



GNOMON

Newsletter of the Association for Astronomy Education

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EDITORIAL COMMENT

The middle pages of this issue of *Gnomon* reproduce the newsletter on teaching astronomy published by the Astronomical Society of the Pacific (No. 11, fall 1988). We are grateful to the publishers for giving permission to include the newsletter, which deals entirely with astrology.

The 1984 Gallup Poll shows that 55% of young Americans believe that astrology works. A similar poll in the UK would be interesting, as would a survey of newspapers publishing astrological articles. May we ask AAE members to participate in such a survey. All that is required is for members to take a look at their *local* papers (the *national* dailies present no problem) over a period of a few weeks, and to note the numbers of articles on (a) astronomy, and (b) astrology, appearing in the columns. Then send the figures to the Editor of *Gnomon* (the names of the newspapers would also be of interest). The result of the survey would be made known at a later date.

Council has agreed to the AAE acting as a "watchdog" on astronomical items in the press, TV and radio. Frequently, incorrect information is given; a recent example was in the BBC TV programme *Antenna* dealing with a possible "fifth force" in nature. It was stated that gravity increased as one approached the centre of the Earth, whereas the opposite is true (it *decreases*). This was a basic point in an otherwise very good production. Again, the AAE would like to enlist the active support of its members in bringing such points to the attention of the Editor.

The AAE participates in exchanges of publications with the following bodies:

The Astronomical Society of the Pacific ("The Universe in the Classroom", USA).

Le Comité de Liaison Enseignants et Astronomes ("Les Cahiers Clairaut", France).

The Junior Astronomical Society ("Popular Astronomy").

The Royal Greenwich Observatory ("Gemini").

The National Association for Environmental Education ("Newsletter").

Copies of these publications will be on view at the Annual Meeting on May 13 at the Science Museum, and at other times on application to the Editor.

A limited number of back numbers of AAE Newsletters (including those in the old format) are available at 50p each (plus postage). Please contact the Editor for details.

FAS HANDBOOK

Copies are still available from the Secretary at £2.25 each (price to non-members £2.75).

GREENWICH STAR DISC

Further to Mr. Iain Neil's letter to *Gnomon* (Vol. 8 No. 2, January 1989) on using photocopies of the Star Disc for Astronomy classes, Mr. Neil regrets he is no longer able to offer the service described in the letter.

VIDEO AND FILM CATALOGUE ON ASTRONOMY

Limited numbers are still available from the Treasurer at 75p per copy.

Copyright

The AAE waives its rights to copyright as long as (1) the copies are made for educational purposes, (2) the AAE is quoted as the source, and (3) attention is paid to the copyright being possibly vested in other publications (if there is any doubt on this, contact the Editor).

AAE ANNUAL MEETING

SATURDAY 13 MAY 1989
10.30 a.m. – 4.30 p.m. at the
SCIENCE MUSEUM,
SOUTH KENSINGTON, LONDON

The business part of the meeting (the AGM) will consist of election of officers, etc. and reports. Full details are given on a separate sheet enclosed with this newsletter. There will be a talk by a guest speaker, and a display of exhibits provided by members. Those wishing to avail themselves of this opportunity should contact the secretary, Bob Kibble, as soon as possible, to make the necessary arrangements.

All members and friends are very welcome.

THE LONDON PLANETARIUM GOES INTO VIDEO

"Starburst", the programme written and narrated for the London Planetarium by Heather Couper, is now into its second year, enhanced by some exciting new video effects. These have been produced by Terence Murtagh, of the Armagh Planetarium in Northern Ireland. Forming planetary systems, supernovae and black holes are among the video effects which now complement the Planetarium's other visual and musical effects. The programme explores the birth of stars, including our Sun; how planets form; and what happens when stars grow old and die.

Schools' programmes continue, at 11.00 a.m. each day during school terms.

