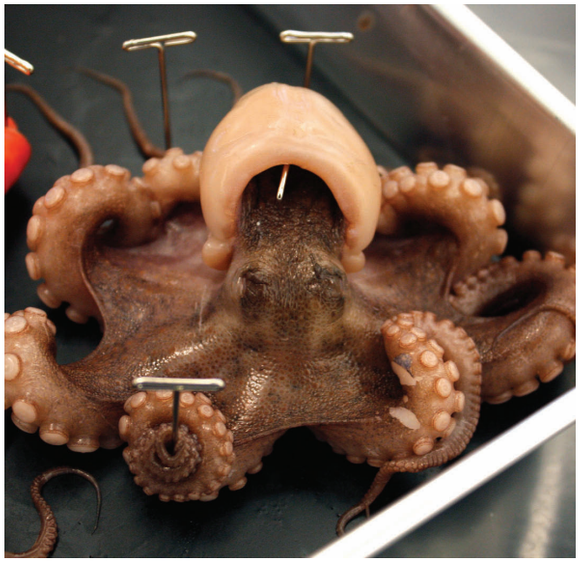
WEIRD SCIENCE

Tissue cultures, genetic modification, bacterial colonies. Over the last decade, more and more artists have been giving up the studio in favor of the laboratory

BY CAROLINA A. MIRANDA



Bio-artwork created by student Sarah Craske in the Nature and Technology Lab of the School of Visual Arts, New York.

In the spring of 2008, curator Paola Antonelli at the Museum of Modern Art in New York was forced to kill a work of art. A thumb-size "jacket" cultivated from mouse tissue that lived inside a sterile glass ball, *Victimless Leather* was not your typical museum piece. The cells were very much alive—and they were multiplying. So rapidly, in fact, that five weeks into the exhibition, they were threatening to clog the incubation system that kept them alive. Antonelli would have to cut off the nutrient supply. But she couldn't bring herself to do it. "There was no way I was going to switch it off," she recalls. "I can't even kill a mosquito."

Victimless Leather (2004) was produced by Oron Catts and Ionat Zurr, the Australian art duo known as Tissue Culture & Art Project (TC&A). For almost 20 years, they have created works that are as much about art as they are about cell biology. The two have grown wings from pig bone cells and made miniature dolls out of mouse tissue. In 2003, they produced *Semi-Living Steak*, lab-grown meat consisting of frog cells cultivated in a bioreactor. These

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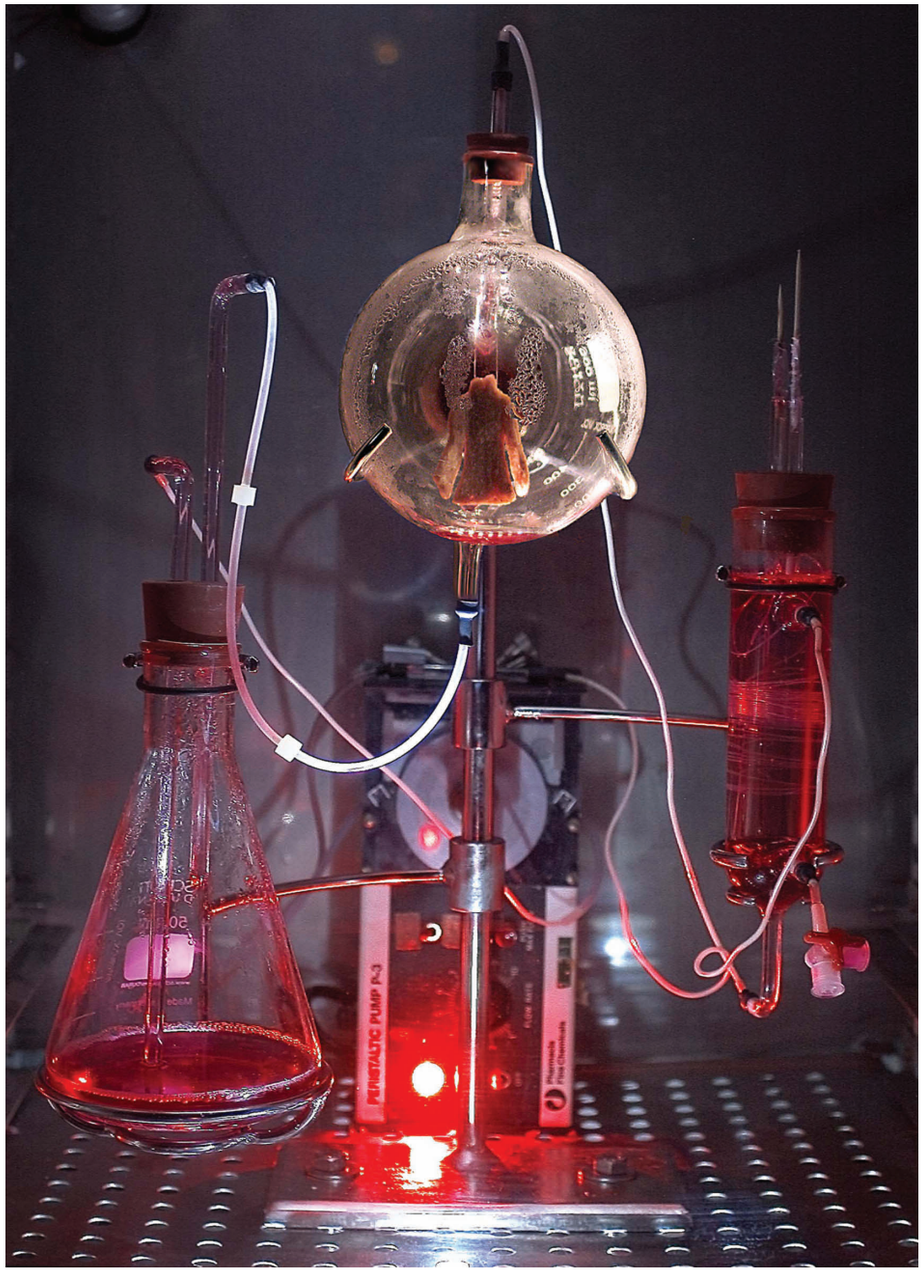
SCHOOL OF VISUAL ARTS, NEW YORK



