

## Part 2

### Argument

**Directions:** Closely read each of the *four* texts provided on pages 11 through 17 and write a source-based argument on the topic below. You may use the margins to take notes as you read and scrap paper to plan your response. Write your argument beginning on page 1 of your essay booklet.

**Topic:** Should extinct species be brought back into existence?

**Your Task:** Carefully read each of the *four* texts provided. Then, using evidence from at least *three* of the texts, write a well-developed argument regarding whether extinct species should be brought back into existence. Clearly establish your claim, distinguish your claim from alternate or opposing claims, and use specific, relevant, and sufficient evidence from at least *three* of the texts to develop your argument. Do *not* simply summarize each text.

#### Guidelines:

##### Be sure to:

- Establish your claim regarding whether extinct species should be brought back into existence
- Distinguish your claim from alternate or opposing claims
- Use specific, relevant, and sufficient evidence from at least *three* of the texts to develop your argument
- Identify each source that you reference by text number and line number(s) or graphic (for example: Text 1, line 4 or Text 2, graphic)
- Organize your ideas in a cohesive and coherent manner
- Maintain a formal style of writing
- Follow the conventions of standard written English

#### Texts:

Text 1 – 3Qs: The Ethics of Species ‘De-extinction’

Text 2 – Bringing Them Back to Life

Text 3 – Case Against Species Revival

Text 4 – The Case Against De-Extinction: It’s a Fascinating but Dumb Idea

## Text 1

### 3Qs: The Ethics of Species ‘De-extinction’

Scientists are closing in on the capacity to clone extinct species using biotechnology and DNA samples from the ancient past, a process that is called “de-extinction.” The prospect of bringing back extinct species was discussed last week at a conference hosted by National Geographic and TEDx, in which many conservationists, geneticists, and biotechnologists supported the idea. We asked Ronald Sandler, a professor of philosophy at Northeastern and author of the new book *The Ethics of Species*, to share his take on what has been described as the “mind-blowing idea of the year.”

Extinction occurs when there are no longer living members of a species. To say that the woolly mammoth, passenger pigeon, and thylacine<sup>1</sup> are extinct is just to say that there are none left alive in the world. It is common in conservation biology and environmental ethics to claim that “extinction is forever.” This is thought to be part of what makes human-caused extinctions so bad—extinction does not just involve the death of individual organisms, but the permanent elimination of a form of life. However, it now appears that it is possible to use biotechnology to create living individuals of species that have gone extinct, perhaps even species that have been extinct for hundreds or thousands of years (so long as useable DNA samples are available in preserved specimens). This is “de-extinction.”

Part of what motivates those working on de-extinction are the scientific and technological challenges involved. It would be an incredible scientific accomplishment to be able to create organisms of a species that has been extinct for some time, such as the passenger pigeon or mammoth. (There have already been efforts to use established cloning techniques to bring back individuals of species that have been extinct for only a few years, such as the bucardo, a Spanish ibex.<sup>2</sup>) There is also a desire, on the part of many people, to see living examples of extinct animals (or plants), particularly charismatic or culturally valued ones, such as the ivory-billed woodpecker or thylacine. Some have claimed that bringing back species that were caused to go extinct by human practices would, to some extent, help make up for the wrong of the extinction. Finally, it may be that the biotechnologies and techniques involved can be used to help conservation biologists in their efforts to preserve highly endangered species. For example, it could help increase the genetic diversity of small populations or those in captive breeding programs. . . .

Finally, it is crucial that our approaches to species conservation can, as much as possible, scale to the extinction crises we face—potentially thousands of species going extinct each year. The only way to do this is by aggressively reducing the causes of extinction, including habitat destruction, climate change, pollution, and extraction. De-extinction does not do this, and it is important that it not reduce the urgency with which we address the causes of extinction and that it not divert resources from efforts to conserve currently existing species. So while de-extinction would be scientifically amazing and there is nothing intrinsically wrong with it, it is important to keep it in proper perspective from a species conservation perspective.

—Angela Herring  
excerpted from “3Qs: The Ethics of Species ‘De-extinction’”  
<http://phys.org>, March 25, 2013

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<sup>1</sup>thylacine — large carnivore

<sup>2</sup>ibex — mountain goat

## Text 2

### Bringing Them Back to Life

... The notion of bringing vanished species back to life—some call it de-extinction—has hovered at the boundary between reality and science fiction for more than two decades, ever since novelist Michael Crichton unleashed the dinosaurs of *Jurassic Park*<sup>1</sup> on the world. For most of that time the science of de-extinction has lagged far behind the fantasy. Celia's clone is the closest that anyone has gotten to true de-extinction. Since witnessing those fleeting minutes of the clone's life, [Alberto] Fernández-Arias, now the head of the government of Aragon's Hunting, Fishing and Wetlands department, has been waiting for the moment when science would finally catch up, and humans might gain the ability to bring back an animal they had driven extinct. ...

