JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial

Welcome to the July edition of Janus. Our speaker this month was to have been Professor Brad Gibson from the University of Hull Centre of Astrophysics, but he has had to postpone his lecture until September. He will be replaced by EAS member David Fishwick who has yet to reveal the subject of his talk.

NASA has recently announced that the public release of the first images and spectra from JWST is scheduled for 12th July - now less than two weeks away! The Webb team has confirmed that that 15 out of 17 instrument modes are ready for science, with just two more still to go. Details of how to see the first images – or, as NASA put it "Unfold the Universe with Webb" - are at: *https://blogs.nasa.gov/webb/2022/07/01/how-to-see-webbs-first-images/*

The announcement comes about a month after a less welcome announcement that, since its deployment in space, the telescope has been struck at least five times by micrometeroids, with one recent strike between 23rd and 25th May being by an object that was larger than what pre-launch models suggested that the telescope would likely encounter (more details are at: *https://blogs.nasa.gov/webb/2022/06/08/webb-engineered-to-endure-micrometeoroid-impacts/*). The object impacted one of the primary mirror segments with a noticeable effect on the mirror segment's performance. However, after initial assessments, the team found the telescope is still performing at a level that exceeds all mission requirements despite a marginally detectable effect in the data.

John

The Solar System July

MERCURY: begins the month just about visible as a morning object, now well past greatest elongation west and returning closer to the Sun. It will reach its highest point in the sky during daytime and be no higher than 3° above the horizon at dawn. It becomes slightly easier to see towards the middle of the month, but ends the month not visible reaching its highest point in the sky during daytime and being, at best, no higher than 0° above the horizon at dusk.

VENUS: remains just about visible as a morning object, now well past greatest elongation W and returning closer to the Sun. It begins the month rising at 02:58 BST, – 1 hour and 47 minutes before the Sun – and will reach an altitude of 10° above the E horizon before fading from view as dawn breaks around 04:17. By the end of the month, it is visible in the dawn sky, rising at 03:21 BST – 1 hour and 59 minutes before the Sun – and will reach an altitude of 11° above the E horizon before fading from view as dawn breaks around 04:55.

MARS: is visible throughout the month in the dawn sky. It begins the month rising at 01:17 BST – 3 hours and 28 minutes before the Sun – and will reach an altitude of 22° above the E horizon before fading from view as dawn breaks around 03:49. At the end of the month, it will rise at 00:01 BST and reach an altitude of 40° above the SE horizon before fading from view as dawn breaks around 04:35.

JUPITER: is also clearly visible in the dawn sky throughout the month. At the beginning of the month it will rise at 00:40 BST and reach an altitude of 30° above the SE horizon before fading from view as dawn breaks around 04:17. By the end of the month, it is visible for longer, rising at 22:45 BST and reaching an altitude of 40° above the S horizon before fading from view as dawn breaks around 04:55.

SATURN: begins the month visible as a morning object, rising at 23:24 BST and reaching an altitude of 23° above the S horizon before fading from view as dawn breaks around 03:50. By the end of the month, approaching opposition, it remains visible as a morning object. It becomes accessible around 22:48, when it reaches an altitude of 10° above the SE horizon and will then reach its highest point in the sky at 02:08, 23° above the S horizon. It will be lost to dawn twilight around 04:34, 16° above the SW horizon.

URANUS: begins the month difficult to see, reaching its highest point in the sky during daytime and being no higher than 4° above the horizon at dawn. Visibility improves as the month progresses until, by the end of the month, it is visible in the dawn sky, rising at 23:55 BST and reaching an altitude of 32° above the E horizon before fading from view as dawn breaks around 03:33.

NEPTUNE: follows a similar pattern to Uranus. It begins the month difficult to see as it will reach its highest point in the sky during daytime and be no higher than 18° above the horizon at dawn. At the end of the month, it is visible in the dawn sky, rising at 22:21 BST and reaching an altitude of 34° above the S horizon before fading from view as dawn breaks around 03:33.

