

Astronomical Society of Edinburgh

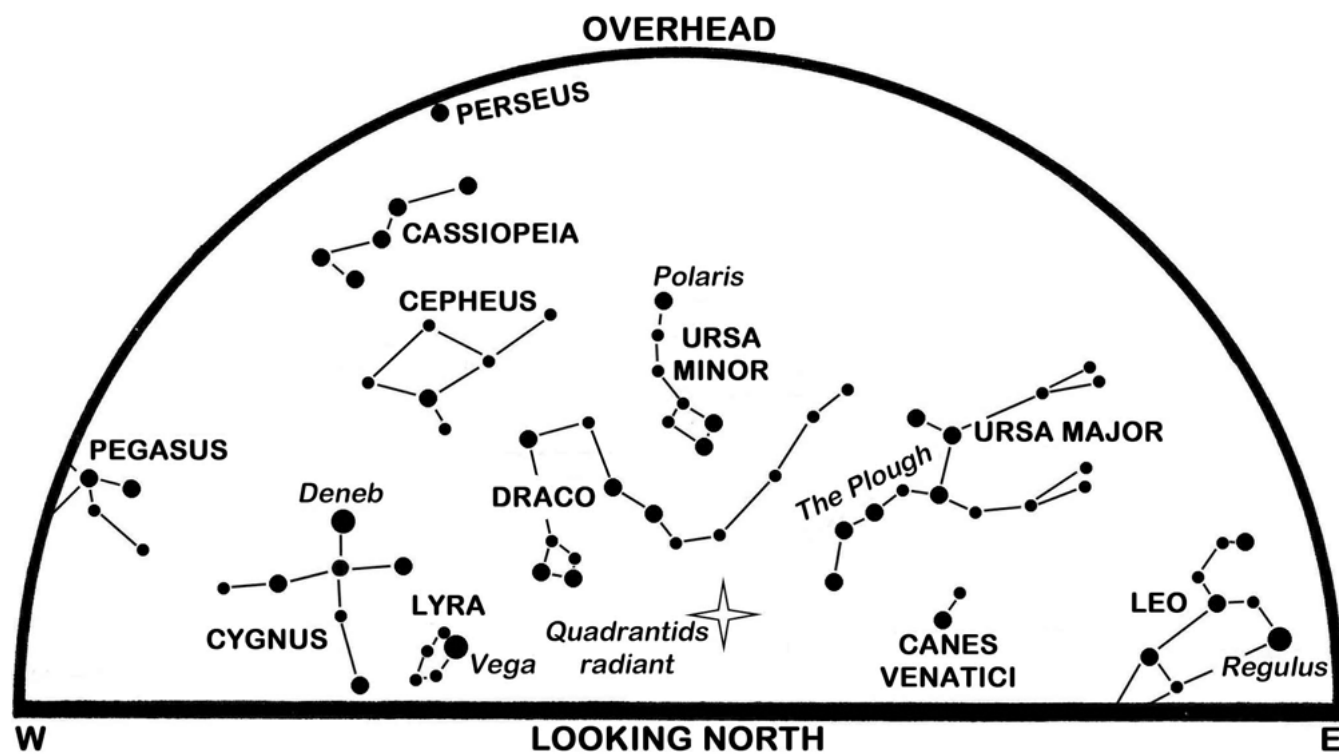
Founded 1924

Posts published from 1 January 2019 to 31 December 2019, from www.astronomyedinburgh.org. Printed on 3 July 2020

Scotland's Sky in January 2019

3 January 2019

Categories: News



You can now find the latest [Scotland Sky Diary](#) for January by Alan Pickup in the [ASE Journal](#).

Watch the total Lunar eclipse on 21 Jan 2019

5 January 2019
Categories: News

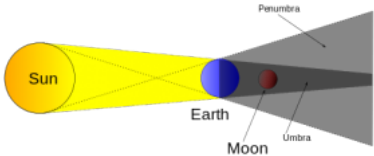


The total eclipse of the Moon will be fully visible from Edinburgh on 21 January 2019, but you'll have to stay up very late or get up very early to watch it. Totality begins at 4:42 am!

All you need to view a Lunar eclipse are your eyes! Binoculars or a small telescope can help to get a closer view as the shadow starts to creep across the Lunar landscape.

The Moon enters the first part of the Earth's shadow, the penumbra at 2:37 am and the eclipse finally comes to an end when the Moon leaves the last of the Earth's shadow at 7:48 am. So it's an all-nighter if you can manage it!

A lunar eclipse occurs when the Moon enters the shadow created when the Earth is between the Moon and the Sun. You might think it should happen every month, when the Moon is full and on the other side of the Earth from the Sun, but because of the inclination of the Moon's orbit around the Earth, that doesn't usually happen.



Lunar eclipse. Image courtesy of F. Sogumo.

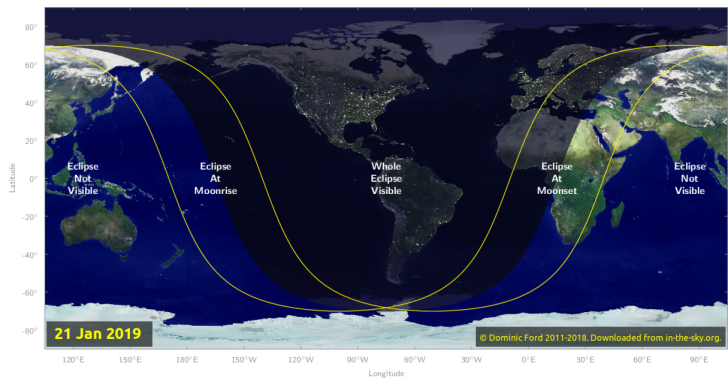
Imaging a Lunar eclipse

It's relatively easy to image a Lunar eclipse. A camera on a tripod is all you need. Hopefully your auto-focus should work OK as the Moon is large enough in the sky to focus on (not so easy for stars and meteors). If you have a cable release as well that can help to avoid vibrations, but if not then you can use the delay timer on your camera.

You can even get decent images with your mobile phone camera, but you should try and support and steady yourself – or the camera – to get the best images. Sometimes the auto-exposure on phones can make the Moon image too bright, losing many of the finer details, so you might need to try and reduce the exposure using manual settings.

Time UT	Event
02:37	Moon enters Penumbra
03:35	Moon enters Umbra, partial eclipse
04:42	Moon fully in Umbra, total eclipse begins
05:13	Mid-point of eclipse
05:44	Moon leaves Umbra, total eclipse ends
06:51	Moon leaves Umbra

Time UT	Event
07:48	Moon leaves penumbra, eclipse ends



Article by Mark Phillips
Sources: in-the-sky.org

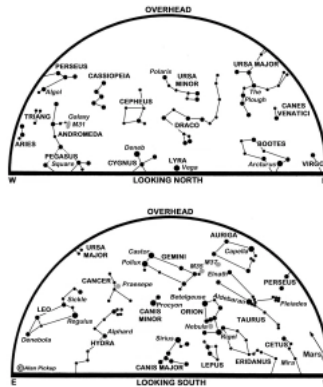
Scotland's Sky in February, 2019

31 January 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, asterism, Astronomical Society of Edinburgh, diary, Jupiter, Mars, Mercury, Night Sky, orion

Orion and Winter Hexagon in prime-time view



The maps show the sky at 22:00 GMT on the 1st, 21:00 on the 15th and 20:00 on the 28th. An arrow depicts the motion of Mars. (Click on map to enlarge)

Even though the two brightest planets, Venus and Jupiter, hover low in the south-east before dawn, the shortest month brings what many consider to be our best evening sky of the year. After all, the unrivalled constellation of Orion is in prime position in the south, passing due south for Edinburgh one hour before our star map times. Surrounding it, and ideally placed at a convenient time for casual starwatchers, are some of the brightest stars and interesting groups in the whole sky.

I mentioned some of the sights in and around Orion last time, including the bright stars Procyon, Betelgeuse and Sirius which are prominent in the south at the map times and together form the Winter Triangle.

Like the Summer Triangle, this winter counterpart is defined as an asterism which is a pattern of stars that do not form one of the 88 constellations recognised by the International Astronomical Union. Both triangles are made up of stars in different constellations, but we also have asterisms that lie entirely within a single constellation, as, for example, the Sickle of Leo which curls above Regulus in the east-south-east at our map times, and the Plough which comprises the brighter stars of the Ursa Major, the Great Bear, climbing in the north-east.

Yet another asterism, perhaps the biggest in its class, includes the leading stars of six constellations and re-uses two members of the Winter Triangle. The Winter Hexagon takes in Sirius, Procyon, Pollux in Gemini and Capella in Auriga which lies almost overhead as Orion crosses the meridian. From Capella, the Hexagon continues downwards via Aldebaran in Taurus and Rigel at Orion's knee back to Sirius.

Edinburgh's sunrise/sunset times change from 08:08/16:45 on the 1st to 07:07/17:44 on the 28th. The Moon is new on the 4th and at first quarter on the 12th when it stands 12° below the Pleiades in our evening sky. The 13th sees it gliding into the Hyades, the V-shaped star cluster that lies beyond Aldebaran. Both the Pleiades and the Hyades are open clusters whose stars all formed at the same time. Another fainter cluster, Praesepe or the Beehive in Cancer, is visible through binoculars to the left of the Moon late on the 17th. Full moon is on the 19th with last quarter on the 26th.

A number of other open star clusters lie in the northern part of the Hexagon, two of them plotted on our chart. At the feet of Gemini and almost due north of Betelgeuse is M35, visible as a smudge to the unaided eye but easy though binoculars and telescopes which begin to reveal its brighter stars. It lies 3,870 ly (light years) away, as compared with 440 ly for the Pleiades and 153 ly for the Hyades. Further north in Auriga is the fainter M37 (4,500 ly) which binoculars show 7° north-east of Elnath, the star at the tip of the upper horn of Taurus. M36 (4,340 ly) and M38 (3,480 ly) lie from 4° and 6° north-west of M37.

Mars dims a little from magnitude 0.9 to 1.2 but remains the brightest object near the middle of our south-south-western evening sky, sinking westwards to set before midnight. Mars is 241 million km distant when it stands above the Moon on the 10th, with its reddish 5.8 arcseconds disk now too small to show detail through a telescope. As it tracks east-north-eastwards against the stars, it moves from Pisces to Aries and passes 1° above-right of the binocular-brightness planet Uranus (magnitude 5.8) on the 13th.

The usually elusive planet Mercury begins its best evening apparition of 2019 in the middle of the month as it begins to emerge from our west-south-western twilight. Best glimpsed through binoculars, it stands between 8° and 10° high forty minutes after sunset from the 21st and sets itself more than one hour later still. It is magnitude -0.3 on the 27th when it lies furthest from the Sun in the sky, 18°, and its small 7 arcseconds disk appears 45% illuminated.

Venus, brilliant at magnitude 4.3, rises for Edinburgh at 05:11 on the 1st and stands 8° high by 06:30 as twilight begins to invade the sky. That morning also finds it 6° above and right of the waning earthlit Moon. A telescope shows Venus to be 19 arcseconds in diameter and 62% sunlit.

Jupiter is conspicuous 9° to the right of, and slightly above, Venus on the 1st though it is one ninth as bright at magnitude -1.9. Larger and more interesting through a telescope, its 34 arcseconds disk is crossed by bands of cloud running parallel to its equator while its four main moons may be glimpsed through binoculars. Edging eastwards (to the left) in southern Ophiuchus, it is 9° east of the celebrated and distinctly red supergiant star Antares in Scorpius, a star so big that it would engulf the Earth and Mars if it switched places with our Sun.

Our third predawn planet, Saturn rises at 06:38 on the 1st and is more of a challenge being fainter (magnitude 0.6) in the twilight. One hour before Edinburgh's sunrise on the 2nd, it lies only 2° above the horizon and less than 10 arcminutes above-right of the Moon's edge. Watchers in south-eastern England see it slightly higher and may glimpse it emerge from behind the Moon at about 06:31.

Venus speeds eastwards through Sagittarius to pass 1.1° north of Saturn on the 18th and shine at magnitude -4.1 even lower in the morning twilight by the month's end. By then, the Moon has come full circle to stand above-right of Jupiter on the 27th and to Jupiter's left on the 28th.

Diary for 2019 February

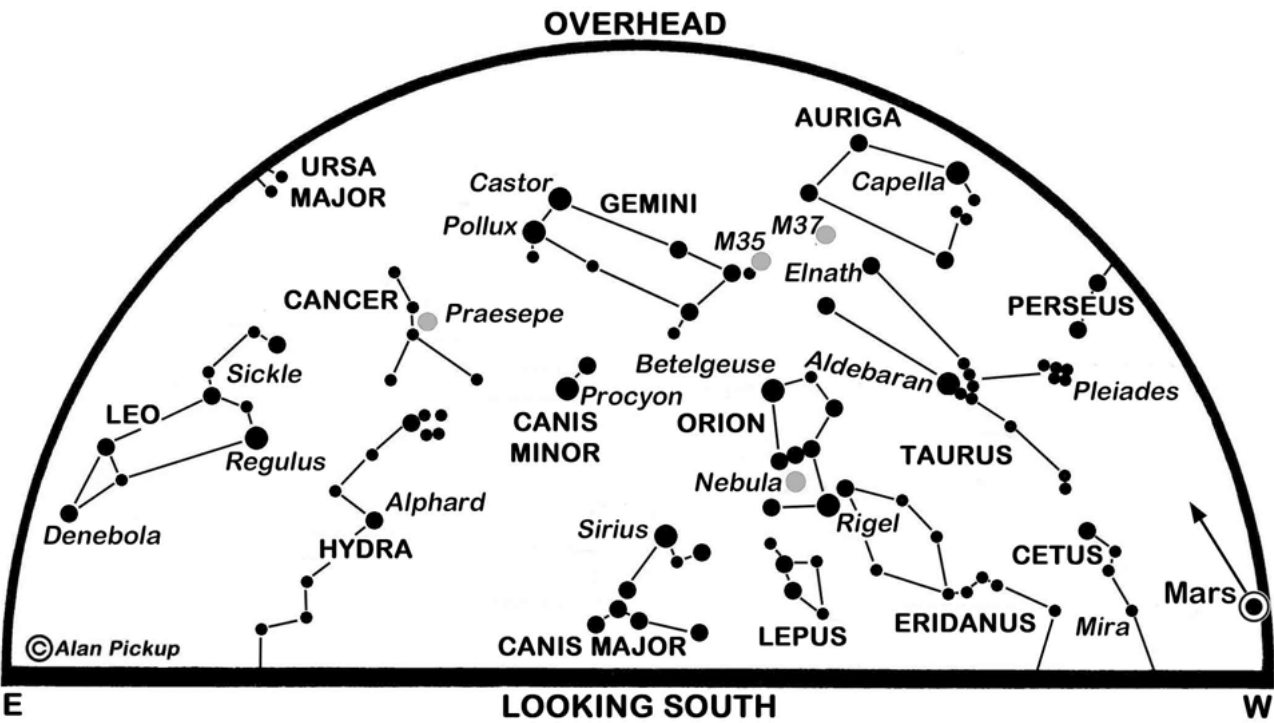
2nd	07h Moon 0.6° N of Saturn
4th	21h New moon
10th	16h Moon 6° S of Mars
12th	22h First quarter
13th	20h Mars 1.1° N of Uranus
14th	04h Moon 1.7° N of Aldebaran
18th	03h Moon 0.3° S of Praesepe
18th	14h Venus 1.1° N of Saturn
19th	13h Moon 2.5° N of Regulus
19th	16h Full moon
26th	11h Last quarter
27th	01h Mercury furthest E of Sun (18°)
27th	14h Moon 2.3° N of Jupiter

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on January 31st 2019, with thanks to the newspaper for permission to republish here.

Scotland's Sky in February 2019

31 January 2019
Categories: News



Orion and Winter Hexagon in prime-time view

You can now find the latest [Scotland Sky Diary](#) for February by Alan Pickup in the [ASE Journal](#).

February 2019 meeting report

4 February 2019

Categories: Meeting report, News



What an amazing meeting we had last Friday. 148 people and a talk by Dr Paul Delgano on the story and history of Black Holes. Very engaging and obviously an interesting topic for many people. We ran out of chairs!

That's triple our normal numbers – it was great to see so many people there. Looks like our publicity is working...

Also at the meeting:

- Horst gave a presentation on the sky for February
- Andrew updated us on various "astronomy and space" items that had caught his attention
- Steuart Campbell gave a

short presentation on some "astronomical curiosities"

- Andrew updated us on the Society's education programme and the "Telescope Help Shop" happening on 9 Feb

Thank you to all our visitors for coming – you were most welcome.

Telescope Help Shop success!

10 February 2019

Categories: News



We had a very successful Telescope Help Shop yesterday with 15 people coming along to learn how to get the best out of their telescopes.

10 members of the Society helped out by showing them how to use their telescopes, advice on how to setup and align their mounts and find objects in the sky. We were fortunate to have clear skies and could observe the crescent Moon and put it all into practice. The hall we used at St Thomas's Church in Costorphine had access to a convenient grassy area just outside so it was very useful. Feedback so far is very positive and the helpers certainly enjoyed being involved. Always nice to share our passion for astronomy!

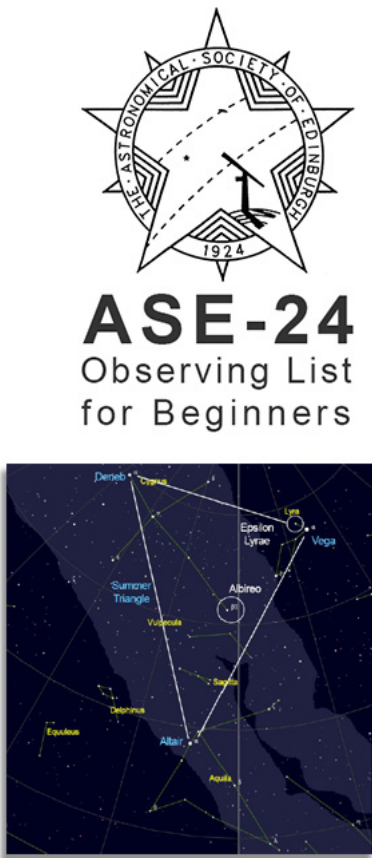
There were also a few short talks:

- Basic setup and alignment techniques
- Eyepieces – how they work, which to use and how to choose them
- Observer's checklist
- The launch of the [ASE-24](#), our Observing List for Beginners developed specially for this event

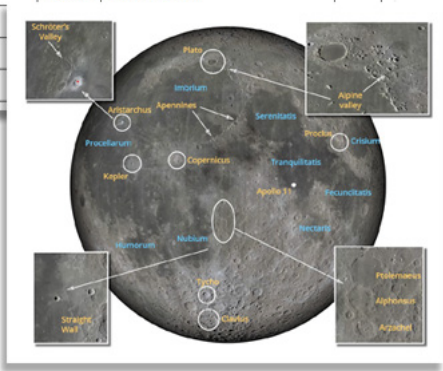
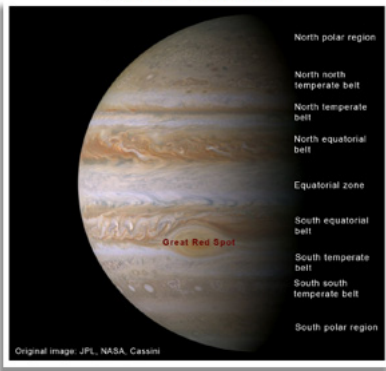
This was our first such event and given the success we hope to run it again in the future. We have a waiting list at the moment so if you would like to be added [please get in touch](#).

ASE-24: Observing list for beginners

13 February 2019
Categories: Knowledge, News



MOON		NEBULAE AND GALAXIES	
ASE-1	Lunar seas and ray craters	ASE-13	M42 – Orion nebula
ASE-2	Copernicus and Plato	ASE-14	M31 – Andromeda galaxy
ASE-3	Other craters and features	ASE-15	M27 – Dumbbell nebula
ASE-4	Apennines and Alpine valley	ASE-16	M57 – Ring nebula
DOUBLE STARS		GLOBULAR CLUSTERS	
ASE-5	Albireo – Cygnus	ASE-17	M13 - Hercules
ASE-6	Epsilon Lyrae	ASE-18	M15 - Pegasus
ASE-7	Mizar, Alcor – Ursa Major	ASE-19	M2 - Aquarius
PLANETS		OPEN CLUSTERS	
ASE-8	Jupiter moons and cloud belts	ASE-20	M45 Pleiades - Taurus
ASE-9	Saturn rings	ASE-21	M35 - Gemini
ASE-10	Venus phases	ASE-22	M34 - Perseus



At the Telescope Help Shop on 9 February we launched our ASE-24. This is an introductory observing list of 24 objects for people new to astronomy, numbered for our founding year of 1924.

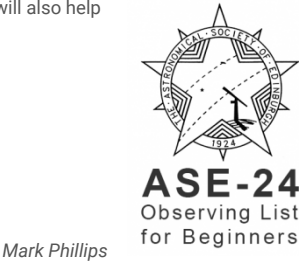
The idea behind the list is that a lot of people get a new telescope and then don't know where to begin. This list is a sort of introductory checklist of some of the most interesting and obvious objects in the night sky. By going through the process of observing objects in the list they will also gain valuable observational skills, especially locating objects in the night sky, as well as seeing some of the best sights in the night sky.

Our guests at the Telescope Help Shop were introduced to the list as a way of taking their first steps in observational astronomy, which will also help them decide which areas they might want to specialise in.

The list is in 2 parts:

- a 1-page checklist of objects
- a longer description with finder charts and how and when to observe all objects

The whole thing can also be [downloaded as a PDF](#) or [viewed online](#).



Our nearest planet?

17 February 2019

Categories: Journal

Tags: ASE, Astronomical Society of Edinburgh, BBC Radio 4, Earth, Mars, member's presentation, Mercury, More or Less, statistics, Steuart Campbell

The BBC radio4 programme *More or Less* (broadcast weekly on Fridays; repeated on a Sunday) deals with claims involving numbers or statistics. Unusually, the episode broadcast on 11 January 2019 contained an astronomical question ("Which is our nearest planet?). That arose from a remark by (Prof) Chris Lintott in a *Sky at night* TV programme, where he claimed that Mars is our nearest neighbour. That was odd since surely everyone knows that the orbit of Venus is nearer to us than the orbit of Mars.

Consequently the programme, presented by Tim Harford, went to work on the answer. Since the inner planets constantly change in their relationship to one another the answer is not obvious. The question had to be adjusted to 'Which planet spends more time as our nearest neighbour for more time than any other planet?'

This task was given to a statistical expert ('Oliver') who wrote a computer program to calculate which planet on average is nearest to Earth than any other. This was then commented on by David Rothery, Professor of Planetary Geoscience at the Open University. He was as surprised as anyone that the answer turned out to be Mercury! The calculation showed that the nearest planet is Mars 18 per cent of the time, Venus 36 per cent of the time, but Mercury 46 per cent of the time. This may be because Mercury's short orbital period means that it is more frequently on our side of the sun than the two other candidates, which often spend long periods on the far side.

Actually, at the time Chris Lintott made his claim, Mars was the nearest planet.

A podcast of the radio programme is available from the *More of Less* website, where the discussion starts 22 minutes in.

Steuart Campbell

This is a slightly expanded version of a presentation Steuart Campbell gave to the ASE on 1 February 2019. Steuart is a member of ASE and a science writer.

It's galaxy season

27 February 2019

Categories: News



As the familiar Winter constellations of Orion, Taurus and Gemini head westwards in the evening, the galaxy-rich constellations of Leo, Canes Venatici and Ursa Major move in.

Harder to observe than open clusters, globulars and the brighter nebulae, galaxies are interesting Spring to Summer objects and you can make out some of them with most telescopes. Imaging is needed to see any real details in these complex, distant objects; they're not always easy to find but very satisfying when you do.

In Ursa Major there's M81 (Bode's Galaxy), M82 (Cigar), both about 12 million light years away, and M101 (Pinwheel) at 21 million.

Article and M51 image: Mark Phillips

Finder charts: Cartes du Ciel

Nearby is Canes Venatici with M51 (Whirlpool) which is actually two interacting galaxies, with an uncertain distance of between 15 – 35 million light years distant.

Leo contains many galaxies, some clustering together. M65, M66 and NGC 3638 form one grouping while M95, M96 and M105 form another. The Leo cluster of galaxies itself is about 330 Million light years away containing at least 70 major galaxies.

The constellations of Virgo and Coma Berenices contain many galaxies. Use your favourite planetarium program to find them.

Connecting your eye to these massively distant objects puts the distance scale of the universe into perspective. Douglas Adams got it right in the Hitchhiker's Guide to the Galaxy when he invented the Total Perspective Vortex:

For when you are put into the Vortex you are given just one momentary glimpse of the entire unimaginable infinity of creation, and somewhere in it a tiny little marker, a microscopic dot on a microscopic dot, which says "You are here."

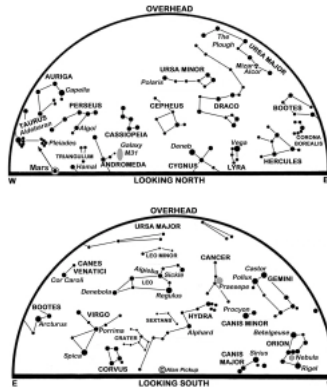
Scotland's Sky in March, 2019

1 March 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, diary, International Space Station, Iridium, ISS, Jupiter, Leo, Mars

Watch earth satellites transit our vernal equinox sky



The maps show the sky at 23.00 GMT on the 1st, 22.00 GMT on the 16th and 21.00 GMT (22.00 BST) on the 31st. Summer time begins at 01.00 GMT on the 31st when clocks go forward one hour to 02.00 BST. An arrow depicts the motion of Mars from the 7th. (Click on map to enlarge)

The Sun climbs northwards at its fastest for the year in March and crosses the sky's equator at 21:58 on the 20th, the time of our vernal or spring equinox. As the days lengthen rapidly, the stars in the evening sky appear to drift sharply westwards so that Orion, which is astride the meridian as the night begins on the 1st, stands 45° over in the south-west by nightfall on the 31st.

Another consequence of the Sun's motion is that the Earth's shadow, on the night side of the planet, is tilting increasingly southwards so that it no longer reaches so far above Scotland at midnight. Indeed, by the end of March the shadow is shallow enough that satellites passing a few hundred kilometres above our heads may be illuminated by the Sun at any time of night. This allows them to appear as moving points of light against the stars as they take a few minutes to cross the sky. Some are steady in brightness while others pulsate or flash as they tumble or spin in orbit.

Dozens of satellites are naked-eye-visible every night, while many times this number may be glimpsed through binoculars. Predictions of when and where to look, including plots of their tracks against the stars, may be obtained online for free, or example from heavens-above.com, or via smartphone apps. Of particular interest are the so-called Iridium satellites which can outshine every other object in the sky, bar the Sun and Moon, during brief flares when their orientation to the Sun and the observer is just right. Although online predictions also include these, Iridium flares are falling rapidly in frequency since the satellites responsible are being deorbited as they are replaced by 2nd generation (and non-flaring) craft.

The most obvious steadily-shining satellite is, of course, the International Space Station which can outshine Sirius as it transits up to 40° high from west to east across Edinburgh's southern sky. As it orbits the Earth every 93 minutes at a height near 405 km, it is visible before dawn until about the 15th and begins a series of evening passes a week later.

Sunrise/sunset times for Edinburgh change from 07:05/17:46 GMT on the 1st to 05:47/18:48 GMT (06:47/19:48 BST) on the 31st which is the day that we set our clocks to British Summer Time.

The Moon is new on the 6th and spectacular over the following days as its brightly earthlit crescent stands higher each evening in the west-south-west. Catch the Moon 12° below Mars on the 10th and 6° below and left of the planet on the 11th. Mars itself stands around 30° high in the west-south-west at nightfall and is well to the north of west when it sets before midnight. This month it dims from magnitude 1.2 to 1.4 as it speeds more than 20° north-eastwards from Aries into Taurus to end the period only 3° below-left of the Pleiades.

Mercury has been enjoying its best spell of evening visibility this year, but is now fading rapidly and may be lost from view by the 7th. Binoculars show it shining at magnitude 0.1 on the 1st as it stands 10° directly above the sunset position forty minutes after sunset.

The Moon and planets never stray far from the ecliptic, the line around the sky that traces the apparent path of the Sun during our Earth's orbit. The ecliptic slants steeply across our south-west at nightfall towards the Sun's most northerly point which it reaches to the north of Orion at our summer solstice in June.

Given a clear dark evening, this is the best time of year to spy a broad cone of light stretching along the ecliptic from the last of the fading twilight. Dubbed the zodiacal light, this glow comes from sunlight scattering from interplanetary dust particles and was the subject on which Brian May, the lead guitarist of Queen, gained his doctorate.

As the Moon continues around the sky, it reaches first quarter on the 14th and passes just north of the star Regulus in Leo on the night of the 18/19th. Regulus, 45° high on Edinburgh's meridian at our map times, lies less than a Moon's breadth above the ecliptic and marks the handle of the Sickle of Leo.

Algieba in the Sickle is a splendid binary whose contrasting orange and yellow component stars lie 4.7 arcseconds apart and may be separated telescopically as they orbit each other every 510 years or so. The larger of the pair has at least one companion which may be a planet much larger than Jupiter or, perhaps, a brown dwarf star.

Between full moon on the 21st and last quarter on the 28th, the Moon passes very close to the conspicuous planet Jupiter on the 27th. The giant planet rises in the south-east in the small hours and is unmistakable at magnitude -2.0 to -2.2 low in the south before dawn where it is creeping eastwards against the stars of southern Ophiuchus.

The red supergiant star Antares in Scorpius lies some 13° to the right of Jupiter while Saturn, fainter at magnitude 0.6, is twice this distance to Jupiter's left and lower in the twilight. Look for Saturn to the Moon's left on the 1st and just above the Moon on the 29th.

Venus is brilliant (magnitude -4.1) but becoming hard to spot very low down in our morning twilight. More than 10° to the left of Saturn as the month begins and rushing further away, it rises in the south-east 81 minutes before sunrise tomorrow and only 39 minutes before on the 31st.

