

# “ $\Omega > 1$ ”

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

**February 2023.**

### 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” please advise before the meeting starts.

### Highlights of the Month.

<b>1<sup>st</sup></b>	<b>Comet C/2022 E3 ZTF</b> closest to the Earth.
<b>14<sup>th</sup></b>	<b>“Valentine’s Day”.</b>
<b>15<sup>th</sup></b>	<b>Venus 0.01° south of Neptune.</b>
<b>16<sup>th</sup></b>	<b>Saturn in Conjunction with the Sun.</b>
<b>21<sup>st</sup> - 28<sup>th</sup>.</b>	<b>Jupiter closes in on Venus with Moon close on 22<sup>nd</sup>.</b>
<b>Mercury.</b>	Low in the SE dawn skies in the first week of the month.
<b>Venus.</b>	Brilliant object low in the SW early evening sky.
<b>Mars.</b>	Well placed for evening observation.
<b>Jupiter.</b>	Sinking into the SW early evening sky.
<b>Saturn</b>	Not observable.
<b>Uranus.</b>	Well placed for evening observation.
<b>Neptune.</b>	Sinking into the SW early evening sky.
<b>Sirius and “The Pup”.</b>	See notes for Double Stars below.
<b>Asteroids.</b>	See notes below.
<b>Comets.</b>	See notes below.
<b>Meteor Showers.</b>	See notes below.

### Forthcoming Meetings.

#### OUAC.

The next OUAC “Clubnights” are on Tuesday 7<sup>th</sup> February and Tuesday 7<sup>th</sup> March.

### Software.

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

# 1. The Solar system.

**Note all times shown are UT.**

## Earth.

### Aurora.

Long 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.

### Artificial Satellites.

For details of “passes” of the ISS and other “Bright” satellites go to the “**Heavens Above**” website and set-up for forecasts for your location.  
Alternatively go to the “**spaceweather**” website and click the “Flybys” button and set-up for forecasts for your location.  
Add the above to your “favourite” websites.

## Sunrise and Sunset.

### Bedford.

**Latitude 52° 6.9’N Longitude 0° 28.1’W**

Date.	Rise.	Transit.	Set.
01	07 <sup>h</sup> 42 <sup>m</sup>	12 <sup>h</sup> 16 <sup>m</sup>	16 <sup>h</sup> 49 <sup>m</sup>
08	07 <sup>h</sup> 31 <sup>m</sup>	12 <sup>h</sup> 16 <sup>m</sup>	17 <sup>h</sup> 02 <sup>m</sup>
15	07 <sup>h</sup> 18 <sup>m</sup>	12 <sup>h</sup> 16 <sup>m</sup>	17 <sup>h</sup> 15 <sup>m</sup>
22	07 <sup>h</sup> 04 <sup>m</sup>	12 <sup>h</sup> 16 <sup>m</sup>	17 <sup>h</sup> 28 <sup>m</sup>
28	06 <sup>h</sup> 51 <sup>m</sup>	12 <sup>h</sup> 15 <sup>m</sup>	17 <sup>h</sup> 39 <sup>m</sup>

## The 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.** Ongoing sunspot activity.

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:



Produced using LunarPhase Pro.

**Full Moon** 05 18<sup>h</sup> 29<sup>m</sup>  
**Last Quarter** 13<sup>d</sup> 16<sup>h</sup> 01<sup>m</sup>  
**New** 20<sup>d</sup> 07<sup>h</sup> 06<sup>m</sup>  
**First Quarter** 27<sup>d</sup> 08<sup>h</sup> 06<sup>m</sup>

### Apsides:

**Apogee** 04<sup>d</sup> 08<sup>h</sup> Diameter. 29' 54" Distance. 406,476km.  
**Perigee** 19<sup>d</sup> 09<sup>h</sup> Diameter. 33' 51" Distance. 358,267km.

### Opportunities for Observing and Imaging.

#### For Northern Observers:

- The waxing crescent Moon is well placed.
- The waxing gibbous Moon is very well placed.
- The Full Moon is well placed.
- The waning gibbous Moon is well placed.
- The waning crescent Moon is less well placed.

## **The Moon continued.**

On 18<sup>th</sup> and 19<sup>th</sup> try locating the very thin crescent Moon very low in the ESE dawn skies **before sunrise.**

On 21<sup>st</sup> and 22<sup>nd</sup> try locating the very thin crescent Moon in the SW evening twilight **after sunset.**

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 & Telescope's* "Lunar 100 Card" is another good starting point. If you are starting out on photography and/or imaging the Moon provides an excellent target.

