

This book contains a wealth of field detail, and extensive literature comparisons with other studies and species. The text is well-supplied with tables, maps and graphs, but lacks any photographs of the habitat or the animals. The printing appears to be photo-offset of typed copy. The text detail is not easy to read, but the study represents a remarkable achievement on a very difficult species. Caldecott closes with a discussion of future research needs and a plea for tropical forest conservation. He notes that pig-tails, unlike some macaque species, 'do not establish themselves in the agricultural areas behind the advancing front of human habitation'. He is concerned that *Macaca nemestrina*, within a few years, could be 'restricted to small populations in remote mountainous areas'. This book is recommended for all primatologists and also to many students of animal behaviour, especially those interested in the behavioural ecology of primates in tropical forests.

CHARLES H. SOUTHWICK

Department of Environmental,
Population and Organismic Biology,
University of Colorado,
Boulder, Colorado 80309, U.S.A.

Natural Selection in the Wild, by JOHN A. ENDLER.
Princeton, New Jersey: Princeton University
Press (1986). Pp. xiii + 336. Price \$40.00 hard-
back, \$13.95 paperback.

John Endler has written an important book that describes contemporary issues in the study of natural selection. The book covers a broad range of topics. The chapters include a summary of philosophical issues, a survey of methods for detecting natural selection, a listing of methodological pitfalls, a discussion of 163 case studies, a summary of selection coefficients, a compilation and statistical analysis of coefficients reported in the literature, and an analysis of current debates on the importance of natural selection. Endler's scrutiny of the literature can be appreciated from the fact that he includes 566 estimates in his sample of coefficients estimated for polymorphic traits. The total sample of studies estimating stabilizing selection on continuously varying traits numbers 330.

Endler's inventory of methods for detecting natural selection covers 10 approaches, ranging from longitudinal studies of cohorts of marked individuals, to studies of trait distributions that span many generations, and comparisons of clines in related and unrelated species. Endler stresses the need for studies that use a combination of methodologies. The *Biston betularia* case study is popular

in the classroom because it highlights so many different aspects of natural selection. Most case studies have taken a much narrower approach and have not combined genetic and phenotypic analysis or short-term and long-term focus.

The appalling rarity of certain types of selection studies is revealed by Endler's surveys. Direct studies of selection on behaviour in nature are virtually non-existent. Comparative studies from which we can make a reasonable inference of selection are common enough, but if we ask for studies that show a correspondence between behavioural variants in a population and fitness, only one or two examples can be produced. Progress in the evolutionary study of behaviour has been stymied at the preliminary step of documenting individual variation. Typology prevails among behaviouralists, as well as their physiological colleagues, and so we have no firm foundation for our belief that natural selection acts on behaviour and physiology.

In contrast to the rarity of behaviour studies, Endler was able to assemble an astoundingly large sample of measurements of selection acting on morphology. Even in the morphological realm, however, there is no room for complacency. Endler details three main faults with our catalogue of studies. (1) Hardly any of the studies measured lifetime fitness. Instead, selection has most frequently been measured over brief segments of the life cycle, giving an incomplete picture of lifetime selection. (2) Most studies have measured selection on a single trait. The liabilities of univariate myopia are that selection can be grossly over- or underestimated, because of correlations between traits, and correlational selection (selection that changes trait covariance) cannot be detected at all. (3) Many studies have focused on traits whose ecological significance is only vaguely understood. For most studies, we cannot put names on the agents that have caused selection. Endler stresses the need for studies of the ecological aspects of selection. The best path here is to follow the lead of the *Cepea* and *Parus* workers, Peter Grant and his colleagues working with *Geospiza*, and Endler himself in his studies of guppies. In these efforts, measurement of selection has been embedded in continuing ecological studies, so that the causes of selection are documented and its consequences can be visualized.

