

# “ $\Omega > 1$ ”

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

October 2015.

### Forthcoming Meetings.

#### OUAC Clubnight.

The next OUAC “Clubnight” is on Tuesday 6<sup>th</sup> October.  
Any reports and images of the Lunar Occultation of Aldebaran on September 5<sup>th</sup> and the spectacular Lunar Total Eclipse on September 28<sup>th</sup> for presentation at the October “Clubnight” will be most welcome.

#### BAA meetings.

Details of BAA meetings at: [www.britastro.org](http://www.britastro.org)

#### Other Meetings.

Friday 2<sup>nd</sup> & Saturday 3<sup>rd</sup> October.  
**The International Astronomy Show.**  
Stoneleigh Park, Warwickshire.  
Full details at [www.ukastronomyshow.com](http://www.ukastronomyshow.com)

Saturday 24<sup>th</sup> October.  
**Federation of Astronomical Societies Convention,**  
University of Birmingham.  
Details at: [www.fedastro.org.uk](http://www.fedastro.org.uk)

### Highlights of the Month.

Throughout the month early risers will be greeted by a fascinating changing apparition of the planets Mercury, Venus, Mars and Jupiter in the predawn/dawn sky. The spectacle is further enhanced when the waning crescent Moon joins the scene from 8<sup>th</sup> to 10<sup>th</sup>. Make the most of imaging opportunities to record the changing scene!

- 7<sup>th</sup> Watch for the reappearance of Mercury low in E dawn skies.
- 16<sup>th</sup> Mercury at Greatest Elongation W ( $18^\circ$ ). Favourable morning apparition.
- 18<sup>th</sup> Very close conjunction between Mars and Jupiter.
- 25<sup>th</sup> **British Summer Time ends at 01:00 UT.**
- 26<sup>th</sup> Venus at Greatest Elongation ( $46^\circ$ ). Brilliant object in the E predawn skies.
- 26<sup>th</sup> Close conjunction between Venus and Jupiter.
- 29<sup>th</sup> Lunar Occultation of Aldebaran (alpha Tauri).

## **Highlights continued.**

Mars low in E predawn skies.

Jupiter is gaining height in the predawn E skies.

Saturn low in SW early evening twilight.

Uranus reaches opposition on October 12<sup>th</sup> and is well placed for observation.

Neptune well placed for evening through midnight for observation.

The **Orionids** meteor shower is active between 16<sup>th</sup> to 30<sup>th</sup> with broad peak activity between 21<sup>st</sup> and 24<sup>th</sup>.

## **Recent Events.**

If you have any images and/or reports of recent events please contact Sheridan so that he can put them on the Club website.

If you wish to present them at a “Clubnight” meeting please contact Sheridan or myself before the meeting starts.

## **Software.**

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

# 1. The Solar system.

**Note all times shown are UT.  
Add one hour when British Summer Time is in operation.**

## Earth.

British Summer Time ends at 01:00 (UT) on 25<sup>th</sup> October. Clocks go **back** one hour.

### 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.

### 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	06 <sup>h</sup> 02 <sup>m</sup>	11 <sup>h</sup> 51 <sup>m</sup>	17 <sup>h</sup> 40 <sup>m</sup>
08	06 <sup>h</sup> 14 <sup>m</sup>	11 <sup>h</sup> 49 <sup>m</sup>	17 <sup>h</sup> 24 <sup>m</sup>
15	06 <sup>h</sup> 26 <sup>m</sup>	11 <sup>h</sup> 47 <sup>m</sup>	17 <sup>h</sup> 09 <sup>m</sup>
22	06 <sup>h</sup> 38 <sup>m</sup>	11 <sup>h</sup> 46 <sup>m</sup>	16 <sup>h</sup> 54 <sup>m</sup>
29	06 <sup>h</sup> 51 <sup>m</sup>	11 <sup>h</sup> 45 <sup>m</sup>	16 <sup>h</sup> 40 <sup>m</sup>

Produced using “Starry Night Pro”.

## The Sun.

### Observing.

To prevent permanent damage to your eyes avoid looking at the Sun directly and never with binoculars or a telescope unless special (expensive!) filters are used. The safest way is the simplest – project the image of the Sun onto grey or white card.

