Astro SG

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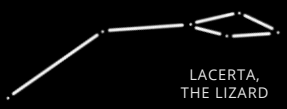

LACERTA,
THE LIZARD

ASTRO DIGEST

BLIZZARD ON PLUTO?!

PLUTO RETURNS TO THE SPOTLIGHT—HARBINGER OF GLOOM, OR GLIMMER OF HOPE?

TINY YET IMPACTFUL

UNCOVER THE HIDDEN WONDERS OF THE NIGHT SKY, WHERE FORGOTTEN CONSTELLATIONS HOLD CELESTIAL SECRETS!

MARTIAN MYSTERIES

DISCOVERIES ABOUT THE MARTIAN SURFACE SPARK CURIOSITY AND CREATES A SHROUD OF MYSTERY AROUND THE RED PLANET!

TRIVIA

BECAUSE THE UNIVERSE LOVES TO KEEP US GUESSING!

EVENTS & STARGAZING

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BLIZZARD ON PLUTO

Something big is unfolding on Pluto. Among the signs is the onset of a planet-wide snowstorm that dwarfs anything we see here. Could this be a cataclysm in the making, or does the phenomenon hold deeper secrets?

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TINY YET IMPACTFUL

Delve into the forgotten stories and hidden wonders of the night sky, from Norma's celestial precision to the intriguing gaps that shaped constellations as we know them!

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MARTIAN MYSTERIES

Over the course of 2024, two groundbreaking discoveries about Mars have resulted in scientists questioning what they truly know about the red, dusty planet, as well as confirming a long suspected mystery!

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TRIVIA, EVENTS & STARGAZING

Get ready to explore cosmic wonders with our latest trivia, upcoming events, top stargazing locations and sky objects—your ultimate guide to the night sky!

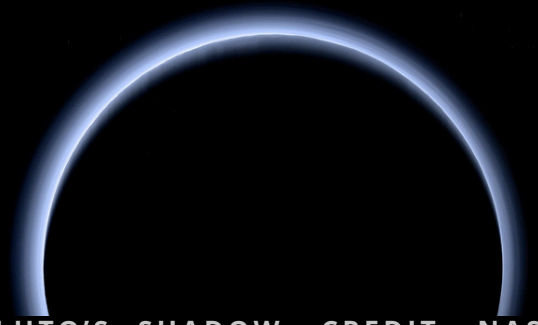
BLIZZARD ON PLUTO

Picture this: You're a planet chilling by yourself far away from the Sun in your quiet, icy neighborhood. Meanwhile, some stray Earth dwellers have demoted your status from planet to dwarf planet some years back, and are now claiming you are about to lose your atmosphere too! That's right, ill-fated Pluto has once again entered the crosshairs of the astronomy community. Since 1988, scientists have been monitoring Pluto's surface characteristics using spectroscopic data from Pluto-background star occultations. They have observed its pressure to be increasing at a decreasing rate, in line with models that indicate a trend that shows its atmosphere is about to fully recede soon. We will now study the cause behind this unique phenomenon.

PLUTO. CREDIT: NASA JPL
This iconic photo taken by New Horizons shows a varied landscape, replete with a heart-shaped region of frozen nitrogen and large patches of orange-brown sediment. The latter is constitutes of tholins,

Basics of Pluto

Pluto is a dwarf planet located in the outer reaches of the solar system within the Kuiper belt. For comparison, its average distance from the Sun is approximately 39 times that of Earth! Its mass is a meager 2 tenths of the Earth. Similar to Earth, its atmosphere is composed mainly of nitrogen, with trace amounts of methane and carbon monoxide. Unlike our home planet, however, Pluto's atmosphere is so thin that it barely clings to the dwarf planet's surface, forming a fragile envelope that can and will collapse very soon. Even Mars' thin atmosphere is 2000 times the pressure of that on Pluto!

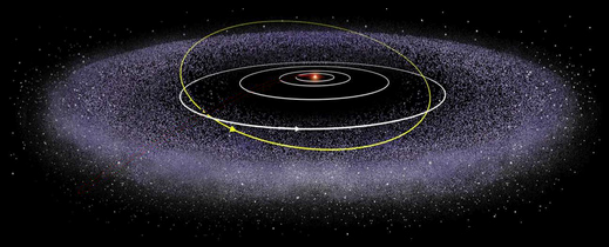


PLUTO'S SHADOW. CREDIT: NASA JPL
In this silhouette of Pluto, its atmosphere is clearly visible in its refraction of the Sun's light. It is coincidentally at its thickest it will ever be, as we will soon see.

