GENERAL BIOLOGY

A LIFE SCIENTIST'S GUIDE TO PHYSICAL CHEMISTRY. *By Marc R. Roussel. Cambridge and New York: Cambridge University Press.* $140.00 (hardcover); $60.00 (paper). xiv + 442 p.; ill.; index. ISBN: 978-1-107-00678-2 (hc); 978-0-521-18696-4 (pb). 2012.

This textbook is written for a one-semester course in physical chemistry for biochemists and life scientists. Because of this, much of the material found in traditional physical chemistry volumes has been shortened or eliminated. The author has intentionally reduced the amount of mathematics, while introducing some necessary mathematical concepts with a "just-in-time" approach (e.g., reviewing differentials at the beginning of classical thermodynamics). One unique feature is the incorporation of exercises throughout the text, rather than just at the end of each chapter. Immediately after a concept is presented, it is followed by one or two worked examples and then a few exercises. This is a very appealing format; as instructors, we are often asked by students which problems they should practice if they are having trouble with particular concepts, and the approach of this text makes this very clear. The author has also provided key equations, concepts, and a set of review exercises at the end of each chapter, as well as an extensive set of end-of-term review exercises.

Part One begins with a brief discussion of quantum mechanics and spectroscopy. The treatment of these topics is quite light on the mathematics and focuses mainly on experimental methods. Although some instructors may be disappointed in this approach, it does provide real-world applications for quantum mechanics and immediate motivation for life sciences students to study this material. In reality, it is extremely difficult to delve deeply into quantum mechanics in a one-semester course, so the material covered here is likely to be sufficient for most instructors. Part Two, focusing on classical thermodynamics, is much longer and more thorough. The treatment of most topics in this section is excellent. The writing is straightforward, and important concepts are emphasized in plain language and set apart in textboxes. Although there are not pages and pages with manipulation of partial derivatives, neither has mathematical accuracy been sacrificed in presentation of this material. Nonideal solution behavior, relevant to electrolyte solutions, is also covered, although instructors may wish more examples with biomolecules were given. Part Three covers kinetics, with a brief discussion of diffusion. The treatment of kinetics is also quite good, with a focus on analysis and interpretation of experimental data. There are particularly instructive examples that involve data analysis where there is too little data to distinguish reaction order. The treatment of diffusion is brief and may be insufficient for instructors who wish to cover the basics of methods such as gel electrophoresis or dynamic light scattering.

Overall, this volume fills an important need in that it is specifically designed for a one-semester physical chemistry course. Coverage of most material is adequate, and mathematical accuracy has not been glossed over in an attempt to make the material accessible. The text is likely to be quite useful to instructors, who typically have to pare down material from much longer textbooks designed for a two-semester sequence. Finally, the author writes in an informal and approachable voice that students will find appealing.

SURITA R. BHATIA, *Chemistry, Stony Brook University, Stony Brook, New York and Center for Functional Nanomaterials, Brookhaven National Laboratory, Upton, New York*

PALEONTOLOGY

BONES, CLONES, AND BIOMES: THE HISTORY AND GEOGRAPHY OF RECENT NEOTROPICAL MAMMALS. *Edited by Bruce D. Patterson and Leonora P. Costa. Chicago (Illinois): University of Chicago Press.* $65.00. vi + 419 p.; ill.; taxonomic and subject indexes. ISBN: 978-0-226-64919-1. 2012.

Bringing together 34 leading researchers in the field of Neotropical mammalogy, this volume provides a unique and worthwhile synthesis of our current understanding of both extinct and extant mammalian biodiversity for one of the most diverse assemblages of mammals on the planet. Rising from the foundations of an integrative symposium held at the 10th International Mammalogical Congress in Mendoza, Argentina, in 2009, this book unites both paleontological and neontological perspectives to generate a holistic and up-to-date view of mammalian diversity and evolution in the Neotropics. Organized into two parts, the editors begin with an introductory chapter that explains the overall mammalian diversity of the Neotropics while simultaneously highlighting why both an updated and interdisciplinary treatise on this subject is currently needed.

