



# GNOMON

Newsletter of the Association for Astronomy Education

Vol. 13 No. 3

ISSN 0952-326X

SPRING 1994

*This issue of 'Gnomon' has been sponsored by  
The Royal Astronomical Society*

This enables the newsletter of the Astronomical Society of the Pacific, 'The Universe in the Classroom', to be included as pages 5-8 of this issue.

## EDITORIAL COMMENT

The Annual Meeting of the Association takes place at Edinburgh on May 14th. Why not make a weekend break of it? Edinburgh is a beautiful city and the capital of Scotland - it has much to offer the visitor.

Only a small number of replies to the Library "Survey" (see the previous issue) have been received. There is a slight majority agreeing with my feeling that the number of astronomy books on the shelves is diminishing. But this is not a scientific analysis, of course.

### Subscription Rates:

Individual Members.....	£7.50
Retired Members.....	£5.00
Corporate Members (e.g. schools, colleges etc.) .....	£15.00

Corporate Members will receive three copies of *Gnomon*.

### Extra Copies:

0-10 .....	£1.00 per copy
11-50 .....	£0.75 per copy
51- .....	£0.50 per copy

Back numbers, not less than one year old, half these prices.

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, thereby effectively reducing their contributions.

### Addresses for Correspondence:

**Secretary:** Eva Hans, The Planetarium, South Tyneside College, St. George's Avenue, South Shields, Tyne and Wear NE34 6ET - for all general enquiries. (Tel: 091 4560403, ext. 477)

**Treasurer and Membership Secretary:** Bob Kibble, 34 Acland Crescent, Denmark Hill, London SE5 8EQ (Tel: 071-274 0530) - for all financial and subscription enquiries.

**Editor:** Eric Zucker, 35 Gundreda Road, Lewes, East Sussex BN7 1PT - for all enquiries concerning the Newsletter. (Tel 0273 474347)

### Advertising Charges:

Whole page.....	£120
Half page.....	£60
Quarter page.....	£30
Inserts.....	£75*

\* These may be of any size which may conveniently be inserted into the newsletter. There may also be an additional charge for posting if the inserts are heavy.

The prices are for *one* issue. A 25% reduction is made for advertising in all four issues.

## AAE ANNUAL GENERAL MEETING, 14TH MAY 1994

We are extremely fortunate in being invited to the Royal Observatory Edinburgh for our Annual Meeting. There will be a talk on the work of the Observatory and a chance to spend some time in its Visitors' Centre. The Annual Business Meeting will take place from 10.30am to 1.00pm. After lunch there will be opportunities to involve yourselves in astronomical activities at the Observatory, including optical plate projects and sunspot studies.

Please use the reply slip enclosed with this issue to inform us of your intention to be there. We need to know numbers in advance so that we can book sufficient room, coffee and lunch for everyone.

### AGENDA:

- 1 Minutes of the last Annual Business Meeting (1993).
- 2 Reports from Officers of Council.
- 3 Charitable status.
- 4 Election of Council for 1994/5.
- 5 Any other business.

### Nominations for posts on Council:

All officer posts are elected annually at the AGM. Some officers may wish to stand again for another year, some may wish to stand down. Here is your chance to become involved in the management of the AAE. The posts are:

### OFFICERS:

President, Vice-Presidents (3), Treasurer, Secretary, Assistant Secretaries (2).

### MEMBERS:

Resource Centre Representatives (3), Members (3), Editor (co-opted by Council).

Each nomination should be accompanied by the names of a proposer and seconder. Nominations may be made from the floor at the AGM or in advance by post. Please complete the reply slip enclosed with this issue.

## CHARITABLE STATUS - UPDATE

Following the positive vote at last year's Annual Meeting our application for Charitable Status has been considered by the Charities Commission and the Inland Revenue. We have been granted status as a charity but subject to a number of further amendments in our Constitution. You will find these changes on an insert in this newsletter. Copies of the Constitution will be available at the Annual Meeting. We will be considering the proposals at the May ABM. This is the final hurdle. Not far to go now.

Bob Kibble

### GNOMON - definition in the Reader's Digest dictionary:

An object, such as the style (projecting arm) of a sundial, that casts a shadow used as an indicator. From the Greek: one who knows, indicator, interpreter, from *gignoskein*.

## VIDEO REVIEW

**"Looking at Sundials", British Sundial Society - Video. Price £12. Available from Jane Walker, 31 Longdown Road, Little Sandhurst, Camberley, Surrey GU17 8QG.**

Many readers will already be familiar with the British Sundial Society education booklet "Make a Sundial". This video is the second major educational resource produced by the Society since its inception in May 1989. As a new member of the Society I wanted to explore the available resources and so purchased a copy.

"Looking at Sundials" runs for 15 minutes and provides a beginner's guide to how sundials are designed and con-

structed. The script is clear and measured and is complemented by an unusual but appropriate musical background. Simple graphics help to explain the principles and there are many examples of armillary spheres, horizontal, vertical and equatorial dials from across the country. The presentation avoids technical details leaving the budding DIY sundial maker to research into one of the better texts available for the trigonometric and equation of time data. Having said that, the hour angles for a horizontal dial are found in "Make a Sundial".

Viewers new to sundials may need to run the video through a few times to assimilate some of the mathematical

ideas and the new language of gnomons, co-latitude and hour angles.

If you have an interest in sundials you will enjoy this short tour of the sundial world. Together with "Make a Sundial" teachers will have everything they could need to make a number of simple dials and show their value as items with social, historical, artistic and scientific significance.

My one regret is that the location of the dials shown on the video is not revealed. However, to save the lifelong search, a list of dials and locations is available from the Society - to members only of course!

*Bob Kibble*

## BOOK REVIEWS

**PRACTICAL ASTRONOMY, by Robert Mills, Albion Publishing Ltd, ISBN 1-898563-02-0, 1993, Hardback, £16.50. (Paperback also available.)**

If ever there were an astronomer's treasure trove in print this is it. From the community of astronomy education Robert Mills stands as constant as the northern star, the grandfather of gadgets, ideas and innovation. No AAE meeting would be complete without Robert Mills and his latest gadget on display providing a focus of interest for young and old alike. With Robert less mobile these days it is timely that this book has appeared to allow a wider audience to appreciate the fruits of his experience.

