

Ordinary Meeting and Exhibition Meeting, 2005 June 25

held at The Cavendish Laboratory, Madingley Road, Cambridge

Tom Boles, President

Ron Johnson, Nick Hewitt and Nick James, Secretaries

The President opened the eighth Meeting of the 115th Session, and invited Dr Nick Hewitt to read the minutes of the May Meeting, which were approved by the members present. It was announced that 23 new members were proposed for election, and those 23 who had been proposed at the previous meeting were approved by the audience and duly declared elected. Mr Nick James, Papers Secretary, reported that Council had approved two papers for publication in the Journal:

The Aurora, 2004, by Ron Livesey
Planetary and Lunar Imaging with a Webcam, by ??? Taylor

Before proceeding, Mr Boles wished to express his deepest gratitude to Mr Jonathan Shanklin and Dr Nick Hewitt for organising the day's events; without them it could not have happened. Thanks were also due to the many local support staff at the Cavendish Laboratory who had assisted in ensuring the day's smooth running, as well as to all of the exhibitors, who had made it such a great success.

It was announced that the next meeting, the Out of London Weekend, entitled *The Planets*, would also be held in Cambridge, running from September 2-4 at the Institute of Astronomy. The President then proceeded to present the Association's annual awards, expressing the great honour that he felt at having been charged with this most pleasant duty.

The Stevenson Medal and Award

Mr Boles announced that the Stevenson Medal and Award were this year to be presented to Mr John Fletcher. A member since 1984, Mr Fletcher had contributed many notable observations to the Association over the years, amongst them, being the fourth member to visually recover Comet Halley upon its 1986 return. It was also noted that his photographic nova/supernova patrol work, whilst yet to bring him a discovery, with the aid of new automated software, might yet bring him a discovery before 2005 was out. His work in the public promotion of astronomy, including many appearances on the BBC's *Sky at Night* and other television programmes, was also commended. It therefore gave the President great pleasure to welcome Mr Fletcher to come forward to receive his award.

Following the applause, Mr Fletcher said that he saw the award as a wonderful compliment, expressing the very great honour that he felt in receiving it. He wished to take the opportunity to thank all those members who had helped him over the years, especially those section directors, past and present, who had taught him so much about the art of observing, and whose contribution to his work was not to be forgotten.

The Merlin Medal and Gift

The President announced that the Merlin Medal and Gift were to be awarded to Mr Melvyn Taylor, in recognition of his prolific observational work, submitting observations of the finest quality to so many of the Association's Observing Sections, most notably the Variable Star, Comet and Meteor Sections. The number that he had submitted to the Variable Star Section now exceeded 80,000, assuring his undoubted position as one of the UK's leading variable star observers. In addition to his observational work, Mr Taylor had also held many administrative posts within the Section, including those of Secretary, Assistant Director and Binocular Secretary. It was added that Mr Taylor was also renowned for his talent for communicating his knowledge to newcomers to the Section.

After the applause, Mr Taylor wished to thank the Association for honouring him in this way. He wished especially to thank the members of his local astronomical societies, the Leeds Astronomical Society, with which he was very proud to have recently celebrated his fortieth anniversary of joining, and the West Yorkshire Astronomical Society. Finally, he wished to recommend the Scottish Astronomers' Group Weekends to all members in the area: he felt that he had gleaned a great wealth of knowledge from the recent such events.

The Lydia Brown Medal and Gift

The Lydia Brown Award was this year to be presented to Dr Nick Hewitt, whose services to the Association, the President felt, had surely been surpassed by few. A member of over 25 years' standing, Dr Hewitt had held the Directorship of the Deep Sky Section for twelve of them, between 1992 and 2004. Simultaneously, he had also

served as President between 1999 and 2001, somehow combining this extraordinary commitment to the Association with the professional demands of working full-time as a General Practitioner in Northampton. After stepping down as President, he had gone on to serve two years as a Vice-President, and a further two years as Meetings Secretary – perhaps the most stressful job in the organisation. In this final post, he had been responsible for instigating the highly successful series of *Observers' Workshops*, and the President recalled that Dr Hewitt had served well beyond the call of duty, willingly stepping in at the last minute to present standby talks when other speakers had had to cancel at too short a notice for any alternatives to be found.

