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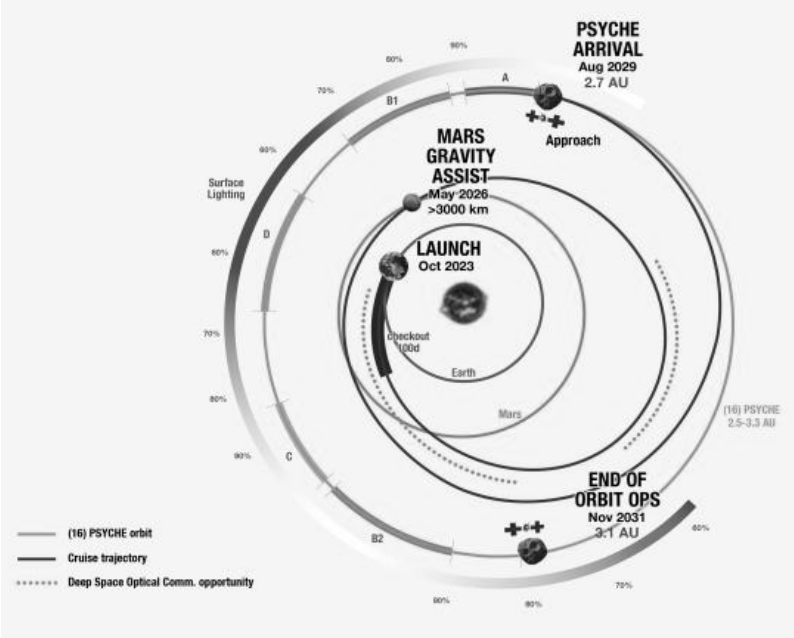
On the cover

Deirdre Kelleghan uses her Coronado PST to regularly observe solar activity and these two sketches of the same area on the Sun's limb on September 16th were done two hours apart at 12:01 UT and 13:58 UT respectively. PST 40 with 8mm eyepiece. Pastel pencil on black paper. Killadoon, Co Mayo.

Psyche mission ready for launch

NASA's Psyche mission, delayed from 2022, is now set to launch on October 5th this year. The probe will journey to a unique metal-rich asteroid orbiting the Sun between Mars and Jupiter. What makes the asteroid Psyche unique is that it appears to be the exposed nickel-iron core of an early planet, one of the building blocks of our solar system.



Deep within rocky, terrestrial planets - including Earth - scientists infer the presence of metallic cores, but these lie unreachably far below the planets' rocky mantles and crusts. Because we cannot see or measure Earth's core directly, Psyche offers a unique window into the violent history of collisions and accretion that created terrestrial planets.

Science objectives include determining whether Psyche is a core, or if it is unmelted material; gauge the relative ages of regions of Psyche's surface; and determine whether small metal bodies incorporate the same light elements as are expected in the Earth's high-pressure core.

News notes

Carbon on Jupiter's moon Europa

Most planets and moons in the Solar System are clearly dead and totally unsuitable for life. Earth is the only exception. But there are a few worlds where there are intriguing possibilities of life.

Chief among them is Jupiter's moon Europa, and the JWST just discovered carbon there. That makes the moon and its subsurface ocean an even more desirable target in the search for life.

Life needs chemical diversity, and among that diversity, carbon is a necessity. The JWST detected abundant carbon dioxide in a specific location on Europa's surface called Tara Regio, a region full of what's called chaos terrain. However, finding carbon dioxide on Europa's surface doesn't necessarily mean there's carbon in the moon's subsurface ocean, which is where it needs to be to bolster the possibility of life.

ISRO mission over?

It looks like India's lander Chandrayaan-3 has succumbed to the cold, and its mission is over. The frigid lunar night lasted about two weeks, and a new day has dawned. With that day came hopes of a sunlit revival for the lander and the rover, but the India Space Research Organization (ISRO) says the chances of the spacecraft awakening in the Sun are diminishing by the hour.

Even though things don't look good for the mission, it's still a success. It's the first spacecraft to land in the Moon's south pole region. The area is critical because it contains vast quantities of frozen water in its permanently shadowed crater. That water is a valuable resource for astronauts who'll visit the Moon in the future and set up bases. It's also the first time ISRO successfully landed a rover and lander on the Moon after its predecessor, Chandrayaan-2, crashed into the surface.

When night falls on the Moon's south pole, temperatures plummet as low as -200C to -250C. The lander and rover were never designed to handle these temperatures. The rover has only a small battery—10 amp-hours—that provides the necessary power to deploy its solar array.

No more Arecibo astronomy

Even though the National Science Foundation announced last year that it would not rebuild or replace the iconic Arecibo radio dish in Puerto Rico — which collapsed in 2020 – a glimmer of hope remained among supporters that the remaining astronomy infrastructure would be utilized in some way.

Instead, the NSF announced recently they have chosen four institutions to transition the site from its historic hub of astronomical research to a STEM educational outreach centre, with a seeming focus on biology.

The 305m-diameter Arecibo radio telescope first experienced problems following a hurricane in 2017 that sheared off one of the 29-metre antennas suspended above the dish. Then a succession of cable failures ultimately led to the December 2020 collapse of the 900-ton instrument platform suspended above the observatory, which crashed down on the iconic telescope's giant dish.