*Practical Astronomy* keeps its feet planted on terra firma. Almost all of the practical activities can be started by the interested amateur with garden shed equipment, protractor, ruler and pencil. It is, as the subtitle suggests, "a user-friendly handbook". This makes the book an ideal resource for school libraries, teachers' centres and birthdays. For primary schools there are ways of counting stars through a drainpipe, making sundials from bicycle wheels and even a way to make your own rainbow. Older enthusiasts will find how to build their DIY binocular stand or how to make a telescope table using marbles for bearings. Practising astronomers will find enough rigour to support their understanding of celestial geometry, optical systems and star maps.

Throughout the book the author includes supporting mathematics which readers can dip into should their taste be

for equations and charts. A section on miscellaneous calculations allows the reader to use astronomy as a vehicle for exploring physics principles, particularly gravity, at A level standard. The text is ably supported by good line drawings and clear section headings but perhaps the most endearing feature of *Practical Astronomy* is the black and white photography. These photographs appear throughout the book and share a certain earthy functionalism without a single constellation in sight. In contrast to the glossy high tech images found in many astronomy books these photographs are a testament to the fact that Robert Mills has in fact himself made the devices he describes. My favourite is "Observing away from city lights" showing how to convert your Mini into a mobile observatory.

You will wait a long time for another book packed with as many valuable ideas as this. I am pleased to review it and can recommend it to our readers.

*Bob Kibble*

**"The Stars and Planets" by Brian Jones. Puffin Books, 1993. ISBN 0-14-034783-6, £2.99.**

This little paperback is unusual in its approach, having large blocks of text illustrated by black-and-white carton-style drawings rather than the more customary colour photos of the planets. The opening chapter is a clear attempt at grabbing the attention of the young reader. Entitled "Is there Life in Outer Space?" it includes speculation on the physical characteris-

tics of aliens. Factual chapters on the Moon and planets follow. Finally there is a section on recognising some of the most famous star patterns and on making and using a little star clock.

The simplicity of style of writing makes this accessible to most eight- or nine-year-olds, but I was unsure about the success of the illustrations. Many of these are quirky and not intended to be realistic. The Sun winks, and there are aliens with trumpet noses! I decided to do some market research and asked the opinion of a ten-year-old riding on the same train as myself. He liked the humour in the pictures: "They're good!" However he explained that he already knew much of the factual content in the book and decided to recommend it for someone slightly younger than himself.

I do have one or two quibbles about the over-simplification of some of the topics. The long arrow on the Moon phase diagram is ambiguous and could be taken to imply that the New Moon is rising in the east while the old crescent is simultaneously setting in the west. The excellent explanation of how to use the pointers of the Plough to find the Pole Star should really be accompanied by a diagram if this is to be clear to someone who has never done this before (and similarly the way to find Sirius using Orion's Belt). And finally the tilt of the Earth's axis is never explained, both diagrams implying no tilt at all.

The aim of the book is to raise interest in the sky and the stars. It should succeed with many readers, although it will not make them "expert star gazers" as it claims on the cover. It is easy to read and attractively laid out - a good travelling companion for a long train journey with kids.

*Anne Cohen*

### NEW!!! THE BAA COLOUR POSTCARD SET

These six spectacular photographs of deep sky objects have been made into a set of postcards to brighten up your correspondence or to use as display.

- 1 The Great Nebula in Orion, taken by Ron Arbour.
- 2 The Rosette Nebula, taken by John Smith.
- 3 The Veil Nebula near 52 Cygni, taken by Barry Moulang.
- 4 The Whirlpool Galaxy, taken by Ron Arbour.
- 5 The Dumb-bell Nebula, taken by Barry Moulang.
- 6 The Horsehead Nebula - a CCD image, taken by Nick Symonek and Ian King.

The pack of six can be obtained for £1.50 (incl. postage) from the British Astronomical Association, Burlington House, Piccadilly, London W1V 9AG.

**ALSO** a large format colour postcard of the Hubble Space Telescope image of the Spiral Galaxy M100, with a small insert of the Earth-based view taken by Ron Arbour. These cost 50p each, from the same address.

### MEMBERSHIP LISTS

I can provide a list of AAE members and addresses. Please send me an A4 stamped (29p) addressed envelope: 34 Acland Crescent, Denmark Hill, London SE5 8EQ.

*Bob Kibble, Treasurer*

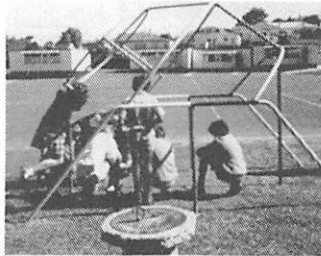
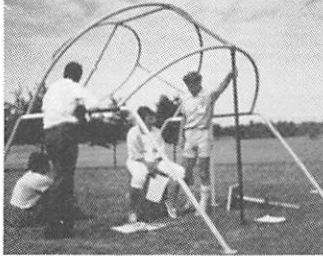
# PIPEHENGE

Members will perhaps recall previous references to Pipehenge in our newsletter. Originating in New Zealand, Pipehenge is a steel tubular structure designed by Eric Jackson, now an AAE member from the Antipodes. Eric displayed Pipehenge at the ASE annual meeting in Birmingham this January. Hearing Eric talk about Pipehenge reminds me of Robert Mills in full flight with one of his own inventions - in fact I expect Robert has already made a pencil sketch of such a device in his time. Before returning home Eric left me with a half-size version of Pipehenge for display and promotion together with some litera-

ture and a video showing Eric and Pipehenge in Action. Contact me for a leaflet.

A number of AAE members are interested in helping to promote Pipehenge in the UK on Eric's behalf. One task ahead is to produce teacher and student support materials which relate to our National Curriculum - a task perhaps for the Council Education group. Unfortunately I doubt that I can transport Pipehenge to Scotland but I will be running some promotional meetings in due course. Watch this space.

