parenchyma itself, and the anterior chamber of the eye. Technical details are more complete than in reviewed articles. Anyone who has tried to track down technical procedures, each article refering to the one that preceded it, can appreciate how useful such a compilation can be. This feature alone makes the book worthwhile for someone contemplating experiments using these techniques.

After two brief chapters on immunology, in which one learns little except that the brain and anterior chamber of the eye appear to be immunologically privileged sites, one arrives at the crux of the matter: what can transplanted neurons really do? A convincing and rather thorough (48 chapters, 562 pages) case is made that they can do practically anything a normal neuron can do. Neurons retain to a large degree the ability to organize themselves into tissues resembling those they normally would have formed, especially if transplanted from embryos into neonates. For example, a fetal cerebellar primordium transplanted to the cerebellum, cerebral cortex, or anterior chamber develops almost as a mini-cerebellum (Björklund *et al.*; Sotelo and Alvarado-Mallart). And fetal retina similarly placed onto the superior colliculus not only develops all the normal cell and plexiform layers but can even mediate light-evoked synaptic responses in the host tectum (McLoon and Lund and their co-workers). Histochemical and immunological markers show that cells also retain their ability to synthesize normal transmitters and peptides. These substances can be released both in response to K^+-depolarization, as is described for monoamines in grafts of substantia nigra detected by electrochemical methods (Hoffer *et al.*), and after electrical stimulation, as is demonstrated electrophysiologically for cholinergic neurons transplanted into a host hippocampus previously deprived of its normal cholinergic input (Segal, Björklund, and Gage). Many examples are given in which axonal projections to and from the rest of the brain are also appropriate for the type of tissue transplanted, although this is not an invariant finding.

What are neural transplants good for? Right from the beginning a major hope has been that it will eventually be possible to repair damaged neuronal circuits by transplanting neurons. Work presented in this volume suggests that at best one can still only be hopeful. The only successful reversals of lesion-induced behavioral deficits are those that depend not on the restoration of specific neuronal pathways but on diffuse transmitter release. The development of normal neuronal architecture within the graft and connections between it and the host brain has so far required fetal donors and usually relatively young hosts, both of which will be difficult to obtain in humans. Nevertheless, for certain disorders such as Parkinson's and Alzheimer's diseases restoration of specific circuits may not be required to alleviate many of the symptoms, and transplants of cells capable of releasing dopamine or acetylcholine into the extracellular space may be helpful. In contrast to this more speculative hope, however, the importance of transplantation in studying neuronal development and specificity of synaptic connections has been established over decades, not in mammals but in lower vertebrates like frogs, newts, and fishes. Now that mammalian transplantations have become feasible as well, similar studies can be made in higher vertebrates; several chapters in this book represent important beginnings in this direction.

The volume is not a review. It is too long, and each contributor is too much interested in presenting his or her recent results. Nor is it a substitute for refereed journals. Many of the chapters provide insufficient data to make possible a critical evaluation of the results. What it does remarkably well is to present the range of experimental problems currently addressed by work on transplantation in sufficient detail that the reader can decide if the technique is useful in pursuing his or her own interests and, if so, how to proceed.

ERIC FRANK
Department of Neurobiology, Northwestern University, Evanston, Illinois 60201

Plant Mitochondria

Higher Plant Cell Respiration. R. DOUCE and D. A. DAY, Eds. Springer-Verlag, New York, 1985. xvi, 522 pp., illus. $104.50. Encyclopedia of Plant Physiology, New Series, vol. 18.

Plant mitochondria, like their animal counterparts, have as a major role the driving of the synthesis of adenosine triphosphate with free energy released during the oxidation of intermediates of the tricarboxylic acid cycle. In that regard, plant mitochondria have many features in common with animal mitochondria, including a similar morphology, the presence of four multicentered electron transfer complexes plus a proton translocating adenosine triphosphatase, and a similar lipid composition. They also have many unique features, including the presence of a cyanide/antimycin A–resistant electron transfer pathway, the ability to oxidize external reduced forms of nicotinamide adenine dinucleotide (NADH) and nicotinamide adenine dinucleotide phosphate (NADPH), the presence of a rotenone-resistant bypass for internal NADH oxidation, the presence of malic enzyme in the mitochondrial matrix, carrier-mediated transport of nicotinamide adenine dinucleotide (NAD^+), the ability of leaf mitochondria to decarboxylate glycine oxidatively during photorespiration, and the large size and complexity of their DNA.

