Monthly Meeting July 13th at 7:00 PM, venue TBA

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

PRESENTATION: Our speaker will be Scott Cadwallader, on Basic Planetary Photography.

What's In This Issue?

Observing Notes: **Hercules – The Strong Man** & Mythology

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

President's Message

And just like that, we're halfway through 2020. The past few months have definitely been tough ones for a lot of people but there are a few flickers of normalcy popping up here and there if you look for them and more and more signs of adaptations to the circumstances that might prove worth taking with us going forward. Speaking to the former point, we're now starting to see operations at the observatory starting back up. Although attendance is being capped for safety reasons, we've started showing the public the wonders of astronomy again. Speaking to the latter, observatory staff have started to put in place procedures for new semi-remote live viewings from the observatory grounds. Although patrons aren't looking through an eyepiece, they are seeing near-real time images being sent to a screen just next to the scope pulling in views. And although that may sound a little disappointing, it's worth noting that the views of galaxies and nebulae are slightly more satisfying that way, due to the rampant light pollution in the city.

Our club has also started to stir a little bit more over the past month. We managed to have two separate members-only star parties during the last lunar cycle, one from our own dark sky site and one from HRPO, both events were enjoyed by all until well after the cows went home. In addition, with the abundant help of the staff from HRPO, we were able to host our third annual Asteroid Day this past weekend at the observatory. The next major club event should be our next Member's Only Night night sometime toward the end of summer, and possibly another dark site star party if we get some good weather. As a quick reminder, the dark site is open to members who show up before dark and keep to basic star party etiquette. A letter showing you're not trespassing can be got by contacting John Nagle.

Coming up in the next few months, with luck, we should be able to enjoy a few more annual favorite events. In July, we should be looking forward to the opposition of Jupiter and Saturn, and then in August we should be able to hold our annual Perseid party, even if it's a bit smaller than usual. To help with any of these events, you'll have to be cleared by BREC, so if you haven't already, contact Chris K to find out how to do so.
For the past few months, we've been making good use of remote conferencing tools to help keep our meetings together, and as a result, we've ended up with some truly awesome speakers from around the country.

JULY MEETING'S SPEAKER: This month, we've decided to bring it back down to the local level for a bit and I'm going to give a little practical advice on how to do some pretty basic planetary photography using intro equipment and some free programs. It probably won't get you on the cover of Sky and Telescope, but with the planets coming into position, and it being a mars opposition year, you might be able to get some good pics for your family and friends with relatively little effort. The format for the meeting is still being decided, so watch for information to come through in the next few weeks.

That should be everything that needs saying. Check the rest of the newsletter for details on upcoming events.

Happy Fourth of July.

Scott Cadwallader, President 2020

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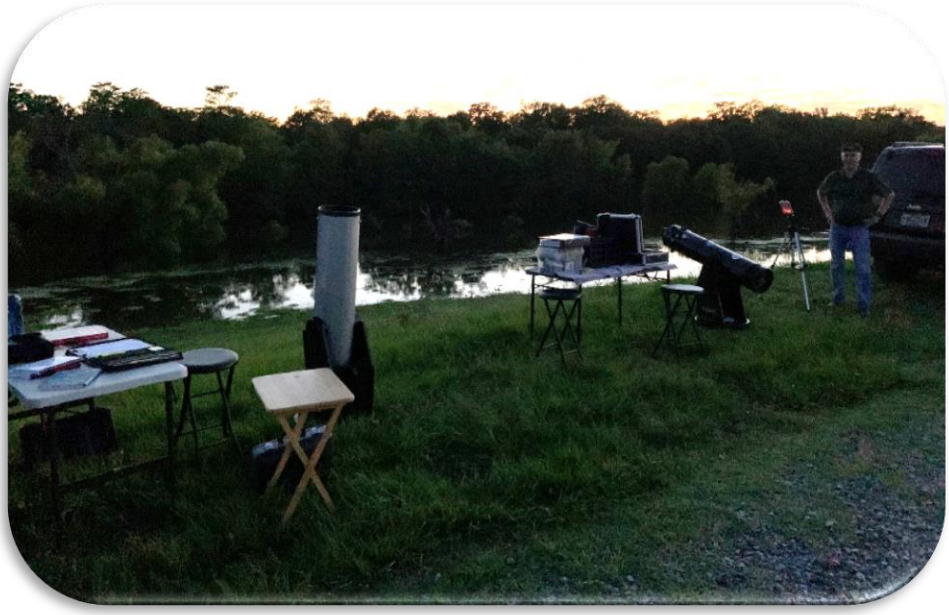
Secretary's Summary of June Meeting

The June meeting was held via Zoom on 6/8/2020, as our city was in quarantine due to Covid 19. There were 20 people in attendance:

- President Scott Cadwallader called meeting to order on Zoom and took the notes in Thomas's absence.
- Coy introduced the guest speaker, David Dickinson, from Universe Today. He spoke about his new book, The Backyard Astronomer's Field Guide: how to find the best objects the night sky has to offer, and fielded questions about the Stellina telescope.
- There was a discussion of the AL candidates for President, and a candidate was approved for submission.
- There was a brief mention of upcoming observatory opening procedures.
- An impromptu star party at the BRAS dark site was announced for that weekend.
- Meeting was closed.

Submitted by Scott Cadwallader, for our Thomas Halligan
Link to the meeting: https://www.youtube.com/watch?v=FCezQ9BlA7U



Coy and Scott C set up their telescopes (with social distancing) at BRAS's dark sky site in Marangouin, LA.

2020 Officers:

GET ZAZZLED!

President: Scott Cadwallader
Vice-President: Coy Wagoner
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
Public Information
Krista Reed
Webmaster:
Frederick Barnett

Upcoming BRAS Meetings:

NSN Training Kit Session, Postponed
Monthly Business Meeting: 7:00 p.m., Wednesday, July 8; via Zoom webinar
Light Pollution Committee Meeting: postponed
Monthly Member Meeting: 7:00 Monday, July 13; venue TBA.
MOON (Members Only Observing Night), TBA

BRAS Outreach Report

Hi Everyone,

At least in the movie, Groundhog's Day, Bill Murray got to DO lots of stuff each day that he re-lived. It's been quite a boring rut that most of us have been stuck in lately, but hopefully you've been able to make the best of it.

We're trying to do just that as far as amateur astronomy goes. While we're still holding off on trying to schedule any IN-PERSON events (i.e., Sidewalk Astronomy, Libraries, etc.), we do have at least one outreach on the horizon. A fun web conference for the local Boy Scouts!

BOY SCOUT WEB CONFERENCE . . . COMING UP!

Over the past couple of months, a few of us have been experimenting with live-streaming our telescope views. Using different filters, apps, cameras and adapters, we've started to get pretty good at showing the Moon, Venus and now even Jupiter and Saturn. Our plan for this outreach is to give a short talk about some Solar System stuff and then switch to LIVE telescope views. The best thing about this concept is the back-up plan. We all know how clouds can wreck any planned observing session (especially when it's planned by Rob for his Scouts! Haha!! Sorry, Rob.) We'll be ready for possible poor weather by having some pre-recorded video footage through the telescopes to show. Because it's video (as opposed to just still images), even if we aren't able to show LIVE views, the feel will be similar. All the way, we'll be on hand to answer any questions about what is being viewed.

There are tons of webinar opportunities out there, but not too many that have telescope views incorporated into them. We're hoping this turns out to be a great event and is something we can start offering regularly.

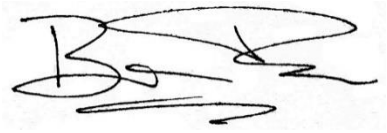
That is pretty much the news as far as Outreach goes.

One more thing . . . the Night Sky Network recently added the category "Virtual" to their outreach choices when we are setting them up on the calendar. I think we are all recognizing that it may be some time yet before things get back to normal. Things like these webinars will work great. I think we can continue with Sidewalk Astronomy, too, by way of a small projector and a screen. It's not looking through the eyepiece, but it's still a LIVE shot of the Moon (or other object).

LOOK UP! LOOK UP!

In the end, our goal is to spark interest and inspire people to start looking up. While getting them to look through our scopes is best, there are lots of other ways and that's what we're working on for the time being.

Clear Skies,



Ben Toman

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BRAS Light Pollution Committee Report

This committee meets at 6:15, same day as the 7:00 BRAS Business Meeting
(normally on Wednesday before the Monthly Meeting)
Everyone is welcome to join in..

There was no meeting in June. Meetings will resume in August, either via Zoom or in person.

John R. Nagle

Submitted by John R. Nagle

Globe At Night

The target for this month's Globe at Night program is **Hercules from July 12th through the 21st.**
If you would like to participate in this citizen science program, you can find instructions at
https://www.globeatnight.org

Here is a handy 2020 GlobeatNight Post card, in case you are out and about at night.

