

BOOKS & ARTS

Missing links in food-chain story

Our actions have driven top predators from much of the world, resulting in complex consequences for many ecosystems, explains **Stuart Pimm**.

**Where the Wild Things Were:
Life, Death and Ecological Wreckage of
Vanishing Predators**

by William Stolzenburg

Bloomsbury: 2008. 240 pp. \$24.99.

Walking in the dark across the forest clearing to my hut after dinner, I hear a tiger roar. The sound resonates through the trees making the animal sound frighteningly large, like some science-fiction monster. A herd of gaur — sleek, muscular and menacing wild cattle — then emerge from the shadows. “They, and not you, are tiger food,” tiger expert Ullas Karanth tells me, but the hairs on the back of my neck defy his reassurance. Being where predators can eat you is a rare experience, and getting rarer. What happens when they vanish from ecosystems is the subject of this entertaining book, *Where the Wild Things Were*.

Journalist William Stolzenburg describes how the removal of top predators affects species at lower levels in the food chain. He does so through the experiences of the researchers who discovered these relationships. He portrays prominent ecologists such as Robert Paine and Charles Elton in their graduate-student days, when their results were new and controversial.

Where the Wild Things Were starts with Paine’s 1966 influential paper on removing the starfish *Pisaster ochraceus* from rocky shores. His experiment was simple and effective, and has been imitated many hundreds of times. Paine showed that without the top predator, intertidal communities soon hold very different sets of species. Without predators, predator-sensitive species can take over communities in which they would otherwise barely survive.

On a vastly greater scale, scientists generally accept that humans exterminated many large animals shortly after their first contact with them. In the 1960s, geoscientist Paul Martin lectured on how the dung of giant sloths — “sloth shit” as he called it with relish — stopped accumulating across widely scattered caves in North and South America at much the same time, some 11,000 years ago. Martin’s result defied the conventional wisdom at the time, that noble savages could not have killed off the sloths so quickly and

over such a large area. This story was a pure historical reconstruction, for human impacts cannot be tested experimentally. However, the progression of human contact, first in Australia and later on smaller oceanic islands, provides some replication of this process.

At a scale between the neat experiments of Paine and Martin, Michael Soulé studied the absence of predators in Californian canyons accidentally isolated by the rapid growth of tract housing in San Diego. The longer the



Star turn: removing predatory starfish from shores allows different species to take hold.

isolation period and the smaller the canyon, the less likely were the few remaining large-bodied predators to survive. In their absence, smaller predators ran amok and eliminated ground-nesting birds. Ecologist John Terborgh investigated islands isolated by the flooding of Lake Guri in Venezuela. Similarly, a lack of predators on these islands precipitated an intricate set of cascading changes, involving plants, insects and vertebrates. Jim Estes, a marine ecologist, carefully pieced together the interactions of killer whales, sea otters, urchins and kelp by combining historical and geographical sources. Again, the message is complexity — urchins eat kelp, sea otters reduce urchin numbers and are thus good for kelp — and so on, up a long food chain involving these and other species.

Stolzenburg’s emphasis on history is also a weakness of the book, which stops short of present theory and practice. In 1960, Nelson Hairston, Fred Smith and Larry Slobodkin proposed that the world is green because predators keep herbivores under control and allow plants to flourish. Two decades later, Lauri Oksanen and his colleagues posited that a green world makes little sense if you are standing in tundras, deserts or grasslands. Where plant production is very low, the few transient herbivores eat little overall so their removal would not be noticed. In slightly more productive systems, more abundant plants support effective herbivores that can strip the greenery but are not themselves eaten by larger predators in significant numbers. Only in the most productive ecosystems would predators control herbivores and greenness prevail.

Whatever the merits of these arguments, the ubiquity of top-down predation is still being debated. Stolzenburg acknowledges this in his epilogue, but quickly concludes that predators are in control, pounding home the point with examples in every chapter. Decades of experiments show that nature is more nuanced.

Stolzenburg is forthright about the consequences. “Ecological wreckage in a land of vanishing predators” is part of the subtitle, and the back cover page notes “chaos in their absence, brazen mobs of deer, marauding racoons, urchin-scoured reefs, [and] bizarre impoverished landscapes of pest and plague” as examples.

The loss of predators is a bad thing, but the outcomes of experiments, following Paine’s intertidal work, are more complex than this simple Armageddon. Remove a predator and the odds are nearly equal that a given prey species will flourish or flounder. A prey species can easily decrease if the predator controls another prey species that, when unchecked, can outcompete its opposition. As Bruce Menge showed in 1995 in his insufficiently appreciated synthesis, this is but one common pattern in many possibilities. Moreover, communities with more species display richer patterns.

What might we do about the loss of predators? In *Where the Wild Things Were*, Stolzenburg discusses only “re-wilding” — a fanciful attempt to return North American

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ecosystems to how they were before humans intervened. Natural ecological processes could be revived in US prairies, for instance, by replacing long-extinct mammoths, sabre-tooth cats and rhinos with their twenty-first-century ecological equivalents from Africa. One should not deny a man his fantasies, but the reality of restoring large species provides more immediate, yet still important challenges, including how much land is needed for various species.

