

CIRENCESTER SCIENCE AND TECHNOLOGY SOCIETY

2006 Autumn - edition Number 5

Notes from the Editors desk

I must start with recommending our readers to visit the 'Tree of Life Exhibition' which is described by Roy Postlethwaite on page 3. It is being sponsored by the society and our members will be helping to staff the exhibition. This will give our society considerable exposure. It opens on 5th October at the Corinium Museum and closes on 5th January.

A recent highlight for the society was our visit to the Royal Society Summer exhibition in London. Personally I found it absolutely fascinating; only about 25 stands each featuring a segment across the spectrum of sciences, but so well presented that one had great difficulty in dragging ones self away from one stand to take in the next. The day was never going to be long enough and one had to forego some of them or spend the night there. A definite 'yes' for next year.

The involvement of young people is an important part of the show (Kingshill School was taking part) and much of the show was interactive which made its understanding so much easier. Since that time our youngsters have received their exam results and sadly we hear that there are fewer qualifying in science related subjects than in previous years. A sad tale which I hope our leaders will recognise and take steps to put right.

Passing through Leicester a few days ago I spent a couple of hurried hours at the National Space Centre. It was quite a rewarding experience and well worth going for it covers every aspect of space science from satellite construction, medical science, geology, astronomy, space physics, particle physics and much more. Some of the space hardware was very impressive. If you get the chance to go you will not be disappointed, it could even be the subject of a Society visit though perhaps a bit more than 2 hours.

I was lucky enough to be invited to the Newcomen Society summer dinner this year. For those who perhaps are not familiar with this institution it is devoted to preservation and research of the records and work of great scientists and engineers. This occasion was special in that it celebrated the life of I.K.Brunel at a special conference. It has been a great year for this bi centenary which at first seemed to be going nowhere with minimal programme but as the months progressed event after event was unveiled and these have been reinforced by some pretty good media coverage.

Lastly I must apologise to all concerned for my comment in the last issue regarding the results of the balloon debate where I embarrassingly mixed up the results. However it was still a great evening. - Your Editor

SCIENCE AND TECHNOLOGY SOCIETY COMMITTEE

Chairman:	Dr Geoff Richards	01285-651972
Vice Chairman:	Peter Tanswell	01666-505029
Treasurer:	Tony Gordon	01666-504993
Programme Organiser:	Dr Roger Wheeler	01452-863476
Minute Secretary:	Mrs Kathleen Wells	01666-502626
Membership Secretary:	Mrs Joan R Cooper	01452-814212
Committee members:	Dr Andrea Tales	01285 650 637
	Prof. Roy Postlethwaite	01285-885345
Newsletter Editor:	Bunny Lees-Smith	01666 577275

Society Meeting times and dates

13th September - The History of the SS Great Britain and its Recent Refurbishment by David Beattie - Director, Arup (Bristol) -7.30pm at the Cirencester Parish Centre (See Brunel200 for details)

8th November - “Fighting a Family Curse; Inherited Sudden Death Syndromes” by Hugh C. Watkins, Professor of Cardiovascular Medicine of the University of Oxford.- 7.30pm at the Royal Agriculture College.

29th November - “Design Close to my Heart” by Taliesin Goleworthy, an engineer who designed the stents that are now commonly used in surgery to repair and maintain the patency of blood vessels - 7.30pm at the Royal Agriculture College.

Happenings.

28th September 2006 - A visit to Gloucestershire Royal Hospital. – Entries for this visit are now closed. Contact Prof. Roy Postlethwaite on 01285885345

At The Corinium Museum, Cirencester.

5th October – Opening of The Tree of Life Exhibition.

Contact Prof . Roy Postlethwaite on 01285885345

Other Happenings - Watch the CSTS website for further details.

Contents of this issue

- 1 Editorial
- 2 Committee, happenings
- 3 Contents and The Tree of Life exhibition
- 4 Isambard Kingdom Brunel 200. – News and Review of the Society’s Lectures
- 5 Cheltenham Science Festival
- 6 Cheltenham Science Festival
- 7 Cheltenham Science Festival and Charles Simonyi Lecture
- 8 Royal Society Summer Exhibition and Book review
- 9 Book review

SCIENCE AND THE ARTS AT THE HEART OF THINGS

“THE TREE OF LIFE EXHIBITION”

Sponsored by the Cirencester Science and Technology Society, hosted by the Corinium Museum and with additional financial support from the Biotechnology and Biological Sciences Research Council and GlaxoSmithKline, “**The Tree of Life**” is one of four exhibitions within a charitable trust called “**A Picture of Health**” set up by retired pathologist, **Dr Geoffrey Farrer-Brown**. Along with Dr Farrer-Brown’s own research illustrations on the vessels and chambers of the heart in health and disease, the exhibition encompasses examples of water colour and oil paintings; mosaics, quilt and mixed media; woodcut print, enamel, metal and glass works; ceramics, wood and stone sculpture; and fibre optic lights in which the overall theme is interpreted by eleven artists and four children.