Victimless Leather–A Prototype of Stitch-less Jacket grown in a Technoscientific "Body," **created by Tissue Culture & Art Project (Oron Catts and Ionat Zurr), 2004.**

COURTESY THE ARTISTS

were cooked up in a honey-garlic sauce and served to diners at a museum in France, while the frog that supplied the cells looked on quietly from a tank. (The "steak," says Catts, had the consistency of gelatinous goo wrapped around felt. The sauce, however, was "really good.")

The ick factor may be high, but these works raise serious questions about the nature of life. "Those cells are living, even if the object itself is not full of life," Catts explains. "It means that our cultural understanding of life is incompatible with what we see in the lab." The piece forces viewers to consider all the life forms, sentient and not, that might presently be simmering in labs. For Antonelli, the destruction of the tissue coat was a vivid embodiment of this abstract idea. "It generated reactions you wouldn't think you'd have rationally," she says. "I really had to think about whether this little coat was alive." Ultimately, it was her scientific colleagues at Columbia University who came in and flipped the switch.

At some point in the 17th century, the British scientist Robert Hooke peered into his microscope and discovered that the sliver of cork he was examining was not a solid block of material but a honeycomb of hundreds of thousands of cells. This discovery led to revolutions in biological science. In just the last 60 years, the architecture

of DNA has been decoded, in-vitro babies have been born, and sheep have been cloned.

So it's natural that some artists spend as much time in the lab as they do in the studio. Over the last three decades, in fact, artists have cultivated human tissue, bred frogs, assembled DNA profiles, and used modified bacteria as electrical transmitters. Bio-art—as this type of work is called—has also begun to surface in museums and avant-garde art festivals, from MoMA in New York to the Biennale of Electronic Arts Perth in Australia.

Jens Hauser is a Paris-based curator who has organized bio-art exhibitions at the Muffatwerk in Munich and the National Center for Contemporary Arts in Nantes, France (where TC&A's frog-cell steak was served). He says that bio-art isn't simply about creating metaphorical representations of scientific concepts, it's about using actual scientific techniques: creating hybrids and manipulating live organisms. "After the age of robotics and digital technology," Hauser explains, "the new media is biotechnology."

These practices go back to the mid-1980s, when the first work of transgenic art was created (in which the genes of one species are placed inside the cells of another). The piece, entitled *Microvenus* (1984–85), was produced by Joe Davis, a Boston-based artist and thinker, and it consisted of a strand of DNA encoded with the symbol of the Germanic rune for life inserted into an E. coli bacterium. *Microvenus* was not only a riff on the origins of humanity (the rune is an abstraction of female genitalia), it represented a new palette for artists.