Diary for 2019 March

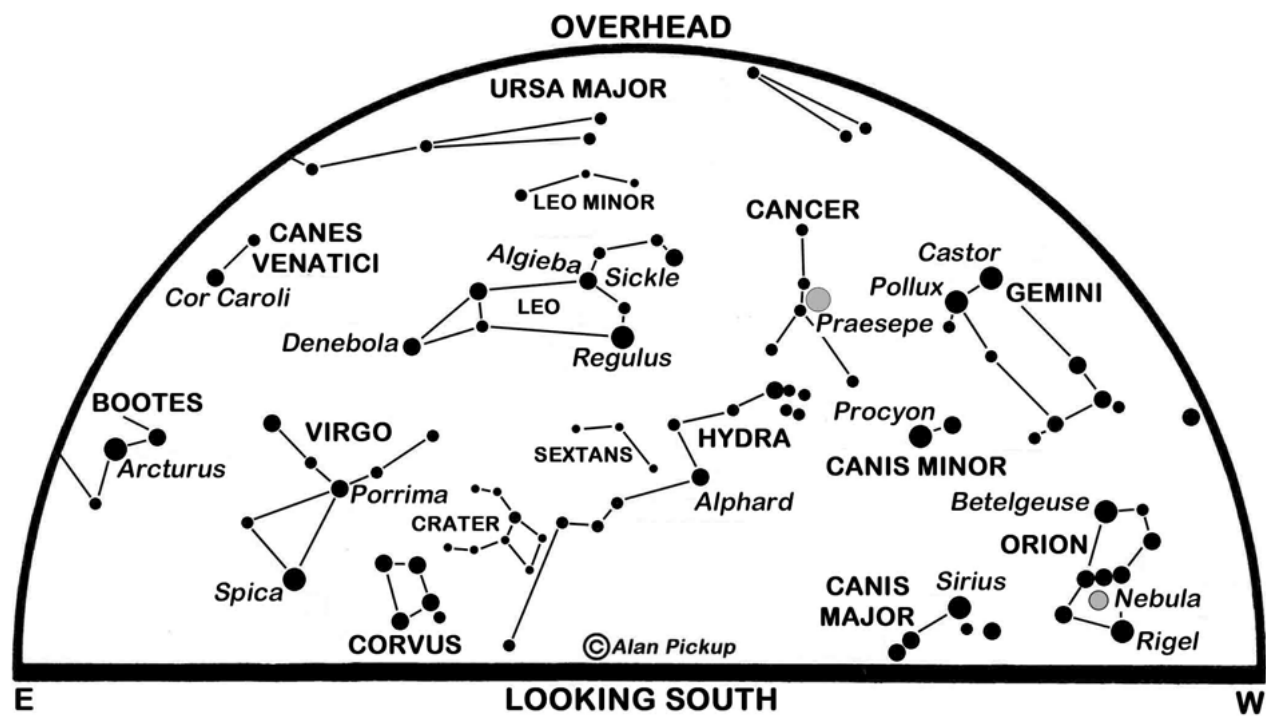
1st	18h Moon 0.3° N of Saturn
2nd	21h Moon 1.2° S of Venus
6th	16h New moon
7th	01h Neptune in conjunction with Sun
11th	12h Moon 6° S of Mars
13th	11h Moon 1.9° N of Aldebaran
14th	10h First quarter
15th	02h Mercury in inferior conjunction
17th	13h Moon 0.1° S of Praesepe
19th	00h Moon 2.6° N of Regulus
20th	21:58 Vernal equinox
21st	02h Full moon
27th	02h Moon 1.9° N of Jupiter
28th	04h Last quarter
29th	05h Moon 0.1° S of Saturn
30th	10h Mars 3° S of Pleiades
31st	01h GMT = 02h BST Start of British Summer Time

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on February 28th 2019, with thanks to the newspaper for permission to republish here.

Scotland's Sky in March 2019

1 March 2019
Categories: News



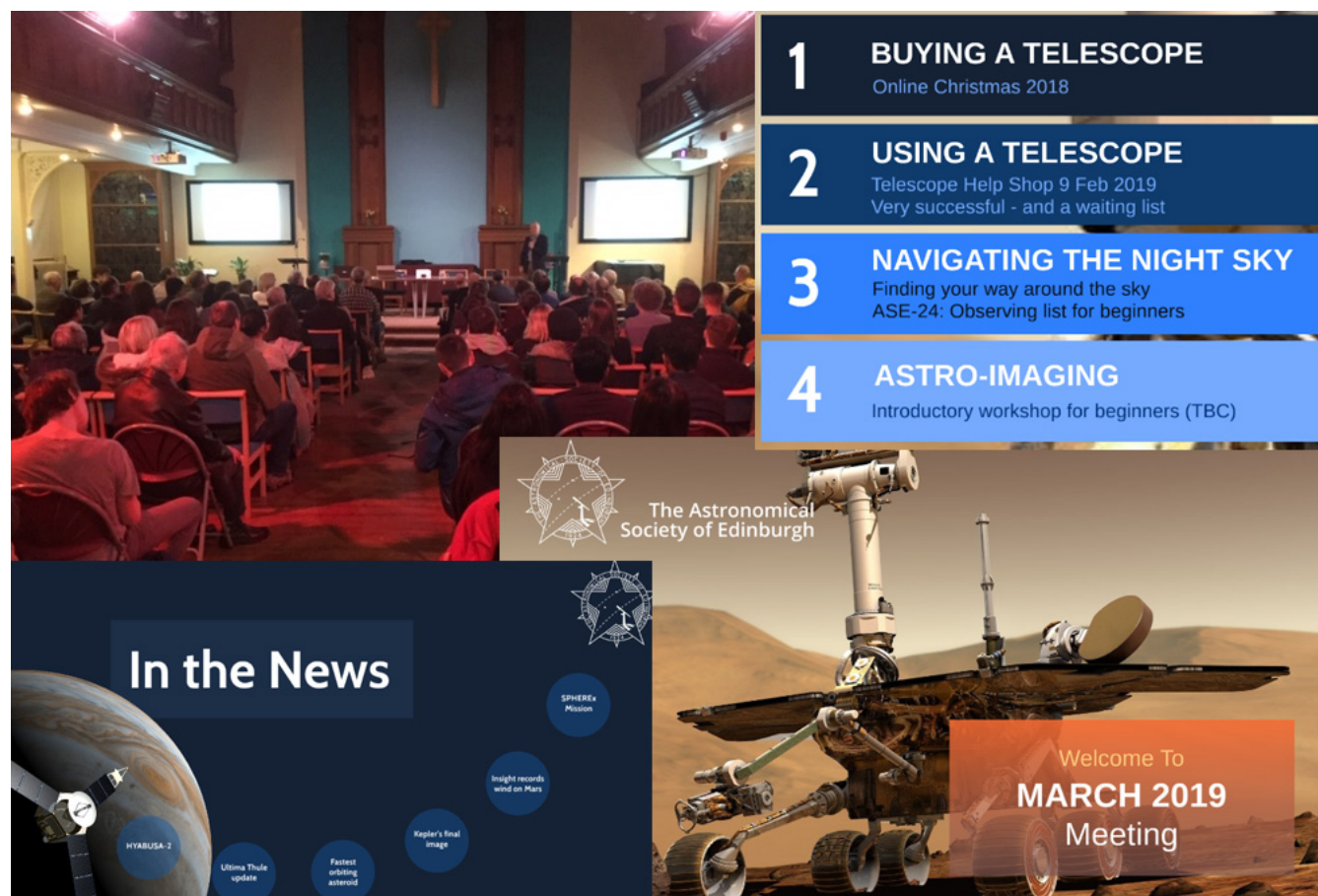
Watch earth satellites transit our vernal equinox sky

You can now find the latest [Scotland Sky Diary](#) for March by Alan Pickup in the [ASE Journal](#).

March 2019 meeting report

5 March 2019

Categories: Meeting report, News



Again this month we had over 100 people and a great talk by Professor Alex Murphy from the University of Edinburgh on “Dark Matter: what is it, and how are we going to find it?”

Because of the interest in our talks we now have to allocate tickets on Eventbrite. These are free and we still want to emphasise that visitors are very welcome. Ticketing just allows us to plan for numbers.

Also at the meeting:

- Alan gave a presentation on the sky for March, plus some images by members submitted to our [Flickr group](#)
- Andrew updated us on various “astronomy and space” items that had caught his attention
- Hugh “Iridium” Somerville gave a brief presentation on the Iridium Satellites
- There were various Society news updates too including details of our developing education program and a proposal to create a group to work with the Cooke telescope on Calton Hill

Thank you again to all our visitors for coming – you were most welcome.

Charles Piazzi Smyth exhibition

22 March 2019

Categories: News



An exhibition to celebrate the 200th anniversary of Edinburgh astronomer Charles Piazzi Smyth will open in the Nelson Monument on Calton Hill on 1st April 2019 and be open all year.

Charles Piazzi Smyth was a fascinating character: he was the second Astronomer Royal for Scotland, led the way with mountaintop observatories, was an accomplished artist, pioneered stereo photography and was a pyramidologist with some very strange views! The exhibition highlights his life and work with some amazing images from the Royal Observatory Edinburgh archives. There is also an excellent 10-minute film created by [Written in Film](#).

One of the sponsors of this exhibition is the Astronomical Society of Edinburgh and much of the content was created by ASE member Dr. Bruce Vickery and our Honorary President Prof. Andrew Lawrence of the [Royal Observatory Edinburgh](#).

You can find out more on the [Charles Piazzi Smyth website](#) and [Facebook page](#).

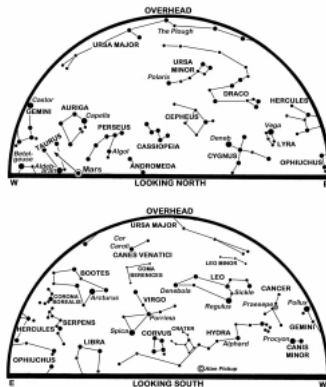
Scotland's Sky in April, 2019

30 March 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, Aldebaran, ASE, Astronomical Society of Edinburgh, Coma Berenices, diary, Fritz Zwicky, International Space Station, Jupiter, Mars

Galaxy clusters of interest in April's southern evening sky



The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on the 30th. An arrow depicts the motion of Mars. (Click on map to enlarge)

Orion stands in the south-west at nightfall as the sparkling skies of winter give way to the less flamboyant constellations of spring, led by Leo and Virgo. By our map times, Orion has mostly set the west and the Milky Way arcs only some 30° above Edinburgh's north-western horizon as it flows between Auriga and the "W" formation of Cassiopeia.

The Milky Way, of course, marks the plane of our disk-shaped galaxy, itself dubbed the Milky Way, around which our Sun orbits every 240 million years. If we look along it, we encounter numerous distant stars but countless more are forever hidden from sight behind intervening clouds of gas and dust – the raw material from which new stars and planets may eventually coalesce. If we gaze in directions away from the plane of the Milky Way, though, the star numbers fall away and there is negligible gas and dust to hide our view of galaxies far beyond our own.

It follows that we might expect our best view of the distant universe to be in directions at right angles to the plane, towards the galactic poles. Regions around the North Galactic Pole are ideally placed in our April evening sky and host some of the most interesting clusters of galaxies in the entire sky.

The pole itself lies in the less-than-startling Coma Berenices which is approaching the high meridian at our map times. As the only modern constellation named for a historic person, this celebrates Queen Berenice II of Egypt who is said to have sacrificed her long hair as an offering to Aphrodite. Her tresses are represented by a cascade of stars that spill southwards through the "M" of "COMA" on the chart. These make up a dispersed but nearby star cluster at a distance of about 280 light years – the second closest star cluster after the Hyades in Taurus.

Roughly coincident with the "C" of "COMA" is another cluster, but this one of more than 1,000 galaxies at a distance of some 320 million light years. The Coma Cluster's brightest galaxies are only around the twelfth magnitude and, as such, a challenge for many amateur telescopes. It was by studying this cluster that the Swiss astronomer Fritz Zwicky uncovered evidence as long ago as 1933 for the existence of what we now call dark matter. He found its galaxies were simply moving too fast to be held together unless additional material was present to supply an extra gravitational pull. Now we suspect that up to 90% of the Coma Cluster consists of this still-mysterious dark matter.

Lying south of Coma Berenices, and about 9° to the east (left) of Leo's star Denebola, is the closer Virgo Cluster of galaxies. This sprawls across 8° of sky and holds about 1,500 galaxies at a distance of 54 million light years or so. Small telescopes show several, though we'd struggle to locate them without a better chart than I can supply here. In fact, The Virgo Cluster lies at the heart of a much larger family of galaxies and galaxy clusters dubbed the Virgo Supercluster which includes the so-called Local Group of galaxies in which the Milky Way is a major player. The Coma Cluster rules another supercluster.

Edinburgh's sunrise/sunset times change from 06:44/19:50 BST on the 1st to 05:32/20:49 on the 30th as the Moon stands at new on the 5th, first quarter on the 12th, full on the 19th and last quarter on the 26th. As I mentioned last time, satellites may now be spotted at any time of night though the current spell of evening passes by the International Space Station ends on or about the 5th.

Mars stands some 30° high and alongside the Pleiades in our western sky as our nights begin at present. The planet, though, is tracking east-north-eastwards against the stars and passes north of Taurus' main star, Aldebaran, to lie between the Bull's horns later in the month. The young earthlit Moon is an impressive sight 9° below Mars on the 8th and stands above Aldebaran and to the left of Mars on the 9th.

Mars no longer glares like an orange beacon in our sky and is now only half as bright as Aldebaran. As its distance grows from 302 million to 335 million km in April, it dims a little more from magnitude 1.5 to 1.6. Even large telescopes reveal little detail on its small ochre disk, less than 5 arcseconds in diameter, and viewing conditions can only deteriorate as it sinks towards the north-western horizon where it sets in the middle of the night.

There are two brighter planets in our predawn sky, both of them low in the south to south-east as the Summer Triangle formed by Vega, Deneb and Altair climbs through the east.

Jupiter, conspicuous at magnitude -2.2 to -2.5, rises in the south-east less than three hours after our map times and stands 11° above Edinburgh's southern horizon before dawn. Slow-moving in southern Ophiuchus, it reaches a stationary point on the 10th when its motion appears to reverse from easterly to westerly as it begins to be overtaken by the Earth. Saturn, rather fainter at magnitude 0.6 to 0.5 and at its own stationary point on the 30th, lies in Sagittarius some 25° to Jupiter's left. Catch the Moon near Jupiter on the 23rd and Saturn on the 25th.

Although Venus is brilliant at magnitude -4.0, it rises in the east less than 38 minutes before sunrise and is unlikely to be noticed. Mercury is furthest west of the Sun (28°) on the 11th but is much fainter and lower still in the morning twilight.

Diary for 2019 April

Times are BST

2nd	05h Moon 2.7° S of Venus
3rd	00h Moon 4° S of Mercury
5th	10h New moon
9th	08h Moon 5° S of Mars
9th	17h Moon 2.1° N of Aldebaran
10th	18h Jupiter stationary (motion reverses from E to W)
11th	21h Mercury furthest W of Sun (28°)
12th	20h First quarter
13th	22h Moon 0.1° N of Praesepe
15th	10h Moon 2.8° N of Regulus
16th	23h Mars 7° N of Aldebaran
19th	12h Full moon
23rd	00h Uranus in conjunction with Sun
23rd	13h Moon 1.6° N of Jupiter
25th	15h Moon 0.4° S of Saturn
26th	23h Last quarter
30th	03h Saturn stationary (motion reverses from E to W)

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on March 30th 2019, with thanks to the newspaper for permission to republish here.

Young people are just amazed at the night sky

30 March 2019
Categories: News



Here's an interesting article from our newest member, Fedra Antoniadou, currently studying physics at the University of Edinburgh. Fedra talks about how there really is an appetite for astronomy in our children.

On 28 March, I took part in "Science After Dark" outdoor, a public outreach science event mainly aimed at children, as a member of the Physics Outreach Team of the University of Edinburgh. The goal of the event was to describe the constellations in the sky by means of games and Greek mythology story-telling, as well as to invite them to look at the sky through the telescopes kindly lent to us by the Astronomical Society of Edinburgh.

Although both activities were fairly simple, turn-out was excellent and enthusiasm filled up the atmosphere. The mere sight of telescopes instantly sparked interest and got everyone asking if they could just look through even before it got dark. The constellation game simply involved finding "hidden" fluorescent posters of constellations visible in March around the playground, which people were supposed to spot using UV flashlights. What I found most remarkable was how quickly participating children turned this into a more exciting activity by creating their own version of it – similar to a treasure hunt – simply through their energy and enthusiasm. The game drove them to want to learn what the constellations' stories were and so afterwards, while narrating the myths behind them, I was thrilled to see a crowd of puzzled faces paying close attention to my words. After that, I attempted to give them an idea of how big our universe is by explaining distances to other star systems in light years and the high probability of "aliens" actually existing, which was the topic that provoked some of the most puzzled and amusing reactions, as well as multiple questions.

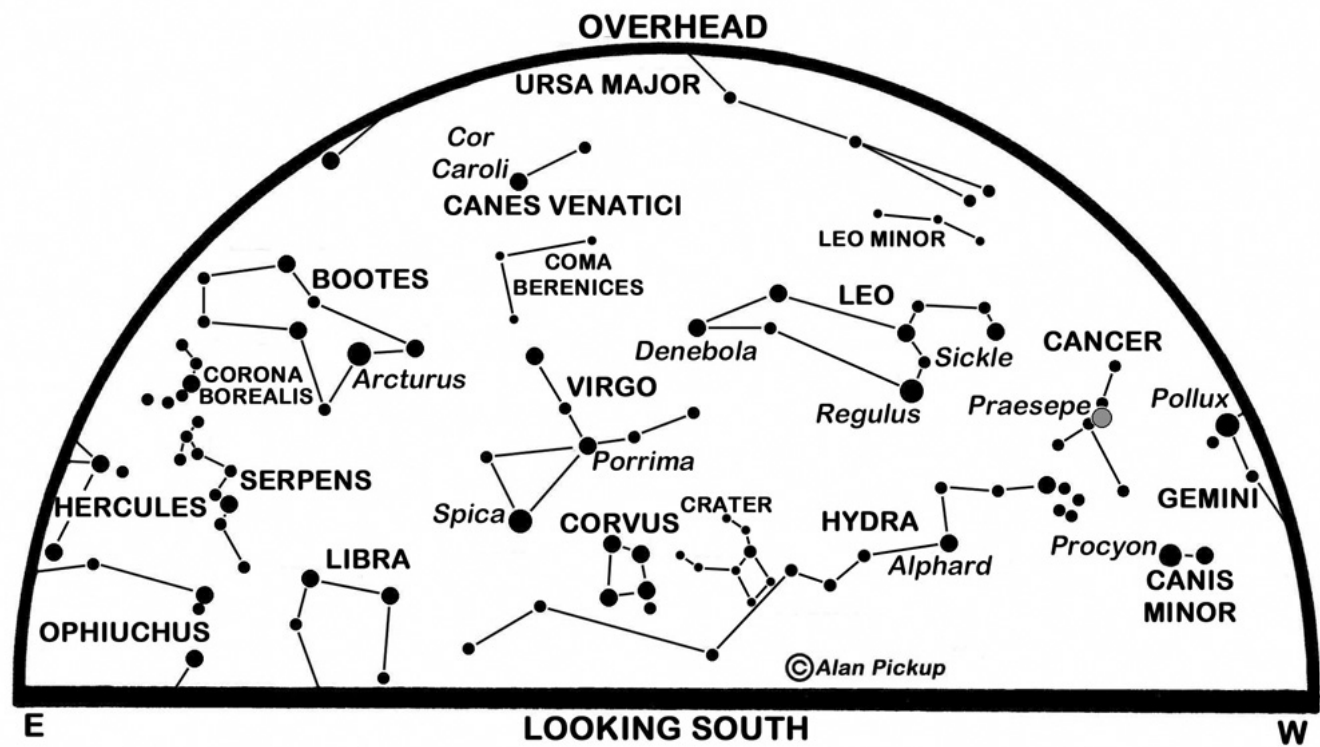
By the time this activity was over, it was clear that everyone's eagerness to look through the telescopes had peaked. By the time we managed to locate some targets, everyone – parents and children – was queuing up to get a glimpse. Some of the most challenging aspects of this activity were the cold weather (as always) and keeping the telescopes still as people took turns in looking through the eyepiece. However, in the end we had numerous people asking questions about astronomy, telescopes and observing in general. This was our greatest achievement and the most rewarding feeling on that night, as we knew we had made an impact, no matter its magnitude.

By teaching the audience some facts in an interactive manner, we initiated a chain reaction of questions. And speculation is really how great science and scientists flourish.

Fedra Antoniadou

Scotland's Sky in April 2019

30 March 2019
Categories: News



Galaxy clusters of interest in April's southern evening sky

You can now find the latest [Scotland Sky Diary](#) for April by Alan Pickup in the [ASE Journal](#).

Edinburgh's forgotten astronomer, Charles Piazzi Smyth

4 April 2019

Categories: News



A fascinating free new exhibition in the Nelson Monument on Calton Hill aims to establish Charles Piazzi Smyth's place in the City of Edinburgh's history. It is part of a year-long series of events to celebrate this ground-breaking astronomer's 200th anniversary.

The exhibition is part-sponsored by the Astronomical Society of Edinburgh, with most of the content provided by ASE member Dr. Bruce Vickery and ASE Honorary President Prof. Andy Lawrence of the [Royal Observatory Edinburgh](#). All the events and information can be found on the website at www.piazzismyth.org developed by ASE member Mark Phillips and sponsored by his company [Cygnus Extra](#).

Housed in Edinburgh's iconic Nelson Monument, the exhibition presents Piazzi Smyth's photography, paintings and drawings, alongside a newly commissioned short film and interviews in what will be the first major exhibition in Edinburgh dedicated to the forgotten astronomer.

The location of the exhibition itself carries strong significance as in 1852 Piazzi Smyth started the Time Ball service which involved hoisting a large ball from the top of Nelson Monument which would drop at exactly one o'clock every day as a time signal to ships docked in Leith harbour. In 1861 Piazzi Smyth added an audible element and set up the One O' Clock Gun service from Edinburgh Castle, stretching a cable all the way from Calton Hill to another clock on Castle Rock, which fired the Gun. The cable is no longer in place but both the Time Ball on Nelson Monument and the One O' Clock Gun still remain active today, providing a daily reminder of Piazzi Smyth's legacy to the city.

Pioneering early photographer, accomplished artist, writer, meteorologist, traveller, enthusiastic investigator of pyramids and of course, ground-breaking astronomer and yet despite such achievements, very few will have heard of Charles Piazzi Smyth or of his innovative work, the influence of which is still felt around the world today. Housed in the Nelson Monument Museum, the new exhibition aims to bring about a new awareness of Piazzi Smyth's work and that of his wife Jessica, forming part of a series of activity around the 200th anniversary of his birth.

In 1845 at the age of just 26, Piazzi Smyth was appointed Astronomer Royal for Scotland at the Calton Hill Observatory in Edinburgh, and also Professor of Astronomy in the University of Edinburgh. Whilst working as Astronomer Royal of Scotland in the nineteenth century, Charles Piazzi Smyth found that the polluted skies obscured the stars. So, along with his new wife Jessica, he decided to take state of the art telescopes to Tenerife in 1856, climbing to altitudes of over 10,00ft. Thanks to his superb photography, scientific recording and drawings we can see how he clearly demonstrated why observatories should be at high altitude. It is through this work he can be said to have pioneered today's practice of positioning telescopes on mountain tops to obtain better observations.

As Astronomer Royal for Scotland he spent much of his time and did much of his work from the City Observatory on Calton Hill, which recently reopened to the public after 100 years and can be visited today.

Piazzi Smyth's later measurements of the Great Pyramid at Giza won him a medal, but his beliefs around pyramids caused him to resign from the Royal Society and the Royal Society of Scotland after arguments about science and religion. His scientific legacy was marred by the controversy, regardless, his influence in the development of astronomy is undeniable, an influence which can still be felt in Edinburgh and across the world today.

A short film to accompany the exhibition has been created by [Written in Film](#).

The exhibition is a partnership between [Royal Observatory Edinburgh](#), [Museums & Galleries Edinburgh](#), [University of Edinburgh](#) and the [Astronomical Society of Edinburgh](#). The exhibition is part of the celebration of Charles Piazzi Smyth's 200th anniversary including a series of public talks, a citizen science experiment with the One O' Clock Gun,

Lauriston Castle lecture, 'Stars, Time and Mountains' and a Symposium at the Royal Society of Edinburgh.

More events and information at www.piazzismyth.org

April 2019 meeting report

5 April 2019

Categories: Meeting report, News



We had over 100 people again and a very interesting talk from Dr Alexander Mackinnon of the University of Glasgow on CTR Wilson and cosmic rays, describing how this branch of high-energy astrophysics can be traced back to the Scottish highlands.

Also at the meeting:

- President Andrew Farrow welcomed 8 new members to the Society
- Horst Myerdierks gave an overview of the what's in the sky for April
- Peter Black gave an update on the Charles Piazzi Smyth exhibition and 200th anniversary celebrations
- Andrew described the visit to the St Andrews Observatory by some members
- He also covered the auctioning of the Lorimer Chairs left to the Society by John Henry Lorimer – which no longer had a home. These have now been sold.
- Andrew talked about some recent news in the fields of astronomy and space
- Ken Thomas talked about the past and future of the Cooke telescope on Calton Hill
- The Charles Piazzi Smyth video was shown at the end. You can find it on the homepage of the [Piazzi Smyth website](#)
- The April Imaging Group meeting has been cancelled as quite a few of the members can't make it

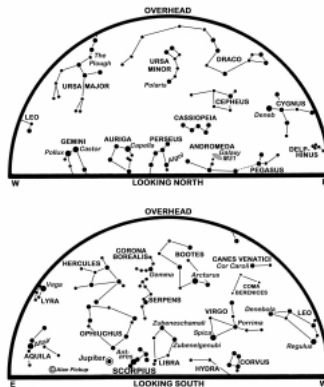
Scotland's Sky in May, 2019

30 April 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, Arcturus, ASE, Astronomical Society of Edinburgh, black hole, Bootes, diary, Eta-Aquarids, Jupiter, M87

Giant world Jupiter becoming obvious in May's twilit nights



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 31st. (Click on map to enlarge)

With its lengthening days and increasingly twilit nights, May is hardly a vintage month for stargazing from Scotland's latitudes. Official (nautical) darkness for Edinburgh lasts for more than five hours around midnight as the month begins but dwindles to nothing by the start of June and does not return until 12 July

Edinburgh's sunrise/sunset times change from 05:30/20:51 on the 1st to 04:37/21:45 on the 31st, while the Moon is new on the 4th, at first quarter on the 12th, full on the 18th and at last quarter on the 26th.

Our charts show Leo diving westwards as the Summer Triangle formed by Vega, Altair and Deneb is climbing in the east. After the Moon, our most obvious nighttime object is the planet Jupiter which rises in the south-east 30 minutes before our map times and reaches less than 12° high in the south before dawn. In fact, look for the Moon above-right of Jupiter on the night of the 19th and closer to the planet's left on the 20th.

The giant world is now edging westwards against the stars of southern Ophiuchus and brightens from magnitude -2.4 to -2.6 as its distance falls from 678 million to 644 million km. The Jovian globe spans 45 arcseconds in mid-May and telescopes show that it is crossed by bands of cloud that lie parallel to its equator. The four principal moons of Jupiter are also easy targets, though sometimes one or more hide from view as they pass in front of, or behind, the disk or are eclipsed in Jupiter's shadow.

Saturn trails almost two hours behind Jupiter but is fainter at magnitude 0.5 to 0.3. It lies in Sagittarius, below the Teaspoon asterism, where it stands above the Moon but low down in the south-south-east before dawn on the 23rd. Always an impressive sight through a telescope, though not helped by its low altitude, its disk appears 18 arcseconds wide at mid-month, circled by rings that measure 40 by 16 arcseconds.

Mercury and Venus are too deep in the morning twilight to be seen at present, though Mercury slips around the Sun's far side on the 21st. The morning twilight also hinders views of the Eta-Aquarids meteor shower which peaks around the 6th-7th and brings swift meteors that stream from a point which hovers low in our east-south-eastern sky for two hours before sunrise.

Mars sets a few minutes before our star map times and may be hard to spot low down in our west-north-western evening sky. It stands between the horns of Taurus on the 1st and shines at magnitude 1.6 to rival the star Elnath, which lies 5° above Mars and marks the tip of the Bull's northern horn.

Mars' pinkish-orange hue is best appreciated through binoculars as the planet dims further to magnitude 1.8 and speeds 20° eastwards during May, crossing into Gemini at mid-month and sweeping only 0.2° north of the star cluster M35 (use binoculars) on the 19th. It recedes from 335 million to 363 million km during May but, at a mere 4 arcseconds in diameter, is too small to be of telescopic interest. Catch Mars above the slim earthlit Moon on the 7th.

NASA's InSight lander used its sensitive French-built seismometer to detect its first likely marsquake on 6 April. The faint vibrations are now being studied for clues as to Mars' interior. Another instrument, a German heat probe designed to drill up to five metres into the surface, seems to have encountered a rock and is currently stalled well short of its target depth.

The Plough looms directly overhead at nightfall and stands high in the west by our map times. If we extend a curving line along its handle, we reach the prominent star Arcturus which, at magnitude -0.05, is the brightest of all the stars in the sky's northern hemisphere and, after Sirius, the second brightest (nighttime) star visible from Scotland, although both Vega and Capella come close.

Classed officially as a red giant star, though more yellow-orange in hue, Arcturus is slightly more massive than our Sun and perhaps 50% older. As such, it has depleted the hydrogen used to power its core through nuclear fusion, progressed to fusing helium instead and inflated to 25 times the Sun's radius and 170 times its luminosity. Eventually, after shedding its outer layers, it will settle down as a dim white dwarf star comparable in size to the Earth.

At present, though, we admire it as the leading star in the constellation of Bootes which has been likened to a pale imitation of Orion or even an ice-cream cone. Bootes takes its name from the Greek for herdsman or plowman, apparently in relation to the seven stars of the Plough which were also known as the "Seven Oxen" in early times.

Arcturus' own name comes from the Greek for "guardian of the bear", another reference to its role in following Ursa Major across the sky. In truth, it is something of a temporary guardian since it is rushing past our solar system at 122 km per second at a distance of 36.7 light years and will likely fade from naked-eye view within (only) half a million years as it tracks south-westwards in the direction of Virgo and the bright star Spica.

It is in the north of Virgo, and roughly coincident with the "D" of the label for Denebola on our south star map, that we find the galaxy M87, the owner of the supermassive black hole whose image was released a few weeks ago. M87 is 54 million light years away and visible as a smudge in small telescopes.