Following the applause, Dr Hewitt thanked those members who had nominated him for the award. With modesty, he stressed the importance of teamwork in the administrative side of the Association, adding that he would have been quite unable to achieve what he had done without the support of many others. He wished to thank all those who had offered him the huge level of support which he had enjoyed throughout his Presidency, and all those in the Deep Sky Section who had assisted him during his tenure as its Director. He felt that as Meetings Secretary, he had perhaps needed more support than in any other rôle, and he thanked all those who had so ably assisted him, especially Mrs Hazel Collette, whom he wished the very best of luck with taking over the job in the coming year.

Before proceeding to the afternoon's talks, the President wished to make one further presentation. Miss Patricia Barber had served the Association as Assistant Secretary in its New Burlington House Office for 18 years, but in April had decided to move on to new pastures. In recognition of her long and valuable service, he presented her with a small token of appreciation on behalf of all the Association's members, to which there was applause.

Finally, Mr Boles invited the organisers of the 2005 *Nightlife Event* to make a brief advertisement. It was announced that this event would be held at Portsmouth Naval Base on July 9, and feature a line-up of distinguished speakers including Dr Allan Chapman. However, tickets needed to be booked in advance, and fliers and booking forms would be available after the meeting.

The President then, with a hint of trepidation, invited Mr Martin Mobberley to present the latest instalment of his Sky Notes.

The June Sky

Mr Mobberley opened with a review of the UK supernova scene, which would be exceptionally quiet this month: the recent unprecedented lull continued, and there had been no new discoveries since Tom Boles' 89th on April 11. However, supernova enthusiasts might like to try imaging a recent discovery of the Lick Observatory, SN2005cf in MCG 1-39-3 in Libra. At discovery, on May 28, it had been mag 15.5, but by mid-June had brightened to mag 13.5, making it an easy CCD target. It had been confirmed as a Type Ia event.

As a brief interlude, the speaker remarked that the time of year had arrived when, rather to his dismay, arachnid guests seemed to delight in visiting his observatory uninvited, and one specimen was displayed.

At 10pm on the following evening, June 26, Mercury, Venus and Saturn would all be contained within a two-degree circle – the second closest conjunction of a triplet of planets in the period 1970-2030. Mercury and Venus would themselves lie at a separation of only 0.1°. The proximity of the Sun would necessitate twilight observing, but members were challenged to image it.

Turning to comets, the brightest at present was 2005 K2 at mag 7, discovered unusually close to the celestial pole at a declination of +75° by LINEAR on May 19. Throughout June it had been plunging southwards through Camelopardalis, entering Ursa Major on June 3, then passing through Lynx into Cancer, where it was now below the southern horizon for latitudes northward of +50°. It would reach perihelion in Hydra at an estimated mag 5 on July 5, before curving sharply westward, passing through Canis Major in September. The speaker commented that it might return as a faint northern object in the winter, however doubt had been cast over this by recent reports of a divided nucleus, implying it to have broken apart; Jonathan Shanklin added that the latest observations indicated that it had faded unexpectedly to mag 9, seeming to confirm this.

Among the fainter comets, 2004 Q2 (Machholz) had now faded to mag 11 and was in Canes Venatici. In mid-July it would pass into Boötes, where it would remain until October, passing 2° south-west of Arcturus around August 19. 161P/Hartley-IRAS, also around mag 11, was heading northward through Cassiopeia, to pass into Camelopardalis in early July, and ~8° from the celestial pole later in the month. 21P/Giacobini-Zinner, a little brighter at mag 10, was in Aries, and would pass into Taurus in early July, and within ~1° of Aldebaran on July 20.

