



BIOINSPIRED!

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THE BIOMIMICRY INSTITUTE

A Few Words on the Biomimicry Education Summit (Denise Deluca)

Denise DeLuca, Professional Engineer (PE) and LEED-Accredited Professional (LEED-AP), Biomimicry Institute 'Outreach Director'.

As you may recall from the [September issue](#) of *BioInspired!*, the Biomimicry Institute conducted an Education Summit in July with the goal of learning from our core education collaborators what they needed and wanted most from the Institute in the coming year.

Although this group would rather be outdoors than in, we stayed focused over those four days and evenings exchanging information, engaging in debate, generating ideas, and, of course, making new friends and colleagues. I left there not only with a group of new friends and an enormous to-do list, but also with a much deeper and broader understanding of what it means to teach biomimicry and teach biomimetically. I learned more than I can share here, but below are bits of feedback gleaned from questions raised during our discussions:

- How do you engage engineers and designers in biology?
 - Teach biology from a functional perspective (called Biology-taught-Functionally)
 - Have students observe and create annotated design drawings of organisms based on functions (reverse-engineer organisms)
 - Have student write using biological terms rather than engineering/design terms (learn to translate)
 - Tap into their inner-naturalist (à la Biophilia) - naturalists, docents, outdoor schools are great at this
 - Partner tech students with biology students, perhaps at different campuses

- What are important skills to teach future biomimics?
 - Observation and abstraction
 - Collaboration and brainstorming
 - Research and critical thinking
 - Design and evaluation
 - Representation and communication
- What does it mean to teach biomimetically?
 - It is about learning, not teaching
 - Learning is best done by exploring and doing
 - Use class time for exploration, collaboration, and active learning. Save passive learning (reading, listening) for homework time

Everyone attending the meeting had faced their own challenges in teaching biomimicry and were eager to learn from each other. Here are a few important points shared during the discussions:

- It is important to avoid getting stuck on "biomimicry lite", teaching only the most shallow application of biomimicry.
- Designers have to be able to critically review biological information, just as they would critically review information from their own area of expertise.
- Just because something is inspired by nature does not automatically make it a better or more sustainable design.

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Janine Benyus has been honored by Time Magazine as a Hero of the Environment, along with Al Gore, David Attenborough, Mikhail Gorbachev, James Lovelock, Norman Myers, Wangari Maathai, and others.

See the [Oct. 19th edition of Time International](#) for the article.





The Biomimicry Education Summit (continued)

- The target audience for biomimicry outreach should also include people that would not categorize themselves as biologists or designers.

Since the July summit we have made progress on a number of short- to mid-term priorities. A few highlights:

We have created a wiki for members of the education group as an internal workspace and communication device.

We have launched our new website which now provides a more extensive list of colleges and universities that are teaching biomimicry at some level. There are now 18 institutions in the U.S and 15 abroad that we know are teaching biomimicry. We know this list is not complete because we continue to learn about new biomimicry courses and initiatives every week. My next task is to update this list and include contact information and perhaps descriptions of biomimicry activities on each campus. Later we will also add teaching resources developed by our wiki contributors.

By the time you read this newsletter I will have given lectures and facilitated workshops at several academic institutions including Montana State University, University of Colorado at Boulder (including a workshop with Rocky Mountain Institute), University of Montana, Middlebury College and Harvey Mudd College. I also conducted a workshop at the local Bioneers conference in Bozeman, Montana. In addition to spreading the seeds of biomimicry, these visits function as feedback mechanisms, where I learn first hand what is most inspiring, most useful, most needed, and least understood. The feedback helps me understand and evolve the simple building blocks we use to share biomimicry that can be re-used and diversified for different audiences. These visits and the new relationships formed also create opportunities to leverage free energy, cross-pollinate, and generate new inter-connections. I look forward to more such visits in the coming year! We gratefully thank the many people at each of these institutions for making these lectures and workshops possible and for their generous donations to the Institute.



Yellow Bay on Flathead Lake, Montana



Participant Presentations

As Outreach Director I receive emails or calls every week from academic institutions that are seeking speakers, looking for teaching materials, or launching courses and programs in biomimicry. I also receive emails daily from students around the world that want to know how to get a biomimicry education. So we know that biomimicry in academia is growing and increasingly in demand.

As the snow starts to fly here in Montana, I am working with Dayna Baumeister on developing the [Two Year Certificate program](#), gathering speakers for the [IBE conference](#) in the spring, developing and refining teaching materials, and working on the handbook.

