JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial

Welcome to the March edition of Janus. March, of course, brings with it the Spring equinox, when day and night are of approximately the same length and, a few days later, British Summer Time begins. The combined effect of these is less time for observing those objects that can only be seen when the sky is dark. As a consolation, the coming Spring and Summer nights will (hopefully) be warmer than the Winter nights that have gone.

The return of group observing sessions at Ranmore seems to have been widely welcomed – especially by new members who greatly appreciate the camaraderie and access to advice they bring. Massive thanks are due to Steve Roebuck for organising these events – long may they continue.

For our March meeting, we welcome back a former member of EAS, John Murrell, whose talk is entitled “Hunting Down Exoplanets or How Long is a Piece of String?” Again, it will be a “hybrid” one with the option to attend either in person or via Zoom.

Work to complete calibration and final commissioning of JWST continues in preparation for the commencement of routine science operations in July. For more information on JWST go NASA’s JWST site: *https://www.jwst.nasa.gov/*

Less good news is the announcement by ESA that the launch of the UK built Mars rover, Rosalind Franklin, planned for September on a Russian Soyuz launcher, is likely to be a victim of Roscosmos’ suspension of operations at Kourou. Full story at: *https://www.bbc.co.uk/news/science-environment-60566000*

John

SkyUpdate
What’s up this month?

The Solar System March

MERCURY: begins the month as a morning object, now well past greatest elongation W and returning closer to the Sun. It is, however, not observable as it will reach its highest point in the sky during daytime and be on, or below, the horizon at dawn. It becomes observable later in the month, but is never easy to see and, by the end of the month is not readily observable since it is very close to the Sun, at a separation of only 3° from it.

VENUS: begins the month emerging into the morning sky as it approaches greatest elongation west. It is visible in the dawn sky, rising at 04:35 UT – 2 hours and 9 minutes before the Sun – and reaching an altitude of 12° above the SE horizon before fading from view as dawn breaks around 06:23. Visibility remains good throughout the month and, by the end of the month, it is visible in the dawn sky, rising at 04:10 UT – 1 hour and 27 minutes before the Sun – and reaching an altitude of 8° above the SE horizon before fading from view as dawn breaks around 05:10.

MARS: is currently emerging from behind the Sun and, throughout the month, is difficult to see. It will reach its highest point in the sky during daytime and be no higher than 4° above the horizon at dawn.

JUPITER: begins the month approaching solar conjunction and will not be readily observable since it is very close to the Sun, at a separation of only 3° from it. Throughout the month, it will be difficult to see as it will reach its highest point in the sky during daytime and be close to the horizon at dawn.

SATURN: recently passed behind the Sun at solar conjunction. It begins the month not observable, reaching its highest point in the sky during daytime and being 1° below the horizon at dawn. It remains difficult to see throughout the month and, by the end of the month it will still reach its highest point in the

sky during daytime and be no higher than 4° above the horizon at dawn.

URANUS: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will become visible around 18:58 UT, 38° above the SW horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 23:20. By the end of the month, it is more difficult to see, reaching its highest point in the sky during daytime and being no higher than 13° above the horizon at dusk.

NEPTUNE: begins the month approaching solar conjunction and not readily observable, since it is very close to the Sun, at a separation of only 12° from it. By the end of the month, having passed behind the Sun at solar conjunction, it remains not readily observable since it is still very close to the Sun, at a separation of only 16° from it.

MOON PHASES:

Last Quarter	23 Feb
New Moon	2 Mar
First Quarter	10 Mar
Full Moon	18 Mar
Last Quarter	25 Mar

Notable Events:

March sees a number of planetary conjunctions Observation of these and many of the other events may require a telescope, although some will be visible with the naked eye. More information with times at *https://in-the-sky.org*

March

3 9P/Tempel at perihelion
4 Conjunction of Mars and Pluto
5 Conjunction of Venus and Pluto
7 Close approach of the Moon and Uranus
Lunar occultation of Uranus
10 Moon at apogee
12 Conjunction of Venus and Mars
16 Close approach of Venus and Mars
22P/Kopff at perihelion
20 March equinox
Venus at greatest elongation west
21 Venus at dichotomy (half phase)
27 British Summer Time begins
28 Conjunction of the Moon and Mars
Close approach of the Moon and Mars
Conjunction of the Moon and Venus
Conjunction of the Moon and Saturn
Close approach of the Moon, Venus and Saturn
Close approach of the Moon and Saturn
136472 Makemake well placed in the sky at opposition
29 Close approach of Venus and Saturn
Conjunction of Venus and Saturn

Collected Observations (and thoughts) – Gary Walker

Latest Observations - 10 Feb

The Sun has certainly woken up now and, over the last month, there have been numerous sunspots (usually at the same time!). Many have been large and medium sized.

