



The Binocular Sky

No. 109
December 2020

Newsletter



Introduction

Welcome to the 9th anniversary edition of the Binocular Sky Newsletter. To all of you: *Thanks for making this feel worthwhile, and may I wish you a joyous festive season, however you celebrate it. Keep safe and keep looking up!*

What a year it has been! I'm frequently grateful that we can continue this hobby of ours, whatever the lockdown or social distancing regulations where we live. Although it's been a tough year, I've been delighted by the way so many astronomers have risen to the challenge and created on-line astro-activities and events. We have a special one, from the folk who bring us the annual Solarsphere Festival, on the 19th of this month.

We've got the **Pleiades** and **Orion Nebula** back in the evening sky, at last. The ice-giants, **Uranus** and **Neptune**, are only 3 hours apart in the sky, so can be observed during the same session if you time it well. Uranus is now relatively easy, but Neptune is getting quite difficult and is only available in the evening.

We also have an appulse of the kind that may have given rise to a legend.

If you would like to receive the newsletter automatically each month, please complete and submit the subscription form. You can get "between the newsletters" alerts, etc. via  and .

The Deep Sky

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

December marks the welcome return of the [Pleiades \(M45\)](#) and the [Great Orion Nebula \(M42\)](#) to early evening observation at a reasonable altitude. The trio of open clusters in Auriga, [M36](#), [M37](#) and [M38](#) and [M35](#) in Gemini are also worth observing. While you are looking at [M35](#), also see if you can identify two smaller open clusters, [NGC 2158](#), which is half a degree to the SE, and the slightly more difficult [IC 2157](#), which is a degree to the ESE. Nearer the Pleiades is [NGC 1647](#), which is within the 'V' asterism of the [Hyades](#). It is a sparse cluster and, although it is visible in a 10x50 binocular, it really benefits from a little more aperture and magnification.

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.

The open cluster [NGC 752](#) is very well placed this month; it is one of those objects that is often overlooked because of its proximity to a more famous object, in this case, the Great Andromeda Galaxy (see below). [NGC 752](#) is a very fine cluster, and easy in 50mm binoculars in which it begins to resolve. Nearby towards Perseus is another fine cluster, [M34](#).

In December, the Milky Way is nearly overhead in the mid-to-late evening. This means that those objects (globular clusters and galaxies) that are outside our galaxy are not as well placed for observation as they are when the Milky Way is low in the sky. [M81 \(Bode's Nebula\)](#) and [M82 \(The Cigar Galaxy\)](#), are still relatively easy to observe, even in a 50mm binocular, and we can be grateful that their altitude is such that we are unlikely to get neck-strain when we do so with straight-through binoculars. This pair can be used as a good demonstration of averted vision: if you have them both in the same field of view, you may see that the core of [M81](#) becomes more

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.

