



## **In Search of the Causes of Evolution: From Field Observations to Mechanisms**

Author: Calsbeek, Ryan

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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.

MARK W. MOFFETT

Mark W. Moffett ([mark@doctorbugs.com](mailto:mark@doctorbugs.com)) is a research associate with the National Museum of Natural History at the Smithsonian Institution in Washington, DC, and a contract photographer with National Geographic magazine.

Dr. Moffett is a winner of the National Outdoor Book Award in the Nature and Environment category and winner of the 2010 PROSE Popular Science Award for *Adventures among Ants*.

## 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

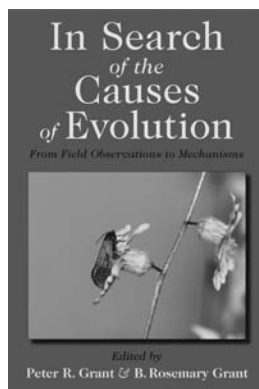
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bill traits, which, when combined with the measures of natural selection made in the wild, roughly predicted the net change in bill morphology seen in their data. More recently, the Grants have been investigating the genetic and genomic basis of variation in bill morphology and, perhaps the icing on the cake, have begun documenting the first stages of the origins of a new lineage of Darwin's finch.

*In Search of the Causes of Evolution* brings together just a small fraction of the biologists who have felt the Grants' influence in their own work. Composed of four related parts, the book covers a breadth of subdisciplines within evolutionary biology: life's origins and macroevolution, the molecular mechanisms that underlie evolutionary change, patterns of behavioral and morphological evolution, and the action and adventure stories of evolutionary field ecology. The book necessarily leaves out large chunks of evolutionary thinking; the specific fields that fail to make the cut include population genetics (except for brief coverage in section four), the statistical measurement of selection, and adaptive landscape theory. But the book is not intended to provide a comprehensive survey of the discipline. Rather, each of the four sections gives the contributors an opportunity to explore the influence that the Grants have had on their research programs and to highlight some of the Grants' own favorite fields of inquiry.

*In Search of the Causes of Evolution* will inspire biologists in the field, at the laboratory bench, and in the classroom. Many of the individual chapters are gems of evolutionary thought. High points include an exploration of classical ideas from novel perspectives, touching on the authors' work, but they often delve into the historical, the whimsical, or just thoughtful speculation. Like any edited volume, however, the book also suffers from a handful of weaker chapters that are comparatively lacking in novelty and insight. Fortunately, these sections are outnumbered by their more thought-provoking counterparts.

Although the individual chapters of an edited volume will often stand alone on their own merit, a volume that is composed of four disparate parts, with topics ranging from life's origins



to the morphology–performance relationships of algae and flying frogs, might easily seem disjointed. In this case, most of the chapters are written without a clear attempt to link the authors' research with other contributions in the book. To ameliorate this issue, Peter and Rosemary Grant introduce each section with a short essay highlighting the central themes contained within each of the four parts—and this is where the book truly shines. The Grants' commentaries weave the sections into a cohesive unit that will make excellent fodder for graduate student reading groups, classroom discussions, and personal consideration.

While reading this book and preparing this review, I had the good fortune of sitting in the audience at a seminar presented jointly by Peter and Rosemary Grant. Their seminar, a team effort like the rest of their endeavors, closely reflected the sentiment captured in the book's final chapter, written by the Grants and in a closing commentary by evolutionary biologist David Wake. Together, these two contributions paint a picture of a research program that will continue to inspire long after their retirement. With their appreciation for the changing toolkit available to evolutionary biologists, the Grants relish opportunities to explore evolution at the level of genes and genomes, but also at the level of individuals and populations. They encourage their fellow biologists

to seek to explain biological diversity at multiple levels, both inside and outside the cell. The interdisciplinary approach advocated by these two masters of their craft is well represented by this celebration of their careers. I heartily recommend *In Search of the Causes of Evolution* as a worthwhile addition to every biologist's bookshelf. Some may prefer to pick and choose the chapters of greatest relevance to their own careers, but all will appreciate the insights gleaned from the Grants' perspective.

The greats are often loath to retire. At the conclusion of the seminar, the Grants announced that they were off to the islands in just a few days. They were eager to see if the new finch lineage was still breeding. Therefore, although they have “formally” retired, their work continues, and thankfully we can look forward to more of their inspirational work in the future.

RYAN CALSBEEK

Ryan Calsbeek ([ryan.calsbeek@dartmouth.edu](mailto:ryan.calsbeek@dartmouth.edu)) is an associate professor in the Department of Biological Sciences at Dartmouth College in Hanover, New Hampshire.

## POLLUTION IS NOT GOOD FOR YOU

**Is a Little Pollution Good for You? Incorporating Societal Values in Environmental Research.** Kevin C. Elliot. Oxford University Press, 2011. 264 pp., \$65.00 (ISBN 9780199755622 cloth).

**A**uthor Kevin C. Elliot, an associate professor of philosophy at the University of South Carolina, is interested in how the philosophy of science and practical ethics interconnect and how they are involved in controversial research topics in contemporary pollution research that are relevant to public policy. His book, *Is a Little Pollution Good for You? Incorporating Societal Values in Environmental Research*, follows his

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