Ordinary Meeting, 2009 December 12
held at the Royal Astronomical Society, Burlington House, Piccadilly, London SE1

David Boyd, President

Ron Johnson, Hazel Collett and Nick James, Secretaries

The President opened the second meeting of the 120th Session and announced that the minutes of the previous meeting were on display at the back of the lecture theatre. He announced that 25 new members were proposed for election, and those 34 new members who had been proposed at the previous meeting were approved by the audience and declared duly elected. Mr Nick James, Papers Secretary, reported that six papers had been approved for publication in the *Journal*:

Nocturnal occultations of Venus, by Jean Meeus
Invisible sunspots and 'orphan' prominences: an observational study, by Fred Nye
Measuring the superhump period of the dwarf nova RX J1715.6+6856, by Jeremy Shears
Noctilucent Cloud over the UK and Western Europe, 2006-2008, by Ken Kennedy
Where have all the aurorae gone?, by Ron Livesey
The first Pic du Midi photographs of Mars, 1909, by Audouin Dollfus

The President announced that the next Ordinary Meeting would be held on Wednesday January 27 at the present venue. Looking further ahead, the next in the Association's series of Back to Basics workshops would be held at the University of Nottingham on Saturday January 30. The Association's annual Winchester Weekend would be held over the weekend of April 9-11.

Before introducing the afternoon's speakers, the President briefly mentioned that the Association's Solar Section had recently produced a new observing handbook, which could be purchased from the BAA Office, either at the present meeting or via the Association's website, for £7.50. He then paused proceedings while Dr Richard Miles finished an observing run using a pre-allocated slot of time on the *Faulkes Telescope South*, taking the opportunity in so doing to talk the audience through the process of using its web interface to make live observations of a range of asteroids, including (7102) NeilBone, named in honoured of the late Director of the Association's Meteor Section.

The President then introduced the afternoon's first speaker, Mr Jonathan Shanklin, Director of the Association's Comet Section, and invited him to deliver the Association's annual *George Alcock Memorial Lecture*.

George Alcock in Antarctica

Mr Shanklin explained that he would be describing some of the sights which might have appealed to George Alcock's many interests, had he had the chance to travel on a hypothetical trip to Antarctica. He remarked that Alcock (1912-2000) was perhaps the greatest visual observer in the Association's history; his impressive tally of astronomical discoveries included five comets – C/1959 Q1, C/1959 Q2, C/1963 F1, C/1963 S2 and C/1983 H1 – as well as six novae – HR Del (1967), LV Vul (1968), V368 Sct (1970), NQ Vul (1976) and V838 Her (1991). Mr Shanklin added that the Association had honoured these superb observational achievements by arranging for a plaque to be erected to Alcock's memory in Peterborough Cathedral, which had been unveiled by the Astronomer Royal, Prof Sir Martin Rees, in 2005. However, Mr Shanklin also added that astronomy had represented but one of Alcock's many enthusiasms, and that he had also been keenly interested in many other areas of natural history.

Embarking on his hypothetical journey, Mr Shanklin first described some of the astronomical sights which Alcock might have seen, commenting that Antarctica's incredibly dark, dry and transparent skies afforded a tremendous view of meteor showers, the Magellanic Clouds, and of the Milky Way stretching from horizon to horizon. But he added that much of the natural history and meteorology of Antarctica would surely also have appealed to Alcock's interests, and went on to describe some of the Antarctic wildlife which might have appealed to him, ranging from penguins and albatrosses to seals and whales.

Mr Shanklin closed with a discussion of the information about the Earth's climate which could be gleaned from Antarctica, describing how cylindrical cores drilled out from the Antarctic ice could be analysed to see how their chemical composition changed with depth. He explained that these revealed how the Earth's atmosphere and climate had changed over the past few hundreds and thousands of years. He noted that these studies revealed a very strong historical correlation between the concentration of carbon dioxide/methane in the atmosphere and the planet's surface temperature, which seemed particularly worrying when viewed alongside plots of the atmosphere's current carbon dioxide content, which was as far above its historical average as it had been below during the last ice age.

Following the applause, the meeting broke for tea. After the break, the President invited the Director of the Association's Meteor Section, Dr John Mason, to speak.

