

SciTalk

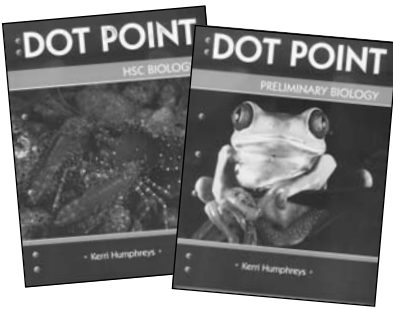
ISSN 1323-7667

Number 2 – May 2007

Book Giveaway

You could WIN these books ...

- DOT POINT HSC BIOLOGY
 - DOT POINT PRELIMINARY BIOLOGY
- by Kerri Humphreys



Prelim ISBN: 978085583 576 7
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These great books cover every dot point from the Stage 6 Biology Syllabus. Each dot point has questions and answers that students should be able to do if they wish to achieve well in their Preliminary Biology exams and in the HSC Biology exam.

TO WIN: Send in your name, school and school address, on the back of an envelope by 2 July 2007 to

Book Giveaway, PO Box 442, Harbord 2096

★ ★ ★

Winner for SciTalk 1/07

Congratulations to G Mudaliar, Bathurst High, who won Dot Point HSC Physics & Preliminary Physics (\$36.95 ea) published by Science Press.

★★ ATTENTION ★★

After you have read this, please write/tick your name below and pass it on.

- 1.
- 2.
- 3.
- 4.
- 5.

Please return to file or noticeboard.

PRIZES TO WIN!

See pages 1, 4 & 12

Send in your entries now

(ALL IN THE ONE ENVELOPE if you prefer!)

This SciTalk & past issues are available at <http://homepage.mac.com/robertgarner>

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Get your orders in now for these books. Special school prices are available – see page 7. □

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CELEBRATE
2007
National Science
Week
with
Physics is Fun
at
Luna Park Sydney

Enquiries/bookings: (02) 9939 6107. See p6.

EDUCATIONAL EXCURSIONS & FUN DAYS

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★ **Primary:** Science & Technology, English, Mathematics, Art & Peer Support

Save \$\$\$... special DISCOUNT PRICES FOR SCHOOLS: see p 6

INSIDE SCITALK ▶▶▶▶

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Why pay more?

SPECIAL SCHOOL PRICES

FUN DAYS or REWARD DAYS to Luna Park Sydney are cheaper if booked through Physics is Fun.

Please tell ALL staff at your school!

Diary Dates 2007

2007 – International Polar Year AND International Year of the Dolphin

JUNE 2007

- 1, 4, 8 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- 5 World Environment Day. www.unep.org/wed/2007/english/
- 8 World Ocean Day. www.theoceanproject.org/wod/
- 8 CMRI free public talk on Epilepsy research. RSVP 4 June. Enquiries: ph 9687 2800
- 15, 16 RACI NSW Schools Titration Competition. www.nswtitration.com
- 22 Winter solstice (4 am) (= shortest day of year)
- 22 Closing date Crystal Growing Comp. www.chem.unsw.edu.au/raci/crystal_grow/index

JULY 2007

- 1–14 International Science School: Yr 11 & 12 students, Uni of Syd. Details on page 4.
- 8–12 CONASTA 56, ICASE 2007, & World Conference on Science & Tech Edn: *Sustainable, Responsible, Global.* (08)92662174. Fax (08)92010003. www.worldste2007.asn.au/
- 20 PD program for HSC Biology Teachers. Museum of Human Disease...see ad on p4
- 22–28 National Chemistry Week. www.raci.org.au/national/events/chemistryweek.html
- 26 National Chemistry Quiz. www.raci.org.au/national/events/nationalchemistryquiz.html

AUGUST 2007

- 3 Jeans for Genes Day – helps to fund scientists working at Children’s Medical Research Institute to prevent & treat genetic diseases & chronic illness. (02) 9687 2800, Worksheets for Stage 5 Science/HSC can be downloaded from: www.jeans4genes.com.au
- 18–26 Australian Science Festival, ACT. School Activities: 15–17/8. www.sciencefestival.com.au
- 18–26 National Science Week – *Antarctic Science*. www.scienceweek.info.au/
- 17, 20, 23 Science Week events: Physics is Fun at Luna Park. <http://homepage.mac.com/robertgarner>
- 22 Physics Olympiad Nat’l Qualifying Exam. www.aso.edu.au/ Close: 29 June. 6125 9645
- 26 Geoscience Australia Open Day. ACT. www.ga.gov.au/education/events, 6249 9859
- 26 Earth Science Week. www.ga.gov.au/education/events, 6249 9859
- 29 Biology Olympiad Nat’l Qualifying Exam. www.aso.edu.au/ Close: 29 June. 6125 9645