A CALL TO TEACHERS AND STUDENTS OF BIOMIMCRY ~

If you are integrating biomimicry into your teaching or learning, we want to hear about it! Just fill out the on-page form you'll find on the web at <http://sinet.ca/tinc?key=zkJeYXyN&formname=BioEducation>. When you're done filling out the information, you simply click on "ok" (lower right) and you're done. Thanks in advance!

Note: If you would like a speaker from the Institute, please fill out the Speaker Request form on our website at: <http://biomimicryinstitute.org/resources/request-speakers.html>

[Denise DeLuca](#)





Access to Experts (*John Carmody*)



Lunch at the University of Montana Biological Station

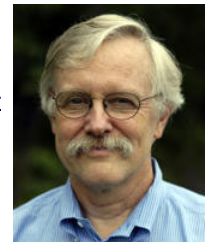
John Carmody is the Director of the Center for Sustainable Building Research and an adjunct Associate Professor in the College of Design at the University of Minnesota.

service between institutions as well as maintaining a directory of local resources such as naturalists or alumni of the BaDT (Biologist at the Design Table) and other biomimicry courses.

Relatively inexpensive audio and video conferencing opens up the possibility of scheduling interactive sessions with experts and teachers in the field, broadening the potential audience while avoiding travel costs. Over time, the Biomimicry Institute could build a library of material by recording these conferences, arranging interviews with experts and archiving existing recording such as [Dayna Baumeister's 2005 talk](#) at the Ontario College of Art and Design's '[Speaker Series](#)' program.

A model is the "[Smart City Radio](#)" site, which delivers weekly, hour-long programs on urban issues, green architecture and sustainable design. Over 300 shows are available as streaming MP3 audio or podcasts. Although recordings lack the ability for students to ask questions, they would allow educators to tap into 'just in time' expertise.

[John Carmody](#)



One of the challenges of teaching biomimicry is accessing expertise. Depending on the specific course focus and student background, the need can cover the spectrum from biology to technology. At the biomimicry education summit this summer, we agreed that it would be great if the Biomimicry Institute could provide a 'matching-making'

Developing a Biomimicry Educators Network (*Tom McKeag*)

Tom McKeag teaches the Applied Biology for Designers and Artists course at the California College of the Arts, San Francisco, California, and a biomimicry course for gifted elementary students in the Dixie School District, Marin County, California.

This past summer the Biomimicry Institute called together educators from around the world to gather at Flathead Lake, Montana, and share their experiences of teaching biomimicry. The summit was a great success, and part of that success included efforts to organize ourselves into a more formal professional group.

During the summit, attendees repeatedly applauded the organizational efforts of the Biomimicry Institute and all expressed their appreciation of the hard work done to bring this international community of educators together. Many expressed the desire to become part of this organizational effort and to help build the framework for an expanded professional network.

Two groups met to discuss the issues involved and then a small subcommittee drafted the shared tenets of the two groups. We proposed that:

- The summit gathering announce the intention to establish a formal relationship between educators and the Biomimicry Institute.
- We create a formal relationship between both educational institutions and individual educators.
- We develop a review process for admittance.
- We establish a steering committee to draft the criteria for admission and develop goals and objectives. The criteria should reflect the vision of biomimicry education as established by this group.
- Members who are part of this network should have their roles clearly defined along with the role of the Institute and the interaction between the two. In other



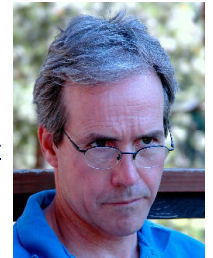
Developing a Biomimicry Educators Network *(continued)*

words, what tangible outcomes does membership yield to the educational institution and/or individual educator and the Biomimicry Institute?

- The critical first step toward defining roles is a two-way information flow between the Institute and the education community and public recognition of the relationship between the Institute and the education affiliates.
- Next steps should include; defining the organizational structure of the network, setting priorities and developing an implementation plan for both the Institute's education work as well as our collective work.

The steering committee met by phone in early October to discuss this idea further. With input from this group, the Biomimicry Institute is now developing a draft document that will lay out the tenants of the formal relationship between the Institute and educators.

We were all very excited about the possibilities for such a network and look forward to strengthening the bonds of our work together.