Samples of Bennu returned

The OSIRIS-REx mission has just completed NASA's first sample-return mission from a near-Earth asteroid (NEA). The samples arrived at the Utah Test and Training Range (UTTR) near Salt Lake City, where a team of engineers arrived by helicopter to retrieve the sample capsule. Analysis of the rocks and dust obtained from Bennu is expected to provide new insight into the formation and evolution of the Solar System.

This represents the culmination of the Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer (OSIRIS-REx) mission, which rendezvoused with the carbonaceous asteroid Bennu in 2018.

After two years of studying the asteroid from orbit, OSIRIS-REx began descending toward its surface on October 20th, 2020. After collecting between 400 grams and 1 kg, the spacecraft departed on May 10th, 2021, and began returning to Earth.

The OSIRIS-REx mission has since continued onto the next leg of its mission, which will be to study the object Apophis. This NEA was previously thought to pose a potential risk to Earth though scientists have since indicated there's a slight risk it might impact Earth in 2068.

This mission extension was announced on April 25th, 2022, and NASA indicated it would henceforth be known as the OSIRIS-APEX ('APophis EXplorer') mission. The mission will rendezvous with Apophis in April 2029, when the asteroid makes an extremely close pass to Earth, then orbit the asteroid for about 18 months before retrieving a sample.

The star that changed the cosmos

by Brian Gough

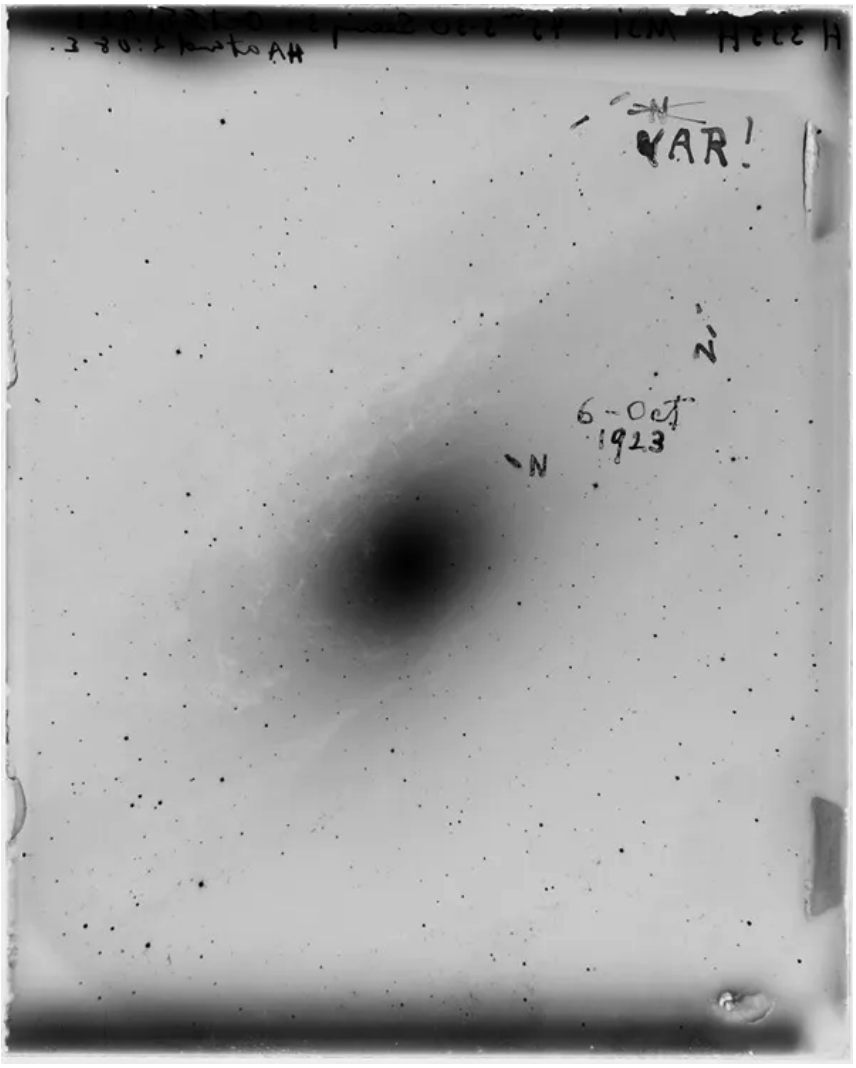
You know that M31 in Andromeda is another galaxy far outside our own Milky Way, don't you? Of course you do! Everyone knows that.

But we haven't always known it. In fact, we've only known for just under a century. Prior to that, astronomers referred to M31 and scores of other galaxies scattered throughout the sky as spiral nebulae. They were visible in great numbers in a bewildering variety of sizes, shapes, and orientations. But no one knew their distance. And their true nature was a hotly debated issue.

On April 26, 1920, astronomers Harlow Shapley of Mount Wilson Observatory and Heber Curtis of Lick Observatory held a Great Debate at the Smithsonian Institution in Washington, D.C. The topic: the nature of spiral nebulae and the scale of the universe. Shapley had measured the size of the Milky Way in 1915 and found it far larger than most astronomers had imagined. He argued the Milky Way was the entire universe and the spiral nebulae were smaller objects within it. Perhaps they were swirling stellar nurseries or condensing solar systems. Curtis argued they were galaxies, each like the Milky Way, and therefore extremely large and at vast distances. The debate had no clear winner.

