GNOMON

Newsletter of the Association for Astronomy Education

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A grant from The Royal Astronomical Society enables "The Universe in the Classroom", the Newsletter of The Astronomical Society of the Pacific, to be sent to members with issues of "GNOMON".

1996 ASSOCIATION FOR ASTRONOMY EDUCATION ANNUAL GENERAL MEETING

This year we are delighted to be joining the Federation of Astronomical Societies at their AGM to share some excellent speakers and facilities at the University of Liverpool. Please fill out the registration form in this issue if you wish to attend. As well as the AGM, you are also invited to wander around the extensive trade stands - there will be books, telescopes, slides, posters and other resources on sale - and for those who indicate it on their forms, tickets to Liverpool Planetarium will be available.

The FAS has organised a selection of interesting lectures including Solar Eclipses, Astrophotography, and Radio Astronomy. For further details see the flyer.

AGENDA

1 Minutes of the last Annual Business Meeting (17th June 1995)
2 Reports from officers of Council
3 Subscriptions - the issue of covenants
4 Fulfilling our aims - our future direction
5 Election of Council for 1996/97
6 Any other business

Nominations for posts on Council:
All 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 AAE issues - new faces are always welcome!. 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.

EDITORIAL COMMENT

This issue of Gnomon has a bit of a hi tech slant, so apologies to those of you without access to email or the internet. There is a vast amount of good astronomy teaching material available through the electronic medium and I feel that as Gnomon is a vehicle for spreading news and astronomical resources, it should have some guides in it to where the latest goodies can be found. This is NET NOTES. Contributions to this section are welcomed. If anyone has strong feelings about whether they would like to see a selection of internet material regularly downloaded and printed out for those teachers who do not currently have access, then please let me know and I'll see what is possible.

There are also lots of goodies around the country in the form of mobile planetaria and more permanent resources and this issue sees the continuation of the Focus On.... section.

I'd like to welcome Roger O'Brien back in this issue. Roger will be expanding the sky notes back page for us by including a mixture of current news and goings on as well as pointers to what's easy to look at up there. I'd appreciate your comments on the Star Map - was it handy, did it photocopy OK, what else would you like to see on it?

Next issue will see the start of regular

continued on page 2

MEMBERSHIP of the AAE costs £7.50 a year for individual members, £15 for corporate membership and £5 for retired persons. For more information, contact Nik Steggall (address letters to: AAE, Royal Astronomical Society, Burlington House, Piccadilly, London W1V 0NL). Members receive 4 issues of GNOMON a year.

GNOMON - definition from the **Concise Oxford Dictionary:**
Pillar, rod, pin or plate of sundial, showing time by its shadow on marked surface; column, etc. used in observing sun's meridian altitude

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.

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

The Association for Astronomy Education,
The Royal Astronomical Society,
Burlington House, Piccadilly,
LONDON. W1V 0NL.

Editor: Alex Lovell, 6 Red Hill Crescent, Wollaston, Wellingborough, Northants NN29 7SX - for all enquiries concerning the Newsletter.
(Tel 01933 665875/664646)
Email: alexlovell@dial.pipex.com

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.

Publication Dates:

These are the equinoxes and the solstices, that is four times a year. Copy deadlines are two months *before* these dates.

FOR YOUR INFORMATION . . .

Mount Wilson Summer Programme for Undergraduates.
For the seventh year running, undergraduates in physics or/and astronomy, who are considering a career in science or science teaching can apply to spend two weeks at Mount Wilson in the San Gabriel Mountains above Los Angeles. The programme centres around a short course in astronomy and astrophysics with a major hands-on component. This year activities include observations with the Snow Solar Telescope, a wide range of visual, photographic and CCD projects and observing with the 100 inch Hooker telescope. In addition, there are lectures on historical topics and a variety of field trips.

Anyone interested in applying should write the address below by 12th April 1996 requesting an application form. The bad news is that you have to find your air fare to Burbank, California and also a fee of $1375 (£920). This is to cover *all* expenses during the two weeks. Still, it is a marvellous opportunity.

Prof Joseph L. Snider, CUREA Director, Dept of Physics, Oberlin College, Oberlin, OH 44074 USA
email fsnider@alpha.cc.oberlin.edu

While on the subject of expensive trips, ***The Friends and Partners in Space International Workshop*** takes place in Russia, April 7-13th 1996. This week long programme will include; lectures by leading Russian and US space professionals, tours of Russian facilities including Star City and various Space Museums, cultural tours, hotel, all meals including a banquet in honour of the 35th Anniversary of Yuri Gagarin's flight, transportation in Moscow and all programme materials. The cost is approximately $700 (£470). For more information contact Jennifer Green at **jlgreen@clark.net** or phone 00 1 301 464 3361.

British Association of Planetaria Meeting.
The BAP is open to anyone in Britain or Ireland who is working in a planetarium or public observatory or who runs a mobile planetarium. The association is very informal. It aims to offer support to members new to the planetarium field and fosters co-operation between establishments. There is an annual meeting and a newsletter is generally circulated at least once a year. At the moment there are no fees, but plans have been put forward to make the BAP more formal which may involve charging a small subscription. The BAP is affiliated to the International Planetarium Society (representation: Undine Concannon, London Planetarium).

The next BAP meeting will be at London Planetarium on 18th May 1996.

