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Insect Life History Patterns: Habitat and Geographic Variation

Edited by

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With 62 Figures

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Preface

This volume results from a symposium entitled "Species and Life History Patterns: Geographic and Habitat Variation", held during the National Meeting of the Entomological Society of America in Denver, Colorado, USA in November, 1979. The stimulus to assemble papers on this theme emerged from continuing discussions with colleagues concerning controversies in ecology and evolutionary biology, namely those associated with plant-herbivore interactions, life history theory, and the equilibrium status of communities. The study organisms used in this series of reports are all either herbivorous insects or those intimately associated with plants. In this volume we stress the variation found in life history traits and address some of the problems inherent in current life history theory.

We include as life history traits not only traditional variables such as fecundity, size of young, and age to first and peak reproduction, but also diapause and migration, traits that synchronize reproduction with favorable plant resources. Because life history traits of phytophagous insects are influenced in part by spatial and temporal variation in the quality and availability of their host plants, we also consider the role that discontinuities in plant quality play in reducing insect fitness. Lastly, much of the traditional life history theory concerns itself with differences between the evolution of traits or constellations of traits when populations incur primarily density-independent, compared to density-dependent, mortality. Consequently, we address this issue and attempt to shed light on the equilibrium status of several phytophagous insect communities.

Because we consider mostly phytophagous insects here, we hope this work will not only further our knowledge of basic ecological processes, but also stimulate and prove useful to applied scientists attempting to manage pests on agricultural crops, forest trees, and ornamental plants. Furthermore, many of the processes and interactions we discuss are not unique to insects and should extend beyond the bounds of Entomology. Finally, our subject is a broad one that encompasses several controversial issues, and in no way do we perceive this volume as either a complete coverage or the final word on variation in insect life histories. However, we have tried to identify the kind of holistic approach necessary to build and improve upon our currently limited knowledge.

We have divided this volume into three parts. Part I is concerned with the impact of different levels of host plant variability on herbivorous insects. Two chapters discuss the effect of intraplant and interplant variability respectively on insect fitness traits, while the third emphasizes how coevolution with different species of host plants has led to disparate life histories and host race or possibly species formation. Part II includes five chapters that directly discuss insect life history traits. These treat the genetic and environmental variances and covariances and identify the selective pressures associated with single traits or combinations of traits. They also discuss inconsistencies between life history data and current theoretical predictions as well as theoretical shortcomings. In Part III we attempt to define the ecological setting under which the life histories of selected herbivorous insects evolved or at least are maintained. The possibility of insect communities without competition and with nonequilibrium coexistence is considered here, as are patterns and processes of habitat exploitation. The necessity for an open-minded approach should be apparent if we are to identify exceptions to current notions of community organization and make appropriate adjustments to evolving ecological theory.

Robert F. Denno
Hugh Dingle

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