



NEWSLETTER JANUARY 2023

NEXT MEETING

Venue: Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 25 January at 19h15.

Programme:

- **“What’s up?” by Danie Barnardo.**
- **Main talk: “Days, nights and seasons on Mercury” by Pierre Lourens.**
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Michelle Ferreira.

NEXT OBSERVING EVENING

Friday 20 January from sunset onwards at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road.

TABLE OF CONTENTS

Astronomy related articles on the Internet	2
Astronomy related images and video clips on the Internet	3
Artist’s depictions	4
What’s up in February 2023?	5
Feature of the month: The next generation of giant, ground-based telescopes	13
NOTICE BOARD	13
Astronomy basics: The Hubble constant	13
Observing: A colourful grouping	14
Pale blue dot	15
Web links for the astronomy enthusiast	16
Pretoria Centre committee	16

Astronomy related articles on the Internet

[EarthSky | One supernova at 3 different times in cosmic history](#)

An enormous galaxy cluster lies between us and the supernova. The cluster acts as a gravitational lens. It has bent and magnified the supernova's light, causing it to travel to us on 3 different paths, some longer and some shorter.

[EarthSky | If we find life beyond Earth, how will we respond?](#)

The discovery of an alien intelligent species that has created a technological civilization would be momentous. But *if* we found them, how might we respond? The new SETI Post-Detection Hub research initiative wants humanity to be ready, if and when it ever happens.

[Ocean of Jupiter's Europa: "Potential for Life Billions of Years Old" \(Weekend Feature\) - The Daily Galaxy](#)

Read text and see 3 video clips.

[EarthSky | Fiery hourglass star seen by Webb](#)

Astronomers used the JWST to catch a fiery hourglass nebula blasting outward from a protostar. And within the neck of the hourglass, they see a protoplanetary disk (aka a proplyd), where new planets are forming. Read text and see 2 video clips.

[EarthSky | Bright, early galaxies surprise astronomers](#)

The JWST enabled astronomers to glimpse a realm of early galaxies which had been beyond the grasp of all earlier telescopes.

[EarthSky | A runaway star moves fast in an unusual direction](#)

["Alien Habitats Could Be Just About Anywhere" - The Daily Galaxy](#)

Read text and see a 42-minute documentary.

[EarthSky | Asteroid hit Canada, may have dropped meteorites](#)

[EarthSky | Double auroras light up Martian skies](#)

[EarthSky | Keck Planet Finder begins search for other Earths](#)

The Keck Planet Finder instrument on the Keck 1 Telescope in Hawaii has achieved first light. It will now begin its search for habitable Earth-sized planets around other stars. It will use the Doppler technique.

[Welcome to Wits Planetarium](#)

The Planetarium at Wits is closed at present, because it is being upgraded. The vision is to transform the Planetarium into a cutting-edge digital facility, while building on its proud history as an unique science engagement venue. When finished, there will be four modern planetaria in South Africa. See the item "**Planetaria**" on the last page of this newsletter.

[Jim Langcuster's answer to What reason, in your opinion, do you think that the aliens have not made contact with humans? - Quora](#)

[EarthSky | The Orion Nebula is a starry nursery](#)

The Orion Nebula appears to the eye as a tiny, hazy spot. But it's a vast stellar nursery, a place where new stars are forming.

[Billions of Rocky Planets in the Habitable Zones around Red Dwarfs — English \(inaf.it\)](#)

[EarthSky | Astronomers find 8 new super-hot stars](#)

8 super hot, extremely bright stars were discovered with SALT. They are white dwarfs.

Astronomy related images, video clips and documentaries on the Internet

The Challenger disaster. See a video clip.

[CNN, Feynman and the Challenger disaster – YouTube](#)

Icebergs. There is a large ice-covered continent at the south pole of the third planet from the Sun. See how huge icebergs break off from the end of a glacier coming off this continent. Are there similar scenes on Earth-like exoplanets in the habitable zones of their parent stars? We don't know (yet), and (in the meantime) can only use our imagination, as in the scenes on the next page of this newsletter.

[EarthSky | Glacier calving in Antarctica: Video and science](#)

Ancient alien theorists. Documentaries about the theories of ancient alien visits to Earth were broadcast on History Channel (channel number 186) on DSTV. (They will very likely be broadcast again sometime.) Ancient alien theorists showed evidence from archaeology and mythology for these theories. (They also presented some hard science.) However, these theories are debunked in the documentary at the following link: (It is 3 hours and 10 minutes long.)

[Ancient Aliens Debunked - \(full movie\) HD – YouTube](#)

A critical discussion is also to be found here:

[Ancient astronauts - Wikipedia](#)

Interactive map. A new interactive map of the Universe lets you scroll from our position in the Milky Way all the way to the edge of the observable Universe.

An introduction to the map is here:

[EarthSky | Map of the universe is interactive, free, online](#)

The map itself is here:

[The Map of the Universe](#)

Auroras. See the 25 best aurora images of 2022 from photographers around the world and use them as wallpaper on your PC screen.

[2022 Northern Lights Photographer of the Year - Capture the Atlas](#)

Immediately below: An artist's concept of a scene at sundown on Kepler-1649c, an Earth-sized exoplanet orbiting within the habitable zone of the star Kepler-1649. The liquid water lake and clouds are imaginary. [Kepler-1649 - Wikipedia](#)



Below: An artist's depiction of a scene near sundown on an Earth-like exoplanet orbiting a binary star. The alien plants, the liquid water lake, the moon and the clouds are all imaginary.



What's up in February 2023? - by Danie Barnardo

This is the last month of Summer and the weather forecast still predicts cloudy weather and rain for this month. Weather25.com predicts 3 to 8 days of rain in Pretoria during February 2023. This means we can expect to still experience challenging viewing conditions during the month. Use the time wisely to research on what to expect in the prime viewing time during the coming winter months and to plan your viewing time accordingly.

The Moon phases for February 2023

Full Moon 5 February
 Last Quarter 13 February
 New Moon 20 February
 First quarter 27 February

The best time for viewing should therefore be the middle two weeks of the month.

The Moon always provides good viewing opportunities (cloudy conditions permitting!), even in light-polluted city-environments. A good source of what to view on the Moon is the Lunar 100 list, which is a list of Lunar highlights similar to the ASSA 100 list. A good source of information is available from: <https://backyardstargazers.com/guide-to-the-lunar-100-including-free-downloads/> which includes a few useful pdf downloads to assist you.

