

ity on their computer to only glean typographical errors because there are scattered inappropriate words and missing small words that more careful proofreading would have avoided. On page 32, Aquinas is placed in the 4th century instead of the 13th century. These are minor points that should be corrected in a future edition. This volume is a worthwhile update for anyone who wants to see where comparative genomics is taking us.

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GENE SHARING AND EVOLUTION: THE DIVERSITY OF PROTEIN FUNCTIONS.

By Joram Piatigorsky. Cambridge (Massachusetts): Harvard University Press. \$60.00. xvi + 320 p; ill.; index. ISBN: 0-674-02341-2. 2007.

The prevailing view among biologists is that each protein has a single primary function. In a style that is both engaging and informative, Piatigorsky explains how inaccurate this widely accepted notion may be. The term "gene sharing" describes the situation where a gene produces a polypeptide or protein that has multiple, equally legitimate functions. By using a number of remarkable examples of protein multifunctionality (such as the classic case of eye lens crystallins), the book effectively illustrates how pervasive gene sharing may be. The author describes how gene sharing can be achieved by modifications to gene expression, which allows the same protein to have a number of different functions and, thus, dynamically participate in a range of different cellular processes. Piatigorsky argues that the widespread nature of gene sharing implies a crucial evolutionary role in protein functional diversification and, as such, organismal complexity.

From an evolutionary perspective, gene sharing is also an important concept as the evolution of functional innovations through gene sharing does not necessarily require the accumulation of mutations in the actual coding sequence, nor does it require gene duplication, two processes generally thought to be prerequisites for the generation of protein functional diversity. Partly due to the widespread nature of gene sharing, the author suggests that we must be cognizant of the fact that proteins seem to have an inherent flexibility, which simultaneously encourages multifunctionality and specialization.

The book is structured in a way that both students and seasoned readers of evolutionary biology can appreciate. With take-home messages neatly summarizing the major points of every chapter and a plethora of apt examples, this volume educates, while continually putting readers in awe of the pragmatic

and yet innovative way in which proteins can evolve new functions.

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SEX, SIZE, AND GENDER ROLES: EVOLUTIONARY STUDIES OF SEXUAL SIZE DIMORPHISM. *Based on a workshop held in Ascona, Switzerland, 21–26 August 2006.*

Edited by Daphne J Fairbairn, Wolf U Blanckenhorn, and Tamás Székely. Oxford and New York: Oxford University Press. \$110.00. ix + 266 p; ill.; index. ISBN: 978-0-19-920878-4. 2007.

Since Darwin's *Descent of Man* (1874), biologists have been fascinated by the evolutionary processes that produce and maintain sexual size dimorphisms (SSD). This excellent volume is filled with the most current and stimulating research on SSD. It is separated into three sections. The first section contains six chapters that review macroevolutionary patterns of variation across major taxonomic groups (e.g., reptiles, birds, and insects). These chapters assess the role of sexual selection as a contributor to SSD and test Rensch's rule. Section II has eight chapters that explore microevolutionary processes that might be responsible for SSD (e.g., fecundity selection, genetic constraints, and differential equilibrium). In some ways, these chapters are the backbone of the book because they provide a synthesis of the proximate selection patterns that generate SSD and, thus, present an organizational framework to further explore how the wide variation in SSD arises in certain species (Chapters 8 to 11) or populations (Chapters 12 through 15). Section III explores the developmental and genetic mechanisms responsible for SSD. Unlike earlier sections, these five chapters do not address the adaptive value or generation of SSD; rather, the authors explore how growth trajectories and morphologies are generated during gene expression and development. This section was particularly thought-provoking because these issues are fundamentally important, yet have received less attention than other areas of SSD research.

The major unifying themes throughout the book are an assessment of the adaptive significance of SSD and an assessment of how genetic constraint might be responsible for SSD. These themes permit authors to synthesize the recent literature and to use their own data to test novel hypotheses along these themes. I found the efficiency of this format unique and effective. Most chapters are short (10 to 12 pages in length) and the reviews are succinct, yet the data presentation and flow of ideas among chapters

are superb. The editors and contributors are to be commended for the tight organization of the chapters.

