

tion of this second edition, but one that would take science another two decades to rediscover.

After having plodded through the 428 pages of this volume, I was continuously reminded of the virtues of *essentials* texts and Cliff Notes. It is not that Darwin's writing is difficult to comprehend. In fact it is rather engaging—sort of like a grandfather telling tales to the progeny. His redundancies have redundancies. Harriet Ritvo's fine introduction boasts such accolades as "compendious" and "wealth of detail" (p ix). The book's back cover states that it is "thorough and intensive research," "a meticulous analysis," and "richly detailed." All gross understatement of the fact. Surely, there is virtue in reading the complex ideas of an author in his own hand. But life is short, reading time is limited, and some things must be condensed for the sake of efficiency. It was nice to see Darwin's mistakes and his obvious frustrations. One can get the feel of this brilliant man struggling, and perhaps more importantly, admitting that struggle. This is the way science works and the way it should be read. But a few excerpts here and there in an *essentials* text would accomplish the same goal and leave readers free for more productive pursuits. Unless the reader is a Darwin scholar or just an intense fan, I see a limited audience for this book.

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ASYMMETRY, DEVELOPMENTAL STABILITY, AND EVOLUTION. *Oxford Series in Ecology and Evolution.*

By Anders Pape Møller and John P Swaddle. Oxford and New York: Oxford University Press. \$90.00 (hardcover); \$39.95 (paper). xi + 291 p; ill.; author, taxonomic, and subject indexes. ISBN: 0-19-854895-8 (hc); 0-19-854894-X (pb). 1997.

Recently, fluctuating asymmetry (FA) and developmental stability have attracted a great deal of interest among population geneticists, as well as developmental and evolutionary biologists. This new book attempts to be a comprehensive treatment of both concepts, including their potential relationships. It is not exhaustively referenced, but includes a diverse sampling of the published literature that should give interested readers a good entry into these fields.

The book begins by presenting concepts of asymmetry, building upon the idea (first articulated by Van Valen and developed by many subsequent workers) that FA is an indicator of developmental instability. The authors make recommendations about how to measure and use FA. Next they delve into developmental stability, including its genetic basis, ontogeny, and variation owing to several factors (Chapters 2 and 3). Another major phenomenon, environmental stress, is introduced in Chapter

4. Recent work on environmental stress has investigated its relationship with developmental stability and has proposed that FA could serve as an indicator of stress in a manner similar to that suggested for developmental instability. Although Møller and Swaddle do not develop these ideas, there are many workers whose interest in asymmetry is fueled by the possibility that FA could help detect changing levels of environmental quality.

The remaining chapters address factors that destabilize developmental programs, with an emphasis on selection. One of the most controversial topics involving FA and developmental stability concerns their heritability. Over the past few years, the authors have been embroiled in vigorous debates on the heritability of developmental instability and they use this book to explain and develop their positions. To their credit, the authors cite the works of other researchers who have taken contrary positions. Interested readers can and should delve into those papers and decide for themselves.

Chapter 7, Developmental Instability and Performance, is in my view one of the most interesting parts. Here the authors explore the relationship between asymmetry and performance, examining the boundaries of costs/benefits of asymmetry and fitness. The analysis of functional performance, asymmetry (both fluctuating and directional), and developmental stability is still in its infancy, but if performance factors can be associated with the origin and maintenance of asymmetry, then it becomes more than just an indicator of some other phenomenon.

Because FA is often difficult to detect, some have questioned whether it might not be a statistical artifact and its use in studying developmental stability and environmental stress inappropriate or limited. Despite this concern, workers from diverse fields are still attracted to asymmetry and developmental stability. Much more work can and should be done to clarify these relationships.

The book is well organized and produced. There are appropriate original illustrations and tables, and very few typographical errors. Each chapter has a bulleted summary of major conclusions, which help clarify the take-home messages. The style of the work is clearly synthetic, and attempts to bring many different ideas into play. Because of the wide range of topics, population geneticists and developmental biologists will cringe over the brief summaries of major concepts that concern their fields. The focus is clearly on connecting asymmetry and developmental stability to major biological concepts, not in rewriting theories of evolutionary genetics.

