Monthly Meeting May 13th at 7PM at HRPO

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

Speaker (who was shushed last month due to an electrical storm):
Merrill Hess will speak on "The life cycle of stars."

What's In This Issue?

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

President's Message

I thank everyone who showed up at our last meeting which was a real test of Murphy's Law when a tree took out the power of HRPO. We moved our meeting to a nearby gymnasium. Merrill Hess will have another chance at the upcoming meeting to do his presentation.

"I have been informed by Chris Kersey that the HRPO Website must be upgraded by 31 August. If you can help or for more information, please contact Chris(O@brec.org)

BRAS CRAWFISH BOIL Our family crawfish boil is coming up on May 18. ***See flyer on the next page for details, and sent out along with this newsletter.***

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 May 8, 6:15 P.M.
Business Meeting – HRPO, Wednesday,May 8, 7 P.M.
Monthly Meeting – HRPO, Monday, May 13, 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. Members Corner: 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

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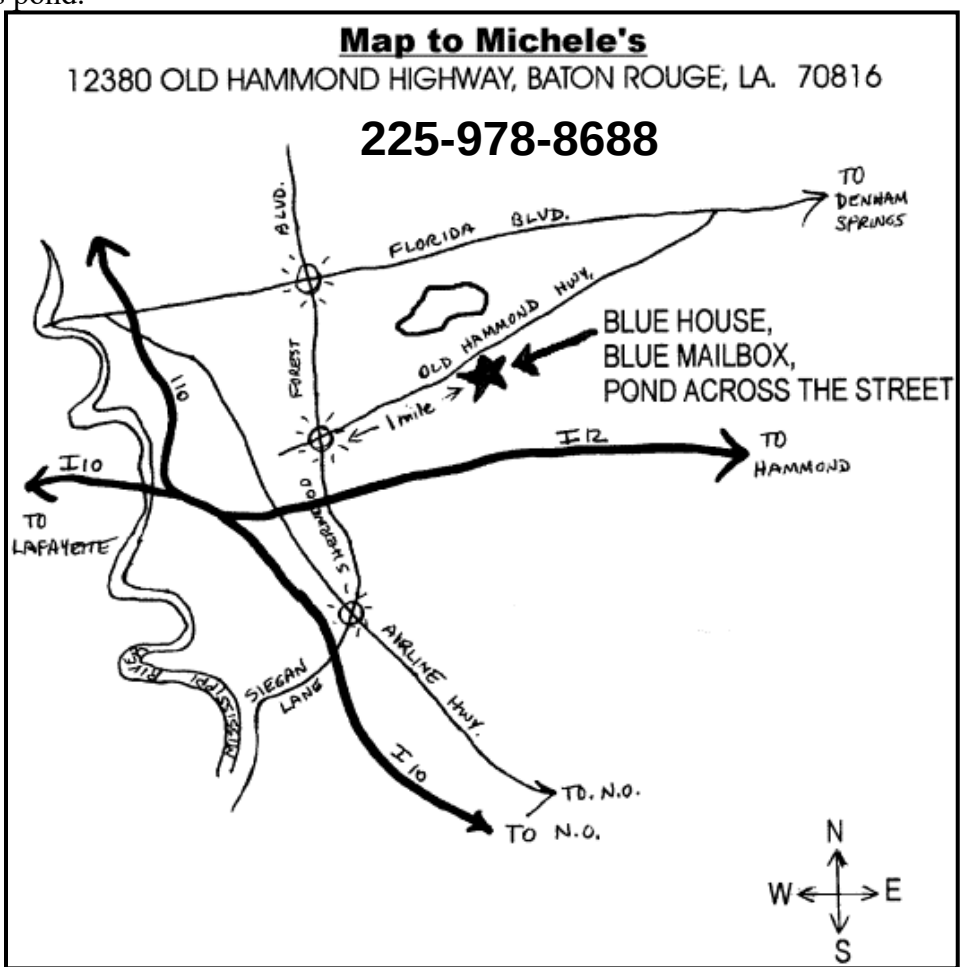
BRAS is having a family-style crawfish boil!
May 18th, 2019
Home of John Nagle and Michele Fry
1 p.m. til -----

BRAS will provide the crawfish and what awl else dat goes in da pot; also coffee and water and an ice chess to keep your stuff cool.

BRING: Members are axed to bring either a side dish or dessert, or throw a few bucks in the kitty for the crawdads. Also, folding chairs fo yo butt to sit in. If you have crawfish trays to spare, bring em. And old newspapers to spread around.
BYOB. Bring the beverages of your choice (this is a private facility, cher, so beer, wine, etc. is permitted).
DIRECTIONS. Halfway between Sherwood Forest Blvd and Flannery Road, on Old Hammond Highway, 12380 clearly visible on the blue mailbox, south side of street. We are right across from the Lakehouse Reception Center's pond.



Please RSVP to Michele at msfry@cox.net, with the number of people you expect to bring (because she needs to accurately predict how many sacks of live crawfish to buy. Also let her know what dish you expect to contribute ('cause we don't want awl sweets and no healthy side dishes, nor vicey versy.

Parking is limited to about 15 spaces if well aligned. Try riding together. Overflow will have to park in Wickland Terrace Subdivision (marked by a caution light) along Elva Drive (first right), park in the curve by the brown picket fence, come in through the back gate.) **Call Michele when you get lost: 225-978-8688**

Secretary's Summary of April Meeting

Due to a power outage at HRPO, the monthly meeting was moved across the street to the recreation center at the park. A formal meeting was not conducted because guest speaker, Merrill Hess, was unable give his power point presentation due to lack of resources at the center. Instead, the members in attendance enjoyed conversation about current astronomical and science events. The crawfish boil was briefly discussed. No raffle was held.

Merrill agreed to give his presentation in May.

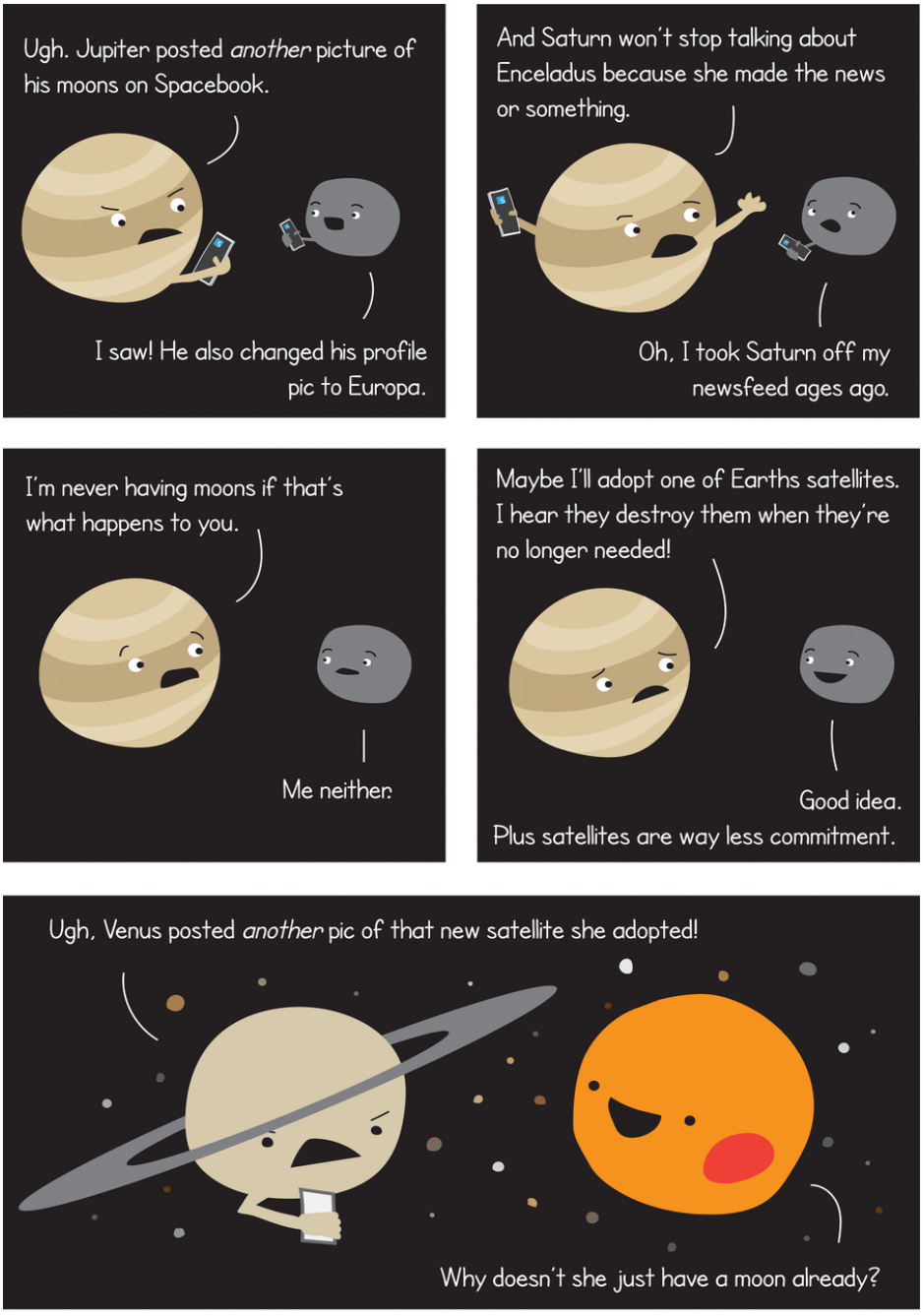
2019 Officers:

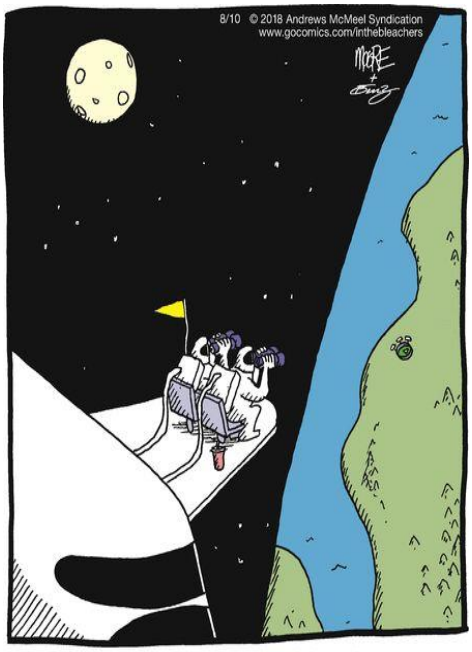
President: Steven M. Tilley
Vice-President: Thomas Halligan
Secretary: Krista Reed
Treasurer: Trey Anding

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

Submitted by Krista Reed, BRAS Secretary





Nosebleeds: the final frontier.

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BRAS Outreach Report

Hi Everyone,

I'm happy to report that we had 3 successful events this past month. Louisiana weather took a bit of a break (for the most part) and let us have a little fun.

Of course, we had our annual outing at Zippity Zoo Fest. Lots of people out and about despite a threat of rain and some pretty high winds that wanted to blow us away.

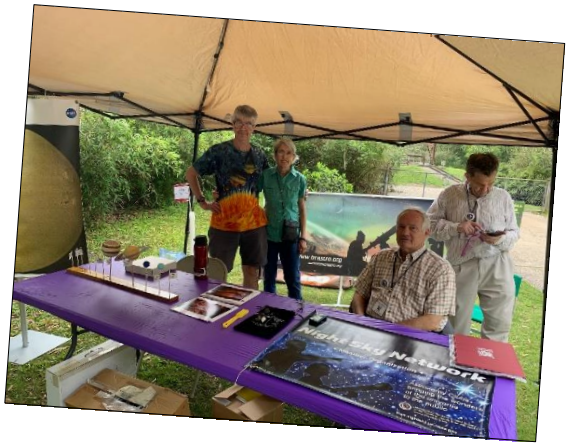
We finally had a night of Sidewalk Astronomy at Perkins Rowe, too! I was even able to do a nice live stream of the Moon via Facebook that also got picked up by followers of Perkins Rowe. It worked! I had several people tell me they saw the feed on Facebook and had to come down to see for themselves.

Most recently we had a great night at the West Baton Rouge Parish Library being a part of their STEAM night. That was probably one of the best events I've attended as far as overall experience. The library staff was so friendly and helpful and even provided small gift bags to each volunteer and had a great spread of food for us, too. The patrons were also extremely courteous, appreciative and enthusiastic. We definitely want to plan on helping out again next year!

Thank you to all the volunteers that helped out with these events. (Chris and Annette R., Scott C., Chris K., Roz R., John N., Coy W., Steven T., Craig B., Susan M., and if I forgot a name, please forgive me!) We couldn't do these events (especially the long ones) without your help.

Finally, we currently have 8...yes, 8...outreach toolkits from the Night Sky Network. We are an active club and I've been logging our events on their calendar. Those are the only criteria for them to continue sending us kits as they become available. (In fact, we qualified for our 9th and it should be coming in July.)

We currently only use 2 of these kits regularly, but the other kits each have things that would probably be great to utilize at various events.



Zippity Zoo Fest- Chris, Annette, Craig and Steve getting ready to battle high winds!

Chris K. and Scott showing off the goods!

Moon map and crater demo ready to go with Chris R. doing some solar!

In the near future, we will begin having some training days where we can get together and learn how to use the materials in these Night Sky Network kits.

My initial thought is to do these training sessions on a Sunday either at the HRPO (which isn't usually used on Sundays) or at a branch of the library. Be on the lookout for more information and if you have questions or suggestions, you can either email me or let us know at the monthly meeting.

Finally finally...we have a few upcoming events that could use your help. Take a look and let me know ASAP if you would like to be of service.

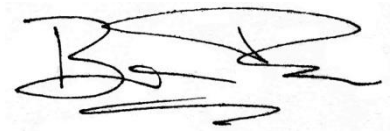
Upcoming Outreach

Friday, May 10th
6pm-10pm
Hot Art, Cool Nights
Mid City Makers Market (off Eugene St in Baton Rouge)
3 or more people to do Sidewalk Astronomy

Tuesday, May 14th
7pm-9pm
Sidewalk Astronomy at Perkins Rowe
(Last one before Summer break!)

Thursday, June 13th
Evening (TBD)
Denham Springs-Walker Library
Presentation to be given on Moon/NASA accompanied by possible telescope views of a daytime Moon. (Presenter has been decided, but if you would like to come, we can also utilize other outreach materials for the event.)

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 6 members in attendance
March minutes were published in April newsletter

Old Business:

1. Discussed what to add to the Dark Sky Advocacy pages. Approved to be as basic as possible. Committee formed to complete rest of DSA pages by May 10th.
2. Discussed linking a DSA page to the LPC Minutes that are in the newsletter.
3. Formed a committee to design a checklist on "How to Make Your Property Dark" For use by BRAS members and the public.
4. Discussed how to put current SQM readings at HRPO on the home page of the DSA pages. Date and time taken, link to spread sheet.

New Business:

1. Discussed adding the Globe At Night monthly information onto the LPC Meeting Minutes in the newsletter. Approved.
2. Discussed how to make a new diorama/example of light pollution. A permanent display at HRPO, actual lights on a stand, new diorama depicting a street with houses/businesses has been approved. In the planning stages now.
3. Discussed any new potential Good Lighting Award nominations.
4. Discussed an educational kit about Light Pollution.
5. Ask the Astrophotography group to take SQM readings where the meeting is held and report them to the LPC.
6. Will ask Fred to add onto a DSA page nominations for Good Lighting Award, and why you made this nomination.

Minutes of this meeting read and approved
Meeting adjourned.

John R. Nagle

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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

(report has been moved to LPC from HRPO

March 27th through April 5th, and April 25th through May 4th –
Leo is the constellation to be observed.

BRAS Astrophotography Group (BRAG)

No current news. For further information, contact Scott Louque, at **slouque at att dot net.**

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.

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum. There are also nine active polls. The Forum has reached 5800 posts.

Deep South Spring Scrimmage Dates Chosen
G2 Activity Brews on Sun
Massive Twin Stars Found Extremely Close Together
Milky Way's Mass More Accurately Measured

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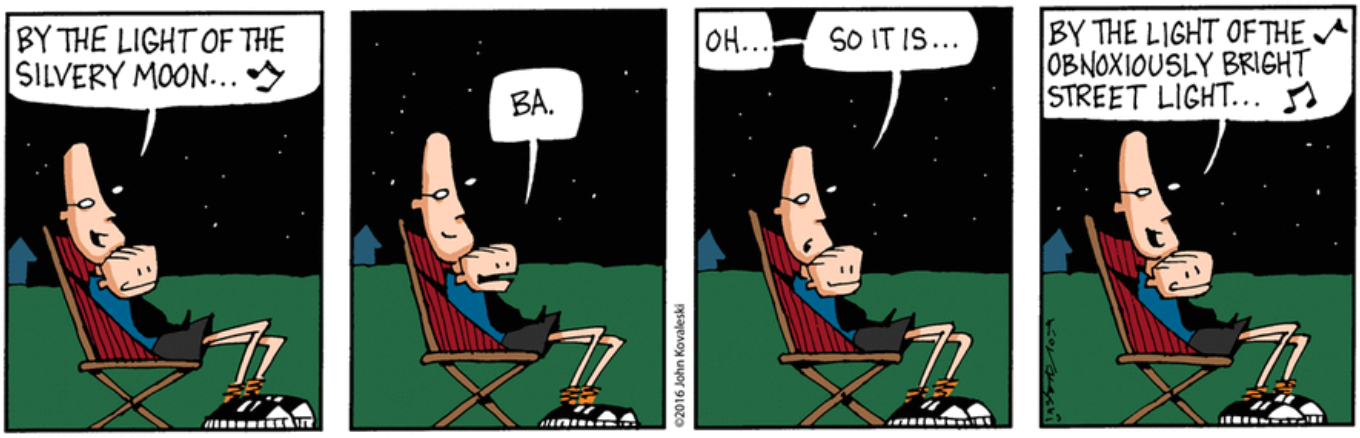

