

Night Visions

2019 June Issue

Newsletter of the Baton Rouge Astronomical Society

Monthly Meeting June 10th at 7PM at HRPO

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

Speaker: Merrill Hess, How To Clean A Telescope Mirror

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President's Message

I want to thank everyone who came out to our crawfish boil on May 18, 2019, and also I thank Michele and John for hosting it in their front yard and organizing the boil. See Michele's write-up in the Member's Corner. I think we should have a late spring family-type event every year. After that our days slowly start to get longer . . . and hotter.

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

ASTEROID DAY June 29 will be the 2nd Asteroid Day hosted by BRAS, it will be at HRPO from 7:00 PM to 10:00 PM. There will be talks, displays, and hands-on demonstrations.

VOLUNTEER AT HRPO: If any of our 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 June 5, 6:15 P.M.

Business Meeting – HRPO, Wednesday, June 8, 7 P.M.

Monthly Meeting – HRPO, Monday, June 10, 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.

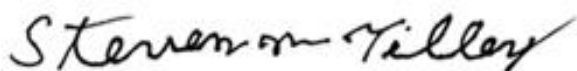
SALE: BRAS is having a surplus telescope/equipment.

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. 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



Michele and John, chefs and hosts of our Crawfish Boil, and Michele's grandson, Jonathan who did some of the heavy lifting!



Secretary's Summary of May Meeting

-Thomas Halligan calls meeting to order at 7:07PM.

-23 members in attendance.

-Thomas introduced himself as the VP pro temp.
(Running the meeting in lieu of President, Steven Tilley)

-Rick Rogers has donated the club a mirror making set. John Nagle (by vote) will receive this kit.

-Fred Barnett must upgrade the websites. He has requested help to keep the pages updated. He gave a list of responsibilities and the requirements. Thomas asked the club if there was anyone interested in this task. Coy Wagoner expressed interested.

-Thomas gave the floor to Chris Kersey. He spoke of the Apollo landing site observing award. He gave an update on International Astronomy Day's turnout. He also brought to the clubs attention that the U.S. Space and Rocket Center will be conducting a rocket launch event on July 16th. HRPO will do a launch event as well as The LA Space Consortium.

-John N plugged the crawfish boil. It will take place at his and Michele's home at 1PM. They have asked everyone attending to RSVP by Wed, May 15th. He also briefly talked about his experience the Texas Star Party.

-Trey Anding gave everyone a tour of the new Zazzle Store for BRAS merchandise. Members can purchase shirts, mugs, and other BRAS items.

-Thomas H gave the floor to Merrill Hess for the monthly talk. The talk was on the life cycle of a star.

-Ben Toman gave an update on upcoming outreach. He mentioned new kits coming from night sky network.

-Thomas thanks everyone for coming.

-No raffle held.

-Meeting adjourns 8:34PM

.

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,

Well, the dog days of Summer approach so we are slowing down a bit with regards to outreach events. We still have a couple (listed below) coming up this month and later I'll be sending out info on a couple later in the Summer.

We had a great night for our final Sidewalk Astronomy at Perkins Rowe before taking our Summer break. Lots of people and lots of great interactions. We did a live stream via our Facebook page and it has almost 900 views!

We also had a couple of members (Chris and Annette R. Krista R., and Scott C.) go out to the Mid City Makers Market and I heard they got a little luck spotting the Sun through some clouds. Thanks to all that helped out this past month with our outreach events.

With slower Summer days ahead, now is a good time for us to think about getting together to learn how to use/utilize some of our many outreach toolkits from the Night Sky Network. Be on the lookout for an invite soon. This will be a great opportunity to get started in volunteering for outreach events. As a group, we'll go over the toolkits and learn how to use the activities and discuss how we can best use them in our events.

Below are the two remaining outreach events for this month. Please let me know if you'd like to help out!

Upcoming Outreach Events



Wednesday, June 12th

SMA Science and Math Academy Vacherie
More info on times to come (I believe it is in the morning around 11am)

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.)

P.S. I was sorry to miss the club's crawfish boil, sending my regrets to Michele and John as follows: "I truly wish I could come. but I'm playing at the airport in New Orleans that day from 9am-1pm, then a wedding at 4:30, then a second line in Metairie at 7:30. I know ya'll will have a blast."

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
April minutes were published in May newsletter

Old Business:

1. DSA web pages – Report by committee on progress. Discussed linking a DSA page to the LPC Minutes that are in the newsletter.
2. Need to ask Fred about linking a DSA page to the LPC Minutes that are in the newsletter.
3. Committee report on a checklist for “How to Make Your Property Dark” for use by BRAS members and the public.
4. Need to ask Fred if the current SQM readings at HRPO can be put on the home page of the DSA pages. Date and time taken, link to spread sheet, ask the BRAG group to take SQM readings at every get together and report them to LPC, and take readings at the BRAS Dark Site whenever anyone goes there.
5. Adding the Globe At Night monthly information onto the LPC Meeting Minutes in the newsletter.
6. Discussed how to make a new diorama/example of light pollution, and a permanent display at HRPO. Will design and build an example of actual lights on a stand, new diorama depicting a street with houses/businesses. Still in the planning stages now.
7. Discussed any new potential Good Lighting Award nominations, and gave approval for John Nagle to determine the suitability of the current nominee.
8. Need to ask Fred to add onto a DSA page recommendations for Good Lighting Award, and why you made this nomination.

New Business:

Chris to draft letter to Entergy and Demco requesting that all lights installed to be full cutoff, and less than 3,200 k temperature.

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.

P.P.S. – Three items have come up since the LPC meeting:

1. The Star Link Satellites – link for information is here
<https://www.theverge.com/2019/5/29/18642577/spacex-starlink-satellite-constellation-astronomy-light-pollution>;

2. Country Roads Magazine interviewed LPC in late April for its June issue. See **Member's Corner** for details.
3. The Main Branch of the EBR Public Library on Goodwood Blvd a screening and discussion about a new documentary from PBS and The American Experience called "Chasing the Moon" will be on Monday, June 17th at 6:30 PM. You must have a ticket (free) to attend. Check with the library on how to get a ticket.

