BY NANCY ZIMMERMAN

O Bioneers!

Connecting a new model of ecology, design, and activism

Listen to the rousing cheers that fill the auditorium as Kenny Ausubel and Nina Simons take the stage to launch the annual Bioneers conference in San Rafael, California, and you might assume that the gathering is just another conclave of do-gooders preaching peace, love, and eco-activism to the converted. But Ausubel and Simons—whose Lamy, New Mexico, organization convenes pioneering scientists, businesspeople, farmers, artists, and assorted activists to share success stories about solving global problems—are decidedly not gurus. Plainspoken and pragmatic, they eschew the platitudes often associated with a goal as high-minded as saving the world, and they take pains to avoid turning Bioneers into a cult of personality.

"It's easy to slip into New Age jargon when you're talking about things like the interconnectivity of all living beings," concedes Ausubel, "but we're really not interested in trendy rhetoric. We only care about results."

By "results," Ausubel means the many ways that individuals and groups the world over are finding workable solutions to the problems threatening our planet: climate change, food shortages, social injustice, dwindling energy resources, environmental toxins, economic decay. "People struggling to make a difference often feel discouraged by the magnitude of the problems we face, which can seem insurmountable," adds Simons. "But in fact, there are countless people around the world working to devise solutions. They're just not necessarily aware that they're part of a larger movement."

The couple co-founded Bioneers in 1990 to bring form and cohesion to that larger movement by providing a platform for disseminating information about all the work being done and breakthroughs being achieved. "The key is connectivity, whether you're talking about individual organisms, ecosystems, economics, or even society and humanity in general," says Ausubel.

Bioneers began as an outgrowth of Seeds of Change, the company Ausubel co-founded with botanist and master gardener Gabriel Howearth. That company, he says, "was dedicated to bringing back biodiversity through the preservation and distribution of native and heirloom seeds. I was inspired to work with nature to heal nature, putting the earth's innate healing capacity to work to restore itself."

Ausubel believes that ecology is really the art of relationships. "As in nature, so with people," he says. "Connectivity is what builds resilience, which ensures survival. Building that connectivity among people is part of the Bioneers mission." >

DYMAXION "2" 4D TRANSPORT COURTESY OF THE NATIONAL AUTOMOBILE MUSEUM (THE HARRAH COLLECTION), RENO, NEVADA

The Dymaxion "2" 4D transport got 30 miles per gallon, could carry 11 passengers at 120 miles per hour, and was intended to fly. Background: The Dymaxion house (designed in 1934) by visionary Buckminster Fuller was a commercial flop but a precocious idea for mass-produced, green housing whose circular metal structure, anchored by a vertical stainless-steel strut, naturally heated and cooled. Dymaxion houses theoretically could be moved anywhere, dropped by helicopter, and were to be priced like cars—for consumers to pay off over five years. Fuller built only one Dymaxion house, in Wichita, Kansas, in 1946. Buckminster Fuller: Starting with the Universe can be seen at the Whitney Museum of American Art through September 21.

> "If you want to look for things to be done in a better way, you've got to look for who's the best teacher, who's done it best. Well, nature's done it best."
>
> —Jay Harman, PAX Scientific

Another key to finding **enduring** solutions, says Simons, is mindfulness. "So much of the way we live is based on the stories we tell ourselves and how we frame our situation based on those stories," she explains. "Innovation requires us to go against the messaging of our culture. We're hardwired for storytelling—so, change the story and you can change everything."

