

“ $\Omega > 1$ ”

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

**November 2019.**

### Recent Events.

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

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

### Forthcoming Meetings.

#### OUAC Clubnight.

The next OUAC “Clubnight” is on Tuesday 5<sup>th</sup> November.

#### BAA meetings.

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

### Highlights of the Month.

**5<sup>th</sup> Guy Fawkes Night!** Coincides with our “Clubnight”. Could be a lively meeting!  
**5<sup>th</sup> & 12<sup>th</sup>** Peaks of the **Taurids** meteor shower which is active throughout the month.

**11<sup>th</sup> Mercury at Inferior Conjunction with Transit of the Sun!**

**17<sup>th</sup>** Peak of **Leonids** meteor shower. Unfortunately Moonlight interferes.

**12<sup>th</sup>** Asteroid **Vesta** at Opposition.

**28<sup>th</sup>** Daylight occultation of **Jupiter** by the Moon.

**28<sup>th</sup> Mercury** at Greatest Western Elongation.

**Mercury** is well placed low in the E morning twilight in the second half of the month.

**Venus** is low in SW evening twilight. Passes S of Jupiter on 23<sup>rd</sup> and 24<sup>th</sup>

**Mars** is slowly gaining height low in the E predawn sky.

**Jupiter** is low in the SW evening twilight. Passes N of Venus on 23<sup>rd</sup> and 24<sup>th</sup>

**Saturn** is low in SW early evening sky.

**Uranus** is well placed for evening and early hour observation.

**Neptune** is well placed for evening observation close to Phi Aquarii.

### 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.

### 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.

### ISS.

The ISS continues a series of morning passes during the first half of the month.

Go to the “Heavens Above” website and set-up for your location. Add to your “favourites”.

Alternatively go to the “spaceweather” website and click the “Flybys” button and follow the instructions to set-up forecasts for your location. Add to your “favourites”.

### Sunrise and Sunset.

#### Bedford.

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

Date.	Rise.	Transit.	Set.
01	06 <sup>h</sup> 56 <sup>m</sup>	11 <sup>h</sup> 45 <sup>m</sup>	16 <sup>h</sup> 34 <sup>m</sup>
08	07 <sup>h</sup> 09 <sup>m</sup>	11 <sup>h</sup> 45 <sup>m</sup>	16 <sup>h</sup> 22 <sup>m</sup>
15	07 <sup>h</sup> 21 <sup>m</sup>	11 <sup>h</sup> 46 <sup>m</sup>	16 <sup>h</sup> 11 <sup>m</sup>
22	07 <sup>h</sup> 33 <sup>m</sup>	11 <sup>h</sup> 48 <sup>m</sup>	16 <sup>h</sup> 02 <sup>m</sup>
29	07 <sup>h</sup> 45 <sup>m</sup>	11 <sup>h</sup> 50 <sup>m</sup>	15 <sup>h</sup> 55 <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.**

**Take care if your telescope has any plastic components in its optical path. Plastic melts!**

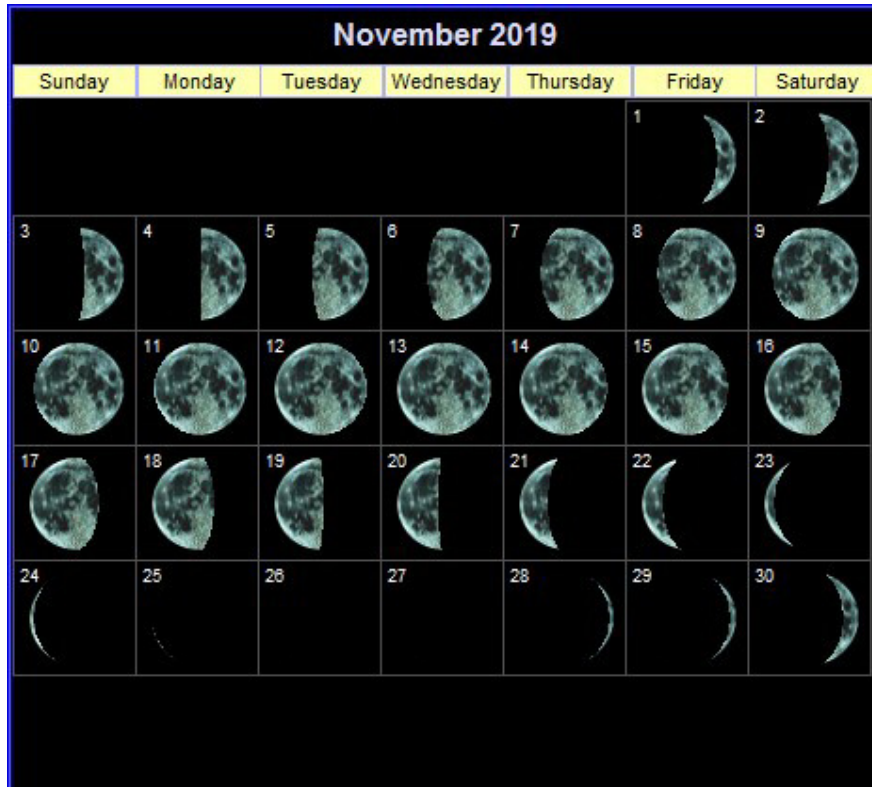
If you have or have access to observe in h-alpha the rewards are much greater.

