starting point for research in inorganic photochemistry would require supplemental reading on experimental technique and elementary photochemical principles. Because of the extensive literature coverage, it provides a useful source for locating such material. Each chapter is self-contained. Overall, the book provides perspective on current experimental and theoretical activity, identifies areas in which further work is required, and suggests constructive solutions to existing problems.

JEFFREY I. ZINK
Department of Chemistry,
University of California, Los Angeles

Characterization of Catalysts

Structure of Metallic Catalysts. J. R. ANDERSON. Academic Press, New York, 1975. x, 470 pp., illus. $33.75.

This book deals with the structure, particularly the surface structure, of catalysts in which a metallic component is a separate phase and with the chemistry of the preparation of such materials. Chemisorption and catalysis enter only as they relate to structure. As the author says, "This is not a book on catalytic reaction chemistry."

The great majority of metallic catalysts consist of tiny particles of metal (usually 10 to 100 angstroms in diameter) dispersed upon the surface of a porous, high-area support such as silica gel or alumina. Work on single crystallographic surfaces of single crystals is beginning to provide data and ideas that help to illuminate the nature of supported catalysts despite problems of discrepancy of scale and despite the fact that the surface areas of such single crystals are much too small to permit practical use. This book covers these materials as well as supported catalysts and metallic powders with and without textural promoters to reduce sintering, although most of it inevitably concerns supported catalysts.

The book appears at an opportune time because it is closely related to several subjects of major current interest. Even a single crystallographic surface may exhibit more than one type of catalytic site, and conventional catalysts will expose more than one type of crystallographic surface. In addition, the crystallites of supported catalysts may involve particles of different sizes that exhibit different types and concentrations of defects, and the catalysts may be influenced by the supports. The effect upon catalytic properties of all of these matters comes under the heading of structure sensitivity. This subject leads immediately into a second subject of current interest, the characterization of the size distribution, the morphology, and the nature of the defects in the set of tiny crystallites of metal in a supported catalyst. There is also considerable current interest in multimetallic or "alloy" catalysts, a subject well surveyed in this book.

The book contains chapters on support materials, massive metal catalysts, dispersed metal catalysts, and the structure and properties of small particles of metal, including their interaction with supports and their sintering. It also contains two chapters on methods of characterizing the physical nature of metallic catalysts. The first and longer describes the application of physisorption, chemisorption, transmission electron microscopy, and x-ray and magnetic methods to characterization of the texture, that is, determination of surface area, particle size and shape, and pore structure. The other chapter treats the characterization of surface composition and structure, primarily by the methods of surface chemical physics.

The book covers a coherent and important subject thoroughly and critically. I believe it will be frequently used and referred to.

ROBERT L. BURWELL, JR.
Ipatieff Laboratory,
Northwestern University,
Evanston, Illinois

Hormonal Effects

Biochemical Actions of Hormones. Vol. 3. GERALD LITWACK, Ed. Academic Press, New York, 1975. xvi, 416 pp., illus. $36.

Four of the 11 papers in this volume provide views of the current status of our understanding of the mechanism by which steroid hormones produce their effects. Three concern applications of the techniques of genetics and cell culture to the study of hormone action. Other papers review recent developments in our understanding of the hormonal receptors in plasma membranes, the mechanism of action of thyroid hormones, and the structure of hypothalamic hormones and their function in regulating the pituitary. The final essay reviews the effects of the hormones that regulate the synthesis of specific proteins in the isolated perfused liver.

An excellent chapter by Hollenberg and Cuatrecasas reviews the many investigations of membrane-localized hormone receptors carried out in their laboratories. The recent advances resulting in the identification and purification of these receptors are summarized, the principles of ligand-membrane interactions are described, and some of the pitfalls of such studies are presented. The chapter deals primarily with the authors' studies of the receptors for insulin and glucagon, but touches on the binding of catecholamines. The review of the hypothalamic-hypophysiotropic hormones by Boss, Vale, and Grant provides an excellent and balanced survey of the contributions of the key laboratories working in this fascinating and fast-growing field. The unanswered question of how these peptides influence the secretion rate of particular pituitary hormones is presented in an interesting fashion. The contributions to endocrinology of the techniques of cell hybridization and studies of the genetic control of differentiated functions, especially the genetic control of hormonal induction, are reviewed in a thoughtful and stimulating chapter by Croce and Litwack. The review by Armelin of the present status of mammalian cell cultures in the study of hormonal and other mechanisms regulating growth emphasizes again that hormones are key extracellular regulators for cell proliferation and growth.