Restaurateur Judy Wicks, owner of the White Dog Cafe in Philadelphia and a frequent speaker at Bioneers conferences, set out to change the narrative that says to be successful, a business must focus on profit margins rather than on human values. In 1983 she founded the restaurant, which was committed to paying employees a living wage and serving nutritious, organic food sourced from local suppliers who practiced **sustainable** farming. Probably the world's only restaurant with its own foreign policy, the White Dog Cafe has initiated educational and community-building programs. A mentoring program provides inner-city high school students with internships at the cafe. White Dog also pursues issues like economic justice, global fair trade, and social change through the arts, among other avenues, and has spearheaded specific campaigns, such as Businesses for Ethical Trade and Human Rights in Chiapas, Mexico. Wicks's Table for Six Billion, Please! is her initiative to promote better understanding by forming alliances with half a dozen restaurants around the world, from Cuba to Lithuania to Vietnam, to spread the philosophy of sustainability. She employs more than 100 people and grosses approximately $5 million annually, ably exemplifying the concept of "doing well by doing good."

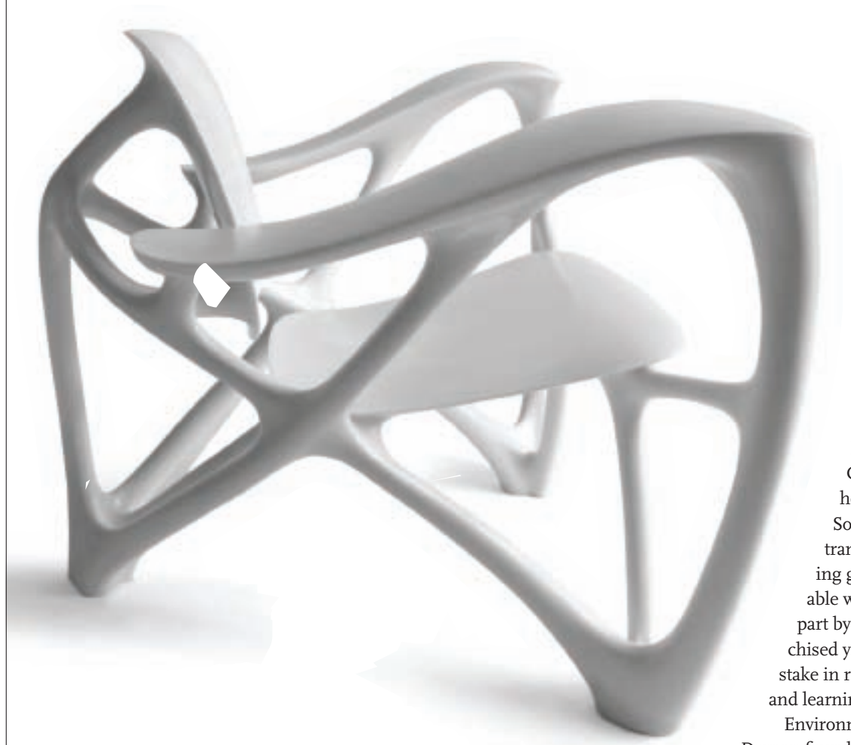
The same **mindfulness** and appreciation of connectivity that led Wicks to manifest a better way of doing business also have a role in functions of industrial design and architecture that are being reimagined around the world. "These disciplines are not separate from nature," points out Ausubel, "and by looking to nature for inspiration, [their creators] can deliver meaningful innovations."

He cites the bullet train in Japan, whose initial aerodynamic design, while whimsically futuristic, produced sonic booms each time the train entered a tunnel. Engineers looked for a creature that similarly moved from a lighter environment to a denser one to model a new approach; they found the kingfisher, a bird that makes lightning-quick dives into the water to nab its prey. By redesigning the train's nose to more closely resemble that of the kingfisher, the scientists were able to eliminate the sonic boom while retaining the train's capacity for high speed.