To top it off, there has been a huge and beautiful prominence on the SE limb of the Sun, at the 8 o'clock position, lasting from about 4th - 7th February, before disappearing! It changed shape over the days, but basically consisted of one big prominence and a very complex area of smaller ones.

On 6th - 7th February, the prominence appeared triangular in shape, with two "prongs" touching the limb, leading some observers to compare it to the Eiffel Tower!

Comet Atlas was still quite bright in my scope, but I have now lost Comets 67P and Borrelly, (actually, they were always very faint and diffuse, being only just visible in my telescope!)

Sadly though, the weather has still often been dire.

Observing in the storms - 21 Feb

Despite having at least three gale-force Storms - Dudley, Eunice, and Franklin - I have still managed to get some observing in!

Surprisingly, especially with Storm Eunice on 18th February, it was not overcast, but with well-broken cloud, and there was a fair amount of sun. It goes without saying that I had to make sure that my telescopes didn't blow over!

The Sun still had a few spots on it, and had numerous prominences, etc, too.

After dark, there were some clear nights or, at least, clear breaks, and I saw that Comet Atlas was still visible.

One advantage of the winds was that it wasn't damp, so there were no dewing problems, and it was even quite mild and warm!

Planetary Nebular - 23 Feb

One Deep Sky class of objects that I love observing are the Planetary Nebula. Strictly speaking, these are misnamed, as early astronomers such as Sir William Hershel, and others remarked on them appearing like planets, since many of them appear circular, like a planet!

In fact, they are formed by stars, like our Sun, which at the end of their lives, become Red Giants. They then puff off their outer layers, and the ring, or sphere is formed, with a White Dwarf star at their centres.

The best, and brightest, in the Summer to Autumn months, is M57 in Lyra. This is known as the Ring Nebula which, in my telescope, is certainly clearly visible as a "smoke ring". It is one of the few Deep Sky objects that appears, visually, just like its images!

Another bright one is M27, in Vulpercula, which is known as the" Dumbell Nebula", as it appears like a dumbell, both visually (as seen in my scope), as well as in images.

In the Winter months, too, such objects are visible. One of the best of them is NGC 2392, in Gemini, which is popularly known as the "Eskimo Nebula" as in images, at least, it appears to take the form of a face and a fur hood! In my telescope, it shows up as a bright fuzzy ball, brighter in the centre. Both this Nebula, and the one in Draco called NGC 6543, also known as the "Cats Eye" Nebula, have a handy star close to them, which aids in focusing the telescope correctly, (being as Planetary Nebula will, inevitably be fuzzy in appearance!)

Planetary Nebula come in all shapes and sizes, not to mention degree of brightness. Some, like M57 and M27, are easily seen in small telescopes, whilst some are excruciatingly faint, and only visible in very large telescopes. In fact, some of them are so faint that they have only been discovered in very recent years, especially the large and spread out ones, that appear like beautiful soap bubbles in images, but would not be visible to visual observers due to their very low surface brightness!

On 22nd February, I saw a total of 7 planetary nebulae. One that I saw was NGC 2440, in Puppis, which appeared similar to the Eskimo Nebula of NGC 2392, but a bit smaller in angular size.

I find that using an Oxygen III filter makes a big difference in observing some planetary Nebula, or even seeing them in the first place! Planetary Nebula that are much easier to see with an Oxygen III filter include NGC 2438 which, although most likely unrelated to it, appears to lie within the open cluster M46 in Puppis, NGC 1501 (in Camelopardalis) and M97 (in Ursa Major), also known as the "Owl Nebula", because it appears to have 2 "eyes" within it. Indeed, without the said filter, these examples - especially M97 - are virtually invisible. With this filter, M97 is fairly easily seen in my scope as a large faint disk. The brighter nebulae, however, do not necessarily need to be observed with the Oxygen filter.

One bright Planetary Nebula is NGC 3242, in Hydra, which is known as the "Ghost of Jupiter". I have seen this appearing as a weird and bright blue blob (yes, it is bright enough to show colour!). I have also seen some of the smaller planetary nebulae show colour, such as NGC 6572, in Cygnus, and NGC 2022, in Orion. They appear as small blue disks, so it is not surprising that the early observers likened them to planets, especially Uranus or Neptune, as they have similar colours, and are of similar angular sizes!

Small angular sized Nebulae appear brighter than the large ones. This again illustrates the problem of all Deep Sky objects - the larger they are, the more spread out, and consequently dimmer, they are!

