

# The astronomical sky above Edinburgh in October

## Earth gains another Moon and the clocks go back one hour on the last Sunday at 2am.

Here's a cool trivia question: How many natural satellites does the Earth have? One – the Moon – right? Well, from 29 September through 25 November, the correct answer will be two!

Asteroid 2024 PT5, recently discovered by ATLAS, will be captured by Earth's gravity during that time and become a second Moon. Alas, it will be too small – barely 10m across – and faint to observe without a powerful telescope but it will be a second, albeit miniature, Moon throughout October.

The new Moon appears on 2 October at 7:49 pm in Virgo (The Maiden) beginning a new Lunar (synodic) month which will last 29 days, 17 hours and 58 minutes.

Lunar apogee (furthest from Earth) occurs on 2 October at 8:57 pm and takes the Moon to 406,515 km away from Earth—around 22,115 km further than average – subtending an angle of 29.4 arc-minutes. The first quarter of the new cycle shows up on 10 October at 7:55 pm in Sagittarius (The Archer).

Lunar perigee (closest to Earth) on 17 October at 1:59 am finds the Moon some 357,179km away from Earth – around 27,221 km closer than average – subtending an angle of 33.4 arc-minutes. The full Hunter's Moon makes an appearance on 17 October at 12:26 pm as it crosses from Pisces (The Fishes) into Aries (The Ram). October's full Moon is also the largest

supermoon of the year but not the last.

The Moon enters last quarter on 24 October at 9:03 am in Cancer (The Crab). Finally, there is a second lunar apogee (furthest from Earth) that occurs on 30 October at 0:04 am and takes the Moon to 406,142 km away from Earth – around 21,742 km further than average – subtending an angle of 29.4 arc-minutes.

On 19 October around 9 pm, the Moon conjuncts with the Pleiades star cluster (M45) in Taurus. Commonly known as the “Seven Sisters”, even naked-eye observers might spot more than seven members in this open star cluster. A pair of binoculars or small telescope will reveal countless additional members all of which lie around 444 light years away. Since it is a star cluster, we know that they all formed together around 100 million years ago when Earth was experiencing the dinosaurs of the Cretaceous period.

The Sun leaves Virgo (The Maiden) on 30 October at 7:04 pm and enters Libra (The Scales). Daylight shortens from 11:30 (11.506 hours) on 1 October to 09:15 (9.252 hours) on 31 October so we gain 2 hours and 15 minutes of night time by month's end.

For the inferior planets: Mercury reaches its furthest point from Earth all year on 8 October and aphelion on 23 October. Since it starts the month at superior conjunction (behind the Sun), it is essentially lost to us for the whole of October.

Venus starts the month shining at -3.9 magnitudes in Libra (The Scales) and ends October in Ophiuchus (The Serpent Bearer), brighter at -4.0 magnitudes since it gets 28 million km closer to Earth. However it only emerges from the Sun's glare in the last week of the month when it will be visible at very low altitude (less than 4 degrees) for around 30 minutes before setting in the south-west. Venus reaches aphelion on 30 October.

We fare much better with the superior planets with Mars, Jupiter, Saturn, Uranus and Neptune all visible for large parts of the night all month long as shown on our sky map. Mars starts the month in Gemini (The Twins) and ends in Cancer (The Crab). The red planet gets 33 million km closer to Earth and brightens by 0.4 mag (around 45% brighter) by month's end. It will reach western quadrature on 14 October and will lie 5 degrees east of the last quarter Moon on 24 October at 2 am. Jupiter reverses direction in Taurus (The Bull) – well, as seen from Earth due to orbital geometry anyway – on 9 October.

It begins the month at -2.5 magnitudes and increases brightness to -2.7 magnitudes by month's end as it approaches closer to Earth by 59 million km. Saturn, in Aquarius (The Water Carrier), dims by 0.15 magnitudes as it recedes from Earth by some 49 million km over the month. On 14 October it will be within 0.1 degree south of the waxing gibbous Moon which will be 90% illuminated so will dominate the show.

