the DNA replicates. If abnormalities in development persist, the responsibility must be placed on the DNA itself.

By drawing attention to the results of nuclear transplantation in a well-balanced critical presentation, and by providing comprehensive coverage of the relevant literature, McKinnell has done a great service for the biological community. In addition, he has provided in a series of appendixes very useful data for anyone wishing to undertake nuclear transplantation in Amphibia. He lists the sources of the animals, the tools and techniques, and the composition of the necessary media. Careful study of this book will profit all biologists and is indispensable to graduate students and others who plan to make use of nuclear transplantation for the investigation of any of the many problems approachable with this technique.

CLEMENT L. MARKERT
Department of Biology, Yale University, New Haven, Connecticut 06520

Osmotic Regulation in Animals

Osmotic and Volume Regulation. Proceedings of a symposium, Copenhagen, June 1977. C. BARKER JØRGENSEN and ERIK SKADHAUGE, Eds. Munksgaard, Copenhagen, and Academic Press, New York, 1978. 512 pp., illus. $49. Alfred Benzon Symposium XI.

The editors of this volume write in their preface that diversification of research impairs communication among specialists in the physiological sciences. In organizing the symposium on which the volume is based, it was the expressed aim of Jørgensen and Skadhauge to promote synthesis by uniting established investigators in the conceptually allied but practically disparate branches of animal physiology concerned with osmotic and volume regulation.

The immediate result of this effort is a collection of some two dozen papers, most of which contain information that has been published elsewhere. The papers are organized into seven sections that adequately represent the broad scope of this subject, at least with respect to vertebrates. The first section deals with the environmental physiology of extracellular fluid volume regulation. It is followed by sections considering the control of drinking, the role of the kidney, the involvement of hormones, and nonrenal mechanisms of water and salt balance. The final two sections present a rather cohesive treatment of volume regulation at the cellular level, with topics ranging from red blood cells to euryhaline invertebrate tissues. Happily, the editors have chosen to print the informal discussions that followed each presentation, and this adds measurably to the utility of this collection.

The participants were given considerable latitude in how they approached their topics, and consequently some of the papers are detailed discussions of very specific topics whereas others serve as brief state-of-the-art messages. For example, the section dealing with volume regulation via antidiuretic hormone is quite involved. Fortunately for the nonspecialist, the concluding paper in this section, by A. C. Guyton *et al.*, nicely shows the utility of a systems analysis approach in integrating the complexities of control evidenced in the preceding papers. Quite in contrast, the section considering the role of the vertebrate kidney is an excellent overview of the comparative physiology of this organ. The introductory remarks by B. Schmidt-Nielsen serve as an informative backdrop for a paper by W. H. Dantzler on avian and reptilian renal mechanisms and one by H. Stolte and Schmidt-Nielsen on renal function in cyclostomes, elasmobranchs, and reptiles.

The symposium provided a forum for the presentation of new ideas and the reinterpretation of older views. Thus, a paper by B. Andersson and another by P. Bie present evidence that contradicts various elements of the generally accepted osmoreceptor model for the control of mammalian water balance. Lively, albeit lengthy, discussions follow these challenges to the classic Verney model.

The collection also contains two papers of a speculative nature. L. B. Kirschner considers the significance in vivo of the external mucus layer covering the gills and skin of aquatic animals, and E. H. Larsen provides a much-needed quantitative treatment of the control of volume and ion content of epithelial tissues. Both papers should be quite useful in future studies for they provide verifiable models of important phenomena in osmotic regulation in animals.

On the whole, the volume is too heterogeneous for those seeking an overview of osmotic and volume regulation in animals. It should, however, command the attention of those specialists it hopes to unite, and in this respect the experiment is a success, particularly if the spirit of this symposium can be carried beyond the pages of this volume.

ROBERT W. FREEL
Department of Biology, University of California, Los Angeles 90024

Marshland Ecology

Freshwater Wetlands. Ecological Processes and Management Potential. Papers from a conference, New Brunswick, N.J., Feb. 1977. RALPH E. GOOD, DENNIS F. WHIGHAM, ROBERT L. SIMPSON, and CRAWFORD G. JACKSON, JR., Eds. Academic Press, New York, 1978. xviii, 378 pp., illus. $17.50.

Probably no land resource has been more ruthlessly exploited than our nation's wetlands. Nearly half the wetlands have been destroyed, and the destruction continues at an estimated rate of 0.5 to 1 percent annually, according to Jack McCormick, a contributor to this volume. Continued destruction is the pattern even with two Executive Orders (No. 11,990, Protection of Wetland, and No. 11,988, Floodplain Management, both issued 24 May 1977). Although some states have passed wetlands protection legislation, there is still cause for national concern. Therefore, this book, the proceedings of a symposium whose objective was to summarize knowledge of the ecology of freshwater marshes and to highlight research needs, is most timely. The 20-some contributions are divided into sections covering primary production, decomposition, nutrient dynamics, and management potentials. Each section is followed by a succinct summary and recommendations.

Data presented in the volume indicate that herbaceous-plant-dominated emergent wetlands (marshes) are, like tidal wetlands, among the most productive ecosystems in the world. Whigham and his colleagues provide an excellent tabular summary for some 20 species. Average peak estimates of annual aboveground standing crops range from 566 to 2311 grams per square meter and compare closely with estimates from salt marshes. Even these figures are underestimates, for there are growing-season losses that, depending on sampling techniques, may be missed and below-surface production, which may be considerable in emergent forms, is not included. In fact, belowground standing crops in prairie marshes can reach nearly 2000 grams per square meter. These prairie wetlands, where 18-fold production changes can occur over a period of five to 20 years, are also among the most dynamic wetland systems. Studies of sedge wetlands by J. M. Bernard and E. Gorham suggest that it is vital to know the life history of the species being studied—a fundamental aspect sometimes overlooked by ecologists preoccupied with computers or statistics.

Fluctuating water tables typical of