A TEXTBOOK OF

# ENTOMOLOGY

FOURTH EDITION

Herbert H. Ross
Charles A. Ross
June R. P. Ross

# *A Textbook of*
# *Entomology*

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*To Herbert Ross's many friends and colleagues who helped in so many ways to make the vast and diverse field of entomology so excitingly interesting to him.*

# *Preface*

Entomology is an ever-growing science that continues to expand in basic knowledge and perspectives through the publication of a large amount of research and ideas. In the 15 years since the third edition of this textbook was published, entomology has taken enormous steps forward in its understanding of the ecology, physiology, behavior, and interactions of insects. These new developments will continue to lead to additional and even more fundamental questions about insects, and new evidence will be needed in order to reach new answers and to test new ideas. The results will significantly change some of our current perceptions and ideas, and, in the long term, will lead us to a much better understanding of our science.

This book serves as an introduction to entomology by presenting the fundamental aspects of the field, and it is organized so that students will acquire a general view of the whole field. This edition preserves the major aims and balance of the earlier editions with emphasis on a knowledge of basic relationships between different groups of insects and between insects and their environment. The relationships between insects and their environments are emphasized in chapters on life processes, behavior, past history, ecology, beneficial insects, and harmful insects. Some chapters are new or nearly completely rewritten to reflect the significant changes that have taken place in entomological thought during recent years. Substantial portions of other chapters were rewritten, and the chapter on insect orders was reorganized to represent more closely the probable evolutionary relationships of the different groups.

As before, evolutionary relationships are stressed as a central theme. Preliminary family trees are included for the common families in a number of orders to visualize more readily their evolutionary relations. It is increasingly evident that our information in such areas as comparative biochemistry, behavior, and anatomy will not be fully understood until the relevant facts are fitted into systems of evolutionary progression. The largely rewritten chapter on the history of insects gives a geological perspective of the dynamic history of insect evolution and the forces surrounding it.

The keys to the orders and families are designed to accommodate only common members and hence are far from complete. They are intended to aid beginning students in realizing the differences used in delimiting orders and families and to give them practice in the usage of keys.

We wish to thank the many persons who have been of assistance in planning and writing the various editions of this textbook. In preparing this fourth edition we particularly wish to thank all of those who have offered encouragement, suggestions, and criticisms. Drs. Donald Ashdown of Texas Tech. University, Frank M. Carpenter of Harvard University, Robert W. Dicke

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