Newsletter of the Baton Rouge Astronomical Society

Next Meeting: Monday, July 11th at 7PM at HRPO

(2nd Mondays, Highland Road Park Observatory)

What's In This Issue?

President's Message

Summer is now upon us – the heat, the storms, and the late nightfall that curtails some observing. If you, like me, have to get up in the wee small hours of the morning to go to your job (3:30 AM in my case), then the late hours of nightfall do most severely cut into any observing. To help us get through another summer, just think of cooler weather (no mosquitoes!), and earlier nightfall for observing! We plan to get our program of "Sidewalk Astronomy" going again this fall and winter. We have never had a lack of volunteers for this, and have even told some of the volunteers not to bring their telescopes for we already had enough for the venue. More information to follow, when it is all set up!

LIGO has announced receiving another gravity wave in December. One in September, one in December, at this rate LIGO should have received at least two or three more by now… all we can do is wait for the announcement(s). Speaking of gravity waves, the ESA LISA program (proving of the concept of a gravity wave observatory in space) has been successful. Plans are now being made to have a three-way observatory (three laser observatories) in a triangle pattern to measure a different frequency of gravity waves from those that LIGO measures. Also, the VIRGO Observatory (in Europe) will soon be online to enhance the LIGO observatories.

Anyone working on plans for next year's Total Eclipse of the Sun? I have been hearing a lot of rumors that all hotel/motel rooms in the path of totality are now reserved – no more are available. I have heard that some people are planning on a road-trip, what equipment they would take, and so forth. If anyone has plans and would like to share them, please contact me.

So far this year we have had good success in all of the BRAS and Observatory's major outreach events. We have had enough volunteers and large attendance. We are still in need of someone to volunteer to be the Outreach Chairperson. Duties would mainly be to receive outreach requests, and arrange for volunteers for the event. Event attendance is not required! Anyone interested please let the temporary Chairperson, Ben Toman, know.

We also still need a Chairperson for the Light Pollution Committee. Most duties would be to run the committee meeting (held ¾ hour before the monthly BRAS meeting), and co-ordinate members of the committee attending other meetings – a form of outreach. If you are interested, contact me. Please note, all members of BRAS are invited to attend the Light Pollution Committee meetings!

Clear Skies,

John R. Nagle

BRAS President
Observing Chairperson

P.S. The 3 posters lent to BRAS by the IDA for display during our International Astronomy Day event were successfully returned. We did have to pay return postage.

Secretary's Summary from June BRAS Meeting

-Meeting started. John Nagle (President) presiding;

-John mentioned new information from RASC on light pollution and what can be expected in the future. He also mentioned our need for more active volunteers to assist with our outreach requests.

-Dr. Brad Schaefer was introduced as our guest speaker for the meeting. He presented an update on previous topics which included LIGO, Tabby's Star and his idea for a mass participation in an imaging experiment during the 2017 solar eclipse.

-The Kickstarter campaign begun by Tabby Boyajian regarding observation of Tabby's Star was brought up and the club decided it should be announced via email to the whole membership for their consideration.

-Ben Toman gave a brief summary of recently passed outreach events and mentioned some that were upcoming.

-Several items were offered up from the BRAS closet that have little or no value to the club in hopes someone may have a use for them before they are discarded to make room.

-Meeting ended

Like I said, I'm not as good as Roz, but I get most of the important stuff :)

Clear Skies

Ben Toman

BRAS Secretary,
(Interim Outreach Coordinator)

This space is reserved for the new **Light Pollution Committee Report**

From the President's Message: ***"We still need a Chairperson for the Light Pollution Committee. Most duties would be to run the committee meeting (held ¾ hour before the monthly BRAS meeting), and co-ordinate members of the committee attending other meetings – a form of outreach."***

Meanwhile, Michele Fry (editor) asks you to please watch this incredible Starry Night painting video**.** She says it is ***"guaranteed to blow your starry mind!"*** https://youtu.be/4dKy7HNU4vk

BRAS Outreach Report

Greetings Everyone,

Please take a look at the following list of requests. As you can see, we are in demand and we could use as many members as possible to help out so we can have a chance of meeting all of these requests. Remember, educational outreach is one of the reasons our club exists and is the reason we enjoy 501(c)3 status.

- **Library:** There are appearances at several local library branches this summer (dates same as shown last month). Chris Kersey has been doing these for a number of years and could always use a hand or two to help out. No experience necessary.

- **KidCamps:** July 18th-22nd, many will have seen signs around town for these outreach events. The camps have children from 3-13 years old and Mr. King is suggesting he will divide them into two 1-hour groups - one for the younger kids, and one for the older kids. As these are daytime events, the presentation will probably be some talking about the solar system, the HRPO and possibly solar observing. Again, Chris Kersey will be at all of these and will need additional help.

- As always, please let me know ASAP if you are willing and able to help out with any of these events.
  Don't keep quiet because you assume someone else is already doing it. Odds are we still need you!
  No experience is necessary!!
  Each of these outreaches is 2 hours or more so will count toward the A.L. Outreach certificate if you are going for that.

We still need an Outreach Coordinator!