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

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Flying "Rocks" and "Dirty Snowballs":

Asteroid and Comet News

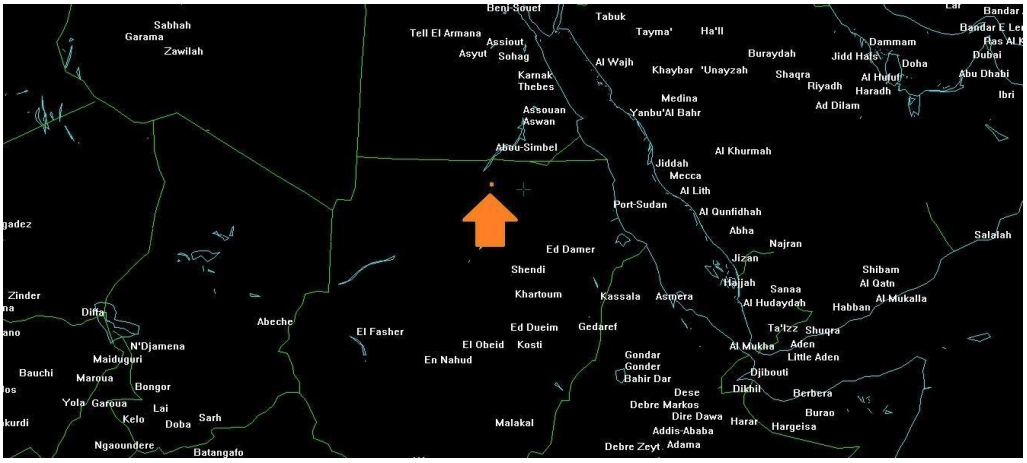
July 2020

Volume 2, Issue 6.

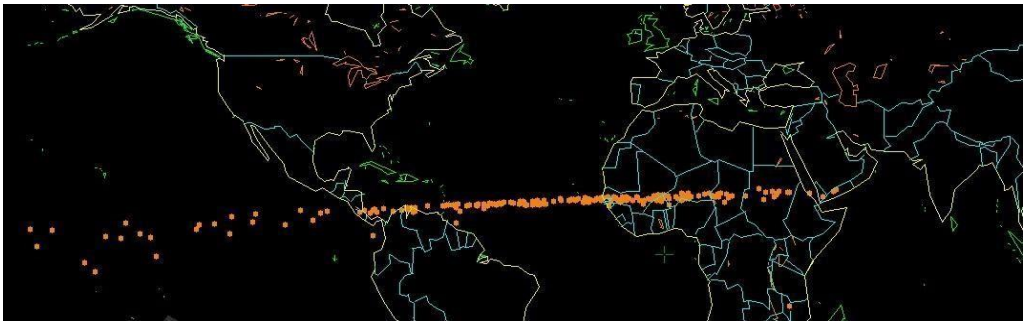
Four times in the past, NEOs were observed by observers of asteroids before impact with the Earth's atmosphere. These four asteroids (2008 TC3,2014 AA, 2018 LA, and 2019 MO) all were on the safe side when it comes to size.

Object	Date of discovery	Date of Impact	Size(M)
2008 TC3	2008-10-06	2008-10-07	4.1
2014 AA	2014-01-01	2014-01-02	2–4
2018 LA	2018-06-02	2018-06-02	2.6–3.8
2019 MO	2019-06-22	2019-06-22	3–10

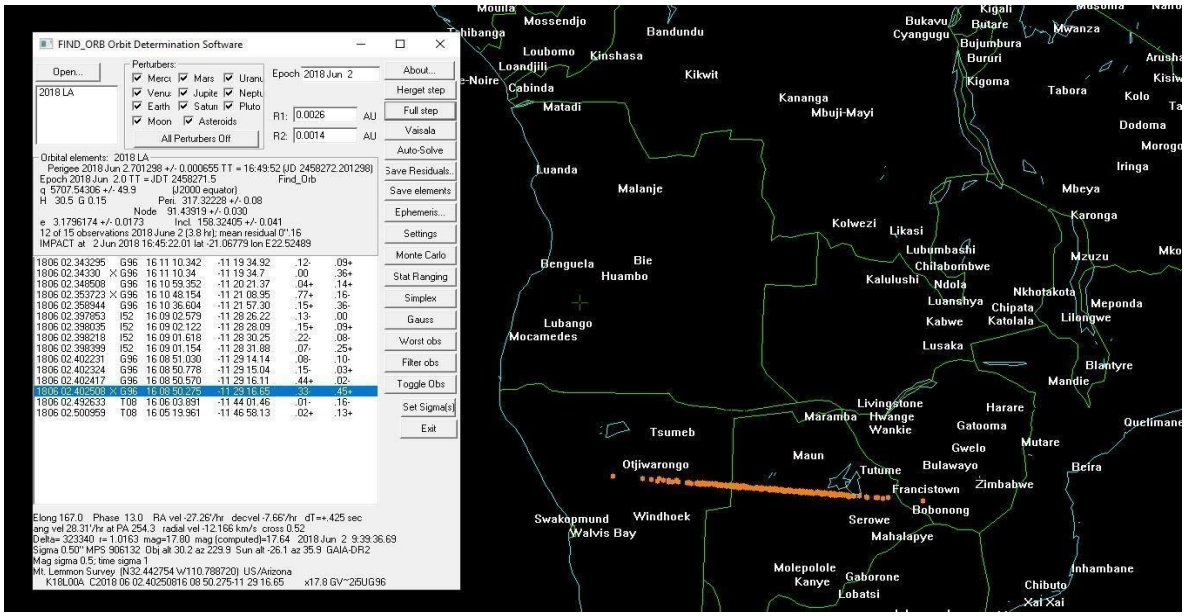
One of the programs available to the amateur observers of asteroids and comets is Find_Orb.[By Bill Gray] It is useful for calculating approximate ephemeris, determining approximate orbits, generating virtual asteroids, virtual impactors, predicting impact locations, and many other things. It should be noted IF one uses the wrong setting, one can gets an incorrect solution. Find_Orb can generate an "asteroid risk corridor" with the help of Guide 9.1.[By Bill Gray]



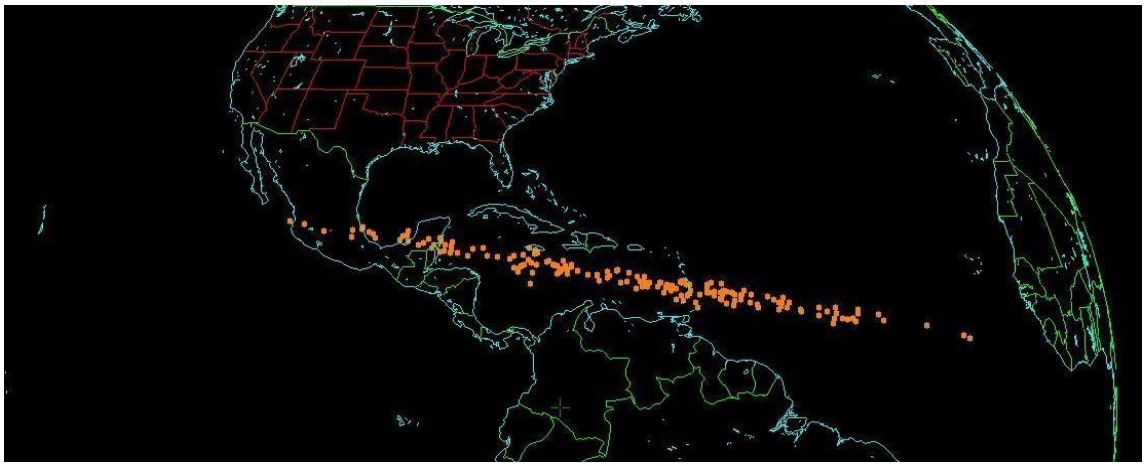
The location of 2008 TC3 impact 2008-10-07