Part 1, The Geological Setting, fell to the responsibility of the paleontologists. A central theme throughout this section's six chapters is that the biogeographic history of South America in particular and the Neotropics in general differs from past perspectives, which often misleadingly relied

on fossil evidence from only the southern part of the continent. Updated information discussed in the individual chapters point to a much more complex history of mammalian evolution in South America, providing support for both in situ and ex situ evolution of South American mammalian lineages. New fossil discoveries over the last 50 years, including Andean sequences, are presented to help clarify the details of evolutionary and geological events throughout South America, providing additional support for "regional provinciality" of several mammalian lineages. Fossil evidence is used throughout this section to discuss the evolutionary processes that helped shape this unique and well-documented paleomammal community and all of the major lineages (litopterns to xenarthrans) are discussed in great detail. In an interesting turn of events, both paleontological and molecular data are presented to elucidate the evolution of one important immigrant lineage to South America, members of the order Carnivora.

Part 2, Regional Patterns, relies on the expertise of neontological mammalogists working in particular regions of the Neotropics to generate accurate descriptions of the modern mammalian diversity living within these unique biomes. The first of the section's nine chapters delimits 11 subregions of Neotropical endemism (West Indies, Caribbean coast, Central America, Chocó, Andes, Guianas, Atlantic forest, Amazonian lowlands, Chaco, Cerrado and Caatinga, and Patagonia) each of which (excluding the Caribbean coast, Chocó, and Chaco) are subsequently addressed by the remaining chapters (Chapters 9 to 16). General discussions of historical and modern biogeographic patterns (based mostly on phylogeographic investigations) dominate each chapter as does the theme for greater sampling and hypotheses-driven research in each of these regions.

This book would prove useful to readers with an interest in Neotropical mammals, both extinct and extant, and could easily be adapted for use in a graduate or undergraduate seminar course in Neotropical biogeography. The integrated approach makes reading the volume as a single piece quite feasible. However, the well-organized structure and dual indexes (both taxonomic and subject) also makes it suitable as a quick reference guide.

Adam W. Ferguson, *Biological Sciences, Texas Tech University, Lubbock, Texas*

From Clone to Bone: The Synergy of Morphological and Molecular Tools in Palaeobiology. *Cambridge Studies in Morphology and Molecules: New Paradigms in Evolutionary Biology, Volume 4.*

Edited by Robert J. Asher and Johannes Müller. Cambridge and New York: Cambridge University Press. $105.00 (hardcover); $50.00 (paper). x + 387 p. + 16 pl.; ill.; index. ISBN: 978-1-107-00326-2 (hc); 978-0-521-17676-7 (pb). 2012.

It has become readily apparent the contemporary paleontologist can no longer stay unaware of modern molecular tools. This volume focuses on the varied approaches paleontologists are using to better understand phenotypic evolution. Interdisciplinary molecular and morphological research is now at the forefront of understanding all facets of vertebrate paleobiology. This collection of articles, derived from a symposium at the 2009 Society of Vertebrate Paleontology meeting, is an artful compilation of an array of topics, from divergence time calculations in mammals to the developmental basis of vertebrate skeletons, written by leading researchers in the field.

The first chapter, an introduction by the editors, is an inspiring call to action for both paleontologists and molecular biologists to use the wide scope of modern genetic data to form and test hypotheses relating to vertebrate divergence and morphological evolution. Part I contains four chapters centered on the topic of divergence. Especially notable is Chapter 3, which critically assesses divergence time estimation methods and how to address problems in properly calibrating these times using both molecular and morphological data. This chapter will be vital to any researcher looking to calibrate a phylogeny with fossils or molecular data and to grasp the theory behind it.

Molecular mechanisms for morphological development and evolution are the emphasis of Part II. This portion encompasses explorations of how molecular biology and gene regulation control phenotypic expression. Learning about these processes in modern organisms, in turn, allows greater understanding of what causes the morphological change present in the fossil record. Although the volume is primarily focused on vertebrates, great attention is given in this portion to major vertebrate groups from fish and turtles to placental mammals and marsupials. A novel highlight is a detailed look into hypotheses of development and formation of a cryptic evolutionary novelty—the turtle shell. Part II will be necessary reading for paleobiologists because so often we lack the understanding of what is actually happening at the molecular level to drive morphological change.

Overall, this volume is well organized and presented with clear figures and a selection of color plates. Both paleontologists and molecular biologists