Pluto's orbit

Key to understanding the collapse of Pluto's atmosphere is its unique orbital trajectory, as shown in the following figure.

BLIZZARD ON PLUTO



PLUTO'S ORBIT. SOURCE: NASA JPL
Pluto's orbit is both highly eccentric and inclined to the plane of the solar system, making an angle of 17 degrees with respect to the solar system.

Unlike the 8 planets, whose orbits are more or less circular, Pluto's orbit is highly elliptical, with an eccentricity of 0.25. As a reminder, eccentricity is a measure of how "squished" an orbit is. This also means that the distance between it and the Sun varies greatly in its 248 year orbit; it is roughly twice as far at its farthest point than its closest point. To us Earth dwellers, this difference would probably seem meaningless, since it is frigidly cold on Pluto regardless of its orbital distance; cold at perihelion and colder at aphelion! Specifically, 38K and 24K, respectively.

This temperature variation is key to the phenomenon, as will soon become clear if you have not already figured it out. Pluto's atmosphere is supported by an equilibrium relationship between the nitrogen ice on its surface (the white blotches you see in its pictures) and the nitrogen gas constituting its atmosphere. In other words, a small temperature change will affect the rate of sublimation and deposition of nitrogen. Intuitively, an increase in surface temperature will increase the amount of nitrogen gas, and therefore the surface pressure and *vice versa*.

$$N_2(Solid) \leftrightharpoons N_2(Gas)$$

Currently, Pluto happens to be about 35.9AU which is nearer its perihelion (29.7AU) than its aphelion (49.3AU). In other words, its temperature is decreasing as it is heading farther from the Sun causing the solid-gas equilibrium point to shift left in the equation shown above. And therefore, herein lies the explanation - Pluto is going into winter! Except, its winter is far more drastic than that for us terrestrials, given that Pluto's winter heralds a complete recession of its atmosphere.

<u>Consequences</u>
The consequences of this atmospheric collapse will be substantial, as the entire dwarf planet's surface is expected to be covered in a layer of nitrogen "snow," causing its albedo, and thus brightness as seen from Earth,

BLIZZARD ON PLUTO

to significantly increase. This is especially the case since currently large portions of Pluto's surface are coated with tholins; dark-coloured complex organic compounds formed by the interaction of cosmic rays with simple carbon-containing compounds. These dark-coloured compounds, seen in the first image of Pluto above, which are suppressing its albedo, would get buried under deposited bright, white nitrogen ice.

An interesting observation

While the general trend of Pluto's atmosphere freezing as it goes farther from the Sun makes intuitive sense, some of you may find it interesting that this process has only just started, i.e., much after Pluto left its perihelion point. In other words, the atmosphere continued to thicken, even though Pluto was already on its way away from the Sun, when it already started receiving less solar radiation. A simple analogy would sort out this curiosity, as was eloquently described in Modern Sciences' article on this phenomenon - this phenomenon is likened to how sand on a beach stores the heat from the Sun until much after its peak at noon, making it the hottest during late afternoon. Similarly, Pluto's solid nitrogen stores the heat until much after its perihelion point when it receives maximum solar radiation, causing it to continue sublimating until the nitrogen deposits reach maximum temperature. This results in a delay between the perihelion point and the maximum surface atmospheric pressure achieved on Pluto.

Is it gone forever?

If this news has left some of you morose, fret not, as Pluto's atmosphere is due for a comeback in 200 or so years, as its surface temperatures start to rise as Pluto makes its way back to the Sun from its aphelion point. Extrapolating, we can quickly realise that this occurrence is cyclical, albeit a very slow cycle indeed!

In other words, we are extremely lucky to be observing Pluto right as its atmosphere peaks, given this will happen only after about 248 years!

For all the Pluto lovers out there who begrudge its demotion back in 2006, fret not, as this discovery will certainly reinforce its relevance and put it back into the limelight in the coming years.

TINY YET IMPACTFUL

The night sky is adorned with 88 officially recognised constellations, each with its own unique story to tell. While some, like Orion and Ursa Major, are household names, others remain less familiar but still offer rich histories. In this article, we explore six such constellations: Monoceros, Lacerta, Norma, Mensa, Hydrus and Lynx.

Monoceros (The Unicorn)

Monoceros, Latin for “unicorn” (mono - “only one,” ceros - “horn”), is a faint constellation situated on the celestial equator. Introduced in the early 17th century by Dutch cartographer Petrus Plancius, it was created to fill the gap between the prominent constellations Orion and Hydra. Creating such a constellation was not only for practical reasons, such as completing the cartographic map of the night sky for timekeeping and navigation, but also to expand the mythological and thematic diversity of the constellations. Namely, one must realise that constellations are not merely labels, but also tell a rich and complex story, often illustrating the culture of the ones who created them.

