

Preface

It seems appropriate to start by repeating the preface I wrote in 2008 for the book proposal. It gives an idea of my motivation and goals before I started writing the book.

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Research initiatives in ecology and evolution have periodically dated but never married. When one looks at long enough time scales, the value of such a union is obvious and undisputed. That is, different ecological conditions have clearly led to dramatic evolutionary changes: some plants perform well in high-light environments and others in low-light environments, some insects are faithful pollinators and others are nectar robbers, and some birds are very good at eating seeds whereas others are very good at eating insects. It is also clear that large evolutionary changes have dramatic ecological consequences: tall trees cause low-light environments beneath them, specialized pollinators and nectar robbers influence seed set in many plants, and specialized bird species can reduce seed or insect abundance. Such examples of reciprocal interactions between ecology and evolution on long time scales are so numerous and unequivocal as to remove the need for lengthy justification. *My goal in the present book will be to consider eco-evolutionary dynamics on contemporary time scales, ranging from just a few generations to several hundred generations.*

Perhaps the most dramatic recent progress in eco-evolutionary dynamics has been made in the area of “contemporary evolution,” also called “rapid evolution.” Indeed, this body of work now provides many of our iconic examples of how natural selection drives evolutionary change: toxic mine tailings cause the evolution of plant resistance to heavy metals, industrial pollution causes shifts in the frequency of melanic moths, droughts that alter food resources drive the evolution of finch beaks, and changing predator pressures altered the evolutionary trajectories of guppy populations. Following this acceptance that ecology drives contemporary evolution within populations, increasing attention has been focused on how ecology can drive the origin of new species. Examples of the contemporary onset of such “ecological speciation” come from plants adapted to different soils, insect populations adapted to different host plants, birds adapted to different food types, and fish adapted to different foraging environments in lakes. *One of my primary goals in the present book will be to provide an integrated understanding of the promoting and constraining forces that determine how ecological changes drive contemporary evolution and speciation.*

Ecology thus drives evolutionary dynamics in contemporary time, but does evolution drive ecological dynamics on similar time scales? A venerable tradition here has been

and detailed enough for specialists. Oh well, this is the book that I would want to read and so it is the book that I have written. I hope it is also useful to you.

In trying to cover so much research in so many allied fields, it was clear early on that I could not possibly intellectually master even a fraction of the ideas and the literature. As a result, I have relied heavily on the help and advice of many individuals who have suggested articles, read sections of the book, provided data, and engaged in formative discussions and arguments. The listing of these individuals does not imply their endorsement of the arguments I have made in the book—in fact, I know a number of folks I here thank strongly disagree with some of my conclusions.

In first-name alphabetical order, thanks to: Adam Siepielski, Åke Brännström, André De Roos, Andrew Gonzalez, Andrew Storfer, Aneil Agrawal, Anthony Merante, Antoine Paccard, Anurag Agrawal, Ayco Tack, Ben Haller, Ben Phillips, Ben Sheldon, Blake Matthews, Brent Emerson, Cameron Ghalambor, Carl Walters, Charles Davis, Chelsea Chisbom, Constantinos Yanniris, Cristiaan Both, Dan Bolnick, Daniel Berner, Dan Flynn, Doug Futuyma, Dany Garant, Daniel Ortiz-Barrientos, Daniel Sol, David Stern, Derek Roff, Elizabeth Nyboer, Eric Palkovacs, Fanie Pelletier, Graham Bell, Gregor Fussmann, Gregor Rolshausen, Gregory Crutsinger, Hans Pörtner, Ian Wang, Ilkka Hanski, Jason Hoeksema, Jean-Sébastien Moore, Jennifer Schweitzer, Jenny Boughman, Jocelyn Lin, Joe Bailey, Joe Hereford, John Paul, Jonathan Davies, Josef Uyeda, Josh Van Buskirk, Josianne Lachapelle, Judy Myers, Kevin Pauwels, Katie Peichel, Kiyoko Gotanda, Lennart Persson, Lima Kayello, Loeske Kruuk, Luc De Meester, Luis Fernando De León, Lynn Govaert, Marc Cadotte, Marc Johnson, Marcel Visser, Marissa Baskett, Mark Urban, Mark Vellend, Martin Lind, Matthew Osmond, Matthew Wund, Michael Becker, Mike Kinnison, Nelson Hairston Jr., Oscar Gaggiotti, Patrik Nosil, Rana El-Sabaawi, Rees Kassen, Robert Colautti, Roger Thorpe, Ron Bassar, Rowan Barrett, Sam Yeaman, Samantha Forde, Sarah Huber, Sara Jackrel, Scott Carroll, Sinead Collins, Sonia Sultan, Stephanie Carlson, Steve Johnson, Steven Franks, Takehito Yoshida, Thomas Ezard, Thomas Hansen, Thomas Near, Thomas Quinn, Thomas Reed, Thomas Smith, Travis Ingram, Vincent Fugère, Yael Kisel, several working groups funded by the Québec Centre for Biodiversity Science (QCBS), and members of the DIVERSITAS (and then Future Earth) core project bioGENESIS, especially cochairs Michael Donoghue, Tet Yahara, Dan Faith, Luc De Meester, and Felix Forest. *I apologize to folks whose help I have forgotten owing to a hard drive failure that eliminated many of my older emails.*

Special thanks are due to those individuals, acknowledged in the figure captions, who provided data for reanalysis or redrafting figures. In addition, Eric Palkovacs and his graduate class at the University of California Santa Cruz read the book in its entirety, as did my graduate class at McGill. Eric Palkovacs, Marc Johnson, Blake Matthews, Joe Bailey, and Jenn Schweitzer were my go-to folks for help with the literature on community and ecosystem consequences of evolutionary change. Katie Peichel, Patrik Nosil, and Rowan Barrett played the same role for the genetics chapter. Thomas Hansen was particularly critical—helpfully so—of my chapters 3 and 4. Nelson Hairston Jr. and three other reviewers provided extensive comments during the review stage. Mike Kinnison was particularly fundamental in my early thinking about eco-evolutionary dynamics. Colin Garraway, Craig Benkman, Felipe Dargent, and Taylor Ward read parts of the “in press” book and pointing out a number of errors that needed fixing. At Princeton University Press, the various stages of book preparation and production were shepherded by Alison

Kalett, Mark Bellis, Joe Pastore, Betsy Blumenthal, Jaime Estrada, Alexandria Leonard, Quinn Fusting, and David Campbell. The references were cleaned up considerably by Melisa Veillette and Fiona Beaty. The book proofs were read in their entirety by Alice Hendry (thanks, Mom!) and Lesley Fleming, who caught a number of errors. Also, I am particularly grateful to Caroline Leblond, who kept my lab running while I had my nose buried in this book.

What does one say having finished a book that is 12 chapters long, has more than 1500 references, and took 7 years to write? Only that I hope you will find the book useful and perhaps even inspiring. I also hope that you will see that eco-evolutionary dynamics as a field has so many unknowns that plenty of opportunities exist for future work. If I write another edition of this book 10 years hence, I expect that it—especially the evo-to-eco chapters—will look very different. You could be the reason.