voted to a review, in terms of apparent polar-wander curves for different continental areas, of all data, available to the end of 1970, which meet these criteria. The data are also tabulated, area by area, in a 28-page appendix, giving the book added value as a work of reference. The remaining third of the book is devoted to a discussion of various aspects of reversals, sea-floor spreading, and plate tectonics, with particular attention paid to the paleomagnetic evidence for sea-floor spreading derived from oceanic magnetic anomalies and the geomagnetic-reversal time scale, and attempts to deduce past plate motions and continental configurations from paleomagnetic pole positions.

In summary, this book goes beyond the requirements, and presumably the pockets, of undergraduates, but as a comprehensive and authoritative treatise on paleomagnetism it will be invaluable to graduate students and research workers. In his preface the author expresses the hope that this book will form "a basis for an extended lecture course in paleomagnetism, and . . . an up-to-date review . . . of the subject." I can only say that to my mind he has succeeded admirably.

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Studies of Biomembranes

Perspectives in Membrane Biophysics. A Tribute to Kenneth S. Cole. D. P. AGIN, Ed. Gordon and Breach, New York, 1972. viii, 318 pp., illus. $18.50.

K. S. Cole is a father of membrane biophysics and so it is fitting that a book be published in tribute to him. It is unfortunate that the tribute to a man who has made so many incisive contributions should be a collection of papers with little attempt at editorial perspective or synthesis, but I am afraid that is the nature of the book. While the information in the papers is quite valuable, it has for the most part already appeared in print elsewhere, and so the intellectual justification for publication is not clear.

Specific comment should be made about Narahashi's paper on the pharmacology of axonal and end plate membranes, which shows again the close interaction of biophysics, physiology, and pharmacology. No sooner is a new biophysical technique developed to answer physiological questions than it is applied to study the action of interesting drugs. Narahashi's work suggests that future experiments on the detailed pharmacology of axons will routinely use voltage clamp methods.

T. L. Hill's speculative discussion of possible mechanisms for the movement of ions across nerve membranes is noteworthy because it uses the Hodgkin-Huxley analysis "as a starting point for a molecular theory [since] it is a little hard to believe that [their analysis] is entirely empirical and completely divorced from molecular realities." It is nice to hear these words after so many years in which the work of Hodgkin and Huxley has been ignored or misunderstood in much theoretical analysis. It would be particularly helpful now if theoretical models were based on mechanisms observed in model experiments on bilayers treated with "ionophores" and if the models were used to make predictions of phenomena, which could be checked experimentally. In this way theoretical studies would leave the realm of speculation and enter the mainstream of research on the mechanism of the action potential.

The contribution of Adrian, Chandler, and Hodgkin has not been published elsewhere and is helpful because it extends and rederives Cole's theorem, a most useful result for determining the electrical properties of a small patch of isolated (perhaps nonlinear) membrane from the properties of a long cylinder of the membrane. Some readers will wish that the authors had explicitly stated the requirement that $\partial i_m/\partial x = 0$ (at constant membrane potential V; i_m is the membrane current, x the longitudinal coordinate). A discussion of the manner in which i_m can still depend on x (indirectly through the dependence of V on x) might also have been helpful in removing some of the confusion concerning the derivation and domain of validity of Cole's theorem. The derivation presented is nonetheless most powerful and useful, permitting insight into a number of stability problems and allowing generalization to certain time-dependent situations. It is unfortunate that the stability problems of the voltage clamp and the action potential itself have not received more attention from applied mathematicians, for inclusion of the time dependence of the system seems to pose a lovely problem in stability theory, perhaps amenable to treatment by singular perturbation theory.

A future area of growth for membrane biophysics is described by Keynes, who points out that because of the quality and thoroughness of Cole's work "capacity has become the most neglected property of nerve." Measurements of capacitance can now be made with great accuracy, and it may be possible to make such measurements dynamically during the time course of interesting biological phenomena such as the generation of action potential. In this way changes in membrane structure may be studied.

The book unfortunately does not include any contribution from P. Fatt, who, with his wife, G. Falk, has developed Cole's impedance measuring techniques into a method to determine the pathways by which current flows across cells, the pathways which make up the equivalent circuit of cells. This method of analysis has provided quite detailed information concerning the electrical ultrastructure of muscle fibers and may prove helpful in analyzing the electrical properties of other, more complicated, cells and tissues.

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New Journals Received

Cultural Hermeneutics. Vol. 1, No. 1, Apr. 1973. Four issues a year. Editor: David M. Rasmussen (Boston College, Chestnut Hill, Mass.). D. Reidel Publishing Co., P.O. Box 17, Dordrecht, Holland. $26.78.

Journal of Raman Spectroscopy. Vol. 1, No. 1, Apr. 1973. One volume a year. Editors: D. A. Long (University of Bradford, Yorkshire, England) and H. J. Bernstein (National Research Council of Canada, Ottawa). D. Reidel Publishing Co., P.O. Box 17, Dordrecht, Holland. $67.83.

Pediatric Radiology. Vol. 1, No. 1, Mar. 1973. Four issues per volume. Springer-Verlag, 175 Fifth Ave., New York, N.Y. 10010. $42.15.

Progress in Neurobiology. Vol. 1, Part 1, May 1973. Editors: G. A. Kerkut (University of Southampton, Highfield, England) and J. W. Phillis (University of Manitoba, Winnipeg, Canada). Pergamon Press, Fairview Park, Elmsford, N.Y. 10523. Vol. 1, Part 1, $6.

Social Change. Vol. 1, No. 1, May 1973. Four issues per volume. Editors: Victor Gioscia (Center for the Study of Social Change, New York) and Philip Slater (Greenhouse, Boston). Gordon and Breach, One Park Ave., New York, N.Y. 10016. Vol. 1 to libraries, $24; to individuals $12; to students, $6.