I met Fernández-Arias last autumn at a closed-session scientific meeting at the National Geographic Society's headquarters in Washington, D.C. For the first time in history a group of geneticists, wildlife biologists, conservationists, and ethicists had gathered to discuss the possibility of de-extinction. Could it be done? Should it be done? One by one, they stood up to present remarkable advances in manipulating stem cells, in recovering ancient DNA, in reconstructing lost genomes. As the meeting unfolded, the scientists became increasingly excited. A consensus was emerging: De-extinction is now within reach. ...

In *Jurassic Park* dinosaurs are resurrected for their entertainment value. The disastrous consequences that follow have cast a shadow over the notion of de-extinction, at least in the popular imagination. But people tend to forget that *Jurassic Park* was pure fantasy. In reality the only species we can hope to revive now are those that died within the past few tens of thousands of years and left behind remains that harbor intact cells or, at the very least, enough ancient DNA to reconstruct the creature's genome. Because of the natural rates of decay, we can never hope to retrieve the full genome of *Tyrannosaurus rex*, which vanished about 65 million years ago. The species theoretically capable of being revived all disappeared while humanity was rapidly climbing toward world domination. And especially in recent years we humans were the ones who wiped them out, by hunting them, destroying their habitats, or spreading diseases. This suggests another reason for bringing them back. ...

Other scientists who favor de-extinction argue that there will be concrete benefits. Biological diversity is a storehouse of natural invention. Most pharmaceutical drugs, for example, were not invented from scratch—they were derived from natural compounds found in wild plant species, which are also vulnerable to extinction. Some extinct animals also performed vital services in their ecosystems, which might benefit from their return. Siberia, for example, was home 12,000 years ago to mammoths and other big grazing mammals. Back then, the landscape was not moss-dominated tundra but grassy steppes. Sergey Zimov, a Russian ecologist and director of the Northeast Science Station in Cherskiy in the Republic of Sakha, has long argued that this was no coincidence: The mammoths and numerous herbivores maintained the grassland by breaking up the soil and fertilizing it with their manure. Once they were gone, moss took over and transformed the grassland into less productive tundra. ...

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<sup>1</sup>Jurassic Park — park in science-fiction novel, *Jurassic Park*, where dinosaurs are brought back to life

40 De-extinction advocates counter that the cloning and genomic engineering technologies  
being developed for de-extinction could also help preserve endangered species, especially  
ones that don't breed easily in captivity. And though cutting-edge biotechnology can be  
expensive when it's first developed, it has a way of becoming very cheap very fast. "Maybe  
45 some people thought polio vaccines were a distraction from iron lungs,"<sup>2</sup> says George  
Church. "It's hard in advance to say what's distraction and what's salvation." ...

—Carl Zimmer  
excerpted and adapted from "Bringing Them Back to Life"  
<http://ngm.nationalgeographic.com>, April 2013

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<sup>2</sup>iron lung — medical ventilator that enables a person to breathe

### Text 3

#### Case Against Species Revival

In the movie *Jurassic Park*, a tree extinct for millions of years delights the paleobotanist. Then a sauropod eats its leaves. This movie later shows us how to re-create the dinosaur but not how to grow the tree, which at that size would be perhaps a hundred or more years old, or how to do so metaphorically overnight. To sustain even a single dinosaur, one would need  
5 thousands of trees, probably of many species, as well as their pollinators and perhaps their essential symbiotic fungi.

De-extinction intends to resurrect single, charismatic species, yet millions of species are at risk of extinction. De-extinction can only be an infinitesimal part of solving the crisis that now sees species of animals (some large but most tiny), plants, fungi, and microbes going  
10 extinct at a thousand times their natural rates. “But wait”—claim de-extinction’s proponents. “We want to resurrect passenger pigeons and Pyrenean ibex, not dinosaurs. Surely, the plants on which these animals depend still survive, so there is no need to resurrect them as well!” Indeed, botanic gardens worldwide have living collections of an impressively large fraction of the world’s plants, some extinct in the wild, others soon to be  
15 so. Their absence from the wild is more easily fixed than the absence of animals, for which de-extinction is usually touted.

Perhaps so, but other practical problems abound: A resurrected Pyrenean ibex will need a safe home, not just its food plants. Those of us who attempt to reintroduce zoo-bred species that have gone extinct in the wild have one question at the top of our list: Where do  
20 we put them? Hunters ate this wild goat to extinction. Reintroduce a resurrected ibex to the area where it belongs and it will become the most expensive *cabrito* ever eaten. If this seems cynical, then consider the cautionary tale of the Arabian oryx, returned to Oman from a captive breeding program. Their numbers have declined so much that their home, designated as a UNESCO World Heritage site, was summarily removed from the register. ...

In every case, without an answer to “where do we put them?”—and to the further question, “what changed in their original habitat that may have contributed to their extinction in the first place?”—efforts to bring back species are a colossal waste.

De-extinction is much worse than a waste: By setting up the expectation that biotechnology can repair the damage we’re doing to the planet’s biodiversity, it’s extremely  
30 harmful for two kinds of political reasons.