An orienting lecture by Dr Farrer-Brown himself at a private launch in the Museum on 4th October 2006, attended by the British Heart Foundation and the Gloucestershire Smoking Advice Centre.

Society members (and wives, husbands, partners) are requested to join existing Museum volunteers, as stewards, for two-hour sessions at mutually convenient times, during the period 5th October 2006 to 3rd January 2007.

Will any new volunteers kindly telephone Judy Mills directly at Tel: 01285 655611.

A4-size colour posters and smaller flyers (with information about our Society on the reverse) are available from the Museum for members who would care to help publicise the event in their local neighbourhoods. Please contact Judy Mills for supplies (Tel: 01285 655611).

Isambard Kingdom Brunel 200. – News

Bristol

16th Sept at 1.30pm – The tale of two bridges - a lecture by David Neale – under the Plimsol bridge, for further information - www.brunelbridge.org.uk –

This part of the final weekend of the Brunel200 Year in Bristol

Swindon

‘Steam’ at Swindon is celebrating Brunel200 throughout the year. It includes a features on the ‘Battle of the gauges’ and Brunels office.

Cirencester

13 Sept at 7.30pm – CSTS meeting at the Parish Centre - Dave Beattie

"The history of the SS Great Britain, and its recent refurbishment".

The talk will give some statistics on the design and construction of the ship, and its working life, with obvious references to Brunel. It will then deal with the salvage of the ship and work up to 2000 to partially restore it. The main part of the talk will be on the work which has been done recently with the assistance of a large HLF grant. This includes stabilising the dry dock, repairing the hull, providing a controlled environment between the hull and the dry dock to preserve the hull, and the provision of the water covered glass deck that now encloses this space.

‘Review of the Society’s Lectures’ An appreciation of the work carried out by John Plevin

I am sure that many members will have read with great interest, the reviews of our lectures over the last three years which have been produced so efficiently by John Plevin. He has decided to step down from this important task. His work in covering the complete range of our lectures from genetics to structural engineering has demonstrated real expertise in presenting the essence of the lectures to the general public. I wish to pay tribute, in this Newsletter, to the great debt that the Society owes to John for his unassuming work over the last three years in publicising our lectures.

The Committee has agreed that we split the load so that two members share the reviewing of the lectures, divided broadly into biomedical and physical sciences and engineering. I hope to announce the names of our reviewers at the first lecture of the new session.

Geoff Richards
Chairman
1 September 2006

CHELTENHAM SCIENCE FESTIVAL 2006

We are lucky to have two of our members who visited the Festival to record their individual highlights of this event. – Editor

Our first reporter - Palmer Newbould

Suspect Science. The event was chaired by Robert Winston. Dick Taverne spoke about his new book *The March of Unreason* (OUP, 2005, pp.310) and Kathy Sykes challenged him on some aspects. While Dick Taverne is a lawyer, he is married to a scientist, and has become irritated by situations in which people ignore scientific evidence in favour of prejudice and newspaper headlines. The prime example is the MMR vaccine where parental resistance is now responsible for rising infection levels among school children. He also discussed GM crops where he maintained that there is no evidence for adverse effects on health or the environment and which contribute greatly to food production in the developing world. The so-called terminator gene has not so far been bred into any GM crop. With homeopathy Dick Taverne and Kathy Sykes agreed about the importance of the placebo effect (i.e. if you think something is doing you good it may well be so). Dick reckoned that there is no good scientific evidence for the curative effects of homeopathy. He also reckoned that organic farming does not have the benefits claimed for it. The event was stimulating and was well managed by Robert Winston. I will try to write a brief review of the book when I have finished reading it.