SEPTEMBER 2007

- 1–16 Great Australian Night-Stalk. www.perthzoo.wa.gov.au/nightstalk/
- 7 National Threatened Species Day. www.deh.gov.au/biodiversity/threatened/ts-day/index.html & www.deh.gov.au/biodiversity/threatened/information/
- 5 Chemistry Olympiad Nat’l Qualifying Exam. www.aso.edu.au Close: 29 June. 6125 9645
- 13 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

OCTOBER 2007

- 7–13 Earth Science Week 2007. www.earthsciweek.org/ & www.ga.gov.au/about/event/
- 18 Oct–13 Nov HSC exams: 24/10 Chem (am), Snr Sci (pm); 30/10 Biol (am); 5/11 Phys (am); 6/11 EES (pm)
- 19, 22, 26, 29 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

NOVEMBER 2007

- 12–16 School Certificate Tests: 12/11: English, Science; 13/11: Mathematics, Australian History, Geography, Civics & Citizenship; 14–16: Computing Skills
- 2, 8, 12, 16 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- 23, 26, 29, 30 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

DECEMBER 2007

- 6, 7 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

- **JANUARY 2008** National Youth Science Forum. Forms to local Rotary club by 15/5/07, interviews in July. Only for Yr 11 in 2007. Enquiries: 6125 2777, fax 6125 8015, email: nsss@anu.au, www.nysf.edu.au/

While all dates have been checked to ensure that information in DIARY DATES is correct, no responsibility will be accepted by the publisher or Editor for any omissions or inaccuracies in it.

Update on BOS matters

Regularly check the BOS website to ensure you have the latest information. It contains syllabuses, past exam papers, Official Notices, Board Bulletins, a statistics archive & more.

Amended Stage 6 Science Support Document (BOS 03/07)

All references to Stage 6 Syllabuses have been amended in line with the changes to all syllabuses, and other changes have been made in the programming and assessment sections.

Stage 6 Syllabuses Minor Amendments (BOS 22/07)

Remember that these amendments take effect for Preliminary and HSC courses in 2007. Refer to Official Notices *BOS 51/06*, *52/06*, *53/06* and *54/06*. The latest versions of each syllabus are on the BOS website.

Approved scientific calculators for 2007 HSC examinations (BOS 22/07)

Make sure your students know which scientific calculators are allowed in the HSC. This list is now available at: www.boardofstudies.nsw.edu.au/manuals/calculators_hsc.html

On BOS website:

- HSC Marking Centre Notes & Guidelines
- Past HSC exams and SC Science Tests
- Amended Periodic Table (BOS 22/05)

BOS enquiries:

Ph (02) 9367 8111, fax (02) 9367 8484
 Website www.boardofstudies.nsw.edu.au/
 BOS contacts for Science:
 • Inspector Science, K–12 & Senior
 • Assessment Officer – Science

NOTE: Your purchase of the Odum & Garner Past HSC Biology, Chemistry and Physics books helps to support the production of Past HSC books for Earth & Environmental Science and Senior Science. Thank you to all the teachers who support these projects.

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• These days are held throughout the year and are a great way to have FUN learning (see p 7).

Worksheets are available for:

- Primary Science & Technology, English, Maths
- Science 7-10 • Technology • Maths • Photography
- Physics • Senior Science • Biology • Art
- Peer Support • Commerce/Bus. Studies/Tourism

NATIONAL SCIENCE WEEK DATES

17, 20 and 23 August 2007

Book your date now by ph (02) 9939 6107.

**** Includes complete Risk Assessment package! ****

The Great Australian Marsupial Night Stalk
in partnership with Tiwest

Many Australian marsupials are on the brink of extinction and need your help. If you would like to help Australian scientists and conservationists, you can take part in this year’s Night Stalk.

Anyone can do a Night Stalk survey – all you need is a torch. It’s fun! It’s free, and easy to do! Get a group together, count the number of marsupials you see in your local bush, record your findings on a spotter’s log and send your results to Perth Zoo.

The Great Australian Marsupial Night Stalk
1 September–16 October 2007



This annual national survey, now in its 9th year, runs from 1 September–16 October, and is designed to collect information about marsupial and feral animal numbers and their distribution.

