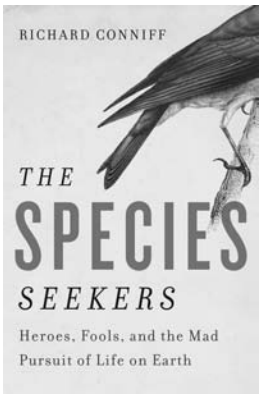
Further on, in the wood down there, they've got no names.
—Lewis Carroll. 1871. *Through the Looking-glass, and What Alice Found There*

The Species Seekers: Heroes, Fools, and the Mad Pursuit of Life on Earth. Richard Conniff. W. W. Norton, 2011. 480 pp., illus. $17.95 (ISBN 9780393341324 paper).

"A rose by any other name would smell as sweet." True enough, but would Shakespeare have dreamed that there would one day be a hundred names for roses, each labeling a species with a scent of its own? A century after Shakespeare, the Swede Carlos Linnaeus began this global naming quest, and how remarkably sweet it would prove to name a species. Over time, the Linnaean rules of nomenclature have been modified, but the extraordinary pleasure of christening an organism new to science remains intact. Perhaps this explains why the seemingly esoteric debates of systematics have often been so heated: The choice of phenetics, cladistics, or phylogenetic systematics affects whether a scientist can describe, name, and retain cherished taxa.

Species Seekers: Heroes, Fools, and the Mad Pursuit of Life on Earth covers natural history from the days of Linnaeus to the early twentieth century. Although the book is directed at nonspecialists, its content is consistently smart and intriguing enough to please professional biologists. I enjoyed, for example, the descriptions of how, before the establishment of most public museums, novel specimens were purchased at great cost from dealers and were shown primarily as public amusements at taverns, at coffee houses, and in private collections. I was also fascinated by the accounts of early attempts at preservation techniques. Certainly, the study of exotic species was initially not for the squeamish: Sometimes, whole collections would rot completely away before an expert had the chance to study them.

Although I was disappointed to find no reference to the botanist Richard Spruce, and even the great Alexander von Humboldt is mentioned only briefly, the book does justice to dozens of underappreciated naturalists. Among them is a favorite of mine, Mary Kingsley. Conniff describes Mary stumbling through the forests of west Africa, confused by the riot of nature all around, until a tribal hunter recognized that she had had a "moment of revelation, remarking, 'Ah, you *see*.'" I, like other field biologists, relate to her



experience: In a daze from the sweltering exertions of a long search, I have collapsed to the ground only to find one of the species I have been seeking coming into focus—a spider or an ant. For the luckiest and most gifted species seekers, such moments have included grander revelations. Years of immersion in nature, isolated from ordinary distractions, provided special opportunities for their minds to move along fresh channels. This led, for example, to Alfred R. Wallace's realization during his long travels in Asia of the concept of natural selection, independent of Darwin's discovery of the idea.

Species seekers have always been far more than mere novelty collectors; they have given us many of the core ideas of biology. Beyond the obvious case of Darwin, Conniff considers the ways in which these collectors have changed how we view the world. By placing man in a single system with other organisms, Linnaeus, like Galileo before him, paved the way for seeing our species as less central to the universe, and taxonomic groupings turned out to mesh easily with Darwin's evolutionary trees. As Conniff describes, Linneaus therefore inadvertently primed later naturalists to take an evolutionary point of view.

Some of these new ideas did not pan out, however. In 1749, the Frenchman Georges-Louis Buffon proposed that the inhospitable climate of the New World made American species "smaller and less capable"—humans included. Thomas Jefferson, who was president of the American Philosophical Society and was devoted to natural history, during his terms as vice president and president of the United States, was determined to prove Buffon wrong. Jefferson thought a beast he called a "mammoth" (now known as the mastodon), known then from a fossil tooth, to be larger than any European animal. Looking for a live mammoth in the American West seemed reasonable to Jefferson on the basis of Indian myths and especially because species extinction was at that time a foreign idea to science. (That would change by the end of his life.)

By the end of the nineteenth century, scientists were describing new parasitic species and elucidating their life cycles; Conniff describes this work of immense practical value as part of the species-seeker tradition. A tale of how Patrick Manson and Ronald Ross figured out the source of malaria makes for dramatic reading. The book ends by bringing us up to speed with a brief overview of species seekers today.

