

Night Visions

February 2021



Newsletter of the **Baton Rouge Astronomical Society**

The Double Cluster, astrophoto by Richard Rogers, see Page 7

Monthly Meeting February 8th at 7:00 PM, via Jitsi

*(Monthly meetings are on 2nd Mondays at Highland Road Park Observatory,
temporarily during quarantine at meet.jit.si/BRASMeets).*

PRESENTATION: Mirror cleaning demonstration by Merrill Hess

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

NEW! BRAS YouTube Channel

President's Message

Happy February everyone—the Winter sky is now at it's peak splendor and the evenings are long and dark enough to take it all in. Well, they're long enough: the ever increasing problem of **light pollution** is keeping things from getting dark enough to really enjoy the night's sky. Which is why we're vamping up our efforts to try to get it under control. The latest plan is to contact every municipality in the surrounding area to make sure they realize this is a problem for a lot of people and to show them ways they can help their constituents out. The plan has already begun. Most recently, we've fired off a question to BREC to find out what they're doing to help mitigate the problem. There's plenty of work to be done here, and we could really use your help in this matter, so if you can spare some time to make a phone call or two, or write an email, just let us know and we'll help you get started.

If you're looking for something to do with the club that's a bit further down the line, we've decided to try to crank up some of our **outreach activities**. The observatory has been spearheading the attempt here, developing protocols for safely showing off celestial events and the like. The normal weekend viewing opportunities are usually well staffed, but we do have some larger events coming up down the line that we could use some help with: of note right now, are the ever popular nano-days, the annual astronomy day event, and, further down the line, our asteroid day programs (see the HRPO News below for info). All of these events need manpower from us to help them out: if you're not already accredited through BREC, contact Chris Kersey and he'll show you how.

One special opportunity for outreach is a pair of events that are coming up surrounding the landing of the Perseverance rover on 18 February. **On both the 18th, there will be a (ahem) landing party for the rover, and on the 19th there will be an online talk about the mission.** Helping out with either of these events should satisfy one of the criteria for the AL / NASA certificate for Perseverance—the other criterion being the having imaged Jazero crater during the latest apparition. If you would like to be a part of either, get in touch with me by at least Friday, 12 February so we can organize your participation. For those of you who, for whatever reason, don't want to go through BREC, we're actively looking for other outreach opportunities—hopefully, we'll get our sidewalk astronomy program back out there before too long.

And, lastly, we should mention that our **Winter MOON event** has been set for Sunday evening, February 7, anticipating good weather. We should have the observatory open and will keep it open until most everybody has had their fill for the evening—so come on out, see people, and maybe get some observing in. These events are a great time to start working on those AL certificates, and you can even use the equipment we have out there to help you out (we may even be able to use the 20" under certain restrictions). If you don't feel like braving the cold, you can always socialize with your fellow members remotely via our social media platforms: we're now active on Facebook, Redditt, YouTube, and Discord—just find your preferred platform and search around for us, and message a moderator to join the closed groups.

That's it: as a quick reminder, we do still have **BRAS merchandise available through Zazzle.com**, key chains, ties and such, the most recent additions to which are various magnets (of course!), one smaller refrigerator style and another one to slap on the side of your car—which could prove useful when you're out observing. At any rate, give it a look: we'll get a portion of the proceeds from any sale made.

[Baton Rouge Astronomical Society Gifts on Zazzle](#)

Okay, I hope to see everybody at the next meetings, and that you enjoy your sky.

Scott Cadwallader, President 2021



**Congratulations to our Webmaster *Fred Barnett*
For 100,000 visits to the *Baton Rouge Astronomical Society* website
and 7000 posts in the *BRAS Forum!***

January Member Meeting Minutes

President Scott Cadwallader called meeting to order on Jitsi, on January 11th, 2021

- Coy introduced the speaker, Marty McGuire, a NASA Solar System Ambassador. His talk was about the Mars Perseverance vehicle scheduled to land on Mars on February 18th.
- Scott reminded everyone that yearly dues are due, and that the BRAS office of Vice President and the PIO are still unfilled. Steven Tilley has volunteered to be acting VP for a month or two.
- Trey reported that dues were due on January 31st, reserved calendars are at HRPO, and that Chris K. will sell the rest.
- Chris K says that there are work orders in for the hydraulic cylinders on the dome's shutter. He said that this Saturday there will be a limited opening of the dome for the public, and that HRPO is still having activities with all the Covid restrictions.
- Ben says there is not much of any Outreach right now. Ben added that if anyone wants to do an individual outreach, let people know about it on Facebook and other social media before the outreach. Scott added that if possible; try not to take business away from HRPO.
- Steven is willing to donate an All-Sky camera to HRPO, says that the camera assembly at HRPO will be the second one, with the first at his residence. The camera assembly will need to be connected to the internet through the LSU server.
- Chris K has started a new program on Light Pollution, Multi-Year Natural Sky Reclamation Plan. Help is needed for this plan. If anyone is Interested, contact Chris or John Nagle. Scott said that members should consider joining the Light Pollution Committee.
- February meeting talk will be on how to clean a mirror, given by Merrill Hess.
- BRAS now has a Reddit, Discord, and a member Facebook group. See Amy Northrop about these.
- Discussed the idea of contacting the local news/tv stations about feeding them local events and sky events.
- More discussion on the above topics.

Meeting was closed.

Submitted by John Nagle, substituting for Thomas Halligan, Secretary



*Happy
Mardi Gras,
Everyone!*

2021 Officers:

President: Scott Cadwallader
Interim VP: Steven Tilley
Secretary: Thomas Halligan
Treasurer: Trey Anding

BRAS Liaison for BREC:
Chris Kersey
BRAS Liaison for LSU:
Greg Guzik

Committees/Coordinators:
AL Awards
Merrill Hess
Light Pollution:
John Nagle
Newsletter:
Michele Fry
Observing:
John Nagle
Outreach:
Ben Toman
Webmaster:
Frederick Barnett



BRAS Business Meeting Minutes –January 27th, 2021 remotely via Jitsi

(This meeting is now scheduled to come early enough to be included in each monthly newsletter.
See President's Message)

- Scott Cadwallader opened the meeting announcing that Steven Tilley will be acting as the interim Vice President for another month, and that Merrill Hess as the interim PIO.
- The February meeting program will be a demonstration on mirror cleaning.
- HRPO – A display on the Bill of Rights is now up, and a couple of displays are being changed out. The asking of health questions is no longer required of incoming patrons, but temperature is still required. HRPO will be open on February 18th for the landing of Perseverance.
- Scott reports the following: There is one month left to submit a conjunction event; an 8-inch telescope has been donated to BRAS, and we will donate it to HRPO to use for the IAD Raffle. Ben has been checking it out and says it is in perfect condition. It was noted that we need to check and see if it has a transferable warranty.
- Chris said that IAD is on May 15th, Nano Days is on March 27th, and that the Radio Field Day is also in the mix.
- Ben said that the only outreach request is for the Oak Park Elementary STEM Night is in March. Ben will give a 5 to 10 minute talk about the Moon, and could then give them BRAS fliers.
- Chris wanted to know if BRAS can start Sidewalk Astronomy again. The idea is to get a few people to spread the word.
- Scott said that the MOON Night will take place after the membership meeting on the 8th, and will last to 12 AM or later.
- Trey said that he had created two fridge magnets with the BRAS Logo, and that they are available on the BRAS store Zazzle page.
- Scott asked if BRAS should support the Danko (Dark Sky Weather Forecasting) web site. He said he envisioned an annual donation of \$30 to \$50. Note: The general membership has already approved an annual donation. Scott said to give Danko a \$25 donation.
- The subject of allowing some BRAS members to attend the Virtual meeting at HRPO was discussed. Trey said that the CDC still recommends avoiding large crowds. Scott said that this subject will be returned to the calendar.
- Various ideas and comments were exchanged.
- Chris reminded that there will be a Moon occultation soon.
- Meeting was closed.

Submitted by Thomas Halligan

Upcoming BRAS Meetings:

MOON (Members Only Observing Night), **Sunday, February 7th, beginning 7 p.m.**

Monthly Member Meeting: **7:00 Monday, February 8th**, via Jitsi remote access (open to the public).

Light Pollution Committee Meeting: **6 pm Wednesday, February 24th** via Jitsi. (Open to the public), followed by.....

Monthly Business Meeting: **7 pm Wednesday, February 24th**, (via Jitsi (Members Only))



BRAS Outreach Report

Hi Everyone,

At least this month I can report that we have an outreach request on the books. Oak Grove Primary is having their annual STEM night, but in a creative way to adhere to social distancing guidelines. We'll be submitting a 5-10 minute video demonstration that will be part of an evening of learning videos. They will be showing the videos on a large inflatable screen in the parking lot and their students (with their families) will watch from the comfort of their vehicles. It's not ideal, but it's commendable that they are making every effort to continue their STEM night event even in the current circumstances.

Coincidentally, the STEM night at Oak Grove was the LAST in-person outreach we did before the world came to a grinding halt last March. It's hard to believe that was almost an entire year ago. The next few months should give us an idea of how soon we'll be getting back to regularly scheduled events. I'm hoping for the best!



