

Chapter 2

Introduction to the Messier Objects

From an amateur perspective, the Messier Catalogue contains many objects. Not only are they of different types, encompassing star clusters, galaxies and nebulae but also they are of different degrees of difficulty from those readily visible to the unaided eye to those that are tough with medium-sized amateur telescopes. Often, when asked the question “have you seen M81?”, it is more accurate to reply that you’ve seen a fuzzy patch where M81 is supposed to be. As Charles Messier predates Edwin Hubble, he was unaware of the nature of many of the objects in his catalogue. That doesn’t diminish his achievements in any way, as it is a good general list for deep sky viewing but it also succeeds in its original objective and many people (including me), resisted the temptation to go blabbing about a “new comet” after checking catalogue objects first.

Whilst most of the objects are not easily visible to small binoculars, often found in many households, there are certainly enough to be worth searching for. Some, like the Pleiades (M45) and Beehive (M44) are a splendid sight, in very modest binoculars, whilst others are best seen as objects to tick off the list of things to see before you die, rather like Uranus, Neptune and Pluto.

It would be a sweeping generalization to say that deep sky viewing is more difficult than solar system viewing, although they have different challenges and it’s a matter of personal opinion as to what you find more difficult.

It would be true to say that most Messier objects are best enjoyed with an 8" or larger reflector with a short focal length and some sort of “wizardry” to find the objects automatically. However, such equipment was not available to Charles Messier and is certainly not available to me on a daily basis. Whilst he had a 6" Newtonian reflector, I have a Skywatcher 5" Maksutov-Cassegrain, which has slightly less light gathering power but sharper views. However, apart from the modern light-polluted

skies of southern England, I also had the disadvantage of having an instrument with a long focal length. The work-round was to use a Skywatcher 32 mm focal length Plössl eyepiece and an Antares screw-in focal reducer, which reduces the magnification by $2\times$ and increases the field of view by about $1.7\times$. The combination of both gives a magnification of $24\times$ and a field of view of about 1.8° . A Skywatcher 9×50 finderscope makes finding objects easier, too. Using a light pollution reduction (LPR) filter may not sound quite in the spirit of the book but many of the Messier objects are barely visible without one, whilst for many it enhances the view quite considerably.

The other instruments used for observing the Messier Catalog are:

- Helios Stellar 15×70 binoculars
- Skywatcher StarTravel 80 short tube refractor

These give wider fields of view than the Maksutov-Cassegrain and using the 32 mm eyepiece and focal reducer combination achieve a whopping great field of view of 7° but only $6\times$ magnification.

In general, the easiest objects to see are open star clusters, as they are less affected by moonlight and light pollution, the hardest are usually galaxies and globular star clusters, especially those whose light is spread out over a large area. Nebulae are almost as difficult but usually there is some sort of shape or internal contrast that makes them stand out from the background. Through modest equipment from difficult locations, it is actually impossible to tell a globular star cluster from a galaxy, as they can both appear as round fuzzy patches, with some central condensation of brightness. Indeed, in Messier's day, it is likely that few astronomers knew that they were different objects, with globular star clusters in and around our own Milky Way Galaxy and the others galaxies or "island universes" in their own right, many much larger and more massive than our own.

Before embarking on this project, most of my deep sky observing was limited to short sessions with binoculars, often just before bedtime and photographing double stars. This is partly due to a busy life with work and family but also because I live in medium light polluted skies, where only the brighter objects are visible and solar/lunar viewing is a lot easier. I had, however, explored the Ring Nebula (M57), Dumbbell (M27) and Andromeda Galaxy (M31) quite extensively with the Maksutov-Cassegrain.

