



Night Visions

2019 July Issue

Newsletter of the Baton Rouge Astronomical Society

Monthly Meeting July 8th at 7PM at HRPO

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

Program: Viewing of NASA's [The Eagle Has Landed](#) video, after which members can discuss and share personal memories of Apollo 11 (and other) missions.

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President's Message

July 20, 2019 will mark the 50th anniversary of the Apollo 11 Moon Landing,

one of the great milestones of United States and World History. Our meeting on Monday, July 8th involves inviting members of B.R.A.S. to share any memories we have of this event. These memories don't necessarily have to be especially profound (though this is certainly encouraged), and they can be about any of the Apollo missions, not just Apollo 11.

BRAS ZAZZLE SHOP We opened a shop on Zazzle We are working some the bugs (i.e. T-Shirt prices). The shop can be found at: https://www.zazzle.com/store/br_astronomical



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

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

UPCOMING BRAS MEETINGS:

Light Pollution Committee - HRPO, Wednesday July 3, 6:15 P.M.
Business Meeting – HRPO, Wednesday, July 3, 7 P.M.
Monthly Meeting – HRPO, Monday, July 8, 7 P.M.

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

SALE: BRAS is having a surplus telescope/equipment.

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

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

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

BRAG: Check below for BRAG's scheduled meeting.

Clear Skies

Steven M. Tilley, President



Secretary's Summary of June Meeting

- President, Steven Tilley, calls the meeting to order at 7:01PM.
- 23 members in attendance.
- Steven talked about the Zazzle store where members can purchase BRAS merchandise.
- Craig Brendan gave a telescope mirror cleaning demonstration. He covered what materials were needed and the process of how it is done.
- Steven thanked everyone for coming to the meeting.
- Steven gave the floor to Vice President, Thomas Halligan. Thomas reminded everyone the topic of the next meeting is centered on the 50th Anniversary of Apollo 11. He asked members to share their personal reflections as part of the presentation.
- Light Pollution Chair, John Nagle, talked about the article in Country Roads Magazine that featured an interview done with the LPC Committee at their March meeting. Several members were quoted in the article.
- Ben Toman, Outreach Chair, gave a list of upcoming outreach opportunities. The Denham Springs Library, and the Vacherie Library will both have events in June.
- Scott Cadwallader will be leading the outreach at Denham Springs, and Scott Louque will lead the Vacherie outreach. The Feliciana Retreat Center will be hosting an event from July 30th to August 1st. They have invited BRAS to attend and given use of cabins.
- Observatory manager, Chris Kersey, gave a report about HRPO. IAD was a bust due to poor weather conditions. The LA Space Consortium will host a mass rocket launch at the main library and at HRPO on July 16th at 5:30PM in honor of the Apollo 11 50th Anniversary. The Apollo 11 talk will be July 12th, and the Apollo 11 Anniversary party will be July 20th. Chris asked for volunteers.
- No Treasury reports.

-Meeting adjourned at 7:55PM.



Submitted by Krista Reed, BRAS Secretary



2019 Officers:

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

BRAS Liaison for BREC:

Chris Kersey

BRAS Liaison for LSU:

Greg Guzik

Committees/Coordinators:

Light Pollution:

John Nagle

Newsletter:

Michele Fry

Observing Notes:

John Nagle

Outreach:

Ben Toman

Webmaster:

Frederick Barnett


BRAS Outreach Report

Hi Everyone,

Ahhhh, Summer! Hot, muggy, cloudy/rainy, mosquitoes that could carry your scope off. Just some of the things we love about Southeast Louisiana. That hasn't stopped us from getting some outreach done, though!

This past month we had two nice events. Scott C. and Roz R. made a trip to the **Denham Springs/Walker Library** and gave a presentation on the Moon landings followed by some observing of the Moon. The Advocate ran an article about it on June 26th. The article begins:

“In recognition of the 50th anniversary of the Apollo 11 moon landing, the Livingston Parish Library hosted an evening of celebration focusing on the moon. The event took place June 13 at the Denham Springs-Walker Branch. Representatives from the Baton Rouge Astronomical Society served as the guest speakers”

The article can be found online (for awhile) here:

https://www.theadvocate.com/baton_rouge/news/communities/livingston_tangipahoa/article_1fbf0fc4-945f-11e9-a56b-e3f083e804ab.html?fbclid=IwAR1w7ZgF624p0Ccgmjvqq_C04Rg3drQ0ssdC6gj8JOY55kry4xNmxcNt0Q

Here are a few pics, provided by Roz.



Scott Cadwallendar gives a presentation on the Apollo Moon Landing



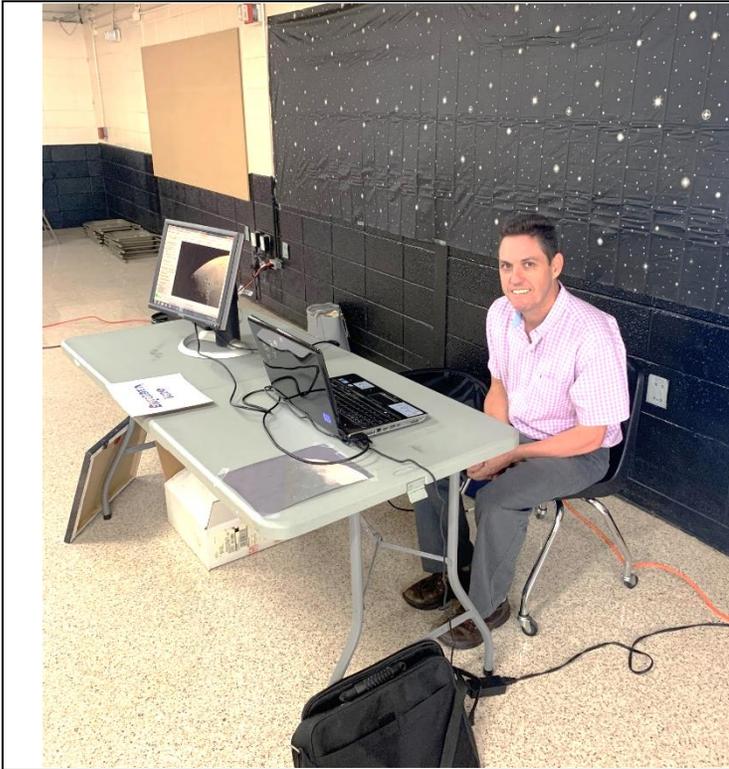
Roz Readinger, courting interested observers in the courtyard after Scott's presentation.



After the presentation, Scott C. trains his scope on the moon.

Also, Scott L. and I were on hand in **Vacherie for a STEM outreach**. Scott showed off his astrophotography rig and I had a scope outside for solar observing when the clouds would cooperate. We had a lot of kids and parents there and we got to watch some cool model rocket launches, too!





STEM Outreach in Vacherie.

Left: Scott Louque shows off his astrophotography equipment.

Above: Ben Toman gives some demos and does some solar observing.

Coming up we have a unique opportunity. We're going to be heading up to the **Feliciana Retreat Center** (former home of the Deep South Star Gaze) to do some stargazing with some camp kids. The campers are children of National Guard service members and Chris R. and his wife, Annette have done this outreach the past two years when it was up in Bunkie. We're going to try to do two nights and have even been offered the use of a couple of 8-person cabins to stay the night if you don't want to tent camp. We're also invited to eat with them. Here's hoping we get some clear skies for a couple nights.

So, take a look at the info here (including an outing to another Library) and let me know if you'd like to participate. If you want to go up to the Feliciana Retreat outreach, I need to know ASAP because they need a head count and will also require background checks for anyone staying the night.

Upcoming Outreach Events:

Thursday, July 11th
West Feliciana Library
5:30pm-7:30pm
(Presentation with Moon viewing)

Wednesday, July 31st-Thursday, August 1st
Feliciana Retreat Center
National Guard Kids Camp
(Stargazing for campers)

Clear skies,

Ben Tomen, Outreach Chairperson





BRAS Light Pollution Committee Report

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

Everyone is welcome to join in..

Meeting called to order by John Nagle

No new members, with 8 members in attendance

May minutes were published in the June newsletter

Old Business:

1. Dark Sky Advocacy web pages, Chris says they are text ready.
2. Linking a DSA page to the LPC Minutes that are in the newsletter, need to ask Fred.
3. A checklist on “How to Make Your Property Dark” for use by BRAS members and the public is still being developed.
4. Put current SQM readings at HRPO on the home page of the DSA pages. Date and time taken, link to spread sheet – need to ask Fred.
5. Globe at Night info now at the bottom of the LPC Report.
6. New diorama on Light Pollution for display at HRPO is being worked on.
7. Need to check out possible Good Lighting Award nominees.
8. Ask Fred about making a DSA web page for nominations for the Good Lighting Award and why you made this nomination – On hold.

