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Book Review

WILSON, Edward O. 1971. *The Insect Societies.* The Belknap press of Harvard University Press, Cambridge, Massachusetts, U.S.A. pp. x + 548. $22.00.

This book is a very impressive achievement for a single author. E.O. Wilson states at the beginning of the work that he is attempting to provide a modern synthesis of insect sociology, and to present the knowledge within the framework of the concepts of population biology. I think he has succeeded to a remarkable degree. Almost all of the information reviewed is from the works of other authors and the range covered is enormous. The bibliography extends over 55 pages and includes references published from the seventeenth century up to 1971. Such coverage has often resulted in books becoming a dull catalogue of abstracts, but the author's control of his material has produced a very readable and coherent account, which is consistently interesting and clear. In some parts the book is even compulsive.

Michener's classification of the degrees of social behavior *(Ann. Rev. Ent., 14:299-342)* is adopted for use throughout the book. Four chapters are devoted to descriptions of the social organizations found among wasps, ants, bees and termites respectively. The accounts also include the taxonomy of the social species, what is known of the fossil records, and current and previous hypotheses about the evolution of sociality within the groups.

An interesting chapter on pre-social insects follows, bringing together information on parental, co-operative, sub- and quasi-social behavior among several orders of insects and in spiders.

Three chapters are given to caste in ants, bees and wasps, and termites, respectively, in which the evolution and determination of castes and the division of labor among them are discussed. As in other parts of the book, the limits of current knowledge are always stressed.

The sensory physiology and mental capacities of the social insects are reviewed as a prelude to discussions of the communication systems employed in alarm and assembly, recruitment, recognition, food exchange and grooming which make up the next three chapters. The author emphasizes the way in which complex social behavior is created out of the relatively simple individual reactions of colony members to stimuli from the rest of the colony and from the environment. These discussions lead into the chapters on group effects and the control of nestmates and on social homeostasis and the superorganism.

Wilson gives considerable attention to the historical importance of the idea of an insect colony as a superorganism and concludes that the concept has lost popularity not because it is wrong but because it has become irrelevant. It was valuable in stimulating interest and research, but does not itself contribute towards understanding the phenomena which have

been discovered through that research.

Hamilton's idea of the importance of haplodiploidy in the development of insect sociality *(J. Theoret. Biol., 7:1-52, 1964)* is among those dealt with in a chapter on the genetic theory of social behavior. The intriguing suggestion that because hymenopteran males are haploid, and a female thus shares more genes with her sisters than with her offspring, social behavior improves her chances of perpetuating her own genes, is subjected to close scrutiny. Predictions which should follow from it are examined using available data, and Wilson concludes that the idea can be provisionally accepted. But he stresses that multiple mating by the queen can cancel the bias unless the population shows low dispersal or much interbreeding.

A chapter entitled "Compromise and Optimization in Social Evolution" discusses how social organization is affected by the environmental circumstances of the colony. It includes a review of Wilson's own earlier work on the hypothesis that the proportions of castes in a mature colony represent an 'optimal mix' which minimizes the 'production cost' of the new virgin queens. The constitution of the optimal mix depends on the degree of specialization of the castes and varies with changes in the environment. The small amount of data which supports the hypothesis is quoted, but it will be very difficult to prove or disprove.

Two chapters on symbioses follow, treating relationships among the social insects and with other arthropods respectively. Wilson thinks that permanent parasitism of one ant species on another can be reached by any of three routes: via the slave-making habit, via temporary parasitism in colony foundation, or via xenobiosis, the habit of one species of living within the nest of another. He gives examples to support his opinion.

The penultimate chapter is on the population dynamics of colonies, a study which the author considers to be the next essential stage in accounting for the observed social phenomena of insects, following work on their physiology. The chapter covers survivorship of colony members and of colonies, regulation of colony growth, competition and territoriality, control of colony destiny and species diversity, and dispersal of colonies.

The concluding chapter relates the study of insect societies to that of vertebrate societies and looks forward to the founding of a general theory of sociobiology.

Throughout the text entomological terms are explained where they occur and no assumptions are made about the reader's background. A glossary is provided. It is clear that the book is intended for wider readership than entomologists only. Each chapter can be read and understood independently, although references are made to other chapters which discuss in detail themes mentioned in passing. This design leads to some repetition of data, especially in the section on behavior, although on most occasions a new facet of interest is revealed.

All the many illustrations are borrowed from earlier works, either reproduced directly or modified, and are mostly good. Some take the form of original drawings by Sarah Landry composed from one or more sources, and these are both clear and pleasing.

Wilson also quotes many passages of description or argument directly from earlier authors. Such inserts provide a valuable change of pace for the reader and enhance the author's own style. He also gives his personal assessment of the value of other people's work, and in cases where no data are available to enable a mystery to be explained, makes a suggestion of his own towards a solution.

I estimate that it took me about thirty-one hours to read through the entire book. The price of the volume may seem high, but for so much solid entertainment and enlightenment it compares well with other media, even without counting re-reading time. I would recommend *The Insect Societies* to anyone. You would actually read it.

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