

## The AAE Responds to the Science and Technology Committee

In January the Commons Select Committee launched an inquiry into astronomy and particle physics in the UK, and in relation to these, invited views on the following:

- 1) the impact of reduced capital funding on UK capability;
- 2) the impact of withdrawal from international ground-based facilities (for example the Gemini Observatory and Isaac Newton Group of telescopes) on the UK's research base and international reputation;
- 3) whether the Science and Technology Facilities Council (STFC) has sufficiently engaged with its research community in these two areas on its strategic direction and impacts of budget reductions; and
- 4) opportunities for, and threats to, outreach and inspiring the next generation of astronomers and particle physicists.

The AAE Council resolved at its latest meeting to

respond to this Committee and express its concerns. The full text of our response is printed on page 2. It is not possible to add to this now as the submission had to be in by 16<sup>th</sup> February of this year.

The Select Committee has also taken evidence from prominent scientists involved in media and outreach activities, and from the presidents of the Institute of Physics and the Royal Astronomical Society. Our response can be seen together with 38 other submissions on the Select Committee's website on:

<http://www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/writev/astron/contents.htm>

One particular concern is that the Science Centre Award Scheme has been withdrawn which will seriously affect the AAE's "Resource Centres". The upper limit of the Small Awards Scheme has also been reduced to £10,000.

*(cont. on p2)*

## Last Flight of Space Shuttle Discovery

**Discovery landed at the Kennedy Space Center for the last time on March 9th 2011. Commander Steve Lindsey said "We're happy to bring discovery home". Discovery was the third orbiter built and has flown more than any other craft. It has carried more crew members into orbit, visited two space stations and launched a telescope into orbit which has seen deeper into space than ever before. Discovery has made 38 trips on which it has spent a total of 352 days in orbit, circling Earth 5628 times and travelling 143 million miles. Discovery was named after**



**two sailing ships, one sailed by Hudson in 1610-11 to search for the north-west passage and the other sailed by James Cook on the voyage in which he discovered the Hawaiian Islands. Its first mission was in 1984 when it deployed three satellites. On its second mission it was the first spacecraft to retrieve a satellite and bring it home. Discovery was grounded for two years following the Challenger disaster. Meanwhile, as we go to press, space shuttle Endeavour is standing at the launch pad at the Kennedy Space Center ready for its next launch, currently targeted at April 9th 2011. This montage released by NASA shows the Discovery with all its 39 mission patches.**

☞ (cont. from p1) **AAE's Comments for the Science and Technology Committee: Astronomy and Particle Physics.**

1. The Association for Astronomy Education has as its mission the promotion of good teaching of Astronomy at all levels in schools, and engagement of the general public. We are a national UK organisation with about 100 members (individual and corporate). The work we do heavily relies on the good will of volunteers, and at the same time a few individual members hold, or have held, awards from funding bodies, such as STFC (and formerly PPARC) and the Institute of Physics, to help fund specific astronomy related events and activities. The awards have helped to promote different aspects of space and astronomy not only to schools but also to a wider public audience. STFC has been the single most important source of funding because of the specific nature of their award schemes.

2. We note with disappointment that the Science Centre Award Scheme has been withdrawn and the upper limit of the Small Award Scheme has been reduced to £10,000. However a Schools Grant Scheme has been added for projects up to £500. This is plainly inadequate. There is very little that can be done with such a budget other than to provide a one-off activity or buy a modest piece of equipment. While the Large Award Scheme offers funding from £10,000 - £100,000, there is more emphasis on research, with strong links to the STFC scientific research community. This places non-university applicants for educational Large Awards funding in direct competition with research groups.

3. One of the AAE's prime areas of practical help has been in providing teacher training workshops. Individual members participate in many aspects of public engagement through open evenings at observatories, lectures to outside groups, and special days for astronomy such as "Your Universe" held at University College London. With funding being cut in the area of public engagement, it will become increasingly difficult to afford to provide these. The recent BBC programme (Stargazing LIVE) has brought awareness of astronomy to the public and it would be a great pity to see such activities wither for want of additional support.

4. Outreach activities bring forefront science and astronomy into the classroom, offering exciting glimpses into research into astronomy and cosmology. This can be inspirational in recruiting teenagers into science in a way that the delivery of the National Curriculum and the exam syllabuses cannot always achieve. Equally important is engaging the general public's untapped enthusiasm for science. Cuts in the funding of such outreach will have a serious impact on this, as it is not something that schools

can somehow magically replace or provide for themselves.

5. It is especially disappointing that STFC has reduced its production of posters and leaflets on various activities and research topics in both astronomy and particle physics. It is a false economy if the goal is to get schools and the public engaged with its activities. At my university observatory, we relied very much on being able to offer a wide variety of informative and well-designed posters to our school visitors and to visitors on public evenings. Instead, visitors to STFC's website are now encouraged to download a pdf file of the various leaflets. I doubt seriously if even one person in a hundred, who might eagerly take up a well-printed folded poster presented on a table, would take the time and trouble to locate, download and print out a poster offering.