MOON PHASES:

New Moon	29 Jun
First Quarter	7 Jul
Full Moon	13 Jul
Last Quarter	20 Jul
New Moon	28 Jul

Notable Events:
Observation of some of these events may require a telescope, although some will be visible with the naked eye. More information with times at *https://in-the-sky.org*

July

1 M22 is well placed
2 IC4756 is well placed
4 The Earth at aphelion
15 Close approach of the Moon and Saturn
19 Close approach of the Moon and Jupiter
20 134340 Pluto at opposition
21 Close approach of the Moon and Mars
Lunar occultation of Mars
22 Close approach of the Moon and Uranus
Lunar occultation of Uranus
28 Jupiter enters retrograde motion
29 Piscis Austrinid meteor shower 2022
30 Southern δ-Aquariid meteor shower 2022
α-Capricornid meteor shower 2022

Collected Observations (and thoughts) – Gary Walker

How far South can I see in the sky from my garden? – 17 Jun

It is a constant source of frustration that many stars and Deep Sky Objects are deep in the Southern Hemisphere and, consequently, are never visible from the UK; we just have to do our best with what IS visible in our skies, and in the Southern skies as seen from the UK.

Not only do we have to contend with whether an object of interest is actually above the horizon, there are also, of course, local pesky obstructions such as houses, trees, and hedges!

However, from my back garden, over the years, I have seen the star Antares, in Scorpius, with its two attendant globular clusters of M4 and M80. The "top" part of Scorpius is visible, but not. of course, it's tail.

The objects of M8, M17, and M22 are also observable from my garden, just above the hedge line.

I have also seen, in the Autumn, the star, Fomalhault, in Pisces Austrinus, in the Southern Fish constellation, which only gets up to about 9.5° above the horizon.

The low altitude of these objects will inevitably degrade their brightness and visibility; further South, observers would get a far better view of them! I can, however, observe M8, M17 and M22, and get quite good views of them. I can resolve M22, but it appears a bit dim, due to its low altitude.

Thus, it seems that my Southern horizon is about 9°-12° above the real Southern horizon visible from this area.
Objects such as the open star clusters of M6 and M7, as well as M54 and M55, are too low to be seen from my garden - areas with a

clear horizon, such as over the sea, would obviously do a lot better!

Latest Observations – 24 Jun

On June 21st – 22nd, I was observing most of the night. At this time of the year, of course, it only gets dark about 11pm, or so, and is already starting to get light again, soon after about 3am, so the “night” is only about 4 hours long!

For the first time for ages, I saw and observed Mars and Jupiter. Jupiter still had a prominent Northern Equatorial Belt, and a thinner Southern Equatorial Belt.

Mars was quite small, and I could not see any surface detail on it, but then it was only about 7' arcseconds in angular size, and it was fairly low down, anyway.

I hadn't seen Mars since July of last year, and I find that that is usually the case because, eventually after Opposition, it gradually disappears into the glare of the Sun, in the evening sky, and then is in the early morning sky, but still, lost in the sun's glare. In time, it gradually crawls away, and slowly becomes more visible as time goes on. It is gearing up to its next Opposition this December when it reaches an angular size of 17' arcseconds.

Thus, I usually lose Mars for about a year, each time, although that doesn't really matter, because it shrinks down to its smallest size of only about 4' arcseconds, when all that can be seen is a tiny disk, even at high powers, (although some amateurs, notably Damien Peach, have managed to still image surface features, even in these situations!).

So far, I haven't seen the Notilucent Clouds, although I have been looking since late May!

Venus Moon Conjunction seen in Daylight! – 26 Jun

The weather on 26th June was mostly sunny with some cumulus and cirrus clouds, so I saw the Venus Moon Conjunction in daylight.

I managed to view a thin crescent Moon 🌙 (7%), about 4 degrees to the North of Venus, in the early afternoon of 26th June, through my binoculars. Venus, and indeed, the Moon, were not visible to the naked eye.

In my telescope, Venus appeared spherical, and fairly small, even at 222X. Venus was about 12' arcseconds in angular size, and about 84% phase, so it was actually at gibbous phase.

I have not been able to see Venus since the end of last year, as it has been stuck low in the dawn sky (what astronomers refer to as "badly placed")!

More Observations – 28-30 Jun

I saw the Comet C/2017 K2 PanSTARRS, with my 8" SCT, in the constellation of Ophiuchus in late June, appearing as a relatively large, and moderately bright fuzzy ball. On 27th -28th June, it appeared in the centre of a circular group of about 10, or so, fairly bright stars, which occupied about half a degree in angular size.

I also looked at several globular clusters in Ophiuchus, of which this constellation has a number, and I estimated that the comet was about equivalent in magnitude and size, to the globular clusters of M9 and M14. These are about magnitudes 8, and 6, respectively, so the comet may have been about magnitude 6 - 7.