Anyone interested in Joining BAP should contact: E M Hans, The Planetarium, South Tyneside College, St George's Avenue, South Shields, Tyne and Wear NE34 6ET, Tel 0191 427 3589

There are several ***ECLIPSES*** this year, and to help schools and organisations, Eva Hans at South Tyneside Planetarium has put together an **eclipse work pack**. You can get a copy by sending two, first class stamps and your address to the planetarium address above.

PONLAF, the Astronomy Forum at the University of North London has sent me a list of their programmes for 1996, some are detailed below. Previously, PONLAF notices have been sent to all Gnomon subscribers in the London Area with Gnomon. To avoid sending copies to those who do not wish to receive them, wasting paper and postage, could anyone wishing to receive the PONLAF newsletter (details of societies within M25 and TV/Radio listings of interest) let me know either by phone, letter or email and I will send them to you as we get them.

PONLAF meets on the last FRIDAY of the month at 6.30 p.m. in room 6/5, Tower Block, University of North London, 116-220 Holloway Road, N7. Each meeting includes a talk on an astronomical topic followed by conversation and questions over tea, coffee and biscuits. A £1 charge is made to cover refreshments, lecturer expenses. Closest tube is Holloway Road (Piccadilly Line).

Teachers in the West Midlands area may like to know of a new group, the West Midlands Federation Of Astronomical Societies. This is an umbrella organisation to co-ordinate the activities of astronomy and space societies in the West Midlands. They intend to hold regular Star Parties and Observing events throughout the year. If you need some volunteer astronomical assistance in your school or help with a school telescope of projects, then local societies can be a great source of enthusiastic help. With the formation of this federation, teachers in the West Midlands now only need one contact address to be put in touch with many societies. That address is: Andy Salmon, 13 Jacmar Crescent, Smethwick, Warley, West Midlands B67 7LF, email 100716.1460@compuserve.com, fax 0121 565 3194

For teachers in other areas contact Chris Sheldon of the Federation of Astronomical Societies, enclosing an SAE, at F.A.S, Whitehaven, Lower Moor, Pershore, Worcs. WR10 2NY.

The F.A.S also produces a yearly handbook which lists not only all the (190!) local astronomical societies, but also national ones, places to visit, sources for slides, videos and other materials and lists of speakers on astronomical topics. The F.A.S also has its own extensive slide collection from which you can purchase either just a single slide of something specific, or many different ones. ***The Handbook*** can be obtained from M. Jones, Tabor House, Norwich Road, Mulbarton, Norwich NR14 8JT

Cost for this year's Handbook hasn't yet been determined. If you are interested, drop an SAE to M Jones for details.

In this GNOMON you should find a copy of the latest ***National Astronomy Week*** newsletter. If you haven't got one, call the editor. Phone number on the front cover.

Last but by no means least, remember to read your AGM leaflet in this issue!

BACK ISSUE BLITZ

With the position of Editor comes the position of Back Issue storage. With my storage space being a little more scarce than Eric Zucker's, I thought now would be a good time to remind you all of the following.

ANY BACK ISSUE OVER A YEAR OLD IS AVAILABLE AT 50p EACH.

I currently have all issues back to 1990 available so if you are missing one or two, or it has always been a question in your mind as to whether the back issues might contain the perfect school project that you've been looking for, then now would be a jolly good time to send for them.

Make your cheque/PO payable to "The Association for Astronomy Education" and send to the Editor's address (see front page).

continued from page 1

features for Key Stages 2 and 3 in response to requests from readers and the usual mix of news and views. Hopefully by June, some of the worthy science bids that have been submitted to the Millennium Commission will know where they stand. Lets keep our fingers crossed that I will have good news to report from around the country.

Finally, thanks to everyone that has been supportive during this transition phase. I'm now getting more used to the mailbag and responsibilities of Editor and my tiny village post office is glad of the quarterly business!

FOCUS ON . . . THE STAR CENTRE

Galileo's probe plunges into Jupiter, Hubble broadcasts amazing images of deep space and planets outside the Solar System seem to be discovered daily. Astronomy is now front page news. To cater for the heightened public awareness of the oldest science, Sheffield Hallam University has launched Star Centre, the UK's first astronomy information and activities base.

Funded jointly by the university and a grant from COPUS, the twin aims of the centre are to facilitate public access to information and to promote observation of the night sky. Brainchild of Professor Bill Harrison and Stardome Director Dennis Ashton, the centre operates from the Centre for Science Education.

At the heart of the information centre is the Internet link to the World Wide Web. This and the centre's own database provide news and data for public use. Resident astronomer Keith Atkin has joined Dennis in interpreting astronomical information for the public. Users contact Star Centre by phone, fax, letter or email: so far many requests have been for images, star charts and factual information, whilst others have been asked for advice on starting astronomy and buying telescopes. Schools, both teachers and pupils, are beginning to use the centre in their studies of the Earth and Beyond.

Star Centre also organises public observing sessions. The first Star Night in December attracted over 300 visitors to view the night sky from Thornbridge Educational Centre in Derbyshire. A second Star Night is scheduled for March 23rd. A novel feature is our Astro Take-Away, in which groups book our astronomers to bring their telescopes to an agreed viewing site. Several Take-Aways have occurred though we are still waiting for a clear night!!

The next large scale promotion is an astronomy convention to be held at Hallam University on October 19th. The convention will feature talks by eminent astronomers including Patrick Moore, trade stands, society exhibitions, mobile planetaria, workshops and cybercafes to surf the net, explore software and connect to Bradford's Robotic Telescope.

