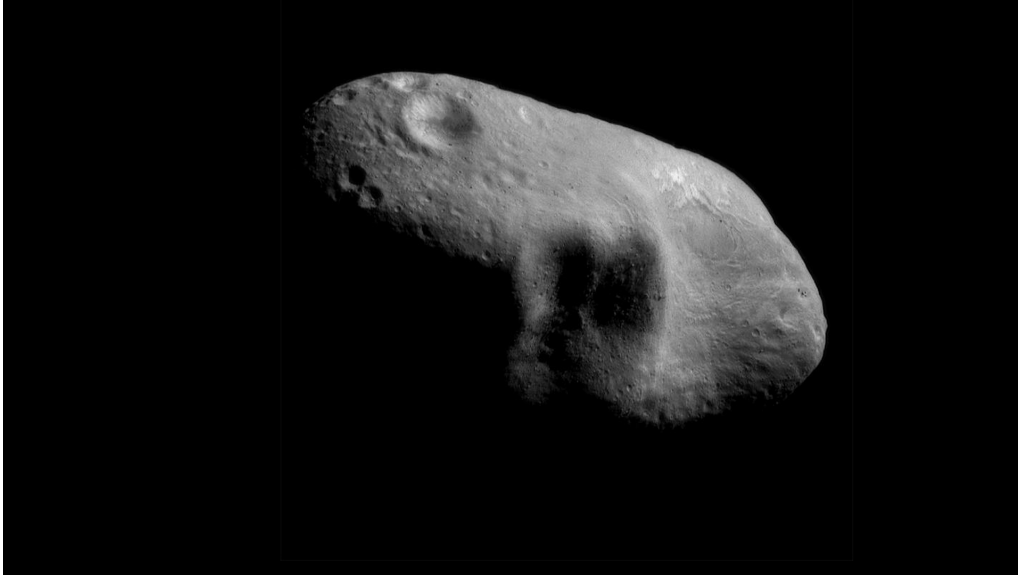


Astronomical Society of Edinburgh

Printed on 30 December 2021

2 July Meeting Report

July 4, 2021



We had an excellent talk from Prof. Giles Hammond of the University of Glasgow on a very interesting project he's running with his students. Alan Pickup also gave us a very comprehensive rundown of what's in the night sky in July and August. Watch the video to see them if you missed the meeting.

A lot of us in the Society do imaging and use some of the calibration techniques that Giles outlined but it was great having the background theory explained to us and seeing how it could be done from scratch.

There are a large number of asteroids which are reasonably bright (>12th magnitude), have rotation periods of several hours and are easily observable from UK latitudes. As asteroids rotate, their magnitude is modulated, and accurate photometry can reveal these fast rotators.

In this talk, I will describe a project which was run with our 3rd/4th year undergraduates at the University of Glasgow during the COVID lockdown. Using a remote telescope in Spain, we took consecutive nights of data of a pair of asteroids. I will describe the work undertaken to calibrate the images using dark/flat/bias frames, the use of plate solving software to identify the asteroid, and how calibration stars were used to estimate the asteroid magnitude.

These techniques can be applied to any remote telescope data and can be expanded to variable stars and exoplanets.

Our Autumn Programme 2021

July 30, 2021



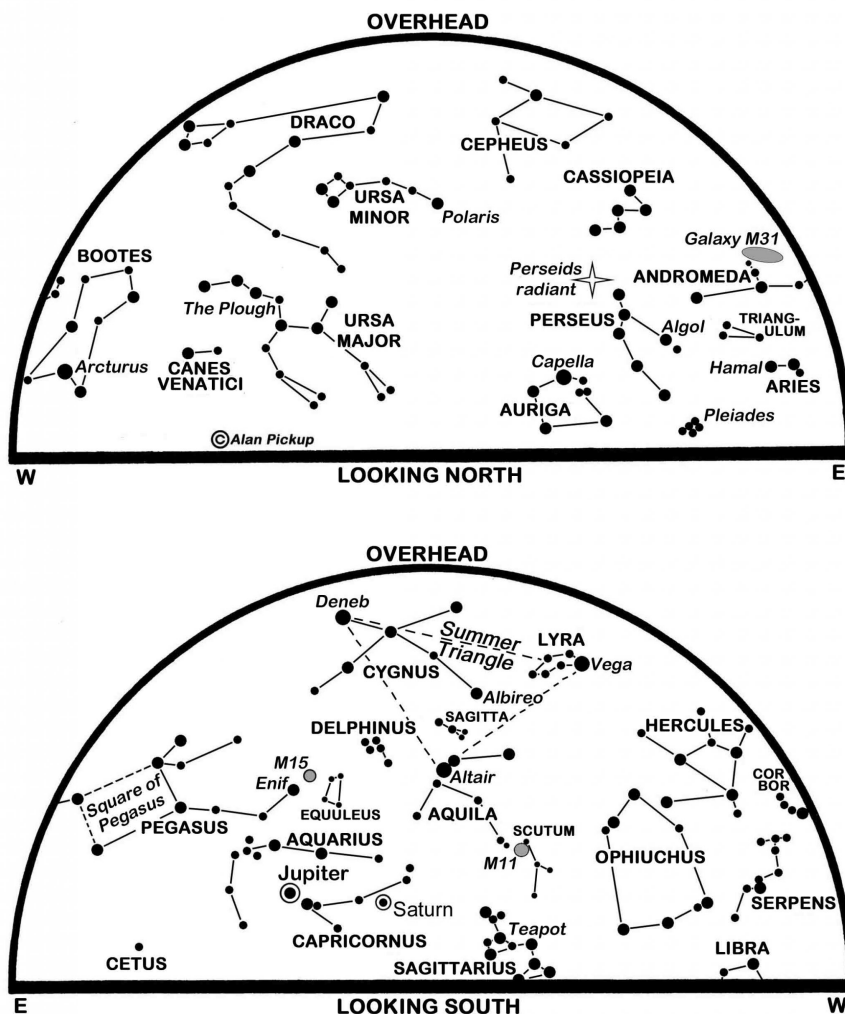
We've got a great programme of talks and events lined up this Autumn. Here's a taster of what's to come. More talks are still to be confirmed.

Join us live on our [YouTube channel](#) – all talks are free to visitors. Or why not [join the Society](#) and then you can be part of the event in a Zoom session or even in person at our normal venue, Augustine United Church, George IV Bridge Edinburgh, when restrictions allow.

Even if we hold physical events, we will still live stream talks to Zoom for ASE members and YouTube for visitors.

Scotland's Sky in August 2021

July 31, 2021



Jupiter and Saturn shine brightly at opposition as the Tears fall



Author: [Alan Pickup](#)

The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on the 31st.

To the welcome relief of astronomers at our northern latitudes, August brings the return of truly dark skies just in time for the peak of the annual Perseids meteor shower, once called the Tears of St Lawrence. We also have the oppositions of Jupiter and Saturn, which, being opposite the Sun, are at their brightest and best as they cross our night sky from the south-east at sunset to the south-west at dawn.

Standing high on the meridian at our map times is the Summer Triangle, though stretched from side-to-side by the map's projection. The bright stars Vega in Lyra, Deneb in Cygnus and Altair in Aquila, mark its corners but its expanse includes a wealth of interesting objects and the two other minor constellations, Sagitta the Arrow and Vulpecula the Fox.

The brightest of these, Sagitta, is the third smallest of all the constellations in the sky, lying 10° north of Altair and just below Vulpecula. Another 10° northwards, and slightly west, is Albireo, the beak of Cygnus the Swan and one of the showpiece double stars in the sky with contrasting gold and blue components. We may glimpse them through binoculars, but a telescope shows them at their striking best.

The Milky Way arches through the Triangle on its way from Sagittarius on the south-south-west horizon to the bright star Capella in Auriga around 15° high in the north-north-east. Halfway between Capella and the "W" formed by the brighter stars of Cassiopeia, higher in the north-east, is the place in Perseus from which Perseids appear to radiate.

The shower's meteors, though, appear in all parts of the sky and are already arriving as they build to a peak on the 12th before petering out by the 24th. Plenty of swift meteors, many leaving glowing streaks or trains in their wake, are seen near the maximum, with numbers predicted to exceed 80 per hour for an observer under perfect conditions. Given the absence of bright moonlight, this could be a bumper year for Perseids-spotting.



Albireo, Mark Phillips

The shower's meteoroids originate with Comet Swift-Tuttle which was discovered in 1862 and takes 133 years to orbit the Sun. Records of the shower, however, date back over two millennia while its whimsical name as the Tears of St Lawrence may have a macabre origin in early Christian tradition. The saint was martyred on August 10, AD258, some say by being roasted alive over an iron grill – with the not unconnected consequence that he is now regarded as the patron saint of chefs.

The Sun sinks 10° southwards during August as Edinburgh's sunrise/sunset times change from 05:17/21:20 BST on the 1st to 06:15/20:09 on the 31st. Its decline also draws the curtain on the season for viewing those high-level noctilucent clouds that I have highlighted in recent notes.



Crescent Moon, Fran Goodman

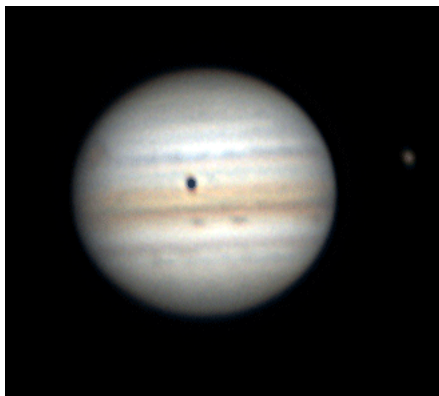
The Moon is new on the 8th, at first quarter on the 15th, full on the 22nd and at last quarter on the 30th. Its path against the stars takes it low across our southern sky at our star map times from Libra, low in the west-south-west, on the 15th and through the Teapot of Sagittarius, low in the south, on the 18th. It reaches full phase in Capricornus on the 21st and on that evening stands 7° below and right of the conspicuous planet Jupiter in the south-south-east.

The Moon's progress carries it below the Square of Pegasus in the east and onwards to lie 11° right of the Pleiades in the east-north-east on the 28th. The star cluster heralds the return of the spectacular and familiar constellations that light up our winter nights and by the time our August nights end Orion is in full

view in the east-south-east.

Jupiter surpasses every star as it comes to opposition on the 20th when it lies 600 million km away, shines at magnitude -2.9 and shows a cloud-banded disk though a telescope. Climbing to stand almost 21° high on Edinburgh's meridian about two and a half hours after our map times, it creeps 4° eastwards during the month to cross the border from Aquarius to Capricornus.

Binoculars, held steadily or preferably on a tripod, allow us to glimpse the four brighter Jovian moons which circle above the Jovian equator in "months" as short as 1.8 Earth-days for the inner one, Io, and 16.7 days for the outermost, Callisto. Telescopes, even small ones, show them more easily and allow us to track their motion across Jupiter's cloudy disk, or watch them disappear behind it. We may also spy the inky black shadows that the moons can cast onto the clouds and there are even, this month, a few instances when one moon eclipses another.



Ganymede shadow transit, Mark Phillips

Jupiter has another 75 moons, mostly small bodies less than 5 km wide and discovered by professional astronomers using large telescopes or during spacecraft flybys. Earlier in July, though, the amateur astronomer Kai Ly claimed to have discovered another moon, Jupiter's 80th, after sifting through years of official survey images of Jupiter and its environs. Unless the claim is overruled by the professional community, this appears to be the first moon of any planet to be discovered by an amateur.

Saturn reaches opposition on Monday when it lies 1,337 million km distant and shines as a magnitude 0.2 object on Capricornus where it is also edging westwards. It lies 18° to the right of Jupiter, passes 5° lower across the meridian, and stands 5° above the Moon on the 20th. Its rings, spanning 42 arcseconds around Saturn's 19 arcseconds globe, make it an unmissable telescopic beauty.



