

“ $\Omega > 1$ ”

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

March 2010.

Forthcoming Meetings.

Saturday 6th March.

BAA Deep Sky Section Meeting.

The Humphrey Rooms,
Castilian terrace,
Northampton.

Doors open 09:30, tea/coffee from 10:00, meeting starts 10:30.

Admission £8 payable at the door covers refreshments and buffet lunch.

Full details of this and other BAA meetings at: www.britastro.org

Highlights of the Month.

Mercury at inferior conjunction on 14th. Watch for its reappearance low in SW evening skies towards the end of the month.

Venus low in SW evening twilight.

Mars well placed for observation.

Jupiter reappears low in E dawn skies at end of month.

Saturn at opposition on 22nd.

Vesta well placed for observation in Leo.

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.

1. Solar system.

Note all times shown are UT.

Earth.

Spring (Northern Hemisphere) Equinox 20^d 17^h 32^m.

British Summer Time begins at 01^h on 28th. Clocks go forward 1 hour.

Sunrise and Sunset for Great Barford, Bedfordshire.

Date.	Rise.	Transit.	Set.
01	06 ^h 49 ^m	12 ^h 14 ^m	17 ^h 39 ^m
08	06 ^h 34 ^m	12 ^h 12 ^m	17 ^h 51 ^m
15	06 ^h 17 ^m	12 ^h 10 ^m	18 ^h 03 ^m
22	06 ^h 01 ^m	12 ^h 08 ^m	18 ^h 16 ^m
29	05 ^h 45 ^m	12 ^h 06 ^m	18 ^h 28 ^m

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.

The Sun continues its resurgence in activity. February was the first month since January 2007 that sunspots were visible every single day. Solar Cycle 24 is under way!

The weeks around the equinox give the opportunity to spot the Zodiacal Light from dark sites.

Hours of darkness give the opportunity for observing potential aurora.

Keep tuned to the www.spaceweather.com site for updates.

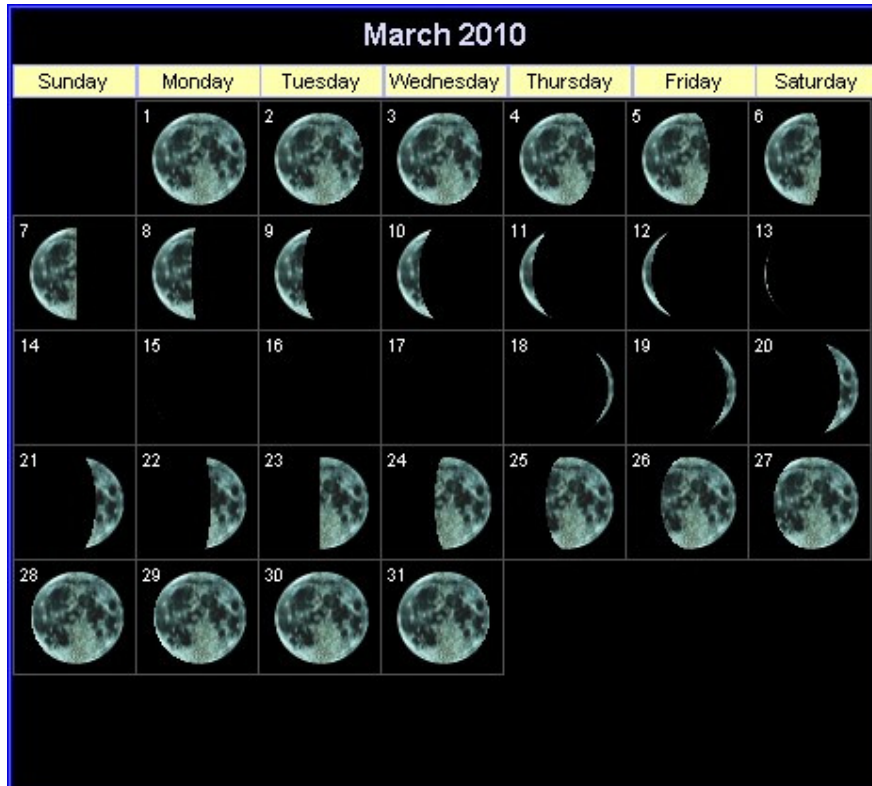
Subscribe (free) to the UK AuroraWatch website to receive alerts.

