Ordinary Meeting, 2010 January 27

held at the Royal Astronomical Society, Burlington House, Piccadilly, London W1

David Boyd, *President*
Ron Johnson, Hazel Collett & Nick James, *Secretaries*

The President opened the third Ordinary Meeting of the 120th session. The audience approved the minutes of the meeting of 2009 December 12, and the election of 25 new members was confirmed by the meeting. The Papers Secretary said that, at the Council Meeting earlier that day, Council had accepted five papers for publication in the *Journal:*

Saturn during the 2006/2007 apparition, by Mike Foulkes
VSX J003909.7+611233: a new gamma Doradus variable in Cassiopeia, by David Boyd *et al.*
Superoutbursts of the SU UMa-type dwarf nova CP Draconis, by Jeremy Shears *et al.*
The Hampstead Observatory, 1910–2010: a century of service to the public, by Doug Daniels
A home-built, fully-automated observatory by Mike Beales

The President announced that the next meeting at Burlington House would be the Special General Meeting and Ordinary Meeting on March 31, at which the main speaker would be Prof. Linda French. He also mentioned the Deep Sky Section meeting on March 6, the Winchester Weekend on April 9–11 at Sparsholt College, Winchester, the Out of London meeting in Shrewsbury on April 24, on the theme *Cosmic Bangs and Explosions*, and the Exhibition Meeting on June 26.

The President then introduced Dr Mike Dworetsky of University College, London.

Chemically peculiar stars of the upper main sequence

Dr Dworetsky first explained the principle of the spectrograph, showing pictures of the grating spectrograph used on the 24-inch (61cm) Allen Telescope at Mill Hill Observatory. The spectrum of the Sun was demonstrated with a high resolution image taken with the UCL echelle spectrograph before it was shipped to the Anglo-Australian Telescope.

Dr Dworetsky reflected that the chemical classification of stars according to their spectra has occurred for over 100 years. The basic system was pioneered at Harvard Observatory in the 1890s and its main features remain in use today. Many astronomers remember the sequence of spectral classes OBAFGKRNS from a mnemonic such as Oh Be A Fine Girl and Kiss Me Right Now or Sooner. Dr Dworetsky reviewed the main elemental lines characteristic of each of these types of stars and showed examples of their spectra. He pointed to the observation that the more luminous (hotter) stars have narrow lines, while less luminous (cooler) stars have broader lines, and also reviewed the effect that magnetic fields have on spectral lines, the *Zeeman splitting* observed when starlight is passed through a calcite crystal polariser, which separates circularly polarised and linearly polarised light. He further pointed out that stellar rotation broadens spectral lines due to the divergent Doppler shifting of light from opposite limbs of the star.

Dr Dworetsky went on to outline the four main types of chemically peculiar star. These are: *Am stars*, which show strong heavy metal lines, no magnetic field, and and are slow rotators; *Ap stars*, which show lines of strontium, chromium and rare earth elements, a strong magnetic field, and generally slow rotation; *mercury-manganese stars*, which show abundance of singly ionised Hg and Mn, but weak magnetic fields and very slow rotation rates; and finally, *helium-weak stars*, which have weaker helium lines than would be expected from their colour. In order to further demonstrate the peculiarity of the compositions of these stars, Dr Dworetsky showed a graph of the log of abundance versus atomic number for all elements, based on the composition of 'normal' stars, the Sun, and meteorites.

The speaker concentrated the rest of his talk on the Ap stars and the mercury-manganese stars. The Ap stars are thought to have 'frozen-in' magnetic fields arising from their slow rotation. Normal convective mixing does not occur in the outer layers of these stars, and abundance anomalies arise on areas of the star surfaces due to magnetic anomalies. 53 Cancri is a typical Ap star with rotation period of 8 days. On this star, a patchy distribution of elements on the surface is apparent, and starspots can be mapped. The mercury-manganese stars may be explained by a diffusion model. These are low rotation velocity stars so they are not well-mixed, and the normal He II convective zone is suppressed. Atoms in the gas migrate due to differential radiation pressure, and species may go up or down. The anomalous abundances observed are due to the 'settling-out' of certain elements in the surface layers, and internally, these stars' compositions are thought to be more normal. Some of them show emission as well as absorption lines.

