

# GNOMON

Newsletter of the Association for Astronomy Education

Vol. 8 No. 1

ISSN 0952-326X

September 1988

## EDITORIAL COMMENT

The last few months have been a time of development for the Association – a wind of change has been flowing through its ranks. The early years of consolidation (which beset any new organisation) have given way to a new dynamic, with the Association thrusting forward on all fronts.

The immediate aim of the AAE, to get astronomy re-introduced in the national curriculum (and so to build a sound foundation from which further advances may be made in the other areas) has been achieved – at least from 1990.

There may be matters of contention concerning detail in the curriculum, but at least we have a foot in the door, which hopefully will open even wider. As the DES representative on the AAE Council (Tony Lacey) said, this should be “just the start of a period of much activity in the field of astronomy in schools”.

## The future of Herstmonceux

In this issue is an article by *Aquarius*, the pseudonym of a distinguished astronomer who is endeavouring to salvage something from the RGO move from Herstmonceux. The author hopes that the different astronomical organisations including AAE may have a part to play in the scheme.

The plan will be on the agenda of the next Council meeting in September. Members' views are welcome.

## New subscriptions

As will be seen in the minutes, the AGM agreed to an increase in subscription from 1 September 1988 (the *new* date for the start of our financial year). These are:

Ordinary member	£6.00
Affiliated institution	£12.00
Retired member	£4.00

(an affiliated institution is a school, college, planetarium, astronomical society, etc. – they will receive extra copies of *Gnomon*).

Members who are employed as teachers may set their subscriptions as an allowance against income tax – this reduces the £6.00 subscription to effectively £4.50.

## New members

The Association is pleased to welcome those members who have recently joined. We hope they find their time in the Association productive and enjoyable.

## NATIONAL ASTRONOMY WEEK

Following the successful events celebrating the discovery of Uranus and the return of Halley's Comet, it has been decided to hold another National Astronomy Week during the period 25 November-1 December, 1990. The theme this time will be: “One Hundred Years of Amateur Astronomy”. Further details will be given later.

## ASTRONOMY EDUCATION SEMINAR

The AAE is to host an afternoon seminar on issues relating to *Astronomy in the National Curriculum*. This will take place on 24 September 1988 (2-5pm) in London. Two representatives from other astronomical bodies are being invited to attend.

## NEW COUNCIL FOR 1988-89

The new Council members are given in the minutes of the AGM included with this issue. Bob Kibble remains as Secretary and the new Treasurer is Nick Steggall.

The Council, under the new constitutional rules, elected Eric Zucker as Editor. He is an *ex-officio* member of the Council. There has been about a 50% change in Council membership.

### ADDRESSES FOR CORRESPONDENCE

**Secretary:** Bob Kibble, 34 Acland Crescent, Denmark Hill, London SE5 8EQ. For all general enquiries (Tel: 01-274 0530).

**Treasurer:** Nicholas Steggall, 38 Victoria Crescent, Birkdale Road, Dewsbury WF13 4HJ for all financial and subscription enquiries (Tel: 0924 454718).

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

## AAE VIDEO AND FILM CATALOGUE

This should be available in September – it contains about 270 titles on astronomy, astronaut (space) and fringe subjects. The catalogue gives details of hiring and purchase. Some videos may be hired free, whereas the purchase price of some titles (e.g. BBC Horizon subjects) runs into hundreds of pounds. Also listed is the duration and the level.

This venture has received the support of the Institute of Physics, the Federation of Astronomical Societies, the British Universities Film and Video Council, the British Interplanetary Society and the Royal Astronomical Society.

The purpose of the catalogue is to put the prospective customer in direct contact with the distributor. Members are reminded of the copyright laws, which, generally speaking, forbid copies being made.

Members of AAE may purchase copies of the catalogue at the reduced price of 75p (non-members £1.50). Provision is made in the *membership renewal form* for an extra 75p to be added to the subscription for those requiring a copy. Please send all monies to the Treasurer, who will distribute the catalogue.

## NEW WORLD'S: THE STORY OF THE PLANETS

Saturday, 12 November 1988  
at 10.30 a.m.

Venue:

THE LONDON PLANETARIUM  
Lecture by Heather Couper

**This JAs event is open FREE to AAE members;  
please bring evidence of membership,  
e.g. this copy of *Gnomon*.**



# EXCITING NEW PROPOSALS FOR THE DEVELOPMENT OF THE HERSTMONCEUX TELESCOPES

*This article has been written by a distinguished astronomer under the pseudonym "Aquarius". It is intended for simultaneous publication in the newsletters of the AAE and the FAS. The plan has already been welcomed by the Council of the FAS, and by the Southern Area Group of Astronomical societies. The AAE Council will consider the plan in September.*

Ask yourself three questions:-

- 1) We all know that the moon causes the tides. We only have one moon so why are there two tides every day?
- 2) How high could the highest mountain be on the earth and why?
- 3) If the whole solar system was shrunk down to the size of a typical classroom how large would the earth and sun be on the same scale and how far would the earth be from the sun?