For more information, please contact:
 Lyndsay Fairclough
 The Great Australian Marsupial Night Stalk in partnership with Tiwest
 Ph: (08) 9474 0497 Fax: (08) 9474 4113
 Email: nightstalk@perthzoo.wa.gov.au
 Visit: www.perthzoo.wa.gov.au/nightstalk/

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 **Sydney Wildlife World**
DARLING HARBOUR

GEOSCIENCE AUSTRALIA OPEN DAY

Sunday 26 August 10 am–4 pm

Come and discover Australia's leading geoscience research agency at Jerrabomberra Ave & Hindmarsh Drive, Symonston ACT

EARTH SCIENCE WEEK

14–20 October 2007 • Theme: "The Pulse of Earth Science"

Earth Science Week aims to raise awareness of earth science and its significance and impact to every day life, education and society. It encourages a sense of responsibility for the use and protection of our natural resources and the environment. Earth Science Week is an ideal opportunity to get your students to discover the wonders of earth science.

Geologi short film

COMPETITION 2007

Geoscience Australia and the National Geographic Channel invite Australian **secondary school students** to participate in Earth Science Week 2007 by producing a short film with an "Earth Science" theme. The winning entry will be showcased on National Geographic Channel website. Prizes include a GPS, mineral specimens, DVDs and books.

Registration is required by Tuesday 31 July 2007.

Competition entries must be received by Friday 31 August 2007

For further information: ph (02) 6249 9859, email: Fiona.Wright@ga.gov.au

Website: www.ga.gov.au/education/events

OPAL – Australia's new 20 megawatt research reactor

This new nuclear reactor was needed as the older HIFAR nuclear reactor at Lucas Heights has almost reached its use by date, due to such things as the transmutation of the aluminium reactor deflector into the more brittle silicon. OPAL is 150 times smaller than an average nuclear power plant. However, it has twice the power of its predecessor (HIFAR), between four and 10 times the irradiation capability, far superior neutron scattering abilities, and will house some of the most sophisticated measuring instruments in the world.

OPAL uses low enriched uranium fuel and is cooled by water. OPAL is on the ANSTO site south of Sydney, thus taking advantage of the area's sound geology, and the existing 1.6 km buffer zone and infrastructure at ANSTO's site. Although it was officially launched in April 2007, OPAL first went critical at 11.25 pm on 12 August 2006. The reactor building is made from reinforced concrete, which protects the reactor from all external events and also provides the structural basis for reactor containment. It is also seismically qualified and is surmounted by a metal grill for protection from a light aircraft collision.

OPAL is a multipurpose facility. It produces neutrons for research, radioactive isotopes for use in medicine and industry, and doped silicon for use in the semiconductor industry. If these materials were not produced in Australia they would have to be imported, and the time taken for this would make the supply of short half-life radioactive isotopes to where they are used very difficult, and would limit the use of nuclear diagnostic and treatment options to Australians. □

The University of New South Wales & School of Medical Sciences presents

A Professional Development Program for HSC Biology Teachers

Exploring Further Frontiers in HSC Biology

Friday 20 July 2007

9.00am - 4.00pm

The program for the day consists of lectures and workshops covering various issues and topics from the HSC Biology syllabus. The 2007 program will include:

- Keynote address from **Professor Mike Archer** on the evolution of Australian biota
- Lectures from UNSW experts on **Immunology, Malaria** and **The Human Kidney**
- Workshops on topics such as **The Human Story, The Ear, Mega Genetics,** and **The Biology of Cancer**
- An opportunity to explore the **Museum of Human Disease**

Registration includes complimentary parking, morning tea and lunch. Please book early to avoid disappointment.

Cost: \$130 (incl GST)

Further information and registration

T 02 9385 1522

F 02 9385 1747

E diseasemuseum@unsw.edu.au

Download registration form at www.diseasemuseum.unsw.edu.au



WIN A FAMILY PASS TO IMAX

IMAX Sydney, at Darling Harbour, is open every day. More than 8 storeys high, it has the world's biggest cinema screen to give audiences the ultimate film experience. IMAX films are both entertaining and educational. Films are constantly changing and cover a wide range of themes. High quality resource materials & teacher guides are provided for school visits.

★ ◆ ★ ◆ ★ ◆ ★

TO WIN A FAMILY PASS* TO IMAX: (for 2 adults and 2 children worth \$50) ... send in your name, school, & school address on an envelope **by 2 July 2007** to:

IMAX Give Away, PO Box 442, Harbord NSW 2096

* This pass will be valid for any one film for any session, except public holidays and films advertised as 'no free list'.

WINNER: G Roberts, Beverley Hills Girls High, won the IMAX Sydney family pass for *SciTalk* No. 1-2007.



WIN A FAMILY PASS TO SYDNEY AQUARIUM



Sydney Aquarium at Darling Harbour is a great science excursion venue. It showcases Australian aquatic habitats, their fauna and flora, information on habitat characteristics, animal adaptations and conservation issues. Bookings are essential. Excursions are self-guided. Information: www.sydneyaquarium.com.au

TO WIN A FAMILY PASS TO SYDNEY AQUARIUM:

(for 2 adults & 2 children worth \$66) ... send in your name, school, & school address on an envelope **by 2 July 2007** to:

Sydney Aquarium Teacher Offer, PO Box 442, Harbord NSW 2096

WINNER: Jenny Piper, Lurnea High, won the Sydney Aquarium family pass for *SciTalk* No. 1-2007.