[Tom McKeag](#)

An International Consideration *(Jamie Miller)*

Jamie Miller is completing his Master's thesis at Queen's University. He is actively working on incorporating biomimicry and bio-inspired design into the Humanitarian Engineering and Global Development Studies program.



"While there were plenty of things the masses might not like about their existence, by far the biggest complaint was being miserably poor, and that they would put up with a great deal of aesthetic or environmental unpleasantness to escape poverty."

Hertsgaard, M (1998) *Earth odyssey: Around the world in search of our environmental future*

Development discourse predominantly focuses on global inequality and justice issues that impact individuals' ability to meet their basic human needs. If biomimicry has not already entered mainstream discussions of development and relief, then this is a formal call to do so. In this article, I propose three avenues to converge discussions of biomimicry and the issues of marginalized communities: creating development-focused, bio-inspired technologies; international promotion of biomimicry; and through development-oriented curricula.

In our techno-optimistic and techno-dependant reality, we are seeing technology called upon to solve the issues that impede the empowerment of marginalized communities. Many organizations believe that our designs will alleviate the symptoms of poverty. But technology must be viewed as more than a collection of mechanical and electrical contrivances. It is also a process, a system and a state of mind. Technologies

are shaped by the interplay of society and available resources and are capable of transforming human environments in both positive and negative ways. In order to appropriately apply technology to the complex circumstances of development, technology should be approached with an emphasis on society and nature, and be tempered by an appreciation of biomimicry's Life's Principles.

In order to influence this international dependence on technology, we must focus on the international promotion of biomimicry. This can be best represented through a sincere and dedicated dialogue with those people who work for and live in marginalized communities. We need to invite their perspective to the design table by designing and delivering specific conferences, workshops, websites and presentations that focus on international issues of marginalization. A conspicuous example is the organization Engineers Without Borders (EWB). Each year, thousands of students are sent on development projects around the world on behalf of EWB. This organization has over 15,000 registered Canadian Chapter Members and holds an annual national conference for hundreds of the EWB Chapter leaders. The conference is used as a national training center where participants attend workshops and presentations that will influence their advocacy at their respective schools. This would be a great place to introduce biomimicry into the development discussion.

Beyond just engaging the affluent, we must also create dialogue with the marginalized communities themselves. I believe that we could do so by initiating development-focused workshops in low-income countries and for low-income communities. It is these people who best understand the conditions of poverty and who are more likely to develop bio-inspired solutions specific to their conditions. A dialogue with





An International Consideration (continued)

developing communities may help us reconnect with the native traditions and techniques, unearthing information that could enrich our view of biomimicry and the natural world.

Another opportunity for dialogue is to create a database to collect and discuss relevant ideas that demonstrate development-oriented, bio-inspired designs and systems. An example could be the Eastgate building in Zimbabwe that emulates the passive temperature-controlled termite mound. This concept could be promoted to low-income equatorial communities. Or the research at Queen's University on emulating the shape and function of coral reefs to design artificial reefs that dissipate wave and tsunami energy and act as a bed for the re-growth of indigenous wildlife.

However, in promoting biomimicry we must be careful not to assume that technologies are contextually interchangeable and that a design could seamlessly integrate into various communities without negatively impacting their social, economical and environmental circumstances. This is about sharing ideas and not necessarily solutions - we must seek the participation of every perspective.

The final discussion of bio-inspired development and relief pertains to the education of the next generation who are increasingly choosing to work for marginalized communities. The increased capabilities of global communication has provided them with an abundance of opportunities to discover issues around the world, fueling the increase in socially and environmental conscientious students who are dedicated to greater global causes. The awareness of current events is

fueling a global passion for change and there is an opportunity for biomimicry to be the paradigm they embrace.

It would be incredible to see the passion that these students have for development paralleled by a passion for biomimicry. The development community is trying hard to embrace sustainability, which provides a way for biomimicry to be incorporated in the courses of hugely popular development programs such as Queen's University's Humanitarian Engineering and Global Development Studies. Biomimicry could be promoted as a paradigm and methodology to the development process and as a possibility to developing sustainable technologies and communities. Biomimicry could be used to quiet human cleverness and allow the students who search for appropriate solutions to direct their questions to nature and to the marginalized.

For this upcoming generation, there is no greater skill to embrace than the ability to humbly participate in dialogue with the rest of the world. Humanity and nature are top priority for this generation, and biomimicry is an appropriate method for their merge. The ultimate goal of this relationship is attained when the students unconsciously and simultaneously think of biomimicry when they think of global development.



