



Special Gathering III Edition!

The third Gathering of the Biomimicry community was held at the Blacktail Ranch (Montana) on June 3-6, 2004. Thirty of us had the privilege of meeting in a truly exceptional place, to discuss the current state of Biomimicry and plan future directions. Equally important, it gave us the opportunity to know each other better, re-energize and refocus.

The [Blacktail Ranch](#) “is an 8,000 acre jewel, located at the base of the Continental Divide, where the Rockies meet the prairie. The South Fork of the Dearborn River flows through the center of the ranch feeding rich meadows and deep, lush aspen groves. Above the riverbed unspoiled acres of pine and fir roll into broad fields of native grasses and wildflowers.” The history of the location as a



traditional meeting ground (a cave system revealed artifacts believed to date back to the Ice Age), its natural beauty and the excellent food made it a perfect venue. ‘Hats off’ to Catherine, Dayna, Janine and Thomas for orchestrating the event!



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The first Biomimicry Gathering was held at Patagonia, Arizona, in 1998, a year after Janine’s book was published. At that time, there was plenty of lab research but no Biomimicry ‘practice’ among designers of products or buildings. One of the key questions at the first meeting was “How do we naturalize Biomimicry in the culture so that it becomes ‘second nature’ for solution seekers to ask nature’s advice?”. The second Gathering was held in Matfield Green (Kansas) in 2002, focusing on the K-12 initiative. The outcomes of the first two meetings were the biomimicry solutions database project, the two-hour *The Nature of Things* special on Biomimicry by the Canadian Broadcasting Corporation, and preliminary work on a K-12 curriculum with the Federal Research Lab (specializes in science education).



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Original Agenda

	FRIDAY	SATURDAY
07:30-08:30	BREAKFAST	
	Orienting to place Finding a teacher Intros and why are you here? Overview of biomimicry Ecosystem - Current niches 10 minute project reviews <ul style="list-style-type: none"> • Guild: Catherine • K-12: Emily & Jeremy E. • Database: Alexis & Jeremy F • Workshops: Dayna • Community: Norbert • Non-profit: Janine • University Ed: John C & Sue • Museum/exhibits: Dayna • Reaching biologists: Janine 	Players in the biomimicry ecosystem: Who's involved now and who might join us, fund us, teach us, etc.? Breakouts: Where should we place our energies in the next 1-3 years? What are we willing to do? How can we cooperate? Breakout Round 1 <ul style="list-style-type: none"> • Workshops • Community communications • Non-profit • Database
12:00-1:00	LUNCH	
1:00-4:30	Ranch tour Dreams of what we want to create together Responsibilities: integrity & ethics	Breakout Round 2 <ul style="list-style-type: none"> • K-12 education • Museum/exhibits • University education • Reaching biologists Visioning on breakout modules Promise letters
6:30-7:30	DINNER	
7:30-??	Afternoon discussions continue Biomimicry and TRIZ	Celebration



Highlights

The Gathering started late Thursday with introductions all around and getting settled, followed by a trek up the hillside behind the ranch to form a circle and



breathe the clean air. Dayna and Janine shared the background of the Ranch: a crossroads and meeting place for both animal and human travelers since ancient times. We then had an opportunity to share our



background, expectations, and connections with other participants of the Gathering. The temperature dropped rapidly as the sun set - the nearby Hogan provided both warmth and a dry place to sit.

Friday morning, Janine reviewed the tremendous progress in the development of Biomimicry over the past 7 years. Biomimicry is now a recognized research discipline as well as an established practice, thanks to dozens of Biomimicry workshops and lectures. Through the *Biomimicry at the Design Table* initiative, we are also seeing the beginnings of a new career for biologists based on a functional view of biology - a welcome antidote to the microbiology and genome trend.



