

Preface

This book originally grew out of encouragement from many colleagues for a comprehensive textbook for an upper-level course in plant ecology. It has been our goal to write such a text from a fresh, contemporary perspective, emphasizing a conceptual approach to the subject. A few words are necessary about how this book was written and revised. The order of authors' names must necessarily be printed in a linear fashion, and in most cases this implies the order of their contributions. In the case of this book, a circle would be more appropriate. The three authors of this book all contributed in multiple overlapping ways to the book; our contributions were different, but not greater or lesser. This book could not have been written by any one or two of us, and it very strongly reflects all of our contributions and differing perspectives. It also offers a taste of our collective senses of humor, and we hope that it provides at least a few chuckles to students wading through this sometimes rather dense body of information.

We have been delighted with the response to the First Edition of this book, and have received many positive and useful comments from both students using the book and professors who have adopted it for their courses. The Second Edition is changed in a number of respects: most obviously, the book is now in full color. We have added many new illustrations and photos, and updated and redrawn most of the others. The text has been updated, with a great deal of new material added; for instance, the bibliography has grown by over a third and now includes over a thousand citations. For example, research on the conceptual and empirical bases of regional and global diversity has been an especially fertile area in recent years leading to an extensive revision of Chapter 19. In addition to including work published since the First Edition, we have also developed certain sections to include a fuller treatment; for example, the

section on plant pathogens has been completely revised and is much more comprehensive. Other, less central material has been deleted or shortened.

We assume that students using this book will have had an introductory course in biology, but may or may not have had advanced biology courses, including general ecology. Recognizing that plant ecology may be the only ecology course a student might take, this book covers the entire field of ecology, from individual plants through populations and communities, to large scale patterns and global issues. Thus, we strive to be inclusive, albeit from a uniquely plant perspective. While topics are introduced at a basic level, there is sufficient depth and coverage of the topics for more advanced students as well.

Plant ecology touches and builds on many subject areas that may not be covered in a typical introductory biology course. Therefore, we include background information that might be considered beyond the subject of plant ecology in its strictest sense. For example, we introduce aspects of plant anatomy and physiology, returning to these subjects when we address herbivory and ecosystem ecology. We discuss soils and below-ground interactions, paleoecology, evolution, climate and nutrient cycling in greater depth than might be expected in an ecology text, and address global climate change from the perspective of both the role and responses of plants and of people.

Ecology can be taught in any one of a number of sequences: it is conceptually a "hypertext" subject rather than a strictly linear one in which one topic clearly builds on the other and leads to the next one. While we present the topics in a fairly conventional order starting from individuals and moving to global ecology, we recognize that other orders are equally logical and that every faculty member covers the topics in a

different order. We provide abundant cross-references for topics introduced or covered in other chapters. This book should be usable, therefore, in courses that begin with biomes, for instance, rather than with the ecology of individual plants. Within Parts, chapters are meant to build on each other. In particular, this revision includes a substantial reorganization of the material in Part II (populations) and Part III (communities), based on feedback that we received about the First Edition.

Science has a language of its own, and acquiring that language can sometimes be daunting. Throughout the book we have placed words that may be unfamiliar in **bold**, and defined them in the text and in the Glossary. Scientific terminology may be tedious to learn, but it performs a necessary function: providing a concise and precise vocabulary that facilitates clarity and communication. In some cases, though, these definitions are presented not because we approve of the proliferation of jargon in ecology, but because these terms are commonly used, and students need to be familiar with them to understand the scientific literature.

Throughout the book we have provided an entry to the scientific literature through the use of examples and key references. In addition, at the end of each chapter we highlight particular papers and books. We especially encourage students to search out the classic references. These studies are still influential as the origin of many key ideas, concepts, and questions in plant ecology. An appreciation of both classic and contemporary work also helps convey some of the sense of plant ecology as a vibrant, dynamic, and exciting field of study.

There are a number of things that distinguish the approach we have taken in this book in addition to our emphasis on a conceptual approach to the subject. Evolutionary biology is essential to how we as scientists think about ecology, and we have incorporated an evolutionary perspective throughout the book, as well as including a short introduction to the subject in Chapter 6. Rather than presenting scientific information as a static collection of "facts," we attempt to portray the history and ongoing process of scientific study and discovery. By doing so, we hope to convey some of the excitement and turmoil that that process often involves, while showing how scientists learn how nature works. Because science is a human endeavor, we show the face of science by including photos of some of the important scientists whose work we discuss. With the same goal, we include the first names of scientists whose work we discuss. While this is an unconventional format, we feel that it not only makes science more human, but reveals the wonderful diversity of those doing important work in plant ecology. It adds something, somehow, in reading about the highly cited work of Waloff and Richards (1977) to learn that the first author was Nadia Waloff, and to find out that she was a "formidable chain-smok-