Future developments include public and school observing projects. The first, on meteor watching is already prepared and others will follow. If you have any ideas for such projects, we would be delighted to hear from you. Once our internet pages are on line, we will publish a regular newsletter which will also be available as hard copy.

Star Centre has received an encouraging response both from the public and the astronomical establishment. At the launch, hosted by Helen Sharman, there were messages of support from ROE, RGO, Jodrell Bank, Lovell Observatory, and a lovely fax from Valentina Tereshkova. The opening was also attended by Galileo Galilei, who gave us a truly inspiring glimpse into his life and times.

Star Centre seems to be meeting a public need - we hope that schools all over the country (not just in Sheffield) will find our service valuable too.

Star Centre is at: Centre for Science Education, Sheffield Hallam University Collegiate Crescent Campus, Sheffield S10 2BP, phone 0114 253 4352, fax 0114 253 2299

Dennis Ashton.

Ed's Note: Galileo can be booked for all kinds of functions. He comes complete with many experiments, full costume and Italian accent! This kind of role playing scientist is an excellent way to bring astronomy alive for an audience of any age and makes a change from the usual lectures. Peter Joyce, who plays Galileo is also well known for his Newton character. You can contact Peter Joyce at: 39 Mafeking Avenue, Brentford, Middlesex, TW8 0NJ. Phone 0181 568 1019.

NET NOTES

Compiled by Alex Lovell with contributions from Steve Tidey, Alan Pickwick and others.

There are plenty of astronomical sites on the world wide web and also plenty of astronomy related electronic 'things'. We'll start with the latter. (All addresses will be typed in bold for clarity, they don't need to be in bold when you use them)

Those of you with an interest in what goes on in the planetarium field can subscribe (free) to a listserv called Dome-L. A listserv is an electronic mailing list. If you want to ask a relevant question, make a point or ask for help, you just send one message to the mailing list and it gets sent to everyone else on the list. Dome-L consists of about 350 planetarians and the topics of discussion range from obsolete equipment and projector bulbs to teaching ideas, job announcements and general interest. To subscribe you need to send an email to:

listserv@listserv.unc.edu
(no subject line is needed)
In the body of your message type:
subscribe DOME-L <firstname lastname>
eg subscribe DOME-L joe bloggs

That's it. You will receive a general message about how to send messages to the listserv and then about every day you will get a 'digest' of the days postings delivered to your email address.

While on the subject of planetariums, more general and emotional discussion on astronomy education can be found lurking in the newsgroup **sci.astro.planetarium.** You can find this if you have access to **USENET.** It is in the sci. family of newsgroups along with **sci.astro** (where you can find a variety of weird and wonderful people), and **sci.astro.amateur** (discussions on telescopes, new planets, latest observations and much more). If you can't find sci.astro.planetarium them you can contact **LHSastro@garnet.berkeley.edu** and ask for the newsgroup postings to be mailed to your email box.

There are a couple of bulletin boards for astronomy in this country. To access them you only need a modem and some communications software.

Starbase One has been going since modems were invented! It has probably the largest resource of downloadable astronomy computer programmes, data, images and information available. You can also access the postings from the different sci.astro groups and exchange emails with other people who log on. You get limited time free, but if you like what you find, please subscribe. It costs about £15. The only downside is that if you live outside the 0171 area, it can be pricey to spend a while on line and you may need to spend quite a while exploring to find what you are looking for. **Starbase One can be found on 0171 733 3992.**

The Search for Extraterrestrial Intelligence Institute in California have a newsletter that will be mailed to you free if you request it. You can find them at **http://www.seti.inst.edu.**

The Astronomical Society of the Pacific, who produce the excellent Universe in the Classroom and a mouthwatering catalogue of slides and resources have web pages at **http://www.physics.sfsu.edu/asp.** From here you can read Universe in the Classroom back issues, browse the catalogue and learn about where to write to for other information.

NASA can be found at **http://www.gsfc.nasa.gov** and the SpaceLink site at **http://spacelink.msfc.nasa.gov** is good for the latest mission news and images. Another good NASA site is the Space Calendar, **http://newproducts.jpl.nasa.gov/calendar**

And finally for this issue, most things on the net are found by chance, but you can increase your chances of finding relevant material by starting your surfing from a page that has many links to other similar pages. Such sites are: **http://www.lochness.com** (resources, planetarium home pages, slides etc) and the UK Astronomy Pages at **http://www.ukindex.co.uk/astro**

I will be pleased to receive your suggestions and comments for this column.

THE EVENING CLASS - SOME SUCCESSFUL LESSONS

As reported in the last issue, I have been teaching four astronomy classes a week at various levels for the last few months. This gave me plenty of opportunities to practice teaching the same lessons in various ways. It is worth reporting two of the more successful lessons.

The first is one we may all have begun with, the traditional "slides around the solar system" lecture. In the past I've done this by talking about each slide in isolation, years ago relying on the notes published with the slides, but more recently relying on my general experience. This is very much the "I talk you listen" school of teaching. I have recently tried out a comparative planetology approach which gives an overall structure to the lecture and allows greater student involvement in the work. I began with a general discussion of four questions.

Why are celestial objects spherical? (Roundness depends on composition, size and internal structure) The moons of Mars and most asteroids are non-spherical.