The high level of integration among chapters and presentation style works well to expose readers to the enormity of research on SSD. The articles display a wide range of analytical methods. Hence, the volume represents a veritable toolbox for students—molecular techniques, phylogenetic comparative methods, and well-designed field and laboratory experiments are all generously represented. Veteran scholars will find new ideas and approaches in this book because it covers such a wide array of systems (pygophores to horns to calyces), taxa (birds to beetles), and levels of biological organization (alleles to all eukaryotes). Readers will appreciate the introductory remarks on the biology of the study organisms in each chapter; these portions were indispensable for connecting with a wide audience. Also helpful are the “Suggested Reading” sections after each chapter that direct readers to the influential literature cited. The only thing missing from this volume is a thoughtful conclusion or summary chapter at the end. Beyond this minor point, I found this to be an excellent assemblage of contributions that will act as a guiding force in future studies of SSD.

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EVOLUTIONARY COGNITIVE NEUROSCIENCE. *Cognitive Neuroscience.*

Edited by Steven M Platek, Julian Paul Keenan, and Todd K Shackelford. Cambridge (Massachusetts): MIT Press. \$65.00. xix + 616 p; ill.; index. ISBN: 0-262-16241-5. 2007.

Sixteen years ago, Barkow et al. published *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (Oxford: Oxford University Press), which was a collection of chapters that laid the theoretical foundation for much of the current cognitive research informed by evolutionary considerations. Since then, the techniques and theories from cognitive psychology and neuroscience have been integrated much more thoroughly than before. This cognitive neuroscience approach now dominates brain research, yet like its cognitive psychology ancestor, most cognitive neuroscience is not concerned with evolutionary questions nor guided by evolutionary considerations. *Evolutionary Cognitive Neuroscience* is an edited work that documents cognitive neuroscience research that does take an evolutionary approach. Although this volume does not address theoretical issues with the depth of *The Adapted Mind*, it provides a valuable introduction to the issues, a snapshot of current research, and an encouraging view of the future of this field.

This book contains 21 chapters grouped into six sections: Introduction and Overview (three chapters); Neuroanatomy: Ontogeny and Phylogeny (four chapters); Reproduction and Kin Selection (four chapters); Spatial Cognition and Language (three chapters); Self-Awareness and Social Cognition (five chapters); and Theoretical, Ethical, and Future Implications for Evolutionary Cognitive Neuroscience (two chapters). The introductory chapter provides a nice overview of the concepts, advantages, and issues that an evolutionary perspective provides for cognitive neuroscientists. Each of the empirical sections included valuable chapters, and several stood out. The chapter on sex differences in spatial abilities by Puts et al. offers an example of a topic with well-developed theories at multiple levels of explanation. Santos et al.’s chapter provides a review of human and nonhuman primate mind-reading theory and research with a focus on the recent demonstration that chimps and macaques use gaze information in competitive, but not cooperative, situations. They discuss the implications of this revealing finding and then demonstrate the value of a solid evolutionary and cognitive understanding by making empirical predictions about the neural basis of these abilities.

The volume would have benefited from discussion of how neurocognitive mechanisms evolve, as this is obviously a central question for this enterprise. In addition, greater coverage of recent structural and functional imaging done with nonhuman primates and how these results compare with human imaging findings would have been enlightening. Nevertheless, readers from a variety of disciplines will find the majority of these chapters quite interesting and a good demonstration of the promise of evolutionary cognitive neuroscience.

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EVOLUTION OF MICROBIAL PATHOGENS.

Edited by H Steven Seifert and Victor J DiRita. Washington (DC): ASM Press. \$119.95. xiii + 355 p; ill.; index. ISBN: 1-55581-300-3. 2006.

This volume provides exemplary insight into the driving forces that shape microbial pathogen evolution. Much information has been wrought by analyzing bacterial genomes, and has been stimulated by the discovery of myriad novel pathogens over the past several decades (such as that *Helicobacter pylori* infections cause ulcers and gastrointestinal carcinoma/lymphoma). In just 17 chapters (including overviews by lead investigators), the book encompasses both general principles and specific examples. Each chapter concludes with a helpful summary of salient points.