

“ $\Omega > 1$ ”

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

September 2016.

Forthcoming Meetings.

OUAC Clubnight.

OUAC “Clubnights” resume on Tuesday 6th September.

BAA meetings.

Details of BAA meetings at: www.britastro.org

Other Meetings.

Friday 14th – Saturday 15th October.
The International Astronomy Show.
Stoneleigh Park, Warwickshire.
Full details at www.ukastrohow.com

Saturday 22nd October.
Federation of Astronomical Societies Convention,
University of Birmingham.
Details at: www.fedastro.org.uk

Highlights of the Month.

1st Annular Solar Eclipse. No phase visible from UK.
16th Lunar Penumbral Eclipse. Eclipse at Moonrise. From UK
19th Vesta very close to “The Eskimo Nebula”.
22nd Equinox.
29th Conjunction Moon and Mercury in E dawn sky.
Venus. Very low in SW evening twilight.
Mars. Low in evening sky.
Jupiter. Conjunction on 26th.
Saturn. Low in SW early evening sky.
Uranus. Approaching opposition on October 15th is well placed for observation.
Neptune. At Opposition on 2nd.

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 please contact Sheridan 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.

Equinox (Autumnal for the Northern Hemisphere) 22^d 14^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.

Go to the “spaceweather” website and click the “Flybys” button and follow the instructions to set-up forecasts for your location. Alternatively go to the “Heavens Above” website and set-up for your location. Add to your “favourites”.

Iridium Flares.

These satellites produce short lived “Bright events”. Some are very bright in the order of magnitude -8. Take a wide-field image of with an exposure of 20 – 30 seconds to capture an event. Regular observing of events brighter than -4 will provide useful practice for estimating the magnitude of very bright meteors and Fireballs. Go to the “Heavens Above” website and set-up for your location for predictions.

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 01 ^m	18 ^h 48 ^m
08	05 ^h 25 ^m	11 ^h 59 ^m	18 ^h 32 ^m
15	05 ^h 37 ^m	11 ^h 57 ^m	18 ^h 16 ^m
22	05 ^h 48 ^m	11 ^h 54 ^m	17 ^h 59 ^m
29	06 ^h 00 ^m	11 ^h 52 ^m	17 ^h 43 ^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.

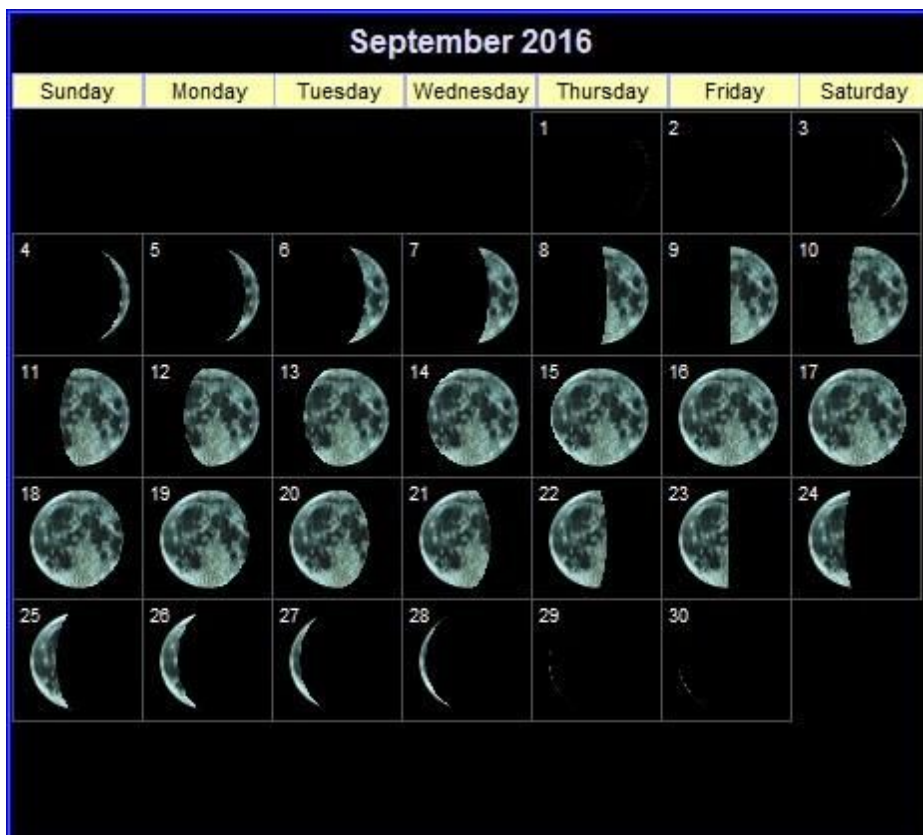
If you have or have access to observe in h-alpha the rewards are much greater.