ing Russian entomologist" at Silwood Park of the Imperial College of London in the mid-20th century (Michael Crawley, unpublished); and to see, beyond the many Davids and Johns and Jameses, names that include Camille, Katherine, Valerie, Lynn and Suzanne, and also Vigdis, Xianzhong, Mohamed Akio, Ignacio, Govindan, Avi, Nerre Awana, and Staffan. Plant ecology is a global endeavor. Research on all continents (including Antarctica) and many islands is discussed and should provide perspective, context, and excitement to students along with the basic information covered. In addition, we have also included the common names and families of plants, to make those species more familiar to students, and also a large number of photos and drawings of plant species.

Readers of the First Edition have questioned the plant families used in some of these identifications. We follow the most recent and definitive revision of angiosperm systematics: Angiosperm Phylogeny Group. 1998. An ordinal classification for the families of flowering plants. *Ann. Missouri Bot. Gard.* 85: 531–553; Angiosperm Phylogeny Group. 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Bot. J. Linnean Soc.* 141:399–436. Plant systematics has undergone great changes in recent years and can come as a surprise to those of us who recall taxonomic affinities from a 40-year-old flora such as Gleason and Cronquist. For example, many people may not be aware that many parasitic plant species have been reclassified in the Orobanchaceae, and are no longer correctly identified as Scrophulariaceae.

This book would not have been written or revised without the enormous contributions of a number of other people in a variety of roles. We are grateful to our colleagues from all over the world who have provided comments, photos, and information, to those who have praised and encouraged us as well as to those who have pointed out when we were ignorant, mistaken, or just plain foolish. We appreciate the help of those people who reviewed, commented on, or helped find errors in the First Edition including: William Bowman, Veronique Delaesalle, Lynda Delph, Philip Dixon, Tom Ebert, Marcel Holyoke, Tim Howard, Colleen Kelly, Jeff Klopatek, Manuel Lerdau, Earl McCoy, Bill Platt, Pedro Quintana-Ascencio, Jose Rey Benayas, Jim Rodman, Abraham Rushing, Kayla Scheiner, Judy Skog, Art Stiles, Peter Stiling, Peter Smallwood, Sharon Strauss, Daniel Taub, Ken Thompson, Mark Westoby, Ian Wright and Richard Wunderlin; Wei Fang, Laura Hyatt, and Eliza Woo also provided invaluable technical assistance. The following people provided responses to a detailed questionnaire sent to early adopters of the First Edition, and we greatly appreciated their insights and suggestions: Edith Allen, Peter Alpert, T. Wayne Barger, Evert Brown, James Cahill, Carmen R. Cid, Donald R. Drake, Eliza-

beth Elle, Gary N. Ervin, David Gorchov, John Krenetsky, Brian C. McCarthy, Colin Orians, Robert K. Peet, Francis E. Putz, Bernadette Roche, Irene Rossell, Paula Schiffman, J. Morgan Varner III, and Andrea Worthington. They offered a variety of perspectives from their experiences as scientists and as teachers at a very wide diversity of types of institutions, from small liberal arts colleges to large research universities. We are also indebted to them and to all of the schools that have adopted the First Edition of this text. We look forward to similarly useful feedback on this Edition.

Critiques of rewritten chapters for the Second Edition were provided by Veronique Delesalle, Katherine Gross and her lab group, Inderjit, Manuel Lerda, Thomas Miller, and Michael Willig; their suggestions greatly improved the quality of the text; Ray Callaway and other colleagues offered valuable feedback on particular material. We also reiterate our thanks to our many colleagues who helped review our First Edition. Of course, all opinions and interpretations, as well as mistakes and omissions are our own.

A special acknowledgement is due to the people at Sinauer Associates: this book is as much their creation

as ours. We are especially grateful to Chelsea Holabird, our skillful, patient and driven editor, Norma Roche, our copyeditor who sometimes knew what we meant (or what we should have meant) even better than we did, to Joanne Delphia the extraordinary scientific illustrator and artist who made the book beautiful while being rigorously accurate, David McIntyre who oversaw the photography with a meticulous and skillful eye and contributed many wonderful photographs himself, Jefferson Johnson who built this incredible book, Christopher Small, the Production Manager, and most of all to Andy Sinauer, who inexplicably continues to put up with us with patience, generosity and tact. He is a remarkable publisher and an admirable person.

Our spouses and children, and colleagues have tolerated us, more cheerfully than we had any right to expect, while we were writing and revising this book rather than doing all of the things we were supposed to be doing or that they wished we were doing. We appreciate their forbearance. To all of the students who use this book, we hope that you enjoy the book and learn a lot from it, and that some of you will go on to make scientific contributions of your own.

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