Meteors, Showers and Streams: George Alcock's Legacy

Dr Mason remarked that this was a timely opportunity to reflect on George Alcock's meteor-observing work, undertaken exclusively in the formative early years of his observing career, because the next few days promised to provide one of the best meteor displays seen in UK skies for many decades – the Geminid meteor shower – due to reach maximum over the coming three nights of December 12-14. He added that despite the ground-breaking nature of Alcock's meteor observations, they were often, perhaps understandably, remembered only as a footnote among the outstanding achievements for which he was better known: the discovery of five comets and six novae. For those later accomplishments, he had been awarded the Association's Merlin Medal on no fewer than three occasions. But the speaker explained that he would seek to shed some light on the ways in which his early meteor-observing work may have nurtured the acuity and incredible memory which were to become Alcock's hallmark in later years.

Dr Mason explained that Alcock had had the good fortune to observe two solar eclipses in his childhood – the partial eclipse of 1921 and the total eclipse of 1929 – though he had been clouded out on the latter occasion. However, if a single event had sparked his interest in astronomy, that seemed not to have been those eclipses, but rather the sight, witnessed by chance at the age of 18 whilst walking across Town Bridge in Peterborough, of a meteor fireball crossing the sky on the night of 1930 November 30. He had found that sight so striking that he had written a detailed account of it and submitted his observation to the then Director of the BAA Meteor Section, J.P. Manning Prentice, even though he had had no previous involvement with the Association.

Dr Mason explained that Prentice had been so impressed by the diligent observation that he had received that he had gone on to urge Alcock to attend the Section's annual meeting on 1931 July 4 – the very meeting at which the death of W.F. Denning was to be reported. Alcock's attendance at that meeting had marked the beginning of a regular correspondence between the two men, in which Alcock had regularly submitted his observations to Prentice in the form of handwritten letters, and Prentice had replied, often in the form of several pages of closely typed foolscap paper. Dr Mason observed that it was fortunate that Alcock had responded well to criticism, as if there was ever any suggestion that his observations had fallen short of the highest standards, Prentice could prove remarkably scathing in his response. The speaker wondered to what extent this stern mentoring hand had inspired Alcock to excel in later life.

Turning to describe the observing project into which Prentice had recruited Alcock, Dr Mason explained that one of the most interesting outstanding unknowns of meteor astronomy in the early 1930s had been the height within the atmosphere at which meteors tended to burn up. Within the BAA, the Meteor Section had made enormous contributions to meteor science thanks to the work of Denning and A. Grace Cooke, now entering her tenth decade of life, but Prentice had realised the pressing need for a new generation of younger observers. He had very quickly spotted the great potential of a partnership between Alcock and himself: the 60-mile separation between their respective homes in Peterborough and Stowmarket would allow them to triangulate the exact three-dimensional positions of any meteors which were seen simultaneously from both locations, because the meteors would appear to the two observers in differing parts of the sky. The pair had carefully arranged the times when they would both go out to observe, and had afterwards brought their observations together and trawled through them for what they called *concordances* – records of meteors which they had both observed at exactly the same moment.

Over the following 20 years, this work had proven so successful that, at the end of that time, around 80% of the total of 1,000 heights which had been calculated worldwide for sporadic meteor trails had been derived from observations by Prentice and Alcock. From that large body of data, it had become clear that meteor trails typically became visible at an altitude of between 80 and 110 km and that they typically burnt out at altitudes of between 50 and 80 km. By the early 1950s, Alcock and Prentice's technique of triangulation was beginning to be superseded by the use of radio-frequency radar which could detect the reflection of radio waves from the ionised material left in the wake of meteor trails; Alcock would, in fact, help to pioneer that new method by offering advice to the Jodrell Bank Observatory for a short time. In the more recent modern era of automated photographic astronomy, however, the triangulation method had seen a modest revival in the hands of Steve Evans (1953–2008) amongst others, who had had some success in triangulating the exact positions of meteors by recording images of their trails from cameras placed at widely spaced locations.

