Book reviews

Behaviour and Evolution. P. J. B. Slater and T. R. Halliday (eds). Cambridge University Press, Cambridge. 1994. Pp. 348. Price £16.95, paperback. ISBN 0 521 42923 4.

Does the inheritance and evolution of behavioural characteristics differ from that of any other characters, such as bristle number or resistance to pathogens? In general, heritabilities are low, the genetic determination is multifactorial, and there is sometimes a substantial element of cultural inheritance. Only if cultural inheritance predominates over genic inheritance will the genetics be non-Mendelian – perhaps maternal, paternal, grandparental or whatever – but behaviour should, nevertheless, evolve by the same mechanisms as any other character.

Why, then, does the evolution of behaviour interest so many people? It is partly because reproductive behaviour can profoundly affect the evolution of other characters, partly because reproduction plays a central role in speciation, and partly because we are particularly interested in the historical origins of our own behaviour. This collection of essays illustrates well this diversity of interest. The chapter by Hoffman reviews what we know of the genetic determination of behaviour, and explains why it is so little. Butlin and Ritchie discuss the roles of behaviour in speciation in a particularly lucid and concise way. Many aspects of the evolution of sex, sex ratios, sex determination and sexual selection are covered in Halliday's contribution, although to do this in a mere 40 pages of so inevitably means many problems remain unaddressed. The same applies to Slater's chapter on 'Kinship and altruism', which provides a clear review of kin selection, genetic relatedness and kin recognition. These four essays are based on a firm foundation of evolutionary biology.

The emphasis in the remaining four chapters is much more behavioural than evolutionary, and collectively they provide a revealing insight into the problems of studying behaviour. In Gittleman and Decker's contribution on 'The phylogeny of behaviour' these difficulties are discussed explicitly, and the authors offer hope that with the new analytical methods described, we can actually say something worthwhile about the historical evolution of behaviour. I. F. Harvey's review of 'Strategies of behaviour' provides a friendly introduction to optimality theory, including such ideas as 'constraint assumptions', 'opportunity cost' and 'phenotype-limited strategies'. However, many with a background rooted in genetics and traditional evolutionary biology will disagree that "the development of ESS theory is probably the single most important contribution to the study of behaviour, ecology and evolution in the last 20 years". The final two papers on 'The evolution of intelligence' (Byrne)

and 'Social structure and evolution' (Lee) devote much space to the definition of terms. It must surely be premature to consider the evolution of characters that are so hard to define.

The authors were aiming at a readership of senior undergraduates and postgraduates in the behavioural sciences, and for them the book has much to offer. Without exception the papers are clearly written and well organized. It is a pity that some are rather sparsely illustrated; the drawings by Priscilla Barrett are charming, but otherwise contribute little.

THOMAS DAY
Department of Genetics
University of Nottingham
Queen's Medical Centre
Nottingham NG7 2UH
U.K.

The Differences Between the Sexes. R. V. Short and E. Balaban (eds). Cambridge University Press, Cambridge. 1994. Pp. 479. Price £19.95, paperback. ISBN 0 521 44878 6.

Any book on sex is guaranteed to attract attention, and one which adopts the provocative topic of the differences between the sexes as its subject is bound to be a winner. But, anyone looking for sensationalism and lapses of political correctness will be sadly disappointed. Instead, they will have found themselves a useful manual which is stimulating for its variety of topic coverage and wealth of information rather than for any other reason.

The book is based on the proceedings of a conference on the differences between the sexes at the 1992 International Conference on Comparative Physiology, and contains a multitude of contributions from internationally known scientists, from geneticists to behavioural ecologists. Often such published proceedings can be dry and insular, failing to integrate the various contributions effectively into a meaningful whole and consequently having limited appeal and value. It is to the credit of the editors that this volume is unlikely to have the same fate.

It sets the scene with a discussion about the importance of sexual reproduction, and its advantages over parthenogenesis. Subsequently, it proceeds to explore sexual differences and their evolution amongst a variety of taxa, including sexual dimorphism in ants, ungulates and apes, and the importance of antlers and other weapons of sex in mammals. There are good digests of the topics of sexual selection and mate choice, and a particularly fascinating chapter on the

subject of sex change in fishes. The book then progresses to examine sexual dimorphism in organ systems, from reproductive systems to sound communication systems and brain size and function. The section on sex differences in behaviour examines mating systems of birds and sexual behaviour of elephants, as well as providing an interesting insight into the delicate world of insect pheromones and their role in the sex life of fruit flies. The costs of sex to fathers, mothers and offspring are also dealt with. Of special interest to geneticists are the chapters about the evolution of sex-chromosomes and determinants of sex, including the effect of environmental factors. The bizarre and varied mechanisms for sex determination amongst mammals are exposed, and prove to be quite an eye-opener. Human sex differences are not entirely ignored, and the proceedings are brought to a close with two short but stimulating contributions by the editors themselves which confirm the views of Aristotle and Darwin that, like it or not, the differences between men and women are not merely morphological.

