GNOMON

Newsletter of the Association for Astronomy Education

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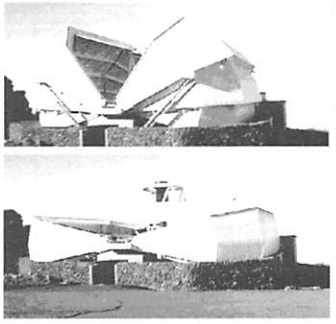
New light on schools' on-line telescopes

First light on the Faulkes Telescope North, now nearing completion on the mountain of Haleakala in Hawaii, took place on the 7th August and the first science camera images were expected later the same month.

FT North will be used with initial schools later this year and more generally from January 2004. Schools registrations will be opened this autumn. The second, identical telescope (FT South) in now being packed at Birkenhead, where it was manufactured, and will be shipped to its Australian site in September. It will be operational later in 2004. Images of the North telescope and its enclosure can be seen on the project web site, including a web cam image updated every minute.



The enclosure of the Faulkes Telescope North, caught (in low resolution) on the webcam opening in Hawaii at dawn in August, showing that the telescope really is working!

.www.faulkes-telescope.com.

The National Schools Observatory and the Faulkes Telescope Project have agreed with Liverpool John Moores University that the UK Schools use of the Faulkes Telescopes and the Liverpool Telescope will be coordinated via the portal

www.schoolsobservatory.org.uk.

This is intended to make it easier for schools to access all three telescopes.

UK Government Deptartment for Education and Skills is providing funds the Faulkes Telescope Project following meetings between the project members and senior staff at the DfES. The Minister, then Margaret Hodge, was clearly impressed with the project, and the DfES will be assisting with the first three years of operations.

The DfES was particularly keen that the project should develop proper Continuing Professional Development and educational programmes to support teachers in their use of the telescopes. Richard Beare (Warwick University) and David Bowdley (Abraham Darby School, Telford) will now be working on this aspect of the project over the next three years.

The near earth object follow-up education/research project has made excellent progress and all the major elements are in place to start when the first telescope is available in the autumn of 2003. Teacher training programmes are well advanced in their development stage and the first schools will be approached about joining this project as development partners in the new academic year.

Agreement has been reached with the Minor Planet Center (MPC) in the USA that results from schools using the telescopes will be accepted by them as genuine scientific data. The software to be used is Astrometrica and a license agreement has been reached to allow access to this free of charge.

Schools will be able to image asteroids that pose a possible collision threat with the Earth and other interesting near-Earth objects.

After performing their analysis, schools can report their data to the MPC for refining the orbital data for the asteroid.

The MPC may also request that a school make an urgently needed observation of an object that has a particularly worrying preliminary orbit that could bring it close to the Earth. Schools sending observations to the MPC will have their names published in the MPC electronic circulars that are published daily. This work has a special significance: the schools will ☞

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

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Publication Dates:

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

☞.be using two of the largest telescope anywhere in the World that are doing near-Earth object work on a regular basis. It is possible that in the process of making their observations schools could also discover new asteroids. In this case, sometime in the future, they would get the right to name their discovery!

Work has progressed on several other projects for schools. These include imaging and measuring galaxies; finding the ages of star clusters by plotting colour-magnitude diagrams; studying variable stars, imaging interacting galaxies, and planetary nebulae. These "education/research" projects involve students investigations which produce new scientific data as well as being educational.

At any level, students can do some "real science", in the sense that they are not just repeating set procedures with known answers as with many traditional school experiments. The use of the telescopes will encourage students to think for themselves and to identify with the projects that they undertake. In most cases the observations and measurements will be new, so that students will be able to talk about "my galaxy or asteroid". To encapsulate this idea, the motto "Real time, real science, real scientists" has been coined. Helping this will be the involvement of professional astronomers, from whom the original ideas for useful investigations in all projects have come as well as ongoing involvement as needed.

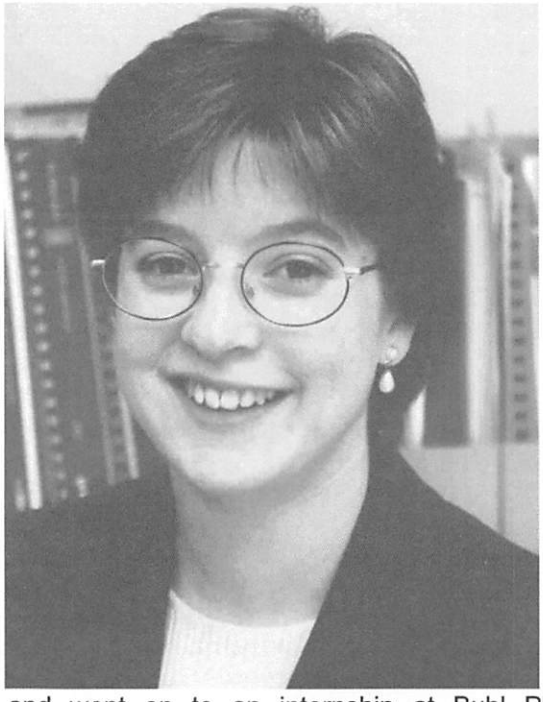
A small number of schools will be acting as Development Partners with the Faulkes Telescope Project from this autumn, trying out the educational projects and providing feedback once the Hawaiian telescope is in its initial phase of operation. After Christmas it is hoped that a much larger number of schools will choose to become involved in the initial pilot phase, which we envisage lasting for a year or more. If you are interested in being involved as a Development Partner, please email **paul.roche@faulkes-telescope.com**.