In answer to a question from the President, Dr Dworetsky said that the anomalous characters of these stars do not seem to arise from their progenitor gas clouds. Theory says that the rotation velocities of stars should show a random (Maxwellian) distribution when they form from gas clouds, but this is not observed – there are too many slow ones. It is not known why.

The President then introduced Sheridan Williams, Director of the Computing Section.

The Indian total solar eclipses of 1898 and 2009

Mr Williams told the meeting that he had been invited to go to Delhi in 2009 January, by the Indian Science Popularisation Association of Communicators and Educators (SPACE), to take part in a solar eclipse workshop. There he had given talks to the many young delegates on *The photography of eclipses* and *Indian eclipses 1800–2199*. Mr Williams repeated for the meeting a presentation he had first given in India, that had

The 18th century Jantar Mantar observatory in Jaipur, India. *Sheridan Williams.*

come from his ongoing work to digitise all past issues of the *Journal*. He had discovered, through scanning old *Journals*, that the 1898 Indian eclipse had occasioned the first successful BAA eclipse expedition. Mr Williams showed a diagram which compared the paths of the 1898 and 2009 eclipses, and others from the 19th and 20th centuries which had crossed India.

In 1898 the vexed question had been the nature of the corona – was it connected to the Sun, the Moon, or even the Earth's atmosphere? It was believed it could not be entirely a solar atmospheric phenomenon due to the great solar gravity. BAA contingents went to three Indian locations. A Mr Newall took a spectroscope he had designed to try to determine whether the corona is rotating, and also to examine the chemical makeup of the corona. Photography was not sensitive enough at that time to record the corona well, but many people made drawings, and temperature measurements were also taken. It was thought at this time that there could be a correlation between eclipses and earthquakes, and this, Mr Williams commented, is an idea that is not entirely dead today.

The rest of Mr Williams' talk concerned his travels in India in 2009 (though in fact he observed the eclipse from China). He told us of the tremendous publicity the eclipse had received in Bihar. While there he had given advice to schoolchildren as to how, and from where, they should attempt to observe the eclipse, and had suggested experiments they could do. He also mentioned his visit to Jantar Mantar Royal Observatory at Jaipur. Built in the 18th century, this gives the time by the Sun accurate to 10 seconds.

Mr Williams said that, in the event, the weather had been favourable for viewing the eclipse in many locations in India. He showed photos of the event that had been supplied to him by his Indian contacts Ankush Maria and Raghu Kalra. One of them showed a train stopped so that passengers could watch the eclipse. One effect of the 2009 Indian eclipse had been to reduce the previously highly-prevalent superstitions about eclipses in that country.

In questions to the speaker, Nick James commented that there was no possible physical mechanism that could account for any eclipse–earthquake correlation, and the idea also had no statistical validity, so should be firmly scotched. Bob Marriott pointed out that the BAA had sent an expedition to Norway in 1896 to observe a total eclipse, but all the observers had been in the same place, and all had been clouded out. India in 1898 was the first successful BAA eclipse expedition.

The President then introduced Nick James to present the Sky Notes.

The January and February sky

Mr James began by noting that the weather had been terrible, with the UK almost entirely covered by snow in late January. He noted that sunspots are now on a rising trend, and showed an image of recent spots by Ron Johnson. An annular eclipse that occurred on January 15 had been observed from Africa and India, John Mason, Hazel McGee and Nick Hewitt being amongst those who had been on expeditions to Africa. A picture was shown of John Mason using a shower mat as an observing instrument. Baily's beads had been observed at the northern edge of the track in India, and Naimal Islam Opu had produced a sequence of images from Bangladesh. On 31 December there had been a small partial eclipse of Moon, and Mr James had taken a picture of this using his mobile phone.

The Geminid meteors had given a good shower. The maximum was on January 13, but many parts of the UK had been clouded. The ZHR had been about 140, close to predictions. Sheridan Williams had observed the meteors from Libya and had recorded three meteors in about 300 exposures. Mr James had experimented with using a Watec camera (a low-light video camera) to record meteors. He had picked up eight meteors, including a bolide.