The following table shows the dates of perigee and apogee of the Moon during February 2023. The Moon's orbit around Earth is elliptical. The point of the orbit closest to Earth is called perigee, while the point farthest from Earth is known as apogee.

	Date	Distance
Apogee	4 February	406,475 km
Perigee	19 February	358,266 km

Moon-Astronomical Objects Conjunctions

A Moon-Astronomical object conjunction occurs when an astronomical object appears to be near to the Moon, as observed from Earth.

Astronomical Object	Date and Time
Pollux	3 February 21:47 – one of the two bright stars in Gemini
Beehive	4 February 23:32 – a famous open cluster in Cancer
Mars	28 February 21:00 – in Taurus

These conjunctions can provide opportunities to acquire impressive astronomical images.

The Planets

Mercury

Mercury is visible in the early morning sky and rises at about 04:15 on 1 February and at about 05:15 on 28 February.

Venus

Venus is near to the sun and visible low in the west just after sunset during the whole of February.

(Continued on next page.)

(Continued from previous page.)

Mars

Mars is visible in the evening sky and sets at about midnight on 1 February and at about 01:00 on 28 February.

Jupiter

Jupiter is visible in the western evening sky and sets at about 21:00 on 1 February and at about 20:00 at month end.

Saturn

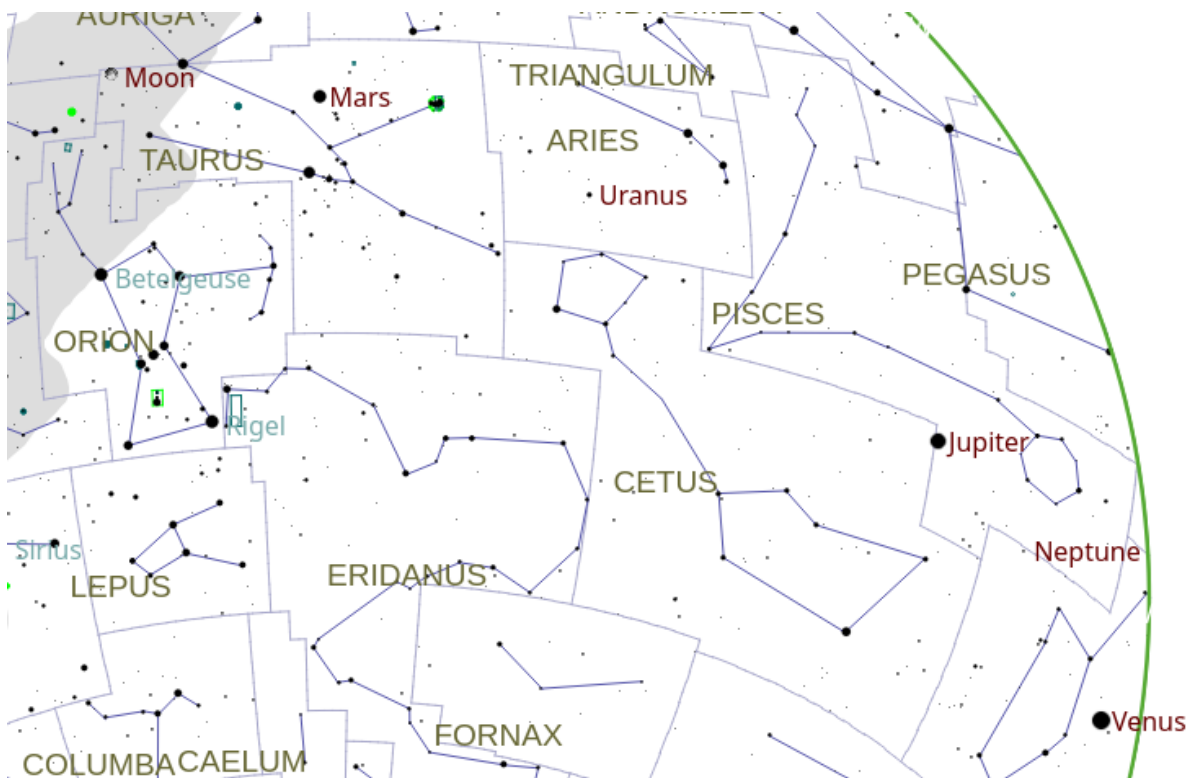
Very near to the sun and not visible from 4 February, when it sets just after sunset.

Neptune and Uranus

Uranus sets at about 23:00 on 1 February and at about 21:30 at the end of the month.
Neptune not visible during February.

Jupiter and Venus approaches one another from 20 February and is in close conjunction low in the west at 19:00 on 28 February.

An impressive lineup of Venus, Neptune, Jupiter, Uranus, Mars and the Moon is visible at about 20:00 on 1 February, as indicated on the image below.