Saturn and 5 moons, Radim Stano

Venus is probably the only other planet visible in Scottish skies though its altitude in the west to west-south-west at sunset sinks from 8° to 6° and it sets less than one hour later. Brilliant at magnitude -4.0, it lies 6° below-right of the young 12%-illuminated Moon on the 11th. Mercury and Mars hide in the twilight below and to the right of Venus.

Diary for 2021 August

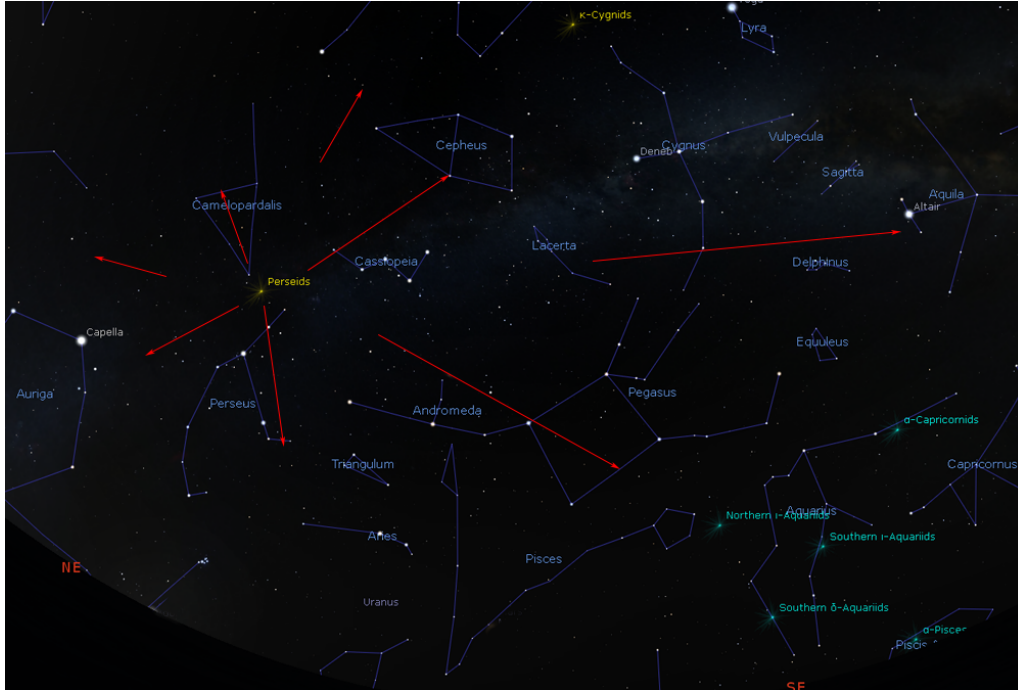
Times are BST

- 1st 15h Mercury in superior conjunction on far side of Sun
- 2nd 07h Saturn at opposition at distance of 1,337m km
- 2nd 08h Moon 5° S of Pleiades
- 3rd 08h Moon 6° N of Aldebaran
- 6th 21h Moon 3° S of Pollux
- 8th 15h New moon
- 11th 08h Moon 4° N of Venus
- 12th 20h Peak of Perseids meteor shower
- 13th 11h Moon 6° N of Spica
- 15th 16h First quarter
- 16th 20h Moon 4° N of Antares
- 20th 01h Jupiter at opposition at distance of 600m km
- 20th 23h Moon 4° S of Saturn
- 22nd 06h Moon 4° S of Jupiter
- 22nd 13h Full moon
- 25th 01h Summer solstice on Mars
- 29th 16h Moon 5° S of Pleiades
- 30th 08h Last quarter
- 30th 16h Moon 6° N of Aldebaran

This is an extended version, with added diary, of Alan's article published in The Scotsman on July 31 2021, with thanks to the newspaper for permission to republish here.

Watch the Perseid meteor shower this August 2021

August 3, 2021



The Perseids, one of the best meteor showers of the year, reaches its peak on the night of August 12-13, not long after New Moon, so conditions are quite favourable. Some will be visible each night from 23 July to 20 August.

The chart above shows the stars for midnight BST 12 – 13 August 2021

At its peak the shower is expected to produce a [Zenith Hourly Rate \(ZHR\)](#) of about 80 meteors per hour. From Edinburgh the radiant of the shower will be 38° above the NE horizon at midnight. This means we might be able to see around 50 meteors per hour, since the radiant will be relatively high in the sky. And remember, you can actually see some Perseids from as early as 23 July all the way up to the peak.

The Moon will set at 22:37 BST with just 24% illumination, so conditions are pretty good. This will also mean that there is a beautiful crescent Moon setting in the West on that evening.



The radiant is the point in the sky that the meteors appear to come from, which in this case is in the constellation of Perseus. To view meteors don't look directly at the radiant itself but at about 30° – 40° away from it, then meteors will show reasonably long trails without being too spread out.

Meteor showers happen when we pass through the debris left behind by comets and asteroids. The comet responsible for the Perseid shower is [109P/Swift–Tuttle](#) and we pass through this cloud every year in Jul–Aug. When these tiny objects hit our atmosphere they burn up and appear as “shooting stars”.

Alan Pickup says in his [August 2021 Sky Diary](#): *Records of the shower, however, date back over two millennia while its whimsical name as the Tears of St Lawrence may have a macabre origin in early Christian tradition. The saint was martyred on August 10, AD258, some say by being roasted alive over an iron grill – with the not unconnected consequence that he is now regarded as the patron saint of chefs.*

Some useful times on 12 August 2021 (BST)

Sunset: 20:58

Nautical darkness: 22:39 – 03:54

Mark Phillips

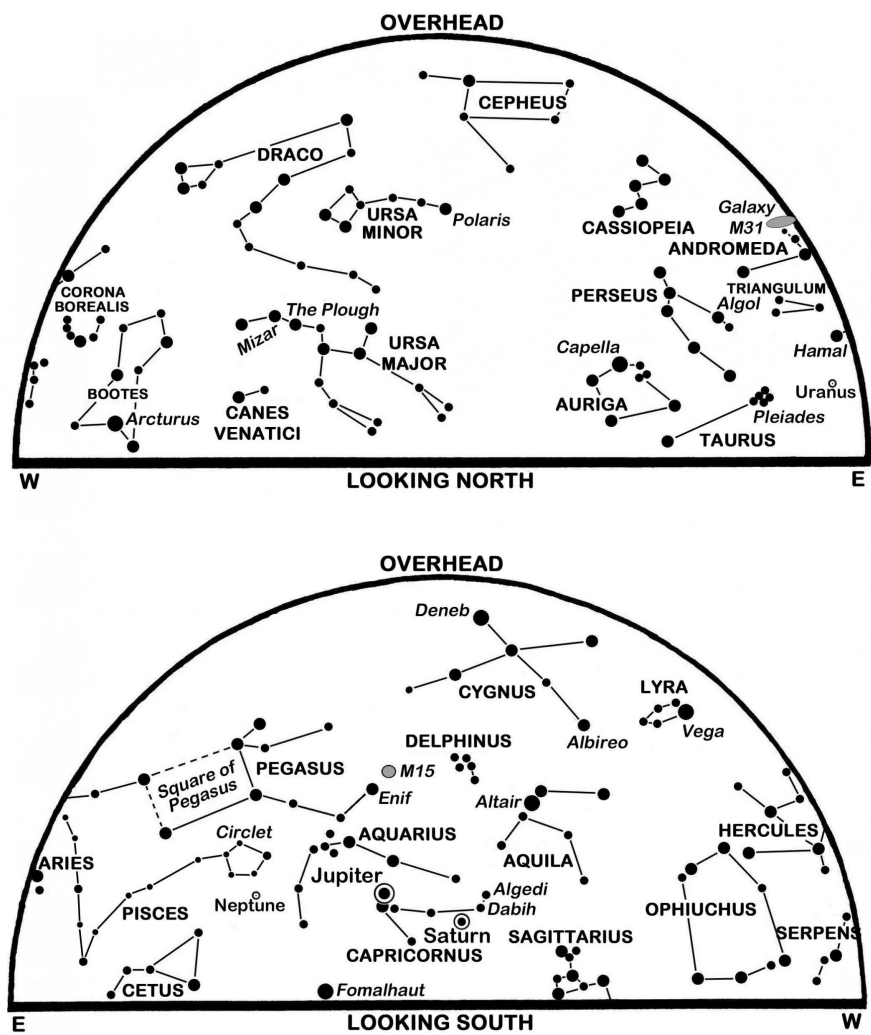
Information source: [in-the-sky.org](https://www.in-the-sky.org)



View our post on [observing and
imaging meteors »](#)

Scotland's Sky in September 2021

August 31, 2021



Escape light pollution to savour Milky Way in evening sky



Author: [Alan Pickup](#)
The maps show the sky at 23:00 BST on the 1st, 22:00 on the 16th and 21:00 on the 30th.
The planet Jupiter dominates our nights as it crosses our southern sky from low in the south-east at nightfall to set in the west-south-west during our morning twilight. Our star maps plot it about eighty minutes before it reaches its highest point at 20° in the south as seen from Edinburgh.

The most obvious other planet is Saturn which lies some 17° to the west (right) of Jupiter and traces an arc across the sky that is 5° lower than that of its brighter and larger neighbour. Both are creeping westwards in Capricornus while high above them, and slightly west, is the asterism of the Summer Triangle formed by the bright stars Altair in Aquila, Vega in Lyra and Deneb in Cygnus.

While the early months of the year provide our most spectacular evening skies, the coming weeks give us our best views of the Milky Way as it flows through the Summer Triangle and overhead as dusk subsides. To catch its misty glow, though, we need to pick a moonless evening and escape the light pollution that swamps so many of us.

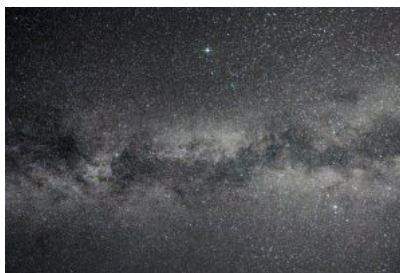
Made up of the combined light of millions of distant stars in the plane of our disk-shaped galaxy, itself called the Milky Way, its path at our star map times takes it upwards from Sagittarius on the south-western



Saturn and 5 moons – Titan, and Rhea (from left to right) (25.08.2021) Radim Stano

horizon to sweep to the right of Altair and close to Deneb in Cygnus before tumbling downwards in the north-east through the “W” of Cassiopeia and to the right of Capella in Auriga.

The Milky Way's brightness and profile is far from uniform. It dims noticeably below Cassiopeia and is brighter in the south where it is divided by obscuring clouds of interstellar gas and dust that lie closest to the plane of the galaxy's disk. One lane of darkness, dubbed the Great Rift, is particularly obvious as the Milky Way traverses the Triangle and represents just one of the problems faced by astronomers in mapping the true size and shape of our galaxy from our viewpoint within it.



Summer Triangle and the Milky Way by Jon Watson

Decades of research, often using radio astronomy which can penetrate the clouds, have shown that we inhabit a so-called barred spiral galaxy. Its arms of gas, dust and stars unwind gently from the ends of an elongated central bar, where older stars predominate. The whole edifice is anchored around a supermassive black hole some 26,000 light years away towards the western edge of Sagittarius.

Now, though, infrared observations from the NASA's now-retired Spitzer Space Telescope combined with star distances and motions measured by the European Space Agency's Gaia spacecraft show that one of our nearest spiral arms, itself called the Sagittarius Arm, has an unusual break. This takes the form of a region of gas and dust and star-formation that is some 3,000 light years long and juts out of the arm at a high angle “like a splinter poking out from a plank of wood”. The region is just above our south-western horizon at our map times and hosts several of our best-loved photogenic nebulae, including the Lagoon, Trifid, Omega and Eagle nebulae, the latter being home to the iconic Pillars of Creation.

