Introduction

Welcome to August's **Binocular Sky** Newsletter. As most of you know, my intention here is to highlight some of the binocular targets for the coming month. It is primarily targeted at binocular observers (although many small telescope observers use it as well) in the UK, but almost all the objects can be seen from anywhere north of latitude 30°N and many of the even further south (we have at least one subscriber as far south as Canberra: 35°S!), for whom our low southern objects culminate high in the sky.

Astronomical darkness, albeit short-lived, has now returned for most of the UK – the observing season proper approaches. Owing to the longer darkness, we have a few more lunar occultations available, enhanced by the Moon's traverse of the Hyades, and we also have a grazing occultation of a bright star for mainland Britain (see page 9).

August is Perseids month, which means it's also *Solarsphere* month. *Solarsphere* is a "bijou" astronomy and music festival with a very friendly atmosphere. A few more details on page 11, but go to their website for full info. For those who prefer their astronomy without music and camping, there's the excellent South West Astronomy Fair at the Norman Lockyer Observatory on the same weekend.

For the last year or so, I've been playing with a little solar binocular: See the Mini-Review on page 11.

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The Deep Sky

(Hyperlinks will take you to finder charts and more information about the object.)

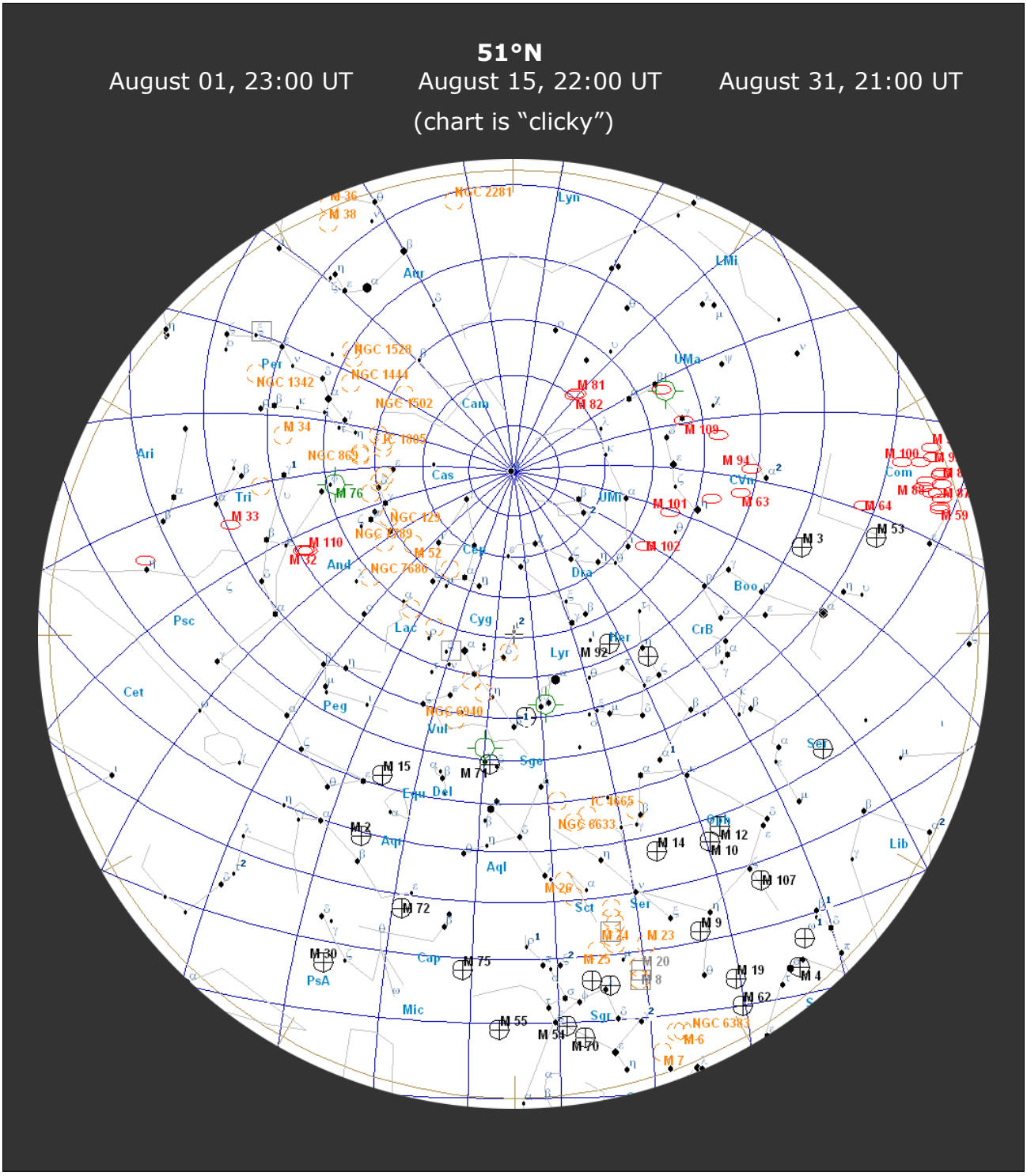
Asterisms are informal groups of stars that form recognisable shapes, and which can either be useful as signposts that lead to other objects of interest (e.g. the "Plough", aka "Big Dipper" in Ursa Major, which directs us to both Polaris and Arcturus) or which remind us of familiar shapes (possibly the best known of these in our summer skies is the "Coathanger" asterism of brighter stars in Collinder 399 in Vulpecula).