Also outstanding in the area of industrial design is the work of Jay Harman, president and CEO of PAX Scientific, a San Rafael engineering, research, and development firm specializing in solving industrial problems. The PAX Streamlining Principle translates nature's flow efficiencies into streamlined design geometries that can improve the performance, output, and energy use of a number of technologies. The company's "Lily impeller," for instance, is a new kind of propeller that lowers **energy** requirements in fans and other rotors by 10 percent to 85 percent while reducing noise by up to 75 percent. *continued on page 82*

CLOCKWISE FROM TOP: SARA STATHAS; GETTY IMAGES; STUDIO LIBERTINY

Clockwise from top: Nina Simons (at left) and Kenny Ausubel formed Bioneers in 1990 to provide a platform for problem-solvers involved in conceptualizing how solutions found in nature can be models for society. The first designs in Japan for the time- and energy-saving bullet train created sonic booms; Japanese engineers redesigned the nose to resemble that of a kingfisher and eliminated the problem. Bees sculpted this vase-shaped hive, *With a Little Help of the Bees* prototype, shown by Studio Libertiny, the Netherlands, at MOMA's Design and the Elastic Mind exhibit earlier this year. Tomás Gabzdil Libertiny considers bees' work of hive-building akin to making a scaffolding, layer by layer, and hails the bees' method as "slow prototyping," an antidote to rapid manufacturing processes.



Art and Minds

Critics, artists, and viewers tend to get hotly divided about whether art can (or should) really try to change minds or save lives. Yet a new movement has arisen in recent years toward, for want of a better term, "ecological art," a practice that sees art as an arena for interconnectedness to be explored, experimented with, and refined. If much art of the late 20th century grew detached and interiorized, today's eco-artists are challenging the notion that detachment is desirable in art. As they integrate their work with political action and social issues, they broaden ecological art to include an overtly activist component.

Some examples are public art projects that use an artistic approach to solving environmental and economic problems, such as Majora Carter's work through her nonprofit, Sustainable South Bronx. That group transformed a toxic dumping ground into a sustainable waterfront park built in part by formerly disenfranchised young people who had a stake in reviving their community and learning a trade in the process.

Environmental artist Betsy Damon founded Keepers of the Waters, an organization whose mission is "to inspire and promote projects that combine art, science, and community involvement to restore, preserve, and remediate water sources." Her Living Water Garden, a public park in Chengdu, China, is centered by a water feature of sculptural flow forms made of black marble and cement that lets visitors observe the cleaning of polluted river water (the sculpture is an artistically designed system of ponds and filters). Damon also brought together students from the da Vinci Arts Middle School in Portland, Oregon, and the nonprofit Urban Water Works to create the da Vinci Water Garden in an abandoned tennis court from storm water redirected from rooftops and a parking lot.

Some artworks are designed to raise awareness of specific problems and to direct attention to potential solutions, such as Melting Ice—A Hot Topic: Envisioning Change, an international traveling exhibit presented in partnership by San Francisco's Natural World Museum and the United Nations Environment Programme (on display through September 1 at the Field Museum in Chicago). The 23 pieces, including photographs, paintings, sculpture, and video installations, illustrate the challenges and opportunities inherent in global warming by examining how the melting of ice and permafrost affects the world's living creatures.

In New Mexico, where the inspiration of the natural world is particularly accessible, artists find abundant opportunities to make social statements and influence social change. In 2004, internationally known artists Helen Mayer Harrison and Newton Harrison of Great Britain embarked on a project, in collaboration with the Santa Fe Art Institute, to explore the relationship between ecology and art. Called *Santa Fe Watershed: Lessons from the Genius of Place*, the installation combined large-scale maps of the past, present, and future terrain of the river with video, photographic images, cultural narratives, and personal recollections to reveal the dire condition of the Santa Fe River and to propose a self-renewing process that would restore the river to vibrancy.

Another enterprise, The Land/An Art Site, is an Albuquerque-based nonprofit organization that provides environmental artists with opportunities to work and exhibit in New Mexico. The group maintains a gallery space in the city and a 40-acre site 80 miles southeast, in the foothills of the Manzano Mountains. There, artists can pursue low-impact, land-based art projects; participants have included installation artists, sculptors, painters, video and sound artists, musicians, dancers, architects, engineers, and writers. One such undertaking by composer and sound artist Steve Peters, titled *Here•ings: A Sonic Geohistory*, involved recording sounds at the site each hour of the day and night over the course of a year to demonstrate the complexity of the habitat through an acoustic ecology; it was produced as a CD with an accompanying booklet.

