

Night Visions

November 2016 Issue

Newsletter of the Baton Rouge Astronomical Society

Next Meeting: Monday, November 14th at 7PM at HRPO
(2nd Mondays, Highland Road Park Observatory)

35th Anniversary Party !!

Join us at this meeting to celebrate BRAS's 35th Anniversary.
Several founding members will be there to help us
remember and appreciate our history and achievements.

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President's Message

November already! Holiday season, cold and long nights (all the better to observe under), and it is also the 35th anniversary of the founding of our organization, the Baton Rouge Astronomical Society, commonly called BRAS. At our meeting this month, to “celebrate” the anniversary, we will have cake and refreshments as some of the founders and first members of 35 years ago will regale us with the “story” of how BRAS came into existence, and some of its history.

December's meeting is our annual “pot luck” dinner and the election of officers for the next year. Be thinking about who you want as officers next year. Be prepared to nominate and/or second nominations. Also be prepared for a good meal.

The first 3 members who told me they found the Witch Head Nebulae silhouette hidden in the October newsletter were Coy F. Wagoner, Robert Bourgeois, and Cathy Gabel. Congratulations, and well done. Each was presented with 3 raffle tickets and one of those tickets won the raffle! (see below).

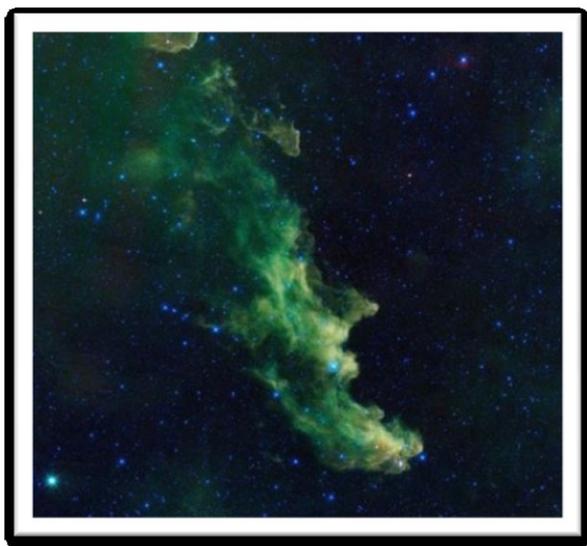
Our Light Pollution Committee is looking for a Secretary to take notes of the committee meetings, and handle some paperwork. Any volunteers? Remember, BRAS Officers, and other personnel are all volunteers. Step up and help by volunteering when asked.

Clear Skies,

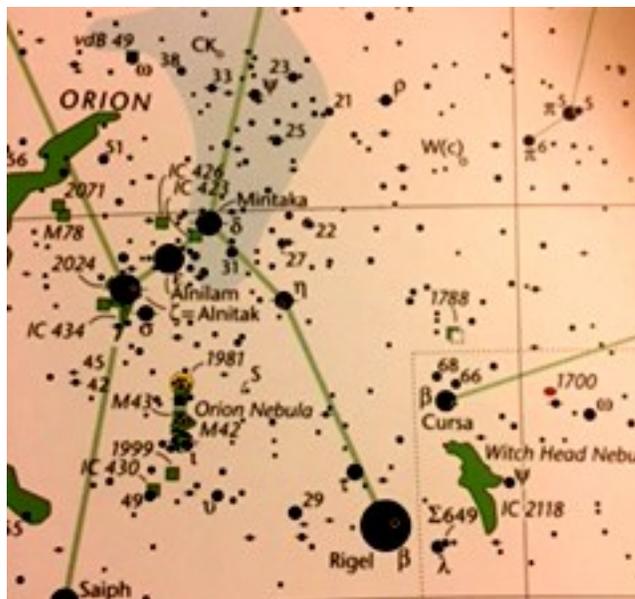
John R. Nagle
President of BRAS
Observing Chairperson



The Witchhead Nebulae Contest



Left: this image was imbedded in the tree trunk of our masthead on Page 1, for members to try to find. It is still there.



Right: The Witch Head Nebulae is located to the right of Rigel, the right foot of Orion. The nebulae can be seen with a low power telescope.



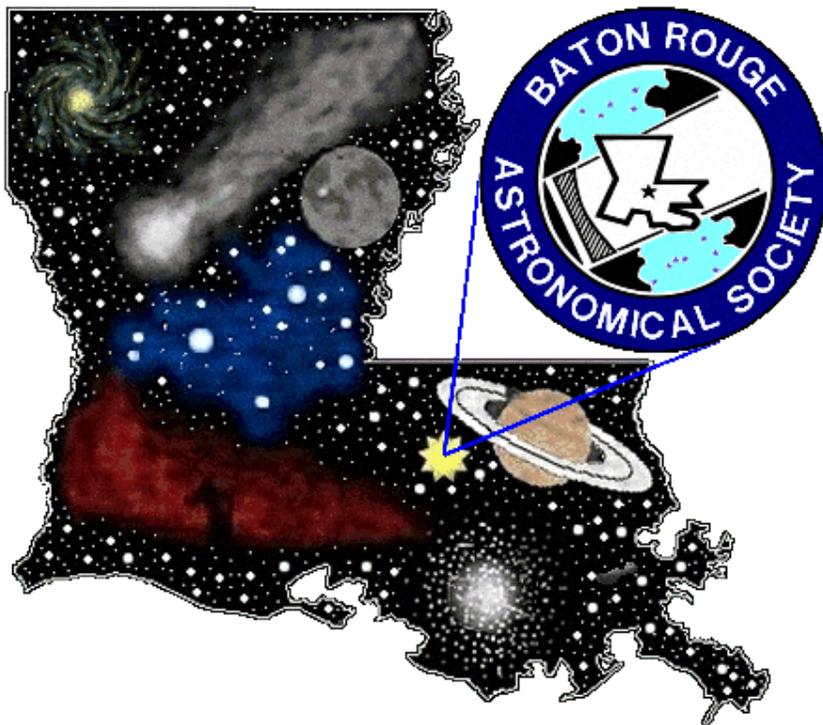
Secretary's Summary from October Meeting

- Meeting called to order
- Thomas Halligan asks for volunteer for secretary of the light pollution committee
- Ben Toman talked about current Outreach requests
- Merrill Hess mentioned Rory Bentley being selected as LSU Physics and Astronomy Featured Student on their website
- Don Weinell spoke about Hodges Gardens Star Party
- Chris Kersey mentioned the millage for BREC up for a vote on November 8th
- Call for volunteers for Spooky Spectrum
- Introduction of Barry Simon as guest speaker for the month
- Raffle held
- Meeting adjourned

Clear Skies,



Ben Toman
BRAS Secretary



This cool image created by BRAS Webmaster Frederick Barnett, (who also supplies our cartoons), graces the home page of our website.

www.braastro.org

2016 Officers:

President: John Nagle
Vice-President: Don Weinell
Secretary: Ben Toman
Treasurer: Trey Anding

BRAS/HRPO Liaison:
Chris Kersey

Committee/Coordinator:

Outreach:
Ben Toman
Observing:
John Nagle
Light Pollution:
Thomas Halligan
Webmaster:
Frederick Barnett
Newsletter Editor:
Michele Fry



BRAS Outreach Report

Hi Everyone,

Well, we had a very busy month of Outreach in October. So busy that we actually had to turn some requests down! I hate to do that, but there's only so much we can do as a volunteer based organization. The ones we were able to attend were great, though.

I heard good things about the event in Vacherie at their Library and the Maker Faire was another success, as well. As I write this, Spooky Spectrum has yet to happen in a couple of days. Hopefully this nice weather will hold out and give us a good crowd out there.

We have no outreach requests for November!

We have no outreach requests for November for anything off HRPO grounds so all of our busy volunteers will have a little bit of time to recuperate. However, please keep in mind that the Observatory is almost always in need of volunteers for the public nights, especially that one Saturday a month that is “**Evening Sky Viewing Plus**” night. I would like to see BRAS making a **bigger presence** on those evenings. Remember, if you would like to volunteer at the HRPO for a BREC event, you need to contact the HRPO to fill out the proper forms required by BREC.

Finally, be on the lookout for upcoming outreach requests. As always, if you can help out, please let me know as soon as you can so we know whether or not we'll have volunteers to make the event. Don't be afraid to volunteer just because you think you aren't qualified or have little experience. We'll never send you out alone if you are not comfortable. Generally there will be 2-3 volunteers for an event and it's a great time to meet other members and to learn a thing or two about the hobby you love!

As always, if you can help out with one (or ALL) of these events, let me know ASAP so I can start to build a list of volunteers for each event. We can always use the help!

Clear Skies,

A handwritten signature in black ink, appearing to read 'Ben Toman', with a stylized flourish at the end.

Ben Toman
Interim Outreach Coordinator





BRAS Light Pollution Committee Report

2nd Mondays, from 6:15 pm to 7:00pm, before the BRAS public meeting.

One does not need to be a BRAS member to attend.

One item on the agenda of the November 14th meeting will be the potential donations of copies of ***There Once was a Sky Full of Stars*** to those local library systems that experienced a loss of books due to the Great 2016 Flood.

We are looking for a secretary to take notes at the meetings.



This meeting will...

- introduce the general public to the LPC
- explain the LPC's benefit to amateur astronomers, nature lovers, homeowners and taxpayers
- summarize the accomplishments of BRAS in this endeavor

A handwritten signature in black ink that reads "Thomas J. Halligan". The signature is written in a cursive, flowing style.

Thomas Halligan
Light Pollution Chairperson

Space is right overhead—double stars, nebulae, the Milky Way Galaxy and other galaxies. We can see it if we let it through.



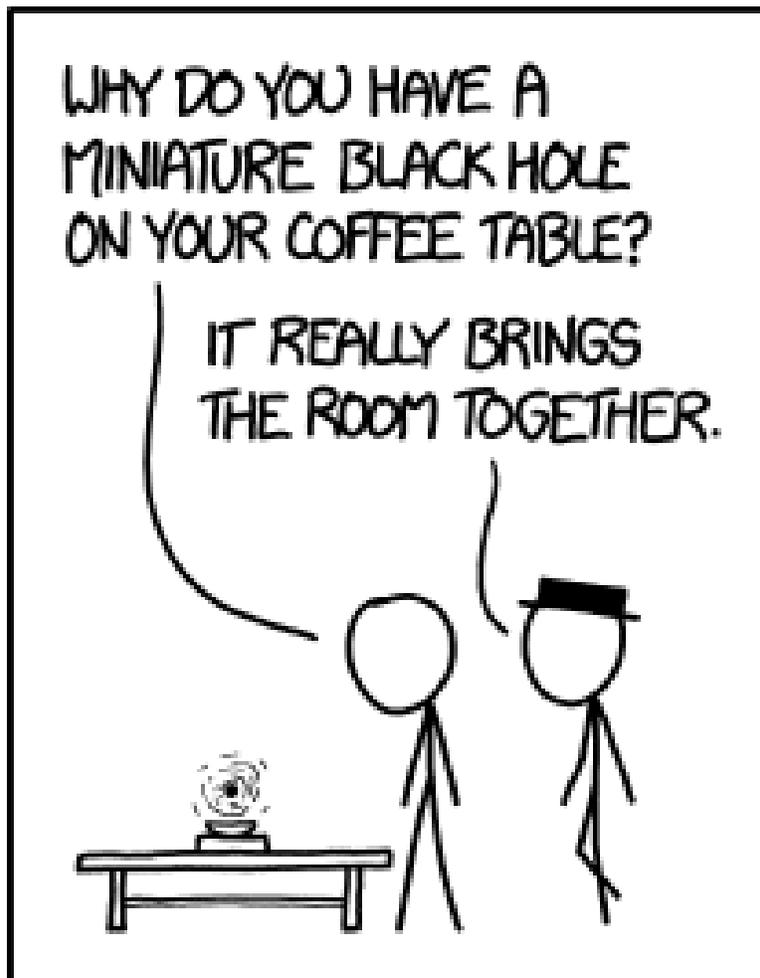
Milky Way over Gila River
Gila Wilderness, New Mexico



Recent Entries in the BRAS Forum

Below are selected recent additions to the BRAS Forum through 26 October. There are also nine active polls. The Forum has reached 4000 posts.

[Mercury and Jupiter Conjoined](#) on 11 October
[Juno Briefing](#) Took Place on 19 October
[Cygnus Cargo Craft](#) Captured on 23 October
[2016 Observe the Moon Night](#) a Success
[Moon Occulted Aldebaran](#) on 19 October
[G1, G2 and G3 Alerts](#) as Solar Cycle 24 Winds Down
At Least [250 People Witness Fireball](#) on 12 October
[Rosetta Mission](#) Ended
Information on [Chi Cygni](#)
Advice for [Viewing Andromeda Galaxy](#)
Information on [NGC 4298 and NGC 4302](#)





BRAS's 20/20 Vision Campaign

GLOBE at Night: until 31 Oct, then 20 Nov to 30 Nov
2016 GOAL: 200 Measurements. CURRENT: 60

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.

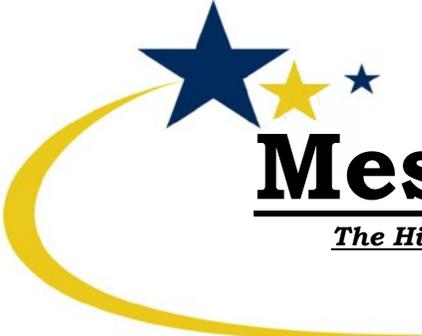
Good View: fifth star seen.

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.

NOTE: Ms. Angelle needs these measurements to compliment out the data she has gathered. Use any opportunity to take at least one or two measurements. Remember, Ms. Angelle needs some time to process the data.





Messages from HRPO

The Highland Road Park Observatory will be closed on 24 June.



FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

4 November: “Life on Exoplanets” Earth is the only place in the Universe harboring life—as far as we know. This is surprising as the Universe is unfathomably vast. While few professional astronomers would describe themselves as “alien hunters”, there are many who are involved in the search for life out in the stars, including exobiologists and planetary scientists. In this talk from LSU graduate student Tyler Ellis we will discuss the idea of life beyond Earth as presented in fiction while constraining our wildest imaginations within the realms of what is known about life here.

18 November: “The Antikythera Mechanism” A box full with dozens of bronze gears and dating to ~100BC was found in a shipwreck off the coast of the Greek island Antikythera. Astonishingly it is nothing less than an analog computer that calculates many astronomical and calendrical events—the phases of the Moon, the dates of eclipses, a full lunar calendar with added months, a full solar calendar, weather predictions, the positions of all the planets in the sky—even the dates of the Olympic games! Who was the great genius who made the Mechanism? Why was the Mechanism completely lost to history with no one building upon this stunning success? Professor Brad Schaefer probes the mystery.

SCIENCE ACADEMY

Saturdays from 10am to 12pm

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

5 November: “Planetary Missions Named for...”

12 November: “Observatories Named for...”

19 November: “Deep Space Missions Named for...”

26 November: “Cadet’s Choice”

ONE-TIME CALLS FOR VOLUNTEERS

***Friday 11 November, 4:45pm to 6:45pm. One volunteer. The Edge of Night.** Front desk duty, assistance with pointing out unaided-eye stuff. Easy.

***Saturday 19 November, 7pm to 10pm. Two or three volunteers. Evening Sky Viewing Plus.** Telescope operation, physical science demonstrations, front desk duty. 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 Fall Rocket Camp. We are asking any BRAS volunteers with time to assist. Thank you.



UPCOMING HRPO EVENTS

(click links for more detailed info)



[The Edge of Night](#)

Friday, 11 November from 4:45pm to 6:45pm

No admission fee. For all ages.

It’s not light, it’s not dark. It’s that special time called twilight, and HRPO wants to introduce you to it!

- *Are all sections of the sky the same shade of blue?
 - *Which stars are seen first?
 - *Are Mercury and Venus or the Moon out?
 - *Is that moving object a plane, a satellite or space debris?
 - *How much actual darkness should I expect in a light-polluted city when twilight has passed?
 - *What are crepuscular rays, and are any in the sky right now?
- There is no other time like twilight. Bring it into your life!

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[Fall Rocket Camp](#)

Monday 21 November and Tuesday 22 November

8am to 5pm daily. For ages nine to thirteen.

\$55 per in-parish child. \$66 per out-of-parish child.

For centuries humanity wondered what it would be like to fly, and then fly into space. Of course, it’s no longer fantasy due to the hard work of the Wright brothers, Robert Goddard and others. The thrill of watching (or being inside) a hot-air balloon, helicopter, jet, rocket or spacecraft never seems to leave us.

At Fall Rocket Camp, kids will learn a brief history of flight as well as the basics of rocket science. They will also learn the safety procedures required for a safe launch and recovery. Then—the kids will build and a rocket! After the flights, the children take their rocket home. The rocket this go-round will be the ever-thrilling two-stage Mongoose; it flies so high HRPO personnel reserve the ball fields next door for launch!

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Observing Notes:

by John Nagle

Andromeda

The Chained Woman

Position: RA 23 25 48.69 to -02 39 32.51, Dec. +53.18 to 21.67

Named Stars:

Alpheratz (Alpha And), “Sirrah”, “surat al-faras”, “navel of the steed”, “Al Ras al Mar’ahgal Musalsalah”, “head of a woman in chains”, mag. 2.07, 00 08 23.17 +29 05 27.0, is a spectroscopic binary star with a distant optical companion of the 11th magnitude. The primary star is a hot blue B8 type supergiant star, and both stars are in the main sequence. The primary has extremely high levels of mercury, manganese, and other elements, with no magnetic field. The two stars orbit each other within a period of 96.7 days. **Alpha And** is part of an asterism known as the “Great Square of Pegasus”, and was formerly considered to belong to both constellations – **Andromeda** and **Pegasus** – being so designated as **Delta Pegasi**, although this name is no longer formally used.

Mirach (Beta And), “al-Maragg”, “the loins”, or “the loincloth”, or “Mizar”, “girdle”, mag. 2.07, 01 09 43.80 +35 37 15.0, is a cool, bright red giant star with a mag. 14 dwarf star companion, and has two 12th magnitude optical companions at 85” and 90” distance. **Beta And** is part of an asterism known as “The Girdle”. **NGC 404**, sometimes called **Mirach’s Ghost**, is only seven arc minutes away from **Beta And**.

Almach (Gamma 1 And), “Anaq al-Ard”, “the earth kid”, or “al-anaq al-ard”, “caracal”, “the desert lynx”, mag. 2.10, 02 03 53.92 +42 19 47.3, is a quadruple star system. **Gamma 1 And** is a yellow/orange giant star, and **Gamma 2 And** is a blue-green companion star at mag. 5.0, and a separation of 9.7 arc seconds.

Nenbus (51 And), mag. 3.9, 01 37 59.50 +48 37 42.6, is an orange giant star in a multiple star system.

Titawin (Upsilon And), mag. 4.10, 01 36 42.98 +41 24 23.0, is a binary system with the primary being a yellow main sequence dwarf star, and the secondary is a fainter red dwarf star, at mag. 13.9, that lies 750 AU (55 arc seconds) from the primary star. **Upsilon And A** has four planets in orbit around it.

Keff al Salsalat (Iota And), “Manus Catereata”, mag. 4.29, 23 38 08.18 +43 16 05.1, is a main sequence blue-white dwarf star. **Iota And** along with **Kappa And** (a white main sequence star), **Lambda And** (a yellow giant star), **Omicron And** (a blue-white giant star), and **Psi And** (a blue-white main sequence star) form an asterism known as “Frederick’s Glory”, a name derived from a former constellation (Frederici Honores).

Almach (Gamma 2 And), mag. 4.84, 02 03 54.20 +42 19 51.0, is the secondary star in the **Gamma And** system, and is a double star itself, with a 6th magnitude companion with an orbital period of 64 years. **Gamma 2 And** is a blue-green star separated from **Gamma 1 And** by 9.7 arc seconds, and is a spectroscopic binary also with an orbital period of 2.7 days and a separation of 30 AU (0.2 to 0.5 arc seconds)

Veritate (14 And), mag. 5.22, 23 31 17.20 +39 14 11.0, is a yellow giant star with one planet in orbit around it at a distance of 0.83 AU, and having an orbital period of 185 days.



Deep Sky:

M 31 (NGC 224), "The Great Nebula", **Andromeda Galaxy**, mag. 3.4, 00 42.7 +41 16, 3.2° x 1° in size, is an extremely bright, large, and elongated galaxy; readily visible to the naked eye. Satellite galaxies include **M 32** and **M 110**. A detailed study has identified seven distinct spiral arms; two dust arms near the nucleus, and five outer arms of coiled star clouds. **NGC 206** lies near the south tip of the galaxy and close to the western rim. The nucleus has an apparent size of about 2.5"x1.5". The **Andromeda Galaxy** has been found to be surrounded by some 300 objects, identified as globular star clusters. The **Andromeda Galaxy** was the first radio emitter found from an external galaxy (from our **Milky Way Galaxy**). There are 15 satellite galaxies, and dwarf galaxies **NGC 221**, **205**, **185**, and **147** around the **Andromeda Galaxy**. **NGC 185** and **NGC 147** are actually located in **Cassiopeia**, but are gravitationally connected to the **Andromeda Galaxy**. **M 33**, the **Triangulum Galaxy**, made a close pass to **M 31** at about 3 billion years ago. The **Andromeda Galaxy** contains a trillion stars. The **Andromeda Galaxy** belongs to the Local Group of Galaxies, along with the **Milky Way**, **Triangulum Galaxy (M 33)**, and 30 or so smaller galaxies. **M 31** is just over 1° west and slightly north of **Nu And**. **M 32 (NGC 221)**, occasionally called "LeGentil", mag. 8.2, 00 42.42 +40 51.55, 8.7'x6.5' in size, is a very bright, large, and round dwarf elliptical galaxy lying about 24 arc minutes south of the **M 31** nucleus. **M 32** is packed with about 400 million stars, with a super-massive black hole with a mass of 2.5 million times that of our sun. **M 32** is suspected to have been much larger at one point, but then lost its outer stars and globular clusters when it collided with the **Andromeda Galaxy**. **M 32** is part of the Local Group of Galaxies. **M 32** is about 25' south of the center of **M 31**.

M 110 (NGC 205), mag. 8.0, 00 40 22 +41 41 07, 22'x10' in size, is a very bright, very large, and somewhat elongated galaxy discovered by Caroline Herschel in 1783, and added to the Messier Catalog in 1967. Radio astronomers have detected molecular clouds in **NGC 205** with properties similar to the giant molecular clouds in the disk of the **Milky Way**, suggesting that **NGC 205** may be able to form new stars. **M 110** contains eight globular clusters in the halo that surrounds it. There is no evidence that a black hole exists at the center of this galaxy. **M 110** is found a little over ½° northwest of the center of **M 31**.

NGC 7686, mag. 5.6, 23 30 02 +49 08, 15' in size, is an open cluster of 20 stars; not well detached from the surrounding star field; small range of brightness; brightest star is at mag. 6.2, possibly an asterism.

NGC 752, **Caldwell 28**, mag. 5.7, 01 57 80 +37 41, 50' in size, is an open cluster of 60 stars; detached, no concentration of stars; small range in brightness; extremely large cluster; brightest star is at mag. 9.0. Suspected to be at least 1.5 billion years old, has a giant star and the rest are sub-giant stars. **NGC 752** is located 4.5° south-southwest of **Gamma And**.

Arp 168, mag. 8.1, 00 42 70 +40 51 90, 17'x13' in size, consists of **M 32**, **NGC 221**, and is located within the outer envelope of **M 31**. **Arp 168** has a faint, diffuse plume curved away from the **M 31** disk.

NGC 7662, **Caldwell 22**, "The Blue Snowball Nebula", **PK 106-17.1**, mag. 8.3, 23 25 54 +42 32 06, 17' in size, is a very bright, pretty small, round planetary nebula; photo mag. 9.2; the central star is a bluish dwarf star at mag. 13.2. **NGC 7662** is a bluish disk with a wooly border and a suspicion of a dark center. On photographs it bears a fanciful resemblance to a lily. **NGC 7662** is located .5° southwest of the 5th magnitude star **13 Andromedae**, and **Iota And** is a little over 2° to the east-northeast. The visible disk of the nebula is 37 arc seconds across.

NGC 956, mag. 9.0, 02 32 40 +44 39, is a pretty, round, irregular open star cluster.

NGC 891, **Caldwell 23**, **UGC 1831**, mag. 9.9, 02 22 33 +42 20 57, 13.5'x2.8' in size, is a bright, very large, and very elongated galaxy; broad dust lane. Discovered by Caroline Herschel in 1783. Part of the **NGC 1023** galaxy group (in **Perseus**). **NGC 891** is an edge-on spiral galaxy. There are 43 globular candidates in the halo on the east side of the galaxy's disk. **NGC 891** is located less than 4° east of



Gamma And, and on a line toward the star cluster **M 34** in **Perseus**.
In the deep sky, beyond mag. 10, there is 7 ARP objects, 78 NGC objects, 25 UGC objects, 3 Hickson Compact Groups, 2 AGCs (active galactic centers), and 1 vdB object.

Other Stars:

Omicron And, mag. 3.62, 23 01 55.25 +42 19 33.5, is a quadruple star system.
Mu And, mag. 3.86, 00 56 45.10 +38 29 57.3, is a multiple star system.
Kappa And, mag. 4.15, 23 40 24.44 +44 20 02.3, is a triple star with one planet in orbit.
Phi And, mag. 4.26, 01 09 30.12 +47 14 30.6, is an emission line star.
65 And, mag. 4.73, 02 25 37.40 +50 16 43.2, is a triple star.
Psi And, mag. 4.97, 23 46 02.04 +46 25 13.0, is a multiple star system.
Z And, mag. 5.09, 23 02 36.34 +42 45 28.1, is a multiple star system.
HD 16028, mag. 5.72, 02 35 38.74 +37 18 44.2, is a triple star.
12 And, mag. 5.77, 23 20 53.17 +38 10 56.9, is a triple star.
HD 5608, mag. 5.99, 00 58 14.19 +33 57 03.8, has one transiting planet in orbit.
HD 16327 mag. 6.19, 02 38 17.86 +37 43 36.6, is a triple star.
HD 221246, mag. 6.19, 23 30 07.39 +49 07 59.3, is a member of the **NGC 7686** star cluster.
HD 11624, mag. 6.28, 01 54 57.63 +37 07 42.0, is a member of the **NGC 752** star cluster.
HD 8673, mag. 6.34, 01 26 08.62 +34 34 47.7, has one planet in orbit.
GY And, mag. 6.38, 01 38 31.84 +45 23 58.9, has Promethium lines in the spectroscope.
HD 222155, mag. 7.1, 23 38 00 +48 59 47, has one planet in orbit.
HD 16175, mag. 7.28, 02 37 01.91 +42 03 45.5, has one planet in orbit.
HD 1605, mag. 7.52, 00 20 32.0 +30 58 29, has two planets in orbit.
HD 13931, mag. 7.52, 02 16 47.38 +43 46 22.8, has one planet in orbit.
HD 5583, mag. 7.6, 00 57 57.0 +34 59 08, has one planet in orbit.
GRB 34, “Groombridge 34”, mag. 8.01, 00 18 22.9 +44 01 22, is a binary star consisting of two main sequence red dwarf stars, designated as **GX And (Groombridge 34A)** and **GQ And (Groombridge 34 B)**. **GRB b34** is one of the closest double stars to the Solar System, located about 14” north of **26 And**. The two components are at mag. 8.3 and 11.3, are separated by 35’, and are both flare stars.
HD 15082, mag. 8.3, 02 26 51.06 +37 33 01.7, has a transiting planet, **WASP-33B**.
There are 31 more stars above mag. 10, and there are 8 stars with transiting planets below mag. 10 along with a flare star and a supernova.

Sky Happenings: November, 2016

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



- Nov. 2nd - The **Moon** passes 4° north of **Saturn** at 2 PM CDT,
 The **Moon** passes 7° north of **Venus** at 11 PM CDT.
- Nov. 3rd - **Asteroid Eurynome** is at opposition at 12 Noon CDT.
- Nov. 5th - Evening – the waxing crescent **Moon** hangs about 7° to the right or upper right of **Mars** (for **North America**). Note: Daylight Savings Time ends at 2 AM on the 6th.
- Nov. 6th - The **Moon** passes 5° north of **Mars** at 6 AM CST.
- Nov. 7th - **First Quarter Moon** occurs at 1:51 PM CST.
- Nov. 9th - The **Moon** passes 1.0° north of **Neptune** at 9 AM CST.
- Nov. 12th - **The Moon** passes 3° south of **Uranus** at 5 AM CST.
- Nov. 14th - **The Moon** is at perigee (221,524 miles from **Earth**) at 5:21 AM CST,
Full Moon occurs at 7:52 AM CST (Note: the **Full Moon** occurs just 2.5 hours after the closest perigee of the year, making this the largest **Full Moon** [33.5’ across] of 2016).
 Night – the **Moon**, just past full, shines near **Aldebaran** and the **Hyades**.

- Nov. 15th - The **Moon** passes 0.4° north of **Aldebaran** at 11 AM CST.
- Nov. 17th - Morning – the weak **Leonid Meteor Shower** peaks before dawn, but sky glow from the waning gibbous **Moon** will hide all but the brightest meteors.
- Nov. 18th - **Mercury** passes 3° north of **Antares** at 3 PM CST.
- Nov. 20th - **Neptune** is stationary at 4 AM CST.
- Nov. 21st - **Last Quarter Moon** occurs at 2:33 AM CST,
Morning – Look for first magnitude **Regulus**, the forefoot of **Leo**, less than 2° above the **Last Quarter Moon**.
- Nov. 24th - Morning – Look for **Gamma Virginis** about 2° to the lower left of the **Moon**,
The **Moon** passes 1.9° north of **Jupiter** at 8 PM CST.
- Nov. 25th - Dawn – the crescent **Moon**, **Jupiter**, and **Spica** form a triangle about 9° tall in the southeast.
- Nov. 27th - The **Moon** is at apogee (252,621 miles from **Earth**) at 2:08 PM CST.
- Nov. 29th - **New Moon** occurs at 6:18 AM CST,
Asteroid **Juno** is in conjunction with the **Sun** at 2 PM CST.
- Nov. 30th - The **Moon** passes 7° north of **Mercury** at 10 PM CST.

Planets:

Mercury – **Mercury** passes on the **Sun**'s far side in late October, and takes about a month to climb into view. On Nov. 23rd, **Saturn** (moving toward conjunction with the **Sun** and will be hard to see) passes 3½° north (the upper right) of **Mercury** (just above the horizon), and **Venus** will be 27° to their upper left at about 15 to 20 minutes after sunset. On Nov. 30th, **Mercury** stands 4° above the southwestern horizon 30 minutes after sunset, shining at mag. -0.5. That same evening, a one-day old **Moon** appears 7° north (to the upper right) of **Mercury**. A telescope will reveal **Mercury**'s fat gibbous disk, which measures 3.5" in diameter.

Venus – On Nov. 1st, a slender crescent **Moon** paints a pretty scene with **Venus** and **Saturn**. Look for **Venus** 10° above the southwest horizon 45 minutes after sunset. Gleaming at mag. -4.0, **Venus** stands out despite its low altitude and the twilight glow. Look for the two-day old **Moon** 15° to the right of **Venus**. As the sky darkens, **Saturn** pops into view 5° to the right of **Venus**. **Saturn**, shining at mag. 0.5, could be a challenge for naked eye observers under less than ideal conditions. Use binoculars to see 1st magnitude **Antares** 7° below **Saturn**. **Venus** spends the month gliding eastward from **Ophiuchus** across the top of the **Teapot of Sagittarius**. On Nov. 17th, **Venus** poses just ½° from the **Teapot**'s lid star, 3rd magnitude **Lambda Sagittarii**. **Venus** lies within 2° of the **Lagoon Nebula (M 8)** from Nov. 11th to the 13th, passing just 1.2° south of the stellar nursery. The **Triffid Nebula (M 20)** stands 1.4° north-northwest of the **Lagoon Nebula**, with the open cluster **M 21** just 0.7° south of the 7th magnitude globular star cluster **M 28**. Two nights later, **Venus** slides 1.6° south of 5th magnitude globular cluster **M 22**. By the close of Nov., **Venus** pulls within 1° of mag. 4.6 double star **52 Sgr** in eastern **Sagittarius**. During Nov., **Venus**'s gibbous disk widens from 14" to 17" in diameter as its phase thins from 78% to 70%.

Mars – **Mars** begins the month 3° northeast of **52 Sgr**, shining at mag. +0.4. The waxing crescent **Moon** appears near **Mars** on both the 5th and the 6th of Nov. **Mars** crosses from **Sagittarius** into **Capricornus** on Nov. 8th, and makes it across much of this constellation by the month's end. On Nov. 30th, **Mars** appears midway between 4th magnitude stars **Theta** and **Iota Capricorni**. Best views of **Mars** will come soon after twilight ends. **Mars**' disk now spans 7", and it will likely look like a featureless orange globe through small telescopes.

Jupiter – **Jupiter** is the sole planet visible at dawn this month. **Jupiter** rises only 2½ hours before the **Sun** as Nov. opens, but around 2:30 AM standard time as the month closes. **Jupiter** shines at mag. -1.7 and dominates the morning sky from its perch in central **Virgo**. On Nov. 1st, **Jupiter** stands 2° south of third magnitude **Gamma Virginis**. **Jupiter**'s steady eastward motion during the month carries it within 8½ of first magnitude **Spica, Virgo's** luminary. by the 30th. The star appears directly below the planet as the two climb higher in the southeast before dawn. In mid-Nov., **Jupiter**'s equator spans 32". On Nov. 5th, **Jupiter**'s moon **Io**'s shadow arrives on the Jovian disk at 6:50 AM CDT. The disk of **Io** follows 38 minutes later. On Nov. 8th, in eastern **North America**, **Ganymede**'s shadow will appear on **Jupiter**'s north polar region.



Ganymede starts to cross **Jupiter**'s disk at 4:03 AM CST. Similar performances occur with **Io** on Nov. 21st and with **Europa** on the 22nd. On Nov. 24th, **Callisto** passes due north of **Jupiter**. For **North American** observers, this is the first time in 3.5 years **Callisto** hasn't crossed in front of **Jupiter**. **Jupiter** starts Nov. just 13° from **Spica** (below **Jupiter**), to close within 8° by Nov. 30th.

Saturn – **Saturn** starts the month only about 5° to the right of **Venus**, at mag. +0.5, and is easily visible 30 minutes after sunset. At the opening of Nov., **Saturn** stands only a bit more than 10° above the southwest horizon 45 minutes after sunset. On Nov. 2nd, the waxing crescent **Moon** is 4° above **Saturn**. The interval between sunset and **Saturn** set shrinks from 2 hours to ½ hour during Nov., as **Saturn** heads toward a conjunction behind the **Sun**. On Nov. 23rd, **Saturn** passes 3½° north (to the upper right) of **Mercury** – look with binoculars 15 to 20 minutes after sunset – you will find them about 27° to **Venus**'s lower right.

Uranus – **Uranus** climbs highest in the south in the mid-evening, when it stands nearly ⅔ of the way to the zenith. **Uranus** resides among the background stars of **Pisces**. To find **Uranus**, locate mag. 5.7 **Zeta Piscium**. On Nov. 1st, **Uranus** appears 1.7° east of **Zeta Psc**, and the gap closes to 0.9° by the 30th. **Uranus** glows at mag. 5.7 – do not confuse it with **88 Psc**, a mag. 6 star that lies 0.6° south-southeast of **Zeta Psc**. A telescope will show the planet's distinctive blue-green color, and a disk diameter of 3.7”.

Neptune – **Neptune** lies due south and nearly halfway to the zenith at 7 PM local time in mid-Nov., glowing at mag. 7.9. To find **Neptune**, first locate 4th magnitude **Lambda Aquarii**, and then you scan 2.5° to the southwest (lower right). Don't confuse **Neptune** with a 7th magnitude star that lies just 0.7° to its north. **Neptune** reaches its stationary point on Nov. 20th. **Neptune** will show a distinctive blue-grey color, and under high magnification and good seeing conditions, you should be able to discern **Neptune**'s 2.3” diameter disk.

Pluto – **Pluto** is too low, too early in the evening for observation this month.



Asteroids – **Asteroid 1 Ceres** (now also classified as a dwarf planet) spends Nov. gliding westward through the sparse star fields of north central **Cetus**. The 600 mile wide asteroid reached opposition and peak visibility in late Oct., so it is now perfectly placed in the southern sky during the late evening. Although **Ceres** fades from mag. 7.5 to 8.1 this month, it remains among the brightest objects floating above the **Whale**'s back. The meager background means that it will take some effort to find the asteroid by star hopping. Start with **Theta** and **Zeta Ceti**, a pair of 4th magnitude stars on the **Whale**'s back. They lie 7° apart. Then shift the same distance north-northwest of **Zeta Ceti** to locate the 5th magnitude star **SAO 129465**. **Ceres** lies a couple of degrees farther north throughout the month.

Comets – **Comet Johnson (C/2015 V2)** should glow at 12th magnitude as it moves eastward through **Canes Venatici**, a constellation that climbs halfway to the zenith in the northeast sky as dawn breaks. The comet begins Nov. just 1° south of spiral galaxy **M 106**, and finishes the month 3° south of the **Whirlpool Galaxy (M 51)**. Unless you have a large telescope, the faint fuzzball won't be visible at low power. Start at 150x or so and take a few minutes to get accustomed to the darker field, and then begin scanning. Once you locate Johnson, bump up the power again to look for detail. The comet likely will appear out of round with a better defined southern flank.

Meteor Showers – The **Leonid Meteor Shower** peaks on Nov. 17th, but a waning gibbous **Moon** (just 3 days after **Full Moon**, at a nearly 90% lit disk) stands 55° away from the shower's radiant. The shower remains active from Nov. 6th to the 30th, however, so you should see a few stragglers in the days before the Nov. 14th **Full Moon** and again in the last week of the month.

The **Taurids Meteor Shower** runs all Oct. and Nov. The southern component of the **Taurids** peak in mid-Oct., and the northern component of the **Taurids** in mid-Nov. If not for the possibility of fireballs, this would be considered a modest shower of minor interest. The **Taurids** are bits of debris from **Comet 2P/Encke**.

The **International Meteor Organization** recently added the **November Orionids** to its calendar of

annual showers for a week centered on Nov. 28th. Careful observers have consistently recorded a few meteors per hour radiating from a point above the **Hunter**'s head.

When to View the Planets:

Evening Sky

- Mercury (southwest)
- Venus (southwest)
- Mars (south)
- Saturn (southwest)
- Uranus (east)
- Neptune (southeast)

Midnight

- Uranus (southwest)
- Neptune (west)

Morning Sky

- Jupiter (southeast)

DARK SKY VIEWING - PRIMARY ON NOVEMBER 5TH, SECONDARY ON NOVEMBER 26TH



Mythology:



Andromeda – The Chained Woman

Perhaps the most enduring of Greek myths is the story of Perseus and Andromeda, the original version of George and the Dragon. Its heroine is the beautiful Andromeda, the daughter of the weak King Cepheus of Ethiopia and the vain Queen Cassiopeia, whose boastfulness knew no bounds.

Andromeda's misfortunes began one day when her mother claimed that she was more beautiful even than the Nereids, a particularly alluring group of sea nymphs. The affronted Nereids decided that Cassiopeia's vanity had finally gone too far and they asked Poseidon, the sea god, to teach her a lesson. In retribution, Poseidon sent a terrible monster (some say a flood) to ravage the coast of King Cepheus's territory. Dismayed at the destruction, and with his subjects clamoring for action, the beleaguered Cepheus appealed to the Oracle of Ammon for a solution. He was told that he must

sacrifice his virgin daughter to appease the monster.

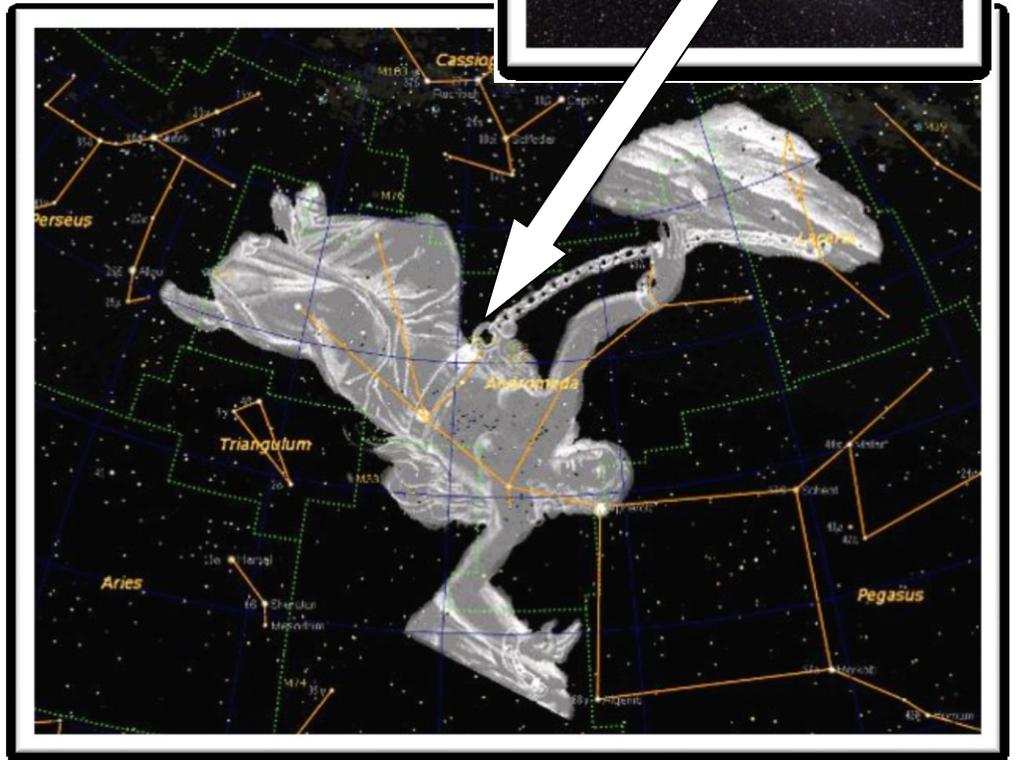
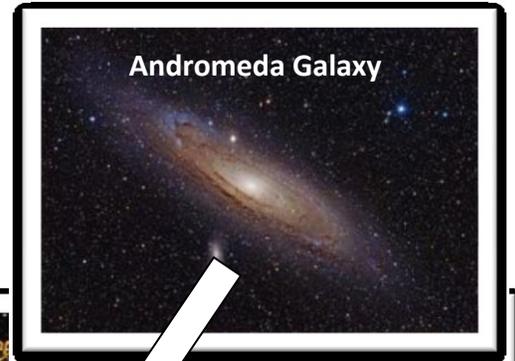
Hence the blameless Andromeda came to be chained to a rock to atone for the sins of her mother, who watched from the shore with bitter remorse. The site of the event is said to have been on the Mediterranean coast of Joppa (Jaffa), the modern Tel Aviv. As Andromeda stood on the wave –lashed cliffs, pale with terror and weeping pitifully at her impending fate, the hero Perseus happened by, fresh from his exploit of beheading Medusa the Gorgon. His heart was captivated by the sight of the frail beauty in distress below.

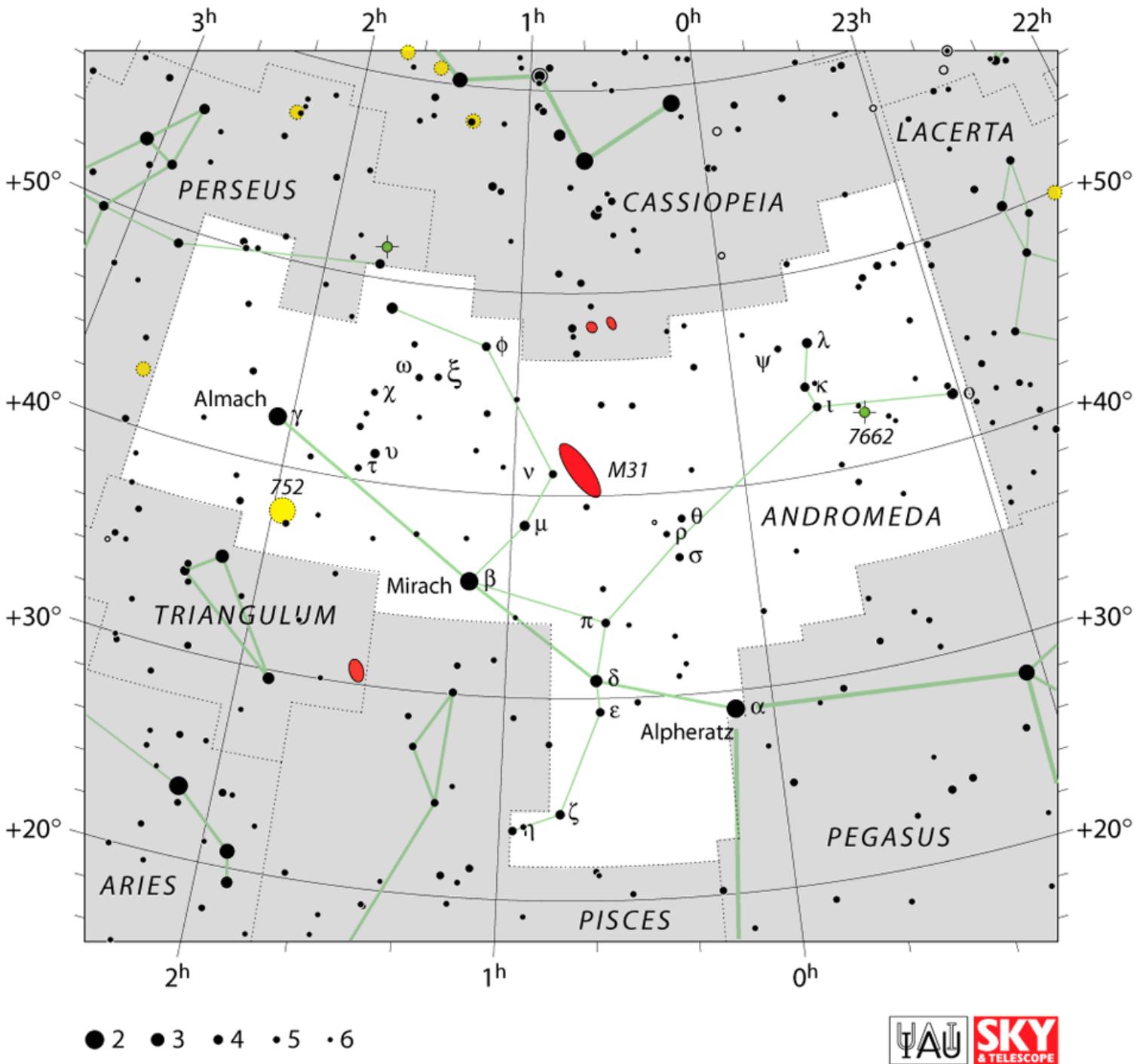
The Roman poet Ovid tells us in his book *Metamorphoses* that Perseus at first almost mistook her for a marble statue. Only the wind ruffling her hair and the warm tears on her cheeks showed that she was human. Perseus asked her name and why she was chained there. Shy Andromeda, totally different in character from her vainglorious mother, did not at first reply; even though awaiting a horrible death in the monster’s slaving jaws; she would have hidden her face modestly in her hands, had they not been bound to the rock.

Perseus persisted in his questioning. Eventually, afraid that her silence might be misinterpreted as guilt, she told Perseus her story, but broke off with a scream as she saw the monster breasting through the waves towards her. Pausing politely to ask the permission of her parents for Andromeda’s hand in marriage, Perseus swooped down, killed the monster with his sword, released the swooning Andromeda to the applause of the onlookers, and claimed her for his bride. Andromeda later bore Perseus six children including Perses, ancestor of the Persians, and Gorgophon, father of Tyndareus, King of Sparta.

It is said that the Greek goddess Athene placed Andromeda’s image among the stars, where she lies between Perseus and her mother, Cassiopeia. Only the constellation Pisces, the Fishes, separates her from Cetus, the Sea Monster. Star maps picture Andromeda with her hands in chains. Her head is marked by the 2nd magnitude star Alpha Andromedae, originally shared by Andromeda and Pegasus, where it marked the horse’s navel. It is known by the two alternative names of Alpheratz or Sirrah. These names come from the Arabic *al-faras*, meaning “the horse”, and *surrat*, meaning “navel”. The star is now assigned exclusively to Andromeda.

The most celebrated object in the constellation is the great spiral galaxy M 31, positioned on Andromeda’s right hip, where it is visible as an elongated blur to the naked eye on clear nights. M 31 is a whirlpool of stars similar to our own Milky Way. At a distance of 2 million light years, the Andromeda Galaxy is the farthest object visible to the naked eye.





The End

