



ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

'NDABA



Monthly Newsletter of the Durban Centre - May 2017

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Chairman's Chatter

By Mike Hadlow

Dear Members,

May is here and we are starting to get into a period of clearer skies and great viewing. We have certainly had some fantastic viewing evening over the last 2 to 3 weeks.

The society has been very active over the last month with a number of activities being undertaken and currently being completed.

Our April meeting was once again well attended, with us being fortunate to have our main speaker being a visiting professor from India, Prof. Jayant Narlikar. His talk was titled 'How Well Do We Know our Universe?' It certainly made me realise that our understanding of the universe has changed over time with our increasing knowledge. However, the problem of the understanding our universe has not been solved, and our understanding will change as more of the universe is learnt in time!

Our public viewing was attended by a single family of three but clouds were intermittent and the Observatory's scope was not opened. Nevertheless, John Gill and Chanu Chetty pointed out various stars and constellations, including Jupiter and the Southern Cross, to the family before the sky clouded over. Our next scheduled viewing will be on 26 May and will be hosted by Navi Naidoo and Ooma Rambilass and assisted by John Visser. St. Henry's school has requested to attend the public viewing with 54 children, 6 staff members and the children's parents and siblings. Logan Govender has kindly agreed to give a presentation prior to the viewing. However, because of the numbers, I request that anyone who is free on that evening and has a telescope, attends the evening to assist with the viewing.

Our Basic Astronomy Course commenced on 5 April with 29 people registering. We have since had four course evenings and completed eight modules of the course. Our next module is on 3 May with the final module being on 10 May. As indicated in our previous newsletter, 10 May will be our general meeting. Members are welcome to attend this meeting on which matters relating to the society will be discussed very shortly, prior to the course content of that week. Those of you who wish to attend the course that evening the topics will be 'Near Galactic Neighbourhood' and 'Navigating the Southern Sky'. Hopefully we will have clear skies and we will be able to view what we have learnt after the presentation.

Our 'Rock - Star excursion' to Matatane River Lodge, near Ulundi, which we held together with members of the Geological Society and the 4x4 club, on 27 April to 1 May was hugely successful. Our numbers were;

ASSA : 8 members + 9 visitors = 17

Geological Society : 5 geologists + 2 visitors = 7 (incl. 2 geologists also members of ASSA)

4x4 : 34 members & family + 9 visitors = 43 (incl. 1 member of 4x4, ASSA & Geological Society)

... Chairman's Chatter

The whole weekend was an incredible experience with a very diverse group of people who shared knowledge of the heavens and the earth, including stars, (Mike, Debbie, Maryanne and Grant), rocks (Riaan, Alan Smith, Mike and Debbie) and plants, with our Jean giving an excursion to those interested in the flora in the area.

We managed to have some great viewing evenings on Thursday, Friday and Sunday nights even though every now and again clouds did appear and block out the viewing. The following were special with the absolutely clear skies;

- A perfect Milky Way.
- The Coal Sack Nebula.
- Omega Centauri.
- Eta Carina.

So in one evening we saw four of the Big Five of the African sky.

We also saw Jupiter, Saturn in the early and late evening and Venus in the early morning.

As a bonus, on Friday evening we saw the International Space Station cross the southern skies over a period exceeding three minutes.

Thanks must go to Debbie who arranged it. I know the next one is in planning and maybe later this year, or early next year.

As indicated last month, we have also arranged a viewing evening on Saturday 3 June at Murray McKenzie's smallholding in Cato Ridge, where at this time of the year and this location, we should experience fantastic skies. Details on this will be published on our website.

Looking forward to seeing you all at our next general meeting and basic astronomy course on the 10th.

Wishing you clear skies and great viewing.

Mike

**BIG 5 OF THE
AFRICAN
SKY**

An invitation to witness the most spectacular
deep-sky treasures of the southern hemisphere

Milky Way Southern Pleiades Coal Sack Nebula Omega Centauri Eta Carinae

Powered by the Deep-Sky Section of the
Astronomical Society of Southern Africa
assa.saao.ac.za/big5

ASSA

The Beehive Cluster

April , 2017 By Brian Ventrudo



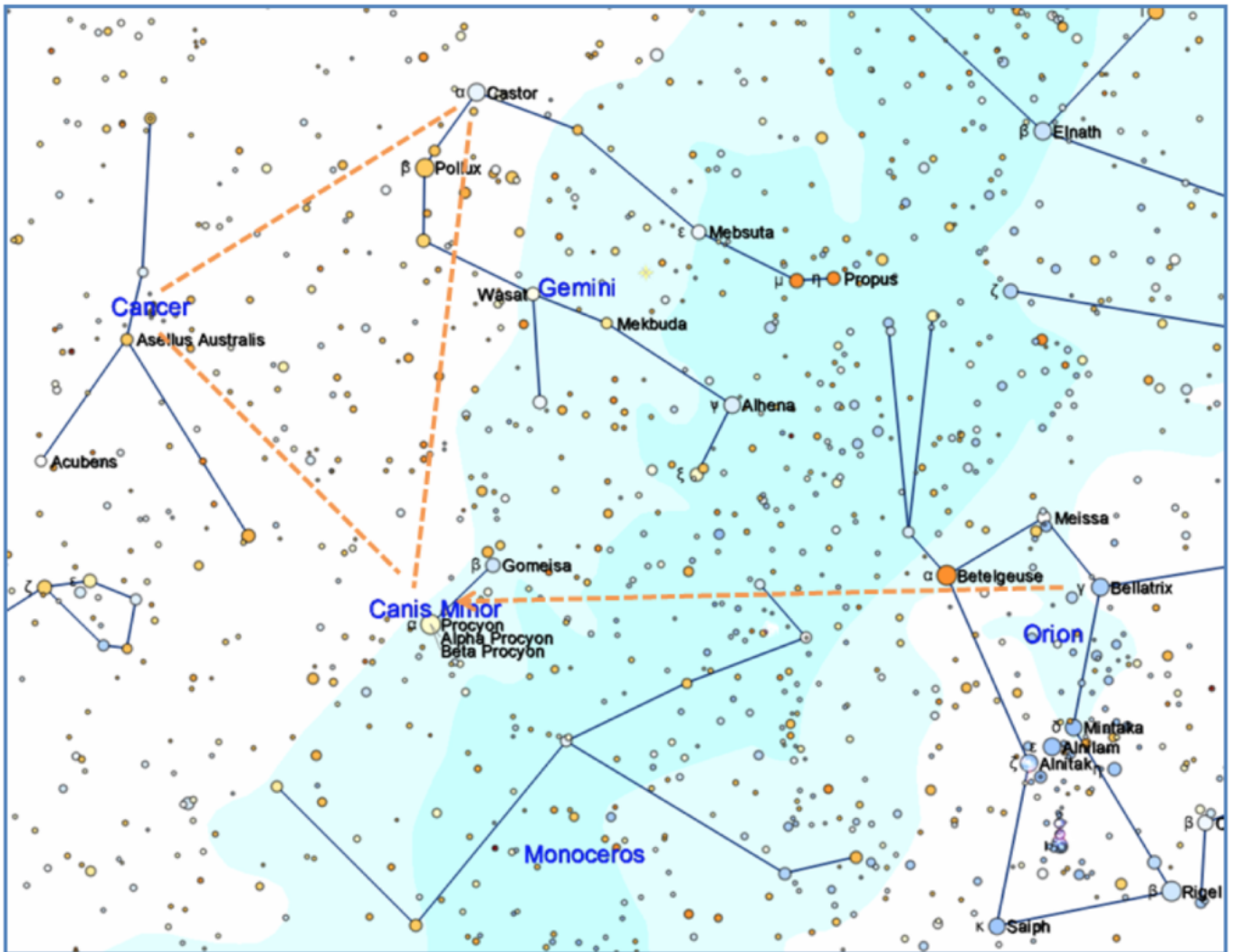
The constellation Cancer is the faintest of the twelve constellations of the zodiac, and many casual stargazers pass it by when looking from bright Gemini to the striking constellation Leo to the east. In city skies, the constellation is hard to see at all.

But there are some excellent sights in this star group within reach of a telescope, including the superb star cluster M44, the Beehive Cluster, which is one of the finest objects for a wide-field telescope or a pair of binoculars.

The constellation Cancer is the faintest of the twelve constellations of the zodiac, and many casual stargazers pass it by when looking from bright Gemini to the striking group Leo to the east. In city skies, the constellation is hard to see at all. But there are some excellent sights in Cancer within reach of a telescope, including the superb star cluster M44, the Beehive Cluster, which is one of the finest objects for a wide-field telescope or a pair of binoculars.