The PPARC National Award programme, "Telescopes in Education", has been extended to run until spring 2004. Recently Paul Roche has visited Durham, Glasgow, Edinburgh, and Hampshire. He has talked to about 80 primary school teachers and PGCE students at the University of Kingston, 30 secondary science teachers in Cambridge, and an entire primary school in Cardiff. He has recently developed a "whole school" project for primary schools involving the Sun, as an introduction to the more advanced projects envisaged by the National Schools Observatory and the FT project. This was successfully piloted (despite typically cloudy Welsh July weather) at Birchgrove Primary School in Cardiff, with children from ages 5 to 11 taking part in a range of activities covering day/night, seasons, scale and size of the Solar system, the Sun as a star, light, shadows, time, religion and observing sunspots! For further information contact Paul.Roche at the address above.

The project Web site is **www.faulkes-telescope.com** and a pdf version of the latest newsletter, with images, is available by adding **/newsletter4.htm.**

Well done Alex!

Congratulations to Alex Barnett (the previous Editor of *Gnomon*) on her appointment as Chief Executive Officer of the Chabot Space & Science Center in Oakland, California



She secured the post from a field of 162 applicants and is only the second woman to hold such a post in the United States. Alex has been an active observer since her junior school days. She graduated in Astrophysics from Leicester University and went on to an internship at Buhl Planetarium in Pittsburgh, Pennsylvania.

On her return to the UK she became a founder member of the team that created the National Space Centre in Leicester, holding the post of Creative Director and being instrumental in fund-raising. She last served there.as Business Development Director. **www.chabotspace.org**

Alan Pickwick

Letter to the Editor

A Latin-American Astronomy Education Journal

We are pleased to inform you all, particularly those interested in the teaching, history and popularisation of the astronomy, that the Latin-American Journal of Astronomy Education (RELEA) is about to be launched.

It will an indexed on-line journal. Articles will be refereed following the procedure known as "double-blind peer review". The first edition will be released towards the end of this year.

The main objectives of the RELEA are to made good the absence of a specific publication of Astronomy Education in Latin-America. It will demonstrate Latin-American activity in this area, for educators, researchers and astronomy students at all levels of education, providing them with the methodological and content tools. It will also try to promote the development of research in astronomy education in the Latin-American countries. It will include the following sections: culture, history and society; teacher formation; teaching and learning; didactic resources; educational policy; news; reviews; and events.

We are making the first call for papers, which can be written in Portuguese, Spanish or English.

Those interested in submitting a work will find more information about the RELEA and instructions to the authors at **www.iscafaculdades.com.br/relea**

We would appreciate your help in spreading the news about the launch of this journal to anyone it may interest and we invite you all to send us appropriate papers.

Thank you for your attention.

Yours sincerely,

Paulo Sérgio Bretones,
Luiz Carlos Jafelice
Jorge Horvath

● South Tyneside College Planetarium has a member of staff who gets no wages, nor time off and not even food. (No it's not the our new lecturing staffcontract conditions!) He is a soft toy, a black and white kitten who is always on duty to comfort any small visitor who is afraid of the dark. Our children's competition last term was to find the three "cat" constellations in the sky (surprisingly, all close together in the spring sky) and to find a name for our space cat. Winning suggestions were: Fuzz Aldrin; Hubble; Kittenaut: Quasar; Moonshadow: Sputnik and Jep-Nu-Ess. **Eva Hans**

● We are told that in the latest book, Harry Potter talks of seeing Orion in June! Is there no limit to his powers?

● The CONCAM (continuous cameras) web site that offers live fisheye lens images of the sky above some of the world's premier observatories. It is easy to pick out the brightest constellations, and the Milky Way is very impressive. It allows real time proof that the sky is different from widely separated locations on the Earth (can you find the Moon?). It could give you a taste for the on-line telescope projects! **http://concam.net**

FOR YOUR LIBRARY

The Cambridge Encyclopedia of Amateur Astronomy. Michael E. Bakich Cambridge University Press. 342pp. Illustrations (4 col.). ISBN 0 - 521 81298-4 (hardback). £35.00.

The spelling in the title of this book immediately sets the scene: it originates in the United States! In the past, there was a world of difference between the "amateur" astronomer in the USA and anywhere else. Advanced telescopes and instruments mostly came from the USA, and, perhaps more important, the dedicated "hobbyist" approach to this activity, as in many others, was (and to a great extent, still is) essentially American. One had to read only the "Amateur scientist" pages of *Scientific American* of, say, 40 years ago to read of incredible feats of scientific endeavour which were being undertaken.

While any European enthusiast might be building a 150mm Newtonian reflecting telescope, for example, and feeling pretty pleased if it included an equatorial drive with manual correcting facility. In the USA meanwhile, amateurs

Gil Machin, of Kansas City Missouri, with his homemade 400mm Newtonian telescope, for which he made his own mirror, clearly showing the equatorial drive and the facility for moving and levelling the instrument Photo by Michael Bakich, the author of this new book.

were making their own catadioptric instruments with incredible (by the standards then) photographic capability. But the evolution of the home computer, the competition from Japan and other Far Eastern countries, and the growth of the internet culture has ensured that the hobbyist in any part of the World can become just as dedicated as their US counterpart.

It is therefore not surprising that the most suitable author for this impressive book is from the USA, and the book reflects that in many ways. But it demonstrates well the progress in amateur astrononmy that has been achieved and shows what can be done these days.