Why does volcanic and plate tectonic activity occur? (the energy for these processes arises from radioactive decay in the core balanced against the heat loss by radiation at the surface, smaller objects cool more efficiently)

Is the object likely to have an atmosphere? (depends on composition ,mass and mean temperature)

What is the composition of the object? (treating the solar system as a vacuum distillation apparatus)

Showing slides in the light of these and other possible questions still allows the traditional tour round the solar system but also gives a consistent set of ideas to "test" against our "observations". In this format the lecture was well received, and with one group I risked a final session in which students took turns to talk about the slides. The fact that some could do at least as well as me suggests that either I am really bad at this or that this problem solving approach gave them a model around which to structure their remarks. The slides were an augmented set of "The Solar System" from Armagh Planetarium.

The second session was almost uniformly successful as it needs few "props" to succeed well. An initial information sheet sets the scene in Italy, the date 1600 ish and the event an enquiry into the conduct of Galileo. This is something of an historical travesty as it includes both of his examinations and various witnesses such as Copernicus and Aristotle who were definitely dead at the time.

The activity developed each time I ran it but it worked best when I had flexible furniture and chose two of the liveliest students for the Pope and Galileo. Some "props" such as large carver chairs for the antagonists, a bible or two and sometimes additional notes which students had made in advance.

I usually "invited" a volunteer to be Galileo a week in advance and invited the group to read about the events if they wished. The format was to start with an empty arena. Each character introduced themselves and gave as much detail of their opinions as they thought prudent in the light of the extreme penalties for heresy. The Pope or the inquisitor then opened the debate with Galileo replying, each side was then invited to select witnesses for their case and so on until all the group was involved. When a useful witness was not called by either side the clerk of the court (me) invited them to speak from the floor. Most sessions ended with about equal numbers on each side and a similar group sitting on the fence.

In one session a particularly efficient Father Ximenes knew her Bible well and quoted scripture at Galileo. In another he was asked why arrows fired vertically upwards were not left behind as the earth moved, he replied that he'd never thought about that before, his case temporarily collapsed and Copernicus had to wade in to limit the damage.

It was amazing to see how involved people became in the trial with some becoming dogmatic and the evidence being pored over by both sides to try and justify their views. The session does need some preparation by the clerk as there is not enough detail in the character cards. This is a compromise between sufficient material to get the students started and so much that they get bogged down in the detail.

The resources for the inquiry were developed jointly by myself and Bob Kibble. I will provide a copy of the material on receipt of an SAE and a stamp to cover the cost of copying. Enquiries to;

Tony Lacey
282 Rutland Road, Nottingham, NG2 5EB

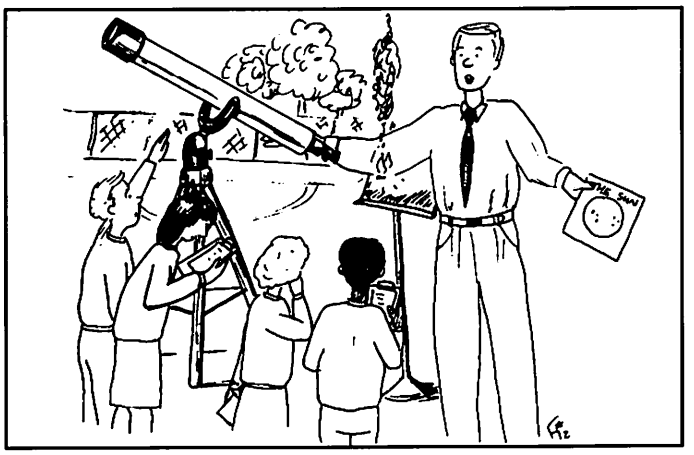
REGIONAL NEWS

North Yorkshire Schools have had access to a great resource for the past few years and I have only just uncovered it! Yorkshire Museum has been running 'Earth and Space', a programme for schools in the North Yorkshire area. Schools participating in the programme get a well written teachers pack with lots of activities in it, a corresponding childrens pack and a structured visit to the museum, York Observatory, Starlab and more.

I recently met Martin Lunn, Honorary Curator of Astronomy at the Museum who provided me with copies of the packs and also a comprehensive night sky guide written by himself. In line with the latest curriculum revisions these materials are now being updated.

At present there is no mechanism in place by which schools from outside of North Yorks can benefit from the materials or the programme, but interested teachers are invited to contact Martin at the address below and he will try and establish what can be done. In the meantime, Martin has agreed to address the yawning need in KS2 and 3 by preparing activities for future issues of Gnomon. We hope to print them in such a way that they can be put straight onto the photocopier. Thanks Martin.

Martin Lunn, Honorary Curator of Astronomy, Yorkshire Museum, Museum Gardens, York, YO1 2DR phone 01904 629745



CURRICULUM CORNER

The Junior Galileo In-tray Exercise

by Bob Kibble

Your name is Galileo. You live in Italy and you are a science teacher. The year is 1600. Most people believe that the Earth is flat and at the centre of the Universe and it does not move. You believe that the Earth is round and turns once every day. You think that the Earth orbits the Sun. This is one of the new ideas which you have been teaching.

Each day you receive letters asking for your advice on matters of great interest. This Monday you arrive at work and on your desk are four letters.

For each one you must write a reply, perhaps with one of your famous diagrams to explain your answers. Make each letter brief and to the point. You should need no more than one side of paper for each reply.

Dear Galileo,

I was a student in your lesson last week. You said that the Earth was round and not flat. But I can see quite clearly that it is flat. As far as the eye can see it is clearly flat (apart from a few hills and houses).

Did you make a mistake in your lesson?

Yours sincerely,
Rodger Simplicio.

Dear Galileo,

I read in the Padua Times last week that you had been teaching that the world was round and that it was turning. Surely if this were true we would all fall off. Gravity pulls downwards.