Globe At Night

The target is Hercules, from June 24th through July 3rd.

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.



BRAS Astrophotography Group (**BRAG)**

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



Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum. There are also nine active polls. The Forum has reached 5900 posts.

[International Astronomy Day](#) Crushed by Inclement Weather
NASA Now Considering [2020 Budget](#)
First Observer [Proposal Deadline for James Webb](#) is Spring 2020
Country Roads Magazine Releases [Light Pollution Article](#)
Is the [Great Red Spot](#) Unraveling?
NASA Allowing Interested Parties to [Send Name with 2020 Rover](#)
[G3 Activity](#) in May
A Few [Eta Aquariids](#) Spotted from Town





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

May 18th was BRAS's Crawfish Boil,

the first in a good many years, held at the home of Michele Fry and John Nagle, veteran crawfish boilers. The mudbugs were HUGE, and Michele claims May is the perfect time of year for this type of picnic, both expense wise (because the price of the crawfish is way down), and weather wise.

Despite a few sprinkles of rain where we huddled under the canopy (or not as some didn't mind getting wet), the weather was perfect – cool, breezy, only slightly overcast -- and the company delightful. 21 members and guests were in attendance, 60 lbs of live crawfish were boiled in two batches along with the corn, potatoes, mushrooms, onions, sausage and garlic pods. Many side dishes were contributed, from cole slaw, to baked beans, green bean casserole, a huge flat of fresh strawberries, home made cookies, a big watermelon, and I can't remember what all else!. So much food that everyone who wanted it got to take home a plate for a loved one (or for their dinner). Lagniappe is the cajun way!

Conversation ranged from astronomy to cult movies to herbal remedies to health concerns to swapping jokes, showing the diversity of interests among our group. Politics and religion were mercifully avoided. There were a few kids running around too, livening up the scene, and two papillon dogs.



BRAS in the NEWS:

"Look to the stargazers

On a chilly Monday night in March, eight people met at Highland Road Park Observatory for the monthly [Baton Rouge Astronomical Society's](#) Light Pollution Committee meeting" That's how reporter Christine Matherne Hall writes it up in her article, published in the June issue of Country Roads Magazine, entitled:

"Star Light, Star Bright

A case for containing light pollution"

Read it online here:

<https://countryroadsmagazine.com/art-and-culture/people-places/star-light-star-bright/>

Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

June 2019

Volume 1. Issue 6.



The 2019 IAA Planetary Defense Conference (PDC) was held on April 29 - May 3, 2019, in College Park, Maryland. At the PDC a Hypothetical Asteroid Impact Scenario was run to help prepare for an (unlikely) impact event. A hypothetical asteroid with the fictional designation “2019 PDC”, asteroid designations do NOT have three letters. 2019 PDC was to make a hypothetical impact near Denver, Colorado. The conference attendees opted for the use of a “kinetic impactor.” At first, it looked the attendees save the day, however as the scenario play 2019 PDC breaks apart, and 200-foot fragment would make a hypothetical impact on Central Park in New York City with only ten days to plan. While this was only a drill, it helps to show what mistakes could be made in hopes to avoid them.

Sources:

[\(http://pdc.iaaweb.org/\)](http://pdc.iaaweb.org/)

[\(https://cneos.jpl.nasa.gov/pd/cs/pdc19/\)](https://cneos.jpl.nasa.gov/pd/cs/pdc19/)

<https://www.nbcnews.com/mach/science/why-nasa-just-destroyed-simulated-new-york-city-huge-fake-ncna100247>

<https://gizmodo.com/nasa-accidentally-destroys-nyc-in-attempt-to-save-denve-1834614030>

A massive explosion happened in the sky near the Podkamennaya Tunguska River in Yeniseysk Governorate, Russia on 30 June 1908(the Tunguska event). Today it is believed that explosion was cause be large meteor (i.e. an asteroid). Given the fact that asteroids do impact the Earth, the world should plan to take action when needed. Asteroid Day was established to mark the anniversary of the Tunguska event and raise global awareness of the risk from asteroids.

Sources:

<https://www.geo-social.net/?p=1653>

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

<https://asteroidday.org/>

[JPL Close Approach Data](#) from April 26 20, 2019 to May 29, 2019 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal LD (au)	H (mag)	Estimated Diameter
(2019 JK)	2019-Apr-30	0.69 (0.00178)	28	6.8 m - 15 m
(2019 JX1)	2019-May-02	0.47 (0.00120)	29.1	4.0 m - 8.9 m
(2019 JY2)	2019-May-05	0.38 (0.00098)	29.6	3.2 m - 7.2 m
(2019 JH7)	2019-May-16	0.19 (0.00048)	29.7	3.1 m - 6.9 m
(2019 KT)	2019-May-28	0.85 (0.00217)	26.6	13 m - 29 m

As of 2019-05-27 there is

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

20,240 discovered Near-Earth Objects (MPC) (<https://www.minorplanetcenter.net/>)

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

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

2,285 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 JO5	5/15/2019 15:52
2019 GD1	5/12/2019 16:11
2019 JG	5/9/2019 15:56
2019 JL1	5/6/2019 14:54
2014 JT79	4/29/2019 14:30
2019 HO2	4/29/2019 14:28

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.

1 June: "Jupiter"

8 June: "Mercury"

29 June: "Saturn"



FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

all start at 7:30pm

14 June: "The Great Red Spot" The latest observations show that the Great Red Spot may be losing its outer edges to the South Equatorial Belt. The Baton Rouge Astronomical Society will explain the origin of the GRS, discuss how to view it and explain the implications of this stunning development.

28 June: "Journeys to the Moon" Since antiquity, humankind has been voyaging to the Moon with imagination and curiosity. This presentation introduces the beginner to making his or her own observations. Neither a rocket nor a spacecraft is required!

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.



Jovian Opposition

Sunday 9 June from 9:45pm to 11:45pm

No admission fee. For all ages.