The American Prairie Foundation is restocking prairies with pure-bred bison and smaller species, such as prairie dogs and their highly endangered predators, the black-footed ferret. The Wildlands Project is a US effort to connect existing wild areas from Alaska to Mexico to make them large enough to support large viable populations of predators. Its South African equivalent, the Peace Parks Foundation, notes that even the national parks of Africa are not always large enough to support lion and wild dog populations, and wants to connect them into 'mega parks'.

Another South African experience is not widely appreciated. During that nation's decades of political and academic isolation, game biologists conducted hundreds of mostly successful reintroductions of many herbivore species, including rare black rhino, black wildebeest and bontebok antelope, to their historical range in dozens of provincial parks. Numerous private game reserves have now extended those experiments, raising practical but difficult questions about how large reserves must be to hold predators or even their prey.

A few years ago, I sat munching on my lunchtime sandwich, watching wildlife that ought only appear together in a dream. Fifty wild horses stared at me. The red deer grazing behind them were oblivious. Farther away a large flock of barnacle geese had stopped to breed, and overhead soared a breeding pair of sea eagles. Wild horses have long disappeared from Europe; in the twentieth century, barnacle geese bred only in the high Arctic, and deer and eagles were found only at the sparsely populated fringes of the continent. Some 5 metres below sea level, the Oostvaarderplassen nature reserve in the Netherlands is an unlikely place to have restored something close to Europe's post-Pleistocene fauna. That these big, wild things now live there shows that nearly anything is possible. Surely, the exciting story is where the wild things were, and will be once again. ■

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Science wars revisited

Beyond the Hoax: Science, Philosophy, and Culture

by Alan Sokal

Oxford University Press: 2008. 488 pp.
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What a difference a decade makes. In the mid-1990s, scientists and academics studying scientific culture were at each other's throats. The scientists thought the sociologists, historians and literary critics were ludicrously ignorant of science, making all kinds of nonsensical pronouncements. The other side dismissed these charges as naive, ill informed and self-serving. The exchanges became known as the science wars.

In 1996, physicist Alan Sokal landed in the centre of this fray by fooling the editors of the journal *Social Text* into publishing as a serious contribution his hilarious parody of cultural studies of science. His new collection of essays, *Beyond the Hoax*, lets us know what he has been up to on the cultural front in the decade since.

At the peak of the science wars, in 1997 Sokal and I both attended an extraordinarily interdisciplinary symposium in Santa Cruz, California. Sparks flew and proclamations of the imminent end of civilization were voiced by many in a large auditorium packed with partisans. Later that year I joined a smaller, less contentious gathering at the University of Southampton, UK, which resulted in a book. In *The One Culture? A Conversation About Science*, a diverse group, including Sokal and me, stated positions, commented on the positions of the others, and commented on the comments. I date the return of peace to academia to 2001, the year this book came out.

Other things happened in 2001 to take the steam out of the science wars. The new administration of George W. Bush decreed strict constraints on federal support for US research on embryonic stem cells, in an early example of its readiness to place ideology over science (and other forms of expertise). This provided a tough new standard against which to measure threats to science. And on a single morning, 3,000 people were murdered by terrorists in the United States in a horrifying demonstration of the real fragility of civilization. As a sign that the science wars are over, I cite the 2008 election of Bruno Latour — one of Sokal's favourite bêtes noires — to Foreign Honorary Membership in that bastion of the establishment, the American Academy of Arts and Sciences.

Beyond the Hoax gives us a memento of those fraught but innocent days of the 1990s. It begins with a reprint of the famous parody, accompanied by a rambling commentary that could itself be a parody of pedantic literary explication. This facing-page exegesis is set in so tiny a font that it gets farther and farther ahead of the text, ending halfway through the article so that all pages from 50 to 90 that would have had even numbers are blank. The commentary explains the jokes, teaches bits of physics, expands on cited texts, and addresses subsequent criticisms. Hoax fans ought to enjoy it.

In a preface, Sokal announces his "visceral distaste for books that have been confectioned by pasting together a collection of loosely connected, previously published essays". His book, he explains, is different. These ten essays (seven previously published) "form, I believe, a coherent whole". But virtually everyone who publishes a collection of essays believes they form a coherent whole. Sokal's obliviousness to this is an early indication of a complacency about his own views, and a lack of imagination about what others might be thinking, that undermines much of what follows.

Take, for example, what he says about Arkady Plotnitsky's interpretation of an obscure reply by the controversial, charismatic, deconstructionist philosopher Jacques Derrida, lampooned as meaningless nonsense in Sokal's hoax and by earlier science warriors. Derrida was asked whether Einstein's view of space-time might contain an example of a subtle Derridean concept, 'the centre of structure'.

Sokal acknowledges that Plotnitsky "has a fair knowledge of physics", but this fails to capture the unique role Plotnitsky played in the 1990s as the sole participant in the conversation who was as comfortable with theoretical physics and mathematics as he was with literary theory, sociology and science history. Plotnitsky took several pages to elucidate the technical concept of a 'centre', on which the much-maligned comment hinges, before suggesting what Derrida might have been getting at. This demonstration that Derrida's remark need not sound absurd if you are as well acquainted with Derrida as you are with Einstein, is dismissed by Sokal for three reasons: Plotnitsky gives two possible readings, "he offers no evidence that Derrida intended (or even understood) either of them", and Derrida was alive at the time so "why not just ask him?"

Or take Sokal's remarks about the physicist, biologist, and historian and philosopher of

"Proclamations of the imminent end of civilization were voiced by many."