MONOCEROS, RELATIVE TO ORION AND HYDRA. SOURCE: STELLARIUM

From this Stellarium depiction, it becomes abundantly clear that monoceros fits snugly between Hydra (below) and Orion (top). In olden-time navigation, having abundant mnemonics to orient oneself using the night sky was crucial for seafaring explorers.

TINY YET IMPACTFUL

Despite its lack of bright stars, Monoceros hosts several notable deep sky objects, such as the Rosette Nebula and the open cluster Messier 50.

A SMORGASBORD OF DSOS. SOURCE: STELLARIUM
Numerous DSOs fill the night sky in and around Monoceros. While many of these are part of the constellation as they are not within IAU's constellation boundaries, there's the breathtaking Rosette Nebula, which Monoceros is iconic for.

ROSETTE NEBULA. SOURCE: ESA
The beautiful Rosette Nebula, named as such for its rose-shaped structure of gas and dust, is a popular target for astro-photographers in the northern hemisphere.

Lacerta (The Lizard)

Defined in 1687 by Polish astronomer Johannes Hevelius, Lacerta is another tiny obscure constellation in the northern sky. One way to trace it would be to start at the iconic "W" shaped Cassiopeia and trace the path along the 2 base stars constituting the larger of the two "v" making up Cassiopeia. Lacerta would be about 3 base lengths from the edge of Cassiopeia (see image on next page).

TINY YET IMPACTFUL

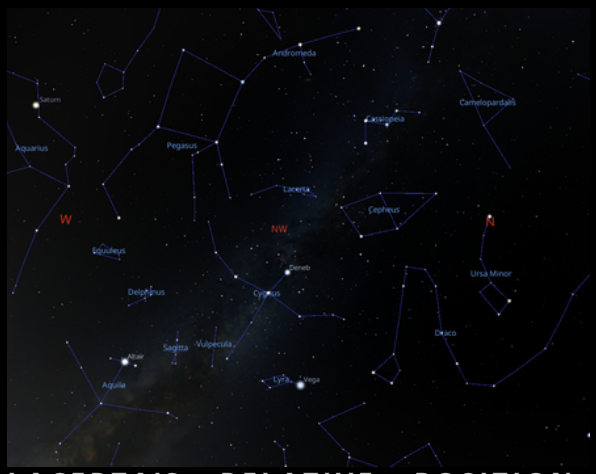
How to locate it

LOCATING LACERTA. SOURCE: STELLARIUM
Finding Lacerta may be tricky for first-timers, but its shape is relatively easy to remember.

Lacerta's brightest stars form a "W" shape, earning it the nickname "Little Cassiopeia."

LACERTA. SOURCE: STELLARIUM
Can you spot the W?

Located between Cygnus, Cassiopeia, and Andromeda, Lacerta contains several interesting variable stars and is traversed by the Milky Way, making it a region rich in star fields. One such example would be C16/NGC7243, a small open cluster about 2800 light years away.



LACERTA'S RELATIVE POSITION. SOURCE: STELLARIUM
Lacerta is located along the belt of the Milky Way, and is thus bound to hold many interesting DSOs.

Norma (The Level)

Norma, Latin for "the level" or "carpenter's square," is a modest constellation in the southern hemisphere. Introduced by French astronomer Nicolas-Louis de Lacaille in the 18th century, it represents a draughtsman's set square.

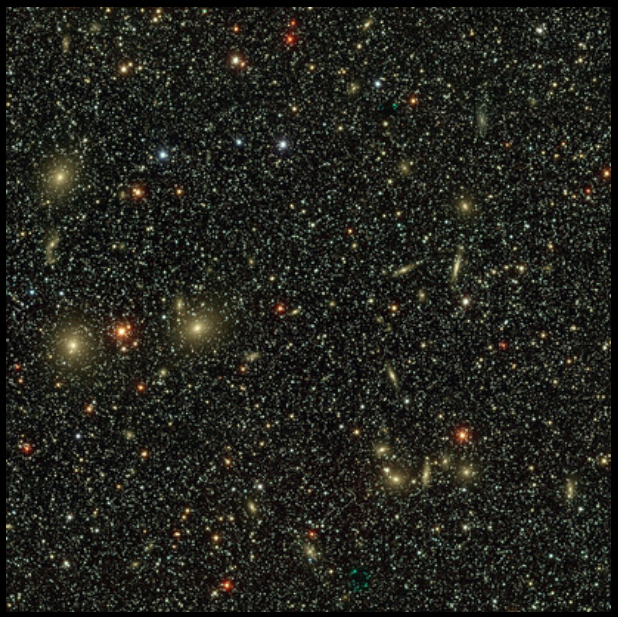
How to locate it

First, locate the tail of Scorpius and the 2 bright stars Hadar and Rigil Kentaurus of Centaurus. Then, trace to the midpoint of these 2 regions, which would be Norma (see image on next page).