BOOK PREVIEW

To be published by Stanley Thornes in June 1989 as No. 17 of the *Extending Science* series: *ASTRONOMY* by Bernard Abrams and Patrick Moore. It is hoped that this will appeal to those concerned with *The Earth in Space* component of the Science National Curriculum. The book will be extensively illustrated, including colour photographs. (Paperback, about 144 pages, price in the region of £4.50).

EUROPEAN PLANETARIA: 2nd COLLOQUIUM

This was held in Paris from 6 to 8 May, 1988. Of particular interest to AAE members was a contribution by Marie Radbo on "A children's interactive show at the Gothenburg mobile planetarium."

"The Swedish universities have been, since 1977, responsible for promoting public interest in the achievements of science and scientific research. In order to implement this objective in astronomy for young children, the Section of Astronomy at the Chalmers University of Technology and the University of Gothenburg have started a project of planetarium shows for primary schools".

(Information supplied by Eva Hans, The Planetarium, South Tyneside College)

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).

INTERNATIONAL ASTRONOMICAL YOUTH CAMP, 1989

We received this information too late to go in the last (December 1988) issue, and it may be rather late now for interested readers to follow it up. However, it is worth a try.

The youth camp is aimed at the 16–24 year-old age group, and will be held at Malga Bissina in the Italian Alps. The situation is ideal for astronomical observation. Working sessions will be held on the following subjects: astrophysics, chemical evolution of the universe, deep sky observation, distances in astronomy, the planetary system, the Sun and variable stars. Beginners as well as more advanced amateurs are welcome.

The camp language will be English; the fee is about DM750 including full-board accommodation.

Full details from IWE e.v. c/o Uwe Reimann, Ferdinand-Beit-Str. 7, D-2000 Hamburg 1, FRG. Interested readers should apply *immediately*.

STELLAR EVOLUTION

The 11th annual astronomy residential weekend course to be held at Rewley House, Wellington Square, Oxford, takes place on 12–14 May. The course is organised by the Department for External Studies, University of Oxford.

Details from the Course Secretary, OUDES, 1 Wellington Square, Oxford OX1 2JA.

ZX SPECTRUM AND ASTRONOMY

by Nick Stegall

A range of astronomical software programs for the Spectrum 48K computer is available from Eclipse Software. This range of programs provides an excellent way of combining both astronomy and computing.

The 'ZX Spectrum Astronomy', covers many aspects of computing and astronomy at a non-technical level and makes full use of the Spectrum's excellent graphics and colour. This tape covers all of the programs listed in the book of the same title published by Sunshine Book's (ISBN 0 946408 24 6) which gives a detailed explanation of the programs and their use. Over 50 programs are included on the tape of which these are just a few: spectrum calendar, star tracker, phases of the Moon, starmaps, Kepler's orbits, solar system trek, stellar magnitude plot, Messier list and quiz and eclipses; an ideal piece of software for learning the basics of astronomy.

'Planetarium II' Computes the Sun, Moon and planets (Mercury to Saturn) anywhere on Earth from 47,000 BC to 10,000 AD. It can also compute stars from 50,000 BC to 50,000 AD allowing for precession (rotation of starsphere every 26,000 years). The database is the same as for the 'Starsphere II' tape providing a computerised planisphere and the fastest sky projection irrespective of machine. The database includes 355 stars to magnitude 8.7 in 47 constellations from 60 cities worldwide.

'Messier List' This tape provides a comprehensive and practical guide to the 109 deep-sky Messier Objects of galaxies, nebulae and star clusters. Included are starmaps, type of object, brightness, RA/Dec, altazimuth, moonlight, etc. A good tape for planning an evening deep-space skywatching.

Other titles available from Eclipse Software include: **Halley's Comet II**, **World Globe**, **Stargazer**, **Astrolabe**, **Space Art**. These may be obtained from 79 Ardrossan Gardens, Worcester Park, Surrey, at £6.95 each.

