In 1996, scientists did an interesting experiment with sheep. Using a tiny needle, they removed the DNA from the center of a sheep’s egg cell. They swapped in the DNA from a different adult sheep. Then they zapped the egg so it would start to divide, implanted it in a third sheep, and waited for her to have a baby.

That baby was a sheep called Dolly—and she was a clone. That means her DNA all came from a single parent sheep. Dolly was an exact copy of her mother—they were more like identical twins.

DNA is an instruction code that sits in the center of every cell. It tells each cell what to be and how to grow. It’s what makes a sunflower seed grow into a sunflower, or a baby mouse grow into a mouse. But Dolly made scientists wonder—if we can swap the DNA inside an egg cell, could we someday clone creatures that died out years ago, such as woolly mammoths?

During the last Ice Age, large, hairy elephants roamed Asia and the Americas. But by about 4,000 years ago, all the mammoths and mastodons had vanished.

Could these ancient beasts ever come back to life?

A Special Sheep

Normally, to make a new baby animal, it takes two parent animals of the same species. Baby animals get half of their DNA from Mom and half from Dad. When these two halves join up inside a fertilized egg, a baby starts to grow. Without parent mammoths, there’s no way to make any more.

Right?
To clone a woolly mammoth, the first thing you would need is some mammoth DNA. Mammoths have been extinct for thousands of years. But since the 1900s, scientists have been digging up remains of mammoths frozen into the arctic ground. Some still even have their skin and hair.

Unfortunately, even when it’s frozen, DNA doesn’t keep very well. It starts to break apart soon after an animal dies. Scientists have found plenty of mammoth DNA—but it’s all just short bits, like an enormous jigsaw puzzle. And it’s mixed up with DNA bits from bacteria, fungi, and other microbes that lived with the mammoth.

Still, by comparing overlapping bits, in 2015 scientists were able to map the whole mammoth genome—like a guide to how it fits together. Unfortunately, you can’t make a clone from a computer list of DNA bits. You need actual DNA. But maybe there’s a shortcut.

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The Elephant Shortcut
Modern Asian elephants are cousins of the ancient mammoths. Their DNA is about 99% the same. Still, that adds up to about 70 million differences.

But if we could change elephant DNA in the places that are different, could we make mammoth DNA?

Some researchers at Harvard are giving it a try. They have swapped out 14 bits of DNA in elephant blood cells with mammoth versions that help mammoths stand the cold.

The experiment seemed to work. But they’re only working with clumps of cells, not a whole animal. It’s a long way from cloning a mammoth.

Large Mom Wanted
If we do manage to get or make some mammoth-like DNA, we’ll also need an egg cell and a host—a modern elephant—to grow a baby mammoth.

This could be tricky—it’s not like sticking a seed in a pot. When a baby is inside a mother, the mother’s body sends lots of signals to help the baby grow correctly. No one knows if a mammoth would be able to develop inside an elephant.

Should We?
Even if scientists could clone a mammoth or other extinct species someday, would it be a good idea?

It might be cool to see a real, live mammoth. But would such an animal be happy, with no other mammoths around? Where would it live? What would it eat? Who would teach it how to be a mammoth?

These are important questions for trying to bring back any extinct species. Cloning is expensive and often fails. Would the money be better spent on saving endangered animals that are still here?

Many animals go extinct because their habitats vanish or become polluted. If we brought them back without fixing their homes, they might go extinct again. So maybe we should do that first.

Beth Shapiro is a biologist who studies evolution and cloning. Like most scientists, Shapiro doesn’t think we’ll see mammoths return any time soon, if ever. And she doesn’t think elephants should be used for cloning—elephants are smart, social animals and don’t like captivity.

But she thinks it might be interesting to give a few elephants some mammoth traits. Cold-loving mammoth-elephant hybrids could help restore Siberian grasslands by munching shrubs. And if it looks like a mammoth and eats like a mammoth, is that mammoth enough?

How to Make a Mammoth
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