Britain in Space David Williams of the British National Space Centre, Mike Healy from EADS Astrium* and Professor Fred Taylor, Prof. of Physics at Oxford University all spoke and answered questions. There was strong advocacy for Britain's achievements in space science, for the importance of space exploration for the advancement of science and human welfare, and for the need for greater resources for space science. I, for one, remained unconvinced.

*I had to look this up. It is, quote, " a world leader in the design and manufacture of satellite systems".

Call my Scientific Bluff. Kathy Sykes' team comprised Robert Winston and Alice Cooper, while Frank Burnet's team comprised Timandra Harkness and Quentin Cooper.

No serious science but a fun game conducted with great élan by Marcus Moore (whom CSTS members will remember from our Balloon debate). I think he also wrote the script in the sense of determining the obscure word to be discussed, and providing general headings for two false and one accurate definition of each. It followed the pattern of the BBC TV Programme. The spontaneous wit and repartee of the participants, greatly catalysed by Marcus, made the event most enjoyable.

Climate Change begins at Home. Dave Reay, University of Edinburgh, sponsored by the Environment Agency.

This was a straightforward account of how changes in personal life style can reduce the emissions of greenhouse gases. Dave Reay gave a clear and enthusiastic talk in which he converted every activity (driving, flying, heating your house, leaving your TV on standby, food miles, etc.) into kilograms or tonnes of CO₂ emission. It was a polished presentation but I suspect he was largely preaching to the converted.

Our second reporter - Tony Gordon

Sleepfaring Jim Horne, Director of the Loughborough Sleep Research Centre.

The speaker discussed the different types of sleep that we experience and how sleep is important to humans and other mammals.

Research shows that lack of sleep does not impair the efficiency of our body – our strength and speed is not impaired and our internal organs continue to operate effectively even when we are deprived of sleep for several days. But sleep is vital to the brain, although the exact repair and refresh mechanisms are not fully understood.

The organ that seems most in need of sleep is the cerebral cortex. One way of examining this function of sleep is through the effects of sleep loss. The most active area of the waking cortex is the prefrontal area (comprising about 30% of the cerebrum) and is responsible for directing and sustaining attention, inhibiting distraction, planning many aspects of behaviour (including speech), working memory, innovative and flexible thinking. These functions are amongst the first to be impaired with sleep loss. For example, sleep loss may well impair the ability to comprehend fully a rapidly changing situation, leaving one liable to distraction by irrelevant information, think more rigidly, and be less able to produce innovative solutions – not a good state for over-tired generals in wartime. The number of words in one's vocabulary is reduced both verbally and in writing.

Our sleep is divided into light sleep, REM (rapid eye movement) sleep and deep sleep. Dreams occur in REM sleep but there is no evidence that they perform any useful function – they were described as a “film show of the mind”. It is the deep sleep that the brain requires, and research shows that the period of deep sleep remains at about 3-4 hours whether we habitually sleep for 5 hours or 8 hours. It is the light sleep and REM sleep that is reduced.

Recent research on very young children (under 1 year) shows a significantly higher proportion of REM sleep than for adults. It appears they need REM sleep for their development. [Perhaps their parents would be glad of any period of prolonged sleep!!]

And finally, when Jim Horne was talking about our Circadian rhythms we were all happy to hear that a post-lunch nap is good for you!

Maths in the weirdest places by Jim Al-Khalili, and Paul Stevenson, from the University of Surrey Department of Physics

A light-hearted double act by two nuclear physicists who each found themselves asked by the media to produce mathematical equations for everyday situations. Paul Stevenson researched many episodes of “Sex and the City” before coming up with an equation for the maximum safe height of a pair of high-heeled shoes, which incorporated the physical parameters of the shoes and the number of units of alcohol consumed.

The audience were invited to participate and chose, amongst other things, to work out the probability of getting road rage. Jim and Paul asked for the factors involved, and how they would affect the probability. They then suggested the appropriate mathematical function to mirror the effect of the factor. Thus it was agreed that temperature would have little effect until it reached a critical level and would then become very important – and was best represented by the “tanh” function. It was agreed by everyone that the number of children in the car was very important and a factorial function was necessary [$n! = n(n-1)(n-2)\dots$].

The audience began to appreciate that the fun had an underlying sense and mathematical logic – if not reality.

Cheltenham Science Festival 2006 - continued

Quantum Origins, by Jim Al-Khalili, Nuclear Physicist and Johnjoe McFadden, Microbiologist, both from University of Surrey.