NEWS FROM NASA

Launch dates in 1989 include:

- June 1: Discovery carries the \$1.4 billion Hubble Space Telescope into orbit.
- July 13: Columbia takes a Syncom satellite into orbit and will retrieve the Long Duration Exposure Facility (LDEF) for return to Earth before it falls into the atmosphere and burns up.
- August 24: Atlantis undertakes a classified military mission.
- October 8: Discovery takes off to launch the Galileo Jupiter probe.
- November 16: Columbia carries a package of astronomy instruments into orbit.
- December 14: Atlantis is launched on another military mission.

Nine shuttle launches are scheduled for 1990, 10 in 1991, 12 in 1992 and 10 more to September 1993.

LDEF was launched in 1984 to expose a variety of materials to the harsh environment of space for one year. The delay in the shuttle programme left LDEF stranded in orbit for longer than planned. Recent analysis indicated that increasing solar activity, which causes the atmosphere to balloon outward slightly, would cause the satellite to slow down and re-enter the atmosphere years earlier than expected. As a result, NASA juggled the manifest to allow a retrieval flight in July 1989.

Success of Ariane Flight 21

On March 11, 1988, Arianespace successfully launched two communications satellites on one launch vehicles, an Ariane 3 from the ELA 1 launch site at Kourou and injected into a geostationary transfer orbit. The two satellites were the SPACENET III, for the American company GTE Spacenet and TELECOM 1C for France Telecom.

This launch contributed to the installation of the first satellite radio positioning system, operated by the US company GEOSTAR Corp. The reception capacity was put into orbit on the SPACENET III satellite.

On March 13, at 12:33, the TELECOM 1C apogee kick motor was ignited at the fourth apogee passage and its solar panels were deployed as scheduled the following day. After ignition of the SPACENET III motor on March 15 at 5.58 pm, its solar panels were deployed during the night.

US to Select a Name for Station

The US permanently manned space station is expected to have a name selected by June. NASA has asked its employees and contractors for suggestions for which the rules state that acronyms or names of living persons are excluded and also that the name be translatable into the languages of NASA's international partners without having an offensive or ambiguous meaning. So far the names under consideration include Earth Star, Freedom, Independence, Jupiter, Minerva, Olympia, Pilgrim and Starlight.

Nick Stegall

BOOK REVIEWS

THE STARS by Heather Couper and Nigel Henbest (1988, Pan Books, pp 144, paperback, £9.99. ISBN 0-330-30352-X).

THE HOME PLANET edited by K. W. Kelley (1988, Addison-Wesley, pp about 160, hardback, £20.00. ISBN 0-356-15984-1).

The latest production from the Couper-Henbest team (*The Stars*) is well up to the previous high standards of presentation; in fact, in my opinion this is the best so far. It is a delight to look at the pictures; even hardened astronomers will enjoy this. Some of the chapter headings are: The Constellation Makers, Stargazing and Stargazing, Messages from the Stars, Our Local Star, Red Giant and White Dwarf, Supernova!, The Living Dead, Black Holes and Beyond.

There are star charts and a complete list of the constellations, as well as a list of other celestial objects which may be seen (a) with the naked eye, or (b) with binoculars, or (c) with a small telescope.

Whether the reader would like to buy the book for himself (or herself), or give it as a present to a child in his (or her) formative years, do not wait any longer; at 1p less than a tenner, this is money well spent.

The Home Planet will appeal to the same category of reader, those who enjoy beautiful pictures. Many of these are computer enhanced, and are, in the main taken from Soviet and American archives. The photographs are linked by commentaries of astronauts and cosmonauts from 18 countries, and many of these are in Russian, with English translations. Chapter headings include: Space Walk, Going to the Moon, Space Stations, and there is a section entitled "Why Space Photography?"

This is not a conventional astronomy book; it is certainly not a textbook. Reading the book brings out the same feelings one would expect to have from a visit to, say, the National Gallery if there were an exhibition of paintings by great masters on astronomical themes.

The book is very large (14" x 10½" x 1"), about the same size as a Times Atlas. It is also very heavy. This means it cannot easily be transported from place to place, but, like a chained bible, it would occupy a place of honour on the bookshelves of astronomers of all ages, as well as artists.

The price is very reasonable for a book of this sort.

