The Binocular Sky Newsletter

No. 116
July 2021

Introduction

Welcome to July's **Binocular Sky** Newsletter.

Astronomical darkness, albeit short, return for locations south of about 53.5°N this month and, as binocular observers with our combination of maximum portability and minimal set-up time, we are well suited to take advantage of what this darkness reveals.

This month, you can see how Harlow Shapley determined the structure of our galaxy from the distribution of the various classes of deep sky objects. Also, make what use you can of any clear skies to explore the star-dense regions of Scorpius and Sagittarius – there is much here to delight any visual observer.

In the Solar System, we have half a dozen lunar occultations, we still have **Vesta** available – just!, and the binocular planets (**Uranus** and **Neptune**) are back – just!

We also have an experiment, to address a reader's query, that you can try if you have 70mm-80mm binoculars (page 10)

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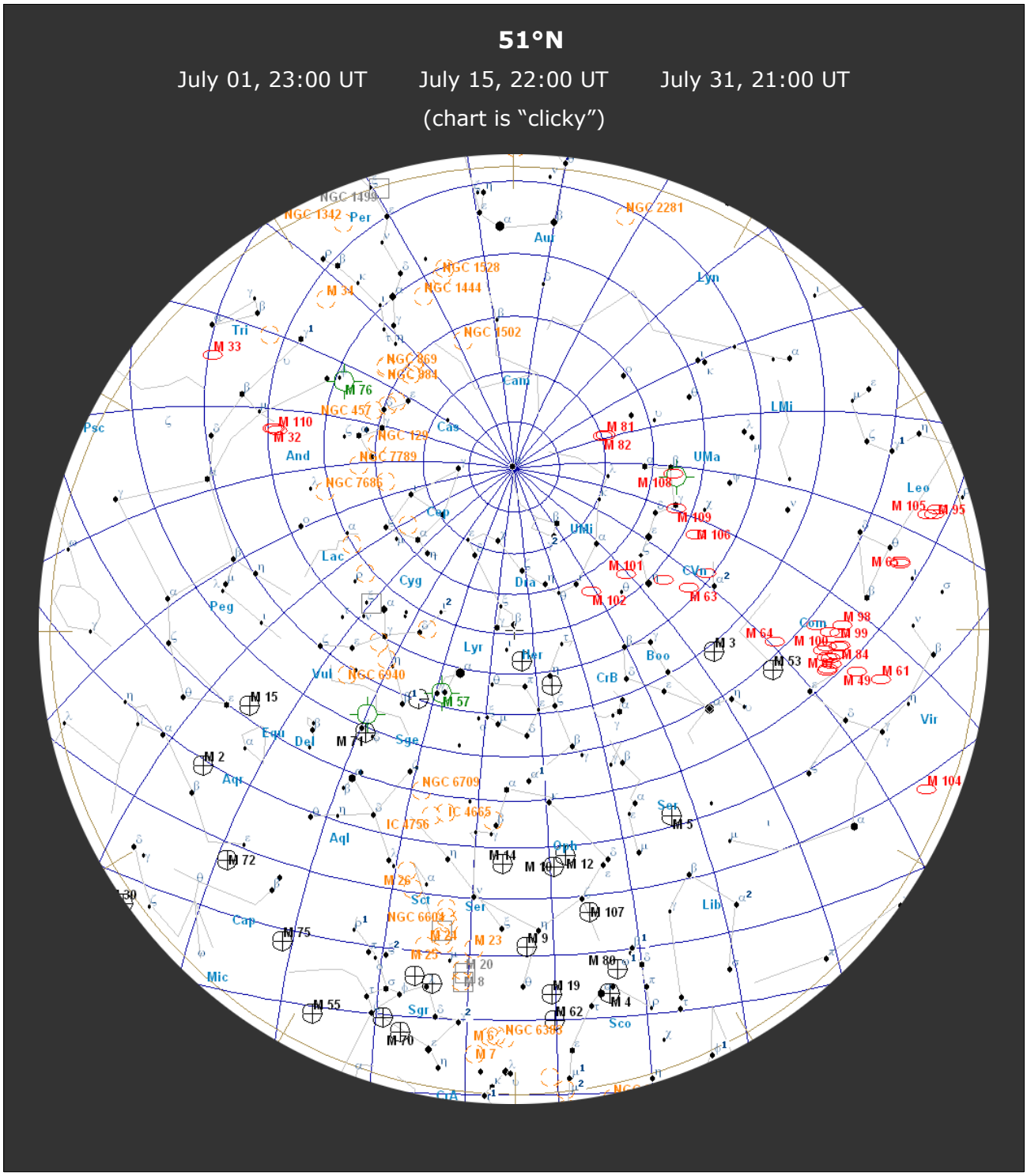
The Deep Sky