The author is obviously a keen photographer. This is clear by the relatively few diagrams he uses compared with the enormous number of photographs (every single one being acknowledged) even a featureless grey rectangle which is described as a piece of welder's glass, suitable for safe viewing of the Sun (without a telescope)! The book covers all levels of amateur astronomy, from simple unaided star gazing, to computer controlled monsters that many professional observatories might wish to own. Sometimes the photographs reflect the range of abilities and different levels of capability, showing the Moon, for example, as could easily be taken with a simple camera hand-held at the eyepiece of a small telescope. On the other hand, some of the illustrations with the latest CCD equipment are just streets ahead of professional work of only a few years ago.

The blurb on the back cover starts "Being an amateur astronomer is great fun, with many different areas to get involved in…..". The author, to his credit, might have used that sentence as his mantra. "Fun" is something too often forgotten in trying to entertain people, and to catch their interest. The writing style is laid-back and entertaining, and the amateur's enthusiasm is plain to see. The "many different areas" are well covered, with the exception of amateur radio astronomy, which can perhaps today be compared to amateur optical astronomy of 40 years ago. For the armchair astronomer, there is much to learn, and who-knows maybe some inspiration become more practical in the process.

Although there is not enough room even in a large book such as this (the pages are 213 by 276mm) to cover each topic in depth, there is certainly plenty of practical description, advice and hints across a wide breadth. Anyone using this book to decide how to get into practical astronomy would be well served by reading this. Key chapters cover basic positional astronomy, time and essential explanations of astronomical concepts; equipment, described in somewhat reverse order from telescopes and their accessories to binoculars; photography with cameras alone, both stationary and mounted on drives (including piggyback on telescopes), long focus photography, digital and video, spectroscopy and photometry etc. later chapters cover observing tips, computers and software, observatories for amateurs, light pollution and how to cope with it, and even the social aspects of the hobby. The final chapter is a quick tour through the universe, from the Solar System out to clusters of galaxies, seen through the eyes of practising amateurs. Finally there are 18 appendices of data and facts, and a large glossary.

Beautifully produced, Mr Bakich's book even smells great!

Richard Knox

CURRICULUM CORNER

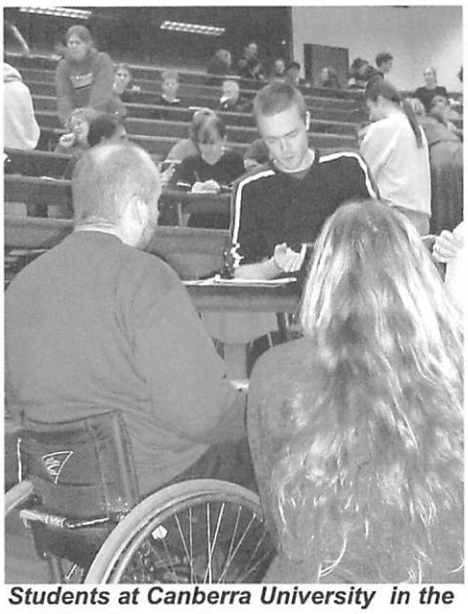
Role-playing for advanced level students

Dr. Paul Francis, of the Australian National University, Canberra, has made a series of role playing and problem solving exercises freely available on the internet, Some of these exercises are clearly suitable for secondary school use, reports Alan Pickwick. Dr. Francis comments that the use of role-playing exercises in teaching astronomy and physics can enliven lectures, deepen student understanding and dramatically increase the level of classroom interaction.

A series of case-studies are presented, illustrating the nature of this technique, its advantages - and some pitfalls.

Rescue in Space: This is an on-line video game. Deep in space, three spaceships are stranded. You are hotshot rocket pilots: your mission is to rescue them. But fuel is limited. This exercise is based around three Java rocket simulator programs. It is designed to teach students in an intuitive way about Newton's laws and about orbits. It's been used both with non-maths classes and with core first-year physics.

Planet Ziggy and its Universe. The starship *USS Drongo* has fallen through a wormhole and crashed onto the mysterious planet Ziggy. The science Team's mission: to find out about the region of space into which you've been hurled. This is used for first-year students with no maths/physics experience. It is designed to complement the galaxies and cosmology part of the course, though it also tests some of the night sky material. It is used as the major assessment item for this part of the course. Full details are at the link below.



Students at Canberra University in the middle of several group exercises designed to promote both understanding and interest in astronomy

The students play the role of scientists aboard the crashed starship. They have to figure out where they have crashed from observations of the night sky.

The Wandering Star. Inhabitants of the planet Mog have noticed a rather striking pattern of stars, low in the western horizon. But all is not as it seems. This exercise is designed for students with no maths and physics background. Dr. Francis uses it in tutorials, posing a puzzle on the whiteboard and the students have to discover what is going on, working in teams. With data projection facilities a PowerPoint file can be projected directly rather than drawing a copy on the board.

Mystery Halo Star. At a conference, the students hear a talk about a halo star with some rather strange properties. They set out to learn more. With the help of telescopes worldwide, the mystery will deepen fast. This exercise requires some basic algebra and physics, though no calculus. It was designed for use with first-year astrophysics students, in a class with reasonably strong high-school maths and physics prerequisites. It has, however, been successfully used with science students as young as year 10.