Eric Zucker

LETTERS

Dear Editor,

"... why day and night are not equal at the equinoxes!", (*Gnomon*, Vol. 8 No. 2, January 1989). This could well be countered by "What's an equinox?" and "What's day and night?"

In the Supplement to the *Astronomical Ephemeris*, Smart, McNally and Russell, Dugan and Stewart all directly or indirectly consider that an equinox is an intersection of the ecliptic with the celestial equator, as does Norton in the 1943 edition. Spencer Jones and the *Macmillan Dictionary of Astronomy* admit both the intersection and its epoch. The Mitchell Beazley encyclopedia definition is rather loosely worded. It could be construed as the date of the occurrence. It is of interest that this last is the most likely meaning intended by the writer quoted above (Ian Ridpath). So the original query is essentially an attempt to compare "oranges and apples". "Day" and "night" are intervals of time. An equinox is a mathematical construct of position – using the word "position" in its spherical astronomy sense – or, if one admits the definition of equinox as an epoch, an epoch cannot be compared with a time interval.

If we interpret "at the equinoxes" as meaning "on the days of the equinoxes" then the answer appears straightforward:-

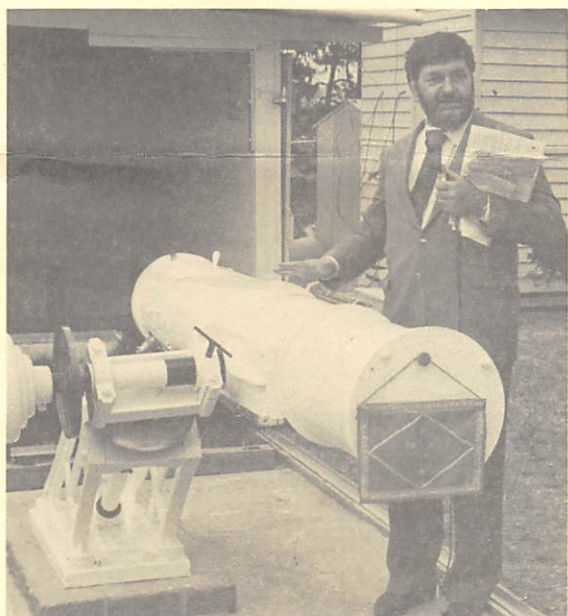
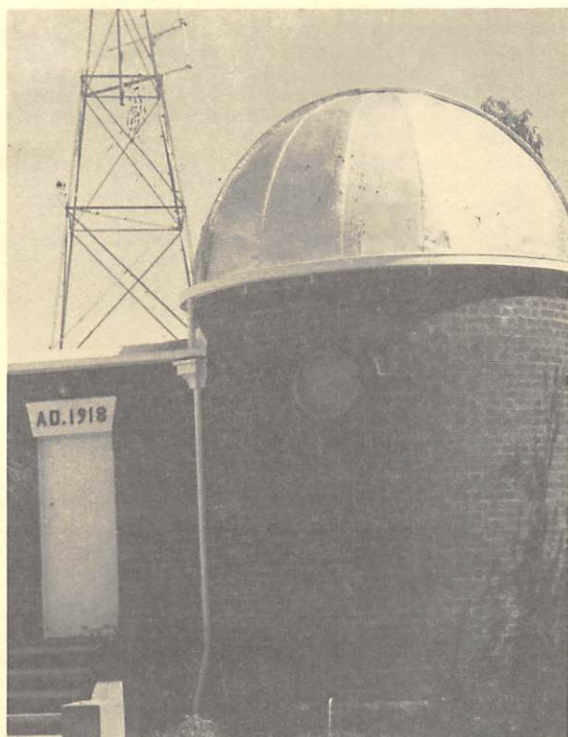
The intervals sunrise to sunset, and sunset to sunrise, are each of the order of twelve hours. During each of these intervals the Sun's declination is changing in magnitude and, in one of them, in sign. Hence, when measured in apparent times the intervals will be unequal. Similarly the Equation of Time is changing in magnitude causing additional changes to the intervals measured in mean time.