Currently (31<sup>st</sup> October) very low activity with no sunspot groups.

Add the “Spaceweather”, the “Soho” and the “Solar Dynamics Observatory” satellite websites to your “favourite” websites.

# The Moon.

## Phases:



Produced using "LunarPhase Pro".

First quarter	04 <sup>d</sup> 10 <sup>h</sup> 24 <sup>m</sup>
Full	12 <sup>d</sup> 13 <sup>h</sup> 36 <sup>m</sup>
Last quarter	19 <sup>d</sup> 21 <sup>h</sup> 12 <sup>m</sup>
New	26 <sup>d</sup> 15 <sup>h</sup> 07 <sup>m</sup>

## Apsides:

Apogee	07 <sup>d</sup> 08 <sup>h</sup>	Diameter. 30' 00"	Distance. 405,060km.
Perigee	23 <sup>d</sup> 07 <sup>h</sup>	Diameter. 32' 35"	Distance. 366,721km.

## The Moon continued.

### Observing.

#### For northern observers:

The waxing crescent Moon is not well placed.

The waxing gibbous Moon is well placed.

The Full Moon is very well placed.

The waning gibbous Moon is very well placed.

The waning crescent Moon is 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. The Moon provides an excellent target if you are starting out on astronomical photography and/or imaging.

### Imaging and Observing Opportunities.

Predawn observation and/or imaging will be well rewarded when the waning gibbous Moon and the waning crescent Moon are well placed.

On 24<sup>th</sup> (Mars close) and 25<sup>th</sup> try locating the very thin crescent Moon very low in the E dawn skies **before sunrise**.

On 27<sup>th</sup> and 28<sup>th</sup> try locating the very thin crescent Moon very low in SW evening twilight **after sunset**.

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

### Lunar Occultations.

#### **Daylight Occultation of Jupiter on 28<sup>th</sup>.**

Reappears from behind the **Bright** NW (upper left) limb about 10:29.

Run a simulation in advance on "Stellarium" or similar software.

Locate the thin crescent Moon about 10:00 and await events!

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.

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

## The Planets.

### Mercury.

Unlikely to be spotted as it hugs the SW horizon during the first week of the month.

#### Inferior Conjunction on 11<sup>th</sup>. Transit of Mercury.

From the UK the beginning "Ingress" will be visible at approx 12:35 and the Transit will still be in progress when the Sun sets so that the end (Egress) will not be visible.

Run a simulation in advance on "Stellarium" or similar software.

Everything crossed for clear skies!

It is uncertain if the OUAC can hold a suitable observing session. If one is possible an e-mail will be circulated to members.

Watch for its reappearance in the E dawn twilight when it commences a favourable apparition for N observers for the second half of the month.

Greatest Elongation W (20°) on 28<sup>th</sup>.

Moon close on 25<sup>th</sup>.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+0.71	8.7''	0.27	09 <sup>h</sup> 01 <sup>m</sup>	12 <sup>h</sup> 58 <sup>m</sup>	16 <sup>h</sup> 56 <sup>m</sup>
28	-0.48	6.7''	0.61	05 <sup>h</sup> 43 <sup>m</sup>	10 <sup>h</sup> 30 <sup>m</sup>	15 <sup>h</sup> 17 <sup>m</sup>

### Venus.

Reappearing low in SW dawn sky.

1.4° S of Jupiter on 24<sup>th</sup>.

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

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-3.9	11''	0.94	08 <sup>h</sup> 58 <sup>m</sup>	13 <sup>h</sup> 09 <sup>m</sup>	17 <sup>h</sup> 19 <sup>m</sup>
30	-3.9	12''	0.89	10 <sup>h</sup> 10 <sup>m</sup>	13 <sup>h</sup> 50 <sup>m</sup>	17 <sup>h</sup> 30

### Mars.

Emerging into the E predawn sky.

Distinctly gibbous phase.