This book provides a provocative synthesis of asymmetry and developmental stability and should be a valuable contribution to studies of FA and its relationship to other phenomena. New investiga-

tors need to go beyond this book, but can do so using the literature cited herein. Established workers will not agree with every position presented here and may, in fact, be stimulated to redouble their efforts to challenge them. If that happens, the book will have contributed a great deal to science.

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EVOLUTIONARY GAMES AND POPULATION DYNAMICS.

By Josef Hofbauer and Karl Sigmund. Cambridge and New York: Cambridge University Press. \$69.95 (hardcover); \$27.95 (paper). xxvii + 323 p; ill.; index. ISBN: 0-521-62365-0 (hc); 0-521-62570-X (pb). 1998.

In essence, this is a mathematical textbook, the main subjects of which are replicator dynamics and Lotka-Volterra equations. The book is divided into four parts: Dynamical Systems and Lotka-Volterra Equations, Game Dynamics and Replicator Equations, Permanence and Stability, and Population Genetics and Game Dynamics. Each part contains an exhaustive compilation of mathematical theorems, many of which have been added to the literature within the last decade. The book lacks (by design) extensive biological discussion, so interpretation of these results is generally left to readers.

One of the most interesting theorems presented is owing to Hofbauer himself. The replicator equation, which is a within-population evolutionary model, is mathematically equivalent to the general Lotka-Volterra equation in the sense that mathematical results concerning the Lotka-Volterra equation (with n populations) apply to the replicator equation (with $n+1$ strategies), and vice versa. For example, the fact that the Lotka-Volterra system with two populations admits no limit cycles immediately implies that the replicator equation, with three strategies, likewise does not allow for limit cycles. Based on this equivalence between the ecological model and the evolutionary model, the authors effectively argue that the mathematical properties of the two types of systems should be studied together, and in fact they do so in the remainder of the book.

Relatively complicated theorems and proofs comprise a large portion of the book, and it is therefore not recommended for those who are not mathematically inclined. In fact, many theorems are stated without proof, and instead are given as exercises for readers to complete. For the biologist who is mathematically inclined or the mathematician interested in biology, however, this volume is rich in results and likely to provoke stimulating thought.

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THE GENETICS OF THE PIG.

Edited by MF Rothschild and A Ruvinsky. Wallingford (UK): CAB International; distributed by Oxford University Press, Oxford and New York. \$160.00. viii + 622 p + 3 pl; ill.; index. ISBN: 0-85199-229-3. 1998.

The book is a comprehensive description of a broad science of pig genetics. Eighteen chapters written by a total of 29 authors contain a magnitude of information from both the classical quantitative and modern biological fields of genetics. The book is useful to essentially all those who are involved in the study, research or production of pigs. The initial chapters are a view of the past evolution, domestication and formation of breeds. Chapters 3 and 4 are a thorough review of the inheritance of coat color and morphological traits. Chapters 5 and 6, on biochemical and molecular genetics, are very complete and up to date.

The material covered in these chapters is comprehensive and well written. The chapter on immunogenetics is an excellent overview. Veterinarians and immunobiologists will find the chapters useful. The reviews of the current physical chromosome maps and linkage maps are very complete. The potential future use of transgenics is discussed well. The chapters on developmental genetics are useful for all basic growth biologists. Of special interest is the discussion of the need and potential methods to maintain genetic diversity. The chapter is both informative and persuasive, as well as realistic in that both the opportunities and difficulties of selection for disease resistance are discussed. Current and future breeding programs are discussed in the remaining chapters. Numerous traits of current and future interest are described.

Overall, the book is a very comprehensive, well-written review on the multiple fields of pig genetics. Numerous chapters will be used as reference for graduate level courses.

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REPRODUCTION & DEVELOPMENT

PRINCIPLES OF DEVELOPMENT.

By Lewis Wolpert, Rosa Beddington, Jeremy Brockes, Thomas Jessell, Peter Lawrence, and Elliot Meyerowitz. London and New York: Current Biology; Oxford and New York: Oxford University Press. \$65.00. xx + 484 p; ill.; index. ISBN: 0-19-850263-X. 1998.

This book has a somewhat old-fashioned title which is your guarantee that it is not just a revision of an already successful textbook (more illustrations,