Members/Community Corner

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

This month we feature a GREAT BIG BRAG about one of our own LSU Astronomy Professors, (article from LSU's website at https://www.lsu.edu/physics/news/2019/04/25-clayton.php)

LSU Astronomer Elected Vice President of American Astronomical Society

Geoffrey C. Clayton, Ball Family Distinguished Professor, LSU Department of Physics & Astronomy

FOR IMMEDIATE RELEASE
April 26, 2019

BATON ROUGE – Geoffrey C. Clayton, the Ball Family Distinguished Professor in the LSU Department of Physics & Astronomy, has been elected vice president of the American Astronomical Society, or AAS. In his new role, as a representative of the Board of Trustees, Clayton will be responsible for the overall scientific content of the society's major meetings. He will select invited speakers, review proposals for special sessions and support and advise the executive officer in maintaining the scientific quality of the program. Clayton will be inducted on June 10 at the annual Business Meeting in St. Louis, Mo.

"In these uncertain times where issues like climate change seem to be threatening the future of humanity, I feel that the AAS is more important than ever," Clayton said. "Maintaining and improving scientific literacy in the United States has never been more crucial. We must continue to make the point that the payoff for tax-payer investments in the areas of science education and basic research is huge, and that astronomy, in particular, has the ability to inspire great interest in science."

Clayton has been a member of AAS for 35 years, serving in a number of positions including council member, and chair of the Committee on the Status of Women in Astronomy and the Sustainability Committee. He received a bachelor's degree from the University of Toronto in 1977, a master's degree from the University of Western Ontario in 1979 and a Ph.D. from the University of Toronto in 1983, all in in astronomy and astrophysics. He joined the LSU Department of Physics & Astronomy faculty in 1996. His research involves the study of dust in various astrophysical environments: circumstellar, interstellar and extragalactic.

Founded in 1899, the American Astronomical Society is an American society of professional astronomers and other interested individuals, headquartered in Washington, D.C. The primary objective of the AAS is to promote the advancement of astronomy and closely related branches of science, while the secondary purpose includes enhancing astronomy education and providing a political voice for its members through lobbying and grassroots activities. Its current mission is to enhance and share humanity's scientific understanding of the universe.

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Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

May 2019

Volume 1. Issue 5.

On April 5, 2019, the Japan Aerospace Exploration Agency (JAXA)'s Asteroid Explorer Hayabusa2 release the Small Carry-on Impactor(SCI). The SCI shoot a 2.5 kg (5.5 lb) copper projectile at 162173 Ryugu (1999 JU3) excavating a crater of approximately 2 meters in diameter. This was done to aid in the collection of unweathered material (Space weathering).[http://global.jaxa.jp/projects/sas/hayabusa2/index.html, http://global.jaxa.jp/press/2019/04/20190425a.html, and https://en.wikipedia.org/wiki/Hayabusa2#Subsurface_sample]

JPL Close Approach Data from March 28, 2019 to April 25 20, 2019 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal LD (au)	H (mag)	Estimated Diameter
(2019 FC1)	2019-Mar-28	0.27(0.00069)	25.6	20 m - 45 m
(2019 FV1)	2019-Mar-31	0.87(0.00223)	28.8	4.6 m - 10 m
(2019 GP21)	2019-Mar-31	0.93(0.00238)	29.8	3.0 m - 6.6 m
(2019 GN20)	2019-Apr-12	0.98(0.00253)	26.4	14 m - 31 m
(2019 GC6)	2019-Apr-18	0.57(0.00146)	26.5	13 m - 30 m
(2019 HE)	2019-Apr-20	0.58(0.00150)	26.7	12 m - 28 m

As of 2019-04-26 there is

789,069 discovered asteroids (MPC) https://www.minorplanetcenter.net/)

20,094 discovered Near-Earth Objects (MPC) https://www.minorplanetcenter.net/)

4,065 discovered Comets (MPC) https://www.minorplanetcenter.net/)

904 objects listed on JPL’s Sentry: Earth Impact Monitoring(JPL) https://cneos.jpl.nasa.gov/sentry/)

2,280 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 2019-03-22 to 2019-04-25

Object Designation	Removed (UTC)
2019 FE	2019-04-25 14:57:52
2010 RA91	2019-04-23 15:08:13

2015 DA54	2019-04-20 15:23:34
2017 UZ	2019-04-18 17:17:30
2018 WE1	2019-04-18 16:58:40
2017 SB33	2019-04-18 16:36:50
2018 CK	2019-04-18 16:25:38
2015 BP566	2019-04-18 16:08:19
2017 XY2	2019-04-18 15:49:45
2015 VD105	2019-04-18 15:25:22
2014 OY391	2019-04-18 15:01:04
2017 GF8	2019-04-17 18:28:25
2014 NJ65	2019-04-17 18:24:47
2017 AR20	2019-04-17 18:10:27
2010 KV21	2019-04-12 21:59:27
2019 GF3	2019-04-12 15:39:55
2019 DJ1	2019-04-12 15:24:46
2014 JU79	2019-04-12 15:07:47
2019 GJ5	2019-04-11 16:17:03
2019 GT2	2019-04-11 16:08:31
2019 GO4	2019-04-11 16:06:32
2014 HT197	2019-04-09 14:58:57
2019 FC3	2019-04-09 14:58:43
2019 FA2	2019-04-05 15:37:22

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.
4 May: "Surveying the Sun"
18 May: "Surveying the Moon"

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FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm
all start at 7:30pm

3 May: "Skygazing—A Pursuer's Guide" This special presentation aimed toward students and families introduces the science hobby and outlines how print and online resources, and HRPO and B.R.A.S., can support a lifetime of intellectual and aesthetic fulfillment.
17 May: "Apollo 10 Fiftieth Anniversary" The Apollo 10 mission tested all aspects of what would be the system to put us on the Moon—except the actual landing. Former BREC Center Supervisor Tom Northrop continues HRPO's countdown to accomplishment of one of the greatest engineering and exploration goals in mankind's history…
24 May: "The Amateur Radio Service" For over one hundred years the original "social medium" has allowed family and friends to keep in touch with no monthly fee! This talk provides a historical framework for understanding the communication modes that are, in their own way, more powerful than the internet!

ONE-TIME CALLS FOR VOLUNTEERS

*Friday 3 May, 7:30pm to 8:30pm. *Two or three volunteers.* **Skygazing—A Pursuer's Guide.** Front desk greeting; information about BRAS; testimonials regarding hobby. Low difficulty.
*Saturday 11 May, 3pm to 11pm. *Fifteen volunteers.* **International Astronomy Day.** HRPO's largest public offering. Front desk duty, telescope operation, physical science demonstrations, children's ride monitoring, relaying messages, welcome table. Low to high difficulty.

ONGOING CALL FOR VOLUNTEERS

HRPO periodically needs BRAS volunteers for crafting (gluing, cutting, painting, etc.); training is offered for these easy to moderate tasks. We also have plenty of "grunt work". We are asking any members with the time to do so to assist. Thank you.

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.

INTERNATIONAL ASTRONOMY DAY

Saturday 11 May from 3pm to 11pm

Thirteenth Consecutive Year!

Volunteers needed! HRPO will be calling!

RAFFLE TICKETS, $5 EACH

EXPECTED EXHIBITORS…

American Institute of Aeronautics and Astronautics
Baton Rouge Amateur Radio Club
Baton Rouge Metropolitan Airport
Baton Rouge Mosquito Abatement
Baton Rouge Zoo
Bluebonnet Swamp Nature Center
Civil Air Patrol
LIGO
Saint Joseph's Academy

POTENTIAL RIDES…

18" Dry Slide
Spacewalk
Obstacle Course
Hamster Ball

OTHER…

Adventure Quest
Face Painting
Homemade Comet
Scope-on-a-Rope

Early volunteer sign-up is needed. It is extremely difficult to schedule a volunteer if that person reveals his availability with only two or three days to go. Sign-up now, please!

American Radio Relay League Field Day

Saturday 22 June from 2pm to 10pm

No admission fee. For ages eight and older.

The Baton Rouge Amateur Radio Club will take part in an exciting nationwide emergency exercise. Temporary stations will be set up at HRPO as BRARC joins similar clubs across the continent in an exciting emergency exercise. Some clubs use strictly battery power and solar power. Some clubs use low power outputs (five watts or less) to make contact with other stations all over North America. Field Day is a twenty-four-hour endurance session of skill and suspense.

The Amateur Radio Service, founded decades ago, is the original "social medium!" Ten of thousands of licensed hams—including high schoolers, college kids, parents and grandparents—communicate day after day from coast to coast.