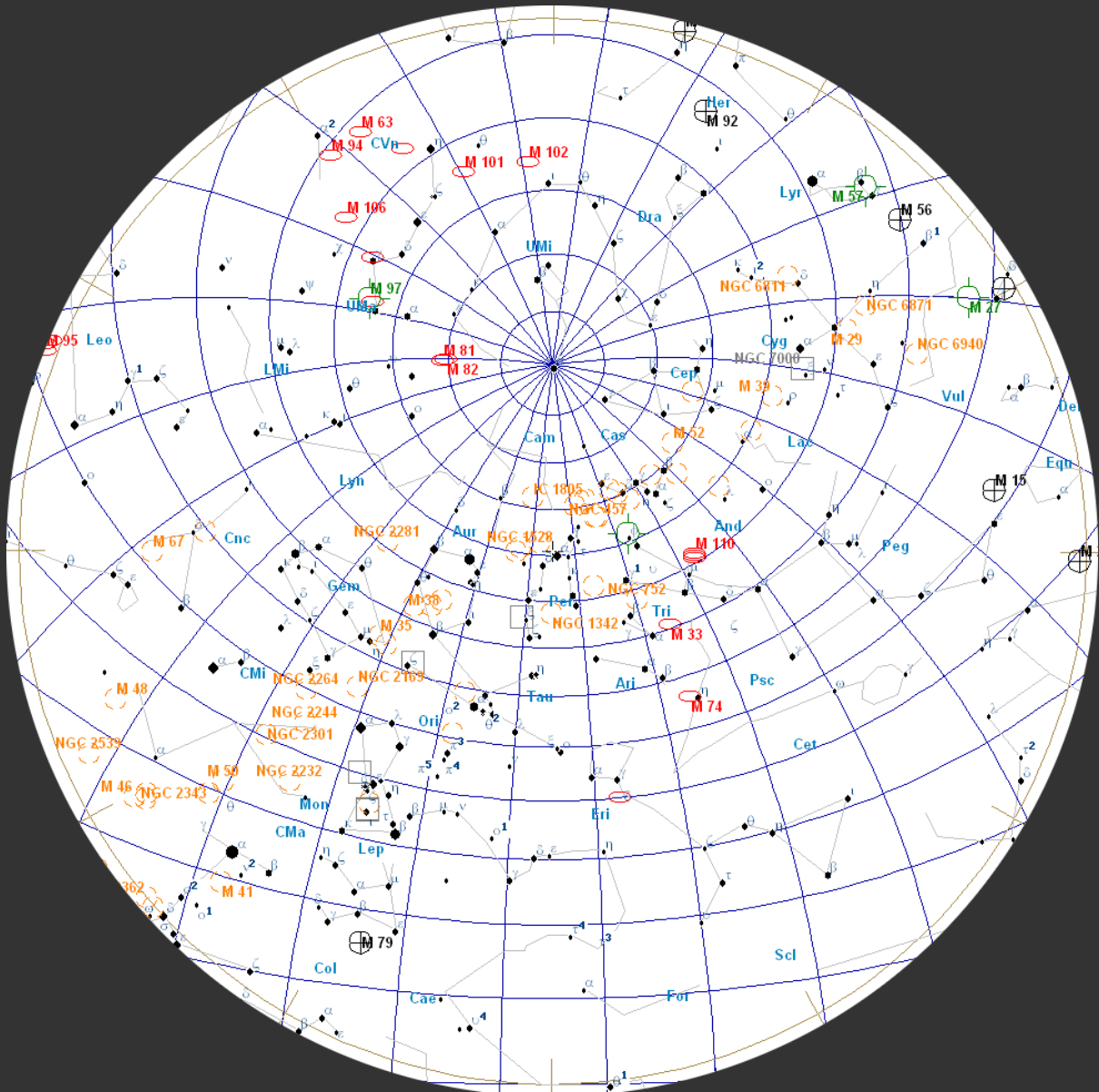
51°N

December 01, 23:00 UT

December 15, 22:00 UT

December 31, 21:00 UT

(chart is "clicky")



apparent if you look at M82.

Two notable exceptions to the generalisation of galaxies being poorly placed on December evenings are The Great Andromeda Galaxy, M31 and M33 (The Triangulum Galaxy), both of which are close to the plane of the

Milky Way. M31 in particular is very easily visible this month and is a naked eye object in moderately dark skies. It is large and bright enough to be able to withstand quite a lot of light pollution (making it available to urban observers). M33 has a low surface-brightness and benefits from lower magnification. This generally makes it easier to see in, say, a 10x50 binocular than in many "starter" telescopes. It is in December evenings that the Sculptor Galaxy, NGC 253, becomes observable before midnight, but you will need a good southern horizon for this.

Although the two Hercules globular clusters, M92 and the very impressive, and very easy to find, M13 are still observable in the early evening, but their altitude becomes less favourable as the month progresses. M15 and M2 are both much better placed for observation in December.

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.

The easiest planetary nebula, M27 (the Dumbbell Nebula – also known as the Apple Core and the Diabolo) – is visible in the evening skies in even 30mm binoculars. The Helix Nebula, NGC 7293 is now about as well-placed as it gets for observation from Britain before midnight; you'll need a decent southern horizon.

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.