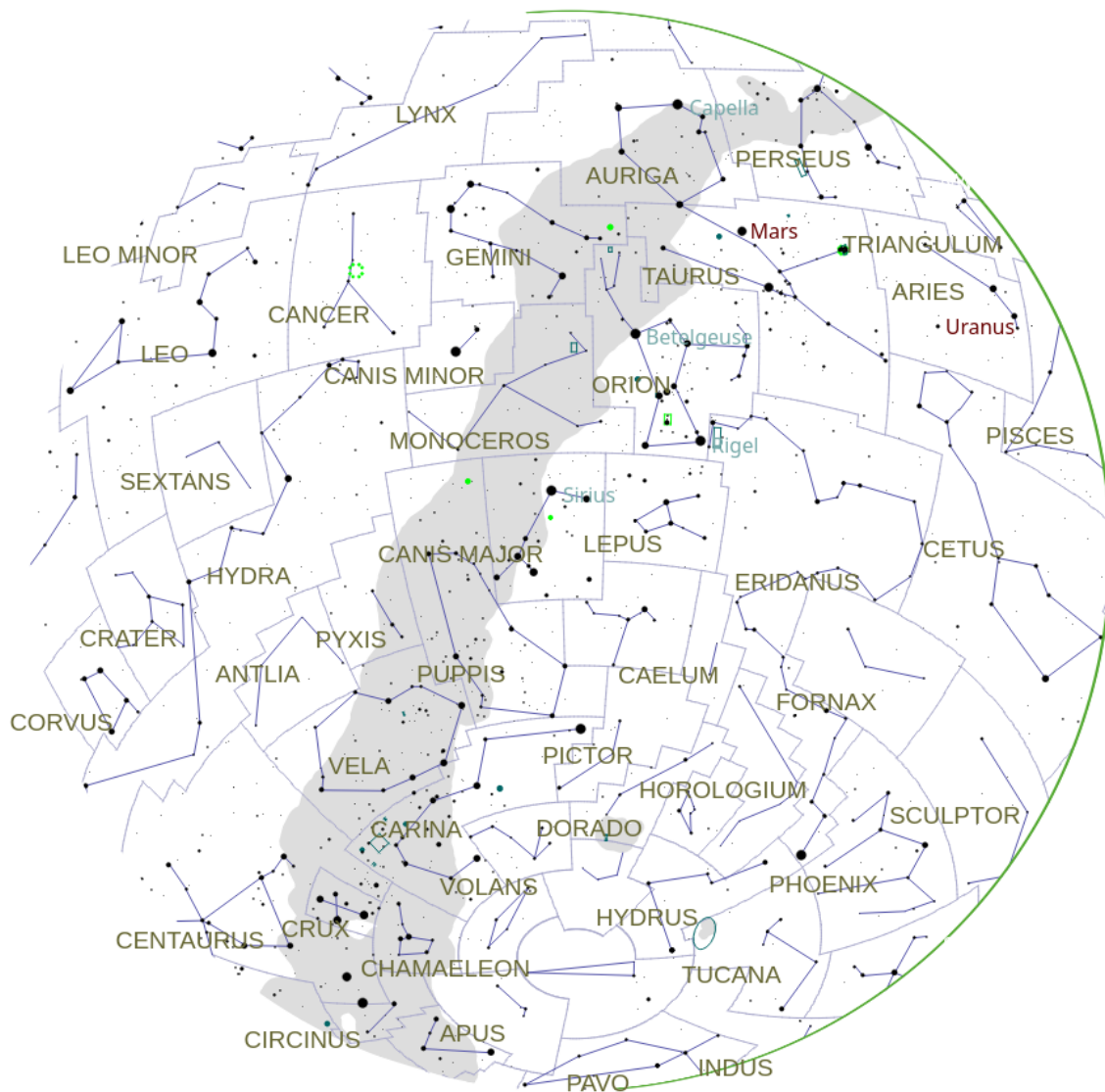


(Continued on next page.)

(Continued from previous page.)

Constellations

Skymap on 15 February at about 21:00, showing the prominent constellations during February 2023



Argo Navis (thanks to Wikipedia: https://en.wikipedia.org/wiki/Argo_Navis)

Argo Navis (the Ship Argo), or simply Argo, is one of the 48 Ptolemy's constellations, now a grouping of three IAU constellations. It was formerly a single large constellation in the southern sky. The genitive is "Argus Navis", abbreviated "Arg". Flamsteed and other early modern astronomers called it Navis (the Ship), genitive "Navis", abbreviated "Nav".

The constellation proved to be of unwieldy size, as it was 28% larger than the next largest constellation and had more than 160 easily visible stars. The 1755 catalogue of Nicolas Louis de Lacaille divided it into the three modern constellations that occupy much of the same area: Carina (the keel), Puppis (the poop deck) and Vela (the sails).

Argo derived from the ship Argo in Greek mythology, sailed by Jason and the Argonauts to Colchis in search of the Golden Fleece. Some stars of Puppis and Vela can be seen from Mediterranean latitudes in winter and spring, the ship appearing to skim along the "river of the Milky Way." (Continued on next page.)

(Continued from previous page.)

Due to precession of the equinoxes, the position of the stars from Earth's viewpoint has shifted southward, and though most of the constellation was visible in Classical times, the constellation is now not easily visible from most of the northern hemisphere. All the stars of Argo Navis are easily visible from the tropics southward, and pass near zenith from southern temperate latitudes. The brightest of these is Canopus (α Carinae), the second-brightest night-time star, now assigned to Carina.

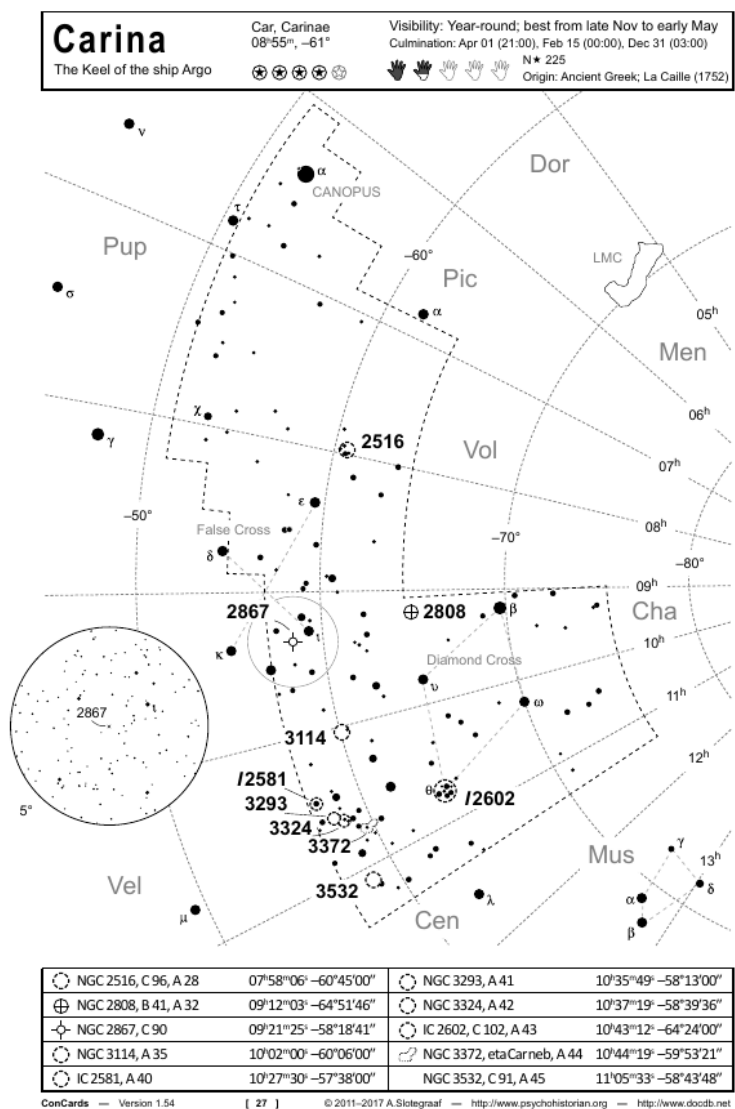
In his 1763 star atlas, Nicolas Louis de Lacaille explained that there were more than a hundred and sixty stars clearly visible to the naked eye in Navis, and so he used the set of lowercase and uppercase Latin letters three times on portions of the constellation referred to as "Argûs in carina" (Carina, the keel), "Argûs in puppi" (Puppis, the poop deck or stern), and "Argûs in velis" (Vela, the sails). Lacaille replaced Bayer's designations with new ones that followed stellar magnitudes more closely, but used only a single Greek-letter sequence and described the constellation for those stars as "Argûs". Similarly, faint unlettered stars were listed only as in "Argûs".

