



A dermestid beetle that dined on transgenic mosquitoes earned a place in Richard Pell's museum.

## Q&A Richard Pell

# Transgene curator

Next month in Pittsburgh, Pennsylvania, artist Richard Pell opens the Center for PostNatural History — a museum of bioengineered organisms. He talks about the joys and pitfalls involved in collecting genetically modified maize, mosquitoes and zebrafish.

### Why did you start the museum?

As an artist, I made robots in an attempt to start an ethical conversation in the engineering community about funding and other political issues. Then I was introduced to synthetic biology by one of the field's pioneers, Chris Voigt, who is now at the Massachusetts Institute of Technology in Cambridge. I began to wonder why transgenic organisms weren't shown on the evolutionary tree. So I began collecting specimens of living things that had been intentionally and heritably altered by humans.

### What is the museum's focus?

The museum is essentially anthropocentric — it looks at the organisms that we alter, but also at how they alter us. The history within an engineered organism is vast, and represents the continuum of human manipulation of plants and animals. For example, the rats we breed to develop human-like tumours will shape the progress of medical research, which in turn will have an effect on which of us survive.



### What specimens have you collected?

Examples include GloFish, which are zebrafish that contain genes from bioluminescent jellyfish and coral — the only transgenic organism you can buy in a pet shop. We couldn't acquire genetically modified maize [corn] directly without entering into an elaborate licensing agreement with its developers, Monsanto. But by planting maize kernels from shop-bought animal food and testing to see whether the plants survived the pesticide Roundup, we were able to add Roundup-Ready maize to our collection. We're not trying to be provocative, we're just documenting thoroughly.

### What specimens don't you have?

The 'biosteel goat' designed by Canadian company Nexia Biotechnologies. It produces milk containing spider silk that could be used to make stronger bulletproof vests — one of the first 'biofactories'. The US Defense Advanced Research Projects Agency [DARPA] moved half of the herd to a decommissioned airforce base in upstate New York. The other half went to an ongoing research project at the University of Wyoming in Laramie. The status of the DARPA goats remains unknown. Our exhibit consists of a diorama of the military goat farm, based on images from Google Earth.

### Does the collection include any insects?

I had a nice stock of mosquitoes, which had been altered so that they could not harbour the parasite that causes malaria. This is one of a handful of organisms engineered to be released into the wild. Last year, when I opened up my mosquito box, it was empty apart from a dermestid beetle larva, a common pest in museums. Despite my attempt to make a habitat, it died, but because its diet consisted exclusively of genetically engineered mosquitoes, it earned a place in the collection.

### Why do you have an exhibit on 'genetic copy prevention'?

Companies wanting to sell living things perceive a fundamental problem: their products reproduce for free. One solution is the terminator gene patented by Monsanto, an on-off switch that allows the organism to reproduce in the lab but that makes it go sterile in the wild. There are other approaches to limiting reproduction: in the late 1950s, the United States built factories to irradiate millions of screw worms, which feed on the living flesh of livestock. Sterilized male screw worms were then dropped from aeroplanes so that wild females would mate with them. This eradicated the insect from US livestock.

### Does the museum cover genetically altered humans?

We don't have exhibits on that topic yet, but we do archive this type of research. For example, in 2007, researchers at Cornell University in New York produced a transgenic human embryo that expressed a red fluorescent protein from coral, and allowed it to grow for five days before terminating it. And in gene therapy, a hacked retrovirus inserts foreign DNA into a patient's genome to produce a certain protein. That change is not supposed to be heritable, but there is the possibility that the virus could make its way into a germ cell. Although both of these examples are minor changes in comparison with how humans have altered other organisms, I think that this will be an area of interest for the museum in the future.

### How does the museum deal with people's biased views?

The rhetoric around altered organisms has become narrow, both for those who are afraid of ' Frankenfoods' and those who believe that genetic engineering will cure cancer. People often want to have their own belief system mirrored in your rhetoric, or at least they want someone else's bias so that they can recognize and argue with it. Otherwise they must argue with themselves, which is uncomfortable but exactly the experience we want them to have. ■

INTERVIEW BY JASCHA HOFFMAN