To settle the debate, astronomers had to establish reliable distances to the spiral nebulae. So they searched for stars in the nebulae whose intrinsic brightness they thought they understood. Knowing a star's true brightness allowed astronomers to calculate how far away it was from Earth. But some of the stars they selected were not dependable milepost markers.

For example, Andromeda, the largest of the spiral nebulae, presented ambiguous clues to its distance. Astronomers had observed different types of exploding stars in the nebula. But they didn't fully understand the underlying stellar processes, so they had difficulty using those stars to calculate how far they were from Earth. Distance estimates to Andromeda, therefore, varied from nearby to far away. Which distance was correct? Edwin Hubble was determined to find out.



The astronomer spent several months in 1923 scanning Andromeda with the 100-inch Hooker telescope, the most powerful telescope of that era, at Mount Wilson Observatory in California. Even with the sharp-eyed telescope, Andromeda was a monstrous target, about 5 feet long at the telescope's focal plane. He therefore took many exposures covering dozens of photographic glass plates to capture the whole nebula.

He concentrated on three regions. One of them was deep inside a spiral arm.

Hubble's glass photographic plate H335H, obtained with the 100-inch Hooker Telescope Oct. 5/6, 1923, shows the galaxy M31. Three "new" stars are marked in black with the letter N. However, Hubble later noted that the star at the top right was present on earlier plates but fluctuated in brightness. He subsequently crossed out the N and marked it with "VAR!".

On the night of Oct. 5, 1923, Hubble began an observing run that lasted until the early hours of Oct. 6. Under poor viewing conditions, the astronomer made a 45-minute exposure that yielded three suspected novae, a class of exploding star. He wrote the letter "N," for nova, next to each of the three objects.

Later, however, Hubble made a startling discovery when he compared the Oct. 5-6 plate with previous exposures of the novae. One of the so-called novae dimmed and brightened over a much shorter time period than seen in a typical nova.

Hubble obtained enough observations of V1 to plot its light curve, determining a period of 31.4 days, indicating the object was a Cepheid variable. The period yielded the star's intrinsic brightness, which Hubble then used to calculate its distance. The star turned out to be 1 million light-years from Earth, more than three times Shapley's calculated diameter of the Milky Way.

Taking out his marking pen, Hubble crossed out the "N" next to the newfound Cepheid variable and wrote "VAR," for variable, followed by an exclamation point.

For several months the astronomer continued gazing at Andromeda, finding another Cepheid variable and several more novae. Then Hubble sent a letter along with a light curve of V1 to Shapley telling him of his discovery. After reading the letter, Shapley was convinced the evidence was genuine. He reportedly told a colleague, "Here is the letter that destroyed my universe."

By the end of 1924 Hubble had found 36 variable stars in Andromeda, 12 of which were Cepheids. Using all the Cepheids, he obtained a distance of 900,000 light-years. Improved measurements now place Andromeda at 2.5 million light-years away.

Hubble eliminated any doubt that Andromeda was extragalactic. Basically, astronomers didn't know the distance to novae, so they had to make a rough estimate as to where they were and therefore what their absolute luminosity was. But that is on very treacherous ground. When you get a Cepheid that's been reasonably calculated, the period will tell you where it sits on the luminosity curve, and from that you can calculate a distance.

Shapley and astronomer Henry Norris Russell urged Hubble to write a paper for a joint meeting of the American Astronomical Society and American Association for the Advancement of Science at the end of December 1924. Hubble's paper, entitled "Extragalactic Nature of Spiral Nebulae," was delivered in absentia and shared the prize for the best paper. A short article about the award appeared in the Feb. 10, 1925, issue of *The New York Times*.

Edwin Hubble's observations of V1 became the critical first step in uncovering a larger, grander universe. He went on to find many galaxies beyond the Milky Way. Those galaxies, in turn, allowed him to determine that the universe is expanding.

An electronic vote conducted in 2018 among all members of the IAU recommended renaming the Hubble law as the Hubble–Lemaître law. The Hubble-Lemaître law describes the effect by which objects in an expanding Universe move away from each other with a velocity proportionally related to their distance. The accepted resolution pays tribute to both Lemaître and Hubble for their fundamental contributions to the development of modern cosmology.

What are Cepheids?

Cepheids are pulsating stars whose brightness varies over timescales ranging from one to more than 120 days. They exhibit a distinctive pattern on a graph of brightness versus time, called a light curve, consisting of a sharp increase in brightness followed by a gradual dimming. This pattern repeats at regular intervals, known as the period.

While working for the Harvard College Observatory, Henrietta Swan Leavitt discovered a relationship between a Cepheid's period and true luminosity. She noted that the longer a Cepheid variable's period, the brighter it appeared. In 1912, she published a graph showing a strong positive linear correlation between the logarithm of these stars' periods and average apparent magnitudes. This is now known as the period-luminosity relationship, or the Leavitt law.

Danish astronomer Ejnar Hertzsprung realized the tremendous significance of Leavitt's discovery. Once calibrated, this relationship would allow astronomers to calculate the distance to any Cepheid from two pieces of data: its period and its average apparent magnitude.

