

Astronomy Observation Journal

Piero Dalle Pezze

July 6, 2015

Abstract

This document contains my observation reports and the objects listed by catalogue that I have so far observed. At the end the complete Messier and Caldwell catalogues are also presented. This file was generated using Java software tool *AstroJournal* (<https://pdp10@bitbucket.org/pdp10/astrojournal.git>) and *pdflatex* (<http://www.tug.org/texlive/>). *AstroJournal* imports files containing astronomy observation reports and observed objects by catalogues. Then it generates an integrated journal document in Latex which is then exported in PDF using the utility *pdflatex*. *AstroJournal* is released under GPL v3 license.

Contents

| | | |
|----------|---|-----------|
| 1 | Legends | 2 |
| 2 | Observation reports | 3 |
| 3 | Observed objects by catalogue | 42 |
| 4 | Complete Messier and Caldwell catalogues | 51 |

1 Legends

Seeing Scale (Antoniadi):

1. Perfect seeing, without a quiver
2. Slight undulations, with moments of calm lasting several seconds
3. Moderate seeing, with larger air tremors
4. Poor seeing, with constant troublesome undulations
5. Very bad seeing, scarcely allowing the makings of a rough sketch

Transparency Scale (American Association of Amateur Astronomers):

1. Do Not Observe: Completely cloudy or precipitating (Why are you out?)
2. Very Poor: Mostly Cloudy
3. Poor: Partly cloudy or heavy haze. 1 or 2 Little Dipper stars visible
4. Somewhat Clear: Cirrus or moderate haze. 3 or 4 Little Dipper stars visible
5. Partly Clear: Slight haze. 4 or 5 Little Dipper stars visible
6. Clear: No clouds. Milky Way visible with averted vision. 6 Little Dipper stars visible
7. Very Clear: Milky Way and M31 visible. Stars fainter than mag 6.0 are just seen and fainter parts of the Milky Way are more obvious
8. Extremely Clear: overwhelming profusion of stars, Zodiacal light and the gegenschein form continuous band across the sky, the Milky Way is very wide and bright throughout

Target Types:

- SN Rem: Supernova Remnant
- Neb: Nebula
- Galaxy: Galaxy
- CL+Neb: Cluster with Nebula
- Opn CL: Open Cluster
- Glob CL: Globular Cluster
- Pln Neb: Planetary Nebula
- Satellite: Our Satellite (Moon)
- Planet: Solar System Planet
- Star: Star
- Dbl Star: Double Star
- Mlt Star: Multiple Star

2 Observation reports

Date: 05/07/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:50-0:20 **Eyepieces:** Panoptic 24mm, Nagler 13mm, Nagler 7mm Vixen 5mm SLV, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4.0mm, 4.30deg; 28x, 2.2mm, 2.80deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.76deg
Altitude: 12m **Filters:** Astronomik UHC, OIII
Temperature: 11C (wind: 13km/h)
Seeing: 3 - Moderate seeing
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|----------|--------------------------|--|
| Saturn | Lib | Planet | 28x, 51x, 72x, 103x | Observation at twilight. At 72x, the North Equatorial Belt was easily visible. The Cassini division was detectable at the lateral sides of the rings, and the rings A and B were clearly distinct. Titan was visible and appeared like a small star. At 28x or 51x the planet looked crisper, but the NEB was not easily detectable. At 103x the Cassini division was not visible. The seeing was not good enough for higher power, unfortunately. |
| IC4665 | - | Oph | Opn CL | 28x |
| Cr349 | | | | Summer Beehive Cluster. Wonderful open cluster, close to Beta Oph (Cebalrai). Always worth having a look if in the area. |
| 61 | Oph | Dbl Star | 28x | From Beta Oph (Cebalrai), I moved South towards Gamma Oph. 61 Oph is a double star located at about 1 degree East of Gamma Oph. It is already split at 28x. It seems to me that they were both blue but with slightly different magnitude. The sky was not completely dark, so I might be wrong. Nice pair. |
| M8 | Sgr | CL+Neb | 15x +/- UHC or OIII, 28x | Lagoon Nebula. At 28x the stars in this cluster with nebula are much better separated. I decided to use a low power eyepiece on the nebulae in this area. The OIII was too strong mainly because the sky was not dark enough and this target is just above the horizon. Instead a UHC was ideal and revealed the nebula via direct vision clearly. This is one of my favourite targets in Sagittarius. |
| NGC6530 | Sgr | Opn CL | 15x +/- UHC, 28x | Cluster inside / East the Lagoon Nebula. This cluster emerges at 28x to me. |
| M20 | Sgr | CL+Neb | 15x +/- UHC, 28x | Trifid Nebula. The Southern part of this nebula benefitted from the UHC filter and showed a patch of cloud around the cluster. The Northern part of the nebula was not visible instead. |
| M25 | Sgr | Opn CL | 15x +/- UHC, 28x | This is a nice open cluster of medium size. Some star are bright, others much dimmer. |
| M17 | Sgr | CL+Neb | 15x +/- UHC, 28x | Omega Nebula. The nebula was clearly visible at 15x with direct vision. It appeared as a small but quite dense cloud. |

| | | | | |
|---------------------------------|-----|---------|------------------------|--|
| M16 | Ser | CL+Neb | 15x +/- UHC, 28x | Eagle Nebula. This nebula was only visible with averted vision. Whereas I did not see much difference in the Omega Nebula between averted and direct vision, for the Eagle Nebula averted vision showed a much wider nebula extension. |
| NGC6604 | Ser | CL+Neb | 15x +/- UHC, 28x | This cluster with associated nebulosity is located at about 1.5 degrees North of the Eagle Nebula. It is a fairly spread cluster without many stars. The nebula shape was not really identifiable, but it was possible to spot the presence of diffuse nebulosity in the area. |
| M24 | Sgr | Opn CL | 28x | Sagittarius Star Cloud. I counted about 50 stars, although the sky was not dark yet. Fantastic cluster |
| M29 | Cyg | Opn CL | 15x | Cooling Tower. Easily detectable as it is in the same field of view of Sadr. It is at about 2 degrees South from Sadr and 2 degrees East from the Cygnus' neck. |
| IC4996 - Cr418 | Cyg | Opn CL | 15x | From Sadr, follow the line forming Cygnus' neck. This object is located at about 1.5-2 degrees East from the Cygnus' neck. It is easily detectable at 15x. |
| NGC6883 - Cr415 | Cyg | Opn CL | 15x | As for IC4996. |
| NGC6871 | Cyg | Opn CL | 15x | As for IC4996. |
| C27 - NGC6888 | Cyg | Neb | 15x +/- UHC or OIII | Crescent Nebula. The nearby group of stars is located on the Cygnus' neck at about 1.5 degrees from IC4996 (from IC4996, just move 1.5 degrees North-West). Spotting the nebula was difficult though. I suspect it requires a darker sky. With averted vision and a UHC filter, very faint small grey patches were suspected around the nearby stars. A OIII filter made these patches slightly more noticeable. However, in my opinion this seems to be a challenging target. |
| M27 | Vul | Pln Neb | 15x +/- UHC | The Dumbell Nebula. This planetary nebula is clearly distinguishable from the background sky and shows up like a grey ball. No detail at this magnification was visible though. Really pretty target. |
| C20 - NGC7000 | Cyg | Neb | 15x +/- UHC | North America Nebula. The presence of diffuse nebulosity was visible in the area, but it was not obvious to spot the presence of this nebula specifically. |
| C33 / 34 - NGC6992 / 6960 | Cyg | SN Rem | 15x +/- OIII | Veil Nebula. I did not spot it. After positioning at 52 Cyg, I gradually moved in the surrounding area at South, but was not able to spot any nebulosity. As for the Crescent Nebula, this is a challenging target and I believe it requires darker skies. |

| | | | |
|----------------------|------------------------|------------------------|---|
| Date: | 02/07/2015 | Telescopes: | Tele Vue 60 F6 |
| Time: | 21:50-0:00 | Eyepieces: | Nagler 13mm, Nagler 7mm Vixen 5mm SLV, Nagler 3.5mm |
| Location: | Cambridge, UK | Power, EP, FOV: | 28x, 2.2mm, 2.80deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.76deg |
| Altitude: | 12m | Filters: | Astronomik OIII |
| Temperature: | 16C (wind: 10km/h) | | |
| Seeing: | 2 - Slight undulations | | |
| Transparency: | 5 - Clear | | |

| Target | Cons | Type | Power | Notes |
|---------|------|--------|---------------------|--|
| Saturn | Lib | Planet | 28x, 51x, 72x, 103x | Observation at twilight. At 28x I could spot the rings and Titan. At 51x Saturn was very crisp but not additional detail was detectable. At 72x, the North Equatorial Belt and the Cassini division on the lateral rings were visible. At 103x those gained details were somehow lost unfortunately. Saturn was lovely at 72x. |
| NGC6871 | Cyg | Opn CL | 28x, 51x | I tried to see this wonderful open cluster again at both 28x and 51x. It is a fantastic cluster with the faint Milky Way dust in the background. 3-4 pairs of double stars were visible. All the bright stars are blue. Really nice. |
| M29 | Cyg | Opn CL | 28x, 51x | Cooling Tower. At 51x the cluster revealed 2-3 dim stars but not much else. The full moon did not help though. |
| M39 | Cyg | Opn CL | 28x, 51x | Great open cluster of medium size. About 20-25 bright stars were visible and other 20-25 faint stars detectable. This is a nice open cluster with a decent size, shape and a mixture of bright and dim stars. |
| NGC7082 | Cyg | Opn CL | 28x, 51x | Although this cluster is a bit smaller than M39, it is much less evident. It is located at South of M39 and where the lines made from two pairs of stars intersecate. Nice to see, but far less spectacular than M39. |
| NGC7086 | Cyg | Opn CL | 28x | Located 3-4 degrees North of M39 and above the star 80 Cyg (Azelfafage, mag 4.75), this cluster is just above a curved chain of stars. It is a small open cluster made of dim stars. |
| Mu | Cep | Star | 28x | Herschel's Garnet Star. Bright red supergiant star located next to IC1396. Magnitude 4.2. It is the biggest star visible at naked eye. |
| IC1396 | Cep | CL+Neb | 28x +/- OIII, 51x | Elephant's Trunk Nebula. I tried to reach this open cluster from M39, but I wrongly arrived at Alpha Cep (Alderamin). Star hopping from Alderamin was much easier. Although the nebula was not visible with the OIII filter, it was nice to see this cluster. In front of the Garnet Star, there is a chain of stars. The brightest is a tight system of three stars of different luminosity. Really nice to see and already split at 28x. This was well separated at 51x. Nearby this system there is another double star where the components have different brightness. Almost all, if not all these stars but the Garnet Star, are blue. |
| NGC7235 | Cep | Opn CL | 28x | From the Garnet Star, I moved East until I reached Zeta Cep. From there in the same field I gradually moved South. There are three bright stars as a reference. Between Zeta Cep and these three stars there is this little open cluster formed by dim stars. |

| | | | | |
|---------|-----|----------|-----|--|
| NGC7261 | Cep | Opn CL | 28x | Two of the three stars previously mentioned are double stars (I think!). To find NGC7261 I moved along the line depicted from these three stars on the side of the double star on the corner (the one located at East). This cluster was also small and made of 3-4 dim stars. |
| Delta | Cep | Dbl Star | 28x | Very close to the cluster above, continuing along that imaginary line, I found this beautiful easily split double star. One component is orange, whereas the other is blue. The brightness is different between the two and in particular the blue star is dimmer. This double star is a little gem and reminded me of Beta Cyg (Albireo). |

Date: 30/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:30-23:20 **Eyepieces:** Nagler 13mm, Vixen 5mm SLV, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 28x, 2.2mm, 2.80deg; 72x, 0.8mm, 0.69deg; 144x, 0.4mm, 0.35deg; 206x, 0.3mm, 0.38deg

Altitude: 12m **Filters:**
Temperature: 20C (wind: 10km/h)
Seeing: 3 - Moderate seeing
Transparency: 4 - Partly clear

| Target | Cons | Type | Power | Notes |
|-----------------|------|-----------|----------------|--|
| Venus - Jupiter | Com | Planet | 28x, 72x, 103x | Observation at twilight. Conjunction Venus-Jupiter. The two planets were about 0.3 / 0.5 degrees apart. Venus was largely brighter and bigger than Jupiter. Venus phase was less than 40%. The planet border was well defined. Jupiter bands were only visible at low power (28x) due to the mediocre seeing. It was possible to see 3 satellites but the sky was still too bright for detect them easily. It was nice to see this conjunction, but unfortunately the seeing did not allow sufficient resolution for Jupiter which was not easy to focus. At 28x the North and South Equatorial belts were visible in the early evening. It was an interesting conjunction but not as great as the one I saw when I was teenager. At the time the two planets were elongated at naked eye. It was spectacular. |
| Saturn | Lib | Planet | 72x | Observation at twilight. Due to the poor seeing, I did not push magnifications higher than 72x. Even at this zoom, the planet was not very crisp. |
| Moon | Oph | Satellite | 72x, 206x | 144x, Observation at twilight. Waxing Gibbous and phase 97%. I observed Tycho, Copernicus and Kepler. |
| NGC6910 | Cyg | Opn CL | 28x | From Deneb (Alpha), I moved to Sadr (Gamma). This open cluster is on the line between these two stars, but on the side of Sadr. Its size is only 8', but is sufficiently bright (magnitude 7.4, surface brightness 11.7). It is formed by few bright stars and I could count about 7-8 dim stars. Apparently, many of these stars are variable. Very beautiful to me. |
| M29 | Cyg | Opn CL | 28x | Cooling Tower. From Sadr (Gamma), this cluster is East - South-East. The main six stars forming a little tower, or an academic hat, were easily visible. No dim star was detectable likely due to the Moon. This is a nice cluster which might be interesting to see at higher power (e.g. 51x). |
| IC4996 - Cr418 | Cyg | Opn CL | 28x | From M29, I moved South. This is a very small open cluster which is detectable at this low power, but would benefit of higher power. It is near an isolated star near three pairs of aligned stars. Three - four stars were detectable apart from the main one. |
| NGC6883 - Cr415 | Cyg | Opn CL | 28x | From IC4996, I moved South, using as a reference a group of stars reminding me of a pan and a long handle. NGC6883 is located below a line of 3 stars. It is quite easy to find. |

NGC6871 Cyg Opn CL 28x

From NGC6883, I moved South-West. There is a chain of about 8-10 stars, leading to this wonderful open cluster. The cluster is of medium size. I could see about 10-15 blue bright stars, and 3-4 pairs seemed to be double stars. There are also lovely double stars in this area.