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

December 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 |
| M33 (NGC 598, the Pinwheel Galaxy) | Tri | gal | 6.2 | 013351 | 303929 |
| NGC 752 | And | oc | 5.7 | 015742 | 374700 |
| M34 (NGC 1039) | Per | oc | 5.2 | 024204 | 424542 |
| M45 (the Pleiades) | Tau | oc | 1.6 | 034729 | 240619 |
| Melotte 25 (the Hyades) | Tau | oc | 0.5 | 042650 | 154841 |
| NGC 1647 | Tau | oc | 6.4 | 044555 | 190542 |
| M38 (NGC 1912) | Aur | oc | 6.4 | 052842 | 355117 |
| M42 (NGC 1976, The Great Orion Nebula) | Ori | en | 4.0 | 053517 | -052325 |
| M36 (NGC 1960) | Aur | oc | 6.0 | 053617 | 340826 |
| M37 (NGC 2099) | Aur | oc | 5.6 | 055218 | 323310 |
| IC 2157 | Gem | | 8.4 | 060449 | 240350 |
| NGC 2158 | Gem | oc | 8.6 | 060726 | 240529 |
| M35 (NGC 2168) | Gem | oc | 5.1 | 060900 | 242100 |
| M81 (NGC 3031) | UMa | gal | 7.8 | 095533 | 690401 |
| M82 (NGC 3034) | UMa | gal | 9.2 | 095554 | 694059 |
| M13 (NGC 6205, the Great Hercules Globular Cluster) | Her | gc | 5.8 | 164141 | 362738 |
| M92 (NGC 6341) | Her | gc | 6.4 | 171707 | 430812 |
| M15 (NGC 7078) | Peg | gc | 6.2 | 212958 | 121003 |
| M2 (NGC 7089) | Aqr | gc | 6.5 | 213327 | -004922 |

Double Stars

| Binocular Double Stars for December | | | |
|-------------------------------------|------------|----------------|---------------------|
| Star | Magnitudes | Spectral Types | Separation (arcsec) |
| ζ Lyr | 4.3, 5.6 | A3, A3 | 44 |
| β Lyr | 3.6, 6.7 | B8, B3 | 46 |
| οΣ525 Lyr | 6.0, 7.6 | G0, A0 | 45 |
| β Cyg | 3.1, 4.7 | K0, B9 | 35 |
| d Cep | 4.1, 6.1 | F5, A0 | 41 |
| 56 And | 5.7, 5.9 | K0, K2 | 128 |
| ΣI 1 And | 7.1, 7.3 | G5, G5 | 47 |
| ψ-1 Psc | 5.3, 5.8 | A2, A0 | 30 |
| 14 Ari | 5.0, 7.9 | F0, F2 | 106 |
| 62 Eri | 5.4, 8.9 | B9, B8 | 67 |
| τ Tau | 4.3, 7.0 | B5, A0 | 63 |
| ν Gem | 4.1, 8.0 | B5, A0 | 113 |
| ζ Gem | 4.0, 7.6 | G0, G | 101 |
| π-1 Umi | 6.6, 7.2 | G5, G5 | 31 |

Variable Stars

| Mira-type stars near predicted maximum (mag < +7.5) | | |
|--|------------|---------------|
| Star | Mag Range | Period (days) |
| R Aql | 5.5 – 12.0 | 270.5 |
| X Oph | 5.9 – 8.6 | 338 |

(X Oph is low in the west as the sky darkens and will be best observed early in the month in the evenings.)

| Selection of binocular variables (mag < +7.5) | | | |
|---|-----------|-------------------|------------------|
| Star | Mag Range | Period | Type |
| XY Lyr | 5.8-6.4 | Irreg | Irregular |
| 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 |
| U Del | 7.0-8.0 | ca. 110d | Irregular |
| TW Peg | 7.0-9.2 | ca. 90d | Semi-regular |
| U Cep | 6.8-9.2 | 2.5d (increasing) | Eclipsing binary |
| V Aqr | 7.6-9.4 | ca. 244d | Semi-regular |
| SS Cep | 6.7-7.8 | ca. 190d | Semi-regular |
| RZ Cas | 6.2-7.7 | 1.195d | Eclipsing binary |