Jim and Johnjoe explained their theory of the quantum evolution of life on earth. Biologists have used Darwin's evolutionary theory to understand and explain how the life forms present in the world today have evolved from the simplest form of reproductive life – a bacteria or an even simpler single cell lifeform. But how did the first lifeform capable of reproduction evolve?

There are many theories including The Primordial Soup Theory, which seems to rely on chance to combine all the elements present in the Soup to form the first DNA or RNA molecule. But we know these molecules are highly complex and the probability of them being formed by chance is infinitely small.

However Quantum Mechanics offers a method of reducing the odds. One of the properties of a very small object like an atom is that, according to Quantum Theory, it exists in many locations, or moves with different speeds until it is observed. When it is observed the 'wave function' for the atom collapses to a specific location.

Jim and Johnjoe postulate that the chemical reaction leading to the first self-replicator is a sequence of the many possible electron and proton *quantum movements* within and between molecules that will combine to form the first self-replicator. But the atoms will only collapse into the desired molecule if and when they are observed. So it is necessary to postulate that the observation or measurement is performed by proto-enzymes which exist to perform the measurement and then drift back into the quantum realm. This route to a single self-replicator will still be extremely improbable but less so than from the Primordial Soup.

This complex theory was admirably and simply presented. But when questioned at the end, less than half the audience said they could accept the theory, and I suspect that for many people it was more a case of not understanding, than not accepting. Johnjoe McFadden has published a book "Quantum Evolution" which may be easier to follow.

The Annual Charles Simonyi Lecture, Oxford Playhouse

Can the Internet save the Enlightenment?

By **Sir Harry Kroto**,

Introduced by Richard Dawkins, also attended by Charles Simonyi who flew himself over from the USA.

Harry Kroto is a very distinguished scientist, Nobel Prize winner, fluent and amusing. But I found it difficult to clarify his main message. The brilliant development of scientific research in the last century or so means that there is good, evidence-based science which can greatly improve human welfare, the management of society and government. This is The Enlightenment.

However there are a number of forces, notably religion and capitalism, hindering the full implementation of the Enlightenment. Their impact is magnified by ill-informed media coverage. Both the Enlightenment and those delaying its implementation make full use of the Internet. How can we, as Internet users, distinguish sense and non-sense, science and non-science?

Harry Kroto has set up the Vega Scientific Trust, a not-for-profit trust which broadcasts scientific programmes free over the internet (www.vega.org.uk). The website includes interviews with distinguished scientists. The material on the website is regularly vetted and is factual and accurate. This seems to be what a number of CSTS members have been looking for in recent years. Try it, and let the Newsletter editor know what you think.

Palmer Newbould

The Royal Society The Summer Science Exhibition 2006

Reported by Robert MacLachlan

It was with very slight misgivings that my wife and I set off for the society's day visit to the Royal Society in London. We were half expecting a dull collection of aged professors explaining incomprehensible science. Our worries were instantly dispelled. About 25 different stands had been set up by largely young scientists who were attractive, articulate and were able to make their line of research both accessible and extremely interesting. This was the Royal Society's show case for cutting edge science and it covered a broad range of subjects from astronomy and chemistry through to Engineering and Technology. Being able to talk to the scientists themselves and have them explain their research so comprehensively made the day most exciting. A lecture by two young Phd's on the environment was both informative and thoroughly entertaining. The large number of special effects consisting of bangs and flashes meant that all the special pictures in the lecture room had had to be firmly removed in advance. We reluctantly left at the end of the day with a feeling that this visit would simply have to be repeated next year.