Date: 29/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:30-22:00 **Eyepieces:** Vixen 5mm SLV, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude: 12m **Filters:**
Temperature: 21C (wind: 6km/h)
Seeing: 2 - Slight undulations
Transparency: 4 - Partly clear

| Target | Cons | Type | Power | Notes |
|--------|------|-----------|--------------|---|
| Moon | Oph | Satellite | 72x, 206x | 103x, Observation at twilight. Waxing Gibbous, 94%. The moon was not very crisp tonight due to a little layer of high clouds caused by the high temperature during the day. I moved from Montes Apenninus to Copernicus. A small crater was visible inside, but many details on the circular border were not clear. Therefore I moved to Kepler as this was farther East hoping to improve the visible contrast. This showed a little shadow on one border. At 206x, from Kepler I moved North-East, following the crater chain formed by Kepler C, Marius D, F, A, C, and B. All these craters are relatively small and close to each other. Finally I moved North reaching Aristarchus which appeared beautiful. This white crater shows an impressive contrast and is close to a little half circle of hills at North-East and a dark crater (Herodotus) at East. Really nice view. |

Date: 23/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:40-23:15 **Eyepieces:** TV Plossl 20mm, Nagler 13mm, Vixen 5mm SLV, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 18x, 3.3mm, 2.73deg; 28x, 2.2mm, 2.80deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg

Altitude: 12m **Filters:**
Temperature: 9C (wind: 6km/h)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|-----------|----------------------|--|
| Venus | Com | Planet | 28x, 72x, 103x | Observation at twilight. Phase about 40%. Again, the Vixen revealed a wonderful Venus. Very crisp on the border and a clear arc defining the phase. A few times I had the impression of a slightly darker patch on the clouds located in the South hemisphere near the centre of the planet. This happened with Venus at different position in the eyepiece. At 103x Venus was still a pleasure to see, but not as much as at 72x. At 28x the phase was clearly there too, and the image was still crisp. |
| Jupiter | Leo | Planet | 72x, 103x | Observation at twilight. All four moons were visible tonight. At 72x 4 belts were detectable and colours were also visible. These appeared as brown-red for the belts and slightly darker white for the zones. At 103x the image was a bit degraded compared to 72x. I believe the Vixen SLV is just a tiny but noticeable bit better than the nagler 3.5mm |
| Saturn | Lib | Planet | 18x, 28x, 72x, 103x | Observation at twilight. At 72x, Titan was clearly visible and appeared yellow-orange. The planet appeared yellow globally, whereas one the North Equatorial Belt was more orange. The Cassini division was detectable on the lateral parts of the rings and the Ring A was distinguishable from the Ring B, due to the difference colour intensity. At 103x, no additional detail was visible, but the Cassini division was still there on the lateral parts. At 28x, the rings were visible and well separated from the planet. Titan's colour was a bit more orange. It is really interesting that these colours appear much more evident when the sky is clear rather than dark. I believe this is due to the eye cones which are more active than the eye rods. At 18x, I could not really distinguish the rings from the planet, although the non spherical shape was observable. No additional moon was detectable at these low powers. |
| Moon | Vir | Satellite | 28x, 72x, 103x, 206x | Observation at twilight. Waxing crescent at about 40%. At 72x, the Moon was really beautiful and crisp. Very soft little clouds passed over the South hemisphere and the view was really suggestive. At 103x, some more detail were visible, although these were somehow lost at 206x due to the non perfect seeing which did not allow to get a perfect focus. At 28x, the Moon appeared as a lovely target floating on the sky. The ultra wide field of the Nagler 13mm really shows the Moon and the surrounding context. |

Date: 15/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:45-0:30 **Eyepieces:** TV Nagler 13mm, Vixen 5mm SLV, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 28x, 2.2mm, 2.80deg; 72x, 0.8mm, 0.69deg; 144x, 0.4mm, 0.35deg
Altitude: 12m **Filters:** Single Polarising Filter
Temperature: 10C (wind: 5km/h)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|--------|------------------------|---|
| Venus | Com | Planet | 72x, 144x +/- SPF | Gorgeous with the Vixen SLV 5mm. The best view of Venus I have ever had so far. Phase was about 45%, and Venus appeared cristal clear without any glare and perfectly focused. The borders were very crisp. At 144x the planet was bigger, but no additional detail was detectable. At both 72x and 144x, I felt that at the center of the visible part of the planet, the colour was just slightly dimmer as if a soft darker cloud was there. Really beautiful. SPF did not help much with the Vixen, so I removed. |
| Jupiter | Leo | Planet | 72x, 144x +/- SPF | Jupiter was visible with North and South Equatorial Belts and four moons. No other detail was detectable. SPF did not help with the Vixen. The planet did not appear much crisp in contrast to Venus. Also here, I preferred the view of Jupiter at 72x (without Barlow). It is as if the barlow lens introduces some imperfections which remove the additional benefit of using a Vixen vs a Nagler. The same can be said for the SPF with the Vixen. Vixen alone gave the best views (without Barlow or SPF). |
| Saturn | Lib | Planet | 28x, 72x +/- SPF, 144x | Saturn was wonderful with the Vixen at 72x. The North Equatorial Belt was detectable particularly when in contrast with the Equatorial zone. The Cassini division was visible on the left and right parts of the rings when the planet was at the centre of the eyepiece. It appeared as a soft grey line which separated more dense rings (B rings) from lighter rings (A rings). The shadow of the planet on the ring or details on the polar region were not visible. Titan was also visible. A SPF did not help and actually degraded the image for Saturn with the Vixen. At 144x, the image degraded and was not as nice as at 72x. At 28x, the planet was very small, but the rings and the empty part between the planets and the rings were visible. Titan at South-West of the planet in the eyepiece was much brighter at this magnification (due to the larger exit pupil) and I felt a small faint dot was detectable at South-East of the planet in the eyepiece. This was closer to the planet than Titan. After checking Saturn's moons positions with Sky and Telescope software application, the only moon at that distance and position was Rhea. I am not sure I saw this moon of magnitude 10. It would be at the limit of my TV60. This dot was more visible with averted vision although it was also detectable via direct vision. |

| | | | | |
|----------|-----|----------|----------|---|
| Epsilon | Lyr | Dbl star | 72x | The Double Double. It was possible to see the two pairs at 72x, although to me this was not appreciable. The two pairs appeared a little bit more than elongated or just separated, but I much prefer when a double star is clearly and nicely separated. The two pairs were similarly separated. Possibly Epsilon1 (the North pair) was slightly more, but, if so, a tiny bit. |
| Beta | Lyr | Dbl star | 28x | Sheliak. Wonderful colour double star. One orange and one blue. Really beautiful. |
| Delta | Lyr | Dbl star | 28x | Superb multi star system. At 28x it is really bright and proportional to the field of view. I love the triangles and the overall geometry in this system of stars. |
| HD175634 | Lyr | Dbl star | 28x | This double star is relatively close to M57 and inside the parallelogram of Lyra. One star is orange, the other is blue. Similar to Sheliak but a bit dimmer. |
| Beta | Sco | Mlt star | 28x, 72x | Acrab or Graffias. Although tight, I prefer this double star at 28x rather than 72x because of the smaller Airy disks. Very nice though. A bigger and bright orange star associated with a smaller blue star. |
| Omega | Sco | Dbl star | 28x, 72x | The two stars were largely more separated than Acrab double stars. A no substantial difference in colour or size was noticeable though. I did not find this target particularly interesting. Nicer at 28x. |
| Nu | Sco | Dbl star | 28x, 72x | I am not sure I saw this. If so, it appeared as a tight double star with the same colour and quite dim. 28x was better due to the higher image brightness. |
| Epsilon | Boo | Dbl star | 28x, 72x | Izar. I could not split this double star at 28x or 72x. I thought it was easier. Still a very nice yellow bright star. The sky was becoming less transparent on this region of the sky. Therefore I moved North. |
| M39 | Cyg | Opn CL | 28x | Quite large open cluster position at North North-East of Deneb. Some stars are faint but still visible without much difficulty with direct vision. The clouds were slowly coming from West. I decided to move to South for the last observations. |
| M4 | Sco | Glob CL | 28x | I was not able to detect this cluster. I suspect the reason was that it is too low in the sky for my TV-60 and Antares brightness did not help either. Therefore I decided to focus on the beautiful open cluster of this region of Sky, which was the only area not affected by clouds and actually transparent. |
| M8 | Sgr | CL+Neb | 28x | Lagoon Nebula. About 1-1.5 degree large, this is a very nice cluster with nebulosity. I did not have a OIII filter with me, but the nebula was detectable without filter. It appeared a soft gray patch surrounding the cluster. This cluster is quite elongated. Superb. |
| M20 | Sgr | CL+Neb | 28x | Trifid Nebula. Positioned at North of M8, M20 is a bit smaller, but still impressive. Also here, the nebulosity was detectable and the shape of the cluster was elongated connecting M20 with M21. |
| M21 | Sgr | Opn CL | 28x | M21 was a condensed group of stars on one extremity of M20. M8, M20 and M21 are really spectacular targets. |
| M23 | Sgr | Opn CL | 28x | This cluster was a little bit at North-West from M21. It was a bit dim, but if the sky were more transparent and darker it would be a lovely target, I think. |

| | | | | |
|-----|-----|--------|-----|--|
| M25 | Sgr | Opn CL | 28x | This cluster showed a mix of bright and dim stars. The size is sufficient for the Nag13 and the details are quite rich. |
| M16 | Ser | CL+Neb | 28x | Eagle Nebula. After seeing M25, I moved North-West towards M16. This appeared quite bright with some stars at the centre. |
| M17 | Sgr | CL+Neb | 28x | Omega Nebula. From the Eagle Nebula, I simply moved South and saw this target. It is a bit smaller than the Eagle, but still bright. |
| M18 | Sgr | Opn CL | 28x | A small open cluster at South of Omega Nebula. |
| M24 | Sgr | Opn CL | 28x | Sagittarius Star Cloud. Impressive and large group of stars. Really spectacular. It covered a field of almost 2 degrees populated by stars. The surrounding stars were quite bright. Globally this appeared as a bright area with a few faint stars. |

Date: 11/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 22:00-0:00 **Eyepieces:** TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude: 12m **Filters:**
Temperature: 15C (wind: 2km/h)
Seeing: 3 - Moderate seeing
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|---------------------------|------|----------|----------------------------|---|
| Saturn | Lib | Planet | 103x, 206x | Very nice view of Saturn tonight. At both 103x and 206x, the Cassini division was detectable when the sky appeared steady for few seconds. It appeared as a soft grey shade on the lateral parts of the rings. Possibly what I was seeing was the shade between the A and B rings. This was not always visible, but just for few seconds when the seeing was steady and no wind blew, the difference in colour intensity was noticeable. Titan was also visible on the South of the planet. It seemed a grey dot. The North Equatorial Belt on the planet appeared as a soft darker gradient compared to the planet equatorial zone. The North Polar Region was not clearly detectable. |
| Venus | Com | Planet | 103x, 206x | Phase about 50%. No detail visible, but the image was sufficiently stable. A SPF would have helped, but I forgot it at home. |
| Jupiter | Leo | Planet | 103x, 206x | 206x was too much for Jupiter tonight. Mostly seen it at 103x. Three moons visible, whereas the fourth seemed behind the planet. North and South Equatorial Belts were visible. On the North Hemisphere another belt was also detectable. No GRS visible. |
| C33 / 34 - NGC6992 / 6960 | Cyg | SN Rem | 15x +/- OIII, 28x +/- OIII | Veil Nebula. No visible or detectable. I carefully searched the stars and positioned at 52 Cygni. 28x +OIII seemed to show a soft transparent cloud, but I cannot say that that was the Veil Nebula. The sky was not fully transparent and dark. This might be the reason. |
| Epsilon | Lyr | Dbl star | 103x | The Double Double. Just managed to see the two pairs, although the separation was not clear. They appeared just a tiny more than elongated stars. I am not sure, but I suspect this was more due to the Nagler 3.5mm. I will try with the Vixen 5mm next time, as generally this eyepiece delivers better views than the Naglers, on planets at least. |
| Beta | Sco | Mlt star | 103x | Acrab or Graffias. It was clearly split, but the seeing was not very nice near the horizon and the stars light was not puntiform. The small star is blue. This double star is the top of the three stars of Scorpius. |

Date: 10/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 22:00-0:00 **Eyepieces:** TV Panoptic 24mm, Nagler 7mm, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg
Altitude: 12m **Filters:**
Temperature: 14C (wind: 5km/h)
Seeing: 3 - Moderate seeing
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|-----------------|-------|----------|----------|---|
| Saturn | Lib | Planet | 103x | Seen during civil twilight and later in the nautical twilight. Although the seeing was not great, Saturn appeared very crisp. The rings had a very nice inclination. The Cassini division was generally not detectable. For few seconds when the seeing stabilised, a hint of dimmer colour was visible on the external part of the rings. A nice belt was visible all the time in the North hemisphere (North Equatorial Belt) of the planet. Titan was visible too. The view was really nice generally. Possibly due to the seeing, but I preferred the view when the sky was darker. |
| Alpha | Sco | Star | 15x | Antares. Lovely red star. I could see the Airy disc and diffraction rings very nicely. Antares is one of my favourite stars. |
| M107 | Ser | Glob CL | 15x, 51x | From Han, Zeta Oph, go slightly South and see a triangle. M103 is on the outside of one of the vertexes. It was barely visible at 15x, also due to the bright sky. At 51x was detectable but still with difficulty. Not much to see. Just a grey smudge visible with averted vision. |
| M10 | Oph | Glob CL | 15x, 51x | Nice globular cluster. It does not have nearby stars, but is relatively large. Stars are not really visible, but the cluster appear with some hint of granulation particularly detectable on the outside. |
| M12 | Oph | Glob CL | 15x, 51x | Like M10, this is another nice globular cluster. Somehow I preferred it to M10 because of the presence of surrounding close stars at east. I believe this cluster is slightly bigger than M10, or at least it seemed so. Like M10, a hint of granulation was detectable. |
| IC4665 Cr349 | - Oph | Opn CL | 15x | Summer Beehive Cluster. Amazing open cluster of large size above the star Cebalrai. A pleasure to see with a low power eyepiece. Stars have similar colours and magnitude, but the shape is nice. |
| NGC6633 | Set | Opn CL | 15x | From 71-72 Oph to East, NGC6633 and Cr386 appear in succession. Both are sufficiently large to be appreciable with a low power eyepiece. They are quite rich in stars. |
| IC4756 Cr386 | - Set | Opn CL | 15x | Graff's cluster. See above |
| Epsilon | Lyr | Dbl star | 51x | The Double Double. I could not split the two. The image suggested a possible elongation of the two stars, but this was not obvious. I would not have detected it if I had not known that they are doubles. I carefully focused inward and outward to reach the optimum, but this was not sufficient. |

| | | | | |
|------|-----|----------|-----|--|
| Beta | Sco | Mlt star | 51x | Acraab or Graffias. Very fine multiple star system at 51x. The two stars have different colour and brightness. If I remember correctly the small one was blue. They were split but still quite tight. At 70x they should be split clearer. |
| M57 | Lyr | Pln Neb | 51x | It was lovely to see this planetary nebulae at 1.2mm exit pupil. The ring was clearly visible and the size was acceptable. No colour of course, but averted vision showed this object pretty well, although it was visible also via direct observation. As expected, the Nalger 7mm is perfect for this target and I expect that is more than adequate for many other planetary nebulae. |

Date: 06/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 15:00-18:00 **Eyepieces:** Nagler 7mm, Vixen 5mm, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude: 12m **Filters:** Variable Polarising Filter (VPF), Single Polarising Filter (SPF)
Temperature: 23C (wind: 5-32km/h)
Seeing: 3 - Moderate seeing
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|--------|------|------|--|---|
| Sun | Tau | Star | 51x +/- VPF or SPF, 72x +/- VPF, 103x +/- VPF | <p>I enjoyed observing the Sun a lot today. There were more than 30 sunspots and also a hint of granulation when the wind became calm for short moments. Very nice day. The wind did not allow to see Sun granulation most of the time. The seeing improved after 5pm when the wind became more moderate. Many sunspots were visible. Three larger umbrae were surrounded by nice areas of penumbra. One of this had an irregular shape and the South part vanished gradually. This at all powers. It was very attractive. A central area contain 4 well defined sunspots and many little grey spots. Around the larger sunspots, there were brighter and extended areas on the Sun surface. 51x gave the best view most of the time. 72x and 103x were interesting powers but only suitable when the wind was calm, which was rare! A VPF increased the detail noticeably. Apart from reducing image brightness, I appreciate this filter because it stabilises the image, particularly under average seeing. Surprisingly I found that I prefer the view through a SPF rather than VPF. A VPF reduces image brightness, whereas a SPF improves contrast to me. Through a SPF I could see a hint of granulation at 51x even when there was moderate wind. This did not happen with a VPF. I am considering whether separate the two filters. Having them separate would also be quite comfortable when watching planets in the twilight. SPF also improved contrast for all the sunspots. This works as follows: 0 (or 180) degrees shows the brightest image, 90 (or 270) degrees shows the darkest image. For observing both planets and the Sun, I found that I prefer the view when the SPF is positioned at 45 (or 135 or 225 or 315) degrees. The image was still bright, contrast was highest than all other options and the number of details was maximised. Nagler 7mm, Vixen 5mm, and Nagler 3.5mm form my best eyepiece combination for watching the Sun with the TV-60. All of them are really useful, although the first two achieve best results almost every time. The Nagler 3.5mm can show some very nice close-up of umbrae and penumbrae.</p> |