Ben and Roz at the last in-person outreach of 2020, at Oak Grove Primary

Finally, others may have pointed it out, but I'll give my two cents here, as well. There are a couple of Challenges available via NASA and/or the Astronomical League that you may be able to take part in. One involved the conjunction of Saturn and Jupiter and the other involves the Mars Perseverance Rover. Opportunities to help fulfill the requirements via some upcoming events at the HRPO have been mentioned, but I'd like to remind you that you can set up your OWN events, too. (Both challenges require a short presentation to the public in some form.) With all of the restrictions ongoing, I believe both challenges allow for virtual presentations or even videos that can be watched later. I encourage you all to think about doing one or both of the challenges. Put together a quick, informative presentation on the topics and find some way of sharing it. (The best way right now may be to create a social media event and invite your friends and family to watch.) Not only is this a great way to do some outreach, but I think you'll find it amazing how much you learn yourself while doing some quick research.



Merrill, Craig and Roz at a STEAM night at Westdale Heights Academic Magnet

Keep sharing your love of astronomy with your friends, coworkers and family. It's the best way to keep your outreach chops in shape for when we are once again unleashed on the community!!

Clear Skies, and Happy Mardi Gras. **STAY SAFE, AND LAISSEZ LES BON TEMPS ROULER!!!!!!**

Ben Toman



BRAS Light Pollution Committee Report

This committee meets at 6:00, same day as the 7:00 BRAS Business Meeting
(NEW SCHEDULE: Meetings will be the Wednesday before the 1st Monday of the month.)

Everyone is welcome to join in..

- Thomas called Mr. Darryl Hughes, BREC Assistant Department Director, Recreation, and inquired about BREC official position on full cut-off lighting fixtures at all BREC properties (as the BREC Environmental Sustainability Policy requires) on behalf of BRAS. Mr. Hughes replied that the BREC Planning and Engineering Departments are in charge of BREC lights, and that he would ask them to call Thomas back. He also stated that all new lights are full cut-off, but he did not know about existing lighting. If BREC does not respond (a call back), an e-mail will be sent to Mr. Hughes.
- Chris said he will request testimonials from parents and ask them to write letters in regards to the LPC Petition.
- The Multi-Year Natural Sky Reclamation Project has started. The LPC will need volunteers to help with this project. If you would like to volunteer, contact Chris Kersey or John Nagle.
- The donated SQM will have its installation delayed until certain maintenance and upgrades of HRPO are completed – the SQM is one of the upgrades.
- Meeting adjourned.

Submitted by John R. Nagle, Chairperson

Globe At Night

The target for the Globe At Night program is **Orion from February 3rd through the 12th**.
If you would like to participate in this citizen science program, you can find instructions at
<https://www.globeatnight.org>

P.S. The “Loss of the Night” app can be used for information and for reporting your observations.

Recent Entries in the BRAS Forum

Below are selected additions to the BRAS Forum, which has reached 7000 posts.

BRAS Member Gets Great Shot of [Jupiter-Saturn Conjunction](#)
ISS Wows with [Magnitude -3.8 Pass](#)
Final Weeks for [Martian Viewing](#) Conclude in February



BRAS MEMBER ASTROPHOTOS

If you want your astrophotos included here, send a .jpg to Michele at newsletter@brastro.org. by the 25th. Be sure to name your file thus: your initials/date taken (yearmonthday)/image name. Ex. RR 20201126 M33. Include a brief discription in the email.

RICHARD ROGERS



The Double Cluster is a pair of pretty good-sized star clusters at the border between Perseus and Cassiopeia--a bit north of straight overhead at ~ 9PM this time of year--big enough to see with the naked eye in perfect sky conditions. This shot is the result of about 100, 10 second images taken with the 8 inch GSO astrograph and the Nikon D300s on an unguided equatorial mount. The images were registered and stacked in Deep Sky Stacker and post processed in Star Tools.

These clusters are made up of relatively “new” stars ~ 10 million years old as compared with the Sun at about 5 billion years old-- made up primarily of large blue-white stars like Sirius. The clusters are about 7500 light years away – so photons in this photo left about 2000 years before the beginning of the first dynasties in Egypt. But they are getting closer! Light from the clusters are strongly blue-shifted, meaning that they are headed this way at high speed – almost 40km/second.

Flying “Rocks” and “Dirty Snowballs”:

Asteroid and Comet News

February 2021
Volume 3, Issue 2.

[JPL Close Approach Data](#) from Dec 28, 2020, to Jan 30, 2021, Distance Nominal < 1 Lunar Distance

Object	Close-Approach (CA) Date	CA Distance Nominal (LD)	CA Distance Nominal (Earth Radii)	H (mag)	Estimated Diameter
(2020 YS4)	2020/12/28	0.25	15.06	27.7	7.5 m - 17 m
(2021 AA)	2021/01/01	0.62	37.36	26.9	11 m - 24 m
(2021 AH)	2021/01/03	0.13	7.83	28.5	5.4 m - 12 m
(2021 AH8)	2021/01/04	0.14	8.44	29.6	3.2 m - 7.3 m
(2021 AS2)	2021/01/09	0.28	16.87	29.4	3.4 m - 7.7 m
(2021 BR2)	2021/01/16	0.19	11.45	30.8	1.8 m - 4.1 m
(2021 BK)	2021/01/18	0.29	17.47	30.3	2.3 m - 5.2 m
(2021 BV1)	2021/01/18	0.62	37.36	28	6.6 m - 15 m
(2021 BO)	2021/01/18	0.06	3.62	32.9	0.69 m - 1.6 m
(2021 BO1)	2021/01/20	0.65	39.17	29.1	4.0 m - 9.0 m

As of 2021-01-30 there is

1,125 objects listed on JPL’s Sentry: Earth Impact Monitoring(JPL) (<https://cneos.jpl.nasa.gov/sentry/>)

2,613 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 2020-12-31 to 2021-01-30

Object Designation	Removed (UTC)
2021 AS2	2021-01-30 15:31:21
2021 AS3	2021-01-19 14:19:10
2021 BM	2021-01-19 14:07:15
2021 AV7	2021-01-19 13:58:49
2021 AN5	2021-01-16 15:51:13
2021 AO	2021-01-13 14:00:39
2021 AT2	2021-01-11 14:34:55
2021 AL1	2021-01-08 14:22:56
2021 AX	2021-01-08 13:59:25

2021 AZ	2021-01-07 21:33:36
2021 AE	2021-01-04 14:35:03
2020 YL1	2021-01-02 13:49:09
2017 FB102	2021-01-02 13:30:30
2020 YC3	2020-12-31 13:40:16

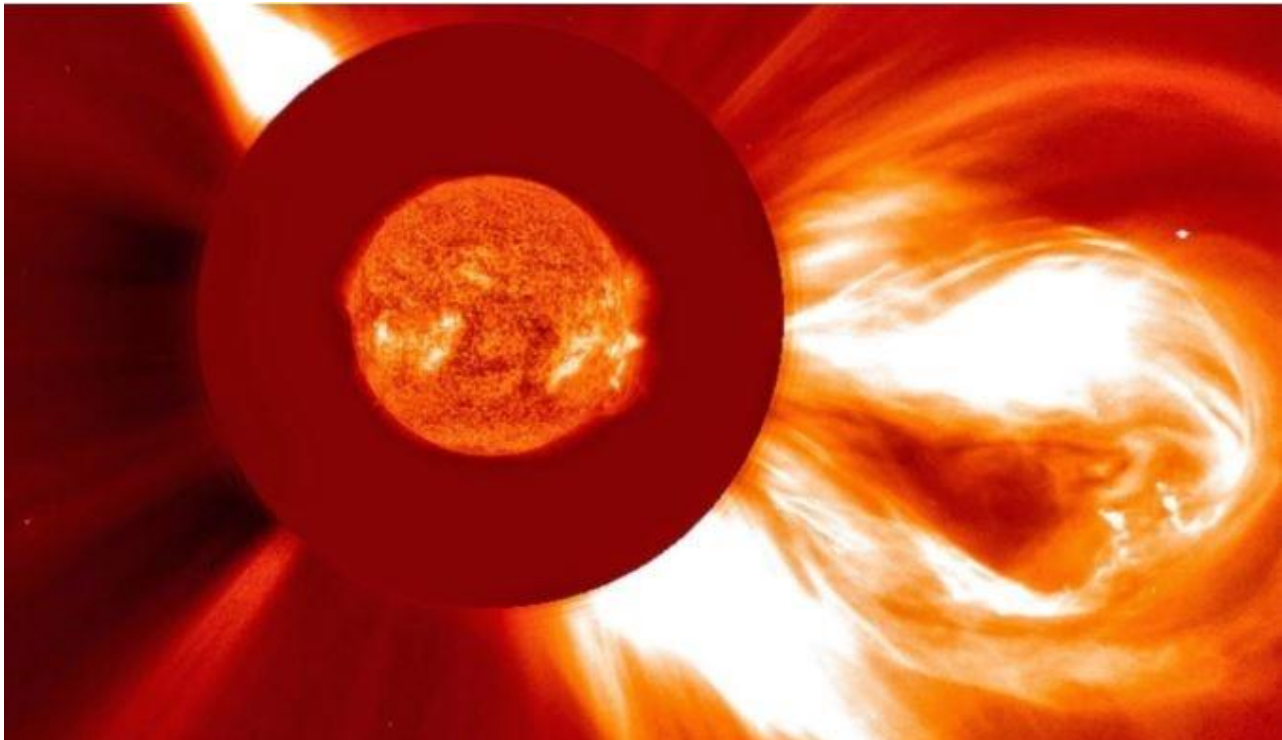
Useful Links:

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>)

[What if ... A Perfect CME Hit Earth? | Spaceweather.com](#)
(spaceweatherarchive.com) JANUARY 21, 2021 / [DR.TONY PHILLIPS](#)



The Solar and Heliospheric Observatory (SOHO) has observed CMEs (Coronal Mass Ejection) leaving the sun at speeds up to 3,000 km/s. This article asks, “What’s the worst the sun could do” if it hit the Earth? And is this even possible? Better read this article and gas up your generator.