Precession and nutation have been ignored.

L. M. Dougherty

Dog Hill Farm,
Barkisland,
W. Yorks.

Note: [Even more basically, if we define the equinox as the instant when the Sun crosses the equator, what precisely do we mean by "the Sun"? Do we mean the *mean Sun* or the *apparent Sun*? Furthermore, are we referring to the *centre* of the (oblate) solar disc, or its "upper" or "lower" limb? Ed.]



Top left: Jelbart Dome containing 5" Jelbart Refractor. (By permission of Karenza Burk).

Top right: 12½" Baker-built telescope under renovation for the centenary. (By permission of Karenza Burk).

Bottom: The Hon. Barry Jones, Minister for Science, re-dedicating the 12½" Baker-built telescope, which was 113 years old at the time. (By permission of John Bailey).

'LOOKING UP, DOWN UNDER'

FROM THE GOLD RUSH TO THE COMPUTER AGE

The land around Ballarat was virgin bush until the first few pastoralists arrived in 1837. Gold brought the first settlers in their thousands in 1851. Gold built the town. Gold paid for it all, including the very beginnings of astronomy in Ballarat.

This story is not one of merely starting astronomy education in a centuries-old settled area. It was real pioneering stuff!

The necessity for technical education was noted in the 1860's, and in 1869, a 'Commission for Promoting Technological and Industrial Instruction' was set up. In the same year, the Ballarat Mining Board, at a meeting on October 6th 1869, moved to found the School of Mines. It was opened on October 26th 1870.

The first astronomy class, in January 1871, attracted four pupils.

James Oddie, a businessman, banker and first mayor of Ballarat, had been responsible for the initiative to erect many of the historic buildings and institutions in Ballarat, and in many cases, provided the money to do so. He had made his money on the Victorian goldfields in the goldrush days of the 1850s.

In 1881, James Oddie was Vice-President of the Council of the School of Mines. He was very keen on technical and scientific education, and was especially interested in astronomy.

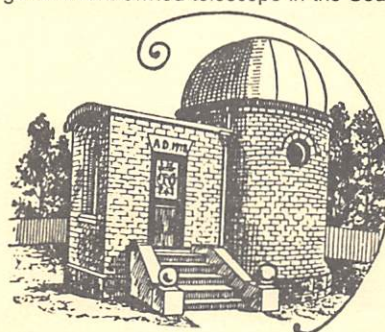
In 1884, at the age of sixty years, James Oddie decided that the School needed its own observatory, and he provided £4,000 to establish it. He persuaded a retired sea-captain, Henry Baker (then sixty-eight years old), to come and live at the observatory and build the telescopes for it. Captain Baker, an inventive and mechanically-minded man, had also made money in the goldfields, and had previously constructed a microscope and a 12½-inch reflecting telescope, the latter winning him a medal at the Melbourne exhibition in 1873. This telescope was installed at the new observatory and was first used there in January 1886. By 1888, the School of Mines observatory contained the 12½-inch 'scope, an 8-inch reflector and the 26-inch 'Great Equatorial Telescope', the largest non-government-owned telescope in the Southern Hemisphere at the time.

We have received a copy of the Journal of the Ballarat Astronomical Society (*"The Oddie - Baker Bulletin"*) from its editor Karenza Burk, who is also a member of the AAE. Ballarat (there are various spellings of the name!) is in Victoria, Australia. The full address, for anyone who wishes to get in touch, is: Ballarat Astronomical Society, PO Box 284, Ballarat, Victoria, Australia 3350.

The bulletin supplied, Vol. 8, No. 4, Jan/Feb 1986, is the centenary number, and makes fascinating reading. **THIS BULLETIN WILL BE ON VIEW TO MEMBERS AT THE ANNUAL MEETING ON 13 MAY AT THE SCIENCE MUSEUM**, and at other times on application to the Editor of *Gnomon*.

Mrs. Burk has extended an invitation to AAE members who would like to visit the Ballarat Observatory (address above, telephone numbers 323911, 432337 or 394617). Needless to say, any Ballarat AS member visiting the UK is warmly welcomed to attend any AAE function or meet with its members.