Date: 03/06/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:40-23:30 **Eyepieces:** TV Panoptic 24mm, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude: 12m **Filters:** Single Polarising Filter
Temperature: 12C (wind: 0km/h)
Seeing: 1 - Perfect seeing
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|-----------|-----------------------------|---|
| Jupiter | Cnc | Planet | 103x +/- SPF, 206x + SPF | Just a quick look until the sky became darker. No particular event tonight. It was very nice to see it. The two main belts revealed some subtle detail appearing like tiny shades. In particular these were more detectable in the North Equatorial Belt. |
| Moon | Sgr | Satellite | 103x +/- SPF | Phase 96%. No many detail were revealed. The moon is not really interesting when full. Craters and seas were detectable but not immersive. |
| M57 | Lyr | Pln Neb | 103x | Ring nebula. The ring was visible with averted vision, but no other detail really. The contrast between the ring and the internal area is much more visible with an OIII filter. Still nice planetary nebula. |
| Zeta | Lyr | Dbl star | 15x, 103x | Already split at 15x, but much nicer at 103x. |
| Delta | Lyr | Dbl star | 15x, 103x | This is a very nice system of stars already visible at 15x. A larger triangle with a little internal triangle. Just beautiful. |
| Epsilon | Lyr | Dbl star | 15x, 103x, 206x | The Double Double. Epsilon 1 and 2 were easily split at 15x. At 103x it was possible to detect that both Epsilon 1 and 2 are double stars themselves. At 206x this pair of tight double stars was visible although these double stars remained very close. Same colour. |
| Beta | Lyr | Dbl star | 15x, 103x | Sheliak. Splendid double already split at 15x. This was very nice at 103x. |
| Beta | Cyg | Dbl star | 15x, 103x | Albireo. Wonderful double. A bit tight at 15x, but very nice at 103x. One orange, the other one blue. |

Date: 26/05/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:15-0:00 **Eyepieces:** TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude: 12m **Filters:** Astronomik UHC, OIII, Single Polarising Filter
Temperature: 9-14C (wind: 15km/h)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|-----------|---|---|
| Jupiter | Cnc | Planet | 103x +/- SPF | Observed in civil twilight. The seeing was not enough good for pushing magnification beyond 103x. At 103x, two major belts and two moons were visible. I did not spend much on this target tonight because it was too windy when I observed it. |
| Moon | Leo | Satellite | 103x +/- SPF, 206x + SPF | Observed in the twilight. Visible almost 60% of its phase. The SPF seems to stabilise the image if the seeing is not good. This is a lovely target with the TV60, and keeps magnification pretty well. At 206x the moon surface appeared like a bubble at the poles due to the seeing, but there were moments in which it was possible to see a quasi stable image. Subtle details on the surface were observable as well as minute craters and shades on the ground. Interestingly, on the terminator mounts tips were illuminated whereas their bases were obscured. There is so much to see at 206x that one could spend the entire night observing our satellite! Montes Apenninus, Caucasus, and Alpes were incredible targets and appeared just beautiful. The crater Cassini and all the small nearby craters were spectacular. While I am not sure the SPF increased image contrast, I prefer the view with SPF as it seems that the image is just stabler at both 103x and 106x. |
| M57 | Lyr | Pln Neb | 28x +/- UHC, 103x +/- UHC or OIII | Ring Nebula. The UHC filter increases a little bit the visibility of this target at 28x, but does not improve the contrast. The object appears as a grey blob without a shape. At 103x the ring was detectable using an UHC filter using averted vision, but this was not easy too see. The ring shape was more noticeable with a OIII filter despite the severe loss in image brightness. Without filter the nebula appeared just as a grey blob and no ring was detectable. Generally, I think an exit pupil of 0.6mm is just too small for nebula filters. It seems to me that 1.0mm is the maximum usable effectively. As this is the exit pupil typically used when observing planetary nebulae, I would say that an OIII filter is a better choice for these targets as it allows to increase contrast which is needed on these targets. Conversely, for bright extended nebulae to watch with low power eyepieces (or exit pupils larger than 3mm), a UHC filter can be beneficial for targeting and maximizing nebulae extension. |
| M97 | UMa | Pln Neb | 28x +/- UHC | Owl Nebula. Invisible at 28x with or without UHC filter. This target requires an OIII filter for being detectable with small aperture telescopes. Consistently with what said for M57, the OIII filter is a better choice for planetary nebulae (and for extended nebulae where we want to maximise nebulae contrast). |

| | | | | |
|-----|-----|---------|----------|---|
| M81 | UMa | Galaxy | 15x, 28x | Bode's nebulae. Not easy to find it at 15x with half moon, but M81 and M82 were detectable via star hopping from Dubhe. At 28x this large galaxy shows its core and a bit of brightness on the body. I was very impressed at seeing these two targets and I believe M31, M32, M101, M81, and M82 are the most appreciable galaxies for small telescopes. Averted vision improved the visibility of this target significantly. |
| M82 | UMa | Galaxy | 15x, 28x | Cigar galaxy. Its elongated shape was visible. It was amazing to see this galaxy and its neighbour M81 in the same field. These two targets are going to become one of my favourite objects. |
| M3 | CVn | Glob CL | 28x | As all the globular cluster seen with a small telescope, M3 also appears like a little grey cloud. This is a bright globular cluster and a hint of 'granulation' is perceptible although no star can be resolved. Not very easy to find due to the lack of bright stars to star hop from Arcturus. |
| M5 | Ser | Glob CL | 28x | It appears like a grey cloud. From the star Unukalhai (Alpha Ser), go South and you find it. It is a relatively easy target. |
| M13 | Her | Glob CL | 28x | Same as M3. Very bright and large globular cluster. Some granulation is perceptible but no star could be resolved. |

| | | | |
|----------------------|---------------------|------------------------|--|
| Date: | 20/05/2015 | Telescopes: | Tele Vue 60 F6 |
| Time: | 21:30-0:00 | Eyepieces: | TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x |
| Location: | Cambridge, UK | Power, EP, FOV: | 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg |
| Altitude: | 12m | Filters: | Astronomik OIII, Single Polarising Filter |
| Temperature: | 9C (no wind) | | |
| Seeing: | 3 - Moderate seeing | | |
| Transparency: | 5 - Clear | | |

| Target | Cons | Type | Power | Notes |
|------------------------|-------|---------|-----------------------------|---|
| Jupiter | Cnc | Planet | 103x +/- SPF, 206x + SPF | Observed in the twilight. The SPF noticeably improved the view. Four belts and the transit of Callisto were easily visible at both 103x and 206x. The use of a SPF seemed to stabilise the image and improved contrast. A fair amount of shades were also perceptible on the main two belts. The transit appeared as a crisp black dot on the planet atmosphere. Without the SPF it was only possible to see the two main belts and no shade on them. They simply appeared as two thick lines across the planet. Interestingly the transit shadow appeared a tiny bit better without the filter. To me, using the SPF requires a bit of experience in order to rotate the eyepiece to gain the best contrast. However this is feasible. |
| Venus | Gem | Planet | 103x +/- SPF, 206x + SPF | Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable even with the SPF. Planet glare was reduced but it was very difficult to focus, likely due to the average seeing and high magnification. |
| C14 NGC869 / 884 | - Per | Opn CL | 15x, 28x | Double Cluster. This target is superb with the Nagler 13. Although low on the horizon, it still offers nice contrast with the background sky and the 2.8deg of fov show the object with all its context. |
| M56 | Lyr | Glob CL | 15x, 28x | This is the first time I detect this target. It is quite challenging to find with a 60mm but not impossible. I used the Sheliak (Beta Lyrae) and Sulafat (Gamma Lyrae) as pointers to target M56 along the line passing through these two stars on the side of Sulafat. M56 was detectable with a 15x using an atlas but was very faint and averted vision was almost required to find it. At 28x the object was more visible, but did not show much detail as it only appeared as a soft grey patch. This target required larger aperture and / or darker skies. |
| M57 | Lyr | Pln Neb | 28x +/- OIII | Ring Nebula. I tried the OIII filter with the Nagler 3.5 (103x). Although the ring shape was noticeable, it was just too much magnification and the overall image was largely degraded. At 28x + OIII the Ring Nebula emerged from the background sky and appeared as a colourless bubble. I believe that an exit pupil of 1-1.5mm can improve the view for this target. |
| M97 | UMa | Pln Neb | 28x +/- OIII | Owl Nebula. Interesting target. Completely invisible without OIII filter. With the OIII, it emerges from the sky and the nearby stars. It is a quite large planetary nebula. No colour or shape was detectable, but it simply appeared as a grey bubble. At 15x + OIII was detectable, but was too small to see any major detail. |

| | | | | |
|---------------------------------|-----|---------|------------|--|
| M108 | UMa | Galaxy | 15x, 28x | Surfboard Galaxy. Invisible at both 15x and 28x. This object as well as most of the other galaxies require larger aperture and / or a darker sky. |
| C33 / 34 - NGC6992 / 6960 | Cyg | Glob CL | 15x + OIII | Veil Nebula. Again, no visible although it is too low on the horizon. |
| Saturn | Sco | Planet | 103x, 206x | It is still fairly low on the horizon. Titan was visible. The Cassini division was not detectable, but it was possible to see a shade in the middle of the ring. At 206x the image was just degraded and difficult to focus. I have to wait for a higher position of the planet. |

| | | | |
|----------------------|--------------------|------------------------|--|
| Date: | 13/05/2015 | Telescopes: | Tele Vue 60 F6 |
| Time: | 21:00-0:00 | Eyepieces: | TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x |
| Location: | Cambridge, UK | Power, EP, FOV: | 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg |
| Altitude: | 12m | Filters: | Astronomik OIII |
| Temperature: | 8C (no wind) | | |
| Seeing: | 1 - Perfect seeing | | |
| Transparency: | 5 - Clear | | |

| Target | Cons | Type | Power | Notes |
|---------------------------|------|---------|------------|--|
| Jupiter | Cnc | Planet | 103x, 206x | Observed in the twilight. The idea started as a joke because I thought the image would have been too dark for discerning any detail. Instead, it was possible to perceive a little amount of shades on the two major belts of the planet. The boundaries of the other two less visible belts (North and South hemisphere, respectively) were also there. At 103x I was able to see the boundaries of these two belts on the 'equator side', but not on the 'pole side'. At 206x these were noticeable. 4 moons were detectable and one was just about to get closer to Jupiter. I agree with Gerry (sgl: jetstream) that watching Jupiter in twilight shows more contrast. I was also able to see some red-ish colour on the major two belts, which instead is less noticeable when watching Jupiter in the dark. Looking at a bright source before watching the planet did not help me instead. I found I had more difficulty to notice details. Although the exit pupil was only 0.3mm, floaters did not cause me serious problems. Interestingly, I found floaters to be a problem when watching the Sun at 103x. Could these be related to overall image brightness? |
| Venus | Gem | Planet | 103x, 206x | Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. At 206x, on one side of the focus, Venus appeared violet, on the other side green/yellow. When in focus, there was no colour aberration. Curiously, at this magnification it was still very bright suggesting that a variable polarising filter might be beneficial. |
| C1 | - | UMi | Opn CL | 28x |
| NGC188 | | | | The detail of this target seemed accessible, but I did not manage to see anything in the position suggested by Stellarium. Unfortunately, I did not have a star atlas with me. |
| Alpha | | UMi | Dbl Star | 28x, 103x |
| | | | | Polaris. A nice target because of the large difference in brightness between the two stars. Polaris' companion was dim grey and detectable at 28x with some difficulty. 103x easily split the two stars. |
| M60 | Vir | Galaxy | 28x | It was detectable with averted vision at 28x. It appeared as a grey patch without a structure. I tried M58, but it was not visible. I believe that to see these targets with this small telescope, very dark skies are required. |
| C33 / 34 - NGC6992 / 6960 | Cyg | Glob CL | 15x + OIII | Veil Nebula. No visible, although it is not the best time of the year to see this target. |

| | | | | |
|--------|-----|---------|------------|---|
| M57 | Lyr | Pln Neb | 15x + OIII | Ring Nebula. The OIII filter largely improves the detection of this nebula at 15x. Without a filter, its detection is not easy. It emerges in the sky as a grey little ball. I believe the Nagler 7mm or even the Vixen 5mm can give great views when combined with an OIII filter. |
| Saturn | Sco | Planet | 103x | It was a bit higher than yesterday, but unfortunately, my telescope and eyepieces were soaked with humidity and could not really see this target after the first 5 min. Rings were clearly defined, and I believe the Cassini division could have been detectable. |

Date: 12/05/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:00-23:45 **Eyepieces:** TV Panoptic 24mm, Nagler 13mm, Nagler 7mm, Nagler 3.5mm, Bresser SA 2x
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg

Altitude: 12m **Filters:**
Temperature: 6C (wind: 20km/h)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|-------------------------|--------|----------|---------------|---|
| Jupiter | Cnc | Planet | 103x, 206x | Observed in the twilight. Still visible at 206x with some detail but the new tripod is not up to this sort of magnifications. To be fair, the new tripod was fine at 103x but only when there was no wind. 3 belts and 4 moons visible. It would be interesting to try 206x with my solid tripod. |
| Venus | Gem | Planet | 103x | Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. A polarised filter might help on this target. |
| M44 | Cnc | Opn CL | 15x, 28x | The Nagler 13mm offers the best view. Its fov covers the whole object nicely. Image not degraded at all and the background sky was darkened just the right amount for maximising contrast. Exit pupil of about 2.0mm shows a really nice brightness / contrast for point source DSO. |
| C14 NGC869 / 884 | - Per | Opn CL | 15x, 28x | Double Cluster. Again, the Nagler 13 offering almost 3 degrees of fov shows the full object with great detail but conserving an adequate image brightness. |
| Stock2 | Cas | Opn CL | 15x, 28x | As above. |
| M103 C13 - NGC457 | or Cas | Opn CL | 28x | Not sure whether I saw M103 or C13 (the Owl Cluster) though. A clear double star was well visible and there were a few dim stars in the background were also detectable. This object starts being visible at 28x. It is relatively small, but a lovely target. I think it was M103 as my memory seems more similar to the images. |
| M60 | Vir | Galaxy | 15x, 28x | Turn West to Vindemiatrix. A little crown of star is visible slightly South. Continue and you see a little arrow of stars and a single star in the North. M60 is between these two objects. Not detectable at 15x. Detectable via averted vision at 28x. A patch of grey. The sky was not fully dark though and my eye was not dark adapted. I believe this object can show more detail. |
| 27 Hya | Hya | Dbl Star | 15x, 28x | Easily split. Colours detectable. |
| M13 | Her | Glob CL | 15x, 28x | Detectable at 15x, but nicer at 28x. No star was resolved. It would be interesting to try 51x although I guess this might be too much. |
| M57 | Lyr | Pln Neb | 15x, 28x, 51x | Ring Nebula. For the first time, I managed to see this object with the TV-60. I find extremely difficult to detect it at 15x unless I map the nearby stars with Stellarium. At 28x M57 is clearly visible and appears as a grey blob. At 51x the ring is detectable. I did not try to use an OIII filter because I was freezing due to lack of cloths and about to leave. I believe this target will show much more detail at 51x with OIII filter. |

| | | | | |
|--------|-----|--------|------|--|
| Saturn | Sco | Planet | 103x | Very low on the horizon and therefore not the best moment for viewing this target. Despite this, rings and titan were visible. Neither the Cassini division nor belts were detectable. |
|--------|-----|--------|------|--|