## **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.

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

## The Planets.

### Mercury.

Low in the SE dawn sky in the first week of the month.

**Take great care if sweeping with binoculars before sunrise!**

Moon close on 18<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.1	6.5''	0.66	06 <sup>h</sup> 30 <sup>m</sup>	10 <sup>h</sup> 42 <sup>m</sup>	14 <sup>h</sup> 33 <sup>m</sup>
15	-0.2	5.5''	0.83	06 <sup>h</sup> 42 <sup>m</sup>	10 <sup>h</sup> 53 <sup>m</sup>	15 <sup>h</sup> 07 <sup>m</sup>

### Venus.

Brilliant object gaining height in the early evening SW sky.

**Close Conjunction (0.01°) with the Neptune on 15<sup>th</sup>.**

Closes in on Jupiter during the last week of February. Closest (0.5°) on 2<sup>nd</sup> March.

**Moon close on 22<sup>nd</sup>. Imaging opportunity with Jupiter!**

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-3.9	11''	0.91	08 <sup>h</sup> 43 <sup>m</sup>	13 <sup>h</sup> 53 <sup>m</sup>	19 <sup>h</sup> 02 <sup>m</sup>
28	-4.0	12''	0.86	07 <sup>h</sup> 47 <sup>m</sup>	14 <sup>h</sup> 08 <sup>m</sup>	20 <sup>h</sup> 30 <sup>m</sup>

### Mars.

Well placed for evening observation. Apparent diameter decreasing with decrease in magnitude as Earth to Mars distance increases.

Moon close on 28<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.2	11''	0.26	11 <sup>h</sup> 20 <sup>m</sup>	19 <sup>h</sup> 48 <sup>m</sup>	04 <sup>h</sup> 20 <sup>m</sup>
28	+0.4	8.2''	0.90	10 <sup>h</sup> 05 <sup>m</sup>	18 <sup>h</sup> 40 <sup>m</sup>	03 <sup>h</sup> 17 <sup>m</sup>

### Jupiter.

An early evening object in SW sky.

Closes in on Venus during the last week of February. Closest (0.5°) on 2<sup>nd</sup> March.

**Moon close on 22<sup>nd</sup>. Imaging opportunity with Venus!**

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	-2.2	36''	09 <sup>h</sup> 30 <sup>m</sup>	15 <sup>h</sup> 40 <sup>m</sup>	21 <sup>h</sup> 50 <sup>m</sup>
28	-2.1	34''	07 <sup>h</sup> 53 <sup>m</sup>	14 <sup>h</sup> 14 <sup>m</sup>	20 <sup>h</sup> 36 <sup>m</sup>

See BAA *Handbook* and website: [http://britastro.org/computing/applets\\_jupiter.html](http://britastro.org/computing/applets_jupiter.html) (note underscore between applets and Jupiter) and/or monthly periodicals for satellite phenomena.

### Saturn.

**Conjunction with Sun on 16<sup>th</sup>.** Not observable.

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

## Uranus.

Well placed for evening observation.  
Moon close on 25<sup>th</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.7	3.6''	10 <sup>h</sup> 36 <sup>m</sup>	18 <sup>h</sup> 06 <sup>m</sup>	01 <sup>h</sup> 39 <sup>m</sup>
28	+5.8	3.5''	08 <sup>h</sup> 51 <sup>m</sup>	16 <sup>h</sup> 21 <sup>m</sup>	23 <sup>h</sup> 52 <sup>m</sup>

## Neptune.

An early evening object SW sky.  
**Close Conjunction (0.01°) with the Venus on 15<sup>th</sup>.**  
Moon close on 21<sup>st</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+7.9	2.2''	09 <sup>h</sup> 10 <sup>m</sup>	14 <sup>h</sup> 54 <sup>m</sup>	20 <sup>h</sup> 38 <sup>m</sup>
28	+8.0	2.2''	07 <sup>h</sup> 25 <sup>m</sup>	13 <sup>h</sup> 11 <sup>m</sup>	18 <sup>h</sup> 57 <sup>m</sup>

## Dwarf Planets.

- Ceres.** An 8<sup>th</sup> mag object in Virgo.  
**Eris.** A CCD target object in Cetus.  
**Haumea.** A CCD target located in Bootes.  
**MakeMake.** A CCD target in Coma Berenices.  
**Pluto.** A 14<sup>th</sup> object located in Sagittarius emerging into the SE dawn sky at the end of the month.