There is a lot of 'buzz' about Biomimicry in the media, sustainability conferences, and other venues. The official theme of the 2005 World Exposition in Japan is "Nature's Wisdom" and Janine consulted on the US pavilion (for an overview, see http://www.expo2005.com/expo_facts.htm). Lastly, there is a recognition that regenerative or type III systems can provide great value to understanding and changing both human systems, as well as our relationship with the environment.

To provide a background for Saturday's breakout sessions, we reviewed the status of current Biomimicry projects. One of the highlights was Jay Harman's description of his research on fluid dynamics. Jay's company, PAX Scientific, is creating commercially viable products that reduce friction by replicating the



geometries found in naturally-occurring vortex flows. Jay's team has developed a series of bio-inspired fans that move air and water with significantly less friction, turbulence, power consumption, and noise. A recent breakthrough is a car radiator fan that cools better at significantly less power, improving fuel efficiency and also reducing the every-increasing load on car batteries. Although PAX Scientific holds a large number of global patents, it will ultimately make its technology available to developing countries through a foundation.



After lunch, we were regaled by Tag Rittel at the Ranch Museum about the history of the Ranch as well as his discovery of an



extensive cave system containing animal remains and human artifacts. Research suggests that the cave was inhabited as far back as the last Ice Age. We had a chance to explore the caves and marvel at nature's sculpture..



Unfortunately for those riding in the back of the truck on the return journey from the caves, the skies opened up and poured. Once everyone got dried off, we got down to exploring both our fears and hopes for Biomimicry (referenced in Janine's article on page 14). Saturday was dedicated to breakout sessions, some of which are described below. At the end of the day, we were encouraged to write 6 and 12 month 'promise letters'. I am sure receiving the letters from Dayna will remind us of what we have accomplished, and inspire us to continue striving.

Selected pictures of the event can be viewed at:

- <http://www.photoaccess.com/share/guest.jsp?ID=A274082AAE5&cb=PA>
- <http://home.primus.ca/~nhoeller/gathering/pictures/>

Norbert Hoeller: nhoeller@primus.ca





Breakout Sessions

Workshops (Dayna Baumeister)

Team: Dayna Baumeister (facilitator), David Hammond, Jeremy Faludi, Derek Esposito, Elizabeth Powers, Laura Poulton, Nina Maclean, Monica Harry, Norbert Hoeller (scribe)

This breakout session focused on improving workshops (100 or less participants) to facilitate education and commercial success of Biomimicry by reaching out to more people and groups, improving efficiency and effectiveness, and providing employment for Biomimicry professionals. Inhibitors include difficulties filling courses (need for improved marketing), preparation and packaging (i.e. workbooks), the high cost of workshop logistics, and a shortage of presenters.

Today, three types of workshops are held:

- standard workshops primarily focused on the 'built environment professionals'
- custom workshops developed at client request
- the first Biologists at the Design Table, reaching out to biologists

Future workshops need to attract new 'users' of Biomimicry information (e.g. industrial designers, pharmacologists, agronomists and organizational/business management experts) as well as new 'suppliers' (e.g. illustrators, biologists trained in functional analysis). A range of courses needs to be developed, including public lectures, half-day customized overview courses for companies, two-day courses sponsored by professional associations, and one week intensive courses.

Various options for increasing the number of presenters were analyzed, including direct training (current model) and 'Teach the Teachers' formats (in-house and subcontract staff, existing training organizations, independent/certified trainers, licensing program). Factors considered:

- degree of control (to maintain scientific rigor)
- degree of logistics and support from Biomimicry Guild
- potential profitability
- growth potential

The format of a one to two week intensive course was sketched out using a team-teaching approach combining a biologist with someone skilled in organization, facilitation and the practice of teaching Biomimicry. Some form of



evaluation was considered valuable to guide students, as well as an apprenticeship model to improve quality and build a community. Although there are no plans to certify Biomimicry practitioners, certification for presenting to specific groups (public, high school students, college students, corporations) was discussed.

Funding models were discussed, from one-time course fees, percentage of profits from ideas generated through workshops, and licensing of Biomimicry ideas.