This exercise was designed to test student's abilities at "back-of-the-envelope" calculations, by getting them to solve the mystery of an enigmatic object. It was run in tutorials: students were given the initial paper, and told to figure out what the object was. They worked in groups of 4-5. Every 20 minutes or so, a "call for proposals" was made and each group had to ask for observations with some telescope: I then handed them the relevant faked data. If they asked for a telescope/instrument I hadn't faked, I made up the results there and then.

The "Zog" Assignment is a fake cosmology exercise. The peace-loving aliens of Planet Zog are discovering the cosmology of their universe for the first time. And it seems to be very different from that of the Earth's universe. This exercise is run with the same students described above. It is run as the assessment for the part of the course covering extragalactic astronomy and cosmology. Dr. Francis basically invented a fictitious universe, with a cosmology rather different from our own. The students have to work out this cosmology from the data given.

The Mystery Planet. Cryptic radio signals have been detected from deep in space. A starship is dispatched to investigate. This exercise is designed to run in parallel with the Solar System part of the course. It teaches how we can deduce the properties of a planet with remarkably little information.

Lost in Space. The crew of the starship *USS Drongo* have fallen through *another* wormhole into another universe (Again? Careless or what?). Can they deduce enough about this universe to find their way home? This exercise is designed for students with a reasonable high-school background in maths and physics. It teaches observational cosmology and the distance scale, as well as the scientific method.

http://msowww.anu.edu.au/~pfrancis/roleplay.html

Role playing with Eratosthenes

Eratosthenes was the first person to measure the circumference of the Earth. A large-scale collaboration for school children has been launched, aiming to repeat his work.

A web site, hosted in France, has an English web page with comprehensive instructions in PDF format (although all the diagrams have labels in French). Pupils' results are logged on the web site, and data is exchanged between schools. The readings are taken with a simple shadow-stick and the theory is easily explained. This is a great way to use the web and interact with schools across Europe. And to measure the diameter of the Earth!

www.inrp.fr/lamap/eratos

Where does *your* shadow point at noon?

Anyone can easily find north or south in either hemisphere of the World using shadows cast by the Sun. If students do this outside their own home they can go on to find the positions of the celestial poles and the associated circumpolar constellations.

But beware! Due to the Equation of Time, a complex function arising from Kepler's Laws and the inclination of the Earth's axis, (*sundials run fast or slow nearly every day of the year They are nearly 17 minutes "fast" in early November this coming quarter - Ed.*). So you must find out when the Sun is actually on *your* meridian due south, or

north, depending on your latitude. Find the times of sunrise and sunset for your location, using either the details given in most newspapers, or from an almanac etc.

Work out the time of true solar noon using the following method. From 12:00 (noon) subtract sunrise time (eg 7:28 a.m.), and add the sunset time (eg 4:44 p.m.) to give the total time the Sun is above the horizon. Divide your answer in half, and add it to the sunrise time. Remember to calculate in hours and minutes.

Thus: 12:00 - 7:28 = 4:32
4:32 + 4:44 = 9.16
9.16/ 2 = 4.38
4.38 + 7.28 = 12.06

So 12.06 p.m. is the true solar noon in this example. At least the Sun is on the meridian at the centre of your time zone. At that longitude, the Sun is due south at this time (in the northern hemisphere) and all shadows point due North.

You can add 4 minutes for each degree west of the central longitude of your time zone, or subtract 4 minutes for each degree east, if you want to be even more precise as to when the Sun is due south where you are.

Get your students to do this activity at home over the weekend and mark their shadow from heels to head in some way (string, pole, chalk line). Their heels will point south and their heads point north. With any luck, the line will point to some distant object that can be used to locate south (or north) at any time.

They should return to this mark after dark, face north, and make a circle around their nose and eyes by touching their tips of their thumbs and middle fingers. In middle latitudes such as the UK, the Pole Star will be found just above the middle of the circle and the Little Dipper will be somewhere around the inside. Also looking in this direction can be found the Big Dipper and the W of Cassiopeia.

When using this activity in the Southern Hemisphere, noon shadows point to the South Pole and, in the night sky, the Southern Cross is somewhere in the circle. But unfortunately there is no obvious star at the centre to act as a south pole star. One has to resort to imagining intersecting lines, such as the extension of the major axis of Crux with lines through either Sirius and Canopus, or ι and β Carinae.

Eric Jackson.

jacksone.j@xtra.co.nz jacksone.j@xtra.co.nz

Where to take GCSE astronomy

Q: I am been a keen amateur astronomer. I am about enter the sixth form and take my AS-levels. Could I take GCSE Astronomy at the same time?

A: I don't see a problem with sitting GCSE Astronomy with your AS-levels except for the coursework component, which has to be internally assessed. The syllabus is run by Edexcel and the syllabus is downloadable from

www.edexcel.org.uk

You should approach Edexcel to see if there are any centres near you offering the subject. It is sometimes offered as an adult education course.

Nigel Marshall runs a Distance Learning Course in GCSE Astronomy, on behalf of Edexcel, for school and college-based students who do not have access to the course at school and for mature students. This is conveniently split into six modules. nigel.marshall@virgin.net"nigel.marshall@virgin.net for details.

The following books are designed for the syllabus. I downloaded these from Amazon www.amazon.co.uk which quotes the prices given:

Astronomy for GCSE, Patrick Moore and Chris Lintott. Gerald Duckworth & Co. Ltd, Paperback - 1 February, 2001. £10.39 + p&p. (see *Gnomon* Vol.20 No.4)

GCSE Astronomy: A Guide for Pupils and Teachers, Nigel Marshall. Mickledore Publishing, Paperback - 1 October, 2001: £7.95 + p&p.