*Bob Kibble*



## Report of the "Training the Trainers" Meeting

*Glasgow University Observatory, October 16th, 1993*

With encouragement from the Education Committee of the Royal Astronomical Society I was asked to organise a "Training the Trainers" meeting in Glasgow, the first to be held north of the border. Unlike in England and Wales, there is no National(!) Curriculum here as Scotland operates its own educational system and it might be thought that astronomy has not had the chance to improve its profile in school education as has happened in the south. As it turned out, however, the timing of the venture was most apposite as the Scottish Education Department (SED) published its guidelines for the teaching of Astronomy in Environmental Studies in March 1993 and this had caused a stir within the local teaching community. As a sounding post at the University's Observatory, I was certainly aware of increased activity within schools as a result of teachers seeking information, support and advice on materials and asking about possible activities beyond the classroom. I have also had telephone calls from anguished parents discussing points related to homework! After circulating some 500 schools, chiefly in the Strathclyde area, 35 people registered; 30 were regular teachers with the split being about fifty-fifty between the primary and secondary areas, the others being actively involved in astronomical or general education. The meeting was planned for October 16, 1993, this being the first Saturday of the local mid-term holiday week.

The day dawned bright and clear following the coldest October night in Glasgow since 1926. After a welcoming talk (myself) which also addressed the reasons for staging the meeting, the enthusiastic audience were treated to presentations by Eva Hans (South Tyneside Planetarium) on "Classroom Aids" and by Brian Kelly (Dundee) on "Activities at the Mills Observatory". Highlights were Eva's production of planetary models from her enormous polystyrene suitcase and the interest shown in the AAE Teaching Packs. Brian showed slides of the solar system "perambuletum" erected within Balgay Park for the summer of 1992, and of the regular activities at the Observatory. The spaceman made by a local primary school was particularly eye-catching and was worthy of placement in any exhibition.

A tour of the Observatory facilities allowed demonstration of equipment used in the teaching of undergraduates. Items included were "artificial stars", spectrometers and machines for reducing photographic records. Research was also seen in action as a postgraduate student was performing spectropolarimetric observations of scattered radiation from the daytime sky - live spectra taken by a CCD attached to a spectrometer were displayed on the VDU of an on-line PC - giving insight to aspects of state-of-the-art observational equipment and the land of abbreviated technical jargon. The brilliant weather also

allowed demonstration of the projection of solar images with the 250mm telescope. One sunspot was kind enough to be close to the solar limb and provide the opportunity to display the Wilson effect, a phenomenon discovered only five miles away at a site now in Glasgow's city centre, but over 200 years ago. The tour was completed with a short session in the planetarium.

After a break for gastronomy (quiches, meats, salads, gateaux, fruit salad and wine) I commenced the afternoon session by running a Workshop. An enlightening discussion ensued on a variety of topics, not all mentioned in this brief summary. Both positive and negative reasons for including some basic astronomy teaching within schools were recorded. For example, many interdisciplinary connections were noted only to be countered with the notion that, if a subject is to survive in its own right, it cannot be seen simply to have an interdisciplinary rôle. Difficulties of dealing with religious beliefs and science were voiced. One primary teacher gave a vivid account of the excitement of the visit of her class to the Observatory on the night of the lunar eclipse in November 1992. Concerns were also raised about the vagaries of the SED's Guidelines. Having dealt with "the planets of the solar system" under stages P4 to P6, the later stages of P7 to S2 suggest that studies should focus on "major features of the universe; further detail of the solar system". What does this mean in terms of real content?

The Workshop session closed with more ideas for classroom aids. For the primary areas, I demonstrated the application of an Earth globe set to the angle of the local latitude - rather than the obligatory  $23\frac{1}{2}^\circ$  - and overlays for the projection of constellation patterns, leading to a kinematic planisphere. A simple spectrometer capable of revealing the Fraunhofer lines in the solar spectrum was described for Secondary level.

In the last session Dr John F. L. Simmons gave a thought-provoking and mind-stretching talk on "Cosmological Horizons". Rather than presenting an up-to-date view of all things cosmological, he led us through the concepts of horizons, making links between the horizons limiting our understanding and which change during our development from childhood to becoming an adult sage (à la Piaget), to the various apparent horizons we encounter when we increase our depth of penetration into the Universe or look further and further back into time.

Participants went away with new experiences, new ideas and an enthusiasm for further meetings. Unlike the organiser, most of them had a week to recover after a full, action-packed and most enjoyable day. Thanks are due to my wife for buying in and preparing for my extended family for the day. The events could not have been accomplished without the indefatigable help of Mrs Margaret Morris who prepared tea and coffee and served the lunch. See you all at the Royal Observatory, Edinburgh, on April 9th, 1994!

*Dr David Clarke, Director, Glasgow University Observatory*

# SPRING ON A SOAPBOX

by Roger O'Brien

**H**IPPOCRATES had an inscription placed over the portal of his medical school at Athens. It read "The art is long". It's a wonder that Greek medicine got as far as it did with encouragement like that.

**I**N astronomy, it is usual to find remarks about all the things the neophyte must learn in order to appreciate the subject. The list varies, but is usually something like this: all the constellations visible from Britain, Right Ascension and Declination, the planets and their satellites, comets, structures of nebulae, ditto galaxies etc. *ad nauseam* and all for starters. Yet we wonder why this, the most accessible of all sciences, has a national following smaller than train spotting or war gaming!

**W**HILE it is true that astronomy needs time, this can be exaggerated and, at its most basic level, it needs little else. To stand quietly before the beauty of the night sky is a gentle joy that can heal the soul. To find out more requires a bit of effort, but most people can handle a trip to the library to borrow a book or two. Alternatively, watch "The Sky at Night" or the excellent programmes in the Open University schedules: astronomy itself of course, but physics, engineering and even history or philosophy programmes can have relevance. Later this year, Peter Davison (the former Dr Who) will be presenting a series of half-hour programmes on astronomy and at least one amateur (Pam Spence, the solar observer from Worthing) is involved.

