

focus almost exclusively on dogs because there is so little research on other canids, a situation that will hopefully improve. Beyond canids, however, each of the authors placed their research into a broader taxonomic context where appropriate, an integration that firmly placed dog research within the existing study of social behavior and cognition.

One recurrent, albeit implicit, theme throughout the volume is how little consensus exists on many of the topics related to behavior and cognition in domestic dogs. Researchers debate features as fundamental as the degree of aggression that occurs in dog-dog encounters, the differences between domestic dogs and wolves, and the impact of domestication on the evolution of the behavior and cognition of dogs (and, implicitly, other species). Part of this is no doubt due to the relative infancy of the field; there were a few studies as early as the 1960s, but the majority of the work cited in this volume has been published since 2000. In addition, dogs live in a variety of different settings, and study contexts range from observations of packs with relatively little human involvement to highly socialized pets. Although an advantage of studying dogs is the variety of contexts in which data can be gathered, this diversity can also be a limitation that makes cross-study comparisons challenging (e.g., dog “day care” centers disallow aggressive pets, artificially driving down the frequency of aggression in these study samples). As many of the authors note, one key challenge remaining for those who study dogs is to utilize similar methods across these different environments to develop a better understanding of fundamentals of dog cognition and behavior, and how they are influenced by these various settings.

The Social Dog is intentionally aimed at a broad audience, both in terms of the topics covered and the apparent target readership. As a result, virtually any reader with an interest in dogs, domestication, or the evolution of social cognition and behavior will likely find something of interest, although the breadth means that few readers will find equal satisfaction in all of the offerings. As a researcher who does not study dogs, I found it to be a comprehensive and enlightening overview and will read further on several of the ideas that I encountered. This book is an excellent resource for researchers who want a thorough overview on recent advances in our understanding of the cognition and behavior of domestic dogs as well as for trainers or veterinarians who wish to know more about the cognition and behavior of the species with which they work.

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DOG BEHAVIOUR, EVOLUTION, AND COGNITION. *Second Edition.*

By *Ádám Miklósi*. Oxford and New York: Oxford University Press. \$110.00. xx + 377 p.; ill.; index.

ISBN: 978-0-19-964666-1. 2015.

With the rapid expansion of canine science, compiling a complete overview of dog behavior, evolution, and cognition is a daunting task. *Ádám Miklósi* is perhaps the only scholar today capable of accomplishing this worthy goal. Having published over 100 elegant papers on canine behavior and cognition, Miklósi has been at the forefront of the field since its early days. In this second edition, the author sets out to increase dogs' prominence in ethology by synthesizing the exponentially developing fields of dog behavior, evolution, and cognition.

Miklósi achieves these aims, crafting what is perhaps the most inclusive volume on canine science to date. Chapters 1–3 set a strong foundation, placing canine science and its methodologies into historical context. Chapters 4–8 present overviews of dog ecology and evolution, focusing on dogs in society and providing a comparative overview of evolution and domestication of the genus *Canis*. Chapters 9 through 13 summarize a wide range of topics in cognition: describing the perceptual world of the dogs, how dogs solve physical and social problems, how dogs communicate and play, and how dogs learn socially and solve social problems. Chapters 14–16 cover additional topics in dog behavior, specifically canine development over the lifecourse, individual differences in canine cognition, and how genes contribute to canine behavior.

Each chapter succinctly provides relevant terminology and background, reviews a multitude of studies in dogs, and charts a course for the field with directions for future research. We especially liked that the chapters included practical considerations for students interested in the applications of this work to canine training and veterinary issues. Throughout the book, Miklósi specifically aims to integrate the field of canine science and provide inspiration for future research without advocating for a particular point of view. In many ways, the inclusive, unbiased nature of this overview is the volume's biggest strength—no other publication incorporates as many perspectives on canine science or provides such a holistic overview of the research conducted in each subfield. However, this impartial inclusiveness inevitably comes at a cost. At times it is necessary for readers to critically discern the takeaway points and determine the conclusion that is best supported by current research. For this reason, we suggest that this book is best for more advanced scholars who have the background necessary to critically evaluate the research presented. For anyone new to the field, sup-

plementary readings that provide overviews of competing viewpoints may be helpful. Fortunately, the author provides suggestions for further reading at the end of each chapter, including descriptions of how each reading would supplement the information presented in that chapter.

