

**“ $\Omega > 1$ ”**

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

**August 2021.**

**Forthcoming Meetings.**

**OUAC Clubnight.**

**Due to Covid-19 “Clubnights” are currently suspended.**

**Highlights of the Month.**

**1<sup>st</sup> to 20<sup>th</sup>**      **Perseids Meteor Shower** active.  
**1<sup>st</sup>**                **Mercury at Superior Conjunction.**  
**2<sup>nd</sup>**                **Saturn at Opposition.**  
**12/13<sup>th</sup>**        **Peak of Perseids Meteor Shower.** Very favourable with no interference from Moonlight!  
**20<sup>th</sup>**              **Jupiter at Opposition.**  
**Mars.**            Becoming lost in W evening twilight.  
**Jupiter.**        Low in S late evening through “early hour” sky.  
**Saturn.**         West of Jupiter low in S late evening through “early hour” sky.  
**Uranus.**        Becoming better placed for midnight to dawn observation.  
**Neptune.**      Available for late evening to dawn observation.  
A Great month to locate and observe/image a wide range of Deep-Sky objects!  
See “Deep-Sky” 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 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.**

## Earth.

### Aurora.

Increasing hours of darkness improve the opportunity for observing potential aurora.

Keep tuned to the [www.spaceweather.com](http://www.spaceweather.com) site for updates.

Subscribe (free!) to the UK AuroraWatch website to receive alerts.

### Noctilucent Clouds.

The Noctilucent Cloud season comes to an end in August. Scan the NW sky about an hour after sunset and the NE sky an hour before sunrise for possible displays. The clouds are distinctive by their silver-blue appearance and very photogenic.

### ISS.

Begins a series of morning passes at the end of the month.

Go to the “Heavens Above” website and set-up forecasts for your location for this and other “bright” satellites.

Alternatively go to the “spaceweather” website and click the “Flybys” button and 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	04 <sup>h</sup> 23 <sup>m</sup>	12 <sup>h</sup> 08 <sup>m</sup>	19 <sup>h</sup> 52 <sup>m</sup>
08	04 <sup>h</sup> 35 <sup>m</sup>	12 <sup>h</sup> 07 <sup>m</sup>	19 <sup>h</sup> 39 <sup>m</sup>
15	04 <sup>h</sup> 46 <sup>m</sup>	12 <sup>h</sup> 06 <sup>m</sup>	19 <sup>h</sup> 26 <sup>m</sup>
22	04 <sup>h</sup> 57 <sup>m</sup>	12 <sup>h</sup> 04 <sup>m</sup>	19 <sup>h</sup> 11 <sup>m</sup>
29	05 <sup>h</sup> 09 <sup>m</sup>	12 <sup>h</sup> 02 <sup>m</sup>	18 <sup>h</sup> 56 <sup>m</sup>

Produced using “Starry Night Pro”.

## Sun.

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.

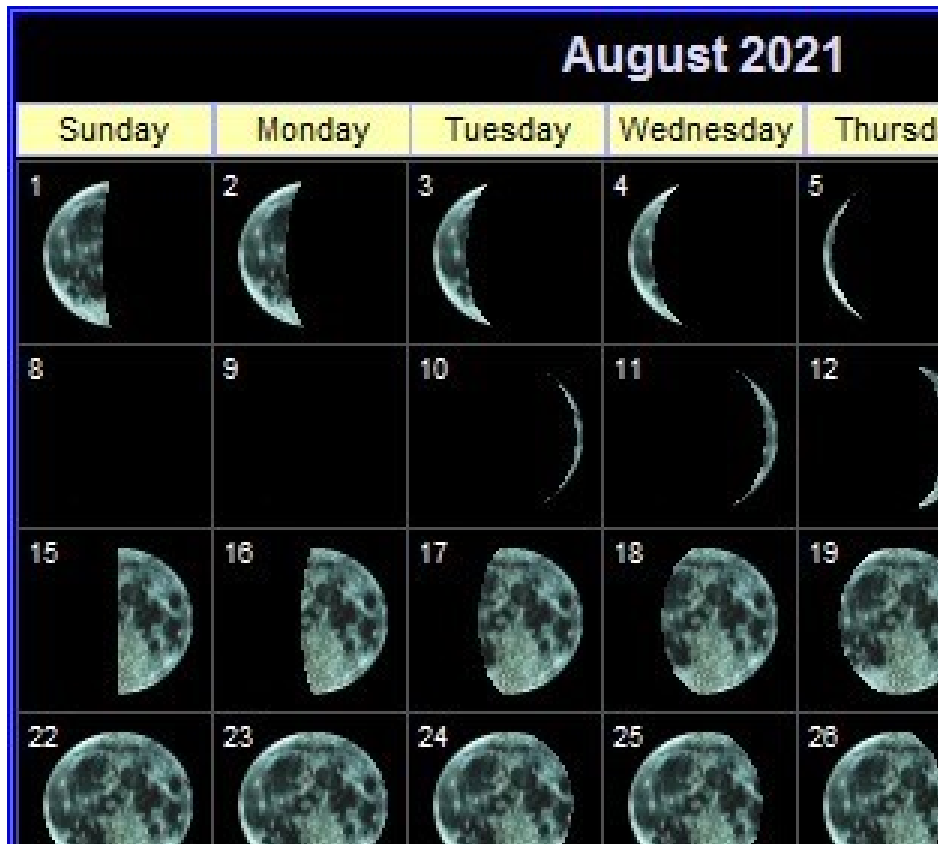
Solar Cycle 25 is gathering pace.