Practice Calculations for GCSE Astronomy, Anne-Michelle D'Anjou, Mike Williamson. Mickledore Publishing, Paperback.1 October, 2001. £3.95 + p&p.

Mickledore can be contacted directly by emailing Nigel Marshall (nigel.marshall@virgin.net) or at Mickledore Publishing, The Arches, Calico Lane, Furness Vale, Derbyshire SK23 7QA. Their direct prices are: *GCSE Astronomy Guide (3rd ed.)* £7.95 post free and *Practice Calculations for GCSE Astronomy* - £4.95 post free.

A distance learning course is run by the Royal Observatory Greenwich: contact Robert Massey at

massey@nmm.ac.uk,

or see the ROG website www.rog.nmm.ac.uk

PPARC also publishes a Resources Guide for Astronomy & Space Science. See

www.pparc.ac.uk/Ed/asr_index.asp

Alan Pickwick

THE THINGS PEOPLE ASK!

Scott, from Augusta, Kansas sent this question: I was doing a project in school in which we had to pick a profession and email someone to ask a few questions about that profession involving math. He went on to ask several specific questions impossible to answer without a knowledge of what level of mathematics Scott had reached.

Briefly, in astronomy, I use mathematics nearly every day, usually in the context of constructing mathematical models of the way in which light emerges from the outer layers of stars. This requires knowledge of techniques of solving partial integro-differential equations, such as the Equation of Radiative Transfer, plus advanced numerical techniques of making such solutions. I also need to know about quantum mechanics (second-order partial differential equations) and numerical methods of solving the Schroedinger equation for multi-electron atoms.

I also use simpler mathematics in daily teaching of a first-year course, where we use algebra and trigonometry, but not calculus. And I need to know a lot about computer programming (not just how to use a mouse or type something using Office97). I mean, programming in C++ or Fortran.

Learning mathematics is essential for any career in science or engineering. A high school education should get as far as algebra, trigonometry, analytic geometry, basic statistics and beginning calculus. This is a foundation for university mathematics and the study of science or engineering. It would also be useful in careers such as economics and medicine.

Astronomers need to have a wide understanding of mathematics including statistics, calculus, complex analysis, differential equations, and numerical techniques.

Probably you will not even understand what some of these are! At this point I ask you to see the teacher.

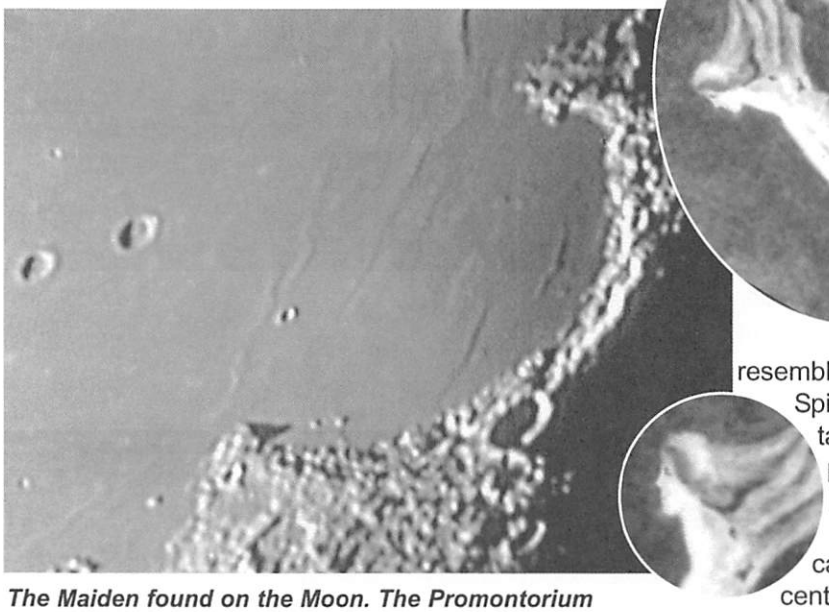
I trust that will be enough for now!

Alien woman seen on Moon

Peter Grego's excellent photographs of the Moon at First Quarter , published with his article in the Spring issue of Gnomon *(vol. 22 no. 3) included one in which the dark maria of the eastern side of the Moon were "touched up" to emphasize the outline of the "Poodle on the Moon". This has prompted Peter to expand on some of the other fantasies that occur as we "gaze on the beautiful face" of the Moon. - Ed.*

The Moon Maiden's long hair streams back from her face, wafting with the breeze whipped up off Rainbow Bay. She gazes across the rippling grey sea in silent contemplation of the rounded Mountains of Jura, a majestic range set against a pitch dark sky.

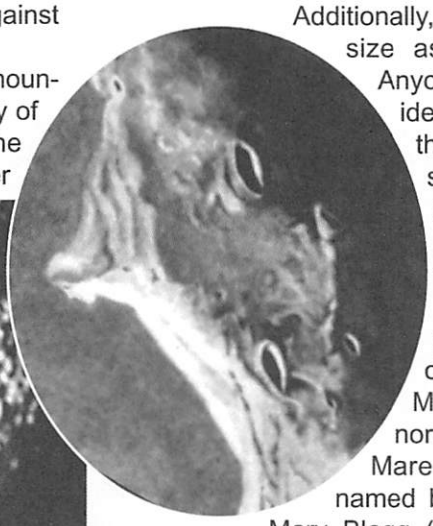
The Moon Maiden is actually made up out of the mountains bordering the western shore of Sinus Iridum (Bay of Rainbows). Her finely detailed facial profile is the Promontorium Heraclides (Cape Heraclides) and her hair is the hilly ground further west. The rest of her body, composed of the Montes Jura, curves away at a graceful angle which gives the distinct impression of an art deco figurine. She is most striking when she has just emerged at the morning terminator when the Moon is around 11 days old. A telescopic view with south at the top shows her the right way around (she is upside down in binoculars!).