Fantasies of reclaiming extinct species are always seductive. It is a fantasy that *real* scientists—those wearing white lab coats—are using fancy machines with knobs and digital readouts to save the planet from humanity’s excesses. In this fantasy, there is none of the messy interaction with people, politics, and economics that characterizes my world. There  
35 is nothing involving the real-world realities of habitat destruction, of the inherent conflict between growing human populations and wildlife survival. Why worry about endangered species? We can simply keep their DNA and put them back in the wild later. ...

The second political problem involves research priorities. I work with very poor people in Africa, Brazil, and Madagascar. Rich only in the diversity of life amid which they eke out  
40 their living, they generate no money for my university. Too many other universities equate excellence with funds generated, not with societal needs met. Over my career, molecular biologists flourished as university administrators drooled over their large grants and their expensive labs. Field-based biology withered. Many otherwise prominent universities have no schools of the environment, no ecology departments, no professors of conservation. It  
45 was all too easy to equate “biology” with molecules and strip faculty positions and facilities from those who worked in the field. De-extinction efforts can only perpetuate that trend.

50 Conservation is about the ecosystems that species define and on which they depend. Conservation is about finding alternative, sustainable futures for peoples, for forests, and for wetlands. Molecular gimmickry simply does not address these core problems. At worst, it seduces granting agencies and university deans into thinking they are saving the world. It gives unscrupulous developers a veil to hide their rapaciousness,<sup>1</sup> with promises to fix things later. It distracts us from guaranteeing our planet's biodiversity for future generations.

—Stuart Pimm  
excerpted from “Case Against Species Revival”  
<http://news.nationalgeographic.com>, March 12, 2013

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<sup>1</sup>rapaciousness — greed

## Text 4

### The Case Against De-Extinction: It's a Fascinating but Dumb Idea

... So what are the objections to an effort to start making amends for anthropogenic<sup>1</sup> extinctions by trying to restore the victims to life? The soundest scientific reason, in my view, is misallocation of effort. It is much more sensible to put all the limited resources for science and conservation into *preventing* extinctions, by tackling the causes of demise: habitat destruction, climate disruption, pollution, overharvesting, and so on. Spending millions of dollars trying to de-extinct a few species will not compensate for the thousands of populations and species that have been lost due to human activities, to say nothing of restoring the natural functions of their former habitats. ...

Resurrecting a population and then re-inserting it into habitats where it could supply the ecosystem services of its predecessor is a monumentally bigger project than recreating a couple of pseudomammoths to wander around in a zoo. The passenger pigeon is often mentioned as a target for de-extinction. Passenger pigeons once supplied people with abundant meat and likely helped to suppress Lyme disease. To create even a single viable population might well require fabricating a million birds or so, since the species apparently survived by a strategy of predator saturation. And if the swarm were synthesized, where could it be introduced? The vast forests the pigeons required are partly gone and badly fragmented at best, and one of the birds' food sources, the American chestnut, is functionally extinct. The passenger pigeon's previous habitat is utterly transformed, and if humanity does not very quickly and substantially curb greenhouse gas releases, the pigeon's old homeland will likely be completely unrecognizable in less than a century. In practical terms, in the near future in which action is required, extinction is certainly "forever."...

De-extinction thus seems far-fetched, financially problematic, and extremely unlikely to succeed on a planet continually being vastly transformed by human action. There are also risks beyond failure. Resurrected, previously benign organisms could become pests in new environments, might prove ideal reservoirs or vectors of nasty plagues, or might even harbor dangerous retroviruses in their genomes. But frankly, I think such problems will probably prove minor compared to the main problem, which is "moral hazard."

Moral hazard is a term invented by economists for a situation where one becomes more willing to take a risk when the potential costs will be partly borne by others. For example, if a person can get government flood insurance, she is more likely to build a beachfront home, worrying less about the risks of sea level rise. The problem is that if people begin to take a "Jurassic Park" future seriously, they will do even less to stem the building sixth great mass extinction event. We are already seeing species extinctions occurring at a rate at least an order of magnitude above prehistoric "background" rates (those outside of the past five mass extinction events), and that gives weight to the extreme seriousness of the current population extinction crisis. And while the critical problem of climate disruption tends to engross the attention of environmentally concerned people, the erosion of biodiversity is potentially equally crucial. The disasters to be caused by climate disruption could be resolved in a few hundred thousand years; recovery from a sixth mass extinction could easily take five or ten *million* years.

Right now the biggest moral hazard on the environmental front is created by the folly of "geoengineering" — the idea that, if humanity fails to limit the flux of greenhouse gases dramatically in the near future, overheating of the earth could be prevented by any one of a series of crackpot schemes. Biodiversity loss has not achieved the prominence of climate

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<sup>1</sup>anthropogenic — resulting from human activity

45 disruption, and it may not do so. But I've already had questions in classes and after speeches about the prospect of engineering biodiversity back into existence — always implying that “biodiversity” is giant ground sloths, ivory-billed woodpeckers, and the like. Moral hazard is already there, and if people ever wake up to their connections to the rest of the living world, it is sure to grow. ...

—Paul R. Ehrlich  
excerpted from “The Case Against De-Extinction:  
It’s a Fascinating but Dumb Idea”  
<http://e360.yale.edu>, January 13, 2014

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