



NEWSLETTER AUGUST 2019

NEXT MEETING

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 28 August at 19h15.

Programme:

- **Beginner’s Corner:** “Feedback from the 2019 Karoo Star Party” by Johan Moolman.
- **What’s Up?** by Johan Smit.

----- **10-minute break — library will be open.** -----

- **Main talk:** “Physical properties, exploration and geology of Venus” by Danie Barnardo.
- **Socializing over tea/coffee and biscuits.**

The chairperson at the meeting will be Bosman Olivier.

NEXT OBSERVING EVENING

Friday 23 August 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.

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Astronomy-related articles on the Internet

Five strange, cool things we've recently learned about the moon.

https://www.livescience.com/65943-strange-facts-about-the-moon.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190716-ls

How astronomers missed the massive asteroid that just whizzed past Earth. Its size is between 57 and 130 meters and it passed just 73 000 km from Earth. And it was discovered just days before it passed so close. https://www.livescience.com/66043-giant-asteroid-flyby-surprises-astronomers.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190727-ls

Newly-discovered, nearby alien world has 3 blazing-red suns.

https://www.livescience.com/66061-three-star-exoplanet.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190731-ls

If aliens are flashing laser beams at us, we now have a way to detect them.

https://www.livescience.com/66086-are-aliens-flashing-laser-beams.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190802-ls

New 3D map of the Milky Way shows our galaxy's heart is totally twisted. A new, incredibly detailed 3D map of the Milky Way has revealed that its central disk is wavy, much like an enormous potato chip.

https://www.livescience.com/66080-3d-mapping-milky-way-twisted.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190802-ls

NOTICE BOARD

Minutes of the AGM. The minutes of the Annual General Meeting of the Pretoria Centre of ASSA, which was held on July 14th 2019, have been placed on the website. These minutes will be taken as "read" at the 2020 AGM.

Annual Report. The full Annual Report of the Pretoria Centre of ASSA has been placed on the website.

Beanies. Beanies will be offered for sale @ R45.00 each at every monthly meeting, until they are sold out.

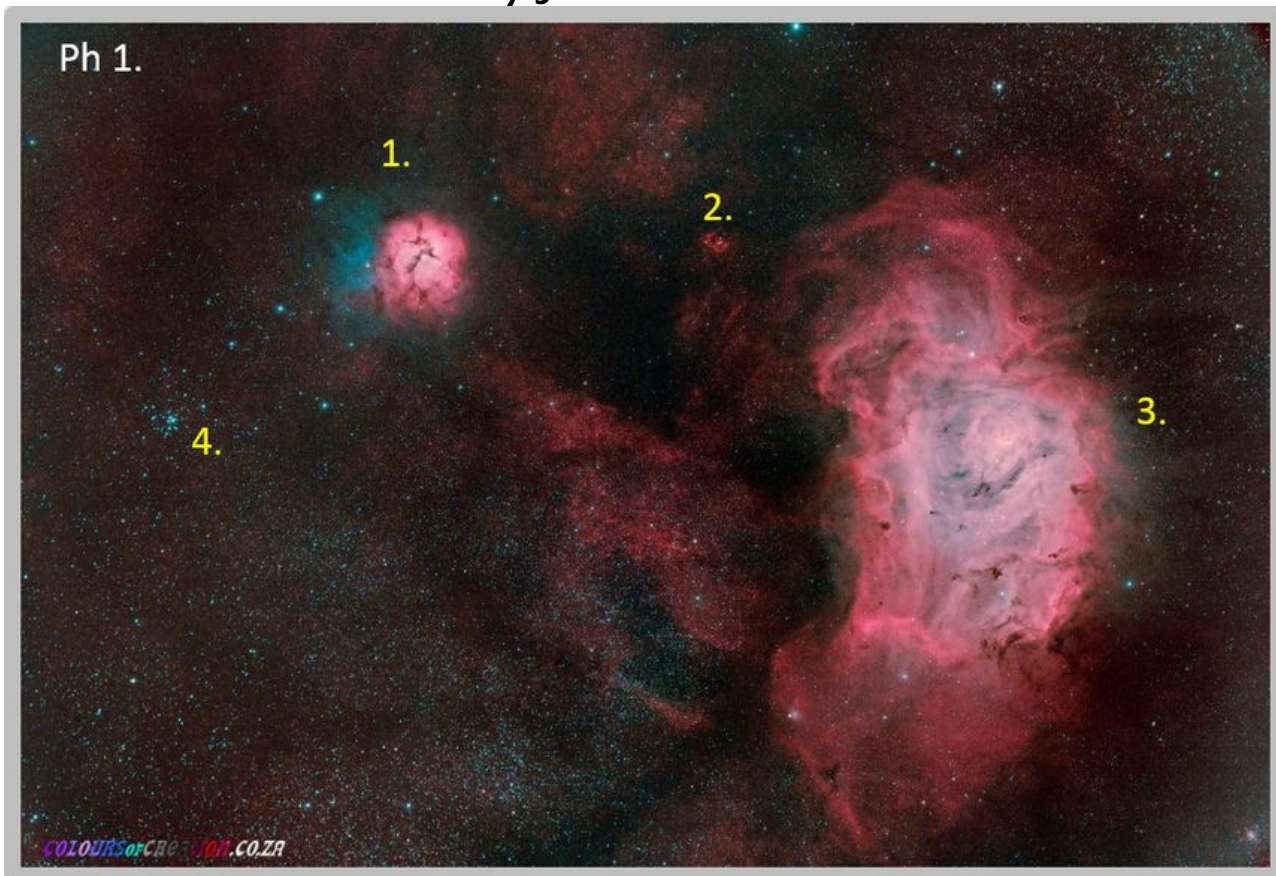
Old newsletters: All old newsletters from January 2004 onward are on our website. They contain a record of our Centre's activities as well as astronomical information.

