



February 2022 EDITION

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Editorial

Welcome to the February edition of Janus. The first month of 2022 has almost passed, and I'm delighted to report a recent milestone on the path to returning to pre-Covid normality. Thursday 27th January saw the first group observing session at Ranmore since the beginning of 2020. The event was marked by it being the first clear night for some time, and those who attended enjoyed a splendid evening's viewing. Thanks are due to Steve Roebuck for organising this long-awaited event.

For our February meeting, Professor Peter Bull MBE FRAS will talk about "A Window Through the Universe". As with other recent meetings, it will be a "hybrid" one with the option to attend either in person or via Zoom.

Following its successful launch, JWST has now completed its journey to the second Sun-Earth Lagrange point (L2), 1.5 million km above the earth. During the course of its 29-day journey, the spacecraft's 6.5m diameter primary mirror - made up of 18 hexagonal segments, each 1.32m across - and the vitally important sunshield, were successfully deployed. The next 3 months will be taken up with carrying out initial checks on the optics, and telescope alignment - a bit more complicated than aligning an 8" SCT! Following a further 2 months of calibration and final commissioning, at the end of June, the spacecraft will be ready to commence routine science operations. For more information on JWST go NASA's JWST site: <https://www.jwst.nasa.gov/>

Finally, I'm delighted to publish a second "Object of the month" piece from Martin Howe - this will hopefully become a regular feature.

John



The Solar System February

MERCURY: begins the month emerging into the morning sky as it approaches greatest elongation west. It is not observable, reaching its highest point in the sky during daytime and is no higher than 1° above the horizon at dawn. As the month progresses, it is just about visible as a morning object, but now well past greatest elongation west and returning closer to the Sun. It will therefore be difficult to see

VENUS: is emerging into the morning sky as it approaches greatest elongation west. It begins the month visible in the dawn sky, rising at 05:21 UT – 2 hours and 16 minutes before the Sun – and reaching an altitude of 13° above the SE horizon before fading from view as dawn breaks around 07:14. By the end of the month, it rises at 04:36 – 2 hours and 10 minutes before the Sun – and reaches an altitude of 12° above the SE horizon before fading from view as dawn breaks around 06:26.

MARS: recently passed behind the Sun at solar conjunction. It begins the month difficult to see, reaching its highest point in the sky during daytime and being no higher than 5° above the horizon at dawn. Visibility does not improve as the month progresses 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.

JUPITER: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will become visible around 17:12 UT, 14° above the SW horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 2 hours and 14 minutes after the Sun at 19:03. Visibility becomes more difficult after the middle of the month and, by the end of the month, it is not readily observable since it is very close to the Sun, at a separation of only 4° from it.

SATURN: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it is not readily observable since it is very close to the Sun, at a separation of only 3° from it. Visibility remains very difficult throughout the month and, by the end of the month, it will reach its highest point in the sky during daytime and be 1° below the horizon at dawn.

URANUS: begins the month as an early evening object receding into evening twilight. It will become visible around 18:12 UT, 52° above the S horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 01:06. By the end of the month, it will soon pass behind the Sun at solar conjunction. It will become visible around 18:57 UT, 39° above the SW horizon, as dusk fades to darkness, and will then sink towards the horizon, setting at 23:23.

NEPTUNE: will soon pass behind the Sun at solar conjunction. Throughout the month, it will be very difficult to see. At the beginning of the month, it will reach its highest point in the sky during daytime and be no higher than 18° above the horizon at dusk. By the end of the month, it will be very close to the Sun, at a separation of only 13° from it.

MOON PHASES:

Last Quarter	25 Jan
New Moon	1 Feb
First Quarter	8 Feb
Full Moon	16 Feb
Last Quarter	23 Feb

Notable Events:

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

February

- 2 19P/Borrelly at perihelion
- 5 Asteroid 20 Massalia at opposition
- 6 Mercury at highest altitude in morning sky
- 7 Close approach of the Moon and Uranus
Lunar occultation of Uranus
- 9 Venus at greatest brightness
- 11 Mercury at dichotomy
- 13 Conjunction of Venus and Mars

Venus at highest altitude in morning sky

- 16 Mercury at greatest elongation west
- 19 M81 is well placed
- 27 Conjunction of the Moon and Venus
Conjunction of the Moon and Mars

Collected Observations (and thoughts) – Gary Walker

News and Observations - 31 Dec

Well, the James Webb Space Telescope was successfully launched on Christmas Day, and there have already been two items on the BBC news about it, one on the day of launch and another, about three days later, explaining the complicated procedures for unfolding the telescope from the rocket. 🚀

Let us hope that nothing goes wrong with it, as it will be too distant from the Earth to send out astronauts to repair it, at 1 million miles away!

