

“ $\Omega > 1$ ”

“Sky-Notes” of the Open University Astronomy Club.

September 2021.

Forthcoming Meetings.

OUAC Clubnight.

**Due to Covid-19 OUAC “Clubnights” are suspended until further notice.
The Observatory is also closed for the same reason.**

Highlights of the Month.

11 th .	Asteroid Pallas at Opposition .
14 th	Mercury at Greatest Elongation E .
14 th	Neptune at Opposition .
22 nd .	Equinox .
Mercury.	Poor evening apparition very low in the SW twilight.
Venus.	Prominent object low in the SW evening twilight.
Mars.	Not observable.
Jupiter.	Prominent object low in the SE to SW dark sky.
Saturn.	Low in S evening sky.
Uranus.	An “early hour” object well placed in the E sky.
Neptune.	Well placed for nightlong observation.
Dwarf Planets.	See notes below.
Asteroids.	See notes below.
Comets.	See notes below.
Meteor Showers.	See notes below.

Recent Events.

If you have any images and/or reports of recent events please contact Sheridan so that he can put them on the Club website.

If you wish to present them at a “Clubnight” meeting, when resumed, please contact Adrian or myself before the meeting starts.

Software.

A very useful item of Planetarium software is “Stellarium” and it’s FREE! Go to their website and download it and the associated user manual.

1. The Solar System.

**Note all times shown are UT.
Add one hour when British Summer Time is in operation.**

Earth.

Autumnal Equinox (Northern Hemisphere) **22nd 19^h 21^m.**

Aurora.

Increasing hours of darkness improve the opportunity for observing potential aurora. Keep tuned to the www.spaceweather.com site for updates. Subscribe (free!) to the UK AuroraWatch website to receive alerts.

ISS.

The ISS continues a series of morning passes in the first two weeks of the month. From the 16th it commences a series of evening passes, Go to the “Heavens Above” website and set-up for your location. Details of other satellites are available on this informative website. Alternatively go to the “spaceweather” website and click the “Flybys” button and follow the instructions to set-up forecasts for your location. Add to your “favourites”.

Sunrise and Sunset.

Bedford.
Latitude 52° 6.9' N Longitude 0° 28.1' W

Date.	Rise.	Transit.	Set.
01	05 ^h 14 ^m	12 ^h 02 ^m	18 ^h 49 ^m
08	05 ^h 25 ^m	11 ^h 59 ^m	18 ^h 33 ^m
15	05 ^h 37 ^m	11 ^h 57 ^m	18 ^h 16 ^m
22	05 ^h 48 ^m	11 ^h 54 ^m	18 ^h 00 ^m
29	06 ^h 00 ^m	11 ^h 52 ^m	17 ^h 44 ^m

Produced using “Starry Night Pro”.

The Sun.

Observing.

To prevent permanent damage to your eyes avoid looking at the Sun directly and never with binoculars or a telescope unless special (expensive!) filters are used. The safest way is the simplest – project the image of the Sun onto grey or white card.

If you have or have access to observe in h-alpha the rewards are much greater.

Solar Cycle 25 is gathering pace.

Keep in touch with the Solar Dynamics Observatory satellite at <http://sdo.gsfc.nasa.gov/>
Add the “Spaceweather” and the “Soho” websites to your “favourite” websites.

The Moon.

Phases:



Produced using "LunarPhase Pro".

New.	07 ^d 00 ^h 52 ^m
First Quarter.	13 ^d 20 ^h 39 ^m
Full.	20 ^d 23 ^h 55 ^m
Last Quarter.	29 ^d 01 ^h 57 ^m

Apsides:

Perigee	11 ^d 10 ^h	Diameter. 32' 56"	Distance. 368,465km.
Apogee	26 ^d 21 ^h	Diameter. 30' 02"	Distance. 404,640km.

Observing.

For northern observers:

- The waxing crescent Moon is not well placed.
- The waxing gibbous Moon is less well placed.
- The Full Moon is becoming well placed.
- The waning gibbous Moon is very well placed.
- The waning crescent Moon is very well placed.