Drinks and refreshments.



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



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!





Asteroid Day

Saturday 29 June from 7pm to 10pm

No admission fee. For ages eight and older.

The first time was so much fun, the Baton Rouge Astronomical Society has decided to do it again! This special event will focus on...

- ...the origins of asteroids
- ...the chemical makeup and orbits around the Sun
- ...the potential dangers they pose to Earth
- ...how to mitigate and/or plan for those dangers
- ...how to view asteroids with a binocular or telescope
- ...how to acquire the rudimentary skills for imaging and tracking asteroids
- ...steps to take to lessen light pollution in order to view/image dimmer asteroids



The event will include a variety of asteroid-oriented physical science demonstrations, experiments and videos! Patrons will also see, weather-permitting and as the climax at 9:45pm, live views of asteroid Ceres and Pallas!



Space Debris and Elon Musk's Satellites

Get caught up here:

https://en.m.wikipedia.org/wiki/Space_debris

Here's what Elon Musk has to say lately about his satellites, and that they **WILL NOT** cause any problem for astronomers!!!!

What do you think?

Weigh in here:

<https://twitter.com/elonmusk>

and on the BRAS General Forum Topic:

Space Debris

and Elon Musk's Satellites

<http://www.braastro.org/phpBB3/viewtopic.php?f=7&t=3001>





Observing Notes: June

by John Nagle

Boötes – the Herdsman, or Plowman

Position: RA 15, Dec. +30°

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

Named Stars

Arcturus (Alpha Boo), (16 Boo), from the Greek “Arktouros” meaning “The Bear Keeper” or “The Bear Guardian”, “Al Simāk al Rāmib” “The lofty Lance Bearer”, mag. -0.05, 14 15 40.35 +19 11 14.2, is the 4th brightest star in the night sky, and is also the brightest star north of the celestial equator. Sometimes called “Job’s Star”, it is an orange giant star described as a golden yellow or topaz color. It has exhausted its core supply of hydrogen. Also known as **HD124897**, and **HIP 69673**.

Nekkar (Beta Boo), (42 Boo), comes from the Arabic phrase for “ox-driver”, sometimes called “Meres”, mag. 3.44, 15 01 56.79 +40 23 26.3, is a yellow giant flare star which has expanded and cooled off the main sequence, and has most likely has lived most of its stellar life as a blue-white B-type main sequence star. Also known as **HD 133288**, and **HIP 73555**.

Seginus (Gamma Boo), (27 Boo), from the medieval Latin translation by Thequius of the Arabic title of the Greek “Boötes”, mag. 3.04, 14 32 04.78 +38 18 28.4, is a white giant star and a *Delta Scuti* type variable star ranging in magnitude from 3.02 to 3.07 every 7 hours. It forms an optical double star with **β 616**, and has a companion at a separation of 2.5 au. Also known as **HD 127762**, and **HIP 71075**.

Princeps (Delta Boo), (49 Boo), (Σ 27), mag. 3.46, 15 15 30.10 +33 18 54.4, has a 7th magnitude main sequence companion at a 105” separation, or at 4560 au. Also known as **HD 135772**, and **HIP 74666**.

Izar (Epsilon Boo), (36 Boo), (Σ1877), from the Arabic word for “girdle” or “loin cloth”, also called “Mirak” (the loins) in Arabic, “Mizar”, and also named “Pulcherrima” from the Latin meaning “the loveliest” by the elder Struve, mag. 2.35, 14 44 59.25 +27 04 27.0, is an orange giant star and a binary star with a fainter main sequence blue-white star of magnitude 4.80, 14 44 59.25 +27 04 27.0, with a separation of 3”. Also known as **HD 129989**, and **HIP 72105**.

Muphrid (Eta Boo), (8 Boo), “Al Mufridal Ramib”, derived from the Arabic phrase for “isolated, single one” (of the lance bearer), also called “Saak” (shinbone), mag. 2.68, 13 54 41.12 +18 23 54.9, is a pale yellow star and a spectroscopic binary star with a period of 494 days. It has a significant excess of elements heavier than hydrogen. Also known as **HD 129989**.

Asellus Primus (Theta Boo), (23 Boo), mag. 4.04, 14 25 12.02 +51 51 06.2. Also known as **HD 126660**, and **HIP70497**.

Asellus Secundus (Iota Boo), (21 Boo), mag. 4.75, 14 16 10.07 +51 22 01.3, is a binary star in a triple star system. The primary star is at magnitude 4.8, the secondary star at magnitude 7.5, and the tertiary star is at magnitude 12.6. Primary and secondary stars are separated by 0.8”; and the primary and tertiary are separated by 38”. Also known as **HD 125161**, and **HIP 69713**.



Asellus Tertius (Kappa Boo), (17 Boo), “the third donkey (ass)”, is a visual binary star. **Kappa² Boo**, mag. 4.53, 14 13 28.95 +51 47 24.0, is a pale white star; **Kappa¹ Boo**, mag. 6.62, 14 13 27.75 +51 47 16.4, is a dwarf star and a spectroscopic binary star. Separation between **Kappa¹** and **Kappa²** is 13.4”. Also known as **HD 124674/5**, and **HIP 69481**.

Xuángē (Lambda Boo), (19 Boo), mag. 4.16, 14 16 23.18 +46 05 16.5, is a metal-poor dwarf star. Also known as **HD 125162**, and **HIP 69732**.

Alkalurops (Mu Boo), from the Greek “kalaurops”, which means “the shepherd’s staff” is a triple star system. **Mu¹ Boo, (51 Boo), “Inkalunis”**, mag. 4.31, 15 24 29.54, (**HD 137391, HIP 75411, Σ 1938**), is a flushed white colored dwarf double star. **Mu² Boo, (17 Boo), “Clava”**, mag. 6.5, 15 24 30.97 +37 20 49.5, (**HD 137392, HIP 75415**), is a greenish-white dwarf star, and its companion star, “**Venabulun**”, mag. 7.6, also a greenish-white dwarf star. Separation between **Mu¹** and **Mu²** is 109.1”, And the separation between **Mu²** and its companion is 2” with a period of 260 years.

