

## Book reviews

**Levels of Selection in Evolution.** Laurent Keller (ed.). Princeton University Press, Princeton, N.J. 1999. Pp. 413. Price £10.15, paperback. ISBN 0 691 00703 9.

The question of the interplay between the effects of selection at different levels of biological organization emerged early in the development of population genetics. Haldane, in Chapter 5 of *The Causes of Evolution*, gave a particularly lucid account. He pointed out that competitive selection between individuals within a population, notably sexual selection, may lead to the evolution of traits that are deleterious with respect to the long-term survival of the species. He emphasized that selection between different gametic genotypes, even among those produced by the same individual, can lead to the spread of traits that are deleterious to the individual, especially in higher plants where genes are expressed in the pollen. He also discussed the evolution of altruistic traits by kin selection and group selection. In addition to conflicts between different levels of selection, there is also the possibility of conflict between entities at the same level of organization, but which are subject to different rules of inheritance. This was probably first noticed by D. H. Lewis in 1941, when considering the spread of nuclear and cytoplasmic genes that control male sterility in plants.

*Levels of Selection in Evolution* is the first book to provide an overview of the very diverse recent literature on these topics, which ultimately traces back to these pioneering contributions (neither Haldane's nor Lewis' work is cited, however!). It contains papers that deal with the evolution of replicators (Szmathmary), individuals (Michod), and animal (Kitchen and Packer) and human societies (Maynard Smith). Other papers treat conflicts and communities of interest between genes within the same organism (Pomiankowski), between the sexes (Lessells), parents and offspring (Godfray), members of social groups (Keller and Reeve), and species in ecological communities (Herre). The properties and consequences of selection at different levels are discussed in general papers by Leigh, Nunney, and Reeve and Keller.

The book contains a large quantity of fascinating biological information and descriptions of clever theoretical models, and will undoubtedly be a very useful resource for researchers in evolutionary biology. One question that it raises, however, is whether there is a useful general theory of conflict that can be applied painlessly to solve particular problems. My impression is that there is not; I can see very little in common between, for example, the application of ESS theory to parent–offspring conflict, and the use of population genetic dynamic modelling to study transposable elements or segregation distorters. The generalizations that are provided in the overview papers are, inevitably, bland and not very informative.

I also have the impression that different topics are at very different levels of scientific development, in the sense of

confronting theories with tests. Topics such as sex ratio distortion and worker conflict in insect societies seem to be in a healthy state, where details of biology can be successfully interpreted by plausible models. In contrast, I am not convinced that the discussions of the evolution of replicators and individuals, at one extreme, or human language at the other, are more than ingenious speculation, with little hope at present for hypothesis testing. It is interesting that different authors contradict each other on some of these topics; Michod, for example, accepts the role of hypercycles in prebiotic evolution, whereas Szmathmary is critical. Leigh believes that anisogamy arose to promote uniparental transmission of cytoplasmic organelles, whereas Lessells emphasizes the importance of the conflict between gamete number and gamete size. Of the more theoretical papers, Godfray's stands out as an example of caution in relating the ideas to the data. I would have liked to see this caution applied more widely; the development of hypotheses is essential for progress, but one should not confuse them with reality.

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**Mosaic Evolution of Subterranean Mammals — Regression, Progression and Global Convergence.** Eviatar Nevo. Oxford University Press, Oxford. 1999. Pp. 413. Price £95.00, hardback. ISBN 0 19 857572 6.

'The mole had been working very hard all the morning, spring cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a brimming pail, till he had dust in his throat, small splashes of white-wash all over his black fur, and an aching back and weary arms'. So begins *The Wind in the Willows* by Kenneth Grahame, creating an evocative image of an industrious creature living in a cosy subterranean home. But to quote the old cliché, truth is often stranger than fiction, and the labours of 'Mole' pale into insignificance when one considers the Herculean digging feats of many subterranean mammals, and the complex 'housekeeping' of the eusocial naked mole-rat. Furthermore, although predictable and stable, the subterranean niche is a nightmarish one for a terrestrial animal, with its claustrophobic darkness and potentially suffocating gas composition, but it is to this specialized microenvironment that subterranean animals throughout the globe have become exquisitely adapted.