To locate Cancer and the Beehive, first find the star Procyon in Canis Minor. To find this star, extend a line eastward from Bellatrix in Orion's right shoulder through Betelgeuse in his left shoulder until you find a bright star. That's Procyon. Now find the bright star Pollux in Gemini and imagine an equilateral triangle pointing eastward with Pollux at one apex and Procyon at another. The third apex, pointing east, lies in the constellation Cancer (see image below). In the northern hemisphere, Cancer is nearly overhead in the mid-evening hours; in the southern hemisphere, it's low over the northern horizon.

... Beehive Cluster



Using the bright stars of Orion and Gemini to find the faint constellation Cancer, the Crab, in the northern spring sky. Created with SkyX by Software Bisque.

The showpiece of the constellation Cancer is M44, the “Praesepe” (“PRAY-see-pay”) star cluster. It’s also called the “Beehive” cluster because it looks like a hive of bees. It is easily visible to the unaided eye in dark sky as a misty cloud just west of the mid-point between the stars Asellus Borealis and Asellus Australis.

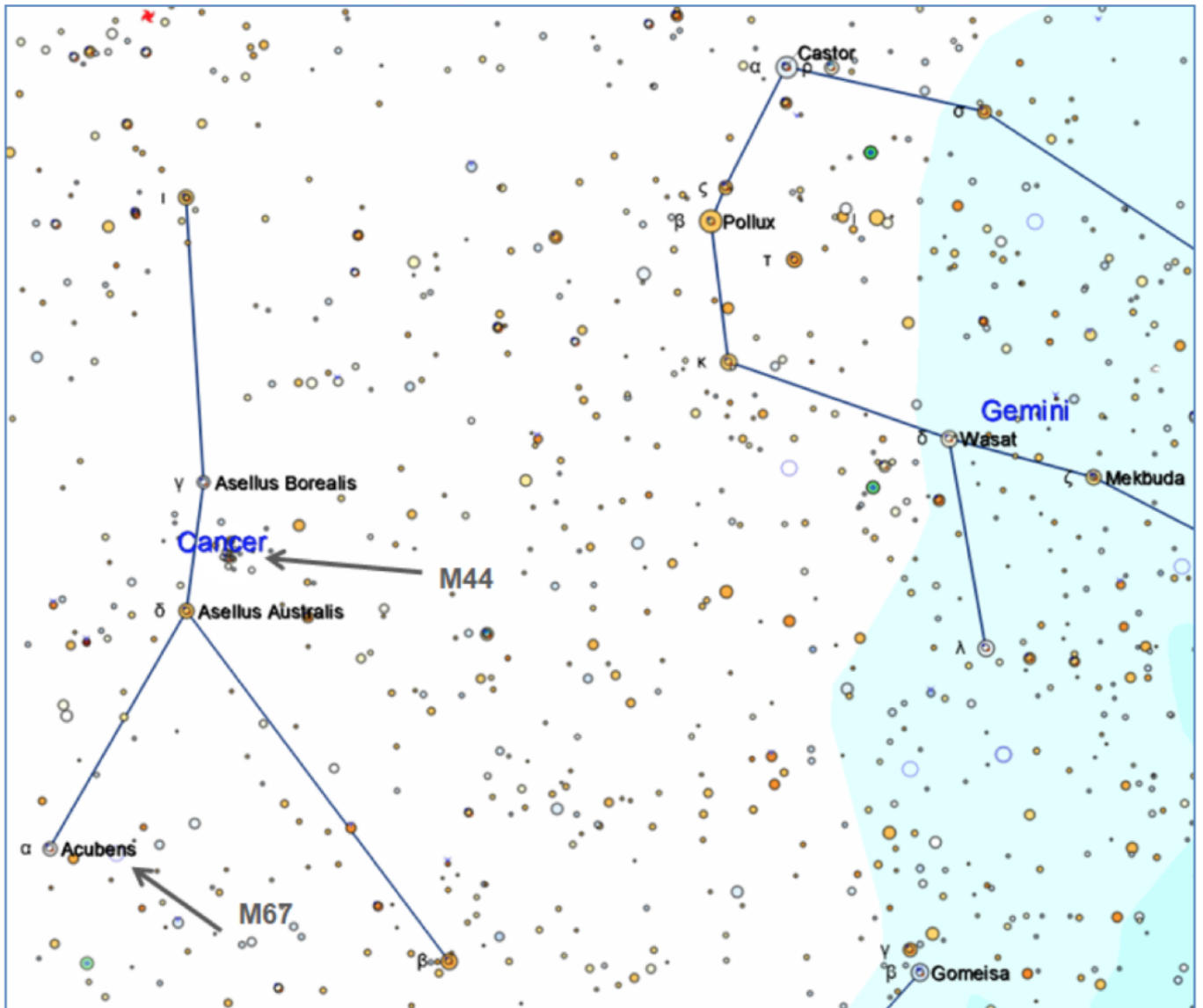
One of the few star clusters known since antiquity, the Beehive was called the “Little Cloud” or “Cloudy Star” by the ancient Greek astronomer Hipparchus. The ancients used the cluster as a weather indicator: if it was invisible, then violent storms were said to be on the way.

Unlike the Pleiades, M45, this cluster can’t be resolved into individual stars with the unaided eye. Its true nature and striking beauty are revealed only with help of binoculars or rich-field telescope.

... Beehive cluster

Galileo was first to turn a telescope toward this “nebulous” object, and reported: “*The nebula called Praesepe, which is not one star only, but a mass of more than 40 small stars.*”

The cluster lies about 580 light years from Earth and stretches 16 light years across. It appears about 1.5° across (about 3x the size of the full moon), so examine it with your binoculars or telescope with a low-power eyepiece to see its full glory. It is a very fine object for binoculars.

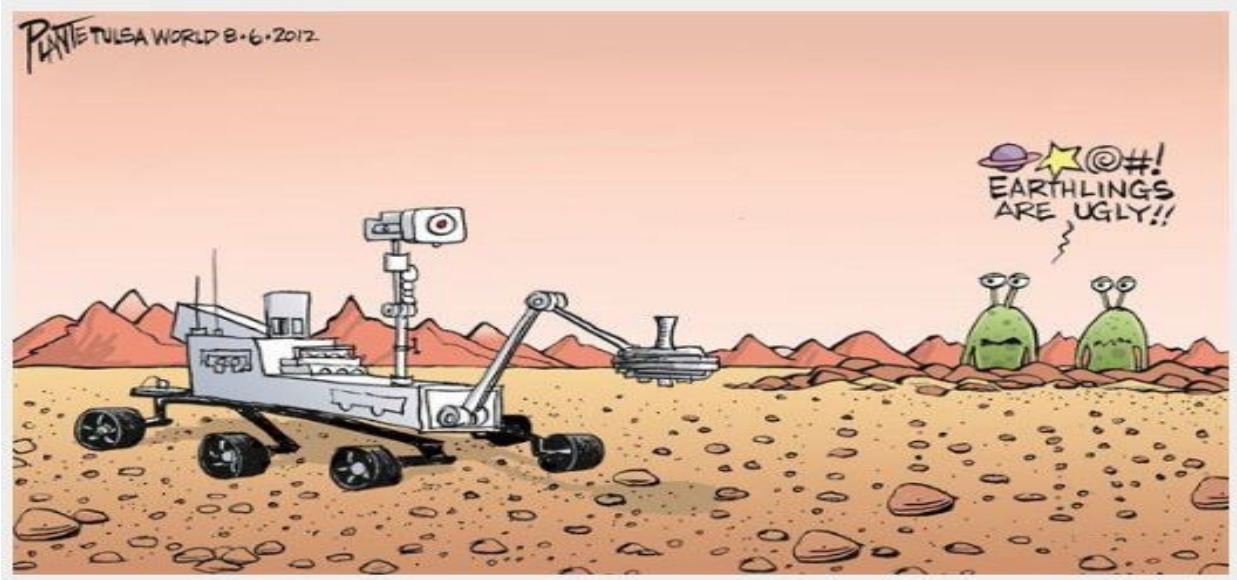


The position of the star cluster M44 in the constellation Cancer. Created with SkyX by Software Bisque.

With larger telescopes, more than 200 stars have been confirmed as members. Astronomers determine which stars are members of the cluster by measuring the common motion of the stars... if they're all going in the same direction, they're assumed to be from the same cluster.