The book addresses both the high and the low points of what it was like

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to be one of the first species seekers. Conniff notes how they "were fanning out across the globe to play their part in a fabulous adventure story," but he also makes clear that "adventure was often just a nice word for prolonged hardship followed by painful death." The author knows of what he speaks. Conniff has spent months with systematists as a contributor of articles on such creatures as fire ants and leeches for the *National Geographic* and *Smithsonian* magazines, but this book omits these firsthand experiences except to reference Conniff's participation in one expedition to Ecuador with two unnamed naturalists, who, he says, later died "when their reconnaissance plane crashed into a cloud forest." Any field biologist will recognize this brief description of the incomparable botanist Alwyn Gentry and ornithologist Ted Parker III.

I once spent a week with Conniff, who persevered nightly clouds of mosquitoes in a search for *Avicularia* tarantulas. Six years later, I was the entomologist on an expedition in Myanmar with my friend, cobra expert Joe Slowinski, when Joe was bitten by a krait—a snake whose "bite is as dangerous as the cobra's," as Rudyard Kipling described it in *The Jungle Book* story, "Rikki-Tikki-Tavi." Joe passed away the next day, and Conniff includes him (along with Gentry and Parker) in his "necrology," a listing of the people who died while looking for new species. Joe collected many new species of reptiles and amphibians during his lifetime but had been proudest of the spitting cobra he discovered and named, *Naja mandalayensis*. So the allure of naming species lives on (or of having one named after you, as was the case after Joe's death: *Bungarus slowinskii*, a krait from Vietnam).

Slowinski, like Gentry and Parker and the taxonomists before them, worked with almost religious fervor despite the risks. Early naturalists had reason to believe their struggles would have an end, certain that the number of species would be limited. After all, how many creatures could fit on Noah's Ark? Describing species was therefore considered, as Conniff puts it, "one of the most important and enduring achievements of the colonial era," and indeed by the mid 1800s, English biologist Richard Owen claimed that "nothing remained for naturalists but the business of classification and arrangement."

Today, most estimates place the number of species on Earth at 10 million or more, about 2 million of which have been identified so far. With accelerating habitat loss, species are vanishing before our eyes—ironically, in most cases, even before a biologist manages to see them, let alone name them. Much has changed since Jefferson's quest for the mammoth: The concept of extinction has become part of the public awareness and an everyday reality. Because Conniff has focused on the origins of species collecting, his detailed narration ends in the early twentieth century. But as he says at the end of *The Species Seekers*, our loss of innocence about extinction makes the centuries-long obsessive mission of the field biologist, first set in motion by Linnaeus, as pressing as ever.

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CRACKING THE SEEDS OF EVOLUTIONARY CAUSALITY

In Search of the Causes of Evolution: From Field Observations to Mechanisms. Peter R. Grant and B. Rosemary Grant, eds. Princeton University Press, 2010. 304 pp., illus. $49.95 (ISBN 9780691146959 paper).

Darwin once wrote briefly on variation in finch beaks, and our world has never been the same. Although he wrote a great deal more about barnacles and orchids than he ever did about his eponymous birds, most of us received our first real introduction to evolutionary biology through the eyes (or beaks) of Darwin's finches. Indeed, who among us cannot recall Darwin's observation that these birds displayed subtle variations in beak size and his prediction that this variation would tend to favor those individuals whose beaks provided increased access to food resources, over time leading to divergence among groups?

One might wonder why, after such an astute observation made by one of the greatest minds in the history of evolutionary biology, a team of field biologists would spend decades of their lives camping on rocks in the middle of nowhere repeating this same observation. And yet, that undertaking is just what spawned the single greatest legacy of modern field studies in evolution. Peter R. Grant is the Class of 1877 professor of zoology (emeritus) at Princeton University; B. Rosemary Grant is professor emeritus of ecology and evolutionary biology at Princeton. The couple has spent nearly 40 years studying evolution together on the Galapagos Islands, documenting patterns and processes, and inspiring multiple generations of evolutionists in their wake. One may safely assert that no single research program has done more to illuminate the path of evolutionary field biology. It is fitting then, that *In Search of the Causes of Evolution: From Field Observations to Mechanisms*, which celebrates decades of achievement and influence, should mark their formal retirement.

Yes, they made the same observation that Darwin made so long ago. Their early work measuring annual variation in bill morphology revealed progressive changes in shape that were linked to patterns of food abundance and rainfall. Subsequent efforts in husbandry showed heritable variation in

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