New Business:

1. Chris to draft letter to Entergy and Demco about light pollution.
2. Ask Fred to link the Country Roads article on Light Pollution to the DSA web pages.

Minutes of this meeting read and approved

Meeting adjourned.



Submitted by John Nagle, Chairman

P.S. Every year BRAS presents a Good Lighting Award to a company that uses BEST outdoor lighting practices. If you notice a business in EBRP that uses Full Cutoff lighting fixtures, please jot down and send their business name, address, date and description to me at jonagle@cox.net. This would be much appreciated.

Globe At Night

The target constellation is Hercules, from June 24th through July 3rd
and July 24-August 2.

Free The Milky Way Campaign

(used to be the 20/20 Vision Campaign, recently renamed by the Light Pollution Committee.)

This campaign's goal was to raise the SQM measurement at HRPO's back viewing pad to 20.0 by HRPO's 20th anniversary. That date past, we decided to keep the effort going until the goal is reached, however long that takes.



Members/Community Corner



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

BRAS member **Connor Matherne** is the featured artist this month at the Louisiana Art and Science Museum's exhibit of his astral photography, entitled: **Art After Hours: Astral Visions**



Using high-tech equipment and creativity, astrophotographer Connor Matherne sees the mysterious beauty of galaxies and nebulae located thousands of light-years away. This collection of photographs features some of the Milky Way's most fascinating objects.

Accompanying the exhibition is a feature about Astral Visions on LASM's OmniGlobe, which includes additional information from Matherne about his process and pinpoints the location of each celestial entity he has photographed.

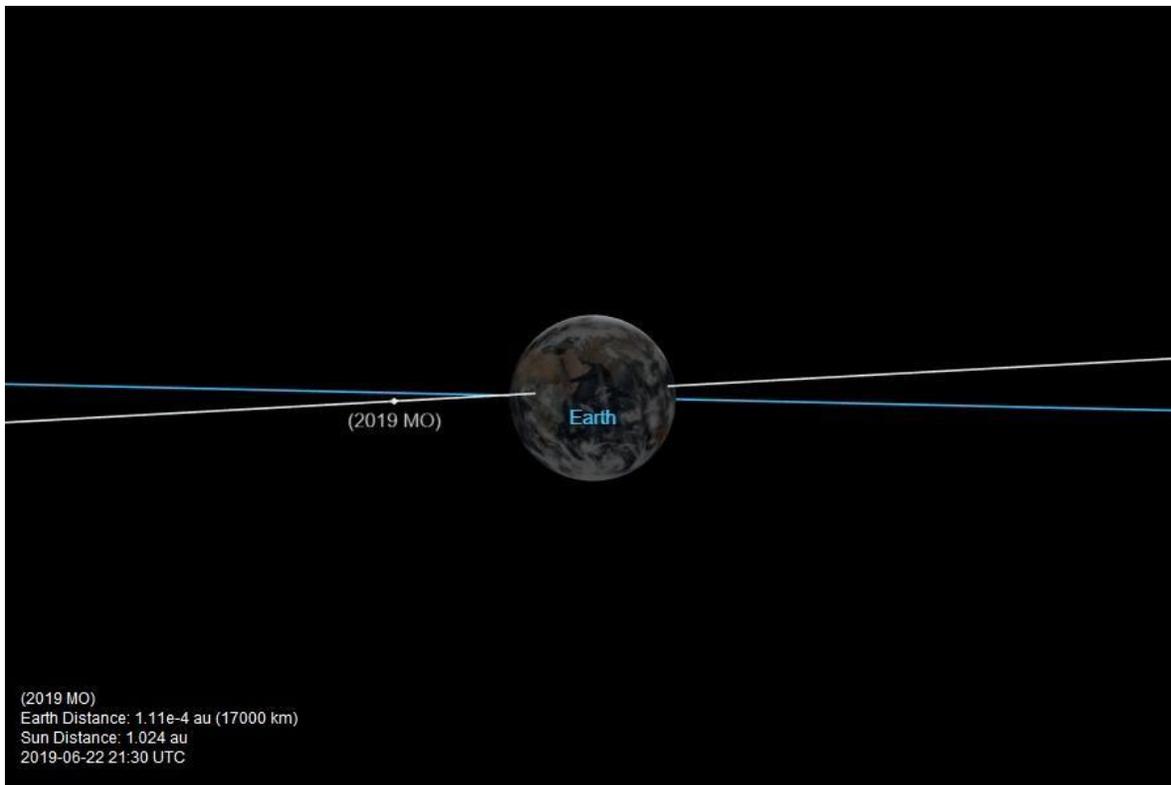
Matherne is a Louisiana State University graduate student and researcher at the university's Planetary Science Laboratory.

BRAS Members are invited to attend the official opening of the exhibit FREE. So mark your calendar for July 11, 5:30 – 7:30 at the Louisiana Art and Science Museum. \$10 for non-members. Includes wine as well as hors d' oeuvres. Matherne will also give a presentation within the planetarium on the topic of astrophotography complete with stunning visuals.

Let's make a party! Come on out and support Connor!



**Flying “Rocks” and “Dirty Snowballs”:
Asteroid and Comet News
July 2019
Volume 1. Issue 7.**



JPL Small-Body Database Browser's Orbit Diagram for the NEO (2019 MO) Earth Distance: 1.11e-4 au (17000 km) Sun Distance: 1.024 au 2019-06-22 21:30 UTC - Screenshot Capture on 2019-06-25

<https://ssd.jpl.nasa.gov/sbdb.cgi?sstr=2019MO;cad=1;old=0;orb=1;cov=0;log=0#orb>

Image from Wikimedia Commons: [https://commons.wikimedia.org/wiki/File:JPL Orbit Diagram of 2019 MO -2019-06-22 hh21 mm30 UTC.jpg](https://commons.wikimedia.org/wiki/File:JPL_Orbit_Diagram_of_2019_MO_-2019-06-22_hh21_mm30_UTC.jpg)

On June 22, 2019 at approximately. 9:45 UTC observers at the University of Hawaii's ATLAS survey telescope on Maunaloa in Hawaii found a new object. Over approximately a half-hour four observations were taken. The observations were submitted to the Minor Planet Center (MPC), using the observer-assigned temporary designations A10eoM1. The MPC posted A10eoM1 to the NEO Confirmation Page. Soon thereafter JPL's Scout system did automated impact-analysis and identified a small possibility of impact, with a rating of 2 (Modest) [<http://archive.is/dQLBo>]

Later in the day NOAA-NASA weather satellite GOES-16 reported a possible a bolide. Davide Farnocchia recognized that bolide's location and time could fit the observations of A10eoM1. However the was not enough observational data to conclusive say if in fact A10eoM1 was the bolide. So Farnocchia calculated an orbit that fit A10eoM1 observations and bolide's location and time and sated looking for precovery observations. Three were found by University of Hawaii Institute for Astronomy's Robert Weryk and Mark Huber and Marco Micheli at the European Space Agency on images take Pan-STARRS 2 survey telescope on Maui about two

hours before discovery by ATLAS. The additional observations along with international infrasound reports and other reports from US Government sensors confirmed the impact. On 2019 June 25 The Minor Planet Center issued MPEC 2019-M72: 2019 MO and A10eoM1 was given the provisional designation 2019 MO.

See:

MPEC 2019-M72: 2019 MO : <https://minorplanetcenter.net/mpec/K19/K19M72.html>

Small Asteroid 2019 MO (NEOCP A10eoM1) impacted Earth on June 22:
<https://remanzacco.blogspot.com/2019/06/small-asteroid-neocp-a10eom1-impacted.html>

"Pseudo-MPEC" for A10eoM1: <https://www.projectpluto.com/neocp2/mpecs/A10eoM1.htm>

NASA Tracked Small Asteroid Before It Broke Up in Atmosphere:
<https://www.jpl.nasa.gov/news/news.php?release=2019-127>

JPL Small-Body Database Browser: (2019 MO): <https://ssd.jpl.nasa.gov/sbdb.cgi?sstr=3842925;cad=1>

Breakthrough: UH team successfully locates incoming asteroid: http://www.ifa.hawaii.edu/info/press-releases/ATLAS_2019MO/

An asteroid hit Earth right after being spotted by telescope this week: A small, harmless space rock turned into a fireball in our atmosphere. What's unusual is that astronomers saw it beforehand:
<https://www.cnet.com/news/an-asteroid-hit-earth-right-after-being-spotted-by-telescope-this-week/>

A car-size asteroid exploded in the atmosphere south of Puerto Rico. Weather satellite and radar captured the moment.: <https://www.washingtonpost.com/weather/2019/06/27/car-sized-asteroid-exploded-atmosphere-south-puerto-rico-weather-satellite-radar-captured-moment>

