AMER. ZOOL., 33:285–287 (1993)

BOOK REVIEWS

Monographs in Developmental Biology. H. W. SAUER, Series ed. (College Station, Tex.), Vol. 24. L. I. HELD, JR. (Lubbock, Tex.): Models for Embryonic Periodicity. viii + 120 pp., 11 fig., 2 tab., hard cover, 1992. SFr.195.-/DM234.-/£84.80/US $156.00. US $ price for U.S.A., £ price for U.K. only (subject to change) (ISBN 3-8055-5598-9).

As cell and developmental biologists use the latest technologies to unravel many of the mysteries of cells and molecules, certain cellular phenomena stubbornly retain their mysteries. The origins of spatial patterns in populations of animal and plant cells are obviously complex phenomena for which there is probably no single explanation. The plethora of models that have been developed to account for these patterning phenomena tends to confuse and intimidate anyone who wishes a better understanding of the complexity of development. For the uninitiated, not only can the number of models be overwhelming but also the details of particular models can be difficult to understand. Until the publication of *Models for Embryonic Periodicity*, I knew of no introductory or advanced text that handled the topic of pattern formation models with such clarity.

The author has undertaken a daunting task and has succeeded admirably in his undertaking. He has managed to strip away the equations and convoluted logic of many models to expose the essence of each scheme. In his introduction the author arranges all pattern formation models into three major categories according to how a given model assigns positions and differentiated states to cells. There are three possible relationships between positions and states: (1) a cell's position determines its state, (2) a cell's state determines its position, or (3) some agent assigns both position and state to a cell. After introducing these three alternatives as a framework for classifying the many types of mechanisms that have been proposed to account for pattern formation, the author then proceeds in the next six chapters to consider the major types of models that comprise each of the three categories. Each of these chapters traces the history of each model, from its origin to its present day derivatives. The discussion is enlivened with numerous examples of patterns in plant and animal tissues that develop according to a particular model. The figures of the text graphically depict the features of each model as well as the differences among models. An accompanying set of simple predictions for models also emphasizes the unique features of individual models. Collectively the figures represent the clearest illustrations of pattern formation models that I have encountered in the literature of developmental biology. Other figures in Chapters 3 and 7 also serve to enlarge upon concepts and patterns mentioned in the text. In a few places in the text (*e.g.*, the discussion of periodic patterns along the anterior-posterior axis of *Drosophila* embryos in Chapter 1 and the discussion of leech teloblasts in Chapter 6), additional illustrations would have enhanced the text; but since the author's descriptions and explanations are generally sufficiently lucid, additional figures were not considered essential. The tables may appear long and tortuous, but they are well-organized, rich in content, and easy to follow.

With his background in computer science as well as developmental biology, in theory as well as experimentation, the author is aware of the erroneous assumptions that theoreticians have often adopted in their comparisons of computers and cells. In the final chapter, however, he shows that developing cells actually do use many of the same mechanisms as computers to process and store information. Genetic evidence supports the view that cells, like computers, use binary codes, linguistic hierarchies, and subroutines. Even though a one to one correspondence may not exist between individual genes and patterns of cells, there is considerable evidence that groups of genes function in patterning subroutines at different times and places during development.

Dr. Held has given us an appreciation for the diversity of pattern formation models and the complexity of development that the models attempt to explain. Fortunately he has presented this complexity and diversity in terms that are easily comprehended. Researchers, instructors, and students can be thankful that Dr. Held writes with such clarity and originality. Some readers may even be inspired by his novel discussion of pattern formation to take some new looks at these old, enduring questions of development.

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Larval Stages of Northeastern Atlantic Crabs. An Illustrated Key. RAY INGLE. Chapman & Hall, London, 1992. x + 363 pp., illustr., glossary, subject and taxonomic indices, US $150.00 (ISBN 0-412-40600-4, cloth).

To anyone familiar with the study of crab larvae, Ray Ingle's name is well known. For over 20 years his meticulous descriptions of larval stages of crabs in the northeastern Atlantic have helped set the standard for studies on decapod development, and this book draws heavily on his many previous publications. The volume is the first of Chapman and Hall's Identification Guide series, advertised by the publishers as "comprehensive reference works for both specialists and non-specialists alike."