Diary for 2019 May

Times are BST

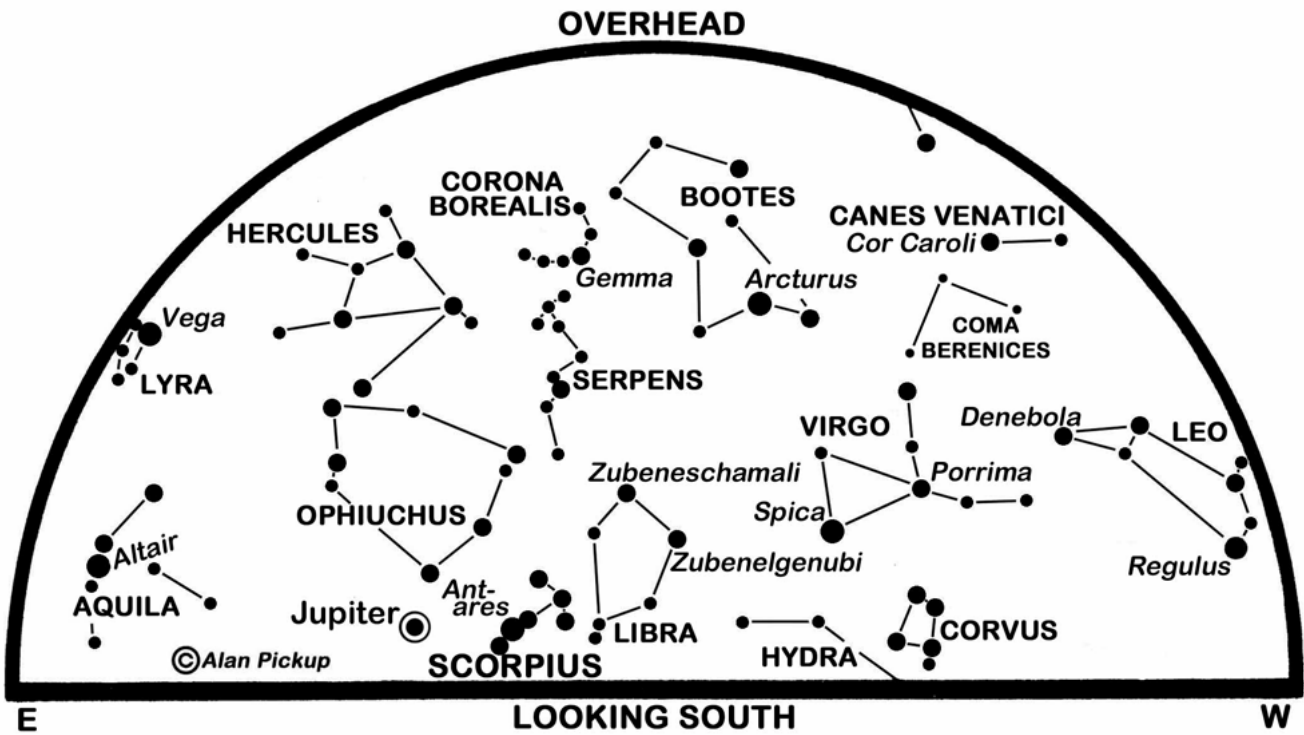
5th	00h New moon
6th	15h Peak of Eta-Aquarids meteor shower
6th	23h Moon 2.3° N of Aldebaran
8th	01h Moon 3° S of Mars
11th	03h Moon 0.3° N of Praesepe
12th	02h First quarter
12th	16h Moon 3° N of Regulus
18th	22h Full moon
19th	18h Mars 0.2° N of star cluster M35 in Gemini
20th	18h Moon 1.7° N of Jupiter
21st	14h Mercury in superior conjunction
22nd	23h Moon 0.5° S of Saturn
26th	18h Last quarter

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on April 30th 2019, with thanks to the newspaper for permission to republish here.

Scotland's Sky in May 2019

30 April 2019
Categories: News



Giant world Jupiter becoming obvious in May's twilight nights

You can now find the latest [Scotland Sky Diary](#) for May by Alan Pickup in the [ASE Journal](#).

Astronomy in the Twilight Zone

4 May 2019
Categories: Knowledge, News



During the summer months it is very easy to stop doing any astronomy because of the light nights. In Scotland, during May, June and July, the Sun never gets very far below the horizon and so the most we get is twilight instead of full darkness.

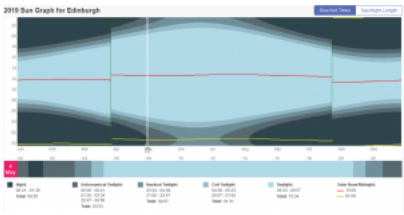
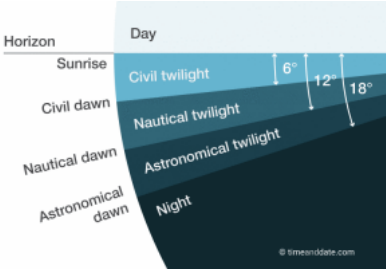
First published June 2018, UPDATED after May 2019 meeting where Mark Phillips gave a talk on this subject.

There are different classes of twilight, defined by how low below the horizon the Sun is. See the diagram.

But don't give up! Here are a few things you can continue to do and see in the warm summer months.

Noctilucent Clouds

"Night Shining Clouds" can give beautiful displays during the summer months. These silvery, high altitude clouds of ice crystals are only really visible in latitudes of about 50 to 70 degrees north or south of the equator when the Sun is between 6 and 16 degrees below the horizon. These mesospheric clouds are at such high altitudes (~85km) that they are still in sunlight even though the sun is below the horizon. They can give some beautiful displays at this time of year and are definitely worth looking out for or have a go at photographing. Even your phone camera can capture them.



Sun chart for Edinburgh showing summer twilight



Moon taken in daytime with IR pass filter

The Moon

The Moon is obviously still around and less affected by the lighter nights. You can even view or image it during the daytime. It's not as easy as during a dark night with the extra glare and the features are not so well defined but you can still make out a lot of interesting features and it's large enough to see lots of detail.

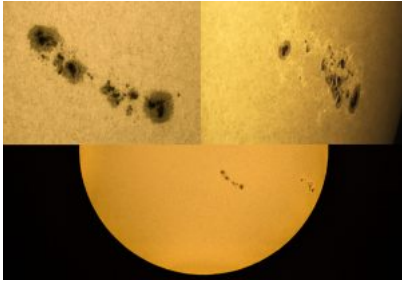
Why not try observing some of our [ASE-24 Moon items](#) or the [Lunar 100](#) or do some imaging with whatever camera you have available. It's not too hard and it's very rewarding.

If you have a camera sensitive to the infrared, such as the latest ZWO cameras, then you can use an [infrared pass filter \(you can get one for about £30\)](#). This takes out all of the glare and it's almost like imaging at night.

The Planets

Similarly, the bright planets are not affected by the twilight so much. Venus, Mars, Jupiter and Saturn can all be observed during the twilight hours. Infrared filters can also give a better, sharper and steadier view on some planets.

The Sun



Sun taken with 80mm and 180mm telescopes using glass and homemade solar film filters

And the most obvious one of course is the Sun. But there's usually more of it in the summer, it's higher in the sky and stays up longer.

The usual warning: never look directly at the Sun unless you are using instruments specifically designed for the purpose. Even a fraction of a second can do irreparable damage to your eyes.

But there are safe ways to look at the sun from projecting it onto a white card held behind the eyepiece of a telescope, to white light sunspot viewing and specialist solar telescopes that can show solar prominences. Glass filters are available to go over the front of most telescopes but you can also make yourself a cheaper – just as good – version using [Baader Solar Safety Film \(£19\)](#), some card, glue and sticky tape. Very effective and cheap! The detailed images of the Sun in this image were taken using one of these.



Saturn taken in bright twilight using IR pass filter

Practise

It's easier to learn to use your telescope in warmer twilight or daytime than freezing pitch black winter night!

- Perfect your polar alignment technique
- Get GOTO functions working
- Setup auto-guiding
- Re-process old images – search out new image processing techniques

So don't stop observing in summer. Enjoy what's on show until the return of the dark – and hopefully clear skies!

Mark Phillips

Image credit: NLC, Moon, Sun and Saturn: Mark Phillips | Twilight diagrams: [timeanddate.com](#)

May 2019 meeting report and information

5 May 2019

Categories: Meeting report, News

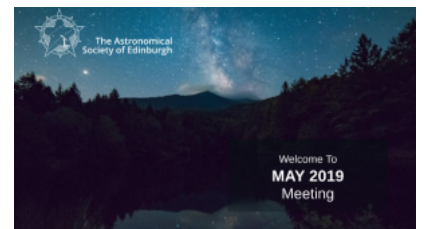


Welcome To
MAY 2019
Meeting

Dr Fabio Biancalana of Heriot-Watt University gave an amazing, mind-warping talk on black holes at our May meeting, introducing some amazing concepts to the 100 plus members of the audience. We also had some very interesting questions raised by audience members.

Also at the meeting:

- Alan Pickup gave a presentation on the sky for May, plus some images by members submitted to our [Flickr group](#)
- Two new members were welcomed to the Society
- Andrew updated us on various "astronomy and space" items that had caught his attention
- Mark Phillips gave a talk on [Astronomy in the Twilight Zone](#)
- Hugh "Iridium" Somerville gave a brief presentation on the Iridium Satellites
- There were various Society news updates too including:
 - a potential observing site for us as Newbattle Abbey College
 - details of our plans for another Telescope Help Shop – experienced volunteers requested
 - the Charles Piazzi Smyth exhibition currently running in the Nelson Monument on Calton Hill
- Sean updated us on various topics that had come to his attention:
 - Isle of Man stamps to celebrate the 50th anniversary of Apollo 11
<https://www.iompost.com/stamps-coins/collection/-one-small-step-/>
 - Go Stargazing events also to celebrate the 50th anniversary of Apollo 11
<https://gostargazing.co.uk/2019/04/24/apollo-50th-anniversary-celebration-events/>
 - A stargazing break led by Bob Mizon on Exmoor
 - Events at John Moore University, Liverpool also for Apollo 11 50th
 - Notification of the AGM on 7th June 2019
 - Memberships need to be up to date in order to vote
 - We will also hold an EGM at this meeting for an amendment to Clause 3 of our Constitution
 - ASE will have a presence at the Scottish National Airshow at the Museum of FLight on 27 July. Volunteers needed on the stand.



[Download presentation as a PDF](#)

Details from Society updates follow:

1. Outstanding Membership applications ahead of AGM – ask them to sign forms if they are here this evening.
2. AGM on Friday 7 June –

The Agenda, papers and accounts and annual report will be circulated, by email, to members on the weekend of Sat 18/Sun 19 May. They will also be available on the Members Section of the ASE website.

The current President, two Vice Presidents, Secretary, Treasurer and five ordinary Councillors have all indicated they are willing to stand again for the Council in 2019-20. If unopposed, they would all be deemed reelected for another year. However, any member who has been a paid-up member for 12 months, and is not in arrears, can seek election to the Council by sending their nomination in writing to the Secretary. This nomination must be seconded by another Member. The deadline for receipt of nominations is 21 days before the AGM. So, that is by Friday 17 May 2019. Email the Secretary at secretary@astronomyedinburgh.org

The Treasurer will not be present at the AGM, so any member questions on the accounts will be noted and if President/Secretary can answer on the night, the Treasurer will respond as soon as possible

3. The Secretary is proposing an Amendment to Clause 3 of the Constitution of the ASE, which governs how people may become members of the Society. The Council is supporting this amendment, and it is designed to streamline the procedure for membership. A paper setting out the proposal, the thinking of the Council on this issue and the procedure for an amendment will be in the paperwork for the AGM circulated in mid-May. Officially this will require a Special General Meeting to be held. The Council has decided that this will take place on 7 June, immediately after the AGM. So, the running order for Friday 7 June will be the Ordinary June meeting at 7:30pm, followed by the AGM, followed by the SGM. Both the AGM and SGM need a quarter of the Society membership to be present to be a valid meeting (this is 24 Members). So members are asked to stay on after the ordinary meeting next month. We expect this AGM and SGM will not take very long and all of the events should be over by 9.30/9.40pm at the latest.

4. As part of our 2019/20 programme of events the ASE will be present at the 2019 Scottish National Air Show at Museum of Flight in East Fortune on Sat 27 July 2019. We are looking to undertake solar observing and public engagement as the event. So we are looking for ASE members to volunteer to take part in the event, and bring astro equipment. The Council will send more details in due course, but initial expressions of interest should be emailed to the Secretary. We'll be making further announcements about other events soon, including the CPS200 Symposium, the next telescope workshop (in September), the 2019 Doors Open Day (in September) and an event for the Transit of Mercury on Monday 11 November.

Dear The Astronomical Society of Edinburgh,

Saturday 20th July 2019 marks the 50th anniversary of the first moon landing and with it comes a fantastic opportunity to celebrate arguably one of humankind's greatest achievements.

The Go Stargazing team are as keen as ever to help promote events being organised as part of these celebrations and raise awareness of them to as wide an audience as possible. If you are organising an event and would like it featured on our webpage at <https://gostargazing.co.uk/apollo50> please do let us know by reply to this email. Over the coming months and as anticipation of the anniversary increases we will promote your activities through our website and social media channels in the hope that we can help attract attendees to your events.

Indeed we are keen to promote all of your forthcoming public stargazing events, a service we are pleased to offer without any charge (Go Stargazing is not-for-profit). Please do take a moment to review the events we have listed for you at <https://gostargazing.co.uk/event-organiser/6809> and if we are missing any (or if they are for some reason incorrect) do please get in touch!

Clear skies!

Neill, Will, Rob and Richard.

YARN MARKET HOTEL,
DUNSTER, EXMOOR
Stargazing Break lead by Bob Mizon

We would love you to join us for our fabulous Stargazing break in the Exmoor Dark Sky Reserve which is the first dark sky reserve in Europe. This break includes accommodation with Dinner, Bed and Breakfast. Talks and stargazing hosted by Bob Mizon MBE FRAS, coordinator of the British Astronomical Association's Commission for Dark Skies: author, observer and planetarium operator. You will also have the opportunity to experience a viewing inside a mobile planetarium and also lunch at a traditional Exmoor Inn. The cost of the break is £200 per person with no single supplements. For further information, or to make a booking, please either call us on 01643 821425 or email hotel@yarnmarkethotel.co.uk

With the 50th Anniversary of the first moon landing getting close, there are a number Moon-related events coming up:

4th May: May the Fourth Be With You – a family-friendly day of activities at World Museum in Liverpool
Part of the Anniversary celebrations at World Museum, this is a free, drop-in event suitable for everyone. I'll be there with some colleagues and a bunch of moon-based activities, so do drop by and say hello.

Open from 11AM-4PM, no booking required – just drop in: <http://www.liverpoolmuseums.org.uk/wml/events/displayevent.aspx?EventId=39486>

Last Reminder: 13th May: Moon: Art, Science, Culture – the annual Astrophysics Research Institute Public Lecture
Redmonds Building, Brownlow Hill, Liverpool

For the lecture this year, we are joining the Moon Landing anniversary celebrations and are delighted to announce not one, but two speakers to share many different aspects of the Moon: Dr Alexandra Loske and Dr Robert Massey.

There are more details here: <http://www.astro.ljmu.ac.uk/node/235>

The lecture will take place at 6PM on 13th May, and is free and open to all – no booking required.

18th May: Rocket to the Moon with Dr Kevin Bowman
World Museum, Liverpool at 2PM and 3:30PM

A talk to celebrate the 50th Anniversary organised by the lovely people at World Museum

Tickets are free, but must be booked in advance – see <http://www.liverpoolmuseums.org.uk/wml/events/displayevent.aspx?EventId=39703>

2nd June: Out of the World with Helen Sharman
Liverpool Anglican Cathedral, evening lecture

Not one we are involved with organising, but this should be a fascinating insight into life as an astronaut, in an amazing venue

More details and tickets here: <https://www.ticketquarter.co.uk/Online/out-of-this-world-with-helen-sharman>

And from the wider Universe...

3rd May – 1st September: Astronomy Photographer of the Year Exhibition, World Museum

The finest in astro-photography comes to Liverpool with an exhibition of the 2018 winners.

Free entry – see <http://www.liverpoolmuseums.org.uk/astronomy>

Advance Notice: MAD 2020 date: Saturday 4th April 2020

After the success of the Merseyside Astronomy Day again this year, we immediately organised a date for the 2020 MAD with World Museum. Obviously, it is possible that circumstances will change and we will have to move the date, but it is unlikely, so you may want to put it in your diary. I will send out more details on the programme and tickets later in the year.

Introduction to exoplanets free course

23 May 2019

Categories: Knowledge, News

Free course

An introduction to exoplanets



Free statement
of participation
on completion



The Open University have produced a brand new free course exploring our Galaxy's population of planets, and some of their many great surprises.

[Introduction to exoplanets »](#)

From the website:

What are the planets outside our Solar System like? Could there be life on them?

Learn about this fascinating area of twenty-first century science in this exciting free course, An introduction to exoplanets.

The course introduces our Galaxy's population of planets, and some of their many surprises. It explains the methods used by astronomers to study exoplanets, and provides a general introduction to the methods of scientific inquiry. The course culminates in discussion of life elsewhere in our Galaxy.

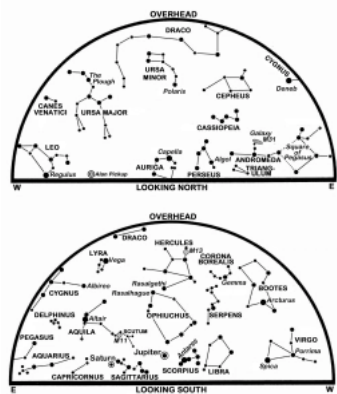
Scotland's Sky in June, 2019

31 May 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, diary, Edmund Halley, Galilean moons, Great Red Spot, Hercules, Jupiter, Mars

Is Jupiter's Great Red Spot unfurling before our eyes?



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 30th. (Click on map to enlarge)

The Sun reaches its most northerly point at 16:54 BST on the 21st, marking the summer solstice in our northern hemisphere. Between its setting in the north-west and its rising in the north-east, it follows only a shallow arc below Edinburgh's horizon and stands, at most, 10.6° below Edinburgh's due-north horizon at 01:14 BST. As a result, twilight persists throughout our June nights and we must stay up late to glimpse even the brighter stars and planets.

The sunrise/sunset times for Edinburgh change from 04:36/21:46 BST on the 1st, to 04:26/22:03 on the 21st and 04:30/22:02 on the 30th. The Moon is new on the 3rd, at first quarter on the 10th, full on the 17th and at last quarter on the 25th.

At times like these, some stargazers forsake their hobby for a couple of months while others switch to observing the Sun, or, perhaps, noctilucent clouds. This June, though, the giant planet Jupiter is well worth a look as it comes to opposition on the 10th. It is then closest to us (641 million km) and stands directly opposite the Sun, so that it rises in the south-east at sunset and passes (for Edinburgh) less than 12° high in the south in the middle of the night.

Conspicuous at magnitude -2.6 as it creeps westwards against the stars of southern Ophiuchus, Jupiter outshines every other object in our night sky except for the Moon which lies close to it on the night of the 16th-17th. A small telescope or good steadily-held binoculars reveal its four main moons, the Galilean moons, as they orbit from east to west of the planet in periods that range from 1.8 days for Io to 16.7 days for Callisto. Jupiter has more moons, 79 at the latest count, than any other planet, with Saturn's tally of 62 coming second. Jupiter's 75 lesser moons, though, are too small and dim to be spotted using any but the largest telescopes.

Jupiter's globe is shrouded in clouds, mainly of ammonia crystals but tinted red and brown by other compounds which may include hydrocarbons. Telescopes show bands of darker cloud and a plethora of streaks and spots that transit smartly across the disk as the planet rotates in its sub-ten-hour day.

The most famous feature, the Great Red Spot, is an anticyclonic storm that may be more than 300 years old and was once larger than three Earths. It has shrunk significantly over the last century but observations over the past two weeks suggest something startling may be afoot and even that the spot may be disintegrating. It appears that 10,000-km-long streamers of reddish gas, perhaps methane-rich, are peeling away from the spot into the adjacent cloud band, the South Equatorial Belt, that circles the planet. Likened by some to the spot unfurling, nothing on this scale has been seen before so it is just as well that NASA's Juno probe has a ring-side view as it orbits Jupiter.

Some 30° to the east of Jupiter, below the so-called Teaspoon of Sagittarius, is our Sun's other gas giant planet, Saturn. Rising in the south-east about one hour before our map times, it brightens slightly from magnitude 0.3 to 0.1 to rival the two brightest stars on our south map – Vega in Lyra which stands very high in the east-south-east and Arcturus in Bootes in the middle of our south-western sky. When Saturn lies just left of the Moon on the night of the 18th, it lies 1,361 million km away and a telescope shows its disk and rings to span 18 and 41 arcseconds respectively.

The constellations of Ophiuchus and Hercules sprawl across the meridian at the map times, though our twilight means that this is not the best month for spotting M13, the Great Globular Cluster in Hercules (see map). Discovered by Edmond Halley of comet fame in 1714, this ball of hundreds of thousands of stars is some 160 light years across, 22,200 light years away and is thought to have formed 11.65 billion years ago. Under the best conditions, binoculars show it as a fuzzy circular patch around two-thirds as wide as the Moon.

Although Venus is brilliant at magnitude -3.9, it rises in the north-east around 40 minutes before the Sun and is unlikely to be noticed in Scotland's dawn twilight. Mars is now as dim as magnitude 1.8 and becoming much harder to spot low down in our north-western evening twilight. Tracking eastwards in Gemini to pass below Castor and Pollux, it sets for Edinburgh at 00:05 BST on the 5th when it is 4° to the right of the slender young earthlit Moon. Mercury, much easier at magnitude -0.7, lies 11° below-right of Mars at that time and is 4° above the horizon one hour after sunset between the 5th and 19th. Mercury passes 0.2° above Mars on the 18th and stands furthest east of the Sun (25°) on the 24th.

Scotland's noctilucent cloud season is just beginning and we can look forward to occasional displays of these "night-shining" clouds until August. Often with a bluish-white sheen, they may appear as wisps, streaks and whirls and merge into banks with cirrus-like herring-bone patterns. The clouds are formed when ice crystallises on dust particles in a narrow range of altitudes near 82 km. Here they are high enough to catch the sun's light when our more typical lower-level terrestrial clouds are in darkness, from, say, one hour after sunset until one hour before sunrise. They rarely reach more than 20° above the horizon and favour directions towards the north-west at nightfall shifting to the north-east before dawn.

Diary for 2019 June

Times are BST

3rd 11h New moon

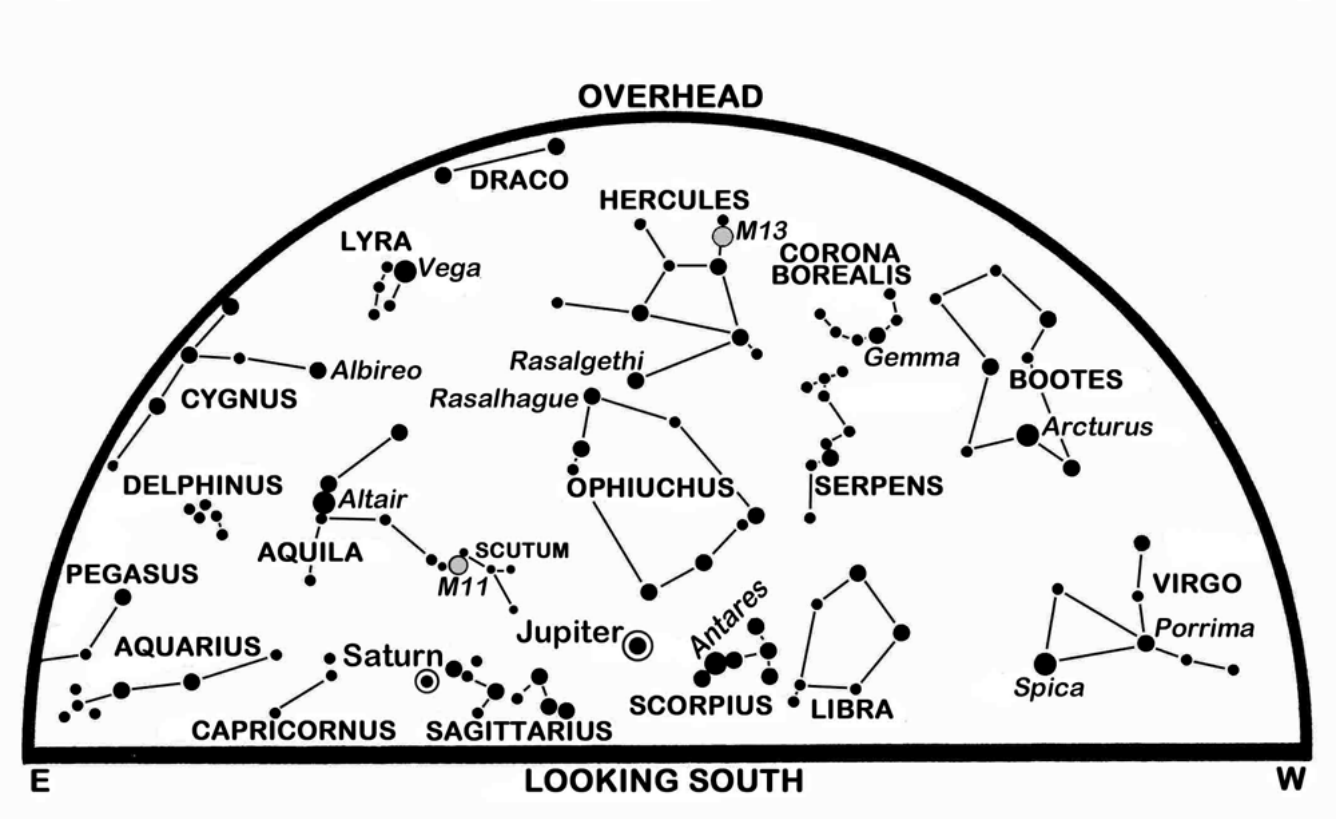
4th	17h Moon 4° S of Mercury
5th	16h Moon 1.6° S of Mars
7th	09h Moon 0.5° N of Praesepe
8th	21h Moon 3° N of Regulus
10th	07h First quarter
10th	16h Jupiter at opposition at distance of 641 million km
16th	20h Moon 2.0° N of Jupiter
17th	10h Full moon
18th	16h Mercury 0.2° N of Mars
19th	05h Moon 0.4° S of Saturn
21st	16:54 Summer solstice
24th	00h Mercury furthest E of Sun (25°)
25th	11h Last quarter
30th	17h Moon 2.3° N of Aldebaran

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on May 31st 2019, with thanks to the newspaper for permission to republish here.

Scotland's Sky in June 2019

31 May 2019
Categories: News



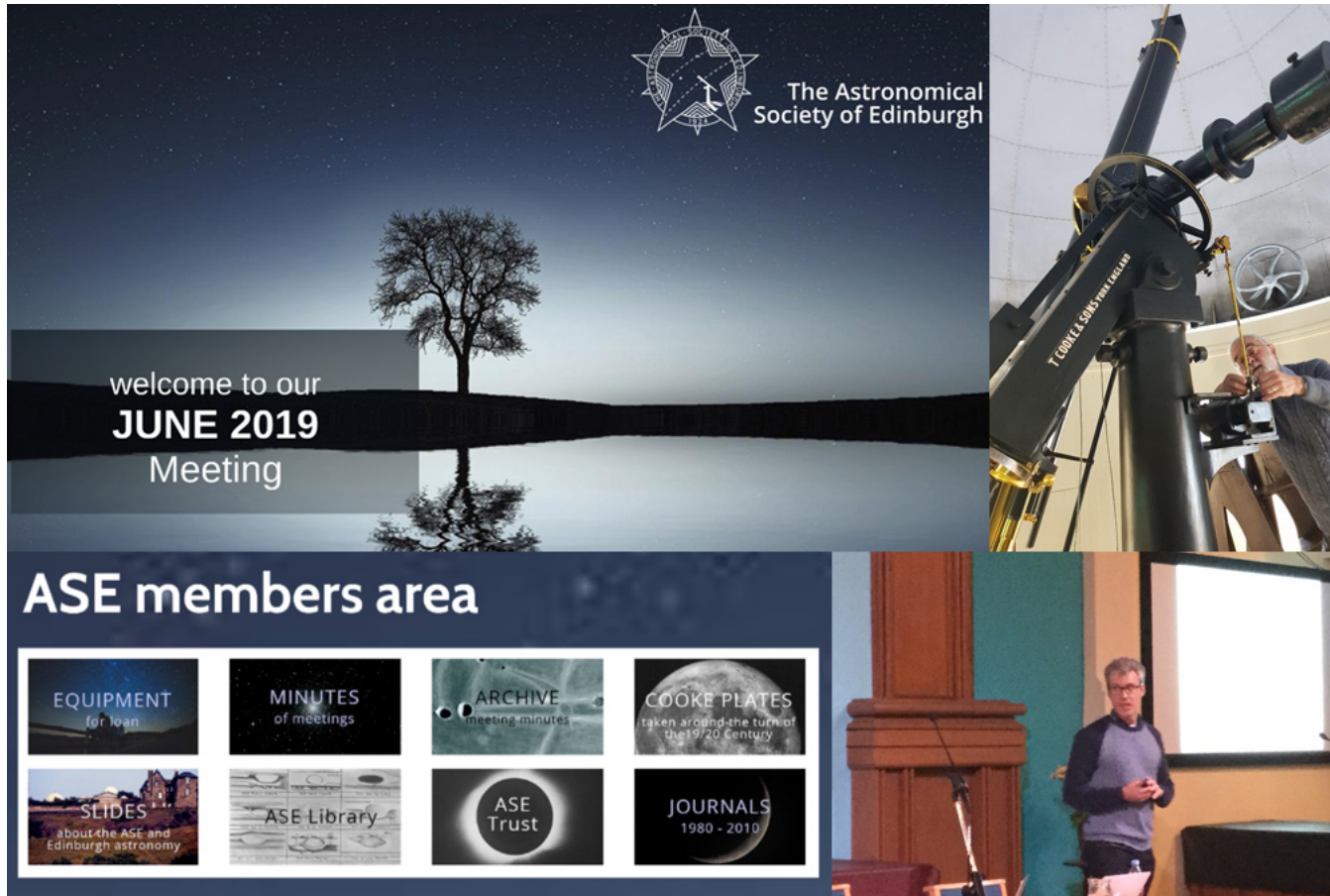
Is Jupiter's Great Red Spot unfurling before our eyes?

You can now find the latest [Scotland Sky Diary](#) for June by Alan Pickup in the [ASE Journal](#).

June 2019 meeting report and information

8 June 2019

Categories: Meeting report, News



Along with our AGM, Professor Philip Best of the ROE gave a really interesting talk about Deep Radio Sky Surveys with the LOFAR array. Who knew radio telescopes might be supplied flat-packed by a well-know Swedish furniture company?

Also at our meeting:

- President Andrew Farrow welcomed 2 new members, bringing our membership up to 98
- Horst gave an overview of the sky in June
- Andrew introduced some interesting [free online astronomy courses from the Open University](#)
- Jim Anderson has been fixing the Cooke telescope drive and apart from power to the motor, the telescope should be in working order now.
- The ASE will have a stand at Scotland's National Airshow at East Fortune 27th July and we would like members to volunteer to be there. [Please get in touch](#) if you can.
- The [Piazzi Smyth Symposium](#) will take place in September and this is free to ASE members.
- Mark Phillips introduced the new Members area of the website. All paid-up members of the Society should register for an account. An email has been sent to all members about this.
- Various telescopes were offered for sale.
- Andrew gave an overview of news items in the astronomy and space world that had caught his attention.

Following the normal parts of the meeting, we had our AGM. Minutes to follow.



[Download the ASE presentation as a PDF](#)

Why is Jupiter so low down?

20 June 2019
Categories: News



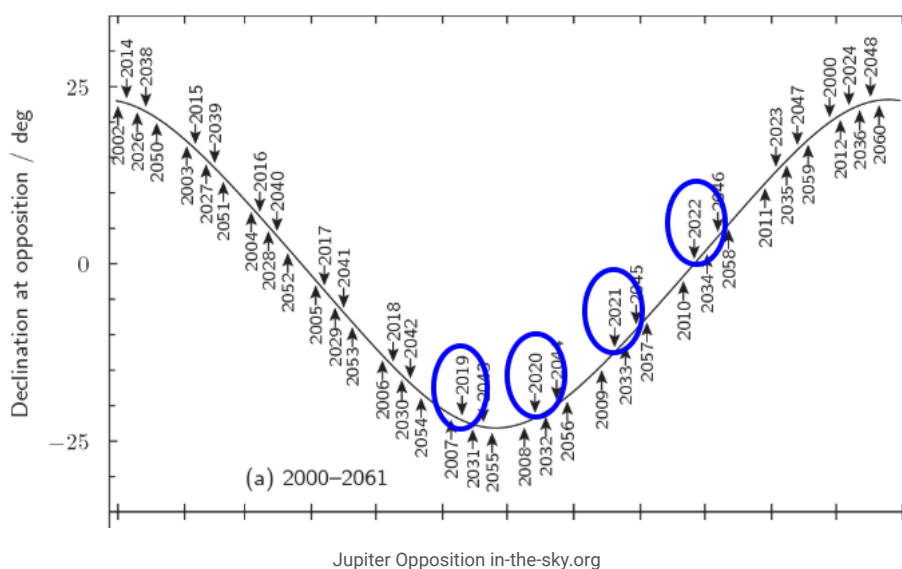
Remember just a few years ago it seems, Jupiter was in the winter sky, high up and easy to observe. So much easier than now, when it barely clears the tree-tops and is seen through thick layers of atmosphere. What's that all about, and when will it be easier to view again?