An article on astronomy education by Mrs. Burk is printed below.



*M! Pleasant
City of Ballaarat.*

The School of Mines continued to conduct classes in astronomy at the observatory for many years after its opening.

In 1888, James Oddie went to England and purchased a 9-inch refractor from Sir Howard Grubb, for £1,000. Unfortunately, because no-one wanted to take the responsibility for housing and using it, it was never un-crated. It was presented to the Australian Government in 1910, to found the observatory at Mount Stromlo.

After the deaths of Captain Baker in 1890, and James Oddie in 1911, the observatory became neglected. In 1915, the Ballarat East City Council took over control of the observatory, and Mr. John Brittain, FRAS, was installed as Curator. He was known and respected by the Astronomical Societies of England, France and America. He had previously lectured in astronomy at the School of Mines, and had written many astronomical papers, as well as a column in the local newspaper, *The Star*, from about 1909, until this paper closed down. He continued to write for the *Ballarat Courier*.

John Brittain raised £5,000 by running an 'observatory appeal' and had the new buildings, with their beautiful stained-glass windows, erected between 1915 and 1916.

He continued the educational role of the observatory and contributed many instruments, including a sundial, to its equipment.

Early in this century, the Misses Barnard had donated to the observatory "beautiful coloured astronomical mechanical lantern slides, illustrating the movements of the various planets and satellites of the Solar System". These were undoubtedly used during lectures to the public, originally in a kerosene (paraffin) projector.

In 1918, a 5-inch refractor, made by Stewart's of London, was donated by a Ballarat engineering firm, Jelbart's, and the dome built by voluntary labour.

In the Mayor's Report of 1921, Brittain had reported that more than 700 people had visited the observatory, plus night visitors for demonstrations and lectures.

An astronomical ephemeris was also published each month.

John Brittain spent 28 years at the observatory until his death in 1943.

Alex Caird took over as Curator in 1947 and continued with the lectures and a monthly article for the press.

In 1957, he requested electric lights instead of gas, so that he could use the projector and lantern slides "for further instruction of the public". Attendance during that year was about 600.

Following the death of Alex Caird in late 1957, a new era began at the Ballarat observatory. The Astronomical Society of Victoria (based in Melbourne) took an interest in it and the Ballarat branch of the ASV was inaugurated in March 1958. This was the first time a *society* had taken over the running of the observatory. More 'modern' books were obtained, including a copy of Norton's Star Atlas.

The Ballarat Astronomical Society (BAS) was founded in August 1958. The members continued to educate the public, especially the school children.

The 1960s were active years for the BAS and there was a strong radio-telescope section and a photography group.

In 1961, the Mayor of Ballarat expressed his pleasure at the educational work being carried on by the BAS. There was quite a high public interest in astronomy at that time and at least one group per week was hosted at the observatory. The BAS members gave lectures, showed films, gave demonstrations and viewing sessions and held exhibitions. They invited guest speakers, including on one occasion, Professor Bart Bok.

A new type of educational activity began in 1969, when the BAS hosted the National Australian Convention of Amateur Astronomers (NACAA). This was, and still is, held over the Easter weekend in alternate years, a different venue being selected for each convention.

The Ballarat Regional Association for Community Education (BRACE) began astronomy courses in 1976, run at the observatory by members of the BAS, and the Melbourne Council for Adult Education (CAE) started an astronomy course at the Ballarat observatory in 1980, with the BAS providing facilities and speakers.

The Total Solar Eclipse of October 23rd 1976, when it was said that the path of totality lay 'straight up the middle of Sturt Street' (the main thoroughfare), produced a boost to membership.

In 1979, BAS members, out of their group-education earnings, bought their first modern telescope, a 14-inch Celestron Schmidt-Cassegrain, which has enhanced and eased public viewing sessions. The BAS now also owns portable 8-inch, 6-inch and 4-inch reflectors, and these have been used for carrying to 'field nights' in other areas, usually by request.