Alazal (Pi Boo), (29 Boo), is a binary star in a triple star system. **Pi¹ Boo**, mag. 4.49, 14 40 43.58 +16 25 05.9, (also called **HD 129174, HIP 71762**), **Pi² Boo**, mag. 5.88, 14 40 43.90 +16 25 04.0, also called **HD 129175**. Both stars are dwarf stars, with **Pi¹ Boo** being a mercury-manganese star. The separation between **Pi¹** and its companion is 500 au with a period of 5000 years. The separation of **Pi²** from **Pi¹** is 128” (12,000 au) with a period of about 5 million years.

Nadlat (Psi Boo), (43 Boo), mag. 4.52, 15 04 26.86 +26 56 51.6, is an orange giant star. Also called **HD 133582, HIP 783245**, and **Σ 1888**.

Merga (h Boo), (38 Boo), from the Arabic phrase meaning “the chained woman”, mag. 5.78, 14 49 18.68 +46 06 59.0, also called **HD 130945**, and **HIP 72487**.

Deep Sky:

NGC 5856, mag. 6.0, 15 07.3 +18 27, is a star and is also called **Herschel 4-71**.

NGC 5466, mag. 9.1, 14 05.5 +28 32, 9.2’ in size, is a large cluster with a low concentration of stars and is believed to be the source of a star stream called the “**45 Degree Tidal Stream**”. **NGC 5466** is notable because it contains a blue horizontal branch of stars, and is as metal poor as regular globular clusters with an age of 12 to 13 billion years. Also known as **Mel 124, Herschel 4-9, GCL 27**, and **C1403+287**.

NGC 5248, mag. 10-10.3, 13 37 32.0 +08 53 07, 6.2’x4.5’ in size, is a bright, large, and elongated galaxy; extremely bright nucleus with many dark lanes; has two long symmetrical arms, and has an absorption lane just south of the nucleus. Located 8.5° southeast of **Epsilon Virginis**. Also known as **Caldwell 45, UGC 8616, MCG+02-35-015, ALFALFA3-552**, and **Herschel 1-34**.

Boötes Void, “The Great Void”, “the Supervoid”, 14 20 +26 00, is a sphere shaped region in the sky, almost 250 million light years in diameter, containing few galaxies. It is now actually considered to be more of a localized “under-density” – since 1977 at least 60 galaxies have been discovered in it.

Hercules-Corona Borealis Great Wall, the largest structure in the universe, covers a significant part of **Boötes**.

Asterism – The Kite, the Ice Cream Cone – consists of six stars: **Alpha, Beta, Gamma, Delta, Epsilon**, and **Rho Boötis**.

Asterism – Al Dhi’bah, The Female Wolves (or Hyenas), form a trapezium shape consisting of **Beta, Gamma, Delta**, and **Mu Boötis**.

Asterism – Al Aulāda’ al Dhi’bah, The Whelps of the Hyenas, consisting of **Theta, Iota, Kappa**, and **Lambda Boötis**.

Asterism – Picot 1 (Napoleon’s Hat), 14 15 01 +18 30 46, consisted of 7 stars in a pattern like Napoleon’s hat. Located south of **Arcturus**.

Beyond Magnitude 10 items of interest:

NGC 5529, “X-Rated Galaxy”, mag. 11.9, 14 15.6 +36 14, 6.0’x0.7’ in size, is a quite faint and pretty large galaxy; bright nucleus; almost exactly edgewise.

UGC 9618A, Exclamation Point Galaxy, mag.14.3, 14 57 47 +24 31 22, interacting galaxies.

Boötes Dwarf Galaxies (Dwarf Spherical Galaxies):

Boötes I, mag. 12.8, 14 00 06 +14 30 00, 26' in size, located 6° southwest of **Arcturus**.

Boötes II, mag. 15.4, 13 58 00 +12 51 00, 8' in size, located 3.6° southeast of **Upsilon Boötis**.

Boötes III, mag. 12.6, 13 57 12 +26 48 00, 60'x90' in size, has a double lobe extending 1.5°, Located 8.7° north-northwest of **Arcturus**.

Cloverleaf Quasar – mag. 17.0, 14 15 46.3 +11 29 43, is a gravitationally lensed quasar with all four lobes being magnitude 17.

Beyond Magnitude 10 are the following objects:

263 NGC; 229 UGC; 133 IC; 260 MCG; 88 CGCG; 15 Quasars; 8 Radio Galaxies; 18 Arp Peculiar galaxies; 4 HCG; 4 Shk; 3 PGC; 2 PG; 1 PKS; 3 Mrk; 1 IRAS; 1 NPM 16; 107 Herschel; 1 AGC; 48 VV, 9 Ring Galaxies; 11 Galaxy trios and Triple systems; 9 Flat Galaxies; 5 Variable Galaxies; and 13 Rose Galaxies.

Other Stars:

Tau Boo (4 Boo), mag. 4.50, 13 47 16.04 +17 27 24.4, is a yellow-white dwarf star with one planet in orbit (**Tau Boötis b**) at a distance of 0.046 au, an orbital period of 3.31 days, and a mass of 5.95

Jupiter's, making it a hot **Jupiter** and tidally locked. There is carbon monoxide in its atmosphere. **Tau Boötis** has a companion, **GJ527B**, a dim red dwarf star, orbiting at a distance of 240 au. **Tau Boötis** is also known as **HD 120136**, and **HIP 67275**.

Xi Boo (37 Boo), mag. 4.54, 14 51 23.28 +19 06 02.3, is a quadruple star system. The primary star is a yellow dwarf star. The secondary is an orange star, mag. 6.8, and has a separation of 57" and an orbital period of 150 years from the primary star. The tertiary star is at mag. 12.6, and the quaternary star is at mag. 13.6. **Xi Boötis** is also known as **HD 131156**, **HIP 72659**, and **Σ 1888**.

HD 125351 (A Boo), mag. 4.80, 14 17 59.82 +35 30 34.1, is a spectroscopic binary star. Also known as **HIP 69879**.