Dayna Baumeister: daynab@biomimicry.net



Biomimicry Database (Alexis Karolides/Jeremy Faludi)

Participants: Jeremy Faludi (facilitator/scribe), Alexis Karolides, Mark Dorfman, Norbert Hoeller, Sue Redding, Kathleen O'Brien, John Glover, John Reap, Nina Maclean, Mary Hansel, David Oakey, John Carmody

The objective of this session was to decide on the best target users and uses of the database as well as to brainstorm on new users and uses. Taking the approach of looking at the tasks required to make the database useful even as a rough prototype, the team agreed on the importance of clarifying who the users are, how we will meet their needs, and also how we will meet the need for ongoing contributions to the database.

The team decided to rethink the short-term goals in terms of a staged 'product/service launch strategy' of the database in support of a service providing biomimicry knowledge to companies. Tasks include:

- Defining user groups that would benefit from the database, such as engineers, architects, product designers, industrial engineers, scientists, planners, strategists and patent lawyers
- Defining how the database will be used, such as brainstorming stimulation, answer lookup, directions for research, unified publication of knowledge in a field, networking between peers, finding consultants and specialists, and Intellectual Property search to determine if an idea is new and novel
- Building an ecosystem of people who will both gain from the database and support the database



- Defining models for how sufficient quality data gets added (provide incentives for academics to contribute voluntarily, work with middlemen funded through grants or corporate support, find creative ways to overcome companies wanting to treat information as proprietary)

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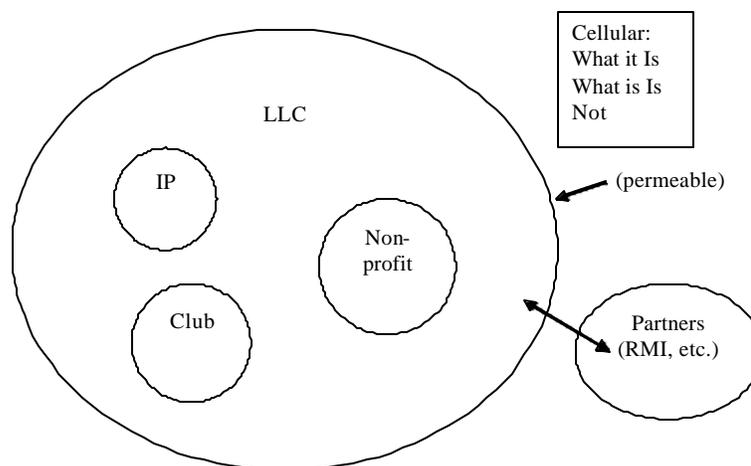


Non-Profit/Guild (Catherine Bragdon)

Participants: Catherine Bragdon (facilitator) Emily Hunter, Janine Benyus, Jay Harman, John Glover, John Mlade, Kathleen O'Brien, Onno Koelman, Mary Hansel (scribe)

This breakout session focused on the legal entities that would be part of a flow system bringing biological information into the built environment, through concurrent growth in both profit and non-profit activities. Entities discussed:

- Guild LLC: created to manage liability risk, hold confidentiality agreements
- Non-Profit: can accept donations, connect people, support education efforts, seed projects, initiate research, and fund grants
- Club: similar to a “Cousteau Society” or “Friends of the Galapagos”, with a newsletter and membership dues, allowing people interested in Biomimicry to participate by mobilizing for action and help generate funding
- Intellectual Property: trademark Biomimicry and license its use, copyrights on teaching tools, patents on tools and technologies





Since our gathering and the visualization of a non-profit entity, we have been working on clarifying the mission, goals and direction this entity might take. We have benchmarked with other non-profits and talked with potential funding sources and granting organizations. We have garnered the writing talents of Dr. Lisa McNeilley, who has a passion for this work and is assisting with the development of this plan. Some of you will be hearing from her next week (hopefully) to get your input in certain areas. We have had some success with trademarks and gained a firm understanding of the steps in the legal process with the selection of legal council in Montana.