The final breakup and abolition of Argo Navis was proposed by Sir John Herschel in 1841 and again in 1844. Despite this, the constellation remained in use in parallel with its constituent parts into the 20th century. In 1922, along with the other constellations, it received a three-letter abbreviation: Arg. The breakup and relegation to a former constellation occurred in 1930 when the IAU defined the 88 modern constellations, formally instituting Carina, Puppis, and Vela, and declaring Argo obsolete. Lacaille's designations were kept in the offspring, so Carina has α , β , and ϵ ; Vela has γ and δ ; Puppis has ζ ; and so on. As a result of this breakup, Argo Navis is the only one of the 48 listed by Ptolemy in his Almagest no longer officially recognized as a single constellation.

Carina

Carina contains the second brightest star in the night sky, Canopus, along with several other notable bright stars, among them η Carinae, surrounded by the famous Carina Nebula (NGC3372). Other famous deep sky objects in the constellation include the θ Carinae Cluster (Southern Pleiades or IC2602), the Wishing Well Cluster (NGC3532), the Diamond Cluster (NGC2516), and the open cluster NGC3603.

Carina is home to 11 stars with known planets and does not contain any Messier objects. The brightest star in the constellation is Canopus, α Carinae, with an apparent magnitude of -0.74. There are two meteor showers associated with the constellation: the α Carinids and the η Carinids. (Continued on next page.)



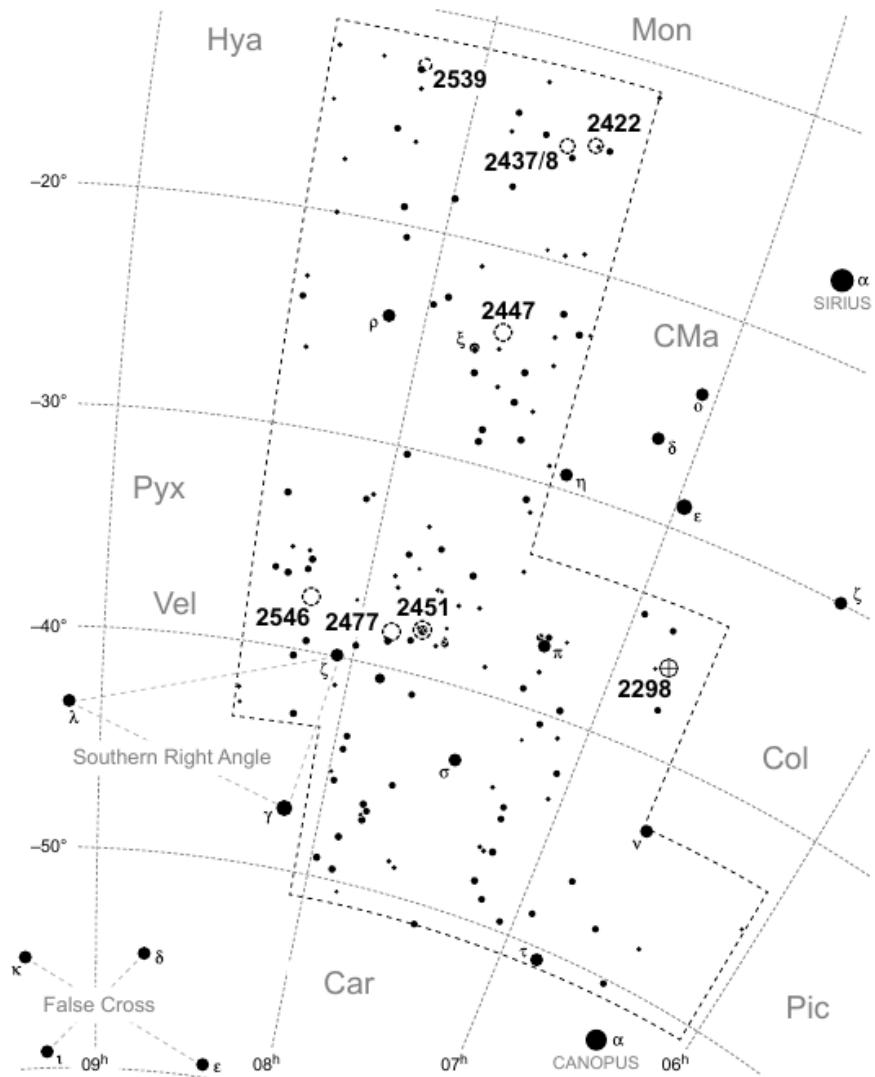
(Continued from previous page.)

Puppis

Puppis contains three Messier objects – the open cluster Messier 46 (M46, NGC 2437), the open cluster Messier 47 (M47, NGC 2422) and another open cluster Messier 93 (M93, NGC 2447) – and has six stars with confirmed planets. The brightest star in the constellation is Naos (ζ Puppis) with an apparent magnitude of 2.21. There are three meteor showers associated with the constellation: the π Puppids, the ζ Puppids and the Puppid-Velids.

NGC 2298 is a globular cluster with an apparent magnitude of 9.3. It was discovered by the Scottish astronomer James Dunlop on May 8, 1826. It is approximately 30 000 light years distant from the solar system.