TINY YET IMPACTFUL

LOCATING NORMA. SOURCE: STELLARIUM
Find the midpoint of these 2 regions, which would place you at Norma.

Owing to its position along the disc of the Milky Way, Norma is home to several notable deep-sky objects, including the Norma Cluster, a rich galaxy cluster, and part of the Great Attractor.



NORMA CLUSTER. SOURCE: WIKIMEDIA
The Norma Cluster, composed of the various elliptical galaxies in the background, happens to be a cluster of great research interest due to its connection to the Great Attractor

The Norma Cluster is located in the Zone of Avoidance, which is a region of the sky pointing toward the disc of the Milky Way which holds the bulk of the galaxy's stars. In this region, it is difficult to study distant galaxies since the heavy presence of stars and interstellar gas would obscure light from these faraway galaxies. Due to these reasons, there are countless foreground stars from the Milky Way's disc that happen to be "photobombing" this image.

The Great Attractor is a gravitational anomaly influencing the motion of galaxies over a region hundreds of millions of light-years across.

FINE RING NEBULA. SOURCE: APOD
Another DSO within Norma would be the purple-hued Fine Ring Nebula (Shapley 1), a planetary nebula believed to have formed about 8700 years ago.

TINY YET IMPACTFUL

Mensa (The Table Mountain)

Named after Table Mountain in South Africa, Mensa is a faint constellation in the southern sky, also introduced by Lacaille. It holds the distinction of being the only constellation named after a geographical feature.

THE TABLE MOUNTAIN. SOURCE: WIKIMEDIA

Located in Cape Town, this mountain is an iconic landmark due to its flat-topped topography. One can quickly see how it maps over to the constellation!

MENSA. SOURCE: STELLARIUM

The Large Magellanic Cloud can prominently be also be seen here.

How to locate it

Mensa is located in the middle of various other less known constellations. It is located between the beta star for Carina, Miaplacidus, and Eridanus' alpha star Achernar.

LOCATING MENSA. SOURCE: STELLARIUM

Achernar and Miaplacidus can be seen in the top left and bottom right of this photo, respectively.

Mensa is notable for containing part of the Large Magellanic Cloud (LMC), a satellite galaxy of the Milky Way, making it of particular interest to astronomers studying galactic structures. This is especially because LMC has countless deep sky objects, such as the extremely active Tarantula Nebula. The latter, however, is located in the neighbouring constellation Dorado, because the LMC itself is at the boundary between Mensa and Dorado.

LARGE MAGELLANIC CLOUD. SOURCE: ESO

The Large Magellanic Cloud is a satellite galaxy of the Milky Way and is among the closest galaxies to ours.

TINY YET IMPACTFUL

TARANTULA NEBULA. SOURCE: NASA
The Tarantula Nebula, located very near Mensa and situated in LMC, has been found to be the most active star-forming region known in the entire Local Group! Unsurprisingly, it's home to R136a1, one of the most massive and luminous stars known.

Hydrus (The Male Water Snake)

HYDRUS. SOURCE: STELLARIUM
The near right angles of the stars making up Hydrus make it one of the easier lesser known constellations to find.

Not to be confused with the larger Hydra, Hydrus is a small constellation in the southern sky, representing a water snake. It was introduced by Dutch navigators Pieter Dirkszoon Keyser and Frederick de Houtman in the late 16th century.

