

“ $\Omega > 1$ ”

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

February 2016.

Forthcoming Meetings.

OUAC.

The next “Clubnight” is on Tuesday 2nd February.

BAA.

Full details of BAA meetings at: www.britastro.org

Other.

“European Astrofest 2016.”

Friday 5th and Saturday 6th February.

Kensington Conference & Events Centre, London.

A few minutes walk from High Street Kensington Underground Station.

Full Details at: europeanastrofest.com and the current issue of *Astronomy Now*.

Highlights of the Month.

The first two weeks provide the opportunity to see the five naked eye planets above the horizon at the same time. The spectacle takes place in the dawn sky and to see all five at the same time an unobstructed SE to W horizon is required. The planets in order from east to west are Mercury, Venus, Saturn, Mars and Jupiter. The waning crescent Moon joins the scene being close to Mars on the 1st, Saturn on the 3rd & 4th, Venus & Mercury on the 6th.
Mercury. Low in SE dawn sky in the first half of the month. Greatest Elongation W (26°) on 7th.

Venus. Prominent object low in SE dawn sky.

Mars. Gaining height in the dark morning SE to S sky.

Jupiter. Magnificent object moving towards at opposition on 8th March.

Saturn Gaining height in SE predawn skies. The Rings are now wide open.

Comet C/2013 US10 Catalina. Binocular object slowly fading towards 8th magnitude. Very well placed for Northern observers. Passes close to “Kemble’s Cascade” on 22nd/23rd.

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 contact Sheridan or myself before the meeting starts.

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 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 | 07 ^h 43 ^m | 12 ^h 16 ^m | 16 ^h 48 ^m |
| 08 | 07 ^h 31 ^m | 12 ^h 16 ^m | 17 ^h 01 ^m |
| 15 | 07 ^h 18 ^m | 12 ^h 16 ^m | 17 ^h 15 ^m |
| 22 | 07 ^h 04 ^m | 12 ^h 16 ^m | 17 ^h 28 ^m |
| 29 | 06 ^h 50 ^m | 12 ^h 15 ^m | 17 ^h 40 ^m |

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.

Currently some moderately activity sunspot groups.

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

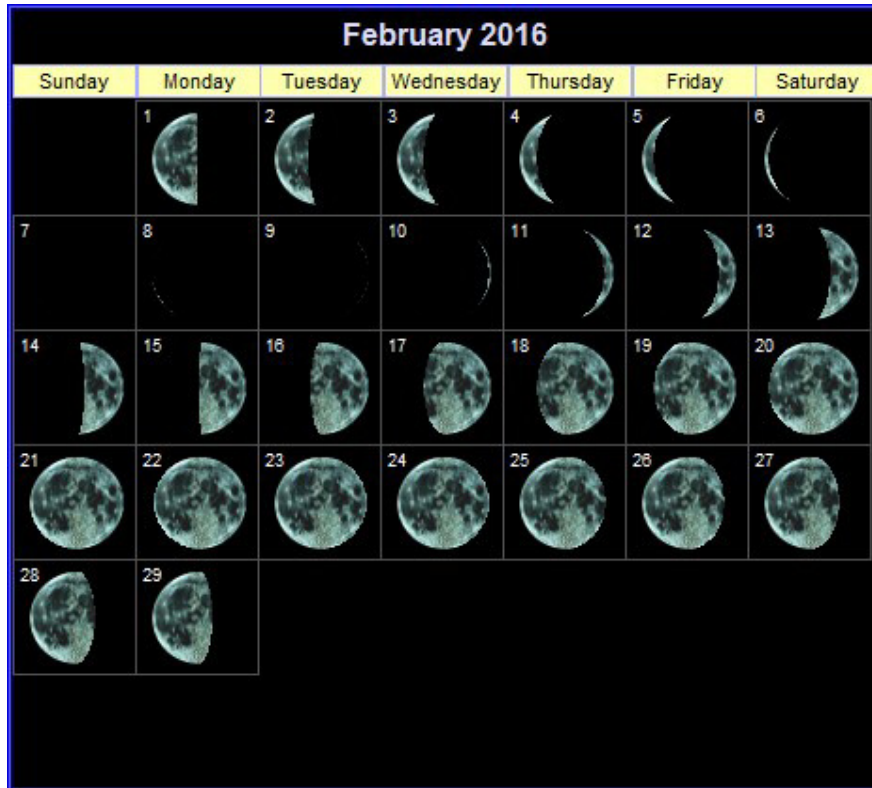
Keep in touch with the Solar Dynamics Observatory satellite at <http://sdo.gsfc.nasa.gov/>

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

The Moon.

