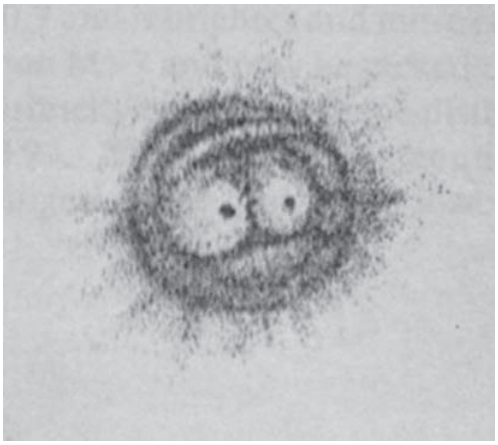
The Owl Nebula – M97

One of the more difficult Messier objects, the planetary nebula M97 can be a tricky target from light polluted skies, and unless a large telescope is used it often appears as a faint grey disk with only the vaguest hints of any detail within. A visual magnitude of 9.9 combined with a large diameter gives it a very low surface brightness. Pierre Méchain, Messier's observing colleague, discovered the nebula in 1781 February and it was observed a few weeks later by Messier himself. He remarked that it was difficult to see and that its light was faint and without stars. William and John Herschel and William Smyth also struggled to see any structure in the nebula, and it was left to observers using the 72-inch Leviathan of Parsontown at Birr Castle in 1848 to determine the 'owl' shape with which we are familiar today. Even knowing now what the nebula looks like, it is still visually difficult to see the owl features with say a 200mm (8-inch) telescope, unless you are observing under a pristine sky.



Lord Rosse

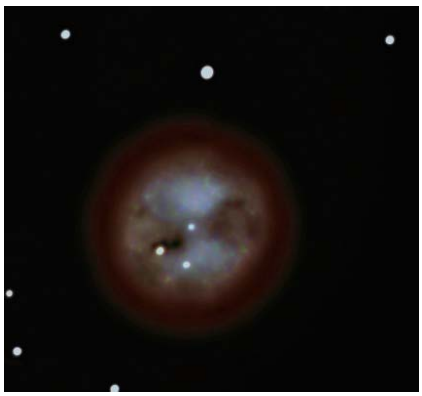
M97, also catalogued as NGC 3587, lies in Ursa Major at RA 11h 14.8m and Dec +55° 1" (2000.0) which puts it approximately 2.3° east and 1.4° south of mag 2.4 Merak (β UMa). A diameter of 170 arcsec equates to a physical diameter of around 3 lightyears, assuming a distance of 3,000 lightyears (the distances to planetary nebulae vary widely in the literature and in many cases are still not accurately known). Its age is estimated at around 6,000 years. Detailed images show a complex shelled structure with the inner shell slightly elongated. It is likely that its true shape is a multi-shelled cylindrical torus viewed obliquely, with the 'eyes' of the owl being the ends of the cylinder. The multi-shell structure was probably formed by successive ejections of material from a dying star. The central star is catalogued as mag 16 but observations suggest it may be closer to mag 14.

Although some of the drawings of M97 from Birr Castle now look rather fanciful and show spiral structure in the planetary, it must be remembered that after discovering the spiral nature of some nebulae it was very easy to suspect spiral structure in almost everything – particularly when the real nature of these objects was still unknown. Thomas Romney Robinson, observing with the great reflector in 1848 March, remarked that it appeared as a most intricate group of spiral arcs disposed around two starry centres. One mystery associated with M97 is that some drawings originating from Birr in the late 1840s (see image here reproduced from the Rosse scientific papers) show a star in each of the owl's 'eyes' – thus giving each eye a pupil. Modern images clearly show a star in one 'eye' with no evidence whatsoever for a second star, and it was never seen again after 1850, even though it had apparently been seen by Rosse, Rambaut and Robinson. The Owl's appearance is discussed in some detail by Wolfgang Steinicke in his excellent recent book *Observing and Cataloguing Nebulae and Star Clusters* (Cambridge University Press, 2010).