Although art might not be able to save the planet, it can interact with other disciplines to further our mindful understanding, inspire creative solutions to ecological problems, and underscore the beauty of the natural world.

—*N.Z.*

Susana Soares's *Face Object* is part of her New Organs of Perception project that proposes training bees' odor-perception abilities to create an alternative diagnostic tool for Western medicine. Bees trained to target specific odors or markers of a given condition will fly into the smaller chamber shown if they sense it. Below: Jay Harman's PAX Streamlining Principle helped create the "Lily impeller"—a fan rotor that achieves phenomenal energy savings for industry. Opposite: Joris Laarman's Bone Chair is an aluminum chair developed through 3-D optimization software that mimics growth patterns in nature and applies their rules to objects of all kinds.

BAS HELBERS/COURTESY OF JORIS LAARMAN

TOP: SUSANA SOARES/COURTESY OF MOMA; BOTTOM: COURTESY OF PAX SCIENTIFIC

"We must draw our standards from the natural world. We must honor with the humility of the wise the bounds of that natural world and the mystery which lies beyond them, admitting that there is something in the order of being which evidently exceeds all our competence."

—Václav Havel, former president of the Czech Republic

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The impeller was inspired by the three-dimensional logarithmic spiral found in the shells of mollusks and the spiraling of tidal-washed kelp fronds, as well as by the shape of our skin pores, through which perspiration escapes. The resulting design, elegant in its simplicity, was featured in Design and the Elastic Mind, a recent exhibit at New York's Museum of Modern Art that explored the relationship between new design and science.

The underlying concept, biomimicry—a fusion of design and biology that derives industrial-design and environmental solutions from the efficiency and inherent beauty of organisms in nature—has been introduced to about 2,000 people every autumn through the Bioneers' annual conference. One featured speaker on the topic, Janine Benyus, heads the Biomimicry Institute, of Missoula, Montana, whose stated mission is to "nurture and grow a global community of people who are learning from, emulating, and conserving life's genius to create a healthier, more sustainable planet."

Her institute lauds a number of innovations that successfully exemplify the realization of that mission, such as a mid-rise building in Harare, Zimbabwe, designed by architect Mick Pearce and the engineers at Arup Associates. The building uses only 10 percent of the energy of a conventional building its size, cooling itself without air-conditioning by a ventilation system modeled on termite mounds, which are self-cooling.

At Sandia National Laboratories in Albuquerque, New Mexico, a study of ways to combine hard and elastic layers of calcium carbonate and protein found in mother-of-pearl inspired a process that produces an ultrathin coating that strengthens windshields, bodies of solar cars, and airplanes.

