BioInspired!

Volume 4, Issue 4
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The Biomimicry Institute

Special "Biologists at the Design Table" Edition

Continuing a trend started with the Gathering III Edition and the Special Costa Rica Workshop Edition, this issue includes a wide range of articles by Hilary Staples, Ian Clarke, Daron Byerly, Denise DeLuca and Gauthier Chapelle on the July 22-27 Biologists at the Design Table (BaDT) Workshop. A theme that runs through the articles is the power of collaboration when designers and biologists are able to work together on a problem, breaking down the barriers between disciplines that inhibit knowledge transfer.

Collaboration requires the jostle of ideas, opinions and experience – although successful collaboration can be done remotely, nothing beats the immediacy of face-to-face meetings. Curt McNamara provides hints and tips for initiating and maintaining study groups. Following that is the second installment of "Biomimetic Green Chemistry in Nepal" by Mark Dorfman, completing the article started in the September issue. John Mlade, another regular contributor, talks about the BioFeedback system, requests he has received for information about biomimicry education, and his project to build a comprehensive education resource database. Closing this issue is information about the 2007 Biomimicry workshops, the Calendar of Events, and a job posting for the Biomimicry Institute.

Best wishes for the Holiday Season!
Norbert Hoeller

Inside This Issue:

Highlights of the 2006 BaDT Workshop

I first heard Janine speak at Bioneers about six years ago. I became very excited by the hopeful message of Biomimicry. At the time I was teaching high school biology and environmental sciences in advanced (college level) grade 11 and 12 courses. Biomimicry provided me with "good news" stories and a new way of thinking about problems for my students. Since then, I completed my Masters thesis and developed a Biomimicry curriculum that integrated Biomimicry into existing lesson plans.

I had the pleasure of attending the 2006 "Biologists at the Design Table" (BaDT) workshop at the Theodore Roosevelt Memorial Ranch. The location was fabulous – the education center is a self-contained unit outfitted with numerous artefacts as well as research tools such as microscopes. It is located in the foothills of the Rocky Mountains near Dupuyer, Montana, well away from distractions. The Ranch has a rich history and association with sustainability. Theodore Roosevelt founded the Boone and Crockett Club in 1887 to support programs that conserved natural wildlife resources. The Ranch was originally a working cattle farm, purchased by the Club in 1985 for its prime location near thousands of acres of national forest and wilderness. The Ranch is dedicated to:

Highlights of the 2006 BaDT Workshop (continued)

- Demonstrating that profitable ranching can coexist with wildlife
- Supporting research by University of Montana students and faculty
- Developing and delivering curricula focused on conservation for K-12 students and teachers

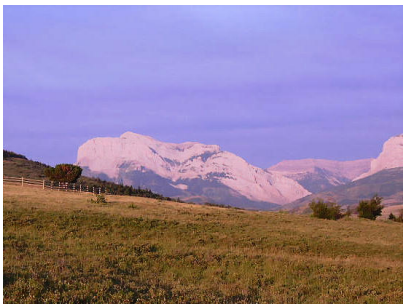
The BaDT workshop was attended by a broad range of people including teachers in biology and life sciences, designers, companies already involved in biology, and people with biology backgrounds who were trying to introduce Biomimicry into their workplace. The course was intended to give biologists the basics of Biomimicry, the ability to distil a design problem down to individual processes, a chance to brainstorm in teams on developing practical solutions, and the opportunity to develop solutions that could be proposed back to companies. As an important framework we discussed the Life's Principles, what Life does (and does not do), and the role of form, process and system in looking for inspiration from nature. Case studies were used to illustrate concepts and provide insight. In addition, Janine and Dayna provided information based on their experiences working with companies to demonstrate that biologists where indeed being invited to the design table and that this trend was gaining strength.