Scout: NEOCP Hazard Assessment: <https://cneos.jpl.nasa.gov/scout/intro.html>

Scout: NEOCP Hazard Assessment (Data Table): <https://cneos.jpl.nasa.gov/scout/>

[JPL Close Approach Data](#) from May 28, 2019 to June 27, 2019 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal LD (au)	H (mag)	Estimated Diameter
(2019 KT)	2019-May-28	0.85 (0.00217)	26.6	13 m - 29 m
(2019 LY4)	2019-Jun-06	0.22 (0.00056)	27.8	7.3 m - 16 m
(2019 LW4)	2019-Jun-08	0.65 (0.00166)	27.3	9.3 m - 21 m

As of 2019-06-27 there is

794,832 discovered asteroids (MPC)(<https://www.minorplanetcenter.net/>)

20,412 discovered Near-Earth Objects (MPC) (<https://www.minorplanetcenter.net/>)

4,086 discovered Comets (MPC)(<https://www.minorplanetcenter.net/>)

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



2,297 objects have been removed from Sentry(JPL) (<https://cneos.jpl.nasa.gov/sentry/removed.html>)

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

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

The following objects were removed from NASA JPL's Sentry: Earth Impact Monitoring list from 2019-05-28 to 2019-06-25

Object Designation	Removed (UTC)
2015 YV20	2019-06-25 13:04:21
2019 JR7	2019-06-23 13:04:07
2019 LJ1	2019-06-21 13:12:48
2019 GQ21	2019-06-21 13:06:53
2019 AU14	2019-06-21 13:06:12
2015 BS516	2019-06-21 13:03:50
2018 XB4	2019-06-12 18:33:46
2019 KB4	2019-06-03 14:49:54
2019 GR21	2019-06-01 19:57:35
2019 KN2	2019-06-01 14:06:43
2019 JM1	2019-06-01 13:59:32
2015 HW182	2019-05-28 14:05:50

Useful Links:

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

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

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

The Tracking News

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

Accessible NEAs

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





Messages from HRPO

Highland Road Park Observatory



SCIENCE ACADEMY

Saturdays from 10am to 12pm

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

13 July: “Back to Apollo”

27 July: “Summer Day”



FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

12 July: “Apollo 11—Mission of the Millenium” Tom Northrop of BREC will present an extended highlighting of the trip that three men took—as the rest of the human species watched, waited, hoped and cheered. Assisted by the scientists and engineers and politicians and other supporters (and preceded by other brave astronauts who paved the way), Neil Armstrong, Edwin “Buzz” Aldrin and Michael Collins committed themselves to a goal that accelerated technological progress and elevated the human spirit.

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

SPECIAL ALERT: DAYLIGHT TIME DISCUSSION

The conversation in the Louisiana State Legislature to eradicate the back-and-forth of Daylight to Standard is probably ending this month. There are two options if the twice-yearly switch is ended: to remain on Standard time year-round, or to remain on Daylight time year-round.





*** * * HRPO APOLLO EVENTS * * ***

STRAW AND STOMP ROCKET CRAFTING WORKSHOP

Friday 5 July from 6:30pm to 7:30pm. For ages four to fourteen. Under eight requires active adult assistance. *RSVP required!*

Join the Louisiana Space Grant Consortium for this fun event. Participants will make and launch customized paper rockets to commemorate the 50th Anniversary of the Apollo 11 Mission. We will watch original footage of the Apollo 11 launch and listen to exclusive radio recordings of the landing by LaSPACE Director, T. Gregory Guzik! Water bottles and snacks provided. Participants must complete a NASA media release form. Finally, LaSpace encourage you to join the Global Launch on July 16 to help the US Space & Rocket Center break a Guinness World Record for the most rocket launches in one day! Please RSVP ASAP—there is a limit of thirty-five invitations for kids!

THE APOLLO MODULE

Saturday 6 July from 3:30pm to 7:30pm. For ages twelve to sixteen. \$15 per EBR Parish registrant; \$18 per other-parish registrant.

For those who have outgrown Science Academy...the next level of thought, challenge and analysis. This month, the module reveals so much about the legendary Apollo mission, and how we will use the Moon as a stepping stone to Mars!

APOLLO 11: WHERE WERE YOU?

Monday 8 July from 7pm to 9pm. No admission fee. For ages twelve and older.

This month's Baton Rouge Astronomical Society meeting honors one of the greatest achievements of mankind. BRAS members will present their recollections of that thrilling time in American history, when we did what none before us had done. Members of the general public are invited to share their memories. There will also be a screening of a classic NASA documentary on Apollo 11.

APOLLO 11: MISSION OF THE MILLENIUM

Friday 12 July from 7:30pm to 8:30pm. No admission fee. For ages fourteen and older.

Tom Northrop of BREC will present an extended highlighting of the trip that three men took—as the rest of the human species watched, waited, hoped and cheered. Assisted by the scientists and engineers and politicians and other supporters (and preceded by other brave astronauts who paved the way), Neil Armstrong, Edwin “Buzz” Aldrin and Michael Collins committed themselves to a goal that accelerated technological progress and elevated the human spirit. This talk has no admission fee and is aimed at a general adult/high school audience.

BACK TO APOLLO

Saturday 13 July from 10am to 12pm. For ages eight to twelve. \$5 per EBR Parish kid; \$6 per other-parish kid.

Science Academy Cadets will investigate the history of the greatest human trek in the existence of the species.

APOLLO 11 COMMEMORATIVE ROCKET LAUNCHES

Tuesday 16 July from 5:30pm to 6:30pm. No admission fee. For all ages.

The Louisiana Space Consortium (based at LSU) enthusiastically sponsors and supports the launching of several (many!) straw rockets, stomp rockets and chemical rockets on this day to commemorate the launch of Apollo 11, as human beings left the Earth for its sole natural satellite. Come join us with your own straw rocket or stomp rocket, and let's all launch together!



APOLLO 11 FIFTIETH ANNIVERSARY PARTY

Saturday 20 July from 6:30pm to 12:30am

For all ages. No admission fee.

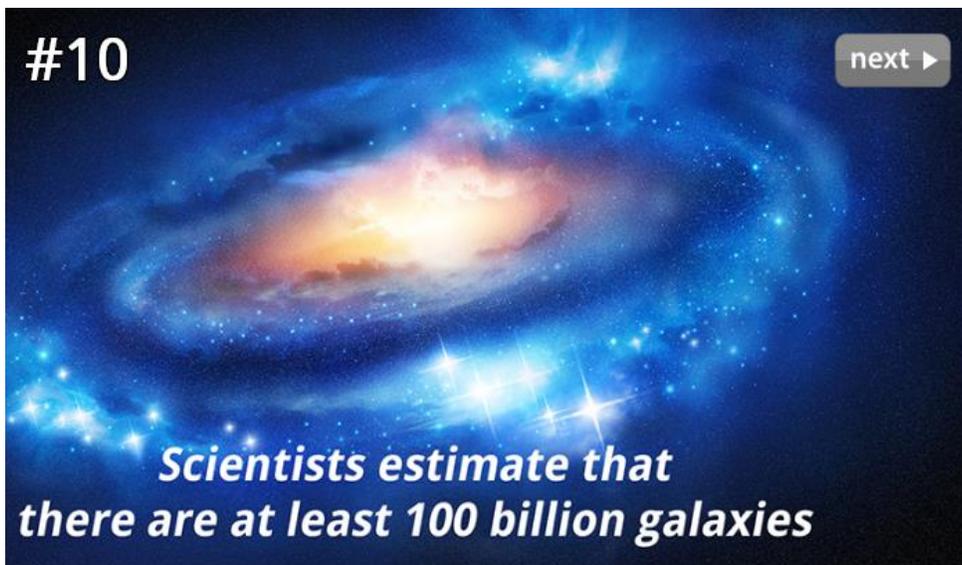
Of all the things we've done over the centuries, certainly setting foot onto another world for the first time qualifies as the most technologically savvy, foresighted and spiritually evocative. A fiftieth anniversary comes only once. Food, physical science demonstrations, hands-on activities, games (with chances to earn prizes), a sky tour and the possibility to view no fewer than *seven* satellites and rocket bodies crossing the night sky. And of course, a view of the Moon as it rises above the eastern horizon.



How many galaxies are there in the Universe?

Scientists can estimate the number of galaxies in our universe by counting how many galaxies are in a particular unit of visible space and then multiplying this by the total size of the universe. One tiny fraction of space mapped by the Hubble telescope in 2012 contained over 5000 galaxies. At the moment scientists' best guess is that there are between 100 billion and 200 billion galaxies, but there may be as many as a trillion or more.

from wisegeek.com/galaxy#10





Observing Notes: July

by John Nagle

Ophiuchus

The Serpent Bearer or Handler

Position: RA 17, Dec. -8°

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 will be new each month.