## Asteroids. (Approx mag +10.5 or brighter).

- Vesta (4).** An 8<sup>th</sup> mag object moving from Pisces into Cetus.  
**Pallas (2).** A 7<sup>th</sup> mag object located in Canis Major. **Worth following!**  
**Zelinda (654).** Located in Hydra. Mag +10.4 at Opposition on 11<sup>th</sup>.  
**Harmonia (40).** Located in Leo. Mag +10.1 at Opposition on 27<sup>th</sup>.

The "Heavens above" website gives very useful details of asteroids currently available for Observation and imaging.

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) (underscore between charts and asteroid).  
(charts\_asteroids)

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

## Comets.

**C/2022 E3 (ZTF).** About mag +5 when closest to the Earth on 1<sup>st</sup>. An easy object in binoculars and may just be a naked eye object from a dark site. It then starts to fade as it recedes from Earth passing 1.5° west of Capella on 5/6<sup>th</sup> and 1.5° east of Aldebaran on 14<sup>th</sup>/15<sup>th</sup>.

The "Heavens above" website gives very useful details of comets currently available for Observation and imaging.

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.

## **Meteor Showers.**

No major Showers this month.

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. The 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.

Favourable minima at “social hours” occur on 17<sup>d</sup> 00.1<sup>h</sup>, 19<sup>d</sup> 20.9<sup>h</sup> and 22<sup>d</sup> 17.7<sup>h</sup>.

**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.

**Omicron (ο) Ceti Mira.** Range +3.4 to +9.3, approximate period 322 days. The classic long period variable star. Brightening towards maximum in June.

**U Ori.** Range +6.3 to +12.0, approximate period 368 days.

Well placed for long hours of observation/imaging. Brightening towards max (+6.3) in May.

### 2.2 Double Stars of the month.

**Alpha CMa Sirius.** The separation between Sirius and its white dwarf companion “The Pup” is approaching maximum in 2023. From dark sites and “good seeing” it is possible to spot “The Pup” in moderate aperture telescopes (6” plus). Imaging is somewhat easier. A challenge for both! Excellent article in February issue of *Sky at Night* magazine.

**h (Herschel) 3945 CMa.** See notes below.

**Alpha Gem (Castor).** See notes below.

**Delta Gem.** See notes below.

**Gamma Lep.** See notes below.

**12 Lyn.** See notes below.

**38 Lyn.** See notes below.

**Beta Mon.** See notes below.

**k Mon.** (Not to be confused with κ). See notes below.

**Beta Ori (Rigel).** See notes below.

**Sigma Ori.** See notes below.

**Theta-1 Ori (The Trapezeium).** See notes below.

**k Pup.** (Not to be confused with κ). See notes below.



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

### **Auriga (Aur).**

NGC1960 (**M36**) (6.0) oc. Large bright grouping. In same low power field as M38.

NGC2099 (**M37**) (5.6) oc. Richest and brightest of the three Messier star clusters in Auriga. At 150 stars brighter than 12th magnitude.

NGC1912 (**M38**) (6.4) oc. Larger than M36. Many bright stars arranged in pairs. The above are excellent objects for photography. Guided exposures of a few minutes will be necessary. CCD images require much shorter exposures.

NGC1664 (7.6) oc. Fine cluster on the borders of Auriga and Perseus.

NGC1778 (7.7) oc. A 6" telescope will show about 20 stars. Larger apertures will reveal more.

NGC1857 (7.0) oc. Hazy patch surrounding an orange 7th magnitude star which interferes with viewing the fainter stars.

NGC1893 (7.5) oc. Fine, though rather sparse cluster. 8"+ telescopes under dark skies may begin to reveal the pale light of the brightest part of the emission nebula IC410 which pervades the star cluster.

NGC1907 (8.2) oc. This small cluster lies just west of M38 appearing as a small smudge of light.

NGC1931 (11.3) en. An 8" telescopes from dark skies should reveal this small pea-nut shaped emission nebula.

NGC 2192 (10.9) oc. Not an easy object probably requiring a 6" telescope to locate and 10"+ to resolve.

NGC2281 (5.4) oc. Handful of stars often overlooked.

