The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER JULY 2017

Next meeting

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 26 July at 19h15.
Programme:

- **Annual General Meeting.** It will be short and sweet (about 40 minutes). Come and speak your mind about society matters and vote for new committee members.
- **What's Up?** by Michael Poll.
- 10 minute break — library will be open.
- **Main talk: "Nova searching with a DSLR" by Jerome Jooste *.**
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Johan Smit.

* **DSLR** stands for **D**ouble **S**ingle **L**ens **R**eflex (camera).

Next observing evening

Friday 21 July 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.

Contents of this newsletter

Chairman's report for the meeting of 28 June 2017 – by Pierre Lourens

Johan Smit presented the topic "Practical observing tips and techniques" under "Beginner's Corner". He encouraged the audience to draw what they see in their telescopes, binoculars or with the naked eye in order to record it as something of value. The excellent drawings of a Dutch amateur were shown.

To do such a sketch properly you need to have it accurately orientated according to the cardinal points, east, west, north south.

He explained how to find the 4 directions on the celestial sphere of an image in the eyepiece of a telescope. Remember that the image might be inverted and the direction may not be obvious at first glance.

All celestial objects drift westward along lines of constant declination as the Earth rotates eastward. Switch off any drives and watch the stars drift. They will drift towards the west. That gives you the first direction in the image, namely west. The direction opposite to that is east. The line perpendicular to the east-west line will be the north-south line.

To find true north, or south, you will have to do some manual labour. Nudge the front of the telescope ever so slightly towards the north. The image in the eyepiece will move south during the nudge. (New stars will enter from the north). That gives you the general direction of north in the image in the eyepiece. Remembering that the true north-south line in the image is perpendicualr to the east-west line previously found in it, you can orientate the sky as seen in the eyepiece against fixed cardinal points.

He also encouraged the audience to draw meteor trails while watching a meteor shower. This is an activity best done while watching the shower with the naked eye.

Use star maps or planetarium programs and sketch the area of the sky around the expected radiant of the shower. While watching the meteors note their direction and length of trail and quickly draw it in on the pre-prepared sketch. Your sketch does not have to be a work of art, but it will give you a permanent record of your observations and will help you recognise the shower's meteors from sporadic meteors. And if done fairly accurately, it may have some scientific value.

During the time for comments and questions about the presentation, Percy Jacobs challenged the audience to observe the next big meteor shower and sketc the activity as described above.

Next was Percy Jacobs with "What's Up?", a summary of wwhich is to be found in the newsletter for June.

Chris Stewart then presented "Telescope making in South Africa" under "Main talk".

He described techniques to make a parabolic mirror, by hand and with a grinding machine. He also discussed the Foucault test and the sophisticated method he had developed to do this test.

He had built an aluminizing plant able to aluminize parabolic mirrors up to 10" in diameter. One Walter Bacchio had built one able to do it for parabolic mirrors up to 13.5" in diameter.

He discussed an efficient primary mirror cell that pivots on a ball in the middle. It has 4 points of support, two spring-loaded and two adjustable.

Secondary mirrors are imported, but are a dwindling resource, he said.

He discussed 6 types of focusers, all made of junk, and all worked.

He discussed eyepieces made of salvaged parts.

He discussed the basic equatorial mounting and showed images of some that that he had made.

Images of several platforms and drives were shown.

In connection with grinding and polishing machines, he mentioned the one built by Johann Swanepoel (a former member of the Pretoria Centre) that could grind mirrors up to 20" in diameter. He also mentioned the one built by another amateur that could grind mirrors up to 24" in diameter.

After the meeting, the attendees socialized over tea, coffee and cookies. **Ω**

Report for Observing Evening on Friday 23 June 2017 - by Michael Poll

We were about 20 at this observing evening, quite a few visitors, and 5or 6 telescopes. The sky was clear and there was plenty to see and talk about.