An asteroid risk corridor for the impact for the NEO 2014 AA 2014-01-02



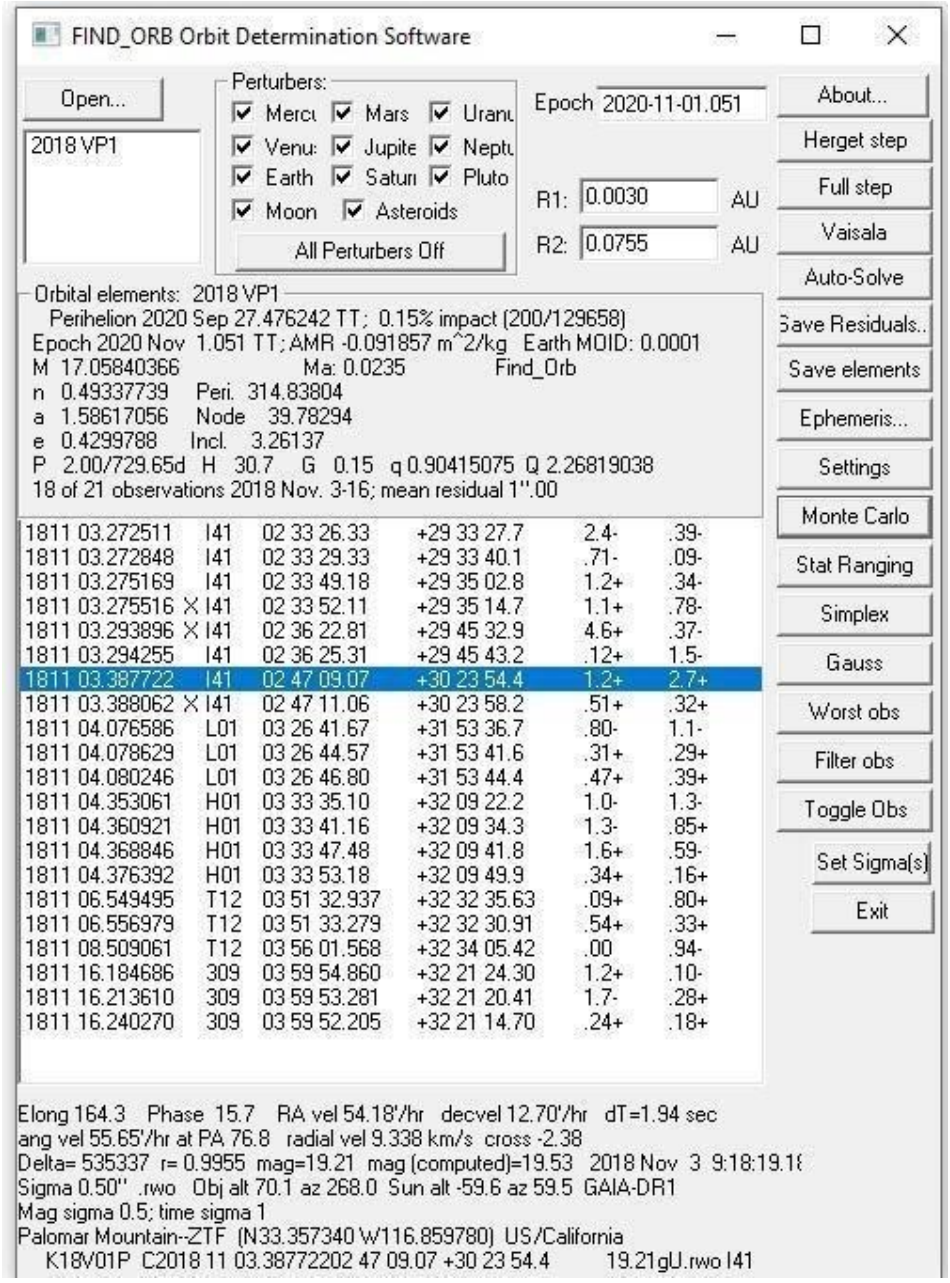
An asteroid risk corridor for the impact for the NEO 2018 LA 2018-06-02



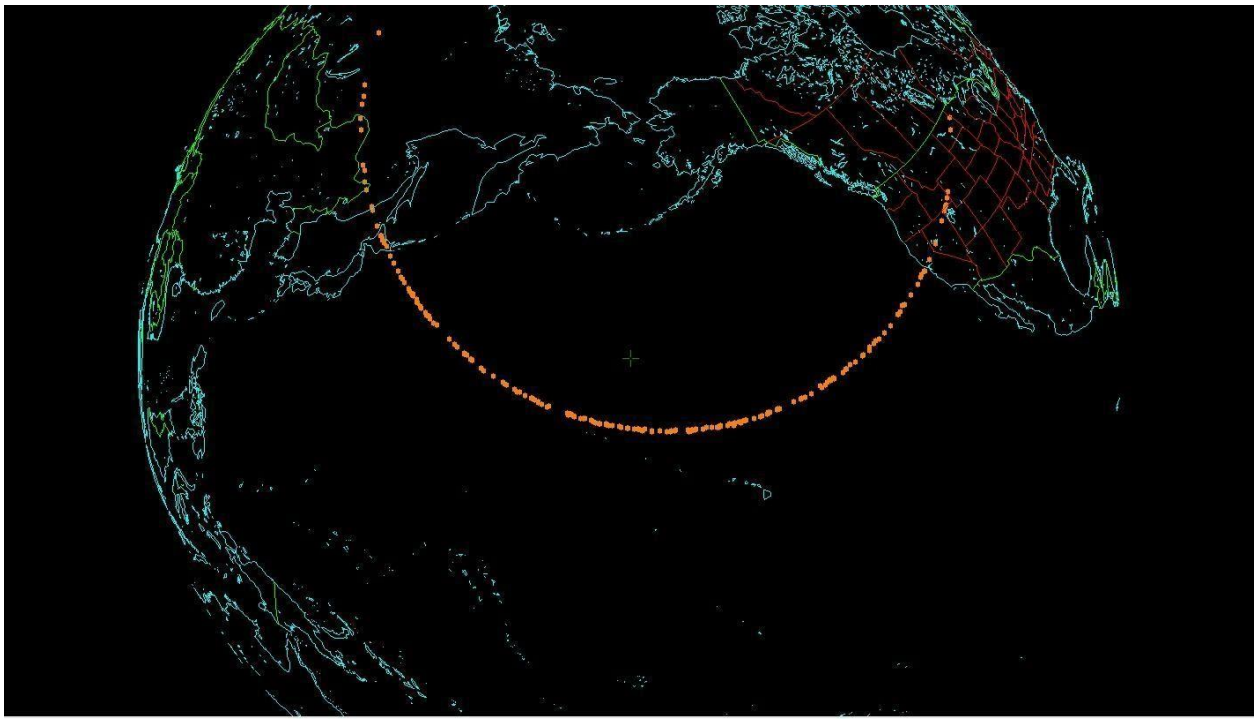
An asteroid risk corridor for the impact for the NEO 2019 MO 2019-06-22

There is a low probability, 1 in 240, that the two-meter 2018 VP1 will strike the Earth's atmosphere and create spectacular fireballs on 2020-11-02. A test with the Imperial College London's Earth Impact Effects Program reports, "The average interval between impacts of this size somewhere on Earth is 0.2 years". In other words, it would be safe to assume objects the size of 2018 VP1 has impacted Earth's atmosphere since 2018-Nov-03, the date of discovery. The Earth Impact Effects Program also suggests that the fireball is unlikely to do any significant damage. NASA JPL lists kinetic energy at impact from 2018 VP1[IF ANY] as ~ 0.00042 MegaTons of TNT. The Chelyabinsk event was 0.4 to 0.5 MegaTons of TNT.

As a test of concept, I obtained the observations of 2018 VP1 for the Minor Planet Center. I loaded the observations into Find_Orb and had it run the Monte Carlo method all night. Find_orb generated the following files MPCOrb.dat, state.txt, and virtual.txt. These files had orbits for 129,659 virtual asteroids 200 were virtual impactors(about 0.15%). I place a copy of the virtual.txt file in the Guide directory along with a copy of impact.tdf.(Project Pluto) Then Guide could generate a map of an asteroid risk corridor.



My Find_orb Setting	
Selecting perturbers	All
Epoch	2020-11-01.051
Monte Carlo noise	2
Physical model Include	SRP
Filler out	3 worst observations



An asteroid (fireball) risk corridor of potential impact for the NEO 2018 VP1, the orange dots is where 200 virtual impactors strike the Earth's atmosphere.

Note: Because there were more than 9 observations, I had to edit virtual.txt to do a workaround. I replace "18 of 21" with "U of O" see edited virtual.txt; this keeps the columns in the right place. I also edited impact.tdf(My) file where I can have more than one risk corridor.

JPL Close Approach Data from Apr 28, 2020 to Jun 13, 2020 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal LD (AU)	CA Distance Nominal KM	If the Earth was the Size of a Basketball (in feet)	H (mag)	Estimated Diameter
(2020 HS7)	2020/4/28	0.11(0.00029)	4.34E+04	2.29	29.1	4.1 m- 9.2 m
(2020 JG)	2020/4/30	0.56(0.0014)	2.10E+05	12.57	25.8	19 m- 41 m
(2020 JA)	2020/5/03	0.62(0.0016)	2.40E+05	14.42	27.2	9.6 m- 21 m
(2020 JJ)	2020/5/04	0.03(8.94E-05)	1.34E+04	0.43	30	2.7 m- 6.0 m
(2020 JN)	2020/5/05	0.65(0.00167)	2.50E+05	15.07	27.4	9.0 m- 20 m
(2020 KF5)	2020/5/28	0.64(0.00165)	2.47E+05	14.89	29.4	3.5 m- 7.9 m
(2020 KJ4)	2020/5/28	0.37(0.00096)	1.44E+05	8.5	29.9	2.8 m- 6.2 m
(2020 KC5)	2020/5/29	0.96(0.00247)	3.70E+05	22.48	27.4	9.0 m- 20 m
(2020 LD)	2020/6/05	0.8(0.00205)	3.07E+05	18.59	22.4	88 m- 200 m
(2020 ML2)	2020/6/13	0.93(0.00238)	3.56E+05	21.65	28	6.7 m- 15 m

As of 2020-06-28 there is

959,226discovered asteroids (MPC)(https://www.minorplanetcenter.net/)
[546,077have been numbered](https://minorplanetcenter.net/iau/lists/NumberedMPs.html)
23,160 discovered Near-Earth Objects (MPC) (https://www.minorplanetcenter.net/)
4,173 discovered Comets (MPC)(https://www.minorplanetcenter.net/)
546,077 objects listed on JPL's Sentry: Earth Impact Monitoring(JPL) (https://cneos.jpl.nasa.gov/sentry/)
2,498 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 2020-04-26 to 2020-06-30