However, perhaps the most interesting observing target would be 9P/Tempel, presently in an easily identifiable part of the sky, 5.5° north of Spica in Virgo. On July 4, NASA's *Deep Impact* spacecraft would collide it with a 370-kg projectile. From the UK, it would not be possible to observe the moment of impact – that would be at 06h00 UT – but its behaviour in the following days would be highly uncertain, a bright flare being possible. However, its southerly declination – -9.5°, and sinking – would render it tricky to observe from the UK: an early evening object, it had been at altitude 40° at the start of evening nautical twilight on May 25, as compared to a

meager 13° on July 4. Mr Mobberley concluded that twilight would pose a huge problem unless it flared spectacularly, and that, in any case, a flat southern horizon would be prerequisite for its observation.

Mr Mobberley briefly mentioned that NASA's Space Shuttle *Discovery* was due to return to flight on July 13, on its first mission since the loss of *Columbia*, before announcing the discovery of a new nova in Aquilla on June 10 by the ASA3V instrument of the *All Sky Automated Survey* at the Las Campanas Observatory in Chile (operated by the Carnegie Institution of Washington). At discovery, its V-band magnitude had been 10.5±0.5, though a light-curve constructed by Guy Hurst from UK observations suggested it to have now faded to mag 12±0.5. The speaker remarked upon the number of novae discovered in the region (RA 18h→20h; Dec -10°→30°) around Aquilla: it had hosted seventeen since 1968.

Moving on to planetary observation, the speaker reported that Jupiter, in Virgo, and setting soon after the Sun, remained just observable at altitude 30° at sunset. A number of images by Association members were shown, most notably those by Dave Tyler, who had found that observing only a few minutes after sunset gave the finest images; for such a bright target, twilight proved to be a lesser problem than the deterioration in seeing closer to the horizon. The speaker noted that both Mr Tyler and the great Damian Peach were present in the audience, and members applauded their images.

Mars, now a morning planet, would pass the next six months in Pisces and Aries, and presently rose to 30° altitude before sunrise at 04h30 BST. Mr Mobberley predicted that its apparition this autumn would yield some exceptional UK observations. While its 2003 opposition had been hyped as its closest approach for thousands of years, its -20° declination had placed it very low in the UK sky; by contrast, its declination would be +15° this autumn, reaching +20° in 2006 January, meanwhile the planet's disk, at 20", would not be much smaller than it had been in 2003.

Giving some observing tips, he advised that, as with Jupiter, twilight was a minor consideration in comparison with the improving seeing with altitude. Indeed, with Mars rising so soon before the Sun, some of Mr Tyler's finest images had been taken up to an hour *after* sunrise (though care had to be taken, pointing telescopes east after sunrise). Secondly, he remarked that Mars' rotation period, 24h37m, was very similar to that of the Earth, and that, as a result, the same face of Mars was visible at nearly the same time on consecutive days, to within 37 minutes. From any given observing location, it consequently took nearly a month to observe the whole surface, even if observations were made throughout the hours of darkness. Each night, new features were visible *early* in the night, when Mars rose, as its rotation lagged a little from the night before. At the time of the meeting, they appeared on the terminated limb. The speaker warned it was easy to get confused: as the planet rotated throughout the night, it revealed features on the disk's fully-illuminated edge, but from one night to the next, the new features were those on the opposite edge, just disappearing into the terminator as it rose.

Mr Mobberley advised that misty, or even foggy, weather was not a lost cause, and often accompanied anticyclonic systems which yielded steady air masses and very fine seeing. He also urged members, in their excitement to observe the planet itself, not to forget Phobos and Deimos. Finally, to obtain eye-catching sharp colour images, he recommended the use of the *LRGB* imaging technique described in his March Sky Notes¹.

Of recent images, a series by Dave Tyler taken on June 18 at 04h01, 04h07, 04h16, 04h27 and 04h41 UT stood out especially, each having been stacked over 200 seconds. So fine was the resolution that the rotation of the disk was clearly visible when the sequence was viewed in animation. The speaker noted that it was even quite distinct when the 04h01 and 04h07 images were blinked, even though Mars had rotated through only 1.5° in that time interval, shifting even the most rapidly moving features at the centre of the disk by a mere 0"14 across the sky.