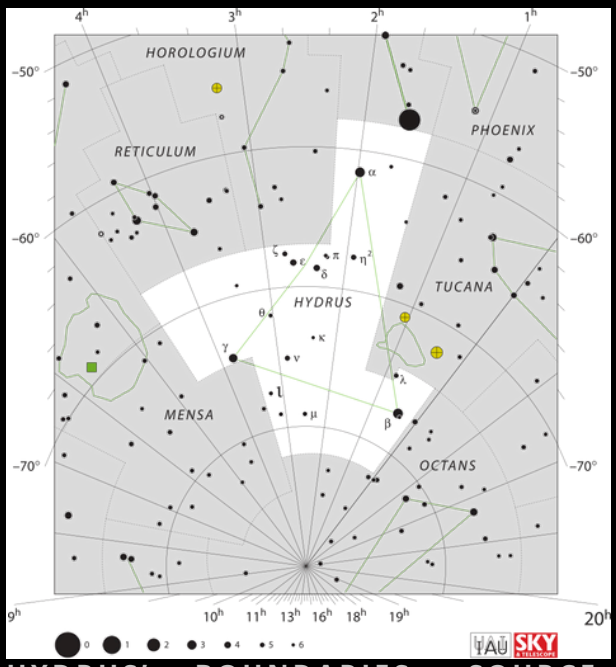
How to locate it

While it is one of the smaller constellations, its shape makes it relatively easy to find in the night sky. Once bright blue Achernar of the neighbouring constellation Eridanus is found, Hydrus can be found based on its iconic shape. For example, try to find it in the following image.

LOCATING HYDRUS. SOURCE: STELLARIUM
A fun challenge!

Hydrus contains the star Beta Hydri, one of the nearest bright stars to the Sun, and is located near the south celestial pole, making it a useful marker for southern hemisphere observers. While it's easy to mistake the Small Magellanic Cloud as being a part of this constellation, it is actually in neighbouring Tucana due to IAU's defined constellation boundary for it, as seen on the next page.

TINY YET IMPACTFUL



HYDRUS' BOUNDARIES. SOURCE: WIKIMEDIA
From this, it is clearly visible that SMC falls outside of Hydrus' boundary.

Consequently, unlike the other constellations in this article, Hydrus does not have any Deep Sky Objects that are visible through amateur telescopes.

Lynx (Literally, The Lynx)

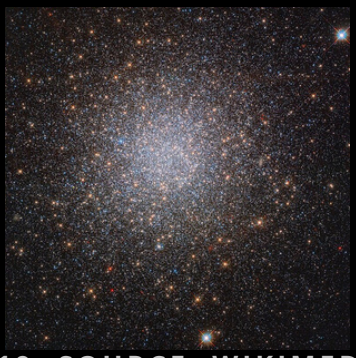
AN ACTUAL LYNX. SOURCE: WIKIMEDIA
This genus of cats live primarily in the northern latitudes.

Lynx is a faint constellation in the northern sky, introduced by Polish astronomer Johannes Hevelius in the 17th century. He named it Lynx because observing its stars requires the eyesight of a lynx.

LOCATING LYNX. SOURCE: STELLARIUM
The Great Bear stares on at the cat in concern.

<u>How to locate it</u>

Locating Lynx is fairly easy, as it is right in front of Ursa Major the Great Bear. Alternatively, follow the direction of the Big Dipper, and stop before you reach the bright star Capella. This would place your field of view within the vicinity of Lynx. Despite its faintness, Lynx contains several interesting objects, such as the globular cluster NGC 2419.



NGC 2419. SOURCE: WIKIMEDIA
This globular cluster is also known as the "Intergalactic Wanderer" due to its great distance from the Milky Way's centre.

MARTIAN MYSTERIES

Mars continues to amaze, revealing secrets that spark both scientific curiosity and dreams of alien life. Two groundbreaking discoveries have reshaped our understanding of the Red Planet: dry-ice-driven gullies and evidence of liquid water hiding deep beneath its surface.

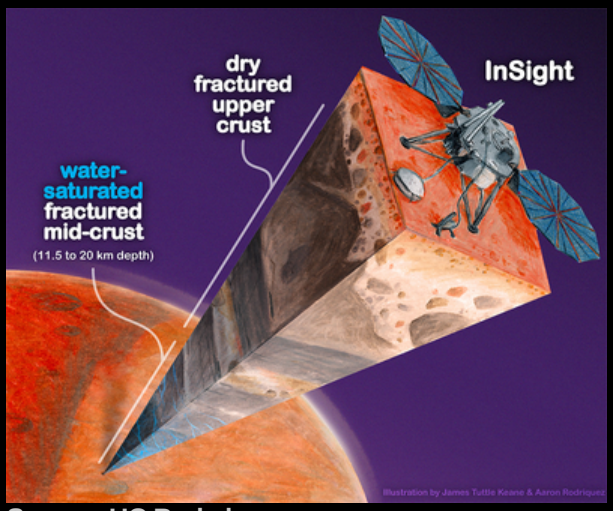
Mars' Gullies: When Dry Ice Steals the Show

Move over, water—CO_2 is the new sculptor on Mars! Recent research proves that gullies on the planet's surface aren't the result of water flows, but dry ice (frozen CO_2) sublimating into gas. When the seasonal frost of dry ice meets a little heat, it creates powerful gas flows that fluidise sediment, carving the gullies we see today. Using a Martian flume setup, scientists mimicked these processes and observed fast-moving flows and lobe-like deposits eerily similar to Martian features.