We found inspiration on walks on the grounds of the ranch, in books, and through brainstorming with one another. We worked on both general problems such as temperature regulation and color, as well as specific problems such as finding a solution for a company whose filters were continually clogging. For example, we explored how to make a light bulb that does not produce heat. Using the Biomimicry Methodology, we asked how nature makes light and where such a capability might be important. We explored bioluminescent organisms that were nocturnal, inhabited caves or lived in deep ocean regions. Using these organisms as a starting point, we could research the specific chemical processes and develop solutions. It was fascinating to learn about 'champion adaptors' or extremophiles such as the Australian Tiger Beetle that could run at 700mph if extrapolated to human size, or the Midge that vibrates at a high frequency that would normally destroy a living organism.

For the final project we were presented with real challenges faced by companies, such as how to retain scent in water. These group challenges required that we analyse a problem, brainstorm ideas, research solutions, and finally develop and present a concept. Along with the other exercises, this provided opportunities to practice thinking like a biomimic, using checkpoints during problem solving to evaluate 'fit', and presenting our ideas in a way that people could both understand and accept.

Hilary Staples

The Power of Collaboration



As a professor teaching basic science to art and design students at the Ontario College of Art and Design (OCAD), I am always looking for new tools that facilitate building bridges between disciplines. Having a PhD in bio-chemistry and a diploma in Fine Art (printmaking) from OCAD has led me to see my role as breaking down boundaries between disciplines that arise due to specialization or structural inhibitors. Non-scientists often feel intimated and excluded from science, not realizing that everyone does 'science' to some extent.

I was attracted to the Biologists at the Design Table workshop both for its content as well as for the mix of participants. Biological knowledge is integral in helping our society become more sustainable. Attendees at the workshop came from a broad range of institutions and fields, including environmental education, public and high school system, product design, quality control, green procurement and corporate administration. All had biology backgrounds, although many were currently working in fields unrelated to biology. Although we often accentuate the differences between researchers and practitioners, how many practitioners are 'closet scientists', and how many scientists have a passionate interest in other fields?

After learning the concepts of Biomimicry, we had the opportunity to work with designers and architects who brought real problems to the workshop. Each designer was

The Power of Collaboration (continued)

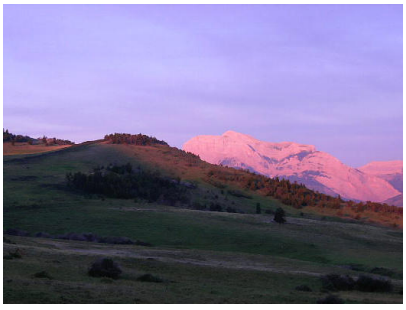
teamed up with three biologists – the teams were given an hour to restate the problem in biological terms and identify natural analogies. Some problems were amenable to concrete biological solutions, while others were more systems or organizational. I was surprised at how quickly the discussions between biologists and designers could develop ideas that had not previously been considered. Solutions were inspired both by 'champion adapters' as well as more common solutions in nature. Champion adapters are exciting to study due to their uniqueness and the extreme conditions or problems that they must overcome. On the other hand, recurrent solutions have been selected across species and time, and are typically associated with environments that relate more easily to the conditions under which our designs operate.

As part of the workshop, we explored how biologists can effectively communicate with designers who do not have a biology background. Designers tend to want concrete solutions, although there is an increasing interest in taking a systems approach to how a product is designed, manufactured, used and disposed. This parallels a re-emergence of system thinking in the sciences, with the recognition that systems cut across scales and disciplines. Biologists are good at doing research (primary literature and secondary reviews), accessing and distilling information that would normally be inaccessible to designers. Biologists at the workshop were taught tools to assist them in adapting to 'design-speak', helping bridge the language problem. An iterative approach seemed to work best: designers and biologists collaborate to understand the problem, biologists propose ideas, designers integrate the ideas into a solution, and finally the loop is completed by reviewing the solution with the biologists. Often, this generated a new set of ideas.

The workshop convinced me that the Biomimicry process can effectively transfer knowledge between biologists and practitioners in a collaborative, inter-disciplinary manner. One of the most important outcomes of these courses is that there is a greater understanding amongst biologists of the needs of designers and to educate designers that biologists can be a useful resource in their design practice. There are an increasing number of design firms that hire anthropologist and psychologists for their expertise. The Biologists at the Design Table course illustrated that in a biomimetic world it will be normal for a biologist to be working alongside a designer or architect.

