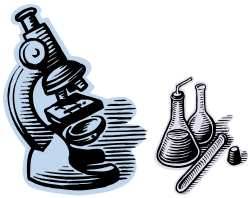

CIRENCESTER SCIENCE AND TECHNOLOGY SOCIETY

2007 September - edition Number 8

Contents of this issue

A reminder of the Society Wednesday Meeting times and dates

12th September at 7.30pm at the RAC.
Professor Innes Cuthill
'The art of concealment. Prey camouflage and preditor vision'

10th October at &.30pm at the Sundial theatre, Cirencester college
Dr Andrew Ives
'Engineering - the ultimate reality show'
Tickets will be needed, see advertisement on page 2
Other Happenings - Watch the CSTS website for information and ask for a programme card when you attend the next meeting.

The Cirencester Science and Technology Society

invites you to the

Second *Patricia Clarke* Public Lecture

on

ENGINEERING - THE ULTIMATE REALITY SHOW

Dr Andrew Ives

Past-President of the Institution of Mechanical Engineers

Humanity's ecological and industrial footprint is stretching the resource and pollution capabilities of our planet to the limit. Any significant change to the products and processes we use on an everyday basis, which might reduce or limit that footprint, takes time to introduce and take effect, and time is no longer on our side.

Engineering based on today's Science and today's Technology, as opposed to tomorrow's Science and Technology, is identified as the vital discipline to address some of the major problems now facing our planet.

Wednesday, 10 October 2007

7.30pm The Sundial Theatre, Cirencester College

Admission by ticket only: £5 (members and full-time students free)

Available from the theatre box office: 01285 654 228 or

www.boxoffice@Cirencester.ac.uk/sundial

Members contact membership Secretary – Mrs Joan Cooper

Editors note's for September.

Like it or not we are in a computer driven world and as such the more mature amongst us have to decide to live with it or reject it. If you decide the former you can access our excellent website which has been in existence for some three years now. In order to keep it relevant and working properly your committee have co-opted (with a bit of arm twisting) Richard Gunner to join them and to lend his expertise to the website management. We welcome Richard on board.

In July the Society tried to arrange a coach trip to spend a day at the Royal Society Summer Show. Unfortunately it had to be cancelled due to insufficient interest by members. There were several factors which led to this, one of which is that your committee had to increase the charge for the coach to a more realistic figure in order not to make significant losses, and it was at the beginning of the holiday period. Roy Postlethwaite put a lot of work into this and I would like to thank him on behalf of the Society.

As it turned out a few people looked for alternative means of getting there and much to our surprise we found that a trip on Megabus to London was extremely cheap (in my case £11.50 for two of us return – booked on the internet of course). Perhaps it is a lesson to be learned if you go to London again.

Time

Time - a commodity none of us have enough of and few of us can define or explain to the young.

When you are young time seems to stretch to infinity as you get older the infinity comes a little closer and for the mature time is like a photoflash.

With these things in mind I took myself off to the Royal Observatory at Greenwich this summer. Here perhaps I still might not be able to define time but I might understand a little more about its measurement. With the help of a very friendly Curator I was introduced to the history of the observatory and its collection of time measuring devices.

King Charles the 2nd commissioned John Flamstead "*to apply himself with the most exact care and diligence to the rectifying of the tables of the motions of the heavens, and the places of the fixed stars, so as to find out the so much desired longitude of places for the perfecting of the art of navigation*". Greenwich housed not only the scientific instruments to be used by Flamstead in his work on stellar tables, but over time also incorporated a number of additional functions such as the keeping of time and later Her Majesty's Nautical Almanac Office.

British astronomers have long used the Royal Observatory as a basis for measurement: four separate meridians have been drawn through the building. The basis of longitude the Prime Meridian established in 1851 and adopted at an international conference in 1884, passes through the Airey transit circle of the observatory. It was long marked by a brass strip in the courtyard, now upgraded to stainless steel, and, since 1999, has been marked by a powerful green laser shining north across the London night sky.