These questions are the astronomical equivalent of asking what colour daisies are, or how big are elephants or fleas, neither of which many children have actually seen. If you do not know the answers to these questions then perhaps you, like many of today's children, were brought up with inadequate educational facilities directed at the nature of the world in which we find ourselves.

The Americans have had men on the moon and space probes visiting Jupiter and Saturn. The Russians have sent probes to Venus and had a man in space for almost a year, returning him to earth in apparently good health. Britain, once a leader in exploration, has not only failed to invest in mankind's future in space but even fails to educate its young in astronomical matters. It is just as much a part of learning about the environment to know the answers to the above questions as it is to learn about the seasons, the names of trees and animals and about the birds and the bees. A society which does not have the will to explore its environment and to learn how it relates to both the large and the small in nature probably lacks the will to survive. If we fail to educate the young about nature on both the large and small scales then how can we hope that a new generation will even seek to find answers to some of the questions which might one day be important for our survival as a society?

The decision of the SERC to abandon the Herstmonceux site has created a unique opportunity which must be firmly and decidedly grasped. There is no other example of a government giving up its own national astronomical observatory complete with telescopes and instrumentation and the opportunity is, therefore unlikely to occur again. Decisions as to the future of the Herstmonceux site, which will have to be taken over the next year or two, will directly influence future generations' access to astronomical knowledge and the way in which our society views its future as a technologically and scientifically aware culture.

It might be thought that astronomy is sufficiently far removed from the world of commerce and industry that it should play no part in the everyday effort of our society. Instead, the converse is true. Many who do enter into a scientific career do so, not because of their immediate involvement, but rather because they identify with the less immediate goal of the search for pure knowledge and the broader perspective of viewing mankind against a larger backdrop. Astronomy, perhaps the oldest of the sciences, provides that reference frame. Any society which is possessed of such a poverty of spirit that it cannot find the effort to pause and wonder occasionally will not only fail to attract people into its high technology but will also fail to retain its best brains and its most enquiring minds; the very people that it needs to become the future leaders of both industry and society. It is within this context that the future use of the Herstmonceux site should be viewed.

The new plan for the site which is currently under discussion with a wide variety of those interested in astronomy in Britain has already received the support of many professional astronomers and amateur astronomical societies both in this country and in the wider context of Europe.

A new educational charity is being formed, the purpose of which is the furtherance of astronomical knowledge throughout society at large and among the young in particular, and to encourage and sponsor astronomical research both by professional and amateur astronomers.

The following bodies will be invited to put forward one representative each for the management committee of the Trust. The three main amateur astronomical bodies in the UK (the BAA, JAS and FAS), the AAE (Britain's major body for encouraging astronomical education), the RAS, Wealden District Council, East Sussex County Council, the English Tourist Board and the Trust itself. It is to be hoped to attract patrons of stature including politicians of national status and scientists of international repute.

A recent survey of the structure of the domes and the connected buildings has shown them to be in sound condition. The telescopes were in regular use until approximately 10 years ago and are still used occasionally. There is therefore no need for any significant rebuilding of them. It is intended that the existing domes would be supplemented by a new building containing both a public exhibition and a lecture theatre.

The lecture theatre is intended to cater for two groups; parties of school children and amateur astronomers. The parties of school children would be given a tour of the site and exhibition and then a chance to ask questions of the astronomers on the site. Herstmonceux is well placed to serve the whole South East region from the Portsmouth/Southampton complex in the West to the whole of the Greater London area in the North.

The second group at which the lecture theatre will be aimed is amateur astronomers. There has never been a major forum in Europe to promote interaction between professional and amateur astronomers.

This is a rapidly growing area of interest. Contacts with senior French amateurs suggest that they, as well as British amateurs, would welcome such a forum. The idea is to create a centre for "summer" schools for amateurs where they can be taught the skills and techniques required to allow them to make serious scientific contributions.

Therefore the development and exploitation of the telescope site forms a central part of the project and is intended to be the central engine which generates publicity and income for the site. The exhibition would cater to the needs of both the tourists and the parties of school children. The lecture theatre would provide facilities for both the school parties and the amateur astronomers' needs. A new coude refractor telescope, in a transparent dome would be provided and would make available safe observing facilities for both the young and the old in a comfortable environment. The surplus funds raised from the education and tourism would be used to fund both serious research on the existing large telescopes and to provide facilities for dedicated amateur astronomers to make serious scientific contributions. Thus a direct link would be forged between those who have an interest in astronomy and who want either casual information (the tourists), education (school parties and amateur astronomers) or to make serious contributions (the professionals and the dedicated amateurs). The concept is novel and has never been attempted before but it is very much in line with present government thinking in the way in which it would provide a direct link between the consumer and the producer of astronomical information.