Ian Clarke

BaDT::Ecotone



Amazingly, in the water, there rests a woody tree. A cluster of stilt roots fixes it to water-logged soil. Shaking off today's high tide, it is busy stabilizing the change in saline conditions through the secretion of salt at the base of each of its leaves. In addition to surviving salt water flooding, it possesses mechanisms to overcome freshwater loss, low oxygen levels, high coastal winds, and unstable nutrient availability. A natural champion of many survival skills, the mangrove tree has made its home in an ecotone.

I learned about ecotones in late July on a ranch in northwestern Montana, probably thousands of miles away from any mangrove tree An ecotone is a transition area between two distinct habitats, where the ranges of the organisms in each bordering habitat overlap, and where there are organisms unique to the transition area. The mangrove is one of those unique residents in an ecotone between land and sea, between saltwater and fresh.

While the day's discussion was about the benefits of these lively, invaluable, and robust natural habitats, I couldn't help but see that this course, Biologists at the Design Table, was about creating a lively, invaluable, and robust human ecotone. In place of 'natural habitats', substitute professions, disciplines, and other such places we reside. This course built a human ecotone between biology and industry, between nature's wisdom and modern human challenges. The organisms unique to this transition area are the biologists that foster a space for partnership and collaboration. Like any other ecotone, it was effervescing with exchange and world-premiere ideas.

BaDT::Ecotone (continued)

What makes this collaboration effective is one part process and two parts untapped wisdom. The process is to first stop and step away from the habit of overcoming our immediate hurdles with the same technologies and parameters that created them. Engineers need to put down engineering books for solutions, architects stop looking at buildings for answers, biologists pause from classification and focus on function. Next, we learned how to organize and present the off-overlooked wealth of knowledge in forests, oceans and backyards, all around us and inside of us. We shared stories about spiders that create webs that, if scaled to human dimensions, could catch and capture passenger jets, of abalone housed shell that would barely notice being run over by a car, of plants and animals that survive the seasons by freezing alive to emerge healthy and intact in the spring. These are examples of entities that have made seemingly impossible challenges part of everyday routine. This information can be devoured by designers hungry for ways to create products inspired by and in harmony with our world. A biologist residing in such an ecotone asks the question, "how does nature overcome this type of challenge?"

Collaboration in this new ecotone is exciting. Biologists and designers were buzzing, telling stories, creating solutions, and brewing ideas. One thing was clear to all: the natural world is an experienced, invaluable teacher. Thank you, Janine, Dayna and the Biomimicry Institute, for creating this collaborative space.

Daron Byerly

A Designer's Perspective

As we chatted during our drive to the ranch, Chris Allen and I kept interrupting one another to point out highlights of the stunning scenery as it unfolded all around us. Even as we became distracted while searching for the directions to the ranch and wondering if our rental car would bottom out over the back roads, I couldn't help but feel a sense of excitement seep in as we approached the front range. My sense of excitement about BaDT and meeting with the biologists, Janine, Dayna, Rose, and the other designers was building as I walked toward the main ranch house. By the time I opened the front door I think I anticipated some sort of amazing energy to flow out and envelop me. What I found, however, was a group of semi-frazzled yet smiling students and support staff that had obviously been worked hard for several days and a set of designers that were not exactly sure what they were supposed to be doing. But within moments the designers were all warmly welcomed and we started in on what was a tremendously energizing – and entertaining – couple of days.

Although I had read the book and heard both Dayna and Janine give their inspiring Biomimicry presentations, I was still fascinated and captivated by what I heard. Each conversation, presentation, and discussion set off a burst of new ideas and questions. The presentation on patterns got me thinking about edges, edge-focused design, and the incredible beauty that is found at the interface of nature and math. A comment by one of the designers that "there are lots of great ideas out there, but they are of no value unless they relieve someone's pain point" got me thinking about why so many great "sustainable solutions" don't seem to take hold. Even the ice breaker activity (which I thought was great) yielded some incredibly creative yet potentially practical solutions that got me thinking about how we communicate and share information.

