Behavioral Ecology

Ecological Aspects of Social Evolution. Birds and Mammals. DANIEL I. RUBENSTEIN and RICHARD W. WRANGHAM, Eds. Princeton University Press, Princeton, NJ, 1986. x, 552 pp., illus. $65; paper, $23.50. Based on a symposium, Philadelphia, Dec. 1983.

Studies in behavioral ecology have sharpened in focus as the field has grown in scope. Whereas 20 years ago biologists would tramp back from several years in the field and publish a descriptive monograph on a species's social system, perhaps briefly considering the natural selective forces responsible for that system, today's studies more often begin with several adaptational hypotheses about specific behaviors, and fieldwork serves to evaluate those hypotheses. Investigative rigor has been gained by the shift in approach, but a sense of social behavior as an integrated and potentially understandable whole has been lost.

This volume returns to a consideration of whole social systems. Key features in the social relations of some of the world's most meticulously observed birds and mammals are summarized, then interpreted from the perspective of the selective regimes presumed to be responsible for their evolution. The editors' stated aim is to examine "the extent to which social evolution in different taxonomic groups can be understood through a series of common principles."

By and large, these are long-term studies. About half are now in their second decade, and a few are in their third. Therefore the extent of knowledge about each focal species is not as surprising as the coherence with which it is presented. Thus, subtle issues such as the differences and similarities between mobs of Eastern gray kangaroos and chimpanzee communities are clear, as is the complex issue of social structure of gelada "baboons," which live simultaneously in harems, herds, and bands.

I suppose it is a sign of scientific progress when each new research generation slays the simple hypotheses of the previous one. In this volume, it happens repeatedly. For instance, Packer disposes of the notion that African lion sociality evolved as a consequence of the advantages of group hunting. Replacement hypotheses are successively more complex, and probably realistic. The new hypothesis on lion sociality combines the advantages for carcass defense with occupation of open habitat and high lion density.

If there is a series of common principles through which social evolution can be understood, they are likely to be complex. The direction of social evolution depends upon the interplay of several (at a minimum) selective forces operating upon certain inherent constraints. In such a complicated causal matrix, one would expect that in different systems the magnitude of any single variable might have manifold effects. Therefore it is not surprising that polygyny in yellow-rumped caciques, sex role reversal in moorhens and spotted sandpipers, and communal breeding in mongooses are all attributed at least in part to high predation risk.

Inherent constraints have always been the *mafiosi* of sociobiology—everyone acknowledged their existence but hardly anyone took them seriously. However, probably because this book concentrates on whole social systems where simplicity is not expected, constraints are generously acknowledged. For instance, evolutionary options are putatively limited by adult sex ratio in spotted sandpipers and dabbling ducks, body size in hornbills, and male dominance in Florida scrub jays. Particularly provocative is Moehlman's analysis of the Canidae, showing that body size in that family correlates with adult sex ratio, mating system, frequency of cooperative hunting, and sex-specific dispersal tendency. Certainly not everyone would agree on what are, and are not, inherent constraints, but constraints are obviously out of the closet.

Three selective forces, resource distribution, predation risk, and social competition, receive most attention by the authors. Scenarios of social evolution derived from both their observations and comparative data are presented in most chapters. All the scenarios are plausible, but by far the most convincing are those supported by evidence from "natural" experiments within a species, such as Rubenstein's analysis of variation in horse social structure in relation to habitat variation and Dunbar's and Wrangham's interpopulational syntheses of gelada and chimpanzee sociality, respectively. Clearly, well-planned and well-performed field experiments would greatly accelerate our understanding of social structure—a fact not lost on the book's authors, at least several of whom are now proceeding with such experiments.

Even though this is a multi-authored book, it is marked by uniform clarity of figures and text. There is also a minimum of specialist's jargon, so that the book will be accessible to general scientific readers with an interest in animal behavior. The editors have provided a prefatory chapter tracing the development of sociobiological thought and a closing chapter synthesizing the major influences on social evolution and the conclusions of the various authors. These chapters are models of concision and coherence and should be suitably adapted for opening and closing lectures of courses in behavioral ecology.

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Muscle Measurements

Electromyography for Experimentalists. GERALD E. LOEB and CARL GANS. University of Chicago Press, Chicago, 1986. xx, 373 pp., illus. $60; paper, $22.

Electromyography, the measurement of voltage gradients produced by a contracting muscle, is a technique that is widely used in studies of kinesiology, muscle mechanics, and motor neurophysiology. Loeb and Gans acknowledge that electromyography is as much an art as a science and demands not only a knowledge of its technology but an ability to discriminate meaningful from irrelevant measurements. The purpose of the book is "to provide the experimentalist with bases for the design and conduct of experiments that facilitate the solution of problems and minimize the chance of serious error." By accomplishing this, the authors have done us and our students a service. Heretofore it has not been possible to direct a student to a source or even a limited set of sources wherein practical guides to the effective design of the components of electromyography could be found.

This book will serve as a practical and useful source not only for the techniques of electromyography but also for other techniques used in the analysis of neuromuscular and musculoskeletal design. The authors make clear that electromyography, no matter how sophisticated, is only one indicator of musculoskeletal performance and place it in perspective relative to other important factors of muscle function, including whole muscle design, motor unit organization, and motor unit recruitment.

Perhaps not apparent from the title is the inclusion in the first third of the book (Part 1) of some important basic concepts of electronics and neuromuscular anatomy. In keeping with most of the book, these sections are written so that students with little background will be able to follow them.