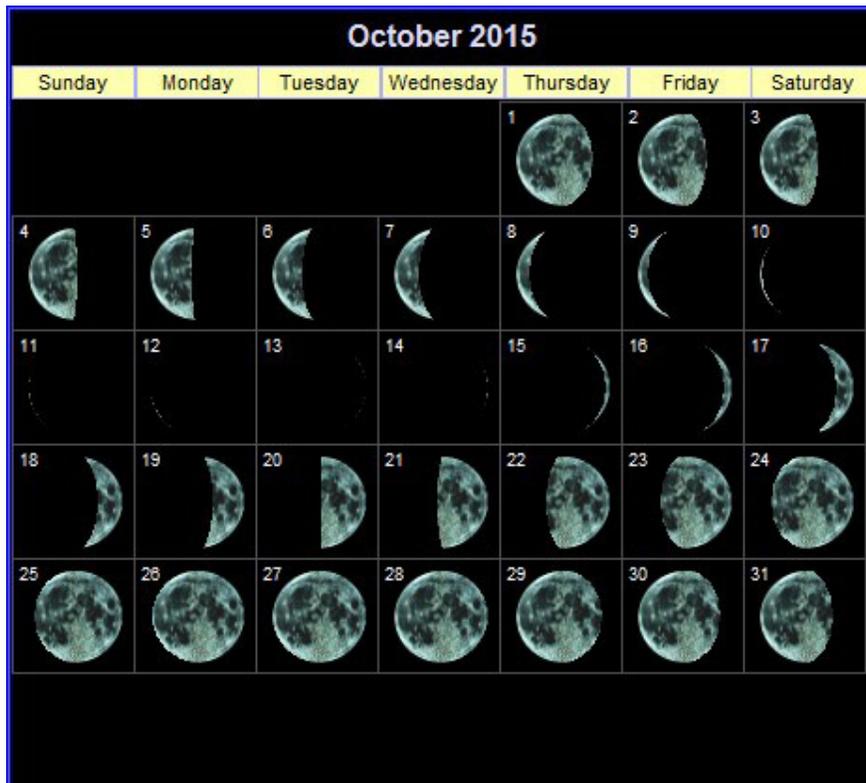
Very active sunspot AR2422 will shortly disappear over the Sun's limb so make the most of the next few days especially if you can observe in h-alpha where the rewards are much greater.

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	04 <sup>d</sup> 21 <sup>h</sup> 06 <sup>m</sup>
New	13 <sup>d</sup> 00 <sup>h</sup> 06 <sup>m</sup>
First quarter	20 <sup>d</sup> 20 <sup>h</sup> 31 <sup>m</sup>
Full	27 <sup>d</sup> 12 <sup>h</sup> 05 <sup>m</sup>



Produced using "LunarPhase Pro".

**Apsides:**

Perigee	26 <sup>d</sup> 13 <sup>h</sup>	Diameter. 33' 19"	Distance. 358,463km.
Apogee	11 <sup>d</sup> 13 <sup>h</sup>	Diameter. 29' 23"	Distance. 406,389km.

**For northern observers:**

- The waxing crescent Moon is not well placed.
- The waxing gibbous Moon is becoming better placed.
- The Full Moon is well placed.
- The waning gibbous Moon is very well placed.
- The waning crescent Moon is well placed.

**Observing.**

Observe the regions along the terminator (sunrise and sunset on the Moon) where the low angle of the Sun highlights lunar topography. A basic lunar map is all you need to get started. *Sky & Telescopes* "Lunar 100 Card" is another good starting point. If you are starting out on photography and/or imaging the Moon provides an excellent target.

**Opportunities.**

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

On 11<sup>th</sup> & 12<sup>th</sup> try locating the very thin crescent Moon very low in the E dawn skies **before sunrise**.

On 14<sup>th</sup> & 15<sup>th</sup> try locating the very thin crescent Moon WSW evening twilight **after sunset**.  
If you can take images of the above so much the better.

**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.

**29<sup>th</sup>** Lunar Occultation of Aldebaran (alpha Tauri).

21 <sup>h</sup> 48.4 <sup>m</sup>	DB
25 <sup>h</sup> 46.7 <sup>m</sup>	RB

Lunar Occultations of Aldebaran also take place in November and December. Four months in a row!