... Beehive cluster

The Beehive emerged out of a great diffuse gaseous nebula some 730 million years ago. Some believe it has a common origin with the Hyades cluster, which forms the “V” in Taurus, a constellation well to the west. The two clusters have since separated, but they’re still headed in the same direction. Because of its nebulous appearance to the unaided eye, the ancient Japanese believed the cluster was a lump of souls, and the sight of it terrified them. It’s called *seki shiki* in Japanese which translates as “piled corpse spirits”.



QHYCCD Astronomy CCD/CMOS Camera

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At The Eyepiece

April 2017 by Ray Field



THE MOON, First Quarter on the 3rd, FULL on the 10th, Last Quarter on the 19th and NEW on the 25th.

The Moon is near the Beehive (M44) on the 2nd, near Regulus on the 4th, Jupiter on the 8th, Saturn on the 14th, Neptune on the 20th, Uranus on the 23rd, Mercury on the 24th, Aldebaran on the 26th, Mars on the 27th, the Beehive (M44) again on the 30th and near Regulus again on the 31st.

MERCURY is in the morning sky over the east before sunrise. It is at its best this year about mid-month, when it rises about 2 hours before the Sun. It will show a crescent phase in a telescope.

VENUS will also show a crescent phase in a telescope. Like Mercury it is in the morning sky rising about 3 hours before the Sun.

MARS sets in early evening twilight and may be glimpsed early in the month. Its reddish hue may help in identification.

JUPITER is a very bright object in the evening sky and fairly near the bright star SPICA in Virgo. Jupiter sets in the early morning. Its 4 brightest moons are visible in binoculars or a telescope. Details of the movements of these 4 moons around Jupiter are given on page 27 of the monthly sky section of the ASSA SKYGUIDE.

SATURN rises early in the evening and lies between the tail of Scorpius and the "Teapot" asterism in Sagittarius. It is near the Moon on the 14th and is visible to the naked-eye as a fairly bright yellowish "star". Its rings are always an awesome sight in any telescope and its brightest moon Titan can also be seen.

URANUS, in Pisces, is not suitably placed for observation this month. It rises before dawn and the Moon is near it on the 23rd. Uranus, is on the verge of naked-eye visibility at magnitude 5.5, but is best found with the aid of binoculars. In a modest telescope Uranus appears as a greenish dot under high magnification.

NEPTUNE, in Aquarius, is fainter than Uranus and needs binoculars to be seen. In a modest telescope under high magnification it appears as a blue dot. It is not well-placed for observation this month as it is still very low above the horizon before dawn. The occultation of Neptune by the Moon takes place on the 20th.

... At the eyepiece

COMET C/2015 V2 (Johnson) should be visible in binoculars this month as it travels past Corona Borealis and the bright orange star Arcturus in the evening sky. A map is given on page 27 of the ASSA SKYGUIDE showing the path of the comet against the starry background. It starts the month off in Hercules and then passes by Corona Borealis on about the 22nd. Then it reaches Arcturus about the 2nd of June.

METEOR SHOWERS: The ETA AQUARIIDS reach a peak on the 5th May and are active from April 21 to May 12. The maximum ZHR (Zenithal Hourly Rate) is predicted to be 60, the period of watch is from 4.00 a.m. to 5.30 a.m. Their observing prospect is rated as good.

THE STARRY SKY FOR MAY 2017: The Southern Cross is at its highest in the early evening, with the constellation of Centaurus straddling it. The Jewel Box open cluster and the Omega Centaurus globular cluster lie in this area. Down to the right from the Crux, toward Canopus, is the "Three Crosses" region of the sky. This area contains many clusters and nebulae, including a rich part of the MILKY Way. The star ETA CARINA, which was once as bright as Canopus, is now just visible to the naked-eye. Eta Carina is in a bright Nebula in a rich part of the Milky Way. In a telescope Eta Carina looks like a bloated reddish star due to the outer layers of the star blown off when it went super nova. Over the north Leo the lion is prominent, with its brightest star Regulus at the top of the "Sickle" asterism. Leo's tail star is called Denebola and is Leo's second brightest star. There is a nice double star that is easy to split in a telescope called gamma Leonis, which is the second brightest star in the "Sickle" asterism. There is a nice planetary nebula called "The Ghost of Jupiter" or NGC 3242 in Hydra, near the base of Crater, the Cup. Its magnitude is 9 and its distance is about 1800 Light Years. The long arm of the Southern Cross extended through the head of the Cross leads to the little quadrilateral of Corvus the Crow. To its right is Crater and to its right is NGC 3242, "Jupiter's Ghost".

References include:- 2017 SKY GUIDE Africa South, Norton's Star Atlas 2000, Philip's Planisphere 35 degrees S., Stars of The Southern Skies by Sir Patrick Moore.



Planet Facts #45

THE SECRETS OF
THE UNIVERSE

MARS

Has the largest dust storms in the entire solar system. They can reach upto 125 mph, can last for weeks and cover the entire planet. This happen when Mars is closest to Sun.

The Cover Image - Prawn Nebula

Image by John Gill

The Prawn Nebula, also known as IC 4628 and Gum 56, is an emission nebula located in the constellation Scorpius. It has an apparent magnitude of 7.31 and lies at a distance of 6,000 light years from Earth. Located to the south of Antares, the nebula is about 250 light years in diameter, corresponding to an apparent size of 1.5 degrees, or 3-4 times the size of the full Moon.

The Prawn Nebula was discovered by the American astronomer Edward Emerson Barnard around 1900. It is a stellar nursery that contains a large number of very hot, luminous, young stars, formed out of the surrounding gas. These stars include two large, hot, blue-white giants belonging to the rare spectral class O. O-type stars have a relatively short life span as they tend to burn out very quickly before ending their lives in supernova explosions and collapsing into either neutron stars or black holes. The blue giants in IC 4628 will end their lives after only about a million years. The material produced by their supernova explosions will be used to form new stars in the nebula.

The two luminous giants and other young stars in the nebula are responsible for illuminating the surrounding gas. The stars emit an enormous amount of ultraviolet radiation which ionises the hydrogen gas in the nebula, making it glow.



In September 2015, ESO released a detailed new image of Prawn Nebula. The image was taken with the MPG/ESO 2.2-metre telescope using the Wide Field Imager (WFI) camera at the La Silla Observatory in Chile as part of ESO's Cosmic Gems program. The image reveals a vast star forming region with three clusters of young stars, not more than a few million years old, which illuminate the surrounding clouds.

IC 4628 was catalogued as Gum 56 by the Australian astronomer Colin Stanley Gum, who published his catalogue of H II regions in 1955.

Constellation: Scorpius
 Right ascension: 16h 56m 54.66861s
 Declination: -40°30'44.4441"
 Angular size: 90 arc minutes (1.5 degrees)
 Apparent magnitude: 7.31
 Distance: 6,000 light years
 Radius: 125 light years

Tech Specs:

Celestron 8" EdgeHD on AVX mount and Canon 600d

Autoguiding by ZWO and PHD

74 Lights @ ISO 400 for 120 seconds

70 Bias, 30 Darks, 80 Flats

Processed in PixInsight

Ancient Astronomers - Charles Messier

From Wikipedia, the free encyclopedia



Born	26 June 1730 Badonviller, France
Died	12 April 1817 (aged 86) Paris, France
Residence	Paris
Nationality	French
Fields	Astronomy
Known for	Messier catalog
Notable awards	Cross of the Legion of Honor

... Ancient astronomers

Charles Messier (French: [me.sje]; 26 June 1730 – 12 April 1817) was a French astronomer most notable for publishing an astronomical catalogue consisting of nebulae and star clusters that came to be known as the 110 "Messier objects". The purpose of the catalogue was to help astronomical observers, in particular comet hunters such as himself, distinguish between permanent and transient visually diffuse objects in the sky.

Biography

Messier was born in Badonviller in the Lorraine region of France, being the tenth of twelve children of Françoise B. Grandblaise and Nicolas Messier, a Court usher. Six of his brothers and sisters died while young and in 1741, his father died. Charles' interest in astronomy was stimulated by the appearance of the spectacular, great six-tailed comet in 1744 and by an annular solar eclipse visible from his hometown on 25 July 1748.

In 1751 he entered the employ of Joseph Nicolas Delisle, the astronomer of the French Navy, who instructed him to keep careful records of his observations. Messier's first documented observation was that of the Mercury transit of 6 May 1753.

In 1764, he was made a fellow of the Royal Society, in 1769, he was elected a foreign member of the Royal Swedish Academy of Sciences, and on 30 June 1770, he was elected to the French Academy of Sciences.