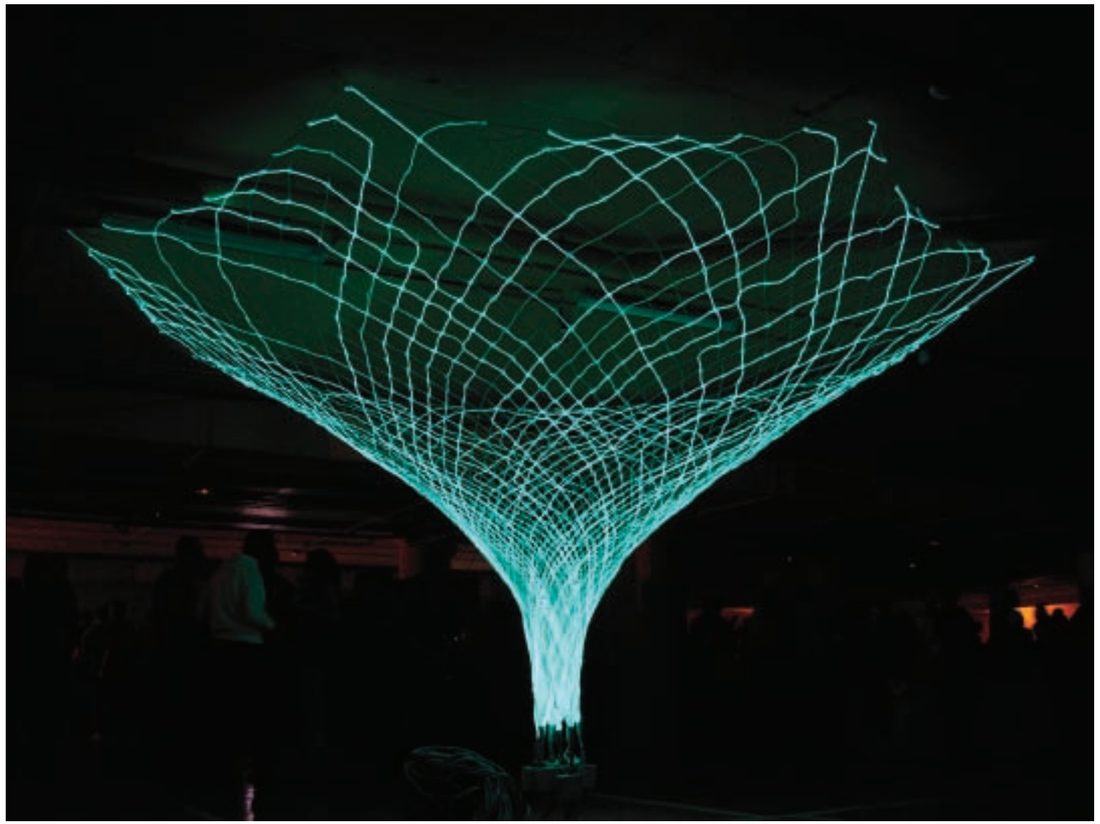
According to Benyus, architects, designers, and scientists aren't alone in finding biomimicry useful; the business community is also beginning to derive inspiration from the natural world to become more efficient and sustainable: "Right now, we humans are acting like the weeds in a newly turned farmer's field. These weeds move into a sun-filled space and use nutrients and water as quickly as they can. They don't bother to put down winter roots or recycle, because their moment in the sun is short. Then they're on to the next sun-drenched horn of plenty.

"These days," Benyus adds, "when we've gone everywhere there is to go, we have to forget about colonizing and learn to emulate the natural communities that know how to stay put without consuming their ecological capital." Becoming masterful at optimization (Benyus cites a mature ecosystem like an oak-hickory forest) makes a community cooperative and integrated with its habitat, according to Benyus. "The newest business consultants in this field [of industrial ecology] are people fresh from gorilla counts and butterfly surveys. I never thought I'd see the day, but it's true—the Birkenstocks are teaching the suits."

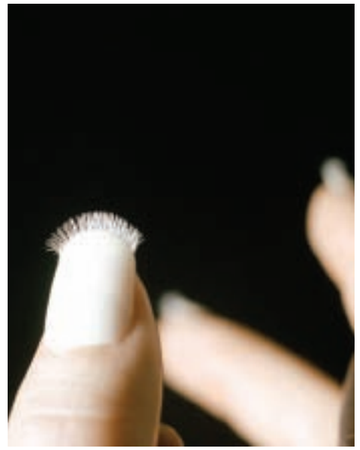
What unites all of these lofty initiatives and theories, along with the scientific discoveries that have used these principles, is their