The book has several provocative sections that make it a fine candidate for discussion at graduate seminars. For example, Endler defines natural selection in genetic terms. In Endler's view, natural selection has three parts: phenotypic variation, a correspondence between phenotype and fitness, and inheritance (a correspondence between parents

and offspring). Such a view has had adherents (e.g. I. Michael Lerner), but a purely phenotypic definition of selection has been more prevalent. Ironically, Endler illustrates why the phenotypic view has enjoyed more popularity. By making natural selection a genetic process, Endler is forced to find some other name for the phenotypic correspondence between phenotype and fitness that is most frequently and succinctly referred to as 'selection.' With that door closed, Endler uses the phrase 'condition b' for phenotypic selection. Thus, in the first half of the book Endler uses the phrase 'condition b' on more than fifty occasions. In the second half of the book Endler's 'condition b' disappears and 'natural selection' is used as a synonym of phenotypic selection. This evolution of terminology convinced me to keep using natural selection for the phenotypic process and to use 'response to selection' as the term for the genetic effects of natural selection.

Additional inconsistencies will engage the attentive reader. For instance, the three conditions for natural selection listed on page 4 (variation, phenotypic selection viewed as a correlation and inheritance) are neither necessary nor sufficient conditions for a genetic response (see equation 6.31), in contradiction to Endler's claim. Some readers may be irritated by such rough shod treatment of important conceptual issues, as well as by the novel and inconsistent notation (cf. pp. 175, 181, 189 and 197).

Despite these problems, Endler's book deserves the attention of students of natural selection. The book does an outstanding job of explaining the need for studies of selection and should attract behaviourists to this essential enterprise.

STEVAN J. ARNOLD

*Department of Biology,
The University of Chicago,
940 East 57th Street,
Chicago, IL 60637, U.S.A.*

Canine and Feline Behavioral Therapy. By BENJAMIN L. HART & LYNETTE A. HART. Philadelphia: Lea & Febiger (1985). Pp. x + 275. Price \$29.75.

There is an old saying that owners become like their pets, and vice versa. If so, then who is to blame if the animal becomes destructive or neurotic? Blame aside, severe behavioural problems in pet animals have often proved intractable, ending in the need to have the animal destroyed. As the authors of *Canine and Feline Behavioral Therapy* point out, however, this unhappy fate can often be averted

using techniques of behavioural therapy, and owners often see these as being as life-saving for the pet as emergency surgery.

The book is in three sections. The first gives practical tips on handling clients: not the animal clients, but the human ones. The problem may occur because the owner is 'overly anthropomorphic', or because the animal seeks attention; it may only occur when the owner is absent. Whether or not it has become like its owner, the behaviour of a pet animal is certainly deeply affected by interactions with humans, and it is the human client as much as the animal that animal behavioural therapy has to address.

The second section deals with specific behavioural problems in dogs and cats, problems such as aggressive behaviour towards humans or other animals, urination or defaecation in inappropriate places, and roaming and escaping. Some of the available solutions are ones that vets have practised for years, such as castration; others rely on techniques derived from, say, our knowledge of operant conditioning and reinforcement. One amusing example of this was the Siamese cat that was, quite literally, toilet-trained, and who was subsequently photographed sitting comfortably on the toilet seat!

The third section is the one most likely to interest readers of *Animal Behaviour*, since it provides some of the scientific background to the techniques used. This ranges from advice about choosing pets, based on what is known about the behaviour of particular species, to procedures based on operant techniques, and the use of various psychoactive drugs. In some ways, it might have been more useful if some of this material was integrated into earlier sections, particularly for readers not well-versed in behaviour so that the theoretical reasons for particular therapeutic actions were clear. One danger of dealing with each behavioural problem in turn is that it can sometimes seem rather like a recipe book; both can end up as little more than a series of instructions to those uninitiated into the mysteries.

Still, any practitioner is going to be presented with specific problems, and there is plenty of detail about how to approach each one. Despite being a dog-owner, I must admit that I had not thought much about the behaviour of wild canines in relation to my own animals. Hart & Hart suggest that the 'natural' social behaviour of the dog involves dominance hierarchies, which dog owners frequently forget. This sometimes necessitates therapy that seems counter-intuitive, but is aimed at reinforcing the owner's dominance or of the dominance of one dog over another. Owners all too often try to treat all their dogs equally, often with disastrous effects.