**Dr Mike Dworetsky, President,  
and the AAE Council**

## The 2011 AAE Annual General Meeting

The AAE and BAP will be joining forces once again for the 2011 conference on Saturday 10<sup>th</sup> September 2011.

We are very pleased to invite all AAE members to the AGM, conference and teachers' day in Liverpool. The World Museum will be our host. An excellent venue right in the heart of the city that is right at the heart of the UK. Liverpool itself overflows with history, music and culture. There are more museums and galleries here than anywhere in the UK outside London, so the conference provides a great opportunity to take a trip to this friendly and vibrant city.

We'd like to invite all teachers, both local and far-flung to join us for a day of useful information and advice. Saturday 10<sup>th</sup> Sept will be FREE for all teachers wishing to attend. GET INSPIRED about astronomy education! The day will be filled with workshops, sessions and talks (plus chances to visit the planetarium). This day will be centred on making astronomy accessible, exciting and hands-on for your pupils.

Both AAE/BAP members attending the conference and teachers attending the open day will be required to register for the event. If you are an AAE member wishing to attend the full conference and AGM and join us for our conference dinner on Saturday night at the cathedral, the conference fees stand at £30 per head. This is a subsidised rate for a limited number so it will be important to register as soon as possible. We will notify AAE members when registration opens. Further information about the schedule and hotels etc will then be made available. In the meantime, keep an eye on [www.planetaria.org.uk](http://www.planetaria.org.uk) for the latest news.

The BAP conference will be running on Friday 9<sup>th</sup> Sept also. All members are welcome to attend both days. We very much hope to see you there.

**Shaaron Leverment  
President: British Association of Planetaria 2011**

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There will generally be a 10% discount to AAE members on all publications and advertising rates. Practising teachers may claim their subscriptions as an allowance against income tax, effectively reducing their contributions.

### All communications (except those to the Editor) should be addressed to:

Association for Astronomy Education  
The Royal Astronomical Society  
Burlington House, Piccadilly  
LONDON W1J 0BQ

[www.aae.org.uk](http://www.aae.org.uk)

For all enquiries concerning the newsletter, contact the Editor:

Anne Urquhart-Potts  
Harriets, Ruan High Lanes  
Truro, Cornwall, TR2 5LR  
✉ [anne@atdupotts.co.uk](mailto:anne@atdupotts.co.uk)  
Telephone: 01872 501110

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### Publication Dates:

These are at the equinoxes and the solstices, that is four times a year. Copy deadlines are four weeks before these dates.



## Edwin Hubble and the Expanding Universe

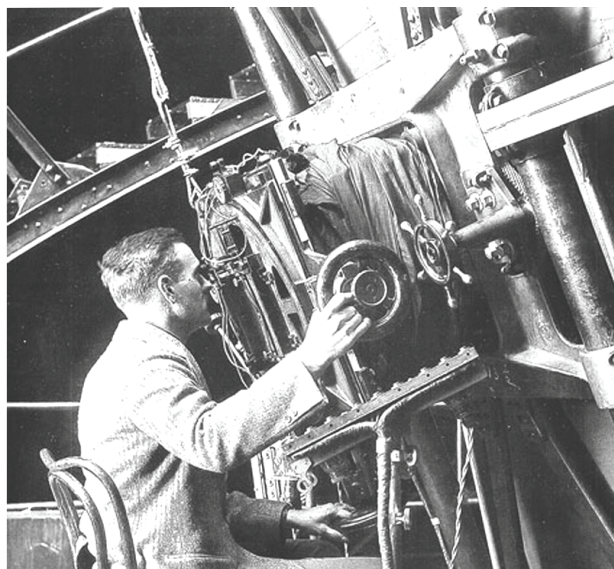
*This is the first part of the text of a lecture to be presented by Prof Ian Morison who has just finished his term as Gresham Professor of Astronomy. The second part, about Hubble's discovery of the expansion of the Universe, will appear in the June issue of Gnomon.*

Edwin Hubble, the son of Virginia and John Hubble, was born at Marshfield, Missouri, USA, on 20th November, 1889. His early interest in astronomy was indicated by the fact that, when just 12 years of age, his article about the planet Mars was published in a local paper! The family moved to Wheaton, Illinois, where his father, an insurance executive, had an office. Edwin went to Wheaton High School where, not only did he do well at his academic studies but also excelled at athletics and football. He held the Illinois High School high jump record for some time. Following his graduation from Wheaton, he was awarded a scholarship to the University of Chicago, where he studied physics, astronomy and mathematics.



Charles Tyson Yerkes, the Chicago streetcar magnate, they had built the world's largest refracting telescope with an aperture of 40 inches.