Named Stars:

Ras Alhague (Alpha Oph), from Rās al Ḥawwā “The Head of the Serpent-Charmer”, mag. 2.08, 17 34 56.0 +12 33 38.1, sapphire colored, has an unseen companion with an orbital period of about 8.5 years and a separation of 6 au. Also known as **55 Oph**, **HD 159561**, and **HIP 86032**.

Cebairai (Beta Oph), from Kalb al Rā’I “the Heart of the Shepherd”, mag. 2.76, 17 43 28.38 +04 34 00.9, is yellow colored. Sometimes mistaken for “The Shepherd’s Dog” (“Cheleb”). Also known as **60 Oph**, **HD 161096**, and **HIP 86742**.

Tsang Ching (Gamma Oph), sometimes called “Muliphen”, mag. 3.75, 17 47 53.57 +02 42 26.9. Also known as **62 Oph**, **HD 161868**, and **HIP 87108**. **70 Oph** is nearby.

Yed Prior (Delta Oph), mag. 2.73, 16 14 20.77 -03 41 38.8, deep yellow in color, is the former of the two stars in the hand. Also known as **1 Oph**, **HD 146051**, and **HIP 79593**.

Yed Posterior (Epsilon Oph), the star behind, or following, mag. 3.23, 16 18 19.24 -04 41 33.4, is a red giant star. Also known as **2 Oph**, **HD 146791**, and **HIP 79882**.

Han (Zeta Oph), the name of an old feudal state in China, mag. 2.54, 16 37 09.53 -10 34 01.7, is near the left knee of Ophiuchus. Also known as **13 Oph**, **HD 149757**, and **HIP 81377**.

Sābik (Eta Oph), “The Preceding One”, mag. 2.43, 17 10 22.66 -15 43 30.5, is a pale yellow star and a close binary (3.4 magnitude with a separation of 20 au). Also known as **35 Oph**, **HD 155125**, and **HIP 84012**. The star **R Oph** is located 0.8° to the southwest.

Imad (Theta Oph), “Pillar”, mag. 3.27, 17 22 00.58 -24 59 58.2. Also known as **42 Oph**, **HD 157056**, and **HIP 84970**. The **Snake Nebula (B 72)** is 1.5° to the north.

Hel Kath (Kappa Oph), “Battlefield”, mag. 3.19, 16 57 40.27 +09 22 30.2. Also known as **27 Oph**, **HD 153210**, and **HIP 83000**.

Marfik (Lambda Oph), from the similar Arabic “Al Marfik”, the elbow, mag. 3.82, 16 30 54.84 +01 59 02.8, is a quadruple star. A binary with the primary (A) at magnitude 4.2, and secondary (B) at magnitude 5.2. Separation is 1.5” with a period of 130 years. There are two wide companions, one at magnitude 11.1 and a separation of 119.2” from AB, and a star at magnitude 9.5 with a separation of 313.8” from AB. Also known as **10 Oph**, **HD 148857**, and **HIP 80883**.

Sinistra (Nu Oph), “Left or Left Hand”, mag. 3.32, 17 59 01.60 -09 46 24.1, has two brown dwarf stars as companions. Also known as **64 Oph**, **HD 163917**, and **HIP 88048**. **NGC 6517** is 1° to the northeast.

She Low (Upsilon Oph), a market tower, mag. 4.62, 16 27 48.23 -08 22 18.1. Also known as **3 Oph**, **HD 148367**, and **HIP 80620**.

Gunibuu (36 OphA), mag. 5.07, 17 15 20.8 -26 36 05.0, is a triple star system. Double orange stars



with the A star at magnitude 5.1, and the B star at magnitude 4.33. Separation of A to B is 4.9". A companion star, also an orange star at magnitude 8.1, has a separation of 208" from AB. Another companion star, at magnitude 13.4, and a separation of 38.6" from AB. Also known as **HD 155886**. **Barnard's Star**, mag. 9.54, 17 57 48.50 +04 41 36.2, a red dwarf star, is the second nearest star system to Earth, and it has the largest proper motion of any star in the sky, moving at 10.31" per year (or 140 km per second). There is at least one companion with a separation of 24', and a period of 24 years.

Also known as **HIP 87937**. Located 3° east of **Beta Ophiuchi**.

Kepler's Star (SN 1604), 17 30 35.98 -21 28 58.2, is a supernova remnant from a supernova first observed by Kepler on the night of October 9, 1604. On that night, **Jupiter** and **Mars** were in conjunction only a few degrees from the supernova, and Kepler made a special study of the event, hence it is known as **Kepler's Star**. Also known as **V843 Ophiuchi**.

Deep Sky:

M9 (NGC 6333), mag. 7.6, 17 19 11.8 -18 30 59.0, 12' in size, is a globular cluster with a medium concentration of stars; bright, large, round, and very well resolved. The east end of dark nebula **B64** meets the cluster. Located 3.5° southeast of **Eta Ophiuchi**. **NGC 6342** is about 1.2° to the southeast, and **NGC 6356** is about 80' to the northeast. Alias: **Bennett 92; Melotte 167; and C1716-184**.

M10 (NGC 6254), mag. 6.6, 16 57 08.9 -04 05 58, 20' in size, is a globular cluster with a medium concentration of stars; very large, round, bright; very well resolved in apertures greater than 10".

Located 1° to the east of **30 Ophiuchi**. **M12** is 3° to the northwest. Alias: **Bennett 83; Melotte 157; and C1654-040**.

M12 (NGC 6218), mag. 6.6, 16 47 14.5 -01 56 52, 16' in size, is a globular cluster with a low concentration of stars; very bright and very large. The core is 3' across. Located 3° to the northwest of **M10**. Alias: **Bennett 80; Melotte 151; and C1644-018**.

M14 (NGC 6402), mag. 7.6, 17 37 36.1 -03 14 45, 11' in size, is a globular cluster that is bright, very large, round, and extremely rich. It cannot be resolved in small telescopes. Located 2° north and 3° east of **99 Ophiuchi**. Alias: **Bennett 97; Melotte 175; and C1735-032**.

M19 (NGC 6273), mag. 7.2, 17 02 37.7 -26 16 05, 17' in size, is a globular cluster with a medium concentration of stars; very bright, large, round, and very well resolved. It has a north-south elongated oval halo with the core off-center to the north. Located 8° due east of **Antares**. A few degrees to the southeast is a dark cloud called "**The Pipe Nebula**". **NGC 2693** is 1.5° to the east-southeast, and **NGC 6284** is 95' to the north-northeast. Alias: **Bennett 86; Melotte 160; and C1659-262**.

M62 (NGC 6266), "The Flickering Globular", mag. 7.2, 17 01 12.6 -30 06 44, 15' in size, is a globular cluster with a high concentration of stars; large, very bright, and very well resolved. It has a ruddy nucleus and an asymmetrical shape. Burnham's does not list **M62** in **Ophiuchus**. Located 6° west of **Theta Ophiuchi**, and 1° to the west-southwest is the variable star **RR Scorpii**. Alias: **Bennett 85; Melotte 159, vdBH 210; and C-1650-300**.

M107 (NGC 6171), mag. 8.1, 16 32 05 -13 03 00, 13' in size, is a globular cluster with a low concentration of stars; large, very rich, very well resolved. A large core is embedded in an unconcentrated 5'x4' halo. It is encircled by four field stars, with the brightest being 11th magnitude.

M107 is not listed for **Ophiuchus** in Burnham's. Located 3° south-southwest of **Zeta Ophiuchi**. Alias: **Bennett 79; Melotte 146; H6-40; and C1629-129**.

Melotte 186, mag. 3.0, 18 01 00 +03 00 00, 240' in size, 15 stars, is an open cluster showing a "V" shape to the naked eye. It is sometimes called "**Bull of Poniatowski**". Alias: **Cr 359, Lund 801; OCL 84; and C1758+209**.

IC 4665, "The Summer Beehive" mag. 4.2, 17 46.3 +05 43, 41' in size, 30 stars, is an open cluster, detached, no concentration of stars; moderate range in brightness; very large; magnitude of brightest star is 6.9. Located 1.4° north-northeast of **Beta Ophiuchi**. Alias: **Cr 349; Melotte 179; Lund 774; OCL 85; C1743+057; includes Struve 2212**.

NGC 6633, mag. 4.6, 18 27.3 +06 31, 27' in size, 30 stars, is an open cluster that is detached, no

concentration of stars; moderate range in brightness; magnitude of brightest star is 7.6; large. Alias: **Cr 380; Raab 130; H8-72; OCL 90; and C1825+065.**

LeDrew 5, mag. 5.8, 18 18.6 +12 03, 42' in size, 12 stars. Possible asterism. Alias; **Alessi 19.**

Cr 350, mag. 6.1, 17 48 07 +01 21 00, 40' in size, 25 stars. Alias; **Lund 779; OCI 75; and C1745+013.**

LeDrew 7, mag. 7.4, 18 14.5 +03 43, 25' in size, 10 stars. Possible asterism.