What can people do in the Amateur Radio Service?

- Talk around the world without the Internet or cell phones.
- Send a message to another country using less electricity than a nightlight.
- Transmit your communication in code—Morse code!
- Speak to astronauts on the International Space Station.

What can adults do in the Amateur Radio Service?

- Earn various awards.
- Have more peace of mind knowing that, unlike the internet, federal law mandates sending identifying information during any communication.
- Increase the chances of their families having contact with the outside world during an emergency, simply by connecting radio equipment to a car battery.
- Collect weather and flight data from a launched balloon.

What can kids do in the Amateur Radio Service?

- Work toward specialized merit badges and patches.
- Steer radio-controlled cars and airplanes, or control robots, using ham-only frequencies.
- Keep a hand-held remote transceiver during camping trips.

Come learn more about amateur (or "ham") radio at this fantastic annual event. Remember, if you like what you see at Field Day, there will be plenty of friendly "hams" around to tell you exactly what you need to do to obtain your own amateur radio license and start transmitting!

Observing Notes: May

by John Nagle

Virgo – the Virgin

Position: RA 12.76, Dec. +21.83°

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

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Spica (Alpha Vir), "ear of wheat" from the Latin, "Azimech", "Al simak al A'zal", "The Unarmed or Undefended One", mag. 0.98, 13 25 11.60 -11 09 40.5, is the 15th brightest star in the night sky. It is a rotating ellipsoidal variable star, a non-eclipsing close binary star system in which the two components do not eclipse each other, but are mutually distorted through their gravitational interaction. Classified as a blue giant star, the primary star is midway between the giant and sub-giant stages of evolution. The secondary is a main sequence star, and the orbital period is 4.01416 days. **Spica** was most likely the star that helped the Greek astronomer and mathematician Hipparchus discover precession of the equinoxes in 127 BC.

Zavijava (Beta Vir), "the corner or kennel of the barking dog" from the Arabic "zäwiyat al-cawwa", sometimes known as "Alaraph", mag. 3.59, 11 50 41.29 +01 43 55.4.

Porrima (Gamma Vir), the Latin name of two ancient goddesses of prophecy, "Zawait al Awwa", the angle or corner of the Barker", mag. 2.74, 12 41 40 -01 26 58.3, is a binary star. The secondary star, **Gamma B Virginis**, mag. 3.68, 12 41 39.60 -01 26 58.0, has a separation of 3 to 70 au, and a period of 171 years. **Gamma Vir**, along with **Beta**, **Eta**, **Delta**, and **Epsilon Virginis** form an asterism known as "***Al 'Awwā***", or "**the Barker**". **NGC 4592** is 1˚ to the north-northwest, and **NGC 4666** is 1.3˚ .to the northeast.

Auva (Delta Vir), the variants "Al Awwa" and "Minelauva" derive from the Arabic "cawwa", meaning "barking dog" or simply "the barker", mag. 3.38, 12 55 36.48 +03 23 51.4, is a red giant star and can be seen without binoculars. It moves with a high velocity – more than 30 km per second – relative to the motion of the neighboring stars. It is a suspected binary star with an 11th magnitude dwarf star located 80 arc seconds away. The dwarf is believed to orbit **Delta Virginis** with a period of 200,000 years, but has not been confirmed yet. Located about 6˚ northeast of **Gamma Virginis**.

Vindematrix (Epsilon Vir), from the Latin "vindēmiātrix", meaning "the grape gatherer" or "the grape harvestress", mag. 2.85, 13 02 10.78 +10 57 32.8, is a giant bright yellow star.

Heze (Zeta Vir), origin of its traditional name is unknown, mag. 3.38, 13 34 41.75 -00 35 45.4, is a main sequence star that can be seen without binoculars.

Zeniah (Eta Vir), from the Arabic "zāwiyah" which means "the corner", mag. 3.89, 12 19 61.39 -00 40 00.3, is a triple star system that can be seen with the naked eye. The three stars form a very close system that can't be resolved in a telescope. The inner two stars are only 0.5 au apart, orbiting each other with a period of 72 days. The third star is a bit more distant and orbits the inner pair with a period of 13.1 years.

Syrma (Iota Vir), from the Arabic "sirmā" which means "train (of a garment)", mag. 4.07, 14 16 00.88 -05 59 58.3.
Kang (Kappa Vir), mag. 4.16, 14 12 53.74 -10 16 26.6.
Khambalia (Lambda Vir), comes from the Coptic meaning "Crooked Claw", mag. 4.52, 14 19 06.60 -13 22 16.2.
Rijl al Awwa (Mu Vir), "the foot of the barking dog", mag. 3.87, 14 43 03.56 -05 39 26.7, is a yellow star.
Elgafar (Phi Vir), mag. 4.81, 14 28 12.22 -02 13 40.6.
Ross-128, mag. 11.13, 11 47 44.40 +00 48 16.4, is a flare star.
Lich (PSR 1257+12), named via an IAU "Name Exo-Planets" campaign, 13 00 01 +12 40 57, is a neutron star and a milli-second pulsar with 3 planets orbiting it.

Deep Sky:

M49 (NGC 4372), mag. 8.4, 12 29.8 +08 16.0, 10.2'x8.3' in size, is an elliptical galaxy that has over 5900 globular clusters that are 10 billion years old on average. Believed to have a supermassive black hole with 565 million solar masses at its core. It is at the center of the **Virgo Cloud**. **M49** is gravitationally interacting with the dwarf irregular galaxy **UGC 7636**. **M49** is also known as **UGC 7629; VCC 1226; MCG+01-32-083; CGCG 042-134; CGCG 1227.2+0816;** and **ARP 134.** Located 4.1˚ west-southwest of **Epsilon Virginis**. The star **20 Virginis** is located 2½˚ to the northeast, and **NGC 4526** is 1˚ to the southeast.
M58 (NGC 4579), mag. 9.8, 12 37.7 +11 49.0, 5.9'x4.7' in size, is a barred spiral galaxy, and one of the brightest galaxies in the **Virgo Cluster**. **M58** is also known as **UGC 7796; VCC 1727; CGCG 070-197; CGCG 1235.2+1205;** and **MCG+02-32-160.** Located 2˚ northwest of the 4.9 magnitude star **Rho Virginis**. **NGC 4567**, with **NGC 4568**, called the "**Siamese Twins**" is ½˚ to the southwest.
M59 (NGC 4621), mag. 9.8, 12 42.0 +11 39.5, 5.4'x3.7' in size, is an elliptical galaxy. Also known as **UGC 7858; PGC 042628; CGCG 070-223; CGCG 1239.5+1155**; and **MCG+02-32-183. M60** is about 25' to the east and slightly south of **M59**.
M60 (NGC 4649), mag. 8.8, 12 43.7 +11 33.0, 7.4'x6.0' in size, is an elliptical galaxy in the **Virgo Cluster**, and is also the third brightest giant elliptical galaxy in the cluster. **NGC 4647**, known as the "**Disappearing Galaxy**" (because **M60'**s optical disk overlaps with the **NGC 4647** disk) is located 2.5˚ to the northwest. **M60** is also known as **UGC 1898; Arp 116; VCC 1978; CGCG071-016; CGCG 1241.1+1150,** and **MCG+02-33-02.**
M61 (NGC 4303), mag. 9.7, 12 21.9 +04 28.0, 6.5'x5.8' in size, is a spiral galaxy in the **Virgo Cluster**, and is one of its larger member galaxies. Six supernovas have been discovered in this galaxy in the last 100 years – **SN1926a; SN1961l; SN1964k; SN1999gn; SN2006ov;** and **SN2008in. Also known as UGC 07420; PGC 040001;** and **MCG+01-32-022. M61** is located 5˚ north and slightly east of **Eta Virginis**. The double star **17 Vir** (magnitude 6.6, and 9.4, separation of 20") is located 50' to the north.
M84 (NGC 4374), mag. 9.3, 12 25.1 +12 53.0, 6.5'x5.6' in size, is a lenticular galaxy and radio emitter located in the core of the **Virgo Cluster**. Its disk is of fast rotating gas and stars, which it means that it likely contains a supermassive black hole at its center. It has over 1,775 globular clusters in it. Also known as **PGC 40455; UGC 7494;** and **VCC 763.** Located 5˚ northwest of **Rho Virginis**, and **M86** is only 20' to the east.
M86 (NGC 4406), mag. 9.2, 12 26.6 +12 57.0, 8.9'x5.8' in size, is another lenticular galaxy near the center of the **Virgo Cluster**. Also known as **UGC 7532; CGCG 1223.7+1314; MCG+02-32-046**; and **Arp 152. NGC 4388** is 20' to the south, and 20' to the northeast is a pair of galaxies, **NGC 4435** (magnitude 10.3) and **NGC 4438** (magnitude 10.8), separated by 7', and they are called "**The Eyes**" galaxies.
M87 (NGC 4486), mag. 8.6, 12 30 49.4 +12 23 26, 8.3'x6.6' in size, is an elliptical galaxy with a jet,

the second brightest galaxy in the **Virgo Cluster**, the 5th strongest radio source (**Virgo A**), an X-ray emitter, and has up to 15,000 globular clusters in it. **M8**7 has a supermassive black hole at its center. Also known as **UGC 7654; VCC 1316; CGCG 070-139; CGCG 1228.3+1240; MCG+02-32-105; 3C274; PGC 041361**; and **Arp 152**. **NGC 4478** (11th magnitude) is located 10' to the southwest. **M86** is 1.3˚ to the northwest. M87 is moving toward **M86**.