Messier discovered 13 comets :

C/1760 B1 (Messier)

C/1763 S1 (Messier)

C/1764 A1 (Messier)

C/1766 E1 (Messier)

C/1769 P1 (Messier)

D/1770 L1 (Lexell)

C/1771 G1 (Messier)

C/1773 T1 (Messier)

C/1780 U2 (Messier)

C/1788 W1 (Messier)

C/1793 S2 (Messier)

C/1798 G1 (Messier)

C/1785 A1 (Messier-Mechain)



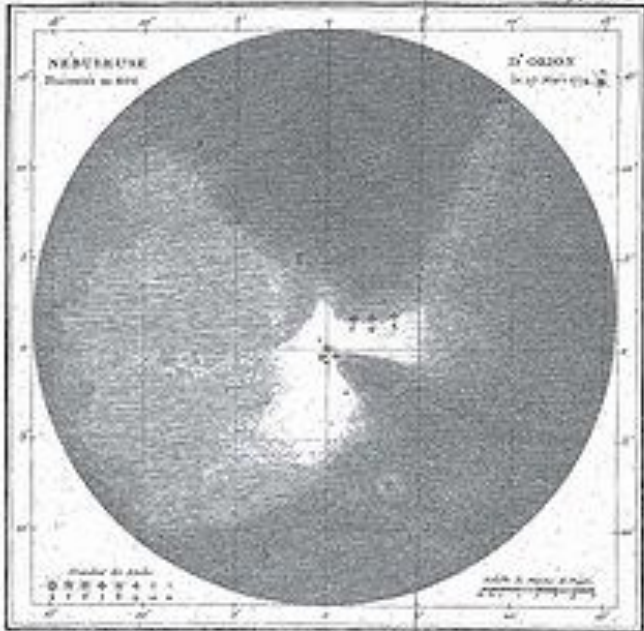
Commemorative plaque in his hometown of Badonviller

Near the end of his life, Messier self-published a booklet connecting the great comet of 1769 to the birth of Napoleon, who was in power at the time of publishing. According to Meyer: *As hard as it may seem to accept, the memoir is an ingratiating to Napoleon in order to receive attention and monetary support. It is full of servility and opportunism. Messier did not even refrain from utilizing astrology to reach his goal. Messier comes quickly to the point on the first page of the memoir, by stating that the beginning of the epoch of Napoleon the Great ... coincides with the discovery of one of the greatest comets ever observed.*

... Ancient astronomers

Messier is buried in Père Lachaise Cemetery, Paris, in Section 11. The grave is fairly plain and faintly inscribed, and while it is not on most maps of the cemetery, it can be found near the grave of Frédéric Chopin, slightly to the west and directly north, and behind the small mausoleum of the jeweller Abraham-Louis Breguet.

The Messier catalogue



The Orion Nebula which Messier gave the designation M42 in his catalogue

The crater Messier on the Moon and the asteroid 7359 Messier were named in his honor.

Messier's occupation as a comet hunter led him to continually come across fixed diffuse objects in the night sky which could be mistaken for comets. He compiled a list of them, in collaboration with his friend and assistant Pierre Méchain (who may have found at least 20 of the objects), to avoid wasting time sorting them out from the comets they were looking for. The entries are now known to be galaxies (39), planetary nebulae (5), other types of nebulae (7), and star clusters (55).

Messier did his observing with a 100 mm (four inch) refracting telescope from Hôtel de Cluny (now the Musée national du Moyen Âge), in downtown Paris, France. The list he compiled contains only objects found in the area of the sky he could observe, from the north celestial pole to a declination of about -35.7° . They are not organized scientifically by object type, or even by location. The first version of Messier's catalogue contained 45 objects and was published in 1774 in the journal of the French Academy of Sciences in Paris. In addition to his own discoveries, this version included objects previously observed by other astronomers, with only 17 of the 45 objects being Messier's. By 1780 the catalog had increased to 80 objects.

The final version of the catalogue was published in 1781, in the 1784 issue of *Connaissance des Temps*. The final list of Messier objects had grown to 103. On several occasions between 1921 and 1966, astronomers and historians discovered evidence of another seven objects that were observed either by Messier or by Méchain, shortly after the final version was published. These seven objects, M104 through M110, are accepted by astronomers as "official" Messier objects. The objects' Messier designations, from M1 to M110, are still used by professional and amateur astronomers today and their relative brightness makes them popular objects in the amateur astronomical community.

My Story - Jean Senogles

“That’s the Southern Cross and those are the two Pointers”, I told the family who were sitting out under the stars on a barmy evening on a cousin’s Karoo farm. “If you draw a line down the longest part of the cross and a line through the middle of the Pointers where they meet is the sky’s South Pole and straight under that is our South Pole”.

“And who told you that young lady?” My aunt, who was quite visible in the light of the Milky Way, asked.

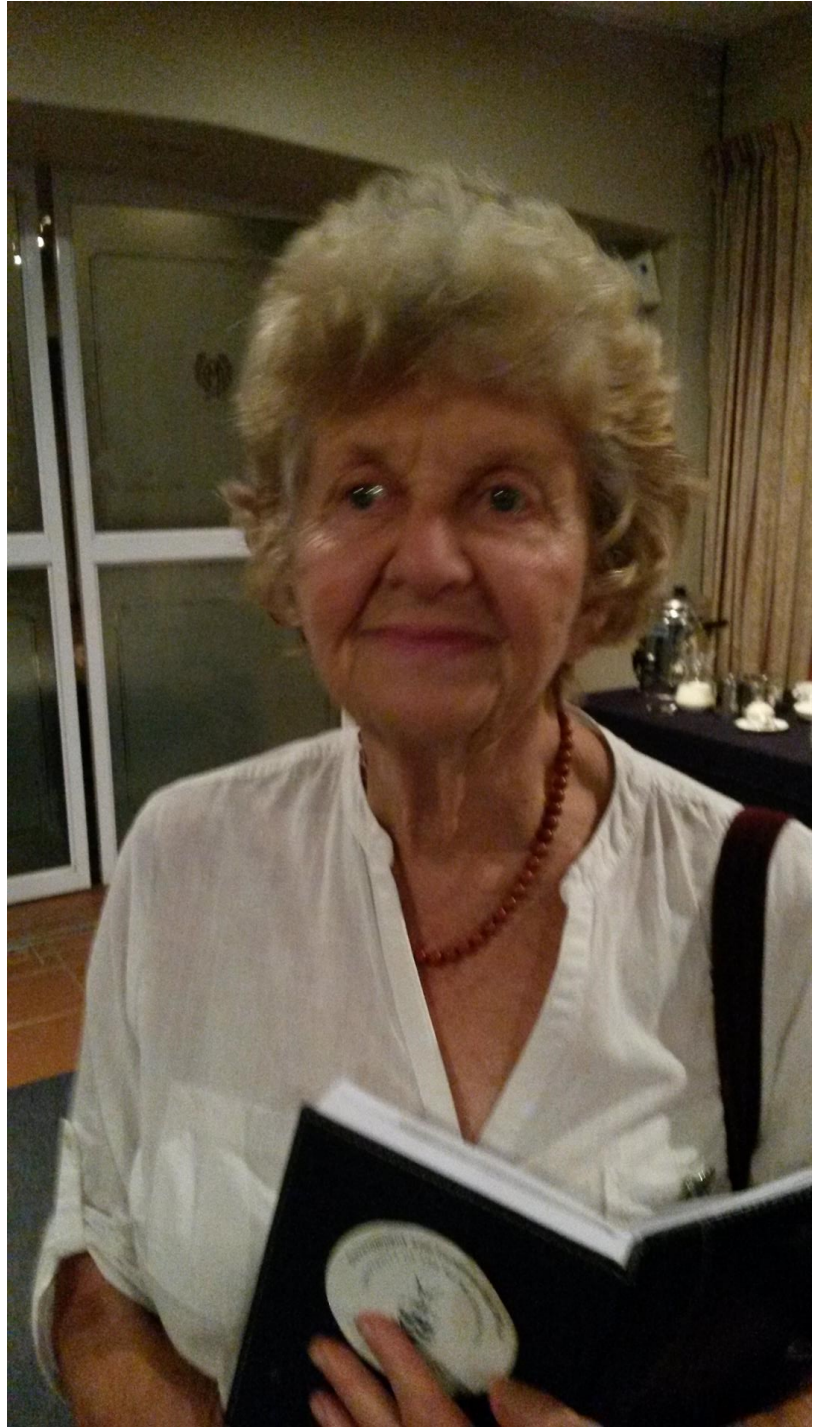
“My Dad”, I replied “And he knows everything!”