Messages from HRPO

Highland Road Park Observatory



REMOTE DISCUSSIONS

All are for ages fourteen and older.

Fridays at 6:30pm.

5 February: "Meeting of the Giants"

12 February: "Star Mergers"

19 February: "The Latest Martian Rover"

26 February: "Our Birth Stars"



Solar Viewing

Saturday 13 February from 12pm to 2pm.

For all ages. No admission fee.

(Solar Viewers, \$2 each. Add-on Activity: \$2.50.)

Virus Shutdown Guidelines in effect.

The hobby of astronomy immediately brings to mind thoughts of darkened backyards and dimly-lit nighttime activities at HRPO. But patrons also have the option of visiting during daylight hours to see our parent star.

Weather permitting, once monthly HRPO personnel offers three views of the Sun...

12pm to 12:30pm - *indirect projection onto white viewing surface* // Patrons get a sense of the speed of Earth's rotation as they see the Sun's image slide on or off the projection device. [Learning Technologies Sunspotter]

12:15pm to 1:15pm - *safely-filtered optical light sent through standard telescope* // This option allows patrons to spy sunspots both small and large. [Orion 10" Skyquest Dobsonian Reflector]

12:30pm to 2:00pm - *hydrogen-alpha light* // Flares and prominences are seen easily in this wavelength. [Coronado Solar Max II 90mm]



Plus Night: “Sirius and Canopus”
Saturday 27 February from 7pm to 10pm
For all ages. No admission fee.
Binoculars recommended.

Sky Viewing Plus takes place about a half-dozen times per calendar year. It is the same program as “Evening Sky Viewing”, with the following additions—

- filtered views of the Moon, Mars and Jupiter (when those objects are available)
- marshmallow roast --physical science demonstrations
- unaided eye sky tour --binocular sky tour
- quiz/scavenger hunt/task game for kids to earn prizes

The game this month will focus on the two brightest stars in the night sky!



Display Premiere: “Arrival of Apophis”
December 2020 – April 2029

Using an outline composed by the HRPO Manager, Education Program Specialist Amy Northrop and other personnel have created a natural sky display focused on the asteroid Apophis. Planetary scientists at one time thought 99942 Apophis might strike the Earth in 2029. We now know that Apophis will instead pass extremely close—within 32,000 kilometers, which is within the orbits of some spacecraft. The predicted magnitude as it passes over Baton Rouge will be about +7. This magnitude is certainly “doable” with a good binocular, and a natural sky. For the next 100 months, this display will stand to remind and encourage local citizens to demand a more natural sky, so that a majority of us will see the passing of Apophis.



Display Premiere:
“Free to Wonder, Free to Ask,
Free to Hear, Free to Decide”

Saturday 16 January to Tuesday 14 December, 2120

2021 is already going to be an amazing year. Could it possibly get better? We Americans are celebrating the 245th anniversary of the Constitution and the 230th anniversary of the Bill of Rights. Without the backing of those documents and an understanding of their purpose neither scientists nor amateurs nor anyone could wonder about things, then ask questions, then hear all sides, then make a decision. For 333 days (from the first Plus Night of the year, to the planned past-midnight end of Geminid Meteor Shower peak viewing) HRPO celebrates the wonderful concepts and tools that help us find the truth!



OBSERVING NOTES FEBRUARY

by John Nagle

Cassiopeia – Queen of Ethiopia

Position: RA 00.0, Dec. 60.0°

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 update the constellations with new and expanded material, but the Sky Happenings calendar and associated information are new each month.

Named Stars:

Schedar (Alpha Cas), from the Arabic “al-sadr”, “breast”, also “Shedar”, “Shedir”, or “Seder”, mag. 2.23, 00 40 30.4 +56 32 14.4, is an orange giant star. The WDS says it has 3 companions – they are optical only: There is a 9th magnitude, widely separated, companion, bluish or pale white, at 63” of separation; there is a second, fainter companion at 38” separation; the third companion, at 14th magnitude, is at 20” of separation. Also known as **HD 3712**, **HIP 3179**, **HR 168**, and **18 Cassiopeiae**.

Caph (Beta^A Cas), from the Arabic “al-kaff al-khadip”, “the Stained Hand”, or from “Al Sanām al Nākah”, “The Camel’s Hump”, mag. 2.28, 00 09 10.09 +59 09 00.8, is a yellow-white sub-giant star and a rapid rotator (72.4 km/second). The ADS says it is a spectroscopic binary star with a period of 27 days. The WDS says there is one companion, magnitude 12.4, at a separation of 66”. There is a 14th magnitude companion at 23” of separation. **Cassiopeia A (Tycho’s Star)** is 6° to the west. Also known as **HD 432**, **HIP 746**, **HR 21**, and **11 Cassiopeiae**.

Tsih (Gamma Cas), from the Chinese for “a whip”, also called “Navi”, named so by Gus Grissom – it is his middle name (Ivan) spelled in reverse, mag. 1.6 to 3.0, 00 56 42.30 +60 43 00.3, is a Be type sub-giant variable star (the first star to be classified as type e for emission) with bright hydrogen lines, a visual double star, and an X-ray source (**MX 0053+60**). It is also a rapid rotator (432 +/- 28 km/second), with a 211 day rotation period. The secondary star in the binary has a period of 204 days. There are two companions; an 11th magnitude dwarf star at 2.2” separation; and a 12.9 magnitude sub-giant star at 54” separation. Two nebulae surround **Gamma Cassiopeiae** – **IC 59** at 25.7 ‘to the north, and **IC 63** at 22.7’ to the northeast. Also known as **HD 5394**, **HIP 4427**, and **27 Cassiopeiae**.

Rachbah (Delta Cas), from the Arabic phrase roughly meaning “the knee of the Lady of the Chair”, also called “Rucha”, or “Rucbar” from the Arabic “Al Rukbag”, “the knee”, and sometimes called “Ksora”, mag. 2.68, 01 25 48.6 +60 14 07.5, is a blue-white eclipsing binary star, with a period of 795 days, and a border-line giant star. There is a 12th magnitude companion. Also known as **HD 8538**, **HIP 6686**, **HR 403**, and **37 Cassiopeiae**.

Segin (Epsilon Cas), mag. 3.35, 01 54 23.68 +63 40 12.5, is a blue-white giant star at the end of the hydrogen fusing cycle, and is notable for showing extremely weak spectral absorption of helium. The star is also a slow rotator (19 km/second at its equator) and a shell star. Also known as **HD 11415**, **HIP 8886**, and **45 Cassiopeiae**.

Fúlú (Zeta Cas), mag. 3.69, 00 36 58.27 +53 53 49.0, is a blue-white sub-giant star and a SPB (Slow Pulsing B star) variable star, and the first one of its kind discovered to have a magnetic field. Also known as **HD 3360**, **HIP 2920**, and **17 Cassiopeiae**.

Achird (Eta^A Cas), mag. 3.46, 00 49 05.1 +57 48 59.6, is a visual binary star with a period of 479.27 years. The primary star is a yellow-hued main sequence dwarf star, and the secondary star is an orange-hued dwarf star at magnitude 7.5, and a separation of 5” to 16” (36 to 106 a.u. – mean separation is 68 a.u.). The WDS says that there are 6 optical only companions. Also known as **HD 4614**, **HIP 3821**,

and **24 Cassiopeiae**.

Marfak (Theta Cas), from the Arabic “al Marfik”, “The Elbow”, also “Marfark”, sometimes called “Marfak East”, mag. 4.34, 01 11 05.93 +55 08 59.8, is a rapid rotator at 103 km/second, and a rotation rate of 1.3 days. The WDS says it is a spectroscopic binary, and that two companions are probably an optic only pair. Also known as **HD 6961**, **HIP 5542**, and **33 Cassiopeiae**.

Marfak (Mu Cas), from the Arabic “al Marfik”, “The Elbow”, also called “Marfak West”, Mag. 5.17, 01 08 12.92 +54 55 27.2, is a spectroscopic binary star with a 22 year period. The secondary star is at magnitude 11.5, a red dwarf at a separation of 7 a.u. This star has an unusually low metal content. Located 28' west-southwest of **Theta Cassiopeiae**. Also known as **HD 6582**, **HIP 5336**, **BD+54 223**, and **30 Cassiopeiae**.

Castula (Upsilon² Cas), mag. 4.62, 00 56 40.0 +59 10 52.2. Also known as **HD 5395**, **HIP 4422**, and **29 Cassiopeiae**.

Pearce's Star (AO Cas), mag. 6.11, 00 17 43.07 +51 25 59.1, is a rotating ellipsoidal variable binary star. Both of the stars are giant “O” type, revolving and almost touching each other, with a period of 3.52355 days, and a computed separation of 15 million miles. It is one of the most massive and luminous stars known – the secondary is the largest star. It is a modest X-ray source and a candidate runaway star with a radial velocity of 31 km/second in recession. The star is surrounded by **vdB 6**. Also known as **HD 1337**, **HIP 1415**, **AO Cassiopeiae**, and **Boss 46**.

Osawa's Star (HD 221568), mag. 7.55, 23 32 47.65 +57 54 20.1, is a variable star. Also known as **HD 221568**, **HIP 116210**, and **V436 Cassiopeiae**.