M89 (NGC 4532), mag. 9.8, 12 35.7 +12 33.0, 5.1'x4.7' in size, is an elliptical galaxy and is suspected to once have been a radio galaxy or active quasar. There are about 2,000 globular clusters within 25' of this galaxy. Also known as **UGC 7760; VCC 1632; CGCG070-184; CGCG 1233.1+1250**; and **MCG+02-32-149. M89** is 1.3˚ east of **M87**, and 40' to the northeast is **M90**.

M90 (NGC 4569), mag. 9.5, 12 36.8 +13 10.0, 9.5'x4.4' in size, is a spiral galaxy classified as anemic. Also known as **UGC 7760**; and **Arp 76. NGC 4550** (magnitude 11.7) is located 20' to the south, and **M89** is 40' to the southwest.

M104 (NGC 4574), the "Sombrero Galaxy", mag. 8.3, 12 39 59 -11 37 23, 8.5'x4.9' in size, is an unbarred spiral galaxy containing between 1200 and 2,000 globular clusters. It is the most massive **Messier** object. It is believed to be a giant elliptical galaxy, and contains a supermassive black hole at its center. It is a weak radio source. It is very bright, very large, and elongated; with a prominent dark lane and a large nuclear bulge. Also known as **UGCA 293; PGC 042407; Bennett 52; MCG-02-32-020**; and **IRAS 12373-1120**. Located about 5˚northeast of **Eta Corvi**, The star **Σ 1669** is 80' to the southeast.

NGC 4697, mag. 9.2, 12 49 37 -05 54 29, 7.2'x4.7' in size, is a galaxy that is very bright, large, and slightly elongated; very bright center. Interacting with an anonymous, barred-spiral galaxy. Also known as **C 52; Bennett 53, UGCA 300; PGC 043276**; and **MCG-01-33-010.**

NGC 4636, mag. 9.5, 12 42.8 +02 41.0, 6.2'x5.0' in size, is a bright, irregularly round galaxy; very bright nucleus. Also known as **UGC 7878; VCC 1939; CGCG 043-002; MCG+01-32-137**; and **PGC 042734**. Located 1½˚ southwest of **Delta Virginis**.

NGC 4699, mag. 9.5, 12 49.0 -08 40.0, 3.9'x2.9' in size, is a very bright and round galaxy; many arms; very bright, very small nucleus. Also known as **UGCA 301; Bennett 54; MCG-01-33-013;** and **PGC** 043321. It is a **Seyfert** galaxy with a very weak nuclear emission.

NGC 5634, mag. 9.5, 14 29.6 -05 59.0, 4.9'x4.9' in size, is a galactic cluster with a high concentration of stars; very bright, quite large, round, and well resolved. Also known as **Mel 126; Bennett 266**; and **Herschel 1-70.**

NGC 5068, mag. 9.6, 13 18.9 -21 02.0, 6.9'x6.3' in size, is a faint, large, irregularly round galaxy; two main arms; very small, faint nucleus. Also known as **Bennett 59a**, and **PGC 046400**.

NGC 4526, the "Lost Galaxy", mag. 9.7, 12 34.0 +07 42.0, 7.0'x2.6' in size, is a very bright, very large, very elongated galaxy; small, bright diffuse nucleus; internal absorption ring. Also known as **UGC 7718; MCG+01-32-100; CGCG 042-155; PGC 41772**, and **Zw642.155**.

NGC 4535, mag. 9.9, 12 34.3 +08 12.0, 6.8'x5.0' in size, is a pretty faint and very large galaxy; an S-shaped spiral; two main arms; very small, extremely bright nucleus. Paired with galaxy **Holmberg 420b.** Also known as **UGC 7727; VCC 1555; CGCG 042-159; MCG +01-32-104; PGC 041812; Herschel 2-500,** and **IRAS 12318+0828.**

NGC 4753, mag. 9.9, 12 52.4 -01 12.0, 5.4'x2.5' in size, is a quite bright, large, and slightly elongated galaxy; extremely small, bright nucleus with dark lanes. Also known as **UGC 8009; Bennett 55;** and **PGC 043671.**

NGC 4216, the "Silver Streak", mag. 10.0, 12 15.9 +13 09.0, 8.3'x2.2' in size, is a very bright, very large, and very elongated galaxy; nearly edge on; small, extremely bright nucleus with a dark lane. In shape it resembles a weaver's shuttle. In a group of galaxies (**NGC 4206, 4222,** and **IC 771**). It is a metal rich galaxy, showing a deficiency of neutral hydrogen. Also known as **UGC 7284; VCC 167**; and **PGC 039246**.

Of Interest Beyond Magnitude 10:

The Siamese Twins, NGC 4567 and 4568, combined magnitude of 10.9, in the process of colliding with each other.

NGC 4567, mag. 11.3, 12 37 32 +11 09 01, 3.0'x2.1' in size, is a very faint and large galaxy; very bright, diffuse nucleus. Interacting with **NGC 4568**. Also known as **UGC 7777; VV 2196; VCC 1673; CGCG 070-189; CGCG 1234.0+1132; MCG+02-32-151;** and **Holmberg 427b.**

NGC 4568, mag. 10.8, 12 36.6 +11 14.0, 4.5'x2.0' in size, is a very faint and large galaxy; bright arms; very small, bright nucleus. Interacting with **NGC 4567**. Also known as **UGC 7776; VV 219a; VCC 1676; CGCG 070-188; CGCG 1234.0+1131; MCG+02-32-152; Holmberg 427a;** and **IRAS 12340+1130.**

The Eyes Galaxies, NGC 4435 and 4438, a pair of interacting galaxies.

NGC 4435, mag. 10.8, 12 28 37.5 +12 58 27.7, 3.0'x2.1' in size, is a very bright, quite large, and round galaxy; very bright nucleus. Interacting with **NGC 4438**. Also known as **UGC 7575; VCC 1030; PGC 040898; CGCG 070-98; Arp 120; MCG+02-32-64;** and **IRAS 12251+1321.**

NGC 4438, mag. 10.2, 12 28 45 +12 54 03, 8.5'x3.2' in size, is a bright, quite large, slightly elongated galaxy; very small, very bright nucleus; dark lane. Interacting with **NGC 4435**. Also known as **UGC 7574; Arp 120; VV 188; VCC 1043; CGCG 070-097; CGCG 1225.2+1303; MCG+02-32-065;** and **IRAS 12252+1317.**

GR8, mag. 14.6, 12 58 40 +14 13 04, 1.9'x1.3' in size, also known as **UGC 8091; VV 558; PGC b44491; CGCG 071-087; MCG+02-33-041; DDO 115; [RC2]A1256+14;** and **8Zw222.**

3C273 Quasar, mag. 12 to 13, 12 29.1 +02 03.2, is the first quasar ever to be identified as well as the brightest and most luminous quasar in the sky. It is also one of the first extra-galactic X-ray sources, discovered in 1970. It is classified as a **Blazer**, a very compact quasar associated with a supermassive black hole at the center of an active giant elliptical galaxy.

Wild's Triplet, combined magnitude of 14.1, 11 46.70 -03 50.5, 5.5'x4.3' in size, **Arp 248**, consists of 3 galaxies: **MCG-01-30-032**, magnitude 15.5, 0.8'x0.5' in size: **MCG-01-30-033**, magnitude 14.1, 3.1'x0.7' in size; and **MCG-01-30-034**, magnitude 15.9, 0.5'x0.4' in size.

8Zw388, called the "**Necklace**", mag. 18.0, 14 24 15.5 -02 29 40.

Markanian's Chain is a stretch of galaxies in a smooth curve. Composed of **M84, M86, NGC 4477, NGC 4473, NGC 4461, NGC 4458, NGC 4438,** and **NGC 4435.**

Virgo Cluster, contains about 1300 galaxies, **M87** is the largest galaxy.

Virgo Galaxy Cluster, the **Coma-Virgo Cloud of Galaxies**. Contains over 3000 galaxies.