The Maiden found on the Moon. The Promontorium Heraclides is at the top of this view of the Sinus Iridum, photographed on 2003 May 11 2003 using a 150mm OG and TouCam CCD by Peter Grego.
(Insets) The "Moon Maiden" from a plate published in* Peeps at the Heavens *by James Baikie (1919).

The Moon Maiden is a good example of lunar simulacra - chance shapes and formations in the lunar landscape which can bear an uncanny resemblance to familiar things. Everyone knows the Man-in-the-Moon, which is undoubtedly the best known of all lunar simulacra. Best seen around Full Moon, his seemingly astonished gaze has been familiar to the eyes of humanity since the dawn of time. His eyes are Mare Imbrium and Mare Serenitatis, Sinus Medii is his nose and the Mare Nubium forms his gaping mouth. There are many more examples of this type, including a leaping hare, a crab, a kissing couple, a donkey and a lady in a rocking chair reading a book. One of the more obvious of the large images, made of the Moon's eastern maria, takes the form of a French poodle sitting obediently at heel (see the illustration in Gnomon, Spring 2003).

Those who have observed the western border of Palus Somnii (Marsh of Sleep) and the eastern border of Mare Tranquillitatis may have noted the striking similarity between these lunar outlines and those of north and western France. The Brittany and Cherbourg peninsulas are obvious, so too is the Ile d'Oleron (the crater Lyell) and the mouth of the Garonne. Inland, the city of Le Mans is marked by the crater Cauchy - named after a French astronomer.



Additionally, the area is about the same size as its terrestrial counterpart. Anyone interested in gaining some idea of the scale of the Moon can therefore do no better than to study this fascinating region when it is under a reasonably high sun (not when too close to the terminator).

Another striking geography lesson can be learned by observing the Spitzbergen Mountains, a group of peaks north of the crater Archimedes in Mare Imbrium. They were so named by the English selenographer Mary Blagg (1858-1944) because of their resemblance, both in shape and scale, to the terrestrial Spitzbergen Islands in the Arctic Ocean. The mountains, visible throughout the lunar day, are most prominent when near the terminator a while after the First Quarter phase.

Another measure of the scale of the solar system can be made by observing Messier A which is adjacent to the crater Messier in Mare Foecunditatis. The crater is an odd 13x11km peanut shape, from which flows a remarkable double linear ray which travels west for over 100km. The crater and its rays resemble the nucleus and bright nuclear eruptions of a comet of Halley proportions; it is even possible that the crater is the result of a cometary impact. This is a fitting tribute to the French astronomer Charles Messier (1730-1817) who discovered several comets and who bequeathed his famous Messier list to ease the burden of comet hunters.

There is an abundance of telescopic lunar simulacra. Rupes Recta (the Straight Wall) is a 110km long fault in Mare Nubium. At the fault's southern tip it joins the appropriately named Stag's Horn Mountains. After Last Quarter, ☞

The hand print (or is it a giant paw?) just to the east (right) of Phocylides - which forms a giant shoeprint in the centre of the photograph! Part of the large crater Schickard is top left. (Photo by Peter Grego)

News from Down Under

Australian astronomers are now recovering after what is (logistically speaking) the astronomical equivalent of the 2000 Sydney Olympic Games – the XXVth General Assembly of the International Astronomical Union. During the last two weeks of July, some 2000 astronomers (almost a quarter of the IAU membership) converged on the Sydney Convention and Exhibition Centre at Darling Harbour, to participate in this triennial event. On offer were half a dozen symposia, 21 joint discussions, four special sessions, and numerous working group meetings, invited discourses, and public lectures. On some days, there were as many as ten events running in parallel! How to choose between topics as diverse as "Astronomy in Antarctica", "Extragalactic binaries", "Solar and solar-like oscillations", or a meeting of the Division III "Committee for Small Bodies Nomenclature"?

Membership of the IAU is open to astronomers who have obtained a PhD, and have a proven record of independent research. Their membership dues are actually paid by the Member Country in which they reside. Many of the General Assembly participants were not IAU members, but were invited to attend as guests. At the Sydney General Assembly, some 300 new IAU members were nominated, and most subsequently admitted.

Given that July is winter Down Under, and the large investment in time and money involved in getting here, we were well-pleased with the turnout. Throughout most of the proceedings, Sydney turned on the brilliantly sunny, cool winter days for which it is renowned.

The Opening Ceremony took place in one of Sydney's icons, the Sydney Opera House. Following drinks in the foyer looking out over Sydney Harbour and the Bridge, the attendees moved to the Concert Hall for a traditional Aboriginal welcoming ceremony, followed by addresses from representatives of the National Organising Committee; the Australian Chief Scientist, Dr Robin Batterham (who later demonstrated one of his other talents by performing on the Grand Organ); the outgoing President of the IAU, Prof. Franco Pacini; and the Federal Minister for Education, Science, and Training, the Hon. Dr Brendan Nelson. The evening was capped off with the awarding of the 2003 Cosmology Prize of the Peter Gruber Foundation, to Prof Rashid Sunyaev.

