

PREFACE

Metabolic ecology gained modern impetus from the publication in 2004 of the paper entitled "Toward a Metabolic Theory of Ecology" by J. H. Brown, A. P. Allen, V. M. Savage, and G. B. West. This paper inspired much subsequent research. Our intention in this book is to showcase the achievements of metabolic ecology, to engage with its critics, and to show how the subject is now maturing by accommodating additional processes relevant to particular areas of application.

The topic is ripe for a book that reviews recent work and highlights promising areas for future development. By inviting multiple authors with different perspectives and expertise, we hope to have produced a balanced book – and one that goes beyond some of the recent controversies to highlight the fundamental roles of biological metabolism in organism–environment interactions. Our intention was that the book be written to be accessible to upper-level undergraduates, and to contain enough meat to hold the interest of graduate students and even senior scientists. We wanted an introduction to this emerging area that inspires by illustrating how the scientific process is applied in diverse but particular cases.

If we have succeeded, the book may help to define metabolic ecology as an emerging field.

We asked the authors to succinctly address a particular topic, present the theoretical foundations and some seminal empirical studies in clear, non-jargony language, and illustrate the major points with key figures and tables presented in a clear and simple form. We asked them to focus on significant recent work, relate it to the metabolic ecology paradigm, and to

address alternative explanations and still unanswered questions. Figures are in color where possible, and have been redrawn professionally to provide the book with a common style. Our overarching aim has been to provide interesting, easy-to-read reviews that can be used systematically in lecture and seminar courses and that together provide an authoritative treatment that will be widely used and will enthuse future generations to study metabolic ecology.

Because metabolic ecology draws on several areas, notably biological scaling, allometry, and comparative biochemistry and physiology in addition to all subdisciplines of ecology, it must contend with different terminologies, methodologies, and traditions. We have therefore made some attempt to standardize terminology and included a glossary. We use the term Arrhenius equation to refer to expressions previously called the Van't Hoff-Arrhenius equation or the Boltzmann factor. In graphs plotting biological traits against the inverse of absolute temperature we have added an additional temperature scale in °C. In these graphs it is generally appropriate to use natural logarithms, $\ln$, for the biological traits, for the reasons described in Chapter 2, section 2.3. (Note that $\ln(x) = 2.303 \log_{10}(x)$.) In other cases we have generally been consistent in using $\log_{10}$ rather than the natural logarithm, $\ln$, even though many original papers used the latter, and where appropriate we have indicated the logarithmic scaling by logarithmic placing of ticks on the axes. We regret that we have not achieved complete consistency in describing the power laws derived from log-log plots. Sometimes these are written $y = mx + c$, where

$y = \log_{10} Y$, $x = \log_{10} X$, and $c = \log_{10} C$, but in other places we have written $Y = C X^m$. In the former case m is referred to as the "slope," in the latter "exponent." The term population growth rate is used, and given the symbol r , except for microbes, where microbiologists have traditionally used the symbol μ . The maximum population growth rate is written $r_{\max}$. We hope that these efforts will be repaid by making the material in the book and the original literature more accessible to general readers.

The idea for the book emerged in a discussion between Jim and Richard on the bus returning to Boston from the fourth Gordon Conference on the Metabolic Basis of Ecology held in Biddeford, Maine, in July 2010. A book outline was drafted and potential contributors were contacted in August, agreement to contribute was obtained by October, outlines of contributions by November, and first drafts by February 2011. Reviews were solicited, often from fellow contributors, and the edited manuscript was delivered to Wiley-Blackwell at the end of May. The enthusiastic response of the authors exceeded our expectations,

and allowed the editors to produce the book rapidly and efficiently.

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and Astrid Kodric-Brown
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