I think it is clear that the world cannot turn.

Yours sincerely,
Reshma Sagredo.

Dear friend Galileo,

At dinner last week you suggested a new idea. It was that the Earth was turning and that this explained night and day. I have thought about this idea and simply can not believe you.

If the Earth were turning then anything thrown into the air would speed off and never return. Birds would take off to fly to a nearby tree and quickly disappear sideways in a windy gust.

I hope that you seriously don't believe that the Earth turns.

Your friend,
Jane Salviati.

Dear Galileo,

My bishops have reported to me that you have been teaching the idea that the Earth moves around the Sun. For a thousand years we have always believed that it is the Sun that moves around the Earth. This is obvious. You can see the Sun move across the sky every day with your own eyes. After all this is how we get day and night.

I am sure there is some mistake. You can't possibly expect people to believe something that challenges what they can see with their own eyes.

Yours respectfully,

Pope Urban.

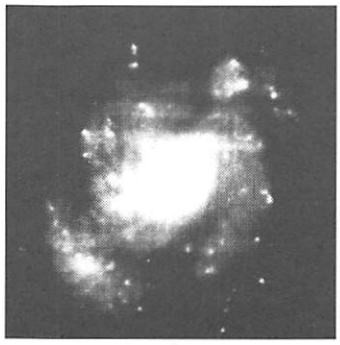
(From the Vatican)

This is an exercise aimed at Key Stage 2, Physical Processes, Section 4, The Earth and Beyond. It can be used as an individual exercise but will also work as a team task. It can encourage communication and interpersonal skills especially if set as a team task. It might find a place as a strategy for revealing misconceptions.

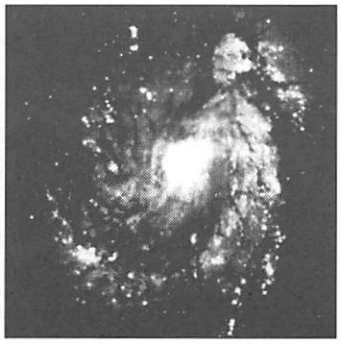
BOOK REVIEWS

HUBBLE VISION, by Carolyn Collins Petersen and John C. Brandt, published by Cambridge University Press in November 1995. ISBN 0 521 49643 8. Price £24.95 ($39.95) hardback.

This book is a fascinating description of the achievements of the Hubble Space Telescope (HST). It starts off with a review of the early days of the project and the disappointment at the poor quality of photographs received. Our readers are no doubt aware of the attempts to rectify the spherical aberration of the mirror - an incredible story in its own right. The extremely sharp images subsequently produced bear testament to the success in correcting the mirror. This book contains many of these photographs covering all aspects of astronomy.



Before.



After.

The authors, Carolyn Collins Petersen and John C. Brandt, both of the University of Colorado, are to be congratulated on this production which is aimed at the general reader (there is no mathematics) as well as the amateur astronomer and professional scientist.

It appeared to the authors that, in the early days at least, too much emphasis in the media was placed on the initial problems or the HST and to little on its positive achievements. To counter this, one of the authors wrote a planetarium programme called "Hubble: Report from Orbit", that listed some of the most important discoveries (1991). This became the basis of an award-winning educational video, which answered many questions put by members of the general public (1994), with the same title as this book.

There was much ignorance of these positive achievements - some people thought that the HST was "a piece of expensive, worthless junk"! However, in a 1993 issue of "Time", the HST was referred to as one of the "genuine marvels of technology" which had yielded "spectacular results". Subsequently, the negative attitude of the media began to change.

The most important feature of the telescope is its excellent resolving power, that is, the ability to see fine detail. Consequently there are many 'before' and 'after' photographs, both in black and white and colour. Many people may only be interested in these photographs and for them the book may be regarded as a beautiful catalogue (rather similar to Muirden and Allen's Catalogue of the Universe, 1979).

There are sections on the HST and the Solar System, the star and the interstellar medium, binary stars, the death of star, galaxies, black holes, quasars and cosmology. There is also a glossary of ten pages and four pages of references for further reading. A comprehensive index completes the book. The prices, £24.95 for the hardback is certainly value for money.

Eric Zucker.

DIVIDING THE CIRCLE, The Development of Critical Angular Measurement in Astronomy 1500-1850. Second Edition by Allan Chapman. Published by John Wiley and Sons at £24.95 (hardback) ISBN 0 47196 169 8.

This book is part of the Wiley - Praxis series in astronomy and astrophysics. Other titles in the series include the Aurora, Planetary Volcanism, Active Galactic Nuclei and many other, 14 in total. These books are written primarily for professional astronomer, astrophysicists, cosmologists, physicists and space scientists and are also accessible to students on these fields. However, some books on the series will appeal to the amateur astronomer, and keen A level students.

Dividing the Circle at first glance seems like a book that only a historian of astronomy would be interested in, and indeed the subtitle does nothing to dispel the idea that this is going to be dry factual book. However, as I am well acquainted with the author who teaches at the faculty of Modern History at Oxford and is a popular lecturer on the amateur astronomy circuit, I knew that despite its title, this book would be quite fascinating. I was not disappointed.

The book describes in great detail how the important job of positional astronomy evolved from inaccurate, cumbersome instruments, to more refined and accurate works of art. Dr Chapman details the lives and achievements of the main characters in this field and this detail is what prevents the book from becoming dry and boring to a non historian. We read all about the feuds between Newton and the Astronomer Royal, Flamsteed, the reluctance of some of the instrument manufacturers to tell their secrets and the large important instruments that were funded by wealthy individuals and not the government institutions.