Skynotes

by Michael McCreary

October to December 2023

Universal Time is used throughout - add 1 hour for Irish Summer Time

The Sun

- On October 1st the Sun is in the constellation of Virgo. Sunrise at Dublin that day is 06:25. It transits the meridian at 12:14 at 33º altitude. Sunset is 18:10.
- An annular solar eclipse on the 14th of October will cross North, Central and South America. Nothing will be seen from Ireland
- Daylight Saving Time ends on October 29th, when clocks go back one hour.
- The winter solstice occurs on Friday, December 22nd at 03:28h. On this day, the Sun crosses the celestial equator travelling from north to south.
- Wednesday, December 13th, sees the earliest sunset of the year at 16:05h. On this day, the Sun reaches its lowest declination and it is the shortest day of the year (7h 29m).
- Sunspot activity for Solar Cycle 25 continues to be quite good and Coronal Mass Ejections (CME) that flung material earthward sparked a couple of aurora displays in September that were seen across the country. It is worth installing the Aurorawatch UK app on your smartphone to set alerts (amber or red), or to join the Facebook group Irish Aurora/NLC Chasers.

The Planets

Mercury is best observed at the beginning of October in the early morning sky but is soon lost to view. The planet is not visible in November as it is then very low on the horizon after sunset. Mercury returns to our morning sky though in December and can be seen one hour before sunrise low in the south-eastern sky.

Venus is at its best morning visibility the start of October, and is a very bright magnitude -4.5 prominent object in the twilight. November sees Venus still a spectacular object rising more than four hours before the Sun.

Venus and the Moon are in conjunction on the 9th of November when the planet is 0.3ºS of the Moon. A grazing occultation of Venus takes place later in the day, weather permitting. The planet remains a dazzling beacon during December in our morning sky and passes close to Spica (the alpha star in the constellation of Virgo).

Mars is now too close to the Sun to be seen and reaches solar conjunction on November 18th, so it cannot be observed. It only rises just before the Sun on December 31st.

Jupiter is a very a bright mag. -2.8) object well placed in the constellation of Aries during the month of October. November sees it reach opposition on the 3rd, when the planet transits at midnight. It is then magnitude -2.9 and attains 50º altitude south. In December, the planet remain visible almost all night and does not set until the early hours. On 21st/22nd Jupiter is paired with a waxing gibbous 67% illuminated Moon nearby.

Saturn can be found in the constellation of Aquarius as night falls in October and remains on view till the early hours, setting at 01h on the 31st. On November 4th the planet is stationary and will then begin its prograde motion.

Saturn is a bright object at magnitude 0.7 and has a pale yellow colour to the unaided eye. The planet is 3.6ºN of the Moon on the night of December 17th.

Uranus - evening visibility of the planet began on in mid-September but it is quite faint (mag. 5.7) and is only visible to the unaided eye under perfectly dark skies. The planet is easier to see in binoculars.

On the 29th of October, Uranus and the Moon are 2.1º (SSE) apart. On the 13th of November, Uranus (mag. 5.6) is in opposition with the Sun, when the planet transits at local midnight. It continues to be well placed in the December evening sky not far from Jupiter and 3º south of Botein (Delta in the constellation of Aries.

Neptune is a well-placed evening sky planet during the period and is a magnitude 7.9 star-like object in steadily held binoculars or a low-power eyepiece on a telescope.

Variable Stars

Algol (β Persei, varies from 2.1m to 3.4m**):** Minima are predicted for Oct 10d 03.5h; Oct 15d 21.1h; Nov 4d 22.8h; Nov 25h 00.5h; Nov 27d 21.3; Dec 15d 02.2h; Dec 17d 23.1h; Dec 20d 19.9h

The following Mira-type stars are approaching maximum: RW And (Nov at mag. 7.4). SU Cnc (Oct/Apr at mag. 10.5). X Lyn. (Oct at mag 10.2). R Hya (Nov at mag 4.5). All dates and magnitudes for Mira stars are approximate.

