students with little or no previous knowledge of the subject, but with a background in general biology, especially genetics and molecular biology. As Futuyma remarks in the preface, the "literature in almost all areas of evolutionary biology has grown so voluminous . . . that it has become nearly impossible to follow—or to understand fully" (p xv). This is reflected in the very large amount of material presented in the book. Although the author's presentation is characteristically clear and well organized, and his grasp of the field is extremely impressive, my guess is that students will find it quite hard to sift out the major concepts from the mass of detail, as has long been true for college textbooks that deal with other areas of biology. If this volume is compared with Futuyma's old *Evolutionary Biology* book, it can be seen that a good deal of evolution toward the conventional biology textbook format has occurred over the past 20 years.

Like many modern textbooks, the printed version is accompanied by Web-based material, including simulation exercises, quizzes, and flashcards. These complement the sets of discussion points and problems at the end of each chapter. These should assist students in deciding what is important versus what is mere detail. This is also true of the first and last chapters, which together provide a historical overview of evolutionary thought, explain why it works just like other sciences (in contrast to the claims of creationists), and show how it has many important applications in health and agriculture, as well as providing a unifying perspective for biology. These chapters are done admirably and should have great educational value.

As one would expect from the revolution in biology introduced by DNA sequencing technology, which has transformed research in evolutionary biology, there is a great deal of emphasis on molecular and genomic aspects of evolutionary biology, with chapters by Scott Edwards and John True devoted to genome evolution and evolutionary developmental biology, respectively, as well as much other material on these topics presented throughout the volume. Although most important aspects of molecular evolution are covered, my feeling is that some of the basics have been rushed through a bit too fast. For example, I do not see that students will get a clear sense of exactly how synonymous versus nonsynonymous rates of nucleotide substitution are calculated from raw data, nor how nucleotide site diversity is measured from comparisons of DNA sequence. This contrasts with the fairly detailed presentation in Chapter 2 of methods for phylogenetic analysis. This is obviously a matter of taste, and a far-ranging book of this kind cannot cover everything.

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Relentless Evolution.

By John N. Thompson. Chicago (Illinois): University of Chicago Press. $100.00 (hardcover); $35.00 (paper). ix + 499 p.; ill.; index. ISBN: 978-0-226-01861-4 (hc); 978-0-226-01875-1 (pb); 978-0-226-01889-8 (eb). 2013.

One might think that where environments are relatively stable, and where species are already well adapted to those environments, there is not much evolution going on. In this book, Thompson argues that nothing could be further from the truth. Evolution is, as he puts it, relentless. Rapid evolutionary change is always occurring, often right under our noses. The fact that we do not always observe larger scale, cumulative trends does not mean that there is no evolutionary action. In one image that the author offers near the end of the book (p. 376), a biological population is like a group of boats sitting in the water with some slack in the ropes that keep them moored to the docks. As the tides come and go, and the weather changes, the boats bob around in the water and drift this way and that. Maybe some even succumb to the elements. The little fleet is not going anywhere in particular, but the boats are nevertheless constantly in motion. Adaptive evolution, Thompson argues, is often a lot like that.

In support of this view, he reviews a huge swath of recent and current research in evolutionary biology and ecology. The reference list runs to 99 pages. Readers who are already sympathetic to the take-home message might find the book most useful as a reference work, or perhaps as a way of getting up to speed on this or that aspect of evolutionary science. The volume has 19 chapters in all. Each of the core chapters surveys research in some area of evolutionary biology that is relevant to the theme of relentless evolution. Each chapter begins with what we know so far and concludes with a discussion of "the challenges ahead." Thompson reviews so many intriguing studies, often with an emphasis on how rapidly our understanding of evolution is changing with new empirical information, that he could well have titled the book *Relentless Evolutionary Science*.