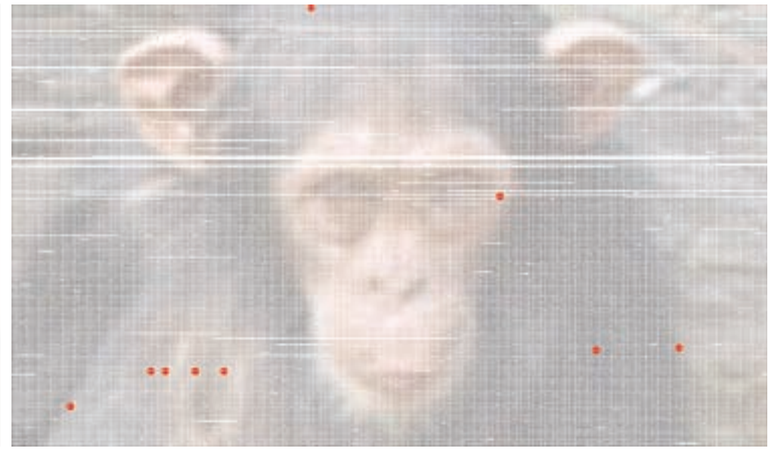
COURTESY OF ANDREW SMITH GALLERY

Joan Myers, *Geothermal Walkway, Iceland*, Epson pigment print, 2008. Geothermal energy is a major resource for Icelandic society. The word comes from the Greek *geo* (earth) and *therme* (heat). For Brimstone, her new exhibition at Andrew Smith Gallery, Myers chronicled the destructive and progenitive forces of volcanoes around the world.



Rachel Wingfield and Mathias Gmachl, *Sonumbra*, electroluminescent lace, camera, speakers, and software, 9'10" high x 16'4 7/8" diameter, 2006. *Sonumbra* is "a sonic shade of light," as the designers call it, an exploration on the roles of new textiles and how they can respond to global ecological concerns. An architectural textile with embedded solar cells is stretched into "an umbrella-like structure fabricated from electroluminescent wires that form an animated lacelike membrane." By day, it offers shelter from the sun; by night, it sheds light using the energy collected during the daylight hours. Shown at Design and the Elastic Mind, *Sonumbra* had a camera installed in the mast to capture the surrounding activity in the galleries, translating each person's location into sound and light.





Left: Some of the most cyborg of new designs pose perplexing questions about the shape of future society. Susana Soares's *Genetic Trace* imagines a future in which people will have specially designed sensing organs that allow for genetic information exchange on encounter with others. This work—made of acrylic nails, white feathers, and whiskers—for the Design Interactions department of the Royal College of Art (England) is seen as a potential aid to "selective mating." So: Is this life-enhancing, or eugenics? Right: Ben Fry's *Human vs. Chimps* follows on a gene-sequencing project through which scientists compared the human genome with that of chimps and found that 98.77 percent of our genetic information is identical. Fry represents the 1.23 percent distinction with red dots superimposed on a photographic image of a chimp's head.

LOOP.PH/COURTESY OF MOMA

LEFT: SUSANA SOARES; RIGHT: BEN FRY (BOTH COURTESY OF MOMA)

shared focus on **solutions**, as well as an understanding of the interconnectedness of individual disciplines. Bioneers continues to embark on new projects to spread the message of positive change. Ausubel was a consultant for and featured participant in Leonardo DiCaprio's 2007 film *The 11th Hour*, and it was his influence that shifted the movie's emphasis from doom and gloom about climate change to the potential for a positive outcome. The organization is also pursuing two strategic goals for the next decade: to further popularize the message of change and bring it mainstream, and to grow social capital to effect change locally.

One ongoing initiative includes Dreaming New Mexico, which offers workshops, lectures, and networking opportunities for local activists and concerned citizens to share their **vision** for bringing about sustainable economic, agricultural, and social structures for the state. As part of that initiative Bioneers is creating "future maps" of the Age of Renewable Energy in New Mexico and of a more localized, ecological food system. The group is adapting one "story" from the Age of Renewables map that shows how to replace significant amounts of coal-fired electricity from the Four Corners with solar and wind power.

Ausubel believes a growing awareness of a shared social responsibility for recognizing problems and devising solutions underlies a widespread shift in **consciousness** that he propounds can eventually heal the world. "The silver lining in all of this is that the next industrial revolution will be about the designing of green products and technologies, which is exactly what the economy needs," says Ausubel. "It's no longer uneconomical to be green." Simons agrees: "What's so exciting is that we have this opportunity to reinvent ourselves. At its core, this is a design issue, one that requires all our creativity and ingenuity." ❁