The Messier Objects

This section contains descriptions and photographs of the Messier objects in catalogue order. The actual appearance of each object will vary according to:

- The clarity of the sky, affected by cloud and/or light pollution
- Eyesight quality of the observer
- Experience of the observer
- Moonlight

- Quality of the individual instrument and accessories used
- Extinction (dimming of objects near the horizon)

Extinction is a particular problem for many members of the Messier Catalogue, as they have a very southern declination. Indeed M7 is never more than 6° above the horizon anywhere in the UK and for the northern parts, never rises at all. As extinction becomes significant for objects within 15° of the horizon, many of the objects are never seen in their full glory from the UK (or even France for that matter). However, if you make leisure or pleasure visits to the southern hemisphere, many of them can be seen at their best. However, you may need to sacrifice aperture for portability.

The easiest objects in the Messier Catalogue are usually the open star clusters. Under poor viewing conditions, their fainter members are lost but, especially for the brighter clusters, their main asterisms are visible under conditions that you would not expect. For a minority of them, however, clear nights make them harder. Some of them are in the plane of the Milky Way, so they can be hard to pick out against the stellar background. Lose a bit of visibility and, hey presto, you can see them. For globular star clusters, galaxies and nebulae, their brightness is more evenly spread out, often over a large area. For example, the Andromeda Galaxy (M31) is the largest natural object that can be seen in the night sky from the northern hemisphere, having about six times the area of the Sun or Moon. This makes the published magnitudes a bit misleading when it comes to visibility. It is based on the total brightness of the whole object. As a general rule, if you can see say a 9th magnitude star through binoculars on a given night, you should be able to see a 7th magnitude galaxy at similar elevation from the horizon. So drop a couple of magnitudes off of star visibility and you're thereabouts. Indeed, for many objects, the published magnitude varies amongst the various commonly used sources and for the larger objects doesn't give a realistic assessment of how easily visible they are. Where there's wide discrepancies amongst various sources as to the magnitude of an object, I have taken an approximate average.

The faintest members of the Messier Catalogue are about magnitude 10.0 and large in size, so are very close to the limit of my equipment under very good conditions. Amazingly enough, there are some brighter objects of reasonable declination (as seen from the northern hemisphere) that he missed.

Quite often, the more difficult objects lack the “wow” factor that you get with some of the easier objects. Figure 2.1 shows the Andromeda Galaxy (M31) photographed through a small telescope and compact digital camera. The smudge in the middle looks nothing like it does through better telescopes and/or photographic equipment. Yet, this is how the more difficult ones look and the challenge is to spot them at all, although others can be a nice surprise. For example, M35, the bright open star cluster in Gemini proved to be a very pleasant surprise when viewed through my set-up, even though I'd seen it in binoculars many times before.

There's a section for each object, which gives:

- An overall description
- How to find it, including a diagram or reference to another diagram