Observing cont.

Observe the regions along the terminator (sunrise and sunset on the Moon) where the low angle of the Sun highlights lunar topography. A basic lunar map is all you need to get started. *Sky & Telescopes* "Lunar 100 Card" is another good starting point. If you are starting out on photography and/or imaging the Moon provides an excellent target.

Opportunities.

On 5th and 6th try locating the very thin crescent Moon very low in the E dawn skies **before sunrise**.

On 8th and 9th try locating the very thin crescent Moon WSW evening twilight **after sunset**.

From 1st to 6th and 24th to 30th clear September predawn skies provide excellent opportunities to image the waning gibbous and waning crescent Moon.

Note the effects of **Libration** to see what is observable on the Lunar Limb.

The **Mare Orientale** is a fascinating area when Libration is favourable.

If you can take images of the above so much the better!

Lunar Occultations.

Unlike the gradual disappearance of a planet (small disc) a star vanishes instantly demonstrating that it is a point source of light as viewed from the earth. For all occultation events start observing 10 to 15 minutes before the predicted time to identify the required star and to allow for slightly different time if you are not at Greenwich. Use an accurate watch to record the time that *you* observe the occultation remembering that times are UT not BST. Enter details in your observing log.

Details of occultations can be found in current *BAA Handbook* and monthly periodicals such as *Astronomy Now* and *Sky at Night*.

The Planets.

Mercury.

A poor evening apparition for N observers and will be very difficult to spot as it hugs the W horizon after sunset throughout the month.

Greatest Elongation E (26.8°) on 14th.

Moon close on 8th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.0	5.9''	0.73	07 ^h 35 ^m	13 ^h 28 ^m	19 ^h 21 ^m
14	+0.2	7.0''	0.56	08 ^h 18 ^m	13 ^h 31 ^m	18 ^h 43 ^m

Venus.

Now easily spotted low in the SW evening twilight.

Waning gibbous disc with slowly increasing apparent diameter.

Moon close on 10th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-4.0	15''	0.73	09 ^h 05 ^m	14 ^h 28 ^m	16 ^h 52 ^m
30	-4.2	19''	0.62	10 ^h 31 ^m	14 ^h 41 ^m	18 ^h 52 ^m

Mars.

Not observable as it approaches **Conjunction on October 8th**.

Moon close on N/A.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
-	-	-	-	-	-	-

Mission details and progress of “numerous” Orbiters, Landers and Rovers are on the appropriate websites.

Jupiter.

Available for long hours of observation low in the SE to SW evening to “early hour” sky.

Low declination does not favour N observers but better than the 2020 apparition.

Moon close on 18th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	-2.9	49''	18 ^h 22 ^m	23 ^h 09 ^m	04 ^h 02 ^m
30	-2.7	46''	16 ^h 22 ^m	21 ^h 05 ^m	01 ^h 52 ^m

Saturn.

West of Jupiter low in the S to SW evening to midnight sky.

Low declination does not favour N observers.

Moon close on 17th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+0.3	18''	17 ^h 41 ^m	22 ^h 00 ^m	02 ^h 22 ^m
30	+0.5	18''	15 ^h 45 ^m	20 ^h 01 ^m	00 ^h 22 ^m

Uranus.

Becoming well placed for observation in the E dark sky.
Moon close on 24th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.7	3.7''	20 ^h 37 ^m	04 ^h 09 ^m	11 ^h 38 ^m
30	+5.7	3.7''	18 ^h 41 ^m	02 ^h 13 ^m	09 ^h 40 ^m

Neptune.

At Opposition on 14th.

Well placed for nightlong observation.
Moon close on 20th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+7.8	2.4''	19 ^h 08 ^m	00 ^h 53 ^m	06 ^h 34 ^m
14	+7.8	2.4''	18 ^h 16 ^m	00 ^h 01 ^m	05 ^h 41 ^m
30	+7.8	2.4''	17 ^h 13 ^m	22 ^h 52 ^m	04 ^h 36 ^m

At mag +13.5 Neptune's largest satellite **Triton** provides a good challenge for 8'' telescopes under favourable sky conditions and when it is at max elongation E or W of Neptune.