Date: 30/04/2015 **Telescopes:** Tele Vue 60 F6
Time: 22:00-23:00 **Eyepieces:** TV Panoptic 24mm, Nagler 7mm, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg
Altitude: 12m **Filters:**
Temperature: 6C (no wind)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|------------------------|-------|-----------|-----------|--|
| Moon | Vir | Satellite | 51x, 103x | Moon phase 91%. The moon at 103x did not need a filter. It was very crisp and showed details in the South hemisphere despite it was almost full. At 51x, the moon is simply scaled of a factor of 1/2, indicating that the Nagler 3.5mm behaves as a perfect 2x Nagler 7mm. It would be useful to have a Moon map to check the crater's names. |
| Jupiter | Cnc | Planet | 103x | At 103x Jupiter showed 4 moons and 4 belts. No specific events were visible this evening. |
| M44 | Cnc | Opn CL | 15x | Beehive cluster. One of the best wide open cluster. Not many faint stars were visible because of almost full moon. However, the cluster still emerged in the sky. |
| C14 NGC869 / 884 | - Per | Opn CL | 15x, 51x | Double cluster. Superb cluster. Even if low in the sky, it was a pleasure to see it. At 51x, the cluster emerged from the background and showed more faint stars. |
| Stock2 | Cas | Opn CL | 15x | This cluster next to the double cluster is very nice and needs a wide field telescope. Its stars are not so bright and generally of similar magnitude and colour. |
| Mel20 | Per | Opn CL | 15x | Alpha Per moving cluster. Wide field telescopes or binoculars are the best for this superb cluster. Even if low in the sky, it was very beautiful to see. ~70 stars detectable. |
| C39 NGC2392 | - Gem | Pln Neb | 15x, 51x | Eskimo nebula. At 15x it was detectable with averted vision. It was easily visible at 51x and appeared like a fuzzy blue/grey small patch next to the star. |

Date: 14/04/2015b **Telescopes:** Tele Vue 60 F6
Time: 21:30-23:20 **Eyepieces:** TV Panoptic 24mm, Plossl 20mm, Nagler 7mm, Vixen SLV 5mm, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.7deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg

Altitude: 12m **Filters:**
Temperature: 9C (no wind)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|---------|------|---------|---------------|---|
| M35 | Gem | Opn CL | 15x | Under dark sky this object emerges clearly. A few bright stars with many little faint stars in background. Averted vision helps, but this object is not too demanding if the sky is sufficiently transparent. |
| M65 | Leo | Galaxy | 15x, 18x | This object requires aperture and dark sky to be detected and viewed properly. Just very faint object visible through averted vision. An exit pupil of 3.3mm is better than 4.0mm. I wonder whether something between 2.5 and 2.0mm can improve this view even more. |
| M66 | Leo | Galaxy | 15x, 18x | See above |
| Mel111 | Com | Opn CL | 15x | Coma Berenices star cluster. Located just south of Gamma Com, this large object is as spectacular as M44. Very rich of stars, some bright some small and fainting. Some are doubles. As this is a large object, 15x is the adequate magnification. As Coma Berenices does not have bright stars, you can find this object knowing that is between Denebola (Leo) and Cor Caroli (Alpha CVn). |
| M53 | Com | Glob CL | 15x, 18x, 51x | This object is not easy to find. It is just 1-2 degrees east of Diadem (Alpha Com), but this star is very dim to be seen, unless the sky is enough dark. Instead use the Virgo trapezium and point to north following the star Vindemiatrix (Virgo). You can find Diadem just going some degree north from Vindemiatrix. M53 appears as a little grey cloud at 15x. No detail of this globular cluster is visible. At 18x, the contrast is a bit improved, but the image is the same. At 51x this objects is larger and well detectable, but still appears like a grey cloud. |
| NGC5053 | Com | Glob CL | 15x, 18x, 51x | Invisible. This is a bit smaller and dimmer than M53. I could not find it. |
| M3 | CVn | Glob CL | 15x, 51x | Again, not easy to find. I used the axis from Gamma to Beta Com. This cluster is brighter than M54 and at 51x seems a large white/grey blob. |
| Jupiter | Cnc | Planet | 103x, 72x | Transit of Ganymede on Jupiter. Little black dot on the Equatorial zone. All the other three main satellites were well distinct on right. |

Date: 14/04/2015a **Telescopes:** Tele Vue 60 F6
Time: 18:00-19:00 **Eyepieces:** Nagler 7mm, Vixen SLV 5mm, Nagler 3.5mm
Location: Cambridge, UK **Power, EP, FOV:** 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude: 12m **Filters:** Variable Polarizing Filter
Temperature: 21C (no wind)
Seeing: 2 - Slight undulations
Transparency: 5 - Clear

| Target | Cons | Type | Power | Notes |
|--------|------|------|---------------------------|---|
| Sun | Psc | Star | 51x +/- VPF; 72x, 103x | Today at 4pm there was a gigantic flare (CME) about 1 sun radius long. Unfortunately I was not at home. I looked at the Sun, but the flare was gone by the time I set up the telescope. A large group of black spots was visible in the North hemisphere. Around them granulation was clearly visible. Granulation was also detectable, although with some difficulty, on the Sun surface at 51x using a VPF. At 72x the Sun revealed a nice image where Sun spot details were visible as well as surface granulation. 103x was just too much for this seeing. Although it can be used for magnifying the solar spots, granulation is completely lost. In addition, floaters become a real issue when watching the sun using 0.6mm exit pupil. I think the best magnification is between 51x and 72x. The Vixen 5mm works very well with the Sun. This was used without VPF filter. |

Date: 11/04/2015 **Telescopes:** Tele Vue 60 F6
Time: 18:00-19:00 **Eyepieces:** Nagler 7mm, Vixen SLV 5mm
Location: Cambridge, UK **Power, EP, FOV:** 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg
Altitude: 12m **Filters:** Variable Polarizing Filter
Temperature: 12C (wind)
Seeing: 2 - Slight undulations
Transparency: 2 - Poor

| Target | Cons | Type | Power | Notes |
|--------|------|------|---------------------|--|
| Sun | Psc | Star | 51x +/- VPF; 72x | Two spot areas: one in the north, the other one in the south. 5 small spots where visible in the north, 4-5 in the south spot area. 2 small spots in the centre of the sun. Best view 51x, using variable polarising filter. No granularity was visible due to the bad seeing. |

| | | | |
|----------------------|------------------------|------------------------|---|
| Date: | 09/04/2015 | Telescopes: | Tele Vue 60 F6 |
| Time: | 21:20-22:45 | Eyepieces: | TV Panoptic 24mm, Nagler 3.5mm |
| Location: | Cambridge, UK | Power, EP, FOV: | 15x, 4mm, 4.30deg; 103x, 0.6mm, 0.77deg |
| Altitude: | 12m | Filters: | Variable Polarizing Filter |
| Temperature: | 9C (no wind) | | |
| Seeing: | 2 - Slight undulations | | |
| Transparency: | 2 - Poor | | |

| Target | Cons | Type | Power | Notes |
|---------|------|--------|-------------------|---|
| Jupiter | Cnc | Planet | 15x; 103x +/- VPF | At the eyepiece from right to left: Callisto, Io, Jupiter, Europa and Ganymede. This evening I decided to test my new eyepiece (Nagler 3.5mm). Due to the lack of transparency, I only tested this on Jupiter. This was the first time I observed at 103x without using a Bresser 2x SA. The difference was quite substantial. I had the impression that the Nagler 7mm with Bresser 2x SA was more colour corrected than the Nagler 3.5mm only at the edge (last 10% before the field stop). This might have been caused by the presence of light fog though, instead of the eyepiece. I will test this again. On the other hand, the lack of the Bresser 2x SA (4 lens less) improved transparency, and this was detectable. With a Nagler 7mm and Bresser 2x SA, I am able to see a bit more than the two main belts only when the seeing is quite good. Tonight, although the seeing was acceptable, but the sky was quite foggy. The main two belts (North and South Equatorial Belts) were visible and other two belts at the poles were easily detectable (North Polar Region, S.S. Temperate Belt). In the North and South Equatorial Belts, some shades were also detectable. No direction was visible but it was possible to see that the borders and belt colours were rough and not homogeneous. This was particularly true for the North Equatorial Belt. No GRS was detectable. The use of a single or double polarizing filter did not improve image quality. The whole image only appeared too dark and the minute details previously described were lost. Possibly, the VPF is more appropriate for brighter objects (e.g. the Sun and the Moon) or Jupiter during sunset or dawn. |

Date: 06/04/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:00-22:45 **Eyepieces:** TV Panoptic 24mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 30x, 2mm, 2.15deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude: 12m **Filters:** Astronomik UHC, OIII
Temperature: 8C (no wind)
Seeing: 2 - Slight undulations
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|---------|------|--------|------------------------|--|
| NGC1647 | Tau | Opn CL | 15x, 51x | In this period of the year, Taurus is quite low on the horizon. This object did not show many stars due to the light pollution and atmosphere. You will need darker skies or look at it when it is higher on the horizon. From Aldebaran, go east for 4 degrees. It is near a couple of stars and i Tauri (mag 5), which is the brightest star in the area. 51x did not help tonight, as the object became too dim. I suspect a 30x, exit pupil 2.0mm would be the best for these targets. |
| NGC1746 | Tau | Opn CL | 15x, 51x | After finding NGC1647, from i Tauri, go east for other 4-5deg until you see iota(?) Tauri (102 Tau, mag 4.6). NGC1746 is a medium size cluster at 15x at west of 102 Tau. It also appears very nice at 51x. |
| NGC1817 | Tau | Opn CL | 15x, 51x | After finding NGC1647, from i Tauri, go south-east for 5 deg until you see m Tauri (mag 4.9). NGC1817 and 1807 appear on the same field of view at both 15x and 51x. 15x is not sufficient for seeing details of these two clusters. These are accessible at 51x. NGC1817 seems less visible than NGC1807 |
| NGC1807 | Tau | Opn CL | 15x, 51x | See NGC1817. NGC1807 is more spectacular than NGC1817 at 51x possibly because it has brighter stars. |
| NGC1662 | Ori | Opn CL | 15x, 51x | A little open cluster near the top of Orion's shield. It is also reachable from Aldebaran (Alpha Tauris) moving towards south for about 8deg. At 15x it only shows its compactness. At 51x it shows some stars. This is a compact open cluster formed by relatively visible stars. |
| M1 | Tau | SN Rem | 15x; 51x +/- OIII, UHC | Invisible after trying with different magnifications and averted vision. Filters did not help either. You need dark skies for this target. Possibly you need to use an eyepiece at 2.0mm exit pupil. |
| M65 | Leo | Galaxy | 30x | Leo triplet. Elongated grey patch visible with averted vision. Shape of a cigar. At 30x, the patch is visible more easily than at 15x. The Leo triplet is more easily detectable when the telescope is slightly moved. The patches will move accordingly. |
| M66 | Leo | Galaxy | 30x | Leo triplet. As for M65. |
| M51 | CVn | Galaxy | 30x | Whirlpool Galaxy. Grey patch without a structure visible with averted vision. A darker sky will make the difference on this target. |
| Jupiter | Cnc | Planet | 103x | Two belts clearly visible and a faint one in the South hemisphere was detectable. All four satellites were visible. Io and Europa were very tight at East of the planet. |

| | | | | | |
|---------|---|-----|---------|--------------|--|
| C59 | - | Hya | Pln Neb | 15x; 51x +/- | Ghost of Jupiter. By naked eye, from Alphard (Alpha Hydrae, mag 1.95), move east and detect |
| NGC3242 | | | | OIII, UHC; | the Lambda Hydrae (mag 3.6). This star appears like a star system extending north and south |
| | | | | 72x | from Lambda Hydrae. Continue moving east following Hydrae body. The next star is slightly |
| | | | | | south of Lambda. This is Mu Hydra (mag 3.6). Then next one is Nu Hydra (mag 3.10). Mu |
| | | | | | Hydra will appear Yellow/Orange and almost isolated. It has a little star on the north. Slightly |
| | | | | | south, you see two bright couples of stars: two more distant at east (HIP50693, HIP50764), two |
| | | | | | closer at west (HIP51170, HIP51193). Consider the tight couple at west. There is a little star |
| | | | | | (near this couple in the direction of the other couple. If you use the tight couple and the little |
| | | | | | star as pointer and you move for another segment in the direction of the little star, the planetary |
| | | | | | nebula will appear. This appears as a faint tiny and diffuse light. No structure. At 51x it appears |
| | | | | | like a little full circle. An OIII seems more effective than an UHC filter here possibly because the |
| | | | | | planetary nebula is low on the horizon. The OIII filter makes it appear from the sky, whereas |
| | | | | | really few nearby stars are visible. 72x does not show more detail. UHC filter works fine but |
| | | | | | does not boost the object at the same level as the OIII does. |

Date: 25/03/2015 **Telescopes:** Tele Vue 60 F6
Time: 21:00-22:45 **Eyepieces:** TV Panoptic 24mm, Plossl 20mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 30x, 2mm, 2.15deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg
Altitude: 12m **Filters:** Astronomik UHC, OIII
Temperature: 6C (no wind)
Seeing: 2 - Slight undulations
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|---------|-------|----------|----------------|---|
| M47 | Pup | Opn CL | 15x | Rich of stars. These are quite spread, making this cluster easy to detect and study. |
| M46 | Pup | Opn CL | 15x | This is a compact cluster. It is detectable. |
| M48 | Hya | Opn CL | 15x | Dim open cluster. It requires transparent skies to shine properly. |
| M65 | Leo | Galaxy | 15x, 18x, 30x | Invisible. Sky not transparent enough. I think an exit pupil of 3.3mm is a good compromise between 4mm and 2mm. 2mm is too much for the TV60 on this targets. |
| M66 | Leo | Galaxy | 15x, 18x, 30x | Invisible. Sky not transparent enough. |
| C50 | - Mon | Opn CL | 15x | Satellite cluster. Six stars in two columns |
| NGC2244 | | | | |
| NGC2264 | Mon | CL+Neb | 15x | Christmas tree. |
| C39 | - Gem | Pln Neb | 15x, 51x +/- | Eskimo nebula. From Wasat (Delta Gem) move east to 63 Gem. 63 Gem is the brightest star of a 'half moon' of 7 stars. The Eskimo nebula is next to the star HIP36370 (mag8.2), which is a bit isolated but very close to 63 on the opposite direction of Wasat. You can spot it at 15x without filters, but you see it only with averted vision. It appears as a very small patch next to the star. At 51x the nebula is visible as a grey little ball. The boundaries are obfuscated. An UHC filter helps increasing the contrast between the sky and the nebula. An OIII filter shows even more contrast, although I think an UHC filter is better at this exit pupil (1.2mm). Using these filters, the boundaries of the nebula appear much clearer although no structure is visible at this magnification. At 72x (and no filter) is still visible as a grey little ball. Boundaries are obfuscated. |
| NGC2392 | | | OIII, UHC, 72x | |
| Jupiter | Cnc | Planet | 72x | Quick observation. Two belts and four satellite were visible. |
| Alpha | Hya | Star | 72x | Alphard. Yellow star |
| Alpha | Vir | Star | 72x | Spica. Blue star |
| Alpha | Leo | Dbl Star | 15x, 72x | Regulus. Blue-white double star visible at 15x. Clearly split at 72x although not all this magnification is actually required for split it. |

