Plant Organelles

The Plastids. Their Chemistry, Structure, Growth and Inheritance. JOHN T. O. KIRK and RICHARD A. E. TILNEY-BASSETT. Freeman, San Francisco, 1967. 624 pp., illus. $17.50.

Because of the great achievements of biochemists in the laboratory as well as in publicity, most readers will equate *plastids* with *chloroplasts*, and the latter they will probably characterize as the containers for the enzymes and pigments of photosynthesis. However, the last few years have witnessed an increased interest in and emphasis on the many other aspects of the life and functions of these cellular organelles. The photosynthetic chloroplasts are only one of the types of plastids which are found in plant cells. Other plastids develop into structures with different biochemical properties. The biochemical riches of the plant kingdom in food substances and pigments are probably due to the specialization and evolution of the synthetic potentials of the plastids.

The authors of this book have undertaken to present an appraisal of the entire field of the biology of the plastids. We can gain an insight into the breadth of this field from the fact that of the close to 600 text pages of the book, only about one dozen are devoted to the process of photosynthesis as such.

The authors have done an admirable job of assembling data and of summarizing the present state of this exciting field of cell biology. The areas of active research which are extensively covered include studies on the reproduction, development, and differentiation of the organelles. The phenotypic and genotypic controls over the plastids are of special interest at present, and they are given extensive and detailed discussion ranging all the way from classical genetics studies to molecular details of the genetic-apparatus of the organelles. Implications of these studies are most relevant to studies of differentiation of all multicellular organisms, both plants and animals.

One of the most important contributions of this book is that it brings together, in a rather clear account, the German literature on the genetics of plastids of higher plants. This part of the book will be greatly appreciated by English-speaking graduate students.

I found the extensive subdivision and subtitling throughout the book somewhat distracting. Also, the division of the subjects covered by the two authors makes for a rather uneven and somewhat arbitrary organization. For example, the part of the book devoted to inheritance and genetics of plastids includes studies of higher plants only. Studies on the inheritance of mutations which affect the chloroplasts of *Chlamydomonas* are treated in the section concerned with the specific biochemical consequences of these mutations.

But these are minor defects in a generally well-presented and timely contribution. This book with its wealth of assembled information can, in addition to being a handy reference for the specialist, admirably serve to introduce advanced students to the field. In summarizing our present knowledge in this field, the authors do not fail to call our attention to the extent of our ignorance. The book will stimulate many new investigations and thus will undoubtedly contribute to its own obsolescence.

AHARON GIBOR
Department of Biological Sciences, University of California, Santa Barbara

Problems in Embryology

The Biochemistry of Animal Development. Vol. 2, Biochemical Control Mechanisms and Adaptations in Development. RUDOLF WEBER, Ed. Academic Press, New York, 1967. 495 pp., illus. $21.

The goal of biochemical embryology has been to elucidate the chemistry of developing systems and to determine the role that biochemical reactions play in developmental processes. A wide variety of approaches and rationales have been applied to the study of developmental problems. The success of these endeavors and the state of knowledge are well illustrated in the present volume.

Rather than undertaking the mammoth task of compiling a comprehensive review of the vast literature of developmental biology, the contributors deal with selected problems that are currently receiving much attention.

The material is presented in nine review articles. The first part of the book is concerned with biochemical control mechanisms in development processes and contains articles on primary induction and determination, metabolic control of growth and differentiation, nucleo-cytoplasmic interactions, sex differentiation, amphibian metamorphosis, and regeneration. The second part deals with adaptations in embryonic development and discusses yolk utilization, mammalian placenta, and nitrogen metabolism and excretion.

For the most part the articles are well organized, are easy to read, and adequately referenced. The material is cross-indexed according to author, animal species, and subject matter. In general, the topics treated are representative of the problems in the selected areas. As in most works of this kind, there are some disappointing disparities of coverage and critical comment. Even so, the diligent reader will find ready entrance to the original literature through the list of references included at the end of each article. The present volume, along with volume 1 of the work, will therefore serve as a useful reference source and an adequate introduction to the kinds of biochemical studies that have been made on developing systems.

These articles are essentially progress reports; they give no definitive answers to the basic questions of the biochemistry of development. As the editor writes in his preface, "Although the amount of information available on biochemical events of development is impressive indeed, it remains for future experimentation to help translate the classic concepts derived from experimental embryology into adequate molecular terms." As I see it, the primary value of *The Biochemistry of Animal Development* is that it points up, as no other recent work of my acquaintance has, the primitive and fragmentary state of fundamental biochemical knowledge in developmental biology.

J. DOUGLAS CASTON
Department of Anatomy, Western Reserve University, Cleveland, Ohio

Mathematical Procedure

Numerical Inversion of the Laplace Transform. Applications to Biology, Economics, Engineering, and Physics. RICHARD BELLMAN, ROBERT E. KALABA, and JO ANN LOCKETT. Elsevier, New York, 1966. 259 pp., illus. $8.50.