44 Boo (i Boo), mag. 4.83, 15 03 47.68 +47 39 14.5, is a triple star system. Components **A** and **B** have an extremely elongated orbit, with apparent separations that can be as great as 5", or dwindle to as little as 0.23", with a period thought to be about 210 years. The two main components have a projected separation of 48.5 au. Component **B**, a variable star at mag. 6.1, shares outer envelopes with a spectroscopic companion (component **C**) that provides periodic eclipses (about every three hours). The stars (components **B** and **C**) are separated by only 0.008 au (about 1.2 million km). **44 Boötis** is also known as **HD 133640**, and **HIP 73695**.

24 Boo (g Boo), mag. 5.58, 14 28 38.09 +49 50 41.9, has one planet in orbit. Also known as **HD 127243**, and **HIP 70791**.

HD 122563, mag. 6.16, 14 02 31.98 +09 41 10.6, is an extremely metal poor giant star. Also known as **HIP 68594**.

HD 141399, mag. 7.2, 15 46 54.0 +46 59 11.0, has four planets in orbit. Also known as **HIP 77301**.

HD 128311, mag. 7.48, 14 36 00.58 +09 44 47.5, has two planets in orbit, b at 1.099 au separation and a 448.6 day period, and c at 1.76 au separation with a period of 919 days. Also known as **HIP 71395**.

HD 122562, mag. 7.69, 14 02 21.0 +20 52 53, has one planet in orbit. Also known as **HIP 68578**.

HD 136418, mag. 7.88, 15 19 06.1 +41 43 59.5, has one planet in orbit at a separation of 1.32 au, and a period of 464.3 days. Also known as **HIP 74961**.

HD 131496, mag. 7.98, 14 53 23 +18 14 07, has one planet in orbit at 2.09 au, and has a period of 883 days. Also known as **HIP 72845**.

HD 125390, mag. 8.2, 14 18 09.3 +38 58 01, has one planet in orbit. Also known as **HIP 69888**.

HD 134113, mag. 8.26, 15 07 47 +08 52 47, has one planet in orbit. Also known as **HIP 74033**.

HD 132406, mag. 8.45, 14 56 54.65 +53 22 55.8, has one planet in orbit at a separation of 1.98 au, and a period of 974 days. Also known as **HIP 73146**.

HD 132563B, mag. 9.47, 14 58 21 +44 02 38, is part of a triple star system, and has one planet in orbit (**HD 132563Bb**) at a separation of 2.6 au, and a period of 1544 days. The other member of the star

system is a spectroscopic binary at 400 au.

WASP-14, mag. 9.75, 14 33 06.3549 +21 53 40.978, has a transiting planet in orbit. The star has a very high proportion of Lithium.

Of Interest Beyond Magnitude 10:

HAT-P-4 (BD+36°2593), mag. 11.2, 15 19 57.93 +36 13 46.8, has a transiting planet.

WASP-113, mag. 11.8, 14 59 29 +46 57 36, has a transiting planet.

HAT-P-44, mag. 13.21, 14 12 35 +47 00 53, has two transiting planets.

Other Stars Beyond magnitude 10 Are As Follows:

Σ – 51 stars; $O\Sigma$ – 14; $O\Sigma\Sigma$ – 1; Double Stars – 80; Multiple Stars – 4; Variable Stars – 14; Ku - 2; h – 2; S – 1; Ho – 4; β – 6; Herschel – 1; and A – 21.

Sky Happenings: June, 2019

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



- June 1st** - Dawn: Look to the east-northeast before sunrise to see the thin sliver of the waning crescent **Moon** 6° to the right of **Venus**,
The **Moon** passes 3° south of **Venus** at 1 PM CDT.
- June 2nd** - The waning crescent **Moon** is 4° from **Venus**, low in the morning twilight,
Asteroid **Pallas** is stationary at 9 PM CDT.
- June 3rd** - **New Moon** occurs at 5:02 AM CDT.
- June 4th** - The **Moon** passes 4° south of **Mercury** at 11 AM CDT,
Dusk: As twilight deepens the **Moon**, one day past new, sets in the west-northwest with
Mercury 6° to its right. You can also find **Mars** to the upper left of the **Moon**, deep in
Gemini,
A double shadow transit on **Jupiter** starts with **Ganymede** and then **Europa** at about 6:35
PM CDT, ending at about 9:50 PM CDT.
- June 5th** - The **Moon** passes 1.6° south of **Mars** at 10 AM CDT,
Dusk: A thicker waxing lunar crescent, **Mars**, and tiny **Mercury** are all in **Gemini** and form a
line 17° long before sunset.
- June 6th** - Evening: The **Moon** is in **Cancer**. The **Beehive Cluster (M44)** is some 4° from the fattening
crescent **Moon**.
- June 7th** - The **Moon** is in the **Beehive Cluster (M44)** at around 2 AM CDT,
The **Moon** is at perigee (228,978 miles or 368,504 km from **Earth**) at 6:15 PM CDT.
- June 10th** - **First Quarter Moon** occurs at 12:59 AM CDT,
Jupiter is at opposition at 10 AM CDT,
All Night: **Jupiter** will be showing its biggest and brightest for the year.
- June 11th** - A double shadow transit of **Jupiter** by **Io** and **Ganymede** will start at around 9:22 PM CDT,
extending until 12:40 AM CDT on the 12th of June.
- June 15th** - The **Moon** passes 0.9° north of dwarf planet **Ceres** at 10 AM CDT,
The waxing gibbous **Moon**, **Jupiter**, and **Antares** form a triangle in the southeast shortly
after sunset.
- June 16th** - The **Moon** passes 2° north of **Jupiter** at 2 PM CDT,
The nearly full **Moon** is less than 4° from **Jupiter**, rising at sunset,
The almost full **Moon**, **Jupiter**, and **Antares** are arranged in a shallow arc some 14° from tip-
to-tip, setting in the southwest at dawn.
- June 17th** - **Full Moon** occurs at 3:31 AM CDT,
Venus passes 5° north of **Aldebaran** at 4 PM CDT.
- June 17th/18th** - Dusk: Look toward the west-northwest after sunset where **Mercury** and **Mars** will be ½°
apart. The two planets are less than 2° apart from each other from June 15th through June 20th.
- June 18th** - **Mercury** passes 0.2° north of **Mars** in the evening twilight,
A double shadow transit of **Jupiter** by **Io** and **Ganymede** starts at 11:06 PM CDT,
The **Moon** passes 0.4° south of **Saturn** at 12 midnight CDT.

