
Meeting of the Deep Sky Section, 2006 March 4

at the Northamptonshire Natural History Society, Humfrey Rooms, Castilian Terrace, Northampton

The Section Director, Dr Stewart Moore, welcomed the audience to the annual Deep Sky Section meeting. He showed examples of images received over the previous year, which included SN 2006X in M100, IC 1613, NGC 147 and Leo I. Moreover, numerous images had been received for the ongoing study of variable nebulae, of the Hubble, Hinds, McNeil and Gyulbudaghian nebulae. Images had also been received of supernova remnants such as the Crab Nebula, and IC443. Moreover, Abel 85 had been nicely re-done. Dr Moore said that as he had not received any images of M3, M5, 10, 14 and 34, he would particularly welcome these.

Dr Moore also welcomed two new visual observers to the Section, re-iterating that visual observing is still a valuable source of data which should not be underestimated.

Dr Moore then handed the meeting over to the first speaker of the day, Dr Nick Hewitt, who spoke on 'Remote Globulars'. Dr Hewitt opened his talk with the remark that it was his dying wish to observe a globular cluster with a very large telescope. He then stated that they offer challenges and that we have learned a tremendous amount from them. They shed light on stellar families, give clues on stellar evolution, stellar distances, ages, chemistry and even galactic structure and evolution. He then posed the question, what are they?

Dr Hewitt said that the stars in a cluster were born at the same time. Clusters provide the oldest datable supernovae in the Universe. There are 200 known to be associated with the Milky Way. Shapley noted that most are clustered towards the centre of the galaxy in Sagittarius, and Shapley also noted the importance of distance. Distance may be calculated using Cepheid and cluster variables. Cepheids are bright and visible over great distances, whilst cluster variables are short period Cepheids, which were discovered by S. I. Bailey in 1895. These stars are quick to rise and peak, varying some 0.2–2 magnitudes, but typically by just under one magnitude. Although RR Lyrae was the first discovered outside of a globular, we know of 1,200 to 1,300 RR Lyrae type stars in globulars. The secret of distance is revealed by the link between the period and absolute magnitude of the star. Once the period is known the absolute magnitude is also known; the distance can then be derived from the difference between the actual and apparent magnitudes. This technique appears to be accurate to some 640 light years. It seems that the most distant globular associated with the Milky Way is AM 1

Horologium. However, BAA members with CCDs may like to try NGC 2419, the 'Intergalactic Tramp', which is some 272,000 light years distant! It should serve as an interesting project as it contains 32 RR Lyrae stars, of around magnitude 17.

Dr Moore then handed the meeting over to the second speaker, Guy Hurst, whose title was 'Drawing and imaging open clusters for enjoyment'. There are c. 1,200 open clusters in our galaxy, of which the Pleiades and Hyades are the most famous. Indeed, there are 29 open clusters in the popular Messier catalogue. However, continuing on the theme of distance, just how far are they away? The Hyades is very important and highly studied, with a distance of some 40 parsecs, and a diameter of about eight light years. At some 400 million years old, it is part of the Taurus moving cluster, and was at its closest to the solar system some 800,000 years ago. Such a cluster has a life expectancy of 100 million years. Guy Hurst carried out a Hyades study, the 'Earls Barton study' in 1971 with a 26cm reflector.

Mr Hurst described his technique. He drew the framework of brighter stars first to avoid distortion of the patterns. He then drew in the remaining visible stars using several different magnifications, labelled doubles and noted coloured stars. Approximate magnitudes were also listed, as was a scale bar in arcminutes, an orientation arrow, for example pointing north, the number of stars, magnitude range and the instrument and power(s) employed.

Today, stars of magnitude 12 may be imaged using a CCD camera and a standard photographic lens with a stack of four images of four seconds each. However, Mr Hurst commented that a Canon 20D digital SLR camera may reach magnitude 12 in 30 seconds at ISO 400 with an F1.8 85mm lens.

The Alter Catalogue of Budapest contained 1,500 cards on non-NGC objects in 1970. It is essentially a bibliography with the position of each of 1,039 open clusters. It contains small catalogues of objects such as Collinder and the 'ultimate challenge' Berkeley clusters (of which 90 are known).

Open clusters also provide a golden opportunity to study stellar evolution, facilitate the training of observers as well as offering excellent photographic and CCD opportunities for sheer enjoyment. 'This is what observing is all about.'

Dr Moore then introduced Gary Poyner, whose talk was entitled 'The OJ+287 observing campaign'. This object is of the β Lacertae type, which is a blazar (an active

galaxy). It offers the observer a golden opportunity to study this form of object as it is close by. It is situated in Cancer, near M44, and is about magnitude 12, with a double outburst period of 11.6 and 1.1 years. However, the object needs further study as there may be another cycle of 60 years or so. The period could be due to one of three possibilities. First, the object is a possible binary black hole. Secondly, it may have precessing jets, or last it may have a rotating helical jet.

The next predicted outburst was for 2006 May/June, and so the speaker urged vigilance. He also suggested that the object offered the opportunity for collaboration with the Radio Astronomy Group. Charts are available in the Variable Star Section database or at the author's website, www.garypoyner.pwp.blueyonder.co.uk/oj_camp.html.

The Section Director then introduced Owen Brazell to speak on 'Planetary nebulae associated with clusters'. The speaker said that the Palomar POSS and DSS plates offer an excellent opportunity for the amateur to re-examine the plates for fresh objects. Indeed, one does not even have to go outside and get cold!