When we finally got to present the biologists with a design challenge, I found myself immediately challenged by the biologists to stick to the Biomimicry Method and identify the real challenge. That in itself was a great eye opener for me and set off another burst of thoughts – how often in engineering do we take sufficient time to identify the real challenge before we start generating solutions? As the biologist discussed natural models and strategies, I thought about how limited engineers are when they are confined to

A Designer's Perspective (continued)

using the standard set of tools they are given in school. As biomimetic solutions emerged, I began to think about what engineering Quality Assurance/Quality Control protocol would look like if they incorporated a spot check on life's principles.

As a designer, BaDT was all too short – there were more questions to ask, more biologists to meet! Alas, after finishing our small groups and another fabulous meal it was time to leave, but I left BaDT inspired, challenged, and hopeful.

Thanks to all of the workshop participants and organizers – I look forward to crossing paths and sharing ideas again with each of you.

Denise DeLuca

A Biologist's Perspective

Three days of training, and here they come: the designers. We were supposed to be ready to address their challenges and propose back to them, fast, as many ideas as possible inspired by living organisms to tackle their problems.

Three biologists together and the fascinating power of combining brain's outputs: to my surprise, we just could not stop talking - one after another, the ideas tumbled out, fuelled by the previous proposals. Even if it was only the first stage of what a "BaDT" should be able to accomplish, I was impressed by how much Janine and Dayna had managed to infuse us with the methodology they designed; I was amazed to discover how much all the things I had learned and all the trees, birds, cetaceans or crustaceans I had looked at as a naturalist could bring valuable insights in trying to solve seemingly unrelated problems.

For the last 20 years, Lynn Margulis's hypothesis has been widely accepted: mitochondria (the "power plants" in our cells), and chloroplasts (support photosynthesis in every green plant), are former bacteria which invaded early eukaryotes. Instead of killing their hosts or being rejected by them, they gradually established a win-win bond and a reciprocal dependence with the cells they were living in.

This ubiquitous relationship is named endosymbiosis. I would have never ever imagined it could provide such an inspiring model… to tackle the vandalism found in some urban communities and proposed as a challenge by Carl. In brief, to avoid being "killed" by the "invaders", don't "reject" them: establish a "win-win bond and reciprocal dependence"!

From a naturalist background, I was trained as an agricultural engineer and a biologist. Discovering Antarctica as a researcher has finished the job of raising my awareness about global change, and I have worked now for five years to inform and educate people about polar sciences, climate change, sustainable development and all the links between them. So when I discovered Biomimicry thanks to a course taught by Janine Benyus at the Schumacher College in England, it was a revelation: finally a concept opening a whole range of solutions, positive solutions, solutions which talk to our innate sense of love of nature. Another win-win way to try to move out of the doomsday rhetoric…

Just a few days before arriving in "our" wonderful ranch, I saw Al Gore's "Inconvenient Truth" in New York. This gave an additional feeling of hope and excitement to the other "big" surprise for me: beside the neat examples I already knew, from the kingfisher high speed train to the termite mound social housing, Biomimicry could create major answers to the greatest challenge we face as a species and as a part of the community of living organisms: climate change. Applying the "Life Principles" taught by rain forests, coral reefs and other mature ecosystems at a country-scale would allow huge savings in carbon dioxide emissions. Think "only" about the impact of eliminating, as all these communities do, the very concept of waste, by interlinking and creating loops between our main economic activities. Add the "shop locally" recipe, and you're up for massive cuts in greenhouse gases.

A Biologist's Perspective (continued)

And if reducing the emissions seems not enough, don't worry. Biomimicry also proposes biological models to directly "suck" CO2 from the atmosphere like plants, or through water like mollusks building their shells, or corals building their skeleton. This last possibility allows to dream even further: why not make the carbon fixed as calcium carbonate the ultimate building material? Why not use it for the dams which we will have to build to protect low-lying lands from the inescapable sea-level rise? Why not create a whole carbon dioxide based economy while reconnecting people with Nature? Wow! Let's get to work!