Early on we noted Sirius and Canopus disappearing into the twilight, but the first serious business of the evening was to look at Jupiter and Saturn. Jupiter was well placed, and we noted the two equatorial belts, and a third belt was seen in Percy's 10 inch telescope. We pointed these out to those who had not seen the planet in a telescope before, and also noted the fact that Jupiter bulges at the equator because it spins fast and so is not quite round because this. Of Jupiter's moons, Io and Europa, were close in on one side, Ganymede and Callisto were spread out on the other. Saturn was lower down in the south east, currently it is in the constellation of Ophiucus. The rings are practically at their widest open.

A couple of degrees away from Jupiter is the double star, Porrima (Gamma Virginis). This double star has a period of 169 years, and the pair closed up in the 2000s. They can now be separated, not too easily, but they will continue to open up over the next few decades.

While on the subject of double stars we looked at Beta Scorpii, an easy double with unequal components, and Nu Scorpii. The first split of the stars of Nu was easy, showing two stars of unequal brightness, but we need to try and split the individual components of these stars at some stage.

A look at Messier 6 (the Butterfly cluster) and Messier 7 led on to a discussion about "nebulae" and catalogues of nebulae. It was explained that nebulae were "fuzzy blobs" rather than points of light like the stars. Historically the first division of these objects was into those that could be resolved into stars, and those that could not. In the 1700s and early 1800s a number of astronomers thought that they would all resolve given a sufficiently large telescope. However, the unresolved ones could be divided into two types from their visual appearance – the green nebulae and the white nebulae. In 1864 William Huggins discovered that the green nebulae were, in fact clouds of gas, which look green due to the light ionised oxygen. Huggins thought that he had solved the "riddle of the nebulae", but the white nebulae showed the continuous spectrum of starlight, but were still not resolved. It had also been noted that many of the white nebulae showed a spiral structure, but it was not known whether or not they were part of the Milky Way. The problem was not solved until 1923, when Edwin Hubble using the 100 inch telescope on Mount Wilson, resolved parts of the Andromeda nebula into stars, and determined its distance to be further away than the diameter of the Milky Way, and therefore discovering that it was a separate entity.

As for the catalogues, we explained how Messier and his contemporaries discovered these objects by chance when comet hunting, and made a list of them for future reference. With later additions there are now 110 objects in Messiers catalogue. M7 is the southernmost one. William Herschel was the first person to make a deliberate search for nebulae and logged more than 2000. His son, Sir John was at the Cape in the 1830s, and catalogued more than 2000 southern objects. He 1864 published the General Catalogue which contained more than 5000 objects. Emil Dreyer in Ireland was asked to tidy up the GC by clearing up ambiguities and duplicate objects and published the New General Catalogue in 1888. This catalogue is still very much in use today, but it was also supplemented with the Index Catalogues. In answer to the question as to whether the IC objects were much fainter we showed IC 2602, the Theta Carinae cluster, which is visible with the naked eye in a dark sky.

Later we looked at NGC3532, known as the Wishing Well cluster, and some people

noticed for the first time the yellow star (x Carinae) which marks one edge of the cluster, and which, although brighter than the cluster members, is further away.

Other examples of multiple tars were shown – Alpha Centauri (double) and Alpha Crucis (triple). There were still some clusters to show – NGC 6231 in Scorpius, also known as the False Comet, and the Jewel Box (NGC 4755). Percy showed the crimson star Ruby Crucis, which, like the Jewel Box, is near Beta Crucis.

We got on to a discussion about telescope mounts and the south celestial pole. Michael's telescope is on an equatorial mount and the discussion ensued when it was pointed out the that axis which seemed to be at a funny angle was actually pointing to the south celestial pole, and was therefore parallel to the Earth's spin axis. The follow up of this is the fact that the altitude of the SCP changes with latitude, the extreme cases being at the south (or north) pole when the spin axis is vertical, and the celestial pole is at an altitude of 90 degrees, and at the equator, where the spin axis is horizontal and the altitude of the celestial poles is zero degrees. By definition therefore, the altitude of the celestial pole at any location defines the latitude of that location. Because the polar axis on the telescope mount is parallel to the earths spin axis, when the telescope rotates around this axis, it tracks the stars as the Earth turns.