One tends to get a sense of déjà vu as once again, this is a PanSTARRS comet. There are so many comets named as PanSTARRS, ATLAS, which can make it really confusing! This is because many Comets are discovered by the robotic telescopes of PanSTARRS and ATLAS. Of course, each new comet is given its own designation, but the proliferation of those with the same names can make it really hard to tell them apart.

I also saw Saturn for the first time since last September, and I could see that its rings had noticeably closed up since then.

The Summer is a profitable time for observing Globular Clusters and Planetary Nebulae, in particular. I had a good look at M13, and M92 in Hercules. M13, of course, is the best one to see in the Northern Hemisphere. In my scope, especially at 166X and 222X, it really appears wonderful, looking like a crystal sphere, with a large fuzzy centre, and numerous outlying stars, some well out from the centre. This effect is particularly

noticeable when I use the technique of "averted vision"!

M92 is also bright, but is more condensed, with a bright centre, but with fewer stars resolved.

The planetary nebula of NGC 6572, in Ophiuchus, is a small, but bright disk, and is one of the few deep sky objects that actually shows colour. I saw it as a beautiful green colour. It helps that it is of a small angular size, and not spread out, so the light is condensed, and thus, it is bright enough for our eyes to see colour in it.

I saw Comet PanSTARRS again on the night of 30th June – 1st July. It appeared as a fairly large fuzzy ball, brighter in the centre, with no tail visible (at least, not to me!).

This is the 42nd comet that I have seen.

On sites like "Space Weather News", there are images of this comet, showing a thin tail, and showing a strong green colour. Of course, visually, it is too faint to activate the eye's colour sensors, so it shows no colour in the telescope!

I saw this comet on 2 consecutive nights (30th June and 1st July), so I could see how fast it was moving in a given period of time. In 24 hours, it has moved just over half a degree from the NE to the SW.

Object of the month – The SuperMoon – Martin Howe

SuperMoons have really come into the public eye within the last few years and, like the hype or not, (and all the names that now get attached to each full Moon, such as the Worm Moon or Sturgeon Moon), at least it puts astronomy onto the public radar which has to be a good thing.

The Moon, like most orbiting astronomical bodies, has an elliptical orbit and as such is sometimes closer to the Earth in its orbit than at other times (known as perigee). If perigee also happens to coincide with, or occurs very close to, the full Moon then it has colloquially become known as a SuperMoon. (According to the Encyclopaedia Britannica, the phrase was coined by an American Astrologer in 1979, so the less said about that the better…)

Although the Moon's orbit is only slightly elliptical (having an eccentricity of 0.055 on a scale of 0 to 1, where 0 represents a perfect circle) it does mean that at closest approach the Moon is only about 356,000 km from the Earth, compared to a little over 406,000 km at its furthest point (apogee). Translated to the angular size that we see in the sky this equates to about 29 arcminutes (just under half a degree) at apogee, versus 34 arcminutes at perigee, and hence noticeably larger by about 17%. July's Full Moon will be very close to perigee, at a little over 357,000 km.

In addition to this there is a well-known phenomenon known as the Moon illusion which makes the Moon appear even larger near the horizon. However, this is just the juxtaposition of the near horizon with the distant Moon playing tricks on our mind and in reality the Moon is the same size at any altitude as it passes across the sky. However, this does further enhance the view of the rising SuperMoon, and the use of telephoto lenses (or a telescope) can emphasise this nicely.

Planning and photographing a SuperMoon rise can be fun, and fortunately London can provide plenty of interesting foreground objects against which to set the Moonrise. There are a number of apps that can tell you where (and when) the Moonrise will occur so you can plan your best vantage point. I personally find the Moonrises early in the year (January/February) very rewarding as the Moon tends to rise behind the City of London as seen from Waterloo Bridge. This is in fact where this month's image of the SuperMoon rise from January 2019 was taken. On that occasion the Moon was almost exactly the same distance away from the Earth as it will be at this July's full Moon.


Martin Howe

Our Mars rover mission was suspended because of the Ukraine war – here's what we're hoping for next

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Just a few months ago, we were confidently expecting to launch our rover, Rosalind Franklin, to Mars in September as part of the ExoMars mission, a collaboration between Europe and Russia. The landing was planned for June 2023. Everything was ready: the rover, the operations team and the eager scientists.

