

here and abroad to explore ways to lasting peace, American intellectuals and their government come off quite well. In no other land is an equivalent effort being made to explore the psychological, technical, and political methods by which we can reduce the possibility of thermonuclear war. In fact, the literature has grown so extensive and sophisticated that few but full-time professionals can keep abreast of it. Furthermore, many natural scientists and strategic specialists in the Pentagon, RAND-type organizations, the Arms Control Agency, and the White House are drawing upon this literature in the formulation of national policy. The movement toward an invulnerable deterrent, the attempt to achieve a nuclear test ban, and the announced decision to spare Soviet cities in the event thermonuclear war should occur are in large part attributable to the energies of these experts. Along with Osgood and Lapp, they too have been seeking alternatives to war or surrender.

Yet from the perspective of the continued precarious nature of the world situation, this effort is rightly judged inadequate. We have only begun to comprehend and meet the challenge posed by the continued advance of science and technology. And when we truly grasp the implications for international society, of the 20th-century scientific revolution, even the prescriptions of Osgood and Lapp may appear mild when set alongside the magnitude of the problem.

X-ray Diffraction

Diffuse X-ray Reflections from Crystals. W. A. Wooster. Oxford University Press, New York, 1962. xi + 200 pp. Illus. \$5.60.

The diffraction of x-rays from lattices has been under ever greater study during the past 50 years. The first years were concerned with the deduction of repeating atomic arrangements in, hopefully, nearly perfect crystalline materials. Occasional early notice was made of unusual diffuse effects on films and other detecting devices, and these observations have led to extensive studies of the diffuse scattering associated with the following effects: temperature motion of atoms, including the rotation, translation, and di-

lation of molecules; the disturbance of lattice perfection by substituting different atomic species (or order-disorder phenomena); the distortion of the lattice caused by atom substitution, vacancies, dislocations, and other imperfections; stacking faults and layering phenomena; precipitation phenomena; and large scale distortion of the lattice (like that associated with cold-working).

A book that covered this area would be of great value to students of the field and to many research workers who are interested in details of the phenomena which give rise to diffuse x-ray scattering.

Wooster has attempted in this book to remove the difficult-appearing relationship between a diffuse scattering effect and the lattice disturbance that causes it by utilizing the optical diffractometer and by a minimal use of mathematics. The optical diffractometer presents a simulated image of the expected diffuse scattering from two-dimensional arrays of holes which represent scattering centers and which have the desired type of imperfections or periodic distortions. The major portion of the book then gives, in complete experimental detail, the interpretation of thermal diffuse scattering, mostly as it is observed by film techniques. Examples of the determination of elastic constants and the spectra of elastic vibrations are given. The rest of the text consists of review chapters on diffuse effects from several structural imperfections—layer types, the effects of twinning in diamond, age-hardening, and order-disorder—and from molecular crystals.

To limit the subject matter, Wooster omitted consideration of diffuse scattering from gases, liquids, and amorphous solids and by the techniques of electron and neutron diffraction.

The many tables, charts, and corrective techniques for thermal, diffuse, scattering studies as well as the optical simulation of diffuse effects will be useful to young research students, the book's intended audience. The review chapters will aid those interested in further investigation of these interesting phenomena. But the content does not appear to have a sufficiently detailed theoretical basis nor to provide sufficient analysis of many of the phenomena to satisfy the advanced research worker or the technologist.

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Sarton's Essays

Sarton on the History of Science. Dorothy Stimson, Ed. Harvard University Press, Cambridge, Mass., 1962. xvi + 383 pp. \$10.

"The history of science should not be a refugium peccatorum; it is on the contrary a discipline which should attract the attention and the devotion of bold and adventurous spirits, hard workers and courageous pioneers" (p. 49). So spoke the late George Sarton in one of the most attractive essays in this selective reprinting of his multifarious writings. It reminds us, however inadequately—for Sarton was truly humble—of his own courageousness in the face of very real difficulties and deficiencies. It also serves to recall a memorable sentence written by his wise and perceptive daughter, in a recent article about George Sarton. May Sarton observed that her father was, "A man who moved with extraordinary freedom over the ages and the continents within a daily orbit as undeviating as that of any planet" [*The Texas Quarterly*, Autumn (1962)]. The singular truth of this statement will be apparent to the readers of these essays which range from Avicenna and Maimonides to Leonardo da Vinci and on to Sarton's (now quite famous) "Notes on the reviewing of learned books." How better could one describe this humane scholar whose principal mission was and always remained the demonstration of the unity of knowledge?

It is entirely fitting that Dorothy Stimson should select and edit this all too brief collection of essays. The selecting must necessarily have been most difficult. Although we are informed that most of the essays were chosen from a list of those that Sarton himself considered suitable for republication, the fact remains that his writings were so diverse in subject matter, so specialized at one moment and at the very next so universally applicable to scholarship in general, at once erudite (but not pedantic), yet at the next turn almost sentimental, that any brief selection inevitably fails to portray the full man and his accomplishments.

At the same time this selection (which has been skillfully handled) may serve to effect the most desirable end: to wit, the publication of Sarton's *Opera Omnia*. Nothing short of such a project can ever do justice to his immense scholarship.

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