NGC 6401, mag. 7.4, 17 38.6 -23 55, 4.4 in size, is a globular cluster with a medium concentration of stars; pretty bright, pretty large, and round. Alias: **H1-44; GCL 73; and C1735-230.**

NGC 6316, mag. 8.1, 17 16.6 -28 08, 4.9' in size, is a globular cluster with a high concentration of stars; bright, pretty small, and round. It is almost surrounded by 5 faint field stars, with the brightest being magnitude 11.5. Alias; **H1-45; vdBHa 219; Bennett 91; GCL 57; and C1715-280.**

NGC 2693, mag. 8.2, 17 10.2 -26 35, 5' in size, is a globular cluster with a high concentration of stars; very bright, large, round, and very well resolved. Located just north of the dark nebula **Barnard 59** – the west end of the stem of the **Pipe Nebula**. Alias: **H6-12; vdBHa 215; Bennett 89; Melotte 164; GCL 55; and C1707-265.**

NGC 6356, mag. 8.2, 17 23.6 -17 49, 3.5' in size, is a globular cluster that is quite faint, large, round, and very well resolved. Alias: **Bennett 93; H1-48; Melotte 171; GCL 56; and C1720-177.**

NGC 6304, mag. 8.4, 17 14.5 -29 28, 7' in size, is a globular cluster with a medium concentration of stars; bright, quite large, round, and very well resolved. Alias: **Bennett 90; H1-147; Melotte 165; vdBHa 216; GCL 56; and C1711-294.**

NGC 6355, mag. 8.6, 17 24.0 -26 21, 6.1' in size, is a globular cluster that is quite faint, large, round, and very well resolved. It has a broad, moderately concentrated core. Alias: **H1-46; Cr 330; GCL 63; OCI 1036; ESO 519SC015; and C1720-265.**

NGC 6325, mag. 8.9, 16 53.4 -22 11, 5' in size, is a globular cluster with a low concentration of stars; pretty bright, quite large, irregularly round cluster. It is situated within a triangle of 12th magnitude stars. Alias: **Bennett 82; Melotte 154; H2-584; GCL 48; and C1650-220.**

NGC 6284, mag. 9.0, 17 04.5 -24 36, 3.3' in size, is a globular cluster with a low concentration of stars; bright, large, round, and very well resolved. Located 10' northeast of a wide pair of 8.5 magnitude stars. Alias: **Bennett 87; H6-11; Melotte 162; GCL 53; and C1701-246.**

NGC 6572, sometimes called “**The Emerald Nebula**”, or “**The Blue Racquetball Nebula**”, or “**The Turquoise Orb**”, mag. 9.1, 18 12.1 +06 51, 11" in size, is a planetary nebula that is very bright, very small, round, and hazy; brighter toward the center; central star is at magnitude 12.9. The planetary disk glows a bluish-green color. Alias: **PK 34+11.1; and PNG 34.6+11.8.**

NGC 6287, mag. 9.2, 17 05.2 -22 42, 5' in size, is a globular cluster with a medium concentration of stars; quite bright, large, round, and very well resolved. Alias: **Bennett 88; H2-195; Melotte 163; GCL 54; and C1702-226.**

NGC 6342, mag. 9.5, 17 21.2 -19 35, 5' in size, is a globular cluster with a high concentration of stars; quite bright, pretty small, slightly elongated, and extremely rich. Alias: **H1-149; GCL 61; and C1718-195.**

NGC 6366, mag. 9.5, 17 27.7 -05 05, 12' in size, is a globular cluster with a low concentration of stars; faint and large. Alias: **Melotte 173; GCL 65; and C1725-050.**

Tr 26, mag. 9.5, 17 28 29.9 -29 29 50, 17' in size, 40 stars, is an open cluster located 25' northeast of the 4.3 magnitude star **45 Ophiuchi**. Alias: **Cr 331; Harvard 15; Lund 753; and C1725-294.**

Items beyond magnitude 10 that are of interest:

NGC 6369, “**The Little Ghost Nebula**”, mag. 11.4, 17 29.3 -23 46, 30" in size, is a planetary nebula. It has a round ring and smooth disk with a central star at magnitude 15.9. It is located in the bowl of the **Pipe Nebula**. Alias: **H4-11; He2-232; Sanduleak 2-207; ESO 520-03; and PK 02+05.1.**

NGC 6309, “**The Box Nebula**”, “**The Exclamation Mark Nebula**”, mag. 11.6, 17 14.1 -12 55, 16" in size, is a planetary nebula that is a bright, small, irregular disk with traces of ring structure. Central star is at magnitude 13.0. Alias: **He2-206; Sanduleak 2-28; and PK 09+14.1.**

Haute-Provence 1, mag. 12.5, 17 31 05.2 -29 58 54, 1.2' in size. Alias: **Dufay 1; vdBHa 229; and**

C1727-299.

PK 10+18.2, “The Butterfly Nebula”, mag. 13.2, 17 05.7 -10 09, 50”x20” in size. Alias: **Minkowski 2-9**; **PK 10+18.2**; “The Siamese Squid”; and “Twin Jet Nebula”.

Bica 1, 17 24 53.5 -24 18 23, is a supernova remnant, an emission nebula. Located 4’ south-southwest of the magnitude 6.1 star **HD157588 (33 Sco)** at 17 25 06.23 -24 14 37.4. Alias: **EQ1721-2415**.

Grasdalen 1, 16 23.8 -24 25, 30’ in size, 91 stars, is only visible in the infra-red. Alias: **LDN 1680**; and **C1622-243**.

B42, “The Great Nebula of Rho Ophiuchus”, 16 25.5 -23 26, 28’x6’ in size, is a dark nebula. Alias: **LDN 1696**.

B59, 65, 66, 67 - “Stem of the Pipe”, 17 21 -27 23, 300’x60’ in size, are dark nebulae. Alias: **LDN 1773**.

B78, “Bowl of the Pipe”, 17 33 -26 30, 200’x140’ in size. Alias: **LDN 42**.

The series of dark clouds, **Barnard 59, 65, 66, 67**, and **78** form the 7° long “Pipe Nebula”, extending from the southwest to the southeast, and east of **Theta Ophiuchi (42 Oph)**. The “Bowl of the Pipe”, **B78**, is a 2° diameter dust cloud centered 2.5° southeast of **Theta Ophiuchi**. The “Pipe’s Stem”, **B59, 65, 66, 67** (together with **LDN 1773**) is 5° long, and connected to the southwest edge of **B78**.

Asterism – “The Nasakalyamaniyy” is the southern boundary line of the “Raudah” or “Pasture”,

Consisting of **Delta, Epsilon, Zeta, and Eta Ophiuchi** with **Alpha, Delta, and Epsilon Serpens**.

Beyond magnitude 10 are the following objects: 20 NGC; 48 UGC; 9 IC; 20 Lynga clusters; 2 Herschel globular clusters; 1 WRAY planetary nebula; 1 Collinder; 10 PK planetary nebula; 24 Minkowski; 4 Sharpless; 3 Pal globular clusters; 2 Sa; 2 The; 21 MCG; 18 Haro; 4 Ced; 3 Abell planetary nebula; 16 He; 10 radio sources; 2 quasars; 8 Terzan; 7 [DB00] infra-red clusters; 2 [DB01] infra-red clusters; 1 DHW; 1 Cn; 1 Pat; 1 Ren; 1 K; 1 GLMP; 1 Nassau; 1 Alessi; 1 PB; 1 Don; 1 PC; 1 Hb; 1 SaWe; 1 TeJu; 1 MyCn; 1 Do; 1 IRAS; 1 PWM; 1 Teutsch; 194 Barnard dark nebula; 58 LDN; 1 LBN; and 1 vdB; 2 flat galaxies; 1 variable galaxy; and 8 VV galaxies.

Other Stars:

Nu Oph, mag. 3.32, 17 59 01.60 -09 46 24.1, has 2 brown dwarf stars in orbit around it. Also known as **HD 163917**, and **HIP 88048**.

RS Oph, mag. 4 to 11, 17 47.5 -06 42 (1950 Epoch), is a binary star consisting of a red giant star and a white dwarf star. It is a recurrent nova with 4 outbursts recorded – 1898, 1933, 1958, and 1967. The 1933 outburst reached naked eye visibility at magnitude 5.0 on August 10th. In 1958, the star brightened to magnitude 4.3 on July 13th.

51 Oph, mag. 4.78, 17 31 24.95 -23 57 45.3, has a developing planetary system. Also known as **HD 158643**, and **HIP 85753**.

