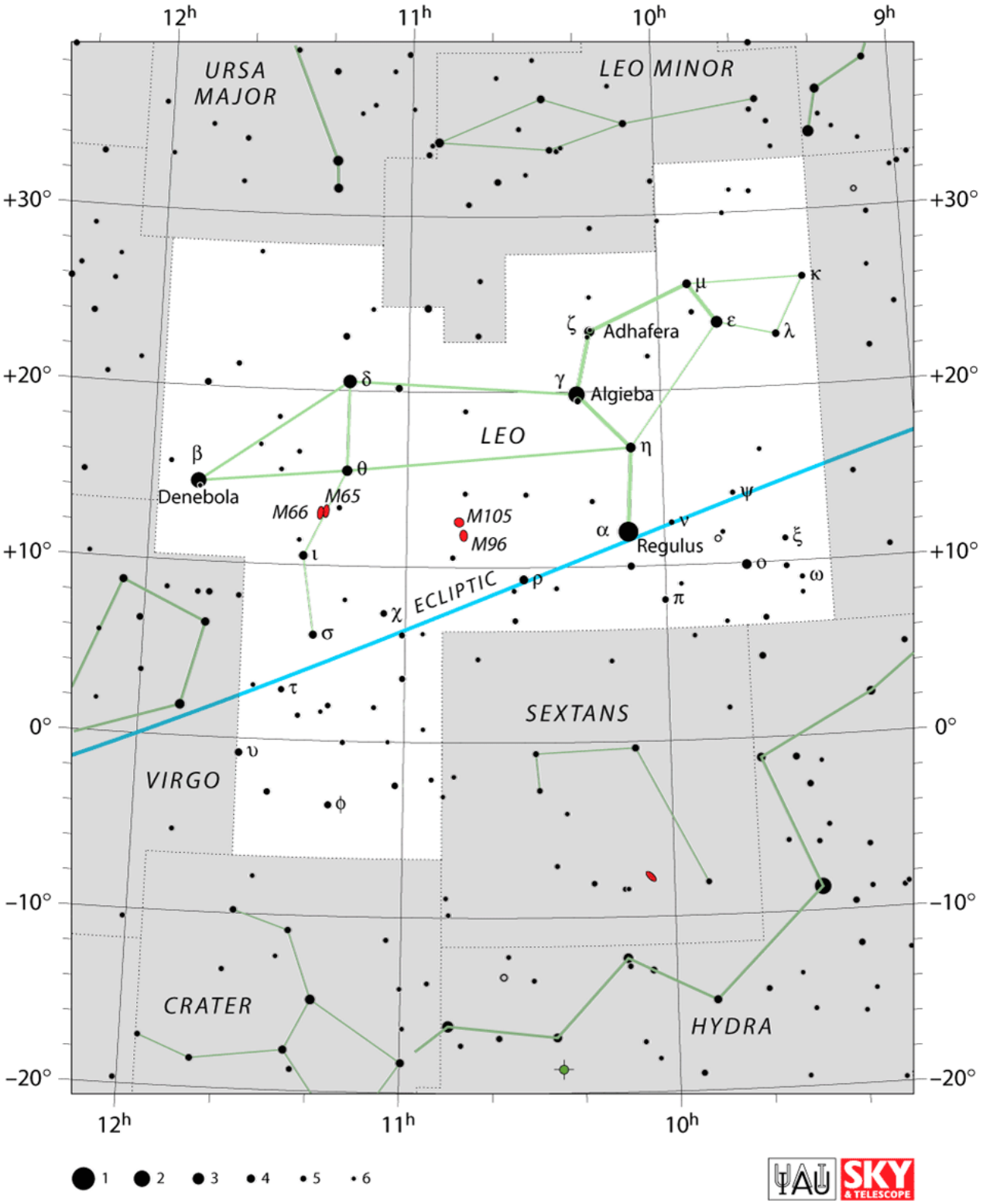
Mythology:

Leo – The Lion

Eratosthenes and Hyginus affirm that the lion was placed in the sky because it was the King of Beasts. Mythological speaking, it is reputed to be the lion on Nemea, slain by Heracles as the first of his twelve labors. Nema is a town some way southwest of Corinth. There the lion lived in a cave with two mouths, emerging to carry off the local inhabitants, who were becoming scarce. The lion was an invulnerable beast of uncertain parentage; it was variously said to have been sired by the dog Orthrus, the monster Typhon, or even to be the offspring of Selene, the Moon goddess. Its skin was proof against all weapons, as Heracles found when he shot an arrow at the lion and saw that it simply bounced off.

Heracles heaved up his club and made after the animal, which retreated into its cave. Heracles blocked up one of the entrances and went in through the other. He grappled with the lion, locking his huge arm around its throat and choking the beast to death. Heracles carried the lion away in triumph on his shoulders. Later, he used the creature's own razor sharp claws to cut off its pelt, which he wore as a cloak. The lion's gaping mouth bobbing above his own head made Heracles look more fearsome than ever.




12h
11h
10h
9h
URSA MAJOR
LEO MINOR
+30°
+20°
+10°
0°
−10°
−20°
Adhafera
Algieba
LEO
Denebola
M65
M66
M105
M96
Regulus
ECLIPTIC
SEXTANS
VIRGO
CRATER
HYDRA
1
2
3
4
5
6
IAU SKY & TELESCOPE

The End