**M**ODERN astronomy books are usually delightful with plenty of beautiful illustrations. Most put the maths in appendixes or special sections within chapters. Those who need or wish to work through the maths can: the rest of the readership just moves on to the next part of the book. There are good magazines e.g. *Astronomy* and *Astronomy Now* to say nothing of the frequent articles in more general science magazines like *New Scientist* or *Scientific American*.

**I**THINK, by now, my drift is clear: astronomy is an accessible subject, if newcomers are not frightened off by experts showing off. Astronomy can accommodate any level of interest and effort and no-one need be put off by lack of funds. Local libraries often have copies of some of the magazines I mentioned and most have at least some general astronomy works by the likes of Patrick Moore and Iain Nicolson. Libraries usually keep lists of local societies so a visit stands a good chance of killing two birds with a single stone. Joining a local astronomical society is a good way to meet enthusiasts, advisers and seasoned practitioners.

**T**HIS spring, as the brilliant winter groups slide down to the western horizon, take advantage of the relatively open spring sky. There is the Plough, which is the major portion of

Ursa Major (The Great Bear), almost overhead. You can slip in two technical terms, here: the zenith is directly above your head and the nadir (nothing to do with Asill) is in the antipodean sky directly below your feet. Somewhat south of the zenith you will find Leo the Lion. With an effort of imagination it does have a sphinx-like shape. It is always a good policy to be able to point out a zodiacal constellation or two since most people do not know the difference between astronomy and astrology.

**T**HE brightest star in Leo is Regulus - the Lion's heart and a typical, white, first magnitude star. First magnitude means that it is among the brightest stars you can see. It is also right on the celestial equator. The stars in the Plough are fainter than Regulus - most of them are of second magnitude. The faintest, Megrez, is where the handle joins the ploughshare and it is much the faintest of the seven. Megrez is of third magnitude. The middle of the handle of the Plough is known as Mizar. It has a companion, called Alcor. If you can see Alcor you can see stars of the fourth magnitude, which are a lot fainter than the likes of Regulus. If you can see Alcor from Haringey, where I live, it is a good night for stargazing. At a good site, someone with average eyesight can see stars as faint as the sixth magnitude. The magnitude scale is a logarithmic, not a linear, scale: a second magnitude star is two and half times as faint as a first magnitude star. Thus, six magnitudes encompass a difference in brightness of a factor of 100. It may seem odd to have the bigger numbers for the fainter stars, but the tradition is established and unlikely to be changed now.

**T**HE Plough's stars are in a dark, uncluttered part of the sky; they look brighter than they really are and form an effective signpost. A good many people know that two stars in the Plough are unofficially dubbed "The Pointers" and they indicate the Pole Star, which is called "Polaris" and is pretty close to the point on the sky where it is pierced by the axis of the Earth's rotation. Following the pointers' line the other way leads to Leo. At the other end of the Plough you can follow the handle round in a broad arc which leads to Arcturus in Boötes (otherwise a rather dull constellation). This star is the brightest in the northern hemisphere. It is an old star and has attained a stage in the development far beyond our Sun's. Arcturus is a giant star and remains very bright until it reaches the next stage, where it sheds an outer layer and its core shrinks to become a white dwarf.

**I**T irritates me that the two celestial bears have tails. Instead, I assume that they are polar bears, which have long necks, and are swimming around Polaris. Similarly, Leo can resemble a mouse with its tail in the air. The night sky is a Rorschach test of your imagination.

## I MEET THE SECOND MAN TO WALK ON THE MOON

by Tony Lawton, President, British Interplanetary Society

After the BIS's 60th Anniversary Banquet held in Hastings on Saturday, 16th October, 1993, our most distinguished and honoured guest Buzz Aldrin fielded questions from the many other participants. As the Society's President, it was my pleasure to act as host to our special guests and I had the privileged opportunity to meet the second man to walk on the Moon.

Buzz originally derived his name from his astonishing restlessness and ability to work and has now legally adopted it. He still retains this vitality at the age of 63. A qualified engineer, he was selected as an astronaut in 1963. After the usual intensive training he first flew in space on the Gemini 12 mission in November 1966.

He was the lunar module pilot of Apollo 11, the first manned vehicle to land on the Moon, in July 1969. Neil Armstrong, the crew commander, was the first to set foot on our satellite and Buzz Aldrin joined him shortly afterwards. Here is a selection of the questions Buzz was asked about the Apollo mission:

*Did you have any experience that caused you to change your*

*spiritual outlook?*

No, but I offered a prayer of thanksgiving in commemoration of a safe landing and gave myself Holy Communion. (He was already a Church Minister.)

*Did you like the Moon - as compared say with Earth?*

No, I did not like the Moon: it is an alien surface with no colouring apart from grey, black and white in various mixtures and shadings.

*Continued on page 9.*



Tony Lawton, BIS President, chats with Buzz Aldrin at the SPACE '93 Banquet.



# SPACE - LINK

Compiled by Nik Steggall

## "RESOURS - 500"

Five hundred years ago a new land was discovered by Columbus: it was America. In order to mark this significant event, the Russian-American space project "Europe - America 500" was created. As part of this Russia sent its spacecraft "RESOURS - 500" from the Plesetsk Cosmodrome to America as a symbol of peace and friendship.

"RESOURS - 500" was launched by a Soyuz launch vehicle on 15th November 1992 on a flight lasting 6.87 days. The spacecraft's shape was a spherical cone being about 6.5m long, 2.4m in diameter and weighing 6,300kgs. Its initial orbit took 88.74 minutes to complete with a perigee of 179km, an apogee of 239km and an inclination of 82.57°. On November 17th this orbit was raised to a perigee of 222km and an apogee of 360km. In this orbit the spacecraft took 90.40 minutes to complete one revolution of the Earth.

