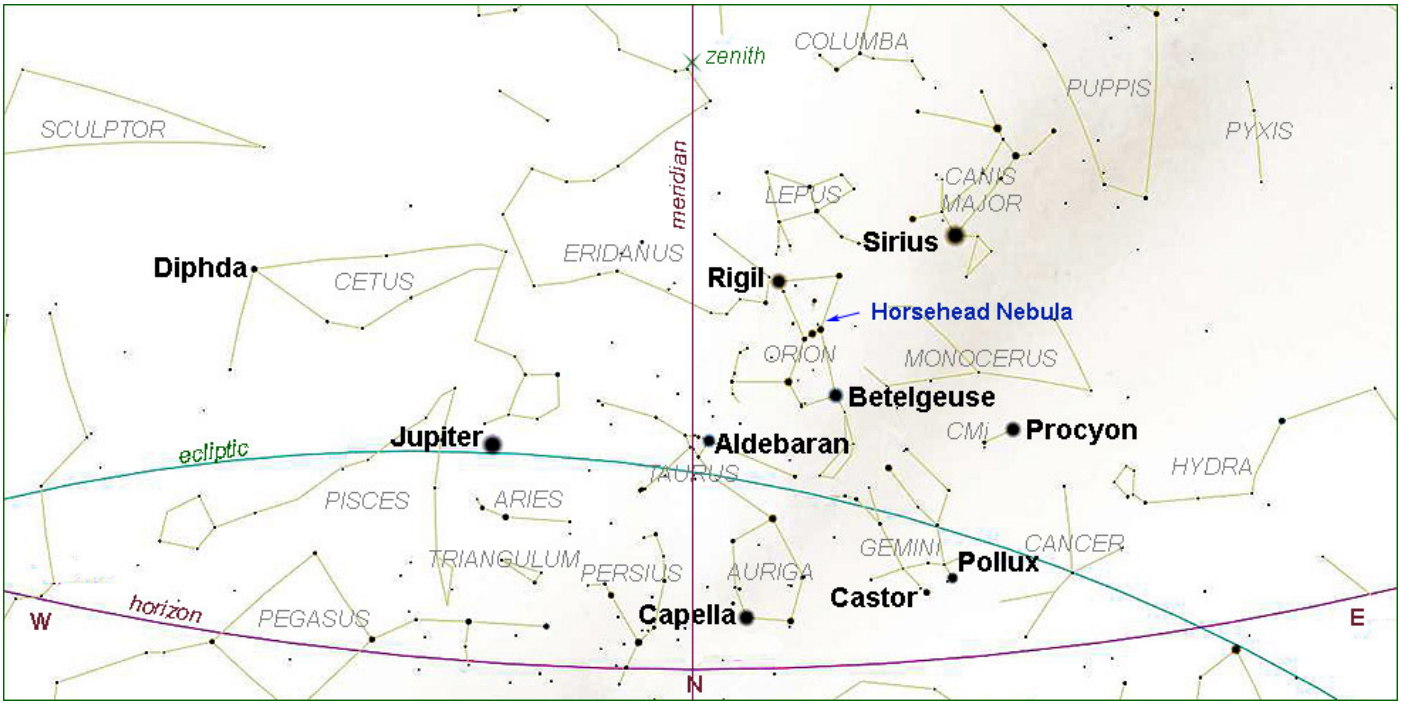
SKYNOTES from Hermanus

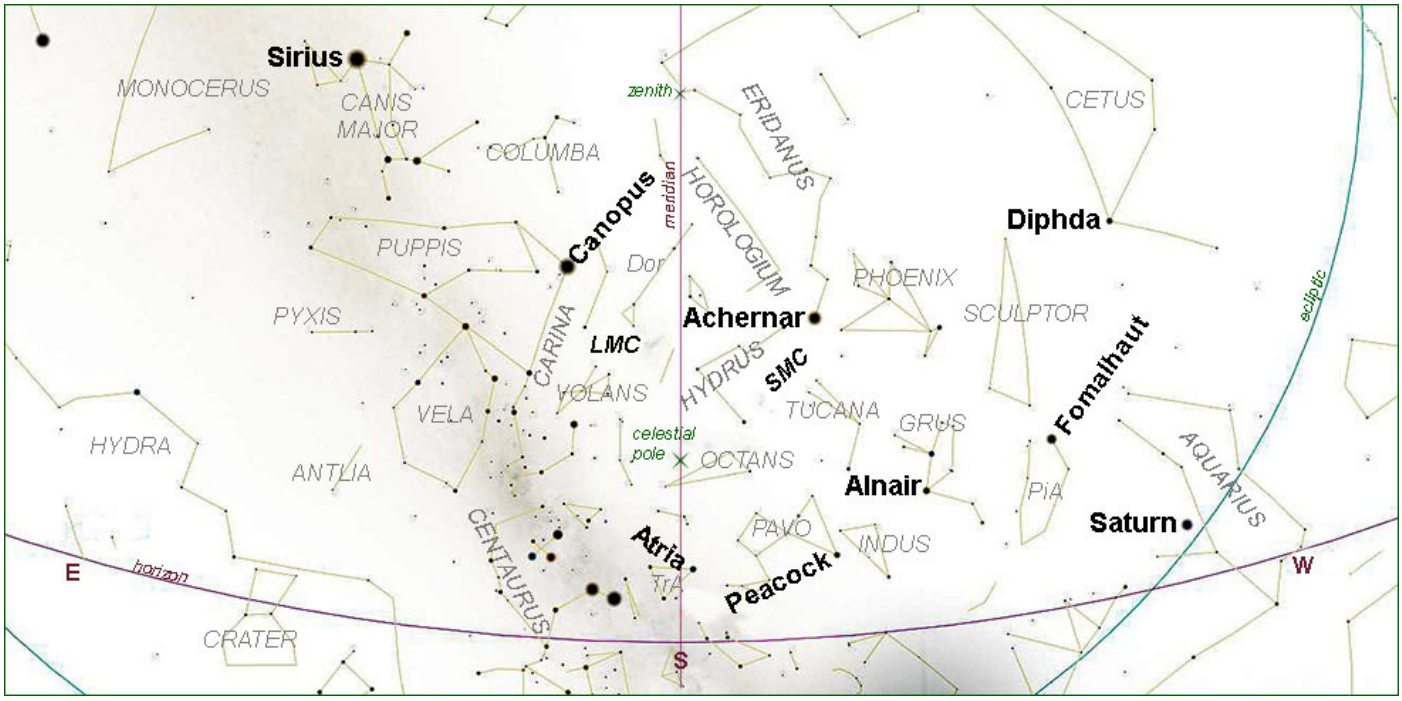
JANUARY 2024

SKY CHARTS

EVENING SKY JANUARY 8th at 22h00 (NORTH DOWN)



EVENING SKY JANUARY 8th at 22h00 (SOUTH DOWN)



THE SOLAR SYSTEM

PLEASE NOTE: all events are as predicted from **HERMANUS**, Western Cape, South Africa.

HIGHLIGHTS for JANUARY FROM THE SKY GUIDE 2024

Date	*Time (SAST)*	*Item*
1	17h28	**Moon** at apogee (404 911 km)
2		**Mercury** stationary
3		**Venus** within the **Blue Horsehead nebula** (IC4592)
	02h39	**Earth** at perihelion (0.983 au)
4	05h30	**Last quarter Moon** and in descending node
8 & 9	12h00	**Moon** near **Venus** at noon
10	09h04	**Moon** southernmost (-28.2º)
11	13h57	**New Moon**
12		**Mercury** at western elongation (23.5º)
		Solstice on **Mars**
13	12h35	**Moon** at perigee (362 264 km)
14	22h00	**Saturn** leads **Moon** by about 5º (17 minutes) above the western horizon
15	22h30	**Moon** leads **Neptune** by 0.6º above the western horizon
17	16h05	**Moon** at ascending node
18		**First quarter Moon**
19	22h57	**Moon** passes 3.9º north-west of **Uranus**
20		**Moon** near **the Pleiades**
		Pluto at conjunction
23	05h44	**Moon** northernmost (+28.2º)
24	04h00	**Venus** within 2º of **Trifid** and **Lagoon** nebulae and lined up
	21h00	**Moon** passes 1º south-west of **Pollux** (β Geminorum)
25	19h54	**Full Moon** near **Beehive** (M44) cluster
27	21h18	**Moon** rises after **Regulus** (α Leo), separation 4.1º
27	04h26	**Mercury** and **Mars** rise together, separation 0.5º
		Uranus stationary
29	10h14	**Moon** at apogee (405 781 km)
30	03h38	**Venus** and **M22** cluster rise together, separation 1.5º
31	22h17	**Moon** in descending node