IC405 en (6v) The "Flaming Star Nebula". Illuminated by the star AE Aur which is a "runaway star" whose path can be traced back to Orion. At present the star is passing by/through the normally dark dust and gas cloud of IC405 and thus illuminating it. In the future as AE moves away the nebula will again become dark.

### **Canis Major (CMa).**

Alpha ( $\alpha$ ) **Sirius** (-1.5). The brightest star in the sky the Sun and supernova and nova excepted. Sirius has a fascinating magnitude 8.5 companion discovered in 1862 by Alvan G. Clark when testing a new 18.5 inch refractor, nicknamed "The Pup", and subsequently identified as an object now called a white dwarf. These stars are the final stages of Sun-like stars that have exhausted their supply of nuclear fuel and have collapsed to form a dense object which will gradually cool and fade from view to become a cosmic cinder. More massive stars follow a different path by "exploding" in an event called a supernova that leave behind even more dense compact objects - neutron stars or black holes. Because of its close separation and glare from Sirius the "Pup" provides a challenge for keen amateurs under favourable conditions.

Pi ( $\pi$ ) ds. (4.7/9.7. sep. 11.6"). Yellow-white primary with bluish secondary.

Mu ( $\mu$ ) ds. (5.3/8.6 sep. 3.0"). Striking contrast of deep yellow primary with blue secondary.

Tau ( $\tau$ ) ds. (4.4/10.5 sep. 8.2"). Pale yellow primary with pale blue secondary. Part of a multiple system set in a rich field of stars.

17 ts. (5.8/9.3, sep. 44.4"). White primary with two orangish companions. Part of a multiple system.

Herschel (h) 3945 ds. (4.8/6.8, sep. 26.6"). Superb Orange and blue pair in the same league as Albireo in Cygnus and Almach in Andromeda.!

NGC2287 (**M41**) +4.5 oc. A fine open cluster located about 5° south of Sirius. It would be easily visible to the naked eye if it reached greater altitude in our skies.

NGC 2345 (7.7) oc. Large loose irregular cluster.

NGC 2354 (6.5) oc. Loose irregular cluster set in a rich star field.

### **Canis Major continued.**

NGC 2362 (4.1) oc. Rich compact cluster surrounding Tau..

NGC 2383 (8.4) oc.

NGC 2207(10.7) sg. Elongated with bright core. Interacting with IC2163 visible as a faint smudge on E edge of 2207.

NGC 2217(10.4) sg. Fairly round with slightly brighter centre situated in a rich star field.

### **Canis Minor (CMi).**

Alpha ( $\alpha$ ) **Procyon** (0.4) has a fascinating companion (12.9) which is white dwarf star. Spotting the companion presents amateurs with a difficult challenge under favourable conditions.

Struve ( $\Sigma$ ) 1103 ds. (7.7/9.2, sep. 4.4"). Pale yellow primary with pale blue companion.

Struve ( $\Sigma$ ) 1149 ds. (7.9/9.6, sep. 21.7"). Fine pair of pale yellow and pale blue stars.

NGC2470 sg. (12.7). Elongated with bright core.

Canis Major.

### **Gemini (Gem).**

Alpha ( $\alpha$ ) **Castor** ms. 1.9/2.9 sep 4.0". Close visual pair. However each of these is a spectroscopic binary. A more distant ninth magnitude star (red) forms part of an eclipsing binary system. A fascinating family!

Delta ( $\delta$ ) **Wasat** ds. 3.5/8.2 sep 5.8". Yellow primary with bluish secondary.

Kappa ( $\kappa$ ) ds. 3.6/8.1 sep 7.1". Orange-yellow primary with bluish companion.

Lambda ( $\lambda$ ) ds. 3.6/10.7 sep 9.6". Blue-white primary with bluish companion.

$\Sigma$ 1108 (Struve) ds. 6.6/8.3 sep 11.5". Yellow primary with bluish companion.

**M35** (5.1) oc. Just visible to the naked eye from dark sites. It is a superb object in telescopes. On its western edge lies the more distant open star cluster IC2158.

NGC2129 (10.2) oc. Located about a degree SW of IC2158.

NGC2266 (9.5) oc. Located about two degrees north of  $\epsilon$  Gem.

NGC2392 (10.5) pn. The "Eskimo nebula" is a fine planetary nebula located about two degrees SE of  $\delta$ . The nickname is derived from the appearance of a face surrounded by the hood of a parka.

NGC2420 (8.3) oc. Located about two degrees east of the "Eskimo".