Puppis The Stern of the ship Argo	Pup, Puppis 07 ^h 45 ^m , -38°	Visibility: Mid-August to late June (Nov to mid-Apr) Culmination: Mar 14 (21:00), Jan 28 (00:00), Dec 13 (03:00)
	☉ ☽ ☿ ♀ ♁ ♃ ♄ ♅ ♆ ♇ ♈ ♉ ♊ ♋ ♌ ♍ ♎ ♏ ♐ ♑ ♒ ♓ ♈ ♉ ♊ ♋ ♌ ♍ ♎ ♏ ♐ ♑ ♒ ♓	N★ 237 Origin: Ancient Greek; La Caille (1752)

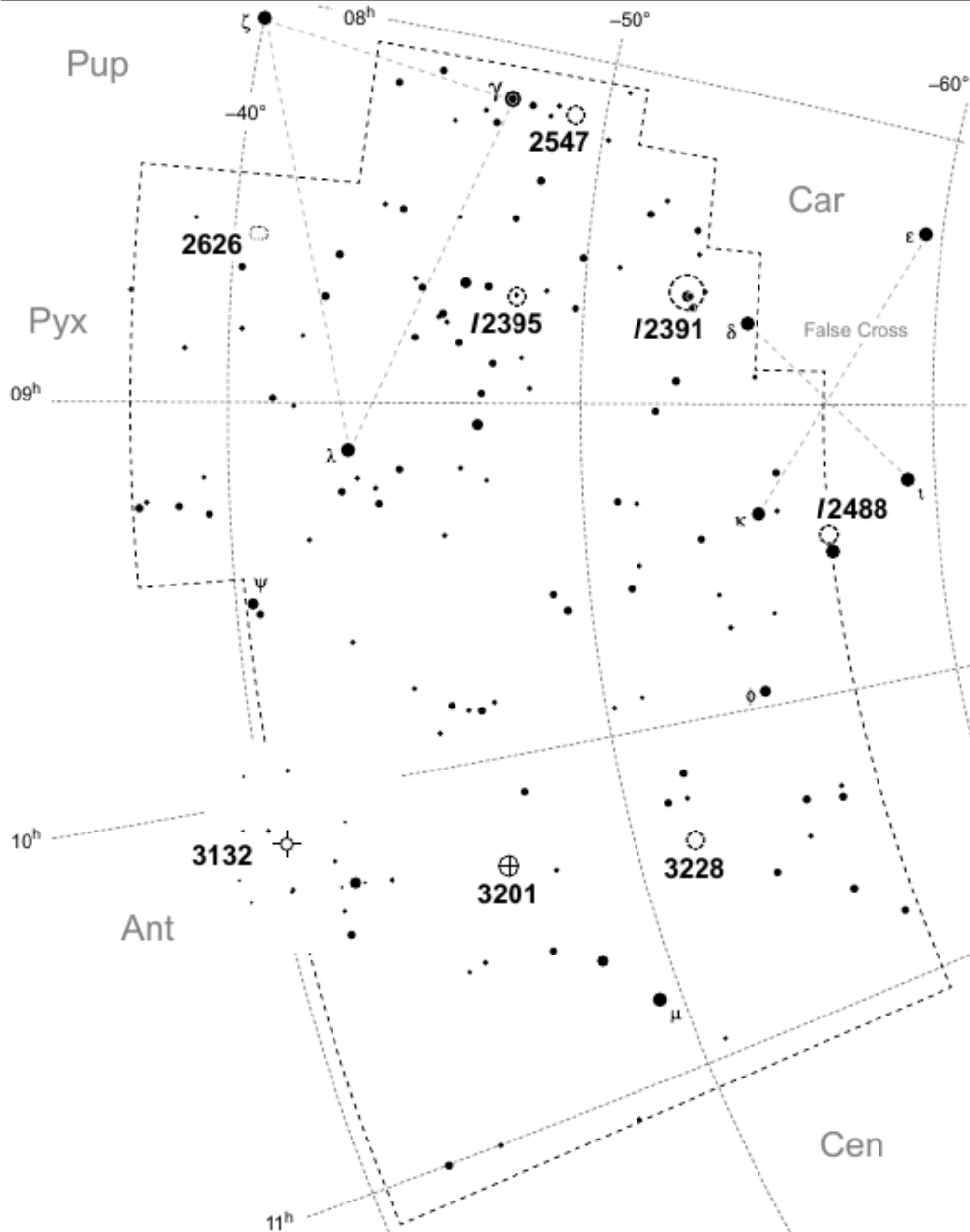


⊕ NGC 2298, B 37	06 ^h 48 ^m 59 ^s -36°00'19"	☉ NGC 2451, A 25	07 ^h 45 ^m 24 ^s -37°58'00"
☉ NGC 2422, M 47, A 23	07 ^h 36 ^m 35 ^s -14°28'57"	☉ NGC 2477, C 71, A 27	07 ^h 52 ^m 06 ^s -38°32'00"
☉ NGC 2437, M 46, A 24	07 ^h 41 ^m 42 ^s -14°49'00"	☉ NGC 2539	08 ^h 10 ^m 42 ^s -12°50'00"
☉ NGC 2438	07 ^h 41 ^m 51 ^s -14°43'55"	☉ NGC 2546	08 ^h 11 ^m 54 ^s -37°37'00"
☉ NGC 2447, M 93, A 26	07 ^h 44 ^m 30 ^s -23°51'12"		

(Continued on next page.)

(Continued from previous page.)

Vela	Vel, Velorum	Visibility: September to July (December to late April)
	09 ^h 25 ^m , -49°	Culmination: Apr 08 (21:00), Feb 22 (00:00), Jan 07 (03:00)
The Sails of the ship Argo	☼☼☼☼☼	N★ 214
	👤👤👤👤👤	Origin: Ancient Greek; La Caille (1752)



☼ gamma Vel, SAO 219504	08 ^h 09 ^m 32 ^s -47°20'12"	☉ IC 2488, A 34	09 ^h 27 ^m 36 ^s -57°00'00"
☉ NGC 2547, A 29	08 ^h 10 ^m 26 ^s -49°10'03"	☼ NGC 3132, C 74, A 37	10 ^h 07 ^m 02 ^s -40°26'11"
☉ NGC 2626	08 ^h 35 ^m 32 ^s -40°40'18"	⊕ NGC 3201, B 44, C 79	10 ^h 17 ^m 37 ^s -46°24'40"
☉ IC 2391, C 85, A 31	08 ^h 40 ^m 36 ^s -53°02'00"	☉ NGC 3228	10 ^h 21 ^m 24 ^s -51°44'00"
☉ IC 2395	08 ^h 42 ^m 37 ^s -48°06'48"		

Vela

Vela contains seven stars with known planets and has no Messier objects. The brightest star in the constellation is γ Velorum, with an apparent magnitude of 1.75. There are three meteor showers associated with the constellation: the δ Velids, the γ Velids, and the Puppig-Velids. (Continued on next page.)