Database: Members are reminded that a database of the books in our library is to be found on our website.

Astronomy basics: Precession of Earth's axis

<https://www.youtube.com/watch?v=0qHjtp4cdCA>

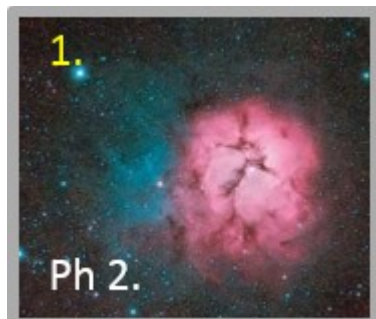
The Lagoon and Trifid region - courtesy Pretoria skies - by Johan Moolman



Location: All images: Pretoria. Light polluted balcony. (Above image: NORTH is left, WEST is up.)

Hardware: Celestron CGX-L mount; Tele Vue 5" refractor (fl 660mm, f/5.2); Radian narrowband quad band filter; Modified/ cooled Nikon D850 DSLR. Guiding: Canon 400mm f/5.6 lens; Cam: Orion Starshoot.

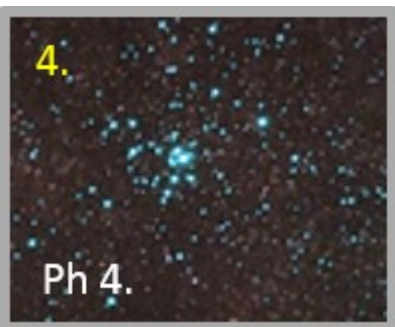
Software: Auto guiding: **PHD**; Camera Control: **BackYardNikon**; Mount control: **Cartes du Ciel**; Stacking and image PP: **PixInsight**; **Paint.NET**. (Integration time: 2 hours - 60 x 120s, iso 1600).



The **Trifid nebula**; M20, NGC 6514. Located in the Scutum spiral arm of the Milky Way. It is an unusual object - a combination of an **open cluster**, an **emission nebula** (red/pink), a **reflection nebula** (blue) and a **dark nebula** - the apparent 'gaps' within the emission nebula that cause the trifurcated appearance; these are also designated **Barnard 85**.

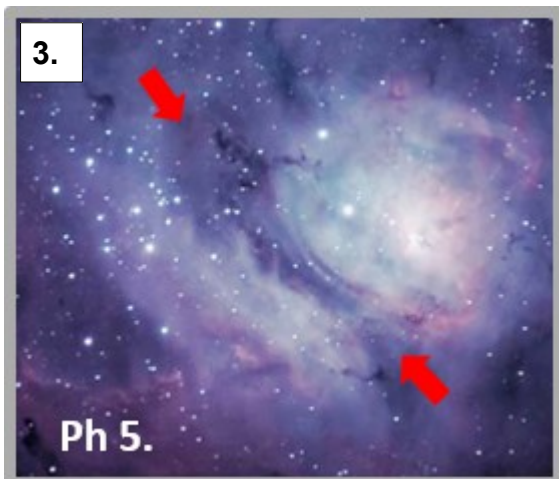


Diffuse nebula **GN 17.58.8**, associated with the open cluster **Bochum 14**. (Many thanks to Magda Streicher for the identification).



M21 aka **NGC 6531**. An open cluster - it is relatively young and tightly packed. A few blue giant stars have been identified in the cluster, but Messier 21 is composed mainly of small dim stars.

“Heart” of the Lagoon Nebula aka M8



(Information quoted from ****N. F. H. Tothill et al. Handbook of Star Forming Regions Vol. II; Astronomical Society of the Pacific, 2008; Bo Reipurth, ed.) [Many thanks to Auke Slotegraaf for supplying literature/ information.]**
 The “**Lagoon Nebula**” is so named because of the **dark rift** separating the two brightest sections of the nebula. The eastern part of the nebula (left in this image) has superimposed on it the open cluster **NGC 6530**, a group of about 100 stars. (NORTH is up; EAST is left).

The Lagoon Nebula is estimated to be between 4000 - 6000 light-years away, spanning 90' by 40', which translates to an actual dimension of 110 by 50 light years.
 “M8 consists of a rich **open cluster** with several O-type stars and a **prominent HII region** (about half a degree in diameter), the core of the cluster superimposed on the eastern half of the HII region. The HII region is surrounded by **bright rims** and at least one dark ‘**elephant trunk**’ structure (See “**The Dragon**” below); these are most prominent at the south-eastern edge of the HII region. A dark lane splits the optical nebula from NE to SW (‘**The Great rift**’).”
Ph 5. Per the **NGC/IC Project**, **NGC6533** refers to the **whole nebula** and **NGC6523** is the **bright core** of the nebula, lying **NW** of the **Great Rift**; the **SE** part of the nebula comprises **NGC6526** in the south and **NGC6530** in the north; and **IC 1271** and **4678** are small condensations to the east of the main nebula (IC 1271 may refer to the O star HD165052). (See *photo/ info gram below*)
Ph 6. (Next page.) Although Messier referred to it as ‘*amas*’, a cluster (M8, *Messier 1781*), the ****authors** use **M8** to refer to the **whole complex of stars, HII regions and molecular gas**, and ‘**Lagoon Nebula**’ to be synonymous. The **open cluster dominates the NE of the region**, so **NGC6530** is now always used to refer to the **cluster** rather than any surrounding nebulosity. The authors** take **NGC6533** to refer to the **HII region** only, comprising **NGC6523** and **6526**. For most practical purposes, **NGC6533** and **6523** are the same. It is not clear that IC 1271 and 4678 refer to real structures, therefor the authors did not use these designations.

