insulin in solution. There are several chapters dealing with insulin-receptor interactions and the metabolic events affected by the activated receptor. The final section consists of an analysis of the actions of insulin on the metabolism of glycogen, lipids, and protein. It is probable that the most important recent developments in the field have emanated from the laboratory of Cuatrecasas. His contribution is an informative summary of his outstanding work on the identification and characterization of the insulin receptor.

Clearly the greatest strength of this volume lies in the 90 pages of questions and answers. This was a small symposium and it appears that the discussion was lively. It was recorded and skillfully edited by Fritz. This exchange of ideas among many of the established investigators in the field is informative and interesting and of a sort not available in standard scientific journals.

Aside from the repetitious nature of many of the data, there are two other features of this book that are unattractive. First, in contrast to the other contributions, that by Cuatrecasas is written with a distracting lack of modesty. It would appear that the concept of a peptide hormone receptor, the experimental approach used in studying the properties of receptors, and virtually all of the relevant work in the field are due to the author and his colleagues. In the opinion of this reviewer such is not the case. Second, the chairman at one or two points attempts to direct the course of the discussion by emphasizing areas of disagreement between the participants. Although it is obvious that differences need to be resolved, this is usually achieved by a systematic and impersonal study of the published data rather than by having "a hot exchange" during the discussion period. The latter is entertaining for the audience but, in general, scientifically unproductive.

The book is a valuable collection of data and opinions which document the status of our understanding of the mechanism of the action of insulin 50 years after its discovery. Every scientific library and every insulinologist should have a copy.

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Matters of Technique

Electron Microscopy in Material Science. A NATO Advanced Study Institute, Erice, Italy, Apr. 1971. U. VALDRÈ, Ed. Academic Press, New York, 1971. xxiv, 758 pp., illus. $35.

Electron Microscopy and Structure of Materials. A symposium, Berkeley, Calif., Sept. 1971. GARETH THOMAS, RICHARD M. FULRATH, and ROBERT M. FISHER, Eds. University of California Press, Berkeley, 1972. xiv, 1292 pp., illus. $28.50.

Electron Microscopy in Material Science contains a collection of lectures, presumably since expanded, given by 18 contributors at the 1970 International School of Electron Microscopy. Unfortunately, some of the chapters, such as those on the transfer of image information and phase contrast, appear to be written by experts for experts and fall short of the first objective of the school: "to bring scientists up to date with a refresher course on the latest developments in conventional and nonconventional electron microscopy." The experts will be pleased to find conveniently accessible, in English, and handled in a masterly fashion with good illustration, much of the advanced information scattered in the literature.

Goringe aptly points out in his chapter on computing methods that half the information available in the electron microscope beam is usually lost in the recording process, where phase relationships are removed and only intensities recorded. Since lattice fringe images use the phase relationships to provide information, it was surprising to find only one page in the book on this subject and this in a chapter on typical problems in electron microscopy with worked examples, written by Goringe and Hall. Other forms of phase contrast are extensively covered.

The book is perhaps at its best when it gets down to the experimental level, as in Brown's candid comments, in his very readable chapter on metallurgical information from electron micrographs, on the measurement of particle size in the case of oxide dispersions in copper and on the pitfalls thereof. As those of us who have built and operated special specimen stages for the electron microscope well know, there is much wizardry involved. The chapter on special electron microscope stages by Valdrè and Goringe is valuable.

Crewe's account of high intensity electron sources and scanning electron microscopy and his comments on the possibility of resolving atoms make interesting reading in the light of his subsequent success. For those of us without high intensity sources, image intensification is of considerable interest, and the authoritative account of the status of development in Siemens A.G. Laboratories by Hermann *et al.* is welcome.

The vital role of electron microscopy in the study of radiation damage emphasized by Hirsch in his stimulating opening lecture is brought out fully in the capable review by Makin. Castaing's chapter on secondary ion microanalysis and energy-selecting electron microscopy is a comprehensive account of his own work and that of his students and reflects their important contributions.

The second purpose of the school, namely, to favor contacts between instrument designers, experts in electron diffraction and contrast theory, and users of electron microscopes, accounts for the inclusion of comprehensive chapters on geometrical optics and problems therein by Septier and on the theory and application of electron diffraction to image contrast by Howie and Gevers.