The book is nicely presented, with plenty of figures and some black-and-white photographs to support the text. One disappointment is the lack of reference material: although each chapter ends with a guide to further reading, much of it is of a rather general nature and its brevity suggests that rationing has been instituted. It is a good and easy read. Its general, straightforward approach and frequent reference to familiar examples will provide an especially useful supplement for students, particularly of behavioural ecology.

SARA CHURCHFIELD

School of Life, Basic Medical and Health Sciences
King's College London
Campden Hill Road
London W8 7AH
U.K.

The Evolution of Theodosius Dobzhansky. Mark B. Adams (ed.) Princeton University Press, Princeton, NJ. 1994. Pp. xi + 249. Price £28.50, hardback. ISBN 0 69 03479 6.

When I was a PhD student, working on the maintenance of an inversion polymorphism, Theodosius Dobzhansky was something of a hero figure. The papers in his *Genetics of Natural Populations* series were a source of inspiration and the blend of field biology with carefully designed laboratory experimentation was a model to copy. More recently, it has saddened me to find his work much less well known amongst students and his contributions sometimes down-played.

So, I took up this book with enthusiasm, hoping to gain more insight into the man and his work and pleased to find him placed at the centre of the 'Evolutionary Synthesis' by the various contributors. Perhaps I was not well prepared: this set of essays needs to be read alongside Dobzhansky's own 1937 classic *Genetics and the Origin of Species*, plus the biographical works that accompanied the reprinting of the *Genetics of Natural Populations* series (Lewontin *et al.*, 1981), to gain anything like a complete picture. However, there are some fascinating glimpses of Dobzhansky's Russian origins, from odd facts, like his kinship with Dostoevsky, to the early scientific influences. Our views of Russian biology

have been so conditioned by the legacy of Lysenkoism and the barriers to intellectual exchange during the Cold War, that it is easy to forget how much a part of the European scene it was in the first part of this century. Indeed, Dobzhansky began his scientific career in an environment where the marriage of Darwinian evolution with genetics was already a major topic of discussion and where Kuznetsov was already arguing, in 1917, that 'the essence of the species idea is the idea of sexual isolation'.

Dobzhansky's background in Russian entomology and evolutionary biology provided the perfect complement to the new experience he gained in T. M. Morgan's laboratory when he moved to the United States. Essays by Allen, Provine, Kohler and Burian all contribute to an understanding of the interactions within the laboratory, and with the wider American scientific community, that lead to the writing of the 1937 book. However, there are only glimpses of the interactions with Wright and Mayr. Many of us sympathize with the sentiment expressed in Dobzhansky's oral memoirs:

'My way of reading Sewall Wright's papers, which I think is perfectly defensible, is to examine the biological assumptions which the man is making and to read the conclusions which he arrives at, and hope to goodness that what comes in between is correct.'

and would like to know more about the productive relationships between Dobzhansky and the mathematician or the museum ornithologist.

The later essays in the collection deal more with Dobzhansky's interest in human problems. Again, a good case can be made for a pervasive influence of his Russian origins. He remained a religious man throughout his life, and a passionate believer in both the relevance of science to social issues and the responsibility of scientists to explain and apply their ideas. Furthermore, he saw that 'Evolution is the part of biology which has the highest, the most direct implications, the most reflections in fields not immediately connected with biology'. At the same time he had the humility to recognize the limitations of scientific knowledge: 'Scientists should be conscious of the provisional and transient nature of their attainments. Any scientist worthy of his salt labours to bring about the obsolescence of his own work.'

Twenty years after his death, we can still learn a lot both from the man and from his work. Anyone wishing to understand Theodosius Dobzhansky would do well to read these essays but should expect to read a lot more besides.

References

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ROGER BUTLIN
Department of Genetics
University of Leeds
Leeds LS2 9JT
U.K.