The final preparations started in February 2021, with part of our team heading to Turin, Italy, to carry out the final alignment and calibration tests. All was going well, though some of the team were slightly delayed by Storm Eunice in the UK. Three days later, they had nevertheless finished the work – leaving some wonderful data, which would help us decide where Rosalind would drill on Mars. The industry team started packing the rover, which was ready to be shipped to the launch site.

Then, a storm far more powerful and tragic than Eunice descended on Ukraine: Russia's invasion. The situation developed in the next days and weeks, leading to a series of emergency meetings. On 17th March, the European Space Agency (ESA)'s council and member states decided to suspend our mission. We won't know for sure what happens next until a study by ESA and industry partners reports back in July – but there are causes for optimism.

The Rosalind Franklin rover is unique among all the rovers planned for Mars. It can drill deeper than any before it – up to 2 metres below the harsh surface. This is important as the subsurface is protected from harmful radiation and could therefore contain signs of past or present life.

Rosalind's instruments include our PanCam, which is a camera that will do geology and atmospheric science on Mars – complemented by the other cameras and a sub-surface sounding radar. Rosalind will also collect pristine samples from below the surface which will be deposited in the "analytical drawer", where three instruments will do mineralogy and search for signs of life.

Some 3.8 billion years ago, at the same time as life was emerging on Earth, Mars was habitable too. There is evidence from orbiters and landers of water on the surface then – there would have been clouds, rain and a thick atmosphere. There was also a global protective magnetic field, and volcanos. This means Mars essentially had all the right ingredients for life – carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulphur. If life emerged there like it did on Earth, we were on a track to find it.

The climate has changed significantly since Mars lost its magnetic field 3.8 billion years ago, though. The planet now is dry, cold, has a thin atmosphere and a surface hostile for life. But below the surface, some living species may have survived, or remains of them could be conserved.

Other missions to Mars are looking for life too. The amazing NASA Perseverance rover landed in February 2021. Its scientists are partly guided by images from a NASA helicopter on the planet, called Ingenuity, and it recently reached an ancient river delta.

Perseverance is collecting samples from Jezero crater, ready to be brought back to powerful labs on Earth by the Mars sample return missions. The results will hopefully complement those from

Rosalind Franklin – which will examine deeper samples from a different and slightly older site, Oxia Planum, where there is also abundant evidence of a watery past.

Options for Rosalind

Russia was meant to help launch Rosalind Franklin on one of its rockets. While a European-built spacecraft would then take it to Mars, a Russian-built platform would again be needed to land it. Russia was also meant to provide radioactive heaters to keep the batteries of the rover warm in the cold Martian nights.

Now, ESA is looking at options. Given that continuing with Russia in 2024 is most unlikely, the main possibilities are either ESA going it alone, or teaming up with a partner such as NASA. ESA's new Ariane-6 rocket, which is nearly ready, could help launch the rover, as could a SpaceX rocket. For the lander and heaters, ESA would need to develop these alone or in collaboration with NASA, by adapting existing technology.

It could therefore take time. What's more, because of the way the planets orbit the Sun, there are opportunities for launches to Mars only every two years: in 2024, 2026 and so on. My expectation is that 2028 is most likely for our mission, but it will require hard work. The positive thing is that ESA and the member states are still keen to go ahead, and we are eagerly looking forward to the launch whenever that will be.

Ultimately, life changed for the Rosalind Franklin team on 24th February. I've been working on the mission since 2003, when we first proposed a camera system for what became ExoMars. We had already provided the "stereo camera system" for ESA's ill-fated Beagle 2, which very nearly worked when it landed on Christmas Day 2003. But orbiter images later showed that the last solar panel didn't quite unfurl, so communications with Earth were impossible. The wait for data from the Martian surface for our team goes on.

There is no getting away from the huge disappointment we felt when the ExoMars Rosalind Franklin rover that we had worked on for almost 20 years was suspended. But it was ultimately a necessary and understandable step, and we now look forward to a future launch.

This still is cutting-edge science, and it will be for the rest of this decade. Due to the uniquely deep drilling, Rosalind Franklin still may be the first mission to find signs of life in space.

Up Next:

NEXT MEETING: 8pm Friday 8 July 2022 - Nonsuch High School

David Fishwick will give a talk on a subject to be advised. 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, may be sometime around the new moon on 28th July, although the present shortness of the nights might mean postponing further sessions until September. The precise date and timings of any session will be advised by email and WhatsApp a few days in advance

AD HOC OBSERVING AT WARREN FARM:

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