"The biological world is a giant factory," says Davis, who serves as a research affiliate at the Massachusetts Institute of Technology and resident artist-scientist at the Harvard Medical School. "There is such a wide range of materials."

As artists increasingly explore this microworld, a new kind of creative space has come into being: the art lab. For about a dozen years, SymbioticA at the University of Western Australia in Perth has been the go-to place for this kind of research and experimentation. Founded by Catts and Zurr of TC&A, SymbioticA provides resident artists with access to high-tech equipment as well as interaction with scientific experts.

In recent years, similar spaces have sprung up. The not-for-profit Genspace, in Brooklyn, opened in 2010 and allows artists use of its lab for a small monthly fee. Last summer, the Fine Arts Department at the School of Visual Arts in New York opened its Nature and Technology Lab, stocked with microscopes, dissection equipment, and an area for plant cloning. Another art-focused lab, BiofiliA, opened last month at Aalto University in Helsinki, Finland.

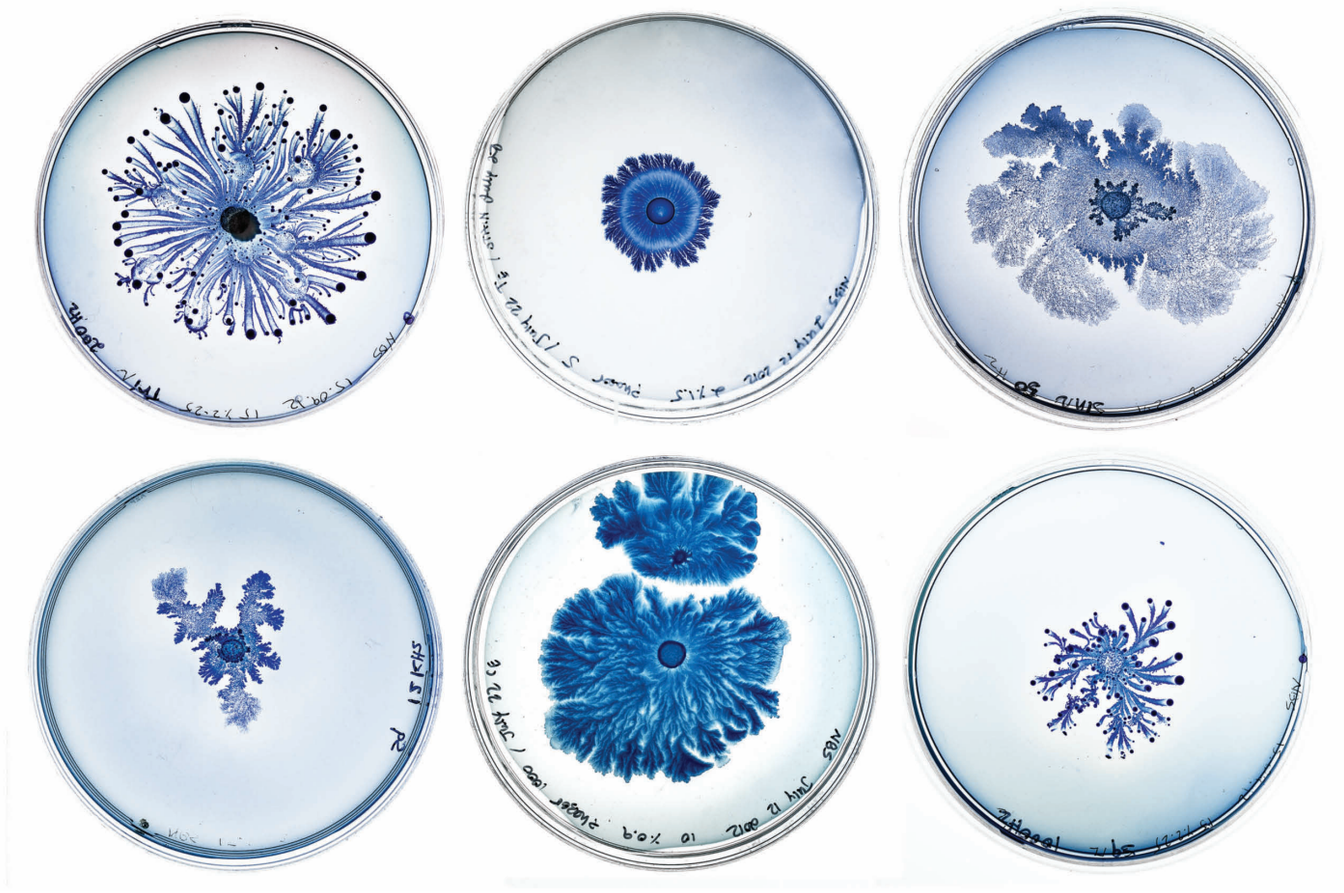
Unlike traditional academic or commercial labs, these spaces aren't focused on projects tied to some greater medical or biological necessity. At Genspace, designers, artists, scientists, and amateur biologists gather to learn from one other. "This is not a biotech start-up," says Nurit Bar-Shai, one of the lab's cofounders and its director of arts and culture programming. "Anyone can come and propose a concept." Bar-Shai, who is an artist, uses the laboratory to grow kaleidoscopic colonies of Paenibacillus vortex, a bacterium commonly found in soil.