WIN A FAMILY PASS TO SYDNEY WILDLIFE WORLD

Sydney Wildlife World at Darling Harbour is a great NEW science excursion venue, which opened last September. It displays Australian fauna and flora in 9 different habitats. With over 6000 animals, this will link well to the syllabus. Details: www.sydneywildlifeworld.com.au

TO WIN A FAMILY PASS TO SYDNEY WILDLIFE WORLD

(for 2 adults & 2 children worth \$68)

Send in your name, school, & school address on an envelope **by 2 July 2007** to: *Sydney Wildlife World Teacher Offer* PO Box 442, Harbord NSW 2096.

WINNER: Jan McBryde, Marsden High, won a Sydney Wildlife World family pass for *SciTalk* No. 1-2007.



AUSTRALIAN SCIENCE FESTIVAL 2007

Schools Education Program: 15-17 August 2007

The Australian Science Festival will be held from 15-26 August 2007. There is a new venue and new program of events for school students of all ages.

The festival's feature attraction will be the ActewAGL Amazing World of Science exhibition and educational schools program held at the Australian Institute of Sport from 15-17 August.

Featured events include hands on workshops and shows for students of all ages and covering disciplines from engineering to genetics. Ticket prices start at \$3 with supervising teachers receiving free entry.



Ph: (02) 6207 5901 **Fax:** (02) 6205 0638

Email: bookings@sciencefestival.com.au

FUN PARK EXCURSIONS

2007 DATES*

March 16, 19. April 2. May 10, 11.
June 1, 4, 8. Aug 17, 20, 23.
Sept 13. Oct 19, 22, 26, 29. Nov 2, 8,
12, 16, 23, 26, 29, 30. Dec 6, 7.

* Note: **OTHER SCHOOL DAYS** (not Tues/Wed) are available by arrangement (a small surcharge will apply)

TIME 11 am–6 pm

COST

\$18.50* / student
plus \$17* booking fee / school

Teachers **FREE:** 1/8 primary or 1/15 secondary students.

Entry to Luna Park is FREE. Extra teacher ride tickets are \$22.00* ea.

* plus 10% GST (schools can claim this back if doing a curriculum-specific excursion).

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DISCOUNT SCHOOL PRICES

ANY school faculty can book a FUN DAY OR EDUCATION DAY at Luna Park Sydney through Physics is Fun and save \$\$\$.

Numbers are limited to ensure minimal queues. Come and join us for a fun-filled day at LUNA PARK Sydney. Curriculum-based worksheets are available.

Interactive learning is a great way for your students to discover that learning is not so dull after all! Students will learn as they ride at these fun-filled excursions.

These fun park excursions are presented by experienced teachers.

WORKSHEETS ... secondary / primary

Secondary: Science 7–10, Physics, Biology, Senior Science; Technology; Visual Arts; Maths; Peer Support; Commerce; Business Studies, Tourism; Photography.

Primary: Science & Technology, English, & Mathematics; Art; or Peer Support.

JOINT EXCURSIONS

Save \$\$\$ – see an IMAX film or visit Sydney Aquarium, before or after Luna Park ... see p3.

PHYSICS IS FUN

Fun Park Excursions

The original and best

Physics is Fun was co-authored in 1983 by Robert Garner and Sylvia Jennings and was based on their earlier excursions at Luna Park in the 1970s. Robert has conducted these fun park excursions since their inception ... both at Luna Park (1983-1987, 1995, 2004-2007) and Wonderland Sydney (1990-2004) – covering many different subject areas. With the closure of Wonderland Sydney in early 2004, these Fun Park Excursions have been at Luna Park Sydney since its re-opening in April 2004.

Please note: Our excursion notes are only for use when on an excursion day booked through Physics is Fun. It is an offence under Copyright Laws to use them on any other occasion without written permission from Physics is Fun.

★ Book NOW – don't miss out! ★

ENQUIRIES/BOOKINGS

Book now by ph/fax/email, then send a deposit of \$100 (+ 10% GST) to confirm your booking and receive your worksheets.

Robert Garner or Catherine Odlum
PO Box 442, Harbord 2096

Ph (02) 9939 6107 Fax (02) 9939 6105

Email: physicsisfun@mac.com

Physics is Fun – The original and best

ABN 54 942 891 924



Free public talk on epilepsy research and progress to better treatment

Epilepsy affects over one million people in Australia, so an average workplace or school could expect an average of 6 in every 100 people affected by this disease.