The Moon will eclipse the Pleiades on February 21, and there will be some graze events visible from the UK. Jupiter is now low in the twilight. In December, Neptune had been very close to Jupiter in the sky, which Sheridan Williams had captured in a photograph. Mr James had observed the event visually.

Mercury might currently be seen in the morning sky. Mars has its opposition on January 30, between Castor and Pollux and Regulus. On this occasion it will attain an angular diameter of 14 arcseconds. Mr James showed recent images of the red planet by Damian Peach, showing the north polar cap rift, which is a dune field at the melted edge of the polar cap. Images of Mars by Richard McKim and Don Parker were also shown. The asteroid Vesta is currently to be found in Leo, an easy object with binoculars. Rising late in the evening is Saturn, in Virgo, the ringed planet being illustrated by an image taken by Paul Maxson from Australia, where the planet is seen higher than from the UK. Transits of Rhea occur on February 5/6, February 15, and February 24.

Amongst the comets, 81 P/Wild and 2007 Q3 (Siding Spring) are currently the best objects, both of 10th magnitude.

In the world of variable stars, attention is focused on epsilon Aurigae. This star undergoes eclipses, but the eclipsing object is not fully understood. An eclipse is now underway. From 3rd magnitude normally, the star has now faded to mag 3.8. For professional instruments it is too bright an object, hence the opportunity for amateur study.

Mr James then mentioned the highly-successful meeting that had been held at the Royal Institution in honour of Sir Patrick Moore's 75 years' membership of the Association. Roger and Gill Perry have produced a 4-DVD set documenting this historic occasion, and it is available to members for £14 a copy (non-members £18). Included, as an extra, is a new interview with Sir Patrick by John Mason.

Finally, the President mentioned that a new BAA website had been launched that day. He thanked the speakers and adjourned the meeting to Wednesday March 31 at the same venue.

David Arditti

Ordinary Meeting, 2010 March 31

held at the Royal Astronomical Society, Burlington House, Piccadilly, London W1

David Boyd, *President*
Ron Johnson, Hazel Collett & Nick James, *Secretaries*

The President opened the 4th Ordinary Meeting of the 120th session. The minutes of the previous meeting were approved by the audience and signed by the President. Dr Boyd announced that 36 new members were proposed for election, and the 29 new members who had been proposed at the previous meeting were approved by the audience and duly elected.

Mr Nick James, Papers Secretary, said that four papers had been approved by Council today for publication in the Journal:

Jupiter's high-latitude storms: A Little Red Spot tracked through a Jovian year, by John Rogers
The lunar shadow speed on Earth during solar eclipses, by Wilhelm Carton
Making visual lunar and planetary observations at the Lowell Observatory, by Paul Abel
Measuring the white dwarf spin period of the intermediate polar 1RXS J063631.9 +353537, by Jeremy Shears *et al.*

The President reminded members of the Winchester Weekend on April 9–11 at Sparsholt College, Winchester, and the Out of London meeting in Shrewsbury on Saturday April 24. The Ordinary Meeting at Burlington House on Wednesday May 26 would contain the George Alcock Memorial Lecture, and the Exhibition Meeting would take place on Saturday June 26 at the Old Royal Naval College, Greenwich.

Dr Boyd then introduced the first speaker, Prof Paul Murdin, of the Royal Astronomical Society and the Institute of Astronomy, Cambridge.

The size and shape of the Earth

Professor Murdin's talk was subtitled 'Laborious and perilous adventures in the Mediterranean', and it was certainly that for those involved, notably the Frenchman François Arago (1786–1853). Studying maths at university with the intention of being an artillery officer, he found that he knew more than most of the students and the lecturers, who often got equations wrong.

150 years earlier Colbert, Minister of Finance under Louis XIV, had begun a project to map France and measure the Earth, which required an accurate survey of the Paris Meridian, the north–south line through Paris. (The location of this meridian is marked by a line on the floor of the Cassini room in what was the Paris Observatory in 1672.) Astronomers Picard, Cassini and La Hire, working for the newly formed Paris-based Academy of Sciences, first mapped the coastline of France, reducing the size of France by 20% and causing Louis XIV to comment that he had lost more of France to his astronomers than to his enemies.