Complete this deep-sky tour of Gemini by locating the open star clusters NGC2355 (9.7) and NGC2395 (7.1).

### **Lepus (Lep).**

Lying beneath Orion Lepus is easily recognized by a quadrilateral of four third magnitude stars and contains a variety of deep-sky objects including one Messier object.

Alpha ( $\alpha$ ) ds; (2.6,11.1; sep. 35.8").

Beta ( $\beta$ ) ds; (3.0/7.5; sep. 2.3").

Gamma ( $\gamma$ ) ds. (3.7/6.3, sep. 96.3"). Fine yellow and pale orange pair.

Kappa ( $\kappa$ ) ds; (4.5/7.4; sep. 2.6"). White and blue companions.

Iota ( $\iota$ ) ds; (4.5/10.8; sep. 12.7").

NGC1974 sg (11.8). Seen almost edge on.

NGC1904 (**M79**) gc (8.0). A fine globular cluster visible as a fuzzy spot in binoculars. Outer edges begin to resolve in 12" (30cm) telescopes.

IC418 pn (10.7). Very small but bright. Central 10.7 mag star surrounded by pale ring. Use a UHC or OIII filter for best results.

## Lynx (Lyn).

5. ds. 5.3/9.8; sep 31.4". Fine yellow and blue pair.

12. ts. 5.4/6.0/7.1; sep 1.7", 9". Fine trio of white stars.

19. ds. 5.6/6.5; sep 14.8". Fine pale yellow and pale blue pair forming part of a quadruple system.

The C (10.9) component lies 74" to the WNW of B. The D component (8.9) lies 215" N of AB.

38. ds. 3.9/6.6; sep 2.7". Fine contrasting white and "rust" coloured pair.

NGC2419 (10.5) gc. Located about 7° north of Castor ( $\alpha$  Gemini) this globular cluster at first appears rather uninspiring. At a distance of 300,000 light years it is one of the most distant objects of its class. Because of its great distance, almost twice that of the Large Magellanic Cloud, it was dubbed the "Intergalactic Tramp" by the eminent astronomer Harlow Shapley.

NGC2683 (9.7) sg. A fine nearly edge-on spiral galaxy located on the borders of Lynx and Cancer about 5° west of  $\alpha$  Lyn.

## Monoceros (Mon).

This faint and rather indistinct constellation is located between Orion and Canis Minor.

Beta ( $\beta$ ) ts. 4.7/5.2/6.1 Sep. AB = 7.3", sep BC = 2.8". Striking triple of bluish white stars.

Epsilon ( $\epsilon$ ) ts. 4.5/6.5 sep. 13.4". Close pair of pale yellow stars. The third mag 12.7 bluish white member is visible in 12"+ apertures.

NGC2244 oc (4.8). Fine open star cluster surrounded by NGC2237-9 "The Rosette Nebula" which is best seen using a UHC filter. Shows well in photographs.

NGC2261 en (10v). "Hubble's Variable Nebula". Located about 2° southwest of NGC2264 this a fascinating object and well worth monitoring for changes in shape and brightness due to the enveloped variable star R Monocerotis. The triangular wedge appears is almost comet like. Detailed star chart available for telescope owners.

NGC2264 oc + en (4.0) The "Christmas Tree Cluster". A fine open cluster with associated nebula that includes the "Cone Nebula".

NGC2323 (M50) oc (5.9). Superb open cluster.

There are many other open clusters in this area of the Milky Way - NGC's 2215(8.4), 2286(7.5), 2301(6.0), 2335(7.2), 2343(6.7), 2353(7.1) and 2506(7.6).

## Orion (Ori).

This constellation dominates the winter skies and because it is so easily recognized forms one of the "key constellations" for finding other winter groupings.

Orion's two brightest stars provide a marked contrast. Betelgeuse is distinctly orange in colour. It is a red giant star entering old age. Rigel is a brilliant blue/white star indicating the exuberance of youth. Betelgeuse is slightly variable in brightness, range 0.1 - 0.9 and bears the designation  $\alpha$  (alpha) indicating that it was brighter than Rigel,  $\beta$  (beta) (0.1), when stars were given these designations. Rigel is now the brighter of the two so either early magnitude estimates were wrong or Betelgeuse has dimmed slightly.

Beta **Rigel** ( $\beta$ ) ds. 0.1/6.8 sep. 9.5". Brilliant bluish white primary with much fainter bluish secondary.

