In the Light of Evolution

Evolution. Nicholas H. Barton, Derek E. G. Briggs, Jonathan A. Eisen, David B. Goldstein, and Nipam H. Patel. Cold Spring Harbor, Woodbury, NY, 2007. 833 pp., illus. $100.00 (ISBN 9780879696849 cloth).

In his autobiographical book *Naturalist,* E. O. Wilson wrote that "in the 1950s and 1960s the molecular revolution had begun to run through biology like a flash flood" (Wilson 2006, p. 219). Today, something of the reverse is happening with the techniques and approaches developed by evolutionists permeating molecular biology. For example, phylogenetic analysis plays a critical role in tracing the origins of antibiotic resistance (Dantas et al. 2008), the predictive power of population genetics has assisted in discouraging the evolution of pesticide resistance in genetically engineered crops (Rausher 2001), and the rise of molecular taxonomy has vastly increased our awareness of microbial species diversity (Giovannoni and Sting 2005). In the past, this synergy has come awkwardly, perhaps because of a difference in scientific cultures.

The new text *Evolution* aims to provide students with the fruits of both molecular and evolutionary scientific cultures early in their careers, with the goal of making evolutionary biology more "accessible" to molecular biology students. The book masterfully covers the field of evolutionary biology from a multicultural perspective through the collaborative writings of a population geneticist, paleontologist, microbiologist, human geneticist, and developmental biologist. Like none before it, this book should successfully introduce evolutionary biology to the present generation of students while drawing appropriate connections to molecular foundations, concepts, and the potential for new, integrative directions.

In some ways, *Evolution* is suitable for any student new to the subject of evolutionary biology. The book is organized into four sections: an overview, the origin and diversification of life, evolutionary processes, and human evolution. The overview combines the history of evolutionary biology with the history of molecular biology. Here are found accounts of evolutionary thought before Darwin, events that influenced Darwin's life, the development of (and opposition to) his ideas, and the integration of multiple perspectives generating the "evolutionary synthesis" in the mid-1900s. Also sketched are the historical circumstances before the birth of molecular biology; the events leading up to the discovery of the structure of DNA; and the technical advances enabling the study of DNA, RNA, proteins, and their relationship to one another and to the evolutionary process.

The frequent comparison of failed and successful theories simultaneously conveys the excitement of discovery and the fallibility of human effort at the cutting edge of biological science.

These chapters are paired and integrated, setting the stage for an extensive summary and interpretation of evidence for evolution and the remainder of the book.

In the meaty midsections of the book, students are presented with the two fundamental aspects of evolutionary biology—pattern (emphasizing current knowledge and theories on the origins of life, deep history, and the origins of phylogenetic diversity) and process (emphasizing the mechanisms of population change). While molecular perspectives are given throughout, the excitement of recent genomic and proteomic advances fortunately do not upstage a clear articulation of the pillars of evolutionary process such as mutation, genetic drift, population structure, and selection. In fact, these subjects enjoy a spectacular and detailed delivery. Considerable attention is also given to phylogeny; "tree-thinking" and diversity (especially microbial diversity); the nature, quantification, and study of genetic variation; the origin of species; the evolution of phenotypic novelty; and, in the final section, human evolution. In addition, the text offers refreshing organizational perspectives on newly consolidated subjects such as "evo-devo" (evolution and development), "cooperation and conflict," and the evolution of genetic systems. Particularly astute analyses center on the role of optimization and constraints, evolutionarily stable strategies, and maintained polymorphisms, bringing together different traditions in evolutionary biology.

The overall treatment is quite thorough, with clear writing and engaging illustrations and photographs. At 833 pages, the book is an intense introduction to evolutionary biology, and students who are serious about digesting the material in this text will gain an impressive perspective on the subject. In other ways, *Evolution* will not be suitable for some courses. The genetic sophistication and integration of molecular concepts immediately bumps the discussion up to a more advanced level and could easily overwhelm beginning university students. Prior exposure to genetics and molecular biology is critical; without it, the pace through the text will surely be slow.

Given that the text operates on a relatively advanced level, students will find the extensive Web support to be exceptionally valuable for more in-depth coverage of particular topics (this resource is currently under construction, however). Fully referenced versions of the printed chapters are also available on the supporting Web site, but the conspicuous lack of references in the main text is unfortunate because students may not want to revisit material they have already read in the text. Hence,