

A taste of Cambridge.

John & Fiona Earle

About ten years ago, the tutors of Queens' College, Cambridge started to invite graduates who had attended the College to a day of varied lectures. This year we went. Actually we were bait, human bait. They hoped that some of us might invite young people along so that they got some idea of what Cambridge has to offer and to discover that Queens' is a lovely set of buildings in which to have a period of study.

We took along two sixteen-year olds who had just passed a considerable number of G.C.S.E.'s with A stars. Chloe is John's granddaughter. She has had thoughts of acting and managed to win a place at the National Youth Theatre for a two-week training course. She did so well that she has been invited to join in the second round of auditions for a part in a play in the winter. However, she realises that acting is anything but a steady way of earning a living. A friend of hers called Tom had vague ideas of engineering as a career but no more.

The outcome.

Tom listened to a lecture on structural engineering and was enthused by it. Tom spoke to the lecturer afterwards who made some very clear suggestions about what further mathematics he needed to get on the course. The Admissions Tutor gave him some advice on how to get more insight into structural engineering and the overall scope of engineering.

Chloe liked the buildings and the atmosphere of the University. She loves the idea of The Footlights which is the undergraduate theatre group, and intends to have a good look at other Universities. In particular she learnt that Drama is not seen as a top class A level at Cambridge, but a good level in English plus a good foreign language plus "something" and Drama would make an acceptable group of results.

Structural Engineering.

The speaker, Dr. Graham McShane, was looking into the improvement of light

fighting vehicles to withstand exploding land mines.

When a landmine explodes, it produces a sudden pulse of compressed air that may damage structures. Also there is a shower of fragments from the mine itself plus fragments of stones and dirt from the road. The constraints of the armour are that it must neither be too heavy, nor too expensive. It must not intrude on the space that the crew occupy. The goal may be summed up as "Even stronger, even lighter".

The researchers found that two thinner plates of armour separated by a metal lattice gave better protection than a single thicker plate. The experimental design can be tested by a kind of glorified airgun that can fire fragments or a pulse of compressed air.

It is right and proper that someone should look at the specific problems of strong armour but it is also vital that someone should take an overall view. When the vehicle hits the mine, are the crew thrown about? Do they need better seat belts? How are they to escape?

Our present money problems.

Professor Lord Eatwell, the President of Queens', explained our present money problems in such a way that non-economists could understand what has happened, based on his book, written with colleagues from Queens' in 2000.

Essentially, financial disaster is likely to follow after there has been a major change in banking systems. About thirty years ago, if someone wanted to borrow from a bank, the manager needed to be persuaded that the borrower could repay the loan plus interest in an agreed time. The manager knew how much he had lent and how much equity remained in the bank.

The rot sets in when Bank A lends money and then sells the loan to someone else. Let's call this bank B. Bank A now has more

money to lend, but already a debt has crept into the system. Bank B now sells the loan to (say) an insurance company so the debt is even more hidden. Repeat this many times over and you can see that an enormous amount of debt has piled up and no one knows where it really is.

If you want to turn an asset such as a house or a car into cash, this can only happen in a market where there are buyers and sellers. If everyone wants to sell because they fear that the value of their asset will fall, then no one buys and there is a non-functioning market and prices fall until someone buys.

If all companies use the same sophisticated data and the same economic models, they will all take the same viewpoint and this drives them into the same viewpoint of either buyer or seller.

The colour of flowers

Dr. Beverley Glover spoke on the diversity of the colour of flowers and dealt with how and why this happened. When white light passes through a prism, we humans can see colours from red to violet. Insects have different kinds of eyes and can see in the ultra violet spectrum, whereas we cannot.

Orange and yellow colours are mainly formed by chemicals called carotenoids that are fat soluble. They are used in photosynthesis. This is the way that a plant uses the energy in light to create plant tissue. Pinks and ivory colours are formed within plant cells and are used in protecting the plant against excessive ultraviolet radiation. Sometimes the genes that lead to the development of colours are turned on when the plant is ready for fertilisation.

Dr. Glover also described research on the surface of a petal which can be covered in flat cells called discs and also conical discs. Bumblebees (used by tomato growers) favour the conical discs over the flat discs as the conical ones give a better foothold to the bees.

Can mathematics help prevent 'flu?

Flu is a nasty virus in that it can suddenly change shape and so we have no

immunity to the new form. When the Hong Kong flu came (we think in the early 60's), our protection strategy was to develop a vaccine and give it to people who were most at risk.

The speaker, Dr. Julia Gog talked us through some rather tricky maths and it could be that we could prevent the virus dividing inside a human cell if we could devise the appropriate chemotherapy. It is easier to provide pills than injections, so this is a line of thought for the future.

Baghdad

While John was listening to the talk about 'flu, Chloe, Tom and Fiona heard Dr. Diana Henderson (College lecturer in History) talk on the Fall of Baghdad. She first covered the three week campaign in 2003. The most devastating remark was her quote of Mr Rumsfeld, who said at the time, " We don't do reconstruction."

Then she outlined the whole complex history of Iraq, from Mesopotamia and Babylon, through the arrival of Islam in 637 AD through the Turkish /Byzantine control. The Turks encouraged diversity and in 1901 about 1.5 million Shias and 1million Sunnis lived alongside Jews and Christians, who were tolerated. By 1914 Turkey was in decline and it was the Germans who financed a new rail link from Berlin to Baghdad.

The British had known about oil in Iraq from 1606. In 1911 the Turkish Petroleum Co. was formed from Britons, Germans and Dutch. In 1914 it was initially the Indian Army who provided forces to protect British oil interests in the First World War. Subsequently Scottish regiments participated in a very hard campaign until the Turkish troops surrendered on 6th October 1918.

Conclusion.

Tom has taken Dr. McShane's advice and is now doing further maths at school. We shall be in Cambridge on Remembrance Day and shall make a point of seeing Dr. Diana Henderson and telling her how much we enjoyed the lectures and how Tom and Chloe have benefited.