One perfect example is NGC 7293 in Aquarius, which is officially of magnitude 7.3, so apparently bright, but the reality is that it is extremely faint, due to the common curse of Deep Sky objects - the dreaded "low surface

brightness". These are words that no visual astronomer ever wants to see, when considering what to observe of any Deep Sky objects. Galaxies and Nebulae particularly suffer from this curse. Despite this problem, I have seen NGC 7293, but it is very faint, even using an Oxygen III filter. In contrast, M57 is listed at. Magnitude 9, yet it is far easier to see!

Planetary Nebulae come in many different angular sizes. Some may be similar in angular size to Jupiter, others are only about the size of a star. Whilst the latter can be easy to see, ironically, they are hard to identify, as they just resemble stars! The only way to tell them apart is to use high magnification, or the Oxygen III filter, which will dim field stars, but hopefully enhance the brightness of a nebula. As a result, I have sometimes been confused as to whether I am in fact seeing a planetary nebula, or a star.

Fortunately, however, some nebulae show a strong blue colour that is quite unlike a star. Some may have a slightly larger angular size than a star, in which case I can tell that it looks “odd”, and IS a planetary nebula, not a star!

In some nebulae, the central white dwarf star is visible - I have seen them in NGC 2392 and NGC 6826, as they are about magnitude 9-10, or so.

Incidentally, NGC 6826, which is in Cygnus (which has numerous planetary nebulae within it), is known as the "Blinking Nebula" (no, I didn't swear, then!). This is because, when viewed in smaller telescopes, it is reported to show a “blinking” effect, where if you stare at the centre star, the surrounding nebula disappears, but if you look with averted vision, the nebula reappears! However, I have never seen this effect when using my 8"SCT - it does not occur with larger telescopes as they collect enough light to show both star and nebula, at the same time.

In other planetary nebulae, the centre star is too faint to be seen even in large telescopes. One perfect example is the star in M57, which is only about magnitude 14, or so. This star is notoriously difficult to see even in very large scopes. Just to add to the fun, it is suspected to be slightly variable, too!

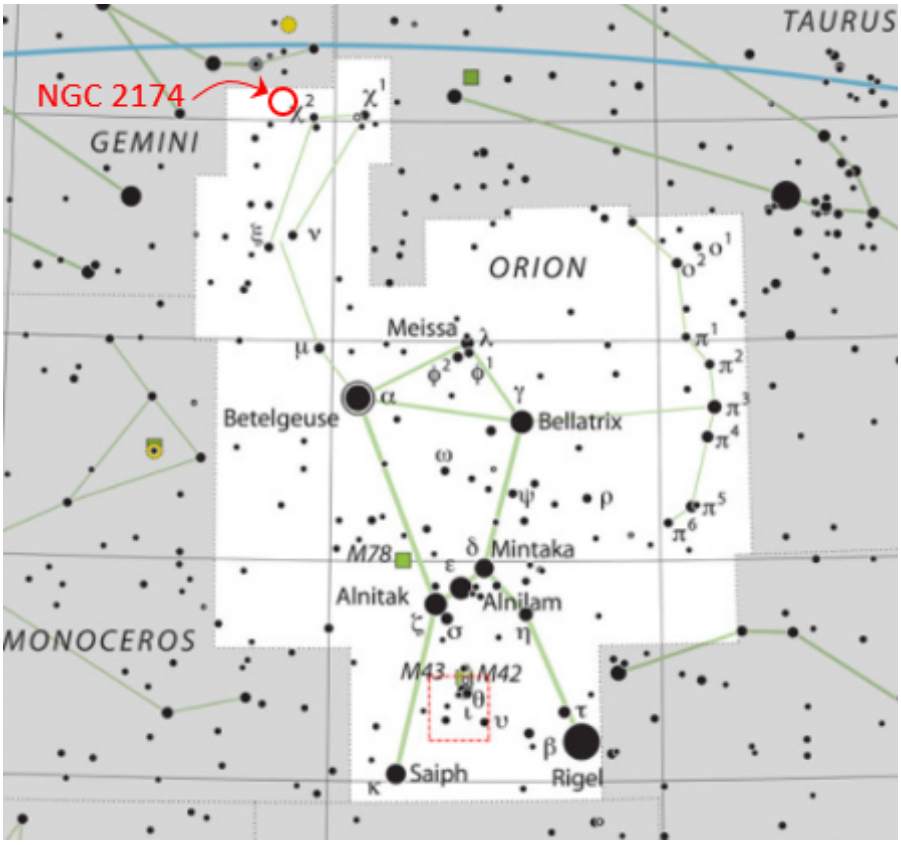
Virtually all Planetary Nebula have been given unofficial Monikers that reflect their appearance, especially in images. The same is true for other types of deep sky objects such as other types of nebulae, and galaxies. Even some open star clusters have been given nicknames, too!