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

Moon.

Phases:

Last quarter	07 ^d 15 ^h 42 ^m
New	15 ^d 21 ^h 01 ^m
First quarter	23 ^d 11 ^h 00 ^m
Full	30 ^d 02 ^h 25 ^m



Produced using LunarPhase Pro.

Apsides:

Apogee	12d 10h	Diameter. 29' 26"	Distance. 406,007km.
Perigee	28d 05h	Diameter. 33' 01"	Distance. 361,877km.

For northern observers:

The waxing crescent Moon is very well placed. Note the prominent Earthshine. A naked eye challenge is to spot the thinnest crescent after sunset. An unobstructed horizon is essential

The waxing gibbous Moon is well placed.

The Full Moon is well placed.

The waning gibbous Moon is becoming less placed especially after midnight.

The waning crescent Moon is less well placed and is a target for early hour and predawn observers.

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 will provide an excellent target.

If you would like to obtain the "Lunar 100 Card" please see me at a Clubnight meeting.

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.		
09	2672	Lambda Sgr	+2.9	05 ^h 03.4 ^m .	DB	One for early risers!
				06 ^h 17.7 ^m .	RB	
19	399		+5.7	20 ^h 42.3 ^m .		
26	1409		+5.1	21 ^h 00.7 ^m		

Further details can be found in *BAA Handbook 2009* and monthly periodicals such as *Astronomy Now* and *Sky at Night*.

The Planets.

Mercury.

Superior conjunction on 14th. Watch its passage on the SOHO LASCO website for a few days either side of conjunction.

Watch for reappearance low down in the W evening twilight towards the end of the month. Use Venus as a guide.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
24	-1.39	5.4''	0.91	06 ^h 13 ^m	12 ^h 45 ^m	19 ^h 18 ^m
31	-0.91	6.2''	0.71	05 ^h 59 ^m	13 ^h 04 ^m	20 ^h 10 ^m

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

Venus.

Low in SW evening twilight.

Moon close on 16th and 17th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-3.92	10''	0.98	07 ^h 18 ^m	12 ^h 59 ^m	18 ^h 42 ^m
31	-3.91	11''	0.95	06 ^h 16 ^m	13 ^h 18 ^m	20 ^h 19 ^m

Mars.

Available for long hours of observation. The disc becomes noticeably smaller by the end of the month as does the gibbous phase.

Currently making a pleasant trio of bright stars with Castor and Pollux.

Moves from NW to W of the open star cluster M44 (Praesepe – The Beehive) during the month.

Moon close on 24th and 25th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.57	12.0''	0.96	13 ^h 16 ^m	21 ^h 38 ^m	06 ^h 00 ^m
15	-0.20	11.0''	0.94	12 ^h 23 ^m	20 ^h 41 ^m	05 ^h 00 ^m
31	+0.17	9.2''	0.92	11 ^h 36 ^m	19 ^h 48 ^m	04 ^h 00 ^m

The **Spirit** and **Opportunity** rovers continue their explorations. However attempts to extract **Spirit** from a “sand trap” have been unsuccessful and further attempts have been abandoned. **Spirit** will now become a static scientific platform and continue to make valuable scientific observations. Attempts will be made to increase the “tilt” to maximize the angle for charging its solar power panels during the approaching Martian winter. This is critical to **Spirit’s** survival. Visit the appropriate websites for updates.

Jupiter.

Just past conjunction with The Sun (Feb 28th). Lost in bright dawn skies for most of the month but may just be glimpsed low in E at end of month.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
31	-2.03	33''	-	05 ^h 09 ^m	10 ^h 40 ^m	16 ^h 12 ^m

Saturn.