Meteors

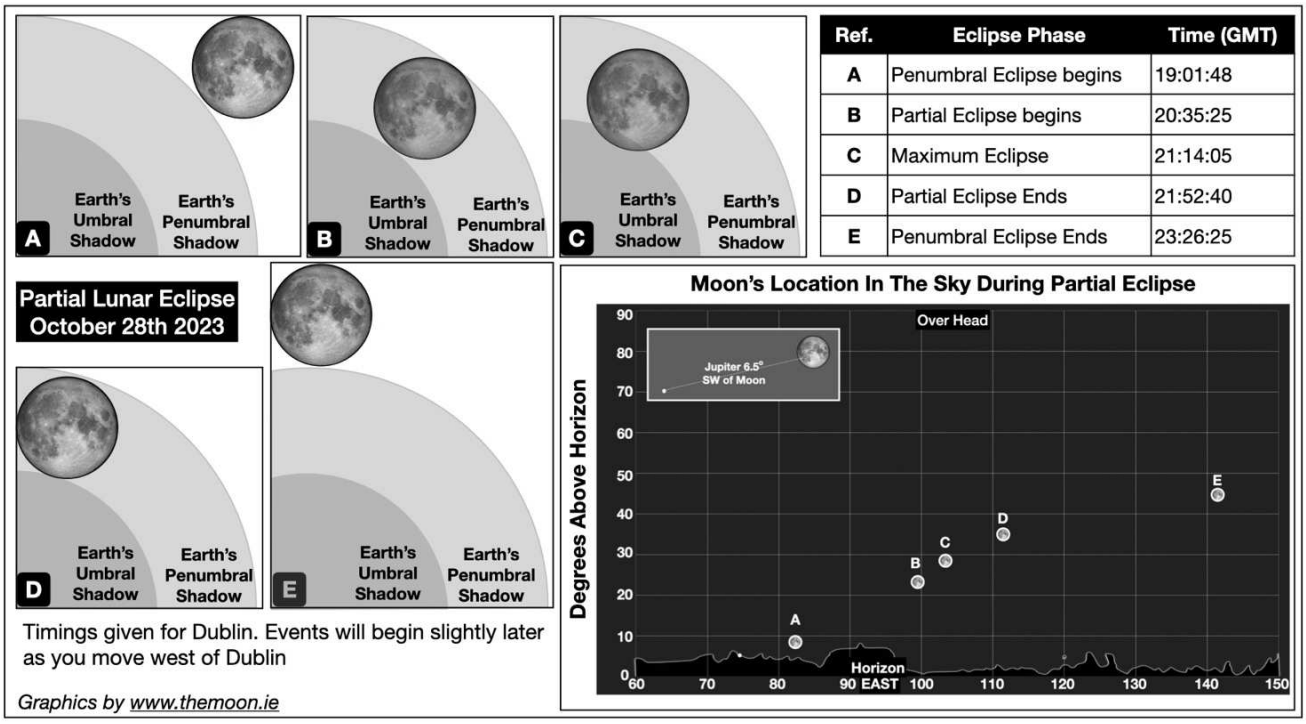
The **Orionids** peak on Oct 21/22. They are best observed after midnight and will be Moon-free this year.

The **Leonids** peak at 05h on the morning of November 18th (ZHR = var). Viewing conditions are favourable as the Moon sets before the radiant gains in altitude.

The **Geminids** peak on December 14th and maximum occurs just two days after new moon.

Partial lunar eclipse on October 28th

Because sunlight is always hitting the Earth, the Earth is always casting a shadow out into space. If you could put a massive screen in space so that the Earth is between it and the Sun, we could cast the Earth's shadow onto the screen and it would be round, just like the Earth. Also, we would see a dark inner circle called the Umbra, surrounded by a lighter circle called the Penumbra. The Umbra is the region where the Earth fully blocks the Sun's light and the Penumbra is where it only partially blocks the light. If you suspended a ball in front of a bright light so that its shadow was cast on a wall, you would get the same effect.



Ref.	Eclipse Phase	Time (GMT)
A	Penumbral Eclipse begins	19:01:48
B	Partial Eclipse begins	20:35:25
C	Maximum Eclipse	21:14:05
D	Partial Eclipse Ends	21:52:40
E	Penumbral Eclipse Ends	23:26:25

Earth's shadow is not visible except when the Moon's orbit path intersects with it. The shadow, at the distance of the Moon, is far larger than the Moon, so we only see parts of it as the Moon passes through. When the Moon is fully within the umbral shadow we say it is a total eclipse. The Moon is seen to dim and usually appears a dark reddish hue. This is because the longer red wavelengths of light are bent as the pass through the Earth's atmosphere to cast a dark reddish light on the Moon. The Moon only partially enters the umbral zone on the 28th and so we term it a 'Partial Lunar Eclipse'. As you can see from the diagram, the Moon is relatively low at the beginning of the eclipse, slowly rising during the event. Sunset is at 18:01 on the 28th so the sky will be dark enough to view the event if the sky is clear. See if you can detect the darkening effect of the penumbral and umbral shadows and if the timings above match those you observed. - *Donnacha O'Driscoll*

Lunar phases and Lunation

Each cycle of the Moon (new moon to new moon) is called a lunation and each lunation is given a specific sequential number.

There are various numbering systems, each differing only by when the first new moon in the sequence is. A popular system is the **Brown Lunation Number** which refers to Lunation 1 as the new moon of January 17 1923.

You will note in our lunar phase table for January to March 2023 that the Lunation Duration varies from month to month. In fact the difference between the shortest possible lunation and the longest is approximately eight hours, which is significant.

The reason of the variation is because the Earth-Moon system does not move at constant speeds in perfect circles. Throughout the year the alignment of the elliptical path of the Moon relative to the Earth's orbital path around the Sun changes as does the movement of both bodies. This means that the period of time between each new moon will vary from month to month. It also gives rise to the phenomenon known as **libration**.

Major Librations Oct - Dec 2023: Maximum librations are given below for the period - note that libration is still favourable two to three days before and after a given date.

