

## BIOMEDICINE NEWS

[18 COMMENTS](#)

# An Unlikely Plan to Revive the Passenger Pigeon

Advances in genetic engineering have some biologists convinced they'll re-create extinct species.

By [Antonio Regalado](#) on March 19, 2013

Passenger pigeons once darkened the skies over the eastern United States. Huge flocks would roost on chestnut trees, their weight snapping off branches. By 1914, though, humans had hunted the bird to extinction.

Now, a project to reanimate the pigeon using genetic engineering is drawing new attention to the question of “de-extinction,” or whether biotechnology can help conserve rare animals and even restore others that disappeared eons ago.

The passenger pigeon effort, known as Revive and Restore, is being paid for by the Long Now Foundation, a nonprofit led by entrepreneur and author Stewart Brand (see [“Environmental Heresies”](#)), who has been stirring interest in the idea of de-extinction by organizing meeting of key researchers, including [one last week at the National Geographic Society in Washington, D.C.](#)

Some scientists are convinced the technology is feasible. “Not only is sequencing of extinct genomes a reality, but revival of extinct species is within reach,” said Hendrik Poinar, a researcher at McMaster University in Ontario, Canada.

The idea of reviving extinct species first gained [attention a decade ago](#), after Dolly the sheep was born via cloning. Since then, advances in DNA sequencing have made it theoretically possible to bring back even ancient species, like the woolly mammoth. Already, researchers have re-created some microorganisms, like the 1918 flu virus, from genetic material found in corpses from the period. Some leading scientists are also creating a startup company that intends to help implement de-extinction (see [“A Stealthy De-Extinction Startup”](#).)

"It's going to be iterative and a convergence of technologies," said Ryan Phelan, a biotech entrepreneur who is married to Brand. "I think de-extinction is an empowering face for applying genomics in new domains."

Globally, there appear to be about half a dozen projects aimed at re-creating extinct animals. Those most likely to succeed in the near term involve cases where researchers have access to cells preserved in liquid nitrogen.

In Australia, for instance, researcher Mike Archer of the University of New South Wales says he is now trying to clone the gastric breeding frog, an species known for gestating its young in its stomach and giving birth through its mouth. Archer says he's using cells frozen by a colleague in the 1970s, shortly before the last of the animals disappeared.

Archer has been trying to re-create the amphibian by cloning those cells into eggs of another frog species. So far he's been able to make embryos, but not yet a live animal. "I do want to test this question: Does extinction have to be forever?" says Archer.

Realistically, biotechnology might play its biggest role in saving species whose numbers are dwindling. When few members of a species remain, they're often closely related, with a limited gene pool, and get caught in an "extinction vortex," says Oliver Ryder, of the San Diego Zoo. For instance, he says, there are only seven northern white rhino left, all in captivity, and the four that are able to reproduce are one another's uncles or children.

Ryder heads project called the Frozen Zoo, which is deep-freezing cells from rare species, including 170 types of birds, to create a bank of genetic information for future use. That effort is now being expanded upon by researcher Jeanne Loring of the Scripps Institute, who is attempting to raise crowdfunding donations to transform some of those banked cells into supplies of stem cells, which might later be used to produce sperm or eggs. With sperm and eggs, says Ryder, researchers could deliver a shot of new DNA into an endangered species, a process he calls "genetic rescue" or "artificial migration."

So far, says Loring, the team has made stem cell supplies for the white rhino, the Somali wild ass, and two other species (see "Stem-Cell Engineering Offers a Lifeline to Endangered Species").

More difficult is recovering species lost long ago. To do so, scientists have to first find and sequence DNA from whatever ancient bones, pelts, or stuffed specimens they can locate. Using such techniques, researchers have already produced partial copies of both the genome of the Neanderthal and of the woolly mammoth.