The "RESOURS - 500" spacecraft descended to the Earth on November 22nd, 1992. The re-entry capsule was recovered in the Pacific Ocean by the recovery ship "Marshal Krylov" 320km southwest of Seattle, U.S.A. Not only did the flight commemorate the 500th anniversary of Columbus's discovery of America but also the 35th anniversary of the origin of the space era, the 35th anniversary of the European Community and the "International Year of Space" - 1992.

Aboard the spacecraft were a number of commemorative items sent by the Memorial Space Museum of Moscow. These items are now available and include a certificate of authenticity. Some of these are listed below:

Buran Badge Set, 11 badges; Soyuz T-11 Fragment Card; Gagarin Silver Pin Badge; Memorial Space Museum, Emblem; Button Badge; MSM - Gagarin, Button Badge; Set of six pin badges showing "Lunakhod-1, Sputnik-1, Luna-3, Luna-9, Luna-16".

Prices and further details from Nik Steggall, 38 Victoria Crescent, Birkdale Road, Dewsbury, West Yorkshire WF13 4HJ.

## A DESCRIPTION OF THE MIR SPACE STATION

The Russian MIR space station circles the Earth at an altitude of between 350 and 400km in an orbit with an inclination of 51.6°. In its present configuration MIR consists of four main modules: the MIR core module and the scientific modules known as "KVANT", "KVANT-2" and "KRISTALL".

The MIR core module, which was launched in February 1986, has a mass of approximately 21 tons, a length of about 13.1m and a maximum diameter of 4.2m. It consists primarily of a passage area with five docking ports, a working area housing the command station, living/eating and hygiene facilities and a propulsion section through which a tunnel allows access to the KVANT module.

*Continued from page 4*

*What worried you most?*

That the lift off motor might not work properly and we would be marooned. There was no way at all out of that.

*How did you feel about the descent to the surface?*

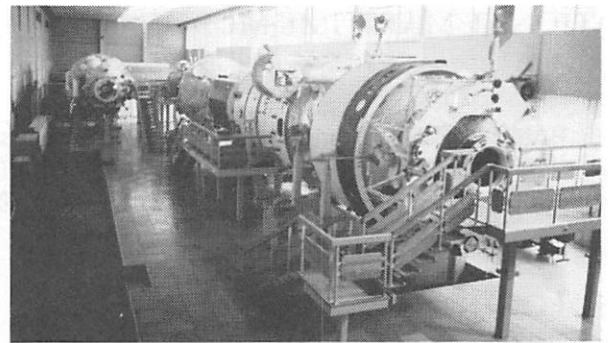
I practised exhaustively and decided the best approach was a very shallow glide angle - as shallow as the fuel reserves would permit. This gives the greatest flexibility in avoiding boulders and small craters. It worked, for we were able to land close to our designated area with the module at an acceptably level siting and stance for take off.

*What is Moonsoil like?*

There is literally nothing like it on Earth. It is utterly devoid of moisture, but it is so finely packed that dust grains pack around the larger grains which in turn pack the larger pieces. There are no small cracks or cavities in Moonsoil.

This made it difficult to drill core samples - the core tube had its sharp edge ground on the inside. This merely packed the Moondust so hard onto the coring bit that the motor stalled and would have burned out if we had persisted. Later expeditions had the sharp edge outside and were able to take deep samples.

Also when we tried to put the flag on the landscape we could



*The MIR Space Station training modules, photographed by Nik Steggall.*

KVANT, an astrophysics module that accommodates instruments from several countries, was docked to the MIR core module in April 1987. It is about 5.8m long, has a maximum diameter of 4.15m and a mass of about 11 tons.

KVANT-2, a module housing scientific and technological experiment equipment, a shower facility and an airlock supporting extravehicular activities, "EVA", (space walks) by the crew, was docked to the station in December 1989. It has a mass of about 19.5 tons, a length of 11.9m, and a maximum diameter of 4.35m.

The KRISTALL module joined the station in June 1990. It is mainly dedicated to technological research, such as semiconductor and biological experiments. It also houses Earth-observation instruments. The mass and dimensions of KRISTALL are similar to those of KVANT-2.

In August 1992, a thruster package, known as "SOFORA", was installed on a 14m mast mounted on top of the KVANT module. These thrusters allow efficient and propellant-saving attitude control of the station. Two further modules are planned to be added to MIR. The "PRIRODA" module, mainly dedicated to Earth-observation tasks such as ocean surface-temperature measurement and studies of the ocean/atmosphere interactions, and the "SPECTR" module, supporting studies of the Earth's atmosphere.

Logistical resupply of MIR is provided by the unmanned PROGRESS system, with a payload capacity in the order of 2.5 tons. The crew is transported to and from the station with the SOYUZ-TM vehicle, which can accommodate three cosmonauts/astronauts per trip. Both the SOYUZ-TM and PROGRESS are expendable systems and are launched by the SOYUZ launch vehicle.

The results of the experiments, including samples, film etc, are usually returned to Earth by the cosmonauts on board the SOYUZ-TM capsule. A special unmanned re-entry capsule enhances these return capacities.

Recently agreements have been made for the U.S. SPACE SHUTTLE to visit MIR up to ten times over the period 1995 to 1997, prior to the development of a global space station. There is therefore the possibility for the SHUTTLE to be used to carry equipment to MIR and to return samples, film etc from MIR to earth.

not drive the flagpole deeper than 3 or 4 inches. The soil just compressed underneath the base of the pole. Again, later expeditions had better flags!

*Do you think the Moon could be a useful base for manned flight to the planets?*

I have mixed feelings about that. Theoretically one could do all sorts of tasks - some because of the low gravity could be easier than on Earth. But my own feelings are that the alien nature of the materials (even common rocks and sand) combined with the extreme difficulties of working in a full lunar space suit mean that work by a construction team would be almost impossible by present means. There are many problems which need to be fully addressed apart from the physics of no water or free hydrogen.

Perhaps the only useful material we may obtain from the lunar surface is helium 3 (He<sub>3</sub>) which could be usefully used in a fusion rocket motor.

Such a motor would give us very useful Solar System flight with minimal danger from radiation.