The geodetic survey of France used a technique, measuring a baseline and triangulating to landmarks, invented by Willebord Snell in 1617. The survey was built around the meridian from Dunquerque to Perpignan, and an east–west line running from Brest to Strasbourg. Latitude and longitude of key places were calculated from astronomical measurements made in temporary observatories. The method of determining longitude was that suggested by Galileo, using eclipses of Jupiter's moons to determine local sidereal time. The difference in longitude between two places was equal to the difference in their local sidereal times.

Isaac Newton, in his work *Principia*, had suggested that the Earth was flattened at the poles, by 17 miles compared with the equator, and that the surface gravity would be reduced and a pendulum would have a longer period there. The French decided to test this theory (of oblateness) by measuring along the meridian – the scale of a degree of latitude should grow longer the further one moved from the equator.

In 1713 Jacques Cassini measured a degree from Paris to Bourges and a more southerly degree from Paris to Amiens. His results seemed to show that the Earth was prolate (flattened at the equator rather than the poles) and thus 'proved' that Newton was wrong. Later Pierre Maupertuis, who had studied Newtonian theory in London in 1728, together with other young scientists criticised Cassini's work and proposed an Arctic expedition to measure a degree much closer to the pole. Between 1734 and 1737 Maupertuis, Le Monnier and Celsius visited Lapland and measured a degree spanning the Arctic Circle. Despite enduring freezing temperatures, hordes of insects, difficulties with the Laplanders, problems associated with moving heavy equipment and being shipwrecked on the way home their expedition was successful.

To measure a degree of latitude further south La Condamine led an expedition to Ecuador between 1735 and 1744. Hostile natives and fauna, unforgiving terrain, squabbles between French and Spanish members of the expedition and even a murder of one member by another caused the group to split into three, each publishing its own paper. Fortunately all reached the same conclusion, that a degree near the equator measured less distance than one in France which, in turn, measured less than one near the pole. The Earth was therefore shown to be oblate, Newton to be correct and Cassini wrong.

Special General Meeting, 2010 March 31

held at the Royal Astronomical Society, Burlington House, Piccadilly, London W1

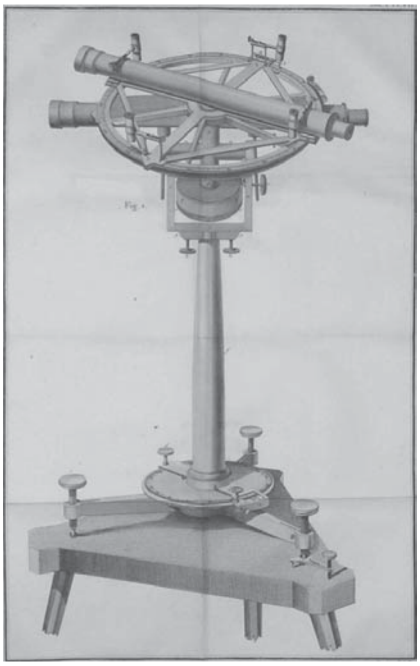
David Boyd, *President*
Ron Johnson, Hazel Collett & Nick James, *Secretaries*

The President opened the Special General Meeting of the 120th session. The minutes of the previous meeting were approved by the audience and duly signed.

Alan Lorrain, Treasurer, was invited to address the meeting. He said that although the accounts were healthy, costs continued to rise. In consequence Council had recommended a modest increase in the annual subscription rates for 2010–2011. Mr Lorrain proposed that the ordinary member subscription should go up to £44.00 with corresponding adjustments to other membership categories. The young person subscription should remain at £18.00. There were no questions. Dr Nick Hewitt seconded the proposal which was carried by the audience *nem.con*.

There being no further business the President adjourned the SGM until 2011 March 30 and the fourth Ordinary Meeting of the current session followed.

Roger Dymock



A new surveying instrument from 1793 – Borda's Repeating Circle

In 1790 the revolutionary government in France decided, in order to facilitate trade, to create a standard system of weights and measures. For example one measure of length had been based on the size of the King's foot, which of course varied with each new king! A new measure, the metre, was defined as 1/10 millionth of the distance from the equator to the north pole along the Paris Meridian.