Seeing my perplexed look at the sudden burst of laughter that greeted that announcement, my long lanky farming cousin picked me up in a big hug and said, “You’re absolutely right, my girl, on all three accounts!”

The next encounter with space was with the Maths Department at school. As a first year teacher I dearly wanted the solar system painted on the great expanse of the outer wall of the sports pavilion. The maths teachers gladly checked my calculations of distance and proportions of the Sun and planets so that they would fit and look well on the wall, but the principal was not at all keen to have it disfigured with crude graffiti.

This I considered to be a great slur on my artistic abilities and a slap in the face for science education but then the Art Department stepped in and eventually the solar system was lit up by its magnificent sun on a very adequate wall..... but under the seating provided for the sports spectators.

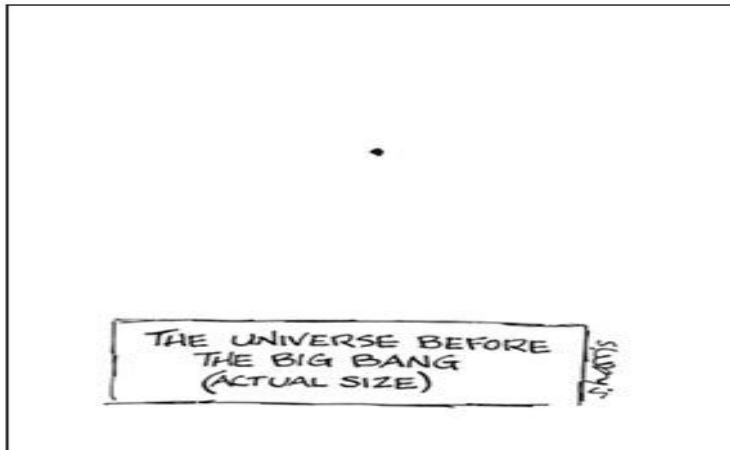
Ron’s Norsemen’s ancestry showed not only in his flaxen hair and blue eyes but also in his love of sailing. I found out early in married life about knots in a line and knots at sea, about sheets and cleats and winches. Most importantly of all though was the care to be taken of the precious sextant, the time keeper and the navigational charts. At sea the daily shooting of the sun and at night the navigational stars became de rigueur. Ron loved the Great Hunter, Orion, as he strode across the sky but I preferred the graceful swing of Scorpio with her tail securely hooked into the Milky Way.



... My story

Tucked safely in the mangroves waiting for a cyclone to pass or sitting out the dog watch waiting for moonrise and looking up at the stars made space seem incomprehensible in its enormity but in a strange and inexplicable way close and somehow personal.

Change is always with us and Ron sailed off to where all Old Salts sail and I became a permanent land lubber again fighting the conservation fight on all fronts and only coming back to stars, planets and moons in the last couple of years by joining ASSA. With astronomical friends Sutherland has been visited twice and by going to Norway I saw what really cold seas looked like but best of all I witnessed the great beauty of the Aurora Borealis.



Planet Facts #46

THE SECRETS OF
THE UNIVERSE

Jupiter

Is the fastest spinning planet in the solar system. It rotates at the rate of 45,300 Km/hour and a day on Jupiter lasts only 9 hours 55 minutes.

Women in Space

NASA's Peggy Whitson takes control of the International Space Station and soon to become the most experienced US astronaut in terms of time spent in space, assumed command of the International Space Station on Sunday as two Russian crew members and an American prepared to fly back to Earth.

For Whitson, 57, it was her second stint in charge of the \$100 billion station, a multinational project overseen by the National Aeronautics and Space Administration and the Russian space agency Roscosmos.

On April 24, Whitson will have spent more time in space than any other American astronaut, surpassing the current US record of 534 days held by NASA's Jeff Williams, 59. She already held records for the most time spent in space by a woman and for the most time spent



spacewalking by a woman.

"She will set another record at this moment," the departing US commander, Shane Kimbrough, said during a Sunday change of command ceremony aired on NASA TV. "She becomes the first two-time female commander of the International Space Station." Kimbrough and Russian crewmates Sergey Ryzhikov and Andrey Borisenko were scheduled to wrap up a 173-day mission on Monday, with a parachute landing in Kazakhstan at 7:21 a.m. EDT (1121 GMT).

Their replacements, NASA's Jack Fischer and Fyodor Yurchikhin of Roscosmos, were due to arrive on April 20 at the station, which is in orbit about 250 miles (400 km) above Earth. The US and Russian space agencies last week agreed to extend Whitson's mission by three months to fill in as the new crew's third member.

Russia is reducing its station cadre from three to two members until its new science laboratory is launched next year, the head of Roscosmos said at the US Space Symposium in Colorado Springs, Colorado, last week. Whitson flew to the station in November with Russia's Oleg Novitskiy and France's Thomas Pesquet. The men were scheduled to fly back to Earth without Whitson on June 2.

She was due to return to Earth in September with Fischer and Yurchikhin, having amassed a career US record of more than 665 days in orbit. Russian cosmonaut Gennady Padalka, with 878 days in orbit, is the world's most experienced space flier.

What are Nebulae ...

Besides Foggy Things in Space

By Pierre Markuse

What exactly is a nebula, and which different types of nebulae can we see in space?

Nebulae (Nebula is the Latin word for “cloud”) are one of the most interesting, and most imaged, objects in astrophotography. They come in many different shapes, sizes, and colors. And while many of them may look alike, the way they came to be can be quite different. Let us take a look at some of the common types of nebulae.

When galaxies were nebulae

Before we got really good at identifying nebulae, other objects were often misidentified as nebulae. “Spiral nebulae” was a term for objects which we now know are actually spiral galaxies. You may have heard the now outdated name “Great Andromeda Nebula” for the Andromeda Galaxy (M31). The reasons for these wrong identifications are rooted in the lower resolution of telescopes available at the time of detection, as well as different opinions on the true size of our Milky Way Galaxy and the Universe as a whole.

If you would like to know more about the history of the term, you should read about the Great Debate that took place at the National Academy of Sciences in Washington in 1920. Just a few years later Edwin Hubble found Cepheid variable stars in the Andromeda Galaxy (M31), allowing him to pinpoint the distance and showing that M31 was indeed a galaxy separate from our Milky Way Galaxy.

General structure of a nebula

Generally speaking, nebulae are interstellar clouds of dust and/or ionized gases, mostly hydrogen and helium. Hydrogen and helium are the bulk of the interstellar medium, which, by mass, consists of about 70% hydrogen, 28% helium, and 1.5% heavier elements (all of which are called metals by astronomers and astrophysicists).

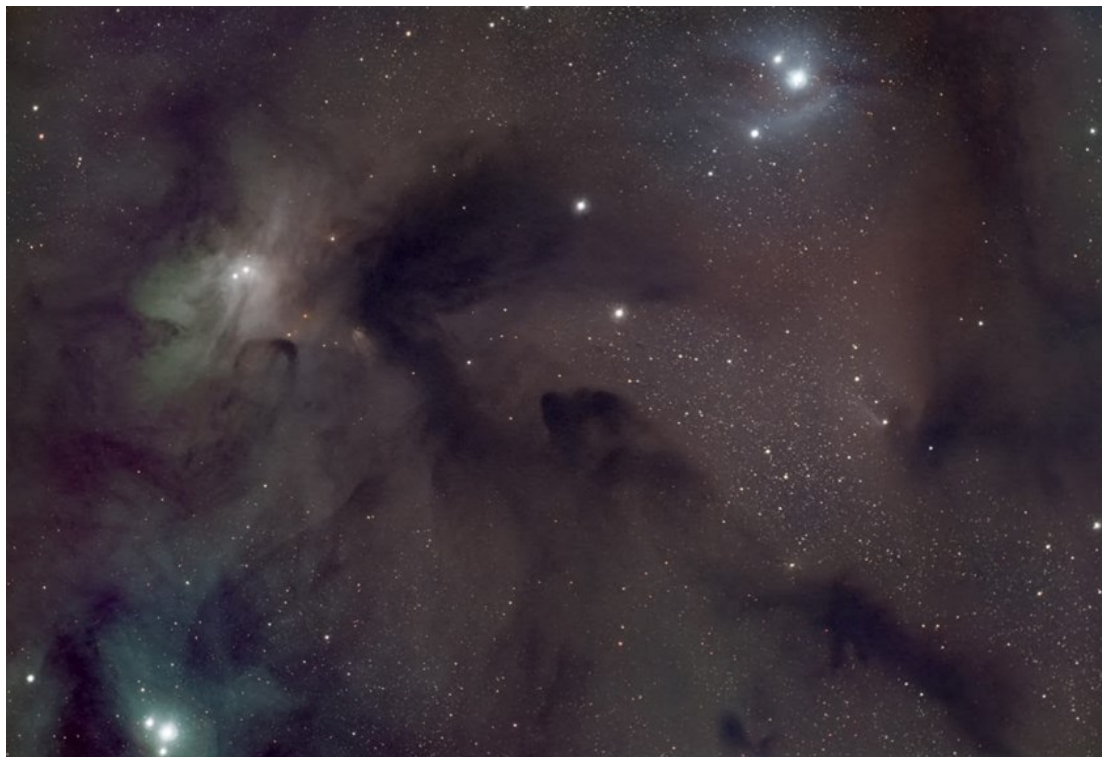
While there are true gigantic nebulae, Lyman-alpha blobs can be hundreds of thousands of light-years in diameter, most of the better-known nebulae fall within the range of under a light-year to a few ten thousand light-years, still a pretty impressive variety.