Venus is brilliant for observers further south, but all-too-easy to miss in our early-evening twilight unless we have a clear and flat horizon. It is only 6° high in the west-south-west at Edinburgh's sunset tomorrow, and a degree lower than this in the south-west at the month's end. The planet sets itself around 50 minutes after the Sun and, even though it brightens this month from magnitude -4.0 to -4.2, we may be best to locate it using binoculars. One helpful pointer is the young crescent Moon which lies 6° above-right of Venus on the 9th and 8° above and to its left on the 10th.

Mercury stands furthest east of the Sun (27°) on the 14th but remains hidden in our evening twilight, as does Mars which is due to pass around the Sun's far side in October. Uranus and Neptune are binocular objects at magnitudes 5.7 and 7.8 in Aries and Aquarius respectively, the latter standing 4,326 million km away at opposition on the 14th.

Our autumnal equinox occurs on the 22nd when the Sun crosses southwards over the equator and days and nights are approximately equal around the world. Edinburgh's sunrise/sunset times progress from 06:17/20:07 BST on the 1st to 07:14/18:50 on the 30th while the Moon is new on the 7th, at first quarter on the 13th, full on the 21st and at last quarter on the 29th. The bright Moon sits below-right of Saturn on the 16th, below-right of Jupiter on the 17th and below-left of Jupiter on the 18th.

During its monthly journey around the sky, the Moon sometimes passes in front of stars, hiding them for a time during what are called occultations. Events involving the brighter stars are surprisingly rare, but two occur early in September when the waning crescent Moon hides third magnitude stars in Gemini in our eastern predawn sky.

On the 2nd, the magnitude 3.1 star Epsilon Geminorum, or Mebsuta, disappears at the bright left edge of the Moon, near the 8 o'clock position, at 01:16 BST as seen from Edinburgh and reappears instantaneously from behind the Moon's dark limb near the 2 o'clock position at 02:09. Kappa Geminorum (magnitude 3.6) takes an almost identical path behind the Moon on the next morning, with its disappearance at 03:45 and reappearance at 04:43. The occultations are best viewed through a telescope but allow for the times to be a little different if you are not in Edinburgh – for example, both events occur around four minutes later for watchers in Stornoway.



Jupiter and 3 moons – Europa, Io and Ganymede (from left to right) (30.07.2021) Radim Stano

Jupiter dims slightly from magnitude -2.9 to -2.7 and shows a 48 arcseconds disk through a telescope at mid-month with its four main moons in attendance or crossing in front of, or beyond, its disk. Saturn, magnitude 0.3 to 0.5, has the north face of its striking rings tilted 19° to the Earth and spanning 41 arcseconds around its 18 arcseconds globe.

Two notable double stars in Capricornus, identified as Algedi and Dabih on our chart, stand a few degrees above-right of

Saturn.

Algedi is a wide naked-eye double whose component stars, both yellow giants, appear separated by about a sixth of the diameter of the Moon. In reality, the double is a line-of-sight effect – the brighter of the two stands 106 light years from us while the fainter is more than six times further away.

Binoculars, or even the naked eye, show Dabih as a pair of stars about half as far apart as those of Algedi. These lie some 330 light years away and probably orbit each other every million years or so. Studies reveal that the brighter is actually three stars in tight formation, while the fainter is itself double so that Dabih actually consists of at least five stars.

Diary for 2021 September

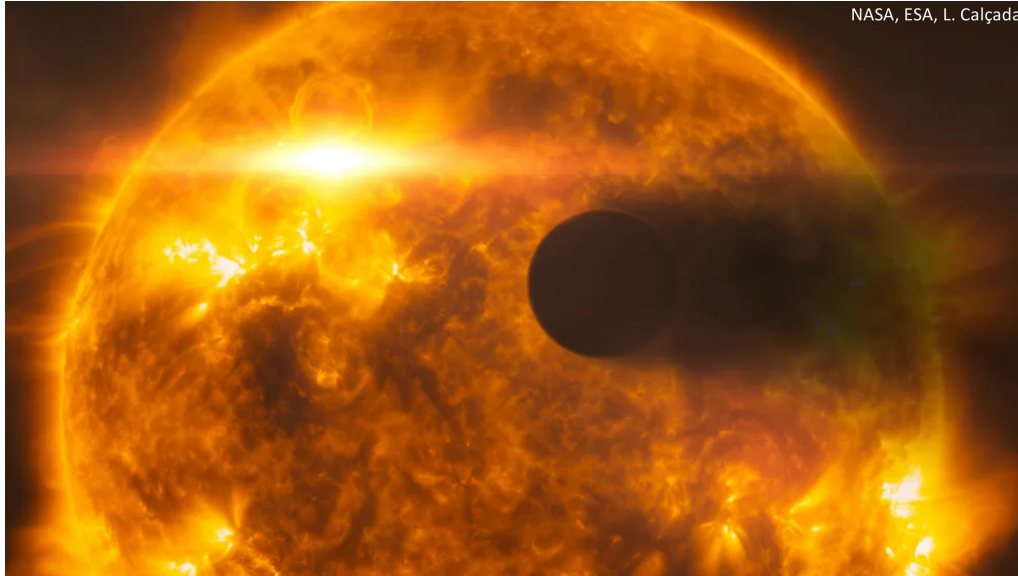
Times are BST

- 2nd 02h Occultation of Epsilon Geminorum (see text)
- 3rd 04h Occultation of Kappa Geminorum (see text)
- 3rd 06h Moon 3° S of Pollux
- 4th 06h Moon 3° N of Praesepe
- 5th 07h Venus 1.7° N of Spica
- 5th 21h Moon 5° N of Regulus
- 7th 02h New moon
- 10th 03h Moon 4° N of Venus
- 13th 02h Moon 4° N of Antares
- 13th 22h First quarter
- 14th 05h Mercury furthest E of Sun (27°)
- 14th 10h Neptune at opposition at distance of 4,326m km
- 17th 04h Moon 4° S of Saturn
- 18th 08h Moon 4° S of Jupiter
- 21st 01h Full moon
- 22nd 20:21 Autumnal equinox
- 26th 00h Moon 5°S of Pleiades
- 27th 00h Moon 6° N of Aldebaran
- 29th 03h Last quarter
- 30th 14h Moon 2.8° S of Pollux

This is an extended version, with added diary, of Alan's article published in The Scotsman on August 31 2021, with thanks to the newspaper for permission to republish here.

3 September Meeting Report

September 4, 2021



The society's regular talks resumed for the new season with a fascinating talk from Professor Don Pollacco of the University of Warwick. His talk covered the science of detecting terrestrial exo-planets and the work involved in untangling the natural activity of a star from the influence of its orbiting planet(s).

The talk covered many aspects of the science: the need to understand stellar behaviour and how studying our own sun contributes to this; the need to develop ever more sensitive spectrometers; and the need to improve the mathematical models in order to extract evidence of planetary influences from the overall observed behaviour of stars.

Next came another of Alan Pickup's The Sky (in September). As well as a brief look back at August's Perseid meteor shower, Alan showed, through a range of compiled diagrams and members' images, what's ahead overhead in the coming weeks, including the movements of the planets, the constellations and some of the deep sky objects.

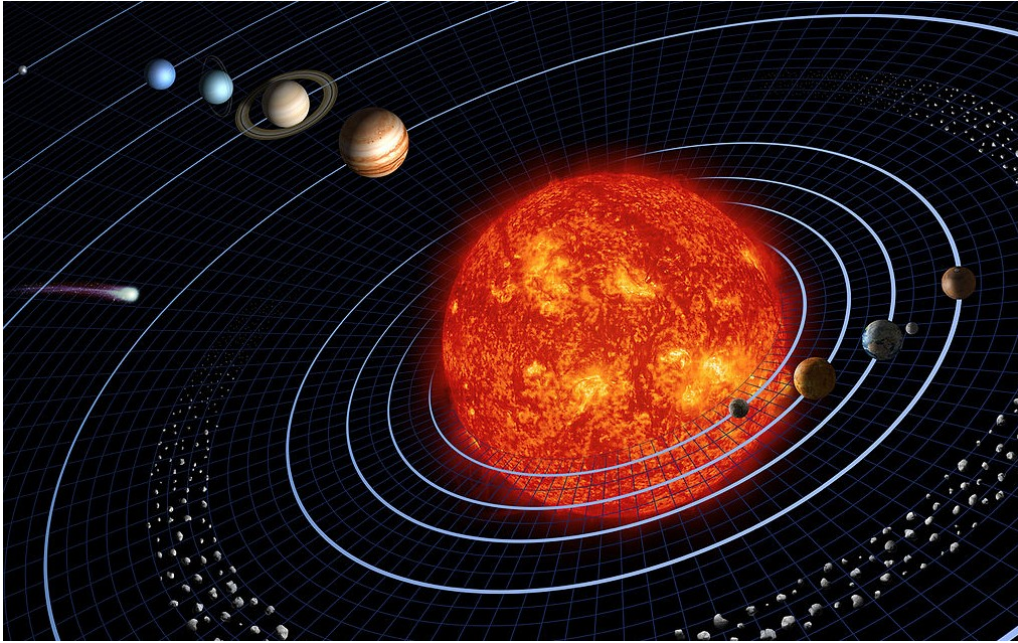
[00:05:06](#) Main talk

[01:12:30](#) The Sky in September

Ian Smith

New interactive solar system map

September 9, 2021



ASE member Radim Stano has been working on a number of projects since he joined the Society and he has now released the first of them – an interactive solar system map.

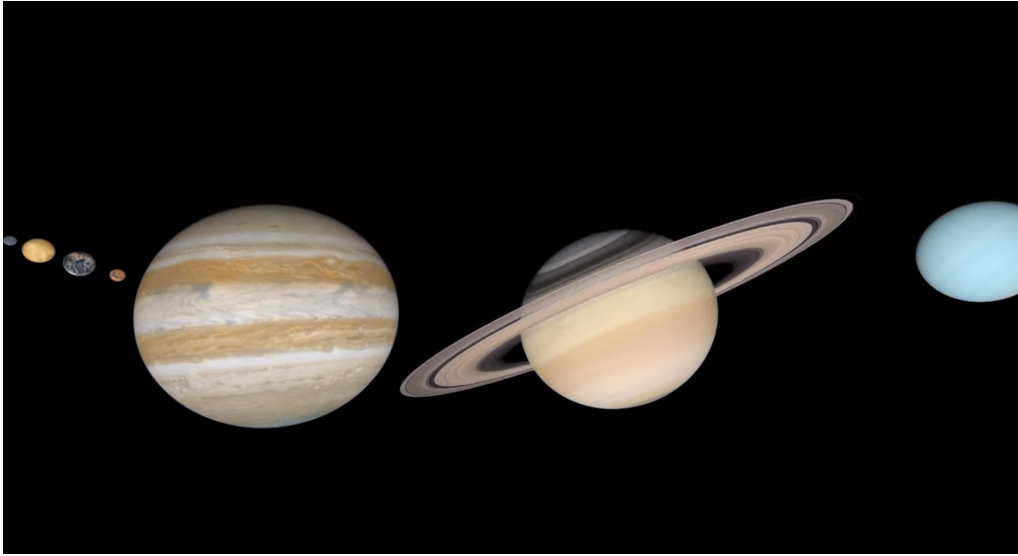
The map allows you to click on any member of our solar system and see images taken of it by ASE members from our [Imaging & Observing Group](#).

Have a look at the first version of the [Interactive solar system map](#) >

(Main image credit: NASA / Public domain.)

Astronomical inspiration at the Dynamic Earth Planetarium

September 14, 2021



Yes – Edinburgh has a fantastic new planetarium at Dynamic Earth! I went to visit Planetarium Manager and former Royal Observatory Edinburgh astronomer, Dr Alastair Bruce yesterday for a look around the dome and a sneak preview of some of their shows.