We left at about 9.00 pm., but with the early sunset we had about three hours of observing. It was getting a bit chilly, but it could have been worse ! The next observing evening is on July 21st 2017. **Ω**

Summary of "What's Up?" to be presented on 26 July 2017 - by Michael Poll

Mercury gives its best evening showing for 2017 during July and August. It will be best seen at the end of July and beginning of August low in the west from about 18h30 until 19h00. Greatest elongation east of 27° is on July 30th .

Jupiter is visible in the western evening sky until about the end of September. It will pass the bright star Spica in the first half of September being closest on September 10th. The Moon will be near Jupiter on July 28th and August 25th.

Saturn is in the constellation of Ophiucus, and is almost directly overhead at around 20h00 in the middle of August. The Moon will be near Saturn on August 2nd & 3rd, and August 30th

Venus can be seen in the east before sunrise throughout August. The Moon will be near Venus on August 19th, they are closest at 6h45. This is a good opportunity to follow them into the daytime sky, and to see Venus in daylight, as the Moon and Venus will still be close to each other during the morning of the 19th.

Constellations to look for in August**:** in the north are Boötes, Corona Borealis, Hercules, and Lyra; and later in August, Aquila and Cygnus. Overhead are Scorpius, Sagittarius and Capricornus, and Ara is to the south east.

There will be a **Partial eclipse of the Moon on August 7th.** The umbral eclipse starts at **19h 22m,** mid eclipse is at **20h 20m,** and the Moon leaves the umbra at **21h 18m**. The duration of the umbral eclipse is 118 minutes. At maximum eclipse 25% of Moon's diameter will be covered. A penumbral eclipse will be seen before and after the umbral eclipse.

This presentation will discuss the basics of eclipses, why there is not an eclipse at every full moon and new moon, the eclipse seasons, and the particular circumstances of the present eclipse. Also to be explained is the Saros Cycle of 18 years and 10⅓ days or 18 years and 11⅓ days, a cycle in which eclipses repeat in an almost identical configuration of Sun Moon and Earth. The August 7th eclipse is Number 61 out of 82 in Lunar Saros series No 119. **Ω**

Observing: NGC 3532: a great cluster - by Magda Streicher

The constellation Carina is one of the best in the southern hemisphere and also, to my mind, hosts one of the best open clusters. Carina was once part of the larger constellation Argo (Ship), but is now known only as the Broken-down Keel constellation of this once proud vessel.

The open cluster NGC 3532 was discovered by Nicolas-Louis de Lacaille while he was on a visit to South Africa in 1752. He noted quite a number of faint stars in the cluster, while John Herschel indicated a brilliant object of its kind. The beautiful star cluster is something really special and boasts a location in space as a near neighbour to the mighty Eta Carina nebula 3 degrees NE and situated in the same binocular field of view.

NGC 3532, also listed as Caldwell 91 and Dunlop 323, is an obvious hazy spot to the naked eye, and only 1 200 light years distant. The cluster is very rich in starlight, and hosts more than 600 true members. NGC 3532 is obviously elongated in an east-west direction and spans nearly one degree in size. The middle area of the cluster is a dense core of starlight.

This cluster (nicknamed the Arrowhead cluster) is a large display of star strings extending to the end of the field of view, appearing to flow over the edge of the cluster. In a way the stars display a spiral shape in various directions, with open patches in between. The lovely yellow 6th magnitude star HD 96544 completely dominates the south-eastern edge of the cluster.