Keep in touch with the Solar Dynamics Observatory satellite at <http://sdo.gsfc.nasa.gov/>

Add the “Spaceweather” and the “Soho Lasco C3” websites to your “favourite” websites.

## Moon.

### Phases:



Produced using "LunarPhase Pro".

New	08 <sup>d</sup> 13 <sup>h</sup> 50 <sup>m</sup>
First quarter	15 <sup>d</sup> 15 <sup>h</sup> 20 <sup>m</sup>
Full	22 <sup>d</sup> 12 <sup>h</sup> 02 <sup>m</sup>
Last quarter	30 <sup>d</sup> 07 <sup>h</sup> 13 <sup>m</sup>

### Apsides:

Apogee	02 <sup>d</sup> 07 <sup>h</sup>	Diameter. 30' 03"	Distance. 404,412km.
Perigee	17 <sup>d</sup> 09 <sup>h</sup>	Diameter. 32' 52"	Distance. 369,127km.
Apogee	30 <sup>d</sup> 02 <sup>h</sup>	Diameter. 30' 04"	Distance. 404,101km.

### Observing and Imaging.

#### For northern observers:

The waxing crescent Moon is becoming less well placed.

The waxing gibbous Moon is not well placed.

The Full Moon is becoming better placed.

The waning gibbous Moon is well placed.

The waning crescent Moon is very well placed.

## **Moon cont.**

### **Observing and Imaging opportunities.**

Observe and image 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.

From the 1<sup>st</sup> to the 7<sup>th</sup> early risers may wish to take the opportunity (if clear!) to observe and image the terminator and limb of the last quarter and waning crescent Moon in the predawn and dawn skies. Libration plays a key part as to what is visible on the limb so plan your observing and/or imaging sessions accordingly.

On 6<sup>th</sup> and 7<sup>th</sup> try locating the very thin crescent Moon very low in the E dawn sky **before sunrise**.

On 9<sup>th</sup> and 10<sup>th</sup> try locating the very thin crescent Moon in the W evening twilight **after sunset**.

## **Lunar Occultations.**

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

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.

## The Planets.

### Mercury.

#### Superior Conjunction on 1<sup>st</sup>.

Watch for its reappearance low in W evening twilight.

0.1° S of Mars on 19<sup>th</sup> but difficult to spot low in W bright twilight.

Moon close on 9<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
07	-1.4	5.0''	0.97	05 <sup>h</sup> 02 <sup>m</sup>	12 <sup>h</sup> 34 <sup>m</sup>	20 <sup>h</sup> 05 <sup>m</sup>
19	-0.4	5.3''	0.86	06 <sup>h</sup> 27 <sup>m</sup>	13 <sup>h</sup> 09 <sup>m</sup>	19 <sup>h</sup> 51 <sup>m</sup>
31	-0.0	5.8''	0.75	07 <sup>h</sup> 30 <sup>m</sup>	13 <sup>h</sup> 27 <sup>m</sup>	19 <sup>h</sup> 24 <sup>m</sup>

### Venus.

Low in W evening twilight.