I don't know about you, but when I was growing up a trip to a planetarium was always one of my favourite experiences and a very influential element in starting my astronomical journey. I remember as a child making trips to the London Planetarium, the Royal Observatory Greenwich (with the late Heather Couper presenting), Jodrell Bank and of course more recently there's the Space Theatre in Glasgow too. Well we now have an impressive and exciting one in Edinburgh which is sure to inspire the next generation of astronomers. And Alastair is perfect for the role – if you've ever met him you'll know why. He's a fabulous and enthusiastic communicator.

Gone are the monolithic, alien-looking projectors dominating the centre of the dome. Now replaced with hidden, high quality projectors around the edge – a new state-of-the-art 6k Digital Planetarium. The graphics are impressive and totally immersive, and coupled with some great music, a planetarium show will definitely leave a lasting impression on you.

It's still relatively new and they are developing their programme, but already there are a number of 25 minute shows that you can go to – as part of your trip around Dynamic Earth, or just a planetarium visit. You can see the current [Planetarium Schedule](#) so you can choose your show. Titles include: *We are aliens*, *You are here*, *What's up*, *We are astronomers*, *We are stars* and more. Have a look at some of their [impressive trailers](#).

On 24/25 September – and in Oct/Nov too, they will be doing 45 minute evening shows too: *You are here* and *Holst's Planets 360 Classic*. And you can ask questions of experienced astronomers at the end. The *What's Up* show in Autumn 2021 will have a bit of stargazing training for the season, a beginner's guide to 'rainbow-making' and a focus on the news of the imminent launch of the Webb telescope.

I'll definitely be taking the family back to see it all properly. It really is amazing!

Mark Phillips

17th September Meeting Report

September 19, 2021



One of our past presidents, Jim Nisbet introduced the evening's event, in which we had a very interesting and extremely dynamic and enjoyable talk, given by Katrin Raynor-Evans, with her lecture entitled: Exploring Astronomy and Space Through Philately – An Introduction.

- Katrin gave us a very well delivered and fascinating talk and we were treated to not just an introduction to the study of and collection of postage stamps (philately), but to a whole historical journey of astronomy and space seen through stamps.
- We were shown the first produced astronomy stamp and then the spread of astronomy themed stamps around the World and here in the UK, all with their associated histories and interesting facts.
- Katrin also gave us collecting tips on how to source and curate a collection, delving into detail with different astronomy and space themes with fascinating examples and history about why the stamps were produced.

The talk was delivered in a very professional manner and full of enthusiasm. The slides are beautifully illustrated with hundreds of images of stamps and Katrin gave us a great insight to old and new astronomy history through her stamps... and in her own words, we learnt that: "Stamp collecting is so much more than a hobby, it's a lifestyle, a community."

This was a terrific talk and very highly recommended!

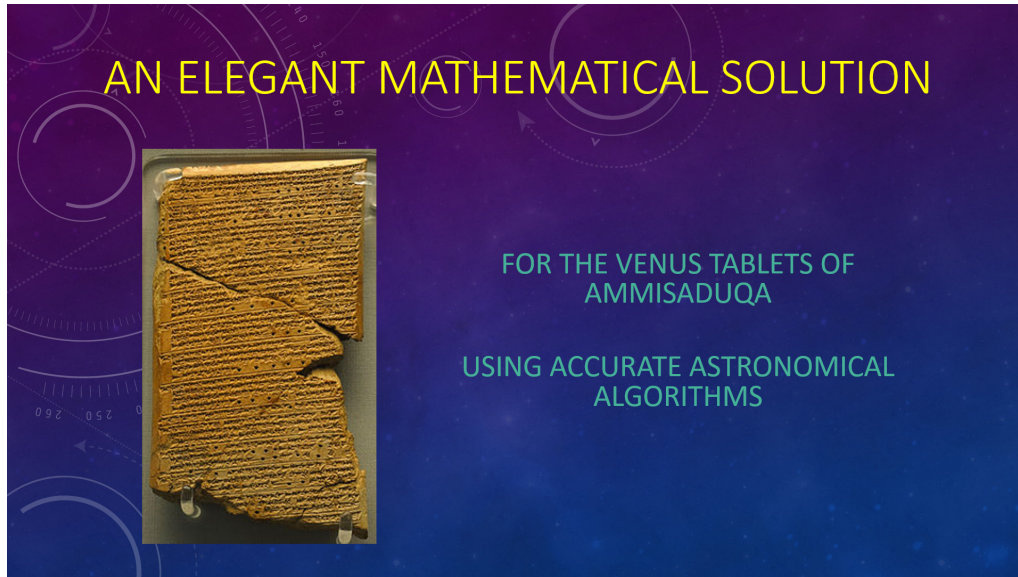
...And, like me, keep your eyes open to look out for and find the very rare possibility to buy a piece of the 'Apollo 15 scandal!' (As Katrin said: "one may come up in a local charity shop or auction.")

Katrin Raynor-Evans is a Fellow of the Royal Astronomical Society and Royal Geographical Society. She is a member of the European Astronomical Society and Astro Space Stamp Society. She writes articles and interviews for popular astronomy magazines including the BBC Sky at Night, Stanley Gibbons, and the American Philatelic Society. She is co-authoring her first book and recently asteroid 446500 Katrinraynor was named after her.

Will Joy

An elegant mathematical solution for the Venus Tablet of Ammisaduqa

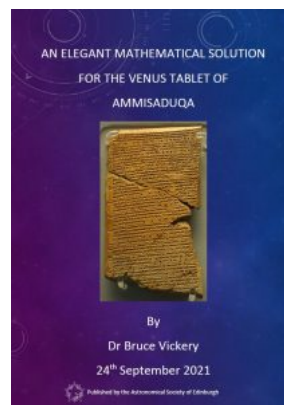
September 24, 2021



Here is the document containing the solution presented by Dr Bruce Vickery on 24 September 2021 at an online meeting of the Astronomical Society of Edinburgh.

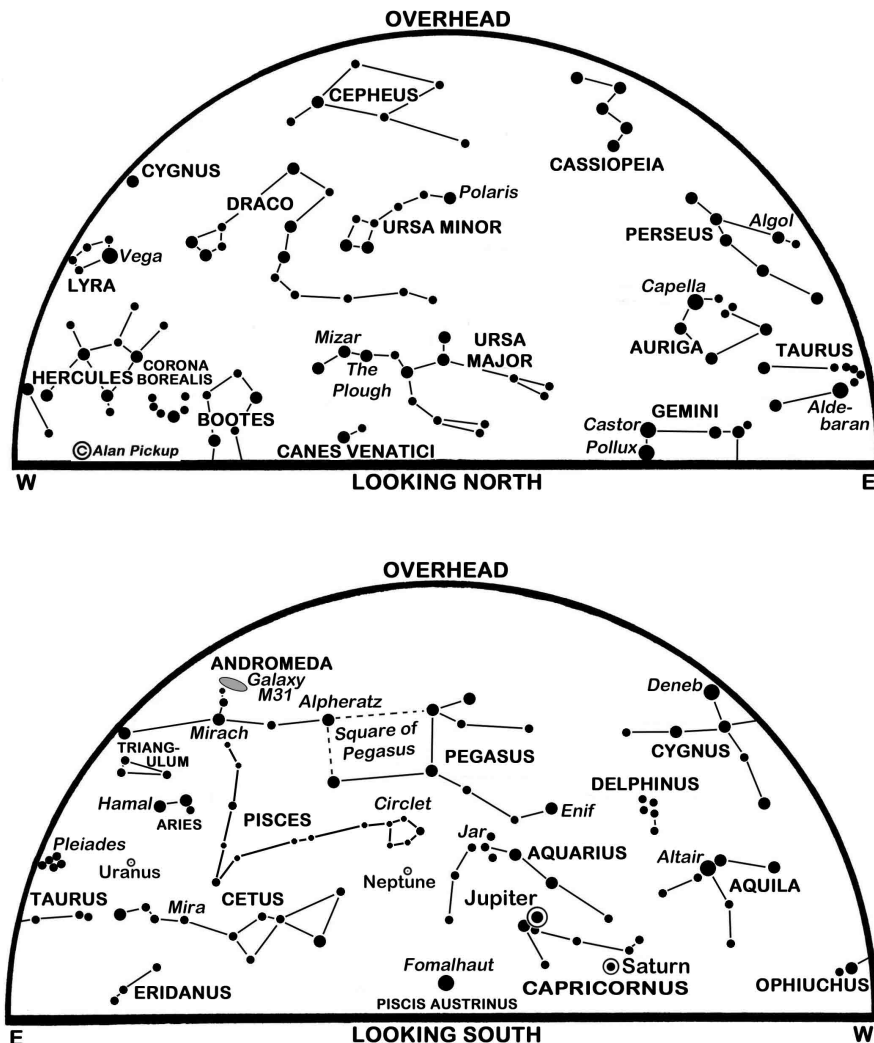
In it he outlines his solution and methods for determining the dates of Ammisaduqa's reign in Babylon from the Venus Tablet.

Read the document: [Ammisaduqa Solved](#) (PDF)



Scotland's Sky in October 2021

September 30, 2021



Saturn and Jupiter lead parade of watery constellations



Author: [Alan Pickup](#)

The maps show the sky at 23:00 BST on the 1st, 22:00 BST (21:00 GMT) on the 16th and at 20:00 GMT on the 31st. Summer time ends at 02:00 BST on the 31st when clocks are set back one hour to 01:00 GMT.

Our southern evening sky is still ruled by the giant planet Jupiter, guarded some 15° to its right (and a shade lower) by the less conspicuous Saturn. Vega, Deneb and Altair, the bright stars that make up the Summer Triangle, stand high in the south at nightfall but have toppled into the middle of our western sky by our map times. Meanwhile, the striking constellations of winter are beginning to climb in the east. Heralding their arrival are Taurus and the Pleiades star cluster, but the focus soon switches to the glorious form of Orion which rises below Taurus and strides southwards to cross the meridian before dawn.

The Square of Pegasus is reaching our high meridian at the map times but is not particularly striking. Indeed, its corner stars stand no comparison with those of the Summer Triangle while the area they enclose is notable chiefly for its paucity of naked-eye stars.

The north-eastern (top-left) star of the Square, Alpheratz, actually belongs to Andromeda and is a crucial link in the "star hop" that takes us to the famous Andromeda Galaxy, now at its best in our evenings. Extend the upper side of the Square to the left beyond Alpheratz for a similar distance to reach the equally-bright Mirach, then "make a right" along a spur of two dimmer stars. The galaxy, also known as M31 or Messier 31 after the French astronomer who first catalogued it, lies alongside the second/fainter of these. Appearing as a fuzzy oval to the unaided eye, and quite obvious through binoculars, it lies 2.5 million light years away and it is somewhat larger than our own Milky Way.

An expanse of sky to the south of the Square is occupied by the so-called watery constellations and the region has even been dubbed the celestial sea. It is not clear, though, whether its origins relate to the rainy season in the Middle East or to a mythological ancient flood.



M31 Pat Devine

In the west of this region is Capricornus the Sea Goat, currently playing host to Saturn and Jupiter and representing a creature that is part goat but with a fishy tail. Next comes Aquarius the water carrier whose overflowing jar, depicted by a Y of five stars (see map), spills its contents southwards towards Piscis Austrinus (the Southern Fish) whose leading star, Fomalhaut, is the 18th brightest in the entire sky but climbs no more than 5° above Edinburgh's horizon.

Following Aquarius is Pisces the (two) fish with its distinctive Circlet of stars just below the Square. The farthest planet, Neptune, is a magnitude 7.8 binocular object some 8° below the Circlet at present while the second most distant planet, Uranus, sits in Aries, to the left of Pisces, and is seven times brighter at magnitude 5.7. The watery theme extends southwards from Pisces to Cetus the Whale or Sea Monster and even further to Eridanus the River which flows all the way to Orion.