Another distinction, and one especially important for astrophotographers, is the brightness of the nebula, or to be more precise, whether it is emitting or reflecting light at all.

Introducing: dark nebulae

Yes, there are nebulae that are not emitting light. They are called dark nebulae or—more fitting—absorption nebulae. As the latter name implies, they absorb the light of objects behind them, and by doing so reveal themselves to us, as their darkness stands out against the rest of the sky. An example would be the Rho Ophiuchi cloud complex with its dark nebulae, which can be seen in this image.

... What are nebulae



Dark nebulae in the Rho Ophiuchi cloud complex. Image: Dylan O'Donnell

The dark patches are the dark nebulae. Interstellar dust grains absorb and scatter the light from objects behind them, a process called extinction. Depending on the size and density of the nebulae, they appear more or less dark. While dark nebulae quickly extinct the visible light, they are more transparent to radio waves and infrared light and therefore, using radio and infrared astronomy, we can look “behind” dark nebulae.

Imaging dark nebulae can yield really impressive images as the one you have just seen, still, most astrophotographers prefer brighter objects. So let us take a look at some nebulae of the shiny kind.

Emission nebulae and reflection nebulae

Although emission nebulae and reflection nebulae are two different kinds of nebulae, we will talk about them together, as they have one thing in common important to astrophotographers, they are—more or less—bright, do not hide in darkness, and sometimes they are conveniently located next to each other.

Reflection nebulae

The mechanism behind reflection nebulae is pretty straight-forward. Light from a star gets reflected by tiny dust particles. The color of a reflection nebula depends on the color of the light the star is emitting but usually ends up to be somewhat bluish, because scattering is more efficient for blue light than for red light.

... What are nebulae

Take a look at this example of a reflection nebula, IC 2631, illuminated by the star HD 97300.



Reflection Nebula IC 2631 imaged by the MPG/ESO 2.2-metre telescope. Image: ESO CC BY 4.0

And if you look closely at this image, you will not only see the very obvious bluish reflection nebula but also dark nebulae above and below the reflection nebula. This region of space is filled with dust and gas, causing these dark nebulae and also supplying the material for star formation. The illuminating star HD 97300, itself a young star, might at some point be joined by new stars being born from this material.



Protoplanetary nebula IRAS 20068+4051. Image: ESA/Hubble & NASA CC BY 4.0

Protoplanetary (or preplanetary) nebulae, like the one in the image to the left, are another type of reflection nebula. They are a short occurrence in the late evolutionary phase of intermediate-mass stars, during which the star is illuminating the circumstellar envelope it shed during this phase. This reflection nebulae can transition into emission nebulae if the star reaches high enough temperatures, and the ultraviolet radiation it emits is strong enough to ionize the circumstellar envelope, resulting in a planetary nebula.

Emission nebulae

The next type of nebulae would be emission nebulae. Emission nebulae come in different types. What all of them have in common however, is the mechanism that makes them “glow”. Simply speaking, emission nebulae are clouds of ionized gas, emitting light of different wavelengths.

In most emission nebulae, strong ultraviolet radiation of nearby stars is breaking neutral hydrogen atoms (other gases such as helium and oxygen are also possible, but hydrogen usually makes up the biggest part) into hydrogen nuclei and free electrons (a process called photoionization).

Those nuclei and free electrons then recombine at an excited state. When the excited neutral hydrogen atoms return to their lowest energy state, they are emitting photons at wavelengths equivalent to the energy difference.

... What are nebulae

Which in case of hydrogen is at 656.281 nanometers, a wavelength in the red part of the visible spectrum, and the reason for the oftentimes reddish-pinkish appearance of emission nebulae in visual light images. Take a look at this image of the Lagoon Nebula (M8, NGC 6523), an HII region in the constellation of Sagittarius, about 5,000 light-years away from Earth.

Lagoon Nebula (M8), an HII region in the constellation of Sagittarius, showing the telltale reddish-pinkish glow of ionized hydrogen. Image: Dylan O'Donnell

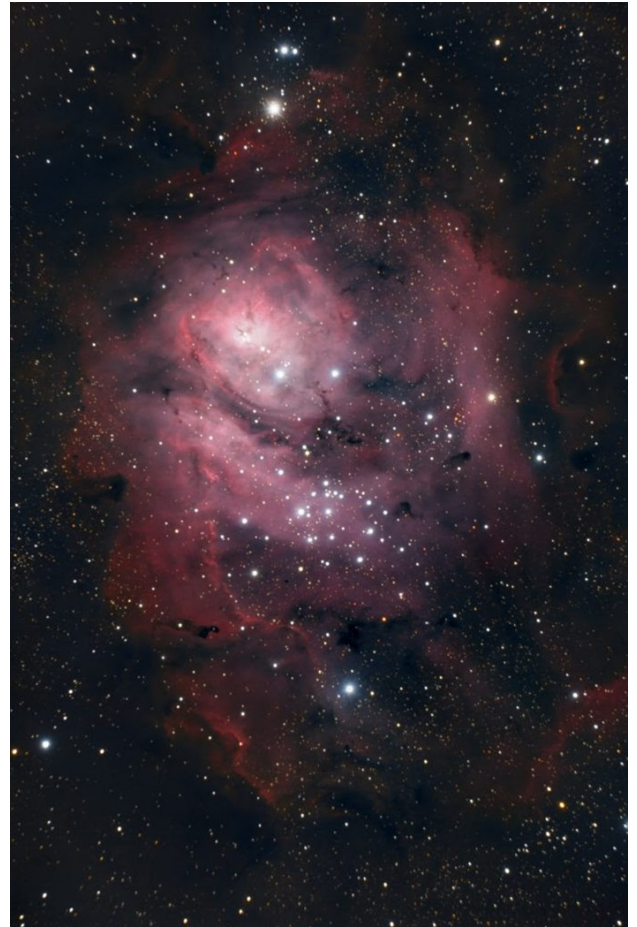
Those HII regions are a common sight in the Universe. You can usually find them in the arms of spiral galaxies as well as in irregular galaxies. Recent star formation generated the stars necessary to ionize the regions and give them their reddish glow. The dense group of stars at the center of the image is the open cluster NGC 6530.

Another form of emission nebulae are planetary nebulae, which I have mentioned a bit earlier when talking about protoplanetary nebulae. Planetary nebulae (PN) are created by red giant stars. Late in their evolution, those stars shed their outer layers and the core of the star, now called a planetary nebula nucleus (PNN), ionizes the shed layers with its immense ultraviolet radiation, creating a glowing nebula.

This phase lasts for about 10,000 years, during which the core cools down more and more, ending its life as a white dwarf star, no longer putting out enough ultraviolet radiation to ionize the ejected layers and the planetary nebula vanishes. Depending on the temperatures and gases involved, planetary nebulae can have different colors. They also come in different shapes and sizes, but usually are within a few light-years in diameter and most of them are spherical/elliptical or bipolar in shape.



Take a look at this collage of planetary nebulae.



