

Headlines tout Jurassic World in offing but scientists, journalists separate fact from fiction

The idea of populating a real-life “Jurassic World” with genetically engineered dinosaurs is an enthralling or frightening scenario — depending upon your perspective — ignited by the movie’s blockbuster debut. Few creatures have captivated our universal child-like imagination quite like dinosaurs. It’s also captured the imagination of some fevered headline writers often more interested in clicks than science:

- “Real ‘Jurassic World’ Scientist Says We Could Bring Back Dinosaurs As Pets” in [Popular Science](#).
- “Could ‘Jurassic World’ Happen In Real Life? Terrifyingly, The Science Behind It Is Not As Far-etched As It Seems” in [Bustle](#).
- “The Science Behind *Jurassic World*: How Dinosaurs Could Be Making a Comeback in the Next Five Years” in [People](#).
- “Jurassic Park comes true: How scientists are bringing dinosaurs back to life with the help of the humble chicken” in [Daily Mail](#).
- “Real-Life ‘Jurassic World’ Dinos May Be 10 Years Off” in *Live Science*.
- “The paleontologist who worked on ‘Jurassic World’ is trying to create a dinosaur within 5 to 10 years” in [Business Insider](#).
- “Jurassic World turning real? Scientists trying to recreate dinosaurs using chickens” in [Christian Today](#).

Let’s separate the hype from the scientific reality. Is the de-extinction of dinosaurs really possible, and soon?

In all of these pieces, the scientific authority fueling this fantasy is Jack Horner, the paleontologist consultant who worked on all four Jurassic Park films and author of [How to Build a Dinosaur: Extinction Doesn’t Have to Be Forever](#). He contends that genetically engineering dinosaurs is feasible by going straight to their actual living descendants today: birds, or *avian dinosaurs*, are the answer. His quest, as described in a [TED talk](#), is to build his own pet dinosaur through individual experiments on developing embryos of chickens nudged in such a way to revert them back to a de-evolved, ancient dinosaur-like state.

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The [recently published work](#) by developmental biologists and paleontologists from Harvard and Yale has been swept up in the hyperbole. They used biochemicals to alter the expression of proteins involved in face development in dozen of chicken eggs. These particular proteins were chosen because of their involvement in the different expression of facial features in bird embryos as compared to reptile embryos.

The results of their experiments that inhibit these proteins were altered chick embryos that had reptilian, or dinosaur-like, snouts where their beaks would normally have been. In addition, using digital models of the skulls, the scientists also found that the altered chicks even resembled that of ancient extinct species of birds and dinosaurs, including *Aracheopteryx* and *Velociraptor*.

Based on that research, along with use of other newer genetic engineering technologies and cloning technologies, Horner's claim is that we could soon have pet dinosaurs. After all, he told *Business Insider*, humans have already been genetically modifying genes of animals in the form of cross-breeding for hundreds of thousands of years. "People made chihuahuas out of wolves, for God's sake," he said. How soon until our children can enjoy a *chicken-osaurus* complete with long bony tail and transformed wings? "Within the next five or ten years," he told *Popular Science*, along with other news outlets.

But despite the recent advances in biotechnology and genetic engineering research over the last two decades since the release of the original "Jurassic Park," we're not much closer to hatching a living dinosaur. So say leading scientists in the fields of animal biotechnology and genetics who provided quotes to GENeS, a news service for journalists that focuses on genetics, and founded with seed money from the Genetic Literacy Project. More specifically, the researchers say that life-sized dinosaur de-extinction remains a gargantuan task regardless of new hyped-up developments in cloning, targeted genome editing, like CRISPR/Cas, and synthetic biology.

"The idea that genetic engineering could get round the difficulties of bringing back creatures from prehistory is a classic example of ignoring the most important part of the entire process, which boils down to basic reproduction," said Mark Westhusin, a professor of veterinary medicine, one of the experts interviewed by GENeS who specializes in developmental biology and genetic engineering of animals. "We probably could genetically modify a dinosaur, but in order to do so we would still have to have a dinosaur we brought back first!"

Skeptical of Horner's claims about dinosaur pets is Alison Van Eenennaam, an animal geneticist in the department of animal science at the University of California, Davis, who told GENeS: "Chihuahuas exist because breeders repeatedly selected dogs with the desired appearance to be parents of the next generation and over hundreds of years developed the breed. This 'selective breeding' uses sexually compatible animals to produce the next generation and we can make crossbreds such as a mule which is a cross between a donkey and a horse—but only because the two species are sexually compatible (although the mule itself is sterile). But we cannot cross a dog and a cat. Period."