The more you look around the skies, the more likely you are to find – invent? – some of your own. If you do this, make your own catalogue of things that **you** find interesting, then share them with others. Your catalogue may never be as famous as Charles Messier's or the NGC, but it can help to enhance **your** personal relationship with your skies. However, it is only polite to check that someone else hasn't got there first; if they have, acknowledge them – there's a reasonably comprehensive list here. We'll highlight a few of them this month.

As the sky darkens at twilight, in the north are NGC 457 (the Owl Cluster) and NGC 663 in Cassiopeia, the Perseus Double Cluster, and Stock 2 (the Muscleman Cluster). Also visible in Cassiopeia is the "Eddie's Coaster" asterism, a lovely curve of stars that is not particularly apparent on star charts or images, but which is obvious in 10x50 binoculars. It is named for Eddie Carpenter, the West Country amateur who discovered it and has been delighting people with it for many years.

Open (also called 'Galactic') Clusters are loosely packed groups of stars that are gravitationally bound together; they may contain from a few dozen to a few thousand stars which recently formed in the galactic disk.

More open Clusters are visible in the southern sky in the region of Ophiuchus. These include Melotte 186, NGC 6633, IC 4665 and M11, The Wild Duck Cluster, all of which are easily visible in 50mm binoculars. M11, which is a cluster of over a thousand stars, benefits enormously from larger apertures and the higher magnification that



permits more stars, including the "V"-shaped grouping that gives it its common name, to be revealed.

IC 4665 benefits enormously from larger apertures and the higher magnification that permits more stars to be revealed. You should seek out a

particularly attractive curved of bright white stars that forms part of the "Hi" asterism (inverted in binoculars from the Northern Hemisphere) that welcomes you to this part of the summer sky.

Even further to the south, culminating at around local midnight, is a group of open clusters in Serpens and Sagittarius that includes M16 (the Eagle Nebula), M17 (the Swan or Omega Nebula), M23, M24 (the Sagittarius Star Cloud – the densest accumulation of stars you will see with binoculars anywhere in our galaxy), and M25.

While you're in this region of the sky, the denser part of the Milky Way that forms the *Scutum Star Cloud* as a backdrop to M25 is also worth enjoying. Also, see if you can find Barnard's Star in Ophiuchus. This has the largest known proper motion of any star. (*Proper motion* is motion with respect to the celestial sphere.) Although it is visible in 50mm binoculars from a dark site, it is considerably easier in larger glasses and I recommend a minimum of 70mm.

In August, we are able to look out of the plane of the Galaxy during the evening. This makes more globular clusters and galaxies available for observation. Very well placed this month are M81 (Bode's Nebula) and M82 (The Cigar Galaxy), both of which are easy in a 50mm binocular. These can be used as a good demonstration of averted vision: if you have them both I the same field of view, you may see that the core of M81 becomes more apparent if you look at M82. If you have good skies, try M51 (The Whirlpool) and M101 which, although it is a large object, is very difficult owing to its low surface brightness. The Great Andromeda Galaxy, M31, is also rising into the sky to a reasonable altitude this month. It is large and bright enough to be able to withstand quite a lot of light pollution although, obviously, it benefits from a dark transparent sky.