Mushagak (HD 17156), mag. 8.17, 02 49 44.9 +71 45 11.6, has a confirmed transiting planet at a separation of 1.16 a.u., and a period of 501 days. It also has one unconfirmed transiting planet. Also known as **HD 17156**, and **HIP 13192**.

Tycho's Star (3C10), 00 25 15 +64 08, 8'x8' in size, is the super nova remnant (SNR) **2C34**, from the November 11th, 1572 supernova that was visible to the naked eye up to 16 months after it appeared. Also known as **Tycho's Supernova**, **C 95**, **B Cassiopeiae**, **HR 92**, **CTB 4**, and **SN1572**.

Tycho G, mag. 17.0, 00 25 19.9 +64 08 18, is a red sub-giant star with a radial velocity of 80 km/second, and is the former companion to the progenitor of **SN 1572**.

Deep Sky:

M52 (NGC 7654), mag. 6.9, 23 24 12 +61 35 00, 20'x12' in size, 200 stars, is an open cluster that is detached, strong concentration of stars; moderate range in brightness; large. It is located 1° south and slightly west of the 5th magnitude star **4 Cassiopeiae**. **NGC 7635 (The Bubble Nebula)** is 36' to the southwest, On the west-southwest fringe is the star **SAO 20606 (BD+60 2532**, magnitude 8.3). Also known as “**The Cassiopeia Salt and Pepper Cluster**”, **Cr 455**, **Mel 243**, and **OCL 260.0**.

M103 (NGC 581), mag. 7.4, 01 33 24 +60 39 00, 12'x5' in size, 172 stars, including **Σ 131**, and is in the **Cassiopeia OB8 Association**. The cluster is detached, no concentration of stars; modest range in brightness; magnitude of brightest star (**HD 9311** – a triple star, **ADS 1209A**, on the northwest edge) is 7.3; fan shaped. The center star is **BD+59 274 (SAO 11826)**, and 1' south of it is **BD+59 273 (SAO 11824)** and **HD 9635 (BD+59 276)**. On the southwest edge is the star **44 Cassiopeiae**. **M103** is located 1° northeast of **Delta Cassiopeiae**. About 1.3° to the east is **NGC 659**, **654**, and **663**. Also known as **OCL 326**, **Cr 14**, and **Mel 8**.

Stock 2, mag. 4.4, 02 14 43 +59 29 06, 60' in size, 166 stars, is an open cluster that is detached, strong concentration of stars; moderate range in brightness; magnitude of brightest star is 8.2. Located 2° north of the **Double Cluster** in **Perseus**. Also known as “**The Muscle Man Cluster**”, **Lund 71**, **OCL 348**, **OCL 348.0**, and **C0211+590**.

Cr 463, mag. 5.7, 01 45 45 +71 48 36, 57' in size, 79 stars, is an open cluster that is detached, no concentration of stars; moderate range in brightness; magnitude of brightest star is 8.5. Also known as **Lund 57**, **OCL 324**, **OCL 324.0**, and **C0144+717**.

IC 1805, “**The Heart Nebula**”, mag. 6.0, 02 32 42 +61 27 24, 60' in size, 62 stars, is a faint, very large

patch of nebulosity surrounding a large (20' in size) open cluster that is detached, no concentration of stars; large brightness range; magnitude of brightest star is 7.8. The central star is **HD 15558**, at magnitude 7.8. The cluster is located within **Mel 15**, and is part of the **Cassiopeia OB6 Association**. Located 5° east-southeast of **Epsilon Cassiopeiae**. Also known as “**The Running Dog Nebula**” (with **IC 1795**), **Cr 26**, **Lund 81**, **Mel 15**, **OCL 352**, **Raab 1**, **Mrk 7**, **RAFGL 333**, **Sh2-190**, **NRL 15**, **LBN 134.96+00.75**, **LBN 645 (IC 1795)**, **LBN 654**, and **C0228+612**.

NGC 457, “**The Owl Cluster**”, “**The E.T. Cluster**”, “**The Dragonfly Cluster**”, mag. 6.4, 01 19 33 +58 17 24, 20' in size, 204 stars, is an open cluster that is detached, strong concentration of stars; large brightness range; large, bright cluster; magnitude of brightest star is 7.0. The central star is **HD 7902** at magnitude 7.0. **Phi Cassiopeiae** is on the southeast edge of the group, but is not part of it. The planetary nebula **WeBo1** is in the cluster. Located 4° southeast of **Gamma Cassiopeiae**. Also known as “**The Phi Cassiopeiae Cluster**”, **Cr 12**, **Lund 45**, **Mel 7**, **OCL 321**, **OCL 321.0**, **H7-42**, **Raab 3**, **C13**, and **C0115+580**.

IC 1848, “**The Soul Nebula**”, **The Embryo Nebula**”, mag. 6.5, 02 51 11 +60 24 06, 9'x4.5' in size, 74 stars, is a faint and very large nebula; irregular in shape; a filamentary structure; nebulosity is brightest in its northeast portion. Contains an open cluster of stars; not well detached from the surrounding star field; large range in brightness; magnitude of brightest star is 7.1. **HD 17505 (BD+59 522)**, magnitude 7.1, is on the west end of the nebula, and **Cr 34** is on the east end. Also known as **Cr 32=Cr 33**, **Lund 95**, **OCL 364**, **OCL 364.0**, **CTB 11**, **Sh2-199**, **OCL 368.0**, **C0255+602 (Cr 33)**, **Lund 96**, **Mrk 8**, **W5**, **Cr 34**, and **C0247+602**.

NGC 129, mag. 6.5, 00 30.0 +60 13, 21' in size, 50 stars, contains **DL Cassiopeiae**, is an open cluster; not well detached from the surrounding star field; moderate range in brightness; very large cluster; magnitude of brightest star is 8.6. Also known as **H8-79**, **OCL 294**, and **Cr 2**.

NGC 654, mag. 6.5, 01 44 00 +61 53 00, 5' in size, 83 stars, is an open cluster that is detached, weak concentration of stars; large range in brightness; magnitude of brightest star is 7.4. Located in the **Cassiopeia OB8 Association**. **IC 166** is 1° to the east. Also known as **H7-46**, **OCL 330**, **Cr 18**, **Mel 9**, **OCL 330.0**, and **C0140+616**.

NGC 1027, mag. 6.7, 02 42 43 +61 36 00, 20' in size, 40 stars, is an open cluster; detached, no concentration of stars; moderate range of brightness; large; magnitude of brightest star is 9.3. Also known as **H8-66**, **OCL 357**, **Cr 30**, and **Mel 16**.

NGC 7789, “**Caroline's Rose**”, “**White Rose**”, “**Magnificent Cluster**”, mag. 6.7, 23 57 24 +56 43 00, 0.5° in size, over 1,000 stars, is an open cluster; detached, weak concentration of stars; small range in brightness; magnitude of brightest star is 10.7. Discovered by Caroline Herschel in 1783, the loops of stars in it resemble the pattern of rose petals. Located between **Rho** and **Sigma Cassiopeiae**. Also known as “**Caroline's Haystack**”, **H6-30**, **OCL 269**, **Cr 460**, and **Mel 245**.

NGC 225, “**The Sailboat Cluster**”, mag. 7.0, 00 43 42 +61 46 00, 14' in size, 20 stars, is an open cluster; detached, no concentration of stars; small brightness range; large cluster; involved in nebulosity; “W” shaped. Also known as **H8-78**, **OCL 305**, and **Cr 7**.

Skiff J0058.4+6828, mag. 7.0, 00 58 24 +68 28, 7' in size, 200 stars, including **TYC 4296 1455 1** (mag. 10.16) = **GSC 04296-01455** on the west side. Also known as **IRAS 009551+6812**.

Stock 5, mag. 7.0, 02 04 24 +64 23 00, 24' in size, 25 stars, brightest star is **53 Cassiopeia** (magnitude 4.9) on the west side. Also known as **Lund 70**, **OCL 339**, **OCL 339.0**, **C0200+642**.

Tr 3, mag. 7.0, 03 12 +63 11, 23' in size, 30 stars, is an open cluster; detached, no concentration of stars; large brightness range. Also known as **Cr 36**, **Harvard 1**, **Lund 101**, **OCL 366**, and **C0307+630**.

Mrk 6, mag. 7.1, 02 29 40 +60 42 24, 6' in size, 29 stars, is an open cluster; detached, no concentration of stars; large brightness range. Also known as **Abt 1**, **Bi 4**, **Lund 79**, **OCL 351**, **St 7**, and **C0225+604**.

NGC 663, “**Letter 'S' Cluster**”, mag. 7.1, 01 46 +61 15, 16' in size, 100 stars, is an open cluster; appears to contain a group of stars arranged in a ‘S’ shape; detached, no concentration of stars; large, bright; moderate range in brightness; magnitude of brightest star is 8.4. The stars **Σ 151**, **152**, and **153** are included in this cluster. It has 34 confirmed Be type stars in it. Located in the **Cassiopeia OB8 Association**. Can be found 1.75° east and .5° north of **M103**. Also known as **C 10**, **H6-31**, **OCL 333**,

Cr 20, and **Mel 11**.

NGC 281, “**The Pac Man Nebula**”, mag. 7.4, 00 52 48 +56 36, 23'x37' in size, includes the **β 1** sextuple star system. It is a pretty faint emission nebula containing a large amount of ionized atomic hydrogen (HII). Located 1.5° east of **Alpha Cassiopeiae**. Also known as **IC 11**, **IC 1590**, **Ced 3**, **Sh2-184**, **LBN 616**, and **LBN 123.17-0628**.