As stated in my December notes, observing weather was abysmal in December, and I only managed to observe the Sun on 9 occasions. There was a big gap of 17 days between 10th and 28th of December when it was overcast virtually all the time.

In late December, there was a prominent group of 3 large sunspots in a line, close together!

The Nova v1405 Cassiopeia is still visible after 9 months, but seems to be sticking to about magnitude 9, where it has been for some time.

I saw Venus on the 29th December, when it was only a 4% illuminated crescent 🌙, very low down in the SW sky.

Constellations - 13 Jan

It is well known by astronomers that groups of stars were seen by the ancients as representing mythological beings, such as those in Greek mythology. Old star maps often depict intricate figures that were supposed to be the constellations. In real life, however, most constellations can't really be seen in this way, because stars do not always fill the entire figures. Thus, it is a case of "join the dots", which doesn't always work!

Obviously, the brightest constellations are the easiest to see, especially in light-polluted skies.

To me, the bright constellation of Orion, rather than representing the Hunter, looks very like a window frame or doorway, with the Belt, and the Sword, (containing the Orion Nebula, M42!).

Cygnus, the Swan, appears like a cross and is, in fact, often known as the "Northern Cross".

Leo, the Lion, appears to me as a rectangle, with a "question mark".

Cassiopeia, the Queen, appears as a letter M, or W, (depending on which way up, you see it!).

Pegasus, the Flying Horse, just appears as a big Square, not helped by the fact, that the "Horse" is upside down, anyway, in our skies!

Corona Borealis, the Northern Crown, appears as a curving shape, not unlike what it is supposed to be!

Delphinus, the Dolphin, especially when seen in binoculars, appears as a boat anchor, or a child's sailboat, or yacht!

Triangular, the Triangle, actually appears as its name suggests, with its 3 stars forming a triangle! And the Plough does represent what it says, or else, a sickle.

Other constellations, especially the faint ones, could mean anything, or nothing, such as Camelopardus the Giraffe, Lacerta the Lizard, the Lynx, Lepus the Hare, Sextant, the Sextant, and Libra the Scales, or Vulpecula the Fox. One example is Hercules, which is difficult to even pick out in our skies. It is a surprisingly faint constellation, given it is named after such a great Hero, although in the much darker skies, of ancient times, it would have been far easier to pick out the fainter constellations!

The human brain has always tended to create patterns out of nothing. As a result, some early astronomers and star chart makers just wanted to make a name for themselves by inventing new constellations,

some of which were later discarded from modern star charts!

Some constellations are pointless, such as Microscopium, which only contains a few faint stars, anyway.

It is notable that many of the Southern Hemisphere constellations are named after birds and scientific instruments, as they were too far South to be known by the Greeks and Babylonians. They were only "discovered" by the seafaring explorers of the Renaissance and consequently, it is not surprising that some were named after scientific instruments - e.g. Microscopium, the Microscope; Horologium, the Clock; Octans, the Octant; Circinus, the Compasses; Norma the Rule!

Unlike the Northern Hemisphere, there are very few mythological beings in the Southern Hemisphere skies!

Latest Observations - 13 Jan

I was still observing the two Comets 67P and Atlas in January. Again, comet Atlas, was much easier to see, as it appeared more condensed, with a brighter centre, whilst comet 67P, was much more diffuse in nature and, consequently, harder to see. Ironically, both Comets remained quite close to the star, Pollux, one of the Gemini "Twins".

The weather was still generally bad, into January, with the usual extended cloudy periods.

The Crab Nebula - 14 Jan

The Crab Nebula was featured in the January EAS meeting. Situated in the constellation of Taurus, it is also known as Messier 1, or M1, being the first on Messier's list, in his catalogue.

I have seen it via my 8" SCT, but it is quite dim, appearing oval shaped, like a galaxy. The fibrous nature of it is not visible.