The third purpose of the school and thus presumably of the book was "to stimulate discussions on specialized topics which are likely to bring fundamental improvements in electron microscopy." No account of any Erice discussions is given in the book and it hardly seems likely that the book will stir up any great discussions, particularly two years after the conference.

Many of the papers are tough. Though the ordinary research worker will be able to make use of them, this is not a book he will be able or will want to read from cover to cover, and few will want to pay the additional cost of much that they will never use. This suggests that it would have been more appropriate to publish the proceedings as three small (cheap?) books covering electron optics and instrumentation, diffraction contrast and applications, and transfer of image information and phase contrast, respectively. The absence of an index is deplorable.

Electron Microscopy and Structure of Materials consists of photographically reproduced typescripts of papers that were presented at a 1971 symposium, together with discussion. The papers are typically ten pages in length, with a few longer, which makes for a very large book. Fortunately, here both subject and author indexes are provided.

The book is a mine of up-to-date information on electron optical technique advances (one-quarter) and applications to current problems in materials science and engineering (three-quarters). Applications are broadly concerned with interfaces, plastic deformation, ferrous alloys, composites, environmental effects, radiation damage, ceramics, and nonmetals.

High-voltage electron microscopy is covered extensively by numerous contributors from the technique standpoint and is also in evidence in the applications. Here Swann's work with environmental stages is particularly noteworthy and gives in situ micrographs showing the reduction of hematite. Electron damage in Cu, Ni, Al, and graphite is covered in interesting articles by several authors. Wolfenden *et al.* review the general features of neutron irradiation swelling in structural materials, making clear the important contribution of electron microscopy.

The use of the multibeam electron microscope technique to image the unit cell is proving a powerful means of looking at defect structures (Wadsley defects) in nonstoichiometric oxide crystals. The work of Allpress and collaborators at CSIRO in Melbourne has received little attention from metallurgists and materials scientists, and it is refreshing to see a paper on the so-called solid solutions of WO_3 and TiO_2 in Nb_2O_5 in this volume.

"Tweed" structures in certain precipitation alloys, such as Cu-Be, when aged at low temperature have remained something of a mystery. Interpretation of these structures as strain contrast effects is further clarified in the paper by Fillingham, Leamy, and Tanner, who have simulated the main features of such images in the computer on rather simple models of elastically isotropic crystals containing dense nonrandom arrays of precipitates.

Electron analyzing and energy selecting microscopy is still in the formative stage of technique development. Silcox and Vincent present encouraging preliminary results obtained on the equipment developed at Cornell University. This uses a Wien analyzer.

Both the principles and applications of electron channeling patterns obtained with the scanning electron microscope are thoroughly covered in papers by Schulson and by Stickler and Booker. The latter used the "rocking beam" technique to obtain selected area patterns from regions down to 5-μm diameter by a depth of a few hundred angstroms.

The value of scanning electron microscopy and transmission electron microscopy in the semiconductor industry is particularly well brought out in the review by Meieran and Cass. Rudee obtained dark-field electron microscopic evidence of the existence of 15- to 20-Å-diameter ordered domains in amorphous Ge and Si films.

Important advances are reported for nonmetals on the characterization of microstructures, for example, in carbides and nitrides of vanadium, titanium, and niobium by Lewis *et al.* and in boron-doped vanadium carbide by Hollox *et al.*, who observed planar precipitation.

Activity continues in the composite field in a wide variety of materials. The work on a new family of glass-ceramics by Chyung *et al.* of Corning Glass Works is of particular interest. The microstructure consists of two-dimensional mica crystals in a glass matrix. The dispersion of easily cleavable flakes confers machinability, although the matrix is brittle. The flakes can be regarded as built-in cracks but also act as crack stoppers, thus increasing the fracture energy. Altogether a fascinating situation.

This book has something to offer almost everybody concerned with recent advances in knowledge of the structure of materials, and deserves a place on many bookshelves.