As I write this, Jupiter will transit (due south and at its highest point in the sky) at about 12:30 BST at a declination of -22 degrees. Which means that from Edinburgh it will be less than 12 degrees above the horizon. I took the picture above just a few minutes ago to illustrate the point.

Unfortunately Jupiter will still be very low again in 2020, at about the same declination and altitude as this year. But fear not, it will then be on its way back up the northern sky, reaching the celestial equator (declination 0 degrees) in 2022, and will reach its peak declination of about 24 degrees in 2024.

There is a correlation between what time of year Jupiter reaches opposition (opposite the Sun as seen from Earth) and its declination. This from in-the-sky.org:

When Jupiter comes to opposition in the northern summer months, the Sun is high in the northern sky, which places the opposite side of the ecliptic plane in the southern sky. This means that Jupiter is poorly placed for observation from the northern hemisphere when at opposition in the summer. Conversely, if Jupiter is at opposition in December, it is sure to be high in the northern sky.

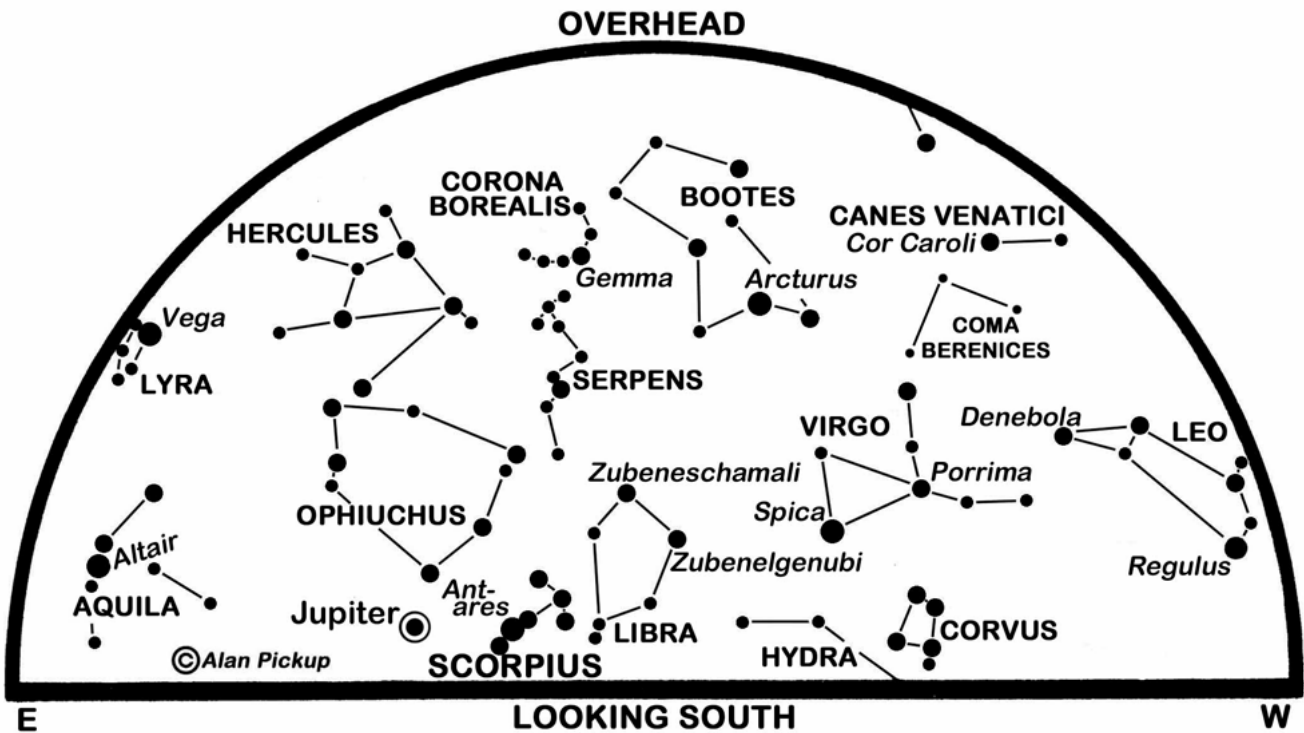


The chart shows the declination of Jupiter for each year. So next year won't be great again – but get ready for the 2021 and 2022 oppositions – and beyond. Jupiter is one of the most fascinating planets to study and definitely worth the effort!

Chart: in-the-sky.org
Article: Mark Phillips

Scotland's Sky in July 2019

29 June 2019
Categories: News



A partial eclipse of the Moon next to Saturn on the 16th

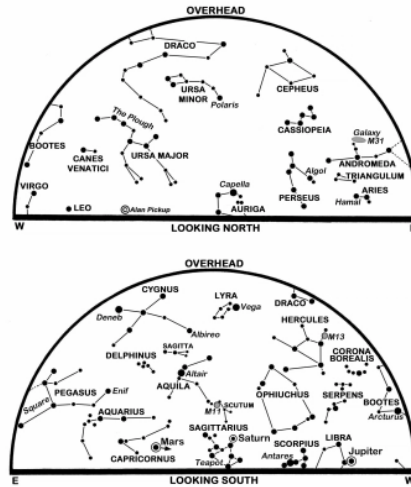
You can now find the latest [Scotland Sky Diary](#) for June by Alan Pickup in the [ASE Journal](#).

Scotland's Sky in July, 2019

29 June 2019

Categories: Journal, Sky Diary

A partial eclipse of the Moon next to Saturn on the 16th



The maps show the sky at 01:00 BST on the 1st, midnight on the 16th and 23:00 on the 31st. (Click on map to enlarge)

July brings a slow return to darker and longer nights as the Sun's trek southwards continues in the wake of our summer solstice. Until the 12th, the Sun dips no more than 12° below Edinburgh's northern horizon so that twilight persists through every night. By the month's end, though, we enjoy almost four hours of effective darkness and, with the Moon out of the way, the fainter stars are once again on show.

The 50th anniversary of Apollo 11's pioneering lunar landing occurs on the 20th while, for stargazers and the weather permitting, the highlight may be the partial eclipse of the Moon which comes four days earlier on the evening of the 16th, though the Moon rises, and the Sun sets, while the eclipse is already underway.

The event begins at 19:44 BST when the Moon begins to encroach of the edge of the outer shadow of the Earth, the penumbra. Between 21:02 and midnight, part of the Moon lies within the central dark umbra where, in the absence of any direct sunlight, it is illuminated in only a dim reddish glow by sunlight refracting around the edge of the Earth. The Moon rises above Edinburgh's south-eastern horizon at 21:44 and greatest eclipse occurs at 22:31 when the Moon stands only 8° high in the twilight with its northern 65% covered by the umbra. The eclipse ends when disk exits the penumbra at 01:18.

Sunrise/sunset times for Edinburgh change from 04:31/22:01 on the 1st to 05:14/21:23 on the 31st. New moon on the 2nd brings a total eclipse of the Sun visible along a track that crosses the south-eastern Pacific to Chile and Argentina. Surrounding areas, but not Europe, enjoy a partial eclipse. The Moon reaches first quarter on the 9th, is full at the lunar eclipse on the 16th and at last quarter on the 25th.

Saturn, the fainter of the two bright planets low down in our southern night sky, lies 8° to the right of the Moon and a little higher on the evening of the lunar eclipse. One week earlier, on the 9th, it reaches opposition in the constellation Sagittarius when it lies directly opposite the Sun so that it rises at sunset and is highest in the south in the middle of the night, albeit at an elevation of only 12°. It is also closest to us, 1,351 million km, and at its brightest at magnitude 0.1.

A telescope shows Saturn's disk to be 18 arcseconds wide while its rings extend across 42 arcseconds and have their northern face tipped Earthwards at 24 degrees. Saturn's globe is blanketed with clouds of ammonia crystals whose shade varies in bands running parallel to its equator. They appear much less prominent than the equivalent bands on Jupiter and there are few noticeable spots.

Jupiter, itself, lies in southern Ophiuchus some 31° to the right of Saturn and far outshines its neighbour even though it dims slightly in July from magnitude -2.6 to -2.4 as its distance grows from 649 million to 691 million km. It lies just below the bright Moon on evening of the 13th when a telescope shows its disk to be 44 arcseconds wide.

The previous evening, the 12th, would be an opportune time to check out Jupiter's Red Spot which, as I mentioned last time, appears to have been spooling some of its reddish material into its adjacent cloud belt. It is certainly measurably smaller than it was just a few weeks ago but there are also signs that the disturbance may have subsided.

The other naked eye planets are poorly placed. The brightest, magnitude -3.9 Venus, rises 50 minutes before the Sun and stands less than 5° high in the north-east at sunrise. Mercury stands 4° to the left of Mars in the west-north-west during the hour after sunset on the 1st but both are too dim, at magnitudes of 1.2 and 1.8 respectively, to be glimpsed in our bright twilight.

Mars is edging towards the Sun's far side and reappears before dawn in October. Mercury reaches inferior conjunction between the Sun and the Earth on the 21st when it passes 5° south of the Sun on its way to our morning sky in August. When Mercury next reaches inferior conjunction, on 11 November, it passes almost centrally across the Sun's disk in a transit that we hope to witness from Scotland.

Our charts show Jupiter and Saturn low down in our southern sky while the star Vega, only slightly brighter than Saturn, crosses the meridian high above them. Vega, of course, forms the Summer Triangle with Deneb in Cygnus, high in the east, and Altair, lower in Aquila. Our map projection squashes the Triangle somewhat – in fact, Deneb and Vega are closer together in the sky than is either star to Altair. An even larger triangle, this one almost equilateral, fills our south-western sky and has its corners at Vega, Jupiter and Arcturus, which lies due west as the leading star of Bootes.

Capella in Auriga stands at its lowest below Polaris in the north and often features in images of noctilucent clouds or NLCs. Little did I realise when I mentioned these silvery-blue "night-shining" clouds last time that 2019 was to unleash some of our best NLC displays in decades. Formed by ice condensing on high-altitude dust particles, some perhaps debris from meteors, they catch the sunlight when our usual lower-level clouds are in darkness during the middle hours of our nights. Researchers are investigating why this should be such a special year for NLCs but expect the bonanza to continue into August.

Diary for 2019 July

Times are BST

2nd	20h New moon and total solar eclipse
4th	23h Earth farthest from Sun (152,100,000 km)
6th	04h Moon 3° N of Regulus
7th	15h Mercury 4° S of Mars
9th	12h First quarter
9th	18h Saturn at opposition at distance of 1,351 million km
13th	21h Moon 2.3° N of Jupiter
16th	08h Moon 0.2° S of Saturn
16th	23h Full moon and partial lunar eclipse
20th	21h 50th anniversary of first manned lunar landing
21st	14h Mercury in inferior conjunction
24th	00h Mercury furthest E of Sun (25°)
25th	02h Last quarter
28th	02h Moon 2.3° N of Aldebaran

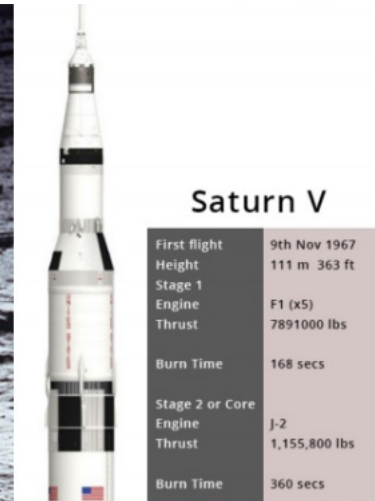
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on June 29th 2019, with thanks to the newspaper for permission to republish here.

July 2019 meeting report and information

9 July 2019

Categories: Meeting report, News



Our honorary president, Professor Andrew Lawrence, gave a very engaging talk on Wandering Astronomers: the past, present, and future of mountaintop astronomy, celebrating the work of Charles Piazzi Smyth and linking it to his own experiences of working at remote observatories.

Also at our meeting:

- President Andrew Farrow welcomed 1 new member, bringing our membership up to 99.
- We were also celebrating the 50th anniversary of the Moon landings. We had planned to do a live stream of the Moon but the weather prevented that from happening.
- Alan Pickup gave an overview of the sky in July.
- The ASE will have a stand at Scotland's National Airshow at East Fortune 27th July and we now have enough volunteers.
- The Piazzi Smyth Symposium will take place in September and this is free to current ASE members. Register online on the [Symposium page of the Piazzi Smyth website](#).
- We will be involved in the ROE Doors Open Days on 28/29 September and will require volunteers as usual. Please give your name to Geraldine or use the sign-up sheet on the Members website (once it's up!).
- We will also be taking part in a Newbattle Abbey evening walk and observing session on 14th August. Please sign up for this on the Members website (once available).
- Mark Phillips reminded members about the new Members area of the website. It will be used for volunteer sign-ups in the future so please remember to register if you are a member.
- The 10 inch Lewis Dobsonian telescope owned by the Society is in need of a new home so any member wishing to use this excellent scope should get in touch.
- Andrew gave an overview of news items in the astronomy and space world that had caught his attention.
- Andrew also did a comparison of various rockets, displaying some of his own models.
- Hugh Sommerville gave a member presentation on some of his interests including imaging, SpaceX rockets and... Iridium Satellites.



Download the ASE presentation as a PDF

Unfavourable Perseid meteor shower August 2019

22 July 2019
Categories: News



The Perseids, one of the best meteor showers of the year, unfortunately coincides with an almost full Moon in 2019 when the shower reaches its peak on the night of August 12-13. Some will be visible each night from 23 July to 20 August.

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 have been able to see around 50 meteors per hour if the Moon wasn't so bright, since the radiant will be relatively high in the sky. You will still be able to see brighter meteors though so it's still worth having a look. And remember, you can actually see some Perseids from as early as 23 July all the way up to the peak.



The Moon will however be fairly low down and if you shelter yourself from it then that will help. Many Perseids are also bright fireballs which means they will still be visible even with the Moon up.

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".

Some useful times on 13 August 2019

Sunrise: 05:38
Sunset: 20:55
Twilight ends: 00:20
Twilight begins: 02:21

Mark Phillips

Information source: Dominic Ford in-the-sky.org

ASE at the Museum of Flight Airshow

28 July 2019

Categories: News



Ten members of the society hosted our exhibition during the Airshow at East Fortune on the 27th July. We had quite a lot of interest and many people came to visit us.

We were in a building near the army's tank and visitors could look through two scopes. Unfortunately, due to the bad weather, the targets were a Vulcan plane, a flying saucer (an indoor light fitting) and Tosh holding the Moon, instead of the Sun!

Some new posters helped tell the story of the solar system and other astronomical features. Our usual handouts were joined by a leaflet on our [4-Steps to the Stars](#) educational programme. There was a lot of interest in the ASE from quite a number of people who had searched us out, location clearly marked on the Air Show programme. A tannoy announcement of our presence also help with our publicity.

It was a long day with members arriving from 7.30am and not departing until 5.30pm, but everyone thought it was all very worthwhile. Sadly the weather prevented much of the flying programme taking place but at least, for some, we provided an alternative diversion.

The Society would like to acknowledge the support of the Museum of Flight staff at East Fortune who helped us put on a successful exhibition.

Andrew Farrow

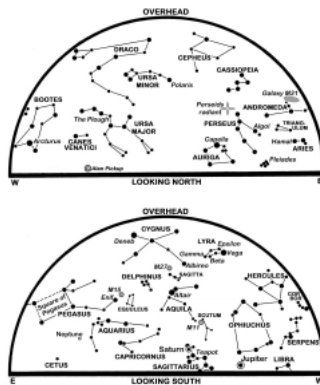
Scotland's Sky in August, 2019

31 July 2019

Categories: Journal, Sky Diary

Tags: Alan Pickup, ASE, Astronomical Society of Edinburgh, Beta Lyrae, Comet Swift-Tuttle, diary, Dumbbell Nebula, Epsilon, Jupiter, M27

Giant planets hang low in evenings as Perseid meteors fly



The maps show the sky at midnight BST on the 1st, 23:00 on the 16th and 22:00 on the 31st. (Click on map to enlarge)

Recent weeks have seen the Earth pass between the Sun and its two largest planets, the gas giants Jupiter and Saturn. Now they hang low in our evening sky, with Jupiter brighter than any star but less than 12° high in the south-south-west at nightfall as it sinks to set in the south-west one hour after our star map times. Saturn, one tenth as bright, trails 30° behind Jupiter and crosses our meridian a few minutes before the map times.

With the exception of Mercury, these are our only naked eye planets. Both Venus and Mars are hidden on the Sun's far side where Venus reaches its superior conjunction on the 14th. Mars stands at the far-point in its orbit of the Sun on the 26th and, by my reckoning, is further from the Earth on the 28th (400 million km) than it has been for 32 years.

The Summer Triangle of bright stars, Deneb, Vega and Altair, fills the high southern sky at our map times as the Plough stands in the north-west and "W" of Cassiopeia climbs high in the north-east. Below Cassiopeia is Perseus and the Perseids radiant, the point from which meteors of the annual Perseids shower appear to diverge as they disintegrate in the upper atmosphere at 59 km per second.

The meteoroids, debris from Comet Swift-Tuttle, encounter the Earth between about 17 July and 24 August but arrive in their greatest numbers around the shower's maximum, expected at about 08:00 BST on the 13th. Sadly, the bright moonlight around that date means that we may see only a fraction of the 80-plus meteors that an observer might count under ideal moonless conditions. It is just as well that Perseids include a high proportion of bright meteors prone to leaving glowing trains in their wake. Our best night is likely to be the 12th-13th as the radiant climbs to stand around 70° high in the east as the morning twilight takes hold.

The Sun drops almost 10° lower in our midday sky during August as the sunrise/sunset times for Edinburgh change from 05:16/21:21 BST on the 1st to 06:14/20:10 BST on the 31st. New moon on the 1st is followed by first quarter on the 7th, full moon on the 15th, last quarter on the 23rd and new moon again on the 30th.

In a month that sees Jupiter dim slightly from magnitude -2.4 to -2.2 and its distance increase from 691 million to 756 million km, its westerly motion in southern Ophiuchus slows to a halt and reverses at a so-called stationary point on the 11th. Its cloud-banded disk, around 41 arcseconds wide, remains a fascinating telescopic sight, particularly given the recent disruption to its Great Red Spot.

Saturn recedes from 1,362 million to 1,409 million km and dims from magnitude 0.2 to 0.3 as it creeps westwards below the Teaspoon, a companion asterism to the Teapot of Sagittarius. Through a telescope, Saturn's disk appears 18 arcseconds wide while the rings span 41 arcseconds and have their north face tipped at 25° towards the Earth.

Catch the Moon close to Jupiter on the 9th and to the left of Saturn as the Perseids peak on the 12th-13th.

Mercury stands between 2.5° and 5° high in the east-north-east one hour before Edinburgh's sunrise from the 5th and 22nd. It becomes easier to spot later in this period as it brightens from magnitude 1.0 to -1.2, though we need a clear horizon and probably binoculars to spot it. It is furthest from the Sun, 19°, on the 10th.

The only constellation named for a musical instrument, Lyra the Lyre, stands high on the meridian as darkness falls. Its leading star, the white star Vega, is more than twice as massive as the Sun and 40 times more luminous, making it the second brightest star in our summer night sky (after Arcturus) at its distance of 25 light years (ly). Infrared studies show that Vega is surrounded by disks of dust, but whether this hints at planets coalescing or asteroids smashing together is a matter of controversy – perhaps a mixture of the two.

Some 162 ly away and three Moon-breadths above-left of Vega is the interesting multiple star Epsilon, the Double Double. Binoculars show two almost-equal stars, but telescopes reveal that each of these is itself double. One of the four has its own dim companion and the whole system is locked together gravitationally, though the orbital motions are so slow that little change in their relative positions is noticeable over a lifetime.

The more dynamic system, Beta Lyrae (see map), lies almost 1,000 ly away and has two main component stars that almost touch as they whip around each other in only 12.9 days. Tides distort both stars and, as they eclipse each other, Beta's total brightness varies continuously between magnitudes of 3.2 and 4.4 – sometimes it can rival its neighbour Gamma while at others it can be less than half as bright.

At a distance of 2,570 ly and 40% of the way from Beta to Gamma is the dim Ring Nebula or M57. At magnitude 8.8 and appearing through a telescope like a small smoke ring around one arcminute across, it surrounds a much fainter white dwarf star which is what remains of a Sun-like star that puffed away its atmosphere towards the end of its life. The Dumbbell Nebula, M27, lies further to the southeast in Vulpecula, some 3° north of the arrowhead of Sagitta the Arrow. At 1,230 ly, its origin is identical to that of the Ring though it is larger and brighter and readily visible through binoculars.

Diary for 2019 August

Times are BST

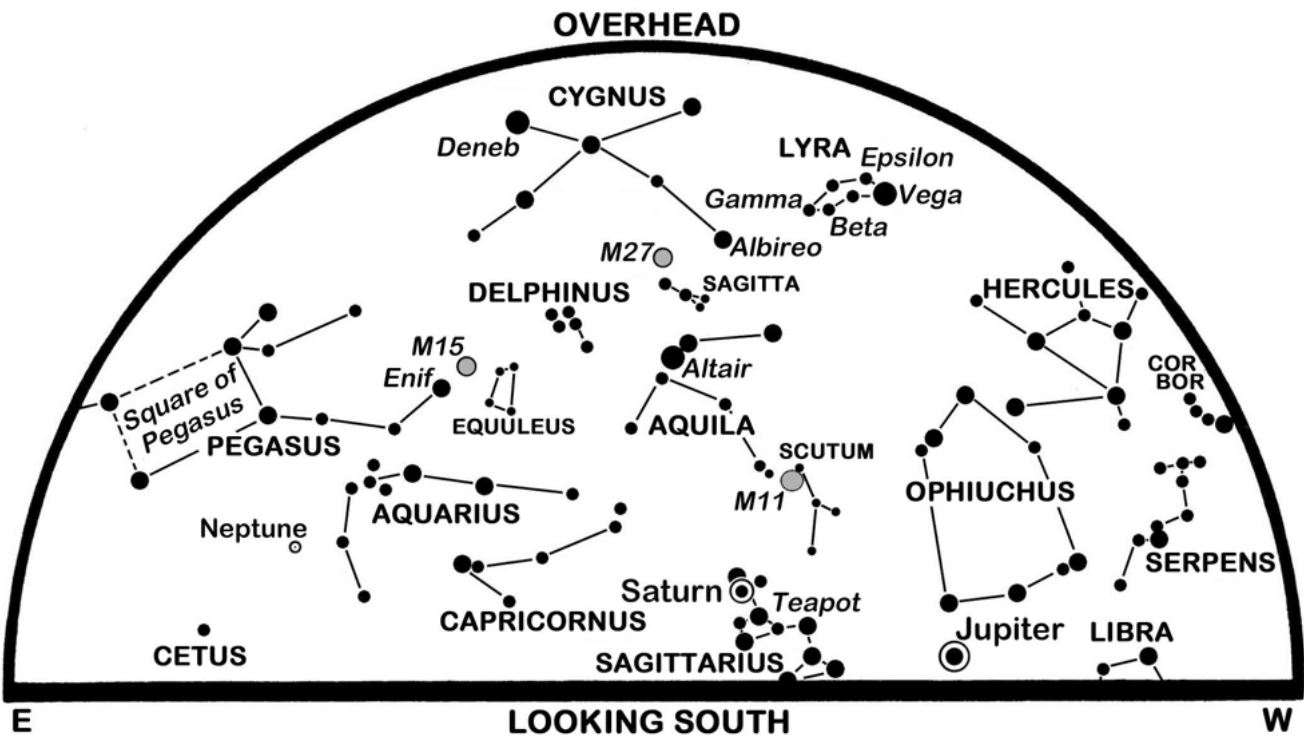
1st	04h New moon
7th	19h First quarter
10th	00h Mercury furthest W of Sun (19°)
10th	00h Moon 2.5° N of Jupiter
11th	17h Jupiter stationary (motion reverses from W to E)
12th	11h Moon 0.04° S of Saturn
13th	08h Peak of Perseids meteor shower
14th	07h Venus in superior conjunction
15th	13h Full moon
17th	11h Mercury 0.9° S of Praesepe
23rd	16h Last quarter
24th	11h Moon 2.4° N of Aldebaran
26th	02h Mars farthest from Sun (249m km)
28th	13h Moon 0.6° N of Praesepe
30th	12h New moon

Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on July 31st 2019, with thanks to the newspaper for permission to republish here.

Scotland's Sky in August 2019

4 August 2019
Categories: News



Giant planets hang low in evenings as Perseid meteors fly

You can now find the latest [Scotland Sky Diary](#) for August by Alan Pickup in the [ASE Journal](#).

Charles Piazzi Smyth Symposium

5 August 2019

Categories: News



During Sept 2-4 2019 there are a series of events to celebrate the life and work of Charles Piazzi Smyth, and his talented partner in life and science, Jessica. All the events are open to the public and will take place at the [Royal Society of Edinburgh](#), George Street, Edinburgh.

Members of the Astronomical Society of Edinburgh get free access to these events as they are jointly supported by the ASE. Select this option when booking if you are a member.

Charles Piazzi Smyth fascinates a wide range of people – Astronomers, Historians, Photography experts, Egyptologists, Art lovers, and the public in general – especially Edinburgh citizens who are fascinated by the history of their City. There are three events:

- A movie screening of "A Residence Above the Clouds", a 2016 film directed by Guillermo Carnero-Rosell
- Denis Pellerin will give a public lecture entitled "Piazzi Smyth: Royal Astronomer and Stereo Photographer"
- Two full days of talks and debate by experts and researchers on topics related to the life and legacy of Charles Piazzi Smyth – mountain top astronomy, photography, meteorology, and pyramidology.

For more information visit the [Symposium page on the Piazzi Smyth website](#). You can book for events through the University of Edinburgh [registration page](#).

Newbattle Abbey observing

14 August 2019

Categories: News



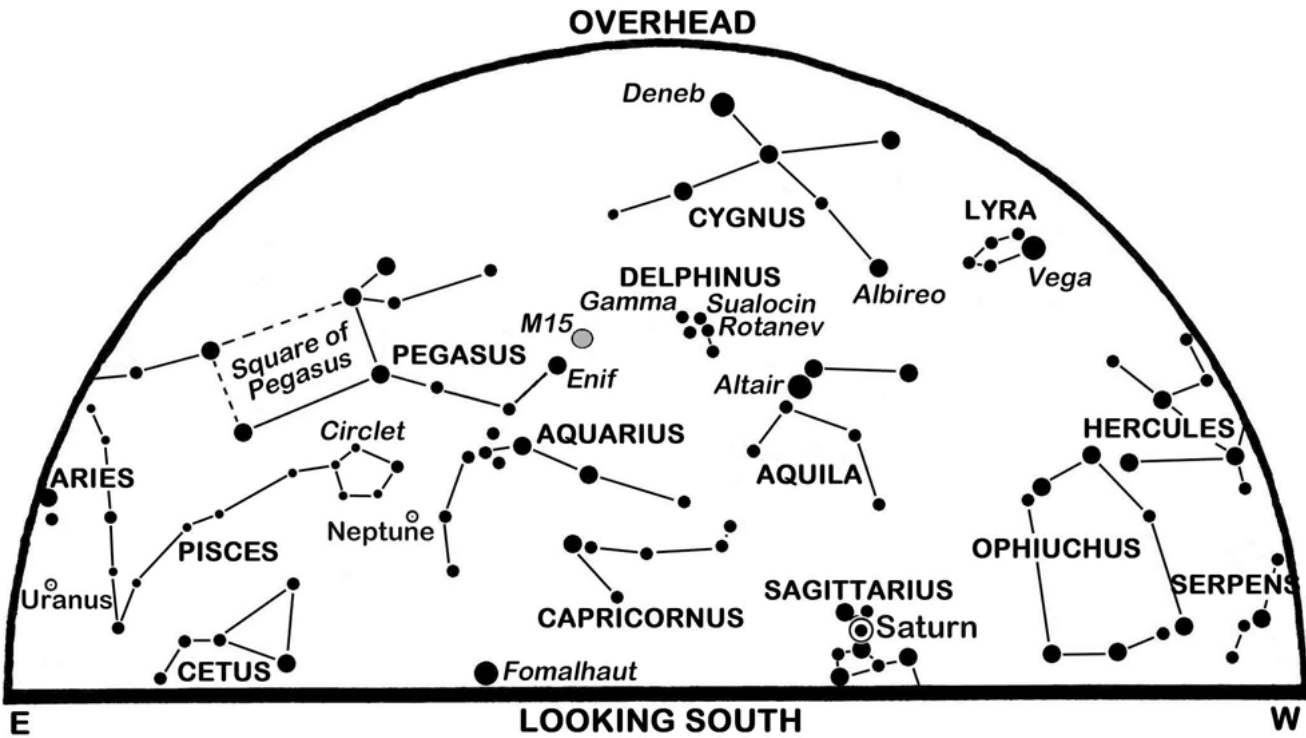
7 Society members turned up at Newbattle Abbey College on 13th August to try out the observing site.

We had originally planned to be there the next day along with a night walk organised by the Ranger but the weather forecast for then was poor. Although there was quite a bit of cloud around we managed to observe Jupiter, Saturn and a few meteors from the Perseids, which was at its peak. The almost full Moon then started to rise and conditions deteriorated.

However, the site looks like it might be a good spot for group and public observing sessions. It is a nice grassy field surrounded by trees with few local lights so it feels quite dark. Once we get better conditions we will be able to test it out properly.

