Welcome to BioInspire, a monthly publication addressing the interface of human design, nature and technology.

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Biomimicry / BioDesign

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Can we believe in human ingenuity alone to lead us to the future with chemical and scientific ways? Perhaps the answer lies more as a collaboration of the natural system and the human system: Humans will have to look to nature to find a future. Five years ago, Paul Hawken, noted environmentalist, recommended the book *Biomimicry, Innovation Inspired by Nature*, by Janine Benyus. Biomimicry is the study of learning from nature to solve problems in design, business and life. The core principle is that nature offers a sustainable solution to human problems. Nature offers a source of endless case studies, and after 3.8 billion years of existence it is clearly a system that works. Humans have inhabited the earth for a short period of time, and consider how Industrialism and progress, as some might say, has created a mess of or even destroyed the environment. Can we undo the damage humankind has inflicted on nature, or can we at least prevent further damage? Perhaps we can learn from the master, Mother Earth.

Biomimicry is not new to the design process. As early as the fifteenth century, Leonardo da Vinci philosophized, "Human ingenuity may make various inventions, but it will never devise any inventions more beautiful, nor more simple, nor more to the purpose than Nature does; because in her inventions nothing is wanting and nothing is superfluous." In 1958, Major Jack Steele of the Aerospace Division of the US Air Force coined the term *bionics* to define their work studying nature and the living world for inspiration in a new science for the military. In 1971, Victor Papanek stated in *Design for the Real World* "one handbook that has not yet gone out of style, and predictably never will, is the handbook of nature. Here, in totality of biological and biochemical systems, the problems mankind faces have already been met and solved, and through analogues, met and solved optimally."

Recently, practical application of biomimicry caused controversy during the 2000 Summer Olympics in Sydney, Australia. Speedo designed a swimsuit to resemble a shark's skin, the fastest fish in the ocean. Could the swimwear make the swimmer swim faster? Aircraft and boat manufacturers are experimenting with an exterior coating replicating this same design to use less drag, hence less fuel. Termite mounds in South Africa stay 87 degrees all year around, all day long, in desert conditions. Mick Pierce, an architect in Zimbabwe, used the same model to build a 33-story building. This "smart design" saved 3.5 million dollars upfront and 10% energy savings annually. This concept of natural ventilation, or working with heating and air - not trying to control it yourself, but to work with nature, is becoming increasingly popular in Europe.

Biomimicry can represent business models as well. The rainforest is a sustainable system. In a mature eco-system like a rainforest, all waste is consumed by another species. Cooperation appears to be more important than competition; a company, an industry, or a community may not be sustainable alone. The key is working together or cooperating within a system. For an organization like Interface it is difficult to cooperate with the competition, but they can lead by example, and they can cooperate with suppliers and customers. Co-evolution can drive change faster.

Marketing groups are always seeking new methods to deliver a message, and in today's business climate, maximizing results on minimal investment is always a concern. Spreading a message is like spreading seeds in nature. A dandelion has thousands and thousands of seeds which blow far and wide. Perhaps one or two germinate to take growth. In the business model, a simple postcard mailer may spread the word. In today's e-commerce, email advertising is inexpensive and can reach a broad audience. Other plants have seeds, which are more valuable and germinate in specific climates and conditions. Some seeds are so valuable nature protects it within a shell. In the business model, more costly advertising is based on demographic evaluation, targeted to a specific audience for a specific outcome.

In 1999, biomimicry and innovation uncovered a major breakthrough in sustainable design for the carpet industry. Benyus led the David Oakey Design's team through a workshop where we pondered, how would nature design a modular "carpet tile" floor? The designers meandered about the woods surrounding Pond Studios to learn something new, not to copy nature's designs, but to think differently. The outcome is revolutionizing the carpet tile industry. Nothing in nature is the same. Nature is diverse, everything is slightly different, and there are no perfect shapes, no perfect colors. No two leaves on a tree are the same shape, size or color. Nature banks on diversity. How does nature design a floor? Imagine a bed of leaves, stones or rocks at the riverbed. No two shapes are identical; no colors are the same. If you pick up a unit or a group of units and replace them elsewhere, the general aesthetic of the floor is unchanged. This concept can translate into modular flooring. The face of the product could be designed so every element would be slightly different; within every square, every color and pattern is slightly different. The installation is random so the pieces could be rearranged, and the overall aesthetic would be unchanged.