Arabic Star Names - 15 Jan

As Ron Canham pointed out in the January meeting, the Arabian astronomers made many important contributions to the Night sky. One obvious example of this is the fact that many bright stars have names starting with the letter A!

Indeed, in my GOTO list of Named Stars, which has a total of 79 names, 29 of them start with the letter A. This can make it awkward when I am trying to get to one of the other stars, between B and T, as I must scroll through all the "A"s, before I can get on to the other stars. Many of the "A"s are famous stars such as Aldebaran, Antares, Arcturus, Algol, Altair, Albireo, and many others. It goes without saying, these are all bright naked eye stars!

V1405 Cas - 20 Jan

Since the end of last March, I have been reporting my observations of Nova Cas, or V1405 Cas. As it just kept on going, (and still is!), I could see that it is certainly an unusual nova - most novae are short-lived.

I have been surprised by the lack of coverage of it either in the astronomical magazines or on the Internet. Most of the coverage dates from when it first appeared on 18th March last year! The only site reporting daily magnitude observations of it is the AASVO site although, in the February issue of the "Astronomy Now" magazine, there is a piece on it (page 75), by Tracie Heywood, which states that it is a "slow" nova, rather than one that quickly brightens and soon fades down again.

However, this one started at about magnitude 8, reached a maximum of magnitude 5.3 in the 2nd week of May, then quickly faded back to magnitude 7.5! Subsequently, there were several brief flare-ups, before it reached magnitude 6.0 in late July. It then faded again, although in early November was still about magnitude 8, but then faded to magnitude 9.5 by late December.

This type of nova occurs in binary stars where one is a white dwarf, and material is pulled from its companion star, upon its surface. When it has gathered enough hydrogen, nuclear fusion occurs, hence the Nova.

As can be seen, when at maximum, it briefly just about reached naked eye visibility, and

has been easily visible in a telescope or binoculars throughout. On 19th January, I could still see it easily with my 8"SCT, when it was about magnitude 10.

It has now been visible for at least 10 months and, although now on a slow fade, at present it is still visible in a telescope!

Comet Borrelly and Astrofest- 30 Jan

At the end of January, after a few failed attempts earlier in the month, I found Comet Borrelly. It was quite faint, and diffuse, via my telescope. This is the 42nd comet that I have seen in nearly 39 years of seeing Comets!

Comet Borrelly is another short-period comet, like 67P, with a 6.8 year orbit. In 2001, the Deep Space probe imaged the nucleus, which proved to be long, and elongated, in shape.

Comet Atlas was still quite bright and fairly condensed, but I had really lost Comet 67P, by now (I last saw it about 8th January).

The weather this last week has again been dire, with a long succession of overcast days and nights - at least a week without even a glimpse of the Sun! When the Sun HAS been visible, it has had a number of spots of varying sizes (large, medium and small) on it.

Today, I was thinking that it is exactly 2 years since the London Astrofest was last held on 30th - 31st January 2020!

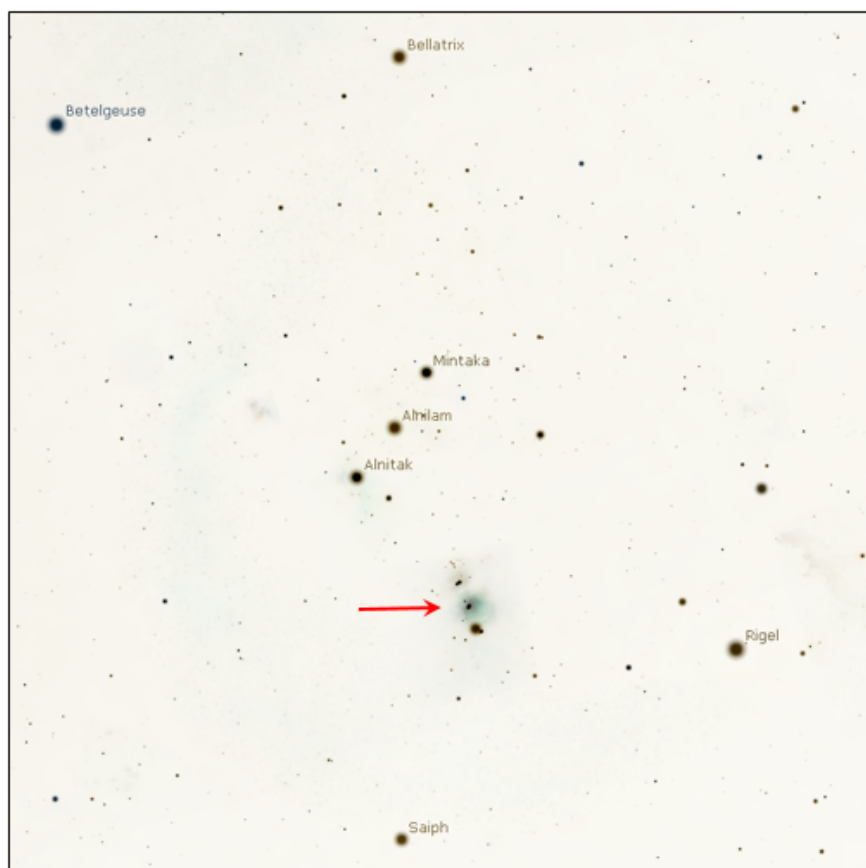
How sad that it still wasn't possible to hold it this year - they are having it on-line, which is not the same. Last year's event was turned into Worldwide Astrofest, with several on-line events from February through to December. Again, not the same, as there are no exhibition stands to browse.