Nurit Bar-Shai performing *Objectivity [tentative]: Sound to Shape*, part of her Soundscape series, at 92YTribeca, 2012.

The SVA Nature and Technology Lab is stocked with microscopes, dissection equipment, and an area for plant cloning.

Bacteria bloom on a page from *The Observer's Book of Wild Animals* in a work by student Sarah Craske produced in SVA's bio-art laboratory.

FROM TOP: TAMAR ZIV; SCHOOL OF VISUAL ARTS, NEW YORK (2)



Detail of Nurit Bar-Shai's *Objectivity [tentative]*. The work explores the network and communication systems of Paenibacillus vortex bacteria.

DORON BEN-AVRAHAM AND NURIT BAR-SHAI/@NURIT BAR-SHAI

At a time when the art world has been revisiting the ephemeral art forms of the 1970s, when performance has taken pride of place in museums, and Land art and environmental themes have been the subject of sweeping retrospectives, the keen interest in bio-art comes as little surprise. The pieces are often about process. Documentation—notes, photography, schematics—is generally the only record of a work. What these works reveal about the nature of life, however, varies as much as the DNA of each artist.

For some, bio-art represents one more step in the long human tradition of shaping the living environment. "Any time you go to a flower shop and buy a bunch of flowers for a friend, you are participating in a process of selection," says artist George Gessert, the author of *Green Light: Toward an Art of Evolution*, a book that examines the ways in which human esthetic choices determine the paths of other species. "If you get the blue irises and not the purple irises, it has an economic ripple effect in the greenhouse or on the field. It means one plant lives and the other doesn't."

Gessert has been crossbreeding plants since the late 1970s. He documents his findings in photography and in artist books, which have appeared at the Centro Andaluz de Arte Contemporáneo in Seville, Spain, and the Smithsonian Institution in Washington, D.C. At its core, his practice is evidence of the ways in which living organisms can be sculpted over time.

Other bio-artists have also worked with breeding, but to different effect. Brandon Ballengée is a New York artist who spent half a dozen years attempting to breed a threatened (possibly extinct) African frog "backward," using related species to produce animals that had "wild" traits such as shorter legs. But regardless of what he achieved in the lab, his animals would never truly be wild: they had never fended off predators or hunted for food. The piece examined some of the illusory aspects of science.

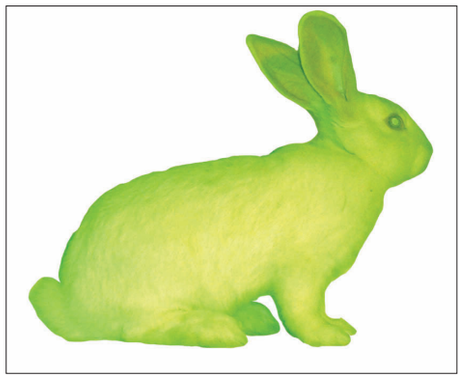
"Occidental culture, especially in the U.S., seems to have this belief that science is going to save the world," says Ballengée. "But it's going to take more than that—it will take people coming together to understand their personal role in how to deal with collective issues such as climate change and species loss." Humans may have the ability to breed, crossbreed, and even clone, but we can't bring back the dead. At least, not yet.

Undoubtedly, a good deal of bio-art explores the tangled—often grotesque—marriage between biology and technology. In 2007, the French Conceptual artist Orlan produced a

"coat" from a patchwork of human tissue. The Chicago-based Eduardo Kac collaborated with a French laboratory to produce a bunny named Alba that glows fluorescent green under blue light. And, in a nod to a sensational 1990s experiment in which scientists implanted an ear-shaped cartilage onto the back of a hairless mouse, Australian artist Stelarc had a similar implant surgically inserted into the skin of his left forearm. His attempt to include a microphone, so that the ear might "hear," failed when the surgery resulted in a nasty infection.