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

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	+1.8	3.7''	0.99	04 <sup>h</sup> 58 <sup>m</sup>	10 <sup>h</sup> 29 <sup>m</sup>	15 <sup>h</sup> 59 <sup>m</sup>
30	+1.7	3.9''	0.98	04 <sup>h</sup> 54 <sup>m</sup>	09 <sup>h</sup> 46 <sup>m</sup>	14 <sup>h</sup> 39 <sup>m</sup>

The Mars **Curiosity** rover continues its explorations returning excellent data and images.

Mission details and progress are on the appropriate NASA website.

## Jupiter.

Very low in the SW early evening twilight.

1.4° N of Venus on 24<sup>th</sup>.

**Daylight Occultation by the Moon on 28<sup>th</sup>.** See Lunar Occultation notes above.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	-1.9	33''	11 <sup>h</sup> 00 <sup>m</sup>	14 <sup>h</sup> 51 <sup>m</sup>	18 <sup>h</sup> 43 <sup>m</sup>
30	-1.8	32''	09 <sup>h</sup> 33 <sup>m</sup>	13 <sup>h</sup> 23 <sup>m</sup>	17 <sup>h</sup> 13 <sup>m</sup>

## Saturn.

Low in SW early evening sky.

Moon close on 29<sup>th</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+0.6	16''	12 <sup>h</sup> 30 <sup>m</sup>	16 <sup>h</sup> 26 <sup>m</sup>	20 <sup>h</sup> 22 <sup>m</sup>
30	+0.6	15''	10 <sup>h</sup> 45 <sup>m</sup>	14 <sup>h</sup> 43 <sup>m</sup>	18 <sup>h</sup> 41 <sup>m</sup>

## Uranus.

Located in Pisces and well placed for long hours of observation.

Moon close on 10<sup>th</sup> & 11<sup>th</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.7	3.7''	16 <sup>h</sup> 18 <sup>m</sup>	23 <sup>h</sup> 27 <sup>m</sup>	06 <sup>h</sup> 40 <sup>m</sup>
30	+5.7	3.7''	14 <sup>h</sup> 22 <sup>m</sup>	21 <sup>h</sup> 29 <sup>m</sup>	04 <sup>h</sup> 40 <sup>m</sup>

## Neptune.

Well placed in the SW for early to mid evening observation.

Moon close on 7<sup>th</sup> & 8<sup>th</sup>.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+7.8	2.3''	15 <sup>h</sup> 00 <sup>m</sup>	20 <sup>h</sup> 29 <sup>m</sup>	02 <sup>h</sup> 02 <sup>m</sup>
30	+7.9	2.3''	13 <sup>h</sup> 05 <sup>m</sup>	18 <sup>h</sup> 34 <sup>m</sup>	00 <sup>h</sup> 03 <sup>m</sup>

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 e.g. x200 or greater. Use "Stellarium" (Freeware) or similar software to determine favourable E and W elongations.

## Dwarf Planets.

**Ceres.** Mag +8.4. Becoming lost in the SW evening twilight about 3° S of Jupiter at the beginning of the month.

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

**Haumea.** A mag +17.3 CCD target located in Bootes, about 5° W of Arcturus. becoming lost in WNW evening twilight.

**MakeMake.** A mag +17 CCD target in Coma Berenices. Low in the E predawn skies.

**Pluto.** Mag +14.5 object located in Sagittarius. Sinking into the early evening SW sky.

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

<b>Vesta (4).</b>	Mag +6.5 at <b>Opposition on 12<sup>th</sup></b> . Well placed for N observers.
<b>Philomela (196).</b>	Located in Cetus. Mag +10.9 at opposition on 2 <sup>nd</sup> .
<b>Hygiea (10).</b>	Located in Taurus. Mag +10.2 at opposition on 26 <sup>th</sup> .
<b>Thisbe (88).</b>	Located in Taurus. Mag +10.9 at opposition on 28 <sup>th</sup> .

Charts and details of asteroids one month either side of opposition are available at:  
[http://britastro.org/computing/charts\\_asteroid.html](http://britastro.org/computing/charts_asteroid.html)  
See also the *BAA Handbook* and/or monthly periodicals.

## Comets.

### **C2018 N2 (ASASSN).**

Probably about 11<sup>th</sup> mag and very well placed for N observers as it moves through Andromeda into Triangulum during the month. Passes about 3° S of M31 at the beginning of the month. Imaging opportunities!

### **C2017 T2 PANSTARRS.**

Predicted to be 9<sup>th</sup> mag but may be brighter. Comets are “Fickle things”!  
Currently moving through Auriga. Close to M36 and M38 at the beginning of the month. During the last week of the month it passes about 2° W of Capella. Imaging opportunities!  
It will pass closest to the Earth at the end of December when it will be very well placed in Perseus. Perihelion is not reached until 4 May 2020 so this comet is worth following!

