

ments at one extreme or emotions at the other, may be properly considered intellectual at all—these are problems for other, better informed studies, and, unfair though it may be to say so, since Feuer is certainly provocative and provoking, these will perhaps be studies written from a more conventional and more generally credible point of view than that of psychoanalysis *post mortem*.

They will almost certainly also be studies that will treat the circumstances of science relative to its content.

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Crystal Lattice Defects

Proceedings of the International Conference on Crystal Lattice Defects.

Supplements 1, 2, and 3 of the *Journal of the Physical Society of Japan*. Physical Society of Japan, Tokyo, 1963. Suppl. 1, 201 pp.; Suppl. 2, 360 pp.; Suppl. 3, 379 pp. Illus. Paper.

The international conference on crystal lattice defects was divided into two parts, topically and geographically. The first part met in Tokyo to discuss the mechanical aspects of defects, and its proceedings are contained in Supplement 1. Of the 34 papers presented in that supplement, about half describe theoretical and experimental studies of the motion of dislocations and their role in determining the strength and age hardening of metals and nonmetals. The remainder consider the point defects that normally accompany dislocations and their effect on internal-friction measurements, with special emphasis on the Bordoni peak.

The second part of the conference was held in Kyoto and concerned itself with more general aspects of defects, not directly related to studies of mechanical behavior. As an indication of the breadth of this conference, consider the 71 papers in Supplement 2. They can be loosely grouped in the following categories: electrons and phonons, their origins and interactions with each other and with other defects; thermal conductivity; point defects, their formation, migration, and contribution to conductivity and their observation by magnetic resonance and optical methods; color centers and luminescence; observation of lattice de-

fects, mostly dislocations, by means of x-ray diffraction, field-ion microscopy, and other methods. The 72 papers in Supplement 3 are formally divided into two groups: (i) interactions between lattice defects, which contains 30 papers that are largely concerned with point defects and their role in various phenomena not already considered in Supplement 2, their interaction with dislocations, and a variety of topics ranging from crystal growth to dielectric relaxation measurements, and (ii) production and annealing of lattice defects, which contains 42 papers dealing with radiation damage in crystals, the defects produced and the methods for detecting these defects, as well as the phenomena that occur when damaged metals and nonmetals are annealed. As in other categories, various methods, materials, purposes, and end results are described.

The collected papers not only vary widely in content but also in the depth and breadth of coverage. Collectively, they accurately reflect our present knowledge of defects in crystals. Individually, they may or may not be sufficient to satisfy the reader's curiosity. If all the references cited are considered in evaluating this collection, however, then it can be recommended as worthwhile reading not only for the initiate but also for the neophyte. Even a casual examination is recommended, if only to illustrate the variety that exists in this field, less than three dozen years after its inception. The variety is particularly impressive when we realize that there exist other problems involving defects, problems that this conference did not consider.

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Sigma Xi-RESA Lectures

Science in Progress, vol. 13. Wallace R. Brode, Ed. Yale University Press, New Haven, Conn., 1963. xiv + 305 pp. Illus. \$7.50.

To the volumes of *Science in Progress*, the 12th of which was very recently reviewed in *Science* [140, 627 (1963)], may now be added the 13th volume. This collection of Sigma Xi-RESA lectures, again edited by Wallace R. Brode, contains the National Lectures delivered during 1961 and 1962.

A pleasant innovation is the inclu-

sion of Alan Waterman's address at the annual convention of the RESA, on the occasion of his receiving the William Procter Prize for Scientific Achievement. Waterman's account of science in the 1960's deals not only with the present, but reaches back into history, and, more importantly, looks penetratingly into the future, where new breakthroughs are surely just around the corner. Erwin R. Biel outlines some important practical applications of new (and to many, surprising) discoveries in the fields of microclimatology and bioclimatology. Norman F. Ransey discusses molecular properties, formerly unobservable in dense gases or in liquids, but now ascertainable by the use of the molecular beam-magnetic resonance method. Sydney Chapman's beautifully illustrated and poetic chapter deals with the aurora borealis produced by the partnership of sunstorms and the magnetic field that emanates from the liquid core of the earth.

Theodosius Dobzhansky faces the dilemma that results from the continued occurrence of mutations with harmful effects, on the one hand, and medical and social progress, on the other, and discusses the present action of selection on man. Culture is deemed by far the most potent adaptive mechanism that has emerged in the evolution of life, and man's success as a biological species is attributed to the fact that his culture is able to change ever so much faster than his genes can. Future evolution will be attuned to our human values. Lloyd M. Beidler emphasizes the fact that all organisms live in a chemical world, and that the detection of chemicals is an important necessity in many animals. He outlines our present knowledge of taste and offers new biophysical approaches to the study of this important chemical sense.

Jesse L. Greenstein takes us on a telescopic journey through enormous reaches of space and time and discusses, in a most understandable way, the evolution of stars and the origin of the elements. Sanborn Brown introduces us to the newly appreciated state of matter—the plasma state—and acquaints us with its implications. Many scientific problems that arise from this recently acquired knowledge are outlined, including the very practical problem of controlling and harnessing the power of thermonuclear fusion.