It is convenient to have in one place presentations of the approaches of three different groups investigating the mechanisms by which estrogens control the synthesis of macromolecules in their target cells. Parallel and complementary investigations of the effects of estrogens in the chick oviduct have been carried out in Shimke's laboratory at Stanford and in O'Malley's laboratory at Baylor, and their experiments and conclusions are summarized here. The discovery some years ago that under certain hormonal conditions the chick oviduct to a large extent synthesizes a single protein, ovalbumin, has provided a model system that has greatly facilitated the study of the mechanism of action of the hormone in this target tissue, permitting the isolation and identification of the messenger RNA for ovalbumin. Comparable studies in the rat uterus, which are more difficult because no single protein is produced in large amounts in response to the hormone, are reported by Katzenellenbogen and Gorski. The fourth chapter devoted to steroids, a review of the glucocorticoid receptor by Cake and Litwack, provides an overview of steroid receptors in general and discusses the tissue distribution and developmental changes in the glucocorticoid receptor in certain tissues. This chapter contains a valuable discussion of the techniques for identifying and quantifying steroid receptors.

All the subjects discussed in this book have been reviewed elsewhere by the same authors or by others. Furthermore, most chapters focus primarily on studies car-

ried out in a single laboratory and make little or no attempt to provide a perspective on the field as a whole. This will nevertheless be a valuable reference book, for the essays continue the tradition of excellence established in the first two volumes, which were published in 1970 and 1972.

CLAUDE A. VILLEE
Department of Biological Chemistry,
Harvard Medical School,
Boston, Massachusetts

Changes in Plant Genomes

Genetic Manipulations with Plant Material. Papers from a NATO Advanced Study Institute, Liège, Belgium, 1974. LUCIEN LEDOUX, Ed. Published in cooperation with NATO Scientific Affairs Division by Plenum, New York, 1975. xiv, 602 pp., illus. $48. NATO Advanced Study Institutes Series A, vol. 3.

In the last two decades, considerable excitement has been generated among experimental botanists by the prospect that important transformations in plant genomes might be accomplished through the combined use of recently developed techniques of molecular biology and plant cell culture. Consider the following facts: In some plants, a single cell, or even a single naked protoplast, can be aseptically cultivated on a chemically defined medium, where it will divide to form a multicellular mass and ultimately an entire normal plant. Naked protoplasts, easily preparable in bulk, can be induced to fuse with one another, sometimes giving rise to parasexual hybrids. Protoplasts can also take up, by pinocytosis, organelles and informational macromolecules in the form of viruses, plasmids, and DNA extracts, and, in some instances, the exogenous information seems to be expressed. Even microspores or pollen grains can be successfully cultivated to give rise to entire haploid plants. Cells of such haploids can be exposed to mutagens, the variants selected by modifications of established microbiological techniques, the chromosome number doubled by colchicine treatment, and a new, stable plant type regenerated.

The implications of this kind of work have stimulated many fertile imaginations. Do you want a carrot high in tryptophan? Simply isolate carrot cells, expose them to a chemical mutagen, select for variants in the presence of a tryptophan analog, and regenerate the new type of plant from the resulting cell mass. Do you want a nitrogen-fixing cereal? Simply transfer the nitrogen-fixing genes of bacteria to other microbes in which they become parts of rapidly replicating plasmids, isolate the plasmids, feed them to cereal protoplasts, and screen the protoplasts on nitrogen-free media. Do you want to cure a biochemical lesion in a higher plant? Simply introduce the desired gene via a transducing phage or even an extract of wild-type *Escherichia coli* DNA. For a while it seemed that no experiment was too bizarre to be successful.

This book summarizes one of many recent conferences convened to evaluate the sometimes conflicting evidence of investigators from different laboratories. The convener of the conference and editor of this volume, Lucien Ledoux of Liège, has included contributions from his own laboratory on the fate of exogenous DNA in plants and on DNA-mediated correction of the thiamineless state in *Arabidopsis*. Several Belgian compatriots have written on such subjects as the analysis of microbial genome structure and sex factors (Mojica-A), plasmids and crown gall (Schell), genetic regulation and interallelic complementation (Matagne and Loppes), molecular biology of *Agrobacterium* (De Ley), the use of isozymes in genetic analysis (Jacobs), the structure of chromatin and chromosomes (Fredericq), the isolation and gradient analysis of DNA (Charles), applications of molecular sieving on agarose gels (Lurquin and Behki), and applications of molecular hybridization (Janowski). Their contributions constitute 15 of the 32 full papers included. Other contributions concern competence for DNA uptake and transformation (Tomasz), nitrogen fixation (Postgate), plant cell culture (Street), plant protoplasts (Cocking), microspore culture (Nitsch), regeneration and chromosome stability in plant tissue cultures (Sheridan), auxotrophic mutations (Redei), mutant selection and heterogeneous cell associations in vitro (Carlson and Chaleff), and the uptake and fate of DNA in plant cells (Hess, Gresshoff, Smith and colleagues, and Kleinhofs).