Another outstanding star, magnitude 7.9, displays a very red colour and is situated just west of the core next to a dark lane cutting east to west into the starlight. Scan about one degree directly south of NGC 3532 and the loose, sprawling cluster of Feinstein 1 swims into view. About 25' across, it comprises a 7th magnitude star and some fainter stars arranged around a very rough east-west oval shape with a depleted centre.

Star clusters are so special, and full of surprises, reflecting much character and seldom disappointing. **Ω**

NAME	OBJECT	RA	DEC	MAG	SIZE
NGC 3532	Open cluster	11h06.4	-58°40	3.0	55'

Astronomy-related articles on the Internet

- **What's the weather like on Proxima b?** The nearest known exoplanet – orbiting the star Proxima Centauri – is only 4.2 light-years away. Does it have liquid water? An atmosphere? Weather? Scientists just announced the first tentative steps to explore those possibilities. http://earthsky.org/space/proxima-b-climate-met-office-unified-model?utm_source=EarthSky+News&utm_campaign=eb983e0ebd-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-eb983e0ebd-394671529&mc_cid=eb983e0ebd&mc_eid=febfe10e42
- **The 2017 total solar eclipse.** It will cross the USA on August 21, 2017. http://www.space.com/36879-best-solar-eclipse-books.html
- **Slow down! Researchers spot possible speeding 'renegade' supermassive black hole.** Astronomers have spied the possible aftermath of a colossal black hole collision that happened in the center of a galaxy far, far away. http://www.space.com/36932-renegade-speeding-supermassive-black-hole-spotted.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20170522-sdc
- **Juno spacecraft has close encounter with Jupiter's cloud tops in 6th flyby.** http://www.space.com/36926-juno-spacecraft-sixth-jupiter-flyby.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20170522-sdc
- **Brown dwarf launches a vast jet.** Astronomers have found a spectacularly long jet – nearly a light-year long – from a brown dwarf. http://earthsky.org/space/brown-dwarf-jet-mayrit-1701117-hh1165?utm_source=EarthSky+News&utm_campaign=d0c1960f29-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-d0c1960f29-394671529&mc_cid=d0c1960f29&mc_eid=febfe10e42
- **Giant dying star collapses straight into black hole.** When the core of a giant star collapsed and formed a black hole, it didn't explode as a supernova. Instead, the whole star collapsed into the black hole. http://www.space.com/37001-black-hole-born-from-collapsing-star-video-images.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20170529-sdc
- **Circumpolar stars don't rise or set.** Circumpolar stars neither rise nor set but always remain in the sky. They're up even in daytime when you can't see them. http://earthsky.org/tonight/circumpolar-stars-dont-rise-or-set?utm_source=EarthSky+News&utm_campaign=fdc5e8b656-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-fdc5e8b656-394671529&mc_cid=fdc5e8b656&mc_eid=febfe10e42
- **Wow! signal explained after 40 years?** Evidence is presented that the well-known **Wow!** signal was generated by a passing comet. http://earthsky.org/space/wow-signal-explained-comets-antonio-paris?utm_source=EarthSky+News&utm_campaign=f441815b4a-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-f441815b4a-394671529&mc_cid=f441815b4a&mc_eid=febfe10e42
- **However, some astronomers reject the evidence.** https://www.livescience.com/59442-astronomers-skeptical-about-wow-signal.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20170612-ls
- **A planet hotter than most stars.** http://earthsky.org/space/kelt9b-planet-hotter-than-most-stars?utm_source=EarthSky+News&utm_campaign=8f78d3808c-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-8f78d3808c-394671529&mc_cid=8f78d3808c&mc_eid=febfe10e42
- **Is it time to rethink how we search for alien life?** Seth Shostak, senior astronomer at the Search for Extraterrestrial Intelligence (SETI) Institute, thinks so. https://www.livescience.com/59547-future-con-rethinking-aliens.html?utm_source=ls-

newsletter&utm_medium=email&utm_campaign=20170621-ls

- **Planet 10? Another Earth-size world may lurk in the outer solar system.** https://www.livescience.com/59592-possible-planet-10.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20170623-ls
- **Earth farthest from Sun on July 3.** http://earthsky.org/tonight/earth-farthest-from-sun-for-year-in-early-july?utm_source=EarthSky+News&utm_campaign=d845f0a65f-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-d845f0a65f-394671529&mc_cid=d845f0a65f&mc_eid=febfe10e42