However, Hubble was using the observatory's 24 inch reflector to photograph areas of the sky to study nebulous objects. Many of these were called "White Nebulae", now known as galaxies. One object soon took his attention: he was amazed to find that one of his target objects, known as NGC 2261, was changing significantly on relatively short time scales. He described it as "the finest example of a cometary nebula in the northern skies". His maiden discovery was published in the *Astrophysical Journal* where he



Hubble arrived at the University **Edwin Hubble at his desk and at the focus of the 100 inch Hooker Telescope, Mount Wilson Observatory which he used to measure the distances to the "White Nebulae".**

with his height of 6ft 1inch and fine physique, soon became a star of the gymnasium, track and sports field. In his third year he played in 6 out the 12 games that brought Chicago the national universities title. He graduated in March 1910 having been vice president of his class.


He gained a prestigious Rhodes scholarship to study law at Queen's College, Oxford partly as a result of the letter of commendation given him by Physics Nobel laureate-to-be Robert Millikan who recommended him as "a man of magnificent physique, admirable scholarship, and worthy and lovable character." Surprisingly, he chose to study Law and Spanish - it seems at his father's insistence - but he would often visit the university observatory and learnt about the new field of celestial photography from its director, Herbert Hall Turner.

During his time at Oxford, it seems that Edwin picked up some affectations and, on his return, surprised his sisters with his attire. Their athletic brother was "dressed in a cape, knickers, and sported a walking stick. A signet ring graced his little finger, and he was wearing a wristwatch he had won for high jumping". (I should point out that in America "knickers" are full breeches gathered and banded just below the knee!)

Back in America, he first taught physics and mathematics at the New Albany High School in Indiana and then, having passed the bar examination in 1913, became an attorney at Louisville, Kentucky. It is not at all obvious that Hubble actually practised to any great extent (if at all) and, by 1914, had tired of the Law. In August of that year he decided to return to the University of Chicago to take a PhD in Astronomy. Chicago was no place for an observatory, so the university had built its observatory on the north shore of Wisconsin's Lake Geneva, seventy-five miles to the north-west of Chicago. Here with money pledged by

cautiously stated "No attempt is here made to explain the phenomenon of illumination, the nebula must be very near." (This is now known as Hubble's Variable Nebula which changes its appearance noticeably in just a few weeks. It is a reflection nebula made of gas and fine dust fanning out from the star R Monocerotis). About one light-year across, it lies about 2500 light-years away in the constellation Monoceros. It is thought that dense knots of opaque dust pass close to R Mon and cast moving shadows onto the reflecting dust forming the nebula.

By the time his thesis was completed, some 17,000 nebulae had been catalogued by other astronomers. In his thesis he wrote "Extremely little is known of the nature of the nebulae and no significant classification [system] has yet been suggested; not even a precise definition has been formulated. At least some of the great diffuse nebulosities, associated as they are with stars visible to the naked eye, seemed to lie within the stellar system (our Milky Way Galaxy). So, too, do the planetaries, massive gaseous clouds at even greater distances from the Sun. Yet others, most particularly the giant spirals which display no visible motion, apparently lie outside our system." Though his thesis was somewhat shaky on technical grounds and rather confused in its theoretical interpretations, it laid the basis of the great discoveries that he was to make in the next ten years.

While finishing work for his doctorate early in 1917, Hubble was invited by George Ellery Hale to join the staff of the Mount Wilson Observatory, in Pasadena, California. However, after sitting up all night to finish his PhD thesis and taking the oral examination the next morning, Hubble enlisted in the infantry and telegraphed Hale, "Regret cannot accept your invitation. Am off to the war." Hubble was commissioned a captain, later  (cont. on p7) **3**

# Letter from ɹǝpɹɔ ɹɹɔɹ

Many of you may be aware of the Faulkes Telescope Project, a pair of 2 metre telescopes located in Hawaii and in Australia. The construction of these telescopes was paid for by UK mathematician turned software entrepreneur Martin “Dill” Faulkes a decade or so ago, specifically for astronomy education and outreach by UK school students. The telescopes were fabricated by Telescope Technologies Ltd in Liverpool, and installed at the summit of Haleakala volcano on Maui in Hawaii, and at Siding Spring Observatory in Australia adjacent to the UK Schmidt Telescope. After overcoming a number of technical hurdles (the concrete underneath the steel track on



**“FTN.JPG”:** Benefactor Martin “Dill” Faulkes standing underneath one of the 2m telescopes that he donated for use in astronomy education (Image credit: Edward Gomez, LCOGTN)

which the Faulkes Telescope South rotates had to be completely replaced) both telescopes are now operating robotically, equipped with imaging CCD cameras and (eventually) spectrographs. The telescopes are housed inside large clamshell-like enclosures which can be opened fully to provide rapid access anywhere in the sky to transient sources like Gamma Ray Bursts, or partially closed to serve as a windbreak. Both Faulkes Telescopes have now been incorporated into the Las Cumbres Observatory Global Telescope Network (LCOGTN), established by former Google executive Wayne Rosing. They are the largest in what will ultimately be a worldwide network of more than 30 telescopes between 0.4m and 2m in size, offering access to the universe free-of-charge to school students in the UK, USA, and Australia.