I feel that we may ignore the Moon and go on to Mars where the climate - and presumably materials are a little more Earthlike.

Reproduced from *Spaceflight*, January, 1994, by permission of the author.

## NATIONAL MARITIME MUSEUM

Greenwich London SE10 9NF (tel: 081-858 4422)

**FAMILY EVENTS** bring to life the fascinating stories of famous astronomers such as Galileo, Flamsteed and Halley.

## THE LONDON PLANETARIUM

Marylebone Road, London NW1 (tel: 071-486 1121)

Wednesday March 23, 6pm  
**THE ASTRONOMY & ASTROLOGY OF GEOFFREY CHAUCER**  
Lecturer Dr Allan Chapman of Wadham College

Tuesday April 5, 6.15pm  
**MY LIFE IN SPACE**  
Stories of life on the MIR Space Station by Russian Cosmonaut Georgi Grechko.

*N.B.* All tickets £5.50 inc. wine, bookable in advance. Doors open 5.45pm.

*Admission:* Adult £4.20, Under 16 £2.60, Senior Citizen £3.25, Family £11.00.

**\*Please Note:** Tickets for Cub Scouts Sessions must be booked in advance through the Group Booking Office.

**Details of the 1994 Space Competition were given in the last issue of GNOMON. The last date for receiving entries is April 15th.**

## SIXTH INTERNATIONAL YOUNG ASTRONAUTS' CONFERENCE

A winning entry to the competition to help towards the expenses incurred in attending this conference was one submitted by Edward Taylor of Croydon, Surrey. In a letter to Dr Anne Cohen, AAE President, Mr Taylor describes how he first became interested in astronomy by taking a course at his college, which led to his attending the conference in Korea.

Mr Taylor described how he wrote to a number of companies inviting sponsorship of his trip, but all sent rejections. He managed to scrape a few pounds together, feeling quite depressed, but almost at the last moment, money started to come in, from his college, BT, the Mills Observatory, a local Rotary Club and (of course), the AAE. The delegation numbered seven, from various places in the U.K.

The numerous participants from all over the world were welcomed on arrival in Korea, especially by local children who persistently asked for their autographs. At a celebration of welcome, the Expo Organising Committee Chairman, Myung Oh, introduced to the delegates astronauts from the U.S.A., Canada and Russia. A number of events, such as the launching of Young Astronauts' rockets, were laid on. At Expo they visited various pavilions, in particular some demonstrating the use of "alternative" energy sources such as wind, waves and solar power.

A conference at which questions could be asked of the astronauts was a great success.

The U.K. delegates enjoyed the company of their colleagues from other countries, and they exchanged addresses.

On the final (fourth) day, the young aspirants were taken to the Expo site and entered a garden where the planets were represented by appropriate sculptures.

A slide show depicting man's growing interest in astronomy and space was put on. Their own personal guide StarFinder welcomed them to StarQuest, guiding them to a simulated space station where they boarded their shuttle, then to a fantastic space adventure through the asteroid belt and Saturn - and even to the centre of a black hole!

At the closing ceremony, the young astronauts were thanked for their participation, and were urged to continue their space interests in the future.

# NEWS FROM THE RAS EDUCATION COMMITTEE

## NOVEMBER 1993



### PERSPECTIVES FROM SPACE

The RAS Education Committee has obtained a number of sets of posters which are available for loan for educational purposes.

Each set consists of eight (57cm x 72cm) posters in a series called "Perspectives from Space" which were developed by NASA "as a contribution to public understanding of space science in the spirit of International Space Year, 1992". The posters have eye-catching colour on one side while the other side consists of a montage of four A4 pages of text and diagrams illustrating the theme of the poster. The material was designed for teachers and educators and may be freely copied for educational purposes. The titles of the posters are:

1. Earth, an integrated system.
2. Patterns among planets.
3. Our place in the cosmos.
4. Our Sun, the nearest star.
5. Oasis of life.
6. The influence of gravity.
7. The spirit of exploration.
8. Global co-operation.

The posters have been encapsulated in clear film for protection and would form a valuable resource for class project work or for special exhibitions. The loans will be free but borrowers will be expected to pay the cost of collection and delivery. Two sets are held at each of the following four locations. For further information or to book a loan period please contact the one nearest to you.

The Executive Secretary,  
Royal Astronomical Society,  
Burlington House,  
London W1V 0NL  
(tel 071-734 4582)

The Education Officer,  
Jodrell Bank Visitor Centre,  
Macclesfield,  
Cheshire SK11 9DL  
(tel 0477 71339)

The Public Relations Assistant,  
Royal Greenwich Observatory,  
Madingley Road,  
Cambridge CB3 0EZ  
(tel 0223 374000)

The Education Officer,  
Royal Observatory Edinburgh,  
Blackford Hill,  
Edinburgh EH9 3HJ  
(tel 031 668 8100)

### NATIONAL SCIENCE, ENGINEERING AND TECHNOLOGY WEEK, 18th -25th MARCH, 1994

At the BAAS meeting in Keele, William Waldegrave announced that the period 18th - 25th March, 1994, would be National

Science, Engineering and Technology Week. The idea is to encourage as many events as possible, to take place during this week, which are designed to bring S.E.&T. to the public at large. The national programme is to be co-ordinated by the British Association.

The RAS is trying to encourage astronomy and geophysics groups throughout the country to organise a public event to take place during this period to publicise our areas of interest. Ideas include holding open days, public lectures, local radio phone-ins, star parties, competitions, exhibitions, slide shows / videos in village halls, libraries, schools etc. Look out for posters advertising such events in your area, or contact your nearest university astronomy or earth science department, planetarium or astronomical society to find out what is planned.

If you are organising an event please also tell the education committee and we will help to publicise it. Help us to ensure that astronomy and geophysics enjoy a high profile of activities during this time.

Don't delay! Start planning today, so that we can co-ordinate our publicity.