Current treatments for epilepsy all target similar aspects of the brain and many are likely to cause side effects such as slowed thought processes and a general 'fuzziness.'

Dr Phil Robinson of the Children's Medical Research Institute has made a discovery that opens the path to a truly new treatment for epilepsy. By targeting a protein called dynamin, Dr Robinson has discovered that he can stop brain cell communication. This holds enormous potential for treating epileptic seizures.

Join Dr Robinson for an evening lecture about the research behind this new discovery and how it may one day be used to develop treatments for epilepsy, schizophrenia, mood disorders and cancer.

We also offer you the opportunity to tour our research facilities. Evening refreshments will be provided.

Where: Children's Medical Research Institute
214 Hawkesbury Rd Westmead

When: Friday 8 June 2007
6:15 for a 6:30 pm start

Cost: FREE

Bookings: Ruth Hardman or Jane Fleming
on (02) 9687 2800



Please RSVP
by Monday 4 June

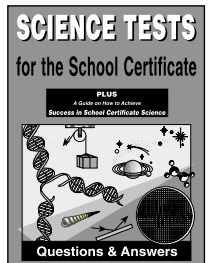
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Please send invoice to school: Yes / No (If yes, please send a School Order form.)

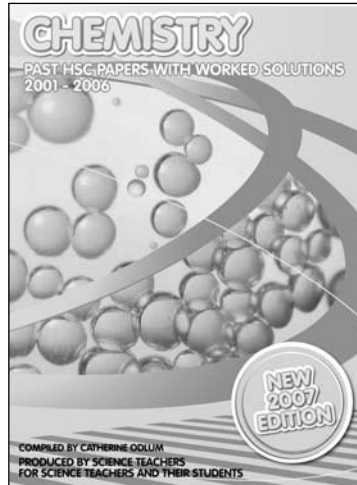
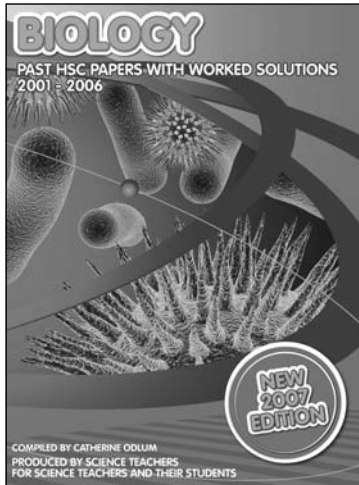
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- complete **WORKED ANSWERS** that would score full marks to ALL the Core and **ALL OPTIONS** ... with **full EXPLANATIONS** for all multiple choice questions.
- includes Periodic Table, Data Sheet (Phys/Chem), Formulae Sheet (Phys)

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- a comprehensive **GUIDE ON HOW TO ACHIEVE SUCCESS IN THE HSC** ... with essential exam techniques and how to study effectively to help students maximise their marks in the HSC
- a HSC Exam **QUESTION BY QUESTION TOPIC GUIDE**
- a **GLOSSARY OF EXAMINATION TERMS**

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Photo Spot Surface of a sea urchin shell (test)

Sea urchins live on seafloors in oceans all over the world. The name 'urchin' is an Old English name for the round spiny hedgehogs that sea urchins resemble.

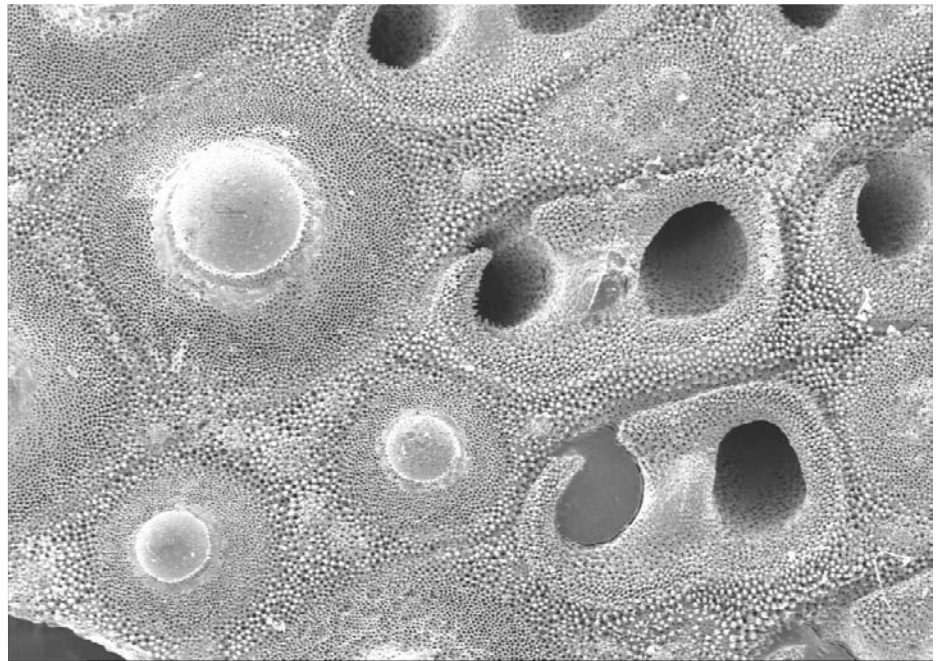
There are over 700 species of sea urchins worldwide. Closely related to starfish, they are invertebrates belonging to the Phylum Echinodermata. Similarly to starfish, sea urchins display five-fold (pentameric) radial symmetry. This pentameric symmetry is not so obvious in live sea urchins, but is easily seen in a dried sea urchin shell. Common colours include black and dull shades of green, olive, brown, purple, and red.