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 **Taurids** continue activity during November. Double radiant with two peaks on 5<sup>th</sup> (S) - ZHR = 10, and 12<sup>th</sup> (N) - ZHR = 10. Slow meteors with “bright events” possible. Moonlight interferes.  
The **Leonids** are active from the 15<sup>th</sup> to 20<sup>th</sup> with narrow peak activity on 18<sup>th</sup> 23<sup>h</sup>, ZHR = 15. Moonlight interferes.

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 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. Well placed for evening observation. Minima at “social hours” occur on 17<sup>d</sup> 22.5<sup>h</sup> and 20<sup>d</sup> 19.3<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.

**Omicron ( $\omicron$ ) Ceti, “Mira”.** Currently at maximum approx mag +3.5. Worth observing and/or imaging for the next few months to plot its gradual fade. Useful article in the November issue of *Astronomy Now*.

### 2.2 Double Stars of the month.

**Gamma And.** See notes below.

**Gamma Ari.** See notes below.

**Struve ( $\Sigma$ ) 326 Ari.** 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.

**Iota Tri.** See notes below.

**Struve ( $\Sigma$ ) 239 Tri.** See notes below.



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

### Andromeda (And).

Gamma ( $\gamma$ ) Almach (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 Albiro 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.

### Aries (Ari).

Gamma ( $\gamma$ ) (4.8/4.8 separation 7.7") ds. Fine equally bright bluish-white pair of stars. Accidentally discovered by Robert Hooke in 1664 while searching for a comet.

Lambda ( $\lambda$ ) (4.9/7.7 sep. 37.4") ds. Wide pair of pale yellow and pale blue stars.

Struve ( $\Sigma$ )326. (7.6/9.8 sep. 5.9") ds. Beautiful orange and dull red pair of stars.

NGC772 (10.3) sg. Located almost 2° ESE of  $\gamma$ .

NGC877 (11.9) sg.

NGC972 (11.4) sg.

### 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 although 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.

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 1° field as oc NGC6939. Two types of object for the price of one!

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 separation 90.4". Binocular object. Yellow and blue components but telescope required to see colour of secondary. Herschel's "Pendulum Star" - tap telescope gently for the effect.

Pi<sup>-1</sup>/Pi<sup>-2</sup> ( $\pi^{-1}/\pi^{-2}$ ) 5.6/4.3 separation 7". 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.

51 Pegasi (5.5). Identify this star for interest as the first sun-like star discovered in October 1995 to have an "exoplanet". The planet was originally named "51 Pegasi b" but in December 2015 following a process of public nomination the IAU announced the winning name was **Dimidium**.

57 Pegasi. 5.1/9.7 separation 32.6". 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)

## **Sculptor (Scl).**

Unfortunately this constellation never rises very high for UK observers so that only brief opportunities are presented to track down some deep-sky gems which unfortunately are not seen at their best even from a dark site. I have taken declination  $-30^\circ$  as the southern limit for objects. This is almost the declination of the first magnitude star Fomalhaut (+1.16) which will give you a marker as to how low these objects are even at their highest when due south. The suitable observation window is thus fairly restricted!

NGC24 (11.5) sg. Located about two-thirds the way between NGC253 and  $\beta$  Cet.

NGC253(7.1) sg. Seen highly inclined to our line of sight. Increasing magnification reveals mottling due to dust lanes. Head south for the best view of this gem.

NGC288 (8.1) gc. A loose globular which resolves readily with high power. The South Galactic Pole is about a  $1^\circ$  to the SW.

NGC613 (10.0) sg. Elongated and fairly bright.

## **Triangulum (Tri).**

Iota ( $\iota$ ) (5.3/6.9 sep. 3.9") ds. Fine contrasting yellow and blue pair of stars.

Struve ( $\Sigma$ )239 (7.0/8.0 sep. 13.8") ds. Fine pale yellow and pale blue pair of stars.

NGC598 (**M33**) (5.7) sg. Viewed face-on and hence has a low surface brightness making it an elusive object. Its visibility provides a good test for sky conditions using binoculars.

From dark sites and under good seeing conditions it is just visible to the naked eye and vies with M31 as the most distant object visible to the naked eye. With 8"+ telescopes try to locate the vast star cloud NGC604. Good target for imaging.

NGC672 (11.6) sg. A bright barred spiral galaxy seen somewhat edge-on.

NGC925 (12.0) sg. Steeply inclined to our line of sight makes it fairly bright. NGC598

P.V.H.