... What are nebulae

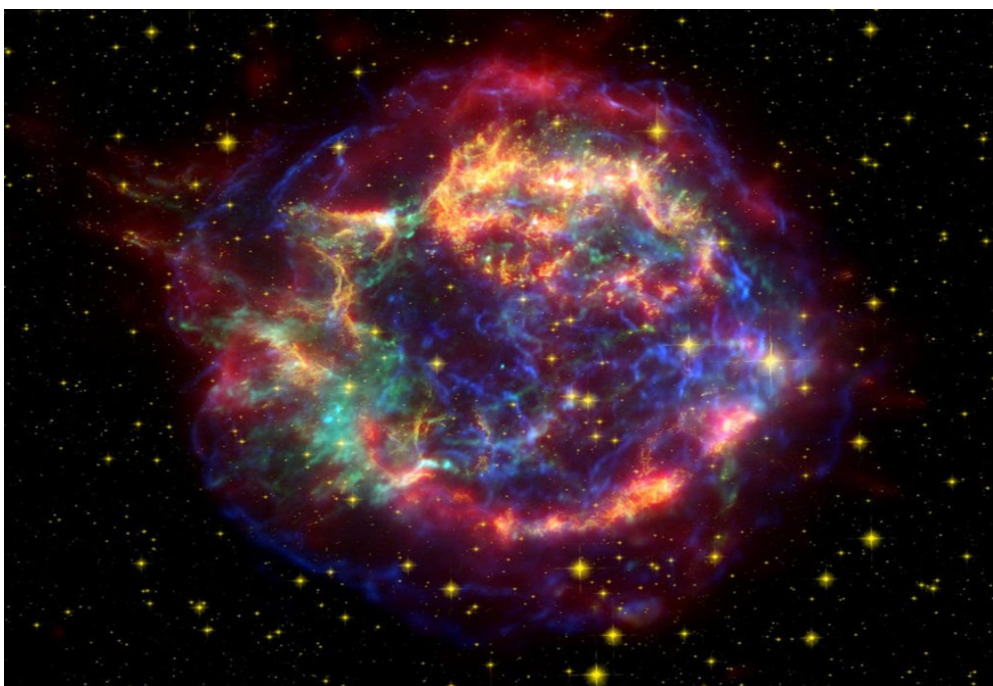
Keep in mind, those nebulae are depicted at their apparent size, so it is not a true comparison of their actual size. They are also not always imaged in the visible part of the spectrum, so the actual appearance in visual light could be different. And as you can see, even though most of them adhere to the spherical/elliptical or bipolar shape, they can still look very different from each other.

The Helix Nebula (NGC 7293), a planetary nebula in the constellation of Aquarius. Image: Dylan O'Donnell

Let us take a look at a single planetary nebula imaged from Earth by an amateur astronomer, the Helix Nebula (NGC 7293), located in the constellation of Aquarius, about 700 light-years away from Earth. It has a diameter of roughly six light-years.



The next type of emission nebulae are supernova remnants (SNRs). They consist of ejected material from their stellar progenitors (the stars that went supernova) and the interstellar material the expanding shock wave is sweeping up. Aside from visible light, supernova remnants can be very bright in radio and X-ray emissions. Core-collapse supernovae also lead to the formation of neutron stars or black holes, which can be found in the remnant. Take a look at this image of Cassiopeia A (Cas A), a supernova remnant (SNR) in the constellation Cassiopeia. It is a composite image, made using Chandra X-ray data (blue and green), Hubble near-infrared data (yellow) and Spitzer Space Telescope infrared data (red).



A false color image of Cassiopeia A (Cas A) using observations from both the Hubble and Spitzer telescopes as well as the Chandra X-ray Observatory. Image credit: NASA/JPL-Caltech

Aside from those big, space-based telescopes, supernova remnants can also be a rewarding target for amateur astronomers. Take a look at this image of the supernova remnant Simeis 147, the "Spaghetti Nebula", highlighting the reddish emission of the hydrogen, ionized by the shockwave of the supernova.

... What are nebulae



Supernova remnant Simeis 147, located 3,200 light-years away in the constellation of Auriga. Image: © 2016 Nicolas Kizilian - Used with permission

Wolf-Rayet nebulae are another type of emission nebulae. They surround Wolf-Rayet stars and are driven by the strong stellar winds of the Wolf-Rayet stars interacting with the outer layers of hydrogen, ejected by the stars earlier in their evolution. Take a look at

this image of the Wolf-Rayet star WR 31a, located about 30,000 light-years away in the constellation of Carina (The Keel) with a clearly visible, spherical, blue Wolf-Rayet nebula surrounding it.

Wolf-Rayet nebula surrounding WR31a, imaged by the Hubble Space Telescope. ESA/Hubble & NASA Acknowledgement: Judy Schmidt CC BY 4.0



Great, but what does a nebula really look like?

Well, that depends on what you understand as “really look like”.

We can image nebulae in the visible part of the spectrum and while that is the part of the electromagnetic spectrum you can see with your eyes, it doesn't really reflect what you would see with your naked eyes.

One of the best examples of gathering more light to see fainter objects: The Hubble eXtreme Deep Field (XDF), combining over 2,000 images with a cumulative exposure time of 22.5 days. It shows about 5,500 galaxies, the faintest just reaching ten-billionth the brightness of what the human eye can see.

... What are nebulae



Image: NASA; ESA; G. Illingworth, D. Magee, and P. Oesch, University of California, Santa Cruz; R. Bouwens, Leiden University; and the HUDF09 Team

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Nebulae are usually far away and not as bright as you might expect—more on that soon—so astronomers taking images try to collect more light (more photons <https://en.wikipedia.org/wiki/Photon>, to be exact) by using telescopes with a big aperture, and by taking images with a long exposure time, sometimes even combining multiple of these long exposures. Doing so, a nebula that would look like a somewhat grayish blob to your naked eyes (or a nebula that wouldn't be visible to you at all), can suddenly shine brightly in all the glory you know from many images.

Now is that what it *really* looks like?

Let's jump ahead 500 years into the future. Instead of a car, there is a small spaceship in your garage. Determined to see a nebula up close, you set a course for the Lagoon Nebula and 20 minutes later you reach your destination, not a bad time for a 5,000 light-year-trip. But when you look out of the window all you can see is maybe a faint red glow in the distance, no bright nebula like in the brochure. But what about the images you have seen? Why does it look like that?

The reason for this somewhat disappointing experience of your trip has to do with the density of the nebula. Here on Earth the air you breathe contains about 3×10^{19} molecules per cubic centimeter (mostly nitrogen and oxygen). In a nebula like the Lagoon Nebula, an HII region, you just have about 100 to 10,000 atoms of hydrogen per cubic centimeter, even less than you would achieve in a typical vacuum here on Earth.

... What are nebulae

So in other words, the nebula is a pretty thin and really spread out object. And unlike on Earth, where you focus the light of the whole nebula with the optics of a telescope onto a detector (a camera) and then collect photons for minutes, hours, or even days, you just have your eyes, can't change your exposure time, and the nebula is not a neatly focused spot but its light is spread out all around you, covering the whole sky. Depending on the size of the nebula, and how dense it is, you might be able to see a faint glow in the far distance, although it would be entirely possible that you could not see the nebula at all while flying through it with your spaceship.

When taking a look at dark nebulae, we see that the density of dust particles in them is extremely low. Being at the center of a dark nebula you would see a curtain of blackness (or heavily reddened and dimmed stars, depending on the size of the nebula) in the far distance to the edges of the nebula. The light from the stars outside the nebula has been absorbed by light-years-thick layers of thinly spread dust, but you would have no problem seeing your immediate surroundings. The experience would not be unlike fog here on Earth. On a foggy day you can go outside and may have problems seeing cars more than 50 meters away from you, and beyond 100 meters it just looks like a solid white wall, still you can see your hand in front of your eyes just fine.

Why is it called “nebulas” one time and “nebulae” the other?

As mentioned before, the word “nebula”, meaning “cloud”, is a Latin word. Now when forming the plural of that word, some people prefer doing it the English way, adding an “s” to the word. Others prefer doing it the Latin way, in which nebula gains an “e” in the nominative plural form. Both forms are regarded correct, but “nebulae” seems to be more prevalent.



Planet Facts #49

THE SECRETS OF
THE UNIVERSE

Neptune

Has a moon called Triton. It is the most unusual moon as it orbits Neptune in a direction opposite to that of the planet's rotation while all the major satellites follow their planets as they turn around.

Scientists think that Triton was a Kuiper Belt object that was captured by the gas giant

This that and the other



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For Sale : Celestron Sky Scout - R 3000.00 - Contact John on 083 378 8797

The SkyScout is an electronic astronomical instrument made by Celestron. It is intended primarily as an educational device to help users locate and identify celestial objects.

The SkyScout is a handheld, battery powered device about 7.4" x 4.0" x 2.5", and weighs about 1 pound. It has a viewing port, a 3" x 1" LCD display on the side and several buttons for controlling and selecting device functions.