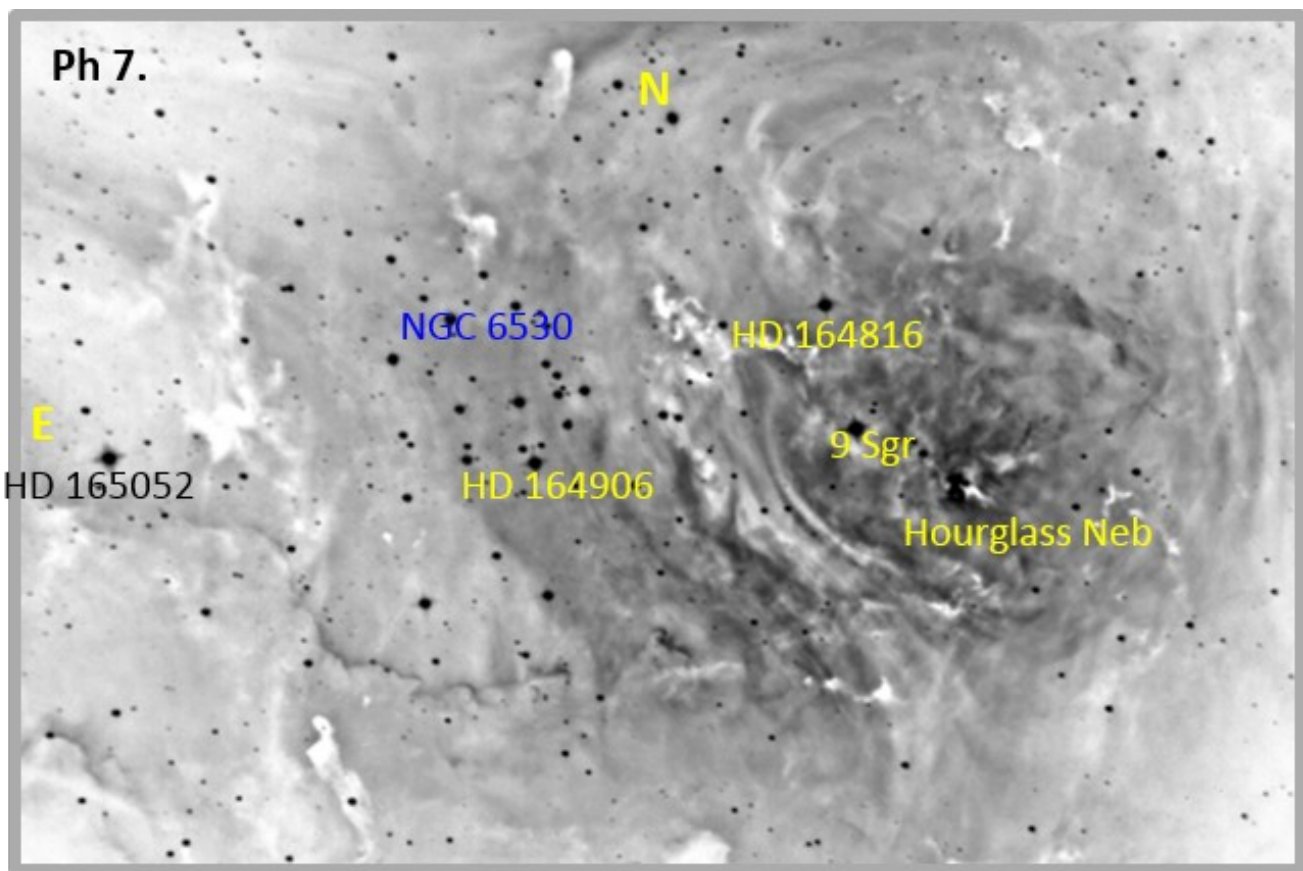
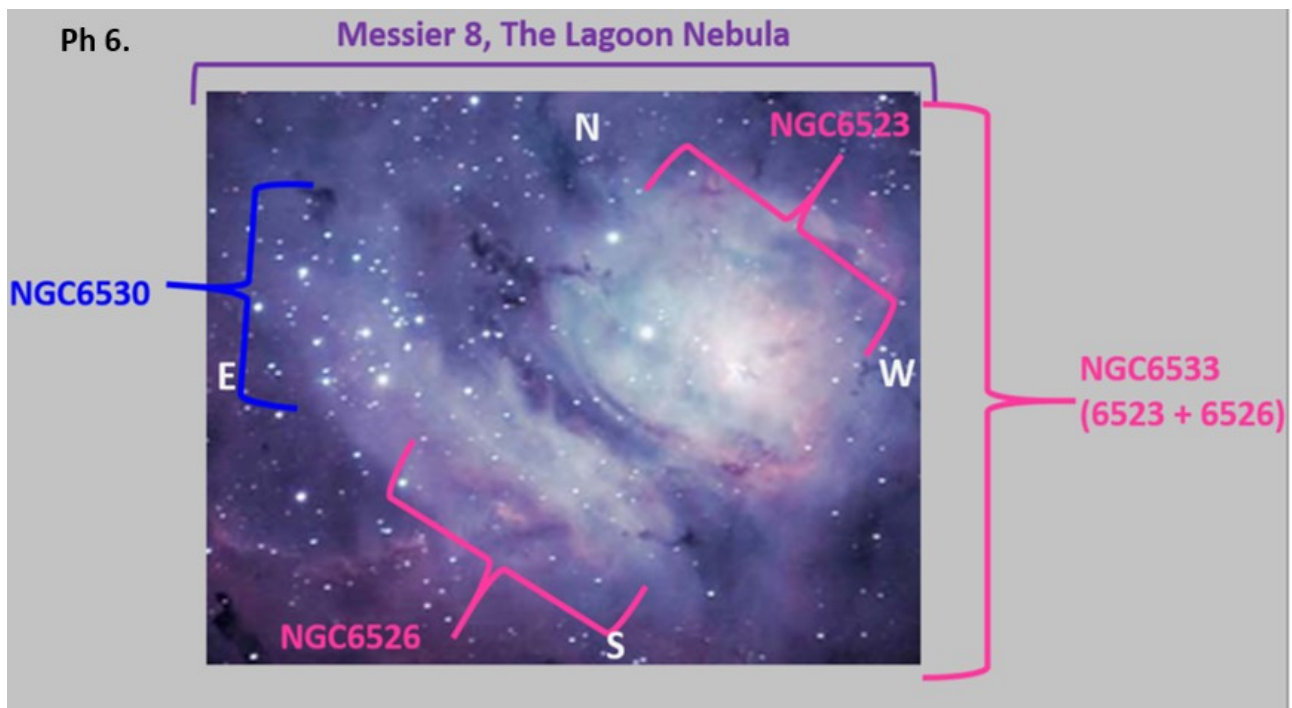
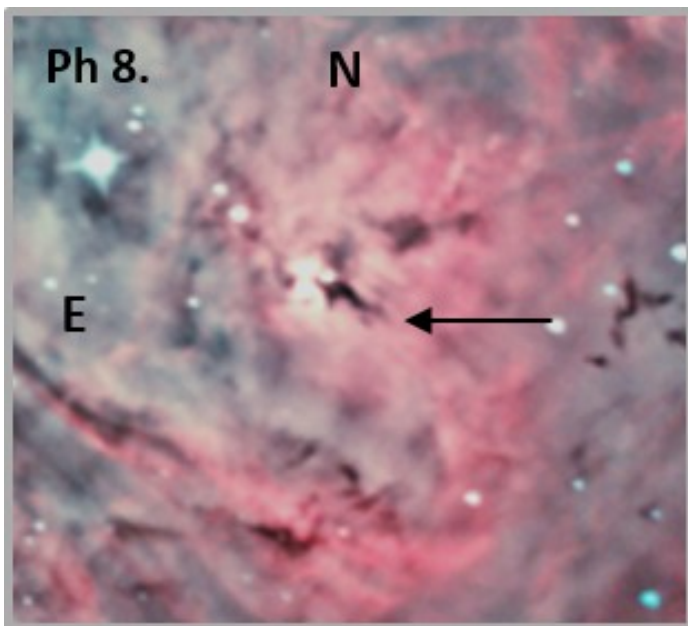
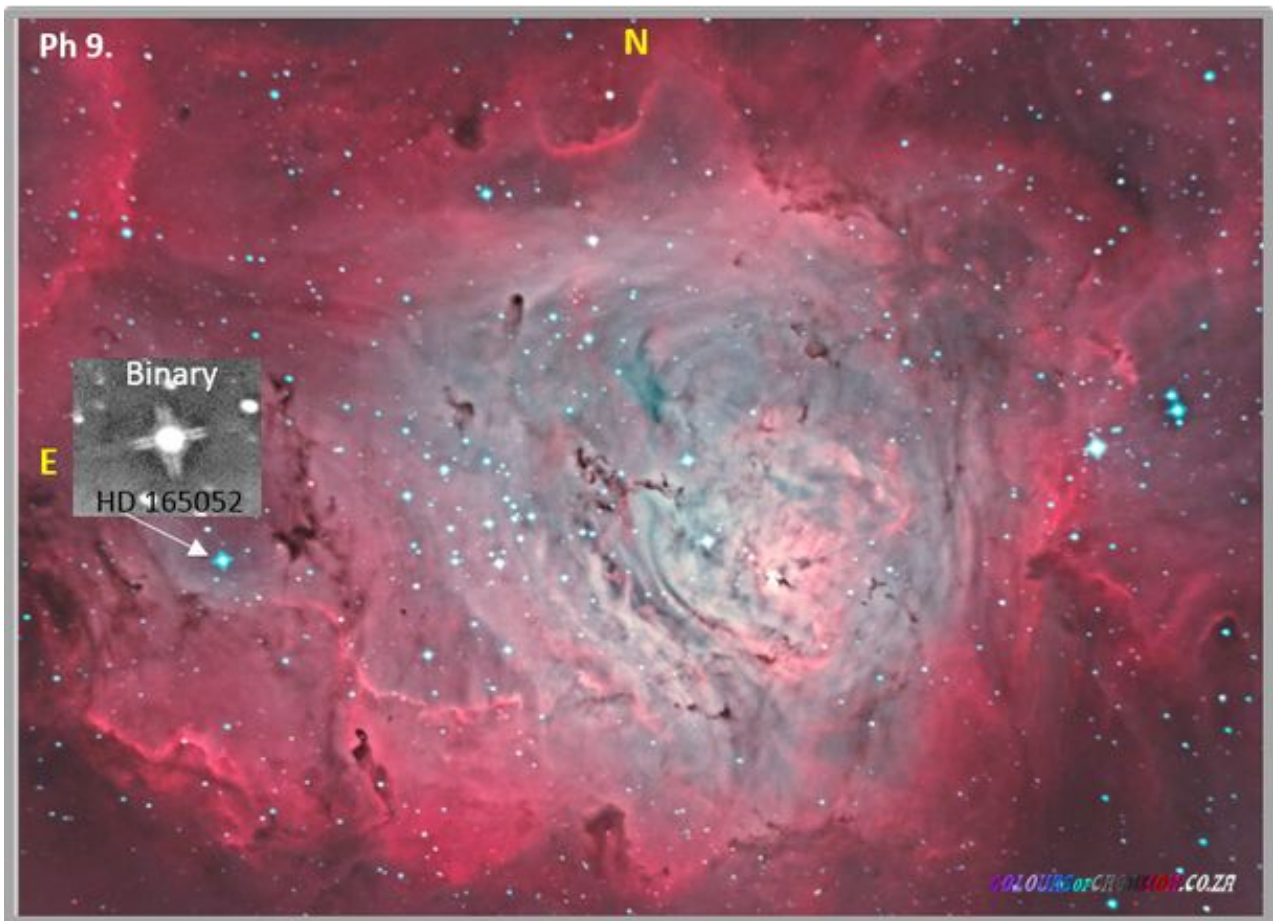