Briefly turning to the *Cassini* probe, the speaker remarked how easy it was, after the initial excitement, to forget its ongoing achievements. On June 9-12, it had completed its first close fly-by of *Hyperion*, and a compilation of the raw images by John Rogers was shown. On June 8, superb images had also been obtained of *Dione* – a nearly-spherical rock, not dissimilar in appearance to our own Moon.

Looking ahead, this being the last Sky Notes before the September Out of London Meeting, there were several forthcoming events. Firstly, the Perseid meteor shower, likely to yield occasional meteors throughout the period July 23 until August 20, with maximal activity around 13h00 UT on August 12, at ZHR ~80. On the night of 11/12, the speaker noted that the seven-day-old waxing Moon would set at 21h26 UT, and so dark skies were possible in the early hours of the morning, when the shower would be at its finest.

Those looking for a holiday with a brief bit of excitement might be interested by the occultation of mag 1.4 star *Regulus* by mag 15.4 asteroid *Rhodope*, of 35-km diameter, on October 19 04h23-04h30 UT. The occultation would be visible along a narrow track passing through Portugal, Spain, southern Italy, Greece and Turkey. It was the brightest star to be occulted in the hours of darkness until that of the same star in 2014 March, though with a maximum duration of 1.1 seconds, and the uncertainty in the position of its track making it impossible to guarantee an event at any given location, it seemed a long journey for little reward.

Sixteen days earlier, on October 3, an annular solar eclipse would be visible across Spain, Portugal and parts of

Africa. The duration of the European portion of the annular phase would be between 4m10 (Portugal) and 4m20 (southern Spain), and take place between 08h55 UT (Portugal) and 09h05 UT (southern Spain). The African eclipse would commence when the annular phase touched the Algerian capital, Alger, at 09h05 UT. A partial eclipse would be seen in London 07h49-10h19 UT, maximum 66.1%; Edinburgh 07h53-10h13 UT, maximum 58.5%.

Mr Mobberley concluded with the second half of the slideshow that he had started in his previous Sky Notes², showing the fruits of Damian Peach's recent 21-day observing expedition to the steady skies of Barbados, from which he had returned with 400 Gb of images. The speaker opened with double star *Porrina*, aka γ -Vir, which had been discussed in detail in his April Sky Notes³, and the components of which were presently separated by less than 0"5. From the UK, they seemed impossible to resolve, but Mr Peach had just managed to do so in Barbados using blue filtered images, and from them, the separation could be estimated to be 0"35.

A sequence of quite remarkable images of Jupiter followed, showing fine filamentary structure within the north/south tropical belts, and resolving fine details within the Great Red Spot. In one image, from April 25, no fewer than 18 anticyclonic circulations, appearing as white spots on the surface, could be seen. On the same morning, at 01h41 UT, an image had revealed Europa transiting in magnificent detail; the speaker thought it just possible to detect a phase in Europa's disk by comparing the brightnesses of his two limbs.

These were followed by images of Mars of similar quality. Mr Mobberley remarked that while these might not appear exceptional, at the time when they had been taken, in late April, the planet had subtended a mere 6"56. It was stunning in itself that they were comparable to older images taken around opposition, when Mars' disk had been several times larger. Following the applause for Mr Mobberley's fine presentation, the President proceeded to introduce the afternoon's final speaker, Mr Roger Dymock.

Spinning Asteroids

Mr Dymock explained that in the following talk he would be describing how even comparatively modestly equipped amateurs could conduct scientifically useful observations of asteroids. He explained that all asteroids rotated about some axis as they drifted through space, and while surface details on them were invariably irresolvable, their changing faces as they rotated could potentially give rise to variability in their brightnesses, following some pattern which repeated on each rotation.