Keep in touch with the Solar Dynamics Observatory satellite at <http://sdo.gsfc.nasa.gov/>
Add the “Spaceweather” and the “Soho Lasco C3” websites to your “favourite” websites.

The Moon.

Phases:

New	01 ^d 09 ^h 03 ^m	
First quarter	09 ^d 11 ^h 49 ^m	
Full	16 ^d 19 ^h 05 ^m	“Biggish Full Moon”.
Last quarter	23 ^d 09 ^h 56 ^m	



Produced using "LunarPhase Pro".

Apsides:

Apogee	06 ^d 19 ^h	Diameter. 30' 30"	Distance. 405,056km.
Perigee	18 ^d 17 ^h	Diameter. 33' 01"	Distance. 361,893km.

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.

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.

Observing and Imaging opportunities.

Clear September predawn skies provide excellent opportunities to image the waning gibbous and waning crescent Moon.

On 2nd and 3rd try locating the very thin crescent Moon WSW evening twilight **after sunset**.

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

On 29th and 30th try locating the very thin crescent Moon very low in the E dawn skies **before sunrise**.

About 22:00 on 21st the Moon will pass less than ½° S of Aldebaran with the Moon about 10° above the E horizon.

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.

On 15th Neptune is occultated by the Moon. Unfortunately the Moon is almost Full (16th) and disappearance behind the dark limb occurs at approx 18:05 with Neptune and the Moon only 2° above the ESE horizon. Reappearance from behind the bright limb occurs at approx 19:55 when Neptune and the Moon will be about 17° above the horizon. Very difficult to observe!

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

The Planets.

Mercury.

Not well placed for northern observers very low in WSW evening twilight skies at the beginning of the month. Becomes better placed in E dawn skies following Inferior Conjunction.

Inferior Conjunction on 12th.

Greatest Elongation W (18°) on 28th.

Moon close on 2nd and 29th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+1.5	9.7''	0.20	07 ^h 22 ^m	13 ^h 07 ^m	18 ^h 51 ^m
23	+0.7	8.3''	0.26	04 ^h 23 ^m	10 ^h 55 ^m	17 ^h 29 ^m
30	-0.6	6.7''	0.58	04 ^h 18 ^m	10 ^h 49 ^m	17 ^h 19 ^m

Venus.

Although a “bright” object it is still not well placed very low in SW evening twilight.

Moon close on 3rd.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-3.9	11''	0.92	07 ^h 27 ^m	13 ^h 30 ^m	19 ^h 32 ^m
30	-3.9	12''	0.86	09 ^h 00 ^m	13 ^h 47 ^m	18 ^h 33 ^m

Mars.

Low in S to SW evening twilight.

Moon close on 9th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.3	10''	0.85	14 ^h 31 ^m	18 ^h 07 ^m	21 ^h 43 ^m
30	+0.1	8.8''	0.85	14 ^h 01 ^m	17 ^h 32 ^m	21 ^h 03 ^m

The Mars **Curiosity** and **Opportunity** rovers continue their explorations returning excellent data and images.

Mission details and progress are on the appropriate NASA websites.