LeDrew 1, mag. 7.8, 00 53 18 +19 32, 40' in size, 22 stars. Could be associated with **NGC 752** in **Andromeda**. Also known as **Alessi 1**.

NGC 659, mag. 7.9, 01 44 24 +60 40, 5' in size, 30 stars, is an open cluster; detached, no concentration of stars; small range in brightness; magnitude of brightest star is 10.4. Also known as **H8-65**, **Cr 19**, and **Mel 10**.

Tr 1, mag. 8.1, 01 35 40 +61 17 12, 4.5' in size, 112 stars, is an open cluster; detached, strong concentration of stars; large brightness range; magnitude of brightest star is 9.6. The cluster is called **BD+60 276**. Also known as **Cr 15**, **Lund 48**, **OCL 328**, **Mrk 3**, and **C0132+610**.

NGC 637, mag. 8.2, 01 43 06 +64 02, 3.5' in size, 20 stars, is an open cluster; detached, strong concentration of stars; large range in brightness; pretty small, bright cluster; magnitude of brightest star is 10.0. Also known as **H7-49**, **OCL 329**, and **Cr 17**.

IC 59 and 63, “**The Cassiopeia Nebula**”, “**The Gamma Cassiopeia Nebula**”, mag. 8.5, fan shaped. **IC 59** – 00 57 30 +61 09, 10' in size, located 30' north of **Gamma Cassiopeiae**, also known as **Ced 4A**, **LBN 620**, and **Sh2-185**. **IC 63** – 00 59 30 +60 55, 10' in size, located 20' north of **Gamma Cassiopeiae**, also known as **Ced 4B**, **LBN 622**, and **Sh2-185**.

King 14, mag. 8.5, 00 31 54 +63 10, 7' in size, 186 stars, is an open cluster; detached, no concentration of stars; small brightness range; magnitude of brightest star is 11.3. Also known as **Lund 19**, **OCL 297**, and **C0029+628**.

NGC 7790, mag. 8.5, 23 58 24 +61 12 30, 17' in size, 134 stars, is an open cluster; detached, no concentration of stars; moderate range in brightness; magnitude of brightest star is 10.9. Contains the star **CE Cassiopeiae**. Also known as **H7-56**, **OCL 276**, **Cr 461**, **OCL 276.0**, and **C2355+609**.

NGC 189, mag. 8.8, 00 39 36 +61 05, 3.7' in size, 15 stars. Also known as **OCL 301**, and **Cr 462**.

NGC 436, mag. 8.8, 01 16 +58 49, 6' in size, 40 stars. Also known as **H7-45**, **OCL 320**, **Cr 11**, and **Mel 16**.

Stock 24, mag. 8.8, 00 39 50 +61 57 36, 5' in size, 180 stars. Also known as **Be 3**, **Lund 22**, **OCL 302**, and **C0036+616**.

Harvard 21, mag. 9.0, 23 54 17.6 +61 43 43.0, 4' in size, 26 stars. Also known as **Cr 458**, **Do 21** (incorrectly listed), and **C2351+614**.

King 12, mag. 9.0, 23 53 +61 57, 3' in size, 35 stars. Also known as **C2350+616**.

NGC 433, mag. 9.0, 01 15 12 +60 08, 2.5' in size, 15 stars. Also known as **OCL 319**.

NGC 103, mag. 9.1, 00 25 18 +61 19, 7' in size, 30 stars, in the **Cassiopeia OB4 Association**. Also known as **OCL 291**, and **Cr 1**.

NGC 146, mag. 9.1, 00 32 54 +63 19, 6' in size, 50 stars. Also known as **OCL 299**, and **Cr 5**.

Frolov 1, mag. 9.2, 23 57 26.5 +61 37 23, 25 stars. The central and brightest star is **LS1+61 110**, at magnitude 10.7. Also known as **C2354+613**.

NGC 185 mag. 9.2, 00 38 57.9 +48 20 14.6, 11.9'x10.1' in size, is a pretty bright, very large, and round galaxy; a dwarf galaxy elliptical of low surface brightness; very faint nucleus. The galaxy is classified as a Type 2 Seyfert galaxy, and has an active galactic nucleus (**AGN**). It is a satellite of the **Andromeda Galaxy (M31)**. It is paired with the dwarf elliptical galaxy **NGC 147**, the western of the pair (located about 1° to the west-northwest of **NGC 185**). Also known as **UGC 396**, **H2-707**, **MCG+08-02-010**, and **C 18**.

Be 62, mag. 9.3, 01 01 12 +63 56 30, 10'x10' in size, 50 stars. Also known as **Lund 35**, **OCL 314**, **OCL 314.0**, and **C0057+636**.

NGC 381, mag. 9.3, 01 08 24 +61 35, 5' in size, 40 stars. It is in the **Cassiopeia OB1 Association**. Also known as **H8-64**, **OCL 317**, and **Cr 10**.

NGC 7788, mag. 9.4, 23 56 42 +61 24, 9' in size, 20 stars. It is in the **Cassiopeia OB5 Association**.

Also known as **OCL 275**, and **Cr 459**.

NGC 147, mag. 9.5, 00 33 12.1 +48 30 31.5, 13.2'x7.7' in size, is a very faint, very large galaxy; irregularly round; bright, extremely small nucleus. It is a satellite of the **Andromeda Galaxy (M31)**. It is paired with **NGC 185**, the eastern of the pair (located 1° to the east-southeast of **NGC 147**). Also known as **C 17**, **UGC 326**, **DDO3**, and **MCG+08-02-005**.

NGC 559, mag. 9.5, 01 29 30 +63 19, 7' in size, 50 stars, is an open cluster; detached, weak concentration of stars; moderate range in brightness; magnitude of brightest star is 10.6. Also known as **C 8**, **H7-48**, **OCL 322**, and **Cr 13**.

NGC 743, mag. 9.5, 01 58 30 +60 10, 5' in size, 12 stars. Also known as **OCL 343**.

King 21, mag. 9.6, 23 49 54 +62 42, 4' in size, 20 stars. Also known as **Lund 1046**, **OCL 220**, and **C2347+624**.

Be 58, mag. 9.7, 00 00 12 +60 56 30, 8'x8' in size, 39 stars. Also known as **OCL 277.0**, and **C2357+606**.

NGC 110, mag. 9.7, 00 27 24 +71 24, 19' in size, 100 stars. Also known as **OCL 300**.

Cz 3, mag. 9.9, 01 03 07 +62 47.2, 3' in size, 10 stars. Also known as **Lund 36**, **OCL 315**, and **C0100+625**.

Objects of Interest Beyond magnitude 10:

NGC 7635, "**The Bubble Nebula**", mag. 11.0, 23 20 48.3 +61 12 06, 205"x180" in size, is an H II region with an emission shell. Within the shell is **BD+60 2522** (magnitude 8.7), an "O" type giant emission line star. It is located 6.4° northeast of Beta **Cassiopeiae**, or 36.2' southwest of **M52**. There is a 7th magnitude star, **HD 220057**, 6' to the west-southwest. To the north is **Sh2-162**. Also known as **LBN 549**, **LBN 548**, **H4-52**, and **Sh2-162**.

Semeis 22, "**The Shrimp Nebula**", "**The Dolphin Nebula**", mag. 12.1, 01 30 33 +58 24 51, 9'x8' in size, is a crescent-shaped nebula. Also known as **Sh2-188**, and **LBN 633**.

Sh2-157, "**The Lobster Claw Nebula**", 23 16 06 +60 02, 60' in size, 50 stars, includes **Sh2-157a**.

Stock 23"**Pazmino's Cluster**", 03 16 10.8 +60 06 58, 29' in size, 25 stars. The center and brightest star is **HD 20040** (magnitude 7.6); detached, no concentration of stars; large brightness range; involved in nebulosity. Also known as **Lund 104**, **OCL 375**, **OCL 375.0**, and **C0312+598**.

Cassiopeia A, "**SN 1671**", 23 23 24 +58 48.9, 5'x5' in size, was a supernova in 1671. It has high velocity ejecta knots (1,825 knots) traveling at 5500 to 14,500 km/second. Also known as **3C461**, **4C58.40**.

Cassiopeia Dwarf = Andromeda VII, 03 27 48+50 35. It is a dwarf galaxy.

Asterisms:

Queen's "W", mag. 2.0, 01 00.0 +60 00, 13'x5' in size. Consists of Alpha, Beta, Gamma, Delta, and Epsilon **Cassiopeiae**.

"Airplane", mag. 5.0, 23 20.0 +62 20, 60' in size, 8 stars – 7th and 8th magnitude, located 40' northwest of **M52**. Also known as "**The Arrow**".

Queen's Kite, mag. 5.0, 01 38.0 +58 30, 2'x1.5' in size, is a rough rectangular shape that includes **Chi Cassiopeiae**.

Kimble's Kite, mag. 6.0, 03 28.0 58 30, 90'x30' in size, is 2° west of **Gamma Cassiopeiae**, and includes **SAO 4917**.

Eddie's Coaster, mag. 7.0, 01 02.0 +63 36, 2'x1.5' in size, is a curved chain of 7th to 9th magnitude stars.

Yüh Lang or Wang Leang, consists of Alpha, Beta, Eta, and Kappa **Cassiopeiae**.

Foo-Loo, "**Bypath**", consists of Zeta and Lambda **Cassiopeiae**.

Ko Sing, "**Guest Star**", consists of Tycho's Star and Tycho's Nova (SN 1572).