Once an extinct animal's DNA code is in hand, researchers would try to progressively modify a related species, using genetic engineering. For instance, to make a mammoth, researchers could add key mammoth genes to the cells of an African elephant, such those that result in thicker fat and denser hair.

That is the strategy being considered for the passenger pigeon, a project Brand says he's paying for "out of my own

pocket." The effort's single employee, Ben Novak, is a graduate student who began sequencing passenger pigeon DNA from museum specimens last year, and plans to complete the job at a University of California, Santa Cruz, laboratory specializing in ancient DNA, or paleogenomics.

Novak says the closest species to the passenger pigeon is the band-tailed pigeon. "We don't know yet if we will have to move 1 percent or 10 percent of a genome over, or just the things that are functionally important," says Novak.

To bring such hybrids to life, scientists need a way to make a complete animal from a cell in a dish. In mammals, cloning and related technologies provide ways to do that. Embryos carrying the new DNA could then be carried to term in a related species.

However, reproductive technology is less advanced in birds, and no bird has ever been cloned. That means there's as yet no way to bring the passenger pigeon's genome back to life. "All I am doing right now is analyzing the passenger pigeon's genome," says Novak. "Right now, it's impossible to create a breeding pair."

Even if it were possible, Novak says, other daunting challenges would follow. Would he dye other pigeons brown to fool the young birds into thinking they were its real parents? Passenger pigeons were also an unusually social species, so it's unclear if creating a few animals would really re-create the species' behavior.

Some conservationists view the whole idea with skepticism. Because nature marches on once a species goes extinct, reintroducing long-lost animals to the wilderness could actually be as damaging to habitats as an invasive species. Mankind's use of the environment has changed, too. Flocks of passenger pigeons, said to reach a billion birds that would cover the sky for hours, might be an unacceptable threat to modern aviation.

"The birds will live in a cage labeled 'Passenger Pigeon,' but they won't be, not really," said David Ehrenfeld, a conservation biologist at Rutgers University, at the National Geographic event. Ehrenfeld noted that there are currently conservationists risking their lives to save the last African elephants from heavily armed poachers: "So why are we sitting in this auditorium talking about bringing back the woolly mammoth? Think about it."

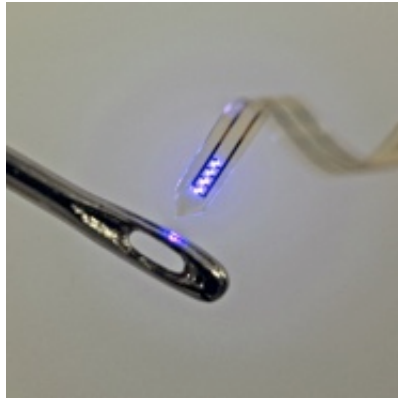
Image by Smithsonian Institution Archives. Image # SIA 2010-0612

Tagged: Biomedicine

Reprints and Permissions | Send feedback to the editor

**[RELATED STORIES](#)**   **[YOU MAY HAVE MISSED](#)**   **[MORE FROM THIS AUTHOR](#)**

---



**Wireless Micro LEDs Control Mouse Behavior**

**Microbes Can Mass-Produce Malaria Drug**

**Why Obama’s Brain-Mapping Project Matters**

11

**Device Finds Stray Cancer Cells in Patients’ Blood**

**Messenger RNAs Could Create a New Class of Drugs**

**How to Make a Computer from a Living Cell**

**Gut Microbes Could Help Us Lose Weight**

28

**Are Your Doctor’s Hands Clean? This Wristband Knows**

12

**Nanoparticles Show Which Way the Stem Cells Went**

**THE LATEST**

**POPULAR**

**MOST SHARED**

40 min ago

**A Social Networking Technology Born Female**

2 hours ago

**Cracking Rock to Get More from Geothermal Fields**

7 hours ago

**Surfing Logs Reveal Global Eating Patterns**

14 hours ago

**Mega Wind Farms Won’t Work Without Better Models**