All in all, we do not foresee a non-profit until 2005 but that only means that we are hard at work making it happen!

Catherine Bragdon: catherineb@biomimicry.net



Bridging the Gap Between Biology and Design (Dayna Baumeister)

Team: Nina, Elizabeth (scribe), John G., John R., Alexis, Laura, Sue, Ashley, Jay, Onno, Elva, David, Mark, Jeremy, Monica, Dayna (facilitator), John C., Derek, Catherine, Janine, Ana, John M.

This large group of gathering attendees discussed ways in which the gap between scientific theory and bringing a product to market may be shortened or eliminated. One of the goals mentioned for the future of biomimicry was to demonstrate more commercial successes. Judging by the positive reactions of designers to biomimicry one would think this goal should be easily achieved, yet the products are not materializing. Somewhere along the way these ideas are falling by the wayside - precisely the phenomenon this breakout session hoped to address in order to facilitate future biomimicry/designer interactions.

Stumbling blocks for biomimetic designs:

- Finding opportunities for which biological solutions are appropriate
- Lack of a support network
- Solutions require too much time, research and development, and money
- Need for continuity/perseverance



- Ability of designers/chemists/engineers to assimilate biology
- Lack of existing technologies/resources able to cater to biomimetic designs
- Ability to infiltrate existing "culture"

Possible solutions:

- Target more likely investors
- Look for visionaries (innovators and risk-takers)
- Become entrepreneurs
- Develop in-house R&D

The personal experiences of David Oakey and Jay Harman revealed that the current marketplace is a hostile environment to biomimicry, for the time being. Time and money pressures in addition to a resistance to change are working to stifle innovation. As more commercial successes are introduced in the future through perseverance and "holding their (the designers) hands a little bit longer," as David put it, the gap between science and product design may eventually become just another step along the path towards sustainability.

I have a transcription of this session that I will be incorporating into my Masters thesis. If you are interested, please contact me.

Derek Esposito: dereke@lamar.colostate.edu



Community and Communications (Norbert Hoeller)

The team of Jeremy Eddy, Mary Hansel Emily Hunter, Kathleen O'Brien, Lara Poulton and myself focused on communications within and between four groups:

- the Biomimicry LLC
- the core group (committed to Biomimicry, actively involved in projects)
- the extended group (involved in Biomimicry, supporting projects)
- the public

We defined our guiding principles, mapped the existing communication flows and listed communication needs. The most spirited discussion was on how best to engage the public through an enhanced Biomimicry website. For details, please see http://www.thinkcycle.com/tc-notes/show-note?tc_note_id=50726.



The website requirements quickly grew in scope and complexity, to the point where development and support using traditional web technologies would be prohibitively expensive. A novel approach combining a traditional web front-end with a collaboration/connection 'engine' may deliver the required functionality at lower costs. The concept is being reviewed with groups involved in web design and research in human/machine interaction. The working document is available at http://www.thinkcycle.com/tc-notes/show-note?tc_note_id=50766. See also http://www.thinkcycle.com/tc-bboard/forum?forum_id=50722 for ongoing discussions.

A distribution list of Gathering attendees has turned into a prototype 'GreenPages' website, where users can update contact information and share that information with others in a controlled manner. The functionality will eventually be integrated into the Biomimicry database.

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Upcoming Events

The ***Sustainable Resources 2004 Conference - An International Forum Connecting People with Hands-on Solutions to World Poverty*** is planned for September 27 through October 5 in Boulder, Colorado. The conference includes a "Learning from Nature" track, headed up by John Mlade. Janine Beynus, Bill McDonough and John Todd are keynote speakers for the conference. Alexis Karolides, Mark Dorfman, Dayna Baumeister and John Mlade are presenting.