Uranus in Taurus (The Bull) is visible all night and stands sentinel at 5.6 magnitudes even though it gets closer to Earth by 42 million km. Neptune, the blue planet, recedes by 35 million km but it is so far away that it barely impinges on observed brightness at 7.6 magnitudes. It is located in Pisces (The Fishes). As it rises on 15 October, it will be occulted by the waxing gibbous Moon illuminated to 96% making observation difficult until late evening on that day.

There are no fewer than 6 meteor showers active in October. Shooting star watchers use a scale called 'Zenith Hourly Rate' which is the number of meteors per hour if the radiant point were directly overhead. The ZHR, then, is a maximum anticipated activity and a bigger number (usually) means a better cosmic show. Alas, October's meteor showers will feature lots of activity but not much of a show!

On 5 October, a meteor shower called the October Camelopardalids (281 OCT) will peak with a ZHR of 5. Although

the meteor shower is named after the constellation Camelopardalis (The Giraffe), the radiant point is more like half way between Polaris in Ursa Minor (The Lesser Bear) and the tail of Draco (The Dragon). Since these constellations are circumpolar (they never set in the Edinburgh and Lothian sky), the meteors can be seen all night. Although activity is low, the waxing crescent Moon is only 7% illuminated making observing conditions favourable. The parent comet is unknown.

On 8 October, the Draconids (009 DRA) will peak with a better ZHR of 10. The parent comet is P/Giacobini-Zinner so the shower is also sometimes called the Giacobinids. The comet has a period of 6.6 years and is currently close to aphelion. Since Draconid activity is best with the comet at perihelion, we cannot expect any outbursts such as the last perihelion (2018) which had a ZHR of 150! If you wish to look, however, the radiant point is close to Rastaban in the head of the dragon. The waxing crescent Moon will be 30% illuminated.

On 11 October, the delta-Aurigid (224 DAU) meteor shower peaks with a paltry ZHR of 2. The radiant point is near Capella but with the low activity and the waxing gibbous Moon at 60% illumination, there will be very little to see. On 18 October, the epsilon-Geminid (023 EGE) meteor shower peaks with another weak ZHR of 3. The radiant point is near Castor's hip but with low activity and the Moon just past full (97% illumination), there will be nothing much to see. The parent comet is C/1954 N1 (Ikeya).

On 20 October, we witness the Orionids (008 ORI) with a ZHR of 20. The parent comet is the most famous of them all: 1/P Halley. Alas, activity this year will be badly affected by moonlight with the waning gibbous Moon 84% illuminated. The radiant point is close to another famous object: Betelgeuse in Orion (The Hunter).

Finally, on 24 October we have the Leonis Minorid (022 LMI) meteor shower with a ZHR of 2. This meteor shower has the

distinction of being the first found in photographic orbital data and the parent body is comet C/1739 K1 (Zanotti). The radiant point is between the hind legs of Ursa Major (The Great Bear) so is circumpolar. Low activity and the Moon at at last quarter (46% illumination) spoils the view.

Comet C/2023 A3 (Tsuchinshan-ATLAS) travels through 4 constellations during October starting in Leo (The Lion), crossing into Virgo (The Maiden) on the 5th, Serpens (The Serpent) on the 16th October and ending in Ophiuchus (The Serpent Bearer) from 20 October onwards. It will require binoculars and best visibility would be during closest approach to Earth on 13 October when it lies 70,724,459 km (0.47 AU) away. There is still a possibility that it will be bright enough to see with the naked-eye during evening twilight but, more likely, it will shine at 6.0 magnitudes and require binoculars. Look an hour after sunset in Virgo (The Maiden), low in the west.