Eta ( $\eta$ ) ds. 3.6/5.0 sep. 1.5". Close pair of white stars.

Delta ( $\delta$ ) ds. 2.0/6.9 sep. 52.6". Blue white primary with pale blue secondary.

Lambda ( $\lambda$ ) ds. 3.5/5.6 sep.4.4". White stars. Part of a quadruple system.

Theta-1 ( $\theta$ ) ms. "**The Trapezium**". AB: 6.7/7.9 sep. 8.8"; CD: 5.1/6.7 sep. 13.4". Superb object!

Iota ( $\iota$ ) ts. 2.8/7.3 sep. 11.3". White primary with pale blue secondary. The third reddish 11<sup>th</sup> magnitude component is located 50" away.

Sigma ( $\sigma$ ) ms. 4.0/10.3 sep. 11.4

## Orion continued.

Zeta ( $\zeta$ ) ds. 1.9/4.0 sep. 2.3". Bluish white stars. Part of a triple system.

NGC1976 (**M42**) (en). One of the most famous objects in the sky. Marking Orion's sword the "Great Orion Nebula" is visible to the naked eye as a faint misty patch. A pair of binoculars or small telescope will begin to reveal detail. Increasing aperture and low power bring increasing rewards for the visual observer. Embedded in the nebula is **Theta ( $\theta^1$ ) Ori**. A group of four young stars, mags 5.4,6.3, 6.8 and 7.0, aptly called "The Trapezium". The whole nebula is a stellar nursery with spectacular images being obtained from large Earth based telescopes and the Hubble Space Telescope. M42 is an ideal target for photography.

NGC1982 (**M43**) (en). A small patch of nebulosity on the northern edge of M42.

NGC2024 (en), nicknamed "the Flame Nebula", surrounds  $\zeta$  Ori.

IC434 en is a strip of nebulosity just south of  $\zeta$ . The famous "Horse's Head Nebula" (Barnard 33) is a small dark intrusion seen dramatically in photographs. It provides one of the biggest challenges to visual observers requiring very dark transparent skies. Responds well to a H-beta nebula filter.

NGC2068 (**M78**) (8.0)(rn) is a small patch of nebulosity about two degrees NNE of  $\zeta$ .

NGC2112 (9.1)(oc) is an open star cluster about two degrees east of M78.

Other open clusters worth locating are NGC2186 (8.7), NGC2169 (5.9) and NGC2175 (6.8) which superimposes a small patch of nebulosity NGC2174.

Long exposure photographs reveal a long arc of nebulosity curving up the east side Orion. This is called "Barnard's Loop" which is extremely difficult to discern visually almost regardless of aperture. Remarkably it has been seen with the naked eye (initially by accident!) from dark sites using O III or UHC filters. The "Loop" is a faint ring of hot gas some  $14^\circ$  by  $10^\circ$  with the western part of the ring being less distinct. The "ring" may be due to radiation pressure from the hot young stars in the region of Orion's belt/sword acting on interstellar material. A less favoured school of thought is that it may be a supernova remnant.

## Puppis (Pup).

The Milky Way passes through this faint constellation presenting fine star fields and many open star clusters including three Messier objects for your collection.

Sigma ( $\sigma$ ) ds. (3.3/9.4, sep. 22.3"). Fine unequal pair of orange and yellow stars.

Herschel (h) 4038 ds. (5.5/8.5, sep. 27.0"). Pale yellow primary with reddish secondary.

Herschel (h) 4046 ds. (6.0/8.4, sep. 22.1"). Gold primary with white secondary set a rich star field.

k ds. (4.5/4.7, sep. 9.9"). Fine pair of blue-white stars. (Not to be confused with  $\kappa$ ).

NGC2437 (**M46**) (6.1) oc. "Contains" the Planetary Nebula NGC2438 (10.5). It is a foreground object and not a genuine member of the cluster.

NGC2422 (**M47**) (4.4) oc. Large and bright. A fine object not best seen from the UK..

NGC2447(**M93**) (6.2) oc. Another fine object not well seen from the UK.

Setting limits of magnitude 10.5 and declination  $-25^\circ$  try locating the following open clusters: NGC's 2421(8.3), 2423(6.7), 2432(10.2), 2455(10.2), 2479(9.6), 2482(7.3), 2509(9.3), 2539(6.5) and Mel 71(7.1).

P.V.H.