Ben Toman,
Interim Outreach Coordinator

back

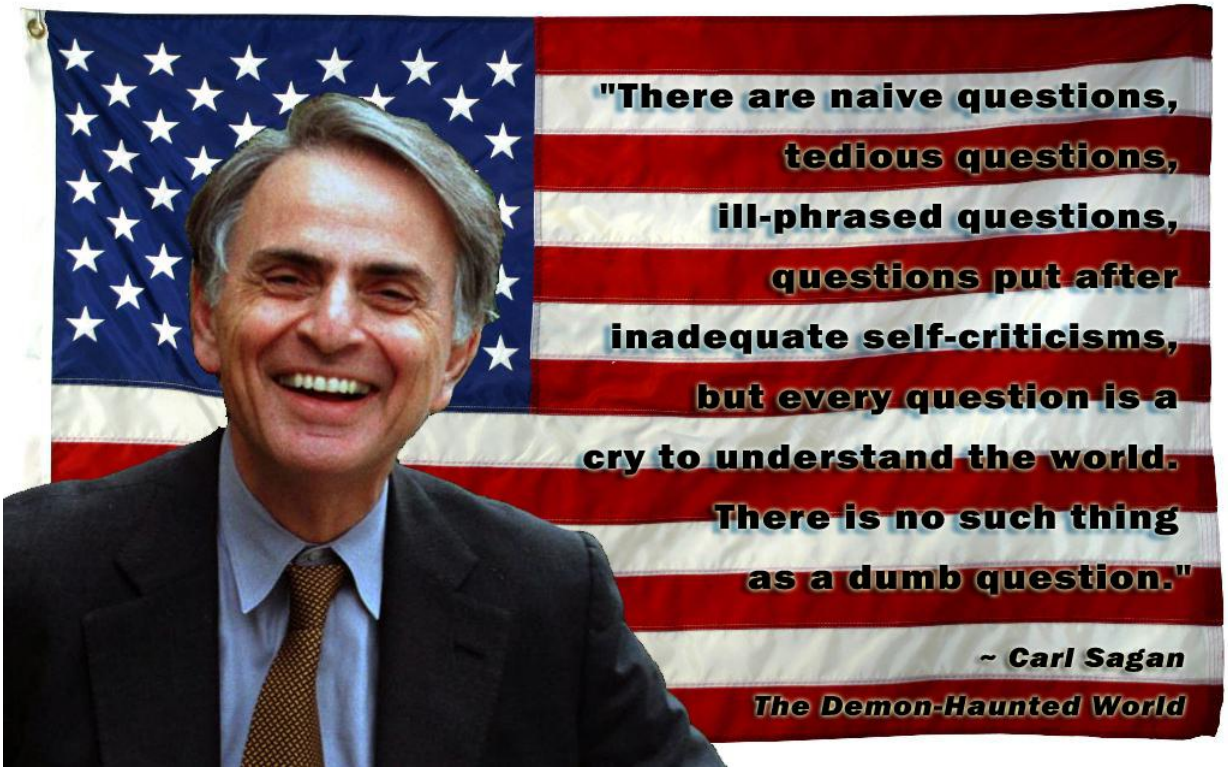
REMEMBER:
Educational Outreach
is one of the
reasons our club exists
and is the reason we enjoy 501(c)3 status.

LIST OF REQUESTS:

- **Tuesday, 5 July (2pm to 4pm),** Baker Community Library
- **Wednesday, 6 July (2pm to 4pm**), Fairwood Community Library
- **Thursday, 7 July (2pm to 4pm),** Zachary Community Library
- **Monday, 11 July (2pm to 4pm),** Scotlandville Community Library
- **Thursday, 14 July (2pm to 4pm),** Carver Community Library
- **Monday, 18 July (1pm to 3pm),** St. Margaret Episcopal Church
- **Wednesday, 20 July (10am to 12pm),** New Song United Methodist Church
- **Thursday, 21 July (1pm to 3pm),** First Baptist Church
- **Friday, 22 July (10am to 12pm),** Saint Paul Lutheran Church

back

Happy and Safe 4TH OF JULY to all our members and friends!



Recent Entries in the BRAS Forum

Below are selected recent additions. There are also nine active polls. The Forum has reached 4000 posts.

Louisiana-Born Astronaut Charged with Felony
New Mount for Celestron C8
BRAS Secretary Ben Toman Images Saturn, Mars and the Moon
NOAA Notes Diminished Milky Way for Many
Comments for TramLinkBR Accepted Until 7th
End of Night Discussion a Success
Kopra, Peake and Malenchenko Return to Earth
July Great Red Spot Viewing Times Generated for Baton Rouge
Michael Collins Gives National Air and Space Museum Talk
Moon and Spica Conjuncted on 14 June
Full Moon on Summer Solstice
Next HRPO Solar Viewing on 30 July

back

20/20 Vision Campaign

GLOBE at Night: until 6 July

2016 GOAL: 200 Measurements. CURRENT: 39

OBSERVATIONS NEEDED FOR SCHOOL PROJECT

BRAS is in the process of assisting a student at St. Joseph's Academy acquire raw data. She needs descriptions of views of five Messier objects—Pleiades, Orion Nebula, Andromeda Galaxy, Beehive Cluster, Whirlpool Galaxy—together with date and time, and the observing location's GaN measurement and quality of view. Parameters have been set defining whether each observation yields a poor, good or excellent view. An alert will also be sent out describing this exercise. The student needs very much this information with at least three sky views (different limiting magnitudes). The observation parameters for this project are as follows…

M45 [Pleiades] *Aperture: binocular. Magnification: 10x – 25x.*
Poor View: fifteen stars or fewer seen.
Good View: sixteen to twenty-nine stars seen.
Excellent View: thirty or more stars seen.

M44 [Beehive Cluster] *Aperture: 50mm – 70mm. Magnification: 10x – 25x.*
Poor View: indistinct blob seen.
Good View: at least ten distinct stars seen.
Excellent View: eleven or more distinct stars seen.

M31 [Andromeda Galaxy] *Aperture: at least 80mm. Magnification: 20x – 40x.*
Poor View: only core of the galaxy seen.
Good View: arms of the galaxy seen.
Excellent View: galaxy's companion (M32) seen.

M51 [Whirlpool Galaxy] *Aperture: at least 8". Magnification: 25x – 50x.*
Poor View: indistinct blob seen.
Good View: arms of the galaxy seen.
Excellent View: galaxy's companion (NGC 5195) seen.
M42 [Orion Nebula] *Aperture: at least 80mm. Magnification 60x – 100x.*
Poor View: only Trapezium (the four brightest stars) seen.
Good View: fifth star seen.
Excellent View: sixth star seen.
Observations should only be made when the Moon is below the horizon. Each observation should include the location's GLOBE at Night measurement or SQM measurement. Use all of these parameters to report your results to observatory@brec.org.

LASTEST SQM MEASUREMENT FROM HRPO

Between 9pm and 9:15pm on 4 April I took another triplet of SQMs at HRPO's back viewing pad. The readings were 18.75, 18.67 and 18.70. The mean was 18.71.

back

Messages from HRPO

The Highland Road Park Observatory will be closed on 8 July.

FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

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

15 July: "200—The Natural Sky Goal" The Baton Rouge Astronomical Society is spearheading an effort to top Louisiana's last-year record of 100+ GLOBE at Night measurements. How can you help?

22 July: "Apollo 15 45th Anniversary" BREC Center Supervisor Tom Northrop's Apollo history talks continue. This was the first lunar landing to use the Lunar Rover, allowing Mission Commander David Scott and Lunar Module Pilot James Irwin to explore more than twenty-seven kilometers of ground. Alfred Worden was the Command Module Pilot.