- June 19th** - A double shadow transit of Jupiter by Io and Ganymede ends at 4:53 AM CDT, The **Moon** passes 0.07° south of **Pluto** at 6 AM CDT.
- June 21st** - **Mercury** passes 6° south of **Pollux** at 12 AM CDT, **Summer Solstice** occurs at 10:54 AM CDT – the official start of **Summer**, **Neptune** is stationary at 11 PM CDT.
- June 23rd** - **Mars** passes 6° south of **Pollux** at 2 AM CDT, The **Moon** is at apogee (251,375 miles or 404,540 km from **Earth**) at 2:50 AM CDT, **Mercury** is at greatest eastern elongation (25°) from the **Sun** at 6 PM CDT.
- June 25th** - **Last Quarter Moon** occurs at 4:46 AM CDT.
- June 27th** - The **Moon** passes 5° south of **Uranus** at 5 PM CDT.
- June 30th** - Dawn: **Taurus** rises in the east shortly before sunrise, cradling the **Moon** in the **Hyades**, directly below the **Pleiades**. Aldebaran will be some 3° from the waxing lunar crescent.

Planets:

Mercury – **Mercury**, on the 1st of June, will shine at magnitude -1.0, and appears 6° high in the west-northwest a half hour after sunset, but sets about 65 minutes after the **Sun**. **Mercury** will fade to magnitude +0.1 by June 17th, when it appears just ¼° from **Mars**. On June 4th, a two day old crescent **Moon** will be 6° to the left of the planet, with both standing some 9° high 30 minutes after sundown. On the following evening, a fatter crescent **Moon** appears 6° to the upper left of the planet. On the evening of the 18th, **Mercury** and **Mars** will stand just 18' apart, with **Mercury** above **Mars** (**Mercury** shows a diameter of 7.4", and is half-lit). On the 19th, the planets are separated by ¾°. On the 20th, **Mercury** will be 6° to the lower left of **Pollux**. The planet will reach greatest eastern elongation (25°) from the **Sun** on the 23rd, appearing 11° high ½ hour after sunset. **Mercury** will then sink closer to the horizon, ending the month 3.8° to the left of **Mars**.

Venus – **Venus** will rise an hour before the **Sun** on June 1st in the company of a slender crescent **Moon**. The two will stand about 6° apart and a similar distance above the eastern horizon a half-hour before sunrise. **Venus** shines at magnitude -3.8, but the **Sun**'s glare will drown it out within the next 15 minutes. On the 18th, **Aldebaran** will be about 5° to the lower right of the magnitude -3.8 planet. It will stand just 3° high a half-hour before sunup on June 30th, heading toward its mid-August superior conjunction, and will disappear from view in early July.

Mars – **Mars** will remain at magnitude 1.8 all month, but the interval between sunset and **Mars**-set will shrink from about 2¼ hours to 1¼ hours during June. On June 17th, **Mercury** will be just ¼° from **Mars**. **Mars** will appear to be only 3.7" across. On the 22nd, the planet will be about 6° to the lower left of **Pollux**. Near month's end, **Mars** will move into a nearly horizontal line with **Mercury**, **Pollux**, and **Castor**.

Jupiter – **Jupiter** rises in the southeast, reaching opposition on June 10th, shining at its brightest for the year at magnitude -2.6. Throughout the month, will stay at magnitude -2.6, and its globe will measure 46" wide. **Jupiter** will peak at an altitude of about 30° at 1 AM local daylight time on the night of opposition. The planet spends June in **Ophiuchus** retrograding just above the body of **Scorpius**. The separation of the planet and **Antares** will shrink from about 12° to less than 9° during the month. On June 11th, **Io** and **Ganymede** will transit **Jupiter**, with their shadows falling almost directly beneath the moons. **Io** begins its transit at 9:22 PM CDT, and within 5 minutes you should notice its shadow immediately to the moon's east, with the two overlapping. **Ganymede** lies north of **Io** and begins its transit at 10:28 PM CDT. **Io** completes its transit at 11:33 PM CDT, with **Ganymede** completing its transit around 12:40 AM CDT on the 12th. There are two more double shadow transits, on June 4th and on the 18th. For a complete listing of all of **Jupiter**'s moon phenomena, see the June issue of *Sky and Telescope* page 51, or the *RASC 2019 Observer's Handbook, USA Edition*, pages 233 and 234.

Saturn – **Saturn**, lying 30° east of **Jupiter** – meaning it trails about two hours behind – will rise about 2½ hours after sunset (around 10 PM local daylight time) at the beginning of the month, but very early in the evening twilight as the month closes. The planet's magnitude will vary from +0.3 to +0.1 during June. The planet lies in northern **Sagittarius**, just south of the **Teaspoon Asterism**. **Saturn**'s disk measures 18" across while the rings span 41" and tilt 24° from our line of sight. **Titan**, the planet's largest moon, shines at 8th magnitude, orbiting the planet in 16 days, passing south of the planet on the mornings of the 5th and 21st, and north of the planet on the 13th and 29th. The three 10th magnitude moons – **Tethys**, **Dione**, and **Rhea** –

are closer to the planet than **Titan**. **Saturn** will arrive at opposition on July 9th.