Asterisms: The Diamond, 13 08 58.42 -01 06 02.1, is a group of 4 stars near the center of **Virgo** – **Alpha, Gamma, Epsilon**, and **Zeta Virginis**. **The Barker (Kennel or Corner of the Barking Dogs),** is composed of **Beta, Gamma, Delta, Epsilon,** and **Eta Virginis.**

Also beyond magnitude is the following objects: 668 NGC; 226 IC; 210 UGC; 4 UGCA; 240 Herschel; 71 VV; 13 ring galaxies; 26 galaxy trios and triple systems; 32 flat galaxies; 2 variable galaxies; 5 Rose Compact Galaxy Groups; 3 HCG; 1 Kaposov; 244 MCG; 166 C; 19 Arp Galaxies; 143 Abell Galaxy Clusters; 2 Abell Planetary Nebulas; 16 ESO; 4 IRAS; 3 Shapley-Ames; 1 RSA; 1 X-ray source; 15 Radio sources; 16 Quasars; 1 Mrk; 1 Llano; 3 Sh; and 1 Pot.

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Other Stars:

Chi Vir, mag. 4.66, 12 39 14.81 -07 59 43.8, is an orange giant binary star. The primary star in the system has three visual companions; one at magnitude 9.1 and a separation of 173.1 arc seconds; a second being a 10th magnitude star with a separation of 221.2 arc seconds; and a third at magnitude 9.1 with a separation of 321.2 arc seconds. A massive planet was discovered in July of 2009. It has a mass of at least 11 times that of **Jupiter**, and orbits the primary star with a period of 835 days.

61 Vir, mag. 4.74, 13 18 24.97 -18 18 31.0, is a yellow main sequence dwarf star that is almost identical in composition to our **Sun**, and slightly less massive. It rotates at the equator every 29 days. It is estimated to be more than 6 billion years old. It has a potential super-**Earth** in orbit around it.

70 Vir, mag. 4.97, 13 28 25.95 +13 46 48.7, is a yellow dwarf star that is believed to be evolving into a sub-giant star because it is brighter than most stars of its spectral type. One planet in orbit was

discovered in 1996.
HD 104304, mag. 5.54, 12 00 44.37 -10 26 41.4, has an unconfirmed planet in orbit around it.
38 Vir, mag. 6.11, 12 53 11.31 -03 33 11.1, has one planet in orbit around it.
HD 106515A, mag. 7.35, 12 15 07 -07 15 26, has one planet in orbit around it.
HD 106252, mag. 7.36, 12 13 29.51 +10 02 29.9, has one planet in orbit around it.
HD 114783, mag. 7.57, 13 12 43.79 -02 15 54.1, has one planet in orbit around it.
HD 106270, mag. 7.73, 12 13 37 -09 30 48, has one planet in orbit around it.
HD 107148, mag. 8.02, 12 19 13.49 -03 19 11.2, has one planet in orbit around it.
HD 102329, mag. 8.04, 11 46 47 +03 28 27, has one planet in orbit around it.
HD 130322, mag. 8.05, 14 47 32.73 -00 16 53.3, has one planet in orbit around it.
HD 109271, mag. 8.05, 12 33 36.0 -11 37 19, has two confirmed planets and one unconfirmed planet in orbit around it.
HD 102195, mag. 8.06, 11 45 42.29 +02 49 17.3, has one planet in orbit around it.
HD 125612, mag. 8.33, 14 20 53.51 -17 28 53.5, has three planets in orbit around it.
HD 126614, mag. 8.81, 14 26 48.28 -05 10 40.0, is a multiple star system with one planet in orbit.
HD 106315, mag. 9.0, 12 13 53.0 -00 23 37.0, has two planets in orbit around it.
DT Vir, mag. 9.72, 13 00 46 +12 22 32.6, has a circum binary planet in orbit around it.
HD 119130, 13 41 30.0 -09 56 46.0, has one planet in orbit around it.
Stars of interest below magnitude 10:
WASP-54, mag. 10.42, 13 41 49.03 -00 07 41.0, has a transiting planet.
HW VIR, mag. 10.9, 12 44 20.24 -08 40 16.8, is an eclipsing binary star with one planet in orbit around it, and a brown dwarf star.
There are 4 more stars with planets in orbit around them.
Also there are 45 Σ stars; 1 OΣ star; 8 β stars; 14 Aitken stars; 2 V stars; 4 South double stars; and 2 Rossiter double stars.

Sky Happenings:May, 2019

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

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May 2nd - The **Moon** passes 4˚ south of **Venus** at 7 AM CDT,
The **Moon** passes 0.2˚ north of asteroid **Vesta** at 8 AM CDT.
May 3rd - The **Moon** passes 3˚ south of **Mercury** at 1 AM CDT.
May 4th - **New Moon** occurs at 5:40 PM CDT.
May 6th - The **Eta Aquarid Meteor Shower** peaks before dawn under a **Moon**-free sky.
May 6th/7th Dusk: The thin waxing lunar crescent is in **Taurus** for the next two evenings. On the 6th it is 2˚-3˚ to the upper right of **Aldebaran**. The next night, the 7th, the **Moon** is less than ½˚ from **Zeta Tauri**, with **Mars** some 4˚ to the upper right of the pair.
May 7th - The **Moon** passes 3˚ south of **Mars** at 7 PM CDT.
May 10th - The **Moon**, one day short of first quarter, is in the **Beehive Cluster (M44)** in **Cancer**.
May 11th - Asteroid **Flora** is at opposition at 6 PM CDT,
First Quarter Moon occurs at 8:12 PM CDT.
May 11th/12th - Evening: The fattening **Moon** is almost equidistant from **Regulus** on these two evenings – first appearing on the 11th to the star's right, and then on the left on the 12th.
May 13th - The **Moon** is at perigee (229,291 miles or369,009 km from **Earth**) at 4:53 PM CDT.
May 14th - Asteroid **Parthenope** is at opposition at 5 AM CDT.
May 15th - Dusk: The waxing gibbous **Moon**, in **Virgo**, is a little more than 8˚ above **Spica**.
May 18th - **Venus** passes 1.2˚ south of **Uranus** at 1 PM CDT,
Full Moon occurs at 4:11 PM CDT.
May 19th - The **Moon** passes 1.2˚ south of dwarf planet **Ceres** at 1 PM CDT,
Mars is 18 arc minutes northeast of the **M35** star cluster in **Gemini**, low in the evening sky.
May All night: The **Moon**, a day past full, forms a wide triangle with **Jupiter** and **Antares** in the

19th/20th - southeast. Follow the trio across the sky throughout the night.
May 20th/23rd - Morning: Look toward the south-southwest well before sunrise to see the **Moon** some 5˚ to the right of **Jupiter**. Watch over the next three mornings as the thinning **Moon** approaches and then overtakes **Saturn**, ending up about 5˚ to the left of the ringed planet.
May 20th - Asteroid **Massalia** is at opposition at 8 AM CDT,
The **Moon** passes 1.7˚ north of Jupiter at 12 Noon CDT.
May 21st - **Mercury** is in superior conjunction at 8 AM CDT.
May 22nd - The **Moon** passes 0.5˚ south of **Saturn** at 5 PM CDT,
The **Moon** passes 0.07˚ south of **Pluto** at 11 PM CDT.
May 26th - The **Moon** is at apogee (251,119 miles or 404,138 km from **Earth**) at 8:27 AM CDT,
Last Quarter Moon occurs at 11:34 AM CDT.
May 27th - The **Moon** passes 4˚ south of **Neptune** at 12 Noon CDT.
May 28th - Dwarf planet **Ceres** is at opposition (9˚ north of **Antares**) at 6 PM CDT,
All night: Asteroid **Ceres** is at opposition. Binoculars will help you spot the dwarf planet as it straddles the border between **Scorpius** and **Ophiuchus.**
May 30th - The **Moon** passes 0.6˚ north of asteroid **Vesta** at 5 PM CDT.
May 31st - The **Moon** passes 5˚ south of **Uranus** at 5 AM CDT.