29 July: "LIGO—The Fantastic Success" After a second successful detection of a gravitational wave (a ripple in the fabric of space-time) Dr. Amber Stuver just couldn't resist coming back to share the better news. Who can blame her?

SCIENCE ACADEMY

Saturdays from 10am to 12pm
For ages eight to twelve. $5/$6 per child.

2 July: "Summer Day"
9 July: "Expedition 8"
16 July: "Juno"
23 July: "Saturn"
30 July: Expedition 9"

ONE-TIME CALLS FOR VOLUNTEERS

- **Monday 4 July, 7pm to 11pm.** *Two or three volunteers.* **A Juno Arrival at Jupiter.** Telescope operation, physical science demonstrations, refreshment table, prize redemption table. Easy to moderate difficulty.
- **Saturday 17 July, 7pm to 10pm.** *Two or three volunteers.* **A Evening Sky Viewing Plus.** Telescope operation, physical science demonstrations. Easy to moderate 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" to go around in preparation for ARRL Field Day. Finally, we would more than welcome any who can help for at least one or two hours anytime during Stargazers Camp. We are asking any BRAS volunteers with time to assist. Thank you.

Juno Arrival at Jupiter

Monday, 4 July from 7pm to 11pm

No admission fee. For all ages.

Drinks and refreshments. Binocular recommended.

Jupiter is the largest of the planets in our Solar System—over 1000 Earths could fit inside! Due to its enormous mass Jupiter greatly influenced the formation and evolution of our entire Solar System…planets, comets, asteroids.

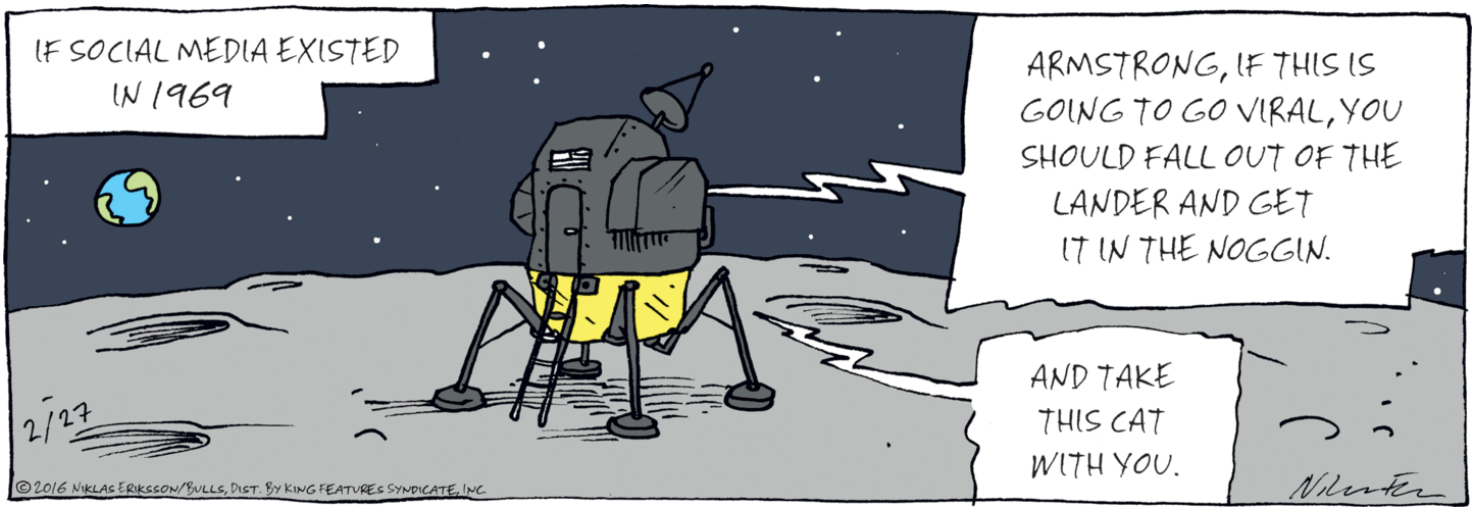
Juno arrives at Jupiter on Independence Day, and in doing so will set the record for the most distant solar-powered NASA spacecraft. Juno's titanium shield guards against the harsh Jovian radiation. Juno will orbit around Jupiter's poles every two weeks, coming at times no higher than 5000 kilometers above the beautiful and turbulent clouds.

When Juno gets to Jupiter it will be traveling over 265,000 kilometers per hour relative to Earth, breaking another record—fastest-moving human-made object in history!

Come join us as we celebrate the beginning of yet another great American space science mission. We'll watch live as NASA officials announce the confirmation of Juno's orbit insertion!

Also…
8:15 pm to 9:15 pm = Twilight Viewing of Jupiter
9:30 pm to 11:00pm = Viewing of Mars and Saturn

