

WHAT IS BIOMIMICRY?

by Zeynep Arhon

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Following the recent lecture by US Biomimicry Expert, Dr. Dayna Baumeister, co-founder of the Biomimicry Guild, Zeynep Arhon explains what Biomimicry is and shows us that nature can inspire industry to find solutions to their problems.

Biomimicry (from bios, meaning life, and mimesis, meaning to imitate) is the conscious emulation of nature's genius. It is studying humpback whale fin to develop a more efficient turbine, or termite mound to design a building without air conditioning, or symbiotic relationships between organisms to develop cooperation strategies. It is innovation inspired by nature.

The conscious emulation of life's genius is a survival strategy for the human race, a path to a sustainable future. The starting point is to accept that we are only toddlers on this planet and nature has already solved the problems that we are tackling with. For designers, engineers, innovators and business leaders, the answer to the question "What would nature do here?" is a revelation. There is not one new idea, but many, because life on this planet has evolved through 3.8 billion years, yielding 30 million species that are success stories. That is why companies are now turning to nature for solutions. Here are a few examples:

"Biomimicry ushers in an era based not on what we can extract from nature, but on what we can learn from her. This shift from learning about nature to learning from nature requires a new method of inquiry, a new set of lenses, and above all a new humility."

Janine Benyus, author of the book "Biomimicry: Innovation Inspired by Nature", and founder of The Biomimicry Institute.



Above: Modeling the front-end of the train after the beak of kingfishers resulted in a quieter train and 15% less electricity use even while the train travels 10% faster. Kingfisher Diving © Ian Andrews | Dreamstime.com

Below: The Shinkansen Bullet Train is the fastest train in the world, travelling 200 miles per hour. Air pressure changes produced large thunder claps every time the train emerged from a tunnel heard a quarter-mile away. © photoclips | Dreamstime.com



Learning from Kingfishers

The Shinkansen Bullet Train of the West Japan Railway Company is the fastest train in the world, travelling 200 miles per hour. The problem? Noise. Air pressure changes produced large thunder claps every time the train emerged from a tunnel, causing residents one-quarter a mile away to complain. Eiji Nakatsu, the train's chief engineer and an avid bird-watcher, asked himself, "Is there something in nature that travels quickly and smoothly between two very different mediums?" Modelling the front-end of the train after the beak of kingfishers, which dive from the air into bodies of water with very little splash to catch fish, resulted not only in a quieter train, but 15% less electricity use even while the train travels 10% faster.

"Creating conditions conducive to life is not optional; it's the rite of passage for any organism that manages to fit here over the long haul."

Janine Benyus

Learning from Spiders

More than 250,000 birds per day in Europe die from collisions with glass windows. Estimates in the United States run into the hundreds of millions. Birds either don't see the glass or they see reflections in the glass, such as trees, that make them try to fly through as if it isn't there.

ORNILUX is an insulated glass sheeting made by Arnold Glas, a German-based company, which is designed to reduce the causes of bird collisions. It uses a special ultraviolet (UV)-reflective coating that appears almost transparent to humans, but is clearly visible to birds, because they can see a broader UV spectrum than humans. The inspiration for the use of UV-reflective patterns came from knowledge of how some species of spiders incorporate UV-reflective silk strands to their webs to protect them against birds. Independent field testing showed that 76% of the birds tested avoided the ORNILUX panel and flew towards the conventional glass panel.

Some species of spiders incorporate UV-reflective silk strands to their webs to protect them against birds. Golden Orb Weaver Spider © Craig Jewell | Dreamstime





The base of bioWAVE™ mimics kelp's holdfast, which is a flexible network of root-like haptera or anchors to attach the kelp to the ocean floor.

Bull Kelp *Nereocystis luetkeana* © Jackie Hilderling

Learning from Kelp

BioPower Systems is an Australian company that creates technologies to convert ocean power into a renewable source of energy for other applications. Its assumption is that oceans must have the best possible technology within them for marine life to have evolved in them for 3.8 billion years.

BioPower's wave power system, bioWAVE™, is based on the swaying motion of kelp in the presence of ocean waves. The hydrodynamic interaction of the buoyant blades with the oscillating flow field is designed for maximum energy absorption. In extreme wave conditions the bioWAVE™ automatically ceases operating and assumes a safe position lying flat against the seabed. This eliminates exposure to extreme forces, allowing for lighter designs and substantial cost savings.

Moreover, the base of bioWAVE™ mimics kelp's holdfast, which is a flexible network of root-like haptera or anchors to attach the kelp to the ocean floor. By being flexible, the haptera allow the kelp's base to rotate slightly, thus providing some protection from the high torque created by waves. The base of bioWAVE™ has multiple anchors that redistribute vertical and lateral forces.

Implications for business

Biomimicry is not limited to developing new products. It can be applied to revisit business concepts and to reshape business initiatives. As Philips Research moved into Open Innovation as a new business area almost hundred years after its establishment, it wanted to understand nature's strategies to survive and thrive. An international team of Certified Biomimicry Professionals worked with Philips Research in order to answer how it could build new business in a new business area. The group focused on "cooperation" as a key survival and growth strategy in nature. Studying numerous species and interactions, the group extracted key guidelines for Philips Research Open Labs team. The project culminated in numerous application ideas and a Design Guideline tool that could be used by Open Labs in the future.

Why now?

The conscious emulation of life's genius is an innovation paradigm, a survival strategy for the human race, and a path to a sustainable future. Life has been performing design experiments in Earth's R&D lab for 3.8 billion years. The organisms that are around today are the best ideas, failures are fossils.

Whatever the design challenge or question in hand, the odds are high that one or more of the existing 30 million species has found a sustainable way to solve it. Today, more than ever in human history, we need to create products, processes, organisations, and policies that are well-adapted to life over the long haul. We need to create conditions conducive to life. Biomimicry offers a practical methodology to achieve this and a new way of viewing and valuing nature.

For more information on Biomimicry visit
www.asknature.org,
www.biomimicryinstitute.org
 or www.biomimicryguild.com



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