

Graduate Center, has produced a rare gem. Rosenberger fell in love early with the New World primates, has never stopped loving them, and now shares his expertise and delight with an energy that makes one wonder how he could already be “emeritus.” It is rare to be able to view a full clade, a unique radiation of mammals in this case, through the eyes of someone who has studied them so thoroughly throughout a lifetime, a researcher who is able to write about them with such clarity.

New World Monkeys sweeps through anatomy, taxonomy, behavior, paleontology, and biogeography with ease. Rosenberger has delved deeply in each of these areas during his career. South America’s long isolation has produced a bold, yet mysterious, evolutionary experiment in the New World monkeys, also known as platyrrhines. While it makes sense to call the primates of Central and South America monkeys, they are not as closely related to the macaques, baboons, and other monkeys of the Old World as we are. Rosenberger introduces us to New World monkey anatomical distinctions in a context of overall comparative primate anatomy. The book’s line drawings, charts, and color plates support this introduction beautifully.

Rosenberger provides several firsthand accounts of events that had a big impact on his career: his involvement with the analysis, just days after its discovery, of the spectacular *Killikaike blakei* fossil on the coast of southern Argentina; his fieldwork as a young graduate student with his undergraduate mentor, Warren Kinzey, in the jungles of Peru studying the little-known Titi monkey, *Callicebus*; his work with a team of Japanese paleontologists evaluating a fossil with subtle anatomical ties to the modern Owl monkey, *Aotus*. All these episodes are related with a buzz of underlying excitement. He writes of the start of his career:

[M]y sanctum became the study collections of skeletonized and preserved primates in the American Museum of Natural History.... [E]volutionary puzzles and anatomical questions could be probed by studying skulls, teeth, limbs, and pelts.... In the stacks, I could turn the pages of rare, oversized, leather-bound volumes dating back 200 years and more, with hand-colored illustrations describing wild primates never before seen by Europeans and with gorgeous lithographs depicting the minute anatomical details of newly discovered skulls and tiny fossil teeth. (xvi–xvii)

Rosenberger loves primate paleontology, and the section on the platyrrhine fossil record is the longest in the book. He details many unresolved questions! In a marvel of publishing efficiency, Rosenberger’s paleontology chapter concludes with a section on *Ucayalipithecus*, referencing the announcement of this new fossil from Peru made in *Science* in April 2020! *Ucayalipithecus* appears to represent a group of anthropoids long known from the Fayum deposits of Egypt: in other words, another immigrant by whatever route, but a member of a separate clade that has no modern (or other fossil) members in the Western Hemisphere.

In his penultimate chapter, Rosenberger painstakingly sets out what he sees as the colossal impossibility of rafting from Africa to South America, even though the continents were closer 40–50 million years ago. Most primate researchers have “accepted” the rafting hypothesis, perhaps mostly because there has been zero evidence of fossil ancestral forms found along a northern migration route from either Asia or Europe, and any such migrants heading south from North America still would likely have faced open-water crossings during the early Cenozoic to get to island South America. But Rosenberger has put a marker down, proposing that ancestral New World monkey fossils will ultimately be found along one of these northern routes.

Finally, Rosenberger reviews, with controlled sadness, the appalling habitat destruction and the danger of lineage extinction, not to mention species extinction, throughout the New World monkeys’ habitats. The data are profoundly depressing. To counter this awful prospect, he details the currently successful efforts to restore and save both the golden lion tamarin (*Leontopithecus*) and the murrelet (*Brachypteryx*). But despite these admirable successes, “vast tracts of the landscape that New World monkeys inhabit” have been “modified, destroyed, and eliminated” at such a speed that it is “impossible for the natural processes of evolution and adaptation that produced the radiation to continue as [they have] for tens of millions of years” (285). There may be some survivors of these abrupt changes, but the scale of the loss will be stunning.