back



RECENT HRPO EVENTS - RESULTS -

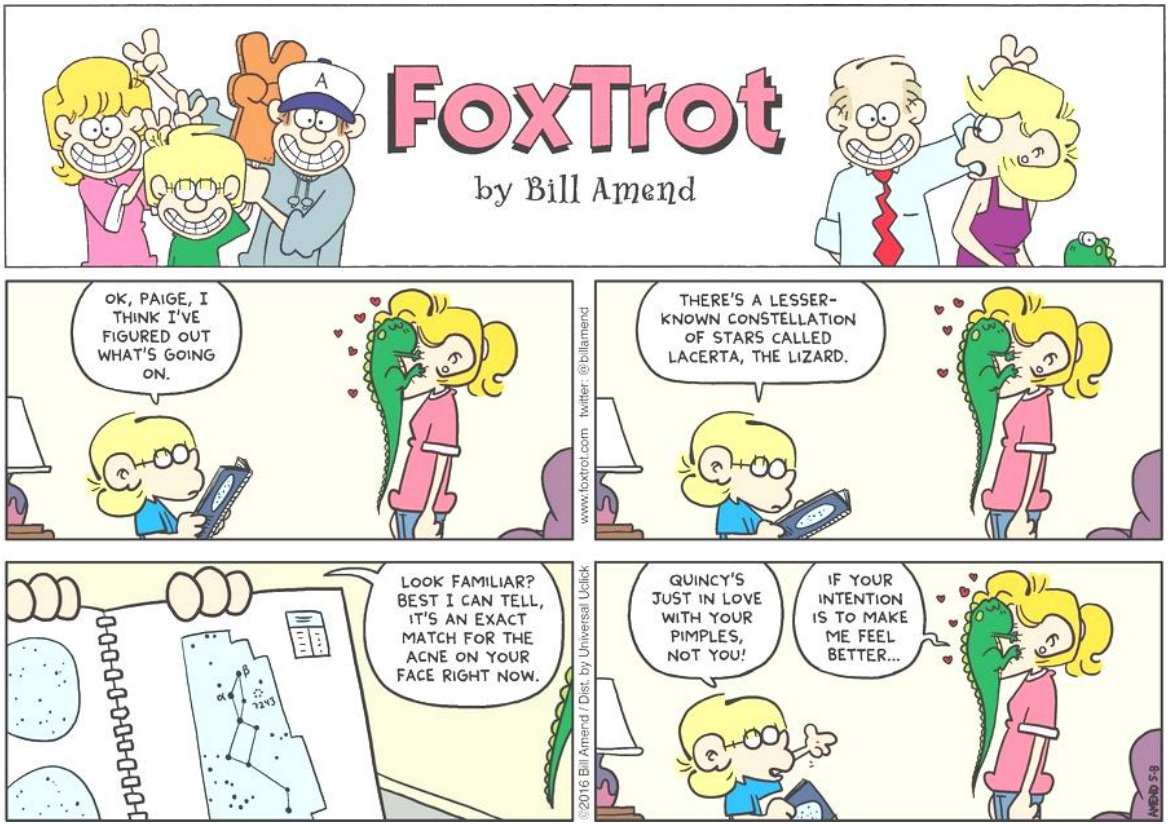
RESULTS OF AMERICAN RADIO RELAY LEAGUE FIELD DAY

This year's AARL Field Day was a huge success, with **134 licensed and non-licensed non-HRPO persons** using the property for the largest crowd in the ten-year history of the event. The sky stayed clear, allowing us to show the visitors Jupiter, Mars and Saturn.

Thanks to the Baton Rouge Amateur Radio Club for their incredibly hard work. There were several bonus points acquired with the GOTA station, and *a lot* of CW (Morse code) contacts. I'm proud to say that even though the 6-meter band was quite ornery this year, I made the first of a few phone (voice) contacts with that band—we heard the distant town of Denham Springs! I also made eighteen other phone contacts during the twenty-four hours including Ohio, North Carolina, Michigan, Pennsylvania, Utah, Kansas, Illinois, and Colorado.

Thanks to Jordan and Hayley for cranking open the 20OGS manually, operating a second telescope on the viewing pad and staffing the physical science demonstration table.

Thanks BRAS President John Nagle and BRAS member Roslyn Readinger for front desk assistance and demo table staffing. Thanks to Professor Greg Stacy for 20OGS operation.



PHOTOS FROM INTERNATIONAL ASTRONOMY DAY

(held on May 14, results reported in June issue). Here's a recap:

IAD was a huge success, with **1155 patrons** visiting during the eight hours--the largest crowd in the ten-year history of the event. The sky stayed clear almost the entire time, allowing us to show the visitors the Sun, the Moon and Jupiter.

Please mark your calendars now:

the next **International Astronomy Day** is **29 April 2017**, again from **3pm to 11pm**

BRAS member Barrow Leake (beige shirt and hat) uses his solar telescope to show patrons the Sun, as BRAS member Merrill Hess (blue shirt and suspenders) surveys the MARS Van activities.

*Celtic band **Kitchen Session** inaugurates the first **IAD** with a live band. BREC Center Supervisor Tom Northrop's daughter Rebekah is the harpist. (BRAS member Ashley Toman graced IAD with a solo harp presence several years ago)*

Above: *Amanda Kirkwood shows off her hobby of "firespinning" as awed patrons watch every move. Amanda is well-trained; individuals should not attempt this unless having undergone extensive training.*

Photos courtesy of HPRO. Captions by Chris.

Venusian Cadet Holden F. (blond hair, left of table) witnesses one of the many fun exhibitors. Holden earned his Cadet certificates during HRPO's Science Academy program.

Observing Notes: July

by John Nagle

Canes Venatici

Position: RA 12.76, Dec. +21.83°

Named Stars:

Cor Caroli (Alpha CVa), "Charles' Heart", mag. 2.89, 12 56 01.84 +38 19 05.7, is a wide double star with each component being spectroscopic binary stars. The primary is a blue dwarf star showing an overabundance of certain metals, it has an unusually strong and variable magnetic field, and its atmosphere has overabundances of *europium, mercury, silicon, strontium, and chromium.* The secondary star, **Alpha^{1} CVn**, mag. 5.61, 12 56 00.60 +38 18 52.9, is a yellow dwarf star. This binary star marks the position of **"Chara"**, one of the two hunting dogs. Separation between the pair is 19 arc seconds.

Chara (Beta CVn), "joy", mag. 4.24, 12 33 45.09 +41 21 24.4, is a yellow-hued main sequence dwarf star. The name **"Chara"** was originally used for the southern dog along with **"Cor Caroli"**, but now is used for the northern dog, named **"Asterion"** or **"little star".**

La Superba (Gamma CVn), mag. 5.42, 12 45 07.83 +45 26 24.8, is one of the reddest stars in the sky, believed to be in the last stages of fusing *helium* into *carbon*. It is losing mass in a relatively fast rate, and is surrounded by a disk of ejected material. Most likely, **Gamma CVn** will eject its outer layers (relatively) soon to form a nebula and become a white dwarf star. **La Superba** is a semi-regular variable star, with an apparent magnitude varying between 4.8 and 6.3 over a period of 267.8 days – it is the brightest J-star known (J-stars are the rare carbon stars that contain an abundance of Carbon^{13}.

Deep Sky:

M 3 (NGC 5272), mag. 6.4, 13 42.2 +28 13, 16' in size, is a globular cluster; medium concentration of stars; extremely bright and very large. **M 3** contains over 450,000 stars, extends 220 ly, and is 11.4 billion years old. **M 3** contains over 274 variable stars, more than any other globular cluster. To find **M 3**, start from **Beta Comae Berenicis** (4th magnitude) and move ½° north and then 6° east. There is a 5.5 magnitude star about 30' to the southwest. The whole cluster has a bluish glow. **M 3** is one of the three brightest globular clusters in the northern sky.