SUGGESTED EVENING OBSERVATION WINDOW

(Lunar observations notwithstanding)

Date		*Moon*	*Dusk end*
1st January	*Rises*	**23h36 (77%)**	**21h23**
14th January	*Sets*	**22h29 (12%)**	**21h37**

SOLAR SYSTEM VISIBILITY

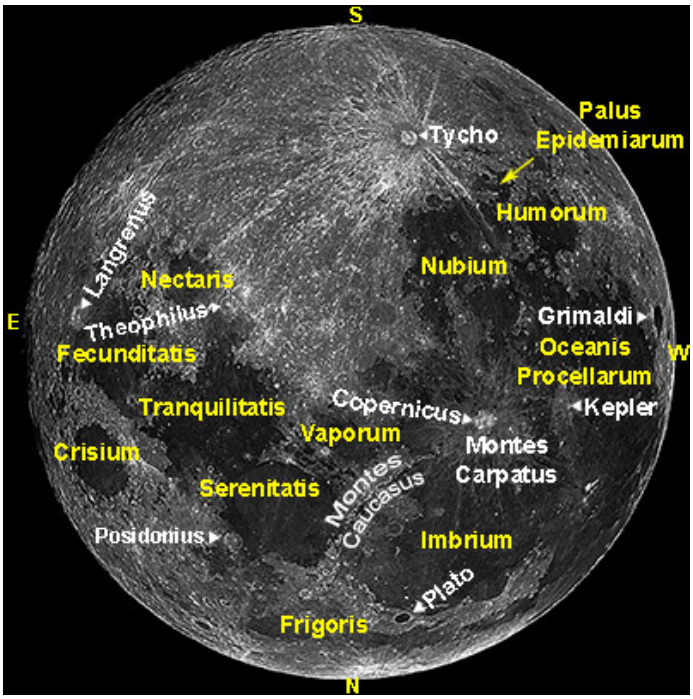
2023 JANUARY 8				*When and Where visible?*
Sun Length of day	Sagittarius 14 hours 20 minutes	Rise: Transit: Set:	05h40 12h50 19h59	**Never look at the sun without *SUITABLE EYE PROTECTION!***
Mercury Magnitude Phase Diameter	Ophiuchus -0.1 53% 7”	Rise: Transit: Set:	04h07 11h11 18h15	**Low in the east before sunrise**
Venus Magnitude Phase Diameter	Ophiuchus -4.0 80% 14”	Rise: Transit: Set:	03h12 10h15 17h18	**“The Morning Star”**
Mars Magnitude Phase Diameter	Sagittarius +1.4 99% 4”	Rise: Transit: Set:	04h32 11h46 19h00	**Low in the east before sunrise**
Jupiter Magnitude Diameter	Aries -2.5 43”	Rise: Transit: Set:	14h20 19h47 01h18	**Evening**
Saturn Magnitude Diameter	Aquarius +0.9 16”	Rise: Transit: Set:	09h24 15h58 22h32	**Evening**
Uranus Magnitude Diameter	Aries +5.7 4”	Rises: Transit: Set:	15h26 20h39 01h56	**Evening**
Neptune Magnitude Diameter	Pisces +7.9 2”	Rise: Transit: Set:	11h07 17h17 23h27	**Evening**
Pluto Magnitude	Capricornus +14.5	Rise: Transit: Set:	06h33 13h42 20h52	**Low in the west after sunset**

Phase: In a telescope, the inner planets (Mercury, Venus and Mars) appear to us in phases, depending on the angle of the Sun’s illumination, as does the Moon. The **angular diameter** is given in arc seconds.

Transit: When an object crosses the **local meridian** it is said to ‘transit’. The local meridian is an imaginary line from the horizon directly north passing overhead through the *zenith* to the horizon directly south.