(Hyperlinks will take you to finder charts and more information on the objects.)

In 1917, the American astronomer Harlow Shapley made the first reliable estimate of the size of the Milky Way Galaxy. He did this by analysing the structure that is so clearly revealed in this month's all-sky chart:



Running in a strip down the middle, coinciding with the Milky Way itself, is the orange band of open clusters. Here, we are looking along the plane of the spiral arms of the galaxy which, of course, is where the star-forming (and, hence, open cluster forming) regions are. The higher density of planetary nebulae (green) here is due solely to the fact that there are more stars here.

This is flanked by the black bands of globular clusters. Shapley reasoned that these must form a halo around the galaxy itself. In the lower (southern) part of the chart, we are looking towards the centre of the galaxy, and so the globular halo is denser here than where it flanks the Milky Way through Cassiopeia and Perseus in the upper part of the chart, where we are looking away from the galactic centre.

From this, Shapley reckoned that the Milky Way has a diameter of around 100,000 light years and that the Solar System is about one third of the way out from the centre.

Lastly, when we look away from the plane of our galaxy, we are more able to see other galaxies in much deeper space (the red regions on the chart).

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.

NGC 457 (the Owl Cluster) and NGC 663 in Cassiopeia, and the Perseus Double Cluster are visible low in the north. More open clusters are visible in the southern sky as the region around Ophiuchus rises. These include Melotte 186, NGC 6633 and IC 4s665, all of which are easily visible in 50mm binoculars. 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 chain of bright white stars that forms part of the inverted greeting "Hi" written in the 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 visible in binoculars anywhere in the sky), and M25. A little to the northeast, in Scutum, is M11 (the Wild Duck Cluster). This is the densest known open cluster, which enables it to be distinguished from the Milky Way background. While you are here, take the opportunity to look at the Scutum Star Cloud as a backdrop to this cluster; it is second only to M24 for star density in the Milky Way.

While you are in this region of sky, 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 July, we are able to look out of the plane of the Galaxy during the evening, making 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, it is easier to resolve the outer stars of the latter one. M5 in Serpens is also visible on these summer nights. It is one of the largest globular clusters

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.

known, being 165 light years in diameter. It's apparent size is nearly as large as a Full Moon. At a reasonable altitude by mid-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 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 than a dumbbell!) is now 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 (although some people see it as being blue).

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: https://binocularsky.com/map_select.php

July 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
NGC 457 (the ET Cluster, the Owl Cluster)	Cas	oc	6.4	011932	581727
NGC 663	Cas	oc	7.1	014601	611406
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
M13 (NGC 6205, the Great Hercules Globular Clus	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
M20 (NGC 6514, the Trifid Nebula)	Sgr	en	6.3	180218	-230159
M8 (NGC 6523, the Lagoon Nebula)	Sgr	en	5.0	180348	-242259
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 Neb	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
M2 (NGC 7089)	Aqr	gc	6.5	213327	-004922

Variable Stars

Mira-type stars near predicted maximum (mag < +7.5)		
Star	**Mag Range**	**Period (days)**
W And	6.7-14.6	397.3
S CrB	5.8-14.1	360.26