M 51 (NGC 5194-95), "The Whirlpool Galaxy", mag. 8.1, 13 29.9 +47 12, 11.0' by 7.8' in size, the spiral arms, of which four concentric coils can be traced, contain many super-giant stars and the irregular companion, **NGC 5195. NGC 5195** is connected to the main galaxy (**NGC 5194**) by an extension of one of the spiral arms, indicating some kind of tidal action between the two. It will take at least a 10 inch telescope under dark skies to reveal spiral details. To find **M 51**, start at **Alkad (Eta Ursae Majoris),** the eastern most star in **The Big Dipper** asterism and the tip of the tail of **Ursa Major,** and move 3.5° to the southeast.

M 51b (NGC 5195), mag. 9.6, 13 30.0 +47 16, 5.0' by 4.7' in size, is a bright, pretty small, slightly elongated galaxy that is part of **M 51**. Computer models and current theory is that **NGC 5195** has had multiple encounters with **M 51**.

M 63 (NGC 5055), "The Sunflower Galaxy" mag. 8.6, 13 15.8 +42 02, 12.6' by 7.2' in size, is a very bright and large galaxy; very small, bright nucleus. In this galaxy the spiral pattern is tightly wound; the two best spiral arms can be traced for about ¼ turn and dust clouds can be seen lying across the spiral arms themselves. A supernova was observed in the galaxy in 1971. To find **M 63**, move 2° north and 3½° east of **Alpha Canem Venaticorum** to the little group of three stars which contain the 4th magnitude star **20 CVn. M 63** is a little less than 2° north of this star.

M 94 (NGC 4736), "The Cat's Eye Galaxy", "The Croc's Eye galaxy", mag. 8.1, 12 50.9 +41 07, 11.0 by 9.1' in size, is a large, very bright, irregularly round galaxy; extremely bright nucleus; very tight spiral arms; very faint outer ring (about 15' in size). In the **M 94 Galaxy Group** is the barred irregular galaxy **NGC 4214** (mag. 9.8), the edge-on spiral galaxy **NGC 4244, Caldwell 26** (mag. 10.4), the low surface brightness spiral galaxy **NGC 4395** (mag. 10.2), the irregular galaxy **NGC 4449, Caldwell 21** (mag. 9.6), and the dwarf irregular galaxy **UGC 8320** (mag. 12.7). It is suspected that **M 94** contains little, if any, dark matter. To find **M 94**, move 2¾° north and 1° west of **Alpha CVn**.

M 106 (NGC 4258), UGC 7353, mag. 8.3, 12 19.0 +47 18, 18' by 8' in size, is a very bright, very large, and very elongated galaxy; small, bright nucleus in bright bulge. M 106 was added to the Messier list in 1947 by Helen Sawyer Hogg. In 1950, M 106 was found to be a radio source in which the emission covered an area about twice as large as its visual extent. A supernova was observed in August 1981. M 106 is classified as a *Seyfert II* galaxy, one that has unusual emission lines and emits X-rays, which is why it is suspected that a part of it is falling into a super-massive black hole at its core. To find M 106, move 1.4° south of the 5th magnitude star 3 CVn. There is a ring of water masses surrounding the nucleus, rotating at some 1,000 km/sec – leading to the assumption of a super massive black hole in the nucleus, causing two bi-polar jets.

NGC 4631, Caldwell 32, UGC 7865, Arp 281, mag. 9.2, 12 42.2 +32 33, 14.0' by 2.6' in size, is a very bright, very large, and extremely elongated galaxy; edge on; star attached. Interacting with galaxy **NGC 4627** (mag. 12.4). There is a giant diffuse corona of X-ray emitting gas surrounding the entire galaxy. **NGC 4631**is located 5.2° north-northeast of 4th magnitude **Gamma Comae Berenices. NGC 4627,** 2.5 arc minutes to the north-northwest, is a dwarf companion galaxy. **NGC 4655** is 32 arc minutes to the southeast of **NGC 4631.**

NGC 4449, Caldwell 21, UGC 7592, mag. 9.6, 12 28.2 +44 06, 6.0' by 4.9' in size, is a very bright and quite large galaxy; faint nucleus. More than 60 star clusters have been identified throughout **NGC 4449**, and over 80 more objects are considered cluster candidates. **UGC 7577** lies 36 arc minutes to the south of **NGC 4449. NGC 4449** is located almost 3° north-northwest of **Charta (Beta CVn).**

NGC 4214, UGC 7278, mag. 9.8, 12 15.7 +36 20, 7.9' by 6.3' in size, is a quite bright, quite large, and slightly elongated starburst galaxy. **NGC 4214** lies 6.8° southwest of **Beta CVn**, and **NGC 4244** (mag. 10.4) **"The Silver Needle Galaxy"**, lies 1.3° to the north-northeast of **NGC 4214**. In 1954, at the southern edge of the outer disk, a supernova was discovered, and ranks as the fourth brightest supernova of the 20th Century. There are seven candidates for supernova remnants in **NGC 4214**.

NGC 4490, Arp 269, UGC 7651, mag. 9.8, 12 30.6 +16 46, 1.7' by 1.6' in size, is a very bright, very large, and very elongated galaxy. Along with galaxy **NGC 4485** (mag. 11.9), **NGC 4490** forms the interacting system **Arp 269. NGC 4485 (The Cocoon Galaxy), UGC 7648,** lies 3.3 arc minutes north-northwest of **NGC 4490.**It will take a large telescope, 13 inches or larger, to see details of the interaction results of **NGC 4485** making a close pass of **NGC 4490.** An X-ray source in **NGC 4490** is a rare X-ray binary system consisting of a black hole primary and a Wolf-Rayet companion in a 6.4 hour orbital period. **NGC 4490** has hosted several supernovas – one in 1982 and one in 2008.

NGC 5005, Caldwell 29, UGC 8256, mag. 9.8, 13 10.9 +37 03, 5.4' by 22.7' in size, is a very bright, very large, and very elongated galaxy; extremely bright nucleus with circular dust lanes. **NGC 5005** is located a little over 3° east-southeast of **Alpha CVn.** X-ray observations detected a variable, hard X-ray source in the nucleus, which has been interpreted as accretion of gas onto a massive black hole. **NGC 5005** may form a binary with the starbursting spiral galaxy **NGC 5033** (mag. 10.10), which lies 41 arc minutes to the southeast. Supernova 1996ai (mag. 13) is located 24 arc seconds east and 4 arc seconds north of **NGC 5005**'s nucleus.
There are 62 more Deep Space items from magnitude 10 thru 14.

