

## The Second Coosing

# Raising Passenger Pigeons from the Dead

By Philip Bethge

**The world has been without passenger pigeons since 1914. Now, scientists want to bring them back. Geneticist Ben Novak has embarked on the project and has begun collecting passenger pigeon DNA from natural history museums. His "de-extinction" efforts are not without critics.**

The eye sockets of the slender pigeon are filled with light-colored cotton. Its neck feathers shimmer in iridescent colors, and it has a russet chest and a slate-blue head. The yellowed paper tag attached to its left leg reads: "Coll. by Capt. Frank Goss, Neosho Falls, Kansas, July 4, 1875."

Ben Novak lifts up the stuffed bird to study the tag more closely. Then he returns the pigeon to a group of 11 other specimens of the same species, which are resting on their backs in a wooden drawer. "It's easy to see just dead birds," he says. "But imagine them alive, billions of birds. What would they look like in the sky?"

Novak has an audacious plan. He wants to resurrect the passenger pigeon. Vast numbers of the birds once filled the skies over North America. But in 1914 Martha, the last of her species, died in a zoo in Cincinnati, Ohio.

Novak, a researcher with the Long Now Foundation, a California think tank, wants to give the species a second chance. At the Museum of Vertebrate Zoology in Berkeley, Novak used a scalpel to slice small tissue samples from the red-painted toes of the passenger pigeons kept there. He hopes to isolate tiny bits of DNA from the samples and use them to assemble an entire genotype. His ultimate goal is the resurrection of the passenger pigeon.

"It should be possible to reconstruct the entire genome of the passenger pigeon," says Novak. "The species is one of the most promising candidates for reintroducing an extinct species."

The art of breathing new life into long-extinct species is in vogue among biologists. The Tasmanian devil, the woolly rhinoceros, the mammoth, the dodo and the gastric-breeding frog are all on the list of candidates for revival. To recover the genetic makeup of species, experts cut pieces of tissue from stuffed zoological rarities, pulverize pieces of bone or search in the freezers of their institutions for samples of extinct animals.

### The Dream of "De-Extinction"

The laboratory techniques to create new life with bits of genetic material were pure fantasy in the past. But now scientists believe that the vision could become reality, step by step. Experts in bioengineering, zoologists, ethicists and conservationists recently met in Washington, DC for a public forum on "de-extinction."

"Extinct animals are the most endangered species of them all" because "there is hardly anything left but the DNA," says Stewart Brand of the Long Now Foundation, which co-hosted the meeting with the National Geographic Society. The current showpiece project in bioengineering is the rebirth of the passenger pigeon.

The story of *Ectopistes migratorius* is a striking example of human hubris. When the Europeans arrived, the passenger pigeon was probably the most common bird on the American continent. The birds travelled in giant flocks, sometimes several hundred kilometers long. "The air was literally filled with pigeons," naturalist John Audubon wrote in 1831, after observing the spectacle. "The light of noon-day was obscured as by an eclipse."

During their long migrations, the pigeons devastated entire forests. They descended upon their breeding grounds in eastern North America by the millions. There are historical accounts, for example, of a breeding

ground in Wisconsin the size of Tokyo, where an estimated 136 million passenger pigeons came to breed. The noise was deafening.

Living in a flock guaranteed the pigeons safety from predators. But the behavior also sealed their fate. When hunters discovered passenger pigeons as game birds, they were able to kill them with brutal efficiency, either by catching them in nets or shooting them with birdshot. They also placed pots of burning sulfur under trees until the birds, anesthetized by the vapors, dropped to the ground like overripe fruit.

In some breeding areas, hunters slaughtered up to 50,000 passenger pigeons a day. The birds were shipped by the ton in freight cars and sold to be grilled at a few cents a dozen.

## Sequencing the Pigeon DNA

By the time the establishment of a closed season for the birds was proposed in the US state of Minnesota in 1897, it was already too late. The last wild passenger pigeon was shot to death in 1900. Then, Pigeon Martha -- named after Martha Washington, the country's first First Lady -- finally met her end at around noon on Sept. 1, 1914. She was the last surviving specimen in an unsuccessful program to breed the birds in captivity.