In the UK, access to the Faulkes Telescopes is coordinated by the Faulkes Telescope Project:

☞ <http://www.faulkes-telescope.com/>.

However, here in Australia, a program called “Space to Grow”(S2G) is working to maximize the scientific and educational returns from this opportunity. You can find

it at:

☞ <http://www.physics.mq.edu.au/astronomy/space2grow/>

Launched in 2009 and funded by a 3 year, \$2.3 million Australian Research Council Linkage grant, S2G brings together astronomers from Macquarie University in Sydney with educational researchers from Macquarie and Charles Sturt University in Bathurst to develop an innovative teaching and learning program. It builds on the success and lessons learned from a 2 year pilot project “Bringing Deep Space into the Classroom”, an Australian School Innovation in Science, Technology and Mathematics program. It targets 5000 students in Years 10–12 (the final 3 years of high school) and some 200 science teachers from 40 schools in both city and rural areas.

Before commencing any of the project modules, all students and their teachers are required to complete “Pre Survey” questionnaires, as well as an Astronomy Diagnostic Test (ADT). After completing the S2G project, they repeat the ADT as well as a “Post Survey” questionnaire. These surveys and tests form a major component of the Research Methodology aspect of S2G, which enables the project team to uncover how students and their teachers view science, and how much they actually learn from the experience. As an added incentive, all students who complete the surveys (regardless of whether they go on to complete a S2G project) go into a draw to win music download vouchers.

Space to Grow provides a number of interactive resources and utilities, starting with an Introduction to the Faulkes Telescopes, through to how to go about making a colour image from a set of multi-filter images, as well as photometry of individual stars in a cluster. Each module includes special interactive versions for teachers plus some video tutorials, an FAQ, astronomy glossary, and links to free software needed to carry out these exercises are also provided. Professional Development workshops as well as personalized training of teachers are being conducted. A special forum and social networking site is also provided to allow participants to chat and share their experiences.

Once the classes have completed the basic modules, they are then invited to think about what object(s) they would like to observe with the Faulkes Telescopes (either North or South), the scientific justification for this, when the target(s) will be accessible, and the required exposure times. Ideas for possible telescope projects and associated flowcharts are provided, but participants are also encouraged to come up with their own. Just like real astronomers the students then complete an application for observing time and submit it. When the data has been obtained the class is given instructions on how to download it, and assistance provided with processing and analyzing the data.

Space to Grow has already produced its first published scientific paper in the professional refereed journal *Publications of the Astronomical Society of Australia*. S2G team member Dr David Frew had long been intrigued by a faint smudge visible on the original Palomar Observatory Sky Survey photographic plates catalogued as “K 1-6” which appeared to him like an old planetary nebula (the puffed-off outer layers of a star like our Sun near the end of its life) but without an obvious central star. Along with 10 students from Sydney Girls High School and their teacher Jeff Stanger the team acquired narrow-band images with the Faulkes Telescope North of K 1-6 in the emission lines of H-alpha and [O III], and found the nebula to be brighter at the edges and more extended in H-alpha, as expected for a planetary nebula. However it also has a “bow shock”, suggestive of an interaction with the dense interstellar medium. They found a solar-like giant variable star near ☞ (cont. on p5)



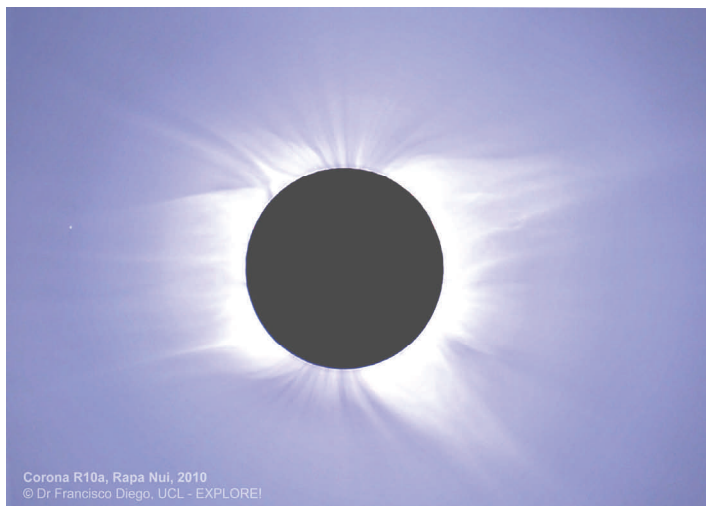
☞ (cont. from p4) the centre, but nothing hot enough to ionize the entire nebula. They then searched the archives of the GALEX ultraviolet satellite and noticed a hot white dwarf-like star at the same position. They theorise that the giant and white dwarf form a binary system (or possibly even a triple system). They conclude that K 1-6 is indeed an old, but bona fide planetary nebula some 3000 light years away. They emphasise that the students were embedded in every stage of the scientific process from instigation through planning and processing, to discussing the findings and drawing conclusions. Although the full impact of "Space to Grow" on the process of learning and engagement of students has yet to be measured, the Faulkes Telescopes are now beginning to fulfill their promise.