Other Stars
5 CVn, mag. 4.77, 12 24 01.48 +51 33 44.0, is a suspected eclipsing binary star.
HD 109995, mag. 7.64, 12 38 47.60 +39 18 31.6, is a horizontal branch star.
HD 115781, mag. 8.13, 13 18 51.94 +33 26 19.3, is a rotating ellipsoid variable star.
HD 115444, mag. 8.97, 13 16 42.46 +36 22 52.7, is a barium star.
TX CVn, mag. 9.34, 12 44 22.07 +36 45 50.7, is a rotating ellipsoidal variable star.
There are five more Other Stars, two with planets in orbit, over magnitude 10.

Sky Happenings:July, 2016

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

back

July 1st - The **Moon** is at perigee (227,411 miles from **Earth**) at 1:40 AM CDT,
The **Moon** passes 0.4° north of **Aldebaran** at 11 PM CDT.
July 2nd - Dawn – as **Aldebaran** climbs into the morning twilight, look 3° or 4° to its lower left for the thin waning crescent **Moon**.
July 4th - **Earth** is at aphelion, farthest from the **Sun** for 2016 (94,512,904 miles),
New Moon occurs at 6:01 AM CDT.
July 6th - **Mercury** is in superior conjunction with the **Sun** at 10 PM CDT.
July 7th - **Pluto** is at opposition at 5 PM CDT,
Dusk – the waning crescent **Moon** hangs low in the west, about 3° to the left or lower left of **Regulus**.
July 8th - Dusk – find the **Moon** about 4° to the lower right of **Jupiter**. The dimmer **Sigma Leonis** shines less than 1° above **Jupiter**.
July 9th - **The Moon** passes 0.9° south of **Jupiter** at 5 AM CDT.
July 11th - **First Quarter Moon** occurs at 7:52 PM CDT,
In the deepening twilight of the southwestern sky, **Spica** will appear some 5° to 6° below and to the left of the **Moon**.
July 13th - **The Moon** is at apogee (251,201 miles from **Earth**) at 12:24 AM CDT,
Neptune passes ½° below **Lambda Aquarii** all week.
July 14th - The **Moon** passes 8° north of **Mars** at 1 PM CDT.
July 15th - The waxing gibbous **Moon, Saturn, and Antares** form a roughly vertical line in the south after the **Sun** sets. Watch the trio wheel around the sky until they set at around 2 AM CDT.
July 16th - The **Moon** passes 3° north of **Saturn** at 12:00 midnight CDT,
Mercury passes 0.5° north of **Venus** at 1 PM CDT.
July 19th - **Full Moon** occurs at 5:57 PM CDT.
July 23rd - **The Moon** passes 1.1° north of **Neptune** at 1 AM CDT.
July 25th - The **Moon** passes 3° south of **Uranus** at 11 PM CDT.
July 26th - **Last Quarter Moon** occurs at 6 PM CDT.
July 27th - The **Moon** is at perigee (229,698 miles from **Earth**) at 6:37 AM CDT.
July 28th - The Southern **Delta Aquarid** meteor shower peaks.

July 29th - The waxing crescent **Moon** occults 1st magnitude **Aldebaran** for observers in the eastern and southern **United States**,
The **Moon** passes 0.3° north of **Aldebaran** at 6 AM CDT,
Uranus is stationary at 9 PM CDT.

July 30th - **Mercury** passes 0.3° north of **Regulus** at 12 noon CDT,
At dusk, in the west-northwest, **Mercury** will shine at ½° from the fainter **Regulus**.

Planets:

Mercury/Venus – On July 6th, **Mercury** passes behind the **Sun** and then climbs slowly into view. Look very low in the west-northwest soon after the **Sun** disappears on July 16th (at **Mercury**'s greatest elongation, of 27 degrees), when the -1.1 magnitude **Mercury** gleams just ½° above the much brighter -3.9 magnitude **Venus.** On July 21st, **Venus** lies just 2° high above the horizon a half hour after sunset, shining at magnitude -3.9, with **Mercury** (-0.6 magnitude) standing 3° to **Venus**' upper left. In the final week of July, **Mercury**, now about 5° to the upper left of **Venus**, moves closer to **Regulus** until the two are ½° apart on July 30th. On July 31st, **Mercury,** at -0.2 magnitude, stands 6° high above the horizon 30 minutes after sundown. **Venus** will pass **Regulus** on August 5th.

Mars – Mars halted its retrograde (westward) motion in **Libra** on June 30th; it glides eastward almost to the bright head of **Scorpius** by the end of July. **Mars** continues to fade over the course of the month, dimming by almost a half from magnitude -1.4 to -0.8. **Mars**' disk shrinks in telescopes from 16" to 13" wide during July. **Mars**, at month's end, still outshines any visible stars, and on calm summer nights of good seeing, may show considerable detail in medium to large telescopes. **Mars** transits the meridian after 8 PM CDT, and sets around 1:20 AM CDT on July 1st. By July 31st, the transit time has moved forward to a little before sunset, and the setting time to before 12 midnight CDT. The most conspicuous feature of **Mars**, *Syrtis Major*, appears near the center of the planet's disk during the evening hours in late July for **North American** observers.

Jupiter – Jupiter is an evening fixture throughout July. On July 1st, **Jupiter** lies 25° high in the west an hour after sunset and does not set until midnight local daylight time. At magnitude -1.9, **Jupiter** is unmistakable. By month's end, **Jupiter**'s altitude drops to appear just 10° above the horizon an hour after sunset. The best time to observe **Jupiter** is when it lies high in the sky in early July, when it's slightly flattened disk then measures 34" across. **Jupiter** creeps eastward until it is just ½° south of 4th magnitude **Sigma Leonis** around July 12th, and further eastward to nearly at the **Leo-Virgo** border by month's end. **Jupiter**'s four bright moons also put on a good show in July. You will typically see all of them strung out in line with the planet's equator, though occasionally one or more will transit or be occulted. The best such event this month, on July 19th, occurs when **Ganymede** crosses **Jupiter**'s northern hemisphere. The transit begins at 9:48 PM CDT (best for eastern **North America**), and lasts for more than three hours (allowing western observers good views).

Saturn – Having passed opposition on June 3rd, **Saturn** continues to shine 6° north of 1st magnitude **Antares** in southern **Ophiuchus**. **Saturn** continues to retrograde throughout July, with its western motion narrowing the gap between it and eastward moving **Mars** from 19° to 11°. At the same time, **Saturn** dims a little from +0.1 to +0.3 magnitude, and the apparent diameter of its globe (18" in mid July) decreases slightly. **Saturn** is at peak altitude as night falls in July, and stays in view past midnight**. Saturn**'s ring system spans 41", and has a tilt of 26° to our line of sight**. Saturn**'s moon *Titan* (8th magnitude) takes 16 days to circle the planet, so you can see nearly two complete orbits during July. *Titan* will be due north of **Saturn** on July 7th and 23rd, and due south of **Saturn** on July 15th and 31st. Outermost moon *Iapetus* spends most of its 79-day orbit far from **Saturn**. It slides 2.2' due north of **Saturn** on the night of July 11/12, when it will shine at magnitude 11. By month's end, it will lie 8.4 ' east of **Saturn**, and its darker hemisphere faces **Earth**, so it will glow dimly at 12th magnitude. The three 10th magnitude moons hover near **Saturn,** circling the planet in less than a week – *Tethys* in 1.9 days; *Dione* in 2.7 days; and *Rhea* in 4.5 days – none stray more than 1' from the edge of the rings. Inner *Enceladus* is a harder moon to see because it glows dimly (12th magnitude) and stays close to the bright rings. It orbits **Saturn** in 33 hours. A good opportunity to see *Enceladus* (at its greatest elongation) comes on the evening of July 11th when it lies 35' west of **Saturn** and appears in a tight triangle with *Tethys* and *Dione*.

Uranus – Uranus rises at about 1:30 AM LDT in early July, and by July's final week it pokes above the horizon before midnight LDT. **Uranus** resides among the background stars of **Pisces the Fish**, southeast of **The Great Square of Pegasus**. To find **Uranus**, center the 4.8 magnitude **Mu Piscium** in your field of view. Some 2° to 3° north of **Mu Piscium** lies a group of four 6th magnitude objects. **Uranus**, at 5.8 magnitude, is the brightest and northernmost of this quartet. **Uranus** remains some 2.7° north of **Mu Piscium** all during July. To confirm your sighting, **Uranus** will show a distinctive blue-green disk spanning 3.5'.

Neptune – Neptune rises shortly before midnight on July 1st, and two hours earlier by month's end. You can find **Neptune** by locating 4th magnitude **Lambda Aquarii**. Once you locate this star, magnitude 7.8 **Neptune** will be in the same field of view. **Neptune** begins the month 29' (about the **Full Moon**'s diameter) southeast of **Lambda Aquarii**, and tracks slowly southwest. It passes 31' due south of **Lambda Aquarii** on July 23/24. A telescope will show **Neptune**'s 2.3" diameter disk, and distinct blue-grey color. On the night of July 22/23, the waning gibbous **Moon** passes in front of (occults) **Neptune** for most of eastern **North America**. The **Moon** will also occult **Lambda Aquarii** for locations south and east of **New Mexico**.

Pluto – On July 7th, **Pluto** reaches opposition. **Pluto** will not be easy to spot (at magnitude 14.1), but its proximity to 3rd magnitude **Pi Sagittarii** makes this a realistic challenge. An 8-inch telescope will gather enough light to reveal **Pluto**, though a larger instrument will make the task easier. Start at magnitude 2.9 **Pi Sagittarii** as an anchor and star hop to **Pluto** – on July 3rd at about RA 19 09 10, Dec. 21 07; July 16th at about RA 19 07 40, Dec. 21 10; and July 25th at about RA 19 04 20, Dec. 21 18. ***These are my estimates from reading the charts, and are not necessarily totally right (JRN).***

Asteroids – Asteroid **7 Iris** lies just about midway between **Mars** and **Saturn. Iris** lies 2° to 3° west-southwest of the easy to split double star **Beta Scorpii**. The double star has two blue-white components, which shine at magnitudes 2.6 and 4.9, and have a separation of 14". On July's final night, **Iris** approaches within 5' of 5th magnitude **Lambda Librae**.

Comets –Comet **PANSTARRS (C/2013x1)** – to avoid bright moon-light, hunt down the comet either at the beginning or the end of the month. In early July, the comet should be at 6th magnitude, but one or two magnitudes dimmer by the end of the month. Observers can see the comet as it skims south of **Scorpius** in early July. In July's final 10 days, the comet makes its way through northern **Centaurus,** passing 0.6° west of the 4.1 magnitude star **C¹ Centauri** on July 23rd.

Meteor Showers – There are several weak, long-lasting showers, with radiants in the late night southern sky, in the 2nd half of July. **The Southern Delta Aquarids**, peaking on the night of July 29/30, with a radiant near the 3rd magnitude **Delta Aquarii**; the **Alpha Capricornids**, which originate from **Comet 169P/NEAT**, and stand out for being unusually slow-moving and often bright; the **Piscis Austrinids**; and an occasional early **Perseid** may show up.

When to View the Planets:

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

DARK SKY VIEWING - PRIMARY ON JULY 2ND, SECONDARY ON JULY 30TH

Mythology:

Canes Venatici – The Hunting Dogs

The Polish astronomer Johannes Hevelius formed this constellation in 1687 from stars that had been previously been considered part of Ursa Major. Canes Venatici represents the two dogs held on a lead By Boötes, snapping at the heels of the Great Bear. The southern dog is represented by the two brightest stars in the constellation, Alpha and Beta Canum Venaticorum.

The star Alpha is known as "Cor Caroli", meaning "Charles's Heart", in honor of King Charles I of England. It was given this title, by Sir Charles Scarborough, physician to King Charles II. Scarborough said that the star shone particularly brightly on the night of May 29th, 1660, when King Charles II returned to London at the Restoration of the Monarchy. There has been much confusion over which King Charles the star is supposed to commemorate because of this, but it definitely refers to the first King Charles. It was originally shown in 1673 on a star map by the English cartographer Francis Lamb under the name "Cor Caroli Regis Martyris", a reference to the fact that King Charles I was beheaded. Lamb and others, such as the English man Edward Sherburne in 1675, drew a heart around the star surmounted by a crown, turning it into a mini-constellation.

The star Beta is called "Chara", from the Greek for "Joy", the name given by Hevelius to the southern dog. The northern dog, called "Asterion" (starry), is marked only by a scattering of faint stars. Bode drew the dogs with their names written on their collars.

Canes Venatici contains a globular cluster of stars, M 3, and a beautiful spiral galaxy, M 51, called "The Whirlpool Galaxy". M 51 was the first galaxy in which the spiral form was noticed, by the Irish astronomer Lord Rosse in 1845. It consists of a large galaxy in near-collision with a smaller galaxy.

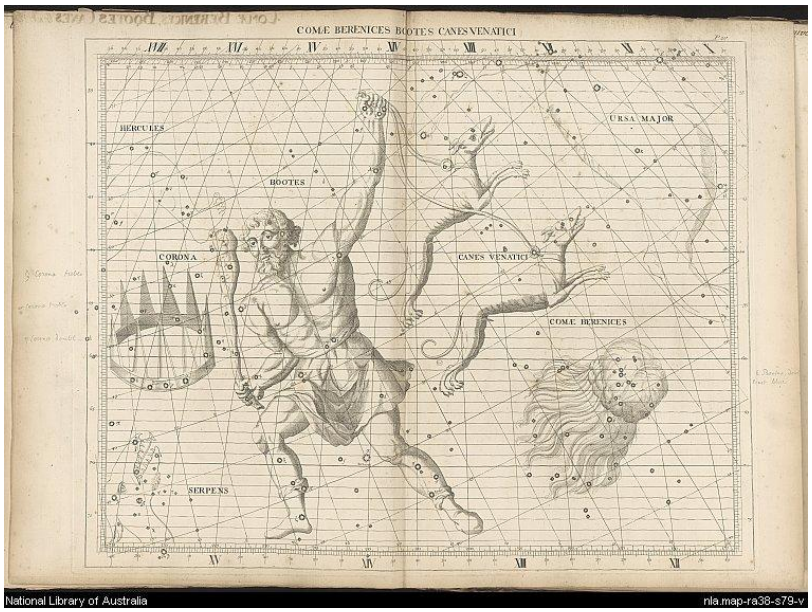
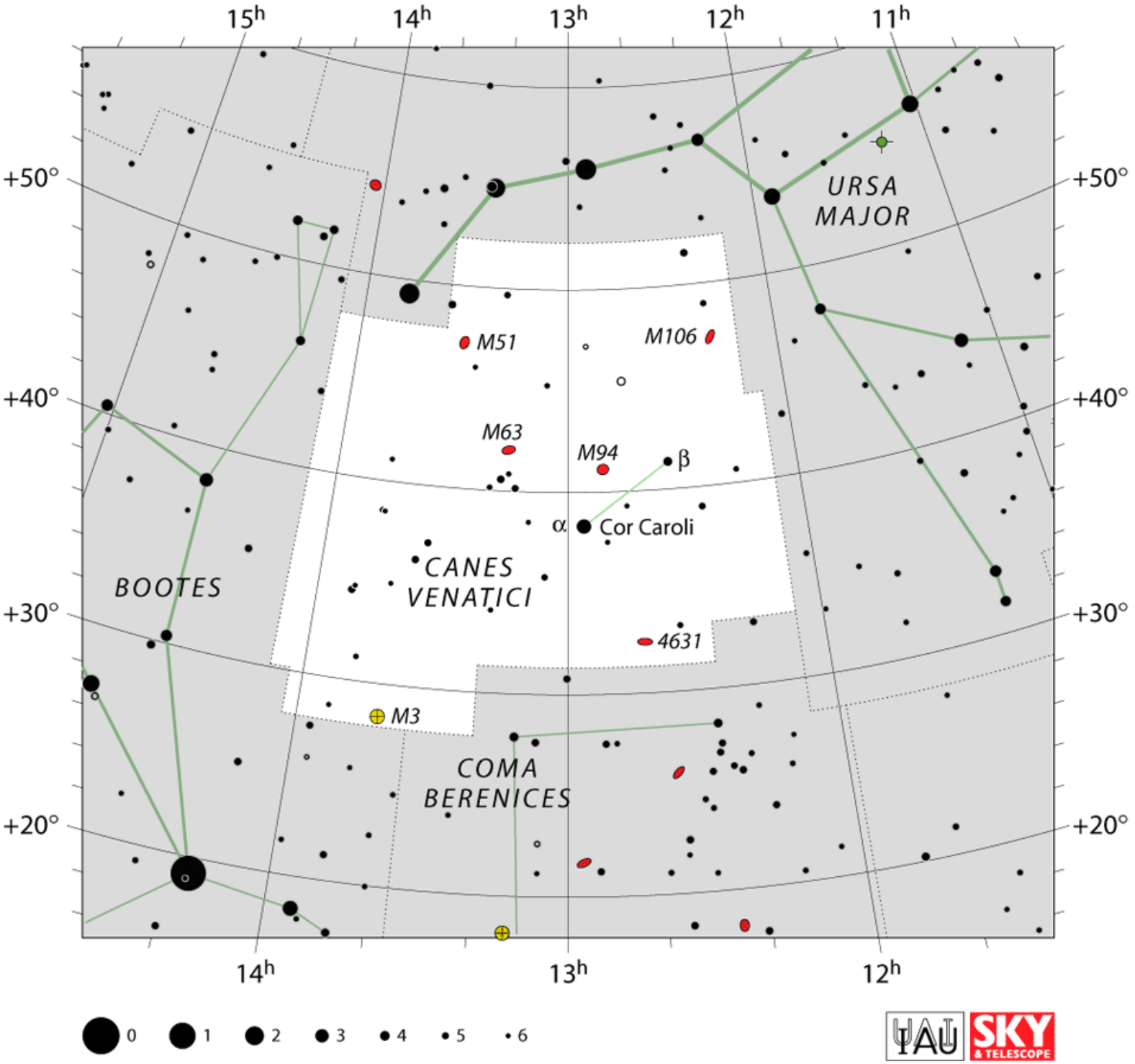


Illustration from Bayer's star atlas Uranometria Omnium Asterismorum, first published in 1603. This was the first atlas to cover the entire celestial sphere. Built upon the work of Tycho Brahe and possibly Alessandro Piccolomini, Bayer introduced a new system of star designation which has become known as the "Bayer designation". Bayer's atlas added twelve new constellations to fill in the far south of the night sky, which was unknown to ancient Greece and Rome.


15h
14h
13h
12h
11h
+50°
+40°
+30°
+20°
URSA MAJOR
M51
M106
M63
M94
β
α
Cor Caroli
CANES VENATICI
BOOTES
4631
M3
COMA BERENICES
0
1
2
3
4
5
6
IAU
SKY & TELESCOPE

The End