### ASTRONOMY IN SCHOOLS

The next day-long workshop in our popular series of "Training the Trainers" is planned for Saturday, April 9th, 1994 at ROE. This is timed to coincide with the Edinburgh International Science Festival (EISF), and just after the NAM, 1994. Anyone involved in the teaching of astronomy at school level is welcome to attend. Look for details in the official EISF programme.

*Margaret Penston, Chair, RAS Education Committee*

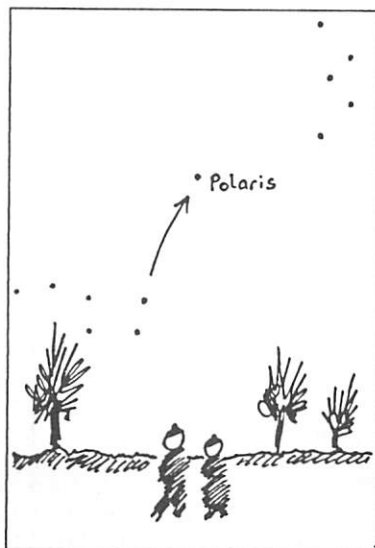
### The sky is your compass, or finding your way in the Northern Hemisphere

One of the most important uses of astronomy has been in navigation. In the Northern Hemisphere the pole star, Polaris, stands as a compass needle indicating North to travellers making their way on a clear night. You can find Polaris using two pointer stars from The Plough. The sketch shows just how to do this.

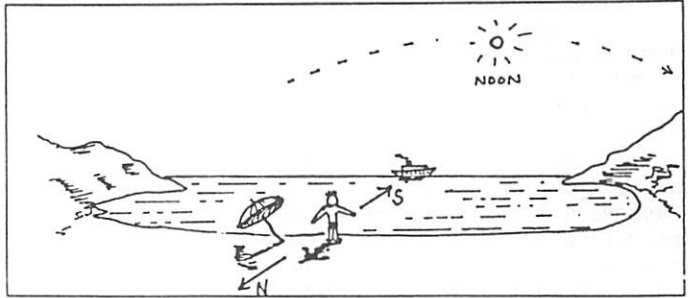
Polaris is not particularly bright but it is found in a part of the sky which has few other bright stars and so it is easy to find. As an additional hint if you can find the "W" shape of Cassiopeia then Polaris lies between this and The Plough. Once you have found North you can then identify the other cardinal compass points. Of course if it is cloudy you'll have to ask a policeman!

What about daytime navigation? Although Polaris is still there the bright Sun overshines the distant stars. But the Sun itself can provide a clue to directions. At midday in the Northern Hemisphere the Sun is in the South. At "local apparent noon" the Sun reaches its highest point in the sky and all shadows are cast in a North-South line. Sundials will show 12 noon at this time but watches are likely to read near 12 noon (or near 1pm during daylight saving time - BST in the UK).

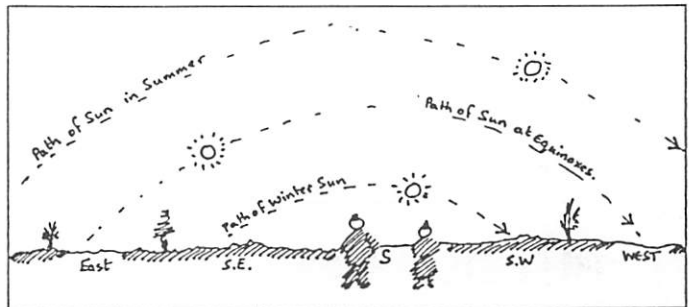
It is more difficult to locate East or West in the morning or



evenings. At the Autumn and Spring Equinoxes the Sun will rise in the East and set in the West. This will help you to locate true East and West but only on March 22nd and September 22nd.



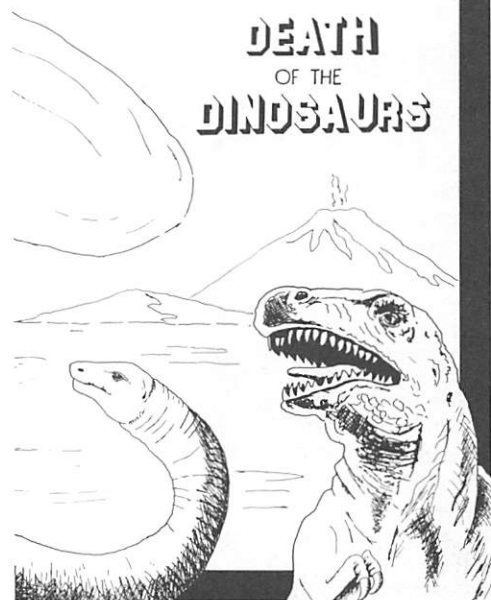
In the Summer months the Sun rises towards the North East and sets in the North West. In Winter it rises in the South East and sets in the South West. The diagram shows how the position of the Sun changes. Can you see why days are longer in the Summer?



There is a North American Indian story of the rabbit who wanted to shoot the Sun because it prevented the rabbit from hunting in the dark. Each morning the rabbit would wait for the Sun to rise but each morning the rabbit fired and missed because the Sun rose in a different place every day.

I remember driving from East to West London one evening when the Moon was bright. I took some back roads to avoid a traffic jam and soon found myself lost and having to rely on my own sense of direction to find my way home. After what seemed like a dozen clever turns and shortcuts a glance out of the car window showed the Moon on my right. What happened next? That's right - ask a policeman!

*Bob Kibble*



### Death of the Dinosaurs

*This article is provided by Eva Hans and is published by Summer Triangle Publishing. It is reproduced by permission.*

The dinosaurs were one of the most successful groups of animals to live on our planet. They dominated the Earth for 160 million years, but 65 million years ago they disappeared.

Some astronomers think that the death of the dinosaurs was

# Sky Diary Spring 1994

By Eva Hans

caused by an object from space which collided with the Earth. This caused such a change in climate that the dinosaurs could not adapt, and became extinct. The object which hit the Earth 65 million years ago may have been an asteroid or a comet. Asteroids are small rocky bodies a few km across which orbit the Sun like tiny planets. Most of them are confined to a band of the solar system between the orbits of Mars and Jupiter, but some of them have orbits which bring them close to Earth. Comets also travel around the Sun. They are made mainly of ice with some rocks and dust frozen into it. When they get near to the Sun some of the ice melts, turns into a gas, and releases the dust. The gas and dust then stream away from the comet to form a long tail. The tail always points away from the Sun.