Astrophotography

- **A novel approach to star trails.** Canadian amateur astronomer Christian Sasse explains how he created his unique star trails. http://earthsky.org/astronomy-essentials/christian-sasse-a-novel-approach-to-star-trails?utm_source=EarthSky+News&utm_campaign=fdc5e8b656-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-fdc5e8b656-394671529&mc_cid=fdc5e8b656&mc_eid=febfe10e42

Astronomy-related images and video clips on the Internet

- **Auroras over the South Pole.** http://earthsky.org/earth/auroras-south-pole-may-28-2017?utm_source=EarthSky+News&utm_campaign=5ada630a6a-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-5ada630a6a-394671529&mc_cid=5ada630a6a&mc_eid=febfe10e42
- **M5 as seen by the Hubble Space Telescope.** http://earthsky.org/clusters-nebulae-galaxies/m5-best-globular-cluster-for-small-telescopes?utm_source=EarthSky+News&utm_campaign=3172181f6d-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-3172181f6d-394671529&mc_cid=3172181f6d&mc_eid=febfe10e42
- **20 years of nonstop Mars coverage: NASA Red Planet efforts detailed.** A new video shows just how extensively NASA has explored Mars over the last two decades. https://www.space.com/37308-nasa-mars-exploration-20-years-video.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20170628-sdc
- **Rainbow reflected at sunset.** http://earthsky.org/earth/photo-rainbow-reflected-in-stream-perfect-circle?utm_source=EarthSky+News&utm_campaign=36f22b71b1-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-36f22b71b1-394671529&mc_cid=36f22b71b1&mc_eid=febfe10e42
- **Wow! Juno's super-close Red Spot images.** http://earthsky.org/space/juno-spacecraft-images-jupiter-red-spot-july-10-2017?utm_source=EarthSky+News&utm_campaign=7ca9e3c73e-EarthSky_News&utm_medium=email&utm_term=0_c643945d79-7ca9e3c73e-394671529&mc_cid=7ca9e3c73e&mc_eid=febfe10e42

Astronomy basics

Put these web links on your list of favourites. They are all links to astronomy education web sites. (Same as last month.)

