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A NON-INDUSTRIAL REVOLUTION IS UNDERWAY

A New Exhibition at The Wild Center Looks at How Humans Are Tackling Problems by Uncoding Nature's Billion-Year-Old Solutions

Tupper Lake, NY – There is a non-industrial revolution taking place in science labs all over the world. From MIT to the University of Tokyo scientists equipped with new tools that let them look into the nano structure of nature are discovering the secrets to some of the most elusive tricks in the world. Their sights are aimed at everything from making energy from sunlight to replicating the way spiders forge a material stronger than steel at room temperature.

David Gross, head curator at The Wild Center, which will showcase some of the breakthroughs this summer, has spent more than a year researching where the new science is headed. Gross is a biologist, and his lifetime of observing animal behavior turned him on to the bio-based discoveries. “Most of these new breakthroughs are happening because people saw something in nature, and were curious about how it happened. How do spiders make silk? How does a burr stick to a dog’s fur? In the last decade we have developed the tools to see and work at tiny scales, where nature works, so we can start to build things in a revolutionary new way.”

Biomimicry is an International Story

This relatively new science, coined biomimicry, (from *bios*, meaning life, and *mimesis*, meaning to imitate) studies nature’s best ideas and then imitates these designs and processes to solve human problems. The core idea is that nature, imaginative by necessity, has already solved many of the problems we are grappling with. Basically, after 3.8 billion years of research and development, failures are fossils, and what surrounds us are the secrets to survival.

Biomimicry is gaining in recognition throughout the world. A recent article in the United Kingdom’s Daily Telegraph (<http://www.telegraph.co.uk/scienceandtechnology/5479418/Biomimicry-why-the-world-is-full-of-intelligent-design.html>) highlighted this truly international movement. A fast, ultra-broadband, low-power radio chip, modeled on the human inner ear that could enable wireless devices capable of receiving cell phone, internet, radio and television signals has recently been developed by scientists at MIT (<http://web.mit.edu/newsoffice/2009/bio-electronics-0603.html>). A *National Geographic* article highlighted biomimetics in April 2008 (<http://ngm.nationalgeographic.com/2008/04/biomimetics/tom-mueller-text>).

“Making Life Easier through Biomimicry”

How will looking at nature solve the problems of humanity - or at least some of them?

Locusts Don't Crash

Locusts fly in swarms but never crash. How do they avoid having multi-locust pile-ups? Car manufacturers like Volvo and Nissan are studying locusts, and other insects like bees, to discover their crash-avoidance systems to see how they can be incorporated into our vehicles, making our roads safer.

Frozen Frog Hearts

Organs used for transplants can last as little as five hours. Keeping hearts and other organs on ice can significantly damage the tissue making the organs not viable. So how does the wood frog manage to freeze in the winter and thaw itself in the spring with no damage to its internal organs? Scientists are working on ways to mimic their non-toxic antifreeze to prolong the life of transplant organs.

Shine a Light on Moths and Butterflies

Moths, unlike cats, have very non-reflective eyes, a trait that protects them against nocturnal predators and helps them see at night. Their eyes have a series of bumps that help keep the light from reflecting. Using a silicon coating on solar panels that resembles the texture of moths' eyes improves the solar collecting efficiency of solar panels by as much as 40 percent, bringing the price of solar down. Scientists recently discovered that butterflies harvest the warmth of the sun through small solar collectors on their wings. Their wings are covered with an intricate array of scales, arranged in such a way that the light reflects off of other scales rather than bouncing off the wing where the warmth would be lost. Chinese and Japanese researchers designed a solar cell based on the butterfly's intricate design and converted more light to energy than any existing solar cell at a lower fabrication cost.

The Whale's a Fan of the Owl

Plane's wings have streamlined edges so they can cut through air more efficiently, right? One of the biggest animals in the world, the humpback whale has extremely unstreamlined edges and can still fly through the water. Scientists have determined that the tubercles, or bumps, on the edge of the flippers produce more lift and less drag than sleek flippers. This discovery has implications for wind power and ceiling fans. Owls fly silently through the night, stealthily approaching their prey before capturing their next meal. Would mimicking the design of owl's wings silence the noise of the fan in your computer? Engineers are studying the tips and curvature of owl's wings and have created a quieter and more efficient fan blade design.

Gross says the promise is huge. "I'll use the spider example. They can make seven different kinds of thread, do it all at room temperature, and it's not just stronger than steel, it's stronger than anything we have invented. And at the end of the day the spider can eat its own web and recycle the material. Imagine if we could make buildings out of tiny beams that required no mining, no smelting, and minimal energy, and could be entirely recycled again at room temperature? Or if we could figure out how plants photosynthesize, we could solve all of our energy needs."

Why the Adirondacks

The Wild Center is located in the Adirondacks, and is surrounded by nature. "One thing about these inventions is that you need to be able to watch nature to see what it's up to, and it makes the Adirondacks a living lab. You can see the wood frogs that freeze solid and thaw, right here at The Wild Center. If you pay attention at The Wild Center you can begin to look at things differently when you're outside and learn from them." Gross says the inventions are everywhere. "The real breakthrough is that we can start to see the molecular structure and even the chemistry lab inside a spider, that's what is fueling the breakthroughs."

On a walk at The Wild Center Gross points out subjects under study. A bee buzzes by. "We know they vote. They can come into a hive and present a case for a new hive location, and elect which option to choose, and the bees all head to the new location. Computer companies are trying to figure out how so much information is shared and acted on so accurately and quickly."

The Wild Center's exhibit, throughout the 31 acre campus, is the first of its kind in the world. It will feature 51 stories of how humans are studying nature and discovering a better way to do things. How does nature make colors without using toxins? How do loons desalinate salt water? How can dogs detect cancer cells

just from sniffing a person? A trained sniffing dog, a robot that can scurry over almost any object based on a cockroach and a silent fan modeled on an owl's quiet flight will be on display. From the moment visitors enter the parking lot, until they leave, they will discover amazing ways that nature has solved its own challenges without using high heats, harmful chemicals or overusing its own resources.

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Notes

To arrange an interview with Dave Gross, please contact Tracey Legat, tlegatjolly@wildcenter.org or (518) 523-7890.

For additional information about biomimicry, please visit The Biomimicry Institute, www.biomimicryinstitute.org or Ask Nature, www.asknature.org.



One of The Wild Center's owls, shown here with head curator David Gross, is one example of the Center's new Mother of Invention theme for 2009. Researchers are working to understand the qualities of owl's wings to make quieter and more efficient fan blades.