Moon close on 11<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-4.0	13''	0.82	07 <sup>h</sup> 32 <sup>m</sup>	14 <sup>h</sup> 18 <sup>m</sup>	21 <sup>h</sup> 03 <sup>m</sup>
31	-4.0	15''	0.73	09 <sup>h</sup> 02 <sup>m</sup>	14 <sup>h</sup> 28 <sup>m</sup>	19 <sup>h</sup> 54 <sup>m</sup>

### Mars.

Becoming lost in W evening twilight.

0.1° N of Mercury on 19<sup>th</sup> but difficult to spot very low in W bright twilight.

Moon close on 10<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+1.8	3.7''	0.99	06 <sup>h</sup> 30 <sup>m</sup>	13 <sup>h</sup> 37 <sup>m</sup>	20 <sup>h</sup> 43 <sup>m</sup>
19	+1.8	3.6''	0.99	06 <sup>h</sup> 26 <sup>m</sup>	13 <sup>h</sup> 08 <sup>m</sup>	19 <sup>h</sup> 51 <sup>m</sup>

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

### Jupiter.

#### Opposition on 20<sup>th</sup>.

Prominent object available for nightlong observation and imaging low in SE to SW dark sky.

Excellent target for imaging although current low declination does not favour N Hemisphere observers but an improvement on 2020.

See BAA *Handbook* and/or monthly periodicals for satellite phenomena.

Moon (Full) close on 22<sup>nd</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	-2.8	48''	20 <sup>h</sup> 31 <sup>m</sup>	01 <sup>h</sup> 31 <sup>m</sup>	06 <sup>h</sup> 27 <sup>m</sup>
<b>20</b>	<b>-2.9</b>	<b>49''</b>	<b>19<sup>h</sup> 12<sup>m</sup></b>	<b>00<sup>h</sup> 07<sup>m</sup></b>	<b>04<sup>h</sup> 58<sup>m</sup></b>
31	-2.9	49''	18 <sup>h</sup> 26 <sup>m</sup>	23 <sup>h</sup> 14 <sup>m</sup>	04 <sup>h</sup> 06 <sup>m</sup>

## Saturn.

### Opposition on 2<sup>nd</sup>.

Available for nightlong observation and imaging low in SE to SW dark sky.

Watch for and image the “Seeliger effect” (Ring Brightening) around the days of opposition.

The reasons for the phenomenon are complex involving backscatter of sunlight, polarization and interference effects.

Fine aspect with rings almost wide open.

Excellent target for imaging although current very low declination does not favour N Hemisphere observers.

Moon close on 20<sup>th</sup>.

See BAA *Handbook* and/or monthly periodicals for satellite phenomena.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
02	+0.2	19”	19 <sup>h</sup> 44 <sup>m</sup>	00 <sup>h</sup> 10 <sup>m</sup>	04 <sup>h</sup> 32 <sup>m</sup>
31	+0.3	18”	17 <sup>h</sup> 45 <sup>m</sup>	22 <sup>h</sup> 04 <sup>m</sup>	02 <sup>h</sup> 26 <sup>m</sup>

## Uranus.

An “early hour” object gaining height in the E skies.

Moon close on 1<sup>st</sup> & 28<sup>th</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.8	3.6”	22 <sup>h</sup> 29 <sup>m</sup>	06 <sup>h</sup> 11 <sup>m</sup>	13 <sup>h</sup> 39 <sup>m</sup>
31	+5.7	3.6”	20 <sup>h</sup> 40 <sup>m</sup>	04 <sup>h</sup> 13 <sup>m</sup>	11 <sup>h</sup> 42 <sup>m</sup>

## Neptune.

Becoming well placed for observation as it approaches Opposition on 14<sup>th</sup> September.

Moon close on 24<sup>th</sup>.

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” or similar software to determine suitable elongations.

