ECOLOGY

Trophic Cascades: Predators, Prey, and the Changing Dynamics of Nature.

A trophic view of nature, with primary producers (green plants) at the bottom, herbivores, and carnivores at the top, begs the question of how such communities are organized. Beginning in the 1960s, two camps formed among ecologists: one argued that the presence of carnivores keeps the world green (by keeping populations of herbivores in check); alternatively, by being the primary source of energy, and through the evolution of defense against herbivory, plants were argued to control ecological communities from the bottom-up. Robert Paine introduced the term trophic cascade to describe the former process in 1980 and, ever since, much research effort has been invested and ink spilled over the debate.

This edited volume brings together 21 chapters, written by leading empiricists and theoreticians. Indeed, the author list is very impressive, spanning disciplines. This is also true of his assertion that advanced maniraptorans, such as Velociraptor, were secondarily flightless, an idea not generally accepted.

Despite these relatively minor problems, I thoroughly enjoyed this book. It represents the most comprehensive collection of scientifically informed dinosaur anatomical illustrations to date, making it a valuable desk reference. One can imagine taking a trip back to the Mesozoic and using this guide to identify these awe-inspiring creatures. This volume should find a proud place on the bookshelf of both amateurs and professionals.

Christopher R. Noto, Biomedical Sciences, Grand Valley State University, Allendale, Michigan

ANURAG AGRAWAL, Ecology & Evolutionary Biology, Cornell University, Ithaca, New York


The use of mathematical models in population biology has been steadily increasing since the 1960s. At the same time, population biologists seem to be diverging into quantitative and less quantitative lineages. This is not good for the health of the broader disciplines, so introductory textbooks serve a more important purpose than ever before. The past decade has seen the publication of many introductory modeling volumes aimed at ecologists and/or evolutionary biologists. One recently published work is this short textbook by Michael Gillman. It is the second edition of a work originally published in 1997.

The volume assumes very little in the way of mathematical training. It is centered around basic models and techniques used in population biology, with brief treatments of stochastic, age-structured, and density-dependent models of single populations, as well as the most commonly used models two-species interactions. The final two chapters give short accounts of some multispecies and spatial models. In general, the explanations are clear and the book would be suitable for a modeling section in a year-long, undergraduate, advanced ecology with much of this literature, I learned a lot from the volume and the community ecology presented is first rate.

Perhaps somewhat underrepresented in the book is smaller scale, mechanistic approaches to understanding how specific plant traits mediate trophic cascade strength. After all, it is not top-down or bottom-up, but some interaction between the two. Nonetheless, many other important and novel drivers of trophic cascades (e.g., animal behavior) are well represented in many chapters.

My favorite chapters were those in the second half of the volume, which either pushed the frontier by linking case studies to specific sets of predictions, or took a passionate stand on the links between trophic cascades and conservation. In particular, the chapters by Schoener and Spiller and Shurin et al. made strong conceptual contributions. The final two chapters (Soulé; Terborgh and Estes) are fervent essays, making a strong case for why our degraded planet needs protection and restoration of carnivores.

NEW BIOLOGICAL BOOKS
Predators, Prey, and the Changing Dynamics of Nature. Edited by John Terborgh and James A. Estes. Data on the great sharks and the smaller elasmobranchs that formed their prey. All eleven great sharks in this guild exhibited significant population declines over the past 35 years, ranging from 87 percent in sandbar sharks to 99 percent. Trophic Cascades: Predators, Prey, and the Changing Dynamics of Nature edited by John Terborgh and James A. Estes (2010), xx + 464 pp., Island Press, Washington, DC, USA. ISBN 9781597264877 (pbk), GBP 27.00. Wallace M. Meyer (a1). Trophic cascades are powerful indirect interactions that can control entire ecosystems, occurring when a trophic level in a food web is suppressed. For example, a top-down cascade will occur if predators are effective enough in predation to reduce the abundance, or alter the behavior, of their prey, thereby releasing the next lower trophic level from predation (or herbivory if the intermediate trophic level is a herbivore). Trophic cascades are an essential aspect of ecosystem function and well-being. Trophic cascades are often drastically disrupted by human interventions for example, when wolves and cougars are removed, allowing deer and beaver to become destructive yet have only recently begun to be considered in the development of conservation and management strategies. Trophic Cascades is the first comprehensive presentation of the science on this subject. CHAPTER 2 - Food Chain Dynamics and Trophic Cascades in Intertidal Habitats. CHAPTER 3 - Some Effects of Apex Predators in Higher-Latitude Coastal Oceans. CHAPTER 4 - Trophic Cascades in Lakes: Lessons and Prospects.