Scotland's Sky in September 2019

31 August 2019
Categories: News

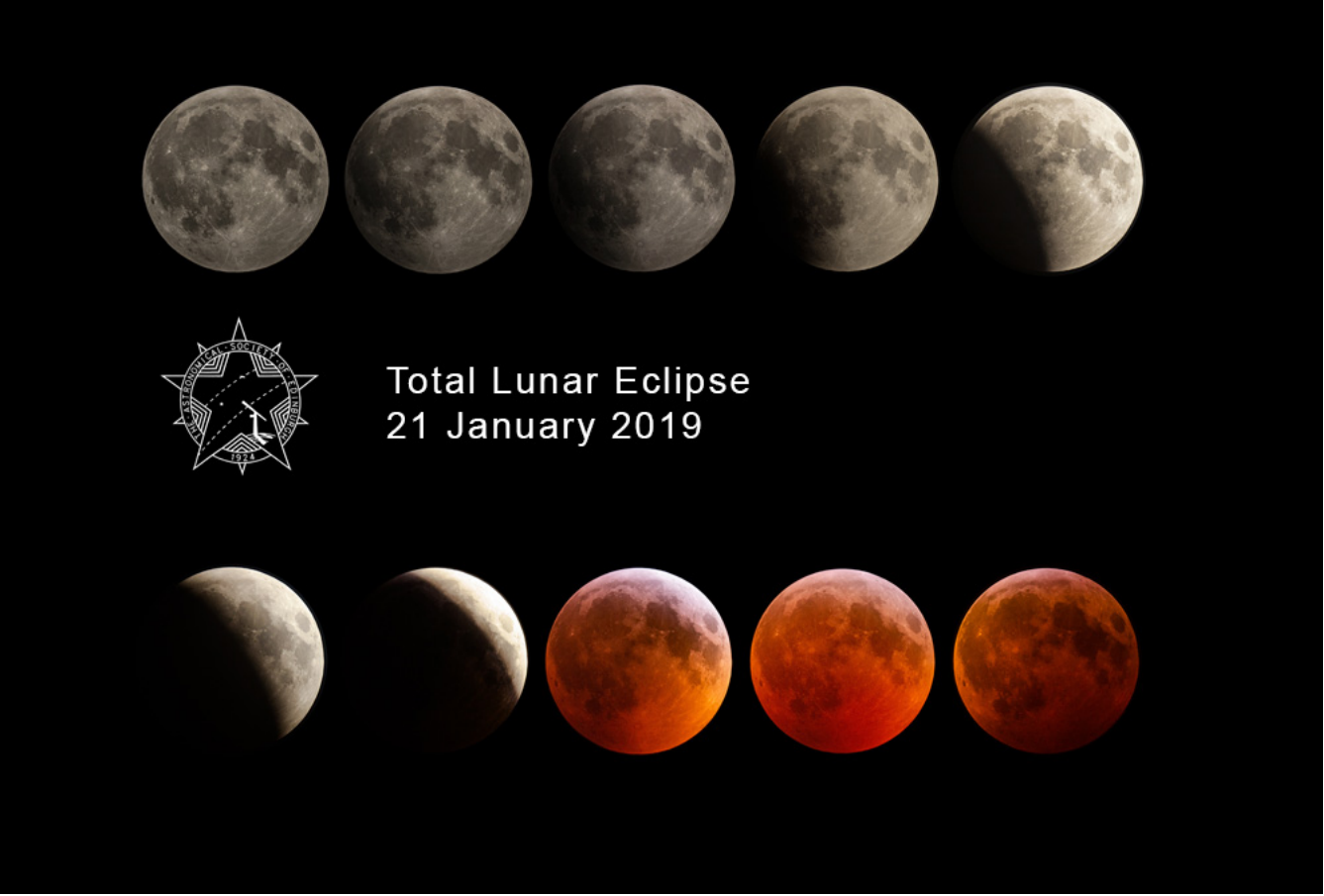


Friendly Delphinus the Dolphin wins a place among the stars

You can now find the latest [Scotland Sky Diary](#) for August by Alan Pickup in the [ASE Journal](#).

Lunar Eclipse live streaming

22 January 2019
Categories: News



In the early hours of 21 January we did our very first Live Streaming event of the total Lunar eclipse.

The event was streamed live on Facebook between 02:30 and 5:45, from just before the eclipse started to just after the Moon left totality. The banner on this post shows processed images taken throughout the eclipse.

Facebook shows that **945 people** were reached by the stream and **453 people** engaged with it in some way.

We hope to do more live streaming events in the future – maybe the transit of Mercury in November?



Lunar eclipse live stream

The Astronomical Society of Edinburgh was live

Share

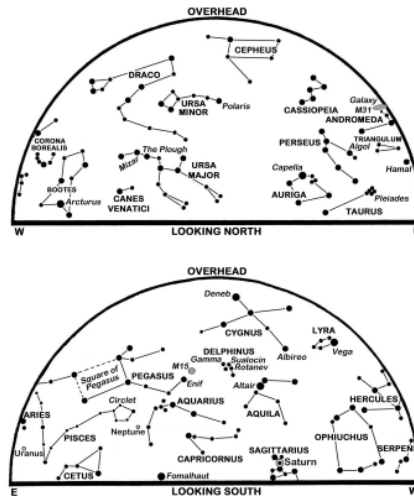
Mark Phillips

Scotland's Sky in September, 2019

31 August 2019

Categories: Journal, Sky Diary

Friendly Delphinus the Dolphin wins a place among the stars



The maps show the sky at 23:00 BST on the 1st, 22:00 on the 16th and 21:00 on the 30th. (Click on map to enlarge)

The Sun's southwards motion carries it across the sky's equator at 08:50 BST on the 23rd, marking our autumnal equinox when days and nights are about equal around the Earth. It also means that our nights are lengthening at their fastest pace of the year.

The Summer Triangle (Vega, Deneb and Altair) remains in prime position high in the south at nightfall with the Milky Way flowing through it as it arches across the east from south to north. The brighter stars of Ursa Major, the Great Bear, form the familiar pattern of the Plough which stands in the north-west at nightfall as it begins to swing below the Pole Star, Polaris, in the north.

By our map times, the relatively empty expanse of the Square of Pegasus is climbing in the south-east while below it is the lengthy but dim constellation of Pisces, neatly book-ended by the Sun's most distant planets Neptune and Uranus. Over the following few hours, though, this same region is invaded by the glorious form of Orion and his entourage of sparkling winter constellations

Last month I mentioned that Vega's constellation, Lyra, was named for a lyre, but how that musical instrument came to be up there is associated with a myth that also involves Delphinus the Dolphin, a small but distinctive constellation that lies just to the left of the Summer Triangle.

That myth concerns Arion, a (real) poet and musician of ancient Greece. It has him returning by sea following lucrative performances in Sicily, only to be robbed and cast overboard before being rescued by a dolphin and delivered safely to shore. In gratitude, Apollo subsequently elevated the dolphin and Arion's instrument, a lyre, to their places among the stars.

The four stars that represent the Dolphin's head form a diamond or kite while telescope reveal that one of these, Gamma (see chart), is a superb double consisting of two stars of contrasting colours that appear only 9 arcseconds apart – in fact, they are separated by 330 times the Earth-Sun distance and take 3,200 years to orbit each other.

How two of the other stars in the diamond, Rotanev and Sualocin, came to be named was a mystery after they first appeared in a star catalogue issued by the Palermo Observatory in 1814. Then it was realised that spelled backwards they became Nicolaus Venator, the Latin equivalent of Niccolò Cacciatore which just happened to be the name of the assistant astronomer at the observatory. While his ruse succeeded, it is worth remembering that the modern craze for "buying" star names has no official standing and the names are not recognised by astronomers worldwide.

The prominent planet Jupiter is already past its best as the sky darkens and sinks from almost 10° high in the south-south-west to set in the south-west by our map times. Still brighter than any star, it dims slightly from magnitude -2.2 to -2.0 this month as it edges eastwards in southern Ophiuchus. The first quarter Moon stands 6° right of Jupiter on the 5th when a telescope shows it to be 38 arcseconds wide at its range of 767 million km.

Telescopes and good binoculars show Jupiter's four main moons, Io, Europa, Ganymede and Callisto. Europa, with its ice-covered surface and likely sub-surface ocean, is of particular interest and the main target of a just-confirmed NASA mission, the Europa Clipper, which may launch as early as 2023 with arrival in 2026. This would see it beat the European Space Agency's Jupiter Icy Moons Explorer (or JUICE) probe which is scheduled to launch in 2022 but only arrive at Jupiter in 2029. JUICE will explore all the main moons apart from Io, the volcanic innermost moon which appears to have less water than any other object in the solar system.

Saturn, our only other easy naked eye planet, is at its best at nightfall, albeit barely 12° high in the south and just below the so-called Teaspoon of Sagittarius. Non-twinkling and fading slightly this month between magnitude 0.3 and 0.5, Saturn moves to set in the south-west two hours after the map times. Catch it right of the Moon on the 8th when it appears 17 arcseconds wide with rings spanning 39 arcseconds and tipped 25° to our view.

Sunrise/sunset times for Edinburgh change from 06:16/20:08 BST on the 1st to 07:13/18:52 on the 30th. The Moon is at first quarter near Jupiter on the 6th, full near Neptune on the 14th, at last quarter above Orion on the 22nd and new on the 28th. On the 29th, the Moon's sliver stands 6° high in the west-south-west at sunset and 3° above the evening star Venus. We have only the slimmest of chances of spotting the pair from our latitudes but binoculars may help – just don't use them until the Sun is safely below the horizon.

We do need binoculars, at least, to see either Neptune and Uranus which shine at magnitudes of 7.8 and 5.7 respectively. Neptune lies in eastern Aquarius where it tracks 0.8° westwards during the month to pass a mere 13 arcsecond south of the naked-eye star Phi Aquarii (magnitude 4.2) on the 6th. At that time, just four days before it reaches opposition, Neptune lies 4,328 million km away and appears as a tiny 2.3 arcsecond bluish disk. Being seven times brighter, Uranus would be easier to recognise were it not in a star-sparse region in south-western Aries.

Of the other planets, Mars is in conjunction on the Sun's far side on the 2nd, as is Mercury two days later, while both remain hidden in the Sun's glare.

Diary for 2019 September

Times are BST

2nd	12h Mars in conjunction with Sun
4th	03h Mercury in superior conjunction
6th	04h First quarter
6th	08h Moon 2.3° N of Jupiter
8th	15h Moon 0.04° S of Saturn
10th	08h Neptune at opposition at distance of 4,328 million km
14th	06h Full moon
18th	07h Saturn stationary (motion reverses from W to E)
20th	18h Moon 2.7° N of Aldebaran
22nd	04h Last quarter
23rd	08:50 Autumnal equinox
24th	23h Moon 0.7° N of Praesepe
26th	10h Moon 3° N of Regulus
28th	02h Moon 4° N of Mars
28th	19h New moon
29th	23h Moon 6° N of Mercury

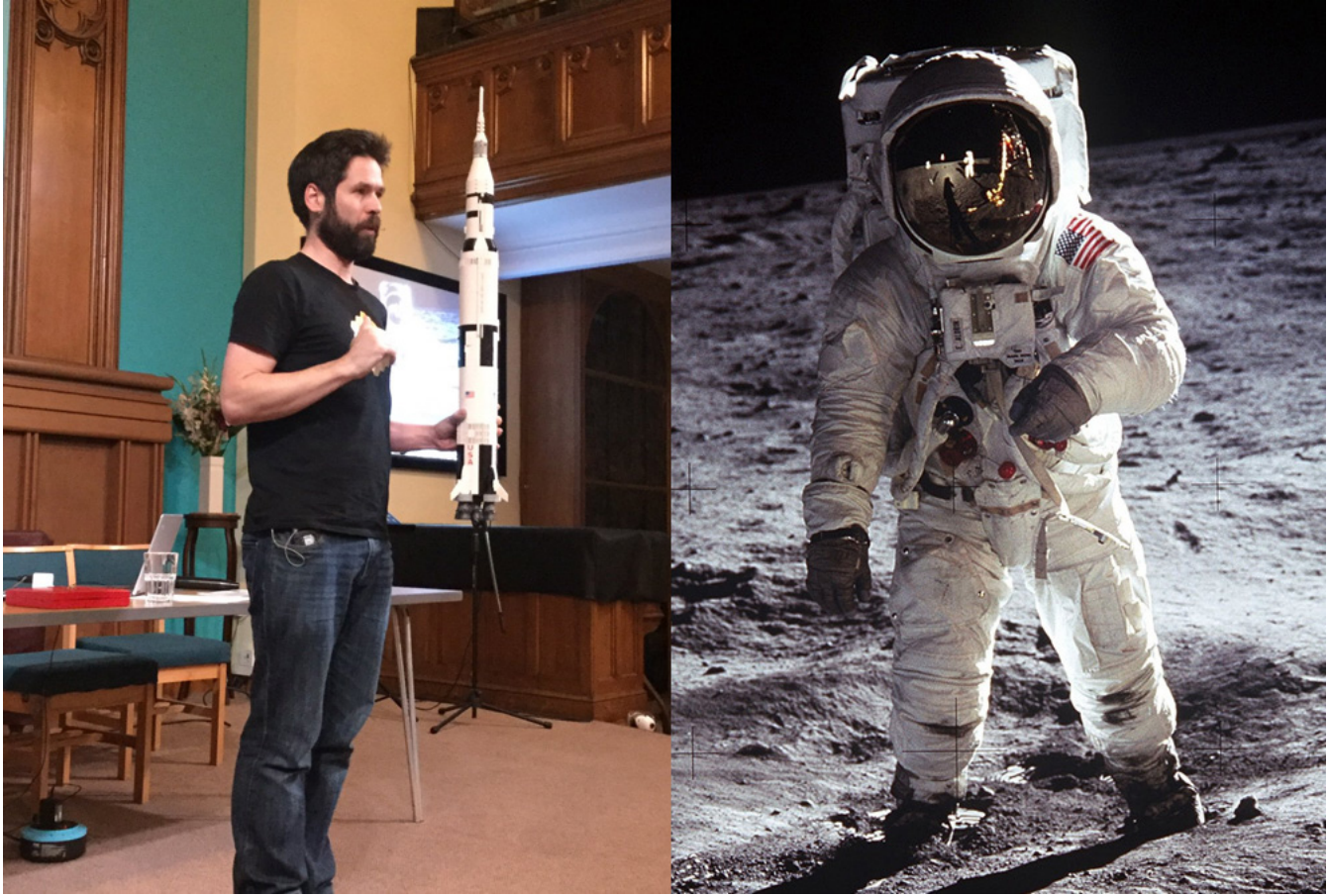
Alan Pickup

This is a slightly revised version, with added diary, of Alan's article published in [The Scotsman](#) on August 31st 2019, with thanks to the newspaper for permission to republish here.

September 2019 meeting report

9 September 2019

Categories: Meeting report, News



What a very entertaining and involving talk we had from Dr Alastair Bruce of the ROE! He brought along his Lego Apollo 11 model and took us through the whole journey with a little orbital mechanics thrown in too.

Also at our meeting:

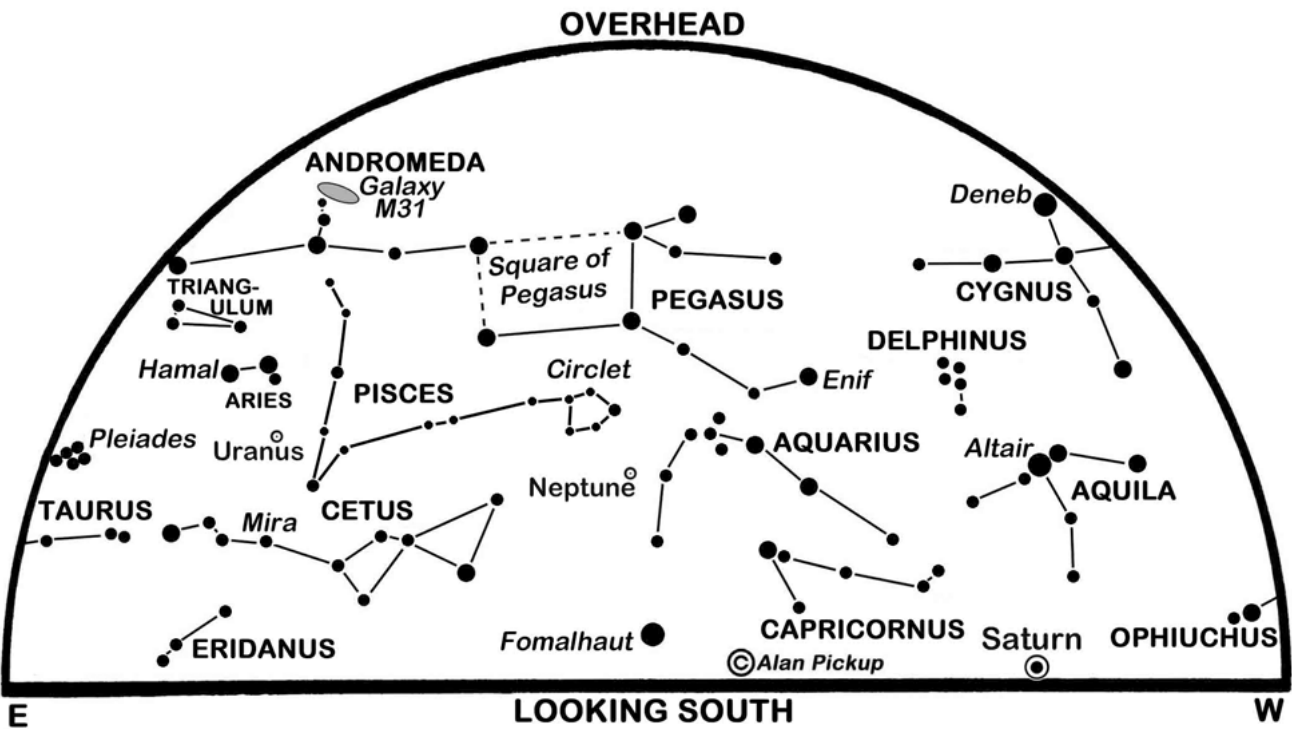
- President Andrew Farrow welcomed 3 new members, including our 100th member, Tom Donohue, who was presented with a branded ASE mug
- Horst presented the Sky in September
- Andrew updated us on our ambitious plans for the new session:
 - Bringing the Cooke telescope on Calton Hill back to life
 - Group observing at Newbattle Abbey College
 - Finishing our [4-Steps to the Stars](#) programme
 - ROE Doors Open days (28/29 Sept)
 - International Observe the Moon Night (5 Oct)
 - Transit of Mercury public observing (11 Nov)
 - Ongoing discussions about our own observatory
 - Regular meetings with a variety of speakers and topics (courtesy of Carl Dennis)
- There is now a Code of Conduct on the Members site about using Newbattle Abbey for observing
- There is also a WhatsApp group for observing notifications – details on the Members site
- Mark Phillips gave a report on the very successful [Charles Piazzi Smyth Symposium](#)
- Andrew covered news in astronomy and space that had caught his attention
- Hugh Sommerville gave a brief presentation on some of his space topics of interest
- Sean Wixted mentioned that he had received brochures from [Eclipse World Tours](#) for the Chile 2020 solar eclipse, if members are interested



[Download the ASE presentation as a PDF](#)

Scotland's Sky in October 2019

30 September 2019
Categories: News

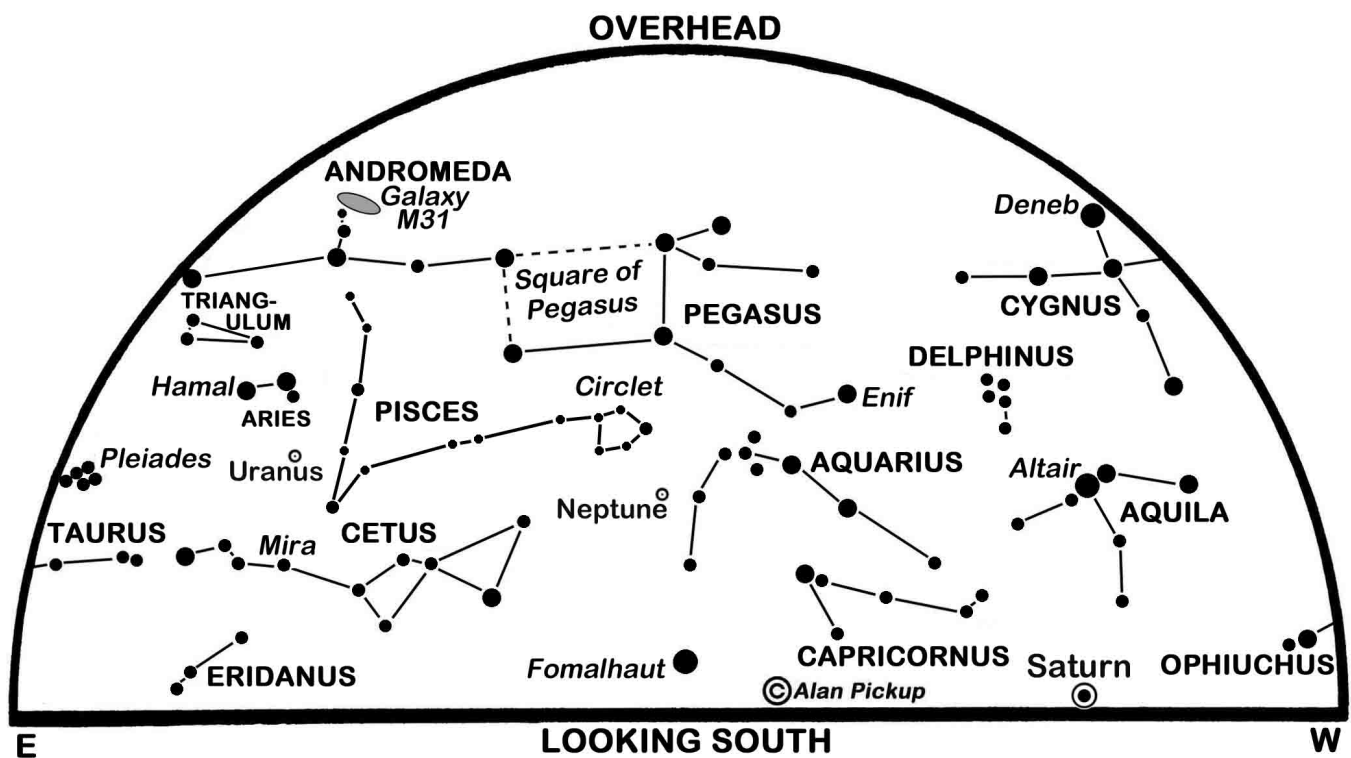
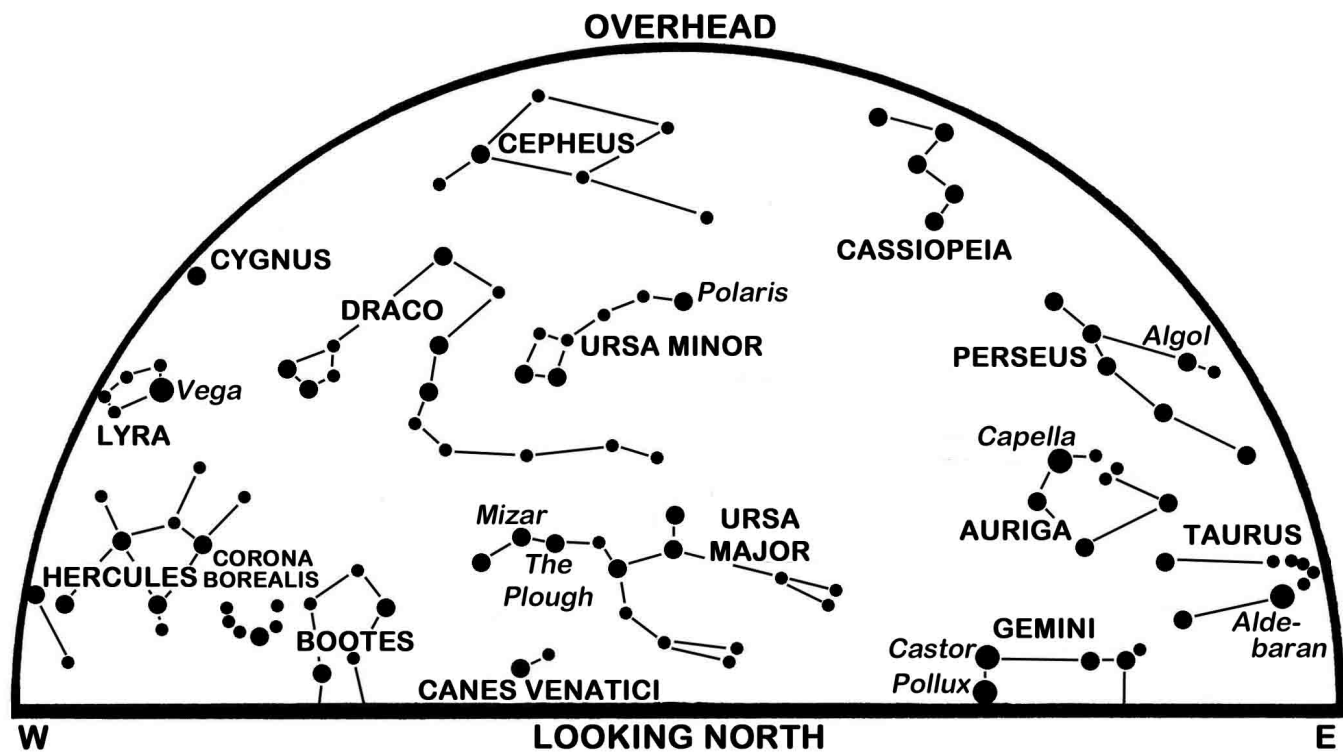


Amateur astronomer discovers first interstellar comet

You can now find the latest [Scotland Sky Diary](#) for August by Alan Pickup in the [ASE Journal](#).

Scotland's Sky in October 2019

30 September 2019
Categories: Journal, Sky Diary



Amateur astronomer discovers first interstellar comet

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 27th when clocks are set back one hour to 01:00 GMT. (Click on map to enlarge)

It is two years since astronomers in Hawaii discovered the first object known to have approached the Sun from beyond our solar system. Given the Hawaiian name of 'Oumuamua, this appeared to be a reddish and elongated slab-shaped body of about the size of a skyscraper that passed 38 million km from the Sun before sweeping within 24 million km of the Earth. It came from roughly the current direction of the star Vega and headed away towards the Square of Pegasus, though it may take 20,000 years to leave the solar system completely.

Its small size meant that it was followed only faintly and for barely a month. Astronomers were surprised to notice no sign of cometary activity – no surrounding fuzzy coma and no tail – while suggestions that it was an alien probe prompted unsuccessful scans for any artificial radio emissions.

Now the second-known interstellar intruder has been sighted, and this one appears larger, brighter and is surely a comet. It was discovered photographically on 29 August from an observatory in Crimea by the amateur astronomer Gennady Borisov using a telescope he built himself. Initially called C/2019 Q4 (Borisov), or Comet Borisov for short, it was clearly speeding along a strongly hyperbolic path past the Sun, very unlike the elliptical or nearly parabolic orbits followed by all previous comets. Now it has been awarded the official interstellar designation of 2I/Borisov.

The comet was travelling at about 33 km per second as it entered the solar system from the direction of the constellation Cassiopeia, fast enough to cover the 4-light-years distance of the nearest star in under 40,000 years. Perihelion, its closest point to the Sun, occurs at 303 million km on 8 December, putting it still beyond the orbit of Mars, and it reaches its closest to the Earth at 293 million km twenty days later.

It is still faint, no better than magnitude 17, but may attain magnitude 14 near perihelion and, while it will never reach naked-eye or binocular visibility, is likely to be within telescopic range until at least the middle of next year. This gives plenty of time for astronomers to study a comet that probably formed elsewhere in the Milky Way galaxy at a different time and with possibly a different composition than those that formed alongside the Sun and Earth. October has Comet Borisov travelling south-eastwards to the west of the Sickle of Leo and passing within a Moon's-breadth east of the star Regulus on the 24th.

Leo's Sickle rises in the north-east in the early morning and stands some 30° high in the east before dawn as our southern sky is dominated by the glorious constellation of Orion. The pre-dawn also gives us a chance to spot Mars as it emerges from the Sun's far side. The planet rises in the east one hour before the Sun on the 1st and two hours before sunrise on the 31st. Moving east-south-eastwards in Virgo, it shines only at magnitude 1.8 and lies 8° below the slender earthlit Moon on the 26th.

As the Sun tracks southwards by 11° during October, the sky at nightfall is changing only slowly. The Summer Triangle is still high in the south as darkness falls, although its three stars, Vega in Lyra, Deneb in Cygnus and Altair in Aquila, have shifted into the west by our star map times. By then, Pegasus, the upside-down flying horse with his nose near Delphinus the Dolphin, stands high in the south.

The sunrise/sunset times for Edinburgh change this month from 07:15/18:49 BST (06:15/17:49 GMT) on the 1st to 07:17/16:35 GMT on the 31st, following Summer Time's end on the 27th. The Moon reaches first quarter on the 5th, full phase on the 13th, last quarter on the 21st and new on the 28th.

Like Mars, Venus is also coming into view from beyond the Sun, but this time into our evening twilight in the west-south-west. Although brilliant at magnitude -3.9, it stands a mere 3° high at sunset for Edinburgh and sets at present only 30 minutes later, so we need good weather and a clear horizon to catch it. On the 29th, look for it 2.8° below the sliver of the earthlit young Moon, only 3° illuminated. Mercury is fainter and even lower at sunset and not visible from Scotland.

Jupiter is well past its best as an evening object although it remains obvious low in the south-west at nightfall, sinking to set at Edinburgh's south-western horizon at 21:14 BST on the 1st and as early as 18:34 GMT by the 31st. At magnitude -2.0 to -1.9 and 36 to 33 arcseconds in diameter, it lies close to the Moon on the 3rd and 31st.

Saturn, one tenth as bright at magnitude 0.5 to 0.6, lies some 25° to the left of Jupiter. When it is close to the first quarter Moon on the 5th, its disk and rings span 17 and 38 arcseconds respectively. It is in Sagittarius low in the south at nightfall and sets in the south-west soon after our map times.

Neptune and Uranus are binocular brightness object of magnitudes 7.8 and 5.7 in Aquarius and Pisces respectively. There is little hope of locating them using our chart, but a web search, such as "Where is Uranus?", should bring up information and a finder chart. Uranus, in fact, reaches opposition at a distance of 2,817 million km on the 28th when it stands directly opposite the Sun and appears as a tiny 3.7 arcseconds blue-green disk through a telescope.

Our Diary, below, records the peak dates for two of the October's meteor showers, the Draconids on the 8th and the Orionids on the 22nd. Neither is among the year's top showers, though both can yield rates of 20 or more meteors per hour under ideal conditions. The Draconids are active from the 6th to the 10th with slow meteors that diverge from a radiant near the Head of Draco, the quadrilateral of stars below and left of the D of DRACO on our north map. Unfortunately, the light of the bright gibbous Moon will hinder observations before the Moon sets in the early morning.

The Orionids, like May's Eta Aquarids shower, are caused by meteoroid debris from Comet Halley. They last throughout the month and into early November but are expected to be most prolific on the nights of the 22nd and 23rd when their fast meteors diverge from a point that lies around 10° north-east (above-right) of Betelgeuse at Orion's shoulder. That point passes high in the south before dawn but is just rising in the east-north-east at our map times, so no Orionids appear before then. As with those other swift meteors, the Perseids of August, many of the brighter Orionids leave glowing trains in their wake.

Diary for 2019 October

Times are BST until the 27th and GMT thereafter.

3rd	21h Moon 1.9° N of Jupiter
5th	18h First quarter
5th	22h Moon 0.3° S of Saturn
8th	07h Peak of Draconids meteor shower
13th	22h Full moon
17th	23h Moon 2.9° N of Aldebaran
20th	05h Mercury furthest E of Sun (25°)
21st	14h Last quarter
22nd	Peak of Orionids meteor shower
22nd	06h Moon 1.0° N of Praesepe
23rd	19h Moon 3° N of Regulus
26th	18h Moon 5° N of Mars
27th	02h BST = 01h GMT End of British Summer Time
28th	04h New moon

- 28th 08h Uranus at opposition at distance of 2,817 million km
- 29th 14h Moon 4° N of Venus
- 30th 08h Mercury 2.7° S of Venus
- 31st 14h Moon 1.3° N of Jupiter

Alan Pickup

This is an extended version, with added diary, of Alan's article published in [The Scotsman](#) on September 30th 2019, with thanks to the newspaper for permission to republish here.