Why does it work on Mars? The planet's low atmospheric pressure makes CO_2 sublimation incredibly potent, reducing sediment friction and fuelling long-distance flows. It's a geological magic trick—no water required! But what about the past? This discovery suggests that Mars' modern gullies might not indicate liquid water, upending theories about its habitability.

Deep Beneath the Surface: Liquid Water Found!

Just when you think Mars has gone all dry ice, seismic data reveals a shocking twist: liquid water still exists on the planet, hidden deep underground. By analysing over 1,300 earthquakes detected by NASA's InSight lander, scientists found seismic signals from water reservoirs located 10–20 kilometres below the surface.



Source: UC Berkeley

A cutout of the Martian Interior. The new study provides evidence for a fractured rock section 11.5km to 20 km below the Martian surface.

Planetary scientist Lonneke Roelofs explained that this water could have seeped underground billions of years ago during Mars' wetter days. The discovery has huge implications for the potential of life on Mars—not the big, splashy kind (no Martian whales here), but microscopic life clinging to fractures in rocks.

MARTIAN MYSTERIES

Roelofs called it the “holy grail” of planetary science, adding that finding liquid water is a huge step forward in understanding Mars’ past and present habitability. The reservoirs could hold enough water to fill a global ocean 1–2 kilometers deep, a mind-boggling thought for a planet with a surface as barren as Mars’.

The Role of Seismic Science: A Red Planet Detective

How exactly did scientists find this water? Enter seismic science, Mars-style. The InSight lander spent years listening to the planet’s earthquakes—over 1,300 of them. By analysing how seismic waves travel through different materials, researchers identified liquid water beneath the surface. It’s like using sonar to map the ocean floor, only here, the “ping” revealed hidden reservoirs of water.

Seismic science has proven invaluable in unraveling Mars’ mysteries, from mapping its crust to hinting at a molten core. This method could even help find other water reservoirs across the planet, expanding our understanding of Mars’ complex geology.

Deep Beneath the Surface: Liquid Water Found!

Mars’ Double Act: What It All Means

With gullies fuelled by dry ice and water reservoirs hidden deep below, Mars proves it’s a planet of extremes. The dry-ice gullies hint at a current surface shaped by sublimation and low-pressure theatrics, while the underground water reservoirs suggest Mars may still harbor the building blocks of life.

The challenge now? How to explore these water reservoirs without letting the thin atmosphere steal it away. Roelofs warns that drilling into the subsurface could cause the water to evaporate before we can study it, thanks to Mars’ near-vacuum conditions. Still, the discovery keeps hope alive for uncovering small life forms—think bacteria, not Martian goldfish.

The Bigger Picture

Beyond Mars, these findings could reshape how we study other icy worlds, like Europa or Pluto, where similar conditions might exist. Dry ice and hidden water may be common sculptors in the solar system, hinting at a universe filled with surprises waiting to be discovered.

For now, Mars keeps the spotlight, a dry-ice artist with a hidden ocean, challenging us to rethink what it means to search for life beyond Earth.

TRIVIA

Welcome to the Trivia! Here, we will include interesting facts and problems that we have curated for you, the reader.

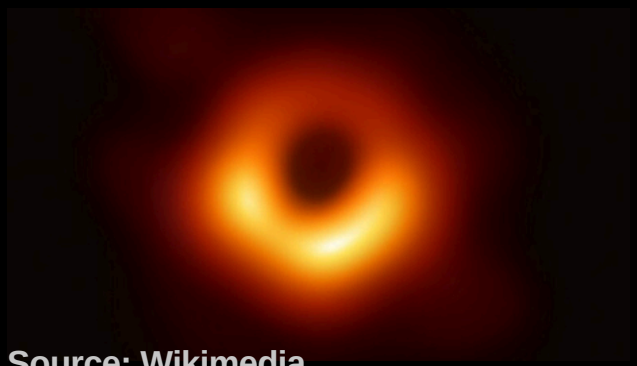
The answers to the problems can be found in the next newsletter, but for now, we hope you'll enjoy this new segment!

Problem I
Locate Pleiades (M45)

Source: Stellarium

Problem II
Is it really true that elements heavier than carbon cannot form in solar-mass stars? Let's go even deeper. Can elements heavier than iron form in solar-mass stars?