(Continued from previous page.)

Regor – γ Velorum (Gamma Velorum)

Gamma Velorum is the brightest star in Vela constellation. It has an apparent magnitude of 1.7. Gamma Velorum is in fact a multiple star system composed of at least six stars, approximately 336 light years distant from Earth.

The star system's traditional name, Suhail or Suhail al Muhlif, is derived from the Arabic suhayl al-muħlif, which means "the glorious (star) of the oath." In modern times, the star has also been known as Regor, but neither name has been formally approved for Gamma Velorum by the International Astronomical Union (IAU).

The primary component in the system, Gamma-2 Velorum or Gamma Velorum A, is a spectroscopic binary star composed of a blue supergiant with the stellar classification of O7.5 and is a massive Wolf-Rayet star, an evolved, exceptionally hot, massive star which is rapidly losing mass as a result of a very strong stellar wind. The Wolf-Rayet star is one of the nearest supernova candidates to Earth and will likely end its life as a Type Ic supernova. The two stars orbit each other with a period of 78.5 days and are separated by 1 astronomical unit.

The nearest companion to the binary star, Gamma-1 Velorum or Gamma Velorum B, is a blue-white class B subgiant star. Other components of the system are Gamma Velorum C, a white star with a visual magnitude of 8.5, and another binary star composed of Gamma Velorum D and Gamma Velorum E. Gamma Velorum D is another white, class A star with an apparent magnitude of 9.4, and Gamma Velorum E is a 13th magnitude star.

NGC 3132 is a bright planetary nebula in Vela, almost half a light year in diameter. It has an apparent magnitude of 9.87 and is approximately 2,000 light years distant from the Sun. It was named the Eight-Burst Nebula because it appears like the figure 8 in amateur telescopes. The nebula's resemblance to the Ring Nebula (Messier 57) has earned it the nickname the Southern Ring Nebula.

The nebula was one of the first targets of the James Webb Space Telescope (JWST) in 2022. contains two stars, a 10th magnitude star and a 16th magnitude white dwarf which has blown off its outer layers and whose ultraviolet radiation makes the nebula glow.

NGC 2547 is an open cluster in Vela, also known in Pretoria Centre as "Johan's heart cluster", revealing, with a little imagination, the shape of a human heart. The star cluster is young with an age of 20-30 million years and is about 1 200 light years from the Sun.

η (Eta) Carinae

Eta Carinae, formally known as Eta Argus, is a stellar system consisting of at least 2 stars located in the constellation of Carina. This star system's luminosity is more than 5 million times greater than our Sun.

Eta Carinae is the only known star that emits ultraviolet laser emissions. The star system is located at around 7500 light-years / 2300 parsecs away from the Sun. The two main components of Eta Carinae, are named Eta Carinae A and Eta Carinae B. This star system has an extensive history of massive eruptions which propelled it several times in the brightest star charts. It is one of the most unique stars ever studied. The primary star, Eta Carinae A, is a peculiar star similar to a luminous blue variable which initially had 150-200 solar masses, but it has already lost more than 30 solar masses. Eta Carinae A has more than 100 solar masses, its exact mass is difficult to estimate due to eruptions. (Continued on next page.)

(Continued from previous page.)

The same goes for its radius which is estimated at around 240 solar radii. Eta Carinae A is more than 5 million times brighter than our sun and has surface temperatures between 9 400 to 35 200 K. The secondary star, Eta Carinae B, is even more obscure. Most observations point out that it has between 30 to 80 solar masses and a radius between 14.3 to 23.6 solar radii. Eta Carinae B is speculated to be 1 million times brighter than our sun. Both stars are enveloped by a cloud of gas and dust known as the Homunculus nebula. The exact age of these stars is hard to determine, but most speculate that they are around 3 million years old. Thus they are much younger than our sun.