Two years ago, we had all heard of Covid 19, but the government and media kept saying that it was not likely to be a problem, in the UK - less than 2 months later, came the first lockdown. Hopefully, this time next year, the London Astrofest will be back at Kensington and Chelsea Town Halls!

Object of the month – The great nebula in Orion (M42) - Martin Howe

Last month we looked at the Pleiades open cluster, and this month we look at one of the other showpiece objects of the winter sky – the great nebula in Orion, number 42 in Charles Messier's catalogue.

Like the Pleiades, M42 (magnitude 4) is also visible to the naked eye even from London, and equally easy to find. It forms part of the "sword" hanging from Orion's belt and is visible as a faint fuzzy patch (see finder chart below).



M42 is an emission nebula – the nebula contains vast clouds of gas and dust from which stars are forming. Photons from some of the newly born hot energetic stars heat the hydrogen gas, which can then release photons at very specific wavelengths that we can see or capture with a camera.

M42 is about 1,300 light years away, which makes it the closest large star-forming region to us.

The nebula region is very large, both in terms of actual size (about 24 light years across), as well as its apparent size in the sky (about 1 degree, or two full Moons, in diameter), helped

somewhat by its relative proximity to us. As a result, viewing this is well suited to a pair of binoculars or a small telescope which will start to show the fuzzy extent of the nebula.

Imaging M42 can actually be quite a challenge, for a couple of reasons. Firstly, its size means that a small telescope or long focal length camera lens is best – high magnifications will not be able to cover the full region of nebulosity. Secondly, it has a very wide range of intensities (dynamic range), from a very bright core through to the faint wispy surrounds. This means that, typically, a number of different length exposures need to be taken to capture each of the different elements at their optimum exposures, and then combining these into a single image.

Being one of the most photographed images of the objects in the night sky we have probably all seen beautiful colour images of M42, however, for my image this month, I have chosen to present a different view using a monochrome shot. I think sometimes this can reveal more faint detail in the nebula without the distraction to the eye of what is otherwise a very bright and colourful nebula.



This image was captured from London using a 200mm f/2.8 Canon camera lens attached to an ATIK 314L mono CCD camera with a hydrogen alpha bandpass filter. The hydrogen alpha filter blocks all of the light hitting the camera except for very specific wavelengths attributable to the emission of photons from the hydrogen atoms within the gas cloud. This also has the benefit of blocking most of the light pollution that would otherwise swamp the image as seen from London, allowing longer exposures to reveal the fainter details. A range of exposures were taken to capture the detail in the different regions of the nebula, including exposures of 4 seconds, 30 seconds, 2 minutes, and 10 minutes. These were then combined into a single image using Photoshop.

Moon: crashing rocket will create new crater – here's what we should worry about

Acknowledgement: This article was written by David Rothery, Professor of Planetary Geosciences at the Open University and was published in **THE CONVERSATION** on 28th January. It is republished in full under Creative Commons Licence. The original article, with additional links can be found here: <https://theconversation.com/moon-crashing-rocket-will-create-new-crater-heres-what-we-should-worry-about-175773>

It's not often that the sudden appearance of a new impact crater on the Moon can be predicted, but it's going to happen on March 4, when a derelict SpaceX Falcon 9 rocket will crash into it.