Track themes include Waste Processing, Green Chemistry, Architecture and Design Process. A broad range of sessions and workshops are planned, as well as a post-conference workshop on *Biomimicry and Design* taught by Dayna Baumeister, Derek Esposito and John Mlade. For more information, please see <http://www.sustainableresources.org> (check out **2004 Program** and **Proposed Presentations**).

John Mlade: johnm@biomimicry.net





The ***SoL Forum on Business Innovation for Sustainability*** will be held in Dearborn, Michigan from October 11 to 14. Janine and Amory Lovins (amongst others) will be leading the opening plenary session, while Janine, David Oakey and Darcy Winslow (Nike) will present "Biomimicry: Learning How to Apply Life's Best Practices to Create Smarter Products". Please see <http://www.solonline.org/events/SustainabilityForum/> for more details. Specify discount code SPKR-01 to get a 10% discount when registering.

Catherine Bragdon: catherineb@biomimicry.net

Bioneers 2004 will be held between October 15 and 17 in San Rafael, California. Jay Harman opens the Friday plenary sessions with *Designing the Next Golden Age*. For more information, see <http://www.bioneers.org/conference>.

Derek will have an essay about biomimicry published in this Fall's issue of *Matter* (<http://www.matterjournal.com>) a new magazine combining literature, art, and activism.

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Janine's speaking engagements for the remainder of 2004 include:

<i>Zero Emissions 10th Anniversary World Congress</i> , Tokyo, Japan	September 16-17, 2004
<i>Health Care Design Conference</i> , Las Vegas	September 21-22, 2004
<i>Sustainable Resources 2004</i> , Boulder, Colorado	September 30, 2004
<i>The Society for Organizational Learning Forum on Business Innovation for Sustainability</i> , Dearborn, Michigan	October 12, 2004
<i>Massive Change, The Future of Global Design</i> , Vancouver Art Gallery	October 16, 2004
<i>Pop!Tech</i> , Camden, Maine	October 21-24
<i>Cooper-Hewitt Museum</i> , NYC	October 25
<i>Green Festival</i> , San Francisco	November 7
<i>National Council for Interior Design Qualification 30th Anniversary Conference</i> , Washington, DC	November 13, 2004
<i>Partners in Environmental Technology Symposium</i> , Washington, DC	November 30-Dec 1



Clippings

Iridigm Uses Interference to Create Structural Color Without Pigments (Sustainable Practices, April 3/2004) "San Francisco-Iridigm Technology produces a flat panel display inspired by the same natural phenomenon that butterflies use to create their iridescence - structural color."

[http://www.deq.state.ne.us/P2-M.nsf/0/e708327637ee8bda86256e67006c852d?](http://www.deq.state.ne.us/P2-M.nsf/0/e708327637ee8bda86256e67006c852d?OpenDocument)

[OpenDocument](#)

Plankton Cool off with Own Clouds (Amit Asaravala; Wired, July 16, 2004) Researchers at the Woods Hole Oceanographic Institute discovered that high levels of ultraviolet light caused plankton to release compounds which promote cloud formation. <http://www.wired.com/news/technology/0,1282,64239,00.html>

Resources

Recent BioInspire newsletters:

- [August 2004: "Restorer Eco-Machines"](#)
- [July 2004: "The Living Building"](#)
- [June 2004: "Places to Intervene in a System"](#)

The Biomimicry Guild Newsletters are now generally available through ThinkCycle at http://www.thinkcycle.org/tc-space/tspace?tspace_id=49344. You do not need to register with ThinkCycle to read the newsletters; however, registered ThinkCycle members can subscribe to get notified automatically of any new newsletters, and can also use the ThinkCycle discussion group. A ThinkCycle Quickstart guide (requires Adobe Reader) is available at:

http://www.thinkcycle.org/tc-notes/show-note?tc_note_id=41609.