70 Oph, mag. 4.03, 18 05 27.21 +02 30 08.8, is a binary star. The primary is a magnitude 4.2 dwarf star, and the secondary is a magnitude 6.0 dwarf star. Separation between the two is 6.7” to 1.7’, and an orbital period of 88 years. There are 8 more companions at various magnitudes and separations near 70 Oph, but none are actually physically involved with the binary. This star is part of an obsolete, V-shaped asterism of 4 stars known as “The Bull of Paniatowsky, with the other three stars being **66, 67**, and **68 Ophiuchi**. Also known as **HD 165341**, and **HIP 88601**.

HD 156846, mag. 6.51, 17 20 34.31 -19 20 01.5, has one planet in orbit. Also known as **HIP 84856**.

HD 154088, mag. 6.73, 17 04 28 -28 34 58, has one planet in orbit. Also known as **HIP 83541**.

HD 155233, mag. 6.80, 17 11 04.0 -20 39 16, has one planet in orbit. Also known as **HIP 84056**.

HD 148427, mag. 6.90, 16 28 28.15 -13 23 58.7, has one planet in orbit. Also known as **HIP 80687**.

HD 150433, mag. 7.22, 16 41 08 -02 51 26, has one planet in orbit. Also known as **HIP 81681**.

HD 157172, mag. 7.86, 17 22 35 -19 36 58, has one planet in orbit. Also known as **HIP 85017**.

HD 149143, mag. 7.90, 16 32 51.05 +02 05 05.4, has one planet in orbit. Also known as **HIP 81022**.

HD 170469, mag. 8.21, 18 29 10.98 +11 41 43.8, has one planet in orbit. Also known as **HIP 90593**.

HD 164509, mag. 8.24, 18 01 31 +00 06 16, has one planet in orbit. Also known as **HIP 88268**.
HD 171028, mag. 8.31, 18 32 15.49 +06 56 44.7, has one planet in orbit.
HD 152581, mag. 8.54, 18 53 44 +11 58 25, has one planet in orbit. Also known as **HIP 82651**.
HD 159243, mag. 8.65, 17 33 22 +05 42 03, has two planets in orbit. Also known as **HIP 85911**.

Stars of interest beyond magnitude 10:

HAT-P-57, mag. 10.47, 18 48 58 +10 35 50, has one transiting planet in orbit.
WASP-163, mag. 12.54, 17 06 09 -10 24 47, has one transiting planet in orbit.
GJ 1214, mag. 14.67, 17 15 18.94 +04 57 49.7, has a transiting super-**Earth** planet in orbit.
Corot-6,25,29,and 26, mag. 13.9 to 15.76, all have a transiting planet.

There are 27 Σ ; 5 $O\Sigma$; 2 $O\Sigma\Sigma$; 11 β ; 3 A; 1 Hu; 1 S; 1 Rst; 2 h; and 55 V stars in this constellation.

Sky Happenings: July, 2019

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



- July 1st** - Dawn: The thinnest sliver of the waning **Moon** is 6° to the upper right of **Venus** shortly before sunrise in the east-northeast. **Venus** will disappear from view later in July, to reappear in September in the evenings, Asteroid **Melpomene** is at opposition at 8 PM CDT.
- July 2nd** - **New Moon** occurs at 2:16 PM CDT.
- July 3rd** - The thin crescent **Moon** is 3° below **Mars**, and 6° from **Mercury**, very low in the evening twilight.
- July 4th** - The **Moon** passes 0.09° north of **Mars** at 1 AM CDT,
The **Moon** passes 3° north of **Mercury** at 4 AM CDT,
Earth is at aphelion (94.5 million miles or 152, 104,285 km from the **Sun**) at 5 PM CDT.
- July 5th** - The **Moon** is at perigee (226,009 miles or 363,726 km from **Earth**) at 12 AM CDT,
Dusk: The thin waxing crescent **Moon** is in **Leo**, less than 3° to the right of **Regulus**,
Mercury is stationary at 11PM CDT.
- July 7th** - **Mercury** passes 4° south of **Mars** at 9 AM CDT.
- July 8th** - Evening: The **Moon**, just shy of first quarter, is 2° from **Porrima**, or **Gamma Virginis**.
- July 9th** - **First Quarter Moon** occurs at 5:55 AM CDT,
Saturn is at opposition at 12 noon CDT.
- July 12th** - Dusk: The waxing gibbous **Moon** forms a triangle with **Jupiter** and **Antares**.
- July 13th** - The **Moon** passes 2° north of **Jupiter** at 3 PM CDT.
The **Moon** is 3 east of **Jupiter** in the evening sky.
- July 14th** - **Pluto** is at opposition at 10 AM CDT.
- July 15th** - The **Moon** is less than 2 from **Saturn** in the evening sky.
- July 16th** - The **Moon** passes 0.2° south of **Saturn** at 2 AM CDT,
The **Moon** passes 0.04° north of **Pluto** at 12 noon CDT,
Full Moon occurs at 4:38 PM CDT.
- July 19th** - Dwarf planet **Ceres** is stationary at 12 noon CDT.
- July 20th** - The **Moon** is at apogee (251,954 miles or 405,481 km from **Earth**) at 6:59 PM CDT,
Night: Contemplate the moment 50 years ago when humankind first stepped onto our closest celestial neighbor (the **Moon**).
- July 21st** - The **Moon** passes 4° south of **Neptune** at 3 AM CDT,
Mercury is in inferior conjunction with the **Sun** at 8 AM CDT.
- July 24th** - **Last Quarter Moon** occurs at 8:18 PM CDT.
- July 25th** - The **Moon** passes 5° south of **Uranus** at 2 AM CDT.
- July 29/30** - The **Southern Delta Aquariid** meteor shower peaks before dawn in a moonless sky.
- July 31st** - **Mercury** is stationary at 2 PM CDT,
New Moon occurs at 10:12 PM CDT.

Planets:

Mercury – **Mercury** is low in the west-northwest at dusk on July 1st, having dimmed to magnitude 1.1, and is lost to view in the following days, reaching inferior conjunction with the **Sun** on July 21st. On the 3rd, **Mercury** will be 4° to the left of **Mars** 30 minutes after sunset. On the 4th, **Mercury** and **Mars** will be about 10° to the lower right of the **Moon** in the west. **Mercury** and **Mars** are in conjunction on July 7th – **Mercury**, at magnitude 2.0, will be 4° to the lower left of the magnitude 1.8 **Mars** – both will be difficult to see in the bright twilight, even through binoculars. Both planets will disappear within a week, and **Mercury** will reappear in the morning sky at the end of July.

Venus – **Venus**, shining at magnitude -3.9, is very low in the bright dawn sky before sunrise. July 1st will provide the best chance to see the planet before it disappears in the **Sun**'s glare. Using the waning crescent moon as a guide, it appears 5° high in the east-northeast 30 minutes before sunrise, and **Venus** lies one binocular field to the lower left. **Venus** will drop from view by the end of July's first week, and will reappear in the morning sky in two months.

Mars – **Mars** will shine at magnitude 1.9 all month, descending ever so slowly deeper into the **Sun**'s bright afterglow. At the beginning of July, **Mars** will lie about 4 to the right of **Mercury**, and on the 3rd is about 3° to the upper left of a very thin crescent **Moon** (one day old), all very low in the west-northwest. **Mercury** and **Mars** are in conjunction on July 7th, with the magnitude 2.0 **Mercury** lying 4° to the lower left of the magnitude 1.8 **Mars**. Both planets disappear within a week, with **Mars** not reappearing (in the morning sky) for about 3 months.

Jupiter – **Jupiter** begins the month at magnitude -2.6 and 45.5" wide. By the end of the month, it has faded a bit to magnitude -2.4 and has shrunk a little to 43' diameter. The planet will stand clear of the southeastern horizon after sunset and climbs nearly 30° high in the south well before midnight. **Jupiter** is in southern **Ophiuchus**, among the faint background stars. The moon **Io** will transit the planet's disk during the evening hours on July 4th, 11th, 18th, and 27th. On the 4th, the transit begins at 9:02 PM CDT, and **Io**'s shadow follows 34 minutes later, with both appearing against the planet's **North Equatorial Belt**. On the 11th, the transit will start at 10:48 PM CDT with the shadow trailing 42 minutes behind. On the 12th, at 10:51 PM CDT, **Io** will emerge from **Jupiter**'s shadow some 14° off the eastern limb and adjacent to the **South Equatorial Belt**. On July 23rd, **Europa** transits the planet's disk starting at 8:54 PM CDT. **Europa** will traverse ¾ of the disk before its shadow starts its transit at 10:45 PM CDT. **Ganymede** will transit across the north polar region on the 24th. The transit will begin before sundown, ending at 8:58 PM CDT, with its shadow starting its transit at 10:26 PM CDT, taking 2 hours and 27 minutes to complete. **Ganymede** will have an encore transit on the 31st. For a complete list of the phenomena of **Jupiter**'s moons, see the July issue of *Sky and Telescope*, page 51, or the *RASC Observers Handbook* for 2019, *USA Edition*, pages 234 and 235.