Objects in Cassiopeia:

43 NGC; 13 IC; 28 UGC; 2 UGCA; 3 vdB; 26 Sh2; 15 Cz; 12 Radio galaxies; 1 Quasar; 5 Teu; 10 King; 5 FSR; 3 Do; 19 Be; 6 C; 20 Ced; 32 Cr; 1 Mayer; 1 Frolov; 2 Maffei; 1 Hrr; 1 VV1; 1 CHR; 1 EGB; 2 HDW; 1 Dias; 1 Dawes; 1 HFG; 1 KKH; 3 MB; 1 Ray; 1 Rie; 1 Al-Teu; 1 Frr; 1 Arg; 1 GM1; 1 Kr; 1 A; 2 Pfl; 2 Dwingeloo; 4 ASCC; 3 Alessi; 1 HaWe; 2 SK; 7 Abell;

2 Hubble; 2 HH; 1 W1; 1 WeBo; 1 Hu1; 2 BV; 1 Tom; 2 Tr; 1 Ha; 1 Outters; 1 Semeis; 3 ES; 1 Str; 4 CTB; 1 Havard; 1 MWC; 10 Mel; 3 HBC; 2 Mrk; 1 Kro; 2 Al; 2 Skiff; 1 Juchert; 1 LeWa; 10 MCG; 6 SAI; 1 RNO; 2 MC; 1 SG; 1 SL; 3 Pat; 3 Pot; 19 Herschel; 124 LDN; 10 LBN; 16 Stock; 32 PK; 36 OCL; 11 C; 11 Lund; 3 Raab; 1 IRAS; and 25 PNG.
Total objects 660.

Other Stars:

48 Cas, mag. 4.48, 02 01 57.55 +70 54 25.4, is a quadruple star. Also known as **HD 12111**, **HIP 9480**, and **A Cassiopeiae**.

Rho Cas, mag. 4.51, 23 54 23.04 +57 29 57.9, is a yellow hyper-giant star and a semi-regular pulsating variable star. Its magnitude varies from 4.1 to 6.2 in a period of about 320 days. There are only seven known yellow hyper-giant stars in the **Milky Way Galaxy**. Also known as **HD 224014**, **HIP 117863**, and **7 Cassiopeiae**.

AR Cas, mag. 4.89, 23 30 01.92 +58 32 56.1, is a septuplet star and an Algol variable star. Also known as **HD 221253**, and **HIP 115990**.

V 509 Cas, mag. 5.10, 23 00 05.10 +56 56 43.4, is a yellow-white hyper-giant star and a semi-regular variable star whose magnitude varies from 4.7 to 5.5. Also known as **HD 217476**, and **HIP 113561**.

HR 8832 (HD 219134), mag. 5.57, 01 42 20.44 +68 02 35.0, is a suspected variable star with 7 planets in orbit. Also known as **HIP 114622**.

HD 1976 (V746 Cas), mag. 5.58, 00 24 15.64 +52 01 11.7, is a spectroscopic binary and a slowly pulsating “B” type star. Also known as **HIP 1921**.

HD 2952, mag. 5.93, 00 33 10.32 +54 53 42.3, has one planet in orbit. Also known as **HIP 2611**.

V 373 Cas, mag. 6.03, 23 55 33.84 +57 24 43.8, is a spectroscopic binary, and an eclipsing binary star. Also known as **HD 224151**, and **HIP 47957**.

HD 220074, mag. 6.39, 23 20 14.37 +61 58 12.5, is a suspected variable star with one planet in orbit. Also known as **HIP 115218**.

HD 11755, mag. 6.87, 01 58 50.0 +73 09 09, has one planet in orbit. Also known as **HIP 9242**.

HD 17505, mag. 7.08, 02 51 07.98 +60 25 03.9, is a star that is associated with a bow shock.

HD 7924, mag. 7.19, 01 21 59.12 +76 42 37.0, has three planets in orbit. Also known as **HIP 6379**.

HD 108, mag. 7.40, 00 06 03.39 +63 40 46.8, is a variable spectrum binary and a runaway star. Also known as **HIP 505**.

HD 221585, mag. 7.47, 23 32 54.0 +63 09 20, has one planet in orbit. Also known as **HIP 116221**.

HD 13908, mag. 7.51, 02 18 15.0 +65 35 40, has two planets in orbit. Also known as **HIP 10743**.

HD 15558, mag. 7.87, 02 32 42.54 +61 27 21.6, is located within **IC 1805**, and is a binary star. It is an extremely luminous star. Also known as **HIP 11832**.

HD 22082, mag. 7.99, 23 26 37.0 +56 53 12, has one planet in orbit. Also known as **HIP115714**.

HD 240237, mag. 8.17, 23 15 42.22 +58 02 35.7, has one planet in orbit. Also known as **HIP 114840**.

HD 17520, mag. 8.24, 02 51 14.46 +60 23 09.8, transitioned to a Be type star in the 1980’s. Also known as **HIP 13308**.

HD 240210, mag. 8.33, 23 10 29.23 +57 01 46.0, has one planet in orbit.

HD 217850, mag. 8.5, 23 02 37.0 +58 52 34, has one planet in orbit. Also known as **HIP 113789**.

BD+60 2522, mag. 8.7, 23 20 44.52 +61 11 40.6, is the source of the **Bubble Nebula (NGC 7635)**.

HD 219415, mag. 8.94, 23 14 54.0 +56 43 49, has one planet in orbit.

Stars Beyond Magnitude 10 That Are Of Interest:

V547 Cas, mag. 10.29, 00 32 29.43 +67 14 08.4, a triple star and a flare star. Also known as **HIP 2522**.

WR 3, mag. 10.69, 01 38 55.63 +58 09 22.7, is a star surrounded by a unique stellar-wind bubble. Also known as **HD 9974**, and **HIP 7681**.

LSI+61 303 (V 615 Cas), mag. 10.8, 02 40 31.67 +61 13 45.6, is a variable star (magnitude 10.4 to 11.1, period of 26.5 days), and a micro-quasar. Also known as **HIP 12469**.

WASP-93, mag. 10.97, 00 37 50.0 +51 17 20, has one transiting planet.

2S 0114+650, mag. 11.09, 01 18 02.7 +65 17 29.9, is an X-ray pulsar star and a variable star. Also known as **V662 Cassiopeiae**, and **HIP 6081**.

WR2, mag. 11.33, 01 05 23.01 +60 25 19.0, is the only **WN2** type star known, and is a **GRB (Gamma Ray Burst)** candidate. Also known as **HD 6327**, and **HIP 5100**.

RX J0146.9+6121, mag. 11.34, 01 47 00.21 +61 31 23.7, is an X-ray pulsar star in **NGC 663**. Also known as **V831 Cassiopeiae**.

HAT-P-44, mag. 13.21, 00 56 50.3 +47 00 52, has two transiting planets in orbit.

LkHa 198, mag. 13.79, 00 11 25.83 +58 49 28.6, is a **Herbig Ae/Be** type star. Also known as **V663 Cassiopeiae**.

V664 Cas, mag. 14.56, 03 03 47.01 +64 54 35.7, is the central star of **HFG1**, and is a re-radiating binary system.

4U 0115+634, mag. 15.19, 01 18 31.9 +63 44 24.0, is an X-ray pulsar star. Also known as **V635 Cassiopeiae**.

4U 0142+61, 01 46 22.21 +61 45 03.8, is a magnetar star.

IGR J00291+5934 (V1037 Cas), 00 29 13.06 +59 34 19.0, is an X-ray pulsar with milli-second pulses.

1E 2259+586, 23 01 08.14 +58 52 44.5, is a magnetar star.

W3 IRS5, 02 25 40.5 +62 05 51.4, is a proto-star, possibly similar to a proto-trapezium.

IRAS 00338+6312, 00 36 47.5 +63 29 02, is a proto-star.

PSR B2319+60, 23 21 55.21 +60 24 30.7, is a pulsar.

PSR B2334+61, 23 37 05.78 +61 51 01.7, is a pulsar.

PSR J0205+6449, 02 05 37.92 +64 49 42.8, is the central pulsar of **3C58**, a supernova remnant and a pulsar wind nebula from **SN 1181**, and a possible quark star. It is located 2° northeast of **Epsilon Cassiopeiae**.

In Cassiopeia, there are the following count of stars:

45Σ; 210Σ; 4 OΣΣ; 157 V; 25 Greek Lettered; 29β; 8 A; 11 ES; 1 Stn; 8 h; 2 HV; 5 Hu; 1 Eng; 1 Bvd; 1 Mlr; 1 S; 1 Frk; 2 HBC; 1 Mlb; 1 St; 1 Arg; 75 Lettered; and 55 Numbered for a total of 457.