GMT was at one time based on the time observations made at Greenwich (until 1954). Thereafter, GMT was calculated from observations made at other observatories which were still active. GMT is now often called Universal time, which is now calculated from observations of extra-galactic radio sources, and then converted into several forms, including UT0 (UT at the remote observatory), UT1 (UT corrected for polar motion, and UTC (UT in discrete SI seconds within 0.9 s of UT1).

Today the buildings include a museum of astronomical and navigational tools, notably including John Harrision's prize-winning longitude marine chronometer, H4 and its three predecessors. These are absolutely fascinating machines, incredible engineering considering the primitive facilities available at the date.

After all this I should have understood what defines time! But no I still have to refer to the dictionary.

"The general relation of sequence or continuous or successive existence; duration or continuous existence regarded as divisible into portions or periods, a particular portion of this characterized by certain events."

Bunny

A visit to the Royal Society Annual Science Show

This years Science Exhibition in London, was one of the most informative events I have visited in a long time. Exhibited by the people behind the science, I was intrigued and inspired by the ideas and designs that had been worked on by people ranging from ingenious scientist to students the same age as myself. From heat receptive plastics, gauges to show the quality of wood whilst it is still growing, to intelligent sensors to measure a sports persons performance, and Eco friendly cars. Many of these designs were aided by universities and schools around the country, with the students able to talk about them based on what they have learnt whilst working on the projects. I thought this science show portrayed to me how science and technology is becoming more accessible to everyone and made me realise how important every discipline of science is, no matter what your subject area. I have never realised before how many different areas were encompassed in the term "science" that all come together to create such interesting - and important creations.

A contribution by Rebecca Lees-Smith aged 18

Some of our members will remember that excellent evening visit we made to *Gloucestershire Royal Hospital*

Our Host that evening was Brian Witcombe. Recently he wrote a piece for the BMJ which by kind permission he has allowed us to reproduce. I well remember the puzzle he set us that evening 'what is in the package?' Well here he expands on what can be done.

The magnetic resonance egg timer

Unless something is happening, an x ray department can seem as uninteresting as an empty garage or aircraft hangar, but it is unethical to let visitors watch patients being examined. Fortunately, when the distinguished members of the Cirencester Science and Technology Society visited us to learn about radiological scanning, one of our secretaries agreed to act as a model, so demonstrating ultrasonography was not a problem. The visitors could see her heart and aorta pulsating, learn how a Doppler signal can be used to assess vascular flow, and witness how abdominal anatomy can be obscured by calcium in the ribs or air in the bowel.

A selection of foods and other items hidden in a cardboard box proved a popular way to demonstrate computed tomography. The visitors enjoyed being quizzed about the contents of the box, and having to distinguish cherries from grapes, a banana from a courgette, and a bruised apple from a sound one. They were also asked to distinguish a length of skirting board from a piece of "tongue-and-groove" plank, and the grain of the timber was shown exquisitely. Scans were completed in seconds, sections in all three orthogonal planes were quickly constructed, and post-processing techniques such as surface rendering were demonstrated.

We showed off magnetic resonance imaging (MRI) using a different phantom, a chicken carcase filled with eggs. The MR images not only revealed the detail of the chicken's anatomy but also distinguished each egg's embryo, yolk, and albumen. The differences between a fresh egg, a bad egg, and a chocolate cream egg were discernable, and one egg was made invisible by wrapping it in aluminium foil. The foil acts like a Faraday cage: it is a barrier to the passage of the radio waves which cause the resonance of protons on which MR signal is dependent.

An unforeseen effect, however, was how cooking an egg changes its MR signal. The albumen of a fresh egg seems white on T2 images, but the signal is lost on cooking so the white turns to black. The change from white to black extends in from the outside as the egg cooks. When an egg is ready to eat and the albumen has solidified, the white of an egg is completely black on T2 images. This occurs, as may be guessed from breakfast experiences, after boiling for a little over three minutes.