Object Designation	Removed (UTC)
2020 ML	2020-06-20 14:06
2020 LG1	2020-06-20 13:58
2020 KU2	2020-06-13 14:01
2016 JR38	2020-06-12 14:01
2018 NF15	2020-06-12 14:01
2011 BA60	2020-06-12 14:00
2017 MA9	2020-06-12 13:58
2020 KB3	2020-06-10 04:28
2020 JU3	2020-06-05 13:28
2020 KR4	2020-05-29 13:58
2020 AN3	2020-05-29 13:32
2020 KO5	2020-05-28 15:13
2020 KO3	2020-05-26 16:23
2020 KN3	2020-05-26 16:17
2020 KU3	2020-05-25 14:27
2020 KE3	2020-05-24 15:21
2020 KM1	2020-05-24 15:19
2020 HU6	2020-05-24 14:57
2020 HJ4	2020-05-23 14:23
2020 JC3	2020-05-22 15:02
2020 KW	2020-05-21 19:38
2020 JX1	2020-05-18 14:29
2020 HL6	2020-05-18 14:09
2015 YC2	2020-05-17 16:02
2020 JU	2020-05-14 14:09
2020 HY8	2020-05-14 14:00
2018 PP29	2020-05-12 14:00
2020 JP	2020-05-09 13:26
2020 HM4	2020-05-06 13:29
2018 UL	2020-05-05 13:47
2020 HF9	2020-05-04 13:33
2020 GK1	2020-05-02 14:29
2020 HM6	2020-04-30 14:01

Useful Links:

Guide to Minor Body Astrometry (https://www.minorplanetcenter.net/iau/info/Astrometry.html)
How Are Minor Planets Named? (https://www.minorplanetcenter.net/iau/info/HowNamed.html)
New- And Old-Style Minor Planet Designations (https://www.minorplanetcenter.net/iau/info/OldDesDoc.html)
The Tracking News (http://www.hohmanntransfer.com/news.htm)
Accessible NEAs (https://cneos.jpl.nasa.gov/nhats/intro.html)

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Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum. There are also nine active polls. The Forum has reached 6700 posts.

Happy Independence Day!
BRARC Mourns Passings of Buddy Brown and Mary McDonald
Inquiry Regarding NASA FY2021 Budget
Inquiry for Light Pollution-Free Astrophotography Site
Prediction for Busier-Than-Average Hurricane Season
InSight Mole Back in Martian Soil!
Perserverance Launch Planned for This Month
Fortieth Anniversary of the Mount St. Helens Eruption
Why Do the Moon's Near and Far Sides Look So Different?
First Solar M-Class Flare Since October 2017
Perseid Meteor Shower Begins in Two Weeks
Have We Clarified the Link Between Supernovae and GRBs?
The Beloved Eskimo Nebula
Huge Envelope of Hot Gas Surrounds Milky Way
Does the Standard Model Need to be Refined?
Do Planets Form Faster Than Previously Thought?
Is Gravity the Only Force that Interacts with Dark Matter?
Can the Copernican Principle Yield a More Accurate Drake Equation?

Messages from HRPO

Highland Road Park Observatory

FRIDAY NIGHT LECTURE SERIES

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

There will be four lectures (all remote)—one each on the 10th, 17th, 24th and 31st. Speakers and topics will be posted at www.hrpo.lsu.edu.

SOLAR VIEWING

Saturday 11 July from 12pm to 2pm.
For all ages. No admission fee.
(Solar Viewers, $2 each. Add-on Activity: $2.50.)
Phase 2 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 Earthð'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]

Edge of Night

Friday 3 July from 8pm to 10pm
No admission fee. For all ages.

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

Jovian Opposition

Monday 13 July from 9:45pm to 11:45pm

No admission fee; for all ages.

Jupiter is exactly 180 degrees from the Sun, rising as the Sun is setting. We are now the closest we'll be to Jupiter this year! Weather permitting viewing of Jupiter will take place.

Plus Night

Saturday 18 July from 7pm to 10pm.

Theme: "Good Luck to Perserverance"

For all ages. No admission fee. Phase 2 Guidelines in effect.

During Plus nights sky viewing starts a half-hour earlier and extra features are available to the public…

*The well-known marshmallow roast commences at the campfire ring behind the building, lasting at least one hour and ending no later than 9:30pm. (The campfire, like the sky viewing, is weather-dependent.)

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

*An unaided eye sky tour takes place, showing the public major features of the sky for that month. The tour takes place at 8pm during Standard Time, and at 9pm during Daylight Time.

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

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

+

Saturnian Opposition

Monday 20 July from 9:45pm to 11:45pm

No admission fee; for all ages.

Saturn is exactly 180 degrees from the Sun, rising as the Sun is setting. We are now the closest we'll be to Saturn this year! Weather permitting viewing of Saturn will take place.

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Observing Notes: July

by John Nagle

Hercules – The Strong Man

Position: RA 17, Dec. +30 °

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

Named Stars

Ras Algethi (Alpha Her), from the Arabic "Al Kalb al Rāi", The Shepherd's Dog", "the head of the kneeling one", and the Chinese "Ti Tso", is a double star. **Alpha¹ Herculis**, mag. 3.31, 17 14 38.86 +14 23 24.9, is a red giant star. **Alpha² Herculis** is also a binary star, mag. 5.39, 17 14 39.20 +14 23 24.0, and consists of a yellow giant star and the secondary is a yellow-white dwarf star with an orbital period of 51.59 days – it's common name means "the kneeler's head". The separation between **Alpha¹** and **Alpha² Herculis** is 4.7". **Alpha¹** is also known as **HD 156014**, **HIP 84345**, **64 Herculis**, and **ADS 10418**. **Alpha²** is also known as **HD 156015**, with the rest the same as the primary.
Korneforos (Beta Her), "The Club Bearer", and from the Chinese "Ho Chung", "In the River", Mag. 2.78, 16 30 13.26 +21 219 22.7, is a yellow giant binary star with an orbital period of 410 days. Also known as **HD 148856**, **HIP 80816**, and **27 Herculis**.
Hejian (Gamma Her), and in Chinese "Ho Keen", mag. 3.74, 16 21` 55.24 +19 09 10.9, is a double star consisting of a white giant star and a 10th magnitude optical companion. Also known as **HD 147547**, **HIP 80170**, **h 277**, **ADS 10222**, and **20 Herculis**.
Sarin (Delta Her), and "Menkib al Jathi al Aisr", mag. 3.12, 17 15 01.92 +24 50 22.5, is a blue white double star with the companion (magnitude 8.2, and a separation of 25.8") being optical only. Also known as **HD 156164**, **HIP 84379**, **ADS 10424**, and **65 Herculis**.
Cujam (Epsilon Her), mag. 3.92, 17 00 17.41 +30 55 34.8, is a spectroscopic binary star – the separation is so small that the two stars almost touch each other - located in the southeast corner of the "**Keystone** " asterism. Also known as **HD 153808**, **HIP 83207**, and **58 Herculis**.
Rutilicus (Zeta Her), mag. 2.81, 16 41 17.48 +31 36 06.8, is a binary star. The primary is a sub-giant star with a yellow tinge, and the secondary is an orange star at magnitude 5.7. The separation between the two is 1.5" (12 au) and an orbital period of 34.45 years. Also known as **HD 150680**, **HIP 81693**, **ADS 10157**, and **40 Herculis**.
Sophian (Eta Her), "Pure", mag. 3.48, 16 42 53.74 +38 55 20.9, is a double star with the magnitude 12.5 companion believed to be line-of-sight only. It is located in the northwest corner of the "**Keystone**" asterism. **M13** is 2.5˚ to the south. Also known as **HD 150997**, **HIP 81833**, and **44 Herculis**.
Rukbalgethi Genubi (Theta Her), and "Rekbet al Jathihal al Aisr", "The Left Knee of the Kneeling Man", and with adjacent stars it was the Chinese "Tien Ke", "Heaven's Record", mag. 3.86, 17 56 15.18 +37 15 01.9. Also known as **HD 163770**, **HIP 87808**, and **91 Herculis**.
Fekhiz al Jathih al Aisr (Iota Her), mag. 3.82, 17 39 27.89 +46 00 22.8, is a sub-giant star in a