https://www.youtube.com/watch?v=nrP4a4MCo8A

http://astro.unl.edu/

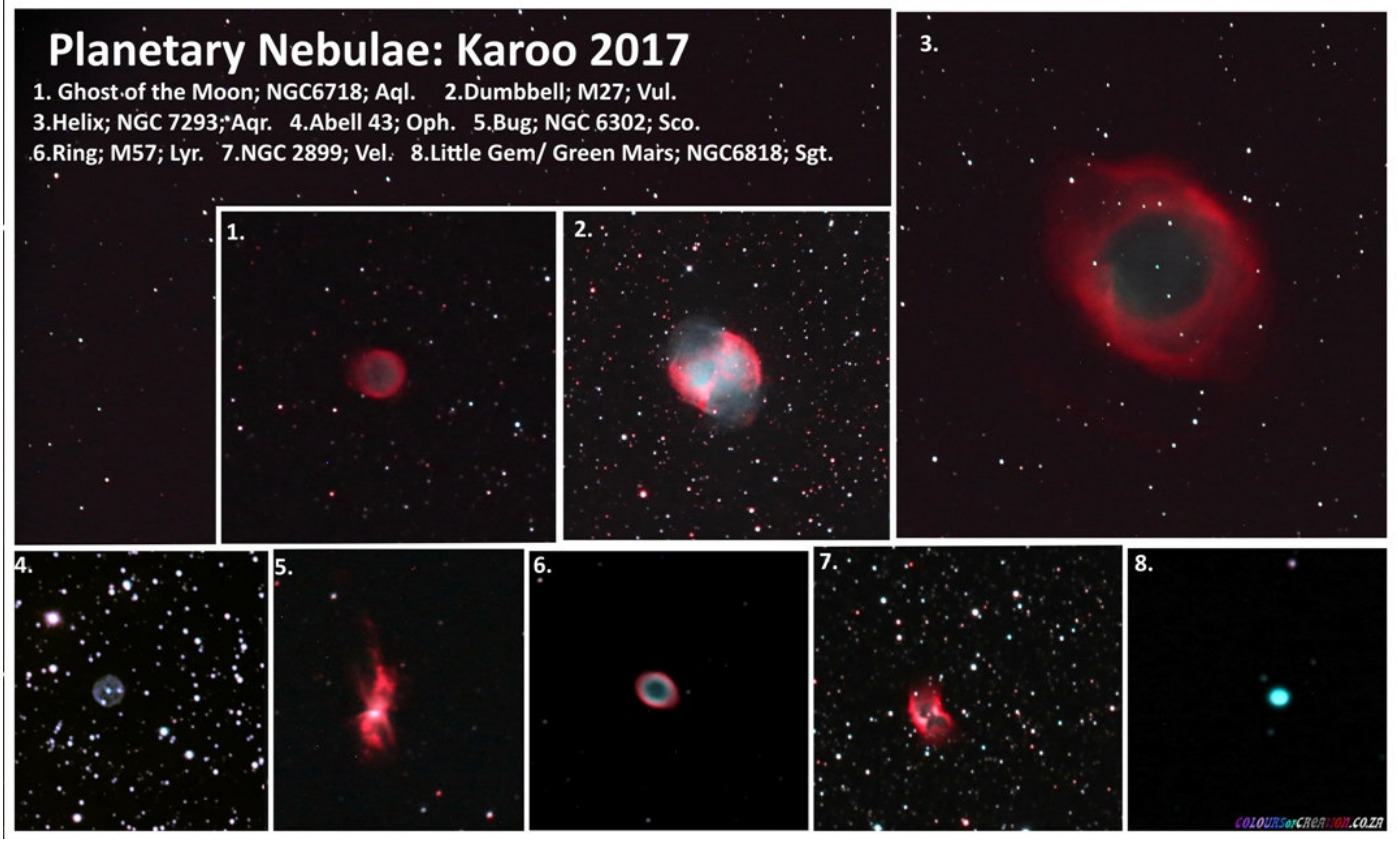
https://www.youtube.com/watch?v=2-Ttcfmbrkl