In 1793 Jean–Baptiste Delambre and Pierre Mechain set out to re-survey the meridian using a new, more accurate, surveying instrument invented by Borda and made by Lenoir – the repeating circle. This was an unfortunate time to start such a survey as the French Revolution had come to a crisis and the king been guillotined. Delambre, captured by a suspicious militia and threatened with, but avoiding, execution, completed his part of the survey, from Rodez to Dunquerque, in 1797. Mechain, surveying between Rodez and Barcelona, fell foul of increasing tension between Spain and France and was placed under house arrest as a spy. Obsessed by errors in his measurements he returned to Paris, spiralled into depression and refused to publish his results.

In 1806, while spending a gap year at the Paris Observatory, the young Francois Arago was sent to Spain to extend the geodesic survey of France into Catalonia (he was brought up speaking Catalan) and the Balearic Islands. Spain had been annexed by Napoleon and was descending into anarchy, so Arago was given an escort of armed police. This was fortunate, as he had to fight off bandits to gain access to mountain tops from which to make observations, and being somewhat of a ladies' man, he killed a man who attacked him after he got involved with that man's fiancée.

His survey work continued to meet resistance during his survey of Majorca which was completed in 1808. Spain was rebelling against French rule, aided and abetted by the British who were anxious to prevent an attack on their ally, Portugal. Arago was suspected of being a French spy – the locals believing that his telescopes and the lighting of bonfires were being used to signal to the French fleet. To avoid the mob Arago gave himself up to the local authorities who imprisoned and, according to some erroneous reports, executed him.

He was eventually released and set sail for Marseilles in an Algerian ship. However his troubles were very far from over as his ship was captured by Spanish corsairs and the ship, crew and passengers held hostage in La Rosa. All were freed after the Regent (or ruler) of Algiers paid a ransom and Arago once again set sail for Marseilles.

His journey home was not to end yet as his ship was damaged in a storm and blown on to the North African coast. Evading the Bedouin he walked to Algiers but was then put under house arrest by the new Regent as the previously friendly nations of Algiers and France were in dispute over the failure of France to pay import duties. Eventually the dispute was settled and Arago freed, but on his way by sea to Marseilles his merchant ship was intercepted by a Royal Navy warship enforcing a blockade of France. Fortunately for him Algiers, where the ship originated, was considered to be a neutral country and he was allowed to continue his journey. Having a British passport supplied by the Royal Society undoubtedly helped smooth his passage. Not quite home and dry though as the Royal Navy launched a raid to capture his ship amongst others but, fortunately for Arago, this was beaten off by the French. So finally, after a journey of three years which should have taken six months, Arago was back on the French mainland.

Even though his work only confirmed what was already known and had little influence on the course of science, Arago was given a hero's welcome on his return to Paris in 1809. He was immediately elected to the Academy of Sciences and eventually became director of the Paris Observatory. He was even head of state for forty days in 1848, signing France's articles on the emancipation of slaves.

There is a memorial to him south of the Paris Observatory. A second memorial consists of 130 discs laid along the Paris Meridian through that city.

The shape of the Earth is known as the geoid and its surface approximates to sea level in the absence of any disturbing forces such as winds and ocean currents. As described earlier the Earth is an ellipsoid with its equatorial radius now known to be 21km more than its polar radius. The shape of the Earth and the oceans are constantly monitored by satellites such as *Topex/Poseidon* using laser and radar ranging, and that shape and sea levels are constantly changing. For example Scotland is rising as the land relaxes after being covered in kilometres of ice during the ice age, and the south of England is tilting downwards causing an apparent rise in sea level.

Professor Murdin's book covering the subject matter of his talk, *Full Meridian of Glory* published by Copernicus, is available from Amazon priced between £10 and £15.

The President thanked Professor Murdin for his entertaining presentation which was warmly applauded by the audience. There being no time for questions the next speaker, Prof Linda French, Illinois Wesleyan University and Visiting Professor of Physics at the University of York, was invited to give her talk.