All things considered, this is a fantastic volume for advanced scholars interested in a complete overview of the field of canine science, but may require supplemental reading for more novice students. The book provides a positive contribution to this growing field, and we have no doubt that when Miklósi pens the third edition, some of his thoughtfully proposed questions will have been answered.

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NEUROBIOLOGY

SINGLE NEURON STUDIES OF THE HUMAN BRAIN: PROBING COGNITION.

Edited by Itzhak Fried, Ueli Rutishauser, Moran Cerf, and Gabriel Kreiman. Cambridge (Massachusetts): MIT Press. \$60.00. viii + 365 p. + 17 pl.; ill.; index. ISBN: 978-0-262-02720-5. 2014.

MOLECULAR AND CELLULAR PHYSIOLOGY OF NEURONS. *Second Edition.*

By Gordon L. Fain; with Thomas J. O'Dell; illustrated by Margery J. Fain. Cambridge (Massachusetts): Harvard University Press. \$79.95. xiii + 735 p. + 16 pl.; ill.; index. ISBN: 978-0-674-59921-5. 2014.



ANATOMY AND PHYSIOLOGY

THE VERTEBRATE INTEGUMENT. *Volume 1: Origin and Evolution.*

By Theagarten Lingham-Soliar. Heidelberg (Germany) and New York: Springer. \$189.00. xiii + 268 p.; ill.; index. ISBN: 978-3-642-53747-9 (hc); 978-3-642-53748-6 (eb). 2014.

THE VERTEBRATE INTEGUMENT. *Volume 2: Structure, Design and Function.*

By Theagarten Lingham-Soliar. Heidelberg (Germany) and New York: Springer. \$179.00. xiii + 348 p.; ill.; index. ISBN: 978-3-662-46004-7 (hc); 978-3-662-46005-4 (eb). 2015.

These two excellent textbooks demonstrate that functional and morphological innovations and complexities (including evolutionary convergence) are vital considerations for reliable reconstructions of evolution. The author's own research covers neontology (sharks and birds), paleontology (ichthyosaurs and dinosaurs), and vertebrate taphonomy. Reading both volumes is essential to appreciating his perspective on structure and function, especially as it applies to currently controversial subjects. The books are well illustrated with photographs, diagrams, and drawings and should help undergraduate biology majors, graduate students, and researchers understand both this underappreciated subject matter and the dynamics of how science progresses.

In Volume 1, Lingham-Soliar begins 450 million years ago (MYA) with the jawless ostracoderms. Did ostracoderms evolve in fresh or salt water, and did bone evolve as protection against predators, or was it an adaptation for the storage of phosphate? The next major step was the evolution of jaws, in placoderms, from the anterior gill arches. With jaws and more active feeding came the innovations that led to modern fishes—paired fins, lightweight dermal scales, sophisticated locomotion, and elegant mechano- and electroreceptors. Conquest of land may have begun about 390 MYA with the fish-like *Tiktaalik* and forelimbs each with four main axial elements—the humerus, ulna, ulnare, and manual digit IV. Surprisingly, the date of the fish-tetrapod transition has now been unsettled by quadrupedal trackways found in Poland that are 18 million years older; workers must now reappraise which group of fishes led to present-day tetrapods.

Two innovations that came with early reptiles were the amniotic egg and an outer protective layer, the epidermis, which gave rise to scales, composed mostly of an entirely new material, beta-keratin, the toughest natural elastomeric material known.