



Elements of Evolutionary Genetics

By Brian Charlesworth, Deborah Charlesworth

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Evolutionary genetics considers the causes of evolutionary change and the nature of variability in evolution. The methods of evolutionary genetics are critically important for the analysis and interpretation of the massive datasets on DNA sequence variation and evolution that are becoming available, as well for our understanding of evolution in general. This book shows readers how models of the genetic processes involved in evolution are made (including natural selection, migration, mutation, and genetic drift in finite populations), and how the models are used to interpret classical and molecular genetic data. The material is intended for advanced level undergraduate courses in genetics and evolutionary biology, graduate students in evolutionary biology and human genetics, and researchers in related fields who wish to learn evolutionary genetics. The topics covered include genetic variation, DNA sequence variability and its measurement, the different types of natural selection and their effects (e.g. the maintenance of variation, directional selection, and adaptation), the interactions between selection and mutation or migration, the description and analysis of variation at multiple sites in the genome, genetic drift, and the effects of spatial structure. The final two chapters demonstrate how the theory illuminates our understanding of the evolution of breeding systems, sex ratios and life histories, and some aspects of genome evolution.

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Editorial Review

Review

The Charlesworths are giants in the field of evolutionary genetics. They have written a textbook that is just what you would expect from them clear, comprehensive, and authoritative. They somehow manage to smoothly blend theory and experiment, while also covering historical developments and modern controversies. The field desperately needed a new textbook at this level. The Charlesworths have beautifully filled the gap. --Richard Hudson, University of Chicago

In any given year, Brian and Deborah Charlesworth think more deeply and creatively about evolutionary genetics than most of us do over our careers. The depth and breadth of their knowledge of both the data, ranging from life-history evolution to comparative genomics, and the relevant theory is nearly unparalleled. We're lucky to have their synthetic overview of the field, which will be a valuable resource for advanced students and their teachers for many years. --Michael Turelli, University of California, Davis

These two leaders of the field have given us a superb overview of evolutionary genetics. Their clear explanation of the key concepts is closely linked to biological examples, and especially, to the most recent data on genome evolution. This will be an essential text. --Nick Barton, IST Austria and the University of Edinburgh

About the Author

Brian and Deborah Charlesworth obtained PhDs in genetics at Cambridge, and have subsequently worked at the Universities of Liverpool, Sussex, Chicago and Edinburgh, and are co-authors of a book about evolution for the general public. Brian is a Fellow of the Royal Society and Honorary Fellow of the American Academy of Arts and Sciences, and Deborah is a Fellow of the Royal Society. Both currently work on questions in population genetics, molecular evolution and genome evolution, and also on mating system evolution.

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David Lalonde:

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