[Jamie Miller](#)

Quality Assessment (Rolf Mueller, Norbert Hoeller & Craig Tovey)

Rolf Mueller is a professor at the School of Physics and Microelectronics at Shandong University, and has taught a summer course on Biomimetic Technology to physics undergraduate students.

Craig Tovey is a professor at the School of Industrial and Systems Engineering and co-founder of the Center for Biologically Inspired Design at Georgia Tech.

Norbert Hoeller has been working with the Biomimicry Institute on communications and education activities, and is conducting research on a pattern language based on Life's Principles.

- the assessment of biomimicry designs
- quality standards across disciplines
- cross-disciplinary assessment skills

Assessment of Biomimicry Designs

It would be a fallacy to believe that any biomimetic innovation will automatically inherit the superiority of nature's solutions. Although inspired by nature, biomimetic technology is still man-made and hence vulnerable to human error. Many state-of-the-art engineering solutions have been derived through powerful design methods grounded in rigorous theoretical analysis. It would be imprudent to ignore both the methods and solutions.

As biomimicry education gains momentum, it becomes increasingly important to focus on the reliability and quality of the outcome. The team comprised of Craig Tovey, Lynne Sopchak, Norbert Hoeller and Rolf Mueller looked at three aspects of quality assessment:

The team proposed that in addition to meeting the requirements of the design brief, all biomimicry designs should be compared with existing solutions on a range of 'Quality of Service' criteria, such as reliability, scalability, cost,



Quality Assessment *(continued)*

and longevity. Prior to developing a new solution, students should research 'prior art' and identify the key criteria that influence the success of the solution within the larger system, in addition to the specific behavior or function that the solution needs to deliver.

Sustainability is a key differentiator of biomimicry. It is important that biomimicry designs are seen as sustainable, to ensure a consistent message. The team proposed that all designs be evaluated in terms of their impact on the environment, on sustainability metrics such as the amount of waste created, energy used, degree of toxicity, and carbon dioxide (or equivalents) emitted. Ideally, designs should be restorative or regenerative, along the lines of McDonough's example of the textile factory where the 'waste' water was cleaner than the water flowing into the plant.

Quality Standards Across Disciplines

In cross-disciplinary teams, it is important that everyone has a common understanding and appreciation of the quality standards of all the disciplines that are involved during the life

cycle of the design. Aside from being aware of differences in quality standards (discussed in more depth below), it is risky to defer quality to a quality expert or a later phase of the project. Quality cannot be introduced at the end of the process: this often leads to frustration, escalating costs and possibly project failure. Issues discovered early in the design process are usually easier to correct than those which surface later in the process.

Tools, methods and principles need to be developed so that quality evaluation is both feasible and practical within the limited time available in design courses. A more serious concern is whether a focus on quality will limit designer's freedom to be creative and visionary. True creativity and innovation often springs out of an understanding of limits. Even visionary designs need to be grounded in the real world. Perhaps students should pitch their designs to Natural Capitalists who will assess the environmental implications, in addition to Venture Capitalists who will assess the viability, feasibility and economics.



Workshop presentations beside the lake



Sunset over Flathead Lake

Cross-Disciplinary Assessment Skills

Biomimicry is an interdisciplinary endeavor that constantly forces its practitioners to deal with results and methods from different disciplines. In order to uncover the technological potential of their research, biologists need to acquaint themselves with engineering problems, concepts, and approaches. Likewise, engineers must sift through a large number of biological results in order to find inspiration for their own work.

The results published in any area of science and engineering differ widely in terms of quality, maturity, and potential impact. Passing a sound judgment on these properties requires not just an understanding of the basic subject matter, but also knowledge of potential shortcomings that research in the area could suffer from. Biologists and psychologists, for

example, are well aware that when conducting experiments with intelligent animal or human subjects, a "double-blind" experimental design is highly desirable. In such a double-blind experiment, neither the subject nor the experimenter knows which condition is being presented and this prevents the experimenter from inadvertently priming the subject. Researchers in non-life sciences who handle only inanimate matter in their - often highly automated - experiments are usually not aware of this pitfall and may hence not exhibit the skepticism that is in order when dealing with "non-double-blind" results from susceptible research areas.