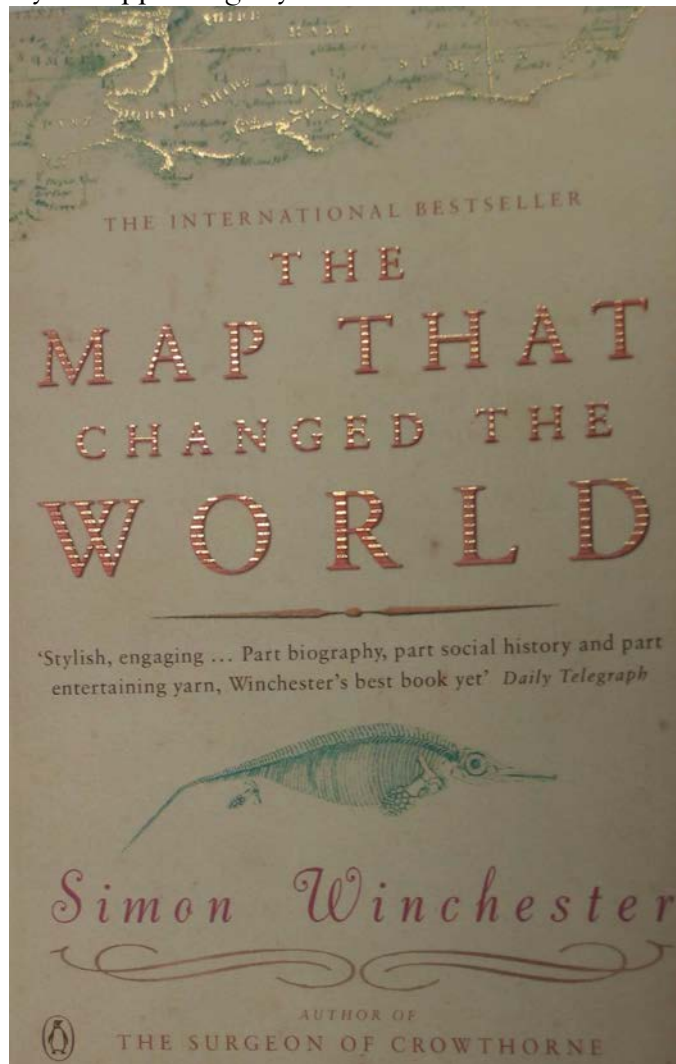
BOOK REVIEW BY KATHLEEN WELLS

THE MAP THAT CHANGED THE WORLD - SIMON WINCHESTER

William Smith was born in Oxfordshire at a time when the bible showed the creation date of 4004 BC. He lived on a farm where the dairymaids used pound stones from nearby quarries to weigh out the butter. These were round and five-sided with flattened top and bottom. William was fascinated by these and his 'marbles'. This was a time when fossils were thought to be stones that had changed to look like things that exist. William came to realise that the 'sea urchin' pound stones and 'lamp shell' marbles were in fact fossils and that they had once been living beings. As he looked at the rocks around him he found many different types.

When he left school he became a surveyors assistant to Mr Webb and worked on drainage and in many coal mines. This entailed a great deal of travel which suited the young Smith. He was able to

stop at every rocky outcrop and with his hammer and bag collect samples from around the country. He found a pattern in the mines he surveyed. Below the red Marls were sandstone, siltstone, mudstone, non-marine band, marine band, coal, seat-earth, then again sandstone etc. he found the layers dipped slightly and surmised that this continued right to the coast.



He then got a new job as surveyor for the Somerset Coal Canal. He was in his element as he could cut down into the underlying rocks and see what went where. He crossed the Cotswolds and visited Tetbury and the Thames Head during his travels. Here he looked at the rocks showing in the nearby tunnels. He spent years collecting data that was to be eventually used in his map. The breakthrough happened when he realised that the fossils found in a strata were found in that strata everywhere in England and probably the whole world.

He rented various properties where he could receive learned men and show them his fossil collection and get them interested in his geological map. He was to spend too much money and have his information stolen by George Greenough the man who started the Geological Society. He ended up in a debtors prison. He had to sell his fossil collection to the Natural

History Museum. Luckily there were men with money who believed in him and helped him to eventually publish his hand coloured map.

Smith was awarded a Woolaston medal (equivalent to a Nobel prize) for geology. He built a museum in Scarborough for fossils. He chose the stone for the House of Commons. His map now hangs in Burlington House behind blue velvet curtains.

This was a well-written book where the scientific information was foremost and proven. It was well researched, but was not however a dry historical fact-based novel. It is a good read for anyone whether a geologist or someone who has just good taste. Details - ISBN 9780140280395 cost £8.99



Editors note – I have also read this book and I agree with Kathleen it is a very good read.

The Editor would like to thank all those members who made contributions to this newsletter. Without you it would not exist.

We really would like to hear from any and all of our members so that we can open up a correspondence page. Please give it a thought, there must be something which irritates you, mystifies you or really turns you on in Science and technology? Get that pen in hand or keyboard at the ready and let us hear from you.

My address is 1 Follyfield , Hankerton, Malmesbury. Wilts. SN16 9LA. If you can send me an email please ring me on 01666 577275 and I will give you details.

Bunny Lees-Smith