Additionally Herstmonceux would serve as a central location for the organisation of international amateur astronomical observing campaigns, from where data would be received, collated, analysed, redistributed and published. It is also intended that Herstmonceux should act as a centre for the manufacture and distribution of several items for serious astronomical use such as a new generation of telescopes and both single and multi-channel photometers.

Herstmonceux, with its attractive setting, its reputation as a national observatory, its position in a major tourist area of South East England and its proximity to mainland Europe should be the core of a major resurgence of astronomical effort and interest.







## Herstmonceux

A major change with established astronomy in Britain will be the use of commercial sponsorship for specific projects from companies who might be able to see some corporate advantage in being associated with such projects. Negotiations have already started with Europe's largest manufacturer of carbon fibre who would be interested in the new high technology telescope design and with England's longest established manufacturer of telescopes. One of England's largest electronics and entertainment industries has also expressed a willingness to provide sponsorship once the viability of the scheme has been demonstrated.

### ON SITE RESEARCH

For the Herstmonceux site to realise its proper potential it is vital that it is an active research centre where new discoveries are made and from where these discoveries are made public. To this end a short, and incomplete, list of research projects is attached. They have a common theme in that they are all long term projects which cannot be undertaken at Britain's overseas observatories where observing time is allocated for a few days at a time only. They would thus be complementary to the work of our overseas sites.

- 1) Photometric and spectroscopic monitoring of Be, Beta Cephei and Delta Scuti stars to discover whether their variations can tell us more about their true nature.
- 2) Observations of long period variable stars which have recently been shown to contain several different periods.
- 3) Observations in conjunction with observers at other longitudes to search for very low level variations.
- 4) Analysis of data to search for multiperiodic phenomena.
- 5) Monitoring of massive binary star systems including both those stars which do not emit x-rays and those that do, eg. Cygnus X-1, the potential 'black hole' candidate.
- 6) Binary star measurements.

If agreement with the present owners of the site, the SERC, and the new owners of the site, whoever they might turn out to be, can be reached then out of the dissolution of the old observatory a bright new future for British astronomy might yet dawn.

"Aquarius"

## Environmental Education

We are pleased to announce a regular exchange of periodicals between the AAE and the National Association for Environmental Education. The Journal of the NAAE is edited by Colin Harris. Any member who would like a sight of the Journal should contact the editor of *Gnomon*.

## GCSE ASTRONOMY EXAM

The first examinations from the London and East Anglian Group (LEAG) took place on 18 and 22 June 1988. AAE members will be very interested in the exam papers. We are unable to reproduce the entire paper for reasons of copyright and space in this Newsletter, but here are four selected questions:

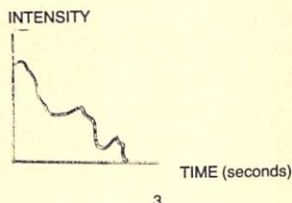
**Paper 1, Question 2:** (a) State the average thickness of Saturn's rings, and describe their composition. (b) Saturn's orbital period is approximately 29 years. State how often the rings are most favourably placed for observation from the Earth.

**Paper 1, Question 16:** A reflecting telescope has a small diagonal mirror mounted on axis inside the tube. (a) Explain why this does not obstruct viewing. (b) Calculate the percentage reduction of the light received by a telescope with a 10cm mirror caused by a 2cm diameter obstruction in the tube.

**Paper 2, Question 2:** (a) Describe each of the following (i) the Photosphere (ii) the Chromosphere (iii) the Corona (iv) the Solar Wind. (b)(i) the majority of the asteroids lie between the orbits of two planets. Name these planets; (ii) Explain why asteroids are not thought to have atmospheres. (c)(i) State fully in words Kepler's third law of planetary motion; (ii) a particular asteroid is observed to have a period of 8 years. Use Kepler's third law to calculate its mean solar distance, in astronomical units.

## VENUS OBSERVED – a correction

There was an omission in this article in the last issue of *Gnomon* (Vol. 7, No. 3, page 3). The last paragraph refers to a graph, showing intensity fluctuations as Venus set behind the roof; this graph did not appear. It is shown below.