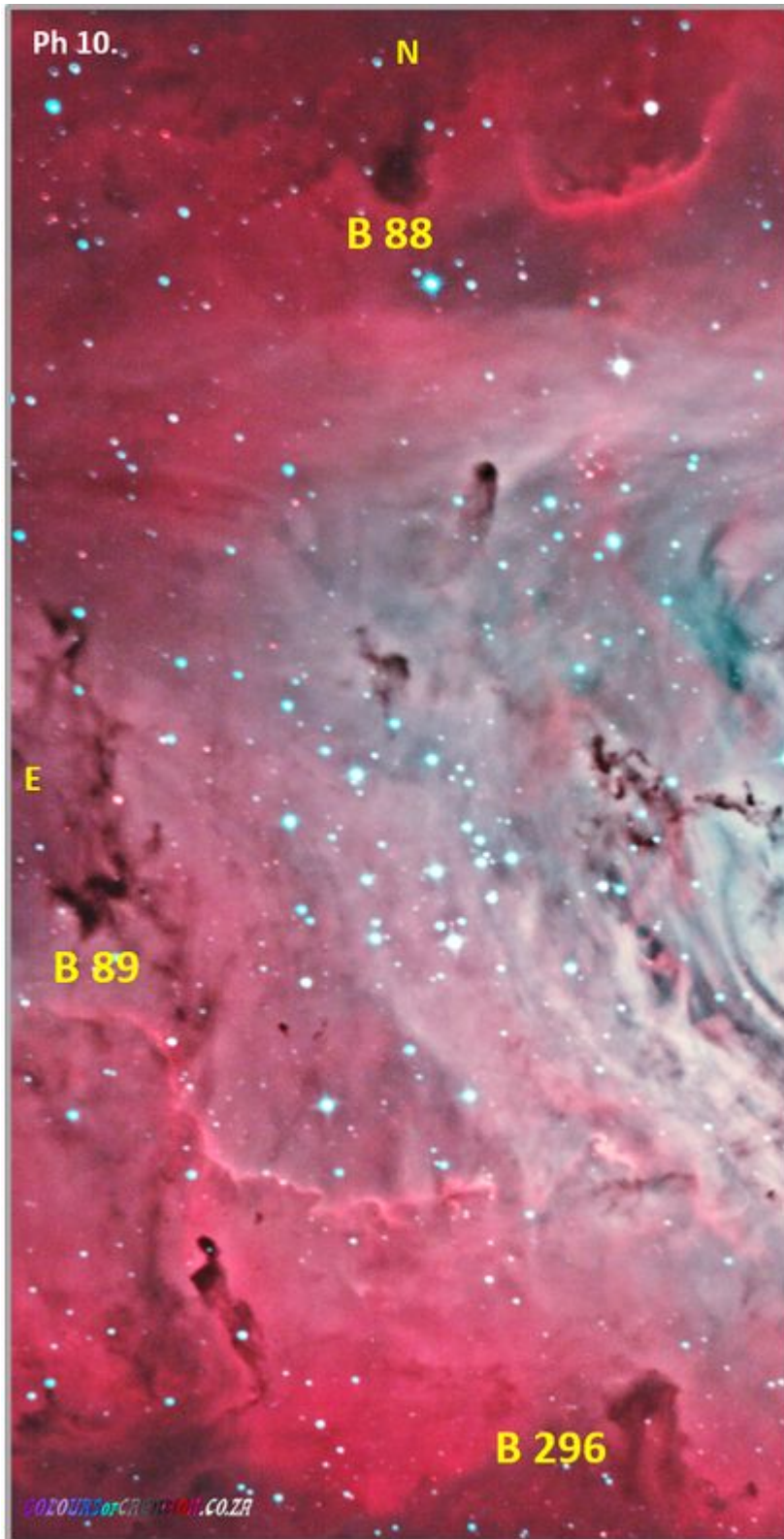
Photo 7: The HII region is about 10 pc in radius and requires about 1051 ionising photons per second; **9 Sgr** appears to be its principal source of ionising radiation, with the binary **HD165052** (*Arias et al.* 2002) contributing as well. *Lada et al.* (1976) identified the star **Herschel 36** as being responsible for ionising the **core of the nebula**, an area about 4' across; it also ionises the **Hourglass Nebula**, embedded behind this core.