A sea urchin shell (or test) is globular in shape, made of calcium carbonate and covered with many long spines which serve to protect the sea urchin from predators. An adult test ranges in size from about 3–10 cm. Typical sea urchins have spines that are 1–3 cm in length, 1 to 2 mm thick, and not terribly sharp. One species of sea urchin, found in the Caribbean, has thin spines that can be up to 10–20 cm long.

The spines are attached at their bases to ball-and-socket joints and can be pointed in any direction. The small smooth spheres seen in the image on the right are these 'ball' attachment points for the spines.

Like other echinoderms, sea urchins move by means of hundreds of tiny, transparent, adhesive tube feet which extend out of the shell. The tube feet poke out of tiny pairs of holes (which can be seen in the image) and work in conjunction with the surface spines.

Their mouthparts are located centrally underneath and contain five united calcium



ABOVE: Surface of a sea urchin test. Magnification is approx 50x.

This photomicrograph was taken by Tony Romeo, Australian Key Centre for Microscopy & Microanalysis, with a scanning electron microscope.

carbonate teeth or jaws, with a fleshy tongue-like structure within. The sea urchin uses these to scrape off and tear up plant material and other food from the sea floor.

Sea urchins feed mainly on plant and decaying animal matter, including kelp, algae, dead fish, sponges, and barnacles. They can also feed on a wide range of invertebrates such as mussels, sponges and brittle stars.

In turn, sea urchins are eaten by crabs, sea otters, fish and people.

Humans consume sea urchin 'roe' either raw or briefly cooked – sea urchin 'roe' is considered a delicacy in many countries including Japan, Korea, Chile, Spain, Greece, France and Italy. Although it is referred to as 'roe', it is actually the organs that produce the roe (the gonads). □

Fatal familial insomnia – a prion-caused disease

The symptoms of fatal familial insomnia (FFI) have been well known since the mid-1800s, yet its cause has only recently been identified as being caused by a prion. This disease affects just 30 families in the world.

The course of symptoms is grim. In a typical case, one day in your early 50s, you suddenly can't sleep through the night. Your pupils become tiny. Men become impotent. Your blood pressure and pulse become elevated, and you sweat heavily as your body goes into overdrive. Over the ensuing months, you suffer insomnia and cannot sleep at all. Your ability to balance, walk or speak disappears, yet your ability to think remains intact, so you know exactly what is happening. After several months, you fall into a coma and die.

At first FFI was thought to be a sleeping disorder, but then doctors examining the brains of those who had died found that the brain decay resembled CJD – the brain was full of holes where the nerve cells had died: the tissue was spongiform (i.e. with holes). It was

through the research of Stanley Prusiner, from the University of California, that the cause of FFI was finally discovered in 1996. Prusiner had found that under certain conditions the body's proteins can turn against it and cause a rare class of degenerative brain ailments such as Creutzfeldt-Jakob disease (CJD) and bovine spongiform encephalopathy (BSE). BSE is known popularly as 'mad cow disease' but converts in humans into a variant of CJD.

Prusiner took material from the brains of several people who had died of FFI and injected the material into mice genetically altered to produce human prions. The mice developed FFI. He performed the same experiment with brain matter from CJD victims and got parallel results. Then he killed these mice and shot prions from them into new mice and again got the two diseases. He concluded that malignant prions can cause disease. Prusiner received a Nobel prize in medicine for his work on prions in 1997.

Not all biologists are convinced of the importance of prions and still believe that there may be some sort of slow virus or something else that is getting into brain tissue and causing

these diseases. But they have no evidence for this. Prusiner remains convinced that prions are the causative agent, but suspects there is some sort of helper protein (which he refers to as 'protein X') associated with prions. Other researchers have found that variants of the same prion protein gene can produce both FFI and a form of CJD. They are currently working on ways to start and stop this process as this would hopefully provide a cure for FFI and CJD, and would perhaps point to treatments for Alzheimer's which has been found to often present with similar brain pathology.

