# PREFACE

This book was initiated as a result of my experience developing a course in plant evolutionary biology. The first day of class, I challenged the students to list unique characteristics of plants and to think about how these features affected the patterns and modes of plant evolution. This became the theme for the course and eventually for this text. As we worked through each topic, I continued to find examples of aspects of the biology and ecology of plants that had implications for evolutionary processes. I was motivated to begin writing reviews of topics that were not covered in the text we were using in class. As the term progressed, I continued writing to fill in gaps, and very soon, I had most of the outline for this book.

Writing this book has been one of the most rewarding experiences of my career. This project has given me an excuse to dive into many topics with which I previously had limited experience. For each topic, I have been pleased and amazed not only with the quantity of information, but also with the quality and creativity of the work. It was perhaps most enjoyable to explore areas of the literature with which I had the least familiarity. I have learned many new things along the way, and some of these have significantly changed my understanding of evolutionary processes in plants. Some of the ideas that were new to me include the pathways for the origins of eukaryotes and the first land plants, the processes affecting mutation accumulation in plant populations, and models for the evolution of sexual reproduction.

In writing this book, I have striven to provide discussions and clear explanations of difficult concepts, as well as new perspectives on topics that have already been thoroughly reviewed. It would not be worth writing such a volume if I did not have something new to say. I am sure that there will be other opinions, and in fact, I hope these ideas will promote more discussion, because otherwise we will learn nothing new. Science cannot progress if we just repeat what has already been said, and it is our duty to advance new ideas with the understanding that some will wane while others may flourish. If I can inspire just a few to engage in new avenues of investigation, whether they agree with me or not, then the book will have been a success.

This book is not solely focused on plants. Much of the discussion of evolutionary processes is applicable to a wide range of organisms. Moreover, the "plant perspective" only makes sense if we have something to compare it to—namely, animals. For each principle, I start out with a general discussion and in later sections, explore the ways that plant biology and ecology may modify our understanding of these principles with regard to plants. I was motivated to take this approach because too often I have noticed that concepts that have been developed from our understanding of animals have been blindly applied to plants without considering the implications of their biology. Virtually everything about plants is different—they are truly the most alien group of organisms we may ever have the privilege of encountering—and these differences should define the core of our understanding of their past, present, and future evolution.

It is probably not possible, and certainly not desirable, to put everything about plant evolution into a single book. I have attempted to be comprehensive without subjecting the reader to oppressive levels of detail. Of course, the topics selected necessarily represent my perspective, and I am sure there are many who will point out important topics that I overlooked. Similarly, I was limited on the number of excellent papers I could cite. My goal was to provide relevant examples from the literature, both historical and contemporary, so that anyone interested would have a window into the topic for further exploration. I purposefully tried to avoid over-citation of the work coming out of my own lab, but sometimes these papers provided the best examples. Out of the many thousands of papers I reviewed during the preparation of this work, I was only able to include a small fraction, and I am sure that many readers could provide a list of very important papers that could have been cited.

Completion of this book would not have been possible were it not for the contributions of many people, and most of all, the students with whom I have had the privilege of working. The best learning comes about through discussion, and I have benefited from discussions with all of my colleagues, and especially my mentors, fellow graduate students, postdocs, and every student who has ever spent time in my lab. Many others have had a direct impact on the content of this text. In particular, I deeply appreciate the contributions of Michelle Nicole Williamson, who generously provided many fine drawings and beautiful illustrations of paleo plants. Those who have provided edits, comments, and participated in discussions that have improved the presentation include Tina Arredondo, Tanya Cheeke, Carol Cruzan, Nic Diaz, Monica Grasty, Lizzi Hendrickson, Brendan Kohrn, Caitlin Lee, Caitlin Maraist, Gina Marchini, Trieste Musial, Jessica Persinger, Avery Pheil, Alisa Ramakrishnan, Jaime Schwoch, Pam Thompson, Michelle Williamson, and Rachael Workman, as well as many students from my courses on evolutionary biology and plant reproduction.