Biotechnology can now introduce new traits in some animals, like a fluorescent protein into a fish to make it glow, but Van Eenennaam said it's not at all like resurrecting a tyrannosaur. "That is a far cry from creating a dinosaur from bits of degraded DNA and a potpourri of genes from other species! We just do not have the biological understanding, nor technical skills to successfully perform such genetic acrobatics," she said.

Still yet another source of hype comes from recent developments in genome editing technologies. The [*Washington Post*](#) reported for example, that the more precise editing technique, CRISPR/Cas9 could

speed up the process of reverting chickens back into dinosaurs. Notably, famed Harvard geneticist George Church caught some press when he also discussed using the technology for de-extinction of other species such as [woolly mammoth](#).

Westhusin wasn't so optimistic about CRISPR/Cas9, however, saying that simply using the technology to splice gene sequences from a woolly mammoth into cells from an elephant in a cell culture was not sufficient to actually produce a *living* animal. "Cells growing in culture in an incubator are a long way from a whole animal walking around, breathing, eating, reproducing, etc. If we wanted to produce a whole animal then we would have to use cloning, a task people often take for granted as easy since we have cloned so many different animals nowadays," he told GENeS.

Should CRISPR/Cas9 actually work, however, cloning the animal itself would only be possible today is through a method called nuclear transfer, and that requires an egg. According to Jason Ross, associate professor of the Department of Animal Science, Iowa State University, "Using an egg source from a related animal may be feasible although the mitochondrial genome present in the recipient egg would be genetically unique in comparison to the mitochondrial genome of the nuclear donor cell or the extinct creature."

Still after injection into a suitable egg, the next major hurdle to face is the actual growth of a baby dinosaur, or a baby mammoth for that matter. Because once the DNA is inserted into a cell, there's the lack of an appropriate womb for the embryo for gestation. It's not as easy as putting a dinosaur embryo into an ostrich egg or a mammoth embryo into an elephant.

There are plenty of different factors that make it difficult for a closely related species to carry a pregnancy to term, such as immune system rejection or nutritional incompatibility, said Rowan Iwasaki, who studies synthetic biology at the University of Colorado, Boulder. One of the first attempts at de-extinction, for example, was that of a Pyrenean ibex that was cloned through a process of preserving cells from the last living of the species. But within a year after birth, it died of severe lung effects, so the idea of resurrecting dinosaurs that diverged 150 million years ago from its closest living relative still seems overly ambitious, he explained during a PreScouter webinar.

Additionally, the genome from any extinct animal would have to be complete to support development and reproduction and that is unlikely for nearly any extinct animal (unless they went extinct only recently). For these reasons, the merging of genes from multiple species into one species as suggested by the Jurassic Park movies is just unrealistic.

"While creating an animal that has multiple traits from different species might be feasible in the mind's eye, it is quite beyond what is scientifically or technically feasible, at least to the point that is portrayed in Jurassic World," Ross said.

So the greatest challenge facing dinosaur de-extinction is that DNA decays too quickly. Its [half-life](#) is only 521 years, meaning that after 521 years, half of the nucleotides forming the backbone of the DNA would be broken down, then in another 521 years the other half of remaining bonds would be broken down. Even under ideal conditions—trapped in amber or frozen in fossilized bone—dinosaur DNA [would've never](#)

survived intact for [more than 7 million years](#) let alone 60 million.

To be fair, not all journalists have bought into the hype surrounding dinosaur de-extinction. Or at the very least they've expressed skepticism about views espoused by Horner. Aside from their headlines, in fact, other responsible reporters have gotten the story right:

- “How biotech has us closer to living dinosaurs of ‘Jurassic World’” by Greta Kaul in [SF Gate](#) doesn't cite Horner, but does feature other scientists on the topic of de-extinction with this same point: “Fear not, the road from chicken to dinosaur is likely a long one. Researchers are not actively working on bringing a dinosaur to life, and de-evolving one species into an ancestor would involve many, many genes...”
- “What Could Live in a Real Jurassic World? A Chickenosaurus” by Brian Switek in [National Geographic](#) also has this nugget about the Harvard and Yale “dino-chicken” research: This method won't let us bring back *Velociraptor* or *Tyrannosaurus*. Those dinosaurs are long gone and never coming back.” and “It wouldn't be a moment of resurrection, but reinvention.”

The sad reality (or happy relief, given what happened in the movies) is that living dinosaurs are still nothing more than science fiction. But there's no need to be discouraged, both Switek and [Audubon](#) magazine suggest, because the fact is that dinosaurs aren't really extinct at all. They exist now as birds, alive and well, and even [sound](#) like the ones in the movies too.

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