Well placed for mid-evening onwards observation.

Opposition on 22nd.

Rings beginning to open.

Moon close on 1st/2nd and 28th/29th.

Excellent target for webcam imaging.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+0.58	19.0''	-	19 ^h 28 ^m	01 ^h 36 ^m	07 ^h 45 ^m
22	+0.51	20.0''	-	17 ^h 56 ^m	00 ^h 08 ^m	06 ^h 20 ^m
31	+0.57	20.0''	-	17 ^h 16 ^m	23 ^h 30 ^m	05 ^h 44 ^m

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

Uranus.

Lost in the bright evening (prior conjunction) and morning (after conjunction) twilight.

Conjunction with the Sun on 17th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+5.94	3.3''	-	07 ^h 19 ^m	13 ^h 09 ^m	19 ^h 00 ^m
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Neptune.

Lost in bright dawn twilight.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
31	+7.95	2.2''	-	04 ^h 31 ^m	09 ^h 27 ^m	14 ^h 23 ^m

Dwarf Planets.

Ceres.

An 8th magnitude morning object located in Ophiuchus.

Eris (2003 UB313).

Lost in evening twilight.

Haumea.

A midnight object located in Bootes. At magnitude +17 provides a target for CCD observers.

MakeMake.

A late evening object located in Coma Berenices. At opposition on 16th. At magnitude +17 provides a target for CCD observers.

Pluto.

A morning object located in Sagittarius.

Asteroids.

Vesta (4). A 6th magnitude object located in the Leo easily visible in binoculars.

See monthly periodicals/*BAA Handbook* for details of other asteroids.

Comets.

81P/Wild 2. A 9th magnitude morning object moving through Virgo. About 2° S of Iota Virginis mid-month.

Up to date details of faint comets may be found on a number of astronomy websites such as the BAA Comet Section web page at www.ast.cam.ac.uk/~jds.

Meteor Showers.

No major meteor 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.

Date. Object. Distance (LD). Magnitude. Diameter.

Please refer to www.spaceweather.com for updates.

LD = Lunar Distance. 1 LD = 384,401km. Magnitude = magnitude at closest approach to the Earth.

Eclipses.

No eclipses this month.

Observing Jupiter & Saturn.

Jupiter. The disc appears distinctly flattened - equatorial diameter greater than the polar diameter. The equatorial bulge is due to Jupiter's very rapid rotation of under 10 hours. Even a short observing session of half an hour will show the rapid rotation of surface features. The main cloud belts are easily seen in small telescopes and with increasing aperture and magnification more and more detail is revealed, subject to atmospheric conditions. Watch for the Great Red Spot, smaller white spots, belt detail, satellite shadows etc. Use as high a magnification as seeing conditions allow. The use of coloured filters can enhance features. Try a selection and you will be surprised at their effect.

Following the ever-changing pattern of the four Galilean satellites - Io, Europa, Callisto and Ganymede - is a fascinating exercise over a few hours and subsequent evenings. Plot your observations on a sheet of graph paper and you will produce their orbital patterns. Identifying each of the satellites is straight forward using charts such as those printed in the *BAA Handbook* or periodicals such as *Astronomy Now*, *Sky and Telescope*, etc.

Saturn. The Cassini division in the rings should be easily seen. Moderate apertures and high power may reveal the Encke division and the dusky Crepe ring, seeing conditions allowing. Cloud belts are visible but these are much less prominent than those on Jupiter. On rare occasions large storm systems may be visible as white spots and/or patches. The use of colour filters enhances the detail.

Saturn's largest satellite, Titan (8.3), is easily visible and moderate aperture telescopes should reveal six others: Mimas (12.9), Enceladus (11.7), Tethys (10.2), Dione (10.4), Rhea (9.7), Iapetus (10.2 - 11.9). Iapetus shows decided variations in brightness, probably due to surface features, with western elongations being brighter than eastern elongations. A suitable chart will be necessary to avoid confusion with faint background stars. The *BAA Handbook* contains charts for Titan and Iapetus and data for the others. *Astronomy Now* gives a chart for Titan.