A very good general source for planetary nebulae is <http://www.hs.uni-hamburg.de/DE/Ins/Per/Kohoutek/index.html>. However, it must be noted that these Kohoutek PK numbers of the 1967 catalogue do not agree with ESO and Strasburg new designations. Moreover, the Kohoutek list is not a full list. Planetary nebulae last from about 40/80,000 years, so they are quite short-lived. As a result, there is only a small chance of catching them associated with a cluster.

The speaker suggested M46 with NGC 2438 and Mink 1–18 in Puppis, although he pointed out that one would need about a 50cm telescope to see them all. However, is the planetary connected? Who knows? The speaker also commented that NGC 2818 with NGC 2818A in Pyxis is a very beautiful sight, however, it is not visible from the UK. M38 and Abel 9 are visible from the UK though Abel 9 is faint. There have been a number of sightings, but it has not been seen using a 60cm telescope in Tenerife. However, it is on the POSS plates. The speaker suggested that the object may be OIII bare, and suggested that observers could try H Beta or UHC filters instead. Indeed, it offers a splendid CCD target.

There are only four planetary nebulae associated with globular clusters, despite

theoretical predictions indicating there should be as many as 16. Clearly, there is room for further research into this discrepancy.

Dr Moore then introduced Karen Holland's talk entitled 'Praesepe: two merging clusters'? Karen said that the project is being carried out jointly with the Leicester University Astronomy Group. The original aim was to determine if Praesepe (M44) harbours brown dwarves (in a repeat of the Pleiades study). However, the study developed from the original aim.

Karen asked the question as to why they were looking for brown dwarves anyway. The answer is that brown dwarves are failed stars, so they do not glow like ordinary stars and they are clearly faint. As a result, you need to maximise the chance of finding them, and so clusters are ideal. However, cluster stars also share common properties, such as similar ages, distances and metallic content, all in a small area where stars interact gravitationally. This means that they also facilitate the study of cluster evolution.

The biggest stars are at the centre of clusters, with lighter stars at greater radii. Thus it is possible to prepare a density and contour plot for a cluster. However, the plot for M44 was anomalous. The speaker suggested that M44 is flying apart, and will disperse in some ten million years. She stated that this may be the result of two clusters colliding.

Dr Moore then introduced Martin Nicholson, who spoke on 'Remote observing'. The speaker lamented that light pollution is a major problem even at his Daventry home, despite it not being anywhere near a large city. Indeed, the speaker said that he suffered badly from domestic floodlights, and despite speaking to the owners politely, he achieved nothing. As a result, he did a cost/benefit analysis of upgrading his equipment and decided that it was not worthwhile.

However, the speaker suggested that a solution is remote observing, using a rent-a-scope system, such as 'New Mexico Skies'. Here the observer may rent a telescope in pristine skies and operate it remotely via the internet. Very expensive equipment may be rented quite inexpensively and the speaker said that the money which would have been spent on upgrading his setup could be better spent on this sort of arrangement.

The speaker showed some stunning images which he had obtained with this setup, but he added that it may also be used for scientific research. Indeed, the speaker had already discovered four new minor planets, 26 new variable stars and various other new objects. As a result, such a scheme can be very rewarding indeed.

The Director then introduced Martin Morgan-Taylor, legal advisor on light pollution to the CfDS, the SPA and a

consultant to DEFRA (Dept of the Environment, Food and Rural Affairs), to speak on the new law dealing with light pollution. The speaker said that the Clean Neighbourhoods and Environment Act 2005 came into force in England in 2006 April. The effect is to make obtrusive lighting a statutory (that is a criminal) nuisance, if certain criteria are met. However, not all lighting would be covered, so public transport and licensed goods vehicle operating depots, lighthouses and prisons are exempt. Moreover, the statute is silent on street lighting, but local authorities cannot prosecute themselves so street lighting will probably fall outside the new law. All business premises have the defence of 'best practical means' so that the light will only amount to a nuisance if its harm outweighs the public benefit (and the costs of removing the nuisance would not be 'unreasonable').

To be covered, the lighting must be 'prejudicial to health or a nuisance'. The speaker stated that his view was that this is an either/or test, and so did not require a mandatory and significant negative effect to health as has been suggested elsewhere. This is also the view of DEFRA, who have drafted the new law. However, the new law is not a panacea, it only protects if these criteria are met. Floodlights shining into windows at night would obviously be covered under either head, but lights shining across observing sites, or simply into the night sky from a distance creating skyglow would not meet the tests so easily (if at all). So the astronomer is not in a strong position.

Any victim of bad lighting should first try diplomacy, and if that fails, they need to complain to their local environmental health department, at their local council, who must then investigate. The speaker had heard of a number of instances where councils had refused to investigate, saying that astronomy is 'hypersensitive', that is an unreasonably sensitive hobby. The speaker suggested that any council deciding which laws to obey and which not to obey could be taken to the Ombudsman, as any possible nuisance must be investigated to determine its merit and not dismissed out of hand. The speaker suggested that any complainant may want to not mention their interest in astronomy if at all possible, and consider dealing with the wider effects of bad lighting, such as it shining into windows, when they complain.

For a full analysis of the new law, see the speaker's latest paper on the subject, available at the Campaign for Dark Skies website, <http://www.britastro.org/dark-skies/>.

Bob Marriott was then introduced who showed a number of electronic slides taken with a Canon Digital Rebel camera, which highlighted the problems of light pollution from Northampton.

Chris Taylor then reminded the audience

that Gamma Virginis (the famous double star Porrima), which had recently closed to 0.3 arcseconds' separation, had widened to 0.5 arcseconds by the time of the meeting, but it still violated Kepler's Laws!

Dr Moore then thanked the audience for its attendance, and the speakers, for what had been a very full and productive day.

Martin Morgan-Taylor