Galaxies are gravitationally bound "island universes" of hundreds of billions of stars at enormous distances. The light that we see from M31, for example, left that galaxy around the time our technology consisted of rocks, sticks and bones.

The two Hercules globulars, M92 and the very impressive, and very easy to find, M13 are at a very good altitude for observation. Although M13 is clearly larger than M92, I find it to be easier to resolve the outer stars of the latter one (needs big binos).

Globular clusters are tightly-bound, and hence approximately spherical, clusters of tens, or even hundreds, of thousands of stars that orbit in a halo around almost all large galaxies that have been observed.

While you're in Hercules, using 70mm or larger binocs, see if you can find an asterism that was introduced by, and named for, the prolific American amateur astronomer, Phil Harrington in his catalogue: Hrr 7. Find *Kajam* (*ω Her*) and pan 2° W to a golden 8th mag star which is part of a 1.3°-long chain of fainter stars that runs approximately north-south. Phil sees a zigzag, but others have seen a dragon, a long-tailed tadpole, and a flower. What do you see?

Also visible this month is M5 in Serpens, which is one of the largest globular clusters known, being 165 light years in diameter. Its apparent size is nearly as large as a Full Moon. At a reasonable altitude from the beginning of the month are the very bright M15, M2 (which looks almost stellar at 10x50) and NGC 6934. This last cluster is very easy to see and is excellent for demonstrating how globular clusters respond to transparency. In apertures of around 70mm and upwards, almost all of them look larger as the sky becomes more transparent. NGC 6934 displays this to the greatest extent of any globular on which I have tested the phenomenon.

The easiest planetary nebula, M27, the Dumbbell Nebula – although I insist that it looks more like an apple core or a diabolo than a dumbbell! – is visible in the evening skies in even 30mm binoculars. At the other extreme, if you have binoculars of at least 100mm aperture, see if you can find and identify NGC 6572, a planetary nebula in Ophiuchus. Even in large glasses it looks stellar, but it has the distinction of being possibly the greenest object in the sky.

Planetary Nebulae are short-lived (a few tens of thousands of years) masses of gas and plasma that result from the death of some stars. They have nothing to do with planets, but get their name from the fact that, in early telescopes, they had the appearance of giant ghostly planets.

There are two other objects which, owing to their southerly declination, are best observed this month. They are the two bright emission nebulae, M20 (the Trifid) and the larger, brighter and easier M8 (the Lagoon). They are only about a degree and a half apart, so they will fit into the same field of view of even quite large binoculars.

For interactive maps of Deep Sky Objects visible from 51°N, you can visit: http://binocularsky.com/map_select.php

August Deep Sky Objects by Right Ascension

Object	Con	Type	Mag	RA (hhmmss)	Dec (ddmmss)
M31 (the Great Andromeda Galaxy)	And	gal	4.3	004244	411608
Eddie's Coaster	Cas	ast	7.0	010129	634005
NGC 457 (the ET Cluster, the Owl Cluster)	Cas	oc	6.4	011932	581727
NGC 663	Cas	oc	7.1	014601	611406
Stock 2 (the Muscleman Cluster)	Cas	oc	4.4	021434	591358
NGC 884 and NGC 869 (the Perseus Double Cluste	Per	oc	5.3	022107	570802
M81 (NGC 3031)	UMa	gal	7.8	095533	690401
M82 (NGC 3034)	UMa	gal	9.2	095554	694059
M51 (NGC 5194, the Whirlpool Galaxy)	CVn	gal	8.9	132952	471144
M101 (NGC 5457)	UMa	gal	7.7	140312	542057
M5 (NGC 5904)	Ser	gc	5.7	151833	020459
Harrington 7	Her	ast	9.0	161652	132255
M13 (NGC 6205, the Great Hercules Globular Clust	Her	gc	5.8	164141	362738
M92 (NGC 6341)	Her	gc	6.4	171707	430812
IC 4665 (The Summer Beehive)	Oph	oc	4.2	174618	054300
M23 (NGC 6494)	Sgr	oc	5.5	175700	-190100
Barnard's Star	Oph	st	9.5	175749	044136
Melotte 186	Oph	oc	3.0	180030	025356
NGC 6572	Oph	pn	9.0	181206	065113
M24	Sgr	oc	4.6	181826	-182421
M16 (NGC 6611, the Eagle Nebula)	Ser	oc	6.0	181848	-134749
M17 (NGC 6618, the Omega Nebula or Swan Nebu	Sgr	en	6.0	182048	-161059
NGC 6633	Oph	oc	4.6	182715	063030
M25 (IC 4725)	Sgr	oc	4.6	183146	-190654
M11 (NGC 6705, Wild Duck Cluster)	Sct	oc	5.8	185106	-061600
M27 (NGC 6853, the Dumbbell Nebula, the Apple	Vul	pn	7.6	195936	224318
NGC 6934	Del	gc	8.8	203411	072415
M15 (NGC 7078)	Peg	gc	6.2	212958	121003