Use a high magnification of x200 or greater.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+7.8	2.3”	21 <sup>h</sup> 11 <sup>m</sup>	02 <sup>h</sup> 58 <sup>m</sup>	08 <sup>h</sup> 40 <sup>m</sup>
31	+7.8	2.4”	19 <sup>h</sup> 12 <sup>m</sup>	00 <sup>h</sup> 57 <sup>m</sup>	06 <sup>h</sup> 38 <sup>m</sup>

## Dwarf Planets.

**Ceres.** Located in Aquarius. Emerging into the dark predawn sky.

**Eris.** A mag +18.7 target located in Cetus.

**Haumea.** A mag +17.3 CCD target located in Boötes.

**MakeMake.** Not observable.

**Pluto.** A 14<sup>th</sup> mag object located in Sagittarius low in the S to SW early evening sky.

**Asteroids.** (Approx Mag +10.5 or brighter).

<b>Vesta (4).</b>	Lost in W evening twilight.
<b>Sappho (80).</b>	Located in Equuleus. Mag +9.8 at Opposition on 14 <sup>th</sup> .
<b>Ariadne (43).</b>	Located in Aquarius. Mag +9.4 at Opposition on 19 <sup>th</sup> .
<b>Julia (89).</b>	Located in Aquarius. Mag +9.1 at Opposition on 25 <sup>th</sup> .

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

[http://britastro.org/computing/charts\\_asteroid.html](http://britastro.org/computing/charts_asteroid.html)

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](http://britastro.org/computing/charts_comet.html)

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

The “*Heavens above*” website has a very useful section for comets.

## **Meteor Showers.**

The **κ–Cygids** are active from 3<sup>rd</sup> to 25<sup>th</sup> August. Peak activity 14<sup>th</sup>, ZHR = 5.

The **Perseids** are active from 23<sup>rd</sup> July to 20<sup>th</sup> August. Peak activity on 12/13<sup>th</sup>, ZHR = 80+, with **no interference from Moonlight**.

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](http://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 ( $\beta$ ) Persei, Algol.** Range 2.2 to 3.4, period 2.7 days. Becoming better placed for observation in the predawn skies. Minima for “social hours” occur on 6<sup>d</sup> 21.1<sup>h</sup>, 26<sup>d</sup> 22.8<sup>h</sup> and 29<sup>d</sup> 19.6<sup>h</sup>

**Delta ( $\delta$ ) 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 ( $\mu$ ) 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.

**Pi Aql.** See notes below.

**Beta Cyg. Albireo.** See notes below.

**Nu Dra.** See notes below.

**Alpha Her.** See notes below.

**Kappa Her.** See notes below.

**Epsilon Lyr.** See notes below.

**Omicron Oph.** See notes below.

**Alpha Sco.** See notes below.

**Beta Sco.** See notes below.

**Delta SerCp.** See notes below.



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

### Aquila (Aql).

Alpha ( $\alpha$ ) Aql, Altair (0.8)

Pi ( $\pi$ ) Aql. (6.1/6.9, separation 1.4") ds. Pleasing close pair of yellow stars.

11 Aql. (5.2/8.7, separation 17.5") ds. Pale yellow primary, blue secondary.

15 Aql. (5.5/7.2, separation 38.4") ds. Pale yellow primary, yellow secondary.

NGC6709 (6.7) oc. Fine object for small telescopes.

NGC6755 (7.5) oc. Another fine object for small/moderate telescopes.

NGC6756 (10.6) oc.  $\frac{1}{2}^\circ$  SSW of NGC6755 and visible in the same low power field of view.

B142 & B143 – Barnard's E. One of the easiest dark nebulae to observe. Located  $1^\circ$  west of Gamma ( $\gamma$ ) Tarazed (+2.7). Dark transparent sky to observe. Image if possible.

Aquila contains a number of moderately bright planetary nebulae for the "collector".

### Cygnus (Cyg).

$\beta$  Cyg, Albireo (3.2/5.4, separation. 34.3") ds. Marking the head of the swan this splendid double star consists of a yellow-orange star (3.2) and a bluish star (5.4) providing a beautiful contrast. Easily photographed.

61 Cygni (5.3/5.9, separation 28.4") ds. Worth locating as it holds the distinction of being the first star to have its distance, 3.4pc, measured. (Friedrich Bessel in 1838 using parallax).

NGC6826 (9.8) pn. This interesting planetary nebula is located about  $6^\circ$  north of  $\delta$ . Nicknamed the "Blinking Nebula" because when viewed directly only the central star (10.4) is seen, but, with averted vision the shell of the nebula springs into view and the central star appears to dim or disappear. Look back at the star and the shell disappears and the star "returns". Hence "blink".