The Sun sinks another 11° southwards during October as Edinburgh's sunrise/sunset times change from 07:17/18:48 BST (06:16/17:48 GMT) on the 1st to 07:18/16:34 GMT on the 31st. The morning of the 31st also brings the end of British Summer Time when our clocks are set back one hour to GMT.

The Moon is new on the 6th, at first quarter on the 13th, full on the 20th and at last quarter on the 28th.

Venus continues as a brilliant evening object, though we may still struggle to see it from our northern latitudes even though it stands furthest from the Sun (47°) on the 29th. As seen from Edinburgh, it is only 5° high in the south-west at sunset on the 1st, and sets itself 53 minutes later. By the 31st, it is less than a Moon's breadth higher in the south-south-west at sunset and visible for 88 minutes.

It brightens this month from magnitude -4.2 to -4.4 and approaches from 132 million to 98 million km. A telescope shows its disk swelling from 19 to 26 arcseconds in diameter while its phase evolves from 62% to 48%, being 50%, like a miniature first quarter Moon, on the 28th. In fact, our Moon is 15% illuminated when it stands 2.3° above-right of Venus on the 9th and Venus itself stands 1.4° above the star Antares in Scorpius on the 16th, though whether we can see the star in the twilight is another matter.

Mercury enjoys its best morning appearance of 2021 later in the month, making for an excellent opportunity if we've yet to spot this elusive innermost planet. From the 20th to the 31st, it rises more than 105 minutes before the Sun and stands 6° to 7° high in the east-south-east one hour before sunrise. Brightening sharply from magnitude 0.2 to -0.8, it should be easy to pick out in the twilight if our horizon is clear. It is furthest from the Sun (18°) on the 25th.



Jupiter by Mike McGovern

There really is no mistaking Jupiter which moves from the south-south-east at nightfall to pass about 19° high in the south for Edinburgh one hour before our star map times. This month its increasing distance causes it to dim slightly from magnitude -2.7 to -2.5, but it barely shifts at all against the background stars of Capricornus, reaching an official stationary point on the 18th when its progress reverses from westerly to easterly.

Saturn, to the right of Jupiter and reaching its stationary point in Capricornus on the 11th, dims from magnitude 0.5 to 0.6 so it is still comparable with the brighter stars until it sets, followed by Jupiter, in the south-west in the early morning hours.

Catch the gibbous Moon (68% sunlit) below-left of Saturn and below-right of Jupiter on the 14th. On that evening, Jupiter is 44 arcseconds across if viewed telescopically, while Saturn is 17 arcseconds wide, its beautiful rings spanning 39 arcseconds with their north face tipped at 19° in our favour.

Our diary lists two meteor showers this month. The first, active from the 6th to the 10th and peaking on the 8th, is the Draconids which is sometimes called the Giacobinids after their parent comet, Comet Giacobini-Zinner. The shower usually produces only a handful of meteors that flow gracefully and slowly away from a radiant point in the Head of Draco, the quadrilateral of stars that lies around 15° to the right (north) of Vega on our northern star map. The Draconids, though, can give us a pleasant surprise – thousands of meteors

per hour were seen in 1933 and 1946 and hundreds per hour were seen as recently as 2011. Given that there is no moonlight to interfere this year, it just might be rewarding to “watch the skies” on the 8th.

Our second shower is more reliable but peaks under full moon conditions on the 21st. Meteors from the Orionids shower have a radiant to the north-east of Orion and begin to appear after our map times as Orion rises in the east. Were it not for the moonlight, some twenty Orionids per hour might have been seen near the maximum – all of them fast and the brighter ones leaving glowing trains in their wake.

Diary for 2021 October

Times are BST

- 1st 15h Moon 3° N of Praesepe
- 3rd 07h Moon 5° N of Regulus
- 6th 12h New moon
- 8th 05h Mars in conjunction with Sun
- 8th 12h Peak of Draconids meteor shower
- 9th 17h Mercury in inferior conjunction on near side of Sun
- 9th 20h Moon 2.9° N of Venus
- 10th 08h Moon 4° N of Antares
- 11th 03h Saturn stationary (motion reverses from W to E)
- 13th 04h First quarter
- 14th 08h Moon 4° S of Saturn
- 15th 11h Moon 4° S of Jupiter
- 16th 15h Venus 1.5° N of Antares
- 18th 12h Jupiter stationary (motion reverses from W to E)
- 20th 16h Full moon
- 21st Peak of Orionids meteor shower
- 23rd 07h Moon 4° S of Pleiades
- 24th 07h Moon 6° N of Aldebaran
- 25th 06h Mercury furthest W of Sun (18°)
- 27th 22h Moon 2.6° S of Pollux
- 28th 21h Last quarter
- 28th 23h Moon 4° N of Praesepe
- 29th 22h Venus furthest E of Sun (47°)
- 30th 16h Moon 5° N of Regulus
- 31st 02h BST = 01h GMT End of British Summer Time

This is an extended version, with added diary, of Alan's article published in The Scotsman on September 30 2021, with thanks to the newspaper for permission to republish here.

1 October meeting report

October 2, 2021



Our first in-person meeting back since the pandemic started was a great success with a very engaging talk from Dr Mike Shaw live from the USA on Getting started in Nighttime photography.

He showed us some of his amazing images plus tips and techniques of how to try it for ourselves. I think it sparked a lot of people's imaginations. For more information about Mike and his work see the links below.

Mark Phillips also presented The Sky in October.

As our first hybrid meeting we had a lot of technology to deal with since we had a remote speaker on Zoom, ASE members also on Zoom, over 300 visitors from all over the world on YouTube and ASE members in the hall at the Augustine United Church in Edinburgh. It all went pretty smoothly thanks to Peter Black and Graham Rule who pulled the technical strings in the background.

About Dr. Mike Shaw

Mike Shaw Photography, LLC

Web: MikeShawPhotography.com

Instagram: [@mikeshawphotography](https://www.instagram.com/mikeshawphotography)

Twitter: [@mikeshawphoto](https://twitter.com/mikeshawphoto)

Facebook: [@mikeshawphotography](https://www.facebook.com/mikeshawphotography)

15 October Meeting Report

October 16, 2021



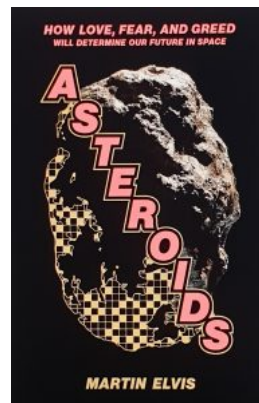
From science fiction to reality. Dr. Martin Elvis from the Center for Astrophysics | Harvard & Smithsonian told us all about asteroids and how our future in space (and he added astronomy) will be tied up with them and the mining of their resources.

He has [written a book](#) with the same title which goes into a lot of the concepts he discussed in more detail.

In the talk he covers:

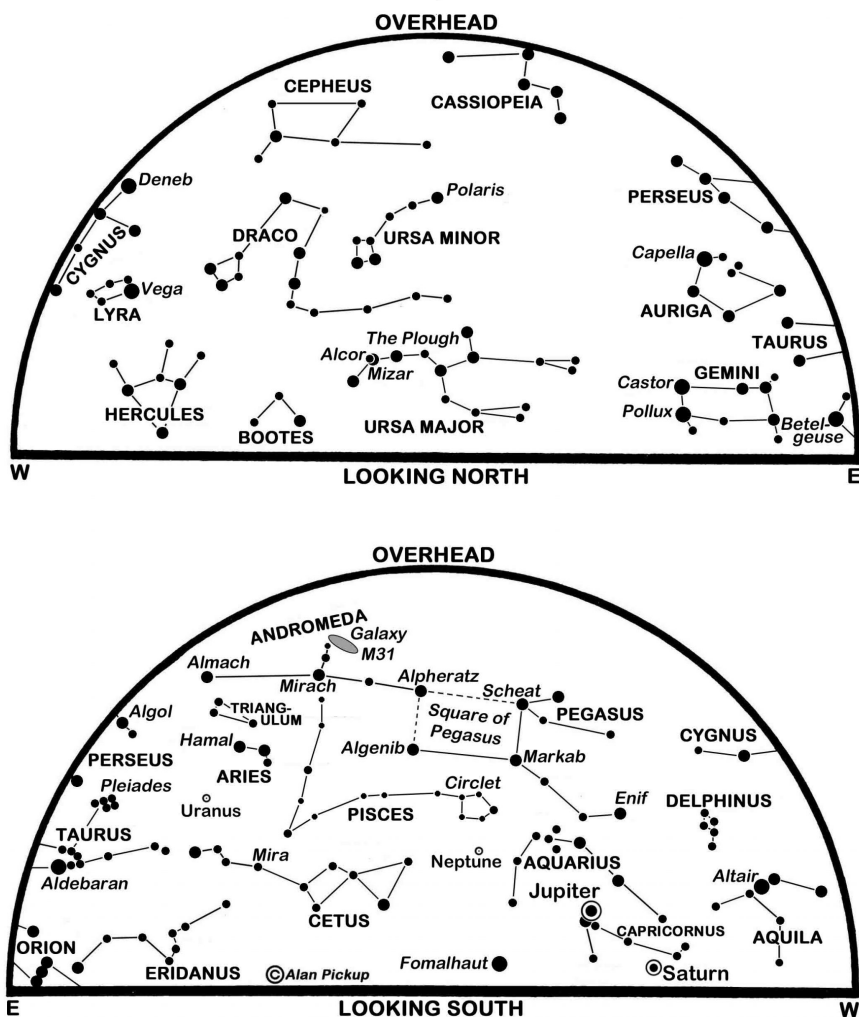
- Love – the flourishing of planetary science and astronomy in general through the study of these objects
- Fear – how do we protect the Earth from a killer asteroid
- greed – the wealth of resources available through mining these bodies

Worth watching if you missed it. It was a real eye-opener about what may be happening in space in the very near future. In fact he predicts as early as 2030!



Scotland's Sky in November 2021

October 30, 2021



Moon eclipsed on the 19th as dawn twilight floods our sky



Author: [Alan Pickup](#)

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 30th.

November brings some of our best stargazing nights of the year. Not only do we hold on to the Milky Way star fields of summer and a trio of bright planets in the evening, but we don't need to wait long before Orion and the other spectacular constellations of winter climb into view in the east. We also look forward to a partial lunar eclipse before dawn on the 19th.

Edinburgh's sunrise/sunset times change from 07:20/16:32 on the 1st to 08:18/15:45 on the 30th. The Moon is new on the 4th, at first quarter on the 11th, full during the eclipse on the 19th and at last quarter on the 27th.

The Moon takes six hours to traverse the southern region of Earth's shadow on the 19th, from 06:02 to 12:04 GMT, but only the early stages of the eclipse are visible from Scotland as the Moon sinks towards our west-north-western horizon and the morning twilight floods the sky.

At 06:02, as the top edge of the Moon encounters the edge of the Earth's penumbral shadow, it stands 13° above Edinburgh's western horizon and 7° below the Pleiades star cluster in Taurus. Little darkening may be noticed until the Moon draws near to the central dark umbral shadow which it begins to enter at 07:19. The Moon sets for Edinburgh only thirty minutes later, though, when the umbra blankets the upper 40% of the Moon's disk. The entire eclipse is observable from North America and most of the Pacific, culminating at 09:04 GMT when all but the southern 3% of the Moon lies within the umbra.

With our sky at nightfall changing only slowly, the Summer Triangle, formed by the leading stars Vega in the constellation Lyra, Altair in Aquila and Deneb in Cygnus, looms high on our meridian, though it tumbles into the west by our map times. By then, Capella in Auriga is the brightest star in the east while the Pleiades lie well to its right and above Aldebaran and the other stars of Taurus.

