Feeding and flocking

C.M. Lessells

Gulls and Plovers: The Ecology and Behaviour of Mixed-Species Feeding Groups. By C.J. Barnard and D.B.A. Thompson. Croom Helm/Columbia University Press: 1985. Pp.302. £25, \$30.

THE idea that natural selection can act on an animal's behaviour, as well as its more tangible characteristics such as morphology, is well established. Behaviour is not now merely described and measured but is interpreted in terms of the selection pressures responsible for its evolution and maintenance. Barnard and Thompson follow in this tradition with their study of lapwings, golden plovers and black-headed gulls feeding on worms in agricultural pasture.

At first sight, winter feeding and flocking behaviour are really rather mundane, but this book reveals the extent of the interdependence of feeding and flocking strategies within and between the three species: foraging choices of individuals determine the size and location of feeding flocks, while the composition of flocks in turn affects feeding rates and hence the best foraging strategies. To add to this, the black-headed gulls make their living by stealing worms from the plovers, while the plovers may exploit the gulls for early

warning of the approach of predators.

Clearly Barnard and Thompson have set themselves quite a task in unravelling the complexities of this system. Their quantitative approach to the problem relies on a wealth of data, so much so that the book is rather hard going. Ultimately the success of the book must be judged by whether they are able to cut a path through the jungle of tables and graphs.

As in many other studies, the difficulties firstly of assessing costs and benefits of alternative actions, and secondly of reconciling the different units (such as calories and probability of predation) of costs and benefits, have made quantitative predictions rather thin on the ground. Precise quantitative predictions, however, can be made about the choice of food items by feeding plovers and thieving gulls. The "optimal diet model" provides a well-worked solution to both problems, but here it has been mangled almost beyond

recognition. Profitability, encounter rate, availability and prey types are all incorrectly defined; for instance equation (8.2) is akin to saying that the overall effect of driving for a while at 20 mph and a while at 30 mph is driving at 50 mph. Consequently the line of argument is weakest where it should be strongest. Similarly, innovative thinking elsewhere in the book is marred by inadequate explanation, confused terminology or misused statistics.

Despite this there is much interesting new detail in the book and some new ways of looking at the interrelationships of flocking and foraging strategies. Barnard and Thompson would have contributed more, however, if in their genuine attempt to push back the frontiers of darkness they had not extinguished the lights behind them. □

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Isolated objectives

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Molecular Cell Genetics. Edited by Michael M. Gottesman. Wiley: 1985. Pp.931. £82.30, \$79.95.

MUCH of the work on the genetics of cultured cells has made use of Chinese hamster cells, especially the CHO cell line originated by T.T. Puck, the founder of cell genetics. The importance of these cells is reflected in the emphasis of this book and it is worth noting that, as Yerganian describes, the use of Chinese hamsters is not without heroic and even tragic episodes — during the Revolution a Chinese research worker was imprisoned for his involvement in the shipment of animals to the United States.

The reasons why the CHO cell line has been used so extensively are partly historical, but perhaps more important is the comparative ease with which recessive phenotypes can be isolated in this cell line. Siminovitch, in 1976, proposed that recessive mutations could be isolated in CHO cells because some loci were hemizygous as a result of chromosome rearrangements.

Subsequent studies described by Siminovitch and others have confirmed and extended these ideas. For some autosomal loci, CHO does appear to have only one copy of the genes; however, other loci are diploid and there is increasing evidence that one locus can be inactivated or deleted by a high frequency event (10^{-3} or greater) to uncover recessive mutations. Such events may have profound implications for our understanding of alterations in gene activity that lead to neoplastic transformation.

In *Molecular Cell Genetics*, the editor lists over 100 mutant phenotypes in

Chinese hamster cells which include nutritional auxotrophic requirements, mutations in mitochondria, RNA polymerases, protein synthesis, DNA repair, lysosomes, membrane proteins, glycosylases, protein kinases and many others.

As is to be expected of a multi-authored book, the chapters in *Molecular Cell Genetics* are of variable quality. Some authors have written overviews of an area, often drawing very heavily on their own studies; others have provided both a review and useful hints for particular procedures. In most cases detailed experimental protocols are not provided, so this is not a laboratory manual but rather a source book which would enable one to find the appropriate protocol. Over half the chapters are concerned with particular mutant systems, while others describe features of Chinese hamster cells and methods for cell genetics such as cell fusion, gene transfer, and cloning and expression of cDNAs. Much of the work still appears to be at the stage of characterizing mutants rather than using them to dissect a particular system or probe the structural function of a protein.

For much of the book I felt that a great deal was expected of the next development: the isolation of the relevant genes. For some loci this has already been achieved; however, there is still much to be done before many of the mutant phenotypes can be exploited for what the editor terms "molecular cell genetics": the synthesis of somatic cell genetics with molecular biology.

For those working in this area, or thinking of entering it, this book will be a valuable source of information. They might like to bear in mind, however, that there is more to cell genetics than *Cricetulus griseus*. □

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