Book Reviews

Analytical Cytology. Methods for studying cellular form and function. Robert C. Mellors, Ed. Blakiston Div., McGraw-Hill, New York–London, 1955. xi + 511 pp. Illus. $15.

Acquaintance with most of the nine topics covered in this textbook is essential to an appreciation of modern cytological research. Subtitled "Newer methods for studying cellular form and function," the subjects under the heading "Optical spectral region" are "Cytophotometry" by A. W. Pollister and L. Ornstein, 67 pages, 127 references; "Histochemical staining" by A. B. Novikoff, 48 pages, 354 references; "Phase-contrast, interference-contrast and polarizing microscopy" by R. Barer, 87 pages, 171 references; "Ultraviolet microspectroscopy" by J. I. Nurnberger, 37 pages, 158 references; and "Fluorescence microscopy" by O. W. Richards, 28 pages, 208 references. Under methods using other forms of radiation are "Electron microscopy" by C. C. Selby, 67 pages, 190 references; "Radioautography" by P. J. Fitzgerald, 43 pages, 89 references; "Historadiography" by A. Engström, 26 pages, 51 references; and "X-ray diffraction" by G. Oster, 20 pages, 46 references.

Written for biologists, these presentations of principles and methods have a minimum of physical and mathematical formulation. The topics closest to classical cytology (and with the greatest current numbers of publications) are presented in greatest detail, with the treatment of x-ray diffraction reduced to elementary principles. Originally covering developments through 1952, the manuscripts have been revised immediately prior to publication to include outstanding work into 1955.

A particularly lucid account of the theory and practice of phase and interference microscopy is presented by Barer with the aid of simple geometry. Microspectrophotometry is dealt with in two sections with emphasis (for the visual) on practical details by Pollister and Ornstein, and (for the ultraviolet) with an objective critical evaluation of principles by Nurnberger. After a brief statement on methods in electron microscopy, Selby gives a valuable summary of the major morphological findings on tissue cells. Most of the remaining subjects have been presented earlier in monograph or review form; but, in addition to the convenience of their collection in one volume, the work of the editor can be admired for scaling the length of individual presentations and their technical level to meet the interests and capacities of a wide biological audience.

WILLIAM L. DOYLE
Department of Anatomy, University of Chicago

Studies of Biosynthesis of Escherichia coli. Publication 607. Richard B. Roberts, Dean B. Cowie, Philip H. Abelson, Ellis T. Bolton, and Roy J. Britten. Carnegie Institution of Washington, Washington, D.C., 1955. xiv + 521 pp. Illus. Paper, $2.50; cloth, $3.

This is a rather unique book. It reports the studies of one laboratory on primarily one strain of bacteria, *E. coli* B. There are occasional studies for comparative purposes on yeasts, *Neurospora,* and sometimes *Chlorella.* About 10 percent of the book is devoted to the general methods, particularly to those involving radioactive tracers. This is followed by a section on permeability of the cell wall, first to inorganic ions, then to organic substances.

From the distribution of the isotopes, it is concluded that not only inorganic ions are easily diffusible but every organic compound used, including glucose-1-phosphate and fructose-1,6-diphosphate. This conclusion that the cell wall is unable to exclude small molecules leads to the supposition that the cell wall is a mere morphological boundary and that the protoplasm is in direct contact with the environment. This is curious, since a variety of other studies would have led one to suppose differently. *E. coli* is shown to be capable of incorporating CO_2 into the aspartic-glutamic system, arginine, purines, and pyrimidines; acetate into lipids, leucine, and the Krebs cycle. Similarly paths are traced for glucose, amino acids, formate, formaldehyde, and so forth. This material occupies possibly half of the book, some of it scattered throughout.

The authors then attempt, with a good degree of success, to integrate this information. There are discussions of variations in metabolism caused by adaptation to different energy sources, and there is a study of extracellular products of metabolism. There are detailed discussions of the role of the Krebs cycle, the synthesis of the glutamic-aspartic families of amino acids (in which proline, arginine, lysine, homoserine, threonine, methionine, and isoleucine are included), the syntheses of other amino acids, complete with charming family pictures (the aromatics, the pyruvic family, and the serine family). There is a long and fascinating section on nucleic acid synthesis and perhaps too long a section on sulfur metabolism. This is followed by a chapter on the mechanism of isotopic competition, and then by a masterly summary, particularly from the kinetic viewpoint. There is an extensive, pertinent bibliography attached.

Aside from detailed and intricate metabolic pathways, it appears that in attempting to explain why compounds supplied externally do not behave identically with those formed by the cell, the important conclusion is reached that the endogenous compounds are not indeed identical with the external material (the acetyl coA and acetate system being a model) and that this applies to virtually all the materials studied. Although this is not an exactly new concept, it is here clearly formulated, experimentally supported, and extended to include substances not usually considered in this light. This is a stimulating and valuable book, a careful and detailed experimental consideration of a limited area *E. coli* B, which may indeed prove large enough at that.

WAYNE W. UMBREIT
Department of Enzyme Chemistry, Merck Institute for Therapeutic Research

Mechanisms of Microbial Pathogenicity. Fifth symposium of the Society for General Microbiology. J. W. Howie and A. J. O'Hea, Eds. Cambridge Univ. Press, New York, 1955. x + 333 pp. $5.

The 16 papers by British and American authors in this fifth symposium of the Society for General Microbiology constitute an impressive compilation of ideas on the disease-producing capacities of selected bacteria, protozoans, and fungi that infect man, animals and plants. The breadth of the area covered is great, but bringing together data and ideas from fields that are related but commonly held at arms length (for example, bacteriology and protozoology)