NGC6871 (5.2) oc. Lies in rich star fields of the Milky Way.

NGC6888 (11.0) snr. Southwest of M29 this is object provides a difficult visual challenge. Dark transparent skies are essential and a nebular filter will help. A good target for CCD imagers.

NGC6910 (7.4) oc. Fine open cluster.

NGC6913 (**M29**) (6.6) oc. Large scattered cluster of stars. Surrounding the M29 area and centred on  $\gamma$  Cyg is the vast emission nebula IC1318 separated by dark dust lanes into five major areas.

NGC6960/6979/6992-5 (7.0) snr. One of the most beautiful deep-sky objects can be found in the "east wing" of Cygnus. This is the "Veil/Filament nebula", a supernova remnant (SNR). Although it shows up well in photographs it can be frustratingly difficult to see visually, partly because of its large angular size. A dark, transparent sky is essential and the use of a UHC filter will pay rich rewards. The western "Filament" NGC6960 is located by the star 52 Cygni which should be identified first. Then sweep eastwards to locate the slightly brighter "Veil" NGC 6992-95. The central "wedge" NGC 6979 is rather faint but patience will reap rewards. Once the "Veil" and "Filament" have been recognized identification without a filter becomes easier although the view is less impressive. An 8" telescope with increasing magnification begins to reveal the delicate "lacy" structure. A small telescope using a low power wide-field eyepiece + filter reveals the complete circular outline which is some  $3^\circ$  across.

NGC7000 (4.5) en. From a dark site the ghostly glow of the "North American Nebula", may just be detected east of Deneb (1.3) by the unaided eye. It shows up well in photographs together with the adjacent IC5067/70, the "Pelican Nebula".

NGC7027 (10.4) en. Strange object identified as a star, then a planetary nebula and currently an emission nebula.

NGC7048 (11.3) pn.

NGC7092 (**M39**) (4.6) oc. Compact cluster of stars.

## **Draco (Dra).**

Alpha ( $\alpha$ ) 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 ( $\mu$ ) ds. 5.6/5.7; separation 1.9". Pair of white stars.

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

Psi ( $\psi$ ) 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 ( $\Sigma$ ) 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. 11<sup>th</sup> magnitude central star. Draco's "Showpiece object".

## **Hercules (Her).**

Alpha ( $\alpha$ ) ds. 3.5/5.4 separation 4.7". Orange and blue. The primary is a semi regular variable 3.1 to 3.9 approx period 90 days.

Gamma ( $\gamma$ ) ds. 3.8/9.8; separation 41.6". Unequally bright pair of yellow stars. Part of a triple system.

Delta ( $\delta$ ) ds. 3.1/8.2 separation 8.9". White primary with bluish-purple secondary. Part of a multiple system.

Kappa ( $\kappa$ ) ds. 5.3/6.5; separation 28.4". Fine pair of yellow stars. Part of a triple system.

Mu ( $\mu$ ) ds. 3.4/10.1 separation 10.1". Yellow primary. Secondary 1" wide pair of red stars. Part of a quad system.

Rho ( $\rho$ ) ds. 4.6/5.6 separation 4.1". White pair. Part of a triple system.

56 Herculis ds. 6.1/10.6 separation 18.1". Fine contrasting orange and blue pair.

100 Herculis ds. 5.9/6.0 separation 14.2". Matched pair of white stars.

NGC6205 (**M13**) (5.9) gc. Arguably one of the outstanding objects in the northern hemisphere. Just visible to the naked eye from dark sites it appears as a fuzzy blob in binoculars. It stands high power well and the outer edges begin to resolve into individual stars in a 4" (100mm) telescope. Increasing aperture brings greater rewards. Lord Rosse and others using the 72" at Birr Castle in the 19th century observed three dark rifts radiating from the centre. Later visual observers confirmed these. However with the advent of photography the rifts disappeared. In the 1950's the late Walter Scott Houston in his "Sky and Telescope" column revised interest in the "Propeller". Responses indicated that visibility of the rifts depended on a careful balance of aperture and magnification. Today a dark sky is probably a key factor.

NGC6207 (11.6) sg. 40" to the NE of M13 and in the same field as a low power widefield eyepiece. This moderately bright galaxy is often overlooked due to the spectacular blaze of the much closer globular cluster.