The Solar System

(Charts are “clicky” for higher resolution alternatives)

The Moon

| | |
|-------------|---------------|
| December 08 | Last Quarter |
| December 14 | New Moon |
| December 21 | First Quarter |
| December 30 | Full Moon |

Lunar Occultations

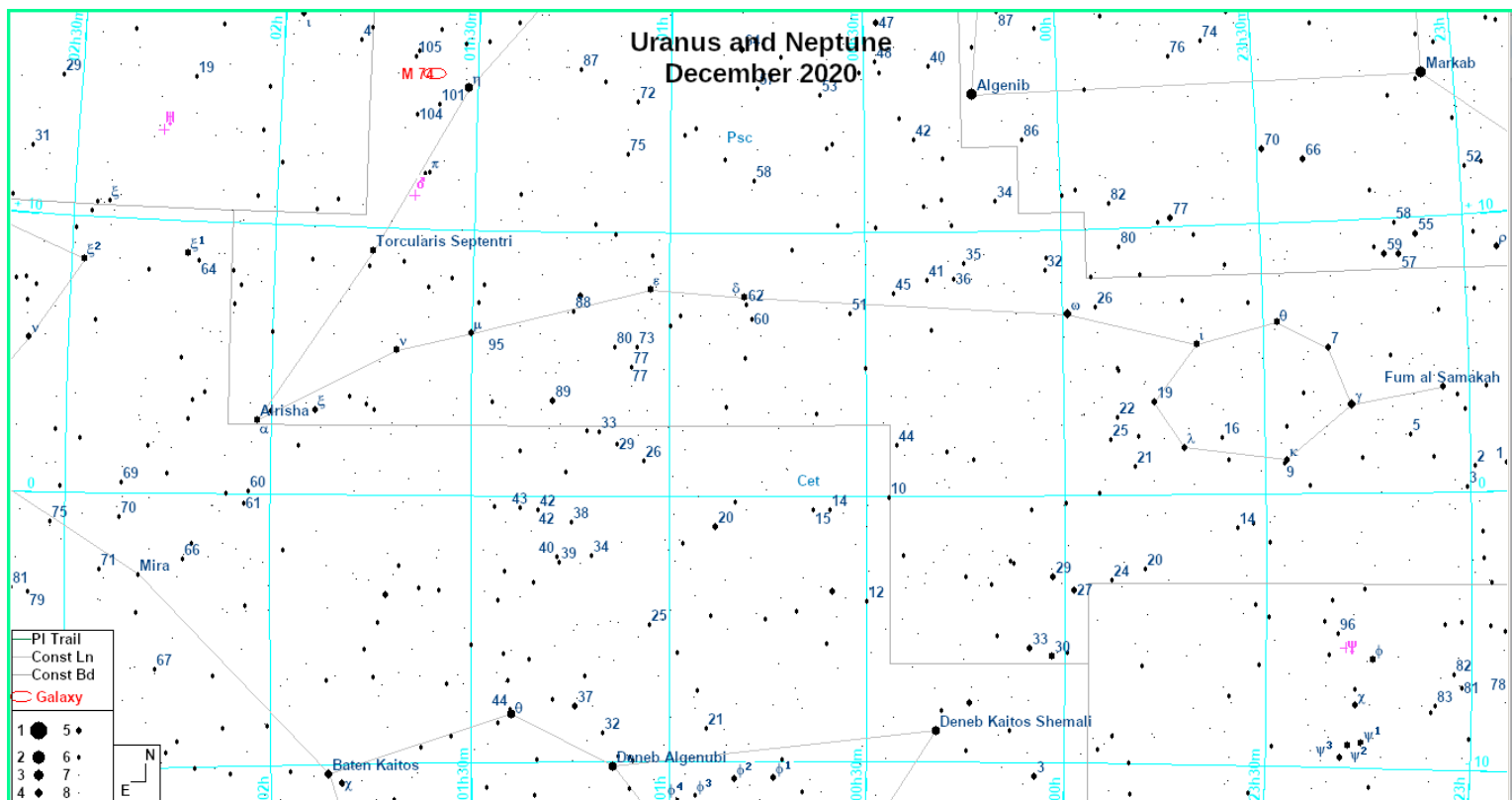
Data are for my location and may vary by several minutes for other UK locations. The phases are **(D)**isappearance, **(R)**eappearance and **(Gr)**aze; they are dark-limb events unless there is a **(B)**.