Date: 24/03/2015 **Telescopes:** Tele Vue 60 F6
Time: 19:00-21:30 **Eyepieces:** TV Panoptic 24mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 72x, 0.8, 0.69deg; 144x, 0.4mm, 0.35deg
Altitude: 12m **Filters:**
Temperature: 5C (no wind)
Seeing: 3 - Moderate seeing
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|--------|------|-----------|-----------|--|
| M47 | Pup | Opn CL | 15x, 51x | Superb anchor shape. 51x reveals many more details. Quite tight double star near the centre. From Alpha Mon, go 5 degrees South. |
| M46 | Pup | Opn CL | 15x, 51x | Missed as I confused it with the aggregation of stars at North-West of 2 Pup A and 4 Pup. |
| M48 | Hya | Opn CL | 15x | Not easy to see if the sky is not very dark. Fortunately it is quite large. It is the third vertex of the triangle formed by the trio of stars "1Hya C Hya 2Hya (CHya mag 3.8 is the brightest in the middle of the trio) and 29 Mon (mag 4.35). |
| Moon | Tau | Satellite | 72x | Waxing crescent 25%. Very crisp details. |
| Venus | Cet | Planet | 72x, 144x | 144x was too much. Possibly because the planet was too low, or because the eyepiece did not cool down properly. In any case, even at 72x, no planet atmosphere detail. |
| Delta | Ori | Dbl Star | 72x | Mintaka. Easily split. |
| Zeta | Ori | Dbl Star | 72x | Alnitak. Separated components A and C. Cannot remember if B was detectable. |
| Sigma | Ori | Dbl Star | 72x | Visible 5 stars, although only able to split Sigma Orionis into two stars. |
| Iota | Ori | Dbl Star | 72x | Hatsya. Very nice double star. The companion is quite dim and small compared to Hatsya. Companion is grey. |
| Alpha | CMa | Dbl Star | 72x | Sirius. Not able to split Sirius. Too much bright. |
| Alpha | Gem | Dbl Star | 72x | Castor. The companion Castor B is also bright and the two stars are quite close to each other. Same colour. Castor C is very dim and more distant from the other two. |
| Zeta | Gem | Dbl Star | 72x | Mekbuda. Easily split double star. |
| M35 | Gem | Opn CL | 72x | Many other stars are visible. |

Date: 22/03/2015 **Telescopes:** Tele Vue 60 F6
Time: 19:00-22:00 **Eyepieces:** TV Panoptic 24mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 144x, 0.4mm, 0.35deg
Altitude: 12m **Filters:** Astronomik OIII
Temperature: 3C (no wind)
Seeing: 2 - Slight undulations
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|-----------|-------|----------|-----------------|---|
| M45 | Tau | Opn CL | 15x, 51x | Very clear and defined. 15x offers the best fov. |
| M42 | Ori | CL+Neb | 15x + OIII, 51x | 4mm exit pupil + OIII shows nebula extension. 51x shows trapezium |
| Sigma | Ori | Mlt star | 51x | Sufficient for seeing 5 stars |
| NGC1980 | Ori | Neb | 15x + OIII | 4mm exit pupil + OIII shows a bit of nebula around the star Hatsya |
| M78 | Ori | Neb | 15x | Unsuccess |
| C50 | - Mon | Opn CL | 15x | Satellite cluster. Six stars in two columns |
| NGC2244 | | | | |
| C49 | - Mon | Neb | 15x + OIII | Rosette nebula. Detectable with OIII filter. A grey patch 2 degree large. No structure visible |
| NGC2237 | | | | |
| NGC2264 | Mon | CL+Neb | 15x + OIII | Christmas tree + Cone nebula. Christmas tree is easily visible. Cone nebula is detectable with an OIII filter near and south of 15mon. |
| M35 | Gem | Opn CL | 15x | Under transparent night, many stars are visible inside. |
| M36 | Aur | Opn CL | 15x | Easy to find after finding M38. A bit difficult to see inside as it is quite dim. |
| M37 | Aur | Opn CL | 15x | Easy to find after finding M36. Still difficult to see inside. |
| M38 | Aur | Opn CL | 15x | Quite clear under transparent skies. |
| M44 | Cnc | Opn CL | 15x | Praesepe. Spectacular at 15x. |
| M67 | Cnc | Opn CL | 15x, 51x | King cobra. Not too easy to detect. Nicer at 51x. |
| M65 | Leo | Galaxy | 15x | Leo triplet. From Chertan (theta Leo), use the star pointers HIP54688 and HIP54711 to reach eta Leo. Eta Leo forms a 90Deg triangle with HIP55033 and HIP55262. From the latter look at south slightly. Galaxy detectable as patches. M56 is elongated. Averted vision for 10min is required. Cover the other eye to relax the observing eye nerve. |
| M66 | Leo | Galaxy | 15x | Leo triplet. As for M65. Maybe using an exit pupil of 2.7-2.0mm is better. |
| M95 | Leo | Galaxy | 15x | Unsuccess |
| M96 | Leo | Galaxy | 15x | Unsuccess |
| Gamma | UMi | Dbl Star | 15x | Pherkad. Blue 3mag. It has a neighbour star 10.30mag. Pherkad Minor orange 5mag. |
| 19-20 | Dra | Dbl Star | 15x | 4.5mag and 7mag. |
| Eta- | Dra | Dbl Star | 15x | 2.7mag and 6.05mag |
| HIP80309A | | | | |

| | | | | |
|---------|-----|--------|------|--|
| M51 | CVn | Galaxy | 15x | Whirlpool Galaxy. From UMA-Alkaid, move south to 24CVn. Continue on that direction until HIP65768. This forms a triangle with HIP66004 and HIP66116. They are all 7mag stars. HIP65768 is the brightest in the area. M51 lies externally of the line between HIP65768 and HIP66004. Averted vision for 10min is required. You will see a grey patch. No structure. |
| M101 | UMa | Galaxy | 15x | Unsuccess |
| Jupiter | Cnc | Planet | 144x | Order: Europa, Callisto, Jupiter, Io, Ganymede. Two belts very visible. The lower one was visible on the left (refractor). On the right the great red spot was detectable. Very minor belts north and south. |

Date: 23/02/2015 **Telescopes:** Tele Vue 60 F6
Time: 19:00-21:00 **Eyepieces:** TV Panoptic 24mm, Plossl 20mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Cambridge, UK **Power, EP, FOV:** 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 103x, 0.6mm, 0.77deg; 144x, 0.4mm, 0.35deg
Altitude: 12m **Filters:** Astronomik OIII, UHC
Temperature: 1C (no wind)
Seeing: 2 - Slight undulations
Transparency: 3 - Somewhat clear

| Target | Cons | Type | Power | Notes |
|---------|------|--------|------------|---|
| M42 | Ori | CL+Neb | 15x, 18x | 4mm exit pupil + UHC shows nebula extension. OIII shows more contrast. |
| C50 | - | Mon | Opn CL | Satellite cluster. Six stars in two columns |
| NGC2244 | | | | |
| C49 | - | Mon | Neb | 15x, 18x |
| NGC2237 | | | | Rosette nebula. Detectable with OIII filter. Very soft grey patch. No structure. Invisible with UHC filter. |
| M35 | Gem | Opn CL | 15x | Detectable but not much detailed. |
| M36 | Aur | Opn CL | 15x | Very poor detail, but detectable. |
| M37 | Aur | Opn CL | 15x | Very poor detail, but detectable. |
| M38 | Aur | Opn CL | 15x | The first of the group to find. Poor detail. |
| M44 | Cnc | Opn CL | 15x | Praesepe. Spectacular at 15x. |
| M67 | Cnc | Opn CL | 15x | King cobra. Not to easy to detect. Looks like a grey patch, more visible using averted vision. |
| Jupiter | Cnc | Planet | 103x, 144x | A bit of wind, but the image stays crisp at high magnifications. No aberration. |
| NGC1662 | Ori | Opn CL | 15x, 51x | Found casually while scanning from Aldebaran to Beltegeuse. Very small little open cluster at 15x. Much better at 51x. Not easily detectable, because of its small size |
| NGC1647 | Tau | Opn CL | 15x | Beautiful open cluster easily detectable from Aldebaran |
| NGC1746 | Tau | Opn CL | 15x | Not sure I found it. It appeared smaller than NGC1647. Possibly a darker sky reveals more interesting features. |
| Cr65 | Tau | Opn CL | 15x | Nice aggregation of stars, although none of them really emerges. Wide field is required. North of Orion-Meissa. |
| Cr70 | Ori | Opn CL | 15x | Gorgeous Orion's belt. The chain of stars surrounding Alnilam is superb. Wide field telescope. |

Date: xx/xx/1998 **Telescopes:** Celestron Newton 114mm F8; Binoculars 15x70; Tele Vue 60 F6
Time: Mar 1998 to Jan 2015 **Eyepieces:** Kellner 25mm, Orion Sirius 10mm, Orion Shorty 2x Barlow. TV Panoptic 24mm, Plossl 20mm, Nagler 7mm, Vixen SLV 5mm, Bresser 2x SA
Location: Venice, Lorenzago (IT). Newcastle, Luton Devon, Cambridge, (UK) **Power, EP, FOV:** 36.4x, 3.1mm, 1.4deg; 72.8x, 1.6mm, 0.7deg; 91x, 1.3mm, 0.57deg; 182x, 0.6mm, 0.3deg. 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 103x, 0.6mm, 0.77deg; 144x, 0.4mm, 0.35deg
Altitude: 10m - 880m **Filters:**
Temperature: -5 to +30C (wind: 0 to 40km/h)
Seeing: 1 to 3
Transparency: 3 to 5

| Target | Cons | Type | Power | Notes |
|--------|------|---------|-----------------------------------|--|
| M1 | Tau | SN Rem | 36x | Crab Nebula. C114F8, Venice (IT). |
| M2 | Aqr | Glob CL | 15x | B15x70, Newcastle (UK). |
| M7 | Sco | Opn CL | 36x | Ptolemy Cluster. C114F8, Venice (IT). Large and beautiful open cluster. It was just above the horizon and the last cluster visible if moving towards East. |
| M10 | Oph | Glob CL | 36x; 15x | C114F8, Venice (IT); B15x70, Newcastle (UK). |
| M11 | Sct | Opn CL | 15x | Wild duck cluster. B15x70, Newcastle (UK). |
| M12 | Oph | Glob CL | 15x | B15x70, Newcastle (UK). |
| M13 | Her | Glob CL | 36x; 15x, 51x | Hercules Globular Cluster. C114F8, Venice (IT); B15x70, TV60F6, Newcastle (UK). |
| M15 | Peg | Glob CL | 15x | B15x70, Newcastle (UK). |
| M20 | Sgr | CL+Neb | 36x | Trifid nebula. C114F8, Venice (IT). |
| M27 | Vul | Pln Neb | 15x | Dumbbell nebula. B15x70, Newcastle (UK). |
| M29 | Cyg | Opn CL | 15x | B15x70, Newcastle (UK). |
| M31 | And | Galaxy | 36x; 15x | Andromeda Galaxy. C114F8, Venice (IT); B15x70, Luton, Devon (UK); TV60F6, Newcastle (UK). |
| M32 | And | Galaxy | 15x | Companion to M31. B15x70, Luton, Devon (UK). |
| M34 | Per | Opn CL | 15x | B15x70, TV60F6, Newcastle (UK). |
| M35 | Gem | Opn CL | 15x, 72x | B15x70, Newcastle (UK). |
| M36 | Aur | Opn CL | 15x, 30x | TV60F6, Newcastle, Cambridge (UK). |
| M37 | Aur | Opn CL | 15x, 30x | TV60F6, Newcastle, Cambridge (UK). |
| M38 | Aur | Opn CL | 15x, 30x | TV60F6, Newcastle, Cambridge (UK). |
| M41 | CMa | Opn CL | 15x | TV60F6, Cambridge (UK). |
| M42 | Ori | CL+Neb | 36x; 15x, 18x, 30x, 36x, 51x, 72x | Orion nebula. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK). |

| | | | | |
|-----------------|-----|---------|---|--|
| M43 | Ori | Brt Neb | 36x; 15x, 18x, 30x, 36x, 51x, 72x | Detached part of Orion Nebula. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK). |
| M44 | Cnc | Opn CL | 15x | Beehive Cluster. B15x70, TV60F6, Newcastle (UK). |
| M45 | Tau | CL+Neb | 36x; 15x, 51x | Pleiades. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK). |
| M57 | Lyr | Pln Neb | 37x; 15x | Ring Nebula. C114F8, Venice, Lorenzago (IT); B15x70, Newcastle (UK). |
| M67 | Cnc | Opn CL | 15x | The King Cobra Cluster. TV60F6, Cambridge (UK). |
| M81 | UMa | Galaxy | 15x | Bode's Galaxy. B15x70, Newcastle (UK). |
| M82 | UMa | Galaxy | 15x | Cigar Galaxy. B15x70, Newcastle (UK). |
| M92 | Her | Glob CL | 15x | B15x70, Newcastle (UK). |
| M110 | And | Galaxy | 15x | M31 Companion. B15x70, Luton, Devon (UK). |
| C14 | - | Per | Opn CL | Double Cluster. B15x70, Exeter, Newcastle (UK); TV60F6, Newcastle (UK). |
| NGC869 / 884 | | | | |
| C28 | - | And | Opn CL | 15x |
| NGC752 | | | | B15x70, Newcastle (UK). |
| C37 | - | Vul | Opn CL | 15x |
| NGC6885 | | | | B15x70, Newcastle (UK). |
| C39 | - | Gem | Pln Neb | 15x, 51x, 72x |
| NGC2392 | | | | Eskimo Nebula. TV60F6, Cambridge (UK). |
| C41 | | Tau | Opn CL | 36x; 15x, 18x, 51x |
| | | | | Hyades. C114F8, Venice (IT); B15x70, TV60F6, Newcastle (UK). |
| C49 | - | Mon | Neb | 15x |
| NGC2237 | | | | Rosette Nebula. TV60F6, Cambridge (UK). |
| C50 | - | Mon | Opn CL | 15x |
| NGC2244 | | | | Satellite cluster. TV60F6, Newcastle, Cambridge (UK). |
| Stock1 | Vul | Opn CL | 15x | B15x70, Newcastle (UK). |
| Stock2 | Cas | Opn CL | 15x | B15x70, TV60F6, Newcastle (UK). |
| Mel20 | Per | Opn CL | 15x | B15x70, TV60F6, Newcastle (UK). |
| Mel25 | Tau | Opn CL | 36x; 15x, 51x | Hydes. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK). |
| Mel111 | CmB | Opn CL | 15x | Coma Berenices Star Cluster. B15x70, Newcastle (UK). |
| Cr39 | Ori | Opn CL | 36x; 15x, 51x | TV60F6, Cambridge (UK). |
| Cr65 | Tau | Opn CL | 15x | TV60F6, Cambridge (UK). |
| Cr68 | Ori | Opn CL | 15x, 30x | TV60F6. Newcastle, Cambridge (UK). |
| Cr89 | Gem | Opn CL | 15x | TV60F6. Newcastle, Cambridge (UK). |
| Cr97 | Mon | Opn CL | 15x, 30x | TV60F6, Cambridge (UK). |
| Cr106 | Mon | Opn CL | 15x, 30x | TV60F6, Cambridge (UK). |