multiple star system. Also in the system is a spectroscopic binary star with a period of 113.8 days, which has two companion stars, one with an orbital period of 60 years, with the other lying further away with a period of about 1 million years. Also known as **HD 160782**, **HIP 86 414**, and **85 Herculis**.
Marfik (Kappa Her), from the Arabic "Al Marfik", "The Elbow", mag.5.0, 16 08 04.55 +17 02 49.2, is a double star. The primary is a yellow star, and the secondary, at magnitude 6.25 at 16 08 04.97 +17 03 16.0, is an orange giant star. The separation between these two stars is 27". The primary is also known as **HD 145001**, **HIP 79043**, **Σ 2010**, **ADS 9933**, and **7 Herculis**. The secondary is also known as **HD 145000**, and **HIP 79045**.
Maasym (Lambda Her), from the Arabic "Mi'sam", "The Wrist", also "Chaou", an early feudal state in China, mag. 4.41, 17 30 44.30 +26 06 38.2, is a deep yellow star. Also known as **HD 158899**, **HIP 85693**, and **76 Herculis**.
Marfik Al Jathih al Aisr (Mu Her), from the Arabic meaning "The Left Elbow of the Kneeler", and "Kew Ho", from the Chinese meaning "The Nine Rivers", mag. 3.42, 17 46 27.72 +27 43 21.0, is a double star with the secondary, at magnitude 10.35, being a binary star with its companion at magnitude 10.80. The primary and secondary are separated by 266 au. The secondary and companion, both red dwarf stars, has a period of 43.2 years. Also known as **HD 161797**, **HIP 86974**, **ADS 10786**, **Σ 2220**, and **86 Herculis**.
Zhōngshān (Omicron Her), also called "Atia", mag. 34.84, 18 07 32.55 +28 45 44.9. Also known as **HD 161797**, **HIP 86974**, and **103 Herculis**.
Fudail (Pi Her), "Excellent In Character", mag. 3.16, 17 15 02.85 +36 48 33.0, is an orange giant star located at the northeast corner of the **Keystone**. Also known as **HD 156283**, **HIP 84380**, and **67 Herculis**.
Rukbalgethi Shemali (Tau Her), "The Northern Knee of the Kneeling Man", mag. 3.91, 16 19 44.45 +46 18 47.8, is a blue sub-giant star. Also known as **HD 147394**, **HIP 79992**, and **22 Herculis**.
Cujam (Omega Her), from "Caiam" – the word used by Horace for the "Club of Hercules", mag. 4.57, 16 25 24.934 +14 02 00.3. Also known as **HD 148112**, **HIP 80463**, **24 Herculis**, and formerly known as **51 Serpentis**.
Ogma, mag. 8.15, 16 30 29.62 +38 20 50.3, has a transiting hot **Jupiter** planet. Also known as **HD 149026**, and **HIP 80838**.
The following stars have been named in various ways, including public contests:
Hunor, mag. 8.71, 16 20 36.36 +41 02 53.1, is a dwarf star with a massive (9 times the size of **Jupiter**) transiting planet (**HAT-P-2b**) with an orbital period of 5.6 days. Also known as **HD 147506**, and **HIP 80076**.
Irena, mag. 9.42, 16 15 50 +10 01 57, has one transiting planet. Also known as **HD 146389**, and **WASP 38**.
Franz, mag. 9.98, 17 20 27.87 +38 14 31.9, has one transiting planet. Also known as **HAT-P-14.**
Pipoltr, mag. 12.4, 17 52 07.02 +37 32 46.2, has one transiting planet, **TrES-3**, in a 31 hour orbit that is decaying. Also known as **GSC 03089-00929**.

Deep Sky:

M13 (NGC 6205), mag. 5.9, 16 41.7 +36 28, 20' in size, is a globular cluster that is extremely bright, very large, round, and very rich. Three dark rifts radiate outward from near the center, like a dark "propeller". Contains over 500,000 stars, and is visible with the naked eye from a dark site with no **Moon**. Located about 2.5˚ south of **Eta Herculis**. About 28' to the north-northeast is **NGC 6207**, and **IC 4617** is 15' to the north-northeast of **Eta Herculis**. Also known as "**The Hercules Cluster**", "**The Great Hercules Cluster**", **Mel 150**, **C1639+365**, **EQ1639+365**, and is part of **Abell 2151**.
M92 (NGC 6341), mag. 6.5, 17 17.1 +43 08, 14' in size, is a globular cluster with a high concentration of stars; large, and very bright. Its stars are exceptionally poor in iron and other elements heavier than the basic hydrogen and helium. Located about 6˚ due north of **Pi Herculis**, or about ⅓ the way from

Iota Herculis to **Eta Herculis**. Contains over 7500 stars. Also known as **Mel 168**, **C1715+432**, and **EQ1715+432**.
DoDz 8, mag. 6.83, 17 26 24 +24 11.6, 14'x14' in size, contains 6 stars, not a true cluster. Also known as **OCL 104**, **Lund 750**, and **C1724+242**.
NGC 6210, mag. 8.8, 16 44.5 +23 49, 20"x16" in size, is a planetary nebula that is very bright, very small, and has a smooth disk. The nebula is involved in a larger, fainter disk, with traces of a ring structure. The central star is **HD 151121** (13.7 in magnitude). The triple star **Σ 2094** is 20' to the south-southwest. Also known as "**The Turtle Nebula**", **PK 043+37.1**, **PNG 43.1+37.7**, and **ARO 05**.
NGC 6229, mag. 9.4, 16 47.0 +47 32, 4.5' in size, is a globular cluster with a high concentration of stars; very bright, large, and round. Located about 1.5˚ north of **52 Herculis** (at magnitude 4.8). Also known as **H4-50**, **C1645+476**, **EQ 1645+476**, and **GCL 47**.
LeDrew 8, mag. 10.0, 17 49.3 +28 04, 12' in size, contains 12 stars. Possible asterism or cluster.
Objects beyond magnitude 10 of interest:
IC 4593, mag. 10.7, 16 12.2 +12 04, 13" in size, is a planetary nebula that is small, faint, and stellar; surrounded by much larger, fainter disk. The central star is **HD 145649** (11.3 in magnitude). Also known as "**The White Eye Pea Nebula**", **PK 25+40.1**, **PNG 25.3+40.8**, and **ARO 27**.
Hercules X-1, mag. 13.83, 16 57 49.834 +35 20 32.6, is an X-ray binary star system consisting of a black hole and a regular star. Also known as **4U1656+35**, and **HZ Herculis**.
AGC 2151, mag. 13.9, 16 05.1 +17 43, 56' in size, is a galaxy cluster, **The Hercules Galaxy Cluster**, that is one of the four groups which together comprise the huge **Hercules Supercluster**. **The Hercules Galaxy Cluster** contains 87 galaxies. The brightest galaxies are as follows: **NGC 6040, 6041, 6042, 6043, 6045, 6047, 6050,** and **6054,** with **IC 1178, 1181, 1182, 1183, and 1185.**
ARP 103, mag. 15.2, 16 49.43 +45 27.5, 3.6'x2.8' in size, is comprised of **MCG+08-31-003**, **003A**, **PGC 59061**, **59062**, and **59065**. Located ½˚ south of **52 Herculis**. Also known as **Zwicky's Triplet**.
Hercules A, mag. 17.82, 16 51 08 +04 59 35, 0.4'x0.3' in size, is an active galaxy that appears to be a regular elliptical galaxy. When imaged in radio waves, it shows plasma jets spanning over one million light years. The galaxy at its center, **3C348**, has a black hole about 1000 times more massive than the one in our galaxy. Parts of **Hercules A** are as follows: **CGCG 252-003**, **UGC 10586**; **3C348**; **MCG+01-43-006**; **PGC 59117**; **4C+05.66**, and **MRC 1648+050**.
Asterisms:
The Keystone – It is in the shape of a trapezoid, representing the torso of **Hercules**. It is comprised of the following stars: **Eta**, **Zeta**, **Epsilon**, and **Pi Herculis**.
The Butterfly – It is a group of six 3rd magnitude stars near the center of **Hercules.** The four northern stars of this asterism form the "**Keystone**" asterism.
Deep Sky Objects in Hercules are as follows: 227 NGC; 60 IC; 355 UGC; 296 MCG; 60 CGCG; 14 Arp; 12 AGC; 5 DoDz; 3 HCG; 12 Radio Galaxies; 20 Quasar Galaxies; 2 PG; 18 PNG; 16 PK; 6 PGC; 37 VV; 33 Herschel; 2 Mel; 1 Abell; 1 Ac; 2 Al; 1 AWM; 1 CTSS; 1 DdDm; 2 GCL; 1 HDS; 1 Hrr; 2 Hu; 5 K; 1 LeDrew; 1 Lor; 1 Mink; 1 Markov; 1 Mrk; 1 NPM1G; 1 Pal; 1 Pat; 6 Ren; 2 Sa; 2 Str, 2 V; 1 Vy; 1 Webb; 1 We; 1 1Zw-1; 1 8Zw-1; 2 3C; 1 IRAS; 1 Teutsch; and 8 MAC. Total of objects in Hercules is 1281.

Other Stars:

14 Herculis, mag. 6.61, 16 10 24.21 +43 49 06.1, is an orange dwarf star with two planets in orbit, b and c. The b planet has a 4.9 year orbital period, and a separation from the star of 2.8 au. Also known as **HD 145675**, and **HIP 79248**.
HD 154345, mag. 6.74, 17 02 36.40 +47 04 54.8, is a dwarf star with one planet in orbit, an orbital period of 9.095 years, and a separation of 4.18 au. Also known as **HIP 83389**, and **Gliese 651**.
HD 164972, mag. 7.01, 18 02 30.86 +26 18 46.8, has three planets in orbit. One of the planets is **Saturn**-like and has a separation from the star of 2.11 au. Also known as **HIP 88348**.
HD 164595, mag. 7.10, 18 00 39.0 +29 34 19, has one planet in orbit. Also known as **HIP 88194**.