THE PRESENT

The BAS currently consists of about 40 members, many of them juniors (under 18), and is an active group. It works with the Ballarat City Council in the maintenance and running of the observatory for the education of the public. Except in mid-winter (notorious in Ballarat), there is normally at least one group each week, plus special occasions and open nights.

Members have also held a few exhibitions in recent years – in 1984, to commemorate the 15th anniversary of the first Moon landing; in 1986, for Halley's Comet; in May 1988, for the Baker Telescope Centenary; and recently (still running at time of writing), a Solar System exhibition, in conjunction with a special 'Family Planet Night', when hundreds of visitors were shown Mars, Saturn and the Moon, as well as video-tapes of the Solar System.

The observatory still has in use the three 'old soldiers' – the 12½-inch (now 115 years old), the 8-inch and the 26-inch telescopes made by Captain Baker, although the 12½-inch is temporarily out of use for repairs. In fact,

the Oddie 8-inch 'scope is the favourite as a training instrument for junior and other new members, because of its simplicity and ease of use.

Our stained-glass windows are the '7th Wonder of Ballarat', we still have the old glass hand-painted 'slides' and many very old astronomical books. We hold regular courses through BRACE and the CAE. The School of Mines (now called 'SMB') is still going strong as a tertiary education college, and, finally, the 9-inch refractor is still in use at Mount Stromlo as a training instrument, being known as the 'Oddie Telescope'.

Astronomical education at the Ballarat Municipal Observatory has rarely ceased, and there is no reason to suspect that it will, given the recent upturn in public interest in astronomy, aided by our marvellous modern media.

The members of the BAS – all voluntary, part-time promoters of astronomy, will probably be worked off their feet in the near future, the way things are going!

Karenza Burk
September 1988

NOTE: Position of observatory – Altitude: 1,513 feet (465.5 metres); Latitude: 37°34'43" South; Longitude: 143°50'29" East.

PICTURE NEPTUNE SPACE ART COMPETITION

Calling all young space artists!

**MEET PATRICK MOORE!
HAVE YOUR WORK PUBLISHED IN
"ASTRONOMY NOW" MAGAZINE
WIN A FAMILY TICKET TO A STARSHOW
& SIT AT THE PLANETARIUM CONTROLS!**

All you have to do is PICTURE THE PLANET NEPTUNE

On August 24 the spacecraft Voyager 2 will pass over Neptune's North Pole at a distance of only 800 miles. A few hours later it will get to within 5,000 miles of Triton, Neptune's largest moon. What will it discover?

Are there oceans of hot water on Neptune?

Does it have rings like Saturn, or Uranus?

What is it like on Triton, the giant, orange-coloured moon?

And what about Nereid, that other more distant moon?

NOW it is the turn of the mysterious blue-green planet Neptune on the very edge of the solar system. It is so far from the Sun that it is always twilight. What do you think Voyager will see?

**ENTER OUR COMPETITION and SEE HOW CLOSE
YOU GET TO A TRUE PICTURE!**

Competition rules from the London Planetarium (Ms. T. Grafton), Marylebone Road, London NW1 5LR.

GNOBLEMS – SOLUTIONS

A number of solutions to these problems have been received. One from Keith Atkin (Sheffield) deals with the potential difference between Earth and Moon, and shows how to calculate this quantity, but goes on to say that as equal amounts of positive and negative particles constitute the solar wind, there will be no such potential difference. A letter from Robert Mills on measuring the radius of the Earth suggests two schools on the same longitude (e.g. Southampton and Newcastle) measure the altitude of the Sun as it transits the meridian. For further details, contact Robert Mills enclosing a stamped addressed envelope (14p): 83 Firs Road, Winterslow, Salisbury, SP5 1SW.

We are still awaiting contributions on how to tell the time on the Moon (*Gnoblem* 5).

GNOBLEM 6

If the Moon's revolution around the Earth were suddenly to stop, how long would it take for the Moon to collide with the Earth? (Answers should include the reasoning behind the calculation).

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