

In his foreword to this new edition Professor Harrison notes the obvious fact that much has been learned since the first edition of the book and the earlier English translation. However, he and the publisher decided that not only would a full revision be impractical but also that Slijper's wide knowledge and the way he applied it to produce his book should not have its flow disturbed by a revision that would require a complete rewrite. We agree.

Harrison's last chapter, on 'Whales and Whaling', is a good piece and entirely new. Most of Slijper's general thoughts and interesting illustrations, however, are retained. Written after the 1978 meeting of the International Whaling Commission, it is very timely and up-to-date, especially in these days of tardy publication schedules.

The new bibliography, presented in a somewhat different format from Slijper's, has many new entries (and has lost many). It is a useful start for anyone interested in a particular topic dealing with cetaceans. As Harrison noted, to do more would be impossible for a book of this sort.

Although the sharpness of some of the photographs has been lost with the reprinting, the book is well made and a good one to have readily available again. In his foreword, Professor Harrison points out that in his opinion 'the book, even unrevised, is still obligatory reading for beginners and, if my experience is anything to go by, a source for more advanced readers to consult repeatedly for information and ideas'. We concur, and often use it in that manner ourselves. It is now even more valuable with the new material Professor Harrison has included.

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Social Insects, Vol. 1, Edited by HENRY R. HERMANN. New York: Academic Press (1979). Pp. xv + 437. Price \$36.00.

Social Insects Volume 1 is the first of a three-volume set designed to 'collate the works of modern researchers' on this subject. This is the volume encompassing theory and miscellaneous topics not covered in the forthcoming volumes. Volume 2 will contain chapters on communication, defence, systematics, presocial insects, and social spiders; and Volume 3 will contain nine chapters, each on a major group of highly social insects.

For readers interested in an authoritative, comprehensive introduction to the biology of social insects, Wilson's 1971 *The Insect Societies* is still the best first choice. If one wishes to delve deeper how good is this new volume as a supplement? As is usually the case with multi-authored books, there are as many answers as there are authors.

The editor's introductory chapter is like a foraging bee in a weed patch. It briefly visits every point of possible interest, buzzing quickly from one to another, in an apparent attempt to be exhaustive by providing at least a sentence or two on everything having to do with social insects. A useful summary of ideas regarding the phylogeny of hymenopteran sociality unexpectedly appears

in the middle. The chapter might well have been turned into a review of that subject rather than cursorily skimming so many other topics.

Chapter 2 (Origin and Evolution of Insect Sociality: A Review of Modern Theory, by C. K. Starr) conscientiously extracts the essence of leading current theories stopping long enough at each one to clarify the issues even for naive readers. But, like a diligent bee, it surprisingly turns away from some of the loveliest blossoms: Michener's theory of mutualism is a more important and viable idea than one would think from reading this chapter, where it is confused with 'reciprocal altruism' (see below), unfairly required to occur in non-relatives for incontrovertible proof (it is in fact most likely to occur among relatives), and criticized for not having a 'robust' (mathematical) formulation — a point foolishly overlooked by Bishop Wilberforce in his criticisms of Darwin.

Chapter 3 (Antiquity of Sociality in Insects, by F. M. Carpenter & H. R. Hermann) is like a forager that would rather be back at the hive. It does the job as quickly as possible (only eight pages), and with little apparent enthusiasm, perhaps because the topic is somewhat outside both authors' areas of special interest. One wishes for more on this topic (insect palaeontology), which is unfamiliar to most students of social insects. As it is, this chapter is less comprehensive and less explicitly related to social evolution than Wilson's earlier (1971) treatment.

Chapter 4 (Territoriality in Social Insects, by C. Baroni Urbani) is like a foraging bee in a plastic flower factory. It begins with a search image (a definition of 'territoriality' taken from vertebrate zoology) that is unsuited to the material at hand, and must repeatedly confront the difficulty of attempting to distinguish nest defence (the subject of two full chapters in future Volume 2) from other kinds of territoriality, which are evidently either rare (e.g. defence of foraging range) or only artificially distinguished (e.g. the extended region around a nest). It is a valiant struggle with an ill-chosen task.

Chapter 5 (Caste Differentiation and Division of Labor, by M. V. Brian) is the masterly dance of an experienced forager at home. Brian is eminently qualified to write this review and has done a praiseworthy job. Its 100 pages are a thoughtful synthesis of more than 400 cited references. It is a major contribution to the literature on social insects, a book within a book that I hope will not be hidden there.

Chapter 6 (Genetics of Sociality, by R. H. Crozier) flies a homing bee's line to the centre of current theoretical issues and discusses them brilliantly. Like Chapter 5, this is a synthetic review containing many original thoughts. While I do not wish to detract from a generally favourable impression, two points seem worth discussing, especially since they concern other chapters of this book, and represent problems common in the literature. First, 'mutualism' (sensu Lin & Michener, *Q. Rev. Biol.*, 47, 131-159, 1972), which requires only enhanced probability of future reproduction compensating the cost of behaviour benefiting others, is not the same as 'reciprocal altruism' (sensu strictu Trivers, *Q. Rev. Biol.*, 46, 35-57, 1972), which requires penalties for non-reciprocity during the lifetimes of the interactants and thus may never occur in insects (which are not known to be capable of this kind of judgment and memory). So the use of the latter term is unfortunate in this chapter, though the confusion here is less than in Chapter 2 (e.g. p. 65). Although it is now common to call all kinds of reciprocity 'reciprocal altruism' (perhaps following Trivers, who discussed even

interspecific symbioses), there are actually several kinds that should be distinguished because they are expected to evolve in quite different situations. The second problem is an expression for individual 'inclusive fitness' that sums the individual's offspring plus all the offspring of the individual's relatives (all members of the same species?) devalued by their coefficients of relatedness. This is so different from Hamilton's original definition of inclusive fitness that it should be given a different name (elusive fitness?). It is a formulation common among authors who apparently wish to link inclusive fitness theory to modern population genetics via some more inclusive (population-encompassing) expression. But it lacks the power of Hamilton's concept because it does not focus on the total reproductive effects of the genotype on population gene frequencies, which is the essence of the idea for analyses of social evolution.

