

Biomimicry: it's only natural

Aligning human actions with the irrepressible forces of nature, the greatest inventor of all, could be the new century's hottest, greenest, business idea, writes Dan Gaffney.



From left: velcro's hooks and loops were modelled on the cocklebur; adhesives copy geckos' sticky feet pads; self-cleaning paints are based on the hydrophobic surface of the lotus leaf; the kingfisher's beak inspired the aerodynamic design of Japan's bullet train.

The world's best brains in research, technology and business have cottoned on to the idea that mimicking nature's way of solving life's problems could be a short cut to making successful technologies that won't cost the Earth. The logic of 'biomimicry', as the idea is called, is that nature is constantly perfecting energy use, recycling and sustainable survival. Therefore, if we copied nature's tricks we might solve our problems faster, smarter and in ways that don't harm the biosphere.

The good news is that biomimicry is already on sale and making handsome profits for its early adopters. Examples include Lotusan, a self-cleaning house paint modelled on the white lotus plant, and adhesives that copy the sticky footpads of gecko lizards. In Japan, the designers of the 500-Series Shinkansen bullet train created faster, quieter transportation by emulating the sleek aerodynamics of the kingfisher's beak.

Velcro-fastening technology is a renowned example of nature-inspired design. Its creator, George de Mestral, took time to notice how cockleburs attached themselves to his clothes and his dog's fur while they had been walking in the woods. When he examined the burrs under a microscope he saw that they had a stiff, hook-like shape. His observations led him to copy nature by designing a two-sided fastener, comprised of tiny burr-like 'hooks' and fuzzy fur-like 'loops'.

Later this month UNSW's Kensington Group will host a forum featuring one of biomimicry's foremost proponents, Janine M. Benyus. The American biologist and author will share examples from companies that have adopted nature-copying technologies, including Nike, General Electric, Hewlett Packard, and Procter and Gamble. Also speaking at the forum on 25 May will be a number of UNSW academics from the faculties of Science, Engineering and the Built Environment who've brought technologies to market consistent with biomimicry's principles.

Biomimicry (from *bios*, meaning life, and *mimesis*, meaning to imitate) is a new science that studies nature's best ideas and then imitates these designs and processes to solve human problems – Janine M. Benyus, author of *Biomimicry: Innovation Inspired by Nature*

One of these is the UNSW Centre for Marine Biofouling and Bio-Innovation that has, for the past seven years, been developing a suite of synthetic furanones that prevent bacteria from colonising surfaces, such as contact lenses, catheters and the hulls of marine vessels. The technology prevents or disrupts the bacterial formation of 'biofilms' and neatly sidesteps the issue of bacterial resistance. Professors Staffan Kjelleberg and Peter Steinberg discovered furanones' ability to interfere with bacterial signalling systems in the 1990s. They isolated

these compounds from the seaweed *Delisea pulchra*, which grows on Australia's eastern coastline.

UNSW Professor of Multidisciplinary Design, Richard Hough, says: "Biomimicry relies on insights into many natural systems or processes, so it is a great catalyst for cross-discipline research. UNSW's Multidisciplinary Design Initiative supports this broader based research; several current proposals for cross-discipline ARC research contain biomimicry themes. Examples include

the mimicking of the metamorphosis of marble by the introduction of supercritical CO₂ into limestone, and improved reverse osmosis processes for recycling of water.

"By joining researchers into teams to study opportunities like these, UNSW can harness more of its research potential. This is especially true in emerging areas like sustainability, of which biomimicry is an integral part," says Hough, who is also a principal with the Arup Group, one of the world's largest independent multidisciplinary design and consulting firms. ■