Orion is clambering above our eastern horizon but by midnight it stands 30° up in the south-east as the three stars of Orion's Belt slant down to Sirius, the brightest star in our night sky. Midnight, too, sees Leo rising in the east-north-east with its bright star Regulus marking the handle of the Sickle, a reversed question-mark of stars that stand for the lion's head and mane.

It is from within the Sickle that very swift meteors of the Leonids shower diverge every November. The shower persists from the 6th to the 30th and is expected to peak on the 17th or 18th but with strong moonlight swamping all but its brightest meteors in 2021. The Leonids are famous for producing intense meteor storms every 33 years, in line with the orbital period of the parent comet Temple-Tuttle, but few are expected this year and none at all before the Sickle rises.

The centre of the largely vacant Square of Pegasus stands some 55° high and due south as seen from Edinburgh at our map times, while the most remote object most of us can see with the unaided eye, the Andromeda Galaxy or M31, appears as a hazy ellipse 14° above and left of the Square's top-left star, Alpheratz.

Underneath the Square, the Sun's most remote planet, Neptune, is visible through binoculars as a magnitude 7.8 object 9° below the middle of the Circlet of Pisces (see map). The second farthest planet, Uranus, is seven times brighter at magnitude 5.7 and lies 11° below Hamal in Aries further to the east. It is 2,803 million km away and directly opposite the Sun at opposition at midnight on the 4th-5th.

Saturn and, more prominently, Jupiter remain on view in the lower southern sky at nightfall and set in the south-west between 90 minutes and three hours after our map times. Saturn lies some 15° to the right of Jupiter and 4° further south, while both are tracking eastwards (to the left) against the stars of Capricornus. Following oppositions in August, their distances are growing and they dim slightly, Saturn from magnitude 0.6 to 0.7 and Jupiter from magnitude -2.5 to -2.3.

The Moon lies below-left of Saturn on the 10th and is near first quarter when it sits below Jupiter on the 11th. On that evening, a telescope shows that Saturn's 16 arcseconds wide disk is set within rings that span 37 arcseconds and have their north face tipped 19° towards us. Also on the 11th, Jupiter appears 41 arcseconds wide with all four of its main moons on display: Europa to the left of the disk and Io, Ganymede and Callisto to its right.

Brilliant and lower still is Venus which may be sighted low in the south-south-west immediately after sunset provided our sky and horizon are clear. Its altitude at Edinburgh's sunset this month improves from 5° to 9° and by the 30th it sets more than two and a half hours after the Sun.

This month Venus brightens from magnitude -4.4 to -4.7, approaches from 97 million to 64 million km and swells in diameter from 26 to 39 arcseconds. It also shrinks in phase from 48% to 29% with the result that its dazzling crescent becomes discernable through binoculars. The planet makes an impressive sight to the left of the slender earthlit Moon on the 7th and to the Moon's right on the 8th.

Mercury, nearing the end of a nice morning apparition, is bright at magnitude -0.8 when it stands 6° high in the east-south-east one hour before sunrise on the 1st. It lies 6° below the thin crescent Moon on the 3rd but is lost from sight over the next week. Mars, much fainter at magnitude 1.6, emerges from the Sun's far side to pass close to Mercury on the 10th and stand low down in our south-eastern morning twilight at the month's end.

Diary for 2021 November

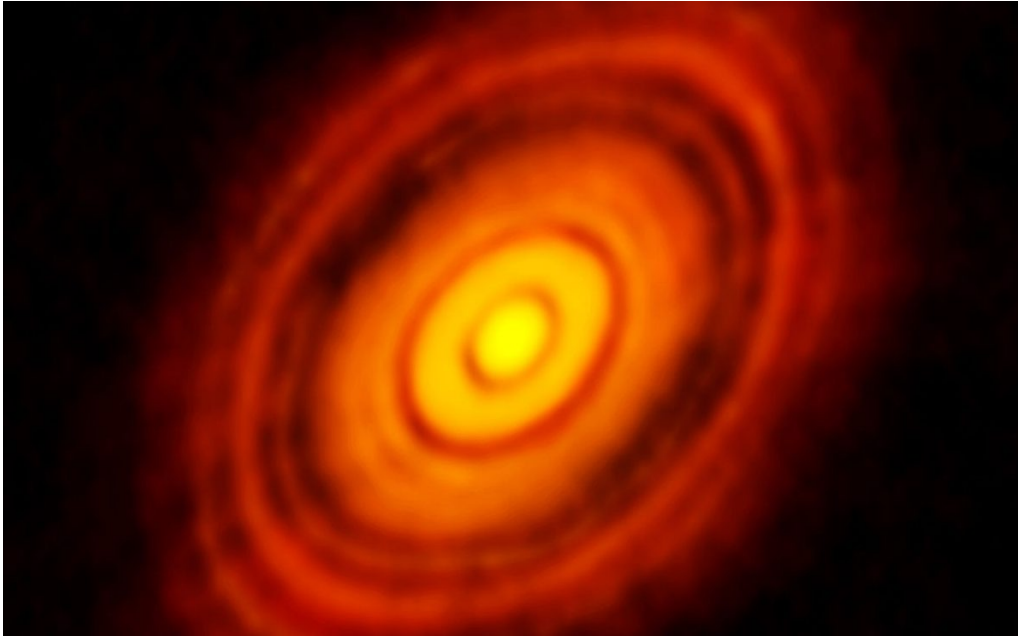
- 1st 02h Mercury 4° N of Spica
- 3rd 12h Moon 6° N of Spica
- 3rd 19h Moon 1.2° N of Mercury
- 4th 21h New moon
- 5th 00h Uranus at opposition at distance of 2,803m km
- 8th 05h Moon 1.1° N of Venus
- 10th 04h Mercury 1.1° N of Mars
- 10th 14h Moon 4° S of Saturn
- 11th 13h First quarter
- 11th 17h Moon 4° S of Jupiter
- 17th-18th Peak of Leonids meteor shower

- 19th 09h Full moon and partial lunar eclipse
- 19th 13h Moon 4° S of Pleiades
- 20th 13h Moon 6° N of Aldebaran
- 24th 04h Moon 2.5° S of Pollux
- 25th 05h Moon 4° N of Praesepe
- 26th 23h Moon 5° N of Regulus
- 27th 12h Last quarter
- 29th 05h Mercury in superior conjunction on far side of Sun
- 30th 23h Moon 6° N of Spica

This is an extended version, with added diary, of Alan's article published in The Scotsman on October 30 2021, with thanks to the newspaper for permission to republish here.

5 November meeting report

November 6, 2021



Stellar bonfires on Bonfire Night from Dr Justyn Campbell-White who gave us a talk about the accretion disks of stars and his work interpreting their spectra. Really interesting stuff and a good demonstration of the software he wrote for the task, STAR MELT.

Alan Pickup also gave us a very comprehensive guide to the night sky in November.

You can find out more about Justyn's work and software on his [University of Dundee webpages](#). You can also try out the STAR MELT Jupyter Notebook there too.

This was our second physical meeting back after lockdown and the first with a speaker actually at the Augustine United Church. We had a good ASE crowd and it was great to chat to people again, some of whom I've never met in person before.

Mark Phillips

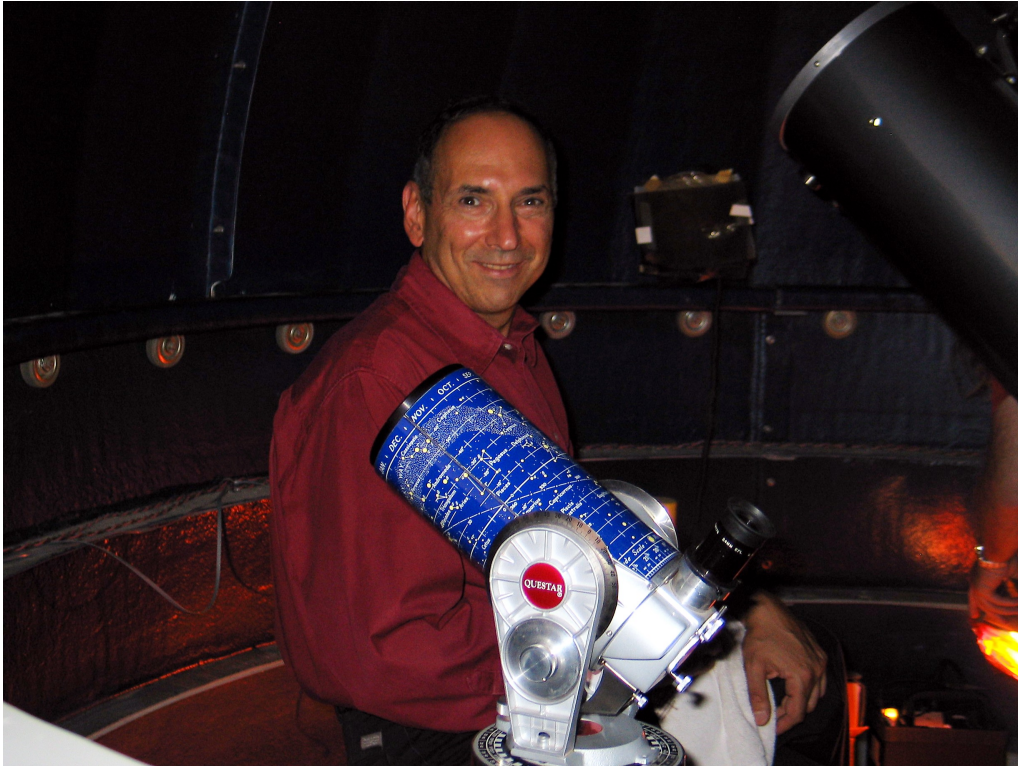
Low- and intermediate-mass stars acquire most of their mass in the protostellar phase, but accretion continues into the pre-main-sequence phase via a disk for a few million years. Accretion is a fundamentally important process, affecting disk stability/evolution, stellar rotation/activity, and planet formation/migration. The main observational challenge is probing the sub-au scales of the innermost disk, not yet possible for most of these stars, even via interferometry. Such young stars, however, possess a wealth of high-energy emission lines, revealing the nature of these accretion-related processes.

During my current position at the University of Dundee, I have developed the Python package, STAR-MELT, to automatically extract, identify, and fit emission lines, directly from the input spectral data. These lines can then be used to investigate the accretion activity and its temporal variability, allowing us to tomographically map the structures and inner disk of the stars.

In this talk, I will present an overview of our analysis method and the STAR-MELT package, along with results from our recently published paper that features analyses of three YSOs. We find that even with similar stellar parameters, the accretion processes and the final stages of star formation can be vastly different in terms of stability and nature.

19 November Meeting Report

November 20, 2021



The legend that is David H Levy gave us a wonderful talk about his love of astronomy and literature. And to hear him recount the story of the discovery and impact on Jupiter of Shoemaker- Levy 9 was very special.

It was so engaging and relaxed to just have him talk to us without presentation slides, like he was just sitting around with us and chatting. A very special experience and one to remember. Watch the video if you missed it.

David joined us online for one of our previous talks, when ASE member Randall Stevenson presented [Comet Tales: Thomas Hardy, Literature and Astronomy, 1850 to the Twentieth Century](#). He really enjoyed it a lot, having similar interests and offered to do a talk for us.

What's in a name? The Tribbles are loose!

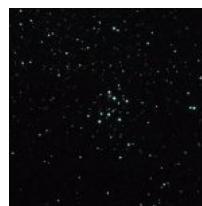
November 20, 2021



How do astronomical objects get their common names? Dumbbell Nebula, Pacman, Cave, Bubble, Flaming Star, Lagoon, Triffid... Some are very obvious, others less so. But who says that's what they'll be named?

These aren't official designations at all but often used by amateurs who like to image them and professionals who can refer to them more colloquially this way. Some of the names are very obscure – take for example the Cooling Tower Cluster, M29. Really?

