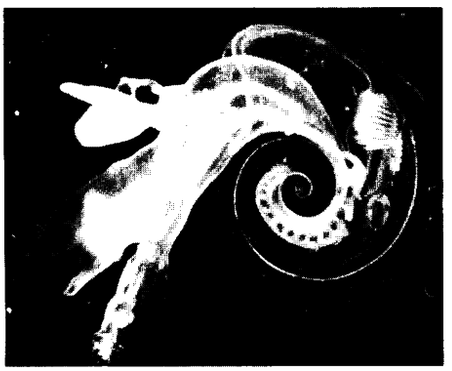

The heteropod *Atlanta peroni*, lateral view. "Heteropods are highly modified for life in the open ocean, the major morphological adaptations including a reduction in the size and weight of the aragonite shell or a loss of the shell associated with an increase in body size; the development of a single swimming fin derived from the gastropod foot; and a tendency for the body and shell to be transparent." [Magnification about 5; from *Pelagic Snails*]

limited familiarity with these animals. The book will be of interest to a wide range of readers. It is unique in being the first book devoted exclusively to the fascinating and little-known groups that comprise the pelagic snails.

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Uncertainties about Mammals

Evolution of Life Histories of Mammals. Theory and Pattern. MARK S. BOYCE, Ed. Yale University Press, New Haven, CT, 1988. xvi, 373 pp., illus. $45. Based on a symposium, Edmonton, Alberta, Aug. 1985.

Useful compilations or syntheses usually tell us one of two things: we know a lot more about something than we suspected; or we know a lot less about something we thought we had just about got right. Boyce's compilation on mammalian life histories does more the latter. Mammals have occupied a disproportionate share of the literature on life history evolution, and much of that literature reflects an overconfidence that the theoretical and empirical foundations of the subject are well settled. The 16 diverse contributions in this volume leave me even more convinced that this self-satisfaction is unjustified.

Boyce himself points out that there is an ever-increasing gap between the analysis of life history evolution from a theoretical perspective and attempts to test theory empirically. In particular, far too little is known about fluctuating environments. Unfortunately, the empirical contributions to this book (for example, Negus and Berger's) stress the inadequacy of simple theoretical models with only a few parameters, while a theoretician berates empiricists for underestimating the complexity hidden in simple models (Schaffer). Because the conspicuous geographic variation in life history traits that prompted the interest in the first place is often not obviously dependent on tradeoffs (Cameron and McClure; Dobson), the implicit or explicit assumption of most theory may not be applicable to many of the trends we seek to explain. Even where tradeoffs seem to occur, the currency may be obscure, as indicated by Bujalska's claim that the high mortality of female voles during reproduction has little to do with the energetic costs of lactation and gestation but is rather dependent on sex-specific territoriality.

We do suspect that quantitative genetics would tell us a lot about the opportunity for, and response to, selection regimes in fluctuating environments. However, our capacity to measure the appropriate parameters in the field (Boonstra and Boag) is quite rudimentary. Although great sophistication can be achieved in laboratory studies (Leamy and Bradley), the evolutionary significance of tradeoffs observed in the laboratory needs to be treated with caution, as any phenotypic correlations may be dominated by the unusual and often benign environment.

Allometric and phylogenetic conservatism in the distribution of life history traits among higher taxa leads some authors to suggest that life history evolution is dictated largely by selection on body size (Lindstedt and Swain) or that interesting variation is often confined to higher taxonomic levels (Harvey and Read). These increasingly common claims sit uneasily with the substantial interspecific and intraspecific variability reported elsewhere in the volume, particularly in Smith's elegant review of research on pikas. In any case, allometric analysis remains a field dominated by a plethora of correlations yet lack of mechanistic explanations. As Harvey and Read comment, "Comparative life-history studies of mammals have so far done little more than describe patterns. Now that a general picture is beginning to emerge, attention must inevitably turn to explaining it."

The book has few errors, though the literature citations are often poorly checked. Its best feature is the papers that draw together large quantities of data and grope toward synthesis or that show special dedication. Some of these studies are certainly heroic in their breadth or implementation. Harvey and Read manage to cover the methods and results of interspecific comparisons of mammalian life histories with extraordinary clarity and admirable brevity. Dobson provided four tonnes of high-protein horse feed to show that ground squirrels have plastic life history traits! A surprising number of people have devoted large parts of their lives to measuring litter sizes of the cotton rat. Perhaps the central problems are the omissions and balance. Two topics I was surprised to find scarcely addressed are the currently exciting interface between behavioral and population ecology and the growing body of long-term field studies where lifetime consequences of life history variation can be assessed. Despite a token chapter on didelphid marsupials (Eisenberg), there is a strong bias toward herbivores in general, and rodents in particular. Even among herbivores, with the exception of Harvey and Read's contribution, the book follows the tendency of mammalogists to ignore primates or treat them as a group belonging to someone else. Although the most widely cited advantages of studies of rodents are their short lifespans and complex demography, facilitating measures of reproductive effort in a changing selective milieu, almost all the empirical studies deal with single atomized traits, such as body size or litter size.

So where do we go from here? All students of mammalian life histories will benefit from at least some of the contributions, yet the rewards are more from syntheses of past research than from a clear guide to profitable future directions. There is a nice catalog of unanswered questions scattered through the volume, but I suspect we need better selection of species suited for addressing particular questions and more focus on what special attributes mammals have to offer to the understanding of life history evolution in general, rather than *a posteriori* attempts to force pet study species into a theoretical straightjacket. My own biases are toward exploitation of the tractable fecundity, the complexity of social evolution, and the diversity of diet and habitat structure revealed in this most fascinating of groups.

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