The rocket launched in 2015, carrying Nasa's Deep Space Climate Observatory (DSCOVR) probe into a position 1.5 million kilometres from the Earth, facing the Sun. But the expended upper stage

of the rocket had insufficient speed to escape into an independent orbit around the Sun and was abandoned without an option to steer back into the Earth's atmosphere. That would be normal practice, allowing stages to burn up on re-entry, thus reducing the clutter in near-Earth space caused by dangerous junk.

Since February 2015, the 14 metres long, derelict upper stage, massing nearly four tonnes, has therefore been in a wide orbit about the Earth. Its precise movements have been hard to predict because they were influenced by lunar and solar gravity as well as the Earth's.

But we can now tell that it is going to hit the Moon on March 4 at a speed of about 2.6 kilometres per second. This will make a crater about 19 metres in diameter – a prospect that has provoked outrage in social media circles from people who are appalled that human negligence will disfigure the Moon in this way.

Misplaced concern

It is, however, surely more environmentally friendly for a dead rocket to end up on the Moon than being scattered through Earth's upper atmosphere in the form of metal oxide particles, which is what happens during a re-entry burn up. The Moon also lacks an atmosphere to shield it from space debris, so it is accumulating naturally occurring impact craters all the time.

The Lunar Reconnaissance Orbiter has already imaged a 19-metre crater formed when a half a tonne lump of asteroid rock travelling about ten times faster than the Falcon 9 struck the surface in March 2013. Over the past decade, hundreds of smaller impacts, by chunks of rock weighing as little as half a kilogram, have been spotted by NASA's lunar impact monitoring project.

The coming impact will be on the lunar far side, so we won't be able to see it happen. But spacecraft orbiting the Moon will be able to image the impact crater afterwards. Will we learn anything new? There have been several previous deliberate crashes onto the Moon, so we know what to expect.

For example, the considerably larger upper stages of rockets used in the Apollo landing missions were crashed so that vibrations detected by seismometers installed on the surface could be used to investigate the lunar interior. The Apollo seismometers were turned off long ago, and is not clear whether the seismometer on China's Chang'e 4 far side lunar lander will be able to provide any useful data this time.

A precisely targeted, deliberate crash was also achieved in 2009 when NASA's LCROSS mission sent a projectile into a permanently shadowed polar crater - making a smaller crater on its icy floor and throwing up a plume that proved to contain the hoped-for water vapour.

Biological contamination

So, I'm not bothered by one more crater being made on the Moon. It already has something like half a billion craters that are ten metres or more in diameter. What we should worry about is contaminating the Moon with living microbes, or molecules that could in the future be mistaken as evidence of former life on the Moon.

Most nations have signed up to planetary protection protocols that seek to minimise the risk of biological contamination from Earth to another body (and, also from another body back to Earth). The protocols are in place for reasons both ethical and scientific. The ethical argument is that it would not be right to put at risk any ecosystem that may exist on another body by introducing

organisms from Earth that might thrive there. The scientific argument is that we want to study and understand the natural conditions on each other body, so we should not risk compromising or destroying them by wanton contamination.

The biggest recent breach of the COSPAR protocols was in 2019 when the privately funded Israeli lunar lander Beresheet crashed on the Moon, carrying DNA samples and thousands of tardigrades. Those are half millimetre long organisms that can tolerate, though not be active in, the vacuum of space. These, and presumably also the microbes that lived in their guts, are now scattered across the Beresheet crash site.

Most likely none of these will end up in a niche where there is enough water for them to revive and become active, but that is not a risk we should be taking. The DSCOVR Falcon 9 was not sterile upon launch, but nor did it carry a biological cargo. It's also been seven years in space, so by now the risk of biocontamination is vanishingly small - but the more things we send to the Moon, the more careful we must be and the harder it will be to enforce any rules.

Up Next:

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

Professor Peter Bull MBE FRAS will talk about A Window Through the Universe. 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:

These will be advised by email.

Meet at "Stepping Stones" Pub at West Humble at 7:30 pm before going on up to Steers field at about 8pm if the sky clears.

AD HOC OBSERVING AT WARREN FARM:

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