NGC6210 (9.3) pn. Located about 4° NE of beta ( $\beta$ ) Her.

NGC6229 (9.4) gc. Located about 7° NW of M13 and well worth locating and imaging.

## **Hercules continued.**

NGC6341 (**M92**) (6.5) gc. Slightly fainter and smaller than M13 this globular cluster deserves equal attention. It starts to resolve in a 6" telescope at high power and becomes increasingly impressive with increased aperture.

The area around M13 contains a number of faint galaxies requiring a large (12"+) telescope to explore. Identity of the objects can prove interesting as some are wrongly labelled on some charts and catalogues.

Abell 2151. The Hercules Galaxy Cluster.

## **Lyra (Lyr).**

Alpha ( $\alpha$ ) Lyr Vega (0.04). The fifth brightest star (Sun excluded) in the sky is worth mentioning as due to the effects of precession Vega will hold the distinction of being the pole-star in about 12,000 years time. Infrared studies indicate that it may be surrounded by a disc of planetary forming material.

Delta ( $\delta$ ) ds.4.5/5.5 separation 10.5') ds. A wide naked eye double .Comprises bluish-white and ruddy orange components. One of the finest double stars for small telescopes.

Epsilon ( $\epsilon$ ) ds/ds. 5.5/6.5 separation 2.8"; 5.0/5.5 separation 2.2". The two pairs are separated by 208". The famous "double-double" star. Splitting the image into the four components with a small telescope provides a good indication of seeing conditions.

Struve ( $\Sigma$ ) 2470 + 2474 ds/ds. 6.6/8.6 separation 13.4"; 6.7/8.8 separation 16.2". White and blue-white pair together with a pair of pale yellow stars. Lyra's other "double-double".

13-R Lyrae vs. 3.8 to 5.0, period 46 days. Fine red-orange semi-regular variable star well suited for binoculars and small telescopes.

NGC6702 (12.2) eg. Diffuse halo with slight central brightening. Locate NGC6703 and move 12' NNW.

NGC6703 (11.4) lg. Located in the northern reaches of Lyra.

NGC6710 (12.8) lg. Located on the southern borders of Lyra.

NGC6720 (**M57**) (9.7) pn. The famous "Ring Nebula" appears as a ghostly smoke ring. Visible as a faint out of focus star M57 at low power it is best seen in telescopes responding well to high powers. The use of filters, UHC and/or OIII, improve contrast. The magnitude 14.8 central star is unlikely to be seen without a large telescope.

NGC6779 (**M56**) (8.2) gc. Often overlooked this globular cluster is located about halfway between  $\beta$  and  $\lambda$  on the borders of the rich star fields of the Milky Way.

NGC6791 (9.5) oc. Requires medium to large telescopes to begin to resolve into individual stars the brightest of which are 13th magnitude.

## **Ophiuchus (Oph).**

Barnard's Star. (9.5). Located at R.A. 17h 58m Dec. +04° 41m. A red dwarf with the largest proper motion of any star in the sky as seen from the Earth.

Lambda ( $\lambda$ ) ds. 4.2/5.2 separation 1.5". White and pale yellow pair. Part of a quadruple system.

Omicron ( $\omicron$ ) ds. 5.4/6.9 separation 10.3". Fine contrasting pair of orange and yellow stars.

Rho ( $\rho$ ) ds.5.3/6.0 separation 3.1". Close pair of blue stars.

NGC6171 (**M107**) (8.1) gc. Granular texture with brighter core in small apertures.

NGC6218 (**M12**) (6.6) gc. Outer reaches resolved in medium apertures showing with a small core.

NGC6254 (**M10**) (6.6) gc. Granular halo with bright core. Outer reaches resolved in small apertures.

NGC6266 (**M62**) (6.7) gc. Bright off centre core with fainter halo.

NGC6273 (**M19**) (7.1) gc. Small bright globular. Outer reaches begin to resolve in small apertures.

### **Ophiuchus continued.**

NGC6333 (**M9**) (7.9) gc. Large bright core. Nearby is the dark nebula Barnard 64.

NGC6356 (8.4) gc. Requires large apertures to resolve.

NGC6402 (**M14**) (7.6) gc. Requires a large aperture to resolve. The most distant of the Messier gc's.

NGC6572 (8.1) pn. Fine bright greenish object.