Corona Borealis (The Northern Crown), you might recall from previous columns, hosts the recurrent nova T CrB better known as the Blaze Star. This should explode by year's end and provide another jewel in the crown, of similar lustre to Polaris, near the star epsilon-13. At the time of our sky map it will be very low in the north west.

At the time of our sky map, some constellations visible are Cassiopeia (The Seated Queen) at zenith, Ursa Major (The Great Bear) in the north, Orion (The Hunter) rising in the east, Cygnus (The Swan) in the west, and Pegasus (The Winged Horse) in the south. The ecliptic hosts Gemini (The Twins), Taurus (The Bull), Aries (The Ram), Pisces (The Fishes), Aquarius (The Water Bearer) and Capricornus (The Sea Goat).

The "Summer Triangle" – Vega in Lyra (The Lyre), Altair in Aquila (The Eagle) and Deneb in Cygnus (The Swan) – is in the west. Circumpolar constellations – always above the horizon – include Cepheus (The King), Camelopardalis (The Giraffe),

Draco (The Dragon) and Ursa Minor (The Lesser Bear).

Errata: In last month's column, the consummate observer will have discovered the ephemeris showed the Moon at apogee twice. That was incorrect and resulted from an over-enthusiastic cut-and-paste by your present interlocutor's fat fingers! Humblest apologies. The 5 September apogee was correct, the 9 September apogee was not. This month, though, the Moon is at apogee twice on 2 and 30 October.

Edinburgh and Lothian Ephemeris		
2 October 12:52 pm	Moon crosses descending node	Virgo
2 October 7:49 pm	New Moon, Meeus lunation 306	Virgo
2 October 8:57 pm	Lunar apogee 406,515 km	Virgo
5 October 11:00 pm	(October) Camelopardalids (281 OCT) peak, ZHR=5	Camelopardalis
8 October 12:59 pm	Earth Mercury furthest apart at 212,212,403 km	Virgo
8 October 11:00 pm	Draconids (009 DRA) peak, ZHR=10	Draco
9 October 7:34 am	Jupiter traverses stationary retrograde point	Taurus
10 October 7:55 pm	Moon at first quarter	Sagittarius
11 October 11:00 pm	Delta-Aurigids (224 DAU) peak, ZHR=2	Auriga
13 October 1:00 am	Comet C/2023 A3 Tsuchinshan-ATLAS closest to Earth	Virgo
14 October 9:15 am	Mars at western quadrature	Gemini
14 October 7:05 pm	Saturn 0.1°S of waxing gibbous Moon	Aquarius
15 October 4:11 pm	Occultation between Moon and Neptune	Pisces
16 October 8:05 am	Moon crosses ascending node	Pisces
17 October 1:59 am	Lunar perigee 357,179 km	Pisces
17 October 12:26 pm	Full (Hunter's) Super Moon	Pisces
18 October 11:00 pm	Epsilon-Geminids (023 EGE) peak, ZHR=3	Gemini
19 October 8:59 pm	Pleiades (M45) 0.1°S of waning gibbous Moon	Taurus
20 October 11:00 pm	Orionids (008 ORI) peak, ZHR=20	Orion
23 October 3:49 pm	Mercury aphelion 69,817,732 km	Libra
24 October 2:00 am	Mars 5.0°E of last quarter Moon	Gemini
24 October 9:03 am	Moon at last quarter	Cancer
24 October 11:00 pm	Leonis Minorids (022 LMI) peak, ZHR=2	Leo Minor
27 October 2:00 pm	End of British Summer Time, clocks go back 1 hour	Virgo
29 October 6:44 pm	Moon crosses descending node	Virgo
30 October 12:04 am	Lunar apogee 406,142 km	Virgo
30 October 3:13 pm	Venus aphelion 108,937,537 km	Ophiuchus
30 October 7:04 pm	Sun leaves Virgo, enters Libra at 0.993 AU	Libra

# Edinburgh and Lothian

(55.95°, -3.19°, 10.00m for 16 October 2024 0:00 am)

