

and complete. There are a few examples of figure legends with incomplete information, but these were definitely the exception, not the rule.

This book provides an excellent update for researchers in the field of taurine research. It should also be of interest to scientists engaged in the study of calcium regulation, cell volume regulation, antioxidant mechanisms, the cardiovascular system, the digestive system, neuromodulation, and human nutrition.

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GENETICS & EVOLUTION

MATERNAL EFFECTS AS ADAPTATIONS. *Based on a meeting held in St Louis, Missouri, June 1996.*

Edited by Timothy A Mousseau and Charles W Fox. Oxford and New York: Oxford University Press. \$65.00: xiv + 375 p; ill.; taxonomic, author, and subject indexes. ISBN: 0-19-511163-X. 1998.

Occasionally there is a multiauthored book that is inspiring enough to revive the interest of evolutionary biologists in some unduly neglected concept. *Sexual Selection and the Descent of Man, 1871-1971* (edited by B G Campbell. 1972. Chicago (IL): Aldine Publishing Company) accomplished this for sexual selection theory. The present book may do the same for maternal effects.

As several chapters make clear, maternal effects are more than troublesome noise in a heritability estimate. In his chapter, Kaplan notes that mothers make the phenotypes (eggs) that start the next generation, and that phenotype is highly organized and stocked with information (not only nutrients) before the offspring genome is expressed. This book challenges us to expand our view of selection and adaptation to include the cross-generational extended phenotypes of parents expressed in their offspring—both in their young and adult offspring, and sometimes even in their grandchildren. The authors discuss species in which parents choose oviposition sites, incubate eggs, care for or educate their young, and where eggs contain, in addition to nutrients, hormones, antibodies, mRNA, and photoperiod-induced cues. Parental effects influence development in myriad and lasting ways. The editors made the point well when they dedicated this book to their mothers “who gave us much more than genes.”

This volume is based on a 1996 symposium of the Society for the Study of Evolution. It contains 19 chapters, separated into four parts on: conceptual issues, assessment and measurement, partial reviews of maternal effects in major groups (selected plants, insects, fish, birds, amphibians and ro-

dents), and four detailed case studies. At the beginning of each part, the editors give very helpful concise descriptions of the major points of each chapter. The emphasis, as the title suggests, is on adaptive significance (fitness effects), and there is much discussion of the difficulties of conceptualizing and measuring fitness across generations.

Maternal effects are effects of the maternal phenotype on the offspring phenotype (Price; Roff; Rositer; Wade). Some chapters in this book describe them as effects of the maternal environment on the offspring phenotype (Ginzburg), or as “environmentally induced” (Lacey) or “non-genetic” (Heath and Blouw; Messina). No doubt these terms attempt to draw a strong distinction between transmitted maternal genes (nuclear and cytoplasmic) and transmitted nongenetic factors and phenotypic changes. But the emphasis on environmental induction is unfortunate, because it can lead to the same type of error as that promoted by descriptions of plasticity as a nongenetic aspect of the phenotype. The maternal genotype is inevitably involved (Moore et al.), and genetic variation in novel or variable maternal effects is what makes them potentially adaptive. Some environmentally-sensitive maternal effects represent a kind of transgenerational phenotypic plasticity (Fox and Mousseau), as exemplified in many of the chapters, some of it likely adaptive. But quantitative genetic research focused on environmentally-variable maternal effects needs to be accompanied by a reminder that many maternal contributions to offspring are constitutive, virtually invariable features of normal development (many nice examples are given in the chapter on fish by Heath and Blouw). Indeed, it could be argued that the most important and most certainly adaptive maternal effects (such as species-typical egg or seed cases, or the cytoplasmic organization that gives rise to polarity and symmetry in an embryo) are precisely those most strictly canalized under selection so as to be immune to effects of environmental variation. Using similar reasoning, genetic variation in maternal effects should not be considered a criterion of adaptation, as suggested in the chapter by Donohue and Schmitt. Although genetic variation is a requirement of a *further* response to selection, the most highly adaptive maternal effects may be those most immune to the effects of genetic variation (highly canalized) in all normally encountered environments.