The authors' stated purpose in writing this book is to advance the point of view that many problems which take the form of equations can be solved numerically by means of the intermediary use of the Laplace trans-

form. The authors point out that the transform "reduces the order of transcendence" of many types of equations, notably linear equations and equations involving convolutions. They recommend solving these simpler problems numerically and then numerically inverting the transform to obtain a numerical answer to the original problem. They discuss a variety of approximate linearizing methods of an iterative sort, such as Picard iterations and the method of quasilinearization, as means of extending their solution methods to certain nonlinear equations.

As for the numerical inversion of the Laplace transform, the authors suggest a procedure which amounts to replacing the relation defining the transform with a system of linear equations which are obtained by evaluating the integral by a method of numerical quadrature of Gaussian type. The authors also include a section on dynamic programming. Numerous examples are included in the text.

The authors suggest that this book is well suited to the purposes of certain nonmathematicians, such as biologists, who want to get answers to equations arising in their work. These methods, they claim, will enable such investigators to relegate the onerous task of computation to assistants. In my opinion the authors have succeeded in their aims, which were to convey a superficial understanding. I strongly recommend this book to those whose needs will be satisfied by superficiality. To those who want something else, the book is a poor investment of time.

W. L. MIRANKER
International Business Machines Corporation, Yorktown Heights, New York 10598

Paleoecological Study

The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region. CHARLES EDWARD CLELAND. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 29. Ann Arbor, 1966. 304 pp., illus. Paper, $3.

This doctoral dissertation reflects the present archeological concern with the relationship of prehistoric man to his environmental setting, as opposed to the earlier almost exclusive preoccupation with problems of chronology and culture description. Cleland's study, a component part of an integrated approach of Michigan's Museum of Anthropology to the changing patterns of environmental adjustment of the prehistoric Upper Great Lakes peoples, takes its departure from the analysis of the faunal remains found at a series of sites in the region. He moves from a general account of the paleoecology of the region beginning at 12,000 B.C. to a treatment of the ethnozoology of the cultures of this broad time range, ethnozoology being defined as the study of the relationship between animal species and man within particular cultures. A useful distinction is made between focal and diffuse economies as two polar types, focal economies being highly specialized ones which are seen as tending to produce cultural stability. Diffuse economies exhibit an ability to exploit a variety of resources, and it is suggested that societies practicing them are relatively flexible and adaptable. These hypotheses deserve further testing and elaboration. The conclusions summarize the ecological relationships of the prehistoric culture periods of the region, and appendices present detailed faunal analyses of sites and useful maps of animal distributions.

The new data on faunal remains from prehistoric sites made available by this study are particularly welcome because of the present paucity of such material. The summary of climatic, vegetational, and cultural changes is also welcome as an early approximation of the situation. From a climatic point of view Cleland places too great reliance on simple temperature changes, to the neglect of the equally important precipitation shifts which inevitably accompany changing patterns of atmospheric circulation. Failure adequately to consider circulation patterns is also evident in a tendency to assume that climatic changes in other regions will be paralleled by identical changes in the Upper Great Lakes area. From the cultural point of view, there is still substantial difference of opinion over the time placement and relations of some of the prehistoric groups. However, differences of opinion in regard to interpretative detail should not obscure the fact that this approach and synthesis from an archeological perspective ably demonstrate the contribution this discipline can make to the general area of paleoecology.

DAVID A. BAERREIS
Department of Anthropology, University of Wisconsin, Madison

Books Received

Abnormal Hemoglobins in Human Populations: A Summary and Interpretation. Frank B. Livingstone. Aldine, Chicago, 1967. 482 pp. Illus. $12.50.

Across the Top of Russia. Richard Petrow. McKay, New York, 1967. 382 pp. Illus. $6.95.

Advances in Applied Mechanics. vol. 10, fasc. 1. G. Kuerti, Ed. Academic Press, New York, 1967. 114 pp. Illus. Paper, $4.75. Two papers.

Advances in Geophysics. vol. 12. H. E. Landsberg and J. Van Mieghem, Eds. Academic Press, New York, 1967. 459 pp. Illus. $18.50. Six papers.

Advances in Microwaves. vol. 2. Leo Young, Ed. Academic Press, New York, 1967. 432 pp. Illus. $17. Six papers.

Advances in Veterinary Science. vol. 11. C. A. Brandly and Charles Cornelius. Eds. Academic Press, New York, 1967. 420 pp. Illus. $17. Eight papers.

Alternatives for Balancing World Food Production and Needs. Martha E. Lochner, Ed. Iowa State Univ. Press, Ames, 1967. 281 pp. Illus. $4.95. Fifteen papers.

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The Birds of America. Seven volumes. John James Audubon. With a new introduction by Dean Amadon. Dover, New York, 1967. vol. 1, 262 pp.; vol. 2, 205 pp.; vol. 3, 233 pp.; vol. 4, 321 pp.; vol. 5, 346 pp.; vol. 6, 457 pp.; vol. 7, 400 pp. Illus. Paper, $2.50 per volume. Reprint, octavo edition (1840–44).

Blood Clotting Enzymology. Walter H. Seegers, Ed. Academic Press, New York,

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