Magnitude: we are accustomed to hearing stars described in terms of ‘magnitude’. For example, the planet Jupiter at magnitude -1.8 is considerably brighter than the star Antares (in Scorpius) at +1.05. The scale is ‘inverse’; the brighter the object, the lower the number. A ‘good’ human eye on a clear night can see down to a magnitude of about +6.

THE MOON



Keeping the image (left) very basic hopefully allows us to memorise the main features, particularly the maria (in yellow).

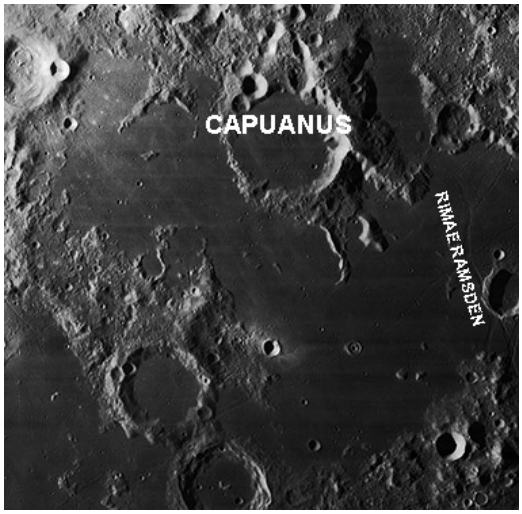
The Moon, given its close proximity, is arguably the most spectacular of all the solar system objects when viewed through binoculars or telescope. Without an atmosphere, there is no veiling of surface features.

The features of this month are the Moon itself, the ten maria, an "ocean" and a "marsh" and some of the most prominent craters, notably Tycho with its huge "splash". Note the ray extending all the way to the NNE through Mare Serenitatis.

Up to modern times, lunar drawings and photographs taken from the northern hemisphere, aided by a telescope (with inverted image), showed south at the top. However, modern convention, again from the perspective of the northern hemisphere, is to put north at the top (south down) and east to the right. So we in the southern hemisphere put south at the top (north down) with east to the left.

Mare Imbrium (Sea of Showers) is a vast lava plain within the Imbrium Basin and is one of the larger craters in the Solar System. The Imbrium Basin formed from a collision with a 250 Km proto-planet during the Late Heavy Bombardment. Basaltic lava later flooded the giant crater to form the flat volcanic plain we see today. The basin's age has been estimated at 3.9 billion years using uranium–lead dating methods. The Moon's maria (plural of mare) have fewer features than other areas of the Moon because molten lava pooled in the craters and formed a relatively smooth surface. Mare Imbrium is not as flat as once thought as later events altered its surface. A broad, shallow valley within the formation about 50 km north of Fra Mauro crater served as the site of the Apollo 14 manned lunar landing in February 1971. On two separate Moon walks, Apollo astronauts Alan Shepard and Edgar Mitchell collected samples of what was believed to be ejected rock. In later radiometric analysis back on Earth, this material was found to have been thermally shocked about 3.9 billion years ago, presumably by the cataclysmic event that created Imbrium.

Palus Epidemiarum (Marsh of Epidemics) is a small lunar mare in the south-western part of the Moon's near side. This feature forms a rough band of lava-flooded terrain that runs generally west–east, with a northward extension near the western end. It spans a shallow trough extending 300 by 120 km. The average thickness of the basalt is 200–250 m, with a maximum depth of 750 m. The feature lies to the southwest of Mare Nubium, and southeast of Mare Humorum.



This mare is notable for a system of rilles in the western end named the **Rimae Ramsden**, and for the wide **Rima Hesiodus** that extends from near the midpoint to the east-northeast roughly 300 Km. The flooded crater **Capuanus** occupies the southern centre of the Palus Epidemiarum and is attached to the southern edge. Near the western end is the flooded crater **Ramsden**, after which the Rimae Ramsden are named. The crater **Cichus** forms the eastern end of the mare.

The northern extension of the mare reaches the outer rims of the crater pair **Campanus** and **Mercator**. A narrow valley between these craters joins Palus Epidemiarum with Mare Nubium, and a rille from the Rimae Ramsden follows the course of this cleft. The small double-walled crater **Marth** lies at the southern midpoint of this northern extension.