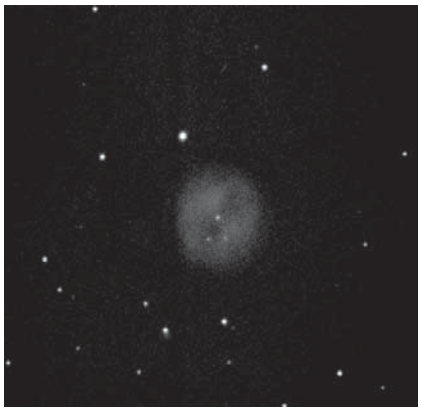
Peter Carson

Andrea Tasselli

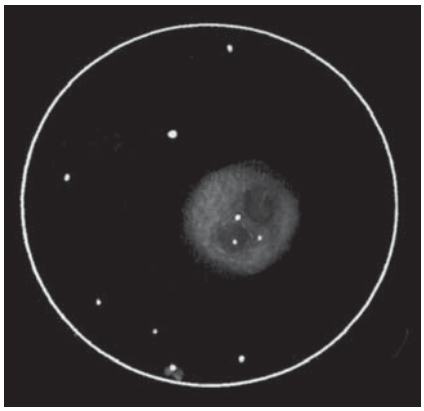
M97 has always been a popular observing target and some images received by the Section are reproduced here. The wide field photograph by Peter Carson, who observes from Leigh-on-Sea, Essex, also shows the spiral galaxy M108 which lies 1° northwest of the Owl and some 45 million lightyears further away – the two objects making an interesting visual contrast in a wide field eyepiece. Peter's LRGB image (L=40m, RGB= 10m each) was made through a Tele Vue NP101 refractor and SX HX916 CCD. Andrea Tasselli's image, obtained from his home in Lincoln, shows the



Fred Stevenson



Maurice Gavin



Dale Holt

nebula with its surrounding star field. With a total exposure time of over 7 hours through a 203mm f/10 M809 Intes Micro Maksutov–Cassegrain (L=4h 10m, R=1h 45m, G=56m, B=51m) and SXV-H9 CCD, some of the outer envelope of the planetary can clearly be seen. Fred Stevenson observes from Amersham, Buckinghamshire and his close up image of the Owl was made under poor observing conditions of partial cloud and a rising Moon, using a 350mm Meade SCT and Meade DSI Pro CCD. It is another LRGB image (L OIII=40m, R=30m, G=17m, B=40m). The outer envelope is clearly visible along with considerable detail across the face of the nebula.

Maurice Gavin's image, although taken with a CCD, gives a good impression of how the nebula appears visually through a 300mm+ class telescope from a dark site. The 5 minute exposure, which clearly shows both 'eyes', was made using a 300mm f/5 Meade SCT and SXV-M9 CCD from his observatory in Worcester Park, Surrey. Dale Holt observes visually from Chipping, Hertfordshire, but uses a video camera to enhance the view and sketches from the monitor screen. Although purists might not regard this as visual observing, Dale feels that it allows him to see faint detail whilst still satisfying his desire to sketch. His drawing reproduced here was made through a 350mm Newtonian equipped with a Watec 120N video camera.

As has already been mentioned the Owl can be a troublesome object in which to see detail visually, and the OIII filter is not the panacea for this planetary that it is for many others. A UHC filter with its wider bandpass offers a much better view, giving increased contrast and better definition of the outer edge. Seeing both 'eyes' however can still be troublesome and with this object, as with many faint nebulae, there is no real substitute for a large aperture and clear dark skies.

Stewart L. Moore, *Director, Deep Sky Section*

A useful DSLR camera modification

Having decided to begin digital imaging of stellar spectra with a DSLR camera and after initially obtaining disappointing results, I wondered if removing the infrared blocking filter would improve the blue as well as the red end sensitivity of the CCD sensor? In theory it should, so I purchased a Canon Rebel 300D with the IR blocking filter removed, and took comparison spectra of Vega through this and a Canon EOS 400D (unmodified). I used a Rainbow Optics Star Spectroscope, 200 lines/mm, at the prime focus of my 0.3m Newtonian reflector, a drift time of 20sec across the field of view at ISO400, RAW image setting for each camera, on 2010 Nov 15.

The answer to the question is yes; removing the infrared blocking filter does improve the spectral sensitivity of the CCD sensor at both the blue and red end, as seen from the results. This has interesting implications for deep sky astrophotography and I encourage people to have a go.

Jack Martin
[jackmartin781@googlemail.com]