In contrast to standard textbook discussions of mitochondria and their functioning during respiration in eukaryotic organisms, which consistently fail to note the extent to which plant mitochondria deviate from the "norm," *Higher Plant Cell Respiration* clearly delineates both those characteristics that plant mitochondria have in common with other mitochondria and those that are unique to plant mitochondria and the plant respiratory process.

Workers interested in mitochondria and respiratory metabolism, whether in plants or in animals, will find that the book contains a comprehensive, up-to-date review of the subject. It also provides a compilation of the progress that has been made in the 25 years since the first publication of a volume of the *Encyclopedia of Plant Physiology* covering plant respiration. No comparable volume has appeared since, and progress has certainly been sufficient to warrant a review of the field at this time. There are many reasons for the progress, but one of the most important is the appearance of procedures to isolate active, purified mitochondria from a wide range of plant sources. Such procedures have made it possible to study the low respiratory control values, the cyanide-resistant oxygen uptake, and the oxidation of externally added NADH in plant mitochondria, among other factors, and to exclude the possibility of their being artifacts caused by mitochondrial damage during the isolation procedure. The recent use of Percoll gradients has allowed chloroplast-free mitochondria to be readily isolated from most chlorophyll-containing plant tissues. As is pointed out in several chapters, the unique aspects of oxidative metabolism that are related to photosynthetically active tissue and the role of

mitochondria therein are just beginning to be assessed.

Another useful aspect of the book is that authors continually point out questions that remain to be answered. The questions show that we now have a reasonably good understanding of the biochemical details behind many of the "aberrant" aspects of plant mitochondria but a poor understanding of how most of those aspects are integrated into the overall respiratory process. This becomes especially apparent in the last five chapters, which focus less on mitochondria and more on the overall process of respiration. Again, in spite of the considerable progress made in the last 25 years, questions abound, and more often than not they center on regulation. The lack of understanding of the regulation of respiratory metabolism is itself related to the fact that in many instances the basic pathways of carbon flow during plant respiration are not known with certainty. For example, the widespread appearance of the enzyme pyrophosphate: fructose-6-phosphate 1-phosphotransferase in the cytoplasm of higher plants and the uncertainty about its role in glycolysis, vis à vis phosphofructokinase, is something that workers need to sort out. To the book's credit, most authors clearly demarcate what is known from what is not, but personal biases do enter into the text at several points. For example, the mechanism by which electrons branch onto the cyanide-resistant pathway, the nature of the cyanide-resistant oxidase itself, and the role of the pathway in metabolism are each brought up by several authors, who have differing opinions about them. However, this strikes me as less a drawback than a healthy sign for the field as a whole.

In any endeavor having the scope provided in this book, some things will be overlooked. The role of mitochondria in cytoplasmic male sterility in plants is given too little attention, and biogenesis, a topic of intense investigation in other mitochondria, is hardly dealt with by any author. The latter lack to some extent reflects the lack of work on biogenesis in plant mitochondria. These omissions are minor given the many other subjects that are carefully and completely reviewed.

This book will become required reading for workers in the field, but it should also be of interest to others, who might have the impression that all the important questions in the field of plant respiration have been answered.

JAMES N. SIEDOW

Department of Botany,
Duke University,
Durham, North Carolina 27706

Books Received

Assessment of Risk from Low-Level Exposure to Radiation and Chemicals. A Critical Overview. Avril D. Woodhead *et al.*, Eds. Plenum, New York, 1985. xii, 529 pp., illus. $65. Basic Life Sciences, vol. 33. From a meeting, Upton, N.Y., May 1984.

The Atlas of Australian Birds. M. Blakers, S. J. J. F. Davies, and P. N. Reilly. Melbourne University Press, Melbourne, 1984 (U.S. distributor, International Specialized Book Services, Beaverton, Ore.). xlvi, 738 pp. $60.

Atomic and Quantum Physics. An Introduction to the Fundamentals of Experiment and Theory. H. Haken and H. C. Wolf. Springer-Verlag, New York, 1984. xiv, 394 pp., illus. $29. Translated from the German edition (Berlin, 1983) by W. D. Brewer.

The Attribