

Night Visions



November 2019

Newsletter of the Baton Rouge Astronomical Society

Monthly Meeting November 11th at 7PM at HRPO

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

Program: Club members will work in teams on the club's new Light Pollution Diorama

What's In This Issue?



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Science Academy

Solar Viewing

Stem Expansion

Transit of Mercury

Edge of Night

Natural Sky Conference



Observing Notes: Cetus – the Sea Monster or Whale & Mythology

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

President's Message

On October 9th, we donated a Library Telescope to the West Baton Rouge Parish Library, made possible by the Horkheimer Charitable Fund thru The Astronomical League.

BOARD NOMINATIONS: So far, nominations for new officers for next year are Scott Cadwallader for President, Coy Wagoner for Vice-President, and Thomas Halligan for Secretary, Trey Anding for Treasurer. Of course, the nominations are still open if you wish to be an officer or know of a fellow member who would make a good officer contact the **Nominating Committee: John Nagle, Merrill Hess, or Craig Brenden.** Nominations are open until the December Meeting, where the votes will be taken.

SALE: BRAS is having a surplus telescope/equipment sale. Interested?, contact John, *jonagle at cox dot net*.

MEMBERS-ONLY VIEWING NIGHTS. BRAS will begin hosting these at HRPO once every 3 months. The first is on November 22nd after the Natural Sky Conference ends, 10 til whenever. Bring your telescope.

ALCon 2022 Bid Preparation and Planning Committee: Will meet on November 16 at 3:00 pm at Coffee Call, 3132 College Dr F, Baton Rouge, LA 70808,

UPCOMING BRAS MEETINGS:

Light Pollution Committee - HRPO, Wednesday November 6th, 6:15 P.M.

Business Meeting – HRPO, Wednesday November 6, 7 P.M.

Monthly Meeting – HRPO, Monday, October 11, 7 P.M.

BRAG MEETING: Nothing currently scheduled.

BRAS ZAZZLE SHOP We opened a shop on Zazzle, with lots of neat items with the BRAS logo. Please consider shopping there for Christmas. The shop can be found at:

https://www.zazzle.com/store/br_astronomical

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

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

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

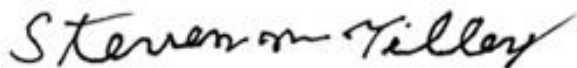
SALE: BRAS is having a surplus telescope/equipment.

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

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

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

Clear Skies



Steven M. Tilley, President



Secretary's Summary of October Meeting

- Welcome by President Tilley.
- Thomas introduced the speaker for the evening, Dr. Manos Chatzopoulos. The talk was titled “Cosmic Fireworks” and was about what happens when massive stars reach the end of their lives.
- The Nomination Committee (Merrill, John, and Craig) introduced the current nominees for officers in the club for next year. Scott Cadwallader has been nominated for president, Coy for vice president, and Thomas for secretary.
- There was a presentation of the Galileo Award to Scott Cadwallader.
- Steven mentioned that planning was ongoing for ALCON for July of 2022. He said that they were still looking for volunteers for committees. If we get the bid, one of the events planned is a trip to LIGO during their Science Saturday. We are also looking for sponsors for ALCON.
- Chris Kersey announced that there had been roughly 150-200 in attendance for the Spooky Spectrum event at the Observatory on the 12th. He was also encouraging members to volunteer to help plan ALCON 2022.
- Ben gave the outreach report. He was looking for 1 or 2 more volunteers for the Mini Maker Faire on the 19th at the main EBR Public Library; a schedule for this event will be coming out later.
- Steven checked for any new faces in the meeting.
- Don announced that the Rockefeller Stargaze will be the weekend of January 24th and 25th; more info will be coming later. This is a birdwatching event as much as it's a stargaze. Price is \$10 a night; there is room for 25 to attend. Participants should have a license/stamp in order to have legal access to the refuge.
- Trey announced that the Astronomy calendars that had been ordered were in. Also, he is now collecting dues from members for next year.
- Steven announced that there would be a Members Only Night for viewing for next month; watch the newsletter and the members-only forum for details.
- Raffle was coordinated by Scott Cadwallader.

Submitted by Roz Readinger, substitute secretary

GET ZAZZLED



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,

We had an encore of good luck with our October Outreach Events!!!!

Our Sidewalk Astronomy at Perkins Rowe was a perfect night! We got to show off Saturn, Jupiter, the Moon, Ceres and even caught the ISS passing over. Take a look below to see when we'll be out there this month.

We had a very busy weekend in late October. It started with a great night out at Lamar-Dixon with the Boy Scouts. Lots of Scouts and parents were on hand to check out some planets, the Moon and some deep sky objects. We were once again lucky to have a clear sky right up until we started packing up.

The next day was the Mini Maker Faire and there wasn't a cloud in the sky! (Unfortunately, not a spot on the Sun, either!) That event is always well attended and we have a good time out there.

Thank you to our volunteers this month: Craig, John, Scott C., Krista, Coy, Chris K., Chris & Annette, Ben, Russell, Carlo and Roz. We couldn't do this stuff without the help you provided. Take a look below for some more upcoming outreach opportunities. I'll be handing out 2019 lapel pins at the December meeting to those that helped out this year. You've got a few more chances to earn yours!

Look over the list of Upcoming Events. Let me know if you'd like to come help out. No experience necessary and really, this is one of the best ways to BUILD experience and help promote astronomy!



A few pics from the Merry Maker's Fair at the Goodwood Library,
L to R: John and Craig at the BRAS booth; Scott C with his Neutonian; and Roz

Upcoming Events

Tuesday, November 5th

6:30pm-8:30pm

Sidewalk Astronomy Perkins Rowe



Saturday, November 9th

10am-2pm

Hammond Eastside Magnet School Fall Festival

(4 or more people needed for demos, info, possible solar observing)

Wednesday, November 13th

7pm

Baton Rouge Free Thinkers Club

(Merrill will give a talk about amateur astronomy. At least one more person in attendance to help answer questions and maybe set up a display would be great!)

Tuesday, November 19th

6:30-7:45pm

Dunham School (Middle School STEM Night)

(2 or more people for demos/info)

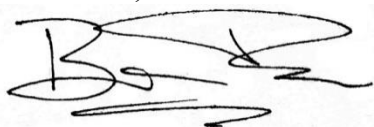
Friday, November 22nd

6pm-10pm

Baton Rouge White Light Night (Mid City Makers Market Location)

(Telescope viewing)

Clear skies,



Outreach Chairperson



Happy
Thanksgiving

BRAS FORUM NOTICE:

The BRAS Forum has a Members Only section, where we post notices or have discussions pertaining to members or the club that the general public can't see. If you would like to join the Members Only section, all you need to do is sign up for the forum (if you haven't already), and then send an email to [fred at eatel dot net](mailto:fred@eatel.net) with your forum username and email address, and ask to be added to the members only section. In your User Control Panel, you can set your preferences to receive email notification anytime a post is made.

Thanks, Frederick Barnett, Webmaster



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

September minutes were published in October newsletter

Old Business:

1. Update on status of diorama, not all material on hand.
2. Invitations for the Third Natural Sky Conference to be sent out by Chris. Scott suggests that the LSU Schools of Biology, Astronomy, and Architecture also be invited.

New Business:

1. Need to draft letter to BREC about their Environmental Sustainability Policy.
2. Pass a standing resolution. When one item/project is completed, start the next – no waiting until the next meeting to notify members of the committee of said completion.
3. The November BRAS membership meeting to be dedicated to working on the Light

Minutes of this meeting read and approved

Meeting adjourned.

John R. Nagle

Submitted by John Nagle, Chairman

Right: This heavenly view of the Milky Way galaxy was taken in the South Pacific paradise of Mangaia, the most southerly of the Cook Islands. This image was chosen as one of the winners of the **National Maritime Museum's Astrophotographer of the Year 2011 Contest**.

Read the article, **Milky Way Galaxy: Facts About Our Galactic Home**

<https://www.space.com/19915-milky-way-galaxy.html>



Globe At Night

Target for the Globe at Night program is **Perseus from November 18th through the 28th**. If you would like to participate in this citizen scientist program, you can find instructions at

<https://www.globeatnight.org>





Members/Community Corner

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

This month highlights the excursions of BRAS Member Steven Tilley, to the 2018 and 2019 AL Conventions. He sent in this writeup and great photos:

Hi everybody. ALCon is the annual convention of the Astronomical League. I have been to two of them: 2018 and 2019. The event usually runs four days, Wednesday through Saturday, and includes lectures, panel discussions, workshops, an exhibition, and astronomy field trips. It is held in a different city each year. In order to attend ALCon one has to register and factor in the cost of getting there and accommodations (I stayed at the Hotel where ALCon was). Events are set up on an "à la carte" basis, where one pays for the convention (about \$60 to \$85) Each field trip, bus transportation, the Star-B-Q, the Awards Dinner, t-shirts, etc. are add-ons.

I had great fun at them both and learned a lot. In fact I had so much fun I am putting my efforts next year into having BRAS host one in Baton Rouge for the 2022 Convention. There is a lot of advance work to do to be awarded the privilege to host a convention, organize hotel accommodations and room rates, bus tours, meals, tours and busses, etc. We began our planning meetings in September. Any BRAS member is welcome to attend. (See President's Message for the November meeting date.) I think there would be great interest among attendees to visit LIGO and Michoud, and eat some authentic cajun food. One added benefit, if we host an ALCon here, our members can attend with greater convenience and less expense.



Here are some of my photos from both years:

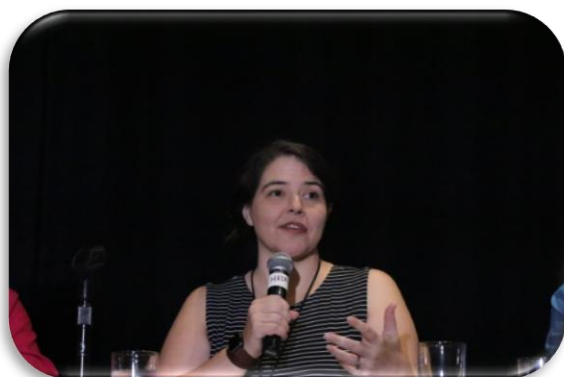
My 2018 ALCON pix



ALCon 2018 Bob Berman – Astronomer, author and "Strange Universe" columnist for Astronomy Magazine.



ALCon 2018 Dr. Phil Plait – a.k.a. the "Bad Astronomer" is an astronomer, writer and blogger



ALCon 2018 Dr. Pamela Gay – Co-Host of the “Astronomy Cast” podcast and the Director of Technology and Citizen Science for the Astronomical Society of the Pacific



ALCon 2018 Bob King – Known as AstroBob, he is an amateur astronomer, writer, educator and photographer



ALCon 2018 panel decision



ALCon 2018 field trip to Joseph J. Casby Observatory



ALCon 2018 -- Eagle Lake Observatory in Baylor Regional Park, this site consists of the Onan Observatory, the Sylvia A. Casby Observatory and the HotSpot Classroom.



ALCon 2018 -- Eagle Lake Observatory in Baylor Regional Park, this site consists of the Onan Observatory, the Sylvia A. Casby Observatory and the HotSpot Classroom

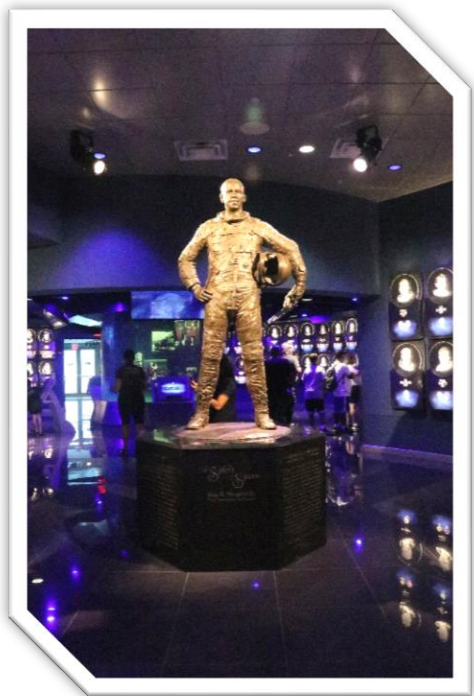


ALCon 2018 -- Eagle Lake Observatory in Baylor Regional Park, this site consists of the Onan Observatory, the Sylvia A. Casby Observatory and the HotSpot Classroom.



ALCon 2018 Vender EXPO.

My 2019 ALCON pix



ALCon 2019 Kennedy Space Center



ALCon 2019 Kennedy Space Center



ALCon 2019 Kennedy Space Center



ALCon 2019 Dr. W Maynard Pittendreigh Astronomical League, Executive Secretary, and Pranvera Hyseni of Astronomy Outreach of Kosovo.



ALCon 2019 the Bahamas



ALCon 2019 the Bahamas



ALCon 2019 the Bahamas

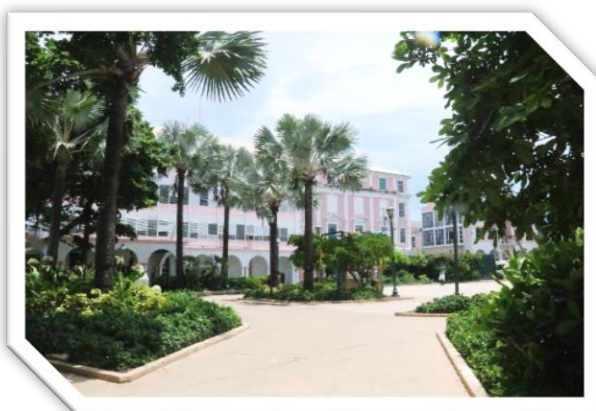


Figure 1ALCon 2019 the Bahamas

***ALCon 2020 will be hosted by The Albuquerque Astronomical Society (TAAS)
From more info go to <http://taas.org/documents/ALCON2020FlyerFinalRev1.pdf> and
<https://www.taas.org/documents/2020ALCONInformationPaper.pdf>***

Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

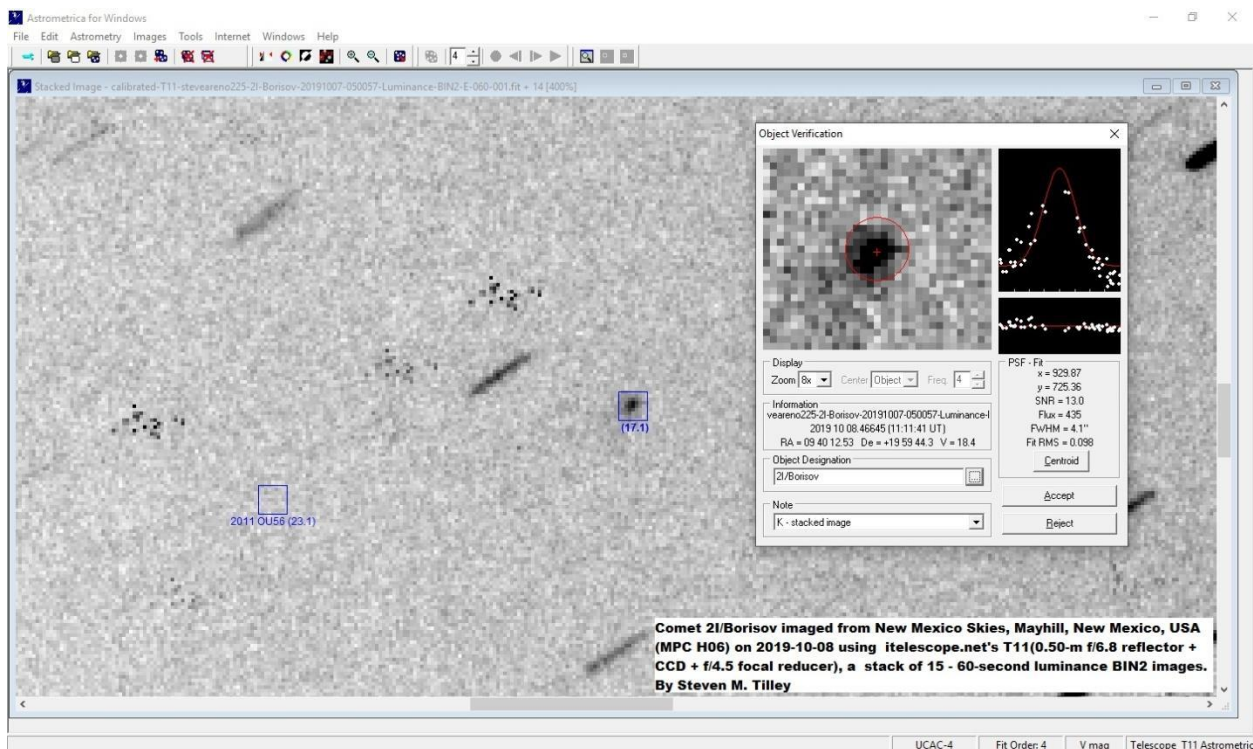
November 2019

Volume 1. Issue 10.

NASA-JPL is Season Two of 'On a Mission' Podcast Targets Asteroids. This is a 10-episode podcast host by Leslie Mullen. New episodes will be released weekly. For more information, see "[Season Two of 'On a Mission' Podcast Targets Asteroids](#)"[NASA JPL press release]

(<https://www.jpl.nasa.gov/news/news.php?feature=7516>)

The interstellar comet 2I/Borisov is continuing high speed through our solar system. There has been a good bit of buzz. Given the fact that it is the second known interstellar object to make its way through our Solar System would explain much of this buzz. If there is buzz if the object is in range of the telescopes if there are open time slots, and the weather helps out, more often than not, I am going to give it a try. With 2I/Borisov being low in the predawn sky, I had to wait for to be at an altitude at which the telescope could take the images. I set up the plan to image 2I/Borisov when it was at an altitude of 27 degrees(minimum target altitude: for T11 is approx 20 degrees). I had the telescope started imaging about a half-hour before the end of full darkness. I had T11 take 15 - 60-second luminance BIN2 images.



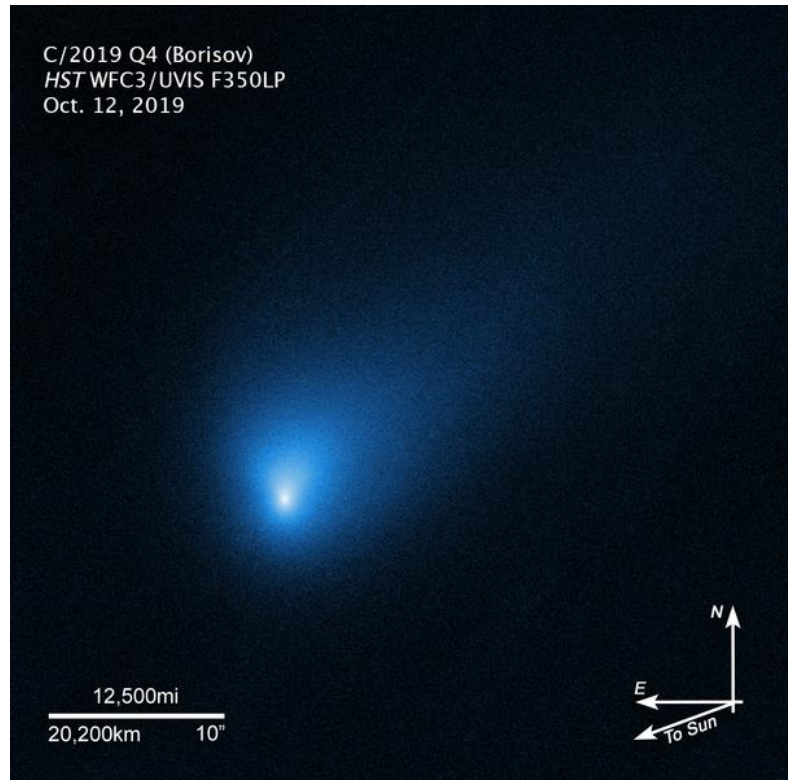
Comet 2I/Borisov imaged from New Mexico Skies, Mayhill, New Mexico, USA(MPC H06) on 2019-10-08 using [itelescope.net](#)'s T11(0.50-m f/6.8 reflector + CCD + f/4.5 focal reducer), a stack of 15 - 60-second luminance BIN2 images. By Steven M. Tilley

This object will be a hot target for the next year or so and will be image many telescopes. Here is one from Hubble;



English: About This Image - HUBBLE'S VIEW OF INTERSTELLAR COMET 2I/BORISOV <https://hubblesite.org/contents/media/images/2019/53/4578-Image>

NASA's Hubble Space Telescope has given astronomers their best look yet at an interstellar visitor – comet 2I/Borisov – whose speed and trajectory indicate it has come from beyond our solar system. Hubble photographed the comet at a distance of 260 million miles from Earth. This Hubble image, taken on October 12, 2019, is the sharpest view to date of the comet. Hubble reveals a central concentration of dust around the nucleus (which is too small to be seen by Hubble). The comet is falling toward the Sun and will make its closest approach on December 7, 2019, when it will be twice as far from the Sun as Earth. The comet is following a hyperbolic path around the Sun and will exit back into interstellar space. Comet 2I/Borisov is only the second such interstellar object known to have passed through the solar system. In 2017, the first identified interstellar visitor, an object formally named 'Oumuamua, swung within 24 million miles of the Sun before racing out of the solar system. --Color Info --



These images are a composite of separate exposures acquired by the WFC3 instrument on the Hubble Space Telescope. The color results from assigning the color blue to a monochromatic (grayscale) image. ([Wikimedia Commons https://commons.wikimedia.org/wiki/File:Comet-2IBorisov-HubbleST-20191016-compass.png](https://commons.wikimedia.org/wiki/File:Comet-2IBorisov-HubbleST-20191016-compass.png))

See

- MPEC 2019-R106 : COMET C/2019 Q4 (Borisov) : <https://minorplanetcenter.net/mpec/K19/K19RA6.html>
- MPEC 2019-S72 : 2I/Borisov = C/2019 Q4 (Borisov): <https://minorplanetcenter.net/mpec/K19/K19S72.html>
- MPC Database: 2I/Borisov = C/2019 Q4 (Borisov) https://minorplanetcenter.net/db_search/show_object?utf8=%E2%9C%93&object_id=2I
- FAQ for gb00234 = C/2019 Q4 = 2I (Borisov) [by Bill Gray at ProjectPluto] <https://projectpluto.com/temp/2i.htm>
- JPL Small-Body Database Browser: C/2019 Q4 (Borisov): <https://ssd.jpl.nasa.gov/sbdb.cgi?sstr=2I>
- 2I/Borisov (From Wikipedia, the free encyclopedia) <https://en.wikipedia.org/wiki/2I/Borisov>

[JPL Close Approach Data](#) from Sep 23, 2019 to Oct 29, 2019 Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal (LD (au))	H (mag)	Estimated Diameter
(2019 SX8)	2019-Sep-28	0.99 (0.00255)	28.9	4.3 m - 9.7 m
(2019 TE)	2019-Sep-28	0.93 (0.00238)	28	6.8 m - 15 m
(2019 TD)	2019-Sep-29	0.34 (0.00087)	29.2	3.9 m - 8.7 m
(2019 SM8)	2019-Oct-01	0.41 (0.00106)	29.2	3.8 m - 8.6 m
(2019 SP3)	2019-Oct-03	0.97 (0.00249)	26.3	15 m - 33 m
(2019 TN5)	2019-Oct-05	0.32 (0.00083)	28.4	5.5 m - 12 m
(2019 UU1)	2019-Oct-18	0.59 (0.00151)	30.4	2.2 m - 5.0 m
(2019 UG)	2019-Oct-18	0.84 (0.00215)	28.1	6.3 m - 14 m
(2019 UL3)	2019-Oct-19	0.77 (0.00199)	28.2	6.0 m - 13 m
(2019 UN8)	2019-Oct-23	0.93 (0.00240)	29.7	3.1 m - 6.9 m
(2019 UO8)	2019-Oct-25	0.41 (0.00105)	29.2	3.9 m - 8.6 m
(2019 UB8)	2019-Oct-29	0.50 (0.00127)	29	4.3 m - 9.5 m

As of 2019-10-27 there is

842,287 discovered asteroids (MPC)(<https://www.minorplanetcenter.net/>)

21297 discovered Near-Earth Objects (MPC) (<https://www.minorplanetcenter.net/>)

4,121 discovered Comets (MPC)(<https://www.minorplanetcenter.net/>)

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

2,364 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 2019-10-01 to 2019-10-27

Object Designation	Removed (UTC)
2019 UQ7	2019-10-27 14:24:50
2019 UU1	2019-10-26 16:24:45
2019 UB4	2019-10-25 13:40:21
2019 QD6	2019-10-25 13:27:19
2019 UR2	2019-10-24 13:28:45
2019 UA2	2019-10-23 13:48:20
2019 UG1	2019-10-23 13:46:45
2019 TJ5	2019-10-23 13:29:22
2019 UB2	2019-10-23 13:28:57
2019 UO	2019-10-22 13:44:43
2019 UN	2019-10-22 13:27:32
2019 UX	2019-10-21 13:34:20
2019 UG	2019-10-21 13:32:59
2019 TP5	2019-10-18 13:32:18
2019 TM6	2019-10-16 13:29:46
2019 TF7	2019-10-15 13:28:23
2019 QE	2019-10-13 13:30:16
2019 SU3	2019-10-12 00:33:53
2019 TS4	2019-10-10 15:59:58
2019 SQ8	2019-10-08 13:30:46
2019 SD10	2019-10-07 13:54:28
2019 TN1	2019-10-06 14:13:30
2019 TF1	2019-10-06 14:03:37
2019 SO6	2019-10-06 13:55:47
2019 TB	2019-10-05 14:06:56
2019 SE8	2019-10-04 23:00:58
2019 SV7	2019-10-02 13:59:20
2012 BG96	2019-10-01 21:06:18
2019 SL4	2019-10-01 14:33:27

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>)



Pulse of a Dead Star Powers Intense Gamma Rays

Our Milky Way galaxy is littered with the still-sizzling remains of exploded stars.

When the most massive stars explode as supernovas, they don't fade into the night, but sometimes glow ferociously with high-energy gamma rays. What powers these energetic stellar remains?

NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, is helping to untangle the mystery. The observatory's high-energy X-ray eyes were able to peer into a particular site of powerful gamma rays and confirm the source: A spinning, dead star called a pulsar. Pulsars are one of several types of stellar remnants that are left over when stars blow up in supernova explosions.

This is not the first time pulsars have been discovered to be the culprits continue article here:

<https://www.nasa.gov/jpl/nustar/pulse-of-a-dead-star-powers-intense-gamma-rays>



CAPTION: THE BLUE DOT IN THIS IMAGE marks the spot of an energetic pulsar -- the magnetic, spinning core of a star that blew up in a supernova explosion. NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, discovered the pulsar by identifying its telltale pulse -- a rotating beam of X-rays, that like a cosmic lighthouse, intersects Earth every 0.2 seconds.

The pulsar, called PSR J1640-4631, lies in our inner Milky Way galaxy about 42,000 light-years away. It was originally identified by as an intense source of gamma rays by the High Energy Stereoscopic System (H.E.S.S.) in Namibia. NuSTAR helped pin down the source of the gamma rays to a pulsar.

The other pink dots in this picture show low-energy X-rays detected by NASA's Chandra X-ray Observatory.

In this image, NuSTAR data is blue and shows high-energy X-rays with 3 to 79 kiloelectron volts; Chandra data is pink and shows X-rays with 0.5 to 10 kiloelectron volts.

The background image shows infrared light and was captured by NASA's Spitzer Space Telescope.

Image credit: NASA/JPL-Caltech/SAO



Messages from HRPO

Highland Road Park Observatory



FRIDAY NIGHT LECTURE SERIES

all start at 7:30pm

1 November: “Medical Imaging” In this brand-new lecture Professor Joyoni Dey of LSU will briefly illustrate the physics behind X-ray, CT, MRI and ultrasound. She will show case examples of [phase contrast X-ray imaging](#) (where interference of X-rays are used to image their phase-shift while propagating through the human body).⁸

8 November: “Apollo 12 Fiftieth Anniversary” The Apollo anniversary overall has been quite fun...and also introspective. Tom Northrop will be opening one of the older history books at HRPO to discuss the flight of [Charles Conrad, Alan Bean and Richard Gordon](#).



SCIENCE ACADEMY

Saturdays from 10am to 12pm

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

2 November: “[Galaxies](#)” The largest main components of the Universe come in a variety of shapes, sizes and staminas—and Cadets will explorer them all.

9 November: “[Earth Orbit](#) Trips I/Electronic Behavior I” This standalone, never-to-return-again series of sessions (each about a month apart) will focus on the space stations and satellites that orbit our home planet, and a collection of electricity demonstrations. Cadets who participates in sessions I, II and III will receive a special notation on their next certificates!

23 November: “[Constellations](#)” The patterns have stayed with our culture and our families throughout the millenia. They help us find our way. Cadets will learn where they originated, and the special celestial objects in each.

30 November: “Life Cycle of a Star” Yes—they are born, and they die...just like us. Most follow a set traditional patterns; others have [strange lives](#) that rival anything found in science fiction. Cadets will immerse themselves in the famous H-R Diagram!





Solar Viewing

Saturday 28 November from 12pm to 2pm.

For all ages. No admission fee.



Stem Expansion

Saturday 16 November from 3:30pm to 7:30pm

Primary Topic: Astrobiology

Secondary Topic: The Dragonfly Mission

For ages twelve to sixteen. \$15/\$18 per kid.

This program offers advanced topics, topic extensions and all-new games and activities to an older crowd. Certificates will be earned, and a section of archived experiments, some not seen in over fifteen years (and some *never* performed on site) take place.



Transit of Mercury

Monday 11 November from 6am to 1pm

No admission fee. For all ages.

A “transit” is the phenomenon of viewing a smaller body crossing in front of a larger one. On Veterans Day—the last time for thirteen years—the disk of Mercury will traverse the disk of the Sun. A Transit of Mercury is not visible to the unaided eye. At least 30x magnification is needed to easily see the phenomenon. Several telescopes (at least six) will be in operation on HRPO grounds. HRPO will be open for the duration of the event. The Sun will actually be rising here in Baton Rouge as the transit gets started!

PLEASE REMIND YOUR FAMILY, FRIENDS AND COWORKERS:

Viewing a Transit across the Sun can be dangerous for one’s eyesight if not performed correctly. The BRAS Forum thread lists a number of safe ways to view the transit (and actually, to view the Sun in general). Do *not* use sunglasses, do *not* attempt to use your hand to cover a portion of the Sun, and do *not* attempt to “glance quickly” in the direction of the Sun. At any rate, a Transit of Mercury is not visible to the unaided eye. If a first-timer is in *any doubt* whether he will be performing the viewing safely, viewing of the Transit should be attempted only with someone with previous solar viewing experience.





Edge of Night

Friday 15 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?* There is no other time like twilight. Bring it into your life!



Natural Sky Conference

Friday 22 November from 7pm to 10pm

No admission fee. For ages fourteen and older.

Although open to the general public the Conference will be aimed at those individuals and organizations in town that have a direct ability to quell the light pollution in the area. HRPO anticipates having the Conference at least through the end of twilight, so participants can see damage currently being caused by the light pollution in the area. The theme of the Conference will be the invitees answering questions (seen beforehand) asking them what they will be actively doing within the next twelve months to lessen the light pollution in the area.

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Apollo 8 "Earthrise"

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White and blue on black, the design (created by HRPO Education Curator Amy Brouillette and BREC's Marketing Department) takes its inspiration from the legendary Apollo 8 "Earthrise" photo.





Observing Notes: November

by John Nagle

Cetus – the Sea Monster or Whale

Position: RA 01 42, Dec. -11 35

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 are new each month.

Named Stars

Menkar (Alpha Cet), from the Arabic “Al Minhar”, “the Nose”, although it actually marks the open jaws, mag. 2.54, 03 02 16.78 +04 05 23.7, is a red giant star that is probably fusing helium to carbon. There is a wide blue star, **93 Ceti** (mag. 5.62, 03 02 22.51 +04 21 10.3, **HD 18883**, **HIP 14143**), at a separation of 15.8’, that is not associated with **Menkar**. About ½° to the southeast is a group of galaxies (16 to 17) of which some are members of **Abell 410** (about 70 galaxies total). **Alpha Ceti** is also known as “**Menkab**”, “**Mekab**”, “**Monkar**”, **HD 18884**, **HIP 14135**, and **92 Ceti**.

Deneb Kaitos (Beta Cet), from the Arabic “Al Dhanabal Kaitos al Janūbiyy”, “the Tail of the Whale Towards the South”, mag. 2.04, 00 43 35.23 -17 59 12.1, is an orange giant star, and is one of the brightest X-ray sources in the solar neighborhood. **NGC 247** is located less than 3° to the south-southeast. Also known as “**Diphda**”, “**Diphda Thani**”, **HD 4128**, **HIP 3419**, and **16 Ceti**.

Kaffaljidmah (Gamma Cet), from the Arabic “Al Kaff al Jidmah”, “the maimed hand, or part of a hand”, mag. 3.47, 02 43 18.12 +03 14 10.2, is a binary system. The primary is a binary also with the primary being yellow dwarf and the B star a blue dwarf at magnitudes 3.5 and 6.1, with a separation of about 70 AU and a period of over 300 years. The secondary star, **BD+02 418** (**LTT 10888**), is a magnitude 10.1 red dwarf star at a separation of 14’ from the primary and a period of at least 1.5 million years. **Gamma Ceti** is also known as **HD 16970**, **HIP 12706**, **86 Ceti**, and **Σ299**.

Phycochroma (Delta Cet), mag. 4.08, 02 39 28.95 +00 19 42.7, is a β Cepheid variable star with a period of 0.161137 days. Also known as **HD 16582**, **HIP 12387**, and **82 Ceti**.

Chuhaoliu (Epsilon Cet), mag. 4.83, 02 39 33.73 -11 52 17.7. Also known as **HD 16620**, **HIP 12390**, and **83 Ceti**.

Baten Kaitos (Zeta Cet), from the Arabic “Al Batn al Kaitos”, “The Whale’s Belly”, or “Belly of the Sea Monster”, mag. 3.74, 01 51 27.61 -10 20 05.8, is a spectroscopic binary star. Also known as “**Rabah al Naamat**”, part of “**Al Na’āmāt**” (see asterisms), **HD 11353**, **HIP 8645**, and **55 Ceti**.

Deneb Algenubi (Eta Cet), mag. 3.46, 01 08 35.26 -10 10 54.9 is a spectroscopic binary star. Also known as “**Dheneb**”, “**Deneb**”, “**Aoul al Naamat**”, a part of “**Al Na’āmāt**” (see asterisms), **HD 6805**, **HIP 5364**, and **31 Ceti**.

Thanih al Naamat (Theta Cet), mag. 3.60, 01 24 01.45 -08 10 57.9, is a spectroscopic binary star. Also known as “**Altawk**”, a part of “**Al Na’āmāt**” (see asterisms), **HD 8512**, **HIP 6537**, and **45 Ceti**.

Deneb Kaitos Shemali (Iota Cet), from the Arabic “**Deneb Kaitos Al Shamāliyy**”, “the Northern Branch of the Tail”, mag. 3.56, 00 19 25.68 -08 49 25.8, is a suspected variable star. Also known as

“Schemali”, **HD 1522**, **HIP 1562**, and **8 Ceti**.

Menkar (Lambda Cet), sometimes called “The Nose of Cetus”, mag. 4.71, 02 59 42.90 +08 54 26.6. Also known as **HD 18604**, **HIP 13954**, and **91 Ceti**.

Tiangunsi (Mu Cet), mag. 4.27, 02 44 56.37 +10 06 51.2, is a suspected variable star. Also known as **HD 17094**, **HIP 12828**, and **87 Ceti**.

Tianqunwu (Xi¹ Cet), mag. 4.36, 02 13 00.01 +08 50 48.3, is a suspected variable star. Also known as **HD 13611**, **HIP 10324**, and **65 Ceti**.

Tianqunliu (Xi² Cet), mag. 02 28 09.52 +08 27 36.3. Also known as **HD 15318**, **HIP 11484**, and **65 Ceti**.

Mira (Omicron Cet), from the Latin for “The Amazing One”, “The Wonderful” by Hevelius, mag. 3.04, 02 19 20.79 -02 58 37.4, is a cool red giant star, and is the prototype of all **Mira** variable stars. **Mira**, the first known variable star, varies from magnitude 3.5 at maximum to 10.1 at minimum over a period of 331.96 days. **Mira** has been observed as far back as 408-355 BCE by Eudoxus and Aratus (310-240 BCE). **Mira** has already expended its helium to fuse into oxygen and carbon and is now starting along the asymptotic giant branch of the H-R diagram. In less than 1 million years, the star will dissipate its outer layers, and it will form a nascent planetary nebula with a white dwarf core about the size of **Earth**. **Mira** has a companion star, **Mira B**, that is a white dwarf variable star (magnitude between 9.5 and 12.0) with a possible period of about 13 years and the current separation of about 0.5 arc second (or 65 AU). There is some evidence to support the view that **Mira B** is a blue sub-dwarf star with a period of 1800 years, but the majority of evidence supports **Mira B** being a white dwarf star. This star is known to *Star Trek* fans. Also known as **HD 14386**, **HIP 10826**, **SAO 129825**, and **68 Ceti**.

Al Sadr al Ketus (Pi Cet), mag. 4.24, 02 44 07.35 -13 51 31.2. Also known as **HD 17081**, **HIP 12770**, and **89 Ceti**.

Chuhaovi (Rho Cet), mag. 4.88, 02 25 57.01 -12 17 25.6. Also known as **HD 15130**, **HIP 11345**, and **72 Ceti**.

Al Sadr al Ketus al Thani (Sigma Cet), mag. 4.74, 02 32 05.28 -15 14 39.6. Also known as **HD 15798**, **HIP 11783**, and **76 Ceti**.

Durre Menthor (Tau Cet), mag. 3.49, 01 44 05.13 -15 56 22.4, is a main sequence yellow dwarf star and one of the nearest naked eye stars at 11.9 light years distance. It has five planets in orbit. This star was the first star to be monitored for the *SETI* search. It has been featured in a lot of science fiction stories and *Star Trek* episodes and the movie *Barbarella*. It also crops up in UFO blogs and discussion boards. There is a wide dust ring (inner edge between 1 and 10 AU, with an outer edge of 55 AU). An analysis of radial velocity data gave short, four periodic signals emerging at 20, 49, 160, and 642 days that seem to indicate the presence of planetary bodies. All planets would have a minimum mass of 4 solar masses, with two long period ones located at 0.5 and 1.3 AU, with two inner planets having a radii of 0.13 and 0.24 AU. There is a 13th magnitude dwarf companion at 2.3 arc minutes to the south-southeast of **Tau Ceti**, but it is most likely a line-of-sight coincidence. At 4 arc minutes to the west-southwest of **Tau Ceti** is the spiral galaxy **MCG-3-5-018 (PGC 6363)** at 13th magnitude and small (0.8'x0.5'). At 13.6 arc minutes west-southwest of **Tau Ceti** is **MCG-3-5-017 (PGC 6323)**. Also known as “**Al Durr al Manthur**”, **Thalath al Naamat**”, part of “**Al Na'āmāt**” (see asterisms), **HD 10700**, **HIP 8102**, and **52 Ceti**.

Aquae Abyssi (Upsilon Cet), mag. 3.99, 02 00 00.22 -21 04 40.0, is a spectroscopic binary star. Also known as a part of “**Al Na'āmāt**” (see asterisms), **HD 12274**, **HIP 9347**, and **59 Ceti**.

Al Nitham Al Awwal (Phi¹ Cet), mag. 4.77, 00 44 11.41 -10 36 33.4, is a suspected variable star. Also known as a part of “**Al Nitham**”, **HD 4188**, **HIP 3455**, and **17 Ceti**; **Phi² Ceti**, mag. 5.17, 00 50 07.72 -10 38 37.6. Also known as part of “**Al Nitham**”, **HD 4813**, **HIP 3909**, and **19 Ceti**; **Phi³ Ceti**, mag. 5.35, 00 56 01.51 -11 15 59.4. Also known as part of “**Al Nitham**”, **HD 5437**, **HIP 4371**, and **22 Ceti**; **Phi⁴ Ceti**, mag. 5.62, 00 58 43.89 -11 22 47.8. Also known as part of “**Al Nitham**”, **HD 5722**, **HIP 4587**, and **23 Ceti**.

Cayrel's Star (BD-16° 251), mag. 11.7, 01 29 30.31 -16 08 05.51.

Luyten 726-8 (UV Cet), mag. 12.54, 01 39 01.54 -17 57 01.8, a flare star prototype is a red dwarf star, with a period of 10 hours between magnitude jumps of 3 to 4 magnitudes, is the primary component. **BL Cet**, mag. 12.99, 01 39 01.54 -17 57 01.8, a red dwarf star, is a flare star and the secondary component.



Deep Sky:

M77 (NGC 1068), mag. 8.9, 02 42 40.7 -00 009 47.8, 8.2'x7.3' in size, is the prototype of the peculiar **Seyfert 2** galaxies, systems with bright, star-like nuclei, emission-line spectra, and moderately-strong radio output. **M77** is very bright, pretty large, irregularly round; very bright nucleus. It has a 10-million-solar-mass black hole surrounded by a bright accretion disk. It has 3 sets of spiral arms, a bright 6'x5' halo elongated, containing a very bright, exceptionally large, core. The halo is mottled with dark lanes and luminous fragments of spiral arms. In 1959, **M77** was assigned the radio designation **3C 71** for its non-thermal radio source. If you make a line from **Delta Ceti** to **M77** (53' east-southeast of **Delta Ceti**), and from its center point go 20' north-northeast you will find **NGC 1055**. Also known as **Arp 37**, **3C 71**, **CGCG 388-098**, **MCG +00-07-083**, **4C -00.13**, **PKS 0240-00**, **Bennett 9**, **PGC10266**, **UGC 2188**, **X-ray source 1H 0244+001**, **IRAS 02401-0013**, and **Cetus A (radio source)**.

NGC 246, mag. 8.5, 00 47 03.3 -11 52 18.9, 4' in size, is a large, pretty bright, with traces of ring structure planetary nebula; center star magnitude is 11.95 (**HIP 3678A**, or **BD-12 134A**).and its companion at magnitude 14.4 (**HIP 3678B**, 4" southeast of the primary. There is yet another companion (**HIP 3678C**) at about 1" northeast of the primary. All three are dwarf stars. **NGC 255** is 15' to the north-northeast. Also known as **PNG 118.8-74.7**, **PK 118-74.1**, **H5-25**, **C 56**, "The Cetus Ring", **VV 4**, and the "Cetus Bubble", and the "Skull Nebula".

IC 1613, mag. 9.2, 04 47.8 +02 07 04.0, 20'x18.5' in size, is a dwarf galaxy; very low surface brightness. It has a large population of Cepheid variables, contains millions of stars, and is possibly as old as 10 billion years. Also known as **PGC 03844**, **CGCG 384-068**, **DDO 008**, **CGCG 0102.4+0153**, **MCG +00-03-070**, **UGC 668**, **C 51**, **IRAS 01025+0153**, and **LEDA 3844**.

NGC 247, mag. 9.2, 00 47 08.8 -20 45 37.4, 19.2'x5.5' in size, is a faint, extremely large, and very elongated galaxy; patchy arms; very bright, extremely small nucleus. The **Burbidge Chain** (see below) is located 16' to the north-northeast. **NGC 247** is located less than 3° to the south-southeast of **Beta Ceti**. Also known as the "Pac-Man Galaxy", **C 62**, **ESO 540-022**, **H5-20**, **UGC 11**, **LEDA 2758**, **AGC 400384**, **Bennett 3**, and **MCG-04-03-005**.

Objects of interest beyond magnitude 10

NGC 584, mag. 10.5, 01 31.3 -06 52, 3.2'x1.7' in size, is a very bright, pretty large, and round galaxy; small, very bright nucleus. Also known as the "Little Spindle Galaxy", **H1-100**, **IC 1712**, **PGC 05663**, and **MCG-01-04-060**.

NGC 1052, mag. 10.5, 02 41.1 -08 15, 2.5'x2.0' in size, is a bright, pretty large, and round galaxy; very bright, diffuse center. It is an active radio source. **NGC 1042** is 14' to the southwest. **NGC 1035** is 22' to the west-northwest. **NGC 1047** is 10' to the northwest. Also known as **H1-63**, **MCG-01-07-034**, **PGC 10175**, **IRAS 02386-0828**, **PKS 0238-084**, and **GSC 5285 00689**.

NGC 45, mag. 10.6, 00 14 04.0 -23 10 55.5, 8.5'x5.9' in size, is a large and extremely faint galaxy; very faint nucleus; many knots on faint arms; extremely low surface brightness. Paired with **NGC 25**. Also known as **UGCA 004**, **ESO 473-001**, **DDO 223**, **MCG-01-01-021**, **IRAS 00115-2327**, and **LEDA 930**.

NGC 541, mag. 12.1, 01 25 44 -01 22 46, 2.1'x1.4' in size, located in **Abell 194**. Also known as **Arp 133**, **Minkowski's Object**, **PGC 05305**, **UGCA 1004**, **CGCG 385-128**, and **MCG+00-04-137**.

The Burbidge Chain, is a chain of four galaxies (**VV 518**) 16' to the north-northeast of **NGC 247**, Located at **00 47 36 -20 28 02**.

VV 518a – mag. 14.43, 00 47 35 -20 25 43. Also known as **ESO 540-25**, and **PGC 02791**.

VV 518b – mag. 17.5, 00 47 38 -20 27 05. Also known as **PGC 02798**, and **MCG-04-03-012**.

VV 518c – mag. 15.85, 00 47 37 -20 29 10. Also known as **PGC 02794**, **ESO 540-024**, and

MCG-04-03-011.

VV 518d – mag. 14.69, 00 47 38 -20 31 10. Also known as **PGC 02796**, **ESO 540-025**, and

MCG-04-03-013.

Cetus Dwarf Galaxy, **Cetus dSph** – mag. 14.4, 00 27 11 -10 56 28, 5'x4.4' in size. Also known as **PGC 3097691**.

Asterisms

Al Sadral Kaitos – The Whale's Breast, comprised of Epsilon, Pi, Rho, and Sigma Ceti.

Al Kaff al Jidhmah – The Part of a Hand, comprised of Alpha, Gamma, Delta, Lambda, Mu, Xi¹, and Xi² Ceti.

Al Na'amāt – The Hen Ostriches, comprised of Eta, Theta, Tau, Zeta, and Nu Ceti.

Al Nithām – The Necklace, comprised of Phi¹, Phi², Phi³, and Phi⁴ Ceti.

The Whale's Head – comprised of Alpha, Gamma, Xi², Mu, and Lambda Ceti.

The following objects are in Cetus: 300 NGC; 189 UGC; 2 UGCA; 126 IC; 359 MCG; 25 ESO; 15 HCG; 31 Arp; 3 Caldwell; 13 PGC; 10 AGC; 17 C; 6 Radio Galaxies; 5 Quasar; 3 Mrk; 8 A; 37 VV; 13 Galaxy Trios; 10 Ring Galaxies; 3 Local Group Galaxies; 8 Flat Galaxies; 3 Shk; 2 Kro; 1 Htg; Haufen A; 1 Stone; 1 BoBn; 2 Snow; 1 PHL; 1 Se; ! WNO; 1 Patchick-Wienerroither; 1 Whitting; 1 Hill; 1 Zw5; 1 Small Galaxy Group; 1 Variable Galaxy; 1 IRAS; 1 2 Mask; and 1 [A084].

Other Stars:

94 Ceti, mag. 5.07, 03 12 46.32 -01 11 45.4, has one planet in orbit at a separation of 1.42 AU, and a period of 536 days. Also known as **HD 19994**, and **HIP 14954**.

75 Ceti, mag. 5.36, 02 32 09.44 01 02 05.3, has one planet in orbit. Also known as **HD 15779**, and **HIP 11791**.

81 Ceti, mag. 5.65, 02 37 41.78 -03 23 45.8, has one planet in orbit at a separation of 2.5 AU, and a period of 953 days. Also known as **HD 16400**, and **HIP 12247**.

HD 11964, mag. 6.42, 01 57 09.82 -10 14 30.6, has two planets in orbit at separations of 0.23 AU and 3.2 AU, and periods of 38 days and 1,945 days. Also known as **HIP 9094**.

HD 1461, mag. 6.47, 00 18 41.62 -08 03 09.3, has two planets in orbit at separations of 0.063 AU and 0.117 AU, with periods of 5.8 days and 13.5 days. There are two more planetary candidates. Also known as **HIP 1499**.

79 Ceti, mag. 6.83, 02 35 20.02 -03 33 34.3, has one planet in orbit at a separation of 0.35 AU, and a period of 76 days. Also known as **HD 16141**, and **HIP 12048**.

HD 7449, mag. 7.50, 01 14 29 -05 02 51, has two planets in orbit at separations of 2.3 AU and 5.0 AU, with periods of 1,275 days and 4,046 days. Also known as **HIP 5806**.

HD 11506, mag. 7.54, 01 52 50.53 -19 30 25.1, has two planets in orbit at separations of 0.64 AU and 2.43 AU, with periods of 170 days and 1,270 days. Also known as **HIP 8770**.

HD 5319, mag. 8.05, 00 55 01.40 +00 47 22.4, has two planets in orbit at separations of 1>8 AU and 2.1 AU, with periods of 675 days and 886 days. Also known as **HIP 4297**.

HD 224693, mag. 8.23, 23 59 53.83 -22 25 41.2, has one planet in orbit at a separation of 0.23 AU and a period of 27 days. Also known as **HIP 118319**.

HD 6718, mag. 8.45, 01 07 48.66 -08 14 01.3, has one planet in orbit at a separation of 3.56 AU and a period of 2,496 days. Also known as **HIP 5301**.

HD 1690, mag. 9.17, 00 21 13 -08 16 32, has one planet in orbit at a separation of 1.3 AU and a period of 533 days. Also known as **HIP 1692**.

HD 2638, mag. 9.44, 00 29 59.87 -05 45 50.4, has one planet in orbit at a separation of 0.05 AU and a period of 3.4 days. Also known as **HIP 2350**.

BD-17°63, mag. 9.62, 00 28 34.31 -16 13 34.8, has one planet in orbit at a separation of 1.3 AU and a period of 656 days. Also known as **HIP 2247**.

HD 16031, mag. 9.76, 02 34 11 -12 23 03, has two planets in orbit. Also known as **HIP 11952**.

HIP 5158, mag. 10.21, 01 06 02.05 -22 27 11.4, has two planets in orbit at separations of 0.89 AU and 2.7 AU with periods of 345 days and 9,018 days. Also known as **CD-23 395**.

Beyond magnitude 10.5 are the following: WASP-71, transiting planet; WASP 77a, transiting planet; WASP 26, transiting planet; WASP 75, transiting planet; HAT-P-46, two transiting planets; HAT-P-45, transiting planet; and WASP-44, transiting planet.

Other stars in Cetus are as follows: 23 Σ ; 1 Σ I; 1 O Σ ; 10 h; 7 β ; 1 S; 1 A; 1 Kui; and 1 Hdo.

Sky Happenings: November, 2019

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



- Nov. 1st -** **Saturn**, the waxing lunar crescent, and **Jupiter** form a line 22° long in the south-southwest after sunset. The two gas giant planets linger in this part of the sky all month.
- Nov. 2nd -** The **Moon** passes 0.6° south of **Saturn** at 2 AM CDT,
The **Moon** passes 0.4° south of **Pluto** at 1 PM CDT.
- Nov. 3rd -** **Daylight Savings Time** ends at 2 AM CDT.
- Nov. 4th -** **First Quarter Moon** occurs at 4:23 AM CST.
- Nov. 6th -** The **Moon** passes 4° south of **Neptune** at 11 PM CST,
The **South Taurid** meteor shower peaks.
- Nov. 7th -** The **Moon** is at apogee (251,691 miles or 405,058 km from **Earth**) at 2:26 AM CST.
- Nov. 9th -** **Venus** passes 4° north of **Antares** at 5 AM CST.
- Nov. 9/10/11** Dawn: **Mars**, in **Virgo**, passes within 2½° of **Spica**, to its left or upper left on the next three days.
- Nov. 10th -** The **Moon** passes 4° south of **Uranus** at 10 PM CST.
- Nov. 11th -** **TRANSIT OF MERCURY!** **Mercury** is in inferior conjunction with the **Sun**. The transit starts at 6:35 AM CST with the mid-point of the transit at 9:20 AM CST, and the end of the transit occurring at 12:04 PM CST. The entire passage across the **Sun** will take almost 5½ hours.
- Nov. 12th -** Asteroid **Vesta** is at opposition at 3 AM CST,
Full Moon occurs at 7:34 AM CST,
The **North Taurid** meteor shower peaks.
- Nov. 15th -** The **Moon** is 1.5° south of **M35** at 2 PM CST.
- Nov. 16th -** Evening: The waning gibbous **Moon** rises in **Gemini**, some 5° to 6° to the right of **Pollux**.
- Nov. 16/17** The **Leonid Meteor Shower** peaks, but the waning gibbous **Moon** will greatly interfere with the viewing of this shower.
- The **Moon** is 0.9° north of the Beehive (**M44**) at 5 AM CST.
- Nov. 19th -** **Last Quarter Moon** occurs at 3:11 PM CST.
- Nov. 20th -** **Mercury** is stationary at 9 AM CST.
- Nov. 23rd -** The **Moon** is at perigee (227,867 miles or 366,716 km from **Earth**) at 1:41 AM CST.
- Nov. 23/24** Dusk: In the southwest, shortly after sunset, **Venus** and **Jupiter** will be just barely over 1° apart.
- Nov. 24th -** The **Moon** passes 4° north of **Mars** at 3 AM CST,
Venus passes 1.4° south of **Jupiter** at 8 AM CST,
The **Moon** passes 1.9° north of **Mercury** at 9 PM CST.
- Nov. 26th -** **New Moon** occurs at 9:06 AM CST.
- Nov. 27th -** **Neptune** is stationary at 2 PM CST.
- Nov. 28th -** **Mercury** is at greatest western elongation (20°) at 4 AM CST,
The **Moon** passes 0.7° north of **Jupiter** at 5 AM CST,
The **Moon** passes 1.9° north of **Venus** at 1 PM CST.
- Nov. 29th -** The **Moon** passes 0.9° south of **Saturn** at 3 PM CST,
The **Moon** passes 0.5° south of **Pluto** at 10 PM CST.
- Dec. 1st -** Dawn: **Mercury** and **Mars** adorn the southeastern horizon at sunrise,
Dusk: **Saturn**, **Venus**, and **Jupiter** form a string of pearls 18° long above the southwestern

horizon after sunset, with the waxing crescent **Moon** overlooking the trio of planets from the upper left.

Planets:

Mercury – **Mercury** will transit the **Sun** on November 11th, in a 5 hour and 29 minute passage, beginning in the early morning. **Mercury** will appear just 10'' across, with the **Sun** spanning 1,939''! The next transit of **Mercury** will not happen until 2049, so see this one! After the transit, **Mercury** will embark on its finest morning apparition of the year, shining at magnitude -0.3 on the 24th. The planet will peak in magnitude at its greatest western elongation (20°) on November 28th, appearing 10° high in the east-southeast 45 minutes before sunrise. The planet will glow at magnitude -0.6, and will maintain it through the end of the month. It will appear conspicuous in the brightening twilight until about ½ hour before sunup. You can see a 7'' diameter disk appearing slightly more than half-illuminated at the planet's greatest elongation.

Venus – **Venus** appears low in the southwest starting about 30 minutes after sundown. Standing just 5° high in early November, its altitude doubles by month's end. The planet, at magnitude -3.8, will pass about 4° above **Antares** on the 9th. On the 10th, **Venus** and **Jupiter** are 10° apart, and the gap narrows by 1° per day. A dramatic conjunction on the evening of November 23rd/24th, between **Venus** and **Jupiter** will happen with the planet **Venus** standing just 1.5° south of **Jupiter** on both nights. A slender crescent **Moon** joins the pair of planets on the 28th, appearing 2° above **Venus** and 6° to **Jupiter**'s upper right. **Venus** will reach its southern most declination (almost -25) this year on the 28th—about one hour before it reaches aphelion. On the final night of November, the gap between **Venus** and **Jupiter** (to the lower right) is about 6½°, with **Venus** setting some 105 minutes after the **Sun**. Earlier in the evening, the 3rd magnitude star **Kaus Borealis** (magnitude 2.81, 18 29 09.5 -25 24 33), in **Sagittarius** at the top of the **Teapot** asterism, is less than 1° from **Venus**.

Mars – **Mars** rises not long before the start of morning astronomical twilight in early November, but about 2½ hours before the **Sun** by month's end. The planet, at magnitude -1.8, with a golden-orange color and a disk diameter of less than 4'' wide, will pass less than 3° from the magnitude 1.0 blue-white star **Spica**, low in the east-southeast before dawn. **Mars** will be to the upper left of **Spica**. The planet spends the entire month moving eastward against the backdrop of **Virgo**. On the 30th of November, the planet is within 0.2° of the 4.3 magnitude star **Lambda Virginis**. The planet will show a featureless disk just 4'' across.

Jupiter – **Jupiter** and **Venus** shine in the mid-twilight in the southwest on November 1st. In early November, **Jupiter** will have a 33''-diameter disk at magnitude -1.9. On the mornings of the 4th and the 11th, there will be double shadow transits. For a complete listing of the phenomena of **Jupiter**, see the November issue of *Sky and Telescope* – page 51. The views of the planet deteriorate as it sinks lower after mid-month after passing from **Ophiuchus** into **Sagittarius** – where it will join **Saturn**. **Venus** will pass 1.4° to the south of **Jupiter** on the 24th, with the thin crescent **Moon** making it a trio with a tight pass (0.7° for **Jupiter**, and 0.9° for **Saturn**) on the 28th.

Saturn – **Saturn**, at magnitude +0.6, is among the background stars of eastern **Sagittarius**, just a few degrees south of the **Teapot** asterism. The planet will be some 25° high in the south-southwest an hour after sunset in early November and 15° high in the southwest late in the month. **Saturn** will set 4½ hours after the **Sun** on the 1st, but about 2½ hours on the 30th. The planet shines at magnitude +0.6 all month and its globe will be less than 16'' wide after the 1st. The ring system will span 35'' to 36'', near its maximum tilt. A waxing crescent **Moon** joins the planet on both the 1st and 29th of November. **Titan**, a moon of **Saturn**, at 8th magnitude will show up through any instrument, but it will take at least a 4-inch telescope to reveal the 10th magnitude moons **Tethys**, **Dione**, and **Rhea**. A bigger telescope is needed to spot the two 12th magnitude moons **Iapetus** (east of the planet in the first half of the month) and the inner moon **Enceladus**, which will reach its greatest eastern elongation and peak visibility on the 1st.

Uranus – **Uranus** is less than a week past opposition as November opens at magnitude 5.7, and will remain visible all night. The planet is among the background stars of southwest **Aries**. Once the sky grows dark, the planet is already 20° high above the eastern horizon on its way to a peak altitude of 60° due south at around midnight local time. By late November, the planet appears highest in the south around 9:30 PM local time. To locate the **Uranus**, the closest bright star is the 2nd magnitude **Alpha Arietis (Hamal)**, but the planet will lie 11° south of this star. Draw an imaginary line from **Alpha Arietis** to the 4th magnitude star

Alpha Piscium. The planet lies roughly midway between the two stars. To confirm sighting, the planet's disk spans 3.7' and shows a distinctive blue-green hue.

Neptune – **Neptune** makes a tempting target on November evenings. The planet is half-way to the zenith in the south around 8:30 PM local time early in the month and some 2 hours earlier by month's end. The planet glows at magnitude 7.9. To find the planet, first find the 4th magnitude star **Phi Aquarii**. Using binoculars, center the star, and **Neptune** is in the binocular field. On the 1st, the planet is 1.3° west-southwest of **Phi Aquarii**, and closes the month 1.5° from the star. There is a 7th magnitude star located 0.9° west of **Phi Aquarii**, so do not confuse the two. Only **Neptune** will show a 2.3" diameter disk with a subtle blue-grey color.

Pluto – **Pluto** will be in **Sagittarius** at RA 19 30.4, Dec. -22 25 with an angular size of 0.1", 100% lit, and a magnitude of 14.3 on November 15th. *By my estimates*, **Pluto**'s positions are as follows: On November 4th – 10.5' west-northwest of the star **HD 183431**; on the 8th – 8' northwest of the star; on the 12th – 5.5' north-northwest of the star; on the 16th – 4.5' north-northeast of the star; on the 20th – 8' northeast of the star; on the 24th – 14' northeast of the star; and on the 28th – 18' east-northeast of the star or 22' north-northwest of the star **HD 183857**.

Moon – The **Moon** is a waxing crescent 3° to 4° to the lower right of **Saturn** on the evening of November 1st. On the 13th, it is just past full phase when it is less than 2° from **Aldebaran**. On the night of the 16th/17th, the waning gibbous **Moon** is 5° to 6° to the lower right of **Pollux** in **Gemini**. On the morning of the 20th, the thinning **Moon** is about 6° to the left or lower left of **Regulus**. The waning lunar crescent is about 3° to 4° to the left or upper left of **Mars** at dawn on the 24th. On the 27th, about 45 minutes after sunset, **Venus**, **Jupiter**, and a very low **Moon** line up. The **Moon** is about 1½° above **Venus** on the night of the 28th, with **Jupiter** to their lower right. On the 29th, the crescent **Moon** is just a little more than 1° to the lower left of **Saturn**.

Favorable Librations: **Mare Smythi** on November 3rd; **Xenophanes Crater** on the 12th;

Drygalski Crater on the 22nd; and **Mare Marginis** on the 30th.

Greatest north declination is on the 17th (+23.0°); south declination on the 2nd (-23.0°) and the 29th (-23.1°).

Libration in longitude: East limb most exposed on the 1st (+7.1°) and the 29th (+5.9°)

West limb most exposed on the 16th (-4.9°)

Libration in latitude: North limb most exposed on the 9th (+6.7°)

South limb most exposed on the 23rd (-6.7°)



Asteroids – Asteroid **4 Vesta** is conveniently placed this month, rising in the early evening sunset and remaining above the horizon almost the entire night. Although **Vesta** remains visible all night, wait until it climbs well above the southeast horizon by mid-evening. In early November, your best guides are the 4th magnitude stars **Omicron Tauri** and **Xi Taurii**. On the 5th, **Vesta**, at magnitude 6.9, passes 0.3° due south of **Omicron Taurii**, and will brighten to magnitude 6.5 when it reaches opposition on the 12th. On the 7th, it will cross into northeast **Cetus**. On the night of opposition, the **Full Moon** will pass several degrees north of the asteroid. The next close encounter comes on the 20th and 21st, when **Vesta** slides 0.4° south of a slightly brighter field star. **Vesta** will end the month 0.9° south of the 5th magnitude star **Lambda Ceti**. **Vesta**'s positions, *by my estimates*, are as follows: On November 1st – about 1° south-southeast of **Xi Taurii**; on the 6th – about ½° northeast of **Omicron Taurii**; on the 11th – just over 2° west and a slightly south of **Omicron Taurii**; on the 16th – just over 3° west and slightly south of **Omicron Taurii**; on the 21st – about 2½° east-southeast of **Lambda Ceti**; on the 26th – about 1¾° southeast of **Lambda Ceti**; and on December 1st – about 1° due south and a little west of

Lambda Ceti.