Gauthier Chapelle

Seeding and Growing Expertise

Professionals accumulate books relevant to their work, yet often can't find the time to dive in and learn the contents. For designers, biomimicry is one such topic. There is a wealth of information available and folks are keen to find others interested in the topic. In other words, there is information and an energy flux. How can we help people self-organize within this space?

Designers move by diffusion and attraction in their professional networks, yet they need a way to broadcast their interests and form into a study group. In Minnesota, we have formed and run a number of groups, some of which have been active for over a decade. Currently we have an 'innovation' group that is studying Biomimicry and TRIZ. For a kick-off event we rented the CBC "The Nature of Things" video. The group has used sample problems from TRIZ (or TIPS – Theory of Inventive Problem Solving) as a way to practice biomimicry. For example, how can we separate sand from shoes at the beach edge? How do organisms solve this problem? Lately we have started to tackle real-life problems such as a more efficient and effective blood pressure sensor.

We have found that people join study groups for a range of reasons. Some feel that they are not using their full capabilities at work, others miss the intellectual stimulation they experienced in college but are not in a position to go back for a higher degree. Others want to expand their knowledge, build contacts, or gain a better understanding of an industry. A study group can attract a range of participants, both in terms of their background as well as how deep they want to explore a subject. Although diversity is an asset, it is not as important as enthusiasm and experience. The best groups have both senior and junior designers talking to one another.

There are numerous ways of publicizing a study group. Many industry associations, such as IEEE, have branches or sections that publish a regular newsletter. Professional associations can send notices to members. Government agencies are another possibility. Personal networks can also be effective in getting out the word. Initial group size can be from a dozen to as many as 40. Most groups shrink to half their initial size and often experience up to 20% turnover on a yearly basis. Typically, from 6 to 12 people will attend meetings, depending on the topic.

It is important to be very specific about what the group expects to accomplish, the location and schedule. A pointer to a book or article that captures the focus area can act as an 'anchor' and help potential participants determine if the group is a good 'fit'. A topic that lends itself to regular opportunities for individual research or exercises can help develop momentum.

'Seeding and Growing Expertise (continued)

To start, the leader has to pick a date, time, and location. Over time we have found that weekday lunches are the easiest, and picking a central location is more important than the food that is served. Having a quiet corner is important. Some restaurants have a room that can be reserved, depending on the numbers.

To keep study groups going, it is important to keep the subject matter fresh. As groups delve deeper into a subject, it becomes increasingly difficult to attract new talent. Regularly change the topic and re-publish the study group notice through the channels mentioned above. Spin off sub-groups to explore areas that the larger group may not find sufficiently compelling. Sometimes, it will be necessary to take a step back, find a new angle or topic, or search for invigorating material. One group investigating complexity and self-organization started to explore modelling tools and is now looking for a client who might gain practical value from the group's efforts. The life of a study group is cyclical, shifting between convergence and divergence, and between the abstract and the practical.

The role of the study group organizer is to be "the guide on the side, not the sage on the stage". The organizer may initiate an idea or topic, but does not take a strong position, instead letting the group evolve. The organizer needs to be a resource person, identifying books, articles and websites that expand the thinking of the group. Housekeeping is another key role: scheduling, meeting logistics and contacting people. Depending on the group's participants, the organizer may also play a synthesizing role, capturing the key points from a meeting and identifying common ground. If the group is becoming overly narrow, the organizer can help guide the group to a new topic, bringing in new ideas or members who can invigorate the group.

Study groups can be a powerful means of gaining deep insight into a field of study and providing an opportunity for multi-disciplinary collaboration to develop and flourish.

Curt McNamara

'Triggering Self-Assembly of Biomimetic Green Chemistry in Nepal (Part 2)

The first part of this article (published in the September 2006 BioInspired! Newsletter) touched on the geography and economy of Nepal, specifically the Kathmandu Valley. It described the transition from tradition industries to more modern methods that have dramatically increased air and water pollution.

