Foreword

Although, as an ecologist with an interest in plant/insect interactions, I have at my disposal close to half a million species that I can legitimately claim as subjects for study, for the past two decades (effectively the entirety of my professional career to date), I have spent much of my time engaged in the study of only two species. One of these species is a small, physically unremarkable brown moth and the other is perhaps charitably described as a noxious weed. I spend my time so occupied not for want of imagination or lack of other opportunities but because I believe fervently that, just as the quality of a physical structure depends not only on its design but on the integrity of its constituent parts, the quality of conceptual knowledge depends on the integrity of its inputs. Not all ecologists or evolutionary biologists approach their disciplines in this precise manner; practitioners of the comparative approach often emphasize breadth over depth, highlighting the need to gather information on a wide range of systems in order to document robustly and unambiguously general patterns. Without question, both approaches are necessary, but this is not to say that everyone will embrace them with equal enthusiasm. I know that my dogged devotion to a tiny fraction of the world's biodiversity has baffled some of my colleagues. One anonymous reviewer of a grant proposal of mine, in fact, argued that, with 80% of what there is to know about these organisms already worked out, it was hardly worth the marginal return to be gained by investing the remaining 20%.

This book, *Evolutionary Ecology across Three Trophic Levels: Goldenrods, Gallmakers, and Natural Enemies*, by Warren Abrahamson and Arthur Weis, is the perfect rebuttal to such an argument. These two authors have personally invested a quarter-century of effort into the study of a wildflower, a fly, and the fly's small circle of enemies; taking into account the person-years invested by collaborators, students, postdoctoral fellows, and other associates, that quarter-century is multiplied manyfold. What these estimable scientists have for their effort is arguably the most

thoroughly characterized three trophic level interaction on the planet, a paradigm system to be used with confidence in defining a conceptual framework for the study of ecological interactions in general. At first blush, *Eurosta,* the fly, and *Solidago,* the host plant, seem less likely candidates for intense scrutiny than my small brown moth and noxious weed, but I envy Abrahamson and Weis, and their fellow travelers, the appealing attributes of their system. The lifestyle of the gallmaking fly makes it exceptionally well suited for quantitative measurement and experimental manipulation; the genetics, physiology, and geographic distribution of the plant permit field, laboratory, and greenhouse study; the system's third trophic level is diverse but manageably so; and the history of the system itself—native to North America and remarkably uncontaminated by human interference—allow for reasonably unambiguous evolutionary interpretations of data.

Years of focused study have produced a wealth of information that is, ironically, staggering in its breadth, encompassing not only ecology and evolution but also systematics, physiology, genetics, molecular and developmental biology, behavior, and a range of other subdisciplines within biology. Synthesized in this volume is more than a century of literature, interpreted, and in most cases inspired by, the conceptual framework of natural selection. August Krogh, a great physiologist of an earlier era, wrote in 1929 that "for a large number of problems there will be some animal of choice, or a few such animals, on which it can be studied most conveniently." This principle is the guiding philosophy behind the use of model organisms that is so characteristic of contemporary cell and molecular biology and so generally eschewed by the majority of ecologists in favor of documenting the diversity generated by natural selection. *Solidago, Eurosta,* and *Eurosta*'s natural enemies may well come to be regarded as a model interaction, as it were, for the fields of ecology and evolutionary biology. Ideally, this book will serve not only as a useful source of information but also as a source of new ideas and insights, and as a shining example of the value of a thorough understanding of the organisms themselves to organismal biologists of any stripe.

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