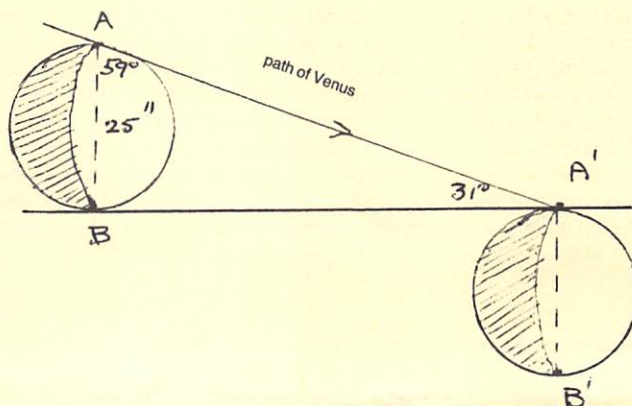
Similar fluctuations are known to exist for a star (virtually a point), but what is the explanation for Venus which presents a finite disc?

The head must be kept perfectly stationary during this observation (perhaps we should resurrect the pillory as a useful astronomical instrument?)

Robert Miles offers the following calculation:

An approximate calculation of the time it would take Venus (marked AB in the figure) to disappear behind a horizontal low roof to the position A'B' can be made as follows:

The diameter of Venus in early April 1988 was 25" and its declination was 26°. Its phase was about 0.60.



The angle at which a celestial body approaches the horizon or a low horizontal roof, is given by  $\beta = \sin \theta / \cos \delta$  ( $\theta$  is the latitude and  $\delta$  the declination).

This angle AA'B is 31° and the upper tip of Venus follows the path AA' and sinks vertically down a distance in angular measure of 25". So we have  $AB = AA' \cos 59^\circ$  and  $AA' = 25'' / \cos 59^\circ = 48.5''$ .

This angular distance is covered at the rate of 15" per second so the time for Venus to set from its first touch on the roof is  $\frac{48.5}{15}$  seconds = 3.23 seconds, which agrees with the observed time.

**Paper 2, Question 5:** (a)(i) State what is meant by the *proper motion* of a star, and describe how it is measured; (ii) Give an example of an open cluster; (iii) Explain how one may decide if a particular selection of stars constituted a *moving cluster*, even if they did not appear closely associated with each other in the sky. (b) Explain how the radio spectrum at 21cm wavelength was used to map the spiral arms of the Galaxy. (c)(i) State the distance in parsecs of a star having the same absolute and apparent magnitude; (ii) A star at a known distance of 100 parsecs has an apparent magnitude of 8. Calculate its absolute magnitude.

Paper 1 is of 1½ hours duration, Paper 2 2½ hours. Candidates are told the marking scheme for each question and that they should produce records of some experimental investigations.

*Acknowledgements:* to the Secretary of the FAS, Chris Sheldon, for providing the papers; and to the LEAG for granting permission to publish these extracts.

## Articles for GNOMON

Members are encouraged to contribute to the Newsletter. If you have anything of interest relating to astronomy and its teaching at *any level* (from kindergarten to University), we will be pleased to publish it. News from astronomical societies is also welcome. It would be helpful if articles are typewritten. Photographs may also be useful, but some editorial discretion may be used here as they take up valuable space in the Newsletter.



## THE CHANGING EDUCATIONAL SCENE – AN OVERVIEW

For many AAE members "school" may be synonymous with 'O' and 'A' levels or even school certificate. However recent years have seen major changes in the educational system and it is our duty as educators to keep in touch with the direction of educational change. This article will give a brief overview of the major initiatives operating in our schools and colleges.

From 1990 all schools will have to deliver an agreed National Curriculum in which science is a core theme. Individual science specialisms are tending to give way to a more broad and balanced science curriculum which will have an astronomy component. (The AAE curriculum working group is currently tackling this issue.)

The main hurdle for a pupil will still be a summative examination at the age of 16, the GCSE. The General Certificate of Secondary Education is designed for up to 90% of the school population and awards grades A to G. There is a GCSE Astronomy syllabus offered by the London and East Anglian Group. Progression from GCSE will take students into a sixth form, a sixth form college, a tertiary college or a college of further education where a variety of new courses is now on offer.

Students may wish to improve on GCSE grades in 1 year or take on a new GCSE subject. A number of GCSE Mature 1 year courses are available to these students. A level syllabuses have undergone minor revision in recent years. Many now follow a common core and options model. BTEC courses run alongside A levels. The BTEC First Award is a one year, full time, course incorporating a number of subjects and carries a vocational bias. BTEC science is directed towards careers in laboratories and related fields. Students may progress on to a BTEC National course which extends the First Award up to a level compatible with entrance to higher education. All BTEC courses contain an element of work experience.

For students wanting a more general exploration of the world of work a number of Pre-Vocational courses exist. These allow students an opportunity to experience a variety of work related areas and have work experience as a central component. Students gain credit for modules of work covered successfully throughout the course and are awarded with a Certificate of Pre-Vocational Education, CPVE, after one year.

