The Sixth Extinction: An Unnatural History

by Elizabeth Kolbert

reviewed by Joshua Rosenau

Four hundred and forty-four million years ago, glaciers swept down from the poles, wiping out at least two thirds of life in the oceans (and scouring away anything living out of the water). Two hundred and fifty million years ago, a combination of factors including supervolcanoes and eruptions of methane from below the oceans (and possibly a meteorite impact for good measure) poisoned the oceans and blotted out the sun, causing a “Great Dying” that wiped out nearly all life in the oceans—96% of marine species disappeared. Two hundred and one million years ago, just as life was recovering from the Great Dying, a sudden climate change caused half of the species alive then to go extinct. Sixty-five million years ago, a meteorite struck near today’s Yucatan peninsula and wiped out the (non-avian) dinosaurs, along with three quarters of the other plant and animal species on the planet. And in the last few centuries, humans have started a sixth great extinction.

As with those past mass extinctions, the one currently under way marks a new geological age, with a new name. In recent years, geologists have come to see that not just the air and water, but the very rocks being laid down right now will look to future geologists not unlike the end of the last ice age, and have proposed formally naming the new epoch Anthropocene in honor of its anthropic origins. Elizabeth Kolbert’s The Sixth Extinction: An Unnatural History takes readers on a tour of these great extinctions, some of the species that went extinct and that are going extinct, the science that lets us track and—perhaps—avert extinctions, and the complex history of the very idea of extinction.

Extinction and speciation are opposite sides of the evolutionary coin, and they were discovered more or less simultaneously. In some ways, as Kolbert shows clearly, the discovery of extinction was even more radical than the idea of transmutation of species. The idea that species could change was scientifically widespread well before Darwin’s On the Origin of Species was published in 1859, with versions of such transmutation having been proposed by his grandfather Erasmus Darwin, as well as by Lamarck and other anatomists. By contrast, Georges Cuvier’s proposal in the early years of the 19th century that fossil creatures represent species that no longer exist at all was radical, and rejected vigorously by many scientists of his day. Part of Thomas Jefferson’s reason for sending Lewis and Clark to explore western North America was precisely to prove Cuvier wrong by finding living mastodons and other living exemplars to match fossils discovered in places like Big Bone Lick, Kentucky (not far from the so-called Creation Museum built by Answers in Genesis).

The idea of extinction also explains some of the resistance to Darwin’s theory of evolution today and in Darwin’s era. Natural selection’s reliance on death, and the role of extinction in creating gaps between what can then be recognized as species, struck many of Darwin’s
contemporaries as gruesome. It stands at odds with some theologies just as profoundly as the link between humans and other animals does for others.

That is not to say that conflicts over extinction have been mainly theological. Views on the timings and causes of mass extinctions have generated huge scientific controversy, from the difficulty Lyell's uniformitarianism had overcoming the catastrophism of earlier geologists to the neo-catastrophism that led people to hunt for asteroids explaining all mass extinctions once the Alvarezes showed that a meteorite caused the end-Cretaceous extinction. While scientific controversy persists, today's scientists tend to be more pluralistic. Kolbert quotes one describing the difficulty of explaining end-Ordovician extinctions: “You have a body in the library, and a half a dozen butlers wandering around, looking sheepish” (page 103).

In the Anthropocene, though, the situation is different. Extinctions still have many causes—she describes how bats and frogs are being wiped out by introduced fungi; tropical rhinos, birds, and trees are threatened by habitat destruction and fragmentation; and mastodons and other massive animals were wiped out as the expanding vanguard of humans entered new continents and islands. But while there are still many causes for extinction, they are linked by a single ultimate cause: humans. In an interview I conducted with her (Rosenau 2014), she asked whether I or any of NCSE’s members could offer a single example of an extinction in the last five hundred years that wasn’t linked to humans. (I couldn’t.)

The idea that humans today are causing an extinction comparable to that which wiped out the dinosaurs is increasingly scientifically uncontroversial, but it’s socially contentious, especially among those invested in denying climate change. Kolbert wastes no time comforting those readers, or others who might find all this talk of destruction, and humanity’s responsibility for it, disturbing. “It doesn’t matter whether people care or don’t care,” she says to those who say the onslaught of extinctions could be averted “if people just cared more and were willing to make more sacrifices.” Instead, “what matters is that people change the world” (page 266).

And Kolbert profiles some of the scientists trying to change it for the better, like those who returned condors to the wild, and those trying to do the same for rhinos and endangered crows, others creating clean rooms where frogs can breed safe from chytrid fungus, and those preserving clonable cells from dinging species in what one zoo calls a Frozen Ark and another The Frozen Zoo™ (extinction as a branding opportunity). But she hasn’t got much hope for those efforts. She acknowledges that they “could be invoked as a reason for optimism,” before adding, “And if this were a different kind of book, I would” (page 265).

Mass extinctions can’t be stopped species by species, because they are caused by massive disruptions to the interactions among lots of species. As humans rearrange the animals, plants, and microbes of the world, as we destroy vital habitats and change the climate, we alter and destroy delicately-entwined networks of interactions, and mass extinction is the inescapable consequence. At this point, keeping one species, like the condor, from going extinct again costs millions of dollars every year, and has no guarantee of long-term success, and it’s far from clear that the offspring of frogs rescued from fungal infection today will ever be able to return to the wild, or that there will ever be a place to release cloned offspring of the cells hibernating in that Frozen Zoo.
Throughout this unflinching exploration of extinctions past and present, Kolbert delivers a thrilling, intriguing, and loving narrative, with insightful and engaging portraits of scientists at work. Her ability to meld history and science with vivid nature writing, vibrant personalities, and vigorous adventures lets readers place today’s extinctions into a broad context: that of an Anthropocene epoch defined by the destruction of many lineages and homogenization of the world’s remaining biota. Her stark assessment of what is happening and who is causing it makes it impossible to put down *The Sixth Extinction* until the final meditation on humanity’s geological and evolutionary legacy.

**REFERENCES**


**ABOUT THE AUTHOR**

Joshua Rosenau is a biologist and Programs and Policy Director at NCSE.

**AUTHOR’S ADDRESS**

Joshua Rosenau
NCSE
PO Box 9477
Berkeley CA 94709-0477
rosenau@ncse.com

Copyright 2014 by Joshua Rosenau; licensed under a Creative Commons Attribution-Non-Commercial-NoDerivs 3.0 Unported License. http://creativecommons.org/licenses/by-nc-nd/3.0/