

early hominin migration was low because in *current* chimpanzee populations, only females migrate without returning. I conjecture that the arguments seem most plausible when one is familiar with external but pertinent data, theories, and arguments.

Scavenger hunt objection: sometimes the main idea of a chapter or section is unclear. For example, in Chapter 1, Sterelny's meta-claims about what he will argue for are scattered throughout the text; at times these meta-claims appear in new language that is not obviously equivalent. Otherwise, the book is surprisingly accessible, reading like a conversation.

Despite these critiques, I fully recommend *The Pleistocene Social Contract*. Readers familiar with this topic will gain insights into the author's method of explaining via positive feedback loops, his challenge to traditional theories, and his conclusions drawn from subtle conceptual distinctions. The novice will gain an appreciation for an interplay between cooperation and cultural evolution, as well as a fresh perspective on the origins of inequality.

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ANATOMY, PHYSIOLOGY, AND DEVELOPMENT

ANIMAL ANOMALIES: WHAT ABNORMAL ANATOMIES REVEAL ABOUT NORMAL DEVELOPMENT.

By Lewis I. Held, Jr. *Cambridge and New York: Cambridge University Press.* \$105.00 (hardcover); \$39.99 (paper). xxi + 272 p. + 16 pl.; ill.; index. ISBN: 978-1-108-83470-4 (hc); 978-1-108-81974-9 (pb). 2021.

This is a great read for any biologist who wants to know what progress modern developmental biology has made in solving some long-standing issues in the field. Its focus is on the developmental mechanisms that give rise to the laws governing developmental anomalies. As the perpetual popularity of "freak shows" and teratology exhibits in museums attests, such anomalies are a fascinating feature of the world. Scientific interest in laws governing this variation reaches back at least to Étienne Geoffroy Saint-Hilaire's studies in the early 1800s, and was a central theme in Darwin's work (he called them "Laws of Variation"). It was exemplified most fully by William Bateson's extensive catalog of phenotypic anomalies, *Materials for the Study of Variation Treated with Especial Regard to Discontinuity in the Origin of Species* (1894). London (U.K.): Macmillan and Company), which forms part of the background to Held's book.

The volume is a very readable deep dive, written as a romp through a series of mysteries and associated detective stories, some of which have been fully solved, others not. It is organized into four parts: Frogs, Flies, Dogs, and Cats. Within each part, a primary example of a developmental anomaly (extra limbs in frogs, four-winged flies, extra toes in dogs, and unusual color patterns in cats) in the target taxon leads into a broad overview of related topics in developmental mechanics in a variety of taxa. A series of 24 General Principles, such as Homologous Organs Diverge Via a Few Key Genes (in Chapter 5) and Patterns Can Emerge from Physical Forces (Chapter 7) are developed using examples from the literature. Figures and accompanying legends frequently provide more detailed information than the main text, which works well to keep the text itself manageable. A collection of color plates highlights some of the more interesting figures, such as the cyclopic goat from the frontispiece, the frog with eyes in its palate, and a mosaic lobster.

What makes this a really wonderful book is that in exploring both long-known and recently discovered patterns of phenotypic variation, Held is able to provide detailed explanations of the underlying developmental-genetic mechanisms that produce the variation. Moreover, because he assumes a basic knowledge of cell signaling mechanisms, he is able to present the information at a much deeper level than most popular evo-devo books can. In his approach, he is returning to the roots of evo-devo, which began as an attempt to integrate our knowledge of developmental mechanisms and associated laws of variation with knowledge of the paths through phenospace that organisms have taken. The goal was to provide a true science of form. Although none of the general principles Held elucidates are likely to surprise experts in the field, in the instantiation of these principles he provides a great service to those of us not up on all of the latest experimental results, and the volume should interest a wide range of readers, from advanced undergraduates through emeritus professors. We have clearly come a long way in understanding the developmental basis of phenotypic variation. And yet, of course, plenty of mysteries remain.

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FASCINATING SHELLS: AN INTRODUCTION TO 121 OF THE WORLD'S MOST WONDERFUL MOLLUSKS.

By Andreia Salvador. *Chicago (Illinois): University of Chicago Press.* \$22.50. 256 p.; ill.; index. ISBN: 978-0-226-81913-6 (hc); 978-0-226-81981-5 (eb). 2022.