Stuart Ryder

 sdr<at>aao.gov.au

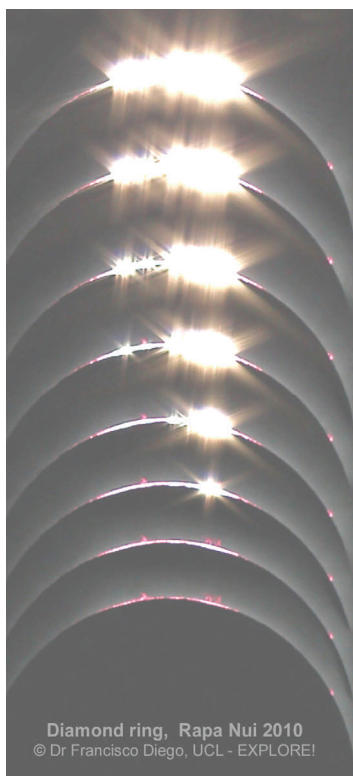
## Eclipse safari

Francisco Diego sends us more fabulous eclipse photos from his travels abroad.



Corona R10a, Rapa Nui, 2010  
© Dr Francisco Diego, UCL - EXPLORE!

**This shows the Sun's corona during the July 11th eclipse in 2010. This photo was taken on Easter Island and is a composite of more than 10 images.**



**This composed image shows a series of single frames extracted from an HD video of the diamond ring. The total time in this sequence is about 5 seconds. The star effect was achieved by placing a triangular aperture at the entrance of the telescope.**

Diamond ring, Rapa Nui 2010  
© Dr Francisco Diego, UCL - EXPLORE!

Francisco Diego

## International Astronomy Youth Camp

My name is Gemma Roberts and I am writing to you on behalf of the leader team of the International Astronomical Youth Camp (IAYC). This is a three-week long summer camp for 16 to 24 year olds aiming to promote the knowledge of astronomy and related sciences in a unique international atmosphere. The astronomy camp is always held in a beautiful remote European location with good dark skies for observing. This year IAYC will take place in the Czech Republic from July 17<sup>th</sup> to August 6<sup>th</sup>. As we believe that some AAE members could be interested in joining us in this adventure, we would like to ask you to circulate this call for applications. Also there is the possibility of joining the IAYC. I have personally enjoyed six summers at IAYC, first as a participant then as a leader, and have always found it a wonderful way to meet people from all over the world with a common interest in astronomy.



We hope that, thanks to you, more young people will discover the magic of the IAYC this summer! It's a great time at the moment following the BBC Stargazing LIVE programmes and we'd really appreciate it if you could help us spread the word.



More information from the IAYC website:

 <http://www.iayc.org>


Gemma Roberts

on behalf of the IAYC leader team

## esa Educational Materials for the Classroom

ESA's Education Office aims to support European teachers across all the member states and has developed a very wide range of resource materials both on-line and in print, covering a variety of topics. These include subjects such as "Ariane5 for Kids" for Primary, some Astronomy exercises for upper secondary level and "Explore Saturn and Titan at School" for all ages.

To order and/or download these materials, visit:

 [www.esa.int/educationmaterials](http://www.esa.int/educationmaterials)

For young space enthusiasts, ESA Kids is the place to visit. With information on everything from rockets to planets, the site offers regular news plus puzzles and other fun activities:

 [www.scienceinschool.org](http://www.scienceinschool.org)

## Queryline

Dear Queryline,

I have struggled for some time now to use my telescope. I have many problems with it such as entering my location into its handset. The other night I entered it and asked it to find the Moon which was right in front of me-it told me it was too below the horizon to view!

However, that is a problem that I can overcome by turning the thing off. My main problem is this: I can see objects perfectly during the day, but at night anything I view is obscured by a massive spider. I have a Skyhawk-1145P SynScan AZ GOTO Telescope and I am attempting a second OU course in astronomy.

Forgive me for contacting you about this, but I have tried the internet, with no positive results. I hope you are able to help me,

Wendy

Dear Wendy,

Many thanks for your question. The best thing is to contact a local astronomical society as their members

are usually very friendly and know all about modern telescopes. To find your nearest society, look on the Federation of Astronomical Society's website:

<http://www.fedastro.org.uk/fas/>

Also, it would be good if you could attend Astrofest early in February where you will find plenty of people to give you advice on setting up telescopes, see:

<http://www.astronomynow.com/astrofest/venue.html>

Good luck and please contact us again if necessary.