Turning to look at the relevance of these observations to Alcock's later and better known discoveries, the speaker noted one similarity in particular. He explained that Prentice had been particularly anxious about the amount of time spent with star charts after each meteor was seen, whilst the observer was busy recording his observation, and was keen that this observing downtime should be kept to a minimum. He had realised that the time spent recording the path of each meteor trail could be drastically reduced if, rather than drawing a line on a star chart, the observer committed to memory the designations of all of the brightest 3,000 naked-eye stars and recorded the path simply by naming naked-eye stars close to its start and end points in a notebook. Prentice's consequent insistence that Alcock should learn his way around the naked-eye sky to such a phenomenal degree must have stood him in good

stead when Alcock had later taken it upon himself to learn the pattern made by over 30,000 stars in the binocular sky to aid his search for comets and novae.

The speaker closed with a discussion of the prospects for the meteor showers and storms of coming years. The imminent 2009 Geminids were an extremely promising prospect, due to reach maximum on December 13, two days before New Moon. The radiant, close to the star Castor, would rise to an altitude of 45° by 10pm, allowing for easy early-evening observation without the need to stay up late. A peak rate in excess of 110 ZHR, spread over more than one evening, was widely expected. In coming years, this shower looked set to outclass the Perseids and become the most spectacular of the annual meteor showers. Modelling by NASA's Meteoroid Environment Office, for example, predicted that its rate might grow to regularly exceed 200 ZHR within the next 20 years.

In 2010, however, the Geminids would be less favourably placed on account of reaching maximum with some interference from an eight-day-old Moon. Consequently, the Perseids were likely to be the year's best shower, reaching maximum in the early hours of August 13, only two days after New Moon, and reaching rates of perhaps 80 ZHR. Looking further ahead, the best prospect for a truly spectacular meteor storm in the next 50 years would perhaps be the Giacobinids of 2011 October 9, expected to reach maximum at sometime between 19h10 UT and 20h40 UT on that evening. The timing of their maximum meant that they would be best seen from eastern Europe or the Middle East, where it would coincide with local midnight. Despite its recurrence every 13 years, this was a storm which Alcock himself claimed never to have seen: the 1933 storm had not been predicted and other engagements had prevented him from observing that evening, and he had been clouded out for the 1946 storm. Other observers in 1933, however, had reported a rate in excess of 40 meteors/minute for a period of around an hour, and within that time, a peak rate of around 90 meteors/minute for around 10 minutes. In 1946, the observed rates had been only a fraction slower, peaking at around 70 meteors/minute. More recent displays, including those in 1985 and 1998, had been more modest but nonetheless spectacular, and so the speaker strongly recommended making an effort to travel to see the 2011 shower.

Following the applause, the President invited the evening's final speaker, Dr Stewart Moore, Director of the Association's Deep Sky Section, to present his sky notes.

The Winter Sky

Dr Moore opened his Sky Notes by remarking that the *International Space Station* (ISS) would be making a series of early-morning passes over the UK in the coming week, and that it had grown increasingly bright over recent years as various solar panels and modules had been added to its structure. At 6.10am on the morning of the meeting, he had himself observed a pass for which the *Heavens Above* website[1] had forecast a peak magnitude of –2.4, but in view of its having been quite readily visible through moderately thick cloud, he wondered whether it might not actually have been somewhat brighter.

On a related theme, the appearance of a strange spiral pattern of blue light in the Norwegian sky in the early morning of December 9 had attracted considerable attention in the media. The light show was now widely believed to have resulted from the malfunction of an experimental Russian *Bulava* ballistic missile, which Moscow had confirmed to have been launched from a nuclear submarine on the same day. The speaker commented that even if the test had failed, few would know where to begin if tasked with creating such an unusual geometric display of debris.

Turning to the solar system, Dr Moore reported that the Moon had been attracting interest in recent months on account of its having been deliberately impacted by a projectile on October 9 as part of NASA's *LCROSS* mission. The aim of this had been to throw up a large plume of material which could be studied spectroscopically to look for evidence for the presence water. At a press conference on November 13, NASA scientists had reported that clear evidence had been seen for a significant abundance of water. The speaker noted that this impact had come almost exactly 50 years after the first impact of a manmade spacecraft onto the lunar surface, that of *Luna 2*, on 1959 September 13.