This volume conveys much of the current excitement and uncertainty in the field, and some of the continuing disagreements and disputes. Unfortunately, the editing is inadequate. Clumsily typed manuscripts have been reproduced without alteration, and inelegant English constructions have been put into print, especially in the chapters by authors whose native language is not English. The pages devoted to 19 short, varied abstracts of about one page each would have been better used for a thoughtful summary by a senior scientist.

Although these defects, as well as the forbidding price and the availability of other, similar books, will deter some prospective purchasers, the volume is timely, authoritative, and useful to teachers and advanced students.

ARTHUR W. GALSTON
Department of Biology,
Yale University,
New Haven, Connecticut

Books Received

Advances in Quantum Electronics. Vol. 3. D. W. Goodwin, Ed. Academic Press, New York, 1975. xii, 474 pp., illus. $46.

African Dilemma Tales. William R. Bascom. Mouton, The Hague, 1975 (U.S. distributor, Aldine, Chicago). xiv, 162 pp. $12.50. World Anthropology.

Aldehydes. Photometric Analysis. Eugene Sawicki and Carole R. Sawicki. Academic Press, New York, 1975. Vol. 1. xxviii, 284 pp., illus. $27.25. Vol. 2. xiv, 344 pp., illus. $28. The Analysis of Organic Materials, No. 9.

Animal Nutrition. P. McDonald, R. A. Edwards, and J. F. D. Greenhalgh. Longman, New York, ed. 2, 1975. viii, 480 pp., illus. Paper, $14.50.

Annual Review of Anthropology. Vol. 4. Bernard J. Siegel, Alan R. Beals, and Stephen A. Tyler, Eds. Annual Reviews, Palo Alto, Calif., 1975. viii, 414 pp. $15.

Applied Algebra for the Computer Sciences. Authur [Arthur] Gill. Prentice-Hall, Englewood Cliffs, N.J., 1976. xvi, 432 pp., illus. $16.50. Prentice-Hall Series in Automatic Computation.

L'Arc et la Corde. Un Modèle d'Antagonismes Dialectiques en Biologie et Sciences Humaines. Elie Bernard-Weil. Maloine, Paris, 1975. 158 pp., illus. Paper, 72 F. Recherches Interdisciplinaires.

Astronomy and Cosmology. A Modern Course. Fred Hoyle. Freeman, San Francisco, 1975. xvi, 712 pp., illus. $15.95.

Behavior Modification and Therapy. An Introduction. Richard R. Bootzin. Winthrop, Cambridge, Mass., 1975. xii, 180 pp., illus. Paper, $4.50.

Being Female. Reproduction, Power, and Change. Papers from a congress, Chicago, Aug. 1973. Dana Raphael, Ed. Mouton, The Hague, 1975 (U.S. distributor, Aldine, Chicago). xiv, 294 pp. $14.50. World Anthropology.

The Best Years of Your Life. A Guide to the Art and Science of Aging. Leopold Bellak. Atheneum, New York, 1975. xviii, 298 pp. $10.

A Bibliography of the Literature on North American Climates of the Past 13,000 Years. Donald K. Grayson. Garland, New York, 1975. 206 pp. $15.

Biology of the Major Psychoses. A Comparative Analysis. Papers from a meeting. Daniel X. Freedman, Ed. Raven Press, New York, 1975. xii, 372 pp., illus. $22. Association for Research in Nervous and Mental Disease Research Publications, vol. 54.

Brain Electrical Potentials and Individual Psychological Differences. Enoch Callaway. Grune and Stratton, New York, 1975. x, 214 pp., illus. $22.50.

Brain-Endocrine Interaction II. The Ventricular System in Neuroendocrine Mechanisms. Proceedings of a symposium, Shizuoka, Japan, Oct. 1974. K. M. Knigge, D. E. Scott, H. Kobayashi, and S. Ishii, Eds. Karger, Basel, 1975. x, 406 pp., illus. $57.50.

Calcium Transport in Contraction and Secre-

(Continued on page 1086)