

Preface

The problem with a textbook, especially in a fast moving science such as population ecology, is that the moment it is published, it is out of date. Given the delays between actually writing a book and its appearance in print, most of the writing for my 2006 first edition was done in 2003–2005. Therefore, the first objective in producing this second edition was to bring it up to date as much as possible. Obviously, this did not mean throwing the first edition into the dustbin and writing everything new from scratch. In many cases it meant finding new examples that illustrate what are still valid ideas or theories. In other cases it meant casting doubt on old favorites such as the theory of *r*- and *K*-selection (called by at least one author a “zombie” theory).

In Chapter 1, for example, I have brought the data on human populations as up to date as possible, recognizing that the number of humans in the world has moved from 6.3 billion in my first edition to over 7.1 billion as of 2014. The example of the exponential growth of the gray wolf population in Wisconsin was not available previously. Information on a renewed interest in the Allee effect is new in Chapter 2.

The chapters on population regulation (Chapter 3) and life tables (Chapter 4) use a variety of new and better examples compared to those in the first edition.

Chapter 5, which deals with metapopulations and the MacArthur and Wilson equilibrium theory, benefit from a great deal of new information published in the last few years, much of it reviewed extensively in Losos and Ricklefs (2010).

A great deal has been written recently relevant to life history theory including the metabolic theory of ecology and its spawn (Sibly et al. 2012). At the same time, Dobson and Oli (2007), and Dobson (2007, 2012) have produced a series of papers proposing to replace the theory of *r*- and *K*-selection with a theory centered around mass, “life style” and phylogeny. I have attempted to at least introduce the reader to the idea that it may be time to realize the limits of *r*- and *K*-selection, if not retire the theory altogether.

In the chapter on competition (Chapter 7), my major contribution is to introduce the reader to the poetic niche theory written by Dr. Seuss (Geisel 1955). A critical evaluation of the Tilman (1982) resource-ratio theory and an example of character displacement among Darwin’s finches (Grant and Grant 2006) are other highlights.

The chapter on mutualism (Chapter 8) features an update on the classic Janzen (1966) paper on the Central American ant-acacia mutualism as well as a new long section on the recent brilliant work on ants and acacias in Africa (Palmer et al. 2010). These studies confirm a major point of the chapter, which is, that without constant co-evolution, mutualistic relationships can easily move toward parasitism by one of the partners. Also new in this chapter is a section on geographic variation in coevolution of mutualism (Rickson 1977), which leads into the similar idea of geographic defenses in host-parasite interaction described in Chapter 9 (Foltz et al. 2003).

The chapter on predator-prey relationships (Chapter 10) brings the reader new information on examples that are engrained in the literature as classics, yet are now being questioned. These include doubts about the hypothesized trophic cascade in Yellowstone after wolf introduction (Middleton 2014) and the apparent failure of the wolf population to either thrive or control the moose population on Isle Royale in Michigan (Mlot 2013). Meanwhile Chapter 11 brings us new information on the potential responses of plants to defoliation.

The last chapter, contributed by my colleague Jon Witt, is entirely new and presents a discussion of multiple trophic level models in much more detail than in the previous edition. Topics examined include trophic cascades, intraguild predation, cannibalism and meso-predator release.

References

- Dobson, S.F. and M.K. Oli. 2007. Fast and slow life histories of mammals. *Ecoscience* 14: 292–299.
- Dobson, S.F. 2007. A lifestyle view of life-history evolution. *Proceedings of the National Academy of Sciences* 104: 17565–17566.
- Dobson, S.F. 2012. Lifestyles and phylogeny explain bird life histories. *Proceedings of the National Academy of Sciences* 109: 10747–10748.
- Foitzik, S., B. Fischer and J. Heinze. 2003. Arms races between social parasites and their hosts: geographic patterns of manipulation and resistance. *Behavioral Ecology* 14: 80–88.
- Geisel, T. Seuss ("Dr. Seuss"). 1955. *On Beyond Zebra*. Random House, New York, NY.
- Grant, P.R. and B.R. Grant. 2006. Evolution of character displacement in Darwin's Finches. *Science* 313: 224–226.
- Janzen, D.H. 1966. Coevolution of mutualism between ants and acacias in Central America. *Evolution* 20: 249–275.
- Losos, J.B. and R.E. Ricklefs. 2010. *The Theory of Island Biogeography Revisited*. Princeton University Press, Princeton, NJ.
- Middleton, A. 2014. Is the wolf a real American hero? *New York Times* Monday March 10, 2014: A21.
- Mlot, C.. 2013. Are Isle Royale's wolves chasing extinction? *Science* 340: 919–921.
- Palmer, T.M., D.F. Doak, M.L. Stanton, J.L. Bronstein, E.T. Kiers, T.P. Young, J.R. Goheen and R.M. Pringle. 2010. Synergy of multiple partners, including freeloaders, increases host fitness in a multispecies mutualism. *Proceedings of the National Academy of Sciences* 107: 17234–17239.
- Rickson, F.R. 1977. Progressive loss of ant-related traits of *Cecropia peltata* on selected Caribbean Islands. *American Journal of Botany* 64(5): 585–592.
- Sibly, R.M., R.H. Brown, and A. Kodric-Brown. 2012. *Metabolic Ecology*. Wiley-Blackwell, Chichester, UK.
- Tilman, D. 1982. *Resource Competition and Community structure*. Princeton University Press, Princeton, NY.