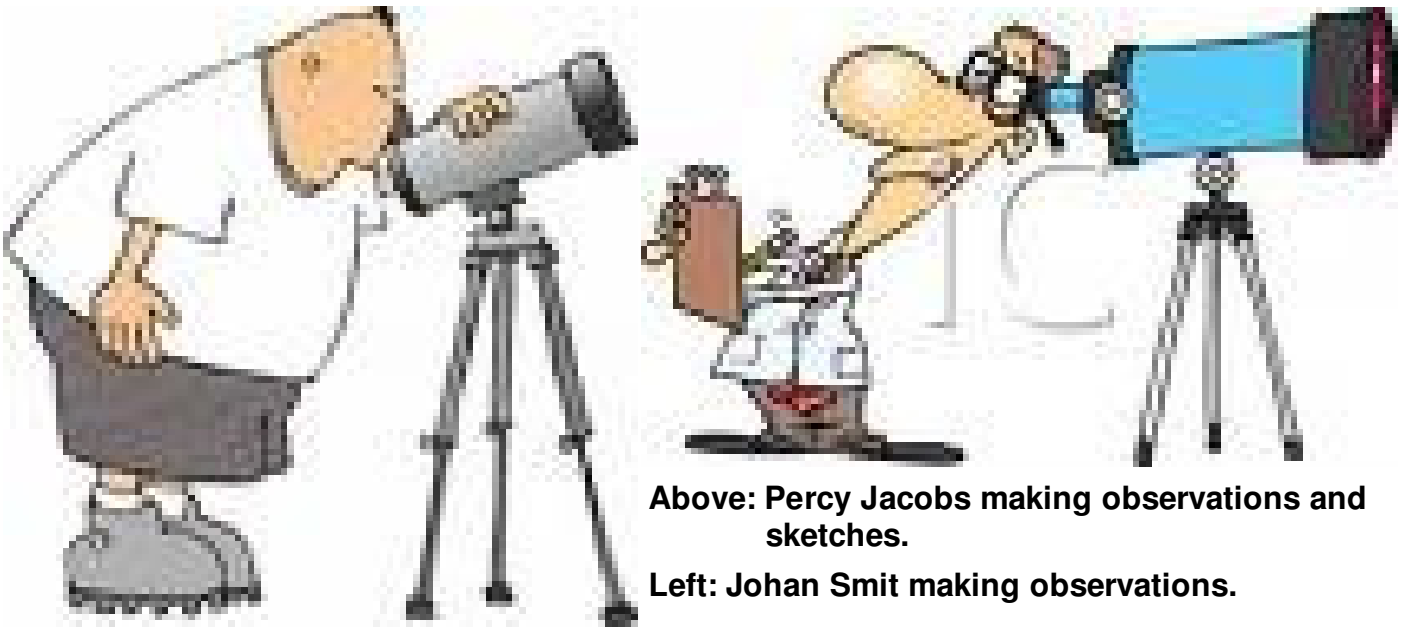
https://www.youtube.com/watch?v=1eR4vCOjZx8

Feature of the month: Strange stars.

1. **The strangest star In the Universe. This is Omicron Ceti, aka Mira.** https://www.youtube.com/watch?v=XyuXBYWZegY
2. **'Alien megastructure' star is at it again with the strange dimming.** https://www.youtube.com/watch?v=gypAjPp6eps
   http://www.livescience.com/59196-alien-megastructure-star-dimming-again.html
3. **Another strange star.** https://www.youtube.com/watch?v=4V9Glji4pY4