Phases:

| | |
|---------------|---|
| Last Quarter | 01 ^d 03 ^h 28 ^m |
| New | 08 ^d 14 ^h 39 ^m |
| First Quarter | 15 ^d 07 ^h 46 ^m |
| Full | 22 ^d 18 ^h 20 ^m |



Produced using LunarPhase Pro.

Apsides:

| | | | |
|---------|---------------------------------|-------------------|----------------------|
| Perigee | 11 ^d 03 ^h | Diameter. 33' 48" | Distance. 364,357km. |
| Apogee | 27 ^d 03 ^h | Diameter. 29' 29" | Distance. 405,379km. |

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.

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.

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. Disappearance is behind the dark limb (DD) of the Moon unless otherwise stated. Enter details in your observing log.

Date. ZC No. Name. Mag. Time.

No "Highlights" this month.

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

Opportunities and Challenges.

On 6th and 7th try locating the very thin crescent Moon very low in the ESE dawn skies **before sunrise**. Note close to Mercury and Venus on 6th!

On 9th and 10th try locating the very thin crescent Moon evening twilight **after sunset**.

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

The Planets.

As stated in “Highlights” above the first two weeks of February provide the opportunity to see the five naked eye planets above the horizon at the same time. The spectacle takes place in the dawn sky and to see all five at the same time an unobstructed SE to W horizon is required. The planets in order from east to west are Mercury, Venus, Saturn, Mars and Jupiter. The waning crescent Moon joins the scene being close to Mars on the 1st, Saturn on the 3rd & 4th, Venus & Mercury on the 6th. If necessary use binoculars to initially locate Mercury but take great care near Sunrise! “Panorama” images are already appearing so make the most of clear skies to take your own!

Mercury.

Low in the SE dawn skies.

Greatest Elongation W (26°) on 7th.

Very thin crescent Moon close (3° NW) on 6th. Image opportunity with Venus to W.

| Date. | Mag. | Dia. | Phase. | Rise. | Transit. | Set. |
|-------|------|-------|--------|---------------------------------|---------------------------------|---------------------------------|
| 01 | +0.1 | 7.5'' | 0.50 | 06 ^h 23 ^m | 10 ^h 32 ^m | 14 ^h 40 ^m |
| 07 | 0.0 | 6.7'' | 0.62 | 06 ^h 24 ^m | 10 ^h 31 ^m | 14 ^h 38 ^m |
| 29 | -0.3 | 5.3'' | 0.87 | 06 ^h 30 ^m | 11 ^h 08 ^m | 15 ^h 46 ^m |

Keep in touch with data and images from the Messenger Spaceprobe at <http://messenger.jhuapl.edu>

Venus.

Brilliant object low in SE predawn and dawn sky.

Moon close on 6th. Image opportunity with Mercury to E!

| Date. | Mag. | Dia. | Phase. | Rise. | Transit. | Set. |
|-------|------|------|--------|---------------------------------|---------------------------------|---------------------------------|
| 01 | -4.0 | 12'' | 0.85 | 06 ^h 06 ^m | 10 ^h 03 ^m | 14 ^h 01 ^m |
| 29 | -3.9 | 11'' | 0.91 | 06 ^h 06 ^m | 10 ^h 39 ^m | 15 ^h 11 ^m |

Mars.

Gaining height in the SE to S dark morning sky.

Small disc so difficult to observe and/or image.

Moon close on 1st and 29th.

| Date. | Mag. | Dia. | Phase. | Rise. | Transit. | Set. |
|-------|------|-------|--------|---------------------------------|---------------------------------|---------------------------------|
| 01 | +0.8 | 6.8'' | 0.90 | 01 ^h 27 ^m | 06 ^h 10 ^m | 10 ^h 54 ^m |
| 29 | +0.3 | 8.6'' | 0.90 | 00 ^h 48 ^m | 05 ^h 11 ^m | 09 ^h 34 ^m |

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

Mission details and progress are on the appropriate NASA websites.

Jupiter.

Heading towards Opposition on 8th March.

A magnificent object well placed for almost nightlong observation and imaging.

Fine aspect below the tail-end of Leo. Worth a wide field image.

Details of satellite phenomena in *Astronomy Now* and at BAA Computing Section website http://britastro.org/computing/applets_jupiter.html (underscore between applets and Jupiter).

Excellent target for imaging.

Moon close on 24th.

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

| Date. | Mag. | Dia. | Rise. | Transit. | Set. |
|-------|------|------|---------------------------------|---------------------------------|---------------------------------|
| 01 | -2.4 | 43'' | 20 ^h 24 ^m | 02 ^h 53 ^m | 09 ^h 18 ^m |
| 29 | -2.5 | 44'' | 18 ^h 16 ^m | 00 ^h 52 ^m | 07 ^h 23 ^m |

Saturn.