Date	Size (°)	P.A. (°)
Oct 5	9.0	227
Oct 20	8.2	32
Nov 2	8.6	225
Nov 17	7.5	25
Nov 30	8.0	221
Dec 13	7.4	35
Dec 27	7.7	219

Moon's Phases

Lunation	New Moon		First Quarter		Full Moon		Third Quarter		Lunation Duration
	Date	*Time	Date	*Time	Date	*Time	Date	*Time	
1246	15-Sep	02:39	22-Sep	20:31	29-Sep	10:57	06-Oct	14:47	29d 16h 15m
1247	14-Oct	18:55	22-Oct	04:29	28-Oct	21:24	05-Nov	08:36	29d 15h 32m
1248	13-Nov	09:27	20-Nov	10:49	27-Nov	09:16	05-Dec	05:49	29d 14h 05m
1249	12-Dec	23:32	19-Dec	18:39	27-Dec	00:33	04-Jan	03:30	29d 12h 25m

***Time:** Irish Summer Time_UTC (Accurate for local Dublin time)

Perigee and Apogee

The Moon's orbit path around Earth is elliptical in shape. This means the distance between Earth and the lunar orbit varies from day to day. The point of the path that is closest to Earth is called **perigee** and the point furthest from Earth is called **apogee**. When the full moon occurs at perigee, the Moon appears at its largest from Earth and is popularly known as a Super-Moon. When it occurs at the apogee it is at its smallest and is occasionally referred to as a Micro-Moon.

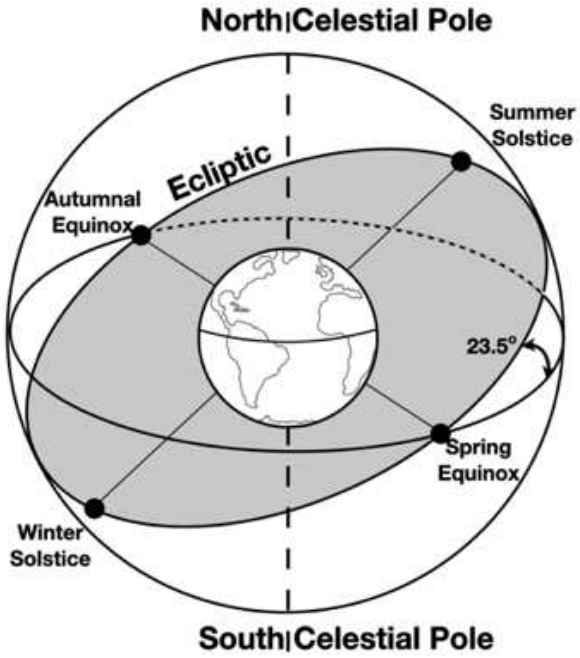
Perigee		Apogee	
Date & Time	Distance	Date & Time	Distance
		Oct 10d 04h 41m	405,426 km
Oct 26d 04h 02m	364,872 km	Nov 06d 21h 48m	404,569 km
Nov 21d 21h 01m	369,818 km	Dec 04d 18h 41m	404,346 km
Dec 16d 18h 52m	367,901 km		

The Moon and the Planets

Due to the relatively close proximity of the Moon to the Earth and because the Moon rotates around the Earth, the end result is that the Moon appears to move across the sky from West to East relative to the backdrop of stars and planets.

The Moon's orbital plane has a 5° tilt to the Earth's orbital plane around the Sun and so the Moon is always located somewhere between 5 degrees above and 5 degrees below the ecliptic which is the line the Sun appears to trace out in the sky throughout the year (see diagram, below). This is also the region where we can locate the planets and the zodiacal constellations.

So, during its journey, the Moon appears to pass in front of, or very close to various planets and stars. The complex movements of the planets, the Earth and the Moon's tilt means that these events vary greatly from month to month. The table below lists some upcoming lunar-planetary close approaches.



Date	Time	Event
Oct-02	03:20	Jupiter 3.4° South of Moon
Oct-02	17:15	Uranus 2.9° South of Moon
Oct-10	09:44	Venus 6.5° South of the Moon
Oct-14	09:33	Mercury 0.7° North of Moon
Oct-15	16:17	Mars 1.0° North of Moon
Oct-24	07:56	Saturn 2.8° North of Moon
Oct-26	01:23	Neptune 1.5° North of Moon
Oct-29	08:14	Jupiter 3.1° South of Moon
Oct-31	11:28	Uranus 2.9° South of Moon
Nov-31	09:30	Venus 1.0° South of the Moon
Nov-13	13:32	Mars 2.5° North of Moon
Nov-13	14:39	Mercury 1.7° North of Moon

Date	Time	Event
Nov-20	14:06	Saturn 2.7° North of Moon
Nov-22	07:45	Neptune 1.5° North of Moon
Nov-25	11:14	Jupiter 2.8° South of Moon
Nov-26	09:19	Uranus 2.6° South of Moon
Dec-09	16:53	Venus 3.6° South of the Moon
Dec-12	10:55	Mars 3.6° North of Moon
Dec-14	05:19	Mercury 4.4° North of Moon
Dec-17	22:01	Saturn 2.5° North of Moon
Dec-19	13:16	Neptune 1.3° North of Moon
Dec-22	14:24	Jupiter 2.6° South of Moon
Dec-23	14:54	Uranus 2.8° South of Moon

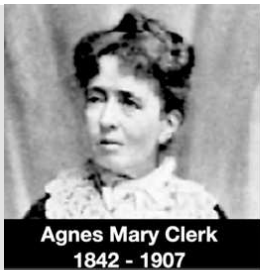
The Lunar Reconnaissance Orbiter

LRO launched June 18, 2009 from Cape Canaveral Air Force Station. It was the first U.S. robotic mission to the Moon in more than 10 years. One of the spacecraft's main goal was to make a 3D map of the Moon's surface from lunar orbit to identify potential landing sites and resources. To date, it has taken more than 2.9 million images.