The selenographic coordinates of this feature are 32.0° S, 28.2° W, and it is enclosed within a diameter of 286 km. Altimetry data from the Clementine spacecraft shows that this feature slopes downward from west to east, with a height difference of 2 Km from end to end.

Oceanus Procellarum (the Ocean of Storms) is a vast lunar mare on the western edge of the near side of the Moon. It is the only one of the lunar maria to be called an "Oceanus" (ocean), owing to its size. Oceanus Procellarum is the largest of the maria, stretching more than 2 500 km across its north–south axis and accounts for 10.5% of the total lunar surface area.

Like all lunar maria, Oceanus Procellarum was formed by ancient volcanic eruptions resulting in basaltic floods that covered the region in a thick, nearly flat layer of solidified magma. Basalts in Oceanus Procellarum have been estimated to be as young as one billion years old. Unlike the other lunar maria, however, Oceanus Procellarum may or may not be contained within a single, well-defined impact basin.

Around its edges lie many minor bays and seas, including **Sinus Roris** to the north, and Mare Nubium and Mare Humorum to the south. To the northeast, Oceanus Procellarum is separated from Mare Imbrium by the **Carpathian Mountains**. Prominent ray-crater **Copernicus** lies within the eastern edge of the mare, distinct with its bright ray materials sprawling over the darker material.

No eclipses, lunar or solar, will be visible from southern Africa in January 2024

METEOR ACTIVITY

No significant meteor showers are predicted for this month

* A word of caution regarding predicted Zenithal Hourly Rates:

ZHR is an ideal value. It is by definition the number of meteors a single observer could possibly see during a shower's peak with the radiant directly overhead on a clear, dark night. Most observers, however, will not see as many meteors as the ZHR suggests. Also, the presence of a bright moon can seriously diminish the observation of meteor activity.

For more meteor watching details, please see SGSA 2023, pages 86- 87.

MEMBERS' IMAGES

IMAGE COURTESY OF PETE SCULLY

The term "photography" was coined in the 19th century (correction here?) and borrowed from the French *photographie* meaning "drawing with light". And this is exactly what Pete has done. Deviating from the technical perfection of an astrophotograph, this has the feeling of a water colour painting depicting a horse's desperate efforts to find an escape from the fury of a storm at sea.

An artist's view of the story. A "one-off", Pete?

LOOKING UP

Stargazing events are notoriously subject to the vagaries of the weather and are necessarily scheduled at short notice.

Please consult our website for updates: http://www.hermanusastronomy.co.za

The Horsehead Nebula
Barnard 33

Description	Dark nebula	***Visibility on January 8th 2024***		
Constellation	Orion			
Distance	1 600 ly, 500 pc	*Rises*	*Transits*	*Sets*
Magnitude	Unknown	17h05	23h14	05h26
Apparent size	6.0 x 4.0 arcmin			
Actual size	2.8 ly. 0.9 pc	*Naked Eye*	No	
J2000 Dec/RA	-2°27'29.9" / 5h40m59.0s	*Binoculars*	No	
Alt/Az	+53°08'13.1" / 034°13'32.5"	*Telescopes*	Yes, but see notes below	

DISCOVERY AND HISTORY

The nebula was first recorded in 1888 by Scottish astronomer Williamina Fleming on a photographic plate taken at the Harvard College Observatory, although William Henry Pickering was officially credited with the Horsehead's discovery in 1889. The first published description of the nebula was given by **E. E. Barnard** in 1913, and was first catalogued as **Barnard 33** by him in 1919.

The **Flame Nebula** (NGC 2024) lies to the east of the bright star Zeta Orionis. The underside of the "neck" of the Horsehead is especially dark, and actually casts a shadow on the field below the "muzzle". The entire region is illuminated by the bright OB star Sigma Orionis, which is also responsible for ionizing the emission nebula IC 434. The much brighter Zeta Orionis is a foreground star, not related to the nebulosity.

AMATEUR OBSERVATION

A 300 mm reflector is probably the minimum you need to see this object from typical city skies, but smaller instruments may return a view of the nebula from darker sky locations. The use of a hydrogen-alpha (H-alpha) filter is also highly recommended. Also be warned, the visual images through amateur telescopes will not yield the rich hues depicted in the photograph to right. Only by chance does the dark nebula resemble the head of a horse but its coincidental appearance has led to its becoming one of the most photographed objects in the sky.

