

Book Review

Losos' lizards

Lizards in an Evolutionary Tree: Ecology and Adaptive Radiation of Anoles by Jonathan B. Losos. University of California Press, 2009. US\$75.00/£30.95 (528 pages) ISBN: 978 0520255913

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On the eve of departure for PhD programs elsewhere, undergraduates who have worked in my lab often ask me for parting words of wisdom to help prepare them for the next stage. My first advice is to “read the naturalists”, and I point them to great works of scientific natural history. The best such books are filled with keen observations on particular groups of organisms and informed hypotheses to explain pat-

terns discovered. Many of the ideas are relevant to contemporary issues in ecology and evolution while also including insights into processes not yet receiving attention. Such works also assemble tests of ideas, and so move understanding forward. In this way great works of scientific natural history provide endless inspiration for new research. I read Lack's magnificent 'Darwin's finches' [1] as a graduate student and still recommend it (with recent masterpieces on the same system by the Grants). Jonathan Losos' new book on the *Anolis* lizards is a work of comparable value that will likewise be the starting point of many careers. It stands among the most informed and engaging accounts ever written on the ecology and evolution of a group of organisms in nature.

Losos has been a passionate observer of anoles from an early age, and his lucid writing and clear-eyed perspectives accompanied by beautiful and instructive images make the work a compelling read. He has much to say about a group that has almost 400 described species exhibiting a fantastic array of conspicuous shapes, sizes, colors and behaviors. A significant fraction of the work is devoted to observations on the lives and circumstances of different types of species, all of which puts the conceptual issues into context.

Anolis has attracted the attention of some of the most prominent and inventive researchers in ecology and evolutionary biology, including Losos himself, and these lizards have played a disproportionately large role in the development and application of many core concepts in our field including character displacement, competition and community structure, species-for-species matching, phylogenetic comparative methods, historical contingency, stages of adaptive radiation, the speciation–area relationship, and the link between morphology, performance and fitness. Losos thoughtfully integrates these concepts and patterns, adds his own insights and viewpoints, and succeeds in drawing a comprehensive picture of the processes

that have driven adaptive radiation in *Anolis* and structured the diverse communities that resulted.

The heights of synthesis occur as Losos addresses the repeated evolution of distinct lizard 'ecomorphs' on the different large islands of the Greater Antilles (Cuba, Hispaniola, Puerto Rico and Jamaica). Each ecomorph is a collection of species of diverse phylogenetic origin that exploit similar perches and that share a suite of morphological and behavioral adaptations. Losos thinks aloud on the implications of such parallel and convergent evolution, on the difficulties of reconstructing the sequence in which the ecomorphs evolved, on why such predictability is not found everywhere, and on the relative roles of genetic constraint and the ecological selective landscape as causes of the diversity exhibited.

Among other high points are the sections dealing with conspicuous problems still lacking a satisfactory explanation. One is the immensely puzzling contrast between the predictable patterns of ecomorph diversification on the largest Caribbean islands and the complete absence of the same forms on the mainland, which nonetheless is hardly deficient in species and morphological diversity. Future investigations of alternative hypotheses will likely offer much insight into the still poorly understood effects of strong predation on adaptive radiation. Another great mystery of *Anolis* evolution is the mechanism of speciation. Sexual signals of species have evolved in association with the color of background light, which varies with habitat. But it is not yet known whether divergence of sexual signals is responsible for the evolution of reproductive isolation, such as by sensory drive, or whether it is an after-effect of speciation driven by other processes. A focus on the factors maintaining reproductive isolation in the (surprisingly few) species pairs that continue to hybridize might ultimately be fruitful.

This wonderful book will appeal to all ecologists and evolutionary biologists interested in the causes of species diversity. It is so well written that interested undergraduates and nonprofessionals will also find it useful and inspiring. When you buy it, guard your copy well (in an act of singular good judgment, the first copy to arrive on my campus was immediately stolen). The book will be a classic, something you will recommend to other researchers looking for inspiration on what to do next.

Reference

1 Lack, D. (1947) *Darwin's Finches*, Cambridge University Press

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