HD 155358, mag. 7.5, 17 09 34.62 +33 21 21.1, is a yellow dwarf star with the lowest metallicity known of any star with a confirmed planet in orbit. It has two planets that are gravitationally interacting. Also known as **HIP 83949**.
HD 145934, mag. 7.6, 16 13 10.0 +13 14 22, has one planet in orbit.
HD 158038, mag. 7.64, 17 25 45 +27 18 12, has one planet in orbit. Also known as **HIP 85294**.
HD 148284, mag. 8.0, 16 25 48.0 +30 15 54, has one planet in orbit. Also known as **HIP 80489**.
HD 160508, mag. 8.11, 17 39 13.0 +26 45 27, has one planet in orbit. Also known as **HIP 86394**.
HD 148164, mag. 8.23, 16 25 45.0 +11 55 09, has two planets in orbit. Also known as **HIP 80484**.
HD 156668, mag. 8.42, 17 17 40.49 +29 13 38.0, has one planet in orbit – it is the second lightest planet discovered by radial velocity. Also known as **HIP 84607**.
Gliese 649, mag. 9.62, 16 58 08.85 +25 44 39.0, is a red dwarf star with a **Saturn** mass planet confirmed, with a period of 598.3 days. Also known as **HIP 83043**.
Beyond magnitude 10 there are two stars of interest:
GSC 02620-00648, mag. 11.59, 17 53 13.08 +37 12 42.4, has one transiting planet, **TrES4b**, with a mass of 1.8 times that of **Jupiter**, and a diameter of 250,000 km.
DQ Herculis, "Nova Herculis 1934", mag. 15.2, 18 07 30 +45 51 33, was an extremely bright, slow nova that reached magnitude 1.3 in December of 1934, and remained at this magnitude for almost two months. It is the proto-type for a category of cataclysmic variable stars known as **Intermediate Polars**.
The following is a list of the stars in Hercules:
104 Σ; 20 OΣ; 1 OΣΣ; 19 β; 6 A, 1 AC; 1 D; 2 Es; 4 h; 157 V; 5 Ho; 5 Hu, 2 HV; 2 Kui; 1 Po; 1 Pry; 1 S; 1 Sh; 2 numbered Herschel; and 1 lettered Herschel.
Total of stars in Hercules is 336.

Sky Happenings:July, 2020

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

July 1st - Evening: July opens with **Jupiter** and **Saturn** shining at 6˚ apart above the southeastern horizon, and toward the south the waxing gibbous **Moon** is less than 2˚ from **Beta Scorpii**.
July 2nd - Asteroid **Herculina** is at opposition at 9 AM CDT.
July 4th - **Earth** is at aphelion (94.5 million miles or 152,095,295 km from the **Sun**) at 7 AM CDT,
Full Moon occurs at 11:44 PM CDT, penumbral lunar eclipse. It will be visible for **North American** observers only in the northwest of the **United States**, **Canada**, and **Alaska**.
July 5th - Asteroid **Vesta** is in conjunction with the **Sun** at 1 AM CDT,
The **Moon** passes 1.9˚ south of **Jupiter** at 5 PM CDT,
Evening: The **Moon**, just past full, joins **Jupiter** and **Saturn** to form a triangle between **Sagittarius** and **Capricornus**.
July 6th - The **Moon** passes 2˚ south of **Saturn** at 4 AM CDT.
July 10th - The **Moon** passes 4˚ south of **Neptune** at 2 AM CDT,
Venus is at greatest brilliancy (magnitude -4.7) at 3 AM CDT.
July 11th - Dawn: High above the southeast horizon, the waxing gibbous **Moon** and **Mars** are less than 6˚ apart, while lower on the eastern horizon **Venus** and **Aldebaran** are only 1˚ apart,
The **Moon** passes 2˚ south of **Mars** at 3 PM CDT.
July 12th - **Venus** passes 1˚ north of **Aldebaran** at 2 AM CDT,
Mercury is stationary at 2 AM CDST,
The **Moon** is at apogee (251,158 miles or 404,199 km from **Earth**) at 2:27 PM CDT, its disk will span 29'34" in size,
Last Quarter Moon occurs at 6:29 PM CDT,
Dwarf planet **Ceres** is stationary at 9 PM CDT,
Asteroid **Pallas** is at opposition at 9 PM CDT.
July 14th - **Jupiter** is at opposition at 3 AM CDT,
The **Moon** passes 4˚ south of **Uranus** at 7 AM CDT.

July 15th - **Pluto** is at opposition at 2 PM CDT.
July 17th - The **Moon** passes 3˚ north of **Venus** at 2 AM CDT,
Dawn: In the east the waning crescent **Moon**, **Venus**, and **Aldebaran** form a shallow arc 6˚ long.
July 18th - The **Moon** passes 4˚ north of **Mercury** at 11 PM CDT.
July 20th - **New Moon** occurs at 12:33 PM CDT (Lunation 1207),
Saturn is at opposition at 5 PM CDT.
July 22nd - **Mercury** is at greatest western elongation (20˚) at 10 AM CDT,
Dusk: The very thin waxing crescent **Moon** is 3˚ from **Regulus**, low on the western horizon.
July 25th - The **Moon** is at perigee (228,889 miles or 368,361 km from **Earth**) at 12:02 AM CDT, its disk will span 32'26" in size.
July 27th - **First Quarter Moon** occurs at 7:33 AM CDT.
July 28th/29th - All Night: The **Southern Delta Aquariid** meteor shower is expected to peak. Best viewing is in the early hours of the morning after the waxing gibbous **Moon** has set.
July 29th - Dusk: The waxing gibbous **Moon** is 5˚ from **Aldebaran**.
Aug 1st - Dawn: **Venus** and **Zeta Taurii** are less than 2˚ apart. To their lower left, **Mercury** is rising in the east-northeast with **Pollux** to its upper left,
Dusk: The waxing gibbous **Moon**, **Jupiter**, and **Saturn** form a triangle above the southeast horizon,
Jupiter is 1.5˚ north of the **Moon** at 7 PM CDT.
Aug 2nd - **Pluto** is 1.1˚ north of the **Moon** at 1 AM CDT,
Saturn is 2˚ north of the **Moon** at 8 AM CDT.
Aug 3rd - **Full Moon** occurs at 12:59 PM CDT.

Planets:

Mercury – Mercury is in inferior conjunction on the evening of June 30th, and does not reappear in the dawn sky until around July 17th, when it will shine at magnitude 1.1, and will rise 1¼ hours before the **Sun**. On the 19th, the planet will shine at magnitude 0.8 and stand 5˚ to the right of the waning crescent **Moon** – both will rise soon after 4:30 AM local time, and should be visible above the northeast horizon 30 minutes later. On the 22nd, the planet reaches greatest western elongation (20˚), at magnitude 0.3, with it being 37% illuminated with an angular diameter of just 7.8". By the 25th, the planet has brightened to magnitude -0.1 in **Gemini**. On the 31st, the planet is at magnitude -0.7, and forms a nice trio of objects with **Pollux** (7˚ to the northeast) and **Castor** (nearby).

Venus – Venus rises two hours before the **Sun** at the star of July, and 3½ hours before the **Sun** by month's end. The planet's sunrise altitude leaps from 21˚ to 35˚ during the month and its crescent will wax from 19% to 43% during the month. On the 1st of July, the planet (at -4.6 magnitude) will stand 8˚ high, adjacent to the **Hyades** star cluster. The **Pleiades** (**M45**) are 10˚ directly above the planet. The planet will reach greatest brilliancy (magnitude -4.7) on the 10th. On the 12th, the planet will pass 1˚ north of **Aldebaran**. On the 16th, in the pre-dawn sky, the waxing crescent **Moon** is located 5˚ above the **Hyades**, and then 3.5˚ northeast of the planet in the pre-dawn sky of the 17th. By the 31st, the planet will stand 2.3˚ southeast of **Zeta Taurii**.

Mars – Mars opens the month at magnitude -0.5 in southwest **Pisces**, rising soon after midnight local time. It will brighten to magnitude -1.1 by the 31st, rising just after 11 PM local time. Its disk will grow from 12" to 15" this month. In the hour before dawn, the best time to view the planet, it will stand 30˚ high in the southeast in early July, and on the 31st, the planet will reach 45˚ altitude. The planet starts the month in **Pisces**, 17˚ south of **Algenib** in the **Square of Pegasus**, and will then move through the northwest corner of **Cetus** between the 8th and 26th.The planet will cross the celestial equator into the northern half of the sky on the 11th. The same morning, the planet will stand 6˚ northeast of a waning gibbous **Moon**. The planet's illuminated disk will increase from 84% to 86% lit during the month, enabling fine details on the surface to be observable with smaller telescopes.

Jupiter – On July 1st, at 11 PM local time, **Jupiter** will stand 15˚ high in the southeast, in the eastern part of **Sagittarius**, shining at magnitude -2.7, roughly midway between the 2nd magnitude star **Sigma**

Sagittarii (**Nunki**), and the 3rd magnitude star **Beta Capricorni** (**Dabih**). The planet moves 4˚ westward in **Sagittarius** during July. The planet will reach opposition on the 14th, and will reach its peak elevation, near 30˚ in the south around 1 AM local daylight time. The planet's disk is 48" across. The **Galilean** satellites – **Io**, **Europa**, **Ganymede**, and **Callisto** – will now shine their brightest at opposition.