Object of the month – The Monkey Head nebula - Martin Howe

The last two months I have looked at two of the winter sky’s showpiece objects – the Pleiades (M45) and the Orion nebula (M42). This month I go off the beaten track somewhat, to the far NE corner of Orion to track down the Monkey head nebula, NGC 2174. It is located very close to the magnitude 4.6 star, χ^2 (Chi-2) Orionis, just inside Orion’s border with the constellation Gemini – see the finder chart below.

Like its more famous big brother in Orion, M42, NGC 2174 is also an emission nebula and star forming region. It is nominally of magnitude 6.8 but has a relatively large apparent size of somewhat more than the size of a full Moon, so will make it well beyond naked eye visibility and in the realms of a pair of binoculars or small telescope from a dark sky site. Even then don’t expect to see much more than a small fuzzy grey patch of light. As with most nebulae, although they can appear quite colourful in long exposure images, the colour receptors in our eyes are just not sensitive enough to reveal the colours of such faint objects.

The nebula is about 6,400 light years away (remember M42 in Orion, being the closest large star forming region to us, is “only’” 1300 light years away)



I actually stumbled across the Monkey head nebula by accident when I was looking for the nearby Jellyfish nebula which is just across the border in Gemini - so I decided to image this instead.

The image below was taken from London and is comprised of three separate narrowband images using Ha, OIII and SII filters using an ATIK 314L CCD mono camera attached to a 200mm Canon f/2.8 lens with a total exposure of just under 3 hours. These images were combined using the popular “Hubble palette” resulting in the false colour image. It is easy to see how the nebula got its unofficial name the Monkey Head!

Editor's Note on Astro-photography

Readers may be interested in visiting the Astronomy Photographer of the Year Exhibition which is open daily at the Fox Talbot Museum at the National Trust's Lacock Abbey until 2 May - details at: *https://www.nationaltrust.org.uk/events/03cbc6dd-abac-41ab-9e87-13e9d321e637/pages/details*

Lacock Photography also run an Astrophotography course at the Abbey - details at: *https://www.lacockphotography.com/product/astrophotography/*

Night Sky Conditions 2021 - Ron Johnson

The following is a summary of the night sky condition during 2021.

The three classifications used are as follows:

Clear Night:	No cloud in the sky throughout the period. (Notionally dusk – 23.00UT)
Clear / Cloudy Night:	passing from time to time with clear periods long enough to permit observations to be made.
Cloudy Night:	Sky completely covered in cloud throughout the period.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clear	1	4	2	8	2	3	6	2	6	2	1	1
Cle/Clo	5	5	8	9	7	7	4	7	9	10	8	6
Cloudy	25	19	21	13	22	20	21	22	15	19	21	24

Totals: Clear 38 Clear/Cloudy 85 Cloudy 242

Longest run of consecutive clear nights: 3 nights
26 - 28 February
16 - 18 July
5 - 7 September

Longest period between clear nights: 33 days
3 November - 5 December

Longest run of consecutive cloudy nights: 17 nights
18 June - 9 July

Years since 1969 with fewer clear nights: 2021 (38).
1978 (31), 1987 (37) & 2016 (37).

Best Month: April (8 + 9)

Worst Month: January (1 + 5)

International Space Station: How Nasa plans to destroy it – and the dangers involved

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https://theconversation.com/international-space-station-how-nasa-plans-to-destroy-it-and-the-dangers-involved-177374

Nasa has announced plans for the International Space Station (ISS) to be officially decommissioned in 2031. After dozens of launches since 1998 got the station up and into orbit, bringing it down will be a feat of its own – the risks are serious if things go wrong.

Nasa's plans for the decommissioning operation will culminate in a fiery plunge into the middle of the Pacific Ocean – a location called Point Nemo, also known as the "spacecraft graveyard", the furthest point from all civilisation.

Finding Point Nemo will be the final stop in a complex and multi-staged mission to transition the operations of the ISS to new commercial space stations, and to bring the remaining structure safely down to Earth.

Originally commissioned for a 15-year lifespan, the ISS is outliving all expectations. It has already been in operation for 21 years, and Nasa has given the go-ahead for one more decade, thereby doubling its total planned time in orbit.