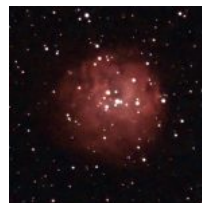
So I came across a couple of objects recently that didn't seem to have any names – and finding the designation of one was a little tricky. So I imaged them – see the banner. NGC 1624 is an Open Cluster within an Emission Nebula (also known as Sh2-212) in the constellation of Perseus. Close by is another similar but smaller object, Sh2-211. Neither seem to have a common name but both look like fluff-balls to me. So the President of the Astronomical Society of Edinburgh has decided to call them the **Tribble Nebulae**.



Cooling Tower?

Who's to say I can't call them that and how can I make it stick? If they have names then they are more likely to be found and observed or imaged by amateurs aren't they? William Herschel said that Mu Cephei had a "a very fine deep garnet colour" and the name *Garnet Star* stuck. So why should he have all the fun? Let's give it a shot!

Updating the entry in [Wikipedia](#) is a start and doesn't detract or make the content incorrect. In fact in the process I added more useful information about the objects than was there originally. The [image on Flickr](#), my [BAA image gallery](#) and this post are other references for the name. And if other imagers want to capture them and say they've got the Tribble Nebulae too then that has to be good doesn't it? Maybe we should start our own ASE Catalogue of Unnamed Astronomical Objects (ACUAO) and give them names. We already have our own catalogue: [ASE-24: Observing list for beginners](#), which has proved to be very useful, so why not?



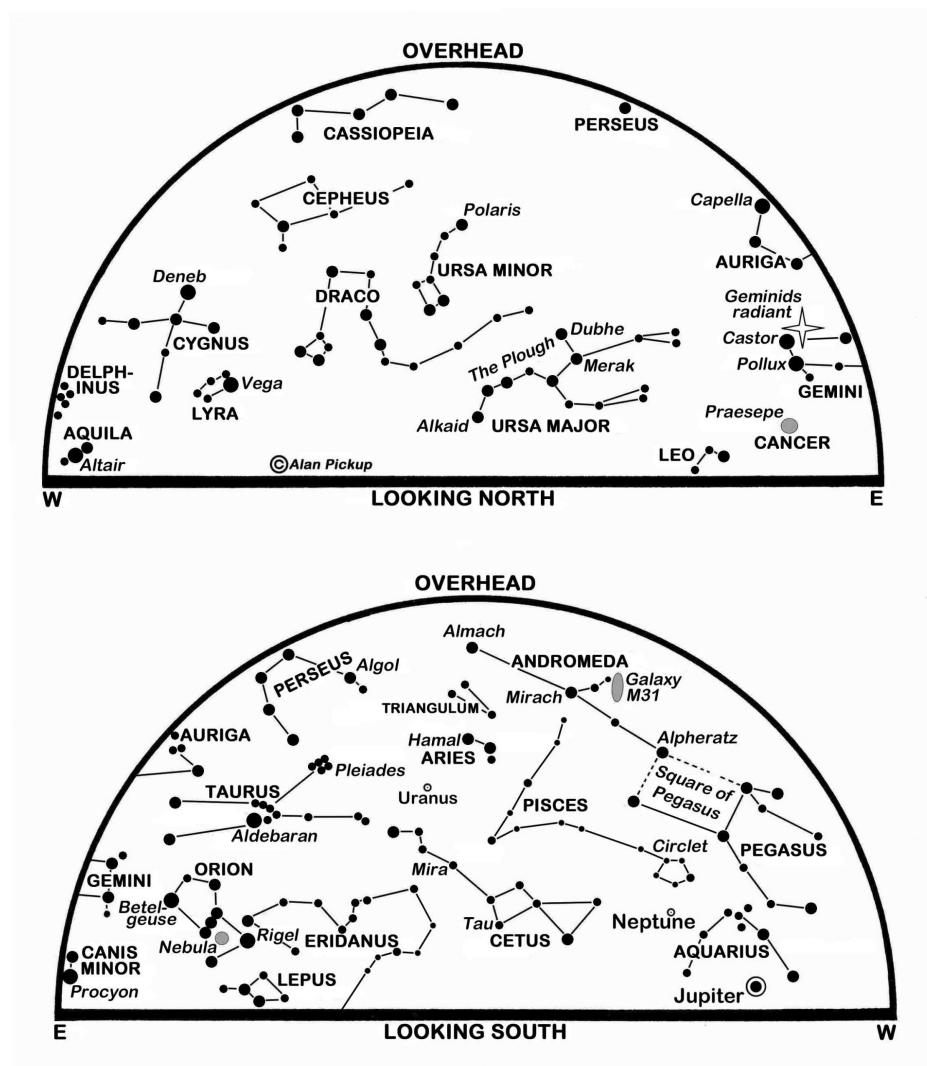
It does look like a Tribble!

Why Tribble Nebulae? Well Tribbles were small furry creatures in the original Star Trek in an episode called "[The Trouble with Tribbles](#)". Spread the word – the Tribbles are loose in Perseus!

Mark Phillips

Scotland's Sky in December 2021

November 30, 2021



Planets align as the James Webb telescope readies for launch



Author: [Alan Pickup](#)

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 31st.

With Orion rising above our eastern horizon earlier each evening, three bright planets lined up in our south to south-west and the return of the always-reliable Geminids meteor shower, December lacks little in the way of night sky interest. Astronomy enthusiasts, though, might be forgiven if their thoughts drifted to French Guiana in South America, and specifically Europe's spaceport at Kourou at which the James Webb Space Telescope, the JWST, is being prepared for launch.

The telescope's mirror has a diameter of 6.5 metres, as compared with the 2.4 metres of its predecessor Hubble, and will operate largely at infrared wavelengths. A joint project between NASA and both the European and Canadian Space Agencies, the JWST includes the Mid-InfraRed Instrument (MIRI) with which the UK Astronomy Technology Centre on Blackford Hill in Edinburgh has been closely associated.

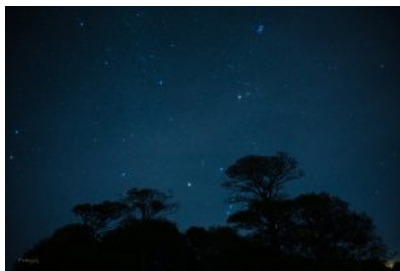
To say that its launch has been a long time coming is an understatement. Conceived in the 1990s for a launch in 2007, delays have seen its cost rocket twenty-fold to almost \$10 billion – all of it riding on a craft that will park 1.5 million km from the Earth, beyond any hope of repair if something goes wrong, and have a nominal operating life of five years, with hopes for a further five.

Its launch atop a European Ariane 5 rocket was pushed back yet again on November 22, from December 18 to "no earlier than" the 22nd. Given the time the JWST takes to reach its observing location, unfurl its sunshield and align its 18 hexagonal mirror segments precisely, it may be further three months before its science operations can really begin.

The Sun is at its most southerly for the year at our winter solstice at 15:59 GMT on the 21st while sunrise/sunset times for Edinburgh vary from 08:20/15:44 on the 1st, to 08:42/15:40 on the 21st and 08:44/15:48 on the 31st.

A total solar eclipse occurs at new moon on the 4th but is visible only from Antarctica. The Moon is at first quarter on the 11th, full on the 19th and at last quarter on the 27th.

Our December star charts show the familiar form of Orion climbing into the south-east, having risen in the east two hours earlier. Above it is Taurus where the Pleiades star cluster is 5° above the bright Moon on the 16th. Orion stands astride the meridian by midnight at midmonth, as Capella in Auriga stands overhead and Sirius, our brightest nighttime star, twinkles furiously lower in the south-south-east.



Orion rising with the Pleiades above. Castor and Pollux in Gemini to the left. Image by Fran Goodman

Above-left of Orion is Gemini whose leading stars Castor and Pollux lie one above the other as they climb though our eastern sky during the evening to pass high in the south in the early morning. It is from a radiant point close to Castor (see map) that medium-speed meteors of the Geminids shower appear to diverge, though the meteors themselves can flare anywhere in the sky.

The shower lasts from the 4th to the 17th, but it is expected to build to a peak overnight on the 13th-14th. Bright moonlight interferes, but we should have around four moonless hours before dawn on the 14th, when, with the radiant high in the sky, meteor rates could exceed 100 per hour for an observer under ideal conditions.

The sole bright planet visible at our star map times is Jupiter, low down in the south-west and dimming slightly from magnitude -2.3 to -2.1. As the night begins, though, it is prominent and close to 20° high in the south as it creeps eastwards against the stars and moves from Capricornus to Aquarius.

Much brighter still, and peaking at the dazzling magnitude of -4.7, is Venus, though we need a clear horizon below and to Jupiter's right to catch it earlier in the evening. On the 1st, it stands 9° high in the south at Edinburgh's sunset and sets itself 153 minutes later in the south-west. By the 31st, it is 8 degrees above the south-western horizon at sunset and visible for only 88 minutes. During the month its disk swells from 39 to 61 arcseconds as it swings around the near side of its orbit and its distance plummets from 64 million to 41 million km. Binoculars show its crescent narrow from 28% of the disk on the 1st to barely 3% on the 31st, by which time some people may be able to distinguish it with the naked eye.

Saturn is considerably fainter at magnitude 0.7, roughly halfway between Venus and Jupiter and sets in the south-west 90 minutes after our map times. The young earthlit Moon lies to the left of Venus and below-right of Saturn on the 7th and below the middle of the Jupiter-Saturn line on the 8th.

Venus serves as a guide to Mercury on the 31st, when it lies 6° to Mercury's right and a degree higher in the bright twilight. Mercury may be glimpsed through binoculars at magnitude -0.7. Mars, is an undistinguished magnitude 1.6 morning object very low in the south-east before dawn where it stands below-left of the waning earthlit Moon on Thursday and again on the 31st.

Comet Leonard was discovered on January 3 this year and is on its way to perihelion, 92 million km the Sun, exactly a year later. As this month begins it may be a seventh magnitude object in Coma Berenices. This puts it 20° south of the star Alkaid in the Plough (see map) and well up in our eastern sky before dawn, but also very low in our north-western sky at nightfall.

The comet passes 5° north of Arcturus in Bootes on the 6th and may be nearing its brightest, perhaps near the 4th magnitude, on the 13th as we lose it in the dawn twilight, though it remains very low in the west at nightfall for a few more days. Of course, comets are fickle creatures and Leonard may surpass expectations or disappoint us altogether.

Diary for 2021 December

- 3rd 00h Moon 0.7° N of Mars
- 4th 08h New moon and total solar eclipse
- 7th 01h Moon 1.9° S of Venus
- 8th 02h Moon 4° S of Saturn
- 9th 06h Moon 4° S of Jupiter
- 11th 02h First quarter

- 14th 07h Peak of Geminids meteor shower
- 16th 19h Moon 4° S of Pleiades
- 17th 19h Moon 6° N of Aldebaran
- 19th 05h Full moon
- 21st 10h Moon 2.6° S of Pollux
- 21st 15:59 Winter solstice
- 22nd 08h Peak of Ursids meteor shower
- 22nd 11h Moon 4° N of Praesepe
- 24th 05h Moon 5° N of Regulus
- 26th 18h Mars 5° N of Antares
- 27th 02h Last quarter
- 28th 07h Moon 6° N of Spica
- 29th 01h Mercury 4° S of Venus
- 31st 14h Moon 4° N of Antares
- 31st 20h Moon 0.9° S of Mars

This is an extended version, with added diary, of Alan's article published in The Scotsman on October 30 2021, with thanks to the newspaper for permission to republish here.

What does ASE membership mean?

November 30, 2021



M42 Orion Nebula, Pat Devine

We always welcome visitors to our meetings at the Astronomical Society of Edinburgh (ASE) – and that will never change. But what does it actually mean if you choose to join us?

