

Entomology

Cedric Gillott

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Preface

The idea of writing this book was conceived when, in the late 1960s, I began teaching a senior undergraduate class in general entomology. I soon realized that there was no suitable text for the class I intended to give. The so-called "general" or "introductory" texts reflected the traditional taxonomic approach to entomology and contained relatively little information on the physiology and ecology of insects. This does not mean that there were no books containing such information. There were several, but these were so specialized and detailed that their use in an introductory class was limited. I hold a strong belief that an undergraduate general entomology course should provide a balanced treatment of the subject. Thus, although some time should be devoted to taxonomy, including identification (best done in the laboratory, using primarily material which students themselves have collected, supplemented with specimens from the general collection), appropriate time should be given also to discussion of the evolution, development, physiology, and ecology of insects. In the latter category I include the interactions between insects and Man because it is important to stress that these interactions follow normal ecological principles. Naturally, the format of this book reflects this belief.

The book has been arranged in four sections, each of which necessarily overlaps with the others. Section I (Evolution and Diversity) deals with the evolution of the Insecta both in relation to other arthropods (Chapter 1) and in terms of the individual orders within the class (Chapter 2). Chapter 3 serves two purposes: it provides a description of external structure, which remains the basis on which insects can be classified and identified, while stressing diversity by reference to mouthpart and limb modifications. In Chapter 4 the principles of classification and identification are discussed, and a key to the orders of insects provided. Diversity of form and habits is again emphasized in Chapters 5 to 10, which deal with the orders of insects.

Section II (Anatomy and Physiology) deals with the homeostatic systems of insects; that is, those systems which serve to keep an insect "in tune" with its environment. The goal of these physiological systems is to enable insects to grow and reproduce optimally. The section begins with a discussion of the integument (Chapter 11), since this has had such a profound effect on the success of insects. Chapter 12 examines sensory systems, whose form and function are greatly influenced by the cuticular nature of the integument. In Chapter

13 neural and chemical integration are discussed, and this is followed, in Chapter 14, by a discussion of muscle structure and function, including locomotion. Chapter 15 reveals the remarkable efficiency of the tracheal system in gaseous exchange. Chapter 16 deals with the acquisition and utilization of food, Chapter 17 with the structure and functions of the circulatory system, and Chapter 18 with nitrogenous waste removal and salt/water balance.

In Section III are discussed reproduction (Chapter 19), embryonic development (Chapter 20), and postembryonic development (Chapter 21). The final section of the book (Ecology) examines those factors which affect the distribution and abundance of insects. In Chapter 22 abiotic (physical) factors in an insect's environment are discussed. Chapter 23 deals with biotic factors that influence insect populations and serves as a basis for the final chapter in which the specific interactions of insects and Man are discussed.

As can be inferred from the opening paragraph of this Preface, the book is intended as a text for senior undergraduates taking their first class in entomology. Such students probably will have an elementary knowledge of insects, gleaned from an earlier class in general zoology, as well as a basic understanding of animal physiology and ecological principles. With such a background, students should have no difficulty in understanding the present text.

On occasions, several of my colleagues have questioned the wisdom (ability?) of a single author attempting to cover the entire field of entomology; the more outspoken ones have plainly told me to "Get help!" I have resisted this advice, partly, I suppose, through selfishness, but mainly on the grounds that multiauthored treatises tend to lack continuity. However, to guard against errors of fact and interpretation resulting from my own ignorance, I have had each chapter reviewed by a specialist.

During preparation of the book, there were moments when I wondered whether the finished product would ever see the light of day or, indeed, whether I should have undertaken the task in the first place! Now that the book is finished, I can truly say that its preparation has been a rewarding and pleasant experience. My hope is that its readers will now receive the same pleasure.

Cedric Gillott

April 1979

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Evolution and Diversity