Cirencester Science & Technology Society

8th Sept 2010

The Society's lecture on the 8th September, entitled "**Stealing Ideas from Nature**" held at the Ashcroft Centre was given by Professor Julian Vincent of Bath University.

His talk explained how much Biologists could contribute to solving engineering problems more efficiently than the pure physical sciences. This new field of research is now known as biomimetics. This is the abstraction of good design from nature, which is often more efficient, simple, and cheaper than the conventional physical design.

He then went on to say that many engineering problems could be solved by re-formulating the problem in terms of function, and examining whole systems involved, instead of just improving existing technology.

He then gave examples, the first being Velcro, which was designed as a replacement to the zip fastener by observing thistle burrs with their tiny hooks for dispersing their seeds, and using this design as a simple economical fastener. Other examples he gave were Lotusan which copies the surface of Lotus leaves in forming a self-cleansing surface. Gecko tape has been developed based on the ability of this animal to climb up vertical walls with the simple attachment of fine surface ridges on its feet.

Sometimes copying nature does not work, as the whole animal or plant system is not present e.g. the Eole glider, which copies the wings of a bat, and works for short time but is unstable without the whole animal to control it. This design was before the Wright Brothers final conquest of flight.

Often by close examination of natural materials, such as wood, we are able to copy their strength by replicating their structure in plastic materials which is much stronger than the plastic itself, and is often lighter. Other examples that have been studied are the Saw ability of the Wood Wasp which is far more efficient than a simple drill and can be used in inaccessible places, such as brain surgery.

The head of the Woodpecker has been found to act as inertia hammer rather than an active neck-head system previously thought, and efficient inertia hammers have been developed from this principle. Another big advantage of biomimetics is that it enables strong efficient structures to be produced at around normal room temperature, rather than the hundreds of degrees needed to deal with ceramics and metals, e.g. some paper-like products can now be manufactured in a very strong form, just using ion adhesion, enzymes and glues. Mother of pearl is a natural example of the strength produced by the arrangement of the crystals in the substance.

Studies of insulation methods used by animals and plants have given the building industry improved thermal insulation as opposed to old fibreglass methods.

In the modern world, with green policies increasingly important, biomimetics has much to offer in producing products that are simpler, more energy efficient and cheaper.

Following his presentation on the 8th September Professor Vincent has provided the following links which give additional information.

http://en.wikipedia.org/wiki/Bionics

http://www.bath.ac.uk/mech-eng/biomimetics/about/

http://users.ecs.soton.ac.uk/dmb/biomimetics.php

http://www.reading.ac.uk/bionis/

http://www.businessgreen.com/business-green/news/2234859/uk-china-biometics-research

http://www.sebiology.org/publications/Bulletin/January_2007/Biomimetics.html

He has also made available a CD containing more than 60 items, including a powerpoint presentation of his lecture and a review, research articles and the text of three books which are almost impossible to get hold of. He is happy for us to loan the CD to members – any member wishing to do so please contact David Newman.