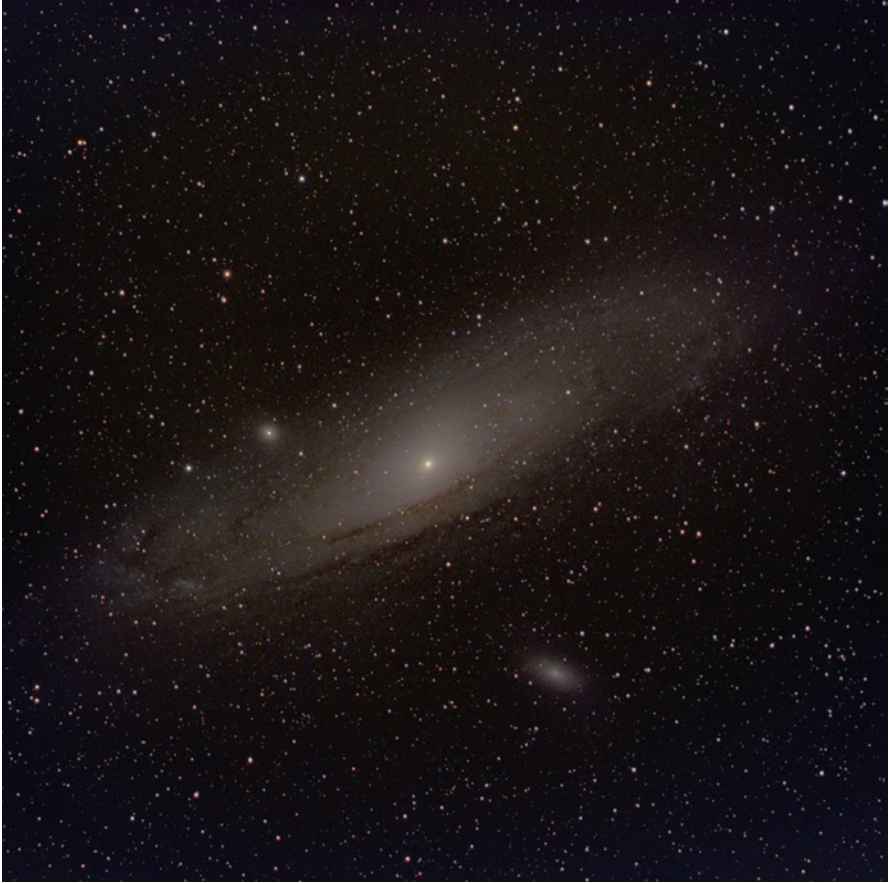


Fig. 2.1 M31 by Anthony Glover

- A description of how it looks, mostly through my binoculars and Maksutov-Cassegrain
- Charles Messier's original observing notes
- Photographic details, showing how the object looks at its best and a representation of how it looks through my Maksutov-Cassegrain. Where applicable, I have included some simple photographs taken through my modest equipment, just to show it can be done.

Below is the introduction to Messier's notes, as researched by Kulvinder Singh Chadha:

Catalogue of Nebulae and Star Clusters

Observed in Paris, by M. Messier, the Naval Observatory, Hôtel de Cluny, Rue des Mathurin.

[This is the *Catalogue des Nébuleuses et des Amas d'Étoiles*, Messier's complete catalogue of his nebulae, which was included in the *Connaissance de Temps* for 1784 and published in 1781].

[As this is a translation, the grammar and sentence structure (e.g. that of many clauses) reflects the style of the time].

[The given size of a telescope refers to the instrument's focal length].

[Messier gives his Right Ascension values in degrees, minutes and seconds of arc, as well as hours, minutes and seconds. The diameter of each object (where applicable) is also given in degrees and minutes of arc, mirroring the columnated table in the published catalogue. Both his and Méchain's RA and Dec calculations for each object will inevitably differ from modern-day values. When looking for the Messier objects it is those modern coordinates that should be referred to].

M. Messier has observed with great care the nebulae & star cluster discoveries that can be seen over the skyline of Paris, he has determined their right ascension and declination, and gives their diameters, with circumstantial details of each: a work that has been wanting in astronomy.

It also enters into some of the details on the research he has made of nebulae that were discoveries by several different astronomers, but he has sought them in vain.

The *Catalogue of Nebulae and Star Clusters*, by M. Messier, is in the volume of the *Academy of Sciences*, year 1771, page 435. He reported at the end of his memoir a drawing traced with the greatest of care of the beautiful nebula in Orion's sword, with the stars it contains. His design might be used to acknowledge it again, if in the course of time it is not subject to any change. A comparison of this present design with those of Messrs. Huygens, Picard, de Mairan and le Gentil, it is surprising to find such a change that one would scarcely imagine that it was the same nebula, if one regards its form. You can see these drawings, given by M. le Gentil in the volume of the *Academy [of sciences]*, 1759, page 470, plate XXI.

The catalogue M. Messier prints, which we give here, we report many nebulae and star clusters that have been discovered since the printing of his memoir, which we have communicated. (NOTE: Objects up to and including M45 are from his printed catalogue and objects from M46 to M103 are taken from his memoirs).

For the positions of the nebula, Messier refers to the numbers that are the same on the next page, and which give the details of each of the observed nebulae.

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