Saturn – **Saturn** lies among the background stars of **Sagittarius**, just south of the **Teaspoon** asterism. The planet reaches opposition on July 9th, shining at magnitude +0.1, and is visible all night throughout the month. The planet's globe reaches an equatorial diameter of 18", with the rings spanning almost 42', and tilted more than 24° to our line of sight. **Saturn** moves westward throughout July, passing 1.1° south of magnitude 2.9 **Pi Sagittarii** on the 20th, and ending the month 0.7° southeast of magnitude 3.8 **Omicron Sagittarii**. Any telescope will reveal the 8th magnitude moon **Titan**, which orbits the planet once every 16 days. When **Titan** is north or south of the planet, it appears 1.3' away. At greatest east or west elongation, **Titan** lies 3.1' from the planet. Three 10th magnitude moons, **Tethys**, **Dione**, and **Rhea** orbit closer to **Saturn** than **Titan**, and can be seen in 4-inch or larger telescopes. A bigger instrument is needed to spot the 12th magnitude moon **Enceladus**. It orbits in 1.4 days, and is only visible when it is at greatest elongation east or west from the planet. On the night of opposition, July 9/10, **Enceladus** is at greatest eastern elongation, and it will be 16" from the **A Ring**'s edge. Outer moon **Iapetus** glows at 10th magnitude in the days around its July 15th greatest western elongation. On the night of opposition, it will lie 8.4' west of **Saturn**, some 2.7 times farther away than **Titan**.

Uranus – **Uranus** will stand 20° above the eastern horizon as morning twilight begins on July 1st, and will more than double that altitude by month's end. The planet resides in southern **Aries**, 10° south and slightly east of the 2nd magnitude star **Hamal (Alpha Arietis)**. At magnitude 5.8, the planet will stand out quite well through binoculars in a sparse region 2.3° south of the magnitude 5.7 star **19 Arietis**. Viewed through a telescope, **Uranus** shows a distinctive blue-green color on a disk that spans 3.5".

Neptune – **Neptune** rises around midnight local daylight time on July 1st, and by 10 PM on the 31st. The planet lies in **Aquarius**, just east of the 4th magnitude star **Phi Aquarii**. Westward motion of the planet against this backdrop will reduce the gap between it and **Phi Aquarii** from 1.3° to 0.9° during the month. **Neptune**, at magnitude 7.8, will show up easily through binoculars, and a telescope, at high magnification, shows the planet's 2.3" diameter disk and a blue-grey color.

Pluto – **Pluto** reaches opposition on July 14th – the exact anniversary of the day the **New Horizons** spacecraft passed closest to it in 2015. **Pluto** is not far from **Saturn** in **Sagittarius**, but you will need at least an 8-inch telescope (in quite dark skies), and a finders chart to locate and identify **Pluto**'s 14th magnitude spec of light among the stars.

Sun – The **Sun** is totally eclipsed on July 2nd as seen from limited parts of the **Pacific Ocean, Chile, and Argentina**.

Moon – On July 1st, an extremely thin **Moon** is about 6° to the right of **Venus**, very low on the east-northeast horizon a mere 30 minutes before sunrise. A thin, waxing crescent is less than 3° to the right of **Regulus** at dusk on July 5th. A waxing gibbous **Moon** forms a triangle with **Jupiter** and **Antares** at dusk on July 12th, and is only about 4° from **Jupiter** the next dusk. The nearly full **Moon** is in **Sagittarius**, with **Saturn** being only about 2° to the left of it at nightfall on the 15th. At the end of the month, the waxing crescent **Moon** is in **Taurus**, some 7° to 8° to the upper right of **Aldebaran** in the early morning hours on the 27th, and a little more than 6° to the lower left of **Aldebaran** the following morning.

Earth – **Earth** reaches aphelion, at its farthest point from the **Sun** for 2019, at 5:11 PM CDT on July 4th. At that time, **Earth** is 152,104,285 km or 94,513,221 miles, or a little more than 1.1068 au from the **Sun**.

Asteroids – Dwarf planet **Ceres** will climb highest in the south as darkness falls, with viewing best during the early evening hours. At 8th magnitude, it is easy to find through binoculars, or a small telescope, among the bright stars near the border between **Scorpius** and **Libra**. **Ceres** lies about 15° west of **Jupiter** all month, but it is easier to find by star hopping from the 2nd magnitude double star **Beta Scorpii**. The dwarf planet lies within 3° of this star all month. It moves closer to the 5th magnitude star **Lambda Librae** during the month's final week, with only 8' separating the two at their closest during the evening of the 27th. **Ceres** location, *by my estimates*, is as follows: On July 1st – about 2.5° northwest of **Beta Scorpii**, or about 1.3° northeast of **Lambda Librae**; on the 6th – about 2.6° west-northwest of **Beta Scorpii**, or about 1.3° north and a little east of **Lambda Librae**; on the 11th – about 2.8° west and a little north of **Beta Scorpii**, or about 1° due north of **Lambda Librae**; on the 16th – about ¾° north and a little west of **Lambda Librae**; on the 21st – about 0.5° north-northwest of **Lambda Librae**; on the 26th – about 0.2° due north of **Lambda Librae**; and on the 31st – about 0.4° south-southeast of **Lambda Librae**.

Comets – Comet **168P/Hergenrother** is near the border between **Pisces** and **Cetus** during the first week of July, going into **Aries** during the second week of the month. This comet loops through the inner solar system every 6.8 years – on its last trip through, the comet experienced an outburst and brightened past 10th magnitude. If we are not lucky again, the comet may reach only 12th magnitude in July. The best time to observe comes during the month's first two weeks when the **Moon** is not in the morning sky. The comet's position, *by my estimates*, is as follows: On July 1st – about 3° south and slightly east of **Omicron Arietis**; on the 3rd – about 3° southeast of **Omicron Arietis**; on the 5th – about 3.2° east-southeast of **Omicron Arietis**, or 3° west and a little south of **Xi Ceti**; on the 7th – about 2.3° west and slightly north of **Xi Ceti**; on the 9th – about 1.6° northwest of **Xi Ceti**; and finally on the 11th – about 3.1° north and slightly east of **Xi Ceti**.

Meteor Showers – The southern strand of the **Delta Aquariid** meteor stream encounters earth during much of July and August, but reaches a broad peak from July 28th-30th. The **New Moon** occurs on the 31st of July, so viewing conditions should be close to perfect. Under a dark sky with the radiant overhead, observers can see up to 25 meteors per hour. Unfortunately, for **Northern Hemisphere** observers, the radiant never passes overhead. The radiant peaks at an altitude of 35° between 3 and 4 AM local daylight time, and this will cut the

observed numbers of meteors roughly in half.

When to View the Planets:

Evening Sky

Mercury (west)
 Mars (northwest)
 Jupiter (south)
 Saturn (southeast)