Use "Stellarium" (Freeware) or similar software to determine favourable elongations.
Use a high magnification - x200 or greater.

Dwarf Planets.

Ceres.

An 8th mag object located in Taurus tracking the S edge of the Hyades during the month and passing less than 1° S of Aldebaran mid-month. Imaging opportunities!

Eris (2003 UB313).

A mag +18.7 CCD target located in Cetus.

Haumea.

A mag +17.3 CCD target located in Boötes. Becoming lost in WNW evening twilight.

MakeMake.

A mag +17 CCD target in Coma Berenices. Becoming lost in WNW evening twilight.

Pluto.

A 14th mag object located in Sagittarius. Low in the S mid-evening sky.

Asteroids. (Approx magnitude +10.5 or brighter).

Vesta (4).

Lost in the SW evening twilight.

Pallas (12).

Located in Pisces. Mag +8.6 at **Opposition on 11th.**

Herculina (532).

Located in Cetus. Mag +10.8 at **Opposition on 19th.**

Charts and details of selected asteroids are available at:

http://britastro.org/computing/charts_asteroid.html

www.heavens-above.com

See also the *BAA Handbook* and/or monthly periodicals.

Comets.

No “bright” comets at present.

Charts and details of selected comets are available at:

http://britastro.org/computing/charts_comet.html

www.heavens-above.com

See also the *BAA Handbook* and/or monthly periodicals.

Meteor Showers.

The **ε Perseids** are active from 5th to 21st with peak activity on 9th, ZHR = 5.

There are always **Sporadic** events and the chance of a brilliant fireball. The latter should be recorded and reported.

Near Earth Objects.

Please refer to www.spaceweather.com for updates.

Eclipses.

No Lunar or Solar eclipses this month.

2. Deep Sky.

Abbreviations used.

M = Messier object. (Shown in **bold**).

NGC = New General Catalogue. IC = Index Catalogue. (Extension of the NGC).

ds = double star. ts = triple star. ms = multiple star. vs = variable star.

gc = globular cluster. oc = open cluster. pn = planetary nebula.

en = emission nebula. rn = reflection nebula. sg = spiral galaxy.

eg = elliptical galaxy. lg = lenticular galaxy. ir = irregular galaxy.

pg = peculiar galaxy. snr = super nova remnant. ly = light year.

The magnitude of an object, excluding double, triple, multiple and variable stars, is shown in brackets e.g. (6.5).

All magnitudes are + unless otherwise shown.

2.1 Variable Stars of the month.

Beta (β) Persei, Algol. Range 2.2 to 3.4, period 2.7 days. Becoming better placed for observation in the “early hours”. Suitable minima occur on 18^d 21.3^h and 21^d 18.1^h.

Delta (δ) Cephei. Range 3.5 to 4.4, period 5.37 days. The prototype for the Cepheid class of variable stars. Their period-luminosity relationship has led them to being used as “standard candles” in measuring distances to nearby galaxies.

Mu (μ) Cephei. Range 3.7 to 5.0, approximate period 755 days. A semi-regular variable star famous for its striking red colour being fittingly called “Herschel’s Garnet Star”. It is the reddest naked eye star visible from the northern hemisphere. Its colour may show signs of variability.

2.2 Double Stars of the month.

Zeta Aqr. See notes below.

94 Aqr. See notes below.

Alpha^{1&2} Cap. See notes below.

Delta Cep. See notes below.

Struve (Σ) 2816 & 2819 Cep. See notes below.

Struve (Σ) 2840 Cep. See notes below.

Gamma Del. See notes below.

8 Lac. Quadruple system. See notes below.

Eta Peg. See notes below.

Pi^{1&2} Peg. See notes below.

57 Peg. See notes below.

2.3 This Month's Constellations - Double Stars/Star Clusters/Nebulae/Galaxies.

Abbreviations used.

M = Messier object. (Shown in **bold**).