Francisco Diego

**NB** This is good advice for anyone purchasing a telescope for the first time and learning to use it. The Society for Popular Astronomy also sell a DVD called "How to Use a Telescope" presented by Prof Ian Morison which is an excellent practical guide to setting up mounts and using GOTO devices. Available from the SPA for £9.99.

[www.popastro.com](http://www.popastro.com)

Ed

## Curriculum Corner

### How High is the Sun

**Required:** solar noon shadow, protractor, string, tape measure.

Have a volunteer stand in the sun at or near solar noon looking at their shadow. Run a string from the top of their head to the top of the shadow of their head. Use a protractor to measure the angle where the string meets the ground. Record the angle, date and the time.

- Is there any difference between the angles measured for the shortest and tallest people in the group?
- Does the angle change if the activity is done at other times between 9 a.m. and 3 p.m.?

NB The angle for each student should be the same which will be a surprise, because what is actually being measured is the height of the sun. This activity is usually done at school over a period of weeks to observe the changing height of the sun as the seasons change.

This is an interesting activity because there is a relationship between the length of their shadow and their height, and the length of the shadows cast by other objects and their height. Can they work out the height of some of those objects such as a flag pole or tree.

Would the students expect there to be any difference in the height of the sun at other seasons? If so, what would they be?

- The sun gets higher in the sky as the summer solstice approaches (June 21<sup>st</sup>) and lower towards the winter solstice (December 21<sup>st</sup>).
- As the solar noon angle of the sun gets lower in the sky the length of daylight get less.
- As the solar noon angle of the sun gets higher in the sky the length of daylight increases.

**Vocabulary:** angle, measurement, arc, protractor, increasing, decreasing

## The Patrick Moore Medal

Do you know, or are you, a teacher with a passion for teaching astronomy and / or geophysics?

The Royal Astronomical Society has introduced a new Medal intended to reward excellence in astronomy and geophysics teaching. Named for astronomer Sir Patrick Moore, the new Medal will be awarded annually, beginning at the National Astronomy Meeting in Manchester in March 2012.

The medal will be awarded for a particularly noteworthy contribution to astronomy or geophysics teaching by secondary school level teachers e.g. by significantly improving examination results, running an active outreach programme or engaging students in extra-curricular projects.

Any secondary level teacher is eligible for nomination – and self-nomination is encouraged. The nomination form can be downloaded from the RAS website:

[www.ras.org.uk/patrickmooremedal](http://www.ras.org.uk/patrickmooremedal)

and should be sent to Lara Maisey, the RAS Events and Awards Officer at:

[ikm@ras.org.uk](mailto:ikm@ras.org.uk) (by 31st July 2011).

### Free for teachers to attend: ESERO-UK Space Day

As part of the inaugural UK Space Conference on 5th July 2011 at the University of Warwick, ESERO-UK is staging a dedicated space education day. Specifically designed for primary and secondary teachers, the day will include a plethora of exciting space-related workshops, including a plenary lecture from the acclaimed Dr. Lucie Green, a solar researcher based at the Mullard Space Science Laboratory. You will also engage with inspirational speakers, discuss the role of space in education and take away important contacts of space education providers in your region. It is **free** for teachers to attend and you can book your place on the UK space education day by returning the online booking form (available at the address below: click 'ok' or 'open' when prompted to do so) to ESERO-UK:

[enquiries@nationalstemcentre.org.uk](mailto:enquiries@nationalstemcentre.org.uk).

## For your Library

*The Cambridge Atlas of Herschel Objects* by James Mullaney and Wil Tirion. ISBN 978052113817-8, £27.99 (US\$35.00) Cambridge University Press. Spiral Bound pp183.

The Herschels (William, Caroline and John) were all assiduous observers. They listed and described over five thousand deep-sky objects in both the northern and southern hemispheres of the night sky. I well remember how useful were the informative designations they allotted to many of these when I used the 1950s Norton's Star Atlas I bought when I began telescopic observing as a teenager: for example, a class I object was likely to be a relatively bright galaxy, while a class VI would be a compressed star cluster. Later editions replaced them by NGC numbers, removing the useful references.

Now, this new Cambridge Atlas has revived the Herschel designations, with 32 detailed charts (of the whole sky, north and south) and an extensive list of targets, arranged in order of Right Ascension. The charts are attractive and uncluttered, although thousands of objects are shown; and the data lists are highly detailed and thorough, giving positions, magnitudes, dimensions of galaxies and clusters, and commonly used names (e.g. 'Christmas Tree Cluster, 'Sombrero Galaxy'). Alternative Messier and NGC designations are given in the listings for the purposes of cross-referencing, but most NGC numbers do not appear on the charts, which is probably a good thing, as it avoids clutter. Only a modest telescope is needed for most of the objects listed, and many will be accessible even to the urban observer with binoculars.