The book is divided into two parts. Part 1 is a very valuable review of studies of decapod larvae in the northeastern Atlantic. Methods for rearing, preparation, and description, as well as a detailed account of the general morphology of zoeal and megalopal stages that includes a valuable section on setal types, are given. Abundant illustrations of examples of the appendages and setal types, and 7 SEM plates, finish the section. Part 2 is an identification guide, complete with keys to and illustrations of larval stages of genera of Astacidea,

Thalassinidea, Palinuridea, and Anomura (despite the book's title) in addition to a more detailed section on crabs. Although the amount of detail contained in this section is wonderful, I found this second part less satisfying. The organization is confusing. A summary classification of the "Reptantia" (the definition in the book varies, sometimes including, sometimes excluding crabs) lists 56 larval crab species, but readers have to work to find which of those are among the 49 described in the text, and what are the 13 or so species not on the list (there are 67 to 69 crab species reported from the area). Accounts of larvae from other regions might have made the guide more useful for non-specialists. For example, the xanthid *Neopanope sayi* is an introduced species whose larvae could conceivably appear in local plankton; the species is not mentioned in the book although larvae are known from North American populations. The only Grapsinae listed is *Pachygrapsus marmoratus*; what do students do when they eventually encounter larvae of *Planes minutus*, whose larvae are not yet known from this area but were described by Lebour (1944) from Bermuda? The glossary is too brief, including only 32 terms, some very general (*e.g.*, plankton, spine) and some specialized (MS222, a commercial anaesthetic for invertebrates). Phyllosoma is listed there, but no other larval name (not even zoea and megalopa, although they are defined earlier in the text). Other terms are defined throughout the text as well.

The book has several rather severe printing problems. For many of the figures, the legends appear alone on the facing page, resulting in 69 pages that are essentially blank save for one figure legend at the bottom. This is especially lamentable because the detailed figures are very crowded together, and spreading them over two pages would have resulted in more usable figures. Possibly as a result of this crowding, some of the figures in my copy, especially 2.28 through 2.31, were so faint as to be illegible. Another printing problem is that other figures, and some of the text, are blurred. I hope these problems are restricted to my copy; however, for this relatively high price, potential readers might wish to look over these pages before purchasing.

Despite the above criticisms, the book is an indispensable reference that belongs in any laboratory where there is an interest in decapod larval development.

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Cannibalism. Ecology and Evolution Among Diverse Taxa. MARK A. ELGAR AND BERNARD J. CRESPI, eds. Oxford University Press, New York, 1992. 361 pp., illustr., author, species, and subject indices, $75.00 (ISBN 0-19-845650-5 cloth).

With the exception of three chapters set aside for special topics, the 15 chapters, each one authored by one or two specialists, provide a hit-or-miss compendium of cannibalism in the biological world. Space does not permit me to review the chapters individually or to name the authors. Neither will I criticize the taxonomic coverage: For most groups information on cannibalism is woefully incomplete or often merely anecdotal, and so it would appear to be for most taxa omitted from the book. What counts is that the kinds of cannibalism and their ecological, behavioral, and evolutionary implications are well covered.

One of the more remarkable inclusions for a book on cannibalism is brood reduction in gymnosperms. Brood reduction takes place by seed and ovule abortion and by lethal sibling competition of embryos, but it has not been shown that the tissue thus destroyed is taken up and used as nutrient. So the relation to filicide and siblicide in cannibalistic animals is moot. The problem receives good discussion here.

Unquestionable cases of filial and sibling cannibalism occur in the other chapters. There are also numerous examples of sexual cannibalism (the victim is the male sexual partner), heterocannibalism (cannibalism without kin or sexual constraints), and behaviors that fall short of cannibalism: infanticide, necrophagy (apparently never referred to by name in this book), and trophic eggs (trophic eggs are infertile, so their consumption should not be regarded as cannibalism).

For the evolutionary analysis of antisocial behavior such as cannibalism, Hamilton's Rule may be used just as it is for social behavior. Cannibalism will be favored if $-k < 1/r$, where k is the ratio of the change in fitness of the victim to the change of fitness of the cannibal and r is the coefficient of relationship. One form or another of this equation is used either explicitly or implicitly by more than half of the authors in this book, providing a picture of a sociobiological approach to problems like cannibalism.

There is a discussion of modeling cannibalism from the standpoint of foraging behavior and an application of stochastic dynamic programming to explain the evolution of filial cannibalism in fishes. Aside from these models, little is said about the population ecological implications of cannibalism except for the several pages devoted to the *Tribolium* flour beetles where there really has been a great deal of experimental analysis.

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Ecological Roles of Marine Natural Products. VALERIE J. PAUL, ed. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, 1992. xiii + 245 pp., illustr., subject index, $39.95 (ISBN 0-8014-2727-4 cloth).

This book is the second in the series "Explorations in Chemical Ecology." The editors of the series are Thomas Eisner and Jerrold Meinwald who wrote the Foreword to this book. Marine chemical ecology is a relatively new, rapidly developing discipline, sometimes called ecological biochemistry, that seeks to clarify the chemical interactions that form the foundation for such activities of the inhabitants of the marine