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The magnitude of an object is shown in brackets e.g. (6.5). All magnitudes are + unless otherwise shown.

Aquarius (Aqr).

Beta (β) is a triple star (2.9, 10.8 and 11.4, sep 35.4" and 57.2" from primary).

Zeta (ζ) ds. (4.3,4.5, sep2.1". Probably requires a 6" telescope to split this pair of white stars. Larger apertures may show them as yellowish.

ψ^1 ds. (4.5,10.8, sep 49.6"). Medium power reveals a wide pair of orange stars. centre. Begins to resolve in apertures greater than 10".

94 ds. (5.3,7.2, sep 12"). Fine pale red/pale green.

NGC6981 (**M72**) (9.3) gc. A distant cluster. Rather loose concentration and difficult to resolve.

NGC6994 (**M73**) (8.9). Asterism of 4 stars. Identify for curiosity to add to your Messier collection.

NGC7009 (8.3) pn. The "Saturn Nebula". Fine blue/green oval object in moderate aperture telescopes. Larger apertures reveal the faint antennae and hence the name. The Central star is visible in 16" telescopes.

NGC7089 (**M2**) (6.5) gc. Showpiece object! Bright compressed halo with bright core.

NGC 7293 (6.5) pn. The "Helix Nebula". RA 22h 29.6m Dec -20° 29.6m. It is possibly the nearest planetary nebula to us and hence its large angular size of 770". However it requires a dark site when binoculars/low power on a small telescope should reveal its ghostly outline.

NGC7606 (10.8) sg. Faint elongated halo with brighter centre. Stellar nucleus visible in 12"+ apertures.

Capricornus (Cap).

α^1 (4.2) and α^2 (3.6) form a fine "line of sight" yellow double star visible to the naked eye and a fine view in binoculars. α^1 has two physical companions (9.2 and 13.7). α^2 has a magnitude 11 reddish companion.

β (3.4, 6.2 sep. 205"). ds. Deep yellow primary with white secondary situated in rich field of faint stars.

\omicron (6.1, 6.6 sep. 22") ds. A fine double of blue-white and blue stars.

σ (5.5, 9.0 sep. 56") ds. A fine double. Deep yellow primary with pale blue secondary.

NGC7099 (**M30**) (7.5) gc. Fine object unfortunately not well seen from the UK.

Cepheus (Cep).

Delta (δ) Cephei, 3.5 to 4.4 over a period 5.37 days, is the prototype for the Cepheid class of variable stars which because of their period-luminosity relationship has led them to being used as "standard candles" in measuring distances to nearby galaxies. Pale blue +6.1 companion. Two types of object for the price of one!

Mu (μ) Cephei 3.7 to 5.0 approximate period 755 days is a semi-regular variable star. It is more famous for its striking red colour being fittingly called "Herschel's Garnet Star". It is the reddest naked eye star visible from the northern hemisphere. Its colour may show signs of variability.

Struve (Σ) 2816 ts. (5.7/7.5/7.5, sep 12"/20"). Fine triple with Struve (Σ) 2819 ds (7.4/8.6, sep 13") in same field. All contained in the large, sparse and nebulous open cluster IC 1396!

Struve (Σ) 2840 ds. (5.6/6.4, sep 18"). Very fine greenish/bluish pair.

Open clusters - NGC188 (8.1), NGC6939 (7.8), NGC7510 (7.9), NGC7762(10.0).

Planetary Nebula NGC40 (10.7).

Spiral galaxy NGC6946 (8.9) in the same 1degree field as oc NGC6939.

The faint reflection nebula NGC7023 and emission nebula IC 1396 provide a challenge to the observer. A dark clear sky is essential.

Delphinus (Del).

β (4.0, 4.9 sep. 0.3") ds. Visible with a small telescope using high power.

κ (5,1,11.7 sep. 28.8") ts.

γ (4.5,5.5 sep. 9.6") ds. A fine double. Primary yellow, secondary green.

NGC6891 (10.5) pn. RA 20h 10.5m Dec +16° 55m. Central magnitude +12.4 star.