Uranus – **Uranus** slowly emerges into a dark sky by the end of June. On the 30th, it rises around 2 AM local daylight time, and climbs 15° high in the east by the time twilight starts. The planet shines at magnitude 5.8 as it lies in southern **Aries**, about 10° south of **Alpha Arietis** (magnitude 2.0 **Hamal**). To observe, first locate 6th magnitude **19 Ari**, which lies 8° south of **Hamal**. Center **19 Ari** in your binoculars and you will see **Uranus** 2.4° to its south. With a telescope, the planet will show a 3.5" diameter disk with a distinctive blue-green color.

Neptune – **Neptune** rises shortly after 1 AM local daylight time on June 15th, and climbs 25° above the southeast horizon by the time twilight begins. The planet glows at magnitude 7.9, and binoculars or telescope is needed to see it. **Neptune** resides in northeast **Aquarius**, in the same binocular field as magnitude 4.2 **Phi Aquarii**. **Neptune** begins June 1.2° east-northeast of this star and crawls 0.1° farther away by the latter half of the month, placing it within 0.4° south of the magnitude 5.6 star **96 Aqr**. Viewed through a telescope, the planet displays a blue-grey disk that appears 2.3" across. The planet reaches stationary point on the 22nd, and its slow, subtle retrograde loop will require over 5 months to complete.

Pluto – **Pluto** will be located, by my estimates, on June 10th at RA 19 37 20, Dec. -21 50. On the 15th, at RA 19 36.6, Dec. -21 58 (or about 4.2° southwest of **Rho¹ Sgr**, or 25°, or due north of **52 Sgr**, almost on the ecliptic).

Sun – The **Sun** arrives at the June solstice at 11:54 AM CDT on June 21st, making it the longest day of the year in **North America**, marking the official start of **Summer** in the **Northern Hemisphere**, and the start of **Winter** in the **Southern Hemisphere**.

Moon – The **Moon** is a slender, waxing crescent some 6° to the upper left of **Mars** at nightfall on June 5th, and at the end of a long arc with **Castor** and **Pollux** the next night. A thicker lunar crescent hangs less than 4° above **Regulus** on the evening of the 8th. A heavy gibbous **Moon** forms a fairly large equilateral triangle with **Jupiter** and **Antares** on the evening of the 15th. The next night, the **Moon** is closer to **Jupiter**'s left or lower left. Late in the evening of the 18th, the night after full **Moon**, the round lunar orb is less than 2° below **Saturn**. On the last day of the month, the waning lunar crescent is in the **Hyades**. Favorable Librations are as follows: On June 11th – **Neumayer Crater**; June 17th – **Abel Crater**; June 27th – **Repsold Crater**; and June 30th – **Ulugh Beigh Crater**.

Asteroids – Asteroid **2 Pallas**, at 9th magnitude in June, lies high in the south after darkness falls. To find, first locate **Arcturus**, an orange giant star at magnitude -0.04 in **Boötes** (the 4th brightest star in the night sky). Next, move 6.4° to the northwest to 5th magnitude **6 Boötis**, then another 2.4° northwest to 6th magnitude **2 Boötis**. From there, cross the border into eastern **Coma Berenices** and star hop to **Pallas**'s position as described below, *by my estimates*: On June 1st – about 3.2° northwest of **2 Boo**; on the 6th – just over 3° northwest of **2 Boo**; on the 11th – about 2¾° west-northwest of **2 Boo**; on the 16th – about 1½° west and slightly north of **2 Boo**; on the 21st – about 2° due west of **2 Boo**; on the 26th – about 1.6° west-southwest of **2 Boo**; and on July 1st – about 1½° southwest of **2 Boo** or just under 3° due west of **6 Boo**.

Comets – Comet **ASASSN (C/2018N2)** will need a moon free period at the end of June to observe. The magnitude 12+ comet resides in northeast **Cetus**, and rises about an hour before morning twilight commences. Look for the faint smudge of light as it glides northward between magnitude 4.9 **Nu Ceti** and magnitude 4.3 **Xi² Ceti**. The comet's positions, *by my estimates*, are as follows: On June 15th – about 2½° west and a little south of **Nu Ceti**; on the 18th – about 2° due west of **Nu Ceti**; on the 21st – about 1.2° west-northwest of **Nu Ceti**; on the 24th – almost 1.2° northwest of **Nu Ceti** or 1.2° south and a little east of **Xi² Ceti**; on the 27th – not quite 1° southeast of **Xi² Ceti**; and on the 30th – about 0.9° east and just slightly south of **Xi² Ceti**.

A harder target lies on the border of **Centaurus** and **Lupus** in early June. Comet **ATLAS (C/2017M4)** will pass between magnitude 2.7 **Beta Lupi** and magnitude 3.1 **Kappa Centauri** during the first week of June. The comet, at 13th magnitude, will need a 12" or larger instrument to be observed.

Meteor Showers – There are no major meteor showers during June, but there are 7 meteor showers associated with **Boötes**. They are as follows: The **Quadrantids** – The most prolific annual meteor shower with

its radiant located in northern **Boötes** near **Kappa Boötes**. These meteors are dim, but have a peak visible hourly rate of approximately 100 per hour on January 3rd/4th. Its zenith hourly rate is approximately 130 per hour at their peak. Meteors from this shower often appear to have a blue tint; The **Alpha Boötids** – They begin on April 14th, peaking on April 27th/28th, and end on May 12th; The **June Boötids** – Also known as the **Iota Draconids**. Starts on June 27th and runs until July 5th, with a peak on the night of June 28th. Typically only 1 or 2 dim, very slow meteors are visible per hour, with the average meteor at a 5.0 magnitude.; The **Beta Boötids** – They are a weak shower beginning on January 5th, peaking on January 16th, and ending on January 18th; The **Lambda Boötids** – are another weak shower; The **Phi Boötids** – Another weak shower beginning on April 16th, peaking on April 30th/May 1st (with an hourly rate of up to 6 per hour), and ends on May 12th; The **Rho Boötids** – A minor shower peaking in November and lasts only 3 days; and the hypothesized **Gamma** and **Nu Boötids**.

