

drate bonding in plants, and the uses of commercial lignin products.

The author's familiarity with and attention to both the scientific and technological accomplishments in this difficult field will make his volume useful not only as a reference work but as a textbook; it should be appreciated by lignin investigators in both the academic and industrial spheres.

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Parts and Wholes in Biology

Molecular Organization and Biological Function. JOHN M. ALLEN, Ed. Harper and Row, New York, 1966. 255 pp., illus. Cloth, \$9; paper, \$5.

This multi-author volume contains eight essays which were presented as a lecture series at the University of Michigan in the spring of 1965. Thus from the start the reader faces the two-fold disadvantage of a substantial publication lag (which is of considerable significance for some of the fast-moving areas reviewed here) and the discontinuities in style, approach, and orientation which often afflict books written by several authors. Moreover, similar treatments of the same subjects, often by the same authors, have appeared elsewhere. So why this book? In my opinion its chief value lies in the collection of these essays into one small volume which can be read as a unit. For the "vertical sectioning" of molecular biology which this book as a whole represents drives home forcefully the basic notion that while cellular organelles and structures are made of molecules, the functions of these multimolecular structures are often much more than the sum of their unorganized molecular parts. Yet it is also clear that the parts contain within them the implicit interaction potentials needed to bring about, under appropriate conditions of environment and perhaps sequential availability of components, the self-assembly of the whole into a functional array.

This theme is clearly stated in the editor's preface and can be traced through the book by the appropriately oriented reader. The book opens with a discussion by Anfinsen on the "self-structuring" of protein conformations on the basis of information contained in the amino acid sequence, followed

by a review by Rich on the mechanisms whereby the nucleotide triplets of DNA are transcribed onto messenger RNA and then translated into sequenced polypeptide chains. Anderson then deals with the simplest type of multimolecular self-assembled system, represented by the bacteriophage, in which the whole is already much more than the sum of its parts. From here things become progressively more complex, and these complications correlate (of necessity) with a progressive loss of focus on the details of the molecular structure which is presumably responsible for the ever more complex edifices described: first Robertson on cell membranes, then Lehninger on mitochondria, Bogorad on chloroplasts, Dowling on visual receptors, and Gibbons on cilia and flagella.

The chapters are uniformly well written and profusely illustrated and provide something of value for each reader, be he a beginning student just becoming acquainted with molecular biology or a full-time research worker in one of the fields under discussion. However, it is likely that only the latter class of readers will be able to wring dry some of the more complex chapters.

But I hope that most readers will go through the entire book, for only in this way does the impact implicit in its organization come through. Both students and practicing investigators whose major interests fall on various parts of the spectrum of complexity presented here should be impressed and sobered: the molecular people with what an incredibly delicate balance of forces must be sorted out to "explain" the self-assembly of the complex structures from their constituent macromolecular parts, and the morphological people with the many levels of interacting organization which still remain to be fathomed before the beautiful structures they look at can be considered to be "understood."

It is a pity that even the paperbacked version of this book is expensive, since it is the sort of work that, if read by students, could help prevent the development and hardening of the "black boxes" which are often built around certain areas of subject matter as a consequence of the "horizontal" organization of many of our classical courses and research disciplines.

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Books Received

The Absorbent Mind. Maria Montessori. Translated from the Italian by Claude A. Claremont. Holt, Rinehart and Winston, New York, 1967. 318 pp. Illus. \$6.95.

Advances in Chromatography. vol. 4. J. Calvin Giddings and Roy A. Keller, Eds. Dekker, New York, 1967. 394 pp. Illus. \$16.50. Seven papers.

Analytical Chemistry of Plutonium. M. S. Milyukova, N. I. Gusev, I. G. Sentyurin, and I. S. Sklyarenko. Translated from the Russian edition (Moscow, 1965) by J. Schmorak. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1967. 383 pp. Illus. \$21.

Applied General Statistics. Frederick E. Croxton, Dudley J. Cowden, and Sidney Klein. Prentice-Hall, Englewood Cliffs, N.J., ed. 3, 1967. 774 pp. Illus. \$10.

Archaeology: An Illustrated Introduction. Liam de Paor. Penguin Books, Baltimore, 1967. 111 pp. Illus. Paper, \$1.45.

Biology of Invertebrata. James H. Wilmoth. Prentice-Hall, Englewood Cliffs, N.J., 1967. 479 pp. Illus. \$12.

Building Structures Primer. James E. Ambrose. Wiley, New York, 1967. 133 pp. Illus. \$7.95.

Calculus. Michael Spivak. Benjamin, New York, 1967. 598 pp. Illus. \$12.90.

Cataclysms of the Earth. High Auchincloss Brown. Twayne, New York, 1967. 287 pp. Illus. \$6.

The Chemistry of Organometallic Compounds: The Main Group Elements. John J. Eisch. Macmillan, New York, 1967. 192 pp. Illus. \$5.95.

Chemistry of Solids. Andrew K. Galwey. Chapman and Hall, London; Barnes and Noble, New York, 1967. 220 pp. Illus. Paper, \$5.50; cloth, \$9.

Chemistry of the Earth's Crust. vol. 2. Proceedings of the Geochemical Conference commemorating the centenary of V. I. Vernadskii's birth. Translated from the Russian edition (Moscow, 1964) by N. Kaner. R. Amols, Translation Ed. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1967. 715 pp. Illus. \$25. Fifty-one papers.

Le Chloroplaste: Croissance et Vieillesse. C. Sironval, Ed. Masson, Paris, 1967. 365 pp. Illus. Paper, 75 F.

The Computer in American Education. A conference (Stanford, Calif.), November 1965. Sponsored by the Association for Educational Data Systems and the Stanford School of Education. Don D. Bushnell and Dwight W. Allen, Eds. Wiley, New York, 1967. 330 pp. Paper, \$3.95; cloth, \$5.95. Nineteen papers.

Concepts and the Structure of Memory. A symposium (Pittsburgh, Pa.), April 1966. Benjamin Kleinmuntz, Ed. Wiley, New York, 1967. 300 pp. Illus. \$7.95. Eleven papers.

The Conquest of Epidemic Disease: A Chapter in the History of Ideas. Charles-Edward Amory Winslow. Hafner, New York, 1967. 425 pp. \$9.50. Reprint, 1943 edition.

The Corrosion of Light Metals. Hugh P. Godard, W. B. Jepson, M. R. Bothe-well, and Robert L. Kane. Wiley, New York, 1967. 372 pp. Illus. \$13.95. The Corrosion Monograph Series.

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