Lunar Occultations December 2020 50.9°N 1.8°W

| Date | Time (UT) | Phase | Star | Spectral Type | Magnitude | Position Angle | Cusp Angle |
|--------|-----------|-------|-----------|---------------|-----------|----------------|------------|
| Dec 11 | 05:00:51 | R | HIP 68752 | A0 | 6.7 | 122 | 41S |
| Dec 11 | 06:15:02 | R | 95 Vir | F2 | 5.5 | 138 | 79N |
| Dec 18 | 18:30:47 | D | 37 Cap | F5 | 5.7 | 218 | 66S |
| Dec 21 | 19:51:41 | D | 30 Psc | M3 | 4.4 | 210 | 65N |
| Dec 21 | 22:01:35 | D | 33 Psc | K1 | 4.6 | 241 | 71S |
| Dec 23 | 17:35:47 | D | HIP 6751 | B9 | 6.6 | 145 | 83N |
| Dec 24 | 18:11:45 | D | 64 Cet | G0 | 5.6 | 141 | 67N |
| Dec 24 | 19:31:10 | D | Xi-1 Cet | G8 | 4.4 | 167 | 65N |
| Dec 27 | 21:11:43 | D | HU Tau | B8 | 5.9 | 150 | 66S |
| Dec 29 | 03:38:07 | D | HIP 68752 | B8 | 6.6 | 267 | 67S |

Planets

Uranus (mag +5.7) is now an evening object, and **Neptune** (mag +7.9) is best early in the evening; it's getting lower in the west, so is best early in the month..



Star of Bethlehem?

On the 21st there is a very close (6 arcminutes) appulse/conjunction of Jupiter and Saturn. To the unaided eye, they may just appear to merge, but binoculars will still separate them. There has been speculation that it was an event like this that gave rise to the "Star of Bethlehem" legend, which is probably why I've been asked to do my talk on the subject several times over the winter. (I don't think



it was an appulse, but if you want to find out what I do think, you'll just have to come along to a talk! 😊)

The image is a simulated (Stellarium) 10x50 binocular view of the event from my location at 1700 UT, when they will be 10° above the southwestern horizon

Meteor Showers

The **Geminids** are the best meteor shower if conditions are right, and this year they are, with the peak coinciding with the dark of the Moon. The shower is active for the last 3 weeks of the month and has its peak predicted for the evening of the 13th, with a ZHR of 120 to 160 (it has been intensifying in recent years). Most meteors are due to debris left by comets, but the Geminid shower is one of two (the other is the Quadrantid shower, which peaks on January 03) that originates from an asteroid, in this case asteroid **3200 Phaethon**. You can use binoculars to examine the persistence of any ionisation trains from these slow-moving, colourful meteors, as they reveal the wind patterns in the upper atmosphere.

Public Outreach & Talks

If you're at any of these, do give me a virtual "wave":

| | | |
|----------------------|--|--|
| Dec 3 rd | Herefordshire AS | Ten Ways the Universe Tries to Kill You |
| Dec 7 th | Winchester Café Scientifique | Fuzzy Blobs: what nebulae teach us about the Universe |
| Dec 10 th | Swansea AS | The Star of Bethlehem |
| Dec 12 th | Newtown AS | The Star of Bethlehem |
| Dec 13 th | Fordingbridge Astronomers | Geminid Meteor Watch |
| Dec 22 nd | Mansfield and Sutton AS | The Star of Bethlehem |

Solarsphere Day, 19th December



Pete Williamson of *Solarsphere/AstroRadio/Reach Out and Touch Space* is one of those who has been keeping astronomy social during the Covid Emergency. He is in the early stages of planning a free "Solarsphere Day" for 19th December 2020. Click on the image above for more info in a video from Pete, and [here](#) for the preliminary line-up for the day.

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 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.](#)**
- 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*

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