The current situation is by no means static. I shall identify three areas of development to look out for in the future. The first is the trend away from examinations and towards student profiling. To sum up a person's education in a single grade does no justice to their many achievements along the way and tells future employers nothing of their particular skills and weaknesses. There is an increasing demand on syllabus planners to build into their assessment schemes ways of recording ongoing student progress. Records of achievement and student profiles are likely to appear eventually at all levels.

A second development is TVEI. The Technical and Vocational Education Initiative is gaining momentum and is extending far beyond the original pilot schemes. This initiative is designed to enrich the lives of students through work-related experiences, learning through problem solving exercises and the use of modern technology. The TVEI extension programme will influence the curriculum at all levels.

Thirdly there is the move towards greater breadth in the post 16 curriculum. Whilst the exact model to be chosen is the subject of debate what is certain is that the days of the three A level curriculum are numbered. Advanced Supplementary (A/S) levels may mean four, five or six subjects will be studied to the age of 18. An alternative will be to extend the core plus options model to options only to produce a modular curriculum where students choose their course to suit their needs in a cafeteria style. Modules in astrophysics could be combined with introductory economics and pure mathematics; the possibilities multiply as you think about them.

I have tried above to indicate the dynamic nature of our education system. The AAE, through its constitution, is committed to astronomy in education and so must be equally dynamic in its thinking and its actions. There are many avenues to be taken. Your AAE Council is actively involved in ensuring that the AAE is at the centre of events. AAE members are asked to respond positively to Council initiatives and help out with the production of teaching materials and the drive for increased membership.

Bob Kibble

## BOOK REVIEWS

### THE HANDBOOK OF ASTRONOMICAL SOCIETIES

*Edited by Brian Jones and published by the FAS. Copies may be obtained from Mr. Jones, 17 Havelock Street, Thornton, Bradford, W. Yorkshire BD13 3HA or Ken Marcus, 5 Cedars Gardens, Brighton, East Sussex BN1 6YD. Price £2.50 including postage and packing.*

The Federation of Astronomical Societies (FAS), publishes its handbook annually. The handbook is a comprehensive guide to astronomical societies and related groups operating in the U.K. The FAS takes the trouble to update all entries annually giving readers up to date information.

The handbook also lists suppliers and sources of both hardware and software relating to astronomy. Equipment suppliers, visual aids catalogues, places to visit and visiting speakers are included making the handbook a valuable resource for teachers and resource centre organisers. I found the list of over 70 FAS slides tempting at 35p each.

Included each year is a number of articles on topics of astronomical interest, the content being of sufficient depth to maintain interest whilst not becoming over technical. The article on 'noctilucent cloud observing' in the 1988 edition particularly interested me as a teacher. The 1989 handbook hopes to include details of photographic suppliers and information on computer programmes. For £2.50 (£2 to FAS members) it represents very good value for money and deserves a wider circulation.

Bob Kibble

### THE GREENWICH GUIDE TO THE PLANETS

*By Stuart Malin. Published by George Philip in association with the National Maritime Museum, Greenwich, 1987. ISBN 0-540-01128-2. Price £4.95.*

The Greenwich Guides to Astronomy are a series of four books on astronomy for the beginner. 'The Planets' would also be a useful reference book for the teacher. Each one is complete in itself but when taken together they present a complete introduction to the night sky and its contents, written by experts from the Old Royal Observatory with right up-to-date information from space exploration and research. They are suitable for observers in both the Northern and Southern hemisphere.

Available now are: The Greenwich Guide to STARGAZING; The Greenwich Guide to THE PLANETS.

To be published: The Greenwich Guide to STARS, GALAXIES and NEBULAE; The Greenwich Guide to ASTRONOMY IN ACTION.

This 96 page book is lavishly illustrated with plates and diagrams including some first rate coloured plates from the Voyager missions. The text is in simple language and where technical terms have been introduced the author has ensured they are explained to the uninitiated. The small mathematical content is confined to data and in keeping with not assuming any previous knowledge, the notations are also explained. To analogize both size and distance in astronomy presents its difficulties and pitfalls, but those used are homely and satisfying.

I particularly liked the inclusion in the text of incidental but interesting information much of which is relevant to present day living. Examples can be found on page 9 in the naming of the planets and days of the week, plus a good lot more, or on page 21 regarding the significance of the moon on the calendar in several early cultures including our own. Our cultural history is steeped in astronomy and no opportunity should be lost in demonstrating this connection.

The one regret is the implied finality of the text. With a few exceptions, it did not suggest the additional knowledge and unsolved mysteries that would induce the reader to seek further information.

I would highly recommend this book, it presents in basic language a comprehensive account of the Solar System and is suitable for any 9 to 90 year old who is curious about the night sky.

