

migration in search of water. Water provides the causal explanation for the initial migration from the forest to the savanna. A migration the bipedalism made possible—endurance running and use of projectile weapons, for example. *Homo* was able to infiltrate forests, grasslands, and rocky terrain, all in a quest to follow a central requirement of life: water. Why a bipedal primate evolved is less clear and whether water played a role is not explored in any depth. That is not a blemish on Finlayson's case. He, for the most part, begins his exploration of the role of water in the evolution and migration of *Homo* after a bipedal primate had emerged.

The author provides a wealth of evidence for his view, albeit evidence that could also support alternative hypotheses. The case is carefully constructed and written in accessible prose. This is a useful addition to the ongoing exploration of the causal factors in the evolution and migration of the genus *Homo*.

R. PAUL THOMPSON, *Institute for the History & Philosophy of Science & Technology and Ecology & Evolutionary Biology, University of Toronto, Toronto, Ontario, Canada*

A REMARKABLE JOURNEY: THE STORY OF EVOLUTION.

By R. Paul Thompson. London (United Kingdom): Reaktion Books; distributed by the University of Chicago Press, Chicago (Illinois). \$35.00. 236 p.; ill.; index. ISBN: 978-1-78023-446-5. 2015.

This is a lucid, compelling, and very instructive exposition of evolutionary theory. Thompson explains the crucial concepts of evolutionary theory in accessible terms, introduces its key proponents, and recounts its many fierce debates and controversies from the time of Darwin's groundbreaking publication up to the encompassing and robust theory that it is today.

The author unpacks the remarkable journey of evolutionary theory in 11 chapters that can be separated thematically into two halves. The first half traces the history of ideas related to Darwin's original theory published in 1859, which culminates in its mathematical formalization due to Ronald Fisher in 1930. A short prologue sets the stage by describing the social and intellectual landscape of Darwin's time, highlighting the emergence of non-literal interpretations of the Bible as a crucial development. Thompson lucidly delineates what he calls the axioms of Darwin's theory and emphasizes the conception of species as mutable entities as its *conditio sine qua non*, which reinforces the importance of an intellectual climate that was ready to stomach the revolutionary thesis for which Darwin amassed unassailable evidence. The author then

singles out the major debates that followed from Darwin's theory, suggesting that its lack of formalization gave room to much of the ensuing controversy. Thompson focuses on mechanisms of heredity and the sources of variation. He introduces the work and persona of Francis Galton, August Weismann, and many other key players, noting miscellaneous, and at times entertaining, personal details, but frequently commenting on their respective mathematical ability in particular. He devotes extra space to Gregor Mendel's experiments and shows how an increasingly rancorous debate was settled by Fisher's formalization in order to achieve a first evolutionary synthesis.

The second half of the book concerns the evidence-based amendments from 1930 onward that unified biology to ultimately achieve Darwin's goal of a "consilience of inductions," in which all major fields of biology contribute evidence to evolutionary theory. Thompson pictures biology around 1930 as a medley of separate fields of investigation and then discusses how, and by whom, genetics, systematics, paleontology, and botany were brought into the evolutionary fold to yield the modern synthesis. Microbiology lagged behind the aforementioned fields and the author couples his discussion of it with an illustrative detour on the discovery of the DNA structure. Lastly, Thompson turns to the emergence of sociobiology and evolutionary embryology, albeit the latter is discussed only briefly. In the closing chapter, he rebuts creationist attacks on evolutionary theory, which nicely ties in with the prologue. Relief from religious dogma prepared the reception of evolutionary theory. Today, religious dogma fuels the last pockets of resistance against a unified, formalized theory of unparalleled explanatory power.

Thompson expertly couples insights on the history of evolutionary theory with a persuasive elucidation of its main concepts. Readers interested in an accessible and comprehensive overview of evolutionary theory, its history, and key players will be delighted by this thorough exposition.

MICHAEL KLENK, *Philosophy, Utrecht University, Utrecht, The Netherlands*

HANDBOOK OF EVOLUTIONARY THINKING IN THE SCIENCES.

Edited by Thomas Heams, Philippe Huneman, Guillaume Lecointre, and Marc Silberstein. Dordrecht (The Netherlands) and New York: Springer. \$349.00. xix + 910 p.; ill.; no index. ISBN: 978-94-017-9013-0 (hc); 978-94-017-9014-7 (eb). 2015.