The orbits of comets and asteroids are quite different. Asteroids usually have orbits which are nearly circular, like those of the planets. Comets, however, have orbits which are very long and narrow. The shape of a comet's orbit is called an ellipse.

## PHYSICS OF ASTRONOMY

### Notes for the NEAB Option

The booklet is designed to encourage more teachers to teach the NEAB Physics of Astronomy option. It has been endorsed by the AAE Council and it is also designed to provide students with a set of notes to make them more secure in their studies.

The booklet goes far enough to allow a teacher new to the material to use it as the basis of a teaching course but not so far as to prevent a keen student using it as a self-study guide.

The desk-top published booklet comprises sixty sides of notes and diagrams and is copy-right free.

The author took a Masters Degree in Radio-Astronomy at Jodrell Bank and is presently a member of the Council of the Association for Astronomy Education.

A single copy of the latest version may be obtained by sending ten First Class Stamps to:

Mr Alan C. Pickwick,  
Manchester Grammar School,  
Manchester M13 0XT

### SPRING 1994

Equinox: Mar 20<sup>d</sup> 20<sup>h</sup> 28<sup>m</sup>  
Solstice: June 21<sup>d</sup> 14<sup>h</sup> 48<sup>m</sup>

### PHASES OF THE MOON:

New Moon	First Quarter	Full Moon	Last Quarter
Apr 11 <sup>d</sup> 0 <sup>h</sup> 17 <sup>m</sup>	Apr 19 <sup>d</sup> 2 <sup>h</sup> 34 <sup>m</sup>	Mar 27 <sup>d</sup> 11 <sup>h</sup> 9 <sup>m</sup>	Apr 3 <sup>d</sup> 2 <sup>h</sup> 55 <sup>m</sup>
May 10 <sup>d</sup> 17 <sup>h</sup> 07 <sup>m</sup>	May 18 <sup>d</sup> 12 <sup>h</sup> 50 <sup>m</sup>	Apr 25 <sup>d</sup> 19 <sup>h</sup> 45 <sup>m</sup>	May 2 <sup>d</sup> 14 <sup>h</sup> 32 <sup>m</sup>
June 9 <sup>d</sup> 8 <sup>h</sup> 26 <sup>m</sup>	June 16 <sup>d</sup> 19 <sup>h</sup> 56 <sup>m</sup>	May 25 <sup>d</sup> 3 <sup>h</sup> 39 <sup>m</sup>	June 1 <sup>d</sup> 4 <sup>h</sup> 2 <sup>m</sup>

### PLANETS:

**Mercury** is a morning object till April 22nd then reappears in the evening sky from May 8th to June 16th. The best chance to see Mercury is during the last two weeks of May.

**Venus** is in the evening sky.

**Mars** is in the morning sky. It comes into conjunction with Mercury on April 4th.

**Jupiter** is well placed for observation throughout the spring. It is at opposition on April 30th when it can be seen all night.

**Saturn** is a morning object in the constellation of Aquarius.

### ECLIPSES

There is an annular eclipse of the Sun on May 10th. As the Moon is at apogee (greatest distance from the Earth) on May 9th, it appears too small on the sky to cover the entire disk of the Sun. Thus, instead of a total eclipse, a ring of the bright photosphere of the Sun will be seen around the dark disk of the Moon at mid-eclipse. This phenomenon however will not be visible from the UK where the eclipse will be seen as partial.

Eclipse begins	May 10 <sup>d</sup> 14 <sup>h</sup> 12.2 <sup>m</sup>
Central eclipse begins	May 10 <sup>d</sup> 15 <sup>h</sup> 23.3 <sup>m</sup>
Central eclipse ends	May 10 <sup>d</sup> 18 <sup>h</sup> 59.5 <sup>m</sup>
Eclipse ends	May 10 <sup>d</sup> 20 <sup>h</sup> 10.6 <sup>m</sup>

Sunset (55°N) May 10<sup>d</sup> 19<sup>h</sup> 52<sup>m</sup>

The second eclipse visible during spring 1994 is a partial eclipse of the Moon on May 25th. This can be seen from southern parts of the UK.

Moon enters penumbra	May 25 <sup>d</sup> 1 <sup>h</sup> 17.9 <sup>m</sup>
Moon enters umbra	May 25 <sup>d</sup> 2 <sup>h</sup> 37.3 <sup>m</sup>
Middle of eclipse	May 25 <sup>d</sup> 3 <sup>h</sup> 30.3 <sup>m</sup>
Moon leaves umbra	May 25 <sup>d</sup> 4 <sup>h</sup> 23.3 <sup>m</sup>
Moon leaves penumbra	May 25 <sup>d</sup> 5 <sup>h</sup> 42.7 <sup>m</sup>

Moonrise (55°N) May 24<sup>d</sup> 19<sup>h</sup> 40<sup>m</sup>  
Moonset (55°N) May 25<sup>d</sup> 3<sup>h</sup> 51<sup>m</sup>

All times are given in U.T. which is approximately equal to G. M.T.

You may obtain a free copy of the information sheet "The Sun and Eclipses" by sending a s.a.e. to The Planetarium, South Tyneside College, St George's Avenue, South Shields, Tyne and Wear NE34 6ET (tel 091 456 0403 ext 477).

AAE Membership is open to anyone interested in Astronomy Education. There is provision for individual and corporate membership. All members receive the newsletter GNOMON four times a year. Members may advertise free in the newsletter. There are teachers' resource packs at primary and secondary levels. Members are eligible for a 10% discount on all AAE publications.

Subscriptions (subject to annual review) are:

Corporate .....	£15.00
Individual .....	£7.50
Retired (senior citizen) .....	£5.00

Further details by phoning 071-274 0530 or 0924 454718.