Purpose of the ISS

The ISS has enabled one giant leap for science and collaboration across mankind, involving five different space agencies (US, Russia, Europe, Canada and Japan). The modules and parts of the ISS have been built progressively by many different countries, only coming into contact for the first time in space.

The monumental conglomerate structure now stretches the length of a football field and is the largest human-made object in space. It is visible by the naked eye from Earth while it completes its 16 daily orbits, passing 400km above the Earth's surface.

Research in the so-called microgravity environment of the ISS has yielded breakthroughs in drug discovery, vaccine development and medical treatments in the last decade. The ISS also helps to monitor Earth's ecosystems and natural disasters in real time. It is used to test future spacecraft technologies and to study health effects of long-term spaceflight for the possibility of future human exploration of the solar system.

Despite onboard research gaining momentum, Nasa has noticed signs of infrastructure and components slowing down. For every orbit around the Earth, the ISS gets scorched by solar radiation on one side and freezes on the other. These thermal extremes cause cyclic expansion and contraction which wears the material. Space radiation chars the transparent glass on the solar cells which are used to power the station, and repeated docking and undocking causes gradual structure degradation, which will ultimately lead to its demise.

The rise of flying space junk also poses unplanned and catastrophic risk of destruction. In 2016, a fly-away speck of paint chipped a window, and just last year, ISS crew went into evacuation standby when Russia obliterated a dead satellite with a missile, causing thousands of pieces of debris to fly by the station at 5km per second. Despite this, Nasa assesses there is "high confidence" the station will see it through to the end of 2030.

The decommissioning operation

While Nasa has committed to maintaining the station until 2030, its partner organisations are yet to officially sign on, meaning the final decision to de-orbit will depend on politics as much as engineering.

If degradation or unplanned damage occurs before the official decommissioning, a free-falling ISS poses serious dangers. In fact, it would not be the first space station to fall out of the sky. In 1979, Nasa's Skylab station was not re-fuelled in time and came crashing down, out of control, leaving chunks of the station scattered across Australia. While no one was harmed, this led to reforms and "design for demise" guidelines.

Design for demise is an important principle for the engineering of satellites and other orbiting space infrastructure. Objects that fall freely from orbit must disintegrate into tiny pieces to make sure they don't pose a danger to people on the ground.

The ISS is too large to satisfy the design for demise principle, which is why we need special operations for de-orbit. Experts estimate that if it were to crash down uncontrolled in a metropolitan area, the worst-case scenario could be on the scale of a "9/11 event". However, this is highly improbable.

In the planned, controlled, de-orbit operation for the ISS, newly built modules will first detach from the main structure and remain in orbit to eventually recombine as parts of future space stations. The ISS will then be gently decelerated by onboard thrusters, causing its orbiting altitude to gradually lower over the course of a few months.

The remaining descent will be more rapid, but controlled by a series of spacecraft sent to attach and steer the structure as it begins to plummet towards Earth. As it re-enters the atmosphere, the majority of the structure will burn away, however the remaining mass should remain on a targeted trajectory to its deep-sea resting place.

A Russian space station was previously brought safely down in the same way, however the ISS is approximately four times larger, so an operation on this scale remains untested.

New era

Before complete de-orbit in 2031, the ISS will first undergo a transition phase to sustain the crucial scientific research currently being conducted, and to form the basis of new industries in space.

Jeff Bazos' Blue Origin recently announced plans to replace the ISS with the company's privately-operated space station. Other key players include Northropp Grumman and Axiom Space (partnered with SpaceX) who have a contract to start building modules off of the existing ISS as early as 2024.

There are also plans for a Russian space station which is likely to comprise of modules detached from the existing ISS. Meanwhile China launched the first module of their independent Tiangong Space Station last year, and plan to complete its expansion in the coming months.

At present, Nasa and its partner agencies oversee the use of their jointly owned infrastructure and are consulted on operations due to their governing expertise. However, times are changing, and Nasa now purchases seats on board spacecraft owned by SpaceX. Ultimately, Nasa will become just another customer of commercial operators.

Up Next:

NEXT MEETING: 8pm Friday 11 March 2022 - Nonsuch High School

John Murrell will talk about 'Hunting Down Exoplanets or How Long is a Piece of String? Attendance via Zoom will also be possible for those members preferring not to attend in person.

Ron Canham will also deliver his Sky at Night presentation for the month to come.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

The next session, allowing for moon rise & set times and cloud conditions, will be sometime between Wednesday 23rd Feb & Thursday 3rdth March. The precise date will be advised by email and WhatsApp a few days in advance

Meet at The Stepping Stones pub in West Humble about 6:30pm and go up to Ranmore around 7pm

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable. Please watch our WhatsApp feed for alerts.