Such lack of cross-disciplinary judgment can lead to the formation of a vicious circle as information is passed back and forth between disciplines. Such a circle could start, for instance, with biologists wishing to establish how animals



Quality Assessment (continued)

solve a problem that in engineering is classified as particularly difficult. It is always possible that the animal is using a much simpler technique to achieve a comparable result. For example, animals (and baseball fielders) are able to intercept moving objects by running in an arc such that the object appears to travel in a straight line - they do not calculate and reconstruct the object's trajectory. If the biologists are not aware of this, they may be misled to claiming that the animal is capable of solving the difficult problem, whereas in reality it was just solving one of the simpler problems. This misjudgment may then in turn mislead engineers to accept these findings as a valid biological existence proof for a solution to the difficult problem. Finally, attempts by the engineers to solve the difficult problem through biomimicry may cement the false impression of the biologists that there is indeed parallelism between what the animal does and potential engineering solutions to the difficult problem.



[Rolf Mueller](#)



[Craig Tovey](#)



[Norbert Hoeller](#)

The Power of Ants and Bees (Chris Beaver)

Chris Beaver is Senior VP at Regen Energy, with 15 years of experience in commercializing research and broad expertise in the electrical sector.



Can research into the behavior of social insects such as ants and bees save us money and at the same time reduce greenhouse gas emissions? [Regen Energy](#) (Toronto) is a new business venture founded on this premise, and is on track to both commercial and environmental success.

The *distribution* of electricity usage is as important to utility companies as the *amount* of usage. Peak usage that is significantly higher than the 'base load' forces utilities to maintain excess generating capacity that is only required for limited periods during the year, or purchase power from other utilities at a time when overall demand is high and the price is set accordingly. In either case, peak power is often generated from coal- or gas-fired generators: these can quickly adjust to electrical demand, in contrast to hydro-electric, nuclear, solar or wind-powered generators. Cutting peak power usage can therefore have a significant impact on greenhouse gases by reducing the need to fire up these fossil fuel plants.

Utilities pass on the high cost of peak power to larger customers by charging more for electricity during high usage periods or basing part of the monthly bill on the customers' peak demand for that month. It is advantageous for these customers to smooth out their energy consumption and avoid large spikes. In the past, the primary tools available were

centralized energy management systems that were often expensive, require ongoing management, and could impact users if the systems took drastic action to control energy demand. The complexity of these systems rises dramatically with size, further driving up costs and increasing 'brittleness': the possibility of failure under unexpected conditions.

Social insect communities follow a different model. Rather than relying on a central controlling authority, agents make independent decisions based on simple 'rules of behavior' while communicating with each other using a simple language. Under the right conditions, this can result in systems that demonstrate complex, emergent behavior. A growing body of research in '[swarm theory](#)' is gradually uncovering the underlying principles behind such self-organizing systems found in a number of species.

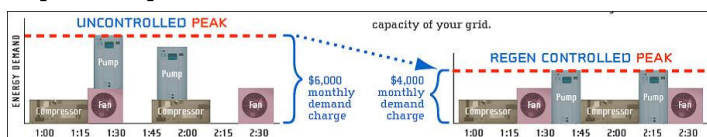
In early 2005, Mark Kerbel and Roman Kulyk identified a business opportunity that applied the principles of swarm theory to solve the challenge of peak power usage. I joined the team as a founding partner in 2006. Their team was able to translate knowledge gleaned from experts into algorithms, hardware and software. The result is an autonomous, wireless power controller designed for cyclical electrical loads that communicates power usage patterns with its peers. Each power controller manages its connected electrical load such that the peak power consumption of the system is minimized, without any impact on users. Initial real-world installations have showed





The Power of Ants and Bees (continued)

peak energy reductions around 30%. Surprisingly, early results suggest the controllers may also be influencing the total electrical consumption – work is underway to verify and explain this phenomenon.



The founders of Regen Energy combine a passion for social and environmental issues, deep expertise in the electrical sector, business experience and strong entrepreneurial capabilities. Using the “Disruptive Innovation” approach, they were able to identify an opportunity that could be developed rapidly, from initial idea to first customer implementation in 18 months. The idea was inspired by the growing body of knowledge about swarm theory, emergence and self-organizing systems. The process and the final service also shares characteristics with natural systems, including the delivery of multiple benefits, fast and direct payback, efficient use of resources, self-management, and a reliance on information rather than energy to solve problems.