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

## The Planets.

### Mercury.

Just past Inferior Conjunction on September 30<sup>th</sup>.

Reappears low in E dawn skies towards the end of the first week to begin a favourable morning apparition.

Greatest Elongation W (16°) on 16<sup>th</sup>.

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

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
07	+1.6	9.0''	0.14	05 <sup>h</sup> 05 <sup>m</sup>	11 <sup>h</sup> 04 <sup>m</sup>	17 <sup>h</sup> 03 <sup>m</sup>
16	-0.5	7.0''	0.56	04 <sup>h</sup> 41 <sup>m</sup>	10 <sup>h</sup> 43 <sup>m</sup>	16 <sup>h</sup> 45 <sup>m</sup>
31	-1.0	5.1''	0.94	05 <sup>h</sup> 48 <sup>m</sup>	11 <sup>h</sup> 06 <sup>m</sup>	16 <sup>h</sup> 24 <sup>m</sup>

### Venus.

Brilliant object in the E predawn skies.

Greatest Elongation W (46°) 26<sup>th</sup>.

Close conjunction with Jupiter (approx 1°) on 26<sup>th</sup>. Observe/image for a few days around this date.

Moon close on 8<sup>th</sup> & 9<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-4.5	33''	0.35	02 <sup>h</sup> 07 <sup>m</sup>	09 <sup>h</sup> 05 <sup>m</sup>	16 <sup>h</sup> 04 <sup>m</sup>
26	-4.4	24''	0.51	02 <sup>h</sup> 21 <sup>m</sup>	08 <sup>h</sup> 53 <sup>m</sup>	15 <sup>h</sup> 25 <sup>m</sup>

### Mars.

Low in E predawn skies.

Close conjunction with Jupiter (23 arcmin) on 18<sup>th</sup>. Observe/image for a few days around this date.

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

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+1.8	3.9''	0.97	02 <sup>h</sup> 45 <sup>m</sup>	09 <sup>h</sup> 48 <sup>m</sup>	16 <sup>h</sup> 50 <sup>m</sup>
31	+1.7	4.2''	0.95	02 <sup>h</sup> 33 <sup>m</sup>	08 <sup>h</sup> 59 <sup>m</sup>	15 <sup>h</sup> 24 <sup>m</sup>

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

Mission details and progress are on the appropriate NASA websites.

### Jupiter.

Gaining height in E predawn skies.

Very close conjunction with Mars (23 arcmin) on 18<sup>th</sup>. Observe/image for a few days around this date.

Close conjunction with Venus (approx 1°) on 26<sup>th</sup>. Observe/image for a few days around this date.

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

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-1.7	31''	-	03 <sup>h</sup> 27 <sup>m</sup>	10 <sup>h</sup> 14 <sup>m</sup>	17 <sup>h</sup> 00 <sup>m</sup>
31	-1.8	33''	-	02 <sup>h</sup> 02 <sup>m</sup>	08 <sup>h</sup> 37 <sup>m</sup>	15 <sup>h</sup> 12 <sup>m</sup>

## Saturn.

Soon to be lost low in the SW evening twilight skies.  
Moon close on 16<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+0.6	16''	-	10 <sup>h</sup> 58 <sup>m</sup>	15 <sup>h</sup> 19 <sup>m</sup>	19 <sup>h</sup> 40 <sup>m</sup>
31	+0.5	15''	-	09 <sup>h</sup> 17 <sup>m</sup>	13 <sup>h</sup> 33 <sup>m</sup>	17 <sup>h</sup> 50 <sup>m</sup>

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

## Uranus.

Well placed for nightlong observation.  
Opposition on 12<sup>th</sup> October.  
Moon close on 25<sup>th</sup>/26<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+5.7	3.7''	-	17 <sup>h</sup> 53 <sup>m</sup>	00 <sup>h</sup> 35 <sup>m</sup>	07 <sup>h</sup> 58 <sup>m</sup>
31	+5.7	3.7''	-	15 <sup>h</sup> 53 <sup>m</sup>	22 <sup>h</sup> 29 <sup>m</sup>	05 <sup>h</sup> 08 <sup>m</sup>

## Neptune.

Well placed for almost nightlong observation.