There will never be any pressure to join and we just want to share our passion for astronomy with everyone. Over the past couple of years our membership has grown significantly and now stands at 155. This is partly due to an increase in interest in the topic over lockdown but also because we have been doing so much more online during that time and there's such a lot of enthusiasm in our Society. Just take a look at the amount and quality of images being taken by ASE members on our [Flickr Group](#). We have the complete range of astronomical experience from brand new – to intermediate – to advanced – to former professionals.

At the very least you get to chat, regularly on our **very active WhatsApp Group** and at meetings, about anything to do with astronomy, telescopes, cameras, imaging and observing – as well as some more random subjects... We learn from each other, help to choose equipment, what to observe and image in the sky, how best to process images... Anything and everything. Members get to join our **meetings via Zoom** if they can't make it in person.

Here's a quote from a recent member about what it means to him.

"I joined the ASE just over a year ago after taking up astrophotography as a hobby in lockdown. I have been impressed by the range of online (and now in person) events and speakers hosted by the ASE. In addition the active WhatsApp groups and newsletter are great source of advice, encouragement and inspiration. And all for just £30 per year is a bargain!"

Pat Devine

Pat has only recently started imaging but look at the image in the banner. This is what he produces now along with many many more excellent images!

We also plan to run more **group observing sessions** again now that restrictions have eased a little. We recently had a group observing out in East Lothian together and that was very successful, with newer members learning from the more experienced.

Every week there is usually an **Email Newsletter**, discussing topics such as ASE news, what's happening in the week, images from members, astronomy and space news, external events, learning about a specific astronomical topic, more random rambles around astronomy (recent topics have included astronomy and

music, telescopes in the poems of Robert Frost), extracts from our archives and history, which goes back to 1924 and beyond.

Our **Imaging & Observing Group** is the most active part of our Society and meets via Zoom every month for members. The membership of the group has more than doubled in size over the past 2 years and so the place we used to meet is no longer large enough – and as we have International members, we meet online. We talk about everything to do with observing and imaging: equipment, techniques, objects, processing, sharing images. We also now get guest speakers, advanced amateur astronomers who share their experience with us. It's great fun and to see just how far our members have come is staggering. Just look at the images on Flickr.

We also run our own projects to encourage people to get out imaging and to provide them with a *focus*: [ASE Messier Project](#), [ASE Caldwell Project](#), [ASE Lunar 100 Project](#) and we have interactive maps of these projects in development too. We have some **equipment that members can borrow**, to try out and maybe help them decide what they might want to get themselves.

There's more information about Membership as well as Gift Memberships on the [Membership Page](#). There really is no pressure and if all you want to do is watch our meetings, in person at the Augustine United Church in Edinburgh or on YouTube, then that's fine by us and you will always be welcome. You can also taking part in our [4-Steps to the Stars Programme](#), to help get you started in astronomy. But if you want to go deeper into the subject, get a telescope, take up imaging or just become more advanced, then membership may be for you. Let us know how we can help you.

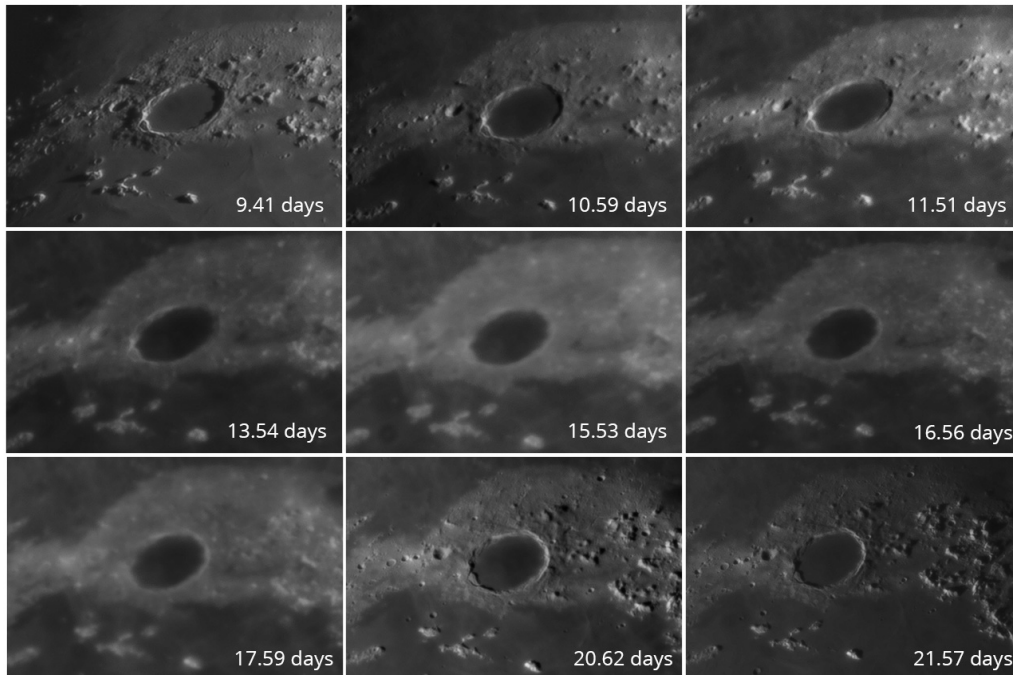
Mark Phillips
President



North America Nebula, Pat Devine

Observe the ever-changing Moon

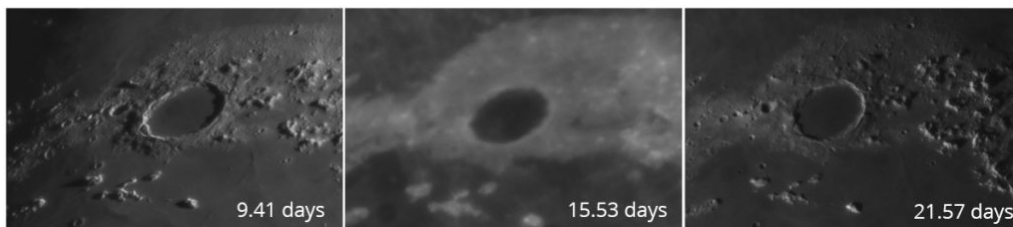
December 1, 2021



Surely the Moon is boring because nothing ever changes on it? Not at all! As the Moon orbits the Earth every month the features change dramatically as the angle of Sun hitting the surface varies and casts strange and beautiful shadows across its landscape.

Of course nothing much actually changes on the surface of the Moon itself (not totally true – new craters are still being created by impacts) but the appearance of its features change daily. It's visible for a lot of each month so make the most of it. It's also a good object to start your astronomical journey with because it's so bright and easy to observe and your first views of the Moon through a telescope are mind-blowing!

A couple of years ago I decided to follow one prominent feature – the [crater Plato](#) – through several lunar phases (this took several Lunar cycles to do because of weather). As you can see from the main image above, Plato changes dramatically as the sunlight strikes it at different angles. The phases where the crater is closest to the terminator (the divider between Lunar day and night) are the easiest to observe and image, Lunar morning and evening, because shadows are more prominent and the features clearer. (Seeing conditions also changed through the observing cycle making some phases clearer than others.)



The first image above shows the sunlight striking the eastern wall of Plato, making it bright white, with shadows on the crater floor cast by the western wall. The third image shows the opposite effect. The central image however shows the sun overhead the crater, causing no shadows at all and making it very indistinct.

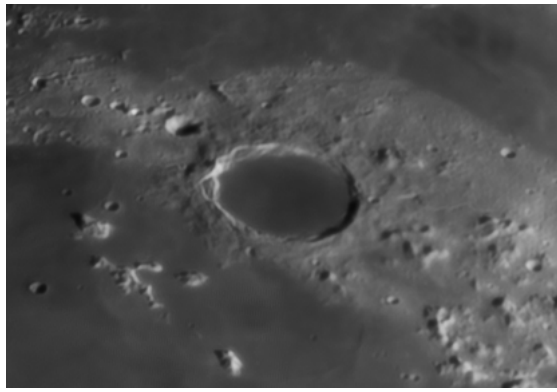
My intention was to create an animation showing how it changed with different illumination. But there was a problem: Libration. The aspect and shape of the crater appears to change throughout the month, making an animation very difficult to put together accurately. This is what I managed:

Libration is when the Moon appears to change it's orientation towards us, showing us more of each limb or pole throughout a lunar month (see animation). So although the Moon keeps only one face towards us, you can actually see about 59% of it's surface, just not all at once. The 3 images above show the change in shape of Plato from an elliptical to a more circular shape because of the changing angle it presents to us – caused by libration.

There are 3 types of libration:



Lunar Libration (Wikipedia, Public Domain)



Plato animation, Mark Phillips

- longitude – caused by the elliptical orbit of the Moon
- latitude – caused by the inclination of its axis of rotation to the plane of its orbit around the Earth
- diurnal – a small daily oscillation caused by the Earth's rotation and our position on it (we move from one edge of the Earth facing the Moon to the other edge)

We have a number of Lunar features in our [ASE-24: Observing list for beginners](#), I also did an article on the [Lunar 100](#), if you want to take Lunar observations further and we also have our own [ASE Lunar 100 Project](#).

There are so many interesting geological features on the Moon that change their appearance throughout the Lunar month (interestingly the definition of the [Lunar month](#) varies quite a bit). Have a look at them with whatever optical instruments you have. It's very rewarding.

*Article and images: Mark Phillips
Originally published 24 November 2019*

3 December 2021 Meeting report

December 5, 2021

It was great to hear from Will Joy about his passion for meteorites and his intrepid Indiana Jones adventures, hunting them in the deserts of the world. Nigel Goodman also gave us a really good presentation about the night sky in December.

You can watch them both in the YouTube video.

17 December 2021 Meeting Report

December 18, 2021

We had a highly entertaining and informative talk on the history of Thomas Cooke telescopes and other business enterprises, from Martin Lunn. Andrew Farrow also gave us an update on our work on the Cooke telescope on Calton Hill.

You can find out a lot more about Cooke telescopes on [Martin's blog: Thomas Cooke Telescopes](#).

A large audience of members and YouTube guests from around the world heard how Cooke telescopes became a byword for quality throughout the middle and late 19th Century. When a man from humble beginnings became a successful Victorian entrepreneur making everything from telescopes to large clock movements and steam cars to scientific instruments.

Martin revealed just how successful and pervasive the Cooke name was throughout the 'British Empire' when it came to telescopes. We also heard that Cooke theodolites were used on many major construction projects including the Forth Railway Bridge and Sydney Harbour bridge to name but two.

A testament to the quality of the equipment is just how many Cooke telescopes are still in use today having found homes in private and public observatories around the world. These ranged from the behemoth made for the millionaire Robert Newall which at 25 inches of aperture and 30 feet long, was the biggest in the world at the time, to the prolific 6 inch aperture Cooke telescopes and used worldwide by many amateur observers and housed in many national observatories.

Following the death of Thomas Cooke his two sons took over the business which continued to grow as it changed ownership over the years. The business provided high quality optics for the army during the Crimean war and did the same for the navy in WW1 and WW2.

Martin went on to discuss the success of Cooke camera lenses having made the first achromatic camera lens for an astronomical camera. These were developed and Cooke's portrait lens set the standard for all cameras thereafter. They were used on Shackleton's Antarctic expedition when Frank Hurley took his iconic photos of the expedition and the ship 'The Endurance' when she became stuck in the ice. The photos of Mallory and Irvine attempting to climb Everest was also recorded on cameras using Cooke lenses.

What we found more amazing was Martin's comments of their continued dominance in high quality cinematography today. Still used by the BBC amongst many other film companies.

Cooke left a huge legacy in the world of Telescopes and high quality optics but sadly there is a dearth of records charting the Cooke business over the years of their industry. So if you are aware of any of the company records that have been hidden away please get in touch with Martin Lunn.

Andrew Farrow