As an example of the kind of argument that Thompson makes, consider the case of selection-driven arms races between predator and prey species. It would be a mistake to suppose that in cases where we do not see such arms races occurring, evolution is idle. Far from it, the hypothesis of

coevolutionary alternation (discussed on page 347 ff.) shows why arms races might not occur. Predators might alternate between different prey species. When predators are going after species A, there will be a strong selection pressure for A to evolve costly defense mechanisms, which make A less appealing as prey. At a certain point, the predators might switch to an initially less preferred but now also less protected species B. As the selection pressure on species A is relaxed, selection will favor individuals who do not have the costly defense mechanisms. Species A will start to lose its defense mechanisms, but B (which is now in the predators' sights) will acquire them. Over time, we might expect the predators to cycle back and forth between species A and species B. The arms race is, in a way, relentless, but it also never goes anywhere.

More generally, Thompson also seeks to shift the focus from trying to understand the trajectories of particular species or populations to trying to understand evolutionary interactions—a welcome move.

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COOPERATION AND ITS EVOLUTION. *Life and Mind: Philosophical Issues in Biology and Psychology.*

Edited by Kim Sterelny, Richard Joyce, Brett Calcott, and Ben Fraser. A Bradford Book. Cambridge (Massachusetts): MIT Press. $55.00. vii + 577 p.; ill.; index. ISBN: 978-0-262-01853-1. 2013.

What makes cooperation possible? Why does it evolve and how is it maintained? This book aims to report on the latest research on these questions. The volume, co-edited by philosophers Kim Sterelny, Richard Joyce, Brett Calcott, and Ben Frazer, successfully brings together multiple disciplinary perspectives on the topic of cooperation and presents studies about many different organisms, ranging from bacteria to higher vertebrates. However, most of the contributions in the book are about humans and primates. The most interesting aspects of *Cooperation and Its Evolution*, as well as some of its shortcomings, lie in its explicit focus on the human case.

The volume is organized into two main parts. The first, Agents and Environments, focuses on the environmental conditions that make cooperation profitable in the first place. Out of the many enjoyable contributions in this part, Flack et al.'s article on the origins of hierarchical systems stands out for its audacity and originality. The authors address the problem of cooperation within a more general systemic framework that generalizes across social and ecological systems. Relying on the idea of *slow variable*, they argue that macroproperties, such as power structures in animal societies, emerge due to the break of symmetries at lower levels of organization. Furthermore, they hypothesize that such properties represent evolutionary responses that balance tradeoffs between robustness and adaptability. This approach is extremely promising as it provides tools and concepts that will be useful for many occurrences of social evolution.

The second part, Agents and Mechanisms, deals with how proximate mechanisms shape evolutionary trajectories. Most of the papers in this part play freely and, rightly so, with evolutionary and mechanistic questions. Beside Riboli-Sasco et al.'s article about bacteria and Skyrms and Huttegger's interesting paper on the emergence of signaling networks, the rest of the contributions focus on higher vertebrates, primates, and humans. The topics span from learning to imitation, and from cultural to moral evolution. The chapters on norms and normative cognition, in particular, provide interesting perspectives on the complex interplay between the expansion of cooperation and the emergence of normative thought in humans. These articles successfully show that recent research on the evolution of cooperation in humans can contribute to rethinking the main features of a general theory about cooperation and its evolution.

Yet, if the aim of the volume is to report on the latest research on cooperation, the focus on humans does not leave enough room for important and transformative studies on the molecular and regulatory underpinnings of cooperation in lower taxa, such as social insects. Methods, concepts, and technologies from molecular biology, bioinformatics, and systems biology are radically changing the way we understand cooperation in these model systems. The thriving field of molecular sociobiology promises to change also the way we conceive of human social evolution in a not-too-distant future. Unfortunately, in *Cooperation and Its Evolution* we do not see much of this burgeoning field. More material about molecular studies in social evolution would have added future oriented perspectives to the rich report of our understanding of cooperation offered in the book.

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PALEOFANTASY: WHAT EVOLUTION REALLY TELLS US ABOUT SEX, DIET, AND HOW WE LIVE.

By Marlene Zuk. New York: W. W. Norton & Company. $27.95. vii + 328 p.; ill.; index. ISBN: 978-0-393-08137-4. 2013.

Paleofantasy is a term coined by Leslie Aiello and redefined by Zuk to describe the view that modern life is out of touch with our evolved nature. The