There were some omissions that I found surprising. Only two chapters (Wade; Moore et al.) mention the relevance of kin selection theory, and none apply the concept of inclusive fitness, in spite of its proven utility for interactions across generations among kin. There is no mention of the impressive maternal effects in social insects, where both mechanisms and fitness consequences are well known. Nor is there any discussion of the enormous cell

and molecular-genetic literature on the maternal control of early embryology, or of macroevolutionary consequences of maternal effects, like those discussed by Ryuichi Matsuda under the heading of "embryonization" (*Animal Evolution in Changing Environments with Special Reference to Abnormal Metamorphosis*. 1987. New York: John Wiley & Sons). The emphasis of most chapters is on a quantitative genetic approach to adaptation, and within this framework there are many original insights.

This volume is a high-quality contribution to the literature on phenotypic plasticity, selection and adaptation, and development as an aspect of natural history and evolution. Perhaps the most important message it contains is clear evidence for the role of environmental factors in structuring development from its earliest inception. As a public service it should be slipped into the mailbox of any science writer, lecturer, or molecular biologist who unflinchingly describes the genome of an organism as a complete set of instructions for an individual.

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ANNUAL REVIEW OF GENETICS. *Volume 32: 1998.*

Edited by Allan Campbell, Wyatt W Anderson, and Elizabeth W Jones. Palo Alto (California): Annual Reviews. \$60.00. xi + 735 p + 12 pl; ill.; subject index and cumulative indexes (contributing authors and chapter titles, Volumes 28–32). ISBN: 0-8243-1232-5. 1998.

CLADISTICS: THE THEORY AND PRACTICE OF PARSIMONY ANALYSIS. *Second Edition. The Systematics Association Publication, Number 11.*

By Ian J Kitching, Peter L Forey, Christopher J Humphries, and David M Williams. Oxford and New York: Oxford University Press. \$75.00 (hardcover); \$29.95 (paper). xiii + 228 p; ill.; index. ISBN: 0-19-850139-0 (hc); 0-19-850138-2 (pb). 1998.

The last several years have yielded developments on all fronts in cladistic analysis—from how we view characters to tree building methods to interpretations of patterns. Hence, an update of this book that pulls together these advancements is most welcome.

While the first edition was essentially a collection of course notes on various topics relevant to cladistics, the second edition is quite different. The scope has been narrowed and refocused, and the new book is one-fifth longer than the original. Sections on applications, such as classification and biogeography, have been removed, as have comparisons of parsimony to other pattern approaches. Far from making the book less useful, this rethinking has turned a usable (though somewhat disjointed) book

into a comprehensive and well-organized text. Although the first edition could be (and was) used as a course textbook, the new edition's more complete development of topics, improved progression, and more readable style will make it even better suited for this purpose.

New topics covered include tree support, combination of data sets, and the still controversial three-taxon analysis method. Useful syntheses of the key views on these topics are provided, with the authors often contributing their own views. There are also summaries of the key points in each chapter, a list of recommended references, a glossary, and an appendix of relevant computer software. As cladistics is an actively developing approach, there will no doubt be occasional disagreement with details and interpretations presented here. But these differences should be minor and will not detract from the unique usefulness of the volume as an upper level textbook or a concise reference for those involved with parsimony analyses.

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THE VARIATION OF ANIMALS AND PLANTS UNDER DOMESTICATION. *Volume 1.*

By Charles Darwin; New Foreword by Harriet Ritvo. Baltimore (Maryland): The Johns Hopkins University Press. \$18.95 (paper). xxv + 473 p; ill.; no index. ISBN: 0-8018-5866-6. [Originally published in 1868. Second edition, revised, published in 1883.] 1998.

MASTER CONTROL GENES IN DEVELOPMENT AND EVOLUTION: THE HOMEBOX STORY. *The Terry Lectures.*

By Walter J Gehring. New Haven (Connecticut): Yale University Press. \$35.00. xviii + 236 p + 8 pl; ill.; index. ISBN: 0-300-07409-3. 1998.

This book describes the scientific experiments that led to the discovery of the Homeobox, and the genes containing this DNA sequence. The author's personal involvement in these experiments, spanning the last third of this century, makes him not only a highly qualified expert, but an invaluable witness.

This easy going, guided tour is at times too focused on Gehring himself. The author first introduces the major concepts of genetics and development, then he moves on to what he considers to be the key to understanding development: homeotic genes. These genes, first studied in the fruit fly *Drosophila melanogaster*, when malfunctioning (mutated) cause bizarre conversion of some parts of the fly body into others: the "homeotic" transformations. Gehring's beloved *Antennapedia* mutant, which