The book details how measurements were taken, (not something many of us would want to have to do today) and what they were used for and it is this putting the subject in context that keeps the story alive and gives the reader a healthy respect for these historical astronomers. For the serious student, every chapter is copiously referenced and the diagrams serve to illuminate the reader when picturing all the dissecting, quinquisecting and measuring becomes tough.

In summary, this book is not for general school use, but it may be found a useful addition to a sixth from library where a project could be constructed around it. It is certainly more for the undergraduate in science or history or the keen amateur astronomer who will find it a good read.

Alex Lovell

SNIPPETS

New from the Antipodes. Our New Zealand member, Eric Jackson, has just written to update us on activities down under. Astronomy Education in New Zealand is undergoing similar trials to the UK in that three years ago it was placed on their science syllabus for children aged 5 upwards. This left teachers in the lurch with no teaching materials and so Astroworks, the main astronomy education group in NZ stepped in. Eric and the rest of the team are planning many projects for this year and we hope to have some news on the activities that they have been trying out in the next issue.

I was delighted to receive a gift of some astronomical Post-It's from a friend. Then I carefully read the text that surrounded a lovely graphic of the sun, moon and stars, it said, Reach for the Moon.....if you fall short you may land on a Star. I think that 'may' in this case should be taken with a major pinch of salt, and the manufacturers should be given a little rap on the knuckles for getting their astronomical distances completely wrong!

DON'T FORGET!!

On July 08-12 1996, the International Astronomical Union is putting on the Colloquium, New Trends in Astronomy Teaching. While the title sounds a bit daunting, I've now had a glimpse at some of the activities and I think there's something for everyone here.

Apart from University Education and Distance learning in Astronomy, there are also workshops planned on the student learning process, planetarium education and teaching, public education, and teaching astronomy in schools with special emphasis on primary and secondary level teaching and teaching materials.

Registration is £100 for the conference, but that includes many social events, tea and coffee, transportation, materials and so on. Accommodation can be provided at £15 per person per night including breakfast in University College London Halls. For full details, contact:

Dr D McNally, University of London Observatory, Mill Hill Park, London NW7 2QS phone 0181 959 0421, fax 0181 906 4161, email dmn@star.ucl.ac.uk

ASTRONOMY WITH ROBOTS

Imagine being able to use big telescopes on good sites to look at the stars. Imagine being able to eavesdrop on the work of professional astronomers whilst they are working. Imagine being able to see the night sky on the other side of the world from your classroom. This and more is already being demonstrated by the Bradford Robotic Telescope.

The telescope has been built by a research group in the department of Industrial Technology at Bradford University who are interested in astronomy but also are interested in advanced technologies that are applicable in British industry, generate jobs and are at the leading edge of research. Robotics is one of these technologies. The Bradford Group have developed the concept of autonomy where machines operate completely by themselves and if they get stuck they fail safely and phone for help. At least that is the theory and that is how a robotic telescope has been operating since December 1993 high in the Pennines near Haworth where the Bronte sisters lived 150 years ago and wrote novels like *Wuthering Heights* and *Jane Eyre*.

The robotic telescope is in its own enclosure surrounded by more than 40 sensors that inform it with a GO signal when it is safe, dark, not too windy and the skies are clear. All the conditions required to observe the stars. The enclosure has a roll-off roof and when the conditions are right the roof opens and the telescope gets to work until the sensors tell it that it is dawn or it is becoming cloudy with a STOP signal. The roof rolls back and the telescope goes to sleep again.

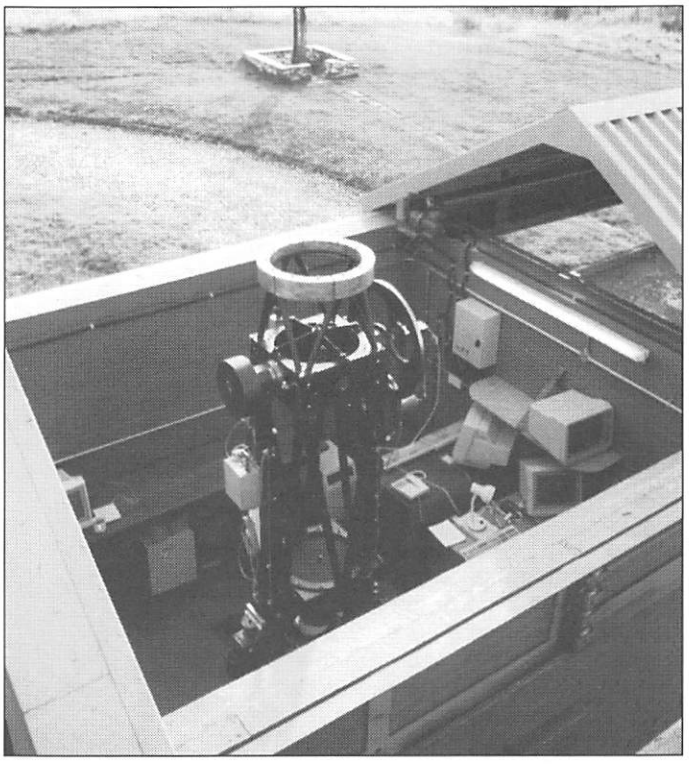
If you want to use the telescope you need access to the Internet with a World Wide Web browser. The World Wide Web address is (**http://www.telescope.org/**). That address on the Web is a computer called Baldrick situated in the Department of Industrial Technology at the University of Bradford. Baldrick is connected to the World Wide Web and connected to the Robotic Telescope with an ISDN phone line. The Web address includes the telescope and a CD-ROM produced by Armagh Planetarium and BTL Ltd which has many astronomical images and information that you can access. There is a set of classroom astronomy projects with teacher and pupil support material, there are links to other interactive sites on the Web, but if you want to use the telescope you click on *the robotic telescope*, avoid all the technical details, pictures of the team and press cuttings and go straight to *use the telescope*.

