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Book review

Life History Evolution

Derek A Roff
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Life history biology sits on the interface between genetics and ecology, and both have made important theoretical and empirical contributions to our understanding. However, the connections between the disciplines have not always been as close as they might have been and this book takes some useful steps towards remedying this. It gives an excellent review of life history theory, and integrates this well with results from the empirical literature.

After an 11-page introduction, Roff sets out 'a framework for analysis' in which he covers the necessary elements of quantitative and population genetics. This includes clear definitions of fitness in a range of circumstances, from density independent populations in constant environments through to the more complex situations of density and frequency dependence and environments that are spatially or temporally stochastic. Trade-offs are then examined, including a valuable analysis of potential pitfalls in studying them and ways that these can be avoided. The author then deals in turn with evolution in constant environments; stochastic environments and 'predictable environments'. The last of these covers situations where there is environmental variation, but at least some information is available to allow individuals to make an adaptive response. The final chapter identifies 20 topics for future study.

Some will find the book too dominated by theory. Others (but probably not readers of *Heredity*!) will find it contains too much genetics. But Roff does an excellent job of making the theory accessible, covering the essential issues and pointing to original sources for the details. Theory is related to a significant number of empirical studies, although there is room for another book reviewing the empirical literature on life histories in detail, and Roff's book would provide a robust skeleton on which to hang this. To make my own assessment, I examined in detail Roff's discussion of the question of fitness measures for density dependent populations in stochastic environments – an area in which I have been involved. I could not fault him – all the key references were there and the issues were made very clear without the more esoteric mathematics. I also examined some areas that I was less familiar with, and again the text was clear and easy to read.

My only real criticism of the book would be that its very long chapters (more than 130 pages in one case) makes it difficult to find things. It would have been simple to address this by including the section headings on the contents pages. A minor personal quibble would be that the book usually expresses problems in terms of the intrinsic rate of increase, *r*, and the characteristic (Lotka) equation. A matrix formulation is often more tractable and is easier to generalise to density dependent populations and stochastic environments, so expanding on the relationship between the two would have been useful.

But overall this is an excellent book. It brings together the key theory in a single place. It gives an invaluable route into the literature, with a bibliography of 1600 or so items. These features, and its identification of topics that need further study should make an important contribution to moving the field forward.

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