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

Moon close on 23<sup>rd</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+7.8	2.3''	-	16 <sup>h</sup> 46 <sup>m</sup>	21 <sup>h</sup> 59 <sup>m</sup>	03 <sup>h</sup> 16 <sup>m</sup>
31	+7.9	2.3''	-	14 <sup>h</sup> 47 <sup>m</sup>	19 <sup>h</sup> 59 <sup>m</sup>	01 <sup>h</sup> 16 <sup>m</sup>

## Dwarf Planets.

**Ceres.** Located in Sagittarius, low in S to SW evening Sky. Fades from mag +7.7 to +8.1 during the month.

**Eris (2003 UB313).** A mag +18.7 target located in Cetus. At opposition on 16<sup>th</sup>.

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

**MakeMake.** A mag +17 CCD target in Coma Berenices.

**Pluto.** Mag +14.3 object located in Sagittarius low in the s to SW evening sky..

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

<b>Vesta (4).</b>	Located in Cetus. Just past opposition on 29 <sup>th</sup> September. About mag +6.0 fading to slightly during the month.
<b>Galatea (74).</b>	Located in Pisces. Mag +10.6 at opposition on 1 <sup>st</sup> .
<b>Eunomia (15).</b>	Located in Pegasus. Mag +7.9 at opposition on 15 <sup>th</sup> .
<b>Papagena (471).</b>	Located in Cetus. Mag +9.5 at opposition on 13 <sup>th</sup> .
<b>Liguna (356).</b>	Located in Pisces. Mag +10.8 at opposition on 13 <sup>th</sup> .
<b>Amphitrite (29).</b>	Located in Aries. Mag +8.7 at opposition on 25 <sup>th</sup> .
<b>Irene (14).</b>	Located in Cetus. Mag +10.4 at opposition on 29 <sup>th</sup> .
<b>Dione (106).</b>	Located in Aries. Mag +10.8 at opposition on 31 <sup>st</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 comets of note 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.

## **Meteor Showers.**

The **Piscids** continue activity during October. Weak activity with the third peak of the shower on 13<sup>th</sup> October, ZHR = Uncertain.

The **Orionids** are active from 16<sup>th</sup> to 30<sup>th</sup> with peak activity on 21<sup>st</sup> to 24<sup>th</sup>, ZHR = 25.

No great problems with moonlight so quite favourable if clear.

The **Taurids** are active from 20<sup>th</sup> October to 30<sup>th</sup> November with two peaks in November. The shower can produce “bright events”.

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

## **Near Earth Objects.**

Please refer to [www.spaceweather.com](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 “early hours”. Minima for “night owls” occur on 18<sup>d</sup> 22.8<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.

**Gamma And.** See notes below.

**Zeta Aqr.** See notes below.

**94 Aqr.** See notes below.

**Alpha Cas.** See notes below.

**Iota Cas.** See notes below.

**Eta Cas.** See notes below.

**Sigma Cas.** See notes below.

**Delta Cep.** See notes below.

**Struve ( $\Sigma$ ) 2816 & 2819 Cep.** See notes below.

**Struve ( $\Sigma$ ) 2840 Cep.** See notes below.

**8 Lac.** Quadruple system. See notes below.

**Eta Peg.** See notes below.

**Pi<sup>1&2</sup> Peg.** See notes below.

**57 Peg.** See notes below.

**Zeta Psc.** See notes below.

**35 Psc.** See notes below.

**51Psc.** See notes below.

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

### Andromeda (And).

Gamma ( $\gamma$ ) (2.2, 5.1) is a fine double star. The brighter component is golden-yellow with its companion a greenish-blue. Arguably second only to Albino in Cygnus.

NGC205 (**M110**) (8.0) eg. A satellite galaxy of M31 visible as an elongated "smudge" in small telescopes.

NGC221 (**M32**) (8.2) eg. A satellite galaxy of M31. Visible as a fuzzy star in small telescopes.