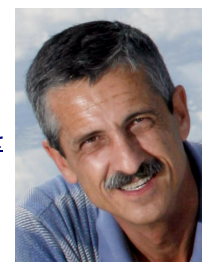
Regen Energy is an excellent example of the growing collaboration between industry, academia and government. Regen Energy tapped the top researchers working on ‘swarm theory’. In spite of some language differences, these researchers quickly became excited about the commercial application of their work. Regen Energy was able to bridge the different cultures, objectives and timelines of industry and academia, translating theory into practice, providing business relevance and driving the project to completion. Government

also plays a role, in encouraging startups with programs such as the Ontario Centres of Excellence, developing sustainability and energy efficiency initiatives, and influencing behavior through regulations, policies and communication. Greater demand for electricity combined with the growth of smaller renewable energy providers will drive a need for wide-scale deployment of appliances and other power loads that manage their usage to optimize the overall efficiency of the grid. The scalability, low-cost, flexibility and self-management capabilities of the Regen Energy power controllers, combined with the potential for granular usage reporting, make them ideal components for the ‘intelligent grid’ of the future.

Additional information:

- [“Bubbling under: Canada’s top 10 cleantechs”](#) (Clean Break, October 27/2007)
- [“Cleantech First Annual Corporate Knights Ranking”](#) (Corporate Knights, October 25/2007)
- [“Lots of buzz surrounding this company”](#) (The Star, September 3/2007)
- [“Reducing Peak Demand using Self-Organizing Systems – Follow Nature’s Lead”](#) (Regen Energy, May/2007)

[Chris Brewer](#)



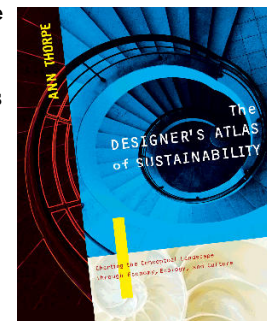
Biomimicry’s Two Faces for Design (Ann Thorpe)

Ann Thorpe is the author of The Designer’s Atlas of Sustainability (Island Press 2007). The book presents a full color, illustrated conceptual overview of the three main landscapes for sustainability—ecology, economy and culture—and how designers can navigate them. Two short articles “10 ways to work in sustainable design” and “The central debates of sustainable design” are available to download at the book’s website, <http://www.designers-atlas.net>.

I applaud The Biomimicry Institute and other organizations that encourage designers to look to nature as a guide for sustainable design. But my experience with product designers and architects suggested to me that something was missing from this encouragement. This missing bit was a visually and conceptually accessible overview of the “big idea” behind

biomimicry. Although the big idea may seem obvious, translating it into a design practice or into a student design brief is not.

This gap in accessibility was part of the inspiration behind my own book, The Designer’s Atlas of Sustainability (Island Press, 2007). The book contains several sections on biomimicry, and I address it in two ways. First, using design terms I review some broad concepts that underpin natural processes. Second, I consider the concept of nature as part of culture, through the lens of ecopsychology.





Biomimicry's Two Faces for Design *(continued)*

The ecosphere (atmosphere, lithosphere, biosphere and hydrosphere) begins my review of nature and I examine a range of things we take from one sphere and put into another (e.g. carbon from the lithosphere into the atmosphere). Next, in the context of materials (which I argue are invisible to designers) I discuss the notion of bioregions and adaptation, introducing the concept of biomimicry and including some well known biomimicry examples such as shark skin and Velcro. I touch upon holism and complexity in a discussion of how nature uses size and time to adapt to change.

In terms of ecopsychology, I review the argument that a connection with nature appears to be a central part of human mental and physical health. This connection with nature is increasingly lost in urban, technological society. Yet if there is an ecological dimension to the human personality, then ecological awareness and respect are not just nice ideas; they are an essential part of healthy human development. I suggest that, although there is a personal and indeed spiritual dimension to this concept, designers can take a secular approach to rebuilding, or expanding upon their connection to nature by developing some basic ecological literacy.

These two sides to biomimicry show that although nature provides a fantastic model of sustainable function and service,

from a human perspective the value in biomimicry goes further. The connection with nature that biomimicry could, or should inspire appears to be central to healthy human development. I think this insight may be an empowering perspective for designers who feel unsure about their knowledge or skill in undertaking biomimicry. To this end I offer a free teaching guide (<http://www.designers-atlas.net>) for the book that includes several introductory biomimicry exercises and design briefs.

