paid by most electrochemists to the cleanliness of their surfaces, and, I believe, any correlation between theory and experimental results is either forced or accidental.

The final two chapters deal almost completely with the solution and double layer. There is a large amount of mathematics, and with a sufficient number of assumptions and simplifications the usual agreement between fact and theory is found.

All the chapters have excellent bibliographies and are mainly reviews. In some instances it is difficult to separate review material from original material without consulting the pertinent references. The main usefulness of the book will be as an overall picture of the solution and double-layer side of electrosorption as viewed by Bockris and his group in Pennsylvania. The book will be helpful for its references and as a guide to present knowledge of electrosorption. It is unfortunate that the price is high.

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Immunology

Germinal Centers in Immune Responses. Proceedings of a symposium, Bern, Switzerland, June 1966. H. COTTIER, N. ODARTCHENKO, R. SCHINDLER, and C. C. CONGDON, Eds. Springer-Verlag, New York, 1967. xvi + 499 pp., illus. $19.50.

As is noted in the introduction to this symposium, the study of germinal centers of lymphoid tissues has yielded a great deal of information in the last five to ten years, after a period during which much was said about these structures but little was known with reasonable certainty. During the era of speculation various functions were attributed to germinal centers, but all were disproven by further experiment. The participation of these centers in immunological responses has now been supported by numerous studies in various laboratories, however, and it is quite apparent that it can no longer be denied.

The bringing together of a distinguished group of investigators from several parts of the world for this first conference on the germinal centers in immune response was a timely and necessary undertaking. The publication that has resulted from the conference brings to investigators of immunological phenomena and of lymphoid function a wealth of contributions on various aspects of germinal-center function.

The book is divided into 18 sections, which deal with aspects of germinal-center function and structure ranging from the phylogenetic and ontogenetic development of the centers all the way to their role in neoplastic disease.

It is already apparent, from the initial contributions on the development of germinal centers, that the exposure of animals to environment, with its myriad of antigens, is important to the development of germinal centers and that—although no definite proof of this is offered in any of the contributions in this volume—these centers are therefore quite closely related to the development of immune responses. The excellent paper by Yoffey and Olson on the formation of germinal centers in lymph nodes goes a long way to clarify many ideas on germinal-center histology and histogenesis. Also of note is the group of contributions in which the ultrastructure of germinal-center cells is described. The active localization of antigen in and around germinal centers makes it appear that they are an important part of immune response. Whether this localization is more important in a primary response or in a secondary response is a question that is still under active investigation. The paper by Young and Friedman should be singled out for the very interesting technique it reports for demonstrating the presence of antibody in germinal centers. Young and Friedman's work is nicely supported by that of Pernis and of Burtin and Buffe. In fact, the entire section on antibody formation in germinal centers leaves one with little doubt that this is indeed a true and not an imagined phenomenon. Of course, there is still the open question of what happens to the cells that are formed in germinal centers and whether they migrate from the center or remain there; White points out well the importance of this problem. The turnover studies reported deal in detail with this question. Interesting data are presented on the kinetics of lymphoid cells within germinal centers and on the migration and death of the cells in immunized and in nonimmunized animals. Germinal-center cells appear to move freely in and out of centers, and antibody-forming cells which are contained in the centers may at later stages migrate out into cortical areas of lymph nodes of red pulp of the spleen. The book also deals at some length with the importance of germinal centers in another type of immune response, that related to delayed hypersensitivity. The examination of germ-free animals has revealed very few germinal centers, again pointing to the likelihood that germinal centers are involved in the development of responses to external antigenic stimuli.

In addition to the studies directly related to germinal-center structure and function, the book includes some papers that have to do with lymphoid structure and function in general. This combination is good, since the lymphoid tissue consists of several compartments intimately related to one another.

In summary, this is a well-organized, well-edited symposium which will be of great value in providing some answers but also in raising a large number of questions. One hopes these will be answered in future symposia of this kind.

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Limnology

The Biological Basis of Freshwater Fish Production. A symposium sponsored by the Sectional Committee on Productivity of Freshwater Communities of the International Biological Programme, Reading, England, Sept. 1966. SHELBY D. GERKING, Ed. Wiley, New York, 1967. xiv + 495 pp., illus. $15.

The limnologist deals with an alien world, the world of water, and perhaps the only methodological advantage he enjoys is that from the very beginning he has had access to a series of ready-made microcosms of graded size and complexity. Even though laboratory aquaria are not small fish ponds, fish ponds small impoundments, or impoundments small lakes (for each has its own peculiar characteristics), some general rules govern them all, and what the scientist finds out about one type of microcosm can be applied, with appropriate reservations, to the others. In addition, the common problems faced in working with water have encouraged the limnologist, the fish culturist, and the fisheries biologist to seek one another's help in both theoretical and practical matters. Any systematic study of freshwater fisheries is therefore likely to contain information of significance