Harrison Brown reminds us that the invention of agriculture, which oc-

curred several thousands years ago, made an enormous change in the mode of life of people, and he draws a parallel between that change and the current change being wrought by the rapid upsurge of science and technology. Brown discusses some of the major problems that result from the change—for example, the possibility of nuclear war, the necessity for the economic development of vast underdeveloped areas of the world, and the rapid dwindling of our natural resources. The role of the government in the attempts to solve such problems is the central theme of the lecture, which was the Sigma Xi-Phi Beta Kappa lecture presented at the annual meeting of the AAAS in 1961.

Wallace R. Brode completes the volume with a special article written in recognition of the 75th anniversary of the Society of the Sigma Xi, of which he was then the national president. Brode's discussion of the growth of science and the development of a National Science Program complements nicely the chapter by Brown.

One lecture is missing from the volume—that by Donald W. Taylor on psychological studies of thinking. Hopefully it will form a part of the next volume in the series.

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Principles and Applications

Electrochemistry. Theoretical principles and practical applications. Giulio Milazzo. Translated from the Italian manuscript by J. P. Hill. Elsevier, New York, 1963. xvi + 708 pp. Illus. \$20.

That the Italian and German editions of this book were successful is not surprising in view of the curious dearth, in recent times and in most languages, of reasonably complete accounts of theoretical and applied electrochemistry. Milazzo's book, practically unaided, can satisfy the needs of many individuals: students who are preparing for examinations that touch on electrochemistry in one way or another, teachers who want material for a few lectures (supplements to a course in physical chemistry), laboratory workers who want data for immediate use at the bench, and plant technicians who are looking for some point in industrial

electrochemistry or for a remedy to a case of corrosion. The book is a mine of information, and, in the discussion of several subjects, the author has been effectively helped by specialists (seven of them are listed as coauthors).

This translation, which is very literal, was made from a completely rewritten Italian version, and it introduces, for the first time in a modern English textbook, the language of tensions—electrochemical, electric, chemical, and even over tensions (but Faraday and others have already spoken of electric tensions!)—recommended by the International Committee of Electrochemical Thermodynamics and Kinetics (CITCE) and submitted to the International Union of Pure and Applied Chemistry (IUPAC). However, references are not given to the published CITCE reports.

The portion of the book that deals with electrolytes is avowedly very condensed, but occasionally it is also old-fashioned—for instance, too much emphasis is placed on the Arrhenius theory of degrees of dissociation. The presentation of electrode kinetics is more up-to-date and that of various electroanalytical applications—polarography, electrokinetic phenomena, and the like—constitutes a useful survey of the present state of these rapidly developing areas. The last six chapters (in a total of 12) give a particularly thorough description of industrial processes, on a truly international scale: general considerations on electrochemical plants; electrometallurgy in aqueous solutions (with a special section on corrosion); electrolysis of alkali halides; other non-metallurgical processes; electrolysis in molten electrolytes, practical primary cells, and storage batteries; and electrochemistry of gases.

The author and the translator deserved better editorial help. Notations are not always consistent: the *I* versus *J* distinction between current and current density is not always observed, and it is needlessly bewildering; a 0.239 unit conversion coefficient in the Nernst equation appears in several portions of the book but not in others, and it should never have been used. The subject-author index is deficient in both respects, woefully so with respect to authors. The book is rich in references to some topics, poor in others, but the names of only a few authors have gained access to the index. Sources are seldom indicated for the very useful and numerous tables of data. The book

is very attractively printed on excellent lightweight paper.

There is no question about the overall usefulness of this book, and Milazzo should be commended for the tremendous effort he has put in its preparation. The perfect textbook of electrochemistry remains to be written; perhaps, with proper editing and careful revision, Milazzo's book might constitute the core of that badly needed paragon.

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Physical Anthropology

Anthropology A to Z. Carleton S. Coon and Edward E. Hunt, Jr., Eds. Translated from the German by Hans Gunthardt. Grosset and Dunlap, New York, 1963. viii + 277 pp. Illus. Paper, \$2.50; cloth, \$4.75.

This work, a translated, adapted, and updated version of *Anthropologie*, a volume in the Fischer Lexikon series published in Germany in 1959, is here presented as a volume in the paperback Universal Reference Library, published by Grosset and Dunlap. It is described as based on the work of Gerhard Heberer, Gottfried Kurth, and Ilse Schwidetzky-Roesing, but one senses some very considerable contributions by the editors.

The reader should be warned that, although some cultural aspects are treated, anthropology as here used must be interpreted in the German sense, and that the entire volume is oriented to the field of physical anthropology. Even the 15-page section on cultural anthropology has a strong biological slant.

The arrangement of the 19 articles in alphabetic order (the "A to Z" of the title) makes for a rather choppy presentation of major topics. Thus, "The concept of race," "The formation of races," "Genetics and race," "The history of races," and "Racial psychology" appear as disconnected units in different parts of the volume; "The descent of man" and "Paleoanthropology" are widely separated. The lack of a table of contents for the articles is inconvenient, but the reader can easily construct one for himself, on the page opposite the flyleaf. On the other hand, a very thorough 24-page