cies in which females are dominant over males. W. L. Franklin extends the earlier work of C. B. Koford on the vicuña, confirming that this camel-like species is the most strictly territorial of all mammal species and is organized into year-round harems totally dominated in all activities by the resident male. A series of articles by several authors on the pronghorn antelope and reindeer elevate these unique north temperate species into the ranks of the best studied of all animal species. Many other examples of excellent special studies can be cited.

Several new syntheses also deserve particular mention: mother-offspring relations by P. C. Lent; courtship and combat behavior by F. R. Walther, nicely illustrated by the author's professional-grade drawings; the sociobiology of the Suidae by Hans Frädrich; the sociobiology and behavior of the antelopes and other bovids of Africa, which constitute one-third of the entire world ungulate fauna, by R. D. Estes; and the first attempt to formulate the ecological correlates in terms of some principles of population biology, by Valerius Geist. While the future of some of the most interesting ungulate species remains threatened by the continued destruction of their habitats, there is an occasional cause for optimism. R. C. Bigalke reports that 19 of the 44 species of South Africa have adapted sufficiently to farmed land to maintain reasonably large, stable populations. H. Mendelssohn describes the increasingly strict measures taken by the Israeli government to protect the two gazelle species still found within its borders. Other authors, including H. K. Buechner, P. A. Johnstone, and John Vincent, describe a few successful attempts to stabilize wild ungulate populations in African reserves and game ranches.

In their general introduction the editors disarmingly list the weaknesses of the book, most notably a relatively thin coverage of deer and other cervids and of ecology and physiology generally. They compensate by providing a short but useful bibliography in these areas. In addition there are two defects in organization. The index is limited to the names of the ungulate species and the contributing authors, making searches for general topics through the 56 chapters unnecessarily laborious. Also, each author's bibliography is presented after his own chapter, whereas a unified bibliography at the end of the two volumes would have been more useful. But these are not major flaws. The editors and authors have made an important and lasting contribution to sociobiology and ecology, and they have brought the ungulates to the center of the stage alongside the primates and carnivores.

EDWARD O. WILSON
Museum of Comparative Zoology Laboratories, Harvard University, Cambridge, Massachusetts

Comparative Endocrinology

The Pituitary Gland. A Comparative Account. R. L. HOLMES and J. N. BALL. Cambridge University Press, New York, 1974. x, 398 pp., illus. $28.50. Biological Structure and Function, vol. 4.

This is the first book devoted entirely to a comparative treatment of pituitary gland structure and function in all vertebrates. Such treatments have been slow in coming not because of a lack of interest in the subject but because of a dearth of basic information. The great body of published work that has been accumulating on the hypophysis in various classes of vertebrates is still meager in view of the fact that the division includes more than 60,000 species and that it is dangerous to extrapolate from one group to another not only within a class, but even among members of the same genus. Holmes and Ball approach the subject by presenting detailed descriptions of representative species, but they also present examples of deviations from a basic plan within a group and stress the number of variations that the gland has undergone during the course of evolution.

The book begins with a brief general outline of the structure and function of the pituitary gland. This is followed by several chapters on specific aspects of the mammalian gland and then by a series of chapters on the other vertebrates. Since we know most about the gland in mammals this is a good sequence to follow. Each chapter is well organized, beginning with an introduction to the taxonomic and phylogenetic position of the class under consideration and then treating in sequence gross morphology, histology and cytology, the cell types present, the evidence concerning their function, the structure and function of the hypothalamus and neurohypophysis, and the mechanisms of control of secretion from that region of the gland. The book ends with a chapter entitled "Some general considerations"—a somewhat disappointing termination for an otherwise good book because of the selection of topics discussed and the cursory nature of the discussion.

One of the strengths of the book is that structure is never divorced from function. The physiology of the gland is dealt with in terms of anatomy, histology, and cytology. The authors are to be especially commended for discussing in considerable detail the development of staining techniques and the problems involved in their use and in the interpretation of the results. These important matters too often are discussed only superficially.

A comparative textbook should incorporate all the available information on the structure and function of the system being studied and discuss the evolutionary significance of the observations. These things have been essentially accomplished by Holmes and Ball. It is not an easy task to compile and catalog information from different groups of animals when common tools and language of investigation and discussion are not available. This book does not alleviate this formidable problem, but calling attention to it is a step in the right direction.

The Pituitary Gland: A Comparative Account should receive widespread acceptance as a textbook for introductory courses in comparative endocrinology and as a general reference. By making the reader aware of the unique features of the gland in the various classes of vertebrates it can, as a comparative book should, suggest new ideas and new approaches to old problems.

MARTIN P. SCHREIBMAN
Department of Biology, Brooklyn College, Brooklyn, New York

Telomerization Reactions

Free Radical Telomerization. CHARLES M. STARKS. Academic Press, New York, 1974. xii, 268 pp., illus. $23.

Since the 1940's, when the nature of free radical telomerization reactions was first recognized, these reactions have been the subject of many investigations. Much of the useful information concerning them, however, is found in the patent literature and in foreign (particularly Russian) journals. Starks has made a unique contribution in assembling the literature

in this field and making it readily available in a readable monograph.