The participants were kept fully informed about the day's highlights, and upcoming events through the production of a daily newspaper "The Magellanic Times" by a team of volunteer students and enlisted contributors. Editor Seth Shostak also included several articles which seemed to escape the notice of the mainstream Australian media, on topics such as how to speak "Strine", new uses for Vegemite, and the fact that the Sydney Harbour Bridge would briefly be dismantled in order to allow through a ship carrying Ayers Rock, after recent refurbishment in Belgium...

When not filling the various auditoria for scientific sessions, astronomers were most likely to be found in the Exhibition Hall, getting their caffeine fix, getting their Internet fix, or browsing the various corporate booths. One of the highlights of any big astronomy meeting is scoring a few "freebies", and this Assembly was no exception. The European Southern Observatory was handing out DVDs containing a documentary of their 40-year history, as well as mouse pads promoting the Atacama Large Millimetre Array (ALMA) project. The Research School of Astronomy and Astrophysics at the Australian National University were giving away handy pen-lights, one of the few items that survived the devastating bushfires that engulfed Mt Stromlo back in January. But apparently the crowd favourite was the cute, furry echidna stuffed toys being handed out at our very own AAO booth. These were intended to serve as a reminder to visitors of the AAO's Echidna fibre-optic positioner being constructed for the Subaru Observatory in Japan, a prototype of which was demonstrated at the General Assembly.

All in all, it was a hectic, almost overwhelming fortnight of astronomy facts and fun, and we all look forward to the next one, to be held in Prague in August 2006.

Stuart Ryder

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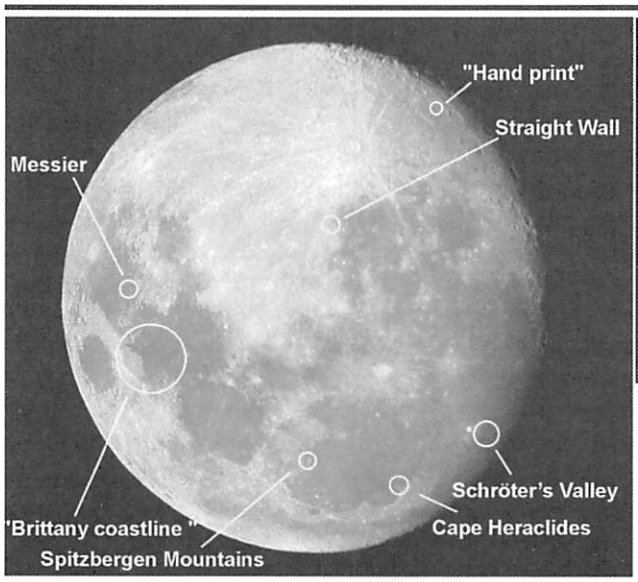


The Moon, as seen in a telescope (inverted) showing the location of som e of the sites described. (Photo by Peter Grego)

☞ nearing the evening terminator, the bright line of the fault and the mountains appears like a mighty sword.

Vallis Schröteri (Schröter's Valley) is a winding rille which meanders over the Oceanus Procellarum for 200km. The head of the valley begins in a craterlet north of the crater Herodotus, after which it widens for several kilometres and then narrows. The topography of this feature gives it the apt name of the Cobra's Head, and it can be observed in small telescopes when the Moon is around 12 days old. Northeast of the valley is a complex of similar though much smaller rilles which look like a mass of slithering snakes. Another prominent lunar serpent, made out of the west wall of the crater Yerkes, can be spotted on the western floor of Mare Crisium when the Moon is older than 17 days.

Recently I identified several more lunar simulacra during CCD imaging sessions – the outline of the friendly ghost Casper (actually the crater Vogel, south of Albategnius), Mickey Mouse (in the southern uplands) and a large handprint east of Phocylides!

Even the newcomer to lunar observation will find that it is full of surprises, providing challenges on all levels. The lunar simulacra spotter is guaranteed endless hours of enjoyment and the chance to make his or her own exciting discoveries at the eyepiece. Although hardly a scientific pursuit, trying to spot lunar simulacra now and again helps make lunar observing all the more enjoyable.

Peter Grego

Sky Diary Autumn 2003

The Autumn skies have a fascination all of their own. Autumn evenings are the first time we have seen dark evening skies for what seems a long time, and the promise of the winter splendour to come is also there. To see Orion rising before dawn is particularly exciting, for example. The heliacal rising of the Pleiades (the first time in the late summer that these famous faint Seven Sisters were seen rising before the Sun drowned them in light) was regarded as a most important event by the North American Indians, and many other aboriginal people around the world. It signalled time to prepare for the harvest before the onset of winter.

Alas, spotting the Pleiades near the morning horizon these days is likely to be far more difficult due to the pollution of our atmosphere (with both fumes and lights), but it remains a challenge. As the Sun apparently moves eastwards by its daily 1°, from the last week in May onwards the western elongation of the cluster from the Sun slowly increases, until it is just possible to make out the faint group of stars in the eastern sky before twilight becomes too bright. These days, it ought to be possible by the first week of July. But two thousand years ago it would have been some two to three weeks earlier than even in the best conditions today, the Sun being that much closer to the Pleiades at the corresponding dates during the present year due to precession of the equinoxes. For such a lovely star group, it is beyond our understanding as to why the ancient Chinese astronomers named the Pleiades the "emanation of the pile or rotting corpses". They don't write 'em like that any more!