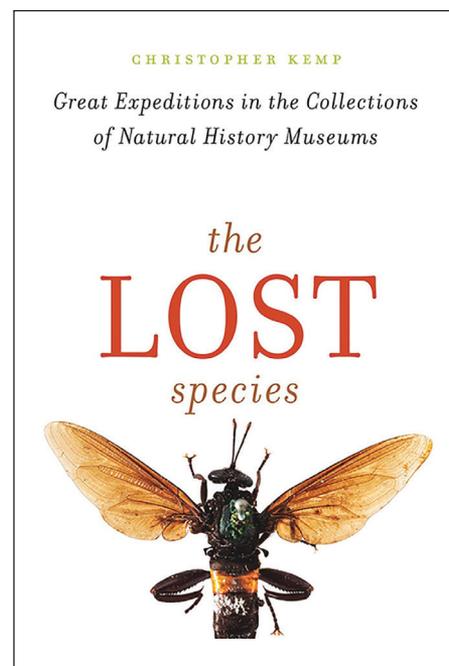
My only quibble with Rosenberger’s writing is his frequent use of “design” language when referring to anatomical structures. Evolutionary scientists see natural selection as a process that “designs” structures, but the language of design has been co-opted by groups that seek to undermine and challenge the teaching of evolution in

the nation’s public schools. Rosenberger has provided a basket of quotations for such groups to misuse. It would have been easy to prevent this. For example: “... the shapes and orientations of lower crowns are especially designed to facilitate opening the woody shells of heavily protected fruits. Evolution typically generates elegant solutions so that structures are designed to perform more than one role” (188; emphasis mine). Science teachers’ lives would be made easier if this read: “... the shapes and orientations of lower crowns facilitate opening the woody shells of heavily protected fruits. Evolution often results in elegant structures that perform more than one role.”

This is an admirable book, ready to be enjoyed by primate specialists and general readers alike.



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The Lost Species: Great Expeditions in the Collections of Natural History Museums. By Christopher Kemp. 2017. University of Chicago Press. (ISBN 978-0-226-38621-8). 250 pp. Hardcover, \$30.00.

The Lost Species is a series of fascinating and unusual adventures in biological discovery. These take place not in mysterious far-flung locales, but in the dusty jars and drawers of the world’s natural history collections. The world’s museums house vast numbers of preserved biological specimens

(over one billion specimens in the United States alone), of which only a tiny fraction – usually less than 5% – are on display to the public. This unseen majority, however, provides a vast “mine of information” where observant researchers can constantly “stumble upon new things.” (These discoveries are ongoing – readers may remember 2020 news reports of a “saber-toothed anchovy” found in a fossil that had been in the University of Michigan collection for over 40 years.) It turns out that museum collections are gold mines of new species waiting to be discovered, sitting on shelves or in jars for 50, 100, even 150 years without recognition. One researcher is quoted as saying, “I guarantee you there are hundreds if not thousands of yet-to-be-recognized species essentially hidden in our collections.... [T]hey’re just chock full of undescribed species.”

Each chapter of *The Lost Species* focuses on a single biological group. Biologists scour the world’s collections making new species discoveries: land snails, a marine roly-poly, pygmy salamanders, bandicoots, African squeaker frogs, cichlids fish, and saki monkeys are all foci of individual scientists’ intense scrutiny. Each short chapter gives a snapshot of a species, a scientist, a taxonomic puzzle, and how that species furthers understanding of biology and biological processes as a whole. Although many of the

specimens are small, old, hidden, or forgotten, their discovery adds to our understanding of bigger-picture topics. Ecosystems and ecological preservation, biodiversity hot spots and microhabitats, keystone species, introduced species and biological control, biomimicry, and evolution and adaptive radiation are all key to the description of each species.

The Lost Species is not just about the specimens, however. Contemporary and past researchers, as well as the history and culture of the times in which they work, are central to each chapter. The progress of scientific approach and technology is evident. Revisiting specimens collected decades ago allows scientists to employ techniques such as CT scans and DNA sequencing that were unavailable to the original collectors. Science appears in action, both as dogged persistence (biologists visiting dozens of museums around the world in pursuit of individual specimen samples) and as serendipity (the discovery of two halves of a tiny beetle stored separately for almost a century, which, finally untied, allowed for description of a new species). Biological chance is evident, as species become extinct in the wild, existing only as preserved specimens in the depths of museums – having a “second life as a representative.” Even the museums are threatened, and as collections become deactivated or closed through lack

of funding, collections become inaccessible for further research.

Although stemming from musty shelves and aging specimens, this is far from a dusty read. Indeed, any teacher or student interested in biology, ecology, evolution, and the history and process of science will find adventure and discovery in the pages of *The Lost Species*.



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