The extent of this depended upon a number of factors, including the object's shape, and the degree of variation in its surface albedo. However, a critical factor was the orientation of its axis of rotation with respect to our line of sight. Asteroids which rotated about an axis closely aligned to our line of sight would, if they could be imaged, appear to rotate, but their unresolved brightnesses would remain unchanged in the absence of new features rotating into view. At the opposite extreme, asteroids whose rotation axes lay perpendicular to our line of sight revealed a maximal area of new surface as they rotated, and thus their unresolved brightnesses varied maximally.

This orientation would vary over time. As the Earth travelled around its orbit, and the asteroid along its, the direction of our line of sight to it would change, having the direct consequence that its apparent position in the celestial sphere would change. But, more subtly, the asteroid's rotation axis would remain in a fixed spatial direction throughout its orbit and hence, as our line of sight's direction changed, so too would its orientation with respect to the asteroid's spin axis.

Consequently, a wealth of information could be gleaned from an asteroid's light curve. The period of any observed modulation gave its rotation period. The amplitude of the modulation gave an indication of the asteroid's shape, increasing with the asphericity of the object. The variability of the modulation over the period of the object's orbit depended upon the orientation of its spin axis. And, from the spin period could also be estimated the asteroid's approximate size, as larger objects tended to rotate more slowly than their smaller counterparts.

Moving on to discuss the practicalities of asteroid photometry, Mr Dymock explained that there were two possible approaches: *differential* or *all-sky* photometry. In the former case, the target was placed in a CCD frame which also contained one, or preferably two, reference stars of known brightnesses. Photometric measurements could then be calibrated by comparison with these reference objects. In the latter case, calibration measurements of reference stars all around the sky were made prior to making any asteroid observations, to correct not only for instrumental effects, but also for the transparency and weather conditions of the particular night. Measurements from across the sky were required to determine how the *zero-point* and *extinction* of the sky varied with altitude due to the changing *air-mass* along the line of sight.

For beginners, the speaker urged the use of the former procedure, which was very simple to use. Although it had the downside of only being applicable to asteroids with steady reference stars nearby, and tended to be less accurate because fewer reference objects were used in the calibration, the results were still scientifically of great value.

He recommended newcomers to use Alan Harris' online database of targets of known period as a source of objects to practice on; he suggested selecting targets which were comparatively bright, and were up for a substantial portion of the night. To begin with, it was rewarding to select objects with spin periods less than eight hours, so that a whole period might be imaged in a single night.

Moving on to observing techniques, Mr Dymock explained that focussing and polar alignment, whilst needing to be reasonable, were less critical for photometry than for imaging. So long as the light from each source was contained within a relatively compact region of the frame, accurate photometric measurements could be made. However, well-chosen exposure times, to prevent saturation, and thorough calibration of the CCD array using flat-frames and dark-frames, were vital. The speaker recommended taking images as frequently as possible during observation, in order to get as many points on the light-curve as possible. He went on to provide a brief overview of how to perform the photometry using his choice of software, *Canopus*⁴.

For observers who felt ready to attempt the greater challenge of making scientifically valuable observations of asteroids of unknown periods, Mr Dymock recommended selecting sources from the lists published in the online *Minor Planet Bulletins* of the *Minor Planet Section*⁵ of the *Association of Lunar and Planetary Observers* (ALPO). In closing, he wished to emphasise that asteroid photometry was a very rewarding activity, and that even amateurs possessing only modest equipment could make very valuable observations.

Following the applause for Mr Dymock's talk, the President adjourned the meeting until the Out of London Meeting, to be held in Cambridge on September 3.

Dominic Ford.

References

¹ Ford, D.C., 'Ordinary Meeting, 2005 March 23', *Jour. Brit. Astron. Assoc.*, ...

² Ford, D.C., 'Ordinary Meeting, 2005 May 25', *Jour. Brit. Astron. Assoc.*, ...

³ Ford, D.C., 'Ordinary Meeting, 2005 April 23', *Jour. Brit. Astron. Assoc.*, ...

⁴ <http://www.minorplanetobserver.com/htms/mpocanopus.htm>

⁵ <http://www.lpl.arizona.edu/~rhill/alpo/minplan.html>