Ron Livesey awarded the Lorimer Medal

5 October 2019

Categories: News



We are delighted to announce that on 14 September 2019, The Astronomical Society of Edinburgh awarded Ronald J Livesey, CEng FICE FRAS a LORIMER MEDAL in recognition of his services to amateur astronomy.

This is the highest award of the Society that is not given lightly or often. You can [read more about our previous Lorimer medallists](#).

This is the citation by Dr Dave Gavine, also a Lorimer medallist:

Ron Livesey has been a very active member of BAA since 1956 contributing observations of Sun, moon, planets, stars, meteors & aurora, to all the observing sections. He was Director of the Aurora Section from 1976 to 2005 and remains as Assistant Director to the present day, specialising in statistics – comparing auroral sightings with solar and magnetic activity. Ron championed the simple 'jam jar' magnetometer from his home in Edinburgh. Even at the age of ninety, Ron still makes sunspot observations for the Solar Section. He has contributed many papers and articles to the BAA journal and meteorological magazines and is an active promotor of astronomy throughout Scotland. As Director he issued frequent newsletters and organised Section meetings. Ron was awarded the BAA's Lydia Brown medal and recently the Goodacre medal – its highest award. He is a past president of the Astronomical Society of Glasgow and an Honorary Member of Dundee Astronomical Society. He is revered by all amateur astronomers in Scotland who know him.

October 2019 meeting report

10 October 2019

Categories: Meeting report, News



We had a very interesting and future-looking talk by John I. Davies, Senior Researcher & Principium Editor, The Initiative for Interstellar Studies at our October meeting.

You can find out more about the [Initiative for Interstellar Studies \(i4is\)](#) on their website, including their [Principium publication](#), of which John is the editor.

Also at our meeting:

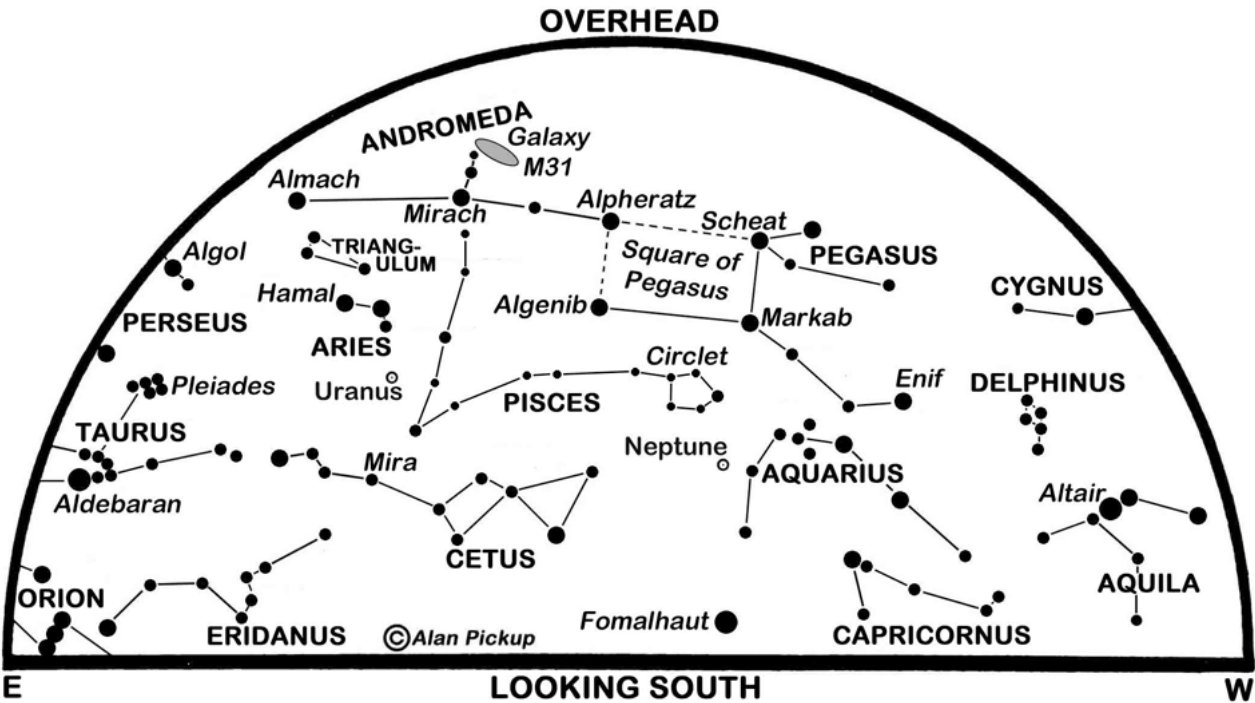
- President Andrew Farrow was travelling *beyond the horizon to the ends of the Earth*, so Secretary Sean Wixted chaired the meeting with input from a number of other Council members.
- We welcomed 5 new members to the Society, bringing our total to 107.
- Alan Ellis announced that renewals are now due (1st October) and members are encouraged to renew ASAP as the subscription will change from 1 Jan 2020 (having been the same since 2004!). These will increase to £30 / £15.
- Alan Pickup presented the Sky in October
- Society Updates:
 - Mark Phillips updated us on planned dates for our [4-Steps programme courses](#).
 - There is a transit of Mercury on 11 Nov and we hope to be able to do some public observing for it, hopefully on Calton Hill.
 - There was a plan to do a Live Stream of the Moon on 5th October, the International Observe the Moon Night. But bad weather and low lunar altitude prevented this from happening.
 - Geraldine Dennis reported on our successful involvement at the Royal Observatory Edinburgh Doors Open Days. Our relationship with the ROE is one that value highly!
 - We hope to arrange another visit for members to the University of St Andrews observatory, courtesy of Aleks Scholz, the Observatory Director. Please let us know if you are interested.
 - Sean gave an overview of an amendment to the Constitution that we are proposing. Information will be emailed round to members this week.
 - Hugh Somerville informed us about a "Working with Kids" policy that we are developing for our public outreach events.
 - We are planning to hold an ASE Strategy Development workshop shortly to help us plan our future. This will cover ideas such as our own observatory, admin, operational base, location, finance etc. Members will be engaged after the initial stage to help with ideas and taking it forward.
 - Andrew Mackie told us about our plans for a Light Pollution meeting at our January 2020 meeting with Bob Mizon from the BAA/Campaign for Dark Skies.
 - We now have a Facebook page called [Dark Sky Edinburgh](#). Please have a look and follow it.
 - Sean also reported that the [Society has awarded a Lorimer Medal to Ron Livesey](#).
- Mark covered news in astronomy and space that had caught his attention
- Hugh Somerville gave a brief presentation on the ISS



[Download the ASE presentation as a PDF](#)

Scotland's Sky in November 2019

31 October 2019
Categories: News

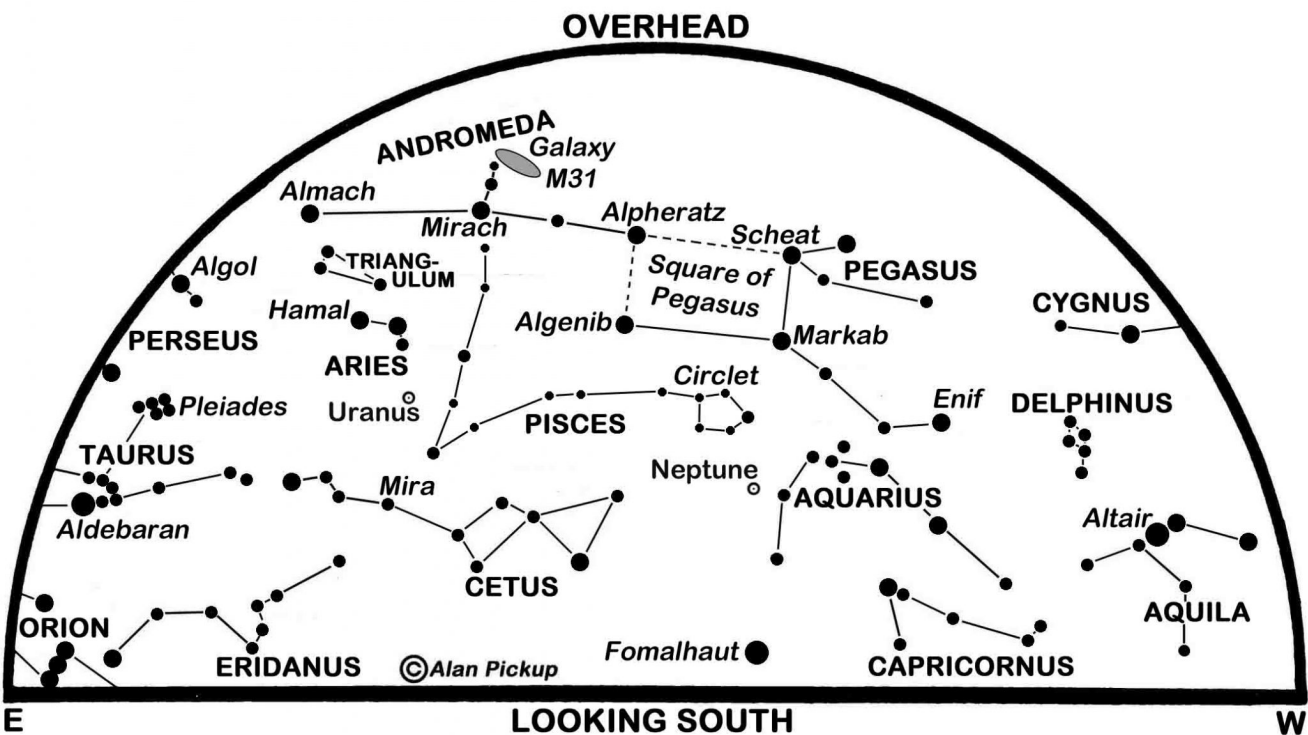
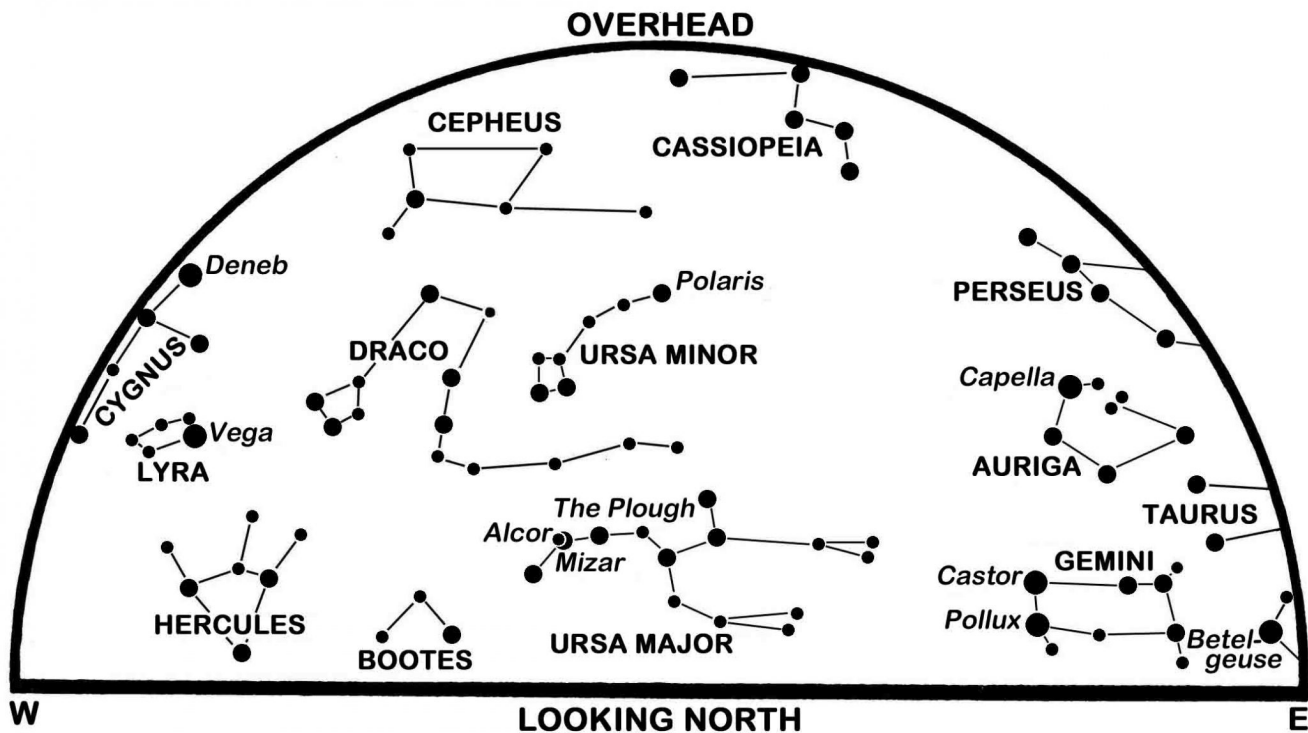


Mercury crosses Sun as bright planets converge in evening sky

You can now find the latest [Scotland Sky Diary](#) for August by Alan Pickup in the [ASE Journal](#).

Scotland's Sky in November 2019

31 October 2019
Categories: Journal, Sky Diary



Mercury crosses Sun as bright planets converge in evening sky

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 30th. (Click on map to enlarge)

With all the planets in view and a sky brimming with interest from dusk to dawn, November is a rewarding month for stargazers, particularly since temperatures have yet to plumb their wintry lows. Our astro-highlight of the month, if not the year, though, comes in daylight on the 11th when Mercury appears as a small inky dot crossing the Sun's face.

Perhaps one puzzle is why such transits of Mercury are not more frequent. After all, Mercury orbits the Sun every 88 days and, as we see it, passes around the Sun's near side at its so-called inferior conjunction every 116 days on average.

The reason we don't enjoy around three transits each year is that the orbits of Mercury and the Earth are tipped at 7° in relation to each other. For a transit to occur, we need Mercury to reach inferior conjunction near the place where its orbit crosses the orbital plane of the Earth, and currently this can occur only during brief windows each May and November. This condition restricts us to around one transit of Mercury every seven years on average but there are wide variations. Indeed, our last transit occurred as recently as May 2016 while we need to wait until November 2032 for the next. We must hang around even longer, and travel beyond Europe, for the next transit of Venus in 2117.

This month's transit begins at 12:35 on the 11th when the tiny disk of Mercury, only 10 arcseconds wide, begins to enter the eastern (left) edge of the Sun. The Sun stands 16° high in Edinburgh's southern sky at that time but it falls to 5° high in the south-west by 15:20 when Mercury is at mid-transit, only one twenty-fifth of the Sun's diameter above the centre of the solar disk. The Sun sets for Edinburgh at 16:13 so we miss the remainder of the transit which lasts until 18:04.

The usual warnings about solar observation apply so that, if you value your eyesight, you must never observe the Sun directly. Solar glasses that you might have used for an eclipse will be no help since Mercury is too small to be seen without magnification. Instead, use binoculars or, better, a telescope which has been equipped securely with an approved solar filter.

A few days after its transit, Mercury begins its best morning apparition of the year. Between the 23rd and 30th, it rises more than two hours before the Sun and shines brightly at magnitude -0.1 to -0.5 while 7° high in the south-east one hour before sunrise. Higher but fainter in the south-east before dawn is Mars (magnitude 1.7) which tracks south-eastwards in Virgo to pass 3° north of Spica on the 8th and end the period 11° above-right of Mercury. Catch it below the waning Moon on the 24th.

The Sun's southwards progress leads to sunrise/sunset time for Edinburgh changing from 07:19/16:33 GMT on the 1st to 08:17/15:45 on the 30th. The Moon is at first quarter on the 4th, full on the 12th, at last quarter on the 19th and new on the 26th.

Three bright planets vie for attention in our early evening sky but the brightest, Venus, is currently also the first to drop below the horizon as the twilight fades. Blazing at magnitude -3.9, it stands less than 4° high in the south-west at Edinburgh's sunset on the 1st and sets itself only 38 minutes later.

Second in brightness comes Jupiter, magnitude -1.9, which lies some 24° to the left of Venus on the 1st and sets two hours after sunset. Then we have magnitude 0.6 Saturn which lies another 22° to Jupiter's left so that it is about 10° high in the south-south-west as darkness falls tonight and sets about 50 minutes before our map times.

Venus tracks quickly eastwards to pass 1.4° south of Jupiter on the 24th when it stands 6° high at sunset as it embarks on an evening spectacular that lasts until May. The young Moon lies 7° below-right of Saturn on the 1st, makes a stunning sight between Jupiter and Venus on the 28th and is nearing again Saturn on the 29th.

Vega, the leader of the Summer Triangle, blazes just south-west of overhead at nightfall at present but is sinking near the middle of our western sky by our map times. Well up in the south by then is the Square of Pegasus whose top-left star, Alpheratz, leads the three main stars of Andromeda, lined up to its left. A spur of two fainter stars above the middle of these, Mirach, points the way to the oval glow of the Milky Way's largest neighbouring galaxy, the famous Andromeda Galaxy, M31.

Below the Square is the dim expanse of Pisces that lies between the distant binocular-brightness planets Neptune and Uranus, in Aquarius and Aries respectively.

Orion, the centerpiece of our winter's sky, is rising in the east at our map times and takes six hours, until the small hours of the morning, to reach its highpoint in the south. Preceding Orion is Taurus and the Pleiades while on his heels comes Sirius in Canis Major which twinkles its way across our southern sky before dawn.

The morning hours, particularly on the 19th, are also optimum for glimpsing members of the Leonids meteor shower. Arriving between the 6th and 30th, but with a sharp peak expected late on the 18th, these swift meteors diverge from Leo's Sickle which rises in the north-east before midnight and climbs to stand in the south before dawn. Fewer than 15 meteors per hour may be sighted this year, far below the storm-force levels witnessed around the turn of the century.

Diary for 2019 November

2nd	07h Moon 0.6° S of Saturn
4th	10h First quarter
8th	15h Mars 3° N of Spica
11th	15h Mercury transits Sun at inferior conjunction
12th	14h Full moon
14th	04h Moon 3.0° N of Aldebaran
18th	11h Moon 1.2° N of Praesepe
18th	23h Peak of Leonids meteor shower
19th	21h Last quarter
20th	00h Moon 4° N of Regulus
24th	09h Moon 4° N of Mars
24th	14h Venus 1.4° S of Jupiter
25th	03h Moon 1.9° N of Mercury
26th	15h New moon
28th	10h Mercury furthest W of Sun (20°)
28th	11h Moon 0.7° N of Jupiter
28th	19h Moon 1.9° N of Venus
29th	21h Moon 0.9° S of Saturn

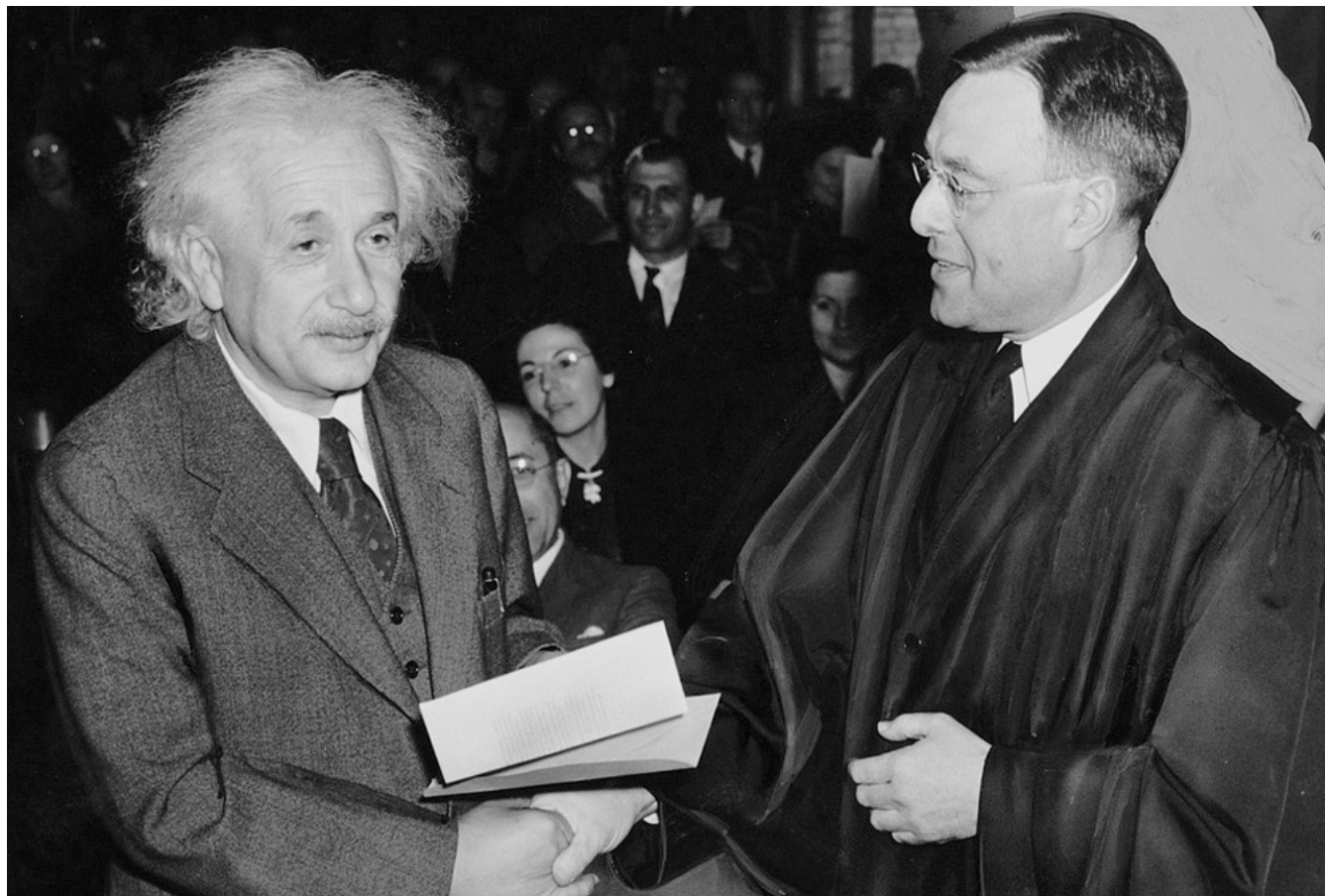
Alan Pickup

This is an extended version, with added diary, of Alan's article published in [The Scotsman](#) on October 31st 2019, with thanks to the newspaper for permission to republish here.

ASE Treasurer to visit Professor Einstein

31 October 2019

Categories: History, News



I bet that got your attention! But it's true, as reported in the Council minutes, the Treasurer of the Astronomical Society of Edinburgh will visit America to talk to Albert Einstein.

But as with all tabloid headlines, there's another side to the story. No, our current Treasurer Alan Ellis isn't going to be time travelling – at least not quite yet, apart from at the eyepiece end of a telescope. But this was reported in the April 1939 Council Minutes of the Astronomical Society of Edinburgh. And if you ever needed a reason to join this historic and august society, the freedom to sift through the rich historical archives of almost 100 years of meeting minutes on the Members website must surely be one of them.

Here's the extract:

With reference to Mr J. Gibson Kerr's proposed visit to America where he would on behalf of the Society inspect various Observatories, view Astronomical Films and discuss certain matters with Professor Einstein and others, it was decided to ask Mr Kerr to accept as a Grant towards his travelling and entertaining expenses the sums of twenty-five and fifty guineas to be charged against Observatory and general expenditure respectively. Mr Kerr returned thanks.

What a generous offer of Mr Kerr to do that on the Society's behalf.

And a little bit more from the same minutes:

Syllabus

The Syllabus for next session was considered and it was decided to hold Lectures each month from October to April. The first of these to be a public lecture of a more popular nature and to be held in a larger Hall such as the Central Hall, Tollcross. The Lecturer to be either Prof Plaskett (of Oxford) or Dr Steavenson. A fee of ten guineas, and expenses, to be paid to the Lecturer; the fee to include the right of publishing the lecture. It was suggested that tickets for the public should be priced at 2/- and 1/-. Mr Gibson Kerr agreed to give a lecture on his American tour, and other lecturers proposed were: Prof Greaves; T.L. MacDonald; Prof Smart; Dr Macpherson; Mr Duncanson; Prof Carroll and Mr Geddes of Aberdeen.

And one final, timely extract from Feb 1939...

Subscriptions

The Treasurer read the names of several members whose subscriptions were in arrear.

You know who you are 😊 Look out for the next historic instalment...

Main image: Library image, Einstein receiving American citizenship

November 2019 meeting report

6 November 2019

Categories: Meeting report, News



Thank you to Matjaz Vidmar from the Royal Observatory Edinburgh for a very interesting and informative talk. I don't think many of us knew just how advanced the Scottish space industry is.

Also at the meeting:

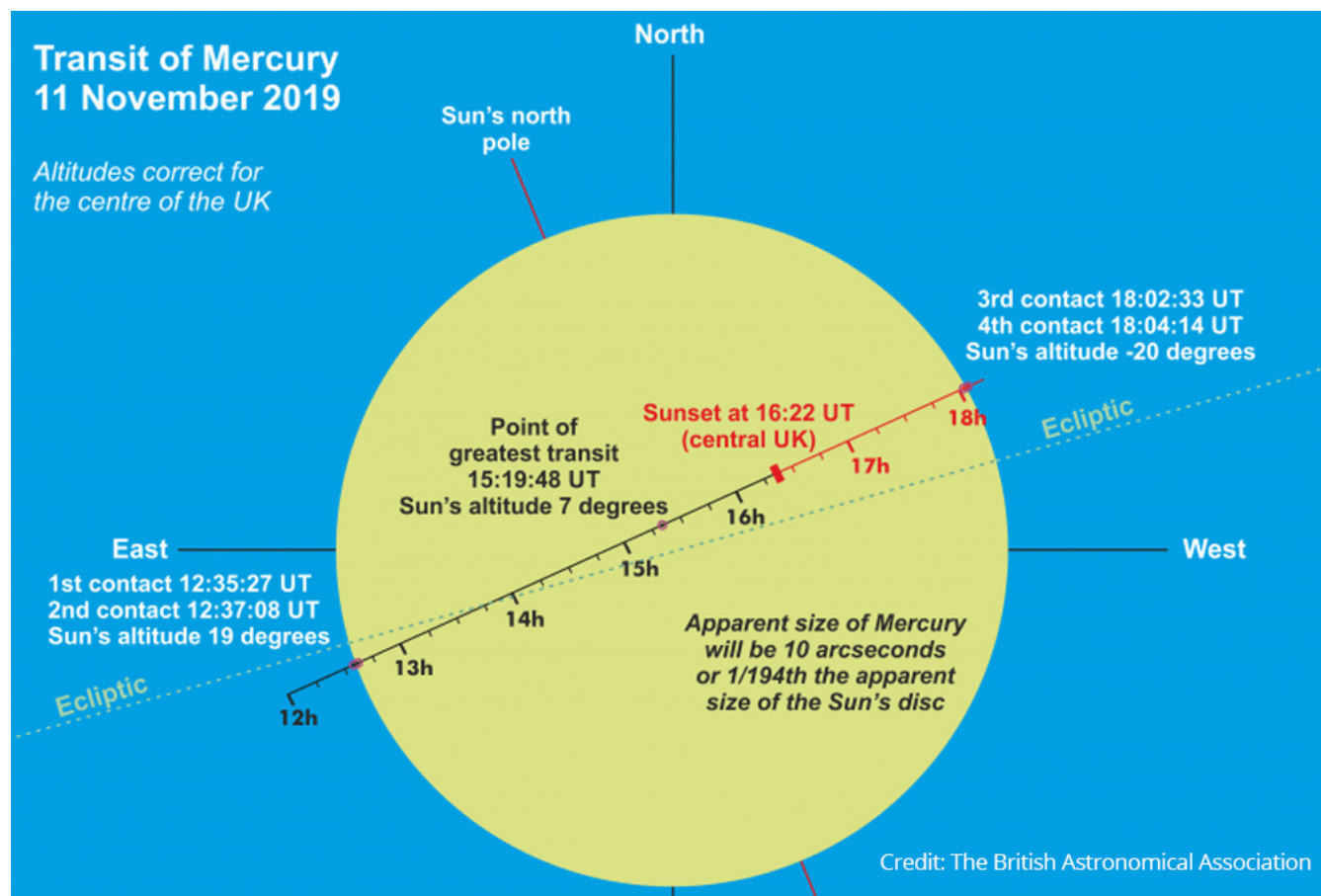
- President Andrew Farrow welcomed 1 new member to the Society.
- An update on subscriptions (due on the 1 October) which will increase from 1 Jan 2020.
- Alan Pickup presented the [Sky in November](#).
- We have more of our [4-Steps to the Stars](#) programme events planned. Another Telescope Help Shop will be held in February 2020 – probably 29 Feb.
- Mark Phillips updated us on progress with the Cooke telescope.
- We hope to show the transit of Mercury through our solar scopes on Calton Hill on 11 November, weather permitting.
- Peter Black gave an update on the Imaging Group, which had a record turnout last month.
- Another visit to the University of St Andrews Observatory is planned, sometime in 2020 now.
- Jim Nisbet had recommended a couple of exhibitions in London:
 - [Astronomy Photographer of the Year](#)
 - [The Moon Exhibition](#)
- Andrew gave an overview of topics that had caught his attention in astronomy and space.
- After the main meeting was over, we held an SGM to approve a change to the Constitution concerning people joining the Society. This was passed by a majority.



Transit of Mercury 11 November on Calton Hill

6 November 2019

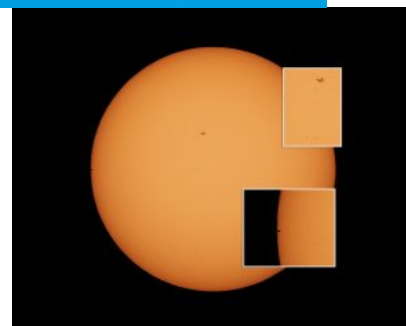
Categories: News



We hope to be observing the Transit of Mercury on 11 Nov 2019 on Calton Hill, WEATHER PERMITTING. The transit starts at 12:35 and continues after the Sun sets (16:13).

We will have our Solar telescopes with us and you are welcome to come along and have a look. The weather forecast is not great however, so keep an eye on our [Facebook page](#) and [Twitter feed](#) for more up to date information.

Transits of Mercury are quite rare (not as rare as Venus!) and the next transit will not be until 2032 so always worth catching them when you can.



Transit of Mercury 2016 photo by Mark Phillips

Observe the Open Clusters of Autumn

12 November 2019

Categories: News



Open Clusters are beautiful, varied and relatively simple to observe and image. As the Summer constellations move westwards, Cassiopeia and Perseus start to take over in the evenings. There are a number of good Open Clusters well-placed at this time of year so have a look at some of them.

At first sight it might seem that Open Clusters are just a bunch of stars, loosely associated with each other and that's it. Well that's sort of true, but they are much more beautiful than that description might suggest.