Chapter 7 (Larvae of the Social Hymenoptera, by G. C. Wheeler & J. Wheeler) is a bit like a worker in a foreign hive, except that it is a welcome addition. The heavy emphasis on morphology seems out of place following strong doses of behaviour and theory. But it reflects the long-term interests of the authors in this important topic. (In a footnote, a glimpse of the author in an earlier instar, we are told that he became interested in ant larvae as a student of William Morton Wheeler.) A more thorough summary of interactions between larvae and adults (e.g. the 'hunger signals' of *Vespa* larvae; the uses of larval silk by weaver ants; and the effects of brood on worker activity rates) might have further stimulated interest in this neglected segment of insect societies. Unfortunately, the authors' main conclusions regarding the social integration of larvae due to their production of essential proteinases has been thrown into some doubt by recent work (Grogan & Hunt, *Insect Biochem.*, 7, 191-196, 1977).

I regret having run out of strained entomological analogies before coming to Chapter 8 (Social and Evolutionary Significance of Social Insect Symbionts, by D. H. Kistner). For this author, judging by his unabashed amusement with words, might have been the most tolerant of all. Kistner calls food-begging within colonies 'rogatory behavior' and finds the 'ecclesiastic overtones' of this term 'only fitting for a field in which priests have made so many contributions' (p. 364). He does the reader a double favour when just for fun he mentions Wasmann's 1895 term 'trutztypus' (defensive morphology) and then kindly refrains from using it. Kistner's valuable review emphasizes literature since 1969 (the last year covered by Wilson's 1971 bibliography), and focusses particularly on the means, extent, and evolution of symbiont integration into colony social life.

The dominant subtheme of this volume is the evolution of insect social behaviour. A definitive treatment awaits combining the phylogenetic, bionomic, and genetic/theoretical approaches that in this volume are apportioned among separate chapters. This book at least puts the reader who is interested in such a synthesis in a somewhat better position to contemplate one.

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Ecology, 2nd edition. By ROBERT E. RICKLEFS. New York: Chiron Press (1979). Pp. xii + 966. Price \$18.95.

Ecology has made a remarkable transition. A field once dominated by emphasis on proximate causation and descriptive natural history, ecology has embraced evolutionary biology to emerge as an exciting science. This 'new era' of ecology presents teachers of the trade with an awesome challenge: how to integrate the important principles of ecology and evolution? *Ecology*, by Robert Ricklefs, is a textbook that accomplishes this goal with an excellent blend of theory and empiricism. In the preface to the second edition, Ricklefs affirms his dedication to a broad, evolutionary view '... my belief remains firm in the principles that evolution is the most important unifying concept in ecology and that ecological systems are best understood in terms of interactions among their components'.

The book covers a remarkable range of topics, with 10 major sections and 43 'chapters'. The imposing 863 pages of text, plus an extensive, up-to-date bibliography and complete glossary provide the reader with a modern, comprehensive treatment of ecology. Ricklefs writes clearly, with over 300 subheadings that highlight upcoming topics, e.g. 'frequency-dependent selection can maintain genetic polymorphism' and 'can asexuality and inbreeding be advantageous'? This active approach, plus a healthy dose of excellent figures, photographs, and examples provide a punch that brings the reader close to the development and testing of ecological principles.

The book begins with a broad, general treatment of ecology, with emphasis on the development of the physical environment and the physiological, behavioural and ecological adaptations of organisms. Here Ricklefs provides a series of fascinating examples that introduce the student to the incredible complexity of ecological interactions. The interface between ecology and behaviour is best developed in these sections, with discussions of territoriality, social organization, courtship, and mating systems.

Ricklefs knows ecology rests on an evolutionary foundation; so after establishing an ecological background, he presents a rather complete picture of evolutionary biology, from Darwin's development of the theory of natural selection, to partitioning phenotypic variance. Sections entitled 'Ecological Genetics and Evolution' and 'Genetics of Populations' provide a good introduction to population genetics and evolution. In these sections, Ricklefs presents many important concepts including local genetic differentiation of populations, reproductive value, and the evolution of senescence.

The last sections of the book cover the ecology of populations, communities, and ecosystems in considerable detail. Competition is discussed clearly, with the standard presentation of two-species interactions. As a notable addition, Ricklefs briefly discusses the problems of calculating competition coefficients in the real world. Predator-prey interactions are treated comprehensively, with particular emphasis on evolutionary responses. The community ecology section presents the topics of community diversity, succession, and species abundance. Ecosystem dynamics are thoroughly discussed, with detailed examples of energy flow and nutrient cycling and an important comparison of temperate and tropical forests.

Although Ricklefs has reduced his treatment of ecology in the second edition, *Ecology* remains the best