

Book Reviews

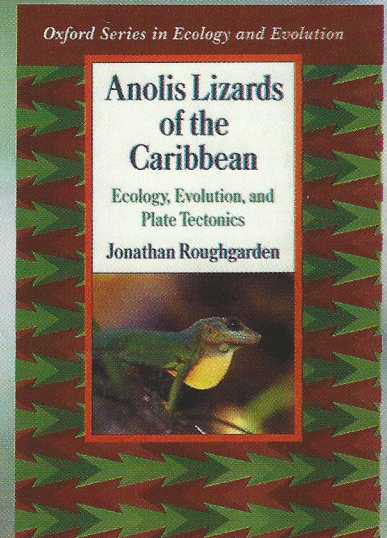
Lizards in the stream

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Roughgarden, Jonathan. 1995. *Anolis Lizards of the Caribbean: ecology, evolution, and plate tectonics*. Oxford University Press, New York. 200 p. + xvi. (ISBN: 0-19-506731-2).

Key words. Lizards, *Anolis*, Caribbean, ecology, evolution, plate tectonics, islands, history, foraging, coexistence, communities



Ecologists most often study phenomena that occur within the lifetime of the observer. These phenomena are caused, however, by processes that span a huge range of scales, from the second by second behavior of individual animals to the processes of plate tectonics that span millions of years. How one goes about untangling such processes is a difficult problem for ecologists, but one, as Roughgarden shows, that is not unsurmountable. This monograph is a compilation of many years of study by Roughgarden and colleagues of the lizards in the genus *Anolis* that live in the Caribbean region.

Roughgarden begins by considering how an organism such as a lizard, with its ability to make decisions regarding its choice of prey items, can maximize its rate of energy intake when constrained by food abundances, body mass, and other important aspects of lizard biology. The ability of lizards to forage profitably is related to their fitness, which in turn, can be related to the presence of other species of lizards that use similar resources. Using empirically based estimates of foraging rates Roughgarden shows that it is not unreasonable to assume that much of lizard diversity, especially on small islands, is a consequence of constraints on foraging of different-sized species as they interact together. Roughgarden sketches out a reasonable picture of how these interactions vary spatially from one island



Norops tropidonotus (male), Las Cuevas, Cayo District, Belize (April 1998). Photo by Peter Stafford, courtesy of The Natural History Museum, London.

to the next, and how one might begin to make predictions of which species should be found together on which islands. Covering the literature on pairs of lizard species found together in different combinations on different islands, Roughgarden builds a convincing case that resource-based competition between different species is likely to explain many aspects of *Anolis* ecology in the Caribbean.

But there is much more to the story, as Roughgarden goes on to show in later chapters. Lizards evolve at relatively slow rates, and Roughgarden shows how certain aspects of the history of the Caribbean basin can be traced by examining the relationships among different species of lizards within the Caribbean dwelling species. Many aspects of the distribution of *Anolis* species among islands cannot be explained by rare colonization events, but must be a consequence of the geological his-

tory of different islands. So on a longer time scale and larger spatial scale, patterns of distribution and ecology of these species reflect geological history, and these patterns are superimposed on the more local patterns of coexistence of species determined by their immediate ecology.

Thus, a fascinating story of history and ecology interacting emerges from Roughgarden's narrative that shows just how complex ecological systems like lizard communities can get. The underlying message of the monograph is that it is indeed possible to untangle many aspects of this complexity by taking a rigorous and multi-scaled approach to the patterns observed in nature. Although Roughgarden describes the results of several field experiments that help elucidate certain aspects of *Anolis* ecology, the real meat of the story lies in weaving together evidence from a wide variety of studies. So ecology without history is incomplete, while history without ecology is inexplicable. Melding together the two, however, yields deep insights in to the nature of species assemblages that cannot be had from investigations of limited scope. Herpetologists and ecologists alike have much to gain from examining Roughgarden's broad, sweeping approach.

Further suggested readings:

- Crother, Brian I. (editor). 1999. *Caribbean Amphibians and Reptiles*. Academic Press, San Diego, California. 495 p. (ISBN: 0-12-197955-5).
- Powell, R. and Henderson, Robert W. (editors). 1996. *Contributions to West Indian Herpetology: a tribute to Albert Schwartz. contributions to herpetology, volume 12*. Society for the Study of Amphibians and Reptiles, Ithaca, New York. 457 p. (ISBN: 0-916984-37-0).
- Rivero, Juan A. 1976. *Los Anfíbios y Reptiles de Puerto Rico*. University of Puerto Rico Press. (ISBN: 0-8477-2317-8).
- Schettino, Lourdes Rodríguez. (editor). 1999. *The Iguanid Lizards of Cuba*. University Press of Florida, Gainesville, Florida. 384 p. (ISBN: 0-8130-1647-9). Availability: see inside cover ad.
- Schwartz, Albert and Henderson, Robert W. 1991. *Amphibians and Reptiles of the West Indies: descriptions, distributions, and natural history*. University Press of Florida, Gainesville, Florida. 736 p. (ISBN: 0-8130-1049-7). Availability: see inside cover ad.



Norops uniformis (male), Cuxta Bani, upper Raspauculo, Cayo District, Belize (April 1997). Photo by Peter Stafford, courtesy of The Natural History Museum, London.

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Background screen photograph: *Anolis eremanni* (male), Ciales, Puerto Rico (24-August-1999). Photo courtesy of Father Alejandro J. Sanchez Munoz, Pastor of Saint Anne's Parish, Saint Thomas, U.S. Virgin Islands.