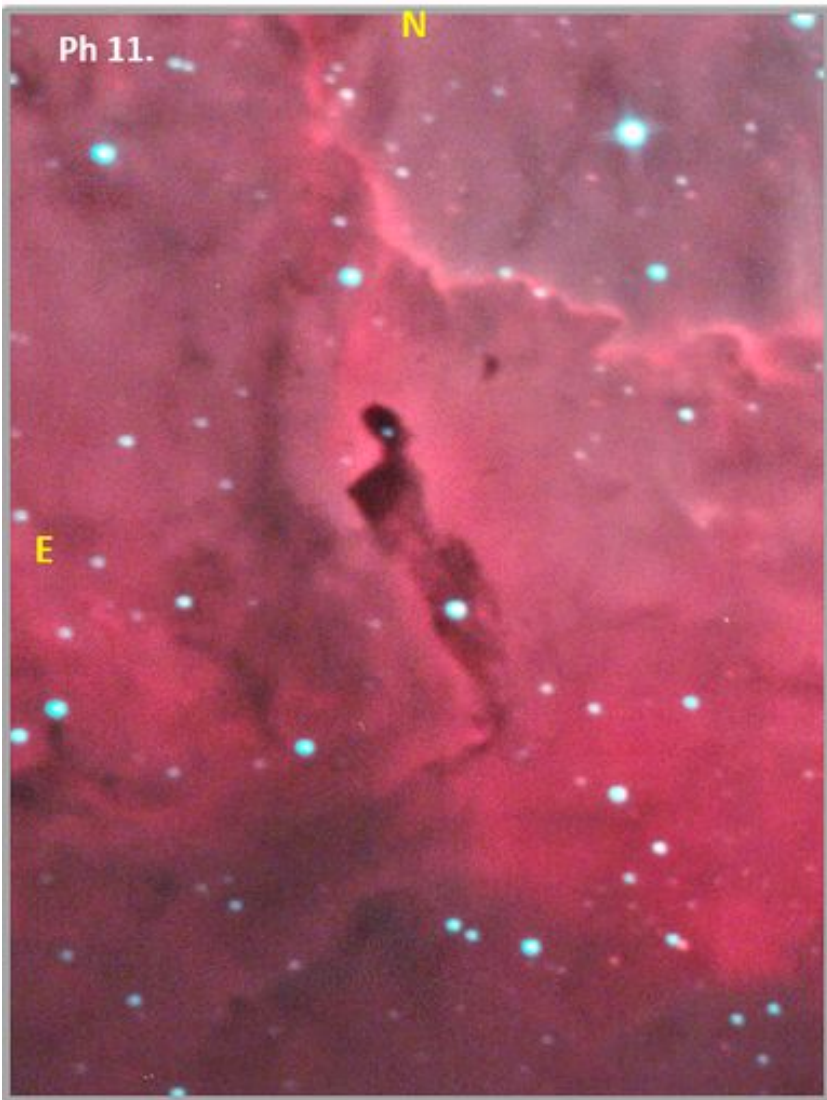
The **Hourglass Nebula (photo 8)** is known to be a region of very recent or ongoing star formation. Tentative early suggestions that the Hourglass might be a bipolar nebula around a central star (e.g. Allen 1986) **are not borne out** by detailed observations. Although the **biconical shape** of the nebula is maintained at 2 μm (Allen 1986), it disappears at longer wavelengths, becoming a **more rounded blob** (Woodward et al. 1986). In this latter work, Woodward et al. combine multi-wavelength observations to show that the Hourglass is an **interestingly-shaped window into a compact HII region lying within a molecular cloud, ionised by Herschel 36**. The delicate curves and traceries that we see in high-resolution images (e.g. from HST) indicate the complexity of the interstellar medium.