Ken Creamer



### SOLUTION TO GNOBLEM 3

A number of readers have sent in correct answers. The reason is due to the "equation of time". Universal time is measured by a fictitious Sun which travels at a uniform rate around the celestial equator; the true Sun, which travels non-uniformly around the ecliptic, may be either in advance of or behind the fictitious Sun, depending on the time of year. Thus the true Sun at noon is not necessarily midway between its rising and setting times.

Ian Ridpath has sent in riders to Gnoblem 3, which readers may care to ponder: (1) Why do the dates of 'the latest sunrise and earliest sunset not coincide with the shortest day? (2) Why do the dates of the earliest sunrise and latest sunset not coincide with the shortest day?, and (3) Why are day and night not equal at the equinoxes?

### GNOBLEM 4

We teach in school to children of suitable age that the "Earth is round", i.e. spherical. We illustrate this by referring to ships disappearing over the horizon. Can anyone suggest an actual experiment, in which the children have to do something, rather than merely accept the argument, which convinces them of the spherical nature of the Earth?

Furthermore, and this will be for older children, how may the radius of the Earth be determined from appropriate measurements? (The experiment of Eratosthenes may inspire answers, but are there other methods?)

### Star Gazing at Oakwell

An exhibition STAR GAZING – A BEGINNERS GUIDE TO THE NIGHT SKY is being held at Oakwell Hall Country Park, Nutter Lane, Birstall, Nr. Batley, West Yorkshire. Running from 1 October 1988 until 3 January 1989, it will accompany the open evenings at the Batley and Spensborough Astronomical Society's observatory in Wilton Park, Batley, each Friday evening (7.30 p.m. to 9.00 p.m.).

Five main areas will be looked at during the exhibition – THE NIGHT SKY, LOOKING (telescopes, binoculars, mirror making), CONSTELLATIONS (what is a star?, the planets, major constellations), SATELLITES (different uses, remote sensing, etc.) and LOOKING AT THE EARTH (environment conservation).

It is also hoped that there will be a series of lectures during the exhibition featuring astronomical subjects. Further details can be obtained from the AAE Treasurer on (0924) 454718.



Some of the 1300 school pupils who visited the RGO for an Open Day in September 1985, relaxing on the lawns in front of Herstmonceux Castle.



## THE 1988 AAE ANNUAL MEETING

The eighth Annual Meeting of the AAE was held on May 21st at Hammersmith and West London College. Thirty-six people attended. The morning was taken up by the business of the Annual General Meeting. With a new constitution to be agreed the AGM was a full and lively affair. (The minutes of the AGM are enclosed in this newsletter). Refreshments, including an excellent cold buffet lunch, were provided by the Jean Cook catering combo.

The afternoon events started with three speakers addressing different aspects of astronomy in schools. John Baxter, a teacher/researcher from the University of Bath, spoke to us about his research findings concerning the misconceptions which young people have concerning things astronomical. He outlined a strategy to adopt when teaching astronomy to schoolchildren. Children, John explained, should confront their preconceptions, often called 'alternative frameworks', before they can be expected to adopt the conventional, correct, world view. One element of St. John's research has been to identify those more common preconceptions.

Frank Flynn is a chief examiner for GCSE astronomy. He gave an update on the current revision of the LEAG GCSE astronomy syllabus. The assessment of coursework is to be carried out by means of student projects. Such projects will require competent persons to act as mentors and assessors. The success of the syllabus will depend to some degree on the availability of such assessors.

With time pressing on Bob Kibble gave two examples of how he incorporated elements of astronomy into the teaching of A-level physics at Hammersmith College. The story of Eratosthenes can be a vehicle for calculations leading to values for the radius and mass of the Earth. A scale drawing of the Earth can then be sketched in order to predict the period of an Earth satellite and so apply the physics of free-fall and centripetal acceleration.

Following afternoon tea Dr. David Hughes gave a most interesting account of the interaction between art and astronomy. Using a number of slides Dr. Hughes showed first how artists have acted as archivists, leaving records of astronomical events before photographic records existed. More slides showed how modern artists have used astronomical subjects to supplement their images. Finally Dr. Hughes explored the area of fictional astro-art showing how the artist and his imagination can produce images which are technically impossible using real world technology.

Members had an opportunity to say a little about their own interests and displays mounted around the lecture room included astro photographs, leaflets from other astronomical societies, worksheets for schools, computer software and things to do on a cloudy night.

The association wishes to thank all who contributed, speakers, display makers and organisers for helping to make the eighth annual meeting a success.