The first four chapters of the book are an introduction to the general mechanistic and kinetic features of free radical telomerization reactions. The significance of chain transfer constants and the processes by which they are determined are presented clearly, and the use of such data in determining the reactivity factors of both monomers and telogens is outlined in chapters 2 and 3. Chapter 4 is an interesting discussion of the kinetics of free radical telomerization reactions in terms of the limitations of steady state treatments that also points out the value of certain empirical approaches to telomerization kinetics.

The next four chapters cover the chemistry of various classes of compounds as telogens. An entire chapter (chapter 5) is devoted to the chemistry of carbon tetrachloride in telomerization reactions. The behavior of other halogen compounds is discussed in chapter 6. Chapter 7 includes the chemistry of many of the oxygen- and nitrogen-containing organic compounds that have been used as telogens. Those telogens that lead to non-carbon-centered radicals (for example, sulfur, phosphorus, and silicone compounds) are discussed in chapter 8. A section on organometallic compounds and their participation in telomerization reactions that probably do not involve free-radical intermediates is also included. The tables in these chapters have been prepared with great care and are most useful. When available, pertinent chain-transfer constants are included along with the structures of the telogens, monomers, and telomeric products formed from them.

The final chapter describes cotelomerization reactions. Although the data available are limited, some examples are presented, and the kinetic aspects of such reactions are examined briefly.

References are placed, in the order in which they are cited, at the end of each chapter. Both an author and a subject index are included.

The book should prove stimulating not only to polymer scientists, but also to chemists interested in the synthetic and kinetic aspects of organic free-radical reactions.

EARL S. HUYSER
Department of Chemistry,
University of Kansas,
Lawrence

Marine Ecosystems

The Biology of the Oceanic Pacific. Proceedings of a colloquium, Corvallis, Ore., Apr. 1972. CHARLES B. MILLER, Ed. Oregon State University Press, Corvallis, 1974. 158 pp., illus. $6. Annual Biology Colloquium.

The first six of the seven chapters in this small book are review articles that summarize and assess the status of most of the prominent and exciting inquiries into offshore blue-water ecosystems. John A. McGowan, the leader of the colloquium on which the book is based, summarizes the zoogeographic study of open ocean zooplankton that he and his students have completed in the last decade. Pacific biotic provinces can be defined by the fauna as well as by water masses and circulation. Calling these regions separate "ecosystems," McGowan discusses what he believes to be the basic features common to all of them. "Their basic organization," he says, "does not differ from other ecosystems." McGowan's questions, posed with no answers as to how his "systems" are maintained, are followed wisely by a paper on control of ecosystem processes by Timothy R. Parsons and Bodo R. de Lange Boom, who present a matrix of 15 biological and physical-chemical parameters assumed to be interacting, interdependent components of an open-ocean ecosystem and succinctly review what is known about their interactions. Bruce W. Frost, a former student of McGowan's, appropriately follows with his studies of an important factor in the control of ecosystem structure, zooplankton feeding rates. Robert R. Hessler discusses his new information on the structure of deep benthic communities below the depauperate central gyres outlined by McGowan. Next, Brian J. Rothschild reopens the question whether the vast though seemingly unproductive open ocean has exploitable fisheries resources. P. W. Hochachka gives his views of enzymatic adaptations to oxygen, temperature, and pressure extremes in the oceans, a subject seemingly out of keeping with the previous papers but having an important relationship to all the studies discussed. Each discussion demonstrates the importance of the kinetics of functional responses, even if only by implication, as in Hessler's account of feeding activities around free baited cameras on the deep-sea floor. Many of these responses may be coupled to enzymatic adaptations to open-ocean life.

In the concluding chapter of the book Joel W. Hedgpeth honors the *Challenger* centennial with a history of oceanography in the Pacific, replete with anecdotes.

Were I to be teaching biological oceanography this year, I might choose this inexpensive little book as my text, as it has covered so many subjects so well. Each of the authors has presented his own picture of the open ocean, and the subtle resonance between them is found in theses about which they do not always agree. Each boldly presents his viewpoint in a manner that might never have been managed in strictly refereed journals. Models erected by intuition, with as yet little substantiation, fill the book and could cause continual excitement in a class of graduate students. Are open-ocean ecosystems delimited by zoogeographic boundaries, as McGowan suggests? Does diversity "contribute" to stability, as Parsons and de L. Boom state? Is size in zooplankton grazers important to competitive exclusion? Is there no way in which the high diversity of the deep benthos is related to the "small amount of food entering the system"? I was delighted by Rothschild's graphs of food chain dynamics and efficiencies, but I tend to favor the argument promulgated by J. H. Ryther (*Science* **166**, 72 [1969]) that the open ocean is not the place to look for new food resources. Hochachka's approach to ecology is untrodden, and there will be a long wait before the importance of enzymatic adaptations to ecosystem dynamics is understood.

A notable omission from a book about an ecosystem is a conceptual model indicating the interdependencies among the system components (such as is presented by J. H. Steele in *The Structure of Marine Ecosystems*, Harvard University Press, 1974). An introduction or conclusion dealing with such relationships might have made them more apparent to the student.

C. B. Miller, another of McGowan's students, did an excellent job putting together so much information in such a compact, inexpensive form. I would call the little book a notable tribute to John McGowan as well as to the *Challenger*'s anniversary.

GILBERT T. ROWE
Woods Hole Oceanographic Institution,
Woods Hole, Massachusetts