Science education in Nepal has advanced to the point where computer presentation technology is the norm, so I was able to utilize pictures and diagrams compiled into a PowerPoint slides show (free to download at http://www.biomimic.us). The workshops opened with a display of common items I purchased from local markets (cleaning products, adhesives, plastic and foam items, insecticides, medicines, synthetic fabrics, etc.) while the slide projected in the background read: "There's no such thing as a free lunch." (i.e. these products do not simply appear on the shelves or completely disappear when their useful lives are through). A series of slides describe, with real life examples and data, how the manufacture, use, and disposal of many common home and office products pose public health risks and environmental hazards through exposures to industrial chemicals – some of which, such as PCBs and mercury, have made their way into every corner of the globe, from once pristine arctic snows to human breast milk.

The known and (and as yet unknown) risks associated with industrial chemical exposure gave rise to the 12 Green Chemistry Principles (http://greenchemistryinstitute.org) designed is to create an industrial society in sync with nature as ever-increasing and advancing populations demand the fruits of the chemical industry.

What better model of sustainable industrial chemistry than the very chemical planet on which we live? Through a series of about 20 slides, I show that chemistry is by no means a stranger to Mother Nature, and that in fact she has been practicing highly sophisticated and low-impact chemistries for hundreds of millions of years. Prior to presenting this section of slides, I asked the students to note down which

Green Chemistry in Nepal (continued)


students attending the biomimicry / green chemistry workshop

characteristics appear to be common to all of nature's chemistries. At each workshop they consistently identified the important ones (self-assembly, protein-mediated, water-based, non toxic/renewable feedstocks, hierarchical "bottom-up" structures, biodegradable end-products, and ambient temperatures and pressures). These bright young students really get it!

The workshops closed with a discussion of ideas as to how scientists residing in Nepal could contribute to, and participate in, the emerging sciences of green chemistry and biomimicry. While it is unlikely that there will be sophisticated laboratories in Nepal any time soon, I present several suggestions leveraging computer and Internet capabilities that exist now in Nepal. Just as India has made itself the center for out-sourcing software engineering expertise, Nepal could set the stage for being sought after for advancing biomimetic solutions for the chemical sector. For example, by proactively building a database of cutting edge information on natural chemistries – in the language of chemists and chemical engineers – scientists in Nepal could one day provide affordable expertise for chemical industry managers, chemists, and chemical engineers around the world looking to find solutions to specific industrial problems.

I continue to get email requests from students and teachers for more information on green chemistry and biomimicry. I hope to make a follow-up visit in Spring/2007.

Mark H. Dorfman

Request for Biomimicry Courses and Degree Programs

As the person who responds to Biofeedback, I get an insider's look at the global "State of Biomimicry". Biofeedback is the community question and comment section on the Biomimicry website. It is the place where, from remote ether-land and connected only via my laptop at a coffee shop, I am able to read tips on innovative emerging research, praise on Janine's recent presentations in Australia, and messages filled with hope for sustainable design submitted by people across the globe. I plan to continue this column as a series of pieces organized around common biofeedback requests.

With all the activity that Biofeedback generates, it is no surprise that it yields regular requests for educational and research opportunities. It is encouraging to receive these requests from future university students. It is today's students who, guided by their mentors, will mainstream biomimicry, and with it, sustainable design as the dominant design paradigm in our culture. As echoed in previous newsletters and by the efforts of Biomimicry Community members working on educational initiatives, expanding educational programs is paramount and must be nurtured and supported.

Just a few years ago, it was common for biomimicry only to serve as a single topic in a class syllabus. Now, entire courses are being developed. As these courses continue to evolve and grow in number, their impact will increase and provide the impetus for yet additional courses. Many dedicated biomimics in academia are developing curricula and even beginning to propose "biomimicry degree programs" among international biomimicry research institutes.