*Bob Kibble, Secretary.*

## MEMBERS' ADVERTISEMENTS

John Gleave and Hellela Sew of 2-4 Twine Cottages, Raw Lane, Hebden Bridge, W. Yorkshire HX7 8PE are manufacturers of orreries and these are for sale. Members should get in touch directly to this address.

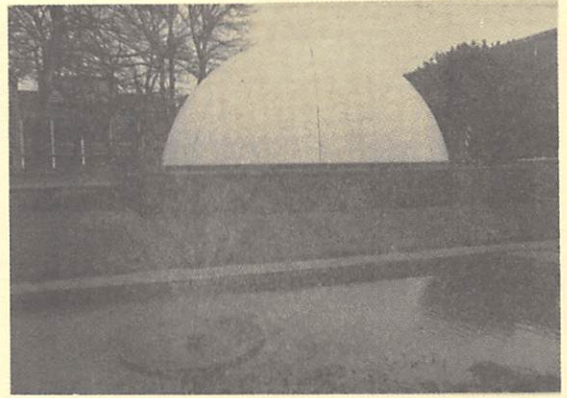
There are several orreries: (1) Earth, Moon and Sun; (2) Earth, Moon, Venus, Mercury and Sun (both of these are 18 inches in diameter); (3) Jupiter and the Galilean moons (16 inches diameter). The prices are (1) £195; (2) £325; (3) £485.

All models are protected by a clear perspex dome. The Jupiter model is mains operated.

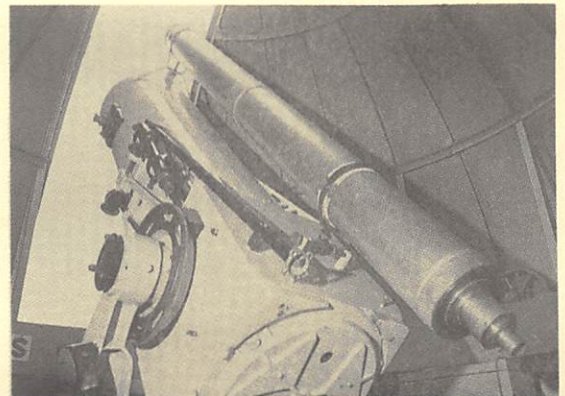
For model (1), the Solstices, equinoxes and zodiac are marked on the base. The inclination of the moon's orbit ( $5^\circ$ ) to the ecliptic is clearly seen. Other models are in the pipeline.

*(Mr. Gleave is a member of the AAE).*

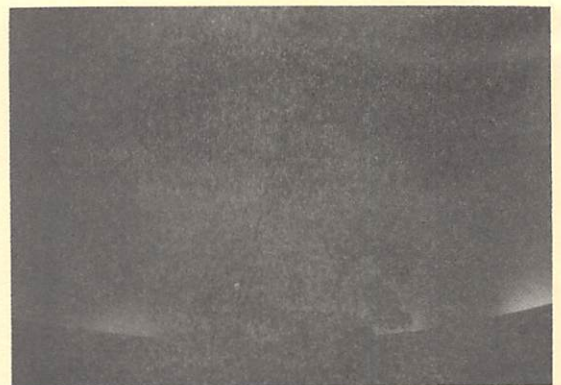
## SOUTH TYNESIDE COLLEGE, SOUTHSHIELDS



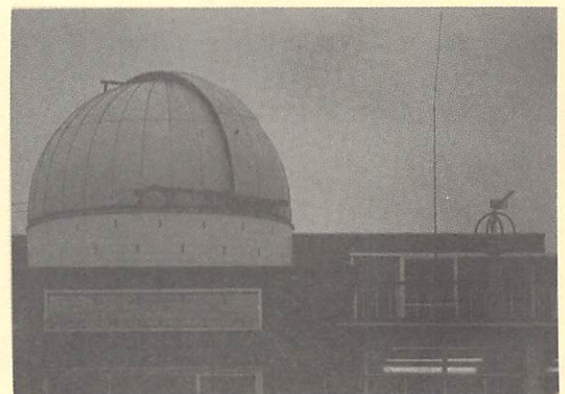
*Planetarium.*



*Telescope.*



*Planetarium Interior.*



*Observatory Dome.*



## LETTERS

Dear Editor,

Recently the science editor of the Daily Telegraph asked me why I thought that British astronomy is second in the world only to that of the United States. I replied that, paradoxically, one reason is because astronomy has until now not been taught in British schools. British astronomers have been self-selected, and only the most talented have succeeded.

However, I should make it clear that I do not regard this as an argument against teaching astronomy in schools. Indeed I find it remarkable that it has taken a generation for our educational system to have acknowledged the existence of the space age. Astronomy embraces every other branch of science, and it is about time that University departments of physics and astronomy reversed the order of their names.