Variable Stars

Selection of Binocular Variables (mag < +7.5)			
Star	**Mag Range**	**Period**	**Type**
U Cep	6.8-9.2	2.5d (increasing)	Eclipsing binary
EK Cep	8.2-9.5	4.3d	Eclipsing binary
V1010 Oph	6.1-7	0.66d	Eclipsing binary
RR Lyr	7.06-8.12	0.57d	RR Lyr
TX UMa	7.0-8.8	3.06d	Eclipsing binary
ZZ Boo	6.7-7.4	4.99d	Eclipsing binary
R Sge	8.0-10.4	71d, 1112 d	RV Tau
U Sge	6.5-9.3	3.38d	Eclipsing binary
DY Vul	8.4-9.7	–	Irregular
U Vul	6.7-7.5	7.99d	Cepheid
X Cyg	5.9-6.9	16.39d	Cepheid
SU Cyg	6.4-7.2	3.84d	Cepheid
AF Cyg	6.4-8.4	92.5	Semi-regular

Mira-type stars near predicted maximum (mag < +7.5)		
Star	**Mag Range**	**Period (days)**
R And	5.8-15.2	409.2
S CrB	5.8-14.1	360.3
R Cyg	6.1-14.4	426.5

Double Stars

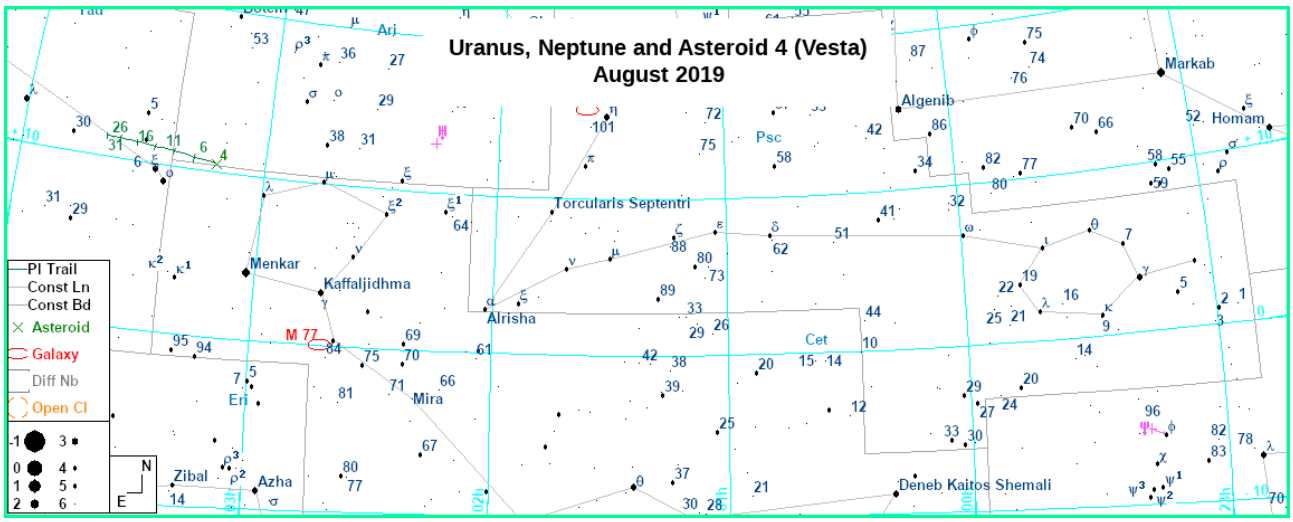
Binocular Double Stars for August			
		Spectral	Separation
Star	Magnitudes	Types	(arcsec)
67 Oph	4.0, 8.1	B5, A	54
ρ Oph	5.0, 7.3, 7.5	B5, A, B3	151, 157
53 Oph	5.7, 7.4	A2, F	41
δ Cep	4.1, 6.1	F5, A0	41
γ Her	3.7, 9.4	F0, K	43
d Boo	3.5, 7.8	K0, G0	105
μ Boo	4.3, 7	F0, K0	109
ι Boo	4.0, 8.1	A5, A2	38
n Boo	5.0, 5.0	K5, A2	628
DN & 65 UMa	6.7, 7.0,	A3, B9	63
π-1 Umi	6.6, 7.2	G5, G5	31