Selection of binocular variables (mag < +7.5)			
Star	**Mag Range**	**Period**	**Type**
U Cep	6.8-9.2	2.5d (increasing)	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
AF Cyg	6.4-8.4	92.5	Semi-regular
ZZ Boo	6.7-7.4	4.99d	Eclipsing binary
U Sge	6.5-9.3	3.38d	Eclipsing binary
U Vul	6.7-7.5	7.99d	Cepheid
SU Cyg	6.4-7.2	3.84d	Cepheid
X Cyg	5.9-6.9	16.39d	Cepheid

Double Stars

Binocular Double Stars for July			
Star	**Magnitudes**	**Spectral Types**	**Separation (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
γ Her	3.7, 9.4	F0, K	43
δ 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
ν 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
δ Cep	4.1, 6.1	F5, A0	41

The Solar System

The Moon

July 01 Last Quarter
July 10 New Moon
July 17 First Quarter
July 24 Full Moon
July 31 Last Quarter

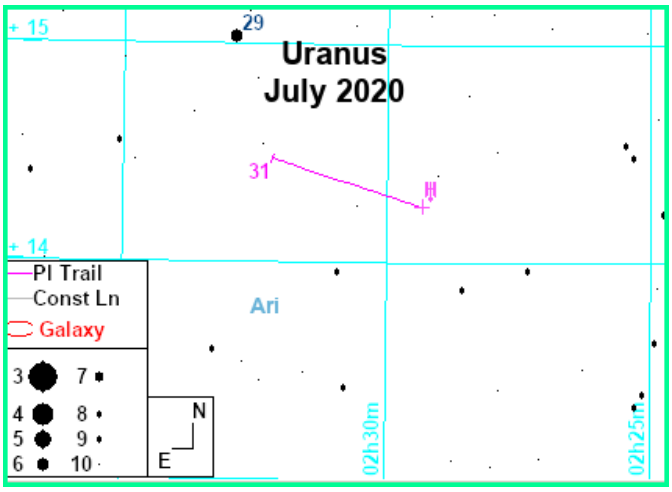
Lunar Occultations

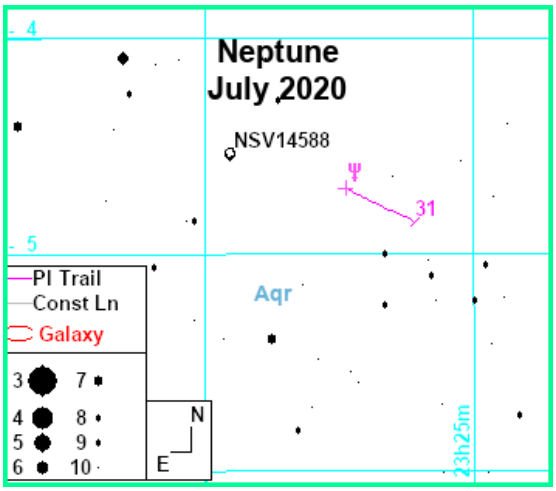
Data are for my location and may vary by several minutes for other UK locations. The phases are (**D**)isappearance, (**R**)eappearance and (**Gr**)aze; they are dark-limb events unless the Cusp Angle is negative.

Lunar Occultation July 2021 50.9°N 1.8°W							
Date	**Time (UT)**	**Phase**	**Star**	**Spectral Type**	**Magnitude**	**Position Angle**	**Cusp Angle**
Jul 01	02:46:13	R	HIP 840	K1	5.8	251	71S
Jul 03	03:51:28	R	nu Psc	K3	4.5	197	19S
Jul 04	03:57:16	R	xi Ari	B7	5.5	276	81N
Jul 14	21:29:45	D	HIP 56079	F5	6.7	139	39S
Jul 19	22:26:51	D	lam Lib	B3	5.0	43	31N
Jul 27	00:00:39	R	HIP 113531	K3	6.1	223	58S

