

all information published on the topic in the past year. In this case, however, the period covered is 1950–1977 giving rise to nearly 4,500 references in a section which occupies nearly a third of the text.

The collection of a vast amount of data is, then, the author's major contribution. If this book has a use, it is as a catalogue and source of information for those who have the patience to sift the wheat from the chaff. □

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## A taste of modelling

William L. Jolly

*Molecular Shapes: Theoretical Models of Inorganic Stereochemistry.* By Jeremy K. Burdett. Pp.287. ISBN 0-471-07860-3. (Wiley: 1981.) £24.05, \$43.25.

ONE of the main efforts in modern inorganic chemistry is the search for simple yet accurate methods for predicting the shapes of molecules. The problem is critical because of the explosion in the number of new structural types that have been synthesized in recent years. In this book Jeremy Burdett briefly describes the more useful of these predictive methods, including the electron pair repulsion approach, the Walsh diagram approach, the Jahn–Teller theorem, the angular overlap method, the crystal field model, the 18-electron rule, the cluster electron counting rules and the fragment formalism. The emphasis is on simple molecular orbital theory, with frequent use of the angular overlap model.

Each topic is discussed in a clear and critical manner, and I am sure that most readers will gain new and useful insights from a reading of any one of the 15 chapters in the book. My only possible complaint is that the book is rather short. Thus Wade's rules for electron-counting in cage compounds are covered in only 13 pages, and the fragment formalism in solid state chemistry (a topic developed by Burdett himself) is discussed in fewer than five. Yet in another sense the coverage of each topic is ideal: the material is presented so interestingly that the reader's appetite is whetted so that he is eager to go to the original literature and learn the details which have been omitted from this book.

To a certain extent, Burdett's approach is idiosyncratic because of its stress on the angular overlap method and arguments *à la* Roald Hoffmann. However that emphasis adds a certain flavour of eccentricity, and I heartily recommend the book to all inorganic and organometallic chemists.

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## Behavioural ecology as competition

T.R. Birkhead

*Behavioural Mechanisms in Ecology.* By Douglass H. Morse. Pp.383. ISBN 0-674-06460-7. (Harvard University Press: 1981.) \$32.50, £17.50.

THERE are now a number of behavioural ecology books available, but this one differs from most others in being primarily concerned with how animals behave rather than with selfish genes and why particular behaviour patterns have evolved. The main theme is competition for resources, mainly food, and Morse starts by discussing foraging efficiency in some detail. The rest of the book is concerned with the constraints on foraging efficiency, such as the effect of predators, high and low temperatures, reproductive activities and so on.

Chapters 2 and 3, on foraging, are perhaps the best. The main aspects of optimal foraging are clearly stated; some of the predictions of optimal foraging theory are presented and the field and laboratory evidence is objectively examined and assessed. Morse concludes that optimal foraging models based simply on energy maximization are not especially useful in predicting foraging behaviour in the wild because they ignore nutritional factors, competition and predation. While these were pertinent criticisms of optimal foraging studies at the time Morse was writing this book, many of his suggestions have already been followed through. For example, in the past few years both nutrient constraints and the influence of predation have been incorporated into optimal foraging models with some success. In discussing habitat selection (Chapter 4) the similarities between optimal foraging (in particular food and patch choice) and habitat selection are outlined, and the importance of habitat selection in terms of food location is emphasized.

The author next looks at the ways animals avoid becoming food items themselves and considers antipredator behaviours, such as alarm calling, from altruistic and selfish standpoints, and then goes on to review behavioural thermoregulation. Under reproduction (Chapter 7) the author discusses parental care and communal breeding. I was surprised to find no mention of evolutionary stable strategies in the discussion of parental care, or indeed elsewhere, and disappointed that there is no mention of communal breeding in groups other than birds. In the next chapter, on the mechanisms associated

with competition for mates, Morse considers the main types of competitive interactions, visual, auditory and olfactory signals used in such interactions, and finishes by considering sexual size dimorphisms. He suggests that these have evolved as a consequence of sexual selection rather than as a result of selection for diversification in foraging between the sexes. This conclusion is based solely on the fact that relatively few sexual feeding morphs exist. While this is entirely reasonable, it is unfortunate that the author misses this opportunity to point out that there have been marked advances in the comparative approach over the past few years and that there now exist quantitative techniques for disentangling the effects of confounding variables.

Territoriality (Chapter 9) covers some standard topics. The main emphasis here is on feeding territories, and as elsewhere in the book the majority of examples are drawn from studies of birds. Chapter 10 looks at dominance hierarchies in relation to food acquisition, and 11 covers inter-specific competition, namely, the form of interactions, spatial relationships between competing species, changes in niche breadth and community structure. The benefits (but not the costs) of living groups are discussed in the penultimate chapter on feeding advantages and antipredator advantages. Finally, Morse considers the future direction of behavioural ecology, urging field workers to examine differences between populations of the same species, and between individuals, to test some of the ideas of R.L. Trivers and others. Unfortunately this chapter has lost some of its impact in the delay between writing and publication. The same is true for much of the rest of the book; there are few references after 1978 and none after 1979.

Behavioural ecologists thinking about using this book as a course text may find the approach rather narrow and the treatment of some topics somewhat incomplete. Another shortcoming, I feel, is the lack of any attempt (except in Chapter 3) to outline theoretical models or evolutionary concepts such as optimization or ESSs. While few would dispute the importance of food acquisition, the way this has been linked to topics such as mate competition and communication seems rather tenuous. Moreover, to emphasize competition for food as Morse has done, almost at the expense of other exciting areas of behavioural ecology, produces a somewhat imbalanced treatment of the subject. This, then, is a readable and attractively produced book, but one which presents a rather specialized view of behavioural ecology.

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A guide to some of the various branches of biology, *Biology in Profile* (editor P.N. Campbell), has just been published by Pergamon. Written especially with aspiring university students in mind, the book contains essays on 20 biological subjects. Prices are: hbk £8, \$19; pbk £3.95, \$9.50.