The Solar System

(Clicking on the charts in this section will take you to higher resolution ones)

The ice giants **Uranus** and **Neptune**, are best observed after midnight. They become gradually easier as August progresses: by the end of the month, Neptune (mag + 7.8) transits just after midnight during astronomical dark, and Uranus (mag +5.7) during morning astronomical twilight. Uranus starts going retrograde on the 10th, and its position changes by only 7 arcmin during August. Neptune, which is going retrograde all month, moves 43 arcmin directly towards *φ Aqr*, with which it has a very close conjunction early next month – watch this space for more details!

Further east in Aries, **Asteroid 4 (Vesta)**, is becoming visible to small binoculars. It starts the month at mag +8.0 and is less than 30° high at the beginning of nautical twilight, but even though it is tracking eastward, it is both brightening and getting higher in nautical twilight, so becomes easier to identify. As with Uranus and Neptune, you confirm its identity through its motion from night to night.



Asteroid Occultations

There are no predicted asteroid occultations of stars mag +7.5 or brighter, observable from the UK, this month.

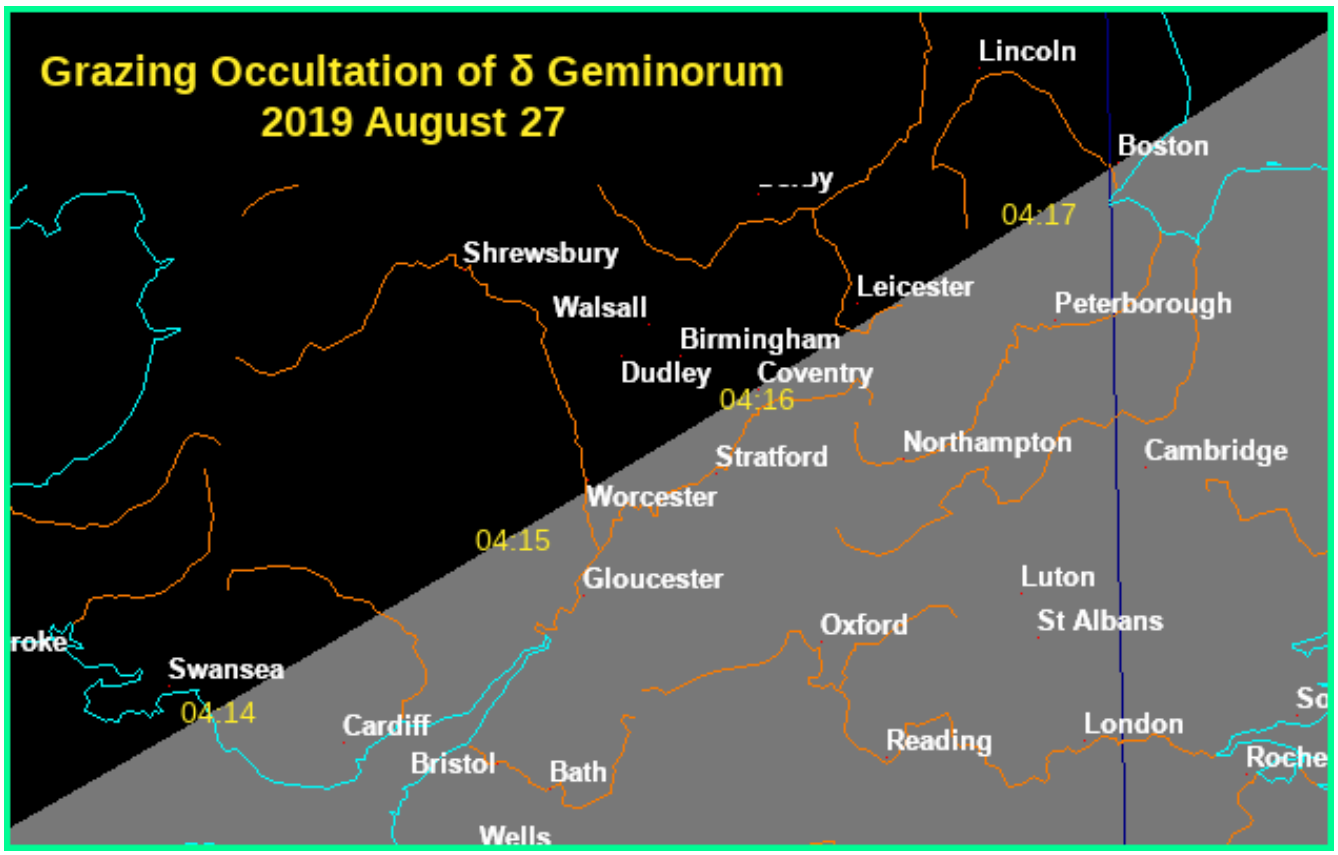
The Moon

August 01	New Moon
August 07	First Quarter
August 15	Full Moon
August 23	Last Quarter
August 30	New Moon

Lunar Occultations

Data are for my location and may vary by several minutes for other UK locations. The phases are (**D**)isappearance, (**R**)eappearance and (**Gr**)aze; they are dark-limb events unless there is a (**B**). The highlights are the events with the **δ Tau** stars as the Moon starts to traverse the Hyades on the 24th, and the graze of **δ Gem** three days later (South Wales and the English Midlands – see chart on page 10).

