Sustainable Living: Biomimicry

by Shawn_Dell_Joyce

Recently, scientists have started looking to nature and emulating natural processes to replace carbon-intensive manufacturing. Think about the humble spider web, three times stronger than steel yet light and flexible. We humans have not been able to design anything quite so useful and biodegradable.

Emulating natural processes to solve human problems, e.g., using seaweed to improve antibiotic efficiency, is a new field of science, called biomimicry. Biomimicry stems from the Latin words "bios," meaning life, and "mimesis," meaning to imitate.

"Biomimicry is basically taking a design challenge and then finding an ecosystem that's already solved that challenge and literally trying to emulate what you learn," said Janine Benyus, who coined the term and is the author of "Biomimicry: Innovation Inspired by Nature." "It's not hoping our systems work like natural systems; it's actually trying to get into a deep conversation with the organisms. Then it takes a biologist working with an engineer, architect or designer to bring that knowledge to a product," she said.

It means to study nature's most successful developments and imitate these natural processes to solve human problems with less pollution.

Probably the most famous case of biomimicry to date is Velcro. In 1941, Swiss engineer George de Mestral was inspired by burrs in his dog's hair. He marveled at how tenaciously they held to the hairs and studied them under a microscope. He noted the tiny hooks on the ends of the burrs' spines that caught loops on anything, from fur to clothing. This formula became the Velcro fastener system we use today. Hooks line one strip and connect to loops on the other strip.

Imagine heating and cooling your home without using any electricity, wearing clothes that wash themselves, or having windows made from mother-of-pearl. All these things are happening in the field of biomaterials. There are many materials in nature that could be manufactured and used more efficiently than their current human-made counterparts.

Think of the glue that mussels make to hold tight to rocks and ships underwater. Our best efforts cannot simulate glue like that. Mussels do it without chemicals, polymers or petroleum. And it's biodegradable. Most human-made compounds will not biodegrade and will be around long after the last human is gone. Also, nature is able to manufacture these materials without high temperatures, a feat we can only dream of.

Think of how easily plants convert water and carbon dioxide into carbohydrates and oxygen. Scientists have tried to replicate photosynthesis in labs to generate hydrogen for fuel cells and to clean carbon from the atmosphere. This process, when perfected, could make hydrogen fuel cells more efficient and self-recharging. Vehicles made with these fuel cells actually would help clean carbon out of the atmosphere and would generate their own power, giving them an advantage over electric and fuel-burning cars.

Scientists participating in the Termite Emulation of Regulatory Mound Environments by Simulation project have scanned termite mounds to create 3-D images of the mound structures. They are studying how termites are able to regulate the temperatures of their mud mounds in the hot sub-Saharan climate. This termite technology has been applied to an office building in Zimbabwe, which manages to stay cool using only 10 percent of the energy a conventional building the same size would use. Termites may change the way we build soon by teaching us how to cool our human structures.

British researchers at the University of Leeds studied bats and their use of echolocation to see in the dark. This research led to a new tool for the visually impaired, called the UltraCane, which senses obstacles using echolocation and guides people around them.

Our species has spent much of its time on this planet looking for ways to conquer and rise above nature. Finally, we are learning from our mistakes and taking advice from our fellow creatures, who have been whispering quietly to us all along.

As our natural resources diminish and fossil fuels become prohibitively expensive, we have to find new ways to build our sagging economy and generate our consumer goods. Our current economy is based on continuous growth fed by plentiful natural resources converted into a steady stream of consumer goods. At some point â€” and perhaps we have reached that point â€” the resources will run out, and the growth will slow to a stop.

Biomimicry may help us replace these environmentally harmful methods with ones that generate real wealth â€” a clean planet with ample resources to sustain the future generations.

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