I should like to suggest (i) that all scholars who know George Sarton's pioneering work will wish to acquire this convenient selection of some 23 of his important essays; (ii) that younger students of the history of science can learn much about their field—and about George Sarton—by carefully reading this volume; and (iii) that the time has come for qualified individuals who knew Sarton and who have access to both his published and unpublished writings to begin work on the aforementioned *Opera Omnia*. There is the George Sarton Memorial Foundation—an honor bestowed upon very few scholars—and this honor itself bespeaks the necessity for a full and accurate edition of his works—for George Sarton was the true "Father" of the History of Science in America.

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Liquid Electrical Insulation

Ions in Hydrocarbons. Andrew Gemant. Interscience (Wiley), New York, 1962. viii + 261 pp. Illus. $12.50.

According to the author's statement in the preface, this monograph represents an attempt to establish the electrochemistry of solutions in hydrocarbons. Both theoretical and experimental material is presented; emphasis is on experimental results, and especially on the author's work on the properties of model systems designed to reproduce some of the properties of insulating oils.

Insulating oils are an essential part of many cables, transformers, and capacitors; their efficiency as insulators is limited by their ionic conductivity. To date, the nature of the conducting species is not known, nor is their concentration or their origin. Gemant's carefully designed experiments represent a pioneering effort to understand the properties of these technically important materials. Where the monograph covers experimental results on model systems, the reader will find highly interesting and suggestive ideas. A number of analogies between synthetic and real systems have been found, but many differences persist. Gemant's frequent suggestions for further fundamental exploratory work constitute one of the valuable parts of the monograph.

The theoretical aspects of the presentation are not so satisfactory: errors, some serious, are made, and material is included which, in my opinion, is irrelevant. Some highly relevant material—such as the work of van der Minne, Garston, Sharbaugh, and others—is only mentioned in passing, or is omitted entirely. The treatment of the "hydrogen-silver" cell (pp. 29–30) is wrong, and implication that glass electrodes may be used to determine hydrogen ion concentrations in pure hydrocarbons is misleading. The corresponding experiments (chapter 6) were made on xylene containing ethanol (a proton acceptor); in pure hydrocarbons sulfonic acids are undissociated neutral molecules. The treatment of the carbonium ions of mechanistic organic chemistry may be cited as an example of irrelevant material; they are important in their own domain, of course, but it is unlikely that they can have much to do with electrical losses in real oils.

Despite these adverse criticisms, however, I recommend the book as a source of ideas to physical chemists who are seeking a new and interesting research field; as Gemant points out, the problems are difficult but intriguing and practical. Insulation engineers will find interesting analogs to some of their problems, and they may be encouraged to support more fundamental research in the electrochemistry of solutions in hydrocarbons.

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Vertebrate Paleontology

Problèmes Actuels de Paléontologie. Éditions du Centre National de la Recherche Scientifique, Paris, 1962. 475 pp. Illus. NF. 62.

Although it is called a colloquium and a symposium, this volume has no theme. It consists of 40 papers that were read at a meeting held in Paris during May and June 1961; the papers have no more in common than that most (even so, not all) of them deal with fossil vertebrates. Despite the title, concerted attention to general or theoretical problems of paleontology seems to have been consciously discouraged. The disparate contributions are all individually competent, and many are excellent. A quorum of European vertebrate paleontologists and two each from the Near East, Africa, and America reported on research they happened to have on hand at that time. Style and length vary from preliminary abstracts to finished technical papers. Subjects range from description of an anatomical detail to discussion of the basic evolution of a class and from agnaths to man.

It is impractical and would be of little general interest to review, or even to list, the individual papers. It must suffice to call the attention of vertebrate paleontologists to a publication in which each is likely to find a technical contribution near his own specialty. All papers, even those presented in English at the meeting, are published in French. The printing and paper are good, but the binding is execrable.

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Experimental Pathology

International Review of Experimental Pathology. vol. 1. G. W. Richter and M. A. Epstein, Eds. Academic Press, New York, 1962. x + 453 pp. Illus. $15.

This new serial publication is designed to provide "timely reviews on important problems of experimental pathology in its widest sense . . . reviews relating to the etiology, pathogenesis, and effects of diseases." The editorial board is composed of distinguished scientists from England, Sweden, Australia, Belgium, and the United States.

This first volume covers a variety of topics which are of both theoretical and practical interest. G. J. V. Nossal critically reviews the genetic control of lymphopoiesis, plasma cell formation, and antibody formation and concentrates on the antibody forming system. In "Arteriolar hyalinosis," by Pierre Dustin, Jr., historical considerations are emphasized rather heavily, but the current state of knowledge is well covered. Sergio A. Bencosme and B. J. Bergman describe the ultrastructure of human and experimental glomerular lesions. Perhaps in no other area has the electron microscope been

so useful clinically in aiding the understanding of human disease. The current status of the common cold viruses is summarized by D. A. J. Tyrrell. Janet Vaughan reviews, in considerable detail, bone disease induced by radiation and emphasizes the effects of internal radiation produced by bone-seeking radioactive elements. Cellular interactions in experimental histogenesis are considered thoughtfully by A. A. Moscona.