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New Books Received

Advances in Aerosol Physics. No. 1. V. A. Fedoseev, Ed. Translated from the Russian edition (Kiev, 1969). Israel Program for Scientific Translations, Jerusalem, 1971 (U.S. distributor, Halsted [Wiley], New York). vi, 170 pp., illus. $15.

Advances in Enzymology and Related Areas of Molecular Biology. Vol. 36. Alton Meister, Ed. Interscience (Wiley), New York, 1972. viii, 374 pp., illus. $15.95.

Animal Behavior. John Paul Scott. University of Chicago Press, Chicago, ed. 2, 1972. xii, 282 pp., illus. Cloth, $12.50; paper, $3.25. The College Library of Biological Sciences.

Bird Ambulance. Arline Thomas. Scribner, New York, 1972. x, 132 pp., illus. Paper, $2.65. Reprint of the 1971 edition.

Boiling Crisis and Critical Heat Flux. L. S. Tong. U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1972 (available as TID-25887 from the National Technical Information Service, Springfield, Va.). viii, 84 pp., illus. Paper, $3. AEC Critical Review Series.

Bridged Free Radicals. Leonard Kaplan. Dekker, New York, 1972. xviii, 482 pp., illus. $24.50.

Carbon-Fluorine Compounds. Chemistry, Biochemistry and Biological Activities. A symposium, London, Sept. 1971. North-Holland, Amsterdam; Elsevier, New York, 1972. viii, 418 pp., illus. $18.75. A Ciba Foundation Symposium.

Cervical Pain. Proceedings of a symposium, Stockholm, Jan. 1971. Carl Hirsch and Yngve Zotterman, Eds. Pergamon, New York, 1972. x, 221 pp., illus. $21. Wenner-Gren Center International Symposium Series, vol. 19.

Chambers Shorter Six-Figure Mathematical Tables. L. J. Comrie. Wiley, New York, 1972. xxvi, 390 pp. $5.95.

Comprehensive Biochemistry. Marcel Florkin and Elmer H. Stotz, Eds. Vol. 30, A History of Biochemistry. Part 1, Proto-Biochemistry. Part 2, From Proto-Biochemistry to Biochemistry. Marcel Florkin. Elsevier, New York, 1972. xviii, 344 pp., illus. $27.75.

Conserving Life on Earth. David W. Ehrenfeld. Oxford University Press, New York, 1972, xx, 360 pp., illus. $10. Revision of *Biological Conservation*, 1970.

The Determination of Hydroxyl Groups. Stig Veibel. Academic Press, New York, 1972. xviii, 160 pp., illus. $10.50 The Analysis of Organic Materials.

Drugs in American Society. Erich Goode. Knopf, New York, 1972. x, 262 pp. Paper, $2.95. A Borzoi Book.

Dynamic Behavior of Processes. John C. Friedly. Prentice-Hall, Englewood Cliffs, N.J. 1972. xvi, 590 pp., illus. $18.95. Prentice-Hall International Series in the Physical and Chemical Engineering Sciences.

Dynamics of Fluids in Porous Media. Jacob Bear. Elsevier, New York, 1972. xxii, 764 pp., illus. $28. Environmental Science Series.

The Earth and Man. Rand McNally, New York, 1972. 440 pp., illus. $35.

Electromagnetic Fields, Energy, and Waves. Leonard M. Magid. Wiley, New York, 1972. xvi, 782 pp., illus. $16.95.

Environmental Quality and Social Responsibility. Proceedings of a symposium, Green Bay, Wis., Apr. 1971. Ravindra S. Khare, James W. Kolka, and Carol A. Pollis, Eds. University of Wisconsin, Green Bay, 1972. xiv, 220 pp. Paper, $3.50.

Enzyme Engineering. Papers from conferences, Henniker, N.H., Aug. 1971, and San Francisco, Dec. 1971. Lemuel B. Wingard, Jr., Ed. Interscience (Wiley), New York, 1972. xiv, 416 pp., illus. $12.50. Biotechnology and Bioengineering Symposium No. 3.

Essentials of Meteorology. D. H. McIntosh and A. S. Thom. Wykeham, London; Springer-Verlag, New York, 1972. xvi, 240 pp., illus. $7.50. Wykeham Science Series.

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