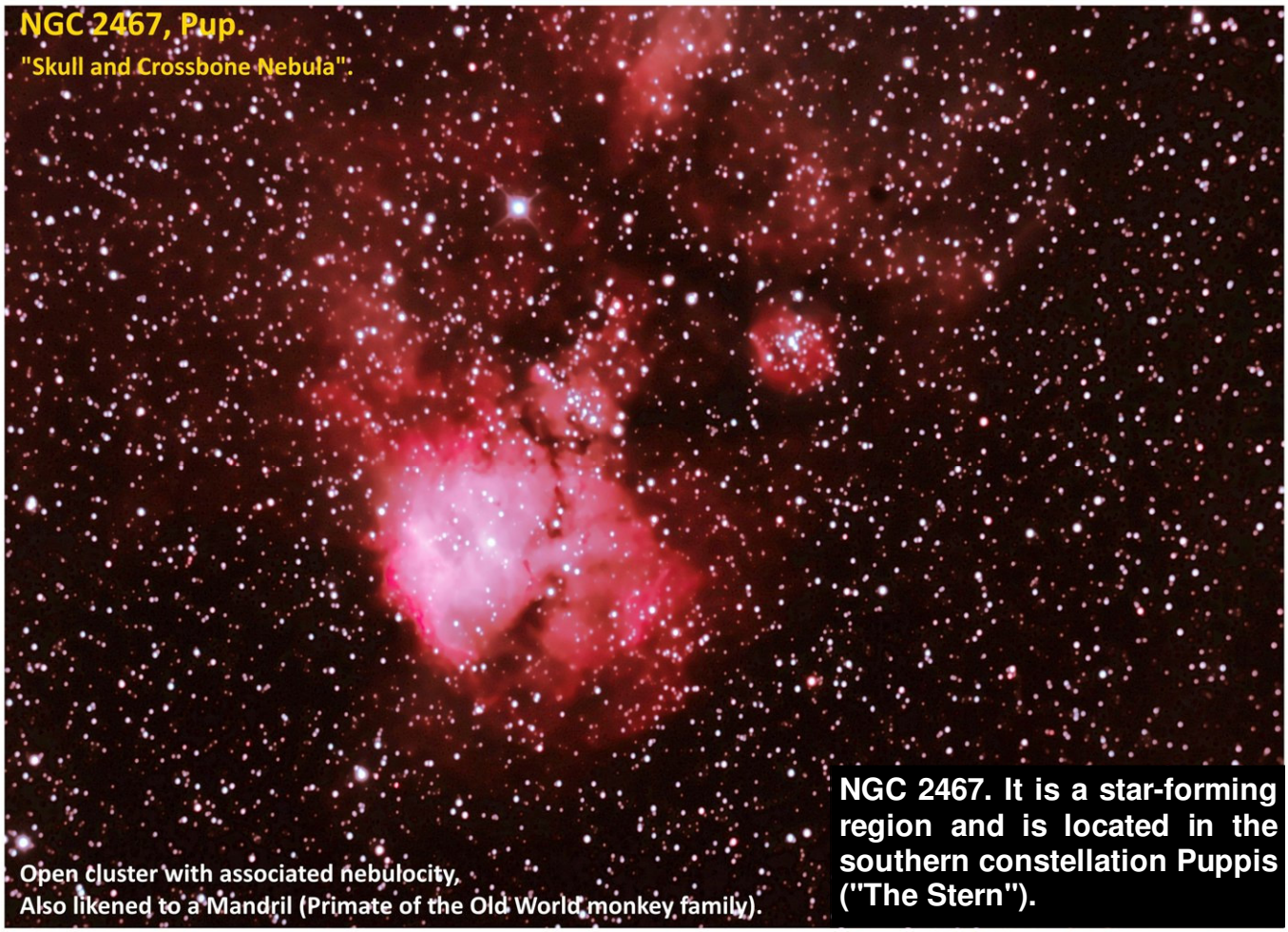
Below: photographs taken by Johan Moolman at the Karoo Star Party 2017.





Above: Percy Jacobs making observations and sketches.

Left: Johan Smit making observations.



NGC 2467. It is a star-forming region and is located in the southern constellation Puppis ("The Stern").

Below: NGC 2264, aka the Christmas Tree Cluster and the Cone Nebula. It is located in the constellation Monoceros ("The Unicorn") near the celestial equator. Both photographs by Johan Moolman.

The Large Magellanic Cloud. Photograph taken by Johan Moolman at the Karoo Star Party 2017.

Pretoria Centre committee

Chairman	Johan Smit	072 806 2939
Vice Chairman	Michael Poll	074 473 4785
Secretary	Michael Poll	074 473 4785
Newsletter Editor	Pierre Lourens	072 207 1403
Events	Michael Moller	082 789 8968
Librarian and Webmaster	Danie Barnardo	084 588 6668
Curator of Instruments	Johan Smit	072 806 2939
Public Relations Officer	Fred Oosthuizen	072 373 2865
Observing Coordinator	Percy Jacobs	060 883 8106
Treasurer and Membership Secretary	Michelle Ferreira	073 173 0168
Member	Bosman Olivier	082 883 1869

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.**

Database: **Members are reminded that a database of the books in our library is to be found on our website. The database was created by Danie Barnardo, one of our committee members.**