You will first be asked to register. This is a method of recording your email address and a password so that your work will be private to yourself and will be returned to you when complete. It is automatic and only takes a minute or so. The Web site handles up to 160 people at the same time and if you look carefully it will tell you how many people are using the system at the same time as you. By the beginning of January 1996 there were over 14,000 registered users in 71 countries.

Once you have registered you have to log in. Then you can make your request. The easiest route is to select the object you want from lists of the planets, the Messier objects or the named stars. You can also select any from the NGC catalogue of galaxies and nebulae by typing ngc and the number without a space or the same way for the SAO catalogue of stars. If your object is not in any of these catalogues you can click on *RA & Dec* and put in the epoch 2000 co-ordinates. There are many additional options including the option of selecting a broad band filter to take the image in a particular colour and of specifying an exposure time. If you leave any options out the telescope will select default values e.g. it will calculate exposure times. When everything is to your satisfaction you submit the job and the telescope will send you back details of the job that has been submitted with all the default values. If you approve the job is submitted to the scheduler with your name and your priority.

Every afternoon at about 4.00pm Baldrick looks at all the jobs that have been submitted and generates a schedule for that night. It has about 50% more jobs in it than can be done, but there is a good reason for this. When it has finished it sends that schedule up to the telescope every evening.

The telescope is surrounded by five computers all networked



together each with their own tasks. It is not difficult to guess what they are because the computers are called Control, Weather, Point, Image and Catalogue. It is Control that receives the schedule each night from Baldrick in Bradford and it is Control that waits for the GO signal from Weather before recalculating the best schedule for the time and the weather conditions from the 150% macro schedule sent up from Baldrick. The recalculation of the schedule takes place whilst the roof is rolling off and the telescope is checking itself. The telescope works very quickly. Most objects are scheduled in the south so the telescope does not move far. The shutter clicks the filter wheel and the focus whine with gaps of silence for the images to be read out and processed by Image ready for storage and transmission to Baldrick when the night is over.

When the job is finished you are informed by email and you can retrieve the image over the Internet with software called a FITS viewer to enable you to manipulate the image and get into the extensive header which will give you a host of detail about the image and the observing conditions when it was taken. They are all calculated automatically and are designed for stars, so if you ask for the moon the quality indices will be rather strange.

The weather on the moors of Wuthering Heights is fickle and you may have to wait a while for your observations. Whilst you are waiting you can access the Web site and see which observations are being scheduled and what is happening to your requests. You can also look at past observations that have been archived.

The Bradford Group have demonstrated eavesdropping which shows the screens of Control, Weather, Image and Point on the Internet. They have also demonstrated prompt observing where they have responded to signals from a satellite which has detected a gamma-ray burster event. Baldrick has received the co-ordinates within 5 seconds of the satellite detecting them in space and 10 seconds later the telescope has started slewing to get the gamma-ray burster in its sights.

Britain has a lead in robotic telescopes. They promise to bring a new era of exciting astronomy to the classroom and to open up new areas of research for amateur and professional astronomers alike. We cannot know what new discoveries they will make.

John Baruch
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Twinkle, twinkle little star
How I wonder what you are

Lewis Carroll summed up astronomy in a couplet of just ten words and it is easy to think we know what a star is. Our Sun is a fairly typical star. More common stars are smaller, redder and fainter. Stars that are larger and hotter are rarer. There are older and younger stars. It is very difficult to find a definition, of less than a book's length, to encompass all the many kinds of stars we can see.

The winter sky was dominated by the great scene stealer - Orion. With seven bright stars arranged in a simple, distinctive pattern, it is the easiest constellation to recognise. This is the Hollywood of the night sky. Spring is not too bad for bright stars though.