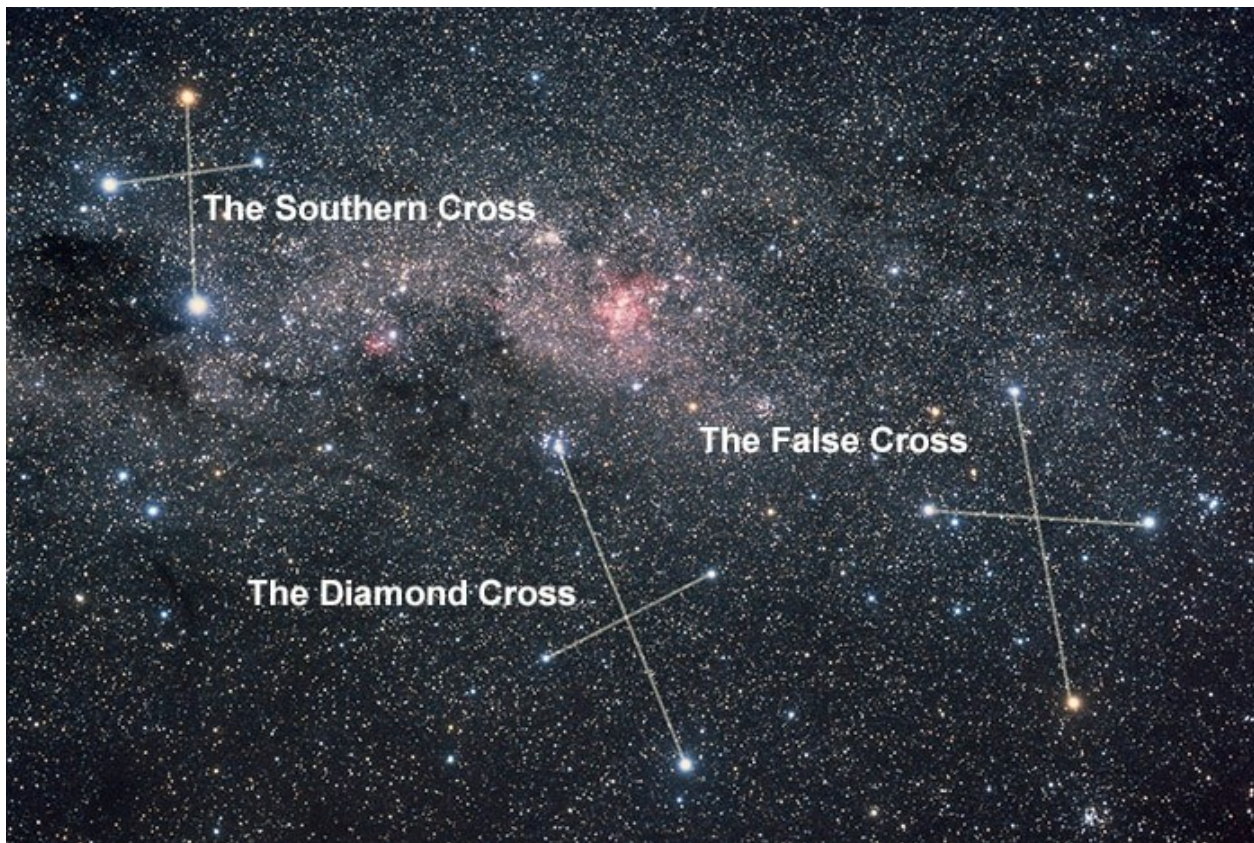
False Cross

The False Cross is an asterism formed by the stars Alsephina (δ Velorum), Markeb (κ Velorum), Aspidiske (ι Carinae) and Avior (ϵ Carinae) in Carina constellation. It was named the False Cross because it is often mistaken for the Southern Cross, which is frequently used in navigation to find true south.

Diamond Cross

The Diamond Cross is one of the three prominent cross asterisms in the far southern sky. Located in the constellation Carina, the asterism is formed by Miaplacidus (β Carinae), θ , υ and ω Carinae. It lies between the brighter Southern Cross and False Cross.

Lastly, a rare opportunity to photograph a comet with the minimum of effort (cloud cover allowing). Simply aim your DSLR in the direction of Mars on the 10th of February and and take a long exposure of 20 to 30 seconds at the largest aperture your widest-angle lens allows. The image may reveal a fuzzy, tailed object, which is actually **Comet C/2022 E3 (ZTF)**, which is very near to Mars in Taurus on 10 February 2023. Ω



Feature of the month: The next generation of giant, ground-based telescopes

Most astronomical objects are extremely faint. A telescope with large aperture is needed to gather enough light from it in a reasonable time. The general trend in astronomical telescopes has therefore been to build telescopes with ever larger aperture. Here follows links to web sites about four giant ground-based telescopes that are planned to come into operation before the end of the decade:

The 39 meter Extremely Large Telescope. Under construction at Cerro Armazones Observatory in Chile. Planned start of operations: 2027.

[ELT | ESO](#)

[Extremely Large Telescope - Wikipedia](#)

The Thirty Meter Telescope. Under construction at Mauna Kea Observatory in Hawaii. Planned start of operations: 2027.

[TMT International Observatory](#)

[Thirty Meter Telescope - Wikipedia](#)

The 25.4 meter Giant Magellan Telescope. Under construction at Las Campanas Observatory in Chile. Planned start of operations: 2029.

[Giant Magellan Telescope](#)

[Giant Magellan Telescope – Wikipedia](#)

The Square Kilometer Array. It is a radio telescope under construction in Australia (low-frequency) and South Africa (mid-frequency), and with HQ at Jodrell Bank Observatory in England. Planned start of operations: 2027.

[The SKA Project - Public Website \(skatelescope.org\)](#)

[Square Kilometre Array - Wikipedia](#)

NOTICE BOARD

Sky Guide Africa South 2023. Members can come and collect their copies at the meeting on 25 January. If they do not, they will have to go and collect them later at the home of one of the committee members.

Fishing for Jellyfish Galaxies. Help astronomers identify elusive "Jellyfish" galaxies in large sky surveys. Do it on your PC.

[Fishing for Jellyfish Galaxies — Zooniverse](#)

Old newsletters: All old newsletters from January 2004 onward are on our website. They contain a record of our Centre's activities as well as astronomical information.

Astronomy basics: The Hubble constant

[What is the Hubble Constant? Daniel Holz measures the universe's expansion using gravitational waves – YouTube](#)

[Nobel Prize Winner Adam Riess: The Hubble Tension is Getting WORSE! - YouTube](#)

Observing: A colourful grouping - by Magda Streicher

The southern constellation of Lepus has in its midst an unusual group of stars, quite outstanding and only 1.5 degrees south of Alpha Leporis. One wonders: what is the true nature of this special group of stars? This question has been asked by many. The group contains five stars, clearly outstanding against the background star field. It was discovered by John Herschel and also catalogued as h3780. It is there remarked that it is a fine clustering of bright stars.

With its variety of colours, it can truly be described as one of the most beautiful stellar groupings. The magnitude 6.4 primary star of the grouping has a very smooth blue-grey colour. Towards the south is a yellow magnitude 8.8 star, accompanied by a fainter member. On the eastern side of the grouping the magnitude 10 member displays an ashy colour. The magnitude 7.7 star is located on the northern edge of the group and displays a strong orange colour - it is also the most outstanding member. A slightly dirty yellow coloured star with magnitude 8.2 is situated further west.

Ongoing speculation is that it could be a real cluster or just a chance grouping of stars. The Hipparcos catalogue states that at least three of the members possess a similar proper motion and concludes that they are in the same cluster. Ω (Magda recently returned from a trip to Réunion and Madagascar. Since then, she has also moved to a townhouse. Her e-mail address is: magdalena@mweb.co.za)