Today, the product Entropy (organized chaos) is the fastest growing product in Interface history. It is applicable to many diverse market segments. Four years later, several new designs have evolved based on this philosophy. Transformation is similar in pattern design to Entropy, only it is constructed from recycled fiber and recycled backing (nature recycles everything). The inherent beauty of this product is that it is one of the most sustainable designs in the carpet industry. If you spill on an area, it's easy to repair. Pick one up and put another one in. It does not matter what direction the tile is – it is irrelevant. Laid randomly on the floor, the installation is quicker, more efficient, and less costly. There is less waste on the jobsite and less attic stock. The product has a longer life cycle. Instead of manufacturing uniform rolls of carpeting, discarding the excess and landfill the rest when a single section wears out, a few tiles can now be easily replaced. The press has grasped the beneficial story about biomimicry. These philosophies have

been featured in Business Week, Fast Company, Interior Design Magazine, The New York Times, Science, Green Futures Magazine, I.D. Magazine, and The Smithsonian. Biomimicry as a mentor for sustainable design is a growing trend.

Inspiration by nature's design principles and processes offers more hope for achieving a sustainable future. As a result, new designs are more creative, bringing unique ideas and products to the market place. There are those who suggest man is superior to nature, that we are a more intelligent species and that nature is here for us to control and exploit. In her book, *turning to one another,* Margaret J. Wheatley states, "Life will continue to teach us that we can't make up our own rules. There's only one way to run this planet, and life is pushing back forcefully right now, insisting that we learn this. We are experiencing dramatic and frightening climate changes all around the globe, destructive floods, more deserts and barren soil, new diseases and pandemics. We can't continue to pretend that our modern ways of relating to life are working."

Biomimicry, using nature's design principles as inspiration, gives hope for a sustainable future. Product design has become more creative, and as a result, more innovative products come to the market place. For David Oakey Designs, the next design phase considers the relationship between nature and our psychological and physiological well-being; to capture the essence of the natural environment with colors and patterns that are diverse and complex, that subtly change. Most people in the industrialized world now spend the majority of their lives in artificial environments, where there is no change. The natural environment is a rich, complex system and an extraordinary diversity of life. It is an active and changing environment, a living environment. Our connection to nature is critical to our survival. It is not what we can extract from nature; it is what we can learn.

Author Biography:
David Oakey, founder of David Oakey Designs, collaborated with Interface in 1994, and has been leading global efforts in sustainable or "smart design" and biomimicry. He is passionate following his steps to sustainability through process, product, and people. In all of his work, Oakey calls attention to the need to design respecting the future in a sustainable way; he inspires architects and designers to change their approach to the design process considering use of materials, processes, and products. Oakey, educated in carpet design at Kidderminster College pursued his entrepreneurial dream establishing David Oakey Designs in 1985. Structured for integrated design and development programs, Oakey has created an award winning work environment for design and color research.

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Notes from the Publisher:

Imagine a world in which human designs were considered "natural". A world in which creativity and innovation lead us through design to sustainable solutions. Better design is possible and within our reach. We need only be bio-inspired.

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In addition, a forum to discuss BioInspire is currently evolving. You are encouraged to post your ideas and comments at:
http://www.thinkcycle.org/tc-space/tspace?tspace_id=41303

Warm Regards, John Mlade

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ABOUT THE PUBLISHER:
John Mlade is a green building professional researching and teaching biomimicry at Colorado State University and is a research assistant at the Institute for the Built Environment. He is also a member of the Biomimicry Guild. Visit www.biomimicry.net for more information.

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