Comets – Comet **PANSTARRS (C/2017 T2)**, a visitor from the **Oort Cloud**, should brighten to 9th or 10th magnitude in November. For now, you will need a 4-inch telescope under a dark sky to see it. On November 26th and 27th, **Earth** will pass through the comet's orbital plane. A short, v shape dust trail will tilt edge on toward us, sticking out as a small spike to the southeast of the comet's head. The comet will then lie about 3° west of **Capella**. The comet's positions, *by my estimates*, are as follows: On November 5th – just over 1° to the

north and a little east of **M38**; on the 10th – just under 3° due north of **M38**; on the 15th – about 2.8° due east and a little south of **Eta Aurigae**; on the 20th – about 2° northeast of **Eta Aurigae**; on the 25th – just over 2° southwest of **Capella**; and on the 30th – just over 3° west-northwest of **Capella**.

Meteor Showers – The **Leonid Meteor Shower** peaks before dawn on November 18th. Unfortunately, the waning gibbous **Moon** will share the sky about 20° to the west of the radiant point in the **Sickle** asterism of **Leo**. The **Leonids** strike Earth’s atmosphere at 44 miles per second, so they produce more fireballs than most meteor showers.

When to View the Planets:

Evening Sky

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

Midnight

Uranus (southwest)
 Neptune (west)

Morning Sky

Mercury (southeast)
 Mars (southeast)

DARK SKY VIEWING · PRIMARY ON NOVEMBER 23RD, SECONDARY ON NOVEMBER 30TH



mythology:

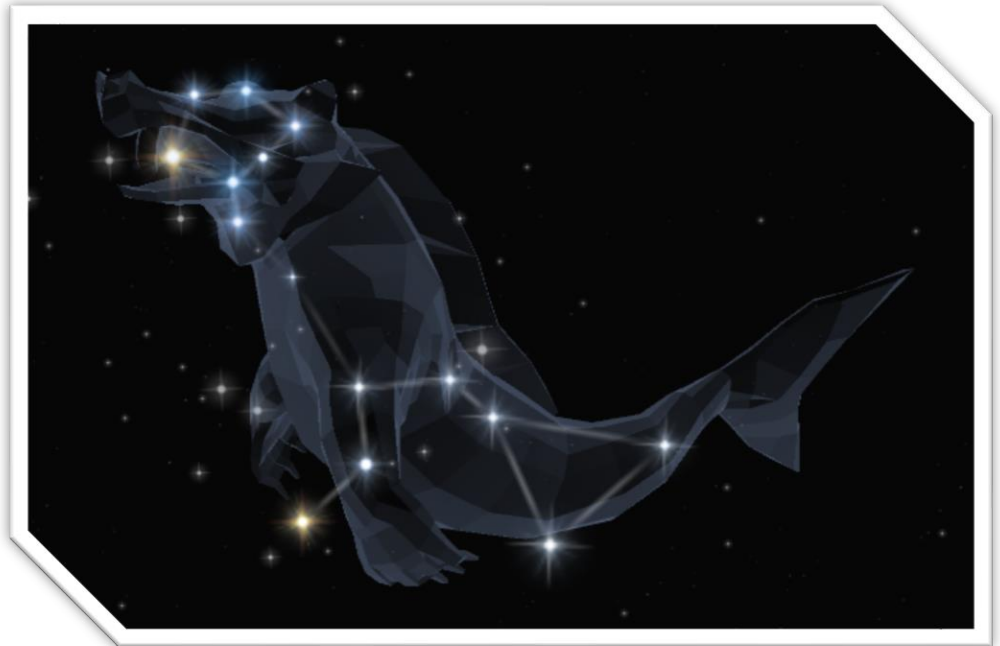
Cetus – The Sea Monster or Whale

When Cassiopeia, wife of King Cepheus of Ethiopia, boasted that she was more beautiful than the sea nymphs called the Nereids, she set in motion one of the most celebrated stories in mythology, whose characters are commemorated in the sky. In retribution for the insult to the Nereids, the sea god Poseidon sent a monster to ravage the coast of Cepheus's territory. That monster is represented by the constellation Cetus.

To rid himself of the monster, Cepheus was instructed by the oracle of Ammon to offer up his daughter Andromeda as a sacrifice to the monster. Andromeda was chained to the cliffs at Joppa (the modern Tel-Aviv) to await her terrible fate.

Cetus was visualized by the Greeks as a hybrid creature, with enormous gaping jaws and forefeet of a land animal, attached to a scaly body with huge coils like a sea serpent. Hence Cetus is drawn on star maps as a most unlikely looking creature, more comical than frightening, nothing like a whale although it is sometimes identified as one.

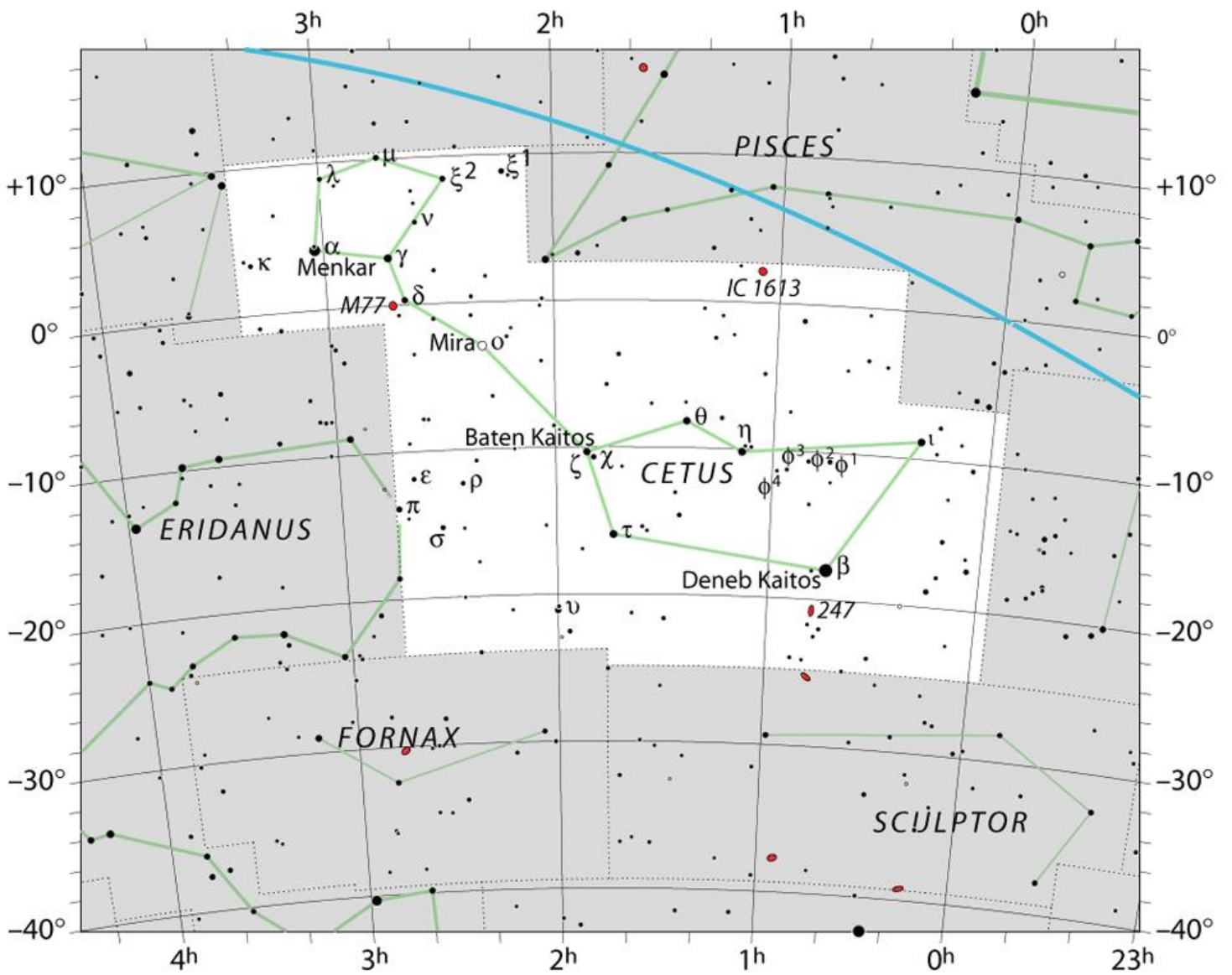
Andromeda trembled as the B-movie monster made towards her, cleaving the waves like a huge ship. Fortunately, at this moment the hero Perseus happened by and sized up the situation. Swooping down like an eagle onto the monster's back, Perseus plunged his sword into the creature's right shoulder. The monster reared up upon its coils and twisted round, its cruel jaws snapping at its attacker. Again and again Perseus plunged his sword into the beast, through its ribs, its



barnacle-encrusted back and at the root of its tail. Spouting blood, the monster finally collapsed into the sea, and lay there like a water-logged hulk. Its corpse was hauled ashore by the appreciative locals, who skinned it and put its bones on display.

Cetus is the fourth-largest constellation, as befits such a monster, but none of its stars is particularly bright. Alpha Ceti is called Menkar from the Arabic meaning "nostrils", a misnomer since this star lies on the beast's jaw. The most celebrated star in the constellation is Mira, a Latin name meaning "the amazing one", given on account of its variability in brightness. At times it can be easily seen without binoculars or telescope. Mira is a red giant star whose brightness variations are caused by changes in its size. The star was first recorded in 1596 by the Dutch astronomer David Fabricius, but the cyclic nature of the changes was not recognized until 1638. The name Mir was given to the star by the Polish astronomer Johannes Hevelius in 1662, when it was the only variable star known.





● 2 ● 3 ● 4 ● 5 ● 6



The End