Currently, there is no treatment available for individuals infected with abnormal prions. Also, prions are difficult to destroy as they are extremely resistant to heat and chemical agents, which has meant careful handling of specimens is essential. While FFI does not appear to be transmissible, CJD is transmissible and was found to have passed from cattle to humans who ate contaminated beef products. As a result of outbreaks of CJD overseas, the Australian Government has banned imports of European beef and beef products. To date, there is no evidence of BSE in Australia. □

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A blast from the past ... and our winter skies

... Don Whiteman

Supernovas provide today's astronomers with a glimpse into the life cycle of stars. New supernovas are discovered from time to time – the latest supernova just discovered, SN 2006gy, appears to be extremely massive.

What is a Supernova?

Stars evolve in a very complex manner. As stars live, they are fusing hydrogen into helium, which releases energy that heats the star's core, creating pressure that holds the star's layers in place. Once the hydrogen is exhausted the fusion ceases and gravity causes the star to shrink, raising the temperature until the helium can fuse. This period will last only 10% of a star's lifetime. This process continues producing heavier nuclei along the way until the core consists of iron. The iron core continues to grow until it reaches the Chandrasekhar limit (1.44 solar masses), at which stage it can no longer support its mass and will begin to collapse with catastrophic results. Supernova!

If the original star is less than 20 solar masses, the supernova will leave behind a neutron star. If it has more than 20 solar masses it will collapse into a black hole.

A new supernova, SN 2006gy, was discovered in 2006 by NASA's Chandra X-ray Observatory and ground-based optical telescopes. This supernova is that of an extremely massive star thought to be 150x that of our Sun and is the most massive supernova ever detected. It is in galaxy NGC 1260, some 240 million light years away. Such a supernova may re-shape what astronomers believe about supernovas.

Discovery of Supernova SN 1987A

Back on 23 February 1987, the Australian astronomer Rob McNaught took an image of the Large Magellanic Cloud (LMC), a companion galaxy of the Milky Way, in the constellation of Dorado. He did not process it until the next day. If only ...

The light from supernova SN 1987A first reached Earth on 23 February 1987. However, it was 'officially' discovered by Ian Shelton and Oscar Duhalde at the Las Campanas Observatory in Chile on February 24, 1987 in NGC 2070 (the Tarantula Nebula). Interestingly, it was also independently observed on 23 February 2007 by Albert Jones an amateur astronomer in New Zealand who noticed something unusual, and Colin Henshaw in Zimbabwe.

Supernova 1987A via Hubble

The progenitor star that became SN 1987A was Sanduleak-69° 202a, a blue supergiant. Lying at about 163 000 light-years away in the Large Magellanic Cloud, it actually blew up about 161 000 BC, but its light only arrived here in 1987. The brightest stellar explosion in 400 years, SN 1987A shone with the power of more than 100 million Suns for 4–5 months.

The entire region around supernova SN 1987A is shown in Figure 1. The most prominent feature is a ring with dozens of

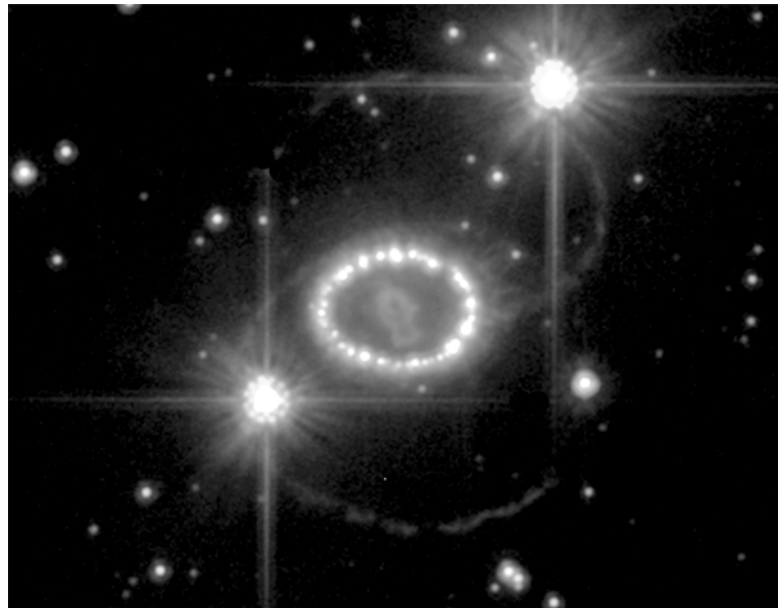


Figure 1 Supernova SN 1987A ... looks 'like a pearl necklace in space'. This image from NASA was taken in December 2006 by the Hubble Telescope.

bright spots. A shock wave of material (from the progenitor star) unleashed by the stellar blast is slamming into regions along the ring's inner regions, heating them up, and causing them to glow. The process takes time and the bright ring was not formed until several months after the supernova. The ring, about a light-year across, was probably shed by the star about 20 000 years before it exploded.