Unlike some recent editions of other popular star atlases, the book is easy to open out flat for use while observing, being spiral bound. Also, (and a nice touch) the maps are printed in 'red-light friendly' colours. The volume is completed by historical information about the Herschels and their telescopes, observing and telescope tips, advice on record keeping and a very useful separate list of 215 'showpiece' objects, many of which are not well known but look quite tempting! The Herschels' own notes on these objects are included in condensed form.

Looking through the maps and lists for some of my favourite Herschel objects, I noted only one omission, one of my favourite observing targets for winter star parties: this is one of Sir John Herschel's double stars, observed and recorded by him while in South Africa, a relatively bright star pair with probably the most admirable colour contrast of any in the winter sky. This is the "Winter Albireo", h3945 (or 145 Canis Majoris), just east of Omicron2 Canis Majoris and north of Tau. This is a true celestial gem, orange and blue; perhaps it has been omitted because it is in fact an optical double, only a line-of-sight effect.

In all, *The Cambridge Atlas of Herschel Objects* is a good-looking volume, and a fitting celebration of the enormous contribution the Herschel family made to our knowledge and enjoyment of the night sky: a very desirable addition for both bookshelf and observatory.

**Bob Mizon**

Mizar Travelling Planetarium  
BAA Campaign for Dark Skies

*The Cambridge Star Atlas* by Wil Tirion, Fourth Edition. ISBN 9780521173636, £23.99 (US\$32.99). Cambridge University Press. Spiral Bound pp90.

It is now twenty years since the first edition of Wil Tirion's "Cambridge Star Atlas". This and subsequent editions have been by the side of observers worldwide as they provide detailed star charts of the whole sky down to magnitude 6.5.

Wil Tirion is famous for his cartography in many publications and this new edition does not disappoint. The main part of the book comprises twenty charts with a generous overlap so that most of the constellations are shown complete on at least one of the pages. The charts are plotted in Right Ascension and Declination. There are good explanations of all the nomenclature. The epoch is 2000.0. The colours used are chosen to show up clearly when using a red torch to preserve dark adaptation. Each chart has an accompanying list of variable stars, double stars, open clusters, globular clusters, nebulae and galaxies. All these are colour coded on the maps.

In addition there are two maps of the Moon, with 250 numbered and listed craters. One map is the mirror image of the other which is really useful if you are observing with a star diagonal. South is at the top (for telescopic observations) but if you are using binoculars you can just rotate the map 180°.

Also new in this edition is a list of the Messier Objects which will be very popular with amateur astronomers who try to observe the entire list of 110. These are also shown on eight sky charts and should help when planning your own "Messier Marathon" (observing them all in one night!). This I have never managed but I did find the list helpful as a quick way to look up the right chart and find a particular object. One small gripe I have is with the page numbering, which is absent from all the pages with charts on—in other words from a large part of the book. This does make the looking up of a particular page a little trying. However the charts themselves are numbered on a different system and these numbers are very clear indeed.

Together with the basic information on Moon phases, seasons, variable stars and Greek nomenclature, this atlas is an essential tool for amateur observers of all abilities. Its spiral binding allows it to lie flat (and to be pegged down in a breeze!). It will be outside in the garden with me whenever I have my telescope out.

**Anne Urquhart-Potts**

☞ (cont. from p3) rising to the rank of major, and was sent to France where he served as a field and line officer. He returned to the United States in the summer of 1919, and went immediately to join Hale at the Mount Wilson Observatory where the 100" Hooker telescope had been completed some two years earlier. He remained on the staff of the observatory throughout his life apart from a further spell in the US Army during the Second World War when he was chief of ballistics and director of the Supersonic Wind Tunnels at the Aberdeen Proving Ground in Maryland. For his work there he received the Legion of Merit award.

In the second half of this article (in the June issue) we discuss what was, perhaps, the greatest discovery of the last century made by Hubble during his work at Mount Wilson during 1924-29 which led to the relationship between distance and redshift of galaxies and which is now known as "Hubble's Law".

Ian Morison 7



## The RAS National Astronomy Meeting

This will take place at the Venue Cymru, Llandudno, North Wales from 17<sup>th</sup> to 21<sup>st</sup> April 2011. The session of interest to educators will be the Outreach sessions which cover all aspects of working with wider audiences—schools, the general public, the media, policy makers etc. There are two distinct sessions. The first is an opportunity to talk to some science journalists about all aspects of interaction with the media. The second session will be where submitted presentations are heard and will be a chance to share some news and find out about the best in astronomy engagement. Abstracts in any area of outreach and education are welcomed, including from those outside the research establishment. More info from the RAS NAM website:

<http://www.ras.org.uk/nam-2011>

## Sky Diary Summer 2011

Welcome to this quarter's notes. Starting with April, let me take you on a tour of what is happening in the sky at night.