I conclude my book by urging designers to ditch the saint/sinner mindset. One *can* practice sustainable design even if one does not live a faultlessly sustainable lifestyle; our system precludes that faultless lifestyle. A large swath of my book deals with the economic and cultural challenges that lie in the path of sustainable design, and, to some extent, biomimicry. There is no "right" way to travel through the landscape of sustainable design, but there are many places to start and any one of them will help designers address these issues in a productive way.



[Ann Thorpe](#)

The Biomimicry Institute Launches New Website

The Biomimicry Institute has launched a new website featuring more content, better organization, and a user-friendly design. We invite you to come take a look at BiomimicryInstitute.org.

Some new features you might enjoy exploring:

- **Biomimicry case studies** – Learn about real world examples of biomimicry from termite inspired air conditioning to a mollusk inspired fan. Updated monthly.
- **K-12 curricula** to help you introduce biomimicry to your students.
- **Information about upcoming workshops**

- **The latest news**, articles, and video about biomimicry. Updated weekly.
- **Calendar of upcoming events**, such as presentations, workshops, exhibit openings, and more.
- **Secure, online donation system** for those wanting to help the important work of The Biomimicry Institute.
- **Newsletter Archives**, complete with a sign-up form so interested people can stay informed on what is happening in the field of biomimicry.
- **And much more...**

Calendar of Public Events

Date	Location	Event
Jan 18, 2008	Bozeman, MT	MSU School of Architecture - Public Lecture
Mar 6-9, 2008	Chapel Hill, NC	13th Institute of Biological Engineering Conference
Mar 17-19, 2008	Southampton, UK	Biological Approaches for Engineering

Date	Location	Event
Mar 20-22, 2008	Dallas, TX	NCIIA 12th Annual Meeting , includes biomimicry workshop
Mar 30-Apr 3, 2008	Girona, Spain	Mechanosensors: From Biological to Bionic Systems
Mar 31-Apr 3, 2008	Melbourne, Australia	Fibrous Proteins: transforming structural knowledge into new materials



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"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. Studying a leaf to invent a better solar cell is an example. I think of it as "innovation inspired by nature."

The core idea is that nature, imaginative by necessity, has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth. This is the real news of biomimicry: After 3.8 billion years of research and development, failures are fossils, and what surrounds us is the secret to survival.

Like the viceroy butterfly imitating the monarch, we humans are imitating the best and brightest organisms in our habitat. We are learning, for instance, how to harness energy like a leaf, grow food like a prairie, build ceramics like an abalone, self-medicate like a chimp, compute like a cell, and run a business like a hickory forest.

The conscious emulation of life's genius is a survival strategy for the human race, a path to a sustainable future. The more our world looks and functions like the natural world, the more likely we are to endure on this home that is ours, but not ours alone."

[A Conversation with Janine Benyus](#)

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Comments can be posted on the newsletter Weblog. At this time, the TypePad RSS feed does not deliver comments.

If you wish to subscribe to this newsletter, please complete the [BioFeedback](#) form and check off 'Quarterly Newsletter'.

Last, but not least, please send any feedback or comments to:

[Norbert Hoeller](#)



Clippings, Resources and Events

Three public-access Weblogs hosted on TypePad are now available to share information of interest to the Biomimicry Community.

- [Clippings](#): short articles relating to Biomimicry.
- [Resources](#): pointers to more extensive information.
- [Events](#): workshops and relevant conferences.

These Weblogs can also be monitored with your favorite RSS Reader. Anyone can post comments. Please be aware that TypePad requires an e-mail address and will display this

address to people viewing the comment. Each Weblog has a 'sticky' post at the top with suggestions on how to reduce the impact of getting SPAMed.

Past issues of John Mlade's [BioInspire](#) magazine are posted on ThinkCycle. BioInspire will be migrated to TypePad shortly.

Contributions of clippings, resources and events are greatly appreciated! Please see the note at the top of each Weblog for instructions.

Thanks, Norbert Hoeller

The Biomimicry Institute has opened applications for the new 2-Year Certificate Program in Biomimicry that will begin May 2008. The program is designed to give attendees the skills necessary to become practicing biomimics. The course will be taught by a suite of experts, led by Dr. Dayna Baumeister, co-founder of the Biomimicry Guild, in the fields of biomimicry and sustainability with several guest lectures by prominent, world-renowned visionaries in the fields of sustainability, green business, green chemistry, ecological design, and more. The application process is now open and applications are due December 21, 2007.

You can learn more and download applications at <http://biomimicryinstitute.org/education/certificate/>.