Astronomers detected the first bright spot in 1997, but now they see dozens of spots around the ring. Only Hubble can see the individual bright spots. In the next few years, the entire ring will be ablaze as it absorbs the full force of the crash. The glowing ring is expected to become bright enough to illuminate the star's surroundings, providing astronomers with new information on how the star expelled material before the explosion.

The object in the centre of the ring is debris from the supernova blast. The glowing debris is being heated by radioactive elements, e.g. titanium 44, created in the explosion. The debris will continue to glow for many decades. The origin of a pair of faint outer rings, located above and below the doomed star, is a mystery. The two bright objects that look like car headlights are a pair of stars in the Large Magellanic Cloud.

Hubble continues to observe this light show which makes the glowing ring look like a pearl necklace.

What's coming up in the skies overhead?

Planets

Over the coming months we will gradually see Saturn disappear from the night sky. From May to July, Venus and Saturn will be in the western evening sky. Venus sets around 8 pm

throughout winter. Saturn will be higher than Venus in the western sky in May and will be setting around 11 pm in mid-May and earlier each night until it disappears around dusk in early August. Venus and Saturn get closer to one another over winter until they are only 1° apart, low in the western sky at the end of June when they begin to separate again.

Mars rises around 2 am through winter and will be visible in the eastern morning sky until dawn. On 13 May Mars will be found just 3° south of the Moon.

Jupiter will be visible all night through winter rising around sunset and will be in the sky until it sets near dawn. Jupiter will be at Opposition on 6 June, so now is the best time for the year to observe Jupiter. In July, Jupiter will be getting closer to the red giant star, Antares (Alpha Scorpius).

Mercury is at greatest elongation 23° east of the Sun on 2 June giving a chance to see the planet low in the western sky.

Comets and meteors

For those with a mid-sized telescope, **Comet Encke** will be visible after midnight around 6 June in the constellation Cetus.

The **Phoenicids** meteor shower appears on the 13 June and should have reasonably slow moving meteors, so watch out for the trains.

Red Moon

A Red Moon will appear on 28 August from 7.52–9.22 pm. More on this in next *SciTalk!*

* * * * *

Viewing the night sky

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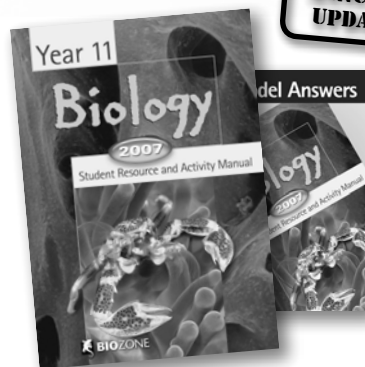
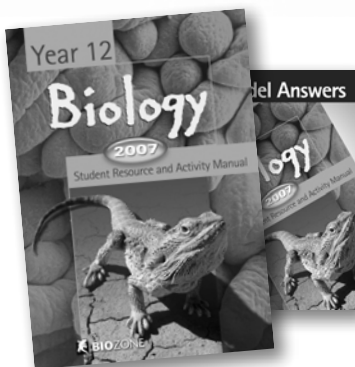
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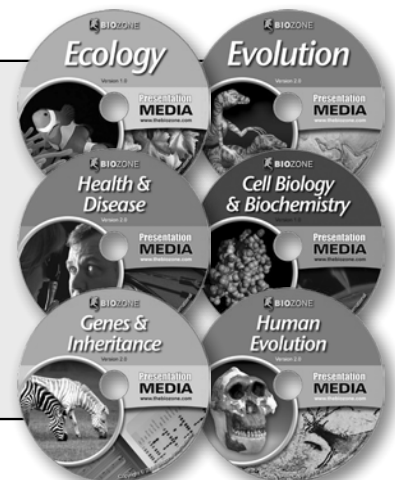
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SciTalk aims to provide science teachers with up-to-date information, important dates, the latest products available, plus 'what's on' in various excursion venues.

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SciTalk is due into schools mid-term. All contributions for *SciTalk* should be directed to the Editor (see below).

CLOSING DATES

- *SciTalk* No. 1–February 2007 ... Jan 25
- *SciTalk* No. 2–June 2007 ... April 5
- *SciTalk* No. 3–August 2007 ... June 29
- *SciTalk* No. 4–November 2007 ... Sept 28

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