You can see many with binoculars and many more with small telescopes. They differ in colour, structure, size and setting. Because most Open Clusters, also known as Galactic Clusters, exist in the plane of the Milky Way, these clusters can have a backdrop of many thousands of fainter stars, making viewing them a very rich experience. ([Globular Clusters](#) differ in that they inhabit a halo surrounding our galaxy.)

Here are a few to get you started, but there are many more that you can find using your favourite planetarium program.

What are Open Clusters?

An Open Cluster is a group of up to a few thousand stars that were formed from the same giant molecular cloud and have roughly the same age.

More than 1,100 open clusters have been discovered within the Milky Way Galaxy, and many more are thought to exist. They are loosely bound by mutual gravitational attraction and become disrupted by close encounters with other clusters and clouds of gas as they orbit the galactic centre.

[Wikipedia](#)



M103

Constellation: Cassiopeia

Mag: 7.4, Size: 6'

One of the most distant Open Clusters (8,000 – 9,500 light years).

About 40 member stars



Finder chart

M52

Constellation: Cassiopeia

Mag: 5, Size: 13'

Almost 200 members, distance uncertain.

M52 has the added bonus of the Bubble Nebula (NGC 7635) nearby (upper right corner of image).



NGC 457, Owl Cluster

Constellation: Cassiopeia

Mag: 6.4, Size: 13'

Distance 7,900 light years. Discovered by William Herschel.

Called the Owl because of the two bright stars that appear like eyes.

M34

Constellation: Perseus

Mag: 5.5, Size: 35' (just larger than the size of the Moon)

Over 100 members, distance 1,500 light years.





NGC 7789, White Rose Cluster

Constellation: Cassiopeia

Mag: 6.7, Size: 16'

Distance 7,900 light years. Discovered by [Caroline Herschel](#), younger sister of William, who was a talented astronomer in her own right.

A beautiful, rich cluster, called the White Rose (or sometimes "Caroline's Rose") because the loops of stars and dark lanes look like the pattern of rose petals from above.

NGC 869 & 884, Double Cluster

Constellation: Perseus

Mag: 3.7 & 3.8, Size: 60'

Distance 7,500 light years. Relatively young at 12.8 million years old.

Both clusters are visible to the naked eye under dark skies and the radiant of the annual Perseid meteor shower is approximately located at these clusters. A beautiful sight with a wide field telescope or binoculars.



Of course there are all the Open Clusters of Auriga too – but that's maybe a topic for another post as Auriga rises higher in the evenings.

If you manage to image or observe any Open Clusters this Autumn, please post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).

Article and images: Mark Phillips

Telescope buying guide – UPDATED 2019

13 November 2019

Categories: Knowledge, News



We often get asked “which telescope should I get”, maybe for yourself or as a present. Well as you might expect there’s no right answer for everyone, but here are a few ideas and things to consider.

There is one answer to the question: “what’s the best telescope to get” and that is: “the one you’ll actually use”! There’s no point buying a telescope that gathers dust because it’s too heavy to carry outside, or too cheap to actually see anything, or doesn’t do what you wanted it to do, or... You get the idea.

I’m really aiming this article at beginner telescopes, perhaps as presents, rather than trying to cover all of the issues for a more experienced astronomer. However, a lot of the same principles do apply.

Hopefully this gets you started. Here are a few things to consider before buying that telescope.

Telescope Help Shop

If you do buy a telescope for Christmas, why not come along to our “[Telescope Help Shop](#)”. We’ll show you how to use it and what to look at. Keep an eye on our website for more details and the next event.

ASE Observing List for Beginners

Our [ASE-24: Observing List for Beginners](#) is now available, so that you know what objects to look at and how to find them with that new telescope.

How much do you want/have to spend?

Of course it would be nice to have an unlimited budget but few of us do. (However, if you do you might want to consider [buying Hubble](#)! Shipping costs could be high though...) So decide how much you have to spend and then do your research based on that.

I would suggest you don’t spend less than about £130 though or it *might* come under the “too useless to see anything worthwhile” category (just my opinion on what I’ve seen) which might just put you off before you’ve even started. Perhaps instead you should consider a [good pair of binoculars](#) – there’s nothing more

Disclaimer

Of course we’ve got to have one. This article is just one of many opinions – you’ll get as many as there are telescopes, and there are a lot available. We don’t – and won’t – actually recommend any specific telescope or supplier. This article is based on what we have seen, purchased, used and suppliers that we’ve bought from in the past. The telescopes shown are just examples but it would be impossible for us to review all of the ones shown here.

Having said that, astronomical instrument suppliers are in general a pretty good and helpful bunch. They live or die by their reviews so if they offer bad service they usually don’t last long.

satisfying than lying back in a deckchair on a dark night and sweeping along the Milky Way with binoculars.

There are decent cheaper telescopes such as [this one](#) (£99), described as a table-top telescope, but you will need something solid to put it on. Tables aren't generally regarded as being solid telescope mounts so you may need to buy a solid tripod to put it on anyway. The mount is as important as the telescope itself and for beginner telescopes they are sold together as a whole setup. That's one reason why you shouldn't go too low.



When you buy your first telescope, what you imagine vs what you actually see...

What do you want to see and do?

If you're new to astronomy or buying it for somebody else then the chances are that you don't really know exactly what you want to do but you want to see some good stuff. That's fair enough, so you want a telescope that can show you a good range of things such as the Moon, planets, star clusters, nebulae and galaxies. All of the telescopes listed below will allow you to view these things to some level.

Or maybe you do know and you want to see or photograph those fantastic colour images that you see in astronomy magazines or on the NASA website?

Time to be realistic: those were *often* (not always) taken using expensive equipment or by astronomers with many years of experience behind them. Putting your eye to the end of a telescope will rarely show that.

I don't mean to put you off – quite the opposite. In fact when you look through a telescope for the first time at the Moon, satellites of Jupiter or the rings of Saturn, I promise you you'll never be the same again! The connection between your little eye and the rest of the universe is just mind-blowing! When you look directly at a galaxy, it's so far away that you are in fact looking millions of years back in time. You're seeing that galaxy as it was millions of years ago, when it's light started out on the journey towards your eye. **TELESCOPE = TIME MACHINE!**

If you do want to take photos through your telescope you can do simple imaging with most telescopes – even using your smartphone camera (you can get [attachments to hold the phone](#) at the eyepiece end of the telescope – many [different types and prices](#)). A motor drive certainly helps but is not essential for the Moon for example. Here's a photo I took by attaching my DSLR on the end of a simple 80mm refractor on an altazimuth mount (see below for what this means) with no motor drive.

And with a bit of practice and experience you really can take amazing images of the night sky. See our [Flickr Group](#) for examples of what some of our members have done with a wide range of equipment.

But start out with realistic expectations and you won't be disappointed.

Get a good book such as [Turn Left at Orion](#), which will show you what to expect, what objects will look like in different telescope sizes, and many ideas of what to look at. Keep an eye on our website for ideas of what to observe at various times in the year. We have published articles on [Globular clusters](#), [Open clusters](#), [comets](#), the [Moon](#), [Lunar eclipse](#), ...



WARNING: Never look at the Sun directly!

If you want to observe the Sun, get advice first. It's important that you use the right equipment or you will blind yourself, permanently! If you get a telescope with a solar filter for use at the eyepiece, DO NOT USE IT! It is dangerous. Solar filters should only be used over the main objective. Don't take the risk – get advice! There are safe ways to do it and we can help you do it properly.

Types of telescope

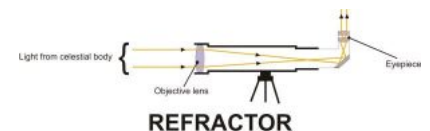
There are *essentially* 3 types of telescope:

Refractor

As used by Galileo, this is what most people think of when they think of a telescope, with a lens at the front and you look through an eyepiece at the end of a long tube. Refractors tend to be cheap at the lower end of the market but very expensive at the top end. The size in mm is the diameter of the main lens which determines how much light you gather.

Refractors are generally maintenance free but cheaper ones can show some false colour fringes around brighter stars. But if Galileo could discover the moons of Jupiter, rings of Saturn and craters on the Moon with something a fraction as good as one of these, then you can too – for yourself.

Here are some examples with links to different supplier websites. There are many more on offer that may be more suitable but these are some examples to help you decide.





Basic 102mm refractor on an app controlled altazimuth mount (see below). About £340



102mm refractor on an altazimuth mount (see below) with slow motion controls for fine movement. About £340



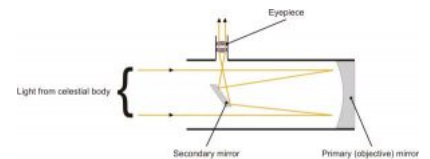
90mm refractor on an altazimuth mount (see below) with slow motion controls for fine movement. About £160

Reflectors

The Newtonian reflector was invented by Isaac Newton in the 17th century and is one of the most common types of telescope in use. In a Newtonian reflector there is a main mirror at the bottom end of the telescope which focuses and reflects the light up to a smaller secondary mirror near the top of the tube which then directs the light off to the side where you can view the object through an eyepiece.

It's easier to built large reflectors than refractors, so they tend to be bigger instruments. The larger the lens or mirror, the more light gathering power it has and so you can view fainter objects. Reflectors do require some maintenance though, such as adjusting mirror alignment (collimation), and after many years of use the mirrors may also need to be re-aluminised. They don't show false colour like refractors because they don't use lenses.

Here are some examples with links to supplier websites:



REFLECTOR



130mm reflector on an equatorial mount with slow motions for fine movements. About £200



130mm reflector on a GOTO altazimuth mount. For use with a smartphone app. About £360



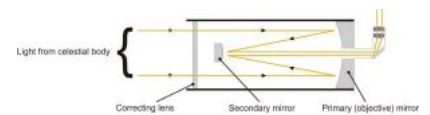
200mm reflector on a dobsonian mount (see below). The most light gathering power here and a good all-rounder – very popular. About £290 (There is 150mm version of this for £220)

Compound

A compound telescope can be of several types: a Cassegrain, Schmidt-Cassegrain or Maksutov among others. The two most common types are Maksutovs and Schmidt-Cassegrains with Maksutovs being the most common for smaller scopes. They are similar in that light passes through a glass corrector plate at the front of the tube, hits the main mirror at the bottom, reflects up to the secondary attached to the corrector plate and is then focused down through a hole in the centre of the main mirror. You then view the image through an eyepiece at the bottom of the tube in a similar position to a refractor.

Compound telescopes tend to be more expensive and of longer focal lengths, making them best suited for observing the Moon and planets, although they are useful for observing other objects too. They don't generally show false colour. One of the downsides can be cool-down time. Because they have a thick corrector lens at the front, it can take longer to cool down to the outside temperature when you take the telescope outside. If you get thermal tube currents it can affect the image quality. So take the telescope outside for a while to cool down before you use it. (This applies to all telescopes actually but more so with compounds.)

Here are some examples with links to supplier websites:



CASSEGRAIN



90mm Maksutov on a GOTO altazimuth mount.
About £300



102mm Maksutov on an equatorial mount with
manual slow motion controls. About £280



127mm Maksutov on an app controlled GOTO
altazimuth mount. About £480

Telescope mounts

There are 2 basic types of telescope mount: **altazimuth** and **equatorial**. It is important that whichever mount you choose it should be sturdy enough to hold the telescope without shaking. If the mount is wobbly then it doesn't matter how good the telescope is.

Altazimuth mount

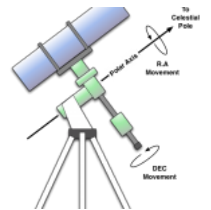
An altazimuth mount is very simple and rotates in two axes: up and down vertically and in a circle horizontally. Altazimuth mounts are the simplest to use.

There is a type of altazimuth mount called a **Dobsonian** (named after John Dobson, the man who invented them) and they are particularly easy to use. They are usually floor standing (smaller ones can be used on a table) and you simply push the telescope around and point it at the object you want to observe. The telescope glides easily on simple, smooth bearings.



Equatorial mount

An equatorial mount is more complicated. It sits at an angle so that one axis points at the celestial pole (the part of the sky above the Earth's pole). This is so that the mount can track objects in the sky by rotating in just one axis.



GOTO mounts

Both altazimuth and equatorial mounts can be GOTO. A GOTO mount is driven in both axes by small motors that point the telescope at objects in the sky for you, controlled by a hand controller. The motors will then track the object and keep it centred in the eyepiece for long periods of time. The controller generally contains a database of thousands of objects. You go through an alignment routine at the start of every observing session to tell the mount where it is pointing, which requires you to be able to identify a small number of bright stars. It's a gadget, it's fun, but also useful if you find it hard to locate fainter objects because of light pollution.

App controlled mounts

The latest altazimuth GOTO mounts can be controlled by a smartphone app. Take the [Skywatcher AZ-GTi](#) mount as an example. After downloading and installing the app, it will take you through an alignment sequence and then allow you to find and track many objects in the sky. Very simple to use but also very powerful.

A word about aperture, magnification, focal length and f-ratios

Sound complicated? Not really but adverts can make it confusing.

If you see a telescope advertised something like: "See stars and galaxies at magnifications of over 300x" – then it's missing the point and probably not one you should buy. **And if you buy it in a toy shop then it's probably a toy!**

Aperture is the size (diameter) of the objective – the main lens or mirror used to catch the light. The larger the better, as long as it's good quality.

Focal length is the distance behind (in front of a reflector) the objective that the image is brought to a focus. At this point you place an eyepiece to magnify it. A refractor or reflector will be approximately as long as the focal length. A compound telescope has a *folded* light path and so is shorter and more compact.

F-ratio is a measure of the **focal length** divided by the **aperture**. A telescope is said to be **fast** if it has a small f-ratio (say f4 – f8) and **slow** if it has a larger one (f9 – f15). **Fast** telescopes *generally* work better for star clusters, galaxies and nebulae.

Slow telescopes *generally* work better for the Moon, planets and Sun. Both work fine for all objects though but if you want to specialise, choose appropriately.

Magnification isn't everything – in fact it's less important than aperture. The eyepiece you use with a telescope determines the magnification.

To work out the magnification: take the focal length of the telescope (in mm) and divide it by the focal length of the eyepiece. So for example a refractor with a focal length of 600mm with an eyepiece of focal length 20mm will give a magnification of 30x, a good choice for smaller telescopes. I know it seems low and not very exciting but it really is true.

I generally use my telescopes at magnifications of about 30 – 60x as that gives the most pleasing views. If you're looking at the Moon, planets and some smaller objects, then sometimes you might want to increase the magnification to see more details, but only if the conditions allow. There's something called "seeing" which is a measure of how stable the atmosphere is. If seeing is poor, and it often is in Scotland, then objects may be *fuzzy* and *dance* around in the eyepiece. A higher magnification will just increase the *fuzzy dancing*.

Summary

- Choose a telescope that will actually get used.
- Consider joining a local astronomical society. The Astronomical Society of Edinburgh has telescopes to lend to members so you can decide what to buy yourself. You can also get help and guidance from experienced astronomers.
- If you have a small amount to spend maybe choose some good binoculars instead.
- Decide what you want to see and do with the telescope and choose a telescope type and size to match.
- Make sure you know how big and heavy the telescope will be – you want to be able to move it outside!
- Refractors and Maksutovs are best suited to Moon and planets, large reflectors to nebulae, star clusters and galaxies, but all telescopes will work for all objects.
- Choose an altazimuth, Dobsonian or equatorial mount.
- Decide if you want/need GOTO – it's a fun gadget, is very helpful but not totally necessary and adds to the cost.
- Don't add too many, if any, accessories to start with. As you get more experienced you can buy more or better eyepieces when you know what you need.
- Use it to explore the wonders of the universe. You'll love it!
- Come along to our special "[Telescope Help Shop](#)" to get help on how to use it.
- Use our [ASE24: Observing List for Beginners](#) to get you started.

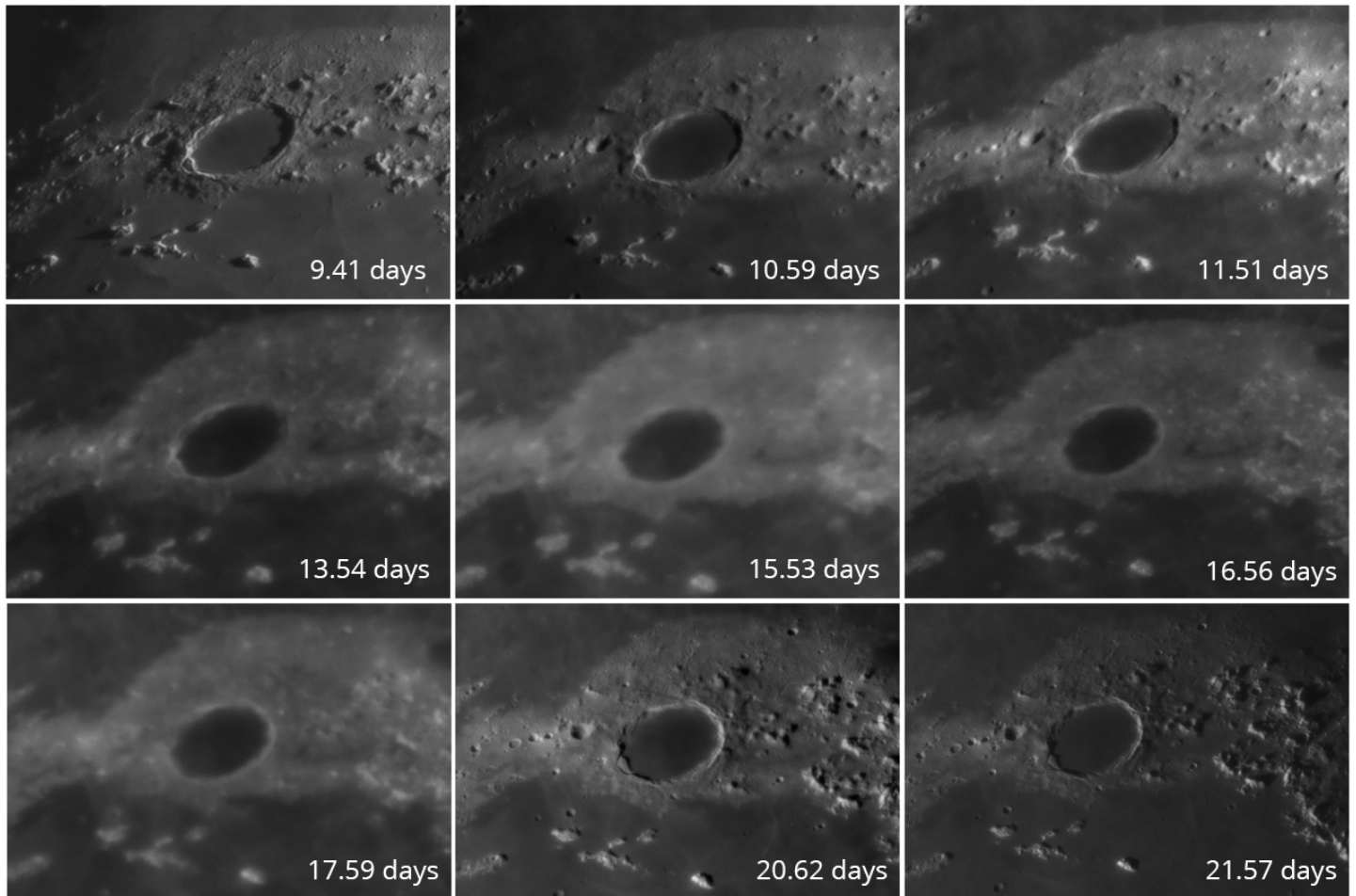
Article by Mark Phillips

I've been an astronomer since I was 9 and over the past 40-odd years I've bought and used many different telescopes – far too many according to my wife. Not all of them were the right purchases at the time, so I hope this helps you avoid some of the pitfalls. There is no right answer for everyone.

Observe the ever-changing Moon

24 November 2019

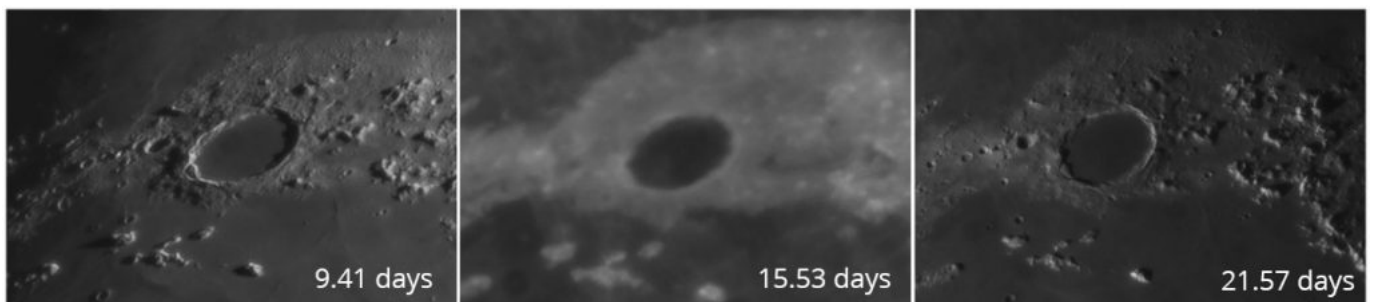
Categories: Knowledge, News



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.

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:

- longitude – caused by the elliptical orbit of the Moon
- latitude – caused by the inclination of it's 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](#) and I also did an article on the [Lunar 100](#), if you want to take Lunar observations further.

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.

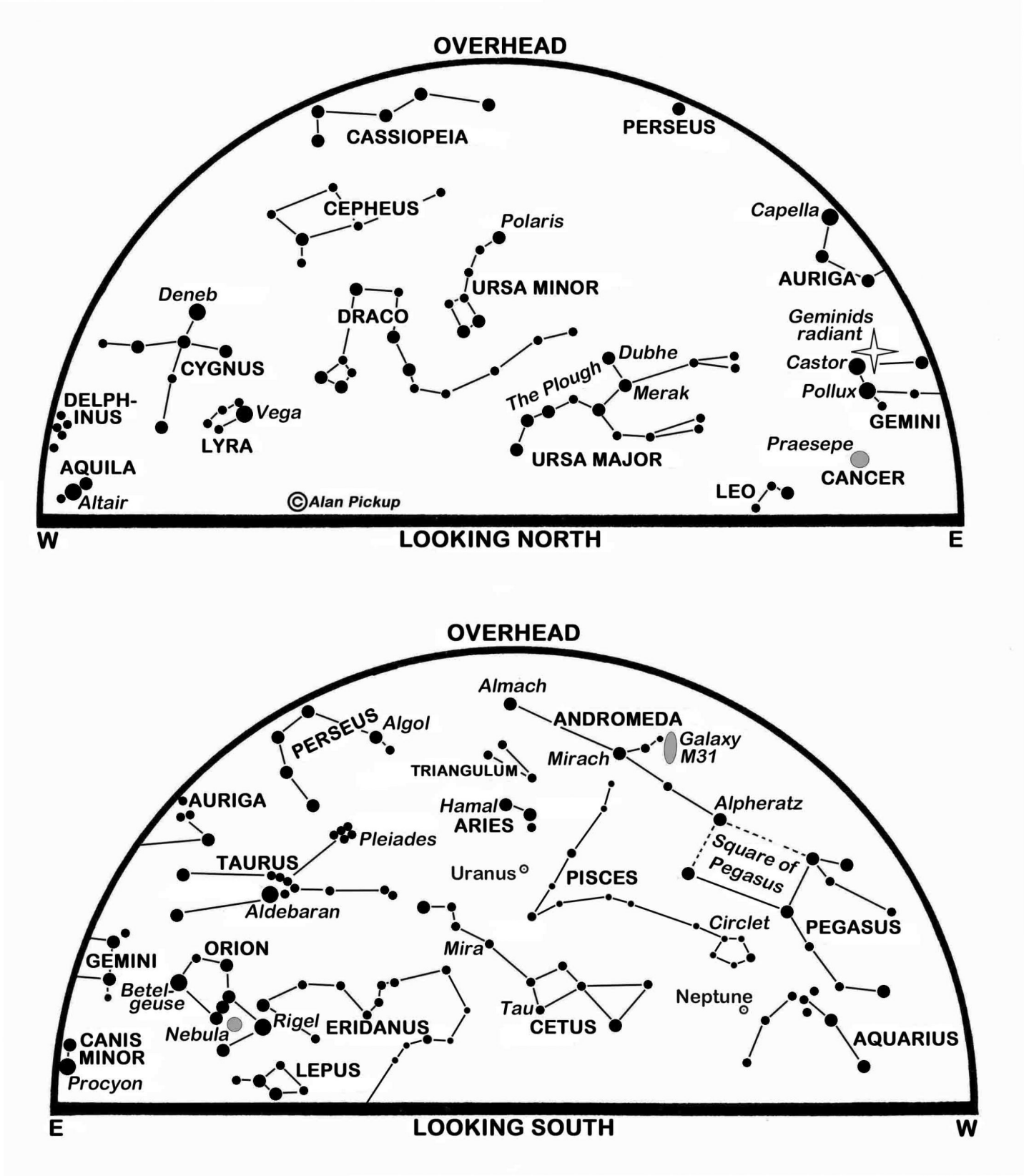


Article and images: Mark Phillips

Lunar Libration (Wikipedia, Public Domain)

Scotland's Sky in December 2019

30 November 2019
Categories: Sky Diary



This month's Sky Diary is published on both the [Journal](#) and this website. From Jan 2020, all Sky Diaries will be published only here. All past Diary and Journal entries can be seen on the [Sky Diary](#) and [Journal archive](#) pages.

The Bronze Age bull that leads Orion across our night sky

The maps show the sky at 21:00 GMT on the 1st, 20:00 on the 16th and 19:00 on the 31st. (Click on map to enlarge)

The two brightest planets hug our south-south-western horizon after sunset at present, but soon set themselves to leave Orion to dominate our December nights which include the longest ones of the year.

The Sun's southwards motion halts at our winter solstice at 04:19 GMT on the 22nd. Sunrise/sunset times for Edinburgh vary from 08:19/15:44 on the 1st, to 08:42/15:40 on the 22nd at 08:44/15:47 on Hogmanay. Because the Earth is tipped on its axis and in an elliptical orbit about the Sun, the solstice coincides with neither our latest sunrise nor earliest sunset. Instead, Edinburgh's latest sunrise at 08:44 is not until the 29th, while our earliest sunset at 15:38 comes on the 15th.

The Moon is at first quarter on the 4th, full on the 12th, at last quarter on the 19th and new on the 26th when it appears too small to hide the Sun completely. Instead, an annular or ring solar eclipse is visible from Saudi Arabia to Indonesia by way of southern India.

Venus blazes at magnitude -3.9 as it stands 5° high thirty minutes after sunset on the 1st. It lies 7° to the left of Jupiter, one seventh as bright at magnitude -1.8, but we lose sight of the latter within a few days as it heads towards the Sun's far side on the 27th.

Venus, meanwhile, tracks eastwards to pass 2° below the much fainter planet Saturn (magnitude 0.6) on the 10th. By the 27th, Saturn is hard to spot in the twilight when it stands 3° right of the very slender young and earthlit Moon. The next evening has the Moon 5° below and right of Venus which, by then, is established as an impressive evening star that stands 12° high thirty minutes after sunset.

Vega, the brightest star in the Summer Triangle, stands high in the south-west at nightfall, but sinks into the north-west sky by our map times. Meanwhile, Taurus the Bull, with its leading star Aldebaran and the Pleiades star cluster, climbs from low in the east-north-east into the south-east. Below Taurus is the unmistakable form of Orion with the three stars of his Belt slanting up to Aldebaran. By midnight, Taurus stands high on the meridian, above and to the right of Orion whose Belt also points downwards to our brightest nighttime star, Sirius in Canis Major.

The Pleiades, a so-called open star cluster, is sometimes called the Seven Sisters, though I leave you to judge whether this is fair description of its naked-eye appearance. Certainly, binoculars and telescopes show impressive views of many more than seven stars. Photographs reveal them to be embedded in bluish wispy haze that astronomers once took to be the remains of the material from which the stars formed. Now we understand the haze to be a cloud of dust which the cluster has encountered as it orbits our Milky Way. The cluster lies 444 light years (ly) away and may be less than 100 million years old – much older and the young blue and luminous stars that illuminate the dust would not have survived.

Taurus has represented a bull in the mythologies of many ancient civilisations since the early Bronze Age, though typically only the horns, head and forequarters are imagined in the sky. Taurus' face is marked by a V-shaped pattern of stars that comprise the Hyades, the nearest of all the known open star clusters in the sky. The measurement of its distance as 153 ly is a vital yardstick in the fixing of other stellar distances in our galaxy and beyond. The bright red giant star Aldebaran, sometimes taken to be the Bull's bloodshot eye, is not, though, a member of the Hyades, being a foreground object at 65 ly.

Perhaps the foremost astrophysical object in Taurus is the Crab Nebula which lies 1.1°, or two Moon-diameters, north-west of the star Zeta, the tip of Taurus' unfeasibly long southern horn. Also known as M1, it is the remains of a supernova witnessed by Chinese observers in 1054, being seen as a naked-eye object for around two years and even being visible in daylight. The expanding debris of the stellar explosion now appears as an eight-magnitude smudge in small telescopes and contains a pulsar, a neutron star some 30 km wide that spins thirty times a second and beams out flashes of radiation at every wavelength from gamma rays to radio waves.

Above and to the left of Orion lies Gemini the Twins whose main stars, Castor and Pollux, sit one above the other as they climb through our eastern sky. Slow meteors of the Geminids shower diverge from a radiant near Castor (see chart) between the 4th and 17th. The display is expected to peak on the 14th at rates that could exceed 100 meteors per hour for an observer under a clear dark sky. It is a pity that the Moon lies just a few degrees below Pollux at the maximum and sheds enough light to swamp many of the fainter Geminids this time around.

The radiant of the month's second shower, the Ursids, lies just below the first "R" in "URSA MINOR" on our north star map. The shower is active between the 17th and 26th with its peak of some 10 medium-speed meteors per hour under (thankfully) moonless skies on the 23rd.

The normally shy innermost planet Mercury is currently shining brightly at about magnitude -0.5 low down in the south-east for two hours before sunrise. However, it sinks lower each morning and is likely lost in the dawn twilight by midmonth. Higher and to its right, and in line with the bright star Spica in Virgo, is the fainter (magnitude 1.7) Mars which tracks 20° east-south-eastwards in Libra this month, and passes a mere 0.2° north of the double star Zubenelgenubi on the 12th. Catch the Red Planet to the right of the waning Moon before dawn on the 23rd.