NGC224 (**M31**) (3.5) sg. The Great Andromeda Spiral Nebula. Increasing aperture reveals more and more detail although increasingly smaller areas of the galaxy fill the eyepiece. 8" telescopes should reveal NGC206 as a hazy patch. It is a large area of star formation. 12" scopes will reveal one or two of M31's large population of globular clusters.

NGC404 (11.9) lg. Located 6' NW of  $\beta$  And. The 2nd magnitude star tends to drown the faint glow of the galaxy. Use high power to push the star out of the field of view for best results.

NGC752 (5.7) oc This large open cluster is located about 4 degrees south of  $\gamma$ .

NGC891 (10.1) sg. Located about 3 degrees east of  $\gamma$  is seen almost edge on. Bright central bulge. Moderate apertures will reveal a narrow dust lane bisecting the long axis. A fine object.

NGC7640 (12.5) sg. Seen nearly edge-on.

NGC7662 (8.6) pn. "The Blue Snowball". Rather small making it difficult to distinguish from nearby faint stars. High magnification on an 8" telescope will reveal an elliptical ring with a dark centre. Large apertures will show a faint second outer ring of nebulosity and the 13th magnitude central star.

### Aquarius (Aqr).

Beta ( $\beta$ ) is a triple star (2.9, 10.8 and 11.4, sep 35.4" and 57.2" from primary).

Zeta ( $\zeta$ ) ds (4.3,4.5 sep2.1". Probably requires a 6" telescope to split this pair of white. Larger scopes may show them as yellowish.

$\psi^1$  ds (4.5,10.8, sep 49.6"). Medium power reveals a wide pair of orange stars. centre. Begins to resolve in apertures greater than 10".

94 ds (5.3,7.2, sep 12"). Fine pale red/pale green.

NGC6981 (**M72**) (9.3) gc. A distant cluster. Rather loose concentration and difficult to resolve.

NGC6994 (**M73**) (8.9) Asterism of 4 stars. Identify for curiosity to your Messier collection.

NGC7009 (8.3) pn "Saturn Nebula". Fine blue/green oval object in moderate aperture telescopes. Larger apertures reveal the faint antennae and hence the name. The Central star is visible in 16" telescopes.

NGC7089 (**M2**) (6.5) gc. Showpiece object! Bright compressed halo with bright core.

NGC 7293 (6.5) pn "Helix Nebula". RA 22h 29.6m Dec -20° 29.6m. It is possibly the nearest planetary nebula to us and hence its large angular size of 770". However it requires a dark site when even binoculars/low power small telescope should reveal its ghostly outline.

NGC7606 (10.8) sg. Faint elongated halo with brighter centre. Stellar nucleus visible in 12"+ apertures.

## **Cassiopeia (Cas).**

Alpha ( $\alpha$ ) (2.2/8.9 sep. 64.4") ds. Fine orange and blue pair. Part of a multiple system.

Iota ( $\iota$ ) (4.6/6.9/8.4 sep. AB 2.5", AC 7.2") ts. Beautiful white, yellow and blue triple system.

Eta ( $\eta$ ) (3.4/7.5 sep. 12.9") ds. Superb gold and garnet pair. The colours are very subjective. What do you see?

Sigma ( $\sigma$ ) (5.0/7.1 sep. 3.0") ds. Bluish white and yellow pair in a superb field.

NGC129 (6.5) oc.

NGC147 (9.3) eg. A satellite galaxy of M31.

NGC185 (9.2) eg. A satellite galaxy of M31.

NGC278 (10.9) eg. Located a few degrees SE of NGC185.

NGC457 (6.4) oc.

NGC581 (**M103**) (7.4) oc. Fine object.

NGC7654 (**M52**) (6.9) oc. Fine rich cluster.

NGC7789 (6.7) oc.

IC1805 (6.5) oc.

IC1848 (6.5) oc.

## **Cepheus (Cep).**

Delta ( $\delta$ ) Cephei, 3.5 to 4.4 over a period 5.37 days, is the prototype for the Cepheid class of variable stars which because of their period-luminosity relationship has led them to being used as "standard candles" in measuring distances to nearby galaxies. Pale blue +6.1 companion. Two types of object for the price of one!