In 2009, celebrating the 150th birthday of the *On the Origin of Species*, the French volume *Les Mondes darwiniens* was published. This handbook is the

English translation, which contains some new contributions. The objective of the voluminous tome is to cover Darwinism in all of its forms. In 42 self-contained chapters by different authors, a wide range of issues in contemporary evolutionary thought is discussed at an advanced level. This volume provides a thorough overview of the ways in which evolutionary thought has expanded and extended to new fields, both within biology (developmental biology, molecular biology, systems biology, and synthetic biology) and beyond (medicine, economics, linguistics, ethics, and psychology).

Extending evolution to new fields, the authors illustrate that it is never simply a matter of extrapolating the same set of Darwinian principles. Depending on the topic of inquiry, an evolutionary approach raises different questions and has distinct applications. In some contexts, variation and descent with modification are central explanatory notions. In others, their role is more peripheral, or only based on loose analogies with Darwin's original work.

The great majority of the 45 contributing authors are Francophone. Although it is not the aim of the handbook to present a distinctly French perspective on evolutionary thought, it is tempting to look for a national signature between the lines. One respect in which this signature presents itself is in the choice of historical examples: we find references to the works of some 19th- and 20th-century French scientists who are not customarily mentioned in Anglophone textbooks. This change of historical canon is refreshing. A less fortunate trace of the French origins of this volume is the amount of spelling errors it contains. Some words have accidentally been left untranslated.

If anything, the contributions to this book—many of them by junior researchers—show the high quality of present-day work on evolution in France. The chapters give a clear and stimulating impression of the diversity and complexity of evolutionary thought, leaving ample room for philosophical and historical reflection. But the volume does not fare well by the standards of a printed handbook: it is a collection of articles, rather than a unified whole. In a sense, this just goes to show how, over more than 150 years, Darwinian thought has diversified: it has become exceedingly challenging to capture its contents in “one long argument.” Nonetheless, more attention should have been given to the formal aspects of the volume, which contains no index. Readers are provided with little incentive to obtain this book in print, rather than looking up its individual chapters online.

JEROEN HOPSTER, *Philosophy, Utrecht University, Utrecht, The Netherlands*



BEHAVIOR

ESCAPING FROM PREDATORS: AN INTEGRATIVE VIEW OF ESCAPE DECISIONS.

Edited by William E. Cooper Jr. and Daniel T. Blumstein. Cambridge and New York: Cambridge University Press. \$104.99. xv + 442 p.; ill.; index. ISBN: 978-1-107-06054-8. 2015.

This book is about escape behavior in animals: predator detection, escape, and how long to stay in a refuge. It uses two influential models about when to flee derived from Ydenberg and Dill (1986. *Advances in the Study of Behavior* 16:229–249), and how long to stay in a refuge devised by Martín and Lopez (1999. *Behavioral Ecology* 10:487–492). So the volume focuses sharply, but not exclusively, on when to flee and how long to hide, and the factors that affect these decisions.

Chapter 1 defines a large number of terms that relate to flight decisions in a spatial sense, a temporal sense, and flight direction. This is a very useful although rather dry chapter. Chapter 2 provides a theoretical understanding of prey decision-making explaining the escape and hiding models at some length—important reading, although not for the faint-hearted. It considers several factors, including the effects of predator starting distance, the predator's direction of approach, the distance that prey becomes alert, and costs of fleeing.

Chapters 3–7 consider factors affecting escape decisions in mammals, birds, reptiles, amphibians, fish, and invertebrates. These include distance to a refuge, prey group size, prey condition, extent of habituation, prey morphology, predator approach speed, and predator gaze. Simple predictions about escape responses in terrestrial and aquatic environments are shown to differ. The invertebrate chapter is particularly interesting in that many different sorts of antipredator defenses are described not just the Ydenberg and Dill (1986) model. There are useful meta-analyses in these chapters, although the bird and reptile contributions focus heavily on the authors' own work.

The next part covers prey behavior while fleeing such as the direction of escape and unpredictable flight paths. Chapter 9 thoroughly discusses refuge use with an impressive compendium of studies, and the factors affecting time spent in refuges, including predator approach speed and proximity, prey size, prey conspicuousness, and hunger. Chapter 10 covers vigilance and pursuit deterrent signaling. These are all useful cross-taxon treatments.

Then on to lizard escape performance (with a huge number of references), which is affected by