Planets:

Mercury – You might catch sight of **Mercury** with binoculars. The innermost planet will lie 8˚ to the lower left of **Venus**, barely 2˚ above the horizon a half-hour before sunrise. **Mercury** will shine at magnitude -0.4. On the 21st, **Mercury** is in superior conjunction with the **Sun**. On the last few days of the month, **Mercury** may be glimpsed low in the west-northwest in the **Sun**s afterglow, far to the lower right of **Mars.**
Venus – Venus rises about an hour before the **Sun** in May, but it is particularly low for observers at mid-northern latitudes. A slender crescent **Moon** will pass 4˚ to the south of **Venus** on the 2nd. The planet shines at its minimum magnitude of -3.8 now, with a disk about 11" wide, and at about 91% illuminated on May 18th. On May 18th, **Uranus** (at mag. 5.9) is 1.2˚ north of **Venus**.
Mars – Mars starts the month, glowing at magnitude 1.6, among the background stars of **Taurus,** several degrees from **Beta Tauri (El Nath).** On May 6th, the planet will nestle between the **Bull**'s two horns, **Beta** and **Zeta Tauri**, making it look like **Taurus** has sprouted a third horn. Adding to this, a slender crescent **Moon** is perched just above the **Hyades** star cluster that forms the **Bull**'s face. The following evening, the 7th, a slightly fatter crescent **Moon** slides 3˚ south of **Mars**. Observers south of a line running from Witchita, Kansas to Savannah, Georgia, will be able to see the 3rd magnitude star **Zeta Tauri** occulted by the **Moon**. By late May, the planet's magnitude fades to 1.8, and sets 2½ hours after the **Sun**, shrinking to less than 4" wide. The planet crosses into **Gemini** on May 16th, and passes less than 0.5˚ north of the open star cluster **M35** on the 18th and 19th, with the planet shining on the northeast edge of the cluster after sunset on the 19th. By the 31st, **Mars** has moved to a point 1˚ south of 3rd magnitude **Epsilon Geminorum**, now glowing at magnitude 1.8, and setting a little after 10:30 PM local daylight time.
Jupiter – As May starts, **Jupiter** will shine at magnitude -2.5, and show a disk of 43" in equatorial diameter. The planet will rise soon after 11 PM local daylight time, but only about 40 minutes after sunset by month's end. **Jupiter** lies in southern **Ophiuchus**, some 10˚ to 15˚east-northeast of **Antares**. A waning gibbous **Moon** stands about 7˚ west of the planet on the evening of the 19th, and a similar distance east of the planet on the following evening (the 20th). On May 7th, **Ganymede** casts its shadow on the planet's **North Polar Region** starting at 2:42 AM CDT, with the transit lasting more than two hours. On May 18th, **Ganymede** will reappear from behind **Jupiter**'s southeast limb at 1:16 AM CDT. Innermost moon **Io** will then cast its shadow onto the planet at 2:44 AM CDT, and 33 minutes later, **Io** itself starts to transit the planet's disk. Each transit lasts about 130 minutes. The following morning, watch **Io** reappear from behind the planet at 2:37 AM CDT, adjacent to the **South Equatorial Belt**. On the night of May 24th/25th, you can find **Ganymede** to the planet's west as **Jupiter** rises. **Ganymede** will slowly disappear, entering the planet's shadow at 12:41 AM CDT, while it is still 16' from the planet's limb. The moon **Ganymede** is so large that it takes 14 minutes to completely disappear. The waning gibbous **Moon** passes 1.7˚ to the north of **Jupiter** on the 20th. There are many transits of **Jupiter**'s moons and their shadows during May. You can find a chart with timing of the events on page 51 of the May issue of ***Sky and Telescope***, or on page 233 of

the ***2019 RASC Observers Handbook, USA Edition.***

Saturn – Saturn rises in the middle of the night throughout May, brightening noticeably from magnitude +0.5 to +0.3 in May, while its equatorial diameter swells to just short of 18" wide – the ring's span will grow to more than 40", with their tilt starting to increase from a temporary minimum of 23.5˚ from the horizontal. **Saturn**, retrograding, moves back in eastern **Sagittarius**, slowly gaining on the **Teaspoon** asterism. The brightest saturnian moon, **Titian** (8th magnitude), will show up in almost any instrument. Look for it south of the planet on the 4th and 20th, and north of the planet on the 12th and 20th. A trio of 10th magnitude moons – **Tethys, Dione**, and **Rhea** – circle the planet inside **Titan**'s orbit, with **Iapetus** orbiting much further out at 10th magnitude, dimming to 11th magnitude on the 18th and 19th. **Saturn** passes 0.5˚ north of the **Moon** on the 22nd.

Uranus – Uranus shines at magnitude 5.9, but is hard to see because it does not escape the twilight glow. The best opportunity to observe this planet comes on May 18th, when it lies 1.2˚ due north (upper left) of **Venus.** On the 31st, **Uranus** appears 5˚ north of a waning crescent **Moon**, with both objects clear of the eastern horizon more than an hour before sunrise.

Neptune – On the 31st, the planet will climb nearly 20˚ high in the east-southeast as twilight starts. You will need binoculars to spot the magnitude 7.5 planet in eastern **Aquarius,** 1.2˚ east-northeast of 4th magnitude **Phi Aquarii**. A telescope will show the 'planet's 2.3" diameter disk and a blue-gray color.

Pluto – On May 15th, **Pluto** will be at Right Ascension 19 38.6, and Declination -21 50, at magnitude 14.3. By my estimate, about 1˚ to 1½˚ north of **Chi³ Sagittarii**.

Moon – At dusk on May 6th, the slender crescent **Moon** is 3˚ to the upper right of **Aldebaran**. The next night, the crescent **Moon** is less than ½˚ to the left of **Zeta Tauri**, and forms a compact line with **Mars** some 3˚ to 4˚ to its right or upper right, and similarly bright **Beta Tauri** even farther right. The first-quarter **Moon** is 8˚ to 9˚ to the right or upper right of **Regulus** on the 11th, and even closer the next night. The waning gibbous **Moon** is around 4˚ to the right of **Jupiter** on the morning of May 20th. The thinning gibbous **Moon** is 7˚to the right of **Saturn** on the morning of May 22nd, and closer to the lower left of **Saturn** the next morning.

Asteroids **–** Asteroid 1 **Ceres** reaches opposition on the night of May 28th-29th, when it moves from **Ophiuchus** into **Scorpius. Ceres** is the largest object in the asteroid belt, the only asteroid to also be classified as a dwarf planet. On the night of opposition, **Ceres** will shine at magnitude 7.0, becoming a 7th magnitude object as early as May 6th, and stays that way until June 19th, and then an 8th magnitude object well into August. For much of May, **Ceres** travels across southern **Ophiuchus**, passing above the heart of **Scorpius**. On the night of the opposition, **Ceres** is about 1¼˚ northwest of **Chi Ophiuchi**. **Ceres** stays low in the southern sky. On May 1st, the asteroid rises near 10 PM local daylight time, and reaches its highest point, about 33˚, around 3 AM CDT. **Ceres** location, ***by my estimates***, are as follows: On May 5th – about 4˚ east-northeast of **Chi Ophiuchi**; on the 11th – about 3˚ west-northwest of **Chi Ophiuchi**; on the 17th – about 2˚northwest of **Chi Ophiuchi** or just over 1˚ south-southwest of **Psi Ophiuchi**; on the 23rd – about 1˚ north-northwest of **Chi Ophiuchi** or just under 1¼ south-southeast of **Phi Ophiuchi**; and on the 26th – about ¾˚ due north and slightly east of **Chi Ophiuchi**.

Asteroid **2 Pallas** begins May at magnitude 8.3 and fades slowly to magnitude 8.9 by month's end as it travels along the border of **Boötes** and **Coma Berenices**. **Pallas**'s position, ***by my estimates***, are as follows: On May 1st – just over½˚ northwest of **2 Boötis**; on the 6th – about 1²/³˚ northwest of **2 Boötis** or just past the border into **Coma Berenices**; on the 11th – about 2⅓˚ northwest of **2 Boötis**; on the 16th – just under 3˚ northwest of 2 **Boötis**; on the 21st – about 3˚ northwest of **2 Boötis**; on the 26th – about 3½˚ northwest of **2 Boötis**; and on the 31st – just over 3½˚ west-northwest of **2 Boötis** as the asteroid curves to the south in **Coma Berenices**.

Comets **–** Comet **ATLAS (C/2017 M4)** should glow at 13th magnitude this month as it travels from **Scorpius** into **Lupus**. This region of the sky rises shortly before midnight local daylight time, and climbs highest in the south between 2 AM and 3 Am. On May 1st, the comet lies 5˚ west of 3rd magnitude **Mu¹ Scorpii**. Then it heads west-southwest, it passé 1.3˚ south of 3rd magnitude **Eta Lupi** on the 13th. Positions of the comet, by my estimates, are as follows: On May 1st – about 2˚ northeast of **NGC 6139**; on the 3rd – about 1½˚ due north of **NGC 6139**; on the 5th – about 1½˚ north-northwest of **NGC 6139**; on the 7th – about 1¾˚ west-northwest of **NGC 6139**; on the 9th – about 2½˚ due west of **NGC 6139**; on the 11th – across the border into **Lupus**- about

1¾˚ southeast of **Eta Lupi**; and on the 13th – about 1½˚ due south and a little east of **Eta Lupi**.

Meteor Showers – The **Eta Aquariid Meteor Shower** is created by **Earth** travelling through one or more dust streams left behind by comet **1P/Halley**. **Halley** returns through the inner system every 75-76 years, and has done so for more than 2,000 years (Chinese astronomers first documented the comet's arrival in 240 BC). Every May, **Earth** skims **Halley**'s outbound path, passing just close enough for older, dissipating dust streams to produce the meteor shower. Both **Northern** and **Southern Hemispheres** can see the **Eta Aquariid** shower, but it is usually the best for those in the south, offering, perhaps, 60 meteors per hour before dawn under dark skies. Equatorial observers can catch an estimated 82% of the total activity. Observers in northern latitudes see significantly fewer meteors since the shower's radiant rises late, and so it is quite low in the east-southeast dawn.

