

Getting Close to the Edge

The Sixth Extinction: An Unnatural History

By Elizabeth Kolbert

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By Matthew Rothschild

This book is equal parts fascinating and horrifying. It's fascinating because it explains the way the biological world works. It's horrifying because it shows how ruinous our industrial footprint is on the globe.

It's not for nothing that Elizabeth Kolbert is a staff writer for *The New Yorker* and the author, previously, of *Field Notes* from *a Catastrophe*. She knows her stuff, and she writes compellingly. Each of her thirteen chapters tells a story about a particular creature or habitat, and how the radical transformations that humans have wrought over the past 200 years have jeopardized it.

There is a chapter on the great auk, whose last specimen was found in Iceland. There is a chapter on the die-off in Panama of golden frogs. There is a chapter on the Great Barrier Reef. Kolbert ventures to all of these places and writes lucidly about them.

A lot of the history of science in this book was new to me, though it's very accessible. For instance, I didn't know that there were five big periods of extinctions on Earth, when catastrophic events took an enormous toll. (Yeah, I knew about the asteroid and the dinosaurs, but I didn't know about the others.)

The "sixth extinction" of the title refers to the present, and the catastrophe that humans are causing today.

"No creature has ever altered life on the planet" the way we have, Kolbert writes.

The first part of the book is a scientific mystery story, or several wrapped into one. For instance, up until the late eighteenth century, no one even knew that a species could vanish off the face of the Earth. Kolbert tells us that even someone as wise as Thomas Jefferson proclaimed: "Such is the economy of nature that no instance can be produced of her having permitted any one race of her animals to become extinct."

But there was a little problem. People were finding enor-

Matthew Rothschild is the senior editor of The Progressive.

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Author of *FIELD NOTES*
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mous bones, in Russia and in America, that didn't correspond to any living animal. Scientists bent over backwards to deny this or to suppose that those animals were still roaming around somewhere.

Kolbert introduces us to the French naturalist Georges Cuvier, who finally, in 1796, came up with the idea of *especies perdues*, or lost species. Cuvier made his leap by examining the molars of a mastodon found in upstate New York and a woolly mammoth found in Russia. He recognized that these were not elephant teeth, as had been assumed, but the teeth of two distinct species that no longer existed. But he didn't stop there. He understood that there was "a world previous to ours," as he put it. And he asked: "What revolution was able to wipe it out?"

Charles Darwin, I learned from Kolbert, didn't believe that cataclysmic events altered the population of the Earth. He, like his predecessor Charles Lyell, believed in the slow and gradual work of natural selection over long periods of time—a theory that went by the name of "uniformitarianism." But he wouldn't have had a good explanation for the disappearance of the great auk, Kolbert points out, which "had obviously not been done in by a rival species gradually evolving some competitive advantage. They had all been killed off by the same species, and quite suddenly.'

Amazingly, Darwin's uniformitarianism wasn't overthrown, according to Kolbert, until the father-son scientist team of Walter and Luis Alvarez demonstrated in 1980 that "on an otherwise ordinary day sixty-five million years ago, an asteroid six miles wide collided with the Earth. Exploding on contact, it released energy the order of a hundred million megatons of TNT, or more than a million of the most powerful H-bombs ever tested. . . . Day turned into night, and temperatures plunged. A mass extinction ensued."

The point, Kolbert notes, is that during cataclysmic events, Darwin's theory of gradual natural selection doesn't work.

"In times of extreme stress," she writes, "the whole concept of fitness, at least in a Darwinian sense, loses its meaning: How could a creature be adapted, either well or ill, for conditions it has never encountered in its entire history?"

Today, Kolbert points out, humans are placing "extreme stress" on the Earth in many ways. For one thing, the ease of international travel has introduced invasive species into ecosystems that they couldn't have reached for tens of thousands of years.

"Global travel represents a radically new phenomenon," she writes. It

is turning the globe back into one giant continent. "Humans are running geologic history backward and at high speed," she says.

But more than global travel, it is ocean acidification and global climate change that are leading us to the sixth extinction, she argues.

"Having discovered subterranean reserves of energy, humans begin to change the composition of the atmosphere," she writes. "This, in turn, alters the climate and the chemistry of the oceans. Some plants and animals adjust by moving. They climb mountains and migrate toward the poles. But a great many—at first hundreds, then thousands, and finally perhaps millions—find themselves marooned. Extinction rates soar, and the texture of life changes.

Most species on Earth, she says, are not equipped to deal with the sudden rise in temperatures that our burning of fossil fuels has caused.

And while she tries to be hopeful in her last chapter entitled "The Thing with Feathers," she warns that humans may fall victim, too, to the sixth extinction, and that the planet may be overrun with giant rats.

She is blunt about what needs to be done.

"To argue that the current extinction event could be averted if people just cared more and were willing to make more sacrifices is not wrong, exactly; still, it misses the point," she writes. "It doesn't matter much whether people care or don't care. What matters is that people change the world."

Ifear I haven't done justice to the beauty of this book, or to Kolbert's marvelous methods: her hitching onto scientific expeditions, her encounters in the field, her close reporting on the fauna and flora, from rhinos to bats and insects.

I apologize for that.

Go read the book. •