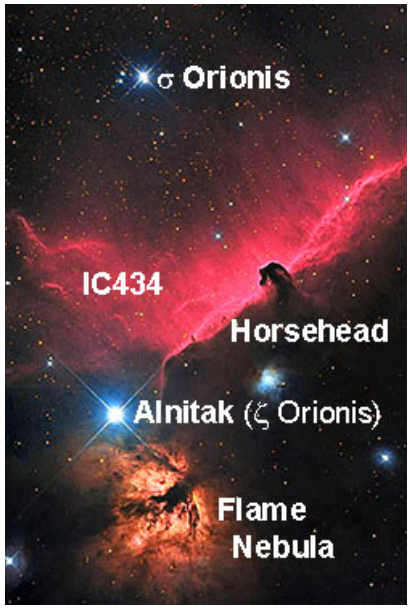


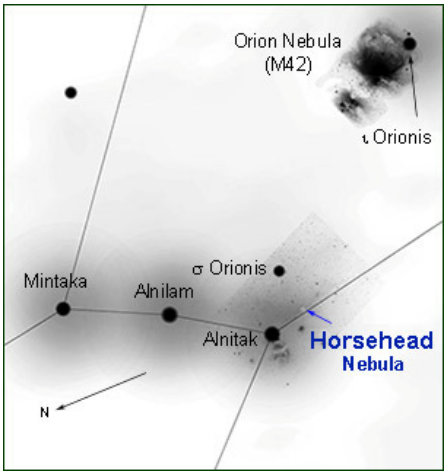
Image right- Horsehead, IC 434 and Flame nebulae imaged with a 384 mm telescope using an H-alpha filter

PROPERTIES AND STRUCTURE

Barnard 33 is the most interesting feature of a huge region of gas and dust situated 1 600 light years away in the constellation Orion, prominent in the summer evening sky in the Southern Hemisphere. The dark cloud of dust and gas is a region in the Orion molecular cloud complex where star formation is taking place. Images reveal a deep-red colour that originates from the ionised hydrogen gas (Hα) of IC 434 nebula, predominantly behind Barnard 33, and caused by the nearby bright star Sigma Orionis. Magnetic fields channel the gases, leaving the nebula in streams shown as foreground streaks against the background glow. A glowing strip of hydrogen gas marks the edge of the enormous cloud and the densities of nearby stars are noticeably different on either side.

Heavy concentrations of dust in the Horsehead Nebula region and neighbouring Orion Nebula are localized into interstellar clouds, resulting in alternating sections of nearly complete opacity and transparency. The darkness of the Horsehead is caused mostly by thick dust blocking the light of stars behind it. The lower part of the Horsehead's neck casts a shadow to the left. The visible dark nebula emerging from the gaseous complex is an active site of the formation of "low-mass" stars. Bright spots in the Horsehead Nebula's base are young stars just in the process of forming.

This narrow patch of nebulosity extends a degree south of the bright star Zeta Orionis (Alnitak), the easternmost star in Orion's Belt. Amateur astronomers often use the Horsehead as a test of their observing skills; it is one of the more difficult objects to see visually in an amateur-sized telescope, requiring dark skies with excellent transparency.



The Horsehead is best seen in long exposure photographs as a dark 4' x 6' notch against the 60' strip of faint nebulosity that is IC 434.

The marked change in star density on either side of IC 434 indicates that this strip of glowing hydrogen marks the edge of a substantial dark cloud. As a cloud core emerging from its parent, and as an active site of low-mass star formation, the Horsehead is a fascinating, active, and complex neighbourhood. The 'streamers' visible in the brighter region appear to outflowing matter, funnelled by a strong magnetic field. Small red spots in the Horsehead Nebula's base are protostars in the process of forming, and red streaks near the yellowish nebula surrounding V615 Orionis are Herbig-Haro objects, which are jets of material ejected from protostars.

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Please keep in touch...

Have a look at our excellent website, edited by Derek Duckitt.

http://www.hermanusastronomy.co.za/

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