| | | | | |
|-----------|-----|-----------|---|--|
| Cr107 | Mon | Opn CL | 15x, 30x | TV60F6, Cambridge (UK). |
| Cr399 | Vul | Opn CL | 15x | Brocchi's Cluster, the Coathanger. B15x70, Newcastle (UK). |
| NGC1750 | Tau | Opn CL | 15x, 51x | TV60F6, Cambridge (UK). |
| NGC1980 | Ori | Neb | 15x | TV60F6, Cambridge (UK). |
| NGC1981 | Ori | Opn CL | 15x, 51x | TV60F6, Cambridge (UK). |
| NGC2264 | Mon | Opn CL | 36x; 15x, 51x | C114F8, Venice (IT); TV60F6, Cambridge (UK). |
| NGC6633 | Oph | Opn CL | 36x; 15x | C114F8, Venice (IT); B15x70, Newcastle (UK). A beautiful chain of stars. |
| IC4756 | Ser | Opn CL | 36x; 15x | Graff's Cluster. C114F8, Venice (IT); B15x70, Newcastle (UK). |
| 27 Hydra | Hya | Dbl Star | 51x | TV60F6, Cambridge (UK). |
| Gamma | UMi | Dbl Star | 51x | Pherkad. TV60F6, Cambridge (UK). |
| Beta | And | Dbl Star | 15x | Mirach. B15x70, Newcastle (UK). |
| Alpha | Her | Dbl Star | 15x | Rasalgethi. B15x70, Newcastle (UK). |
| 71-72 | Oph | Dbl Star | 15x | B15x70, Newcastle (UK). |
| Alpha | Leo | Dbl Star | 37x, 74x | Regulus. C114F8, Italy (IT). |
| Beta | Ori | Dbl Star | 37x, 74x; 15x | Rigel. C114F8, Italy (IT), B15x70, Newcastle (UK). |
| Alpha | UMa | Dbl Star | 15x; 30x | Dubhe. B15x70, TV60F6, Newcastle (UK). |
| Zeta | UMa | Dbl Star | 15x; 15x, 51x | Mizar and Alcor. B15x70, TV60F6, Newcastle, Cambridge (UK). |
| 19-20 | Dra | Dbl Star | 51x | TV60F6, Cambridge (UK). |
| Eta- | Dra | Dbl Star | 51x | TV60F6, Cambridge (UK). |
| HIP80309A | | | | |
| Beta | Cyg | Dbl Star | 72x | Albireo. C114F8, Venice (IT); TV60F6, Newcastle (UK). |
| Sun | | Star | 50x; 15x, 51x | TV60F6, Cambridge (UK). |
| Moon | | Satellite | 36x, 90x, 180x; 15x, 51x, 72x, 103x, 144x | C114F8, Italy (IT); B15x70, TV60F6, Newcastle, Cambridge (UK). |
| Mercury | | Planet | 15x | B15x70, Newcastle (UK). |
| Venus | | Planet | 36x; 72x, 144x | C114F8, Venice (IT); TV60F6, Cambridge (UK). |
| Mars | | Planet | 36x, 90x, 180x | C114F8, Venice (IT). |
| Jupiter | | Planet | 36x, 90x, 180x; 72x, 103x, 144x | C114F8, Italy (IT); B15x70, TV60F6, Newcastle, Cambridge (UK). |
| Saturn | | Planet | 36x, 90x, 180x | C114F8, Venice (IT). |
| Uranus | | Planet | 10x; 15x; 15x | B10x50, Lorenzago (IT); B15x70, TV60F6, Newcastle (UK). |

3 Observed objects by catalogue

Catalogue: 1–Messier

| Name | Other Name | Type | Cons | Common Name |
|------|------------|---------|------|---|
| M1 | NGC1952 | SN Rem | Tau | Crab Nebula |
| M2 | NGC7089 | Glob CL | Aqr | |
| M3 | NGC5272 | Glob CL | CVn | |
| M5 | NGC5904 | Glob CL | Ser | Ptolemy Cluster |
| M7 | NGC6475 | Opn CL | Sco | |
| M8 | NGC6523 | CL+Neb | Sgr | |
| M10 | NGC6254 | Glob CL | Oph | Lagoon Nebula |
| M11 | NGC6705 | Opn CL | Sct | |
| M12 | NGC6218 | Glob CL | Oph | |
| M13 | NGC6205 | Glob CL | Her | Great Globular Cluster in Hercules |
| M15 | NGC7078 | Glob CL | Peg | |
| M16 | NGC6611 | CL+Neb | Ser | |
| M17 | NGC6618 | CL+Neb | Sgr | Eagle Nebula Omega, Swan, Horseshoe, or Lobster Nebula |
| M18 | NGC6613 | Opn CL | Sgr | |
| M20 | NGC6514 | CL+Neb | Sgr | |
| M21 | NGC6531 | Opn CL | Sgr | Trifid Nebula |
| M23 | NGC6494 | Opn CL | Sgr | |
| M24 | IC4715 | Opn CL | Sgr | |
| M25 | IC4725 | Opn CL | Sgr | Sagittarius Star Cloud |
| M27 | NGC6853 | Pln Neb | Vul | |
| M29 | NGC6913 | Opn CL | Cyg | |
| M31 | NGC224 | Galaxy | And | Andromeda Galaxy |
| M32 | NGC221 | Galaxy | And | |
| M34 | NGC1039 | Opn CL | Per | |
| M35 | NGC2168 | Opn CL | Gem | |
| M36 | NGC1960 | Opn CL | Aur | |
| M37 | NGC2099 | Opn CL | Aur | |
| M38 | NGC1912 | Opn CL | Aur | |
| M39 | NGC7092 | Opn CL | Cyg | |
| M41 | NGC2287 | Opn CL | CMa | |
| M42 | NGC1976 | CL+Neb | Ori | Orion Nebula |
| M43 | NGC1982 | Brt Neb | Ori | De Mairan's Nebula |
| M44 | NGC2632 | Opn CL | Cnc | Beehive Cluster |

| | | | | |
|------|---------|---------|-----|---------------|
| M45 | Mel 22 | CL+Neb | Tau | Pleiades |
| M46 | NGC2437 | Opn CL | Pup | |
| M47 | NGC2422 | Opn CL | Pup | |
| M48 | NGC2548 | Opn CL | Hya | |
| M53 | NGC5024 | Glob CL | Com | |
| M56 | NGC6779 | Glob CL | Lyr | |
| M57 | NGC6720 | Pln Neb | Lyr | Ring Nebula |
| M60 | NGC4649 | Galaxy | Vir | |
| M65 | NGC3623 | Galaxy | Leo | Leo Triplet |
| M66 | NGC3627 | Galaxy | Leo | Leo Triplet |
| M67 | NGC2682 | Opn CL | Cnc | |
| M81 | NGC3031 | Galaxy | UMa | Bode's Galaxy |
| M82 | NGC3034 | Galaxy | UMa | Cigar Galaxy |
| M92 | NGC6341 | Glob CL | Her | |
| M97 | NGC3587 | Pln Neb | UMa | Owl Nebula |
| M103 | NGC581 | Opn CL | Cas | |
| M107 | NGC6171 | Glob CL | Oph | |
| M110 | NGC205 | Galaxy | And | |

Catalogue: 2–Caldwell

| Name | Other Name | Type | Cons | Common Name |
|-------------|-------------------|-------------|-------------|---------------------------------|
| C14 | NGC869/884 | Opn CL | Per | Double Cluster, h or chi Persei |
| C28 | NGC752 | Opn CL | And | |
| C37 | NGC6885 | Opn CL | Vul | |
| C39 | NGC2392 | Pln Neb | Gem | Eskimo or Clown Nebula |
| C41 | | Opn CL | Tau | Hyades |
| C49 | NGC2237 | Neb | Mon | Rosette Nebula |
| C50 | NGC2244 | Opn CL | Mon | Satellite Cluster |
| C59 | NGC3242 | Pln Neb | Hya | Ghost of Jupiter |

Catalogue: 3-NGC

| Name | Other Name | Type | Cons | Common Name |
|---------|------------|--------|------|-----------------|
| NGC1647 | Cr415 | Opn CL | Tau | Christmas' tree |
| NGC1662 | | Opn CL | Ori | |
| NGC1750 | | Opn CL | Tau | |
| NGC1746 | | Opn CL | Tau | |
| NGC1807 | | Opn CL | Tau | |
| NGC1817 | | Opn CL | Tau | |
| NGC1931 | | CL+Neb | Aur | |
| NGC1980 | | Neb | Ori | |
| NGC1981 | | Opn CL | Ori | |
| NGC2264 | | CL+Neb | Mon | |
| NGC6633 | | Opn CL | Oph | |
| NGC6871 | | Opn CL | Cyg | |
| NGC6883 | | Opn CL | Cyg | |
| NGC6910 | | Opn CL | Cyg | |
| NGC7082 | | Opn CL | Cyg | |
| NGC7086 | | Opn CL | Cyg | |
| NGC7235 | | Opn CL | Cep | |
| NGC7261 | | Opn CL | Cep | |

Catalogue: 4-IC

| Name | Other Name | Type | Cons | Common Name |
|-------------|-------------------|-------------|-------------|-------------------------|
| IC4756 | Cr418 | Opn CL | Ser | Graff's Cluster |
| IC4996 | | Opn CL | Cyg | Elephant's Trunk Nebula |
| IC1396 | | CL+Neb | Cep | |

Catalogue: 5-Stock

| Name | Other Name | Type | Cons | Common Name |
|--------|------------|------|------|-------------|
| Stock1 | | | Vul | |
| Stock2 | | | Cas | |

Catalogue: 6–Melotte

| Name | Other Name | Type | Cons | Common Name |
|-------------|-------------------|-------------|-------------|---|
| Mel20 | | Opn CL | Per | Alpha Persei Moving Cluster, Alpha Persei Cluster |
| Mel25 | | Opn CL | Tau | Taurus Moving Cluster, Hyades |
| Mel111 | | Opn CL | Com | Coma Berenices Star Cluster, Coarse Hair, Tuft |

Catalogue: 7-Collider

| Name | Other Name | Type | Cons | Common Name |
|-------|------------|--------|------|-----------------------------------|
| Cr65 | nl | | Tau | |
| Cr89 | 912 Gem | | Gem | |
| Cr97 | | | Mon | |
| Cr106 | | | Mon | |
| Cr107 | | | Mon | |
| Cr399 | | Opn CL | Vul | Brocchi's Cluster, the Coathanger |

Catalogue: 8-DoubleStars

| Name | Other Name | Type | Cons | Common Name |
|-----------|------------|-------------------|------|---------------|
| 27 Hydra | | | Hya | |
| Alpha | Polaris | | UMi | |
| Gamma | Pherkad | | UMi | |
| 19-20 | | | Dra | |
| Eta- | | | Dra | |
| HIP80309A | | | | |
| Beta | Albireo | Blue, or- ange | Cyg | |
| Sigma | | | Ori | |
| Beta | Rigel | | Ori | |
| Alpha | Castor | | Gem | |
| Beta | Sheliak | Blue, or- ange | Lyr | |
| Delta | | | Lyr | |
| Epsilon | | Double pair | Lyr | Double Double |
| Zeta | | | Lyr | |
| HD175634 | | | Lyr | |
| Beta | | Blue, or- ange | Sco | |
| Omega | | | Sco | |
| Delta | | Blue, or- ange | Cep | |

4 Complete Messier and Caldwell catalogues

Messier Catalogue

| Name | Other | Type | Cons | RA | Dec | Mag | Size (arc min) | SB | Distance (ly) | Common Name |
|------|---------|---------|------|----------|-----------|-----|----------------|------|---------------|---|
| M1 | NGC1952 | SN Rem | Tau | 00:40:22 | +22° 01' | 8.4 | 8' | 11 | 4.9-8.1 | Crab Nebula |
| M2 | NGC7089 | Glob CL | Aqr | 00:42:42 | -0° 49' | 6.3 | 11.7' | 11 | 33 | |
| M3 | NGC5272 | Glob CL | CVn | 00:42:44 | +28° 23' | 6.2 | 18.6' | 11 | 33.9 | |
| M4 | NGC6121 | Glob CL | Sco | 01:33:12 | -26° 32' | 5.9 | 26.3' | 12 | 7.2 | |
| M5 | NGC5904 | Glob CL | Ser | 01:33:51 | +2° 05' | 6.7 | 19.9' | 11 | 24.5 | |
| M6 | NGC6405 | Opn CL | Sco | 01:36:42 | -32° 13' | 4.2 | 20' | 10 | 1.6 | Butterfly Cluster |
| M7 | NGC6475 | Opn CL | Sco | 01:42:20 | -34° 49' | 3.3 | 80' | 12 | 0.65-1.31 | Ptolemy Cluster |
| M8 | NGC6523 | CL+Neb | Sgr | 02:42:00 | -24° 23' | 6 | 45' | 13 | 4.1 | Lagoon Nebula |
| M9 | NGC6333 | Glob CL | Oph | 02:42:41 | -18° 31' | 8.4 | 5.5' | 11 | 25.8 | |
| M10 | NGC6254 | Glob CL | Oph | 03:47:00 | - 4° 06' | 6.4 | 12.2' | 12 | 14.3 | |
| M11 | NGC6705 | Opn CL | Sct | 05:24:11 | - 6° 16' | 6.3 | 14' | 9 | 6.2 | Wild Duck Cluster |
| M12 | NGC6218 | Glob CL | Oph | 05:28:43 | -1° 57' | 7.7 | 14.5' | 12 | 15.7 | |
| M13 | NGC6205 | Glob CL | Her | 05:34:32 | +36° 28' | 5.8 | 23.2' | 12 | 22.2 | Great Globular Cluster in Hercules |
| M14 | NGC6402 | Glob CL | Oph | 05:35:31 | - 3° 15' | 8.3 | 6.7' | 12 | 30.3 | |
| M15 | NGC7078 | Glob CL | Peg | 05:36:12 | +12° 10' | 6.2 | 12.3' | 11 | 33 | |
| M16 | NGC6611 | CL+Neb | Ser | 05:37:17 | -13° 47' | 6 | 7' | 12 | 7 | Eagle Nebula |
| M17 | NGC6618 | CL+Neb | Sgr | 05:46:47 | -16° 11' | 6 | 11' | 13 | 5,000-6,000 | Omega, Swan, Horseshoe, or Lobster Nebula |
| M18 | NGC6613 | Opn CL | Sgr | 05:52:19 | -17° 08' | 7.5 | 9' | 12 | 4.9 | |
| M19 | NGC6273 | Glob CL | Oph | 06:08:54 | -26° 16' | 7.5 | 5.3' | 11 | 28.7 | |
| M20 | NGC6514 | CL+Neb | Sgr | 06:46:54 | -23° 02' | 6.3 | 28' | 13 | 5.2 | Trifid Nebula |
| M21 | NGC6531 | Opn CL | Sgr | 07:02:48 | -22° 30' | 6.5 | 13' | 11 | 4.25 | |
| M22 | NGC6656 | Glob CL | Sgr | 07:36:36 | -23° 54' | 5.1 | 24' | 11 | 9.6-11.6 | Sagittarius Cluster |
| M23 | NGC6494 | Opn CL | Sgr | 07:41:48 | -19° 01' | 6.9 | 27' | 13 | 2.15 | |
| M24 | IC4715 | Opn CL | Sgr | 07:44:36 | -18° 29' | 4.6 | 95' | 4.3 | 10 | Sagittarius Star Cloud |
| M25 | IC4725 | Opn CL | Sgr | 08:13:48 | -19° 15' | 4.6 | 29' | 12 | 2 | |
| M26 | NGC6694 | Opn CL | Sct | 08:40:24 | - 9° 24' | 8 | 15' | 12 | 5 | |
| M27 | NGC6853 | Pln Neb | Vul | 08:51:18 | +22° 43' | 7.5 | 480" | 11.2 | 1.148-1.52 | Dumbbell Nebula |
| M28 | NGC6626 | Glob CL | Sgr | 09:55:33 | -24° 52' | 7.7 | 15' | 11 | 17.9 | |
| M29 | NGC6913 | Opn CL | Cyg | 09:55:52 | +38° 32' | 7.1 | 7' | 11 | 7.2 | |
| M30 | NGC7099 | Glob CL | Cap | 10:43:58 | - 23° 11' | 7.7 | 8.9' | 11 | 27.8-31 | |
| M31 | NGC224 | Galaxy | And | 10:46:46 | +41° 16' | 3.4 | 189' | 13.5 | 2,430-2,650 | Andromeda Galaxy |
| M32 | NGC221 | Galaxy | And | 10:47:50 | +40° 52' | 8.1 | 8.5' | 12.4 | 2,410-2,570 | |
| M33 | NGC598 | Galaxy | Tri | 11:11:31 | +30° 39' | 5.7 | 68.7' | 14.2 | 2,380-3,070 | Triangulum Galaxy |
| M34 | NGC1039 | Opn CL | Per | 11:14:48 | +42° 47' | 5.5 | 35' | - | 1.5 | |
| M35 | NGC2168 | Opn CL | Gem | 11:18:56 | +24° 20' | 5.3 | 28' | 12 | 2.8 | |
| M36 | NGC1960 | Opn CL | Aur | 11:20:15 | +34° 08' | 6.3 | 12' | 12 | 4.1 | |