Bright-rimmed clouds (photo 9) toward the “edges” of the main emission region of M8 raise the possibility of ongoing star formation significantly outside the core of the complex.

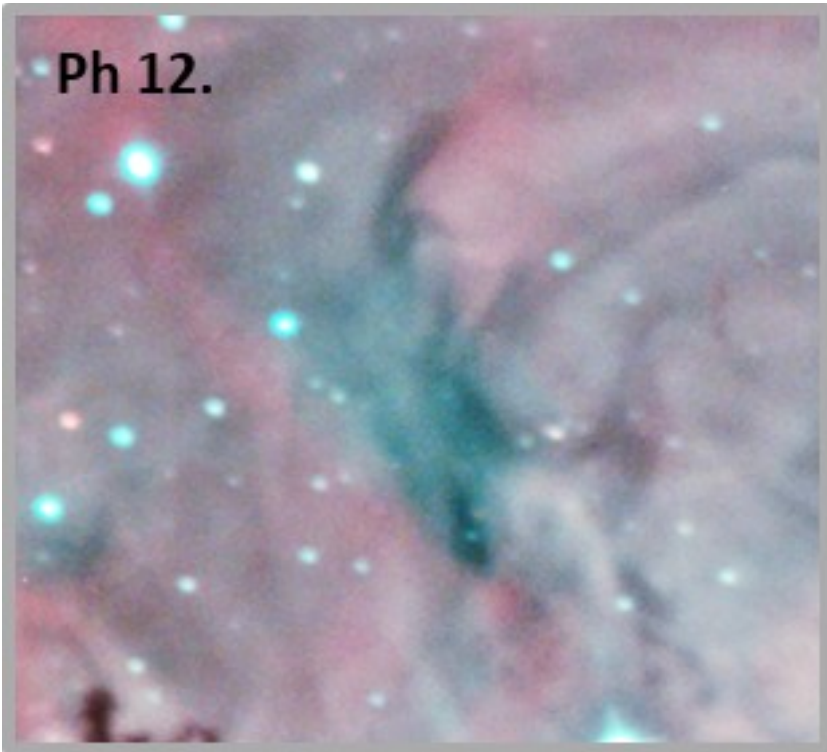




The presence of **dark markings** (*photo 10*) against the nebular background was noted by Barnard (1908) and Duncan (1920). Out of 23 dark areas, Bok & Reilly (1947) consider **16** to be “**true #globules**”, being regular and round, with diameters ranging from 6” to 1’ — mainly in the 10”–30” range. (**Bok globules#** - dark, collapsing clouds of proto-stellar material.) The most prominent of these have been catalogued by E. E. Barnard as **B88, B89** and **B296**.



'The Dragon' (photo 11) is the prominent 'elephant trunk' to the SE of the core of NGC6530 - lying in front of the SE rim.



The **greenish-blue area (photo 12)** most likely represent emissions in the Oiii and hydrogen - Alpha bandwidths. (Radian narrow band quad band filter used for imaging.) Bok & Reilly (1947) commented, at the end of their paper on globules in the Milky Way, many of them in **M8**, that every one of the globules they had just described merited further careful study "with the largest available reflecting telescopes". This advice is still valid, decades later.