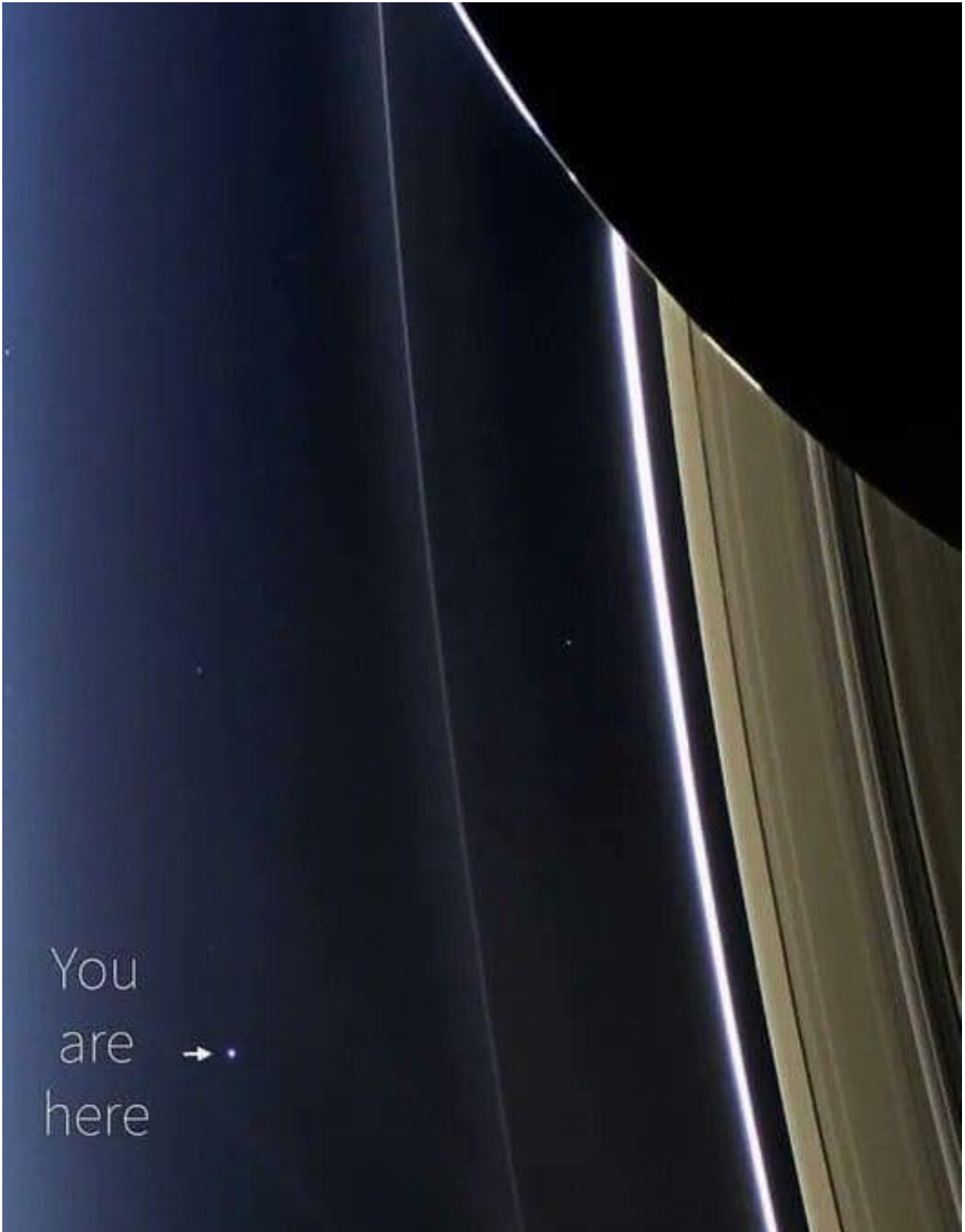
OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 2017	Star grouping	05 h 39.4 m	-17° 51.0'	7.5	4.5'



A photograph taken by the Cassini Probe from near Saturn. You are on the pale blue dot at the bottom left of the photograph. This is reminiscent of the book “**Pale blue dot**” by **Carl Sagan**. I invite you to read the book.

A summary of the book is to be found at: [Pale Blue Dot \(book\) – Wikipedia](#)

A video clip is to be found at: [Carl Sagan - Pale Blue Dot - YouTube](#)



Web links for the astronomy enthusiast

- ◆ **The website for all information about the ASSA and the ASSA Centres:**
<https://assa.saao.ac.za/>
- ◆ **ASSA Specialist Sections:**
 ASSA has various areas of interest. Join and participate!
<https://assa.saao.ac.za/sections/>
- ◆ **ASSA Publications to download and enjoy:**
 MNASSA: <https://www.mnassa.org.za/>
 Nightfall: <http://assa.saao.ac.za/sections/deep-sky/nightfall/>
 To receive as part of ASSA membership benefits - *Sky Guide*, the astronomical handbook for Southern Africa: <http://assa.saao.ac.za/about/publications/sky-guide/>
- ◆ **Mail Groups to join:**
 For general ASSA related information: <https://groups.io/g/ASSA-announce>
 For posting general items and discussion: <https://groups.io/g/ASSA-discussion>
- ◆ **Social Media to join and share:**
 Facebook: https://www.facebook.com/Astrosocsa/?_rdc=1&_rdr
 Youtube: https://www.youtube.com/channel/UCJ4b1fhmPvYTOsy15YP-_JA
 Twitter: <https://twitter.com/AstroSocSA>
- ◆ **Planetaria:**
 WITS Planetarium (Johannesburg): [Welcome to Wits Planetarium](#)
 Naval Hill Planetarium (Bloemfontein): [Planetarium Home \(ufs.ac.za\)](http://www.ufs.ac.za)
 Iziko Planetarium (Cape Town): [Planetarium and Digital Dome - Iziko Museums](#)
 Sutherland Planetarium (Sutherland): [Sutherland Planetarium](#)
- ◆ **More web links can be found on page 118 of “2022 Sky Guide Africa South”. Ω**

Pretoria Centre committee

Chairman	Johan Smit	072 806 2939	johanchsmit@gmail.com
Vice Chairman	Bosman Olivier	082 883 1869	bosman.olivier@gmail.com
Secretary	Michael Poll	074 473 4785	pollmnj@icon.co.za
Newsletter Editor	Pierre Lourens	072 207 1403	pierre.lourens@vodamail.co.za
Librarian and			
Webmaster	Danie Barnardo	084 588 6668	daniebar403@gmail.com
Public Relations Officer	Bosman Olivier	082 883 1869	bosman.olivier@gmail.com
Observing Coordinator	Neville Young	083 303 2840	nevyoung@gmail.com
Treasurer and			
Membership Secretary	Michelle Ferreira	073 173 0168	michellem.ferreira@standardbank.co.za
Curator of Instruments	Johan Jordaan	082 373 3395	jjordaan121@gmail.com
Additional member:	Neville Young	083 303 2840	nevyoung@gmail.com