

Preface and Acknowledgments

My early interest and delight in learning (especially about everything that moved) was encouraged by my parents, who never left a doubt that doing what we love is one of life's greatest rewards. A grateful daughter dedicates this book to those two smart and loving people.

Robert May and Dale Clayton believed I should write this book before I believed it, and I appreciate that; the task has been a remarkable experience. John Raich, the dean of the College of Natural Sciences at Colorado State University, was instrumental in providing leave time with which I began this book; I'm thankful for his effort, and for the confidence he has in me.

Since that beginning, my research associate, Mike Freehling, has deftly handled all manner of things that have escaped my attention as I've explored the nooks and crannies of this book. I appreciate Mike's intelligence, ability, and friendship. Mike has worked with me throughout my career and has played a large role in everything I've done. He also assisted with this book, and I'm especially grateful for his help with the bibliography.

Paul Harvey, Eli Holmes, William Marquardt, Robert May, Randy Moore, and Robert Poulin read the manuscript in its various stages; their comments were invaluable. William Marquardt also produced the photograph of *Trichinella spiralis*. In addition, Ben Hart and Dennis Minchella and his students read various chapters and made useful suggestions. I also appreciate feedback from William Black, Dale Clayton, Larry Curtis, Douglas Futuyma, John Holmes, Mike Huffman, Hilary Hurd, Marc Klowden, Ed Levri, Manfred Milinski, Sarah Randolph, Heinz Richner, Dan Simberloff, Joe Travis, and Claus Wedekind, who read portions of the manuscript and commented on them. At Oxford University Press, Kirk Jensen and Lisa Stallings patiently answered questions and helped the book come to fruition.

Gary Raham of Biostratation provided the cover illustration, depicting elevation-seeking behavior in ants. Conery Calhoon (C. Calhoon Illustration) created the other original illustrations and shared her characteristic good humor and encouragement. (Please note that we have taken liberty with scale in some drawings.) Photographs were provided by Greta Aeby, Richard Brusca, Norm Dronen, Terry Galloway, Ben Hart, Gary Hendrickson, Joseph Hinnebusch, Peter Hudson, Rick Karban, Paul Lewis, Richard Lucius, Barbara Maynard, C. Kirk Phares, Luc Plateaux, Laurent Péru, Larry Roberts, Marie Timmerman, and Claus Wedekind. Because the Colorado State library was devastated by a recent flood, some of the material I had to reprint was not in the best shape; nonetheless, the photographic services group at Colorado State University snatched visual victory from the jaws of some fairly grim photocopies. At Texas A&M University, Angus Martin of the Cushing Memorial Library and Pixey Mosley of the Sterling Evans Library went well beyond the call of duty to help me acquire and reproduce figure 5.9. The College of Natural Sciences and the Department of Biology at Colorado State University helped finance the publication of figures 3.4, 3.6, and 3.12. Susan Conway tracked down Justice Stewart's statement. Rob Kozusko, Melanie McCall, and Kristina Parkinson assisted a great deal with library work. Felicity Huntingford, Boris Kondratieff, Marc Mangel, Robert Paine, LeRoy Poff, and Daniel Simberloff provided useful information and discussion. I am especially grateful to Marijke de Jong-Brink, who was remarkably understanding when the completion of this book interfered with my participation in a collaborative project, and to Felicity Huntingford, in whose laboratory I proofread the final copy.

While writing about parasite transmission, I became enchanted (as you will see) by the legend of the rat king. Scholars on three continents, ranging from one of my invertebrate zoology students to a folklorist, helped me sort out this story and collect photographs. They are Tracy Carlson, Norman Dronen, Gary Hendrickson, Newton Kingston, Carol Mitchell, John Pearson, Nicole Rempel, and Claus Wedekind.

Shortly after beginning this book, I wrote to many colleagues, asking them for reprints, preprints, and insights they might have. The response was generous beyond my expectation, and I was the delighted recipient of many thoughtful letters. The community of scientists is one of the attractive things about the work we do, and the goodwill and help of my peers is a great personal and professional gift. Space prevents me from listing all of you, but I am indeed grateful.

Despite all this assistance, the book nonetheless has its limits, and some caveats are in order. The emphasis of the book is on eukaryotic endoparasites—helminths and protista. These animals have inspired much of the literature, with the exception of areas such as grooming and some avoidance behaviors. Ectoparasites are covered in more detail than parasitoids or noneukaryotes, and microherbivores are not included. This taxonomic variegation reflects both

irregularity in the depth of the literature and in the extent of my own interests. In addition, some peripheral areas—such as evolution of virulence, sexual selection, parasitic castration/host reproduction, population consequences/models, and social parasitism—could each be the subject of a book; the discussion of these topics is necessarily truncated.

This book mentions a multitude of animal species, some briefly and others at length. For the sake of consistency, *I have used the Latin binomials that appeared in the original literature that I cite*, regardless of subsequent taxonomic revisions. In some cases, those original papers did not offer enough information for me to apply synonyms with confidence; rather than update some names, but not others, I chose to use the original designations in all cases.

To improve readability, all of the tables have been gathered in an appendix at the end of the book. Page references are provided where necessary.

As with all attempts to impose order in the form of categories, mine is unavoidably flawed. For instance, altered appearance is not, strictly speaking, behavior, and behaviors such as grooming can be seen as either avoidance or defensive maneuvers. It is my hope that these ambiguities and, at times, arbitrary designations, do not obscure the larger story I am telling.

That story is one that begins more than two decades ago with the application of theoretical rigor to ideas about the evolution of host-parasite interactions. This fusion showed that there were certain key elements (e.g., transmission, susceptibility, survival/recovery) that were likely to affect host-parasite interactions because they affected the fitness of the participants. After a brief excursion into the lives that parasites live, I explore the idea that transmission, susceptibility, survival, and recovery can have behavioral components as well as physiological ones. Like their physiological counterparts, host behaviors help define the multitude of evolutionary pathways taken by parasites and their hosts.

What you will see is that a grasshopper is not always truly a grasshopper, doing grasshopper things, nor is an ant always an ant. The questions that emerge from this realization can lead across all of biology, from neuroscience to ecology, into epidemiology and biological control. I imagine I haven't dreamed of most of these questions—I hope you do. And I hope you have a good time reading this book.

*Lafayette, Colorado
Summer 2000*

Janice Moore