Norbert Hoeller: nhoeller@primus.ca



Personal Perspectives: Mark Dorfman

I came to the Biomimicry Guild gathering in Montana not knowing exactly what to expect but thinking at the very least, I'd finally get to meet Janine in person, get a better sense of the what she and Dayna are up to (especially the type of biomimicry work they're paid to do), and breathe some clean Rocky Mountain air. What I didn't anticipate was coming away with an overwhelming sense of camaraderie amongst a group of such extraordinarily creative, friendly, dedicated, diverse, and fun people and a palpable feeling that the momentum is building towards the next big industrial revolution.

To give you an idea of how captivating the weekend was for me, I never even made it up to the top of the nearest hill to get a view of the strikingly beautiful terrain! This is particularly noteworthy because I always make it a point to acknowledge and experience my surroundings whenever I have an opportunity to travel to a new place. When I left Manhattan, I was kvelling (as my Yiddisha grandmother would have said) at the thought of drinking in the magnificent Montana mountains with all my senses, but the weekend was so chocked-full of interesting, worthwhile, and provocative conversation that I just never broke myself away.

Unfortunately, my "day job" beckoned me to leave Montana relatively quickly and turn my attention away from biomimicry for the subsequent two months. Now that I have some time to turn my attention back to it, I'll prepare a presentation for the Sustainable Resources conference in Boulder, Colorado this September. My presentation will profile the chemical industry's impact on the environment and public health, and describe the potential for biomimicry to "evolutionize" the industry into one that supplies us with more effective products yet has a much softer footprint on the planet.

Mark Dorfman: markhdorfman@yahoo.com





Gathering Thanks: Janine Benyus

Biomimicry III was one high note held for an astounding 48 hours. The landscape was luminous, the dialogue was from the heart, and the work was intense and generous. When it came time to dream, our scribes had to write up, down, and around the edges of huge whiteboards to capture the group's creative outpourings. The record goes to the Community and Communications group: 3 whiteboards covered in tiny handwriting in less than half an hour - a real feat at the end of a four-session day.

I especially loved the laughter in the dining hall - a familiarity (and decibel level) rarely reached by strangers. But as our first night's stories revealed, we'd been cycling toward one another for a while. Our attraction to the same meme spun us to this ranch in Montana, where we could compare notes on the practice of biomimicry and co-create the discipline's next three years. Judging by the mirth meter, the people in that dining hall will find a way to work together again - which was the gathering's true purpose.

In the early days of biomimicry, we had projects, but didn't know enough people to champion those projects. Now we know great people, and more importantly, they know each other. This allowed us to brainstorm the third stage - the creation of formal entities that will give us a way to interact with the larger world. Three proposed institutional "skins" - a research institute, a friends-of organization, and the already established LLC - should provide biomimicry with lots of surface area for new people to find us and exchange nutrients and knowledge with us. Good thing the ranch is 8,000 acres; we'll need it for the next gathering!

We also did some values sounding, agreeing that we should be known for inclusiveness, scientific accuracy, and a focus on innovations that enhance Life above all else. That includes our own lives, so we brainstormed about how to make a living in biomimicry. We agreed it's time to create economic niches for bio-inspired designers, biologists at the design table, bio-design faculty, etc. It's time to reach out to more biologists, and to bring biology-taught-functionally to more students in the design professions. We realized that our database has to be more about matchmaking people than serving up information. And we decided not to wait for someone else to innovate, but to midwife sustainable products ourselves through a bio-inspired research group. Finally, we pledged to give

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thanks to the organisms that teach us, by finding a way to direct royalties to conserve the habitats of the bio-muses. (And if you don't have a tux, you'll need to rent one for the world's first Nobel-like prize for organisms that inspire us!)

As we said good-bye, one of the ranch staff asked me why all these people decided to "come all the way out here." I tried to answer, but looking around at those beaming faces, I just said "It has something to do with love." Thanks again to Norbert and Dayna for setting this up so deftly, and to all of you, for taking the time of your lives to be at the Gathering. It felt better than I can express to be in your midst.

Janine Benyus: benyus@montana.com