"It has a Frankenstein aura about it, but it's really important work," says Robin Held, who organized "Gene(sis)," a 2002 exhibition at the University of Washington's Henry Art Gallery in Seattle. The show was a milestone for bio-art in the United States, displaying early works by key artists in the movement. "There is this growing sense of alarm at the implications of genetically-modified organisms," Held explains. "Their work covers the spectrum, from wonder to horror and every point in between."

Art&Life Manipulation Course students and guests take part in the first hands-on session in the new BiofiliA laboratory at Aalto University in Helsinki.



Alba, Eduardo Kac's transgenic *GFP Bunny*, 2000; George Gessert's Pacifica iris hybrid named for Eduardo Kac, 1990–99.

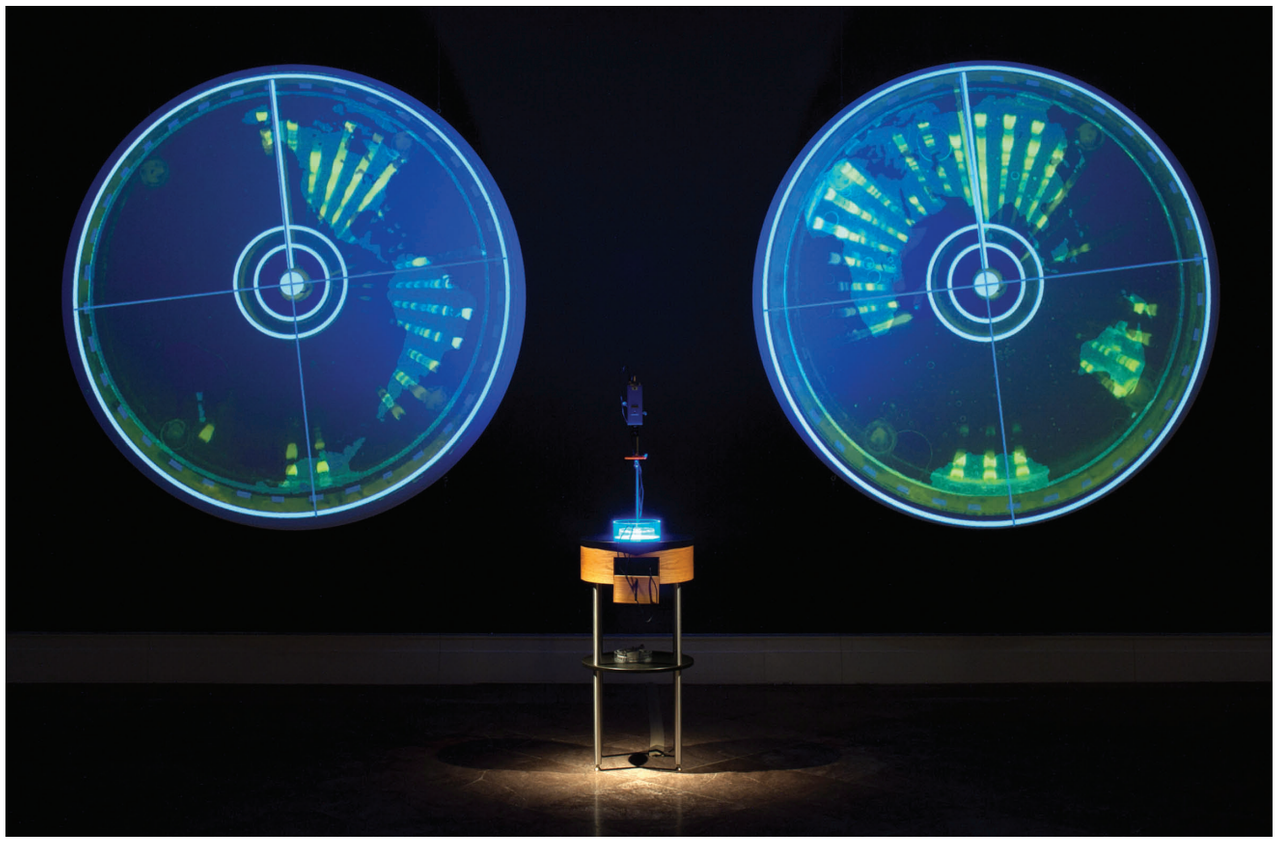
Paul Vanouse is a Buffalo-based artist who has worked with DNA in one form or another for more than a decade. In his newest piece, *Suspect Inversion Center* (2011-present), which is on view through May 6 at the Beall Center at the University of California, Irvine, Vanouse manipulates his own genetic material to create a DNA profile that matches that of O.J. Simpson. "My contention here is that DNA is held up as one of the most culturally authoritative images we have," Vanouse explains. "Yet it's completely constructed. A DNA profile is something that's been processed in a laboratory. It's highly plastic. I can make these abstract bar codes look like anything I want."