Observing: A planetary nebula with a strange appearance - by Magda Streicher



Planetary nebulae are still among the most splendid deep-sky objects to observe and study, and of course it's a pure pleasure to do so with the aid of a telescope.

Planetary nebulae originate at the massive final stages of certain stars. The supersonic wind generated by the hot star, or double stars, can reach speeds of up to 560000 kilometres per hour. When sufficient dust has formed around the star to reflect enough light, and when sufficient gas has been expelled to absorb and reemit light from the star, the nebula becomes visible.

Only two degrees northeast of the magnitude 4.3 star Lambda Leporis, we find a somewhat strange planetary nebula in the constellation Lepus called IC 418 (Index Catalogue). There's

something about IC 418 that leaves me with a somewhat spooky feeling. And I know why: it is because of its nickname, Spirograph Nebula (resembles a pattern made by the toy which produces geometric patterns), and the fact that the Hubble picture shows it as a strange object that appears somewhat three-dimensional.

Furthermore, from the picture the surface appears to be covered in criss-cross lines. The planetary nebula is surprisingly bright, even through amateur telescopes, appearing as a disc with a very high surface brightness. The edge is well-defined and covered with a strong reddish to orange glow which high magnification could reveal, but only in very dark, transparent sky conditions. It is definitely worth trying to glimpse this outer edge glow.

The Hubble picture brings to the fore the different layers on the surface of this planetary nebula. The central star has a very faint halo around it, which gives the inner section of the nebula the familiar pale blue colour. If one gazes long enough at the Hubble picture of IC 418, it really takes on the appearance of an eerie orange ball hanging against the black velvet of the night sky. Perhaps the eye of an alien ghost?

But ghost or no ghost, the Hubble picture shows us a huge amount of detail in the Spirograph Nebula, and at least one can imagine some of the planetary nebula 's beauty through the eye of the beholder.

OBJECT	TYPE	RA	DEC	MAG	SIZE
IC 418	Planetary nebula	05 h 28.2 m	-12° 41' 12"	10.7	14" x 11"

July 19th 2019 observing evening report - by Michael Poll, Neville Young and Johan Smit

Another clear evening, and we did some observing amongst a lot of discussing. Johan, Neville and Michael were there, Johan with a very nice 4-inch APO refractor. The Sefako Makgatho University (SMU) students were there also, and, together with a few visitors, we numbered about 15 or so attendees.

Neville writes:

Two of the visitors were Tebogo and his wife. Their presence was the ideal opportunity for some of the students to test their new knowledge and become teachers. According to Tebogo - who had no prior astronomy knowledge - he learned much from the students as they instructed him and his wife in front of the solar system model and did their best to answer his questions. No better way to know you have learned than to teach what you have learnt!

The students completed another observation report as they always do on these evenings. Most of the observations they were required to make were revision of what they had been observing this year, in preparation for the final practical examination on the 23rd of August. By now they can recognise several constellations and know the corresponding alpha stars. Johan Smit taught them a sensible mnemonic to help remember the constellations of the zodiac- "As Telescopes Get Cheaper, Lets View Lots of Small Stars, Comets And Planets". The students measured sizes of constellations and angles between stars using the roughly standard angles we see across our fingers, fists and hands at the end of our extended arms. They have some idea of the types of telescope through which they have been looking. They know that Jupiter is moving from Ophiuchus to Scorpius in the next month and that it will take 12 years to orbit the Sun before it appears in Ophiuchus again. The mnemonic "I Enjoy Good Cooking" helps them to remember the Galilean moons Io, Europa, Ganymede and Callisto – which they were able to identify as arranged around Jupiter on that evening.

Saturn and Jupiter were well up, and Saturn's altitude, at least, provided an illustration of how the sky changes in one month – last month at the same time we had to wait for Saturn to clear the trees to the south east, but this month, by the time twilight ended, it was already at a reasonable altitude– it is an effect of the Earth moving around the Sun. Jupiter's bright moons were almost symmetrically placed and evenly spaced with Ganymede and Io on one side and Europa and Callisto on the other. The rise and set times of the planets was discussed using the 'rise and set' chart in the Sky Guide, and pointing out that for Jupiter and Saturn to be as high as they were when it got dark they would have risen in the afternoon in daylight, and that they would be setting in the west in the early hours of the following morning.

Telescopic objects in Scorpius we looked at were the open cluster Messier 7 and NGC 6441, a globular cluster, both in the same region. (NGC 6441 is very near the star G Scorpii). A question as to how far away M7 was led to a long discussion. Generally the open clusters are composed of young stars and are relatively close to the Earth ("hundreds of light years") whereas the globular clusters are old and are much further away ("thousands of light years"). (References give the distance to M7 as 780 light years and to NGC 6441 as 44 000 light years). This globular cluster appeared as a small round fuzz in the telescope but to show a better example Omega Centauri was accessed, but for first-time viewers, having looked at 6441, Omega was too big to see at first as it nearly filled the whole field.

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This led on to a discussion about light years (the distance light travels in one year) and about how far away the Sun and Moon were and how long light takes to travel from each of these. Also one uses light years to make the figures manageable – illustrated by the fact that we do not express the distance from Pretoria to Cape Town in millimetres.

Tebogo had noticed that the Moon was in the sky these mornings well after sunrise. Michael said that this happens at this time of year, because in our winter the nearly full Moon spends as much time in the sky as the Sun does in summer. This is a good observation, and it led on to the suggestion that people could look out for other things that were going on in the sky – for example to check how the sunrise and/or sunset points change from week to week as the Sun moves from north to south and back again.