Planets

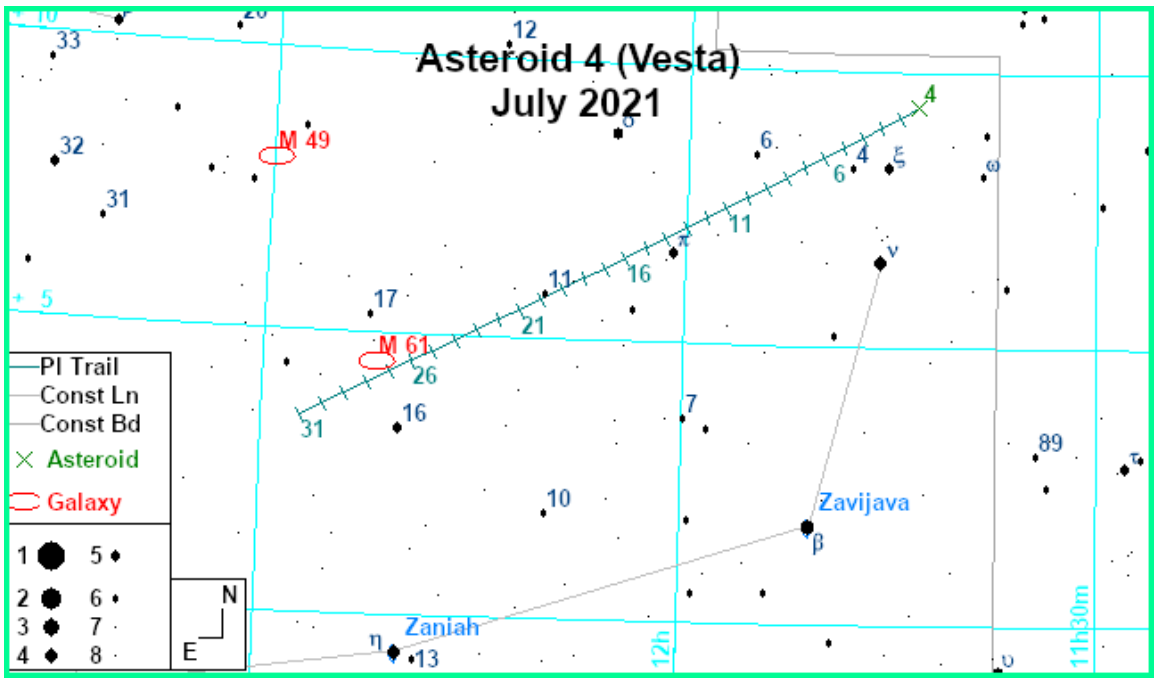
The binocular planets, **Uranus** (mag +5.8) and **Neptune** (mag +7.9) are back and are now observable in morning twilight, in *Aries* and *Aquarius* respectively. Neither is easy from this latitude. The 7th mag star just above Neptune's trail on the chart (next page) is HIP 116402.





Asteroids

Asteroid 4 (**Vesta**) fades from mag. +7.8 to +7.9 during the month as it moves SE through northern Virgo, but is still within the range of small binoculars as we lose it into the western twilight.



A Jovian Experiment?

Here's an interesting one: a correspondent suspects he may have spotted the GRS complex (GRS plus a bit of trailing SEB) with APM APO 16x70s, 5hrs after local sunrise. (He checked the position of the GRS **after** the obs). It's theoretically possible, and he wonders if anyone else has managed this feat - GRS in 70 or 80mm at less than 20x - or knows of anyone who has. (I haven't!)

If you want to discuss this, you can do so here.

Public Outreach & Talks

If you find yourself at any of these, do give me a virtual "wave". Dates are UT.

July 8th	Pop Astro Live	**The Right Light at Night**
July 15th	Bourne End Community Association	**Time and Calendars**

Zoom/Webex Talks during the SARS-CoV-2 emergency?

I regularly give talks, on *Binocular Astronomy* and numerous other astronomical topics. During the current "lockdown" in the UK, I'd be happy to do this – potentially anywhere in the world – on Zoom or Webex if that is of interest.

If you would like a talk for your society/group, Click here for current talks.

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**.
- Buy equipment or books through an affiliate link in the newsletter or on https://binocularsky.com
- Make a small PayPal donation to newsletter@binocularsky.com

Wishing you Clear Dark Skies,

Steve Tonkin

for

The Binocular Sky

Acknowledgements:

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Variable star data based on *The International Variable Star Index*

Occultation data derived with Dave Herald's *Occult*

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