the future. It is more successful at posing problems than at solving them, and in their ambition to point the way the contributors may have made some errors in emphasis, interpretation, and methodology. Such is the case in an evolving science. This book marks the beginning of an exciting era in population biology, with an emerging role for tropical studies and an expanding link between ecology and genetics.

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Ground Squirrels

The Biology of Ground-Dwelling Squirrels. Annual Cycles, Behavioral Ecology, and Sociality. JAN O. MURIE and GAIL R. MICHENER, Eds. University of Nebraska Press, Lincoln, 1984. xvi, 459 pp., illus. $25.95. From a symposium, Banff, Alberta, Canada, Oct. 1982.

This collection of symposium papers is the first synthesis of investigations bearing on sociality of the ground-dwelling sciurids—ground squirrels, prairie dogs, and marmots—of western North America. These animals have been the subjects of many long-term investigations, which have begun to generate the basic data on kinship, spacing, dispersal, and asymmetries of behavior that are needed to test hypotheses in sociobiology. Of the 20 chapters in the volume, nine are primarily reviews; the remainder are based on original data, generally from intensive studies of individual species. The volume is an empiricist's delight. The reader is given a clear idea of what is known and what is not known about ground squirrels. All the chapters give honest critiques of existing data, and the authors frequently make suggestions for future research and call for consistency in the gathering and analysis of data (as is particularly appropriate in the case of spacing behavior, as reviewed by McLean). Although adoption of the comparative method is a strength of the volume, one deficiency is a lack of consistency in cross-referencing among chapters.

Because an understanding of sociality within any group depends on knowledge of many other aspects of its biology, Murie and Michener chose to include papers on phylogeny (Hafner), behavioral ontogeny (Ferron), life history (Heaney), and physiological ecology (Phillips, Joy, Bintz). The chapters by Ferron and Heaney compare aspects of the biology of tree squirrels and ground squirrels. In his treatment of the evolutionary relationships of the Nearctic Sciuridae, Hafner concludes that, although phyletic components may in some cases help explain interspecific differences in behavioral patterns, in sciurids there is a lack of concordance between degree of sociality and phyletic position. This sets the stage for explaining sociality in sciurids in terms of socioecological or energetic parameters.

Sociality in ground-dwelling sciurids is the major concern of the remainder of the volume, which is organized into sections on annual cycles, communication, mating systems, dispersal and dispersion, and kinship and sociality. The mix of review and data papers is effective in highlighting the questions asked by ground squirrel biologists and the results of attempts to answer them. The reviews of annual cycles (Michener), mating systems (Dobson), and dispersal (Holecamp) clearly define the limits of sociality in ground squirrels and should serve as the starting point for an understanding of their behavioral ecology. Communication is presented as the mechanism by which social cohesion is maintained, and the reviews on vocal and visual communication (Owings and Hennessy) as well as the thorny subject of olfactory communication (Halpin) are interesting and provocative.

The seven papers that report data on sociality cover a wide range of the levels of sociality found in ground-dwelling sciurids and demonstrate the rewards of long-term field investigations of single species. Here the most important theme is the role of individuals within social groups, whether the matter at issue is the ecological basis of monogamy in hoary marmots (Holmes), the functional basis of multiple mating in 13-lined ground squirrels (Schwagmeyer), settlement patterns in Columbian ground squirrels (Murie and Harris), or behavioral asymmetries based on kinship in Richardson's ground squirrels (Davis). By far the most important paper in this group is the presentation by Armitage (the dean of active ground squirrel researchers) of data collected over 20 years on patterns of residency, recruitment, and immigration in discrete populations of yellow-bellied marmots. Although it requires some effort to decipher and interpret these marmot genealogies, a fascinating tale of individual variability and its effect on population processes makes the effort worthwhile.

The volume appropriately ends with a retrospective comment by King on the importance of burrows to the biology of ground-dwelling sciurids. It was King's classic 1955 paper on social organization in a black-tailed prairie dog town that showed what could be learned by studying sciurids. Now, nearly 30 years later, with publication of this volume, we have a timely update on progress in the field. This volume will be valuable not only to mammalogists and vertebrate sociobiologists but indeed to all of those interested in the adaptive nature of sociality.

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Physiological Ecology

Seabird Energetics. G. CAUSEY WHITTOW and HERMAN RAHN, Eds. Plenum, New York, 1984. xii, 328 pp., illus. $55. From a symposium, Honolulu, Aug. 1983.

The utilization of energy by organisms is of interest to both ecologists and physiologists. As J. Wiens notes in a chapter of this volume, physiologists are concerned with how the environment influences the quantity of energy and nutrients available to an organism and how these resources are apportioned among requirements for such activities as maintenance, growth, and reproduction. Ecologists, on the other hand, wonder how metabolic requirements create demands for energy and nutrients from the environment and how the balance between supply and demand influences individual fitness. This book uses both these approaches by considering environmental relations to energy acquisition and expenditure and by using this information for the development of ecological models.

The book focuses on seabirds, a group defined on the basis of habitat rather than taxonomy. Seabirds range over about two-thirds of the world's surface, yet comprise only about 3 percent of all avian species. Representing four orders—Procellariformes (tube-nosed birds such as albatrosses), Pelecaniformes (pelicans and relatives), Charadriiformes (shorebirds such as gulls and terns), and Sphenisciformes (penguins)—these birds breed in some of the harshest environments on Earth, including Antarctica. The susceptibility of population size and distribution to regional variation in abundance of oceanic food and to periodic disturbance in availability of food, such as that caused by the El Niño

phenomenon, justifies the choice of seabirds for study of the relations between energetics and environmental resource availability.