Sky Happenings: February, 2120

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



- Feb. 2nd** - Asteroid **Melpomene** is at opposition at 1 AM CST.
- Feb. 3rd** - Dawn: High in the south-southwest before the **Sun** rises, the waning gibbous **Moon** is about 6.5° from **Spica**, in **Virgo**,
The **Moon** is at perigee (229,980 miles or 370,116 km from **Earth**) at 1:03 PM CST.
- Feb. 4th** - **Last Quarter Moon** occurs at 11:37 AM CST.
- Feb. 5th** - **Venus** is 0.4° south of **Saturn** at 11 PM CST.
- Feb. 6th** - Dawn: The waning crescent **Moon** rises in the south-southeast sky in tandem with **Antares**,
With about 4° separating the pair.
- Feb. 8th** - **Mercury** is in inferior conjunction with the **Sun** at 8 AM CST.
- Feb. 9th** - Asteroid **Pallas** is in conjunction with the **Sun** at 2 PM CST.
- Feb. 10th** - The **Moon** passes 3° south of **Saturn** at 5 AM CST,
The **Moon** passes 3° south of **Venus** at 2 PM CST.
- Feb. 11th** - **Venus** passes 0.4° south of **Jupiter** at 6 AM CST,
New Moon occurs at 11:06 PM CST (Lunation 1214).
- Feb. 13th** - The **Moon** passes 4° south of **Neptune** at 11 AM CST,
The **Moon** passes 4° north of **Jupiter** at 1 PM CST.
- Feb. 17th** - The **Moon** passes 3° south of **Uranus** at 10 AM CST.
- Feb. 18th** - **Perseverance, with the drone Ingenuity, will land on Mars today**,
The **Moon** is at apogee (251,324 miles or 404,467 km from **Earth**) at 4:22 AM CST,
The **Moon** passes 4° south of **Mars** at 5 PM CST,

- Dusk: The waxing crescent **Moon** and **Mars** are about 3.5° apart, high in the southwest, as they sink toward the western horizon, disappearing around midnight.
- Feb. 19th** - **First Quarter Moon** occurs at 12:47 PM CST,
Dusk: The first-quarter **Moon** is in **Taurus**, placed nicely between the **Hyades** and the **Pleiades**, with **Mars** to their right.
- Feb. 20th** - **Mercury** is stationary at 7 AM CST,
Venus is at aphelion.
- Feb. 21st** - Asteroid **Amphitrite** is at opposition at 10 PM CST.
- Feb. 22nd** - The **Moon** is 0.4° north of **M35** at 2 AM CST.
- Feb. 23rd** - Supernova **SN1987A** occurred on this day,
Evening: The waxing gibbous **Moon** is around 7° from **Pollux**, in **Gemini**.
- Feb. 24th** - Evening: The **Moon**, now in **Cancer**, is only a few degrees from the **Beehive Cluster (M44)**.
- Feb. 25th** - Dawn: **Jupiter**, **Mercury**, and **Saturn** are in a wide triangle in the east-southeast before the **Sun** rises.
- Feb. 26th** - Evening: The almost-full **Moon**, rising in **Leo**, trails **Regulus** by about 7°.
- Feb. 27th** - **Full Moon** occurs at 2:17 AM CST.

Planets:

Mercury – **Mercury**, on February 1st, can be observed in the bright twilight after sunset – it will be a challenging view after its greatest eastern elongation last month. Start your attempt 30 minutes after sunset. The magnitude 0.9 planet is 6° high in the western sky. Watch with binoculars for 15 to 20 minutes as the sky darkens and the planet dips lower. The planet will be only 2° high 15 minutes before it sets. The planet will pass through inferior conjunction on the 8th, and will re-emerge as a naked-eye object at dawn on the 20th, when **Saturn**, **Mercury**, and **Jupiter** will form a triangle when **Saturn** and **Mercury** rise together 4.4° apart at around 5:40 AM local time, followed by **Jupiter**, 7° east of **Saturn**, about 22 minutes later. On the 28th, **Mercury** shines at magnitude 0.3, and stands only 3° west of **Jupiter**, with **Saturn** 5.5° to **Mercury**'s west. **Mercury** will display a 46% illuminated disk spanning 8”.

Venus – **Venus**, at magnitude -3.9, will stand less than a **Moon**'s width southeast of **Saturn** on February 6th, but they rise only ½ hour before the **Sun**. **Venus** is on its way to a late March superior conjunction with the **Sun**, passing 26' due south of **Jupiter** on the 11th. But be careful when observing because the planets are located just 10.5° east of the **Sun**. They can be seen in binoculars 20 minutes or so before sunrise, so be very careful if you observe these planets. **Venus** ends its long **Morning Star** apparition which began back in June 2020. The planet will reappear in the dusk sky in mid-April.

Mars – **Mars** will shine among the stars of **Ares**, beginning the month at magnitude 0.5, and dipping to 0.9 by the end of February. It is in a gibbous phase of 90% illuminated on the 1st, with the planet's annular size shrinking from nearly 8” to 6.4” during the month. During the first five days of the month, **Syrtis Major** swings into view in the evenings between sunset and local midnight. **Solis Lacus** and **Sinus Meridiani** (dark features) are on view in the last week of the month. The planet moves into **Taurus** on February 23rd, and ends the month nearly 14° northwest of **Aldebaran**, nicely placed about 3° southwest of the **Pleiades** cluster (**M45**).

Jupiter – **Jupiter** will pass 26' due north of **Venus** on February 11th, located just 10.5° east of the **Sun**, with **Jupiter** shining at magnitude -2.0. On the morning of the 20th, **Saturn** and **Mercury** rise together 4.1° apart around 5:40 AM local time, followed by **Jupiter**, 7° east of **Saturn**, about 22 minutes later, forming a triangle. On the 22nd, **Jupiter** will stand only 1° high – about 5° east (lower left) of **Mercury**, while **Saturn** stands 4° to **Mercury**'s southwest (right). On the 28th, the trio of planets form a tidy triangle low in the east-southeast. **Jupiter** is at magnitude -2.0, **Mercury** at +0.3, and **Saturn** is at +0.7.

Saturn – **Saturn** begins February, emerging from the solar glare in the dawn sky in mid-month, gaining almost 1° in elongation each day. The planet is in **Capricornus**, where it will spend the entirety of 2021. On the 6th, the planet will pass just 0.4° from **Venus**, rising only ½ hour before sunrise. On the 15th, **Saturn** and **Mercury** rise together in the eastern sky. On the 18th, the pair of planets will stand roughly 3° high 45 minutes before sunrise. On the 25th, **Saturn**, **Mercury**, and **Jupiter** form a tidy triangle low in the east-southeast. On the 28th, **Saturn**'s disk is 15' wide with the ring system spanning 34” at its widest.

Uranus - **Uranus** and **Mars** begin February about 6.5° apart in **Aries**. At magnitude 5.8, **Uranus** is only visible in binoculars for most people. The planet will lie 10.5° south of **Hamal (Alpha Arietis)**. On the 9th, the planet is positioned between 6.9 magnitude star **SAO 92882** and the 7.8 magnitude star **SAO 92879** in southeast **Aries** – 24' from **SAO 92882** and 5' from **SAO 92075**, shining at magnitude 5.8. A waxing crescent **Moon** lies within 5° of the planet on the 17th. Observing through a telescope, the planet displays a 3.5" wide disk with a greenish hue.

Neptune – **Neptune** appears early in February as a binocular object in **Aquarius**. It will lie less than 20° high once the sky is dark. At magnitude 7.8, the planet lies slightly less than 2° northeast of **Phi Aquarii**, a dim 4th magnitude star, on the 1st. By mid-month. The planet is too low to find. The planet will fade in the bright evening twilight as it approaches a March 11th solar conjunction.

Moon – The **Moon**, during February, will have a trio of occultations. On the 6th, early in the morning, the 4.4 magnitude star **Omega Ophiuchi** will be occulted, with its return from behind the dark limb at around 3 AM CST, when the **Moon** is low in the southeast sky. Early on the 22nd, the waxing gibbous **Moon** (74% illuminated) will eclipse **M35** for the western **United States** and **Canada**, starting at about 3 AM CST, ending around 4:20 AM CST. On the 23rd, southeastern **United States** and parts of **Central America** can watch the **Moon** hide **Kappa Geminorum**. Observers from **Delaware** and southward along the **U.S.** coast will see the star disappear around 6:40 AM CST, and reappear on the **Moon's** bright limb a few minutes to an hour later – exact times depend on the observer's location.

Favorable Librations: **Hausen Crater** – on February 1st; **Le Gentil Crater** – on February 2nd;
Cabeus Crater – on February 3rd, and **Hayn Crater** on February 15th.

Greatest North Declination on the 23rd (+25.1°)

South Declination on the 9th (-24.9°)

Libration in Longitude: East Limb most exposed on the 12th (+4.6°)

West Limb most exposed on the 24th (-6.3°)

Libration in Latitude: North Limb most exposed on the 14th (+6.6°)

South Limb most exposed on the 1st (-6.6°), and on the 28th (-6.5°)

Asteroids – Asteroid **4 Vesta** – **Vesta's** positions, according to the *RASC Observer's Manual, 2021 USA Edition*, are as follows: On February 5th – 11 377.78 +12 16.2, at magnitude 6.6; on the 15th – 11 32.79 +13 36.3, at magnitude 6.3; and on the 25th – 11 25.36 +15 02.9, at magnitude 6.1.

Asteroid **15 Eunomia** – **Eunomia's** positions, according to the Edition *RASC Observer's Manual, 2021 USA Edition*, are as follows: On February 5th – 07 58.16 +16 38.5, at magnitude 8.9; on the 15th – 07 50.03 +16 26.3, at magnitude 9.1; and on the 25th – 07 44.6 +16 13.1, at magnitude 9.4.

Asteroid **18 Melpomene** – **Melpomene's** positions, according to the *RASC Observer's Manual, 2021 USA Edition*, are as follows: On February 5th – 08 54.6 +12 21.8, at magnitude 9.4; and on the 15th – 08 45.01 +13 50.6, at magnitude 9.7. **Melpomene's** positions, *by my estimates*, are as follows: On the 1st – about 0.2° northwest of **Acubens (Alpha Cancri)**; on the 3rd – just under 1° northwest of **Acubens**; on the 5th – just under 1.5° northwest of **Acubens**, or about 1° northeast of **M67**; on the 7th – about 2° northwest of **Acubens**, or 1° due north and a little east of **M67**; on the 9th – around 2.6° northwest of **Acubens**, or about 1.5° north-northwest of **M67**; on the 11th – about 1.8° north-northwest of **M67**; on the 13th – about 2.3° northwest of **M67**; on the 15th – just under 3° northwest of **M67**; on the 17th – about 3.3° northwest of **M67**; and on the 17th – about 3.6° northwest of **M67**.