Mu ( $\mu$ ) Cephei 3.7 to 5.0 approximate period 755 days is a semi-regular variable star. It is more famous for its striking red colour being fittingly called "Herschel's Garnet Star". It is the reddest naked eye star visible from the northern hemisphere. Its colour may show signs of variability.

Struve ( $\Sigma$ ) 2816 ts (5.7/7.5/7.5, sep 12"/20"). Fine triple with Struve ( $\Sigma$ ) 2819 ds (7.4/8.6, sep 13") in same field. All contained in the large, sparse and nebulous open cluster IC 1396!

Struve ( $\Sigma$ ) 2840 ds (5.6/6.4, sep 18"). Very fine greenish/bluish pair.

Open clusters - NGC188 (8.1), NGC6939 (7.8), NGC7510 (7.9), NGC7762(10.0). Planetary Nebula NGC40 (10.7).

Spiral galaxy NGC6946 (8.9) in the same one degree field as open cluster NGC6939.

The faint reflection nebula NGC7023 and emission nebula IC 1396 provide a challenge to the observer. A dark clear sky is essential.

## **Lacerta (Lac).**

Struve ( $\Sigma$ ) 2876 (7.8/9.3 sep 11.8") ds. Fine blue and white double.

Struve ( $\Sigma$ ) 2894 (6.1/8.3 sep. 15.6") ds. Yellow primary, blue secondary.

Struve ( $\Sigma$ ) 2902 (7.6/8.5 sep. 6.4") ds. Yellow and white double.

8 Lacertae = Struve ( $\Sigma$ ) 2922 (5.7/6.5 sep. 22.4") Multiple star. Brightest four components are white/blueish white. Has been described as a poor open cluster.

O Struve ( $\Sigma$ ) 475 (6.8/10.8 sep. 15.5") ds. White primary with faint blue companion.

BL Lacertae (14 to 17). Prototype for class of quasi-stellar object (QSO).

### **Pegasus (Peg).**

Eta ( $\eta$ ) (2.9/9.9 sep 90.4") ds. Binocular object. Yellow and blue components but telescope require to see colour of secondary. Herschel's "Pendulum Star" - tap telescope gentle for the effect.

Pi<sup>-1</sup>/Pi<sup>-2</sup> ( $\pi^{-1}/\pi^{-2}$ ) (5.6/4.3 sep 7") ds. Fine binocular object. Pi<sup>-1</sup> is a multiple system with 4 companions of 10<sup>th</sup> to 12<sup>th</sup> magnitude.

57 Pegasi. (5.1/9.7 sep 32.6") ds. Beautiful orange primary with blue companion.

NGC7078 (**M15**) (6.3) gc superb object.

NGC7331 (9.5) sg. Seen almost edge on.

About half a degree south is the fascinating group of galaxies "Stephan's Quintet". The brightest member of the group is NGC7320 (12.7).

Many happy hours can be spent wandering around "The Square" to locate many moderately bright galaxies. Use a star atlas such as the excellent "Sky Atlas 2000" to plan your journey.

### **Pisces (Psc).**

Alpha ( $\alpha$ ) (4.2/5.1 sep.1.5") ds. Requires a large aperture telescope using high magnification to split this pair of bluish-white stars.

Zeta ( $\zeta$ ) (5.6/6.2 sep. 23") ds. Fine white and yellow pair of stars.

35 (6.0/7.6 sep 7.6") ds. Fine yellow and blue pair.

51 (5.7/9.5 sep.27.5") ds. Glorious bluish and greenish pair of stars.

65 (6.3/6.3 sep 4.4") ds. Fine matched pair of pale yellow stars.

Wolf 28 (12.3). Van Maanen's Star. One of the few white dwarf stars visible in amateur telescopes.

NGC128 (11.8) sg. Brightest of a group of five galaxies.

NGC488 (10.3) sg. Elongated halo with brighter core.

NGC628 (**M74**) (9.4) sg. Seen face on and hence low surface brightness.

NGC7541 (11.7) sg. Elongated oval with bright core. 3' to the SW is NGC7537 (13.0).

### **Pisces Austrinus (Psa).**

Alpha (1.2) Formalhaut. The most southerly first magnitude star visible from the UK. A young star encircled by a disc of gas and dust possibly indicating planetary formation.

P.V.H.