Our finding suggested commercial potential, but there are practical constraints. The actual process of scanning takes a minute or two to complete, and the egg has to be cooked at a distance from the scanner to prevent the egg pan and heat source becoming stuck to the magnet. Moving a boiling egg in and out of the scanner is hardly practicable and, even if these matters could be solved, an MR egg timer is unlikely to become a cost effective alternative to the standard sandglass.

Brian Witcombe, *radiologist - Gloucestershire Royal Hospital, Gloucester*

SCIENCE AND THE ARTS AT THE HEART OF THINGS

Report on "The Tree of Life" Exhibition held at the Corinium Museum,

Cirencester from 5th October 2006 to 3rd January 2007.

The information sheet, originally published in the "Newsletter" of the **Cirencester Science and Technology Society**, outlines the genesis, content, supporting lectures and organisation of this exhibition, one amongst four related exhibitions conceived and established by retired pathologist, Dr Geoffrey Farrer-Brown, within a charitable trust called "A Picture of Health". The Society's aim was to advance locally an objective of major scientific institutions by bringing together science and the arts with, in this instance, an important public health message. The Corinium Museum provided recently modernised facilities, cost free, for both the three-month exhibition and an excellent preview lecture by Dr Farrer-Brown at an opening launch on 4th October 2006.

Extensive publicity was undertaken by the host museum. In support of its own "What's On" booklet, posters and pamphlets designed by Dr Farrer-Brown (samples herewith), were distributed to libraries, doctors' surgeries, hotels, schools, sports and visitor centres, season ticket holders and Society members' own localities. Accounts were presented in the "Wilts and Gloucestershire Standard" newspaper, on "Radio Gloucester", on the Cotswold District Council and other local websites and, by Dr Farrer-Brown, in the "Country Life" magazine. The Society issued notices in its "Newsletter" and distributed leaflets at lecture meetings, at which repeated announcements were made from the Chairman's rostrum. Nineteen Society members volunteered as stewards for 2-hour sessions during the exhibition, at which pamphlets, details of the Society and the current lecture programme (copy herewith) were on display.

The three supporting lectures were well attended and of high quality. Those by Professor Hugh C. Watkins ("Fighting a Family Curse: Sudden Death Syndromes") and Taliesin Golesworthy ("Design Close to my Heart") were given at the Royal Agricultural College and attracted non-paying school students in addition to large numbers of members and visitors. Professor Watkins subsequently responded to a letter of thanks by observing: "It really is a privilege to be able to talk about our work to such an interested and interesting audience. I enjoyed myself so much that I kept thinking afterwards: "I must do more of that". But I don't think there are many Societies like yours".

The impact of the exhibition was assessed by means of a visitors' book (60 entries), a questionnaire to Society members (36% response), enquiry of the museum staff and word of mouth. There was almost universal acclaim for the quality, variety and relevance of the exhibits and for the technical skills and interpretations of the artists. A typical response was: "The novel artistic interpretations of the blood system, utilising different media, were both fascinating and thought-provoking. The imaginative concepts displayed were eye-opening and unique". Two youngsters commented: "Cool" and "Wicked", praise indeed in modern parlance. Less enthusiastic comments came from two animal lovers and a smoker. Sign posting of the museum within the town could be improved and there was a dearth of posters on the High street. During thirty of one hundred and eighty 2-hour mid-week sessions, there were 214 visitors. The museum staff reported that attendance was good and fairly typical for a temporary exhibition here; quiet during mid-week but busy during weekends and holiday periods. Eight new members joined the Society during the course of the exhibition. The overall costs were £599-91.

The Society wishes to thank the contributing artists, Dr Farrer-Brown and the "Picture of Health" Trust, the supporting lecturers, the staff of the Corinium Museum and the funding institutions, Biotechnology and Biological Sciences Research Council and GlaxoSmithKline, for financial support.