We discussed the fact that the Sun is at its furthest north on June 21st, but that the difference in the sunrise times on June 21st and December 21st is only about 2 hours at the latitude of Pretoria (26° south), but the further one goes from the equator the longer the day in summer and the shorter the day in winter. Even Cape Town is affected in this respect, as it is about 8° further south than Pretoria. On June 21st sunlight hours are 10½ hours in Pretoria and 14½ hours in Cape Town, and that if one goes far enough away from the equator (66° north and south of the equator at the Arctic circle and Antarctic circle, the sun never sets for a period of time (“the midnight sun”). It is unfortunate that many in South Africa have not experienced the fact of these very late sunsets and it being broad daylight at 10 pm.

By 8.30 pm the gibbous Moon had cleared the horizon in the south east, so telescopes were re-located to avoid the trees. There was not much serious observing as students and visitors were trying to take pictures down the eyepiece with their phones, but we did point out the craters Grimaldi (the darkest spot on the Moon) and Aristarchus (the brightest spot on the Moon).

Johan writes

Apart from jumping from planet to planet as the need arose, I managed to get to Omega Centauri, the Jewel Box, NGC3532 (the Wishing Well cluster), M6 and M7, and I even managed to show the Coathanger to a few people. The Coathanger only just fitted into the field of view of the short focal length refractor, so I used that and the view in the finder, to demonstrate the effects of aperture and focal length on magnification and field of view.

While observing Jupiter the students proudly rattled off the names of the Jovian Moons. When I asked which side of Jupiter they were, I was met with some puzzled looks. I realised that the observers needed some training on the cardinal points as seen in an eyepiece, and then to relate that view to what is seen in the sky. Thus, some of them received intensive training in identifying the cardinal directions in the field of view of any telescope. Basically that means watching the drift in the eyepiece. Everything moves westwards due to earth's rotation, so the drift direction pointed them to the western side of the telescope view. Complimentary to west, east is automatically on the opposite side. Finding North or South means softly nudging the front of the scope North or South and viewing the effect in the eyepiece. The rule is, that if the scope is nudged Northwards, the stars in the view of the eyepiece move Southwards, and new stars enter from the north.

They could then quickly decide which side of Jupiter was which, and therefore on which side the moons were, and from there relate that to where the moons will be seen in the sky.

One bright student did notice the corrected and reversed directions of the view—which is caused by the 90 degree diagonal that corrects the inverted image of the basic telescope in one direction. On a straight-through astronomical telescope both directions, N-S and E-W, are reversed, but in the refractor with the diagonal, east – west was “correct”, while north – south was inverted, relative to the sky view.

Again it was a good evening and a few people learnt something new. Only the fact that I had to replace a flat tyre that found a puncture on the way to the observing field spoilt my mood early in the evening. The exercise to fit the spare wheel warmed me up and during the evening astronomical activity fixed my mood.

On the next page are photographs taken at last month's observing evening. Ω

Immediately below: Our chairman (Johan Smit) discovered a flat tyre after arriving at the observing field. He had to do a quick change before the guests arrived. He strongly reminds me of a Voortrekker replacing a wheel of his oxwagon.

Below: The Sefako Mkgatho University (SMU) medical students have learned enough now to be able to explain the workings of the solar system to others. Here Ndzetelo and Wiseman use Neville's solar system model to help guests understand why Jupiter and Saturn are in the positions amongst the stars where they could be seen that evening. Photographs taken by Neville Young.



Chairman’s report for meeting on 24 July 2019 - by Johan Smit

Instead of the usual “Beginners Corner” our annual general meeting took place. We looked back at activities over the last year, section reports and electing the new committee for the next year. As usual the present committee was re-elected. Again an alert member noticed that I myself was not nominated. Someone made the necessary nomination. Again I missed an opportunity to quietly slip out of the committee.

To replace committee members who retired and left Pretoria, Louis and Craig Kloke were nominated at the AGM. They accepted the nominations which were approved by the members. Our committee is again at full strength and I am looking forward to input from the new committee members.

The full chairman’s report will be available on our web site.

Then Michael Moller pointed out some things to look forward to in August 2019. He covered everything from the Moon, planets and his ASSA 100 pick, to best constellations to concentrate on.

By just following his advice you are guaranteed not to be bored in August. And his experience as one of the first to complete the ASSA 100 challenge means that you should take his advice seriously.

And lastly, we celebrated the 50 year anniversary of the Apollo 11 lunar landing in 1969. Michael Poll and Neville Young shared their collection of memorabilia with the audience. Francis Thackeray, invited by Neville Young, shared his memories, including a photograph, taken by our own 12” telescope and signed by Neil Armstrong, and a sample of moon rock.

Frik le Roux, who was born after the lunar landing, shared his fascination with this event. I must admit that I learned a lot, despite seeing myself as quite informed about this event. It felt good to look back at one of humankind’s greatest events.

The meeting ended with the usual refreshments, together with discussions on the lunar landing. Ω

Pretoria Centre committee

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Pretoria Centre members Percy Jacobs, Danie Barnardo, Michael Poll, Bosman Olivier together with Chris Curry (from Johannesburg) gave a successful viewing evening to members and guests of the Mountain Club of South Africa on July 6th 2019 at Wilgepoort. Pierre Lourens (a member of the Pretoria Centre and MCSA) also attended.



Feature of the month: New ultrahot class of exoplanet discovered

The planet, called WASP-121b, is about 10 times hotter than any other known exoplanet. This is due to two factors: its extreme proximity to its host star, and the fact that this star is hotter than the Sun. The planet is so bloody hot that metals like iron and magnesium are in vapour form in its atmosphere.

https://www.livescience.com/66090-heavy-metal-hot-football-exoplanet-jupiter.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20190803-ls

Astronomy-related images and video clips on the Internet

Magical images of the Perseid meteor shower over the years.

<https://www.msn.com/en-za/news/weather/magical-images-of-the-perseid-meteor-shower-over-the-years/ss-BBv4d7g?ocid=spartanntp&pfr=1#image=10>