"The Moon is a more dynamic place than we expected to find. With the Lunar Reconnaissance Orbiter, we are watching the Moon changing before our eyes. We are seeing new impact craters form," Jones said. "We've found unusual terrains that we don't fully understand yet. We've found a place at the north pole of the Moon that's colder than Pluto! And we've found ice in these super cold places, which could hold records of what's been happening on the Moon over a long time – and could be a potential resource to astronauts."

Did you know?

The first storm of 2023/24 will be called Agnes after Agnes Mary Clerke, born in Skibbereen, and who subsequently lived a while in Cobh. She was a great astronomy communicator and is one of the few women to have a lunar crater named after her (editor's note: only 35 women have a crater on the Moon name after them, and half of those are on the lunar far side. A good read is "Women of the Moon" by Altschuler and Ballesteros).


Agnes Mary Clerk
1842 - 1907

90 with the C-90

by Kevin Berwick

I own a small 3.5-inch Maksutov Cassegrain telescope, the Celestron C90. Here, I will continue my series on documenting my deep sky experiences from the Dublin suburbs with this tiny telescope.....Ninety with the C90

This summer hasn't been great for astronomy. Even when it was clear, it was often quite foggy here on Dublin's coast. I spent a total of zero nights under the stars in the last two or three months! So I really don't have much to report. What I decided to do was to look back at a few older articles in this series that have been published before and try and put a slightly new spin on some old observations through my tiny Mak.

The article will focus on Cassiopeia, a circumpolar constellation which is particularly well placed in in the autumn and winter. The Milky Way flows through the constellation so it is a happy hunting ground for the deep sky observer.

It is worth bearing in mind the place that the constellation has in popular culture. Famously, Cassiopeia was a blonde medical technician on TV's *Battlestar Galactica* back in 1978. The actress, Laurette Spang-McCook, also appeared in a number of iconic TV series from that era, including *The Dukes of Hazzard*, *Magnum, P.I.*, *Man from Atlantis* and *Gemini Man*.

More recently, as a character in the video game *League of Legends*, Cassiopeia was born into a life of privilege. When bitten by a tomb guardian, she was transformed into a snake-like predator. Cunning and agile, Cassiopeia spends her life under the veil of night, terrifying her enemies as a snake/human hybrid.

As an amateur astronomer, Cassiopeia doesn't terrify me in the least. In fact, like Orion, Cassiopeia is one of those constellations which always seems to be prominent on cold winter nights. Far from terrifying you, I hope this article will inspire both you and me to get back out under the stars as prime observing season approaches here in the Northern hemisphere. So let's begin...

NGC 663

NGC 663 is a young open cluster of about four hundred stars in Cassiopeia. This cluster consists of a circular smudge of stars. Two pairs of 'eyes' look at you. One pair of 'eyes' consists of the two 9th magnitude stars, SAO11968 and SAO11964. The second pair consists of SAO11972 and SAO11974, again at roughly 9th magnitude. The fact that all four stars are of a similar magnitude enhances this odd effect.

Some observers have imagined the outline of a lawnmower in this cluster, hence the moniker Lawnmower Cluster. I certainly didn't see this, but maybe you will.

M103

Another find in Cassiopeia, M103 is one of the oldest open clusters known and it is the farthest open cluster in the Messier catalogue at 7200 light years. To my eyes, through the C90, the cluster appears triangular. There are hints of haziness in the Northern part of the cluster, presumably due to unresolved stars. The three brightest stars in the cluster are in the East. The northernmost star, HD9311 Cas (STF 131) is, to my eyes, clearly double, though I read it is triple.

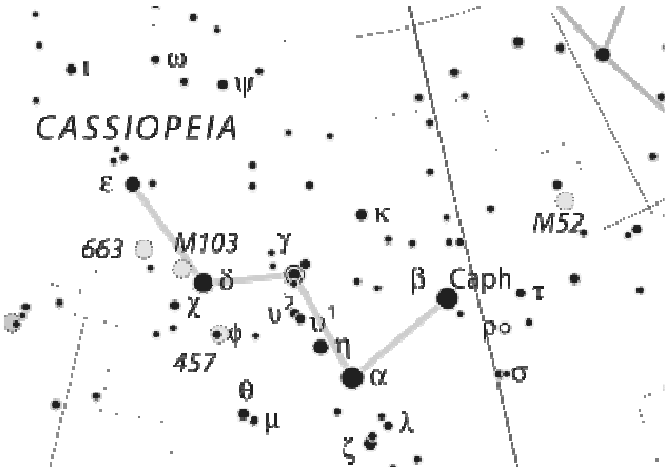
NGC 457

NGC 457 was discovered by William Herschel in 1787. This cluster in Cassiopeia, also Caldwell 13, is variously called the Running Man, Phi Cas Cluster (Phi Cassiopeiae is not actually part of the cluster), the Dragonfly and the ET cluster. I always refer to it as the Owl Cluster.

The cluster is clearly visible, even under poor conditions. Since it is not part of the Messier catalogue, NGC 457 is sometimes overlooked. However, NGC457 is definitely one of the prettiest clusters that I have seen, eclipsing many in Messier's famous catalogue.

It actually does look like an Owl. I can easily make out the wings, body, and feet. The body is very bent. Two eyes, with one, the slightly yellowish φ Cas, considerably brighter than the other, complete the Owl. The majority of the rest of the stars are white to my eyes, including the other 'eye'. One exception is one of the stars constituting the 'armpit' in the eastern 'wing' of the Owl. This star, known as V466 Cas, shines at magnitude 8.6 and is reddish.