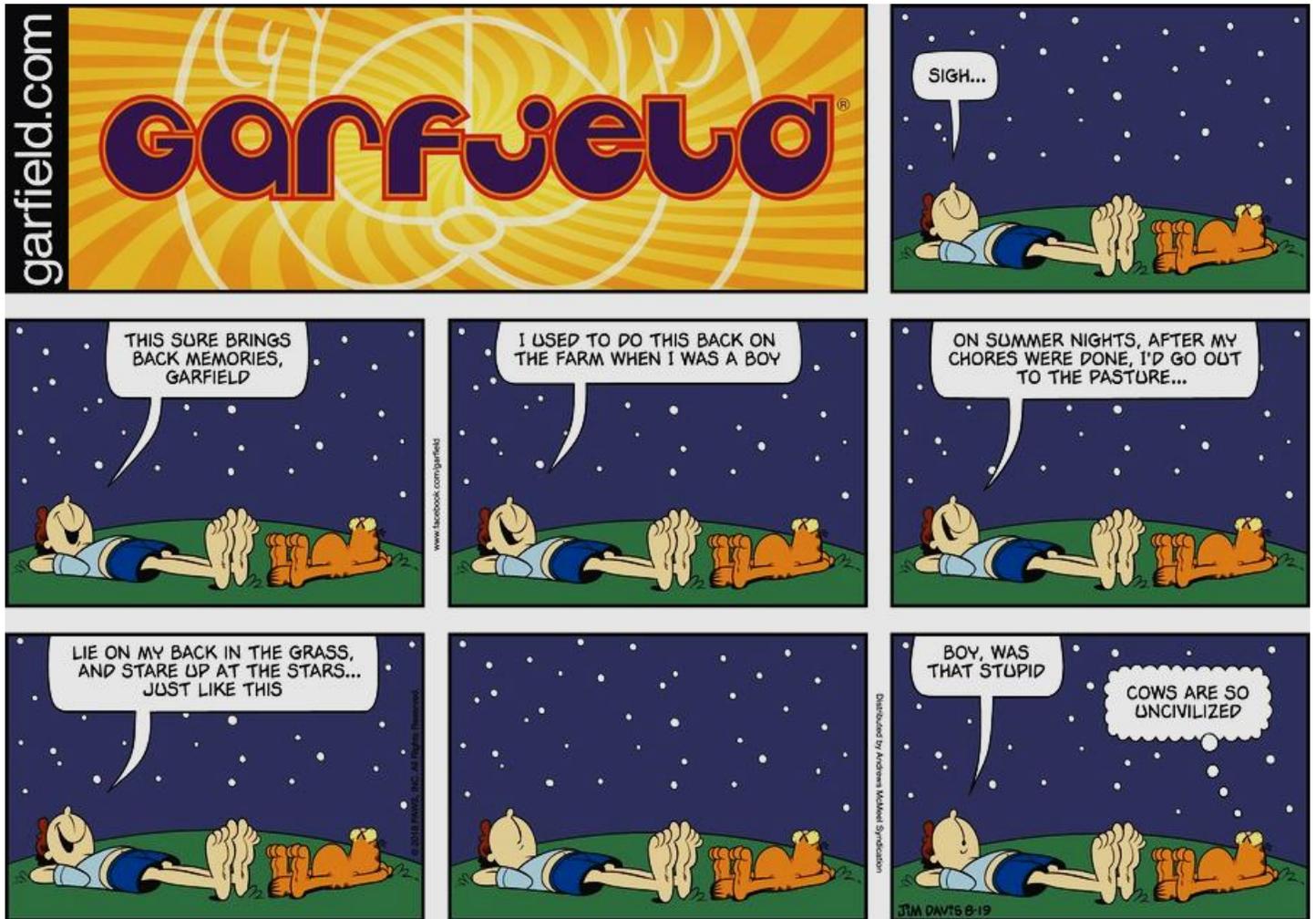
Midnight

Jupiter (southwest)
 Saturn (south)
 Neptune (east)

Morning Sky

Venus (northeast)
 Saturn (southwest)
 Uranus (east)
 Neptune (south)

DARK SKY VIEWING - PRIMARY ON JULY 6TH, SECONDARY ON JULY 27TH



Mythology

Ophiuchus – The Serpent Bearer or Snake Handler

Ophiuchus, pronounced off-ee-YOO-cuss, represents a man with a huge snake coiled around his waist. He holds the head of the snake in his left hand and its tail in his right hand. The snake is represented by the constellation Serpens Caput and Serpens Cauda.

The Greeks identified him as Asclepius, the god of Medicine. Asclepius was the son of Apollo and Coronis (some say that his mother was Arsinoe). The story goes that Coronis two-timed Apollo by sleeping with a mortal, Ischys, while she was pregnant by Apollo. A crow brought Apollo the news, but instead of the

expected reward, the crow, which until then had been snow white, was cursed by Apollo and turned black.

In a rage of jealousy, Apollo shot Coronis with an arrow. Rather than see his child perish with her, Apollo snatched the unborn baby from its mother's womb as the flames of the funeral pyre engulfed her, and took the infant to Chiron, the wise centaur (represented by the constellation Centaurus).

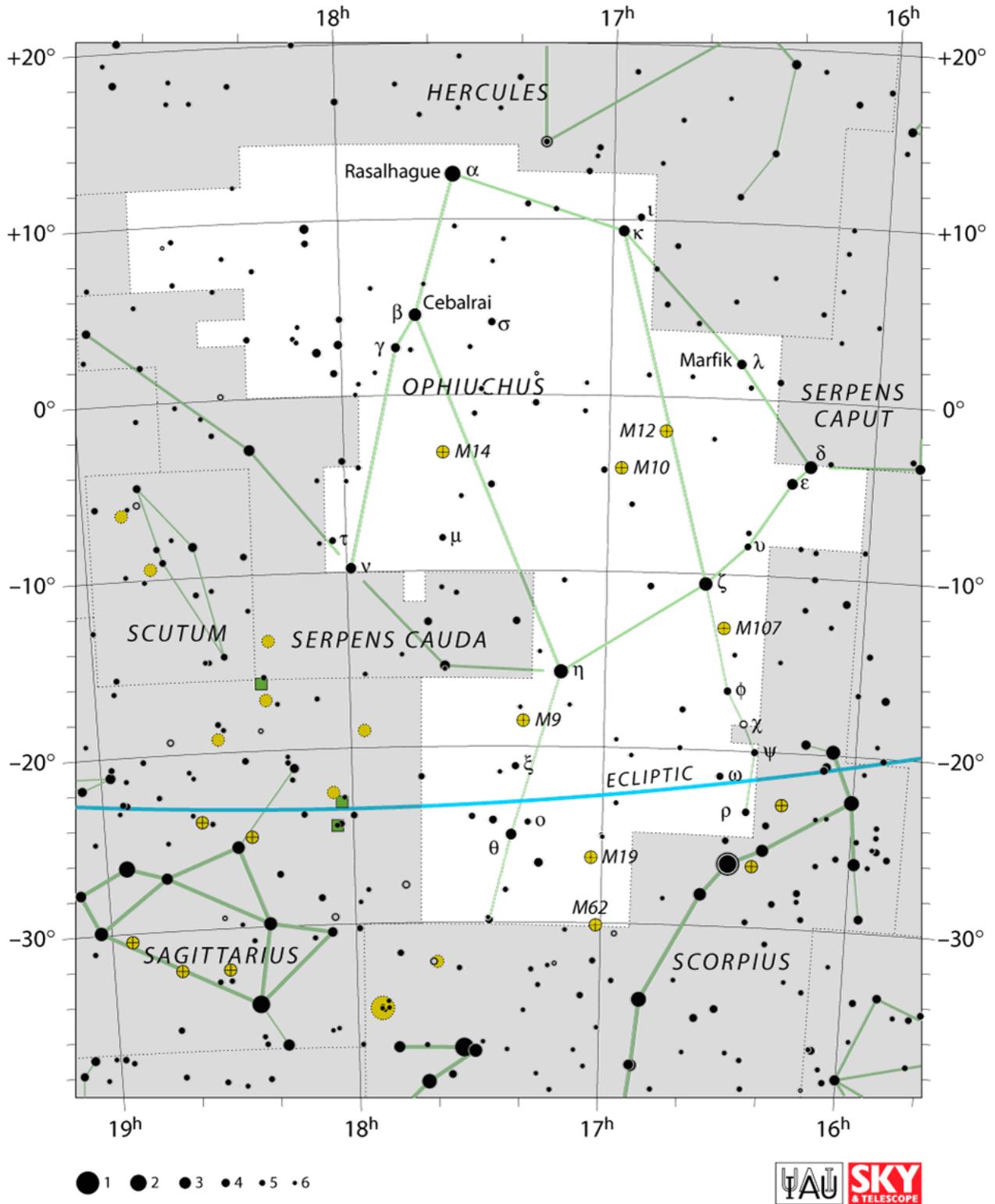
Chiron raised Asclepius as his own son, teaching him the arts of healing and hunting. Asclepius became so skilled in medicine that not only could he save lives, he could also raise the dead. On one occasion in Crete, Glaucus, the young son of King Minos, fell into a jar of honey and drowned while at play. As Asclepius contemplated the body of Glaucus, a snake made towards it. He killed the snake with his staff, and then another snake came along with an herb in its mouth and placed on the body of the dead snake, which magically returned to life. Asclepius took the same herb and laid it on the body of Glaucus, whereupon the magical effect was repeated. Because of this incident, says Hyginas, Ophiuchus is shown in the sky holding a snake, which became the symbol of healing from the fact that snakes shed their skin every year and are seemingly reborn.

Others, though, say Asclepius received from the goddess Athena the blood of Medusa, the Gorgon. The blood that flowed from the veins on her left side was poison, but the blood from the right side could raise the dead.

Another of the men whom Asclepius supposedly resurrected was Hippolytus, son of Theseus, who died when he was thrown from his chariot (some identify him with the constellation Auriga the Charioteer). Reaching for his healing herbs, Asclepius touched the boy's chest three times, uttering healing words, and Hippolytus raised his head.

Hades, god of the underworld, began to realize that the flow of dead souls into his domain would soon dry up if this technique became widely known. He complained to his brother god Zeus, who struck down Asclepius with a thunderbolt. Apollo was outraged at this harsh treatment of his son and retaliated by killing three Cyclopes who forged the thunderbolts of Zeus. To mollify Apollo, Zeus made Asclepius immortal (in the circumstances he could hardly bring him back to life again) and set him among the stars as the constellation Ophiuchus.





The End