Located in Scorpius.

Gaining height low in the SE dark morning skies.

The rings are now wide open.

Moon close on 13th.

| Date. | Mag. | Dia. | Rise. | Transit. | Set. |
|-------|------|------|---------------------------------|---------------------------------|---------------------------------|
| 01 | +0.5 | 16'' | 04 ^h 03 ^m | 08 ^h 10 ^m | 12 ^h 17 ^m |
| 29 | +0.5 | 17'' | 02 ^h 22 ^m | 06 ^h 27 ^m | 10 ^h 33 ^m |

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

Uranus.

Well placed for early evening observation at the beginning of the month but moving into W twilight towards the end of the month.

Moon close 21st and 22nd.

| Date. | Mag. | Dia. | Rise. | Transit. | Set. |
|-------|------|-------|---------------------------------|---------------------------------|---------------------------------|
| 01 | +5.9 | 3.4'' | 09 ^h 46 ^m | 16 ^h 21 ^m | 22 ^h 55 ^m |
| 29 | +5.9 | 3.4'' | 07 ^h 58 ^m | 14 ^h 35 ^m | 21 ^h 12 ^m |

Neptune.

Lost in SW evening twilight.

Conjunction on 28th.

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

Dwarf Planets.

Ceres.

Located in Aquarius. Lost in the SW evening twilight.

Eris (2003 UB313).

A CCD target object in Cetus.

Haumea.

A CCD target located in Bootes.

MakeMake.

A CCD target in Coma Berenices.

Pluto

A mag +14.3 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).

Located in Cetus. Mag +7.5 fading to +7.7. A widefield image will include Uranus in the same field with the gap widening during the month.

Zelinda (654).

Located in Hydra. Mag +10.1 at opposition on 2nd.

Harmonia (40).

Located in Cancer. Mag +9.7 at opposition on 5th.

Klotho (97).

Located in Leo. Mag +10.4 at opposition on 10th.

Europa (52).

Located in Leo. Mag +10.0 at opposition on 13th.

Astrea (5).

Located in Leo. Mag +8.7 at opposition on 15th.

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

http://britastro.org/computing/charts_asteroid.html (underscore between charts and asteroid).

(charts_asteroids)

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

Comets.

Comet C/2013 US10 (Catalina). Now a circumpolar binocular object very well placed for northern observers. Fading slowly from 6th to ? magnitude as it moves through Camelopardalis. Passes ($\frac{1}{2}^\circ$) from open star cluster NGC1502 and Kemble's Cascade on 22nd/23rd and $\frac{1}{2}^\circ$ from planetary nebula NGC1501 on 24th/25th. Imaging opportunities!

Charts and details of selected comets are available at:

http://britastro.org/computing/charts_comet.html (underscore between charts and comet).

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 for updates.

Eclipses.

No 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. Becoming well placed by early evening. Favourable minima at “social hours” occur on 2^d 0.7^h, 4^d 21.5^h, 24^d 23.2^h and 27^d 20.0^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.

Omicron (\omicron) Ceti Mira. The classic long period variable star. Brightening towards maximum (+3.4) in Mar/Apl.

U Ori. Well placed for long hours of observation. Brightening towards max (+6.3) in Mar/Apl.

2.2 Double Stars of the month.

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 (α) 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 (π) ds. (4.7/9.7. sep. 11.6"). Yellow-white primary with bluish secondary.

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

Tau (τ) 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^o 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.

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

Canis Major continued.

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 (α) 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 (Σ) 1103 ds. (7.7/9.2, sep. 4.4"). Pale yellow primary with pale blue companion.

Struve (Σ) 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 (α) **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 (δ) ds. 3.5/8.2 sep 5.8". Yellow primary with bluish secondary.

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

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

Σ 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 ϵ Gem.

NGC2392 (10.5) pn. The "Eskimo nebula" is a fine planetary nebula located about two degrees SE of δ . 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 (α) ds; (2.6,11.1; sep. 35.8").

Beta (β) ds; (3.0/7.5; sep. 2.3").

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

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

Iota (ι) 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^o north of Castor (α 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^o west of α Lyn.

Monoceros (Mon).

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

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

Epsilon (ϵ) 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^o 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 α (alpha) indicating that it was brighter than Rigel, β (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 (β) ds. 0.1/6.8 sep. 9.5". Brilliant bluish white primary with much fainter bluish secondary.

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

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

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

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

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

Sigma (σ) ms. 4.0/10.3 sep. 11.4

Orion continued.

Zeta (ζ) 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 (θ) 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 ζ Ori.

IC434 en is a strip of nebulosity just south of ζ . 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 ζ .

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° by 10° 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 (σ) 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 κ).

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° 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.