Fun-Fact-of-the-Month:
Black holes hold most of the entropy in the universe. While fully understanding this requires knowledge of quantum field theory, an intuitive explanation is as follows: when matter enters a black hole, all of its information appears to be 'destroyed' from the perspective of outside observers. However, in reality, this information is transferred to the surface of the black hole, ensuring it is not lost. To obey the second law of thermodynamics —and because the infalling matter effectively "loses" all its information except for mass, charge, and angular momentum —the entropy on the surface must exceed the maximum possible entropy of the infalling matter. This leads to the black hole entropy being astronomically high.
(Reference: link)



Source: Wikimedia

ANSWERS FOR THE PREVIOUS NEWSLETTER

Problem I

Problem II

Using binding energies for deuterium and helium-3, we simply get

7.718058 MeV - 2.22457 MeV = **5.493488 MeV**

EVENTS AND STARGAZING

Leavitt Lectures sign-ups!

Given the new IOAA advisory regarding increasing inclusivity in future team selections as well as the low percentage of female participation in the Singapore Astronomy Olympiad, Astronomy.SG will comply by organising special lectures available for girls only to attend.

Details of the Lectures are as follows, with further information available after signing up through the form below.
First lecture: 15 December (Sunday)
Last Lecture: 2 March (Sunday)
Held from 7:00 - 9:30 p.m.

Though the Lectures have already started, feel free to sign up for the rest of the sessions.

Female participants of the 2025 SAO can register interest via this link: https://tinyurl.com/leavitt-lectures

For more details, feel free to email fish@astronomy.sg

We look forward to seeing you there!

CELESTIAL: Light to Night at ACM
Festival dates: 17 Jan – 6 Feb 2025
Stargazing sessions: 18 Jan, 25 Jan, 1 Feb (Saturday) 8-10pm
Venue: Asian Civilisations Museum

Programme highlights
🌌 Explore Celestial Wonders: Step into a world of light and reflections with immersive outdoor art installations
🎶 Beans & Beats at ACM: Sip specialty brews, groove to live DJ sets, and snap a creative photo of a pagoda to redeem a free coffee! Terms and conditions apply.
🎭 Vibrant Performances: Enjoy an illuminated dragon dance, live getai music, and dramatic Chinese opera.
🏛️ Special Exhibition & Free Entry: Don't miss Pagoda Odyssey 1915: From Shanghai to San Francisco, with free admission on selected dates (17, 18, 24, 25, 31 Jan & 1 Feb, 6:00 - 10:00 p.m.).

For more details, stay tuned at https://go.gov.sg/celestial.

EVENTS AND STARGAZING

Inaugural SAND Bingo Challenge

Join us for another round of our astrophysics-themed Bingo, where you can take on challenges and help your school collect points. With SAND 2025 still more than half a year away, there's still time to complete as many challenges as possible and aim for stellar prizes! The Bingo Challenge is still live on our Discord channel—come join the fun! Not sure how to enter? Just drop us an email/message and we'll get back to you!

Please note: This event is only eligible for secondary and tertiary schools that are open to participate in SAND 2025.

Featured Stargazing Location: Bishan Ang Mo Kio Park

Escape the city lights without leaving the heartlands at Bishan-Ang Mo Kio park, a sprawling green open space suitable for stargazing. As one of Singapore's largest parks, its open spaces provide ample room to lay down a blanket, set up a telescope, or simply gaze at the night sky. While light pollution is still a challenge, clear evenings do reveal countless celestial objects including an array of DSOs. Gather your friends for an enchanting night under the stars in this urban sanctuary!

BISHAN-AMK PARK.
This expansive green open space has countless ideal spots for you to set up your stargazing gear and peer into the night sky.

EVENTS AND STARGAZING

January's skies offer a new chapter of the celestial sphere. As the cloud cover gradually recedes, January offers crisp skies perfect for stargazing. As we step into the new year, spend a few minutes staring outside your window at the wonders the universe has to offer.

Free-hand stargazing

- **The Lost Jewel of Orion (NGC 1980).** While most of us know about the Orion Nebula, The Lost Jewel of Orion enjoys lesser prominence. This open star cluster, located in close proximity to Orion Nebula itself happens to be quite bright. In fact, you often end up looking at this star cluster much before you spot the nebula itself! This is largely because ι Orionis, Orion's 8th brightest member, hails from this star cluster.

- **Pleiades (M45).** Also known as the Seven Sisters, this active open star cluster hardly needs an introduction. Its name originates from Greek culture, where it refers to the seven daughters of the ocean nymph Pleione. Even from our light-polluted skies, Pleiades happens to be relatively easy to spot.