Lunar Occultations, August 2019, 50.9°N, 1.8°W							
Date	Time	Phase	Star	Spectral Type	Magnitude	Cusp Angle	Position Angle
Aug 24	02:41:25	D(B)	Del-1 Tau	G8	3.8	-83N	73
Aug 24	03:50:27	R	Del-1 Tau	G8	3.8	75S	246
Aug 24	04:07:27	R	Del-2 Tau	A7	4.8	27S	197
Aug 24	04:20:41	D(B)	Del-3 Tau	A2	4.3	-50N	40
Aug 25	03:30:18	R	CDTau	F7	6.8	89S	264
Aug 25	04:19:31	R	HIP 24820	G8	6.2	66S	241
Aug 26	01:26:47	R	HIP 29360	B1	7.4	56N	305
Aug 27	04:04:11	D(B)	Del Gem	F0	3.5	9N	16
Aug 27	04:15:42	Gr	Del Gem	F0	3.5	30N	
Aug 27	04:23:13	R	Del Gem	F0	3.5	30N	338



Public Outreach & Talks

This month I will be at the following public events; please do come and introduce yourself if you're at any of them.

9th-11th	SolarSphere Astronomy and Music Festival	**Public Observing, Binocular Astronomy** (workshop) **"How Old Is It?"** (talk)
12th:	Fordingbridge Astronomers	**Perseids Picnic** (Public Observing)
20th:	Solent Amateur Astronomers	**"Pseudoastronomy: Planet X, Zetans and Lost Civilisations"** (talk)
24th:	River Cottage Festival	**Public Observing**
30th-31st:	End of the Road Festival	**Public Observing**

Equipment Review

This month we look at the **Celestron EclipSmart 10x25 Binocular**.

On the run-up to the 2017 eclipse in the USA, a number of inexpensive dedicated solar binoculars (and telescopes) became available. A few months later, the same items began to be offered at a discount on Amazon UK and USA, and elsewhere.