When to View the Planets:

Evening Sky

Mercury (northwest)
Mars (northwest)
Jupiter (southeast)

Midnight

Jupiter (south)
Saturn (southeast)

Morning Sky

Venus (northeast)
Jupiter (southwest)
Saturn (southwest)
Uranus (east)
Neptune (southeast)

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**DARK SKY VIEWING - PRIMARY ON JUNE 1<sup>ST</sup>, SECONDARY ON JUNE 29<sup>TH</sup>**  
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Boötes – The Herdsman

Boötes is traditionally depicted as a herdsman with two hunting dogs on a leash and a club in his other hand. The two dogs, Asterion and Chara, are represented by the constellation Canes Venatici, the Hunting Dogs.

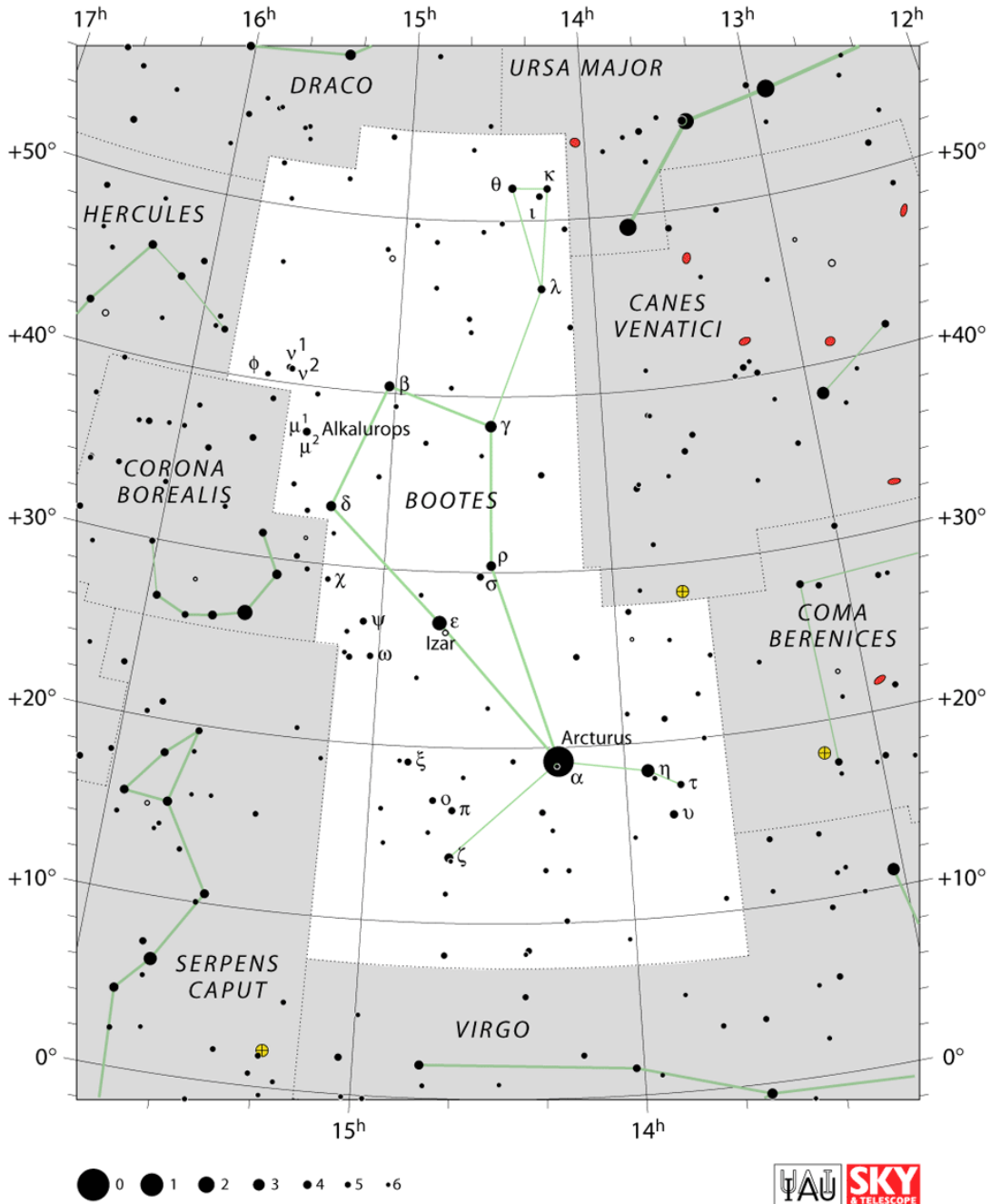
Most commonly, Boötes is taken to represent Arcas, son of Zeus and Callisto, daughter of the Arcadian King Lycaon. Arcas was brought up by his grandfather, the King, who one day decided to test Zeus by serving him his own son for a meal. Zeus, however, saw through Lycaon’s intensions, and transformed the cruel king into a wolf, killed all of his sons with thunderbolts, and brought Arcas back to life.

Zeus’s wife Hera, having heard of her husband’s infidelity, transformed Callisto into a bear. Callisto roamed the woods until, years later, she met her son, who was now grown up. Arcas did not recognize his mother and began to chase her. Callisto hid herself in a temple, where he could not hurt her without risking being convicted to death for defiling a sacred place. To avoid a tragedy, Zeus placed both of them in the sky; Callisto as Ursa Major, and Arcos as Boötes.

A second legend identifies Boötes with Icarus (not to be confused with Icarus, son of Daedulus). According to this tale, the god Dionysus taught Icarus how to cultivate vines and

make wine. When Icarus offered some of his new vintage to shepherds, they became so intoxicated that their friends thought they had been poisoned, and in revenge they killed Icarus. Icarus's dog, Maera fled home howling, and led Icarus's daughter Erigon to where his body lay beneath a tree. In despair, Erigon hanged herself from the tree; even as the dog died, either of grief or by drowning itself. Zeus put Icarus in the sky as Bo²tes, his daughter Erigon became the constellation Virgo, and the dog became Canis Minor or Canis Major (according to different authorities).

In another myth, Boötes is credited for inventing the plough, which prompted the goddess Ceres to place him in the heavens.



The End