The Jovian Trojan asteroids

The Trojans are located in the same orbit as Jupiter, 60º ahead of and 60º behind that planet. Those ahead of Jupiter, at the Lagrangian L4 point, are referred to as the eastern group and those behind, at the Lagrangian L5 point, are known as the western group. Asteroids at these locations are continually changing position and can librate at least ±30º either side of the nominal points, and similarly in inclination.

Other regions of the Solar System contain many asteroids, for example the Main Belt, between Jupiter and Mars. They are not evenly distributed across the belt – some locations, known as Kirkwood Gaps, containing far fewer asteroids than other regions of the belt. Orbits of asteroids in these gaps have periods which relate to that of Jupiter by factors of, for example, 2:1 and 3:1. That is they complete 2 or 3 orbits respectively for every one of Jupiter – 2:1 or 3:1 resonances. This makes them unstable and they are liable to be thrown inwards, a source of Near Earth Objects, or otherwise completely out of the Solar System. Spacecraft have visited some Main Belt asteroids e.g. Mathilde, Gaspra and Ida, and many asteroids in this region are easily visible from Earth through a telescope.

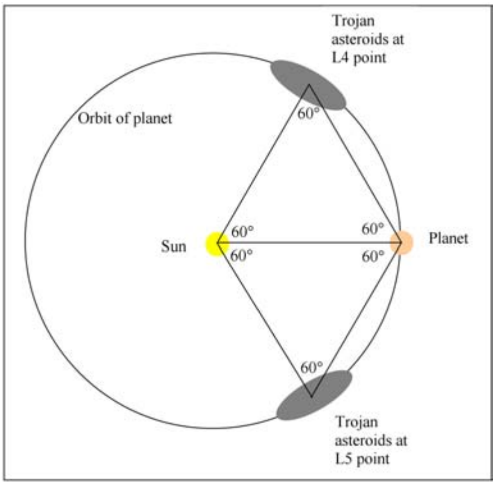
The different compositional classes of asteroids are referred to by letters and these classes vary across the Main Belt due to differing temperatures at the time of formation. For example C class, or Carbonaceous asteroids, are most common in the outer regions of the belt around 3AU from the Sun. D and P classes are found in the outer Main Belt and amongst the Trojans. Asteroid spectra do not show absorption or emission lines, as do stellar spectra, but are generally sloped and may contain a broad peak.

Many meteorites have their origins in the Main Belt – iron meteorites being over represented in collections as they are more easily spotted on the ground than stony ones. Most of the latter are chondrites which contain chondrules – small spheroidal objects a millimetre or so in diameter, some of the most primitive material in the Solar System.

As an asteroid spins its observed magnitude varies and this can be plotted as a lightcurve, typically exhibiting two maxima and minima. From such a lightcurve we can determine the object's rotational period, its shape and the orientation of its pole.

Comets are another type of small body orbiting the Sun but their composition is quite different to asteroids – described by Fred Whipple as 'dirty snowballs'. Their makeup is not the only difference – they are instantly recognisable by their curved dust and straight blue ion tails caused by volatiles subliming as they near the Sun. Jets of material are also emitted by the nucleus, as imaged by the *Giotto* spacecraft. Jan Oort hypothesised that comets had their origins in a spherical cloud extending 100,000AU from the Sun.

However asteroid–comet boundaries have become blurred with some comets acting like asteroids and vice-versa, *e.g.* some meteor showers are associated with asteroids. Comet 107P/Wilson–Harrington was discovered in 1949 but asteroid 4015, discovered in 1979, proved to be the same object. The comet is now possibly 'dead' in that it has either lost all its volatiles or a crust has formed on its surface preventing their escape. Asteroid 2001 OG_{108} (LONEOS) belongs to that class known as Damocloids and is in a highly inclined, highly elliptical orbit similar, in some respects, to that of Halley's comet. It was redesignated C/2001 OG_{108} when it developed a coma and a tail. A spectrum of this object was typical of that of a D type asteroid – 70% of Trojan asteroids have this type of spectrum. Its light curve showed the double peak typical of an asteroid but it had, for an asteroid but not for a comet, a fairly long rotational period of 57.19hrs – the jets emitted by the nucleus often acting as brakes to slow the spin. The Tagish Lake meteorite exhibited a similar spectrum and calculations of its orbit showed it to have originated in the outer Solar System where P and D type asteroids predominate.