Asteroid **29 Amphrite** – **Amphrite's** positions, according to the *RASC Observer's Manual, 2021 USA Edition*, are as follows: On February 5th – 10 43.31 +12 51.6, at magnitude 9.4; on the 15th – 10 34.37 +13 26.0, at magnitude 9.2; and on the 25th – 10 24.49 +13 59.2, at magnitude 9.1. **Amphrite's** positions, *by my estimates*, are as follows: On February 9th – about 2.2° southeast of the star **46 Leonis**; on the 11th – about 1.8° southeast of **46 Leonis**; on the 13th – about 1.3° southeast of **46 Leonis**; on the 15th – just under 1° south-southeast of **46 Leonis**; on the 17th – about 0.6° due south and a touch east of **46 Leonis**; on the 19th – about 0.6° southwest of **46 Leonis**; on the 21st – 1° west-southwest of **46 Leonis**; on the 23rd – about 1.5° west and a little south of **46 Leonis**, or 2.5° due east and a little north of **37**

Leonis; on the 25th - 2° east and a little north of **37 Leonis**; and on the 27th – 1.5° east and a little north of **37 Leonis**.

Asteroid **60 Echo** – **Echo's** positions, *by my estimates*, are as follows: On February 1st – about 1° south-southwest of **Acubens (Alpha Cancri)**; on the 5th – about 0.3° southeast of **M67**; on the 10th – about 1° due west of **M67**; on the 15th – about 2° due west and a little north of **M67**; on the 20th – just over 3° west and a little north of **M67**; and on the 25th – about 4° west-northwest of **M67**.

Comets – Comet **7P/Pons-Winnecke** – **7P's** positions, according to **ALPO**, are as follows: On February 10th – 15 33.5 +09 54, in **Serpens** at magnitude 16.2; and on the 20th – 15 58.7 +09 48, in **Serpens** at magnitude 15.9.

Comet **141P/Machholz** – **141P's** positions, according to **ALPO**, are as follows: On February 10th – 03 44.3 - 01 01.0, in **Taurus** at magnitude 13.8; and on the 20th – 04 36.9 +01 07, in **Taurus** at magnitude 14.9.

Comet **C/2020 M3 (ATLAS)** – **C/2020 M3's** positions, according to **ALPO**, are as follows: On February 10th – 05 45.2 +45 35, in **Auriga** at magnitude 12.5; and on the 20th – 05 59.7 +48 08, in **Auriga** at magnitude 13.0.

Comet **C/2020 S3 (Erasmus)** – **C/2020 S3** could be as bright as 7th magnitude – unfortunately, it is located too close to the **Sun** to be seen from the ground. It was discovered on September 17, 2020 by Nicholas Erasmus.

Comet **88P/Howell** – **Howell's** positions, *by my estimates*, are as follows: On February 1st - 6° due east and a little north of **Phi Aquarii**; on the 5th – just over 4° west and a little south of **27 Piscium**; on the 10th – just over 1° northwest of **10 Piscium**; on the 15th - 2° southwest of **29 Piscium**; on the 20th – just over 5° southwest of **29 Piscium**; and on the 25th - 8° west and a little north of **25 Ceti**.

Meteor Showers – There are no major meteor showers this month. February is traditionally a quiet month for meteors. The average sporadic (random) rate for meteors is seven per hour and occasional fireballs.

When to View the Planets:

Evening Sky

Mars (southwest)
 Uranus (southwest)
 Neptune (west)

Midnight

Mars (west)

Morning Sky

Mercury (east)
 Venus (east)
 Jupiter (east)
 Saturn (east)

DARK SKY VIEWING - PRIMARY ON FEBRUARY 13TH, SECONDARY ON FEBRUARY 20TH



Cassiopeia – The Queen of Ethiopia

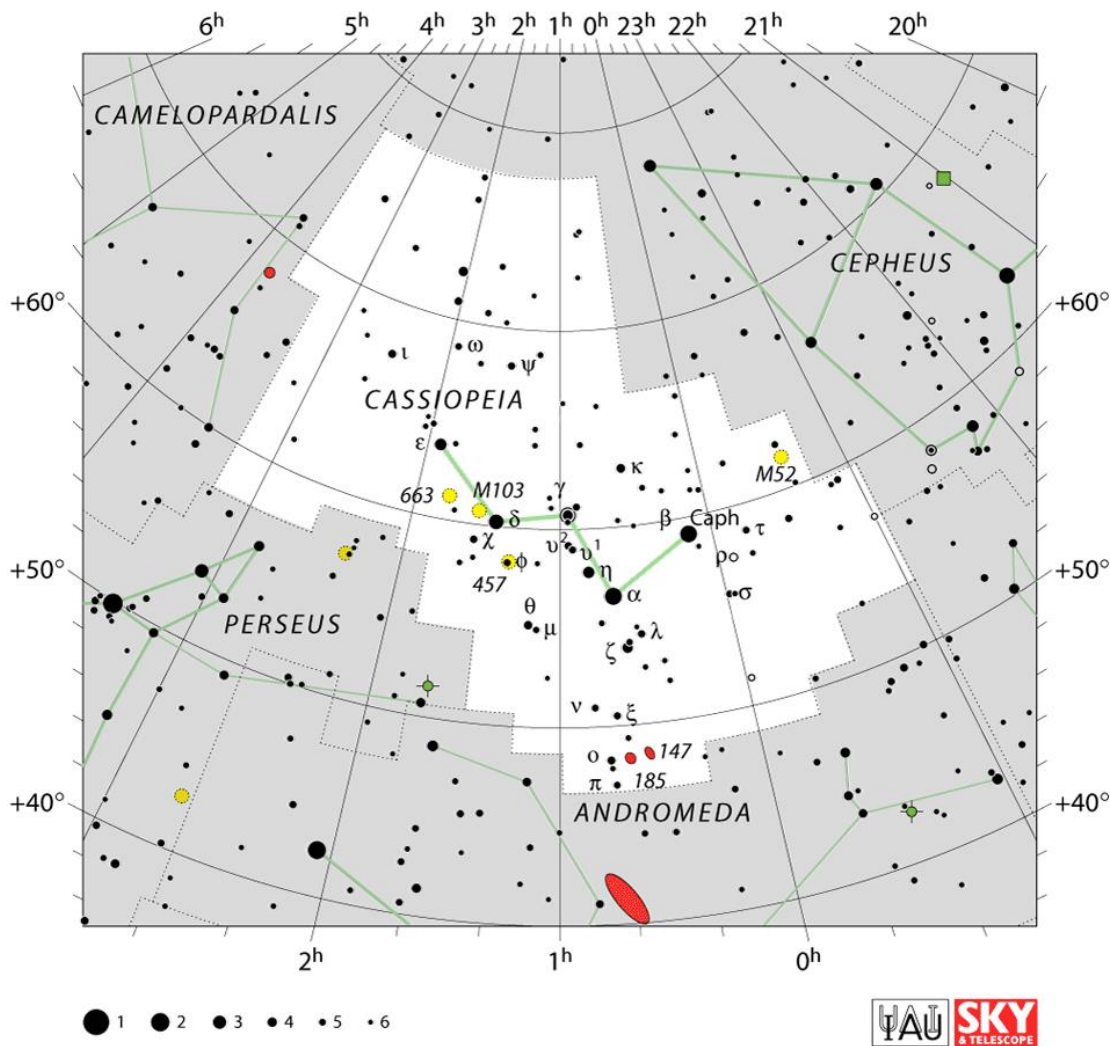
Cassiopeia was the vain and boastful wife of King Cepheus of Ethiopia, who lies next to her in the sky. They are the only husband-and-wife couple among the constellation. Classical authors spell her name Cassiopeia, but Cassiopeia is the form used by astronomers.

While combing her long locks one day, Cassiopeia dared to claim that she was more beautiful than the sea nymphs called the Nereids. There were fifty Nereids, daughters of Nereus, the so

called Old Man of the Sea. One of the Nereids, Amphitrite, was married to Poseidon, the sea god. The Nereids appealed to Poseidon to punish Cassiopeia for her vanity, and the sea god sent a monster to ravage the coast of King Cepheus’s country. This monster is commemorated in the constellation Cetus. To appease the monster, Cepheus and Cassiopeia chained their daughter Andromeda to a rock as a sacrifice, but Andromeda was saved from the monster’s jaws by the hero Perseus in one of the most famous rescue stories in history.

As an added punishment, Cassiopeia was condemned to circle the celestial pole for ever, sometimes hanging upside down in an undignified posture. In the sky Cassiopeia is depicted sitting on her throne, still fussing with her hair.

The constellation of Cassiopeia has a distinctive “W”-shape made up of its five brightest stars, which writers such as Aratus likened to a key or a folding door. Alpha Cassiopeiae is called Shedar from the Arabic, meaning “the breast”, which position it marks. Beta Cassiopeiae is known as Caph, from the Arabic, meaning “the stained hand”, as it was thought by them to represent a hand stained with henna. Delta Cassiopeiae is named Ruchbah, from the Arabic, meaning ‘knee’. The central star of the “W”, Gamma Cassiopeiae, is an erratic variable star given to occasional outbursts in brightness.



The End