U3A at the Royal Institution

This month's U3A Explore Science at the Royal Institution certainly covered at least two of the points in the U3A information leaflet. We most certainly laughed and definitely learnt from our three speakers.

The first speaker, Andrew Hanson talked about measuring colour. He showed us a slide with three coloured squares on it and told us that by the end of the talk we would all agree that the colours were identical.

The three primary colours that our eye can see are red, green and blue and are all we need to make every colour. At the lower end of the spectrum is red, which has the least energy, in the middle is green, which has more energy, but the area with the most energy is blue. The whole spectrum gives us white light, however a combination of red, green and blue gives us black. He passed red and green cards through the spectrum and it was only in the middle where light was predominantly green that the true colours could be seen.

We looked at a pink elephant cut out staring intently at a rotating star on its side. The image disappeared! But we all sat there for a few moments still seeing the pink elephant that had been burnt onto our retina. We saw a chequer board with two numbered squares and a cube standing on it. One numbered square was in the shadow of the cube and the other was surrounded by squares of a different colour. We were asked whether or not the squares were the same colour? They were but our eyes had been deceived by the shadow and the colour of the surrounding squares.

As a result of our genetic make up we each have a different perception of colour and this changes as we age. The eye yellows and our ability to see blues becomes less, so if the bluebells do not seem so vivid this spring it is not due to cold weather it is, unfortunately, due to the aging process. One slide we saw showed a gadget for measuring the colour of a Crème Brulée so you know that the colour is exactly right! Finally were we convinced that all three cards were the same colour? I think the answer is yes. We discovered that yet again something we take so much for granted, like colour, is much more complex than we imagine.

Anna Ploszajski gave the second talk on the subject of smart materials; she is also a talented stand-up comic. Smart materials can change their properties in response to external stimuli. She started with the natural example of a pinecone whose scales close in response to rain so allowing dispersal of their seeds in dry, windy conditions. The self-healing property of lime-mortar, which was used in the construction of the pyramids, was one reason for the survival of these tombs over long periods of time. She showed a fascinating video of a stretched spring regaining its shape on heating, which is the basis of kettles which switch themselves off. Photochromic spectacles are another example of the use of a smart material. She then explained how squashing some asymmetric crystals of quartz induced a potential difference across it. This is an example of the piezoelectric effect. She predicted that in the future such smart materials could power streetlights when vehicles run over them. She also demonstrated the change of a liquid to a solid on exposure to a magnetic field. Finally she predicted that the planes of the future would be more like Leonardo de Vinci's flying machine published in 1488 that was based on wings with jointed struts and a flexible skin like bats. The wings of these futuristic planes that changed according to flight conditions would be made of shape-changing alloys responding to electric currents and temperature changes. Unfortunately they would be too slow to react and too delicate with present-day materials. This was an entertaining and very informative presentation.

Our third speaker was Jack Ashby, who is the manager of the Grant Museum of Zoology at UCL. He was talking about the unnatural nature of natural history museums.
Less than 1% of museum collections are on public display. What they do display can be "stuffed" specimens, mounted skeletons, preserved specimens in fluid, collections of tiny animals on microscope slides, or beautiful glass models. The speaker has written a book about the natural history in 100 objects, which I could not resist buying. He told us that the longest known animal is the Bootlace Worm measuring 55 metres. The walrus feeds on clams, which it holds fixed tight in its tubular mouth whilst the tongue fits into the tube and when it is withdrawn creates a vacuum sucking the living flesh of the clam out of its shell.

We also learnt that a walrus uses its tusks to hook onto ice floes when it sleeps and to climb out of the water. Worms are unpopular objects in museums apart from penis worms that catch the eye of visitors. The amazingly large antlers of the incorrectly named Irish Elk are the result of sexual selection by the females. The Box Jellyfish has eyes with lenses that can form an image. This is an example of convergent evolution making them similar to image forming eyes in other animals with a different origin. Striped possums are the marsupial version of aye-ayes both with a long, spindly finger to hook beetle larvae out of holes in tree trunks. Snakes cannot dislocate their jaws but have eight areas of contact in their skulls that allow relative movement when swallowing large prey. Jack is an expert on Australian mammals and he tells of the extinction of the thylacine as a result of a bounty as they were believed to kill sheep. Actually it was feral dogs and human thieves who were responsible for the decline in numbers of their sheep. We learnt that the domestic cat is the main cause of extinction of Australian marsupials. Many other facts were presented in the lecture and his book, which persuaded me to visit the Grant museum when I can.

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