Jupiter.

Too close to the Sun to be observed.

Conjunction on 26th.

Moon close on 2nd.

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

Saturn.

Low in the S to SW evening twilight skies.

Moon close on 8th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+0.5	17''	13 ^h 42 ^m	17 ^h 51 ^m	22 ^h 01 ^m
30	+0.5	16''	11 ^h 56 ^m	16 ^h 04 ^m	20 ^h 11 ^m

Don't forget to visit the Cassini mission websites at <http://saturn.jpl.nasa.gov> and <http://ciclops.org>

Uranus.

Becoming well placed for observation as it moves towards opposition on 15th October.

Moon close on 18th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.7	3.7''	20 ^h 01 ^m	02 ^h 49 ^m	09 ^h 37 ^m
30	+5.7	3.7''	18 ^h 05 ^m	00 ^h 52 ^m	07 ^h 38 ^m

Neptune.

At opposition on 2nd.

Well placed for nightlong observation.

At mag +13.5 Triton, Neptune's largest satellite, provides a good challenge for 8'' telescopes under favourable sky conditions and when it is at max elongation E or W of Neptune. Use a high magnification - x200 or greater. Use "Stellarium" (Freeware) or similar software to determine favourable E and W elongations.

Occultation by the Moon on 15th. See notes above.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+7.8	2.4''	-	18 ^h 46 ^m	00 ^h 05 ^m	05 ^h 25 ^m
30	+7.8	2.3''	-	16 ^h 51 ^m	22 ^h 09 ^m	03 ^h 26 ^m

Dwarf Planets.

Ceres. Located in Cetus about 5° west of M77. Mag +7.4 brightening to +7.1 as it moves towards opposition on 21st October.

Eris (2003 UB313). A mag +18.7 target located in Cetus.

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

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

Pluto. Mag +14.3 object located in Sagittarius. Low in the S mid-evening sky. A year on from the New Horizons "Fly-by" spectacular images and data continue to be returned.

Asteroids. (Approx magnitude +10.5 or brighter).

- Vesta (4).** A morning object located in Gemini. Mag +7.7 brightening to +7.4 during the month. Passes within 1° of the NGC 2392 “The Eskimo Nebula” from 17th to 21st. Closest 40’ on 19th. Imaging opportunities a must for early risers!!!
- Metis (9).** Located in Aquarius. Mag +9.2 at opposition on 6th.
- Kalliope (22).** Located in Sculptor. Mag +10.5 at opposition on 8th.
- Penelope (201).** Located in Aquarius. Mag +10.6 at opposition on 10th.
- Egeria (13).** Located in Cetus. Mag +10.7 at opposition on 13th.

Charts and details of asteroids one month either side of opposition are available at:

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

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

Comets.

Charts and details of selected comets are available at:

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

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

Meteor Showers.

The **Piscids** are active during September and October. Weak activity from with three peaks on 8th September, ZHR = 10; 21st September, ZHR = 5; 13th October, ZHR = ?

There are always **Sporadic** events and the chance of a brilliant fireball. The latter should be recorded and reported. See earlier note for using Iridium Flares as magnitude comparisons for “Bright Events”.

Near Earth Objects.

Please refer to www.spaceweather.com for updates.

Eclipses.

An Annular Solar Eclipse occurs on 1st September. No part of the eclipse is visible from the UK.

A Penumbral Lunar Eclipse occurs on 16th September. The eclipse is visible at Moonrise from the UK ending at 20:54. The maximum phase of the eclipse is 91%.

Details of these eclipses are in the *Handbook* of the BAA.

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 6^d 22.7^h and 29^d 21.2^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.

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 sep 2.1". 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 "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 "Helix Nebula". RA 22h 29.6m Dec -20o 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 even binoculars/low power 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 (4.0, 4.9 sep. 0.3) ds. Visible with small telescope using high power.

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

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 1 degree 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 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 +16o 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 (ϕ) 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 constallations. 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 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.