Novak's goal is to bring back the species, and he seems perfect for the job. In elementary school, he completed a project on the dodo, the extinct bird species from Mauritius. The passenger pigeon has fascinated him for years. "We caused the extinction of the species," says the 26-year-old. "Now we have a moral obligation to bring them back." To that end, the genetic detective is visiting natural history museums to take tissue samples from as many of the roughly 1,500 remaining samples of the skin and bones of the bird as possible.

The passenger pigeon's DNA has about 1.3 billion base pairs. Their sequence describes what the bird looks like, what its call sounds like and how it behaves. However, the animal's genetic material in the museums is shredded into miniscule pieces, degraded by bacteria and contaminated with foreign DNA. But that doesn't deter Novak. He and Beth Shapiro, an evolutionary biologist at the University of California in Santa Cruz, have begun to decode the bird's DNA.

The biologists have an ambitious plan. Bit by bit, they intend to match the DNA sequence of the passenger pigeon with that of its close relative, the band-tailed pigeon. Then they will essentially stamp out the divergent sequences from the band-tailed pigeon genome and replace them with synthesized passenger pigeon genetic material.

With the help of the genome created in this fashion, the scientists will create primordial germ cells for the passenger pigeon, which will then be implanted into young embryos of an easy-to-breed pigeon species. The scientists hope that once they have grown and mated, the pigeons will lay eggs that will hatch into passenger pigeons.

## Chickens in a Duck's Egg

The procedure is not only complicated, but also largely untested. But, says Novak, "all the necessary steps are being studied intensively right now." For instance, he explains, biologists have already managed to insert primordial germ cells from chickens into duck eggs. The drakes that emerged a short time later actually carried the sperm cells of chickens.

Novak is already thinking beyond the hatching of the first passenger pigeon. Once a flock of the birds has been created, he plans to release them into the wild. "The passenger pigeon was a keystone species in the forest ecosystems," says Novak, explaining that the destructive force of the flocks led to a radical rejuvenation of forests. Thick layers of pigeon droppings fertilized the soil, which soon led to new growth. "Passenger pigeons are the dance partners of the forest," the scientist raves. And the "ballroom" still exists.

But even if scientists can pull off this feat, does it really make sense to bring a long-extinct species back into the world? "Conservation biology's priority must remain that of ensuring a future for species (currently) existing on the planet," retired Professor Stanley Temple of the University of Wisconsin-Madison says critically. He fears that species extinction could be trivialized in the future. "People might say: 'Can't we let them go extinct and bring them back later?'"

Zoologist David Ehrenfeld of Rutgers University also criticizes the species resurrection projects, saying that

they are "extremely expensive" and, in light of a global species crisis, downright absurd. "At this very moment, brave conservationists are risking their lives to protect dwindling groups of existing African forest elephants from heavily armed poachers, and here we are talking about bringing back the woolly mammoth," he says.

Ehrenfeld also doesn't believe that revived species would stand much of a chance of survival. "Who will care for the passenger pigeon chicks?" he asks, noting that parental care is "critical" for the development of young birds.

### **Darkened Skies**

But Novak rejects the criticism. "Passenger pigeon parents were never incredibly involved in raising their young," he says. He also plans to teach the chicks the basics of passenger pigeon life by dyeing carrier pigeons and essentially using them as flight controllers for the returning species.

"We'll ferry them with homing pigeons down to wintering grounds and back to the breeding area," he says. "After a few years, we have passenger pigeons that fly the same (routes) as their forefathers."

When that happens, clouds of passenger pigeons will darken the skies once again, and another dream could be fulfilled for Novak. "Part of me would really love a passenger pigeon as a pet," says the scientist. And perhaps, he adds, the pigeon zoo could even be expanded.

There are 50 extinct pigeon species worldwide, says Novak. He has already earmarked three of them for resurrection: the Japanese silver-banded pigeon, the Choiseul crested pigeon and the thick-billed ground dove.

"I am a pigeon nut," says Novak.

*Translated from the German by Christopher Sultan*

### **URL:**

<http://www.spiegel.de/international/zeitgeist/scientists-aim-to-bring-the-passenger-pigeon-back-from-extinction-a-893744.html>

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