Using biotech to demystify biotech is an approach that has been employed by other artists as well. The loose collective of American artists known as Critical Art Ensemble has handed out (harmless) genetically modified bacteria to museum-goers and has baked DNA into cookies for performance-based works that explore the limits of biotechnology. In 2002, the group collaborated with a scientist from the Mellon Institute of Industrial Research in Pittsburgh to kill "super crops" engineered by agricultural biotech giant Monsanto, using little more than some pesticide and enzymes acquired at a health-food store. The final work consisted of tidy rows of withering Monsanto plants on display at the Corcoran Gallery in Washington, D.C. It earned the artists a cease-and-desist order from the company.

The larger goal in these works has been to draw the public into discussions about what genetically modified organisms are and what their social and political implications might be. "If you tell the average person, 'I want to talk to you about transgenics,' they're going to be bored. It's not a burning public dialogue," says Steve Kurtz, a founding member of CAE and chair of the visual studies department at the State University of New York Buffalo. "But if you tell them, 'I have this crippled E. coli bacteria that's been altered with some human DNA, and I want to give it to you,' now you can have a discussion." Their pieces have addressed such issues as corporate control of the global food supply and fears about lab-grown super organisms run amuck.

Kurtz knows the harrowing emotional reactions that biotechnology can inspire, especially in the wake of 9/11. In 2004, he was detained and investigated by the FBI on suspicion of bioterrorism because of the

CLOCKWISE FROM TOP: SUSANNA KEKKONEN; COURTESY THE ARTIST; COURTESY BLACK BOX GALLERY, COPENHAGEN



Paul Vanouse, *Ocular Revision*, 2010, at the Albright-Knox Art Gallery in Buffalo, New York. The work uses a custom experimental circular gel electrophoresis rig to visualize DNA bands.

TOM LOONAN/ALBRIGHT KNOX GALLERY, BUFFALO

contents of his home lab. The ensuing legal battle lasted four years, during which time he was charged with wire and mail fraud for his acquisition of E. coli bacteria (the sort that can be easily purchased online). The case was eventually ruled "insufficient on its face," meaning that Kurtz's actions did not constitute a crime. But his detention put a freeze on the development of bio-art in the United States.

"It became much more difficult to do research," says Held, the "Gene(sis)" curator. "There was a real fear that what happened to Steve would happen to others." As a result, bio-art has been more widely funded and displayed in Europe and Australia than in the United States.

Certainly, bio-art isn't the easiest arena in which to work. It often calls for centrifuges and incubators. Living tissue can't be easily (or even legally) transported from one place to another. Failed projects require proper biohazard disposal. Most museums and galleries are ill equipped to provide this sort of infrastructure. So, for the most part, bio-art circulates among experimental festivals and university museums.

"To organize a show as a curator, you need to find institutional partners—labs that will do the work," explains Hauser, who has organized more than half a dozen bio-art exhibitions around the world. "And sometimes it's not just one lab. I did an exhibit in Luxembourg where we worked with four or five labs."

As a result, only a handful of bio-artists are represented by commercial galleries: Orlan works with several, including Stux in New York (where her works are priced between $9,000 and $60,000), while Ballengée is represented by Ronald Feldman Fine Arts in New York and Nowhere Gallery in Milan (his works range from $6,000 for prints to $125,000 for installations). However, bio-artists are more often connected to academia, either as teachers or fellows, which allows them to concentrate on experimentation over object production.

The pioneering Davis, for example, is currently at work on a project in which he aims to feed silkworms gold chloride to see if they will spin gold cocoons. "To me, it doesn't really matter about the craft," he explains. "What matters is making something that holds an idea." In trying to create this symbolic creature—a little worm that can produce gold—Davis will likely make important discoveries. These could have a ripple effect in the world of art, as well as science.

In some ways, it's a return to the past, when artists like Leonardo da Vinci kept small laboratories and dissected animals. For bio-art, says MoMA's Antonelli, "It is just the beginning. It is a moment when we are drunk with possibility." ■