Some people argue that teaching astronomy in schools will kill interest in it. Fortunately, I think that our subject is a good deal more appealing than that, and I believe that many more people would have taken it up if it had been part of the conventional curriculum instead of being a "fringe" subject. Is not the fact that the British Astronomical Association's membership is a mere 3,000 a dreadful indictment of the popularisation of astronomy over the past 30 years? Rather than killing interest, I foresee a healthy rise in the numbers of members of astronomical societies, particularly the Junior Astronomical Society, once astronomy becomes an established school subject.

Had astronomy been taught in schools 30 years ago, perhaps current government ministers would have a rather different attitude towards the British space programme.

Yours sincerely,

Ian Ridpath,  
Editor, Popular Astronomy.

[Mr. Ridpath is referring to an article in the *Daily Telegraph* (4.7.88) by Adrian Berry, entitled "Britain turns its gaze overseas". This is a strong condemnation of the effects of underfunding. It contains a short quote by Mr. Ridpath which seems to suggest that he is not in favour of astronomy being taught in schools, but Mr. Ridpath's letter clarifies and expands on that point. *Editor.*]

Dear Editor,

A subscriber to the recent correspondence in *Gnomon* concerning the use of Imperial and Metric systems in astronomy wrote, "... astronomy is a science ..." Can the originator, or any other correspondent, explain what that means? This enquiry arises because the OED and its derivatives are astonishingly broad in attempting to define 'science' and, in any case, I seek enlightenment and not a semantic exercise.

In my experience the practice of astronomy is no different in its requirement of personal skills and management conduct than many other occupations not classed as 'science'. This is equally so for the undergraduate, seeking to schedule his 'clear' and his 'cloudy' exercises together with set work, lectures and his personal life, and the director of a prestigious astronomical institute seeking to fit a little research into his continuing complex of financial and administrative problems.

Is the total content of our learned journals to be classified as science? Or that portion which would be left if the subconsciously groomed observations, the preconceived conclusions and the prejudices could be identified and removed? Or ... ?

After more than half a century's association with astronomy I would like to know.

Yours sincerely,

Cdr. Dougherty  
Dog Hill Farm,  
Barkisland, W. Yorks.  
HX4 0ES.

## La Carretera de Mirca

This article appears in Gemini No. 20 (June 1988), the Newsletter of the RGO. It is reproduced by permission of the Editors, Chas Parker and Keith Tritton.

This winter has been the hardest since operations began at the Observatorio del Roque de los Muchachos. On three occasions in December, January and February operations had to be suspended for short periods until the weather cleared, and the percentage of usable time dropped to around 55% for the winter semester. Heavy rains damaged roads in and around Santa Cruz as well as on the mountaintop.

The Mirca road, the main route to the observatory, finally fell victim in late February and has been closed more or less ever since. An immense rock fall in Los Andenes, within sight of the telescopes, completely blocked the road. Several other sections on the lower stretches suffered severe damage from the rains, which washed away the road base in two or three places and reduced the carriageway to single track.

The road was officially closed, and rebuilding and improvement was declared a high priority project by Obras Publicas, the authorities responsible for its maintenance. Extensive work will be required, at a cost estimated as 65 million pesetas (about £320,000).

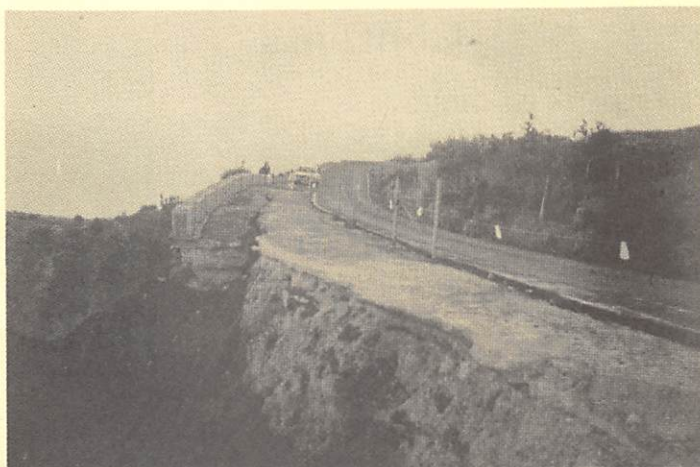
Work started at the end of April, and the road is completely closed at time of writing. The work could take as much as three months, though it is not known whether this means the road will be closed all this time. In the meantime all staff and visitors have to travel via the alternative Garafia road, taking some two and a quarter hours each way.

Keith Tritton



Steve Murphy

Rock fall in Los Andenes on the main road to the observatory.



Steve Murphy

A section of the road washed away by heavy rain on the lower stretches only a few kilometers out of Santa Cruz.





"IT'S THE AAE ON THE  
HOT LINE !"