The depth and breath of these courses vary depending on the research work of the instructor, availability of local resources, and the goal of the course – largely determined by the department or degree program that it is part of. Some courses emphasize the study of biological mechanisms that one day may inform design, such as sensors or locomotion. Other courses are geared around specific engineering challenges that can potentially be informed by nature and result in student research and design projects. Yet other courses, like the one I developed and instructed at Colorado State University in 2003, take a more broad look at the philosophy of biomimicry, implementing major principles and the methods of innovation through which one can implement biomimicry in design.

All of these approaches to instructing biomimicry are valid and help students understand and apply related concepts no matter what their main course of study. The diversity of programs is critical to meet the evolving interests of students and inspire them to explore the discipline. Disseminating information about courses and areas of study generates

Request for Biomimicry Courses and Degree Programs (continued)

student interest (which BioFeedback suggests is booming the world over), which in turn justifies not only the continuation of biomimicry-related coursework, but the future development of biomimicry degree programs.

The Biomimicry Institute has been preparing a list of universities that offer biomimicry degree programs or have biomimicry-related courses for the Biomimicry website. We are also compiling biomimicry-related thesis papers which will be posted with the approval of the authors. Recently, students have described research goals as diverse as applying biomimicry to interior design and architecture, applying the principles to manufacturing techniques, and even community design. The plan is to make the Biomimicry website a place where interested or inspired individuals go to explore the basics of Biomimicry, learn about where they can study biomimicry, and find potential topics and resources for current research endeavors.

We would like your assistance to make the lists of university coursework and graduate research as complete as possible. Please share information on courses that are being taught around topics of biomimicry or students that are working on advanced degree programs who have chosen to pursue a biomimicry-related topic for their graduate research. The listing will serve as a resource to current and future students and instructors, promoting and celebrating biomimicry as a formal discipline. You can contact me by clicking on my name in the Adobe Reader (PDF) file.

John Mlade.

Calling all Biologists! The 2007 Biologists at the Design Table Workshop

The fourth BaDT Workshop is planned for May 23-29, 2007 at the Theodore Roosevelt Memorial Ranch in Dupuyer, Montana. Led by Janine Benyus, author of *Biomimicry: Innovation Inspired by Nature*, and Dayna Baumeister, PhD, this five-day intensive course trains biologists interested in applying biomimicry to design.

Students will have an opportunity to learn the key concepts of Biomimicry through hands-on exercises with other biologists, engineers, designers and managers. They will take home:

- "A sense of possibility, because sustainable models already exist ... right outside!
- A proven method for bringing nature's ideas to the design table
- Tools and expert contacts for further explorations
- A whole new way of viewing and valuing the genius that surrounds us"

All applications must be received by April 11th. Please see http://biomimicryinstitute.org/edu-badt.htm for additional information, or contact me directly.

Bryony Schwan
Executive Director,
The Biomimicry Institute
406-728-4134

Calendar of Public Events

Date	Location	Event
Dec. 17-20	Kunming, China	Conference on Robotics and Biomimetics
Jan. 30-31, 2007	San Francisco, California	AIA/COTE Biomimicry for a Sustainable Built Environment (Kira Gould at 617-867-0032)

Date	Location	Event
Mar. 31 – Apr, 4 2007	Glasgow, Scotland	Biomimetics and Biomechanics (Society for Experimental Biology)
May 23-29, 2007	Dupuyer, Montana	Biologists at the Design Table

"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

BioInspired! is published quarterly and is posted on a public-access Weblog hosted by TypePad. For those of you familiar with RSS Readers, TypePad supports various feed formats (look for the *Subscribe to this blog's feed* link in the right navigator).

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, or of you have any feedback or comments, please drop me a note.

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 contains short articles on issues relating to Biomimicry.
- Resources contains pointers to more extensive information.
- Events covers workshops and relevant conferences.

These Weblogs can be viewed 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

Biomimicry Institute Job Openings

The Biomimicry Institute has a job opening for a Director of Education. Please see the downloadable job description for information on where to send applications.

All applications must be received by December 22nd, 2006.

Biomimicry Institute
406-728-4134