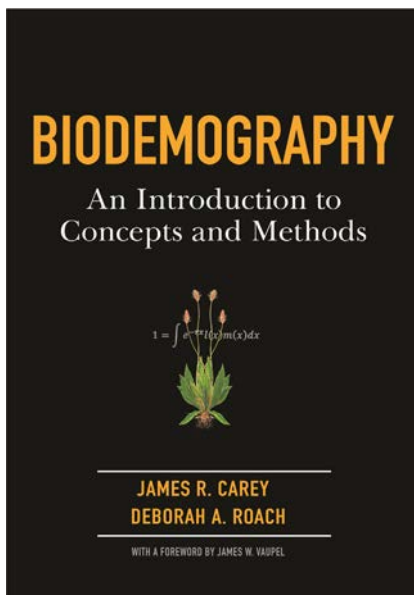


Book Review

Biodemography:
Unifying Concepts from
Biology, Demography,
and MathematicsMarlène Gamelon ¹* and
Hannah Froy ¹

Classical demography is broadly concerned with the size, distribution, structure, and change of populations. ‘Demography’ literally means ‘description of the people’ and has long been centered around the study of human populations. Dobzhansky famously stated that nothing in biology makes sense except in the light of evolution [1]. Evolution is driven by the propagation of genes within and among populations, which depends on age-specific patterns of fertility, mortality, and migration. Therefore, it can also be said that nothing in evolution makes sense except in the light of demography [2]. The connections between demography, evolution, and population biology can be traced back to two seminal books: Malthus [3], who stated that populations grow exponentially, whereas resources do not, and Darwin [4], for whom

selection on births and deaths results from a struggle for existence. In the early 1900s, Lotka built his research at the interface between biology and demography (see e.g., [5]); but biodemography as an interdisciplinary science has emerged only recently (in the 1970s) when demographers recognized the need to integrate biology. Biodemography, bringing together demographers, evolutionary biologists, ecologists, social scientists, mathematicians, and statisticians, to name just a few, is an interdisciplinary approach that allows key biological questions to be tackled. For instance, assessing the biological foundations of ageing in human and non-human populations has long been a central topic in biodemography. Biodemography is thus a fascinating and growing research area, unifying concepts and methods across a large range of scientific disciplines.

In their new book, Carey and Roach [6] provide an excellent introduction to the concepts and methods that form the foundation of biodemography. With this book, the authors offer biologists an accessible and practical overview of the demographic approaches that may offer insights into a range of important biological questions. Beginning with an informative contextualization on the origins of biodemography, Carey and Roach build from basic principles through to more advanced concepts and methods using an array of interesting biological examples. The introduction to data exploration and visualization provides an important but often overlooked starting point for beginners. Methods and mathematical concepts of increasing complexity are introduced as biological problems, with worked examples throughout making the book highly pedagogical. The authors draw on their own expertise on insects and plants in addition to a wide range of other taxa, such as mammals (human and non-human) and birds, which adds interest throughout – including a nice example of human life history and demography

based on the family of Charles Darwin. The book builds from basic life tables and mortality and fertility functions through to the population matrices that are widely used for projection. Along the way, the authors touch on a range of topics, from life-history variation to epidemiology and the evolution of ageing in structured populations. They finish with chapters on more applied questions, clearly illustrating the utility and applicability of the biodemographic approaches in a variety of contexts, from conservation to biological control. The book provides an excellent resource for everyone, from students to experienced researchers, who wishes to utilize the wealth of methodological approaches developed in demography, and it will therefore have an important impact on the development of the field.

Biodemography is a bridge between biological theories and demography and relies on strong methodological foundations. By definition, it already integrates several fields of research, but the integration of additional research areas to this interdisciplinary science could help strengthen our understanding of demographic dynamics. For instance, epidemiology, behavioral ecology, and physiology will offer new insights into the underlying mechanisms inducing variation in demographic rates (e.g., fertility, mortality) in both time and space. In the current context of global change and now we have entered the Anthropocene, biodemography and its subdisciplines also offer an important framework to determine the consequences of environmentally-induced variation in demographic rates. Unraveling the effects of abiotic (e.g., climate), biotic (e.g., intra- and interspecific interactions), and anthropogenic factors (e.g., habitat destruction, harvesting) on human and non-human demography becomes possible with the integrative biodemographic approach. Biodemography will undoubtedly play a pivotal role in our ability to reliably

project populations under future environmental conditions and will help us to anticipate some population declines thanks to more mechanistic approaches [7].

Biodemography: An Introduction to Concepts and Methods by James R. Carey and Deborah A. Roach, Princeton University Press, 2020. US\$60.00/£50.00, hbk (480 pp.) ISBN 9780691129006

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<https://doi.org/10.1016/j.tree.2020.03.008>

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