In the coming month, Full Moon would be on 31st December and would be accompanied by a partial lunar eclipse, though even at the moment of greatest eclipse at 19h22 UT only 8% of the lunar disk would be in shadow. The eclipse would begin at 17h17 UT and end at 21h28 UT. Of perhaps greater interest was the annular solar eclipse which would be visible two weeks later on 2010 January 15, and which would be best seen from the Indian Ocean or Africa. The Sun remained otherwise quiet in its extended period of solar minimum, and despite the appearance of a small sunspot on December 10 its disk remained entirely blank for most of the time.

Two notable meteor showers would reach maximum within the next month. The Geminids, already under way and due to reach maximum on December 14, promised to provide a very spectacular show as already described by the previous speaker. The Quadrantids were less favourably timed, reaching maximum on December 3, when they would have to share the sky with an 18-day-old Moon. However, the speaker commented that given the poor predictions, it was likely that a relatively small number of observers would monitor them, and so any observations that were made would be of particular importance.

Turning to the planets, Dr Moore reported that Jupiter's current apparition in the southern skies had passed opposition on August 14 and was now nearing its end. As seen from the UK, the planet now set at around 8pm. On December 19, it would reach a close conjunction with Neptune, which would pass within a mere half-degree to its north. With Jupiter shining at mag. –2.1, and Neptune at a mere mag. 7.9, the former might prove a useful pointer for finding Neptune, though only for those with particularly unobstructed western horizons. Mercury would reach greatest eastern elongation in the evening sky of December 18, though it would prove a difficult object at this apparition, setting at 5.07pm, four degrees below the two-day-old Moon.

Saturn's new apparition was now underway. It was currently a morning object and would remain so for a few more months until reaching opposition on 2010 March 22. By Christmas, however, it would be making it above the horizon by midnight. Its rings remained in a relatively closed configuration, currently inclined at 4.8° to our line of sight, and over coming months this would not improve. Rather, the rings would appear to narrow once again, and by June would be inclined at a mere 1.7°. They would not begin to open out any further than their present configuration until the autumn of 2010.

Mars could be found in Cancer and would be the planet of interest in the coming weeks. It would reach opposition on January 29, two days after making closest approach to the Earth on January 27, on which occasion it would appear at its largest. However, it was in a comparatively distant part of its orbit at this apparition, and its disk would consequently measure a rather meagre 14" across at its largest. For comparison, it had measured 25" across at its 2003 opposition, and Jupiter typically measured around 50" across. Dr Moore commented that Mars could be quite a challenging planet to observe visually, since it appeared as a small and very bright disk whose glare could hinder the observer from distinguishing much detail in its disk. He added that its rotation period of 24h39m – only a little longer than an Earth day – was a frustration to those who observed at a similar time each day, as for many days at a time the observer would see a very similar face. This was an especial frustration, he added, as the hemisphere around Syrtis Major was rather more visually appealing than the comparatively bland appearance of the opposite hemisphere. He advised visual observers to use a red filter when studying the surface of the planet, and a blue filter when studying the polar cap.

Turning finally to the deep sky, Dr Moore congratulated Ron Arbour upon having made his 22nd supernova discovery, 2009mf, in IC 65, on December 6. The discovery had been made using Arbour's 12-inch Meade. Dr Moore also congratulated Tom Boles upon having made his 127th supernova discovery, 2009kp, in NGC 6246, on November 3; this was Boles' tenth discovery of the year.

The midnight sky in December was commonly associated with the constellations of Gemini, Orion and Taurus, and so the iconic Great Orion Nebula (M42) would be sure to be well observed in coming weeks. But the speaker also urged the audience to take a look at the nearby bright nebulous complex of NGC 1973, NGC 1975 and NGC 1977, as well as M43, just to the side of M42, and the open clusters NGC 1980 and NGC 1981 at either end of the Orion's sword. A little more challenging were the planetary nebulae Abell 12, close to μ-Ori, and NGC 2022, both in Orion. The open clusters M36, M37 and M38 in Auriga were also extremely appealing; NGC 2169 was a more challenging target, shaped like the digits '37'. Finally, the speaker added that Hubble's Variable Nebula (NGC 2261) was well placed at present in northern Monocerus and provided an unusual opportunity to see an emission nebula which could change quite radically in appearance over a period of months.

Following the applause, the President adjourned the meeting until 5.30pm on Wednesday January 27 at the present venue.

Dominic Ford

References

[1] http://www.heavensabove.com