Having identified the brighter satellites visually visit the Cassini mission web site to see what remarkable objects these small specks of light really are and the fascinating planet and ring system they inhabit. See <http://saturn.jpl.nasa.gov> and <http://ciclops.org>

Photography/CCD/Webcam Imaging of Jupiter and Saturn.

The brightness and large disc size of these planets make them excellent targets for the aspiring and experienced astrophotographer/CCD/webcam imager.

A wide angle, unguided exposure of up to 25 seconds on ASA 200 or 400 slide film will record the planet amongst the background stars of the constellation through which the planet is currently passing.

The main barrier to recording "surface" details will be the prevailing seeing conditions but with patience and a little luck excellent results can be achieved.

There are a number of publications on photography and imaging to which you can refer as necessary.

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 Recent and Current Events.

2.2 Variable Stars.

Beta (β) Persei, Algol. Range 2.2 to 3.4, period 2.7 days. Favourable minima occur on 5^d 22.1^h, 25^d 23.8^h and 28^d 20.6^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. Long period variable, range +3.4 to +9.3, period 332 days. Well placed for early evening observation as it slowly fades from maximum last November. Distinctly orange/red

U Ori. Long period variable, range +6.3 to +12.9, period 368 days. Brightening towards max on 23rd Feb. Well placed for almost nightlong observation.

Epsilon (ϵ) Aurigae. Eclipsing binary range +3.0 to +3.7, period 27 years. Fall from max to min and rise back to max takes almost 2 years. Minimum lasts almost a year. Currently undergoing its long eclipse so well worth monitoring. BAA Variable Star of the Year (2010).

2.3 Double Star of the month.

Gamma Virginis (Porrina). Low in the E mid-evening. Well worth checking what aperture can resolve this interesting binary as the separation of this pair is slowly increasing.

2.4 Double Stars/Star Clusters/Nebulae/Galaxies.

Cancer (Cnc).

Zeta (ζ) ts. 5.6/6.0/6.2; separation AB 0.8", ABxC 5.7". Beautiful triple system of yellow stars. AB requires a large aperture to split.

Phi-2. (ψ^2) ds. 6.3/6.3; separation 5.1". A beautifully matched pair of white stars.

Iota-1. (ι^1) ds. 4.2/6.6; separation 30.5". Striking gold and blue pair visible in small telescopes.

Struve (Σ)1245 ds. 6.0/7.2; separation 10.3". A multiple star. Yellow-white primary with yellow secondary. White third component.

NGC2632 (**M44**) (3.1) oc. Praesepe (The Beehive). Easily visible to the naked eye although any slight haze will soon hide it therefore making it a good test for sky conditions. In binoculars and lower power on telescopes it is a beautiful object and well suited to the novice astrophotographer. Large telescopes reveal a field of faint galaxies lying beyond the cluster.

NGC2682 (**M67**) (6.9) oc. Often overlooked because of its more famous neighbour this cluster containing some 200 members is well worth locating. It is one of the oldest open clusters known.

NGC2775 (10.3) sg. Located on the Cancer/Hydra border a few degrees NNE of Hydra's head.

Active galaxy OJ+287 in Cancer. A BL Lac object which may be on the verge of its regular outburst. Requires regular monitoring with reports being submitted to the BAA Variable Star Section. Good ongoing project for the OU 16".

Hydra (Hya).

This constellation straggles its way across the southern winter/spring skies. The moderately bright stars forming the monster's head are located east of Procyon. α Hya is located some 15° SE of the head.

Epsilon (ϵ) qs. 3.8/4.7/6.8/12.4. Located in the "head" about five degrees south of M67 in Cancer.

NGC2548 (**M48**) (5.8) oc. A fine open cluster containing some 80 stars. To locate form an equilateral triangle (apex south) with M48 as the apex, Procyon and the Hydra's head as the other corners.