The SkyScout has a 12 channel GPS receiver and orientation sensors that measure location and pointing angle. From an internal database of some 6,000 celestial objects an object is identified simply by centering it in the device's zero-power optical finder and pressing a button. The LCD screen displays the name of the object (star, planet, deep sky object, etc.) and other relevant data. An audio presentation is available via earphones on 200 of the most popular celestial objects.

The SkyScout will also locate an object; the user selects the desired object from the database and red arrows in the viewfinder direct the user to point the viewfinder to the object. The SkyScout also features a "Tonight's Highlights" mode, leading the user through the night's best objects.

The Month Ahead

MEETINGS:

The next meeting will be on Wednesday 10 May @ 19:30

MNASSA:

Monthly Notes of the Astronomical Society of Southern Africa. Go to www.mnassa.org.za to download your free monthly copy.

MEMBERSHIP FEES:

Members - R 145 Family Membership - R 160 Joining Fee - R 35

Payment by cheque, made payable to **The Astronomical Society of Southern Africa - Natal Centre** and either posted to:

P O Box 20578, Durban North, 4016 or handed in to the treasurer.

EFT: **The Astronomical Society of Southern Africa - Natal Centre.**

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Public Relations: Sheryl Venter (+27) 82 2022 874

Meet & Greet and School Liaison: Maryanne Jackson (+27) 82 8827 200

'nDaba Editor & Webmaster: John Gill (+27) 83 3788 797

All other contact information is available on our website: www.astronomydurban.co.za



ASSA Durban - Minutes of the General Meeting

10 th April 2017

The meeting was completed in a record time of under 15 minutes. Needless to say “Everything was in order”. This was done to afford more time for visiting Professor Jayant Narlikar with his talk entitled ‘How Well Do We Know our Universe?’

Jan van Riebeeck's comet

On December 17, 1652, eight months after landing in Table Bay, Commander Jan van Riebeeck observed a bright comet. His journal entry reads: *“Savonts omtrent tusschen 9 a 10 uijren sagen in 't O. Z. Oosten suiijwaerts van 't hooft van den revier omtrent 80 graden boven den horisont een vreemde star met een staert streckende de staert noortwaerts recht op de knie van den reuijs ende 't hooft meest Zuijen omtrent 10 grad: van aff.”*

The comet, now designated C/1652 Y1, is currently in Hercules, slightly over 282 AU from the Earth.



Editors Note:

Most of the articles published in the 'nDaba are written by astronomers from the Northern Hemisphere and therefore references to stars and constellations are from a Northern perspective. For example, it means that Orion is the wrong way up!

Public Viewing Roster

2016-2017	Phone		Phone	Assistant	Date start	Public viewing	Date end
Mike Hadlow	0833264085	Kira Wisniewski	0741034724	Brian Finch	12/10/16	28/10/16	09/11/16
M Jackson	0828827200	Brian Jackson	0828867100	Debbie Abel	09/11/16	25/11/16	14/12/16
John Visser	0823573091	John Gill	0833788797	Peter Foster	14/12/16	30/12/16	11/01/17
David Ellinger	0837639519	Marcia George	0734288394	Mike Hadlow	11/01/17	27/01/17	08/02/17
Mark Hardie		Kirsty Pirie		Kira Wisniewski	08/02/17	24/02/17	08/03/17
Brian Finch		Debbie Abel	0833264084	Maryanne Jackson	08/03/17	24/03/17	12/04/17
Chanu Chetty		Peter Foster	0826555445	John Gill	12/04/17	28/04/17	10/05/17
Navi Naidoo	0844660001	O Rambilass	0837783931	John Visser	10/05/17	26/05/17	14/06/17
Mike Hadlow	0833264085	Kira Wisniewski	0741034724	Sheryl Venter	14/06/17	23/06/17	12/07/17
M Jackson	0828827200	Brian Jackson	0828867100	-	12/07/17	23/07/17	09/08/17
John Visser	0823573091	John Gill	0833788797	-	09/08/17	18/08/17	13/09/17
David Ellinger	0837639519	Marcia George	0734288394	-	13/09/17	22/09/17	11/10/17
Mark Hardie		Kirsty Pirie		-	11/10/17	20/10/17	08/11/17
Brian Finch		Debbie Abel	0833264084	-	08/11/17	17/11/17	15/12/17
Chanu Chetty		Peter Foster	0826555445	-	13/12/17	15/12/17	10/01/18

Planet Facts #48

THE SECRETS OF
THE UNIVERSE

URANUS

Makes one trip around the Sun every 84 years. During some parts of its orbit, one or the other of its poles point directly at the Sun and get direct sunlight for 42 years. The rest of the time they are in darkness.






Richard de Gouveia (Professional Photographer)

SHOOTING THE STARS WEEKEND WORKSHOP

Penwarn Country Lodge | 19 - 21 May 2017 | R 6 500 p/p

RICHARD DE GOUVEIA

Professional Photographer Guide, photographer and teacher, Richard spends his time guiding guests around Africa; showing them the beauty of nature and how best to capture it with a camera. Richard also shares his passion and knowledge through photographic workshops and courses for Nikon in South Africa.



Join Nikon in South Africa & Richard de Gouveia for a weekend of fun, learning and of course photography as we dive deep into the cosmos and learn to capture the Milky Way in all its glory. Richard will be there every step of the way to ensure that you grasp all you need to get the images you always dreamed of. There is also an optional extra day where Richard will offer tuition on Landscape photography.

Points to be covered

- Star trails
- Landscapes
- Long Exposures
- Time lapses
- Panoramas
- Painting / Drawing with light

Please bring with:

- DLSR Camera
- Wide angle lenses (f/2.8 or less is preferable)
- SD/CF cards and chargers
- Cable release
- Tripods
- Laptops and chargers
- Camping chairs
- Head torch and/or torches
- Comfortable and warm clothes (NB!)
- Blankets

Where: Penwarn Country Lodge

When & Price:

18 May 2017 (Landscape Extra day)
 Non Participant - R1250.00
 Participant - R2500.00

19 - 21 May 2017 (Astro Photo weekend)
 Non Participant - R2500.00
 Participant - R6500.00

Call 087 285 3300 or <https://www.webtickets.co.za/event.aspx?itemid=1468368268>

ASSA Symposium 2018

It is planned to have the 11th ASSA Symposium in Auditorium at the SAAO in Cape Town from Friday 9 to Sunday 11 March, 2018. The theme is:

Amateur Astronomy in the Digital Data Age – *how Amateurs can do real Science*

The aim being to try and recreate the link between professional and amateur astronomers. The advance of astronomical technology with large surveys has robbed the amateur community of many of the niche areas where it used to contribute to science: variable and double star work, comet discovery, SNe for example.

Several ASSA members are collaborating with professionals and it is hoped that the ASSA Symposium 2018 will make for new links and understanding by bringing one or two prominent experts to the Symposium with ideas as to where and how amateurs can contribute and collaborate – much of the needed technology is now within reach of the amateur community.

Some examples of this could be:

- monitoring particular objects and/or variable stars
- using robotic telescopes for educational and scientific purposes
- photometry
- spectroscopic SNe follow ups
- participating in various Citizen Science projects, like “**Zooniverse**”

The reasons for choosing Cape Town in March 2018 are the following:
 there is a critical mass of both professionals and amateurs
 it has several nearby institutions SAAO, UCT, Stellenbosch, UWC, AIMS and SKA HQ
 the SAAO has a good accessible venue with catering facilities, good, cheap access by air/bus/car
 weather in March usually OK – no SE!!

So before anyone plans to go away on Holiday next year, consider a visit to the fairest Cape – its closer to home, cheaper and also a good opportunity to visit friends and relations. Also remember that booking early saves lots of money that you can then spend in Cape Town!

There is a website, which will be regularly up-dated with the latest news, requests, costs and deadlines etc. Please check it weekly!

This will be a major event that will hopefully give direction to many ASSA members and forge new links

<http://symposium2018.assa.saao.ac.za/>

It will help the LOC* enormously to let us know if you are thinking of attending, by simply sending me an e-mail (case@saao.ac.za) saying that you are interested in coming or that you will be coming. Sending me an e-mail does NOT commit you to coming – it’s merely information. Knowing how many people we need to cater for helps.

Many thanks for your support and look forward to seeing many of you here next year.

* LOC Case Rijdsdijk – Chair
 Dr Ian Glass
 Eddy Nijeboer
 Auke Slotegraaf