| | | | | | | | | | | |
|-----|------------|---------|-----|----------|-----------|------|-------|------|---------------|------------------------|
| M37 | NGC2099 | Opn CL | Aur | 11:57:36 | +32° 33' | 6.2 | 24' | 11 | 4.511 | |
| M38 | NGC1912 | Opn CL | Aur | 12:13:48 | +35° 50' | 7.4 | 21' | 12 | 4.2 | |
| M39 | NGC7092 | Opn CL | Cyg | 12:18:50 | +48° 26' | 5.5 | 32' | 11 | 0.8244 | |
| M40 | Winnecke 4 | 2 Stars | UMa | 12:18:58 | +58° 05' | 9.7 | 12 | - | 0.51 | Winnecke 4 |
| M41 | NGC2287 | Opn CL | CMa | 12:21:55 | - 20° 44' | 4.5 | 38' | 12 | 2.3 | |
| M42 | NGC1976 | CL+Neb | Ori | 12:22:24 | - 5° 27' | 4 | 90' | 11 | 1.324-1.364 | Orion Nebula |
| M43 | NGC1982 | Brt Neb | Ori | 12:22:55 | - 5° 16' | 9 | 20' | 13 | 1.6 | De Mairan's Nebula |
| M44 | NGC2632 | Opn CL | Cnc | 12:25:04 | +19° 59' | 3.7 | 95' | 13 | 0.577 | Beehive Cluster |
| M45 | Mel 22 | CL+Neb | Tau | 12:25:24 | +24° 07' | 1.6 | 100' | 11 | 0.39-0.46 | Pleiades |
| M46 | NGC2437 | Opn CL | Pup | 12:26:12 | -14° 49' | 6.1 | 27' | 13 | 5.4 | |
| M47 | NGC2422 | Opn CL | Pup | 12:29:47 | -14° 30' | 4.2 | 30' | 11 | 1.6 | |
| M48 | NGC2548 | Opn CL | Hya | 12:30:49 | - 5° 48' | 5.5 | 54' | 13 | 1.5 | |
| M49 | NGC4472 | Galaxy | Vir | 12:31:59 | +8° 00' | 9.4 | 9.8' | 13.2 | 53,600-58,200 | |
| M50 | NGC2323 | Opn CL | Mon | 12:35:26 | - 8° 23' | 5.9 | 16' | 12 | 3.2 | |
| M51 | NGC5194 | Galaxy | CVn | 12:35:40 | +47° 12' | 8.4 | 10.8' | 12.9 | 19,000-27,000 | Whirlpool Galaxy |
| M52 | NGC7654 | Opn CL | Cas | 12:36:50 | +61° 35' | 5 | 13' | 12 | 5 | |
| M53 | NGC5024 | Glob CL | Com | 12:37:44 | +18° 10' | 8.3 | 14.4' | 12 | 58 | |
| M54 | NGC6715 | Glob CL | Sgr | 12:39:28 | - 30° 29' | 8.4 | 9.1' | 11 | 87.4 | |
| M55 | NGC6809 | Glob CL | Sgr | 12:39:59 | - 30° 58' | 7.4 | 19' | 13 | 17.6 | |
| M56 | NGC6779 | Glob CL | Lyr | 12:42:02 | +30° 11' | 8.3 | 5' | 12 | 32.9 | |
| M57 | NGC6720 | Pln Neb | Lyr | 12:43:40 | +33° 02' | 8.8 | 86" | 9.3 | 1.6-3.8 | Ring Nebula |
| M58 | NGC4579 | Galaxy | Vir | 12:50:53 | +11° 49' | 10.5 | 6' | 13.1 | 63,000 | |
| M59 | NGC4621 | Galaxy | Vir | 12:56:44 | +11° 39' | 10.6 | 5.3' | 12.9 | 55,000-65,000 | |
| M60 | NGC4649 | Galaxy | Vir | 13:12:55 | +11° 33' | 9.8 | 7.6' | 12.9 | 51,000-59,000 | |
| M61 | NGC4303 | Galaxy | Vir | 13:15:49 | +4° 28' | 10.2 | 6.5' | 13.4 | 50.2-54.6 | |
| M62 | NGC6266 | Glob CL | Oph | 13:29:52 | - 30° 07' | 7.4 | 14.1' | 11 | 22.2 | |
| M63 | NGC5055 | Galaxy | CVn | 13:37:01 | +42° 02' | 9.3 | 12.6' | 13 | 37000 | Sunflower Galaxy |
| M64 | NGC4826 | Galaxy | Com | 13:42:11 | +21° 41' | 9.4 | 10.3' | 12.7 | 22,000-26,000 | Black Eye Galaxy |
| M65 | NGC3623 | Galaxy | Leo | 14:03:12 | +13° 05' | 10.3 | 9' | 12.8 | 41,000-42,000 | Leo Triplet |
| M66 | NGC3627 | Galaxy | Leo | 15:06:29 | +12° 59' | 8.9 | 9.1' | 12.7 | 31,000-41,000 | Leo Triplet |
| M67 | NGC2682 | Opn CL | Cnc | 15:18:34 | +11° 49' | 6.1 | 30' | 13 | 2.61-2.93 | |
| M68 | NGC4590 | Glob CL | Hya | 16:17:03 | -26° 45' | 9.7 | 9.8' | 13 | 33.6 | |
| M69 | NGC6637 | Glob CL | Sgr | 16:23:35 | - 32° 21' | 8.3 | 7.1' | 11 | 29.7 | |
| M70 | NGC6681 | Glob CL | Sgr | 16:32:32 | - 32° 18' | 9.1 | 7.8' | 11 | 29.4 | |
| M71 | NGC6838 | Glob CL | Sge | 16:41:41 | +18° 47' | 6.1 | 6.1' | 12 | 13 | |
| M72 | NGC6981 | Glob CL | Aqr | 16:47:15 | -12° 32' | 9.4 | 5.9' | 12 | 53.40-55.74 | |
| M73 | NGC6994 | Opn CL | Aqr | 16:57:09 | -12° 38' | 9 | 2.8' | - | 2.5 | |
| M74 | NGC628 | Galaxy | Psc | 17:01:13 | +15° 47' | 10 | 10' | 14.2 | 24,000-36,000 | |
| M75 | NGC6864 | Glob CL | Sgr | 17:02:38 | -21° 55' | 9.2 | 6' | 11 | 67.5 | |
| M76 | NGC650/1 | Pln Neb | Per | 17:17:07 | +51° 34' | 10.1 | 163" | 10.4 | 2.5 | Little Dumbbell Nebula |
| M77 | NGC1068 | Galaxy | Cet | 17:19:12 | - 0° 01' | 9.6 | 7.3' | 13 | 47000 | Cetus A |

| | | | | | | | | | | |
|------|---------|---------|-----|----------|----------|------|-------|------|----------------|--------------------------|
| M78 | NGC2068 | Brn Neb | Ori | 17:37:36 | +0° 03' | 8.3 | 8' | 12 | 1.6 | |
| M79 | NGC1904 | Glob CL | Lep | 17:40:06 | -24° 33' | 8.6 | 7.8' | 12 | 41 | |
| M80 | NGC6093 | Glob CL | Sco | 17:53:54 | -22° 59' | 7.9 | 5.1' | 11 | 32.6 | |
| M81 | NGC3031 | Galaxy | UMa | 17:56:48 | +69° 04' | 6.9 | 24.9' | 13.2 | 11,400-12,200 | Bode's Galaxy |
| M82 | NGC3034 | Galaxy | UMa | 18:02:23 | +69° 41' | 8.4 | 10.5' | 12.5 | 10,700-12,300 | Cigar Galaxy |
| M83 | NGC5236 | Galaxy | Hya | 18:03:37 | -29° 52' | 7.5 | 13.1' | 13 | 14700 | Southern Pinwheel Galaxy |
| M84 | NGC4374 | Galaxy | Vir | 18:04:36 | +12° 53' | 10.1 | 6.7' | 13 | 57,000-63,000 | |
| M85 | NGC4382 | Galaxy | Com | 18:18:24 | +18° 11' | 10 | 7.4' | 12.9 | 56,000-64,000 | |
| M86 | NGC4406 | Galaxy | Vir | 18:18:48 | +12° 57' | 9.8 | 9.8' | 13.2 | 49,000-55,000 | |
| M87 | NGC4486 | Galaxy | Vir | 18:19:54 | +12° 24' | 9.6 | 8.7' | 13 | 51,870-55,130 | Virgo A |
| M88 | NGC4501 | Galaxy | Com | 18:20:26 | +14° 25' | 10.4 | 6.8' | 13 | 39,000-56,000 | |
| M89 | NGC4552 | Galaxy | Vir | 18:24:33 | +12° 33' | 10.7 | 5.3' | 13.2 | 47,000-53,000 | |
| M90 | NGC4569 | Galaxy | Vir | 18:31:23 | +13° 10' | 10.3 | 9.9' | 13.4 | 55,900-61,500 | |
| M91 | NGC4548 | Galaxy | Com | 18:31:36 | +14° 30' | 11 | 5.2' | 13.4 | 47,000-79,000 | |
| M92 | NGC6341 | Glob CL | Her | 18:36:24 | +43° 08' | 6.3 | 11.2' | 11 | 26.7 | |
| M93 | NGC2447 | Opn CL | Pup | 18:43:13 | -23° 52' | 6 | 22' | 12 | 3.6 | |
| M94 | NGC4736 | Galaxy | CVn | 18:45:12 | +41° 07' | 9 | 12.3' | 13.1 | 14,700-17,300 | |
| M95 | NGC3351 | Galaxy | Leo | 18:51:06 | +11° 42' | 11.4 | 7.3' | 13.5 | 31,200-34,000 | |
| M96 | NGC3368 | Galaxy | Leo | 18:53:35 | +11° 49' | 10.1 | 7.8' | 13.1 | 28,000-34,000 | |
| M97 | NGC3587 | Pln Neb | UMa | 18:55:03 | +55° 01' | 9.9 | 202" | 12.1 | 2.03 | Owl Nebula |
| M98 | NGC4192 | Galaxy | Com | 19:16:36 | +14° 54' | 11 | 9.4' | 14 | 44400 | |
| M99 | NGC4254 | Galaxy | Com | 19:39:59 | +14° 25' | 10.4 | 5.3' | 13.2 | 44,700-55,700 | |
| M100 | NGC4321 | Galaxy | Com | 19:53:46 | +15° 49' | 10.1 | 7.5' | 13 | 55000 | |
| M101 | NGC5457 | Galaxy | UMa | 19:59:36 | +54° 21' | 7.9 | 28.5' | 14.9 | 19,100-22,400 | Pinwheel Galaxy |
| M102 | NGC5866 | Galaxy | Dra | 20:06:05 | +55° 46' | 9.9 | 6.5' | 12.2 | | |
| M103 | NGC581 | Opn CL | Cas | 20:23:56 | +60° 42' | 7.4 | 6' | 11 | 10 | |
| M104 | NGC4594 | Galaxy | Vir | 20:53:28 | -11° 37' | 9 | 8.6' | 11.6 | 28,700-30,900 | Sombrero Galaxy |
| M105 | NGC3379 | Galaxy | Leo | 20:59:00 | +12° 35' | 10.2 | 5.3' | 12.8 | 30,400-33,600 | |
| M106 | NGC4258 | Galaxy | CVn | 21:29:58 | +47° 18' | 9.1 | 17.4' | 13.6 | 22,200-25,200 | |
| M107 | NGC6171 | Glob CL | Oph | 21:32:12 | -13° 03' | 8.9 | 3.3' | 12 | 20.9 | |
| M108 | NGC3556 | Galaxy | UMa | 21:33:27 | +55° 40' | 10.7 | 8.6' | 13 | 46000 | |
| M109 | NGC3992 | Galaxy | UMa | 21:40:22 | +53° 23' | 10.6 | 7.5' | 13.6 | 59,500-107,500 | |
| M110 | NGC205 | Galaxy | And | 23:24:12 | +41° 41' | 9 | 19.5' | 14 | 2,600-2,780 | |