That concludes the article for this issue. Thanks for reading. More next time.



Observer's Corner

compiled by Aubrey Glazier

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Welcome to our most quiet Observer's Corner ever! During June and July, the vast majority of the IAS members have had to put up with 100% overcast skies. And to top it all, in our 2023 Celestial Calendar, September 16 is called Cloud Appreciation Day! Pardon me as I chuckle silently.

But thankfully Michael Murphy and Barry Pickup have managed to produce their images for our Orbit magazine. Kevin has described 3 very fine open star clusters in Cassiopeia. John O'Neill, over in Massachusetts, observed a good number of sunspots, a supernova in Ursa Major and an excellent image of a conjunction involving the Moon and 2 planets. Yours truly has managed to observe some popular and not so popular objects in various parts of the sky.

from John O'Neill

Sunspot counts: June – August 2023: Counts were conducted on 24 days during this period. The maximum count I observed was on 22nd June when the Wolf Number was W=143, while the minimum count I observed was on 12th August when the Wolf Number was W=49. All observations were reported to the AAVSO Solar Section. I used 70 mm and 85 mm refractors equipped with Thousand Oaks Type 2+ solar filters.

SN 2023 ixf in M101: I estimated the magnitude of this supernova visually: 11.6 at 02:33 UT on 19-20 June 2023. 28 cm SCT at 117x.

Moon & Venus with Mars 21-22 June 2023: Venus (magnitude -4.6) appears brilliant, 3.1° from the centre of the crescent Moon. Dim Mars (magnitude +1.7) lay 4.5° east of the bright planet. Naked-eye observation. 01:30 UT. Clear Sky. Site: Topsfield, MA, USA.

from Barry Pickup

Jul 12: I could see Venus at 22.35 BST, it was very low though at 5° or so. It had a distinct yellow colour due to its low altitude. Mercury was nearby but I couldn't see it.

from Aubrey Glazier

I own a William Optics 158 mm f/7 apo refractor supported by a Berlebach Planet alt-az mount and a William Optics 70 mm f/6 small apo refractor with mirror diagonals fitted at all times on both scopes.

Aug 8: Recently I received a new 2-inch mirror diagonal. The first object I observed with it was Polaris. The magnitudes or this true binary are: A = 2. B = 9.1. Separation (Sep) = 18.4". Position Angle (PA) = 236°. As the sky was still bright, I saw the white secondary at 112x in the 9 o'clock position. The primary was yellow-white as usual.

Gorgeous K3 orange -0.04 magnitude Arcturus came next with its white optical companion CN Boötis. The latter is magnitude +6.

Then I observed Izar (Epsilon Boötis). It is now considered as an uncertain double star. Some amateurs are disgusted with this judgement. But it doesn't really matter – does it? The double is still a beautiful sight. F. G. W. Struve called it Pulcherrima, which means most beautiful. Magnitudes: A = 2.6. B = 4.8. Sep = 2.9". PA = 347°. The primary is yellow-orange, and the secondary is white with my refractor.

In a recent issue of *Orbit*, Mick McCreary published an article stating that Albireo (Beta Cygni) is now known to be an optical double. Magnitudes: A = 3.2. B = 4.7. Sep = 34.6". PA = 54°. Don't we all remember Sir Patrick Moore on the Sky at Night praising the colours of Albireo? I see the individual stars as rich K3 orange and B9 sapphire blue. Split at 40x. But even 9x binoculars can split it.

Aug 16: I manage to observe the extremely faint carbon star called V382 Cassiopeiae. I needed 225x to see it for sure. I estimated its magnitude as +12.9 on www.aavso.org . Sky conditions must have been very good. I could see that the star was orange. It was New Moon on this night in my Bortle 8 back garden. That must have helped me to find it.

Aug 21: I must thank John O'Neill for highlighting the conjunction of Sigma Arietis and Jupiter in the 2023 edition of Sky High. Jupiter's magnitude was -2.5, and the 5.5 magnitude star was a mere 10" (arc seconds) south of the south pole of the largest planet in our solar system. It was a magnificent sight! The moons Europa, Ganymede and Callisto were also visible. Io had gone behind Jupiter earlier. I was with friends at the Sugarloaf car park on this Monday night. It was well worth driving down to see this delightful conjunction.

Sep 4: n the last issue of *Orbit* (page 9), John Flannery highlighted the life of Jürgen Stock. On a printout of a Guide 9.1 DVD, I came across the open star cluster Stock 24. However, this cluster was almost non-existent with my refractor. At 167x I could just about see 4 faint stars. The brightest star was +10.9. Anyway, I found the cluster, and I'm pleased to share that with you all.

above: Michael Murphy took this image of the aurora borealis from Clifden, Co. Mayo on Tuesday 12th September. He used a Canon DSLR on a tripod with a 6 second exposure..

***right*:** Barry Pickup pictured the crescent moon and Venus at 23.15 in the western sky with his Canon 500D and 50mm f1.8 lens.

***below*:** John O'Neill took this excellent image of the crescent moon, Venus and faint Mars on 22nd June 2023 at 01:35 UT. DSLR at 55 mm focal length..