Saturn – Saturn lies 6˚ east of **Jupiter** on July 1st, and nearly 8˚ east by the 14th. **Saturn's** disk spans 19" and the rings stretch nearly 42". The planet's polar axis tilts 21˚ toward us, revealing the northern side of the ring system. The planet reaches opposition on the 20th. The planet's wide ranging moon **Iapetus** will reach inferior conjunction with the planet on the 28th, as it moves from its fainter eastern elongation. Early in the month, the moon will brighten to magnitude 11. On the 27th and 28th, the moon will lie 1' south of the planet while **Titan**, the planets largest and brightest moon, will stand 3' west of the planet. **Titan** can be found due north of the planet on the 15th and 31st, and due south of the planet on the 7th and 23rd.

Uranus – Uranus will rise two hours before dawn on July 1st in **Aries**, located midway between **Alpha Arietis** (**Hamal**) and **Alpha Ceti** (**Menkar**), shining at magnitude 5.8 with a greenish-colored disk spanning 3.5". On the 14th, the planet stands 4.8˚ due north of a waning crescent **Moon**.

Neptune – Neptune is in northwest **Aquarius**, shining at magnitude 7.9. On July 1st, the planet will rise shortly after local midnight. In the pre-dawn sky of the first week of July, the planet will stand between 11˚ and 15˚ west of **Mars**. To locate **Neptune**, find 4th magnitude **Phi Aquarii** – the planet is about 4˚ east-northeast of this star. On the 10th, the planet will be nearly 5˚ north of the gibbous **Moon**, with a tiny 2" wide bluish disk.

Pluto – Pluto reaches opposition, in **Sagittarius**, on July 15th, glowing at magnitude 14.3. On July 1st, the planet is 41' south of **Jupiter**. In late July, **Pluto** is 3.2˚ due east of **Jupiter**.

Earth – Earth reaches aphelion, its greatest distance from the **Sun**, at 6:35 AM CDT on July 4th, at a distance of 94,507,635 miles from the **Sun**.

Moon –The nearly full **Moon** will undergo a penumbral eclipse too slight for the eye to detect. Mid-eclipse occurs at 11:30 PM CDT on the 4th. The **Full Moon** will occur at 11:44 PM CDT on July 4th ,

Favorable Librations: **Mare Australe** on July 2nd; **Mare Smithii** on July 4th; **Mouchez Crater** on July 13th, and **Pascal Crater** on July 14th.

Greatest North declination is on July 19th (+23.9˚)

Greatest South Declination is on July 5th (-24.1˚)

Libration in Longitude: East limb most exposed on July 6th (+5.0˚)
West limb most exposed on July 19th (-5.4˚)

Libration in Latitude: North limb most exposed on July 11th (+6.8˚)
South limb most exposed on July 25th (-6.7˚)

Asteroids **– Asteroid 1 Ceres** is in **Aquarius**, 13.5˚ due south of **Neptune** on July 1st, and 16˚ south of **Neptune** on the 31st. On the 31st, the dwarf planet, at magnitude 7.3, is only 0.8˚ northwest of the 3rd magnitude star **88 Aquarii**. According to the ***RASC Observer's Manual, 2020 USA Edition***, **Ceres** locations are as follows: On July 10th -23 15.80 -18 31.9, at magnitude 8.4; on the 20th – 23 15.35 -19 25.4, at magnitude 8.2; and on the 30th – 23 12.58 -20 29.3, at magnitude 8.1.

Asteroid 2 Pallas reaches opposition on July 12th in western **Vulpecula**, at magnitude 9.6. According to the ***RASC Observer's Manual, 2020 USA Edition***, **Pallas's** positions are as follows: On July 10th -19 06.83 +21 34.0, at magnitude 9.6; on July 20th – 18 58.79 +20 39.8, at magnitude 9.6; and on July 30th -18 51.59 +19 21.0, at magnitude 9.6.

Asteroid 7 Iris's positions, according to the ***RASC Observer's Manual, 2020 USA Edition***, are as follows: On July 10th – 18 15.22 -20 23.8, at magnitude 9.1; on July 20th – 18 05.71 -20 11.6, at magnitude 9.5; and on July 30th – 17 58.34 -20 01.0, at magnitude 9.5.

Asteroid 56 Melete's positions, ***by my estimates***, are as follows: On July 1st – just over 2˚ north-northeast of **Zeta Scuti**, or about ½˚ west and north of **LDN 453**; on July 5th – just under 2˚ due north of **Zeta Scuti**; on July 10th – just over 2˚ north-northwest of **Zeta Scuti** (it is now in the **Serpens Cauda** constellation- all the rest of the positions are in this constellation); on July 15th – just over 2.5˚ northwest of **Zeta Scuti**; on July 20th –about 3˚ west-northwest of **Zeta Scuti** at **LDN 431**; on July 25th – about 3.4˚ west and a little north of **Zeta Scuti**; and

on July 30th – about 3.8˚ due west and a touch north of **Zeta Scuti**.

Comets **–** **Comet 2P/Encke** positions, according to **ALPO**, are as follows: On July 1st – 08 03.8 +17 43, at magnitude 7.3 in **Cancer**; on July 11th – 09 13.9 +08 19, at magnitude 7.8 in **Cancer**; on July 21st – 10 29.3 -03 23, at magnitude 9.0 in **Sextans**; and on July 31st – 11 58.0 -16 04, at magnitude 10.4 in **Corvus**.

Comet 88P/Howell positions, according to **ALPO**, are as follows: On July 1st – 12 55.7 -05 31, at magnitude 11.1 in **Virgo**; on July 11th – 13 08.4 -07 26, at magnitude 10.8 in **Virgo**; on July 21st – 13 24.3 -09 36, at magnitude 10.4 in **Virgo**; and on July 31st – 13 43.2 -11 59, at magnitude 10.1 in **Virgo**.

Comet C/2019 U6 (Lemmon) positions, according to **ALPO**, are as follows: On July 1st – 10 25.4 -02 11, at magnitude 6.6 in **Sextans**; on July 11th – 11 34.4 +05 59, at magnitude 6.9 in **Leo**; on July 21st – 12 33.1 +12 29, at magnitude 7.4 in **Virgo**; and on July31st – 13 21.3 +16 54, at magnitude 8.0 in **Coma Berenices**.

Comet C/2020 F3 (NEOWISE) positions, according to **ALPO**, are as follows: On July 1st – 05 55.7 +26 08, at magnitude 4.4 in **Taurus**; on July 11th – 06 43.8 +41 49, at magnitude 4.3 in **Auriga**; on July 21st -09 43.9 +47 13, at magnitude 5.3 in **Ursa Major**; and on July 31st – 12 22.6 +29 58, at magnitude 6.5 in **Coma Berenices**.

Comet C/2017 T2 (PANSTARRS) positions, according to **ALPO**, are as follows: On July 1st – 12 30.6 +41 38, at magnitude 8.8 in **Canes Venatici**; on July 11th – 12 50.9 +33 56, at magnitude 9.1 in **Canes Venatici**; on July 21st – 13 08.9 +26 44, at magnitude 9.3 in **Coma Berenices**; and on July 31st – 13 25.3 +20 11, at magnitude 9.7 in **Coma Berenices**. **Comet T2**, ***by my estimates***, will be located at the following positions: On July 1st – less than ½˚ from **Beta Canum Venaticorum** (**Chara**) and the **NGC 4485/4490 pair**; on July 5th – about 3˚ west of **Alpha Canum Venaticorum** (**Cor Coroli**); on July 10th – just under 5˚ due south and a touch west of **Alpha Canum Venaticorum**; on July 15th – about 4˚ southwest of **Beta Comae Berenices**; on July 20th – about 1˚ due south and a touch west of **Beta Comae Berenices**; on July 25th - 5˚ south-southeast of **Beta Comae Berenices**; and on July 30th – about 4.5˚ northwest of **Alpha Comae Berenices**, and about 3.5˚ east-northeast of **M53**, or about 3.7˚ northeast of **NGC 5053**.

Comet C/2020 F8 (SWAN) positions, according to **ALPO**, are as follows: On July 1st – 06 16.7 +31 47, at magnitude 7.7 in **Auriga**; on July 11th – 06 26.1 +28 19, at magnitude 8.5 in **Auriga**; on July 21st -06 33.5 +25 16, at magnitude 9.1 in **Gemini**; and on July 31st – 06 39.4 +22 30, at magnitude 9.6 in **Gemini**.

Meteor Showers **–** There are two Class I meteor showers in July.

The **Southern Delta Aquarids**, active from July 21st to August 23rd, peaking on July 29th with a maximum zenith hourly rate of 20.

The **Perseids**, active from July 17th to September 1st, peaking on August 12th with a maximum zenith hourly rate of 100.

There are 2 Class II showers in July.

The **Alpha Capricornids**, active from July 3rd to August 11th, peaking on July 26th with a maximum zenith hourly r4ate of 4.