Moon phases for the fourth quarter of 2003

Month	New Moon	First Quarter	Full Moon	Last Quarter
October	25	2	10	18
November	23	1 & 30	9	17
December	23	30	8	16

The three months to the end of the year will see the Sun reach its furthest south, the northern winter solstice (which seems really strange to be writing now while temperatures are reaching record levels, and people are gratefully flopping into the sea outside my window!). The constellations near the zero meridian of right ascension, such as the Great Square of Pegasus, Andromeda, the Great Galaxy and M33, Cassiopeia are now high in the evening sky and o Ceti (Mira) and Fomalhaut are found lower in the south.

There are total eclipses of the Sun and Moon during the quarter, but only the latter will be seen by most of the world since the solar eclipse is visible from only a small corner of Antarctica on November 23. The eclipse of the Moon, on the other hand, while offering nothing like the spectacle of a total solar eclipse, is still worth the effort, costs nothing (except some lost sleep) and is visible over half the World. The passage of the Moon towards the ascending node of its orbit on November 9 takes it through the umbral part of the Earth's shadow as the prelim to the eclipse of the Sun near the node two weeks later. From the UK the first contact with the umbra is on November 9 at UT 23: 32.5, and totality begins on November 10 at UT 1:06, lasting till only 1:31. Last contact with the umbra is at 3:04. The relatively short duration of totality is because the Moon is only just totally immersed in the Earth's shadow even at greatest eclipse. It should provide a fine view of the bright coppery glow over the south-eastern part of the Moon's limb. The Moon will be high in the sky throughout the eclipse, in the constellations of Aries.

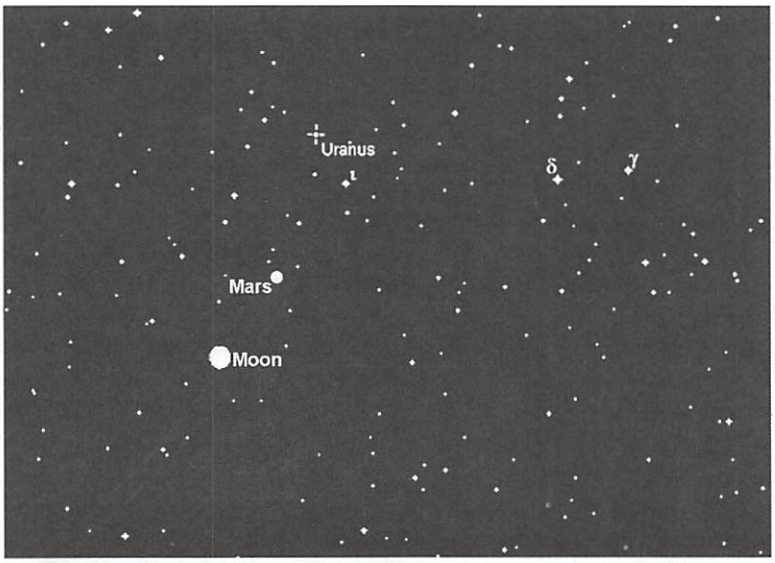
Rising and setting times (UT): lat. 52°N; long. 3°W

	October 15		November 15		December 15	
	Rise	Set	Rise	Set	Rise	Set
Sun	07h 41m	18h 33m	07h 32m	16h 39m	08h 13m	16h 19m
Mercury	06h 53m	18h 27m	08h 46m	17h 00m	09h 48m	17h 36m
Venus	09h 06m	19h 05m	09h 40m	17h 41m	10h 26m	18h 26m
Mars	17h 18m	03h 08m	14h 24m	01h 14m	12h 47m	00h 47m
Jupiter	03h 54m	17h 24m	01h 21m	14h 32m	23h 37m	12h 40m
Saturn	22h 46m	14h 48m	19h 43m	11h 45m	17h 36m	09h 41m
Uranus	16h 55m	03h 01m	13h 52m	23h 54m	11h 55m	21h 59m
Neptune	16h 08m	01h 19m	13h 06m	22h 14m	11h 10m	20h 19m

Meteor activity during the Autumn is mostly confined to two showers. The Leonids (peaking at November 18d 03h) are not expected to be as good as in recent years, but still promising quite a lot of activity. The Geminids (December 14d 10h) should also be worth watching in the late evening.

Interest in Mars has been very high during its closest approach in August, and the planet will still be very bright at the beginning of October. As a little test of the basic understanding of the celestial co-ordinates and familiarity with the positions of the stars, take a look at the table of rising and setting times on this page, and note that on December 15, Mars rises at 12:47 and sets exactly 12 hours later. So what is its position in the sky, roughly, in both right ascension and declination, and in what constellation would you expect to see it?

Soon after sunset on the evening of October 6, the Moon and Mars will be close together in the sky (the Moon about 1.5° south of Mars) and will act as a good pointer towards Uranus. The 6 mag planet will be just over 1° north of iota Aquarii (mag. 4.27) and should be easy to find in a small telescope or binoculars, or even with the unaided eye if the bright Moon allows. This star is in a line with two stars, delta and gamma Capricorni, which mark Capricorn's "nose".



An interesting close approach between the Moon and Mars, which point to Uranus (marked with a cross round its disc) on October 6. About 1° south west of Uranus is the star ι Aqr, which forms an almost straight line with δ and γ Cap.

Saturn is in Gemini, and is well above the eastern horizon in the evenings by the end of the quarter. It is now beginning its slow descent towards the southern sky, but will remain prominently high in the north for a year or two yet!

Jupiter will be in Leo, and rises just before midnight by the end of the year.

Richard Knox