NGC6905 (11.1) pn.

NGC6934 (8.9) gc.

NGC7006 (10.6) gc.

Draco (Dra).

Alpha (α) Thuban. Although only a third magnitude object, 5000 years ago Thuban held the distinction of being the Pole Star. Its designation alpha is strange as it is only the seventh brightest star in the constellation.

Mu (μ) ds. 5.6/5.7; separation 1.9". Pair of white stars.

Nu (ν) ds. 4.9/4.9; separation 61.9". Pair of bright white stars.

Psi (ψ) ds. 4.9/6.1; separation 30.3". Pair of yellowish stars.

16 & 17 ds. 5.4/5.5; separation 90.3". Pair of bright white stars.

40 & 41 ds. 5.7/6.1; separation 19.3". Pair of pale yellow stars.

Struve (Σ) 2155 ds. 6.8/10.1; separation 9.8". Pale yellow and blue pair.

NGC4236 (9.6) sg. Seen almost edge and low surface brightness makes it a test for moderate apertures.

NGC4319 (11.9) sg. Elongated haze with prominent core. A Quasar, Makarian 205 (14.5) lies 40" to the south.

NGC5866 (**M102**) lg. Elongated object. One of the "missing" Messier objects.

NGC5907 (10.3) sg. Thin needle of light. A fine edge-on galaxy.

NGC6503 (10.2) sg. Distinctly elongated.

NGC6543 (8.1) pn. The "Cats Eye Nebula". Bright small disc with greenish tint. 11th magnitude central star. Draco's "Showpiece object".

Equuleus (Equ).

The second smallest of the 88 constellations. It contains no notable deep sky objects.

Epsilon (ϵ) (6.0, 7.1 sep 10.7") ds. Pale yellow primary with blue companion giving pleasant contrast. The primary is itself a close double approaching periastron in 2021. High power may show it as elongated.

Lambda (λ). (7.4, 7.4 sep 2.8") ds. Matched pair of pale yellow stars.

Struve (Σ) 2786 (7.2, 8.3 sep 2.5") ds. Pair of white stars.

Struve (Σ) 2793 (7.8, 8.5 sep 26.6") ds. Yellow primary with blue companion. The primary is an unresolved double.

NGC7015 (11.5) sg. Faint halo with brightening towards the centre.

Lacerta (Lac).

Struve (Σ) 2876 (7.8, 9.3 sep 11.8") ds. Fine blue and white double.

Struve (Σ) 2894 (6.1, 8.3 sep. 15.6") ds. Yellow primary, blue secondary.

Struve (Σ) 2902 (7.6, 8.5 sep. 6.4") ds. Yellow and white double.

8 Lacertae = Struve (Σ) 2922 (5.7, 6.5 sep. 22.4") Multiple star. Brightest four components are white/blueish white. Has been described as a poor open cluster.

O Struve (Σ) 475 (6.8, 10.8 sep. 15.5") ds. White primary with faint blue companion.

BL Lacertae (14 to 17). Prototype for class of quasi-stellar object (QSO).

Pegasus (Peg).

Eta (η) 2.9/9.9 separation 90.4". Binocular object. Yellow and blue components but telescope require to see colour of secondary. Herschel's "Pendulum Star" - tap telescope gently for the effect.

Pi⁻¹/Pi⁻² (π^{-1}/π^{-2}) 5.6/4.3 separation 7"). Fine binocular object. Pi⁻¹ is a multiple system with 4 companions of 10th to 12th magnitude.

57 Pegasi. 5.1/9.7 separation 32.6". Beautiful orange primary with a blue companion.

NGC7078 (**M15**) (6.3) gc, Superb object!

NGC7331 (9.5) sg. Seen almost edge on.

About half a degree south is the fascinating group of galaxies "Stephan's Quintet". The brightest member of the group is NGC7320 (12.7).

Many happy hours can be spent wandering around "The Square" to locate many moderately bright galaxies. Use a star atlas such as the excellent "Sky Atlas 2000" to plan your journey.

P.V.H.