Caldwell Catalogue

| Name | Other | Type | Cons | RA | Dec | Mag | Size (arc min) | SB | Distance (ly) | Common Name |
|------|------------|---------|------|-----------|----------|------|----------------|------|---------------|--------------------------------|
| C1 | NGC188 | Opn CL | Cep | 00h 44.4m | +85° 20m | 8.1 | 14 | 13.9 | 4800 | |
| C2 | NGC40 | Pln Neb | Cep | 00h 13.0m | +72° 32m | 11.6 | 0.6 | 10.9 | 3500 | Bow Tie Nebula |
| C3 | NGC4236 | Galaxy | Dra | 12h 16.7m | +69° 28m | 9.7 | 21x7 | 15 | 7 million | |
| C4 | NGC7023 | Neb | Cep | 21h 01.8m | +68° 12m | 6.8 | 18x18 | 13.3 | 1400 | Iris Nebula |
| C5 | IC342 | Galaxy | Cam | 03h 46.8m | +68° 06m | 9.2 | 18x17 | 15.4 | 13 million | |
| C6 | NGC6543 | Pln Neb | Dra | 17h 58.6m | +66° 38m | 8.8 | 0.3/5.8 | 11.9 | 3000 | Cat's Eye Nebula |
| C7 | NGC2403 | Galaxy | Cam | 07h 36.9m | +65° 36m | 8.9 | 18x10 | 14.1 | 14 million | |
| C8 | NGC559 | Opn CL | Cas | 01h 29.5m | +63° 18m | 9.5 | 4 | 12.5 | 3700 | |
| C9 | Sh2-155 | Neb | Cep | 22h 56.8m | +62° 37m | 7.7 | 50x10 | 6.8 | 2800 | Cave Nebula |
| C10 | NGC663 | Opn CL | Cas | 01h 46.0m | +61° 15m | 7.1 | 16 | 13.1 | 7200 | |
| C11 | NGC7635 | Neb | Cas | 23h 20.7m | +61° 12m | 7 | 15x8 | 16.2 | 7100 | Bubble nebula |
| C12 | NGC6946 | Galaxy | Cep | 20h 34.8m | +60° 09m | 9.7 | 11x9 | 14 | 18 million | |
| C13 | NGC457 | Opn CL | Cas | 01h 19.1m | +58° 20m | 6.4 | 13 | 12 | - | Owl or E.T. Cluster |
| C14 | NGC869/884 | Opn CL | Per | 02h 20.0m | +57° 08m | 4.3 | 30 & 30 | 11.7 | 7300 | Double Cluster, h & chi Persei |
| C15 | NGC6826 | Pln Neb | Cyg | 19h 44.8m | +50° 31m | 9.8 | 0.5/2.3 | 10.6 | 2200 | Blinking Planetary |
| C16 | NGC7243 | Opn CL | Lac | 22h 15.3m | +49° 53m | 6.4 | 21 | 13 | 2500 | |
| C17 | NGC147 | Galaxy | Cas | 00h 33.2m | +48° 30m | 9.3 | 13x8 | 14.4 | 2300000 | |
| C18 | NGC185 | Galaxy | Cas | 00h 39.0m | +48° 20m | 9.2 | 12x9 | 14.4 | 2300000 | |
| C19 | IC5146 | Neb | Cyg | 21h 53.5m | +47° 16m | 10 | 12x12 | 12.6 | 3300 | Cocoon Nebula |
| C20 | NGC7000 | Neb | Cyg | 20h 58.8m | +44° 20m | 6 | 120x100 | 10.2 | 1800 | North America Nebula |
| C21 | NGC4449 | Galaxy | CVn | 12h 28.2m | +44° 06m | 9.4 | 5x3 | 12.7 | 10 million | |
| C22 | NGC7662 | Pln Neb | And | 23h 25.9m | +42° 33m | 9.2 | 0.3/2.2 | 10 | 3200 | Blue Snowball |
| C23 | NGC891 | Galaxy | And | 02h 22.6m | +42° 21m | 9.9 | 14x2 | 14 | 31 million | |
| C24 | NGC1275 | Galaxy | Per | 03h 19.8m | +41° 31m | 11.6 | 2.6x1 | 13.4 | 230 mil. | Perseus A |
| C25 | NGC2419 | Glob CL | Lyn | 07h 38.1m | +38° 53m | 10.4 | 4.1 | 13.5 | 275000 | |
| C26 | NGC4244 | Galaxy | CVn | 12h 17.5m | +37° 49m | 10.6 | 16x2.5 | 14.2 | 10 million | |
| C27 | NGC6888 | Neb | Cyg | 20h 12.0m | +38° 21m | 7.5 | 20x10 | 5.8 | 4700 | Crescent Nebula |
| C28 | NGC752 | Opn CL | And | 01h 57.8m | +37° 41m | 5.7 | 50 | 14.2 | 1200 | |
| C29 | NGC5005 | Galaxy | CVn | 13h 10.9m | +37° 03m | 9.8 | 5.4x2 | 12.4 | 69 million | |
| C30 | NGC7331 | Galaxy | Peg | 22h 37.1m | +34° 25m | 9.5 | 11x4 | 13.6 | 47 million | |
| C31 | IC405 | Neb | Aur | 05h 16.2m | +34° 16m | 6 | 30x19 | 6.9 | 1600 | Flaming Star Nebula |
| C32 | NGC4631 | Galaxy | CVn | 12h 42.1m | +32° 32m | 9.3 | 15x3 | 13.5 | 22 million | Whale Galaxy |
| C33 | NGC6992 | SN Rem | Cyg | 20h 56.4m | +31° 43m | - | 60x8 | 13.4 | 2500 | East Veil Nebula |
| C34 | NGC6960 | SN Rem | Cyg | 20h 45.7m | +30° 43m | - | 70x6 | 13.6 | 2500 | West Veil Nebula |
| C35 | NGC4889 | Galaxy | Com | 13h 00.1m | +27° 59m | 11.4 | 3x2 | 13.4 | 300 mil. | |
| C36 | NGC4559 | Galaxy | Com | 12h 36.0m | +27° 58m | 9.8 | 10x4 | 14.1 | 32 million | |
| C37 | NGC6885 | Opn CL | Vul | 20h 12.0m | +26° 29m | 5.7 | 7 | 10.1 | 1950 | |
| C38 | NGC4565 | Galaxy | Com | 12h 36.3m | +25° 59m | 9.6 | 16x3 | 13.8 | 32 million | Needle Galaxy |

| | | | | | | | | | | |
|-----|---------|---------|-----|-----------|----------|------|---------|------|------------|--------------------------|
| C39 | NGC2392 | Pln Neb | Gem | 07h 29.2m | +20° 55m | 9.9 | 0.2/0.7 | 8.4 | 4000 | Eskimo or Clown Nebula |
| C40 | NGC3626 | Galaxy | Leo | 11h 20.1m | +18° 21m | 10.9 | 3x2 | 12.9 | 86 million | |
| C41 | - | Opn CL | Tau | 04h 27m | +16° 00m | 1 | 330 | 13.2 | 151 | Hyades |
| C42 | NGC7006 | Glob CL | Del | 21h 01.5m | +16° 11m | 10.6 | 2.8 | 12.8 | 135000 | |
| C43 | NGC7814 | Galaxy | Peg | 00h 03.3m | +16° 09m | 10.5 | 6x2 | 13.2 | 49 million | |
| C44 | NGC7479 | Galaxy | Peg | 23h 04.9m | +12° 19m | 11 | 4x3 | 13.7 | 106 mil. | |
| C45 | NGC5248 | Galaxy | Boo | 13h 37.5m | +08° 53m | 10.2 | 6x4 | 13.7 | 74 million | |
| C46 | NGC2261 | Neb | Mon | 06h 39.2m | +08° 44m | 10 | 2x1 | 9.8 | 2500 | Hubble's Variable Nebula |
| C47 | NGC6934 | Glob CL | Del | 20h 34.2m | +07° 24m | 8.9 | 5.9 | 12.7 | 57000 | |
| C48 | NGC2775 | Galaxy | Can | 09h 10.3m | +07° 02m | 10.3 | 4.5x3 | 13.1 | 55 million | |
| C49 | NGC2237 | Neb | Mon | 06h 32.3m | +05° 03m | - | 80x60 | 17.5 | 4900 | Rosette Nebula |
| C50 | NGC2244 | Opn CL | Mon | 06h 32.4m | +04° 52m | 4.8 | 24 | 11.7 | 4900 | Satellite Cluster |
| C51 | IC1613 | Galaxy | Cet | 01h 04.8m | +02° 07m | 9 | 12x11 | 14.5 | 2300000 | |
| C52 | NGC4697 | Galaxy | Vir | 12h 48.6m | -05° 48m | 9.3 | 6x3 | 12.8 | 76 million | |
| C53 | NGC3115 | Galaxy | Sex | 10h 05.2m | -07° 43m | 9.1 | 8x3 | 12.3 | 22 million | Spindle Galaxy |
| C54 | NGC2506 | Opn CL | Mon | 08h 00.2m | -10° 47m | 7.6 | 7 | 11.8 | 10000 | |
| C55 | NGC7009 | Pln Neb | Aqr | 21h 04.2m | -11° 22m | 8.3 | 2.5/1 | 9 | 1400 | Saturn Nebula |
| C56 | NGC246 | Pln Neb | Cet | 00h 47.0m | -11° 53m | 8 | 3.8 | 14.7 | 1600 | |
| C57 | NGC6822 | Galaxy | Sgr | 19h 44.9m | -14° 48m | 9.3 | 10x9 | 13.7 | 2300000 | Barnard's Galaxy |
| C58 | NGC2360 | Opn CL | CMa | 07h 17.8m | -15° 37m | 7.2 | 13 | 12.8 | 3700 | |
| C59 | NGC3242 | Pln Neb | Hya | 10h 24.8m | -18° 38m | 8.6 | 0.3/21 | 10.6 | 1400 | Ghost of Jupiter |
| C60 | NGC4038 | Galaxy | Crv | 12h 01.9m | -18° 52m | 11.3 | 2.6x1.8 | 12.6 | 83 million | Antennae Galaxies |
| C61 | NGC4039 | Galaxy | Crv | 12h 01.9m | -18° 53m | 11.8 | 3.2x2.2 | 13.8 | 83 million | Antennae Galaxies |
| C62 | NGC247 | Galaxy | Cet | 00h 47.1m | -20° 46m | 8.9 | 20x7 | 14.5 | 6800000 | |
| C63 | NGC7293 | Pln Neb | Aqr | 22h 29.6m | -20° 48m | 7.3 | 13 | 12.9 | 522 | Helix Nebula |
| C64 | NGC2362 | Opn CL | CMa | 07h 18.8m | -24° 57m | 4.1 | 6 | 8 | 5100 | |
| C65 | NGC253 | Galaxy | Scl | 00h 47.6m | -25° 17m | 7.1 | 25x7 | 12.7 | 9800000 | Sculptor Galaxy |
| C66 | NGC5694 | Glob CL | Hya | 14h 39.6m | -26° 32m | 10.2 | 3.6 | 13 | 113000 | |
| C67 | NGC1097 | Galaxy | For | 02h 46.3m | -30° 17m | 9.2 | 9x6 | 13.7 | 47 million | |
| C68 | NGC6729 | Neb | CrA | 19h 01.9m | -36° 57m | 9.7 | 1 | 9.5 | 424 | |
| C69 | NGC6302 | Pln Neb | Sco | 17h 13.7m | -37° 06m | 9.6 | 0.8 | 9.1 | 5200 | Bug Nebula |
| C70 | NGC300 | Galaxy | Scl | 00h 54.9m | -37° 41m | 8.7 | 20x13 | 14.8 | 3900000 | |
| C71 | NGC2477 | Opn CL | Pup | 07h 44.6m | -23° 52m | 5.8 | 27 | 13 | 3700 | |
| C72 | NGC55 | Galaxy | Scl | 07h 44.6m | -23° 52m | 7.9 | 32x6 | 13.6 | 4200000 | |
| C73 | NGC1851 | Glob CL | Col | 00h 14.9m | -39° 11m | 7.3 | 11 | 12.5 | 39400 | |
| C74 | NGC3132 | Pln Neb | Vel | 05h 14.1m | -40° 03m | 9.4 | 0.8 | 8.9 | 2000 | Eight Burst Nebula |
| C75 | NGC6124 | Opn CL | Sco | 10h 07.7m | -40° 26m | 5.8 | 29 | 13.1 | 1500 | |
| C76 | NGC6231 | Opn CL | Sco | 16h 25.6m | -40° 40m | 2.6 | 15 | 8.5 | 6000 | |
| C77 | NGC5128 | Galaxy | Cen | 16h 54.0m | -41° 48m | 7 | 18x14 | 13 | 16 million | Centaurus A |
| C78 | NGC6541 | Glob CL | CrA | 13h 25.5m | -43° 01m | 6.6 | 13 | 12.2 | 22300 | |
| C79 | NGC3201 | Glob CL | Vel | 18h 08.0m | -43° 42m | 6.7 | 18 | 13 | 17000 | |

| | | | | | | | | | | |
|------|---------|---------|-----|-----------|----------|------|---------|------|------------|---------------------|
| C80 | NGC5139 | Glob CL | Cen | 10h 17.6m | -46° 25m | 3.6 | 36 | 11.6 | 17300 | Omega Centauri |
| C81 | NGC6352 | Glob CL | Ara | 13h 26.8m | -47° 29m | 6.1 | 7 | 10.3 | 18600 | |
| C82 | NGC6193 | Opn CL | Ara | 17h 25.5m | -48° 25m | 5.2 | 15 | 11.1 | 4300 | |
| C83 | NGC4945 | Galaxy | Cen | 16h 41.3m | -48° 46m | 8.7 | 20x4 | 13.5 | 17 million | |
| C84 | NGC5286 | Glob CL | Cen | 13h 05.4m | -49° 28m | 7.6 | 9 | 12.4 | 36000 | Omicron Vel Cluster |
| C85 | IC2391 | Opn CL | Vel | 13h 46.4m | -51° 22m | 2.5 | 50 | 11 | 500 | |
| C86 | NGC6397 | Glob CL | Ara | 08h 40.2m | -53° 04m | 5.6 | 26 | 12.7 | 7500 | |
| C87 | NGC1261 | Glob CL | Hor | 17h 40.7m | -53° 40m | 8.4 | 7 | 12.6 | 55500 | |
| C88 | NGC5823 | Opn CL | Cir | 03h 12.3m | -55° 13m | 7.9 | 10 | 12.9 | 3400 | S Norma Cluster |
| C89 | NGC6087 | Opn CL | Nor | 15h 05.7m | -55° 36m | 5.4 | 12 | 10.8 | 3300 | |
| C90 | NGC2867 | Pln Neb | Car | 16h 18.9m | -57° 54m | 9.7 | 0.2 | 6.5 | 5500 | |
| C91 | NGC3532 | Opn CL | Car | 09h 21.4m | -58° 19m | 3 | 55 | 11.7 | 1600 | |
| C92 | NGC3372 | Neb | Car | 11h 06.4m | -58° 40m | 6.2 | 120x120 | 11.4 | 7500 | Eta Carinae Nebula |
| C93 | NGC6752 | Glob CL | Pav | 10h 43.8m | -59° 52m | 5.4 | 20 | 11.9 | 13000 | |
| C94 | NGC4755 | Opn CL | Cru | 19h 10.9m | -59° 59m | 4.2 | 10 | 9.2 | 4900 | Jewel Box |
| C95 | NGC6025 | Opn CL | TrA | 12h 53.6m | -60° 20m | 5.1 | 12 | 10.5 | 2500 | |
| C96 | NGC2516 | Opn CL | Car | 16h 03.7m | -60° 30m | 3.8 | 30 | 11.2 | 1300 | |
| C97 | NGC3766 | Opn CL | Cen | 07h 58.3m | -60° 52m | 5.3 | 12 | 10.7 | 5800 | |
| C98 | NGC4609 | Opn CL | Cru | 11h 36.1m | -61° 37m | 6.9 | 5 | 10.4 | 4200 | Coalsack Nebula |
| C99 | - | Dk Neb | Cru | 12h 42.3m | -62° 58m | - | 400x300 | 12.8 | 610 | |
| C100 | IC2944 | CL+Neb | Cen | 12h 53m | -63° 00m | 4.5 | 15 | 10.4 | 6000 | |
| C101 | NGC6744 | Galaxy | Pav | 11h 36.6m | -63° 02m | 9 | 16x10 | 13.8 | 34 million | |
| C102 | IC2602 | Opn CL | Car | 19h 09.8m | -63° 51m | 1.9 | 50 | 10.4 | 492 | Theta Car Cluster |
| C103 | NGC2070 | Neb | Dor | 10h 43.2m | -64° 24m | 1 | 40x25 | 15.7 | 170000 | |
| C104 | NGC362 | Glob CL | Tuc | 05h 38.7m | -69° 06m | 6.6 | 13 | 12.2 | 27700 | 47 Tucanae |
| C105 | NGC4833 | Glob CL | Mus | 01h 03.2m | -70° 51m | 7.3 | 14 | 13.1 | 19600 | |
| C106 | NGC104 | Glob CL | Tuc | 12h 59.6m | -70° 53m | 4 | 31 | 11.5 | 14700 | |
| C107 | NGC6101 | Glob CL | Aps | 00h 24.1m | -72° 05m | 9.3 | 11 | 14.5 | 49900 | |
| C108 | NGC4372 | Glob CL | Mus | 16h 25.8m | -72° 12m | 7.8 | 19 | 14.2 | 18900 | |
| C109 | NGC3195 | Pln Neb | Cha | 12h 25.8m | -72° 40m | 11.6 | 40_35 | 10.5 | 5400 | |