The first chapter, by Rahn and Whittow, summarizes so effectively the state of knowledge of seabird energetics, breeding biology, population dynamics, and economic relations to the fishing and guano industries that the rest of the book is almost unnecessary. The other chapters are arranged logically from the egg to the population: costs of egg formation and incubation behavior, embryonic growth rates and thermal tolerances, energetics of adult breeding behavior, temperature regulation, flight and terrestrial locomotion, and finally population energetics and impacts on marine resources.

Because research on seabirds began in earnest only 20 years ago and many species spend most of their adult life at sea, where observations of their activities is difficult, some chapters have few data on seabirds to present and rely mainly on studies of other birds, even chickens. Other chapters on more completely studied topics reveal some fascinating differences between seabirds and other species: prolonged incubation periods of Procellariformes, production of stomach oils for feeding of nestlings, and embryonic and nestling tolerances of periodic feeding and neglect by attending adults. These features, particularly prolonged incubation periods, invite questions concerning the selective pressures underlying their evolution, and I would have liked to see the authors abandon all caution and advance some testable hypotheses.

The construction of ecological models is complicated by a lack of precise measurements on energetics of free-ranging birds and population sizes of both birds and prey and by arguments about the degree of complexity such models require to be accurate. However, the estimates are intriguing and invite further effort. For instance, seabirds may consume about 7.8 million tons of prey each year worldwide and may return annually about 7700 tons of excrement just to the marine system off Newfoundland alone.

Though this book may stimulate few controversies, it provides a solid summary of the state of current knowledge and a stimulus for further research. It should prove informative reading for physiologists, ecologists, ornithologists, and anyone else who enjoys seafood.

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Synthesizing Data

Summing Up. The Science of Reviewing Research. RICHARD J. LIGHT and DAVID B. PILLEMER. Harvard University Press, Cambridge, Mass., 1984. xvi, 191 pp., illus. $17.50; paper, $7.95.

Until recently, reviews of social science research on a given subject have been qualitative and judgmental because individual investigations are typically characterized by specific conditions of unknown pertinence to the effect or relationship of interest. In the last decade, however, methods have been developed for systematically integrating the findings of diverse studies. These new procedures—often called meta-analysis—are of vital importance to the scientist, for whom the matter of interpreting prior findings is at least as critical as the task of generating additional results. The productions of such integrative procedures may also be essential to the policy-maker, who in making a decision may need to use simplified accounts of what is known about several research areas. Policymakers are likely to be concerned primarily with the effects of treatments: surgical, drug, educational, psychotherapeutic, and so on. Others interested in summaries of research on treatments include those who manage treatment programs and those who may be treated by them.

For a problem in social science, the pertinent research literature is usually more diverse than that for one in natural science. There is great variation in procedures, both measuring operations and experimental manipulations or treatments. Hence, with few research studies being replicated very closely, exact reproduction of findings is rare.

Light and Pillemer not only provide an excellent introduction to the new systematic methods for summing up and analyzing bodies of research but also examine the standard qualitative type of review, assessing the strengths and weaknesses of each approach. They recommend a synthesis combining the two. The book provides guidance to professionals who want to undertake research reviews and to policy-makers who must evaluate the adequacy of such reviews. Since they are writing for broad audiences, the authors cannot provide a manual for those undertaking quantitative reviews, but such people can adequately prepare for such a task by using the literature cited. Although the authors occasionally bring up the need for evaluating the quality of the research plan in each research report, they do not include quality as a possible criterion for excluding reports from a review. (Perhaps they believe there is not enough consensus in such judgments.)

This lucid book has many fine characteristics. The authors stress the analysis of the variation in findings across studies to uncover factors associated with successful and unsuccessful treatments and to seek the boundary conditions for each conclusion drawn. They examine the problem of publication bias: Positive results are more likely to be submitted for publication and published; negative findings may be buried in file drawers. The authors emphasize clear and precise conceptualization, especially in the formulation of the question to which the review is addressed.

Problems of conceptualization and operationalization are pervasive in social science and in the study of treatments. The authors show that reviewers must determine exactly what the treatment was and how much it varied from one study to another. They discuss the matter of multiple outcomes of any treatment, including side effects and immediate versus long-term effects. Neglected, however, is the problem of inferring from an empirical measurement to the conceptualized goal of the treatment. No one index adequately indicates quality of life after heart surgery. No one score is sufficient to assess even one aim of psychotherapy. But what set of measuring operations or what weighted index represents the construal of the desired outcome?

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Books Received

Advances in Archaeological Method and Theory. Vol. 7. Michael B. Schiffer, Ed. Academic Press, Orlando, Fla., 1984. xvi, 462 pp., illus. $49.50.

Advances in Cognitive-Behavioral Research and Therapy. Vol. 3. Philip C. Kendall, Ed. Academic Press, Orlando, Fla., 1984. xiv, 258 pp. $42.

Aging and Drug Therapy. G. Barbagallo-Sangiorgi and A. N. Exton-Smith, Eds. Plenum, New York, 1984. x, 523 pp., illus. $85. Ettore Majorana International Science Series (Life Sciences), vol. 15. From a course, Erice, Italy, Nov. 1982.

Alcohol and the Fetus. A Clinical Perspective. Henry L. Rosett and Lyn Weiner. Oxford University Press, New York, 1984. xx, 220 pp. $24.95.

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The Catalogue of Fantastic Inventions. Carelman.

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