NGC3242 (8.6) pn. Nicknamed "The Ghost of Jupiter" as it appears similar in size to the planet. Bright bluish object with irregular edges. The 12th magnitude central star is prominent in 8" and larger telescopes.

NGC4590 (**M68**) (8.2) gc. Located about 4° south of β Crv. Not well seen from UK latitudes.

Leo (Leo).

This easily recognized constellation is also a fine hunting ground for many moderately bright galaxies providing an excellent area to practice "star-hopping" skills as there are many bright reference stars should you go astray.

Leo contains some fine double stars.

Alpha (α) = **Regulus** ds. 1.4/7.7; separation 176.9". Regulus is blue/white, the companion is yellowish.

Gamma (γ) ds. 2.2/ 3.5; separation 4.4". Deep yellow primary with pale yellow companion.

54 ds. 4.5/6.3; separation 6.5". Pale yellow primary with blue-green companion.

88 ds. (6.4/8.4) separation 15.4". Yellow primary with yellow companion.

90 Leonis ds. 6.0/7.3; separation 3.3". Both stars are bluish-white. A third deeper blue member of the system (8.7) separation 63" in p.a. 234°.

A "route" of exploration I enjoy is to start with the "bright" galaxy NGC2903 at the western end of the "Sickle" and follow the curve of the sickle until Regulus is reached, then move to the "underbelly" containing M95/M96 and then to the tail where M65/M66 are located. Finally drop down the hind leg to the bright but rather isolated NGC 3521. Following the above route will lead you to encounter numerous moderately bright galaxies some of which make pleasing groups in the same low power/wide field of moderate aperture telescopes. Don't be afraid to use high magnification once you have located an object.

NGC2903 (8.9) sg. A spiral galaxy inclined to our line of sight. One of the brightest galaxies in Leo surprisingly it is not a Messier object.

NGC3190 (11.0) sg and NGC3193 (10.9) eg. Pair of galaxies located mid-way between ζ and γ .

NGC3226 (11.4) and NGC3227 (10.8) about 1° east of γ form a close interacting pair of galaxies.

NGC3351 (**M95**) (9.7) sg, NGC 3368 (**M96**) (9.2) sg and NGC 3379 (**M105**) (9.3) eg. An excellent trio in the same low power field located about 3° south of 52 Leo. Close to M105 is NGC 3384 (10.0) eg.

NGC3623 (**M65**) (9.3) sg, NGC3627 (**M66**) (9.0) sg and NGC3628 (9.5) sg. Located about 3° SSE of θ form another fine trio in a low power field. NGC3628 is seen edge-on and begins to reveal a dark dust lane at higher power with moderate apertures.

NGC3596 (11.0) sg. Located about a degree east of the M65/M66 group.

NGC3607 (10.0) eg. and NGC3608 (11.0) eg. A close pair of galaxies midway between θ and δ .

NGC3626 (10.9) sg. Located about one degree east of NGC3607.

NGC3655 (11.9) sg. Located about two degrees southeast of NGC3607.

NGC3686 (11.4) sg. Located about one degree NNE of NGC3655.

NGC3521 (8.9) sg. "Star-hop" southwards from the M65/M66 group to locate this bright spiral galaxy which is often overlooked as it lies some way south of the main body of Leo. Another object overlooked by Messier?

Two objects belonging to the "Local Group" of galaxies are located in Leo. Both are dwarf galaxies and are extremely difficult to view visually but make excellent targets for CCD imagers.

Leo I is located a mere third of a degree north of Regulus whose light drowns the feeble glow of the small stellar system.

Leo II is located two degrees north of δ . It is smaller and fainter than Leo I.

Leo Minor (LMi).

A small indistinct constellation above the northern borders of "dad" containing a number of moderately bright galaxies worth locating and providing a good opportunity for you to practice "star hopping" in a small area of sky.

NGC3003 (11.7) and NGC3021 (12.1) form a close pair. Take care when identifying the identity of this pair as NGC3021 has a higher surface brightness.