When to View the Planets:

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

DARK SKY VIEWING - PRIMARY ON MAY 4TH, SECONDARY ON MAY 11

Mythology:

Virgo – The Virgin

Virgo is the second-largest constellation in the sky, exceeded only by the much fainter Hydra; the Greeks called the constellation Parthenos. She is usually identified as Dike, goddess of justice, who was the daughter of Zeus and Themis; but she is also known as Astraeia, daughter of Astraeus (father of the stars) and Eros (goddess of the Dawn). Virgo is depicted with wings, reminiscent of an angel, holding an ear of wheat.

Dike features as the impartial observer in a moral tale depicting mankind's declining standards. It was a favorite tale of Greek and Roman mythologists, and its themes sound familiar even today.

Dike was supposed to have lived on Earth in the Golden Age of mankind, when Cronus ruled Olympus. It was a time of peace and happiness, a season of perennial spring when food grew without cultivation and humans never grew old. Men lived like the gods, not knowing work, sorrow, crime or war. Dike moved among them, dispensing wisdom and justice.

Then, when Zeus overthrew his father Cronus on Olympus, the Silver Age began, inferior to the age that had just passed. In the Silver Age, Zeus shortened springtime and introduced the yearly cycle of seasons. Humans in this age became quarrelsome and ceased to honor the gods. Dike longed for the idyllic days gone by. She assembled the human race and spoke sternly to them for forsaking the ideals of their ancestors. 'Worse is to come' she warned them. Then she spread her wings and took refuge in the mountains, turning her back on

mankind. Finally came the Ages of Bronze and Iron when humans descended into violence, theft and war. Unable to bear the sins of humanity any longer, Dike abandoned the Earth and flew up to heaven, where she sits to this day next to the constellation of Libra, which some see as the scales of justice.

There are other goddesses who can claim identity with Virgo. One is Demeter, the corn goddess, who was daughter of Cronus and Rhea. By her brother Zeus she had a daughter, Persephone (also called Kore, meaning maiden).Persephone might have remained a virgin for ever had not her uncle, Hades, god of the Underworld, kidnapped her while she was out picking flowers one day at Henna in Sicily. Hades swept her aboard his chariot drawn by four black horses and galloped with her into his underground kingdom, where she became his reluctant queen.

Demeter, having scoured the Earth for her missing daughter without success, cursed the fields of Sicily so that the crops failed. In desperation she asked the Great Bear what he had seen, since he never sets, but since the abduction had taken place during the day he referred her to the Sun, who finally told her the truth.

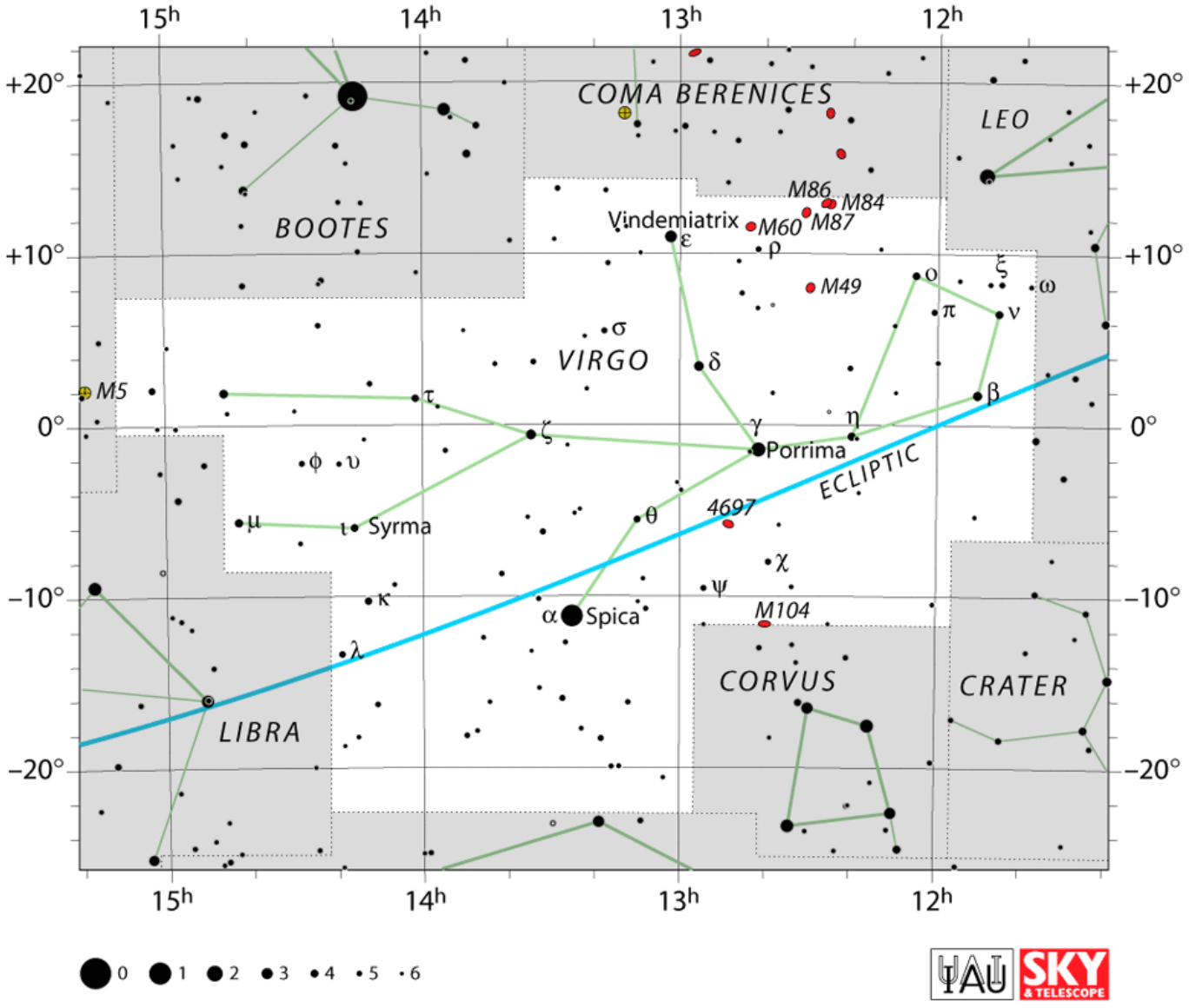
Demeter angrily confronted Zeus, father of Persephone, and demanded that he order his brother Hades to return the girl. Zeus agreed to try; but already it was too late, because Persephone had eaten some pomegranate seeds while in the Underworld, and having once done that she could never return permanently to the land of the living. A compromise was reached in which Persephone would spend half (some say one-third) of the year in the Underworld with her husband, and the rest of the year above ground with her mother. Clearly, this is an allegory on the changing seasons.

Eratosthenes offers the additional suggestion that Virgo might be Atargatis, the Syrian fertility goddess who was sometimes depicted holding an ear of corn. But Atargatis is identified with the constellation Piscis Austrinus. Hyginus identifies Virgo with Erigone, the daughter of Icarius, who hanged herself after the death of her father. In this story, Icarius became the constellation Boötes, which adjoins Virgo to the north, and Icarius's dog Macra became the star Procyon.

Eratosthenes and Hyginus both name Tyche, the goddess of fortune, as another identification of Virgo; but Tyche was usually represented holding the horn of plenty (cornucopia) rather than an ear of grain. In the sky, the ear of corn is represented by the first magnitude star Spica. Latin for 'ear of grain' (the name in Greek, Stachos, has the same meaning).

Beta Virginis is called Zavijava, from an Arabic name meaning 'the angle'. Gamma Virginis is named Porrima, after a Roman goddess. According to Ovid in his *Fasti,* Porrima and her sister Postverta were the sisters or companions of the prophetess Carmenta. Porrima sang of events in the past, while Postverta sang of what was to come.

Epsilon Virginis is named Vindemiatrix, from the Latin meaning 'grape gatherer' or 'vintager', because its first visible rising before the Sun in August marked the beginning of each year's vintage. Ovid in his *Fasti* tells us that this star commemorates a boy named Ampelus (the Greek word for 'vine') who was loved by Dionysus, god of wine. While picking grapes from a vine that trailed up an elm tree, Ampelus fell from a branch and was killed; Dionysus placed him among the stars. This star's Greek name, Protrygeter, also means 'grape gatherer'. Its importance as a calendar star is shown by the fact that it was one of the few stars named by Aratus and, at third magnitude, was far fainter than the others. Vindemiatrix marks the top of Virgo's right wing.


15h
14h
13h
12h
+20°
+10°
0°
−10°
−20°
COMA BERENICES
LEO
BOOTES
VIRGO
LIBRA
CORVUS
CRATER
M86
M84
M60
M87
M49
M5
M104
4697
Vindemiatrix
Porrima
Syrma
Spica
ECLIPTIC
0 1 2 3 4 5 6
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The End