NGC6633 (4.6) oc. Large, bright but loose open cluster well suited for small aperture.

### **Sagitta (Sge).**

NGC6838 (**M71**) (8.3) gc. Almost lost in the foreground stars of the Milky Way. A relatively poor globular which for a time was considered to be a rich open cluster. It is a young cluster containing "metal" rich stars.

### **Sagittarius (Sgr).**

Sagittarius contains many fine objects unfortunately not well seen from our latitudes. The Galaxy's centre lies in this direction obscured by intervening stars, gas and dust.

**M24** (4.5) originally thought to be an open cluster is now classed as a star-cloud.

NGC6494 (**M23**) (5.5) oc

NGC6514 (**M20**) (6.3) en & rn. The "Trifid Nebula"

NGC6523 (**M8**) (5.8) en. the "Lagoon Nebula".

NGC6531 (**M21**) (5.9) oc,

NGC6618 (**M17**) (6.0) the "Omega Nebula",

NGC6626 (**M28**) (6.9) gc,

NGC6637 (**M69**) (7.7) gc

NGC6656 (**M22**) (5.1) gc

NGC6681 (**M70**) (8.1) gc.

NGC6715 (**M54**) (7.7) gc,

NGC6809 (**M55**) (6.9) gc,

NGC6864 (**M75**) (8.6) gc.

IC4725 (**M25**) (4.6) oc.

### **Scorpius (Sco).**

Alpha ( $\alpha$ ) Antares ds. 1.2/5.4 separation 2.9". Red-orange primary with fainter greenish companion. Difficult to split requiring very good seeing conditions.

Beta ( $\beta$ ) ds. 2.6/4.9 separation 13.6". Blue-white primary with pale blue companion. Fine object for small telescopes.

Nu ( $\nu$ ) 4.3/6.8 separation 2.3" ds. Pair of white stars requiring good seeing conditions to split.

NGC6093 (**M80**) (7.2) gc. Fine object unfortunately not well seen from the UK.

NGC6121 (**M4**) (5.9) Fine globular unfortunately not well seen from the UK.

NGC6405 (**M6**) (4.2) oc. Unfortunately it briefly creeps above the southern horizon making it very difficult to observe from the UK.

NGC6475 (**M7**) (3.3) oc. Another fine object that unfortunately briefly creeps above the southern horizon making it very difficult to observe from the UK.

### **Scutum (Sct).**

Contains a brighter part of the Milky Way known as the "Scutum Star-cloud".

NGC6705 (**M11**) (5.8) oc. The "Wild Duck" is a fine sight in telescopes and is easily located in binoculars.

NGC6694 (M26) (8.0) oc. Fainter than M11 but easily located.

### **Serpens Caput (SerCp).**

Beta ( $\beta$ ) ds. 3.7/9.9; separation 30.6". Pale yellow primary with blue secondary.

Delta ( $\delta$ ) ds. 4.2/5.2; separation 4.4". Fine pair of yellow stars.

5 Serpentis ds. 5.1/10.1; separation 11.2". Yellow primary with reddish secondary. Situated in same field as M5.

NGC5904 (M5) (5.8) gc. Splendid object which stands high magnification well.

NGC5921 (10.8) sg. Faint oval halo with bright core.

### **Serpens Cauda (SerCd).**

Nu ( $\nu$ ) ds. 4.3/8.3 separation 46.3". Wide pair of green and pale blue stars.

Struve ( $\Sigma$ ) 2303 ds. 6.6/9.1 separation 2.1". Good optical test for small instruments.

Theta ( $\theta$ ) ds. 4.6/5.0 separation 22.3". Bluish-white pair of stars suitable for binoculars.

NGC6611 (M16) (6.0) oc & en. Bordering naked eye visibility this nebula and its associated star cluster forms one of the most well known HST images - "Pillars of Creation".

### **Vulpecula (Vul).**

Collinder 399 (3.6) oc. Aptly named the "Coat-hanger" this cluster is visible to the naked eye as a hazy patch. A fine site in binoculars.

NGC6853 (M27) (7.6) pn. The "Dumbbell Nebula", is easily seen in binoculars. The "dumbbell" shape becomes more recognizable in telescopes with increasing magnification. In common with other planetary nebulae it responds well to filters especially the OIII type.

PVH.