The topics covered in this volume clearly indicate the editors have wisely decided that experimental pathology indeed has wide limits. If subsequent volumes in the series continue in this concept, most life scientists will find the *International Review of Experimental Pathology* interesting and useful.

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Plasma Physics

Physics of Fully Ionized Gases. Lyman Spitzer, Jr. Interscience (Wiley), New York, 1962. xii + 170 pp. Illus. $4.75.

Spitzer's monograph was first published in 1956, and has become the most widely quoted reference in the field of plasma physics. Its popularity can probably be ascribed to the fact that the book was not only the first concise introduction to the field but also a convenient summary of the most important theoretical results available at that time. The last 6 years have seen an enormous increase in plasma research and, particularly since the controlled fusion effort both in this country and abroad was declassified, a vast amount of new material has been published. The growth of the subject and the advances in understanding are both reflected in this edition, which is 60 percent longer than the first edition.

The style again excels in economy of presentation, and some readers may find the derivations or explanations too sketchy. However, all important statements are adequately documented with reference to the pertinent literature so that the treatise still fulfills its primary purpose: a brief résumé of the field and a guide to further study for those who wish to delve more deeply.

The general arrangement of the material has not been greatly changed, and the monograph is still divided into five chapters. The first and the last chapters deal with single particle motion and with encounters between charged particles, respectively. Discussion of a few new topics—for example, synchrotron radiation and the most important theoretical improvements reported in the very recent literature—have expanded these chapters only slightly. The second chapter, in which the basic macroscopic features of plasmas are developed, combines, without much change, practically all of the subject matter that was distributed among the second and third chapters of the first edition. The discussion of the stress tensor has been improved, however, and a little more detail is given on the problem of diffusion across magnetic fields.

Major additions have been made to the treatment of waves (chapter 3 in this edition). In fact, the section represents an admirable summary of this very complex topic from a macroscopic point of view. It includes such nice features as "Allis diagrams" and a number of dispersion curves. Even phenomena like Landau damping and two-stream instabilities, which depend on velocity distributions rather than on macroscopic quantities, are briefly discussed in fairly simple terms. Finally, the problem of hydromagnetic equilibria and their stability has been added as an entirely new subject (in chapter 4). The treatment is again very brief, of course, and perhaps not altogether satisfying. But the principal methods of attack are at least indicated, and a few important examples are worked out.

It is probable that this second edition will retain for the monograph its place as the most popular publication in the field for many years to come.

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Epidemics and God's Justice

The Cholera Years. Chales E. Rosenberg. University of Chicago Press, Chicago, Ill., 1962 x + 257 pp. $5.95.

Charles Rosenberg, an assistant professor in the Departments of History and the History of Science at the University of Wisconsin, uses the story of three great cholera epidemics—1832, 1849, and 1866—as a means of exploring the development of medicine and its growing role in American society during the 19th century. To many Americans of that day, the epidemic of 1832 came as divine punishment, especially designed "to drain off the filth and scum which contaminate and defile human society." Physicians blamed a complex of predisposing and exciting causes, but intemperance, filthy habits, and other sins were cited as the most frequent cause of the disease. Medicine reinforced morals, strengthened the view that poverty was a sin, and gave comfort to the righteous. Public health efforts were largely confined to ineffectual quarantine, advice on personal habits, and emergency hospitals for the dying.

In 1849 Americans tended more to blame man rather than God, as the growing prestige of natural science challenged religious orthodoxy. But no effective means of control had been devised, and attempts to clean the nation's cities proved futile. Cholera still had a special affinity for the poor and depraved—terms that many considered nearly synonymous; the extreme suffering among recent Irish immigrants was seen as the natural result of their character, habits, and addiction to Roman Catholicism.

By 1866, medicine, primarily in the person of John Snow, had discovered that cholera was spread by the evacuations of the sick, and disinfection emerged as a rational preventive. A new board of health in New York City, a landmark in the history of public health, applied this theory and, with unprecedented energy, set about cleaning the city. The epidemic—whether for this reason or not—visited New York far more lightly than in the past; for the first time, public health efforts seemed effective, and cholera was now punishment for neglecting sanitary law. As the century progressed, cholera became a moral, not a social, problem.

In a way that is all too rarely done, Rosenberg has skillfully interwoven medical, social, and intellectual history to show how medicine and society interacted and changed during the 19th century. The history of medicine here takes its rightful place in the tapestry of human history.

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