We can start with the Moon, the perfect starting object for any budding astronomer. It is a great object to utilise when discussing orbits. As the planets go around the Sun and moons around the planets, the shape of these orbits are elliptical. On the 2<sup>nd</sup> of April our Moon is at the furthest it will get from the Earth during 2011. This maximum apogee is an almighty 406,655km. Now compare this to March's closest lunar approach at 356,577km. That 14% difference shows how eccentric the Moon's orbit really is.

Mercury heads down towards the western horizon for its inferior conjunction on April 10<sup>th</sup>. If you managed to see the fantastic evening showing of Mercury during March then well done. You have to be a bit lucky with the weather and have a good horizon to catch this one. During May you would expect to see Mercury as on the 7<sup>th</sup> it is at western elongation. Unfortunately it is almost aligned horizontally

Moon phases for the second quarter of 2011				
	New Moon	First Quarter	Full Moon	Last Quarter
April	3	11	18	25
May	3	10	17	24
June	1	9	15	23

with the Sun so is washed out and impossible to see. It is not until late June and early July that you have some kind of a chance to view Mercury again. I say "some kind of a chance" as it never gets higher than 2° above the south western horizon at the time of civil twilight.

If you want to get a good look at Mercury you really need to wait until September. There will be more details in future issues of Gnomon's Sky Notes.

Venus lives in the glare of our Sun for a good while now. Don't bet on seeing this for the next few months. The same goes for Mars too. I would say that in May there is a chance for the avid observer to give it a go, but it is tiny at only 4 arcseconds in diameter and so faint against the sky. Heading into June it is a bit of the same, a difficult object to spot. Right near the end of the month on the 28<sup>th</sup> is your best chance, around 03:30. Look for the Moon low down in the northeast. To the left and up a little will be the Pleiades star cluster. Below and left of the Moon will be Mars. Don't get it mixed up with the brighter star Aldebaran very low on the horizon below that. Fingers crossed for some clear

8 skies on that night.

Jupiter during April is in conjunction with the Sun and does not recover from this until later on in June. In fact if you are looking for Mars on the 28<sup>th</sup> June, why not look to the right of the Moon and Mars and you will see Jupiter as a bright -2 magnitude object. Two days before that

Rising and setting times (BST): lat.52°N; long.3°W						
	April 15		May 15		June 15	
	Rise	Set	Rise	Set	Rise	Set
Sun	06:08	20:01	05:11	20:51	04:44	21:26
Mercury	05:44	19:01	04:36	18:11	04:45	21:44
Venus	05:20	16:49	04:27	118:17	03:50	19:49
Mars	05:46	18:28	04:27	18:41	03:14	18:50
Jupiter	06:02	19:14	04:17	17:56	02:27	16:30
Saturn	18:27	06:12	16:18	04:11	14:13	02:07
Uranus	05:31	17:40	03:36	15:49	01:36	13:54
Neptune	04:35	14:41	02:38	12:44	00:36	10:45
Moon	16:49	04:27	18:41	03:34	21:15	04:04

Data for other venues and dates can be estimated from this (and the Moon phase) table.

on the 26<sup>th</sup> the crescent Moon will pass just to the north of Jupiter giving a great photo opportunity.

Saturn is the perfect object to observe as it is easily found directly south during April around midnight (and earlier on in the night towards the southeast). Its steadily opening rings and dancing moons are a wonderful sight through binoculars or a telescope. On the 17<sup>th</sup> of April Saturn and the Moon are only 8° apart. As we move into May, Saturn is still the planet to watch although it will be getting gradually lower in the sky. By June it will still easily be seen but the best viewing opportunities need a good southern horizon.

Uranus is definitely not something to try to look for during the quarter. Neptune however is possible in June. You will need a telescope to see anything whatsoever and that must be computer guided or you will have to boot up some software to locate it. Also you will have to be up at 02:30 and have a very low southeast view. A good free planetarium and sky simulator is stellarium:

<http://www.stellarium.org/>

June gives us a couple of astronomical extras. Firstly the summer solstice occurs on the 21<sup>st</sup>. At around 17:00 we begin summer in the northern hemisphere. As quick as the long sunny days come they then start to disappear. Secondly on the 15<sup>th</sup> (my birthday) there is a total eclipse of the Moon. "Whoo!", I hear you cry. Well don't get as excited as I did initially, as totality ends about half an hour after the Moon rises just after 21:30. The benefit is that you can get yourself to a nice location with a good horizon and take a photo with some nice foreground. If you do take a nice photo the why not send it in to us and we can use it in a future issue of Gnomon. Send any images to:

[anne@dupotts.co.uk](mailto:anne@dupotts.co.uk)

And finally we have a meteor shower. There are a few through this quarter, but the only one that has a favourable peak and more than a rate of 5 per hour is the Aquarids. These peak on the 5<sup>th</sup> of May. The material burning up in our atmosphere to make this shower has an association with comet Halley, and a rate of around 35 meteors per hour. Happy stargazing!

James O'Neill