The **Piscis Austrinids**, active from July 30 to August 11th, peaking on August 8th with a maximum zenith hourly rate of 5.

There are 11 Class IV – weak - showers in July. All of them have a maximum zenith hourly rate of less than 2.

When to View the Planets:

Evening Sky	
Jupiter	**(southeast)**
Saturn	**(southeast)**

Midnight	
Mars	**(east)**
Jupiter	**(south)**
Saturn	**(south)**
Neptune	**(southeast)**

Morning Sky	
Mercury	**(northeast)**
Venus	**(east)**
Mars	**(south)**
Jupiter	**(southwest)**
Saturn	**(southwest)**
Uranus	**(east)**
Neptune	**(south)**

DARK SKY VIEWING - PRIMARY ON JULY 18TH , SECONDARY ON JULY 25TH

Hercules – The Strong Man (aka The Kneeling Man)

The origin of this constellation is so ancient that its true identity was lost even to the Greeks, who knew the figure simply as Engoriasin, literally meaning “The Kneeling One”. The Greek poet Aratus described him as being worn out with toil, his hands upraised, with one knee bent and a foot on the head of Draco, the Dragon. ‘No one knows his name, nor what he labors at’, said Aratus. But Eratosthenes, a century after Aratus, identified the figure as Heracles (the Greek name for Hercules) triumphing over the dragon that guarded the Golden Apples of the Hesperids. The Greek playwright Aeschylus, quoted by Hyginus, offered a different explanation. He said that Heracles was kneeling, wounded and exhausted during his battle with the Ligurians.

Heracles was the son of Zeus and Alcmene, a mortal woman. When he was an infant, Zeus laid him at Hera’s breast while she was slept. Having suckled her milk, Heracles became immortal. Hera was enraged, both at this and at her husband’s infidelity, and while she could not kill Heracles, she made his life difficult at every turn. She cast a spell that made him insane and kill his wife and children. Once he regained his senses and realized what he had done, he visited the Oracle at Delphi to see how he could atone for his deed. The Oracle sent him to serve Eurystheus, King of the Mycenae, for a period of 12 years. It was then that he got the name of Heracles, which means: The Glory of Hera”. His given name at birth was Alcides, Alcacus, or Palaemon according to different sources.

King Eurystheus gave Heracles a series of tasks, known as the Labors of Heracles. The first was to kill the Nemean Lion, a beast whose hide was impervious to any weapon. After Heracles had strangled the lion to death, he used its claws to cut off the skin and later used the pelt as a cloak and the gaping mouth as a helmet, which both protected him and made him look even more frightening. The Nemean Lion is represented by the constellation Leo.

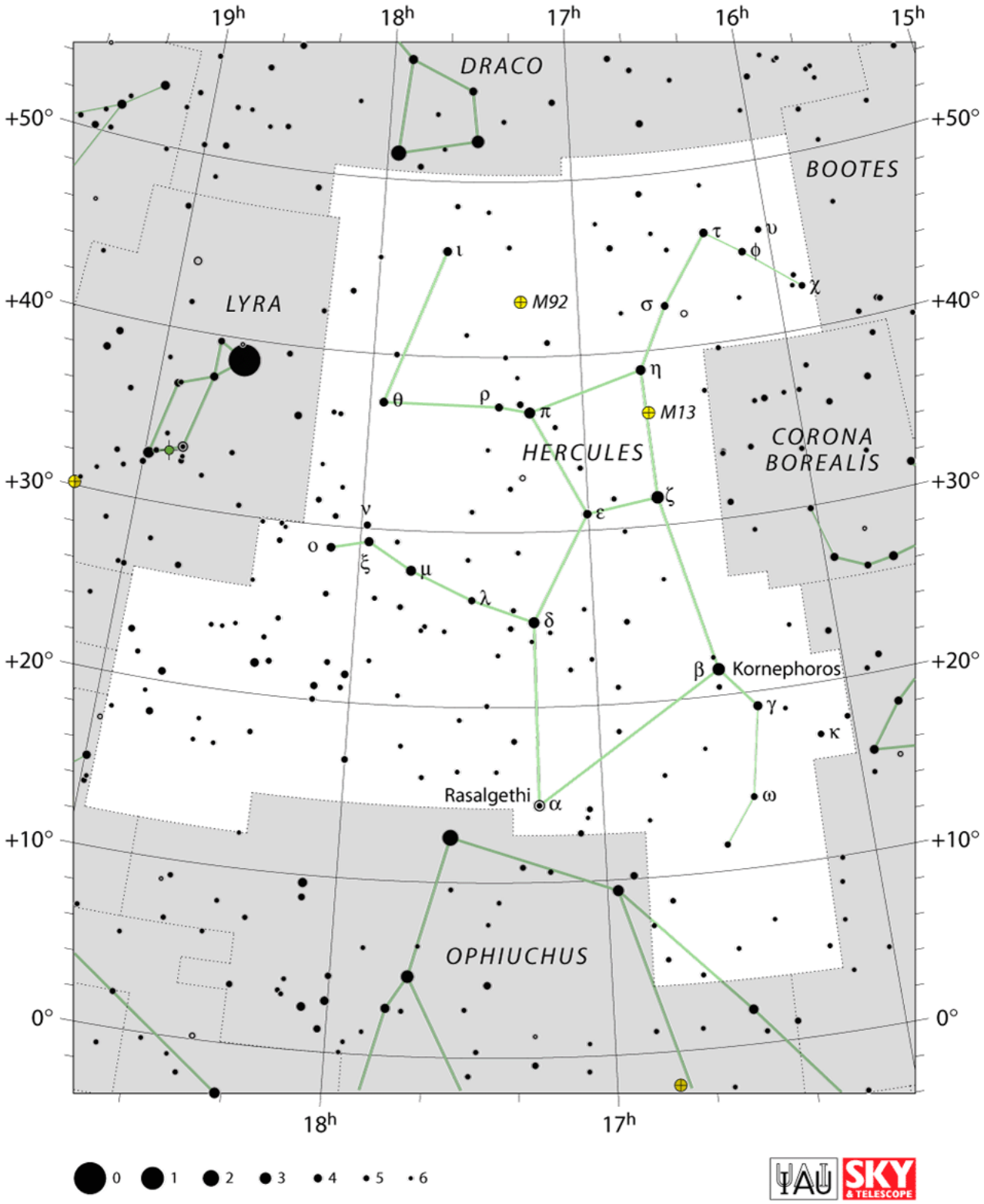
The second task was to destroy the Hydra, represented by the constellation Hydra, a monster with multiple heads. As he fought with the wild beast, Hera sent a crab to distract him. Heracles killed the crab, and Hera placed it in the sky as the constellation Cancer, the Crab.

Heracles was then sent to catch a deer with golden horns and, after that, a ferocious boar. The fifth task was to clean the stables of King Augeias of Elis. The sixth was to kill a flock of marauding birds, and the eighth labor was to bring the horse of King Diomedes of Thrace, which ate flesh, to King Eurystheus. The ninth was to bring the belt of Hippolyte, the Queen of the Amazons. The tenth labor was to steal the cattle of Geryon, a monster that lived on the island of Erytheia. On his way back, he was attacked by local forces, which outnumbered and nearly overcame him. He sank to his knees and prayed to Zeus. The god helped him by sending rocks, which Heracles threw at his attackers. This is the event that, according to Aeschylus, was commemorated by the constellation Engonasin (The Kneeler).

Even though Eurystheus and Heracles had originally agreed on ten tasks, when Heracles came back the king refused to release him from his service and set two additional tasks. The first was to steal the Golden Apples from Hera's garden on Mount Atlas. The garden was guarded by the Hesperides, daughters of the Titan Atlas, and the Hesperides were guarded by the dragon Ladon, whose task was to make sure that they did not steal any of the apples. The dragon is represented by the constellation Draco, The Dragon. Hera herself placed the dragon in the sky after Heracles had killed it.

The final labor was the most difficult one. Heracles was sent to the gates of the Underworld to fetch Cerberus, the dog that had three heads and was tasked with guarding the entranced and making sure that those who had crossed the river Styx did not try to escape. Heracles used his pelt to protect himself and dragged the dog to Eurystheus. The king, who had not expected to see Heracles again, had no choice but to release him from his service.

After completing the twelve labors, Heracles married Deianeira, daughter of King Oeneus. While the two were traveling together, they came to the river Evenus, where the centaur Nessus ferried people across. Heracles swam the river, but Deianeira needed to be carried and Nessus, who offered to do it, fell in lust with her and tried to ravish her. Heracles shot the centaur with an arrow that was tipped in the Hydra's poison. As he lay dying, Nessus offered Deianeira some of his blood, saying it can act as a love charm. Deianeria kept the blood, poisoned by Heracles arrow. Much later, she became worried that Heracles attention was wandering to another woman and she gave him a shirt on which she had smeared Nessus's blood. When Heracles put the shirt on, the Hydra's poison started burning his flesh and, once he realized what was going on, he built himself a funeral pyre on Mount Oeta and lay on his pelt ready to die. The fire burned the part of him that was mortal, and the immortal part joined Zeus and the other gods on Mount Olympus. Zeus placed Heracles in the sky as the constellation now known by his Roman name, Hercules.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