

**BA Festival of Science in York, 2007**  
**The x-change, Wednesday 12 September**



Speakers:

- **Dr. Jen Hiller**, Diamond Light Source
- **Dr. Brenda Boardman**, Oxford University
- **Dr. Tiziana Rossetto**, University College London
- **Dr Trevor Gregory**, Yorkshire Science

Host: **Sue Nelson**

Dr Jen Hiller was the first speaker at the Wednesday x-change. Dr Hiller is based at Diamond Light Source, a scientific facility based around synchrotron technology that is funded by the Science and Technology Facilities Council and the Wellcome Trust. The synchrotron is a giant particle accelerator that is capable of producing intense beams of X-ray, infrared or UV radiation. This radiation can penetrate samples and analyse them at the atomic and molecular level.

Dr Hiller proposed three theoretical scenarios where the diamond synchrotron could be applied. One of these was a real project due to begin in a few weeks and Dr Hiller invited the audience to guess which one was true. The first case related to claims that "intact collagen" had been found in a 60 million year old dinosaur fossil (*Tyrannosaurus rex*, Montana). If this was proven, it could represent a novel way to phylogenetically analyse fossilised specimens. The synchrotron could be used to compare the diffraction patterns of modern collagen versus the ancient collagen to verify these claims.

The second case involved analysis of historical documentation, including the 1297 Magna Carta and the Declaration of Independence. These documents were written in iron-gall ink; while this ensured the writing was uneraseable, it also began to eat through the parchment itself. The synchrotron could be used to take a cross-section through a very small sample to identify how far the ink has penetrated through the document.

The third case related to a 12<sup>th</sup> Century prayer book, which could be analysed via the synchrotron to identify if the manuscript had been scraped and re-used; this could turn out to be a 3<sup>rd</sup> century manuscript from Archimedes!

At the end of her talk, Dr Hiller revealed that the real case where the synchrotron will be used is the *T. rex* fossil.

Our second speaker was Dr Brenda Boardman, leader of the Lower Carbon Futures Team at Oxford University, who spoke about the way we use energy, in particular fossil fuels, as a direct contribution to climate change. Dr Boardman spoke about the need to be both energy efficient (for example, looking for A+ ratings on appliances) and the absolute necessity of moving over to renewable energy sources. Dr Boardman highlighted the fact that as a developed world, we have even more responsibility to act, as we are more aware of the problems. She also invited anyone who had ever protested against a windfarm to leave the room immediately! An audience member questioned Dr Boardman, "why should we make changes when other countries, such as China, are making no attempt to curb their environmental emissions?". Dr Boardman replied that even a small reduction in carbon emissions was better than nothing, and that screwing in a low energy lightbulb was good, but not enough. Another audience member was concerned that these claims were not backed up by scientific evidence. Dr Boardman replied that climate scientists were, "90% certain that anthropologic events were leading to a change in our climate".

Our third speaker was Dr Tiziana Rossetto, an earthquake engineer from University College London, who was the BA Isambard Kingdom Brunel Award winner in 2007. Her work involves analysing and understanding earthquake damage and incorporating findings and philosophies into new building designs to prevent future collapses. She asked how we can make buildings more seismically resistant. In the future, Dr. Rossetto hopes to implement a more social and holistic approach to her work, by analysing how people's actions and responses to an earthquake can also affect the seismic resistance of a building.

Our fourth speaker was Dr Trevor Gregory, director of Yorkshire Science. He devoted a lot of time to refuting Dr Boardman's earlier stern words on climate change. He proposed that air travel was the biggest contributor to carbon emissions and that we should never fly abroad again. He then moved onto his own area of interest, of how to encourage creativity and inspiration in the workplace. He stated that he thought the best example of innovation in the workplace was the Post Office® queuing system, where a single queue feeds in to multiple cashiers. Dr Gregory wanted the UK government to improve creativity and inspiration in education and cited a good example in Sahar Hashemi, co-founder of Coffee Republic and creator of the new sugar-free Skinny Candy line.

Throughout the Wednesday x-change, four finalists in the *perspectives* poster competition invited us to visit their posters, including Keri Collins talking about "Effishient propulsion", Marco Colombo telling us about "Optimisation: the science of the best", James Rossiter questioning "How we talk to robots" and Belen Mayo-Martin telling us "Your Neurons Can Talk!".

**Stephanie Swift**