The orbits of Trojan asteroids. *Roger Dymock.*

The locations and composition of asteroids and comets were, as one might expect, strongly influenced by the origins and evolution of the Solar System. These small bodies are the leftovers from the formation of the Sun and planets from the original solar nebula. The Nice model, developed by Gomes, Morbidelli, Levison and Tsiganis, explains how the changes in the orbits of the gas giants influenced the orbits of asteroids and comets. Originally Jupiter and Saturn were closer together and further from the Sun. They slowly migrated inwards, Uranus and Neptune switching places, and the planetesimals were scattered outwards. When Jupiter and Saturn reached a 2:1 resonance a major upheaval of the minor bodies occurred – objects originally at the L4 and L5 points escaped and new ones were captured.

An asteroid's surface properties can be determined to some extent from its phase curve – a plot of the magnitude against phase angle of the asteroid as it approaches opposition. Typically, at opposition, an asteroid may be 0.1–0.4 magnitudes brighter than expected – the Opposition Effect. This may be due to shadow hiding, the roughness of the surface reducing the amount of light reflected away from zero phase angle, or coherent backscatter, constructive interference of light reflected from the tops and bottoms of surface grains.

Trojan asteroid (624) Hector may be a binary or a rubble pile and the density of (617) Patroclus is similar to that of water, indicating that it also may be a rubble pile. The larger Trojans may be more irregular in shape and have longer rotational periods than the smaller ones but more data is need to confirm these suspicions.

Trojan asteroids are dark with albedos typically less than 0.05, which implies a broad opposition effect, but they may be icy and have a bright surface component (similar to carbonaceous chondrite meteorites) both of which imply a sharp opposition effect. For example the phase curves of (1173) Anchises and (588) Achilles show no opposition effect, which could be due to no ice or brighter materials visible, space weathering or absence of regolith.

The speaker requested the help of amateur astronomers to determine the lightcurves and phase curves of Trojan asteroids, typically of magnitude 16, explaining that unfiltered differential photometry would give satisfactory results for this purpose. In conclusion Professor French stated that there were many mysteries surrounding Trojans, including their composition, scattering properties and collision history. Many comets appear physically similar to Trojans, *e.g.* C/2001 OG_{108}, supporting the idea that they may have a common origin.

Following applause for Professor French the President invited Callum Potter to present the current Sky notes.

Sky notes for March and April

A summary of recent observations began with images of sunspots, prominences and aurora, showing that there has at last been some increase in solar activity. The south polar icecap of Mars was prominent in recent images and an orange dust storm could also be seen in that region, together with Tharsis Montes poking through white morning cloud. Of the gas giants Jupiter is not well placed for observation but images of Saturn showed an interesting spot in the South Tropical Zone. This is well worth observing over the coming months to see if it remains or fades. Transits of Saturn's moons Rhea and Tethys have been imaged and both satellite and shadow transits can be observed with medium to large telescopes depending on the moon in question.

The break-up of comet 2007 Q3 Siding Spring was first observed by Nick Howes and his discovery was reported in the *Daily Mail*. Recent supernovae discoveries took Tom Boles to a total of 129 and Ron Arbour to 23. The Deep Sky Section held their annual meeting in Northampton on 2010 March 6 – images of M3, M86 and the Virgo cluster demonstrated some of the work of the Section.

Looking ahead Mercury and Venus are well placed for observation in the evening sky, being joined by a very young crescent Moon on the evenings of April 15 and 16. The Lyrid meteor shower reaches a maximum on April 22 and a number of faint comets are visible telescopically (a list is available on the Comet section website). On the variable star scene the old 1901 nova, GK Per, has gone into outburst again, R CrB shows little sign of recovering from minimum and Epsilon Aurigae is now thought to be at minimum but observers should be alert for a mid-eclipse brightening (see the Variable Star section website for further details).

Following applause the President adjourned the meeting until 2010 May 26 at the same venue.

Roger Dymock