Most were between 6x and 8x magnification, but *Celestron* produced two 10x *EclipSmart* models, 42mm and 25mm aperture. Apart from the aperture (and hence weight and size),

there were only two significant differences: the Porro-prism 42mm is threaded for a tripod adaptor and has a slightly wider field of view (7°) than the compact roof prism 25mm (5.7°). My rationale for choosing the smaller model were that it is cheaper, lighter, and smaller, and that the extra aperture and wider field of the 42mm model is irrelevant for a bright object only 0.5° in diameter, at a magnification that is nowhere near that which tests the resolving power of the aperture.

Its main intended purpose was to enable me to have a quick scan of the Sun for sunspots before deciding whether it's worthwhile setting up a solar-filtered telescope; hence the higher magnification of the 10x, as compared to the lower magnification offerings by other brands, would be an advantage.

The construction is a no-frills dual-hinge centre-focus compact roof-prism, with a neck-cord. It has no lens caps, but comes in a slightly padded pouch with a belt-loop. It tips the scales at a miserly 323g (11oz), a weight for which the neck-cord is not too thin. It sports Celestron's *Safe Solar Filter Technology*, which seems to mean that the "non-removable" ISO12312-2-compliant neutral density glass filters are held in place with a screw-down collar. It takes more than 8 complete turns to unscrew it, so it is unlikely to come adrift by accident. When you do take it off, you find two pieces of neutral density glass filter in each side.

The optical tubes, which seem to be of alloy construction, are armoured with a matte black rubber material that does not get overly slippery in sweaty hands on a hot day. The focus and right eyepiece dioptre adjustment are smooth and suitably stiff. Irritatingly, one of the hinges is slightly looser than the other, and there does not seem to be any facility for adjusting its tension.

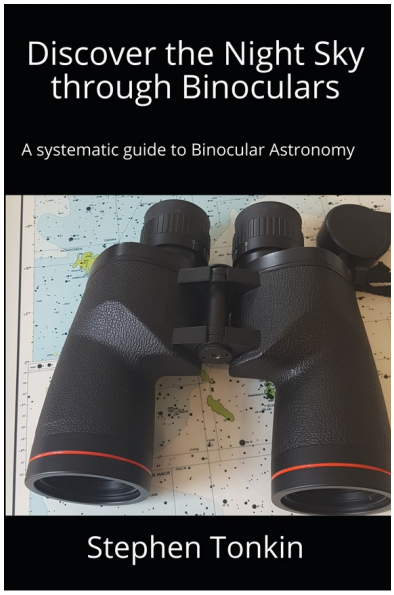
Several online reviews complain that "you can't see anything through it" - I strongly suspect that this is because the reviewers don't realise that this is a one-trick pony and, the only thing you *can* see through it is the Sun (or, only just, a bright light).

I found that the easiest way to locate the Sun without looking at it with unfiltered eyes is to start off directly below it and gradually raise the binoculars. I've successfully helped novices and children to locate the Sun like this. The image is white; for some reason, this usually surprises members of the public, who expect it to be yellow!

This is a useful bit of kit for personal use – it takes up little room and adds an imperceptible amount of weight to a kit-bag – but there are easier ways of showing people the Sun if you're doing outreach. The main reason for reviewing it now is that we have a transit of Mercury coming up in November and, if you were to consider getting one of these binoculars, get in head of the rush (if there is one). Also, you'll want to get a bit of practice (the presence of sunspots permitting) for this stiff challenge: it takes very good visual acuity and a critically-focused binocular to give you a (slim!) chance of detecting Mercury in transit at a magnification of only 10x!

The **Binocular Sky Newsletter** will always be free to anyone who wants it, but if you would like to support it, there are a number of options:

- Purchase one of my books, **Binocular Astronomy** or **Discover the Night Sky through Binoculars**. Click on the cover image for more information.
- Make a purchase via the affiliate links in the Binocular Sky shopfront
- Make a small PayPal donation to newsletter@binocularsky.com



Wishing you Clear Dark Skies,

Steve Tonkin

for

The Binocular Sky

Acknowledgements:

The charts in this newsletter were prepared with Guide v9.0 from http://projectpluto.com or Stellarium under GNU Public License, incorporating Milky Way panorama ©Axel Mellinger

Variable star data based on *The International Variable Star Index*
Occultation data derived with Dave Herald's *Occult*

Disclosure: Links to *Amazon* or *First Light Optics* may be affiliate links