Diary for 2019 December

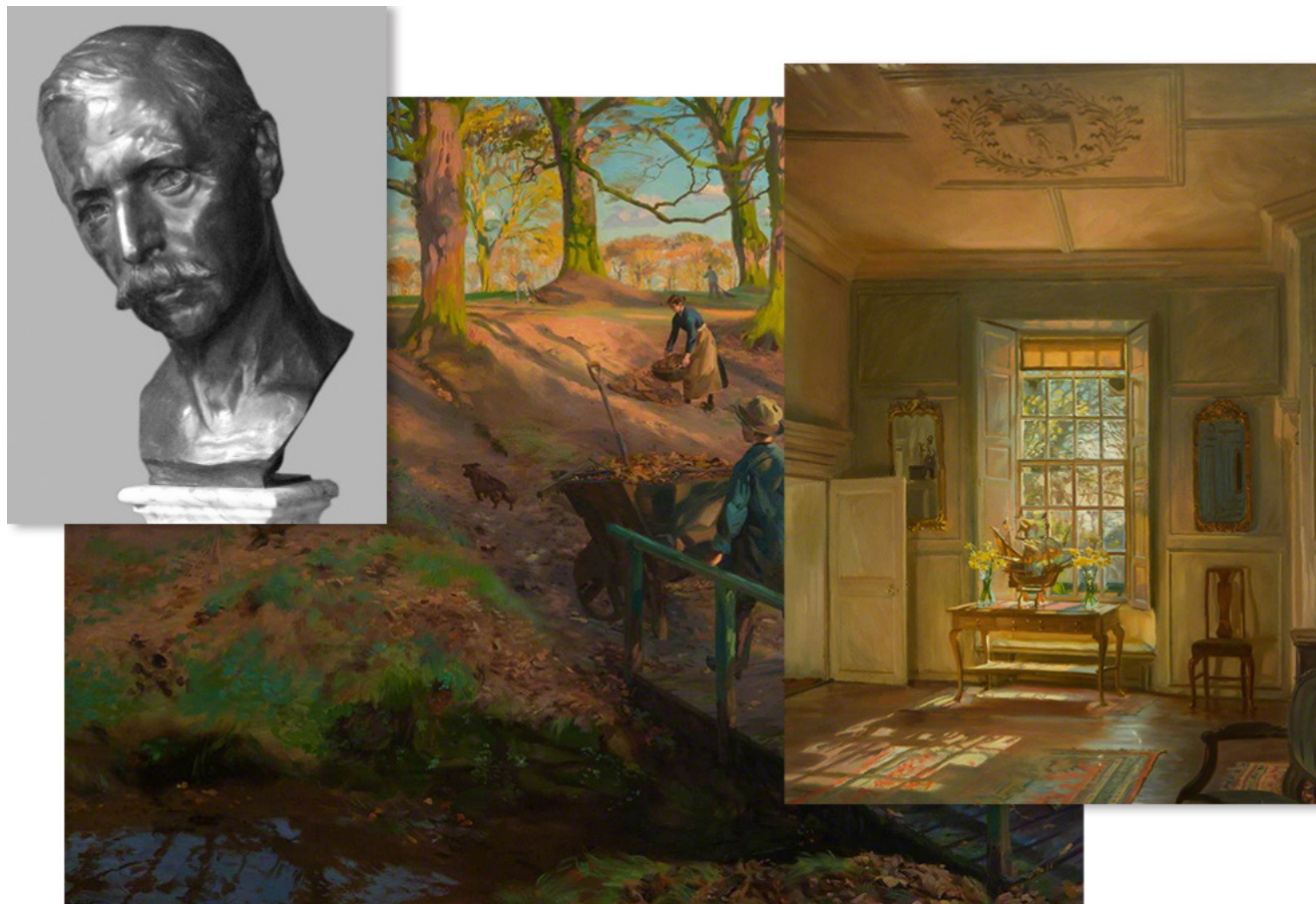
4th	07h First quarter
8th	13h Interstellar Comet Borisov closest to Sun (300m km)
11th	05h Venus 1.8° S of Saturn
11th	12h Moon 3° N of Aldebaran
12th	05h Full moon
14th	14h Peak of Geminids meteor shower
15th	16h Moon 1.3° N of Praesepe
17th	05h Moon 4° N of Regulus
19th	05h Last quarter
22nd	04:19 Winter solstice
23rd	Peak of Ursids meteors shower
23rd	02h Moon 4° N of Mars
26th	05h New moon and annular solar eclipse
27th	12h Moon 1.2° S of Saturn
27th	18h Jupiter in conjunction with Sun
29th	02h Moon 1.0° S of Venus

Alan Pickup

Lorimer, Astronomy, Art and Medals

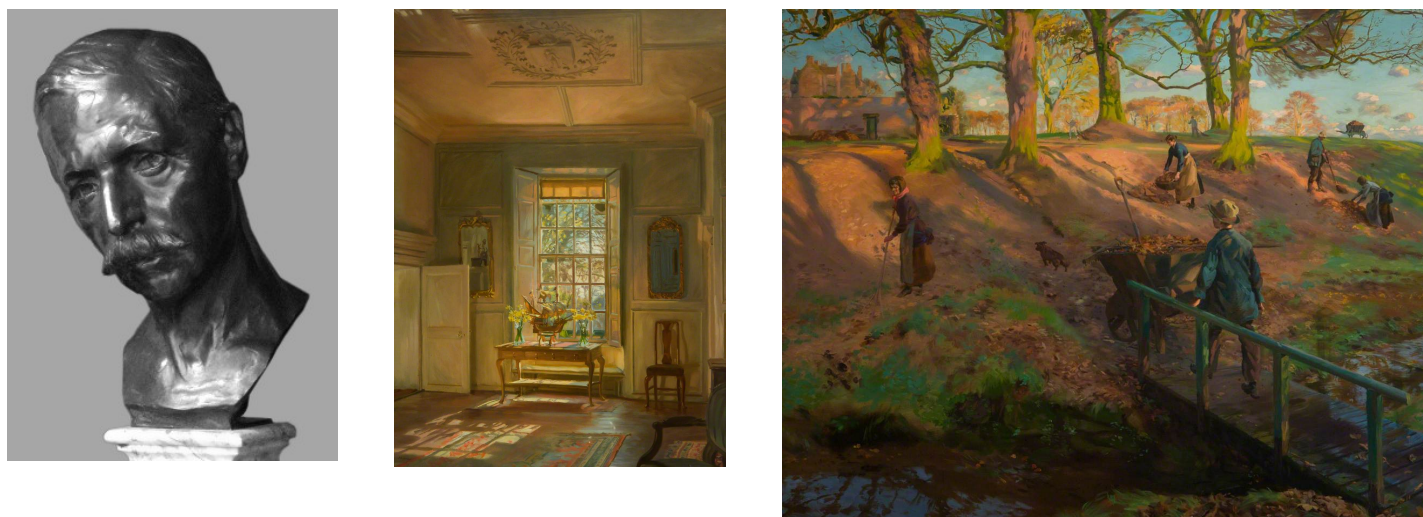
10 December 2019

Categories: History, News



We are very privileged to own some beautiful artworks by one of our former Vice Presidents and benefactor, the artist John Henry Lorimer.

Just a little more from the archives... While re-organising some of the historical pages on our website, I found that a bust of John Henry Lorimer and two of his paintings still belong to the Astronomical Society of Edinburgh. All are on loan to [Kellie Castle](#), one of his family homes, and can be seen there. You can also see these two paintings as well as more of his work on the [Art UK website](#).



Lorimer also left a substantial bequest to the Society which still helps support us to this day. The Society awards the [Lorimer Medal](#) using some of the bequest in his honour to people who have made notable contributions to popular astronomy. The first was awarded to [Sir James Jeans](#) in 1938 and the most recent to [Ron Livesey](#) this year. Others include famous TV astronomer Sir Patrick Moore and current members Dave Gavine and Alan Pickup.

LORIMER LECTURE: Consideration was given to the arrangements for a Lorimer Lecture. It was unanimously resolved to approve the recommendation that the Lorimer Medal should be awarded to Mr Patrick Moore, and it was agreed that his Lecture should be given on 2nd November. After discussion it was resolved that the lecture should take place in Leith Town Hall.

-

I discovered that the medal awarded to Sir Harold Spencer Jones in 1953 is part of the collections at the [National Maritime Museum, Greenwich](#) (although they incorrectly state the date of award as 1955 – I have sent a correction).

Just a little more from our fascinating heritage.

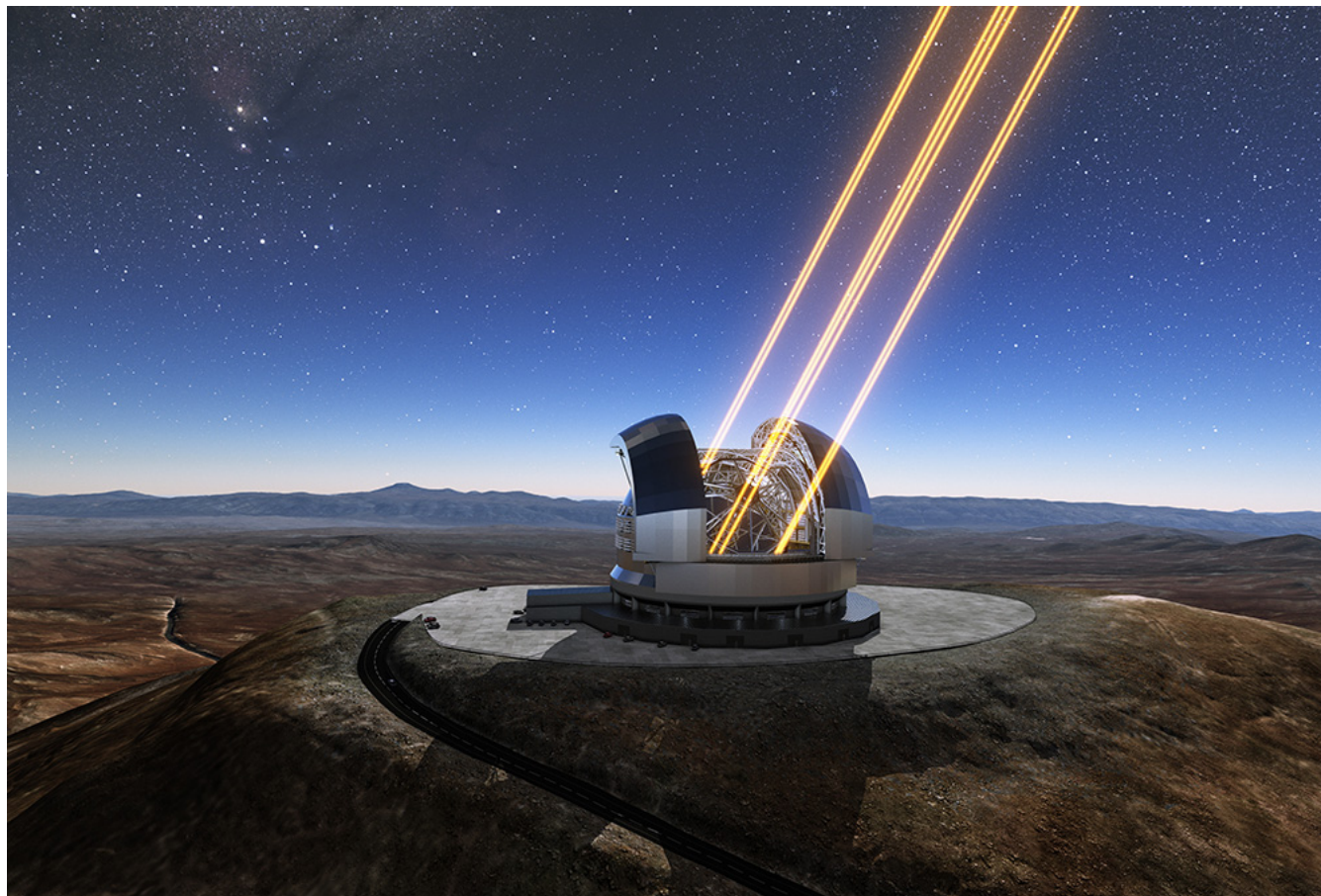
[Wikipedia entry on John Henry Lorimer](#)

*Painting photo credit: National Trust for Scotland, Kellie Castle & Garden
Mark Phillips*

December 2019 meeting report

10 December 2019

Categories: Meeting report, News



The main talk was given by Prof Colin Cunningham of Edinburgh University who described the many engineering and scientific challenges associated with the building and future operation of the ELT. It's 39m mirror(s) having a larger area than all the existing research telescope mirrors (>1m) in operation today.

Also at the meeting:

- The President paid tribute to [Prof. John Brown OBE](#), who died on the 16th Nov. As well as Astronomer Royal for Scotland, John was also an Honorary President of the ASE since 1995.
- Sean updated the Society on the [AstroBoost](#) initiative. The ROE will be holding a training day for all successful Societies to be able to utilise the outreach material on the James Webb telescope. The ASE will apply to be part of the programme before the January deadline.
- Horst described the highlights of the night sky in Dec
- The [4-Steps programme](#) is progressing with the next Telescope Help Shop on the 29th Feb 2020.
- Peter Black updated the meeting on the Strategy Development Workshop held to discuss the ASE's future and the work streams that came out of the meeting.
- Andrew gave an overview of topics that had caught his attention in astronomy and space.
- Hugh Somerville gave a short presentation on the ISS and the highlights of Alexei Leonov, the Russian Cosmonaut space walk.



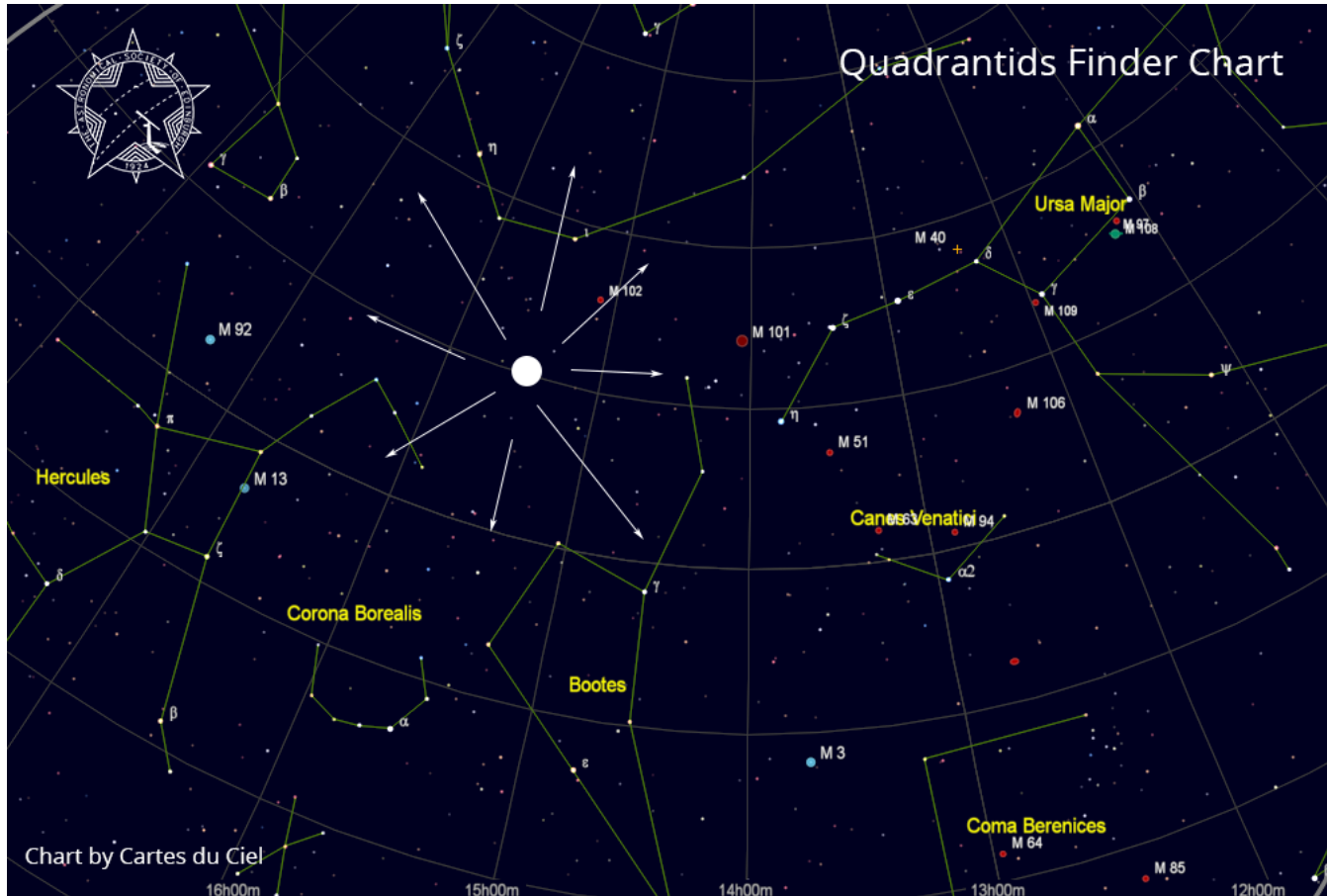
[Download ASE slides as a PDF](#)

The next meeting was announced as focussing on Light Pollution and it is anticipated that the other usual agenda items will be omitted apart from the Sky in Feb. The audience for this event will include a number of invited organisations representatives

The Quadrantids New Year meteor shower

13 December 2019

Categories: News



This meteor shower radiating from a forgotten constellation is one of the most prolific of the year but not as popular as other showers. This year the Moon is mostly out of the way so it could be a good one.

It peaks on the night of 3 – 4 January 2020, which could explain why it's so rarely observed. It's often very cold, it's just after New Year and even though the shower ranges from about 27 December to 10 January, the actual peak is quite narrow, so you really only have one night – a few hours actually – to see a good number of meteors. Unfortunately, they're mostly not the brightest of meteors, often around the mag. 3 – 6 range, so you need a dark sky.

The **Zenith Hourly Rate (ZHR)** for the Quadrantids is about 120 meteors per hours. This is the rate you would observe if the radiant was overhead at the time of maximum. From Edinburgh you could see up to 100 meteors per hour in the early hours of the morning and with the 61% illuminated Moon setting just before 1am it shouldn't interfere too much. So if you're on your way home from a little celebration and look up you might just catch a few... just be careful not to fall over!

It's not totally certain what the parent body of the Quadrantids is but might be minor planet [2003 EH](#) which may also be comet C/1490 Y1, observed by Chinese, Japanese and Korean astronomers about 500 years ago.

The chart above shows the radiant of the shower – the point in the sky from where the meteors appear to radiate. The name Quadrantids comes from an old constellation Quadrans Muralis (Mural Quadrant) created by the French astronomer Jérôme Lalande in 1795. The Quadrantids themselves were first seen in 1825.



Quadrans Muralis, Wikimédia Commons

Observing and imaging the Quadrantids

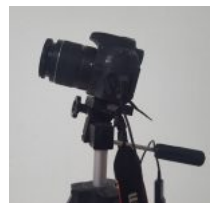
Wrap up warm! It is December after all and you don't want to miss the display because you're too cold.

You don't need anything other than a little patience to observe the Quadrantids. Just lie back in a reclining chair if you can (saves a lot of neck pain) and look up. The advice is usually to look about 30-40 degrees away from the radiant and about 60 degrees up to get a good chance of seeing more meteors. But remember meteors can appear in any part of the sky at any time. The closer to the radiant they are, the shorter the trails will be – further away trails appear longer.

To image meteors a camera on a fixed tripod is sufficient, preferably with a remote shutter release, but this is not essential as you can use the camera's delay timer. The length of exposure you can use without stars appearing to trail is dependent on the focal length of the lens you are using. A basic rule of thumb is to divide 500 by the focal length of the lens, and that gives you the exposure in seconds. For example, a 28mm focal length lens should be able to do 18 seconds without any significant trails showing. Work out what the [best ISO is for your camera](#) to make it as sensitive as possible without introducing too much noise. Something between 800 and 3200 should be fine.

Because stars are faint and small your auto-focus may not work well – or at all – so you will probably have to focus the camera manually. This is critical! There's no point spending an evening taking hundreds of exposures only to find that all of them are blurred afterwards. Take some time over this to get it spot on. Here's a [tutorial on using Live View](#) to get the focus right.

If you manage to image or observe the Quadrantids, please post your images and observations to our [Flickr group](#), [Facebook page](#) or [Twitter feed](#).



Imaging Group pictures in 2019

29 December 2019

Categories: News

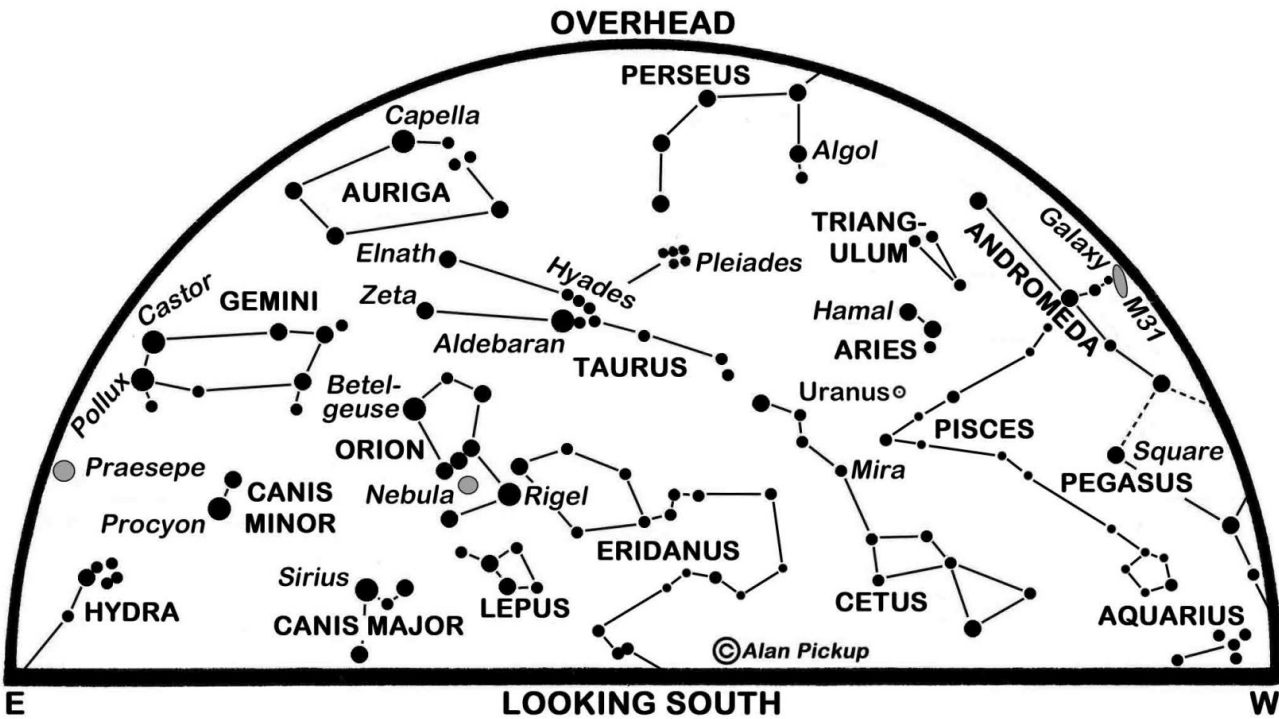
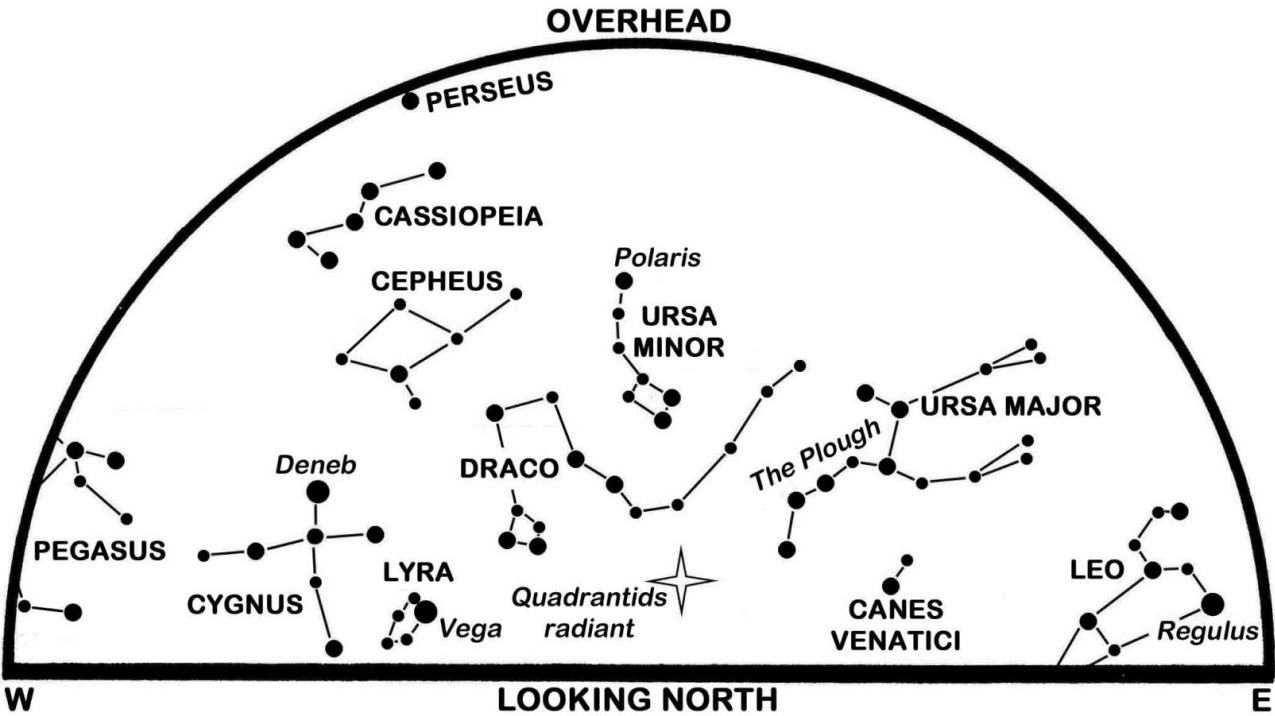


Here's a selection of images posted to our [Flickr Group](#) in 2019 as a short video.

YouTube video player

 <https://youtube.com/watch?v=2LvqYLCNZpw>





Venus and Orion dominate our January evenings



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.

Our chill January evenings bring the spectacular sight of Orion at the centerpiece in an array of bright stars and constellations. The annual Quadrantids meteor shower should also enliven the next few nights, but, with the conspicuous exception of Venus, the brighter planets are taking an extended New Year holiday.

Venus, brilliant as always, improves from magnitude -4.0 to -4.1 while its altitude in Edinburgh's south-south-western sky at sunset climbs from 15° to 26° and by the month's end it sets in the west four hours after sunset. It lies in the middle of Capricornus as the year begins but speeds east-north-eastwards and onwards

through Aquarius where it makes an impressive sight 5° above-right of the young earthlit Moon on the 28th. Telescopes show its dazzling gibbous disk which swells from 13 to 15 arcseconds as its distance, still on the far side of its orbit, shrinks from 191 million to 163 million km.

Quadrantid meteors are already arriving but the shower builds to quite a sharp peak on the 4th. Perspective means that they appear to diverge from a radiant point which lies low in our northern sky (see chart) during the evening and trails below and left of the Plough's handle as it climbs high into the east during the morning hours. Under perfect skies before dawn on the 4th a lucky observer might spot 80 or more medium-speed Quadrantids per hour, with many of the brighter ones leaving persistent glowing trains in their wake.

Orion rises in the east as darkness falls and lies below and left of Taurus as it climbs through our south-eastern sky to cross the meridian at 23:00 GMT on the 1st and by 21:00 on the 31st.

After our focus on Taurus last month, it is time to turn to Orion, which, since it straddles the sky's equator and forms such a distinctive pattern, is recognised in cultures worldwide. Its earliest representation appears to have been carved into a piece of mammoth ivory more than 32,000 years ago.

The Orion we know makes his appearance in Greek mythology as an all-powerful hunter. In one myth, he fell in love with the Pleiades and is pursuing them across the sky while many stories tell of his death from a scorpion's sting – said to be the reason that the constellation of the scorpion, Scorpius, is set opposite Orion in the sky.

A line through the three stars of Orion's famous Belt slants up towards Aldebaran and down to Sirius in Canis Major, the larger of the Orion's two faithful hunting dogs. The other is Procyon in Canis Minor which, together with Sirius and the red supergiant star Betelgeuse at Orion's shoulder, form the nearly-equilateral triangle we call the Winter Triangle.

Betelgeuse, perhaps 700 light years (ly) away, is some 15-20 times more massive than our Sun but 800 times wider with a surface at 3,300°C, much cooler and redder than the Sun's 5,500°C. Although it formed only around 8 million years ago, the star is already exhausting the hydrogen and helium nuclear fuel near its core and is predicted to explode as a supernova within the next million years. It pulsates slowly and erratically in size and brightness over the months and has occasionally outshone the contrasting blue supergiant star Rigel at Orion's knee. Recent weeks, though, have seen Betelgeuse fade to magnitude 1.2, less than half as bright as Rigel and a level not seen in fifty years.

Rigel, thought to lie about 950 ly away and be slightly more massive than Betelgeuse, is one tenth as wide with a surface at a blistering 12,000°C. Like most of Orion's other bright stars, it, too, is approaching its end in a supernova.

Don't miss the chance to spot the Orion Nebula which appears as a fuzzy cloud in Orion's Sword, a line of relatively dim stars that hang below the Belt. This region, 1,350 ly away, is a cloud of gas and dust in which new stars and planets are forming. If light pollution stops us seeing it with the unaided eye, then binoculars make it obvious.

Sunrise/sunset times for Edinburgh change from 08:44/15:49 on the 1st to 08:10/16:43 on the 31st. The Moon is at first quarter on the 3rd and full on the 10th when it moves through the northern region of the Earth's shadow, the penumbra, in the first of four penumbral lunar eclipses in 2020. We see very little of the other three, but this one is visible in its entirety between 17:08 and 21:12 as the full moon climbs through our eastern sky. The Moon's southern part should dim noticeably around mid-eclipse but it doesn't stray into the central dark umbra of the shadow. Last quarter occurs on the 17th and the Moon is new on the 24th.

Jupiter, bright at magnitude -1.9, begins to emerge from our morning twilight later in the month and lies 10° below-left of the waning Moon on the 22nd. Mercury and Saturn reach conjunction on the Sun's far side on the 10th and 13th respectively and remains hidden in the Sun's glare.

Mars rises at about 05:15 throughout January and brightens a shade from magnitude 1.6 to 1.4 even though its location one hour before sunrise drops from 12° to 9° in the south-south-east. Tracking eastwards against the stars, it stands 6° below-left of the Moon and 7° north of Antares, the lead star in the aforementioned constellation of Scorpius, on the 20th. Another pulsating red supergiant, Antares has a name which derives from the Greek for "rival to Mars" because of its colour, though it is currently brighter than the Red Planet.

Diary for 2020 January

3rd 05h First quarter

4th 09h Peak of Quadrantids meteor shower

5th 08h Earth closest to Sun (147,091,144 km)

7th 22h Moon 3° N of Aldebaran

10th 15h Mercury in superior conjunction

10th 19h Full moon and penumbral lunar eclipse

12th 00h Moon 1.3° N of Praesepe

13th 12h Moon 4° N of Regulus

13th 15h Saturn in conjunction with Sun

17th 04h Mars 5° N of Antares

17th 13h Last quarter

20th 15h Moon 7° N of Antares

20th 19h Moon 2.3° N of Mars

23rd 03h Moon 0.4° S of Jupiter

24th 22h New moon

27th 19h Venus 0.1° S of Neptune

28th 07h Moon 4° S of Venus

This is an extended version, with added diary, of Alan's article published in The Scotsman on December 31st 2019, with thanks to the newspaper for permission to republish here.