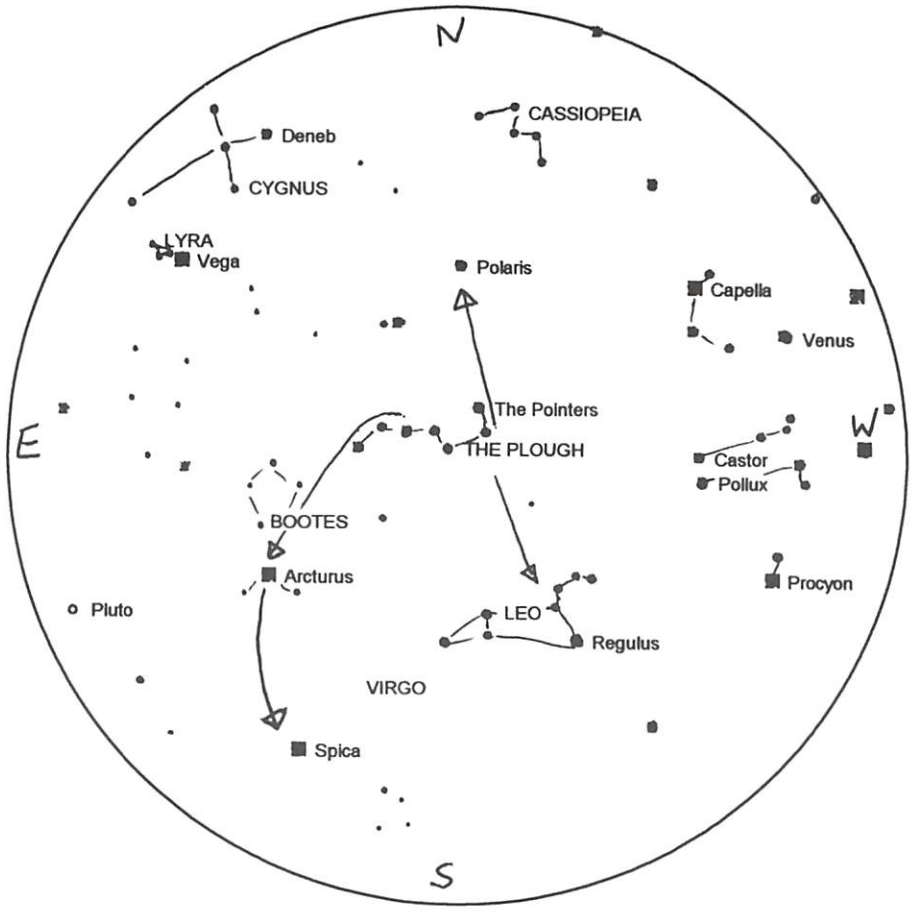
The sky chart shows what a Londoner might see, if it is clear at 9 p.m. May 1st. One of the best observing tricks is to use the easy constellations as signposts to the hard ones. I have included some arrows to show you how to find other constellations from the Plough (or Ursa Major). Two stars in the Plough are called "The Pointers" because you can draw a line through them and it points to Polaris, the star that stands directly above our north pole. Polaris, unlike all the other stars, scarcely moves as the Earth rotates. Ursa Major and Cassiopeia are circumpolar, which means they never set so are always visible on clear nights.

Follow the line through the Pointers in the opposite direction and you'll find Leo. Leo straddles the ecliptic (the path of the Sun and planets through the sky in a year). Leo is an ancient constellation and is part of the Zodiac. Taurus, Gemini and Cancer are also part of the Zodiac.

Three stars form the handle of the Plough and you can sweep round their curve to find bright Arcturus - Orange in colour. Carry on with the sweep until you find a brilliant blue star - Spica in the zodiacal constellation of Virgo. You can tell a lot about a star just by looking at it. An orange star like Arcturus is hotter than a red star but just a bit cooler than our Sun. A white star like Spica is much hotter. The bluer the colour of the star, the hotter is its surface. The hottest stars are white tinged with violet. If there are two stars of the same colour, but different visual brightness, you know that one must be nearer or brighter. Now you have found Spica and Regulus, you have located the Zodiac, which is where you must look to find the planets.

Although you can't see Jupiter easily this Spring, some good results from the Galileo spaceprobe should be out by the time you read this.

Roger O'Brien



Sky Diary Spring 1996

Information supplied by Eva Hans

MERCURY is in the evening sky in Taurus from April 6th to May 5th. It reappears in the morning sky from May 24th. It will be most easily seen in the second half of April. **VENUS** will be low in the South West and very bright until the beginning of June when it becomes too close to the Sun to be seen. You'll have to wait until mid-May to see **MARS,** and only then if you get up before sun rise will you see it near the eastern horizon. **JUPITER** and **SATURN** are also objects for early risers. Jupiter is among the stars of Sagittarius, while Saturn is in Aquarius.

There is a **TOTAL LUNAR ECLIPSE** on the night of April 3rd - 4th. The moon rises that night at around 18h and sets around 05^h in the morning.

Moon enters penumbra	April	3^d 21^h 15.7^m
Moon enters umbra		3^d 22^h 20.9^m
Totality begins		3^d 23^h 26.5^m
Totality ends		4^d 0^h 09.7^m
Moon leaves umbra		4^d 1^h 58.7^m
Moon leaves penumbra		4^d 3^h 03.7^m

For an eclipse of the moon to happen, the moon must be full. **MOON PHASES** for Spring are:

MOON PHASES:

New Moon	First Quarter	Full Moon	Last Quarter
	Mar 27^d 01^h 31^m	Apr 4^d 00^h 07^m	Apr 10^d 23^h 36^m
Apr 17^d 22^h 49^m	Apr 25^d 20^h 40^m	May 3^d 11^h 48^m	May 10^d 05^h 04^m
May 17^d 11^h 46^m	May 25^d 14^h 13^m	June 1^d 20^h 47^m	June 08^d 11^h 05^m
June 16^d 01^h 36^m			

Note also the **EQUINOX:** Mar 20^d 08^h 03^m
and the **SOLSTICE:** June 21^d 02^h 24^m

All times are UT (GMT)

The April Lyrid **METEOR SHOWER** takes place between April 19th and 25th. This is not a particularly rich shower, but you can increase your chances of seeing meteors by observing after midnight on the night of April 21st / 22nd. Look towards the North East.

For a free set of astronomical postcards please send a large sae to:
THE PLANETARIUM, SOUTH TYNESIDE COLLEGE, ST. GEORGES AVENUE, SOUTH SHIELDS, TYNE AND WEAR NE34 6ET. TEL: 0191 427 3589.