Source: Wikimedia


Source: Wikimedia

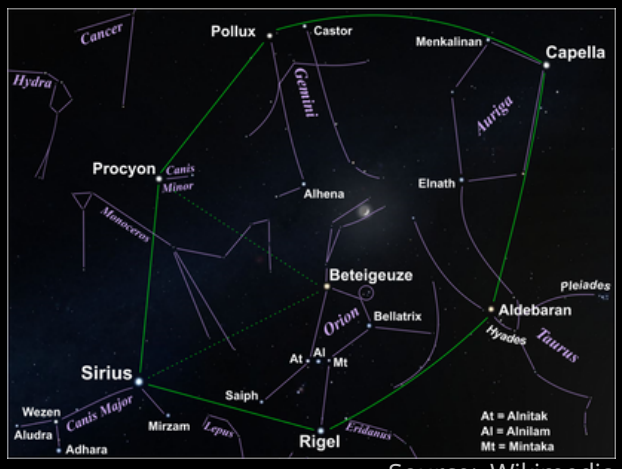
EVENTS AND STARGAZING

Free-hand stargazing (Cont'd)

- **ω Centauri.** Omega centauri has previously made a showing in our newsletter, but as a binocular-type object. However, we recently (and anecdotally) found out that this globular cluster is in fact visible with the naked eye! That's right, regardless of our ever-present sky-glow, you can in fact see this jewel if you peer hard and use your peripheral vision.

Source: Wikimedia

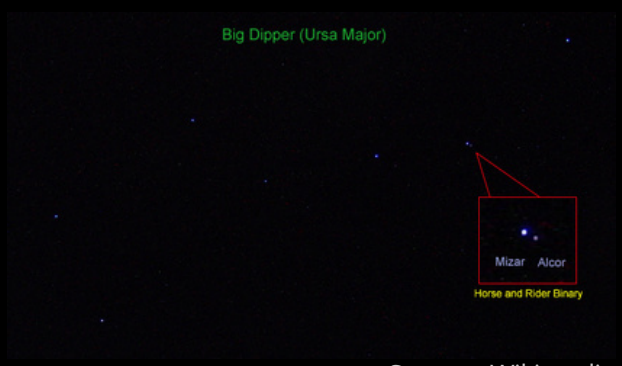
- **Winter Hexagon.** Don't miss the Winter Hexagon, an immense asterism dominating the winter night sky, formed by connecting six of the brightest stars from various constellations.



Source: Wikimedia

Binoculars

- **Mizar and Alcor.** This pair of stars are what are called a *visual double*, wherein they appear close together but are not gravitationally coupled and infact far distant from each other. Regardless, this prominent couple is a fascinating sight to novice stargazers and professional alike!



Source: Wikimedia

EVENTS AND STARGAZING

Binoculars (Cont'd)

- **M3.** Similar to omega Centauri, this is a globular star cluster with hundreds of thousands of stars. However, the former is one-tenths of the latter's mass and happens to be a bit more than twice as far, causing it to appear much dimmer. Consequently, it requires, at minimum, a pair of good binoculars to spot it.

Source: Stellarium

- **Golden Eye Cluster (M67).** Discover M67 in the constellation Cancer, a captivating open star cluster that's among the oldest known, featuring mysterious blue stragglers that defy our understanding of stellar evolution. This well-studied celestial wonder provides a unique window into the cosmic past, making it a must-see for any stargazing enthusiast.

Source: Stellarium

EVENTS AND STARGAZING

Telescope

- **Spiral Cluster (M34).** On the other end of the age spectrum, we have M34. Gaze upon it, a young and lively open star cluster located in the constellation Perseus, vibrant with dozens of stars that are just a few hundred million years old. This cluster is a favorite among astronomers for its accessibility and the brilliant view it offers through binoculars or a small telescope, perfect for an enchanting stargazing session.

Source: Wikimedia

- **Patrick Starfish Cluster (NGC 1245)**. Behold the Patrick Starfish Cluster (NGC 1245), a stunning open star cluster nestled in the constellation Perseus, noted for its dense assembly of over 200 stars shaped reminiscently of a starfish. This cluster's intricate arrangement and age of about one billion years make it a captivating target for telescopes, offering a delightful spectacle for deep-sky enthusiasts.

Source: Wikimedia

SOURCES

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Content page
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Water on Mars
How, when and where current mass flows in Martian gullies are driven by CO2 sublimation
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Trivia
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