NGC3184 (9.7) although just over the border in neighbouring Ursa Major this spiral galaxy is easily located about 1° west of μ UMA.

NGC3245 (10.8) Elliptical galaxy.

NGC3254 (11.5) Spiral galaxy seen almost edge-on.

NGC3294 (11.7) Spiral galaxy.

NGC3344 (9.9) Spiral galaxy. It is the largest and brightest galaxy in Leo Minor. A ninth magnitude double star lies 1' to the east which interferes with the view.

NGC3395 (12.1) and NGC3396(12.2) Interacting Spiral and Peculiar galaxies.

NGC3414 (10.7) Spiral galaxy.

NGC3430 (11.5) Spiral galaxy.

NGC(3432 (11.2) Spiral galaxy seen nearly edge-on.

NGC3486 (10.3) Spiral galaxy seen nearly edge-on.

NGC3504 (11.1) Spiral galaxy.

Lynx (Lyn).

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

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 (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° west of α Lyn.

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.

NGC2437 (**M46**)(6.1) which contains the planetary nebula NGC2438(10.5). It is a foreground object and not a genuine member of the cluster.

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

NGC2447(**M93**)(6.2). 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).

Sextans (Sex).

A small constellation containing a couple of fine double stars and some interesting galaxies.
35 ds. 6.3/7.4; separation 6.8". Yellow primary with yellow-orange companion.

Σ 1441 ds. 6.4/9.9; separation 2.6". Orange primary with fainter yellow companion.

NGC3115 (9.1) is an elliptical galaxy called "The Spindle Galaxy" for its obvious shape which is easily visible in moderate apertures.

NGC3166/3169 (10.6/10.4) are close pair of interacting spiral galaxies visible in the same field of view.

Ursa Major (Uma).

Zeta (ζ) Uma ds. +2.3/+4.0, separation 14.4". Better known as Mizar, the penultimate bright star in the tail. Closer naked eye inspection shows that Mizar (2.5) has a fainter companion named Alcor (4.0). The pair provide a good test for reasonable eyesight. The pair form an optical double ie. they are not physically associated. Through large binoculars or small telescopes Mizar itself is shown to have a fourth magnitude companion, separation 14", forming a true binary system.

Xi (ξ) ds. 4.3/4.8; separation 1.8". Close pair of golden stars.

NGC3031 (**M81**) (6.9) sg. One of the more beautiful spiral galaxies seen almost face on. It hosted a supernova in 1993 that reached about 12th magnitude making it visible in small telescopes.

NGC3034 (**M82**) (8.4) ig or sg? An intriguing object that even in moderate apertures appears "strange". It may be an irregular or small spiral galaxy. Once thought to be an exploding galaxy, current theory favours a "starburst galaxy" ie a galaxy undergoing an intense period of star formation.

M81 and M82 are bright enough to be seen in binoculars and close enough to be viewed in the same low power field of a telescope. They are probably physically associated in space. A photograph with both in the same field of view makes for an interesting comparison.

NGC 3077 (9.8) eg. Visible on the edge of the same field as M81 and M82 at low power.

About 2° SE of β UMa a low power field will reveal two very different deep-sky objects:

NGC3556 (**M108**) (10.7) sg. Seen almost edge-on.

NGC3587 (**M97**) (12.0) pn. The "Owl Nebula". Two dark patches in the ghostly disc give the distinct impression of two large eyes requiring moderate apertures to see. It is one of the faintest of the Messier objects.

NGC3992 (**M109**) (10.6) sg. About a degree SE of γ UMa this object is best observed using high power to remove the bright star (a natural form of light pollution!) out of the field of view.

NGC5457 (**M101**) (7.7) sg. About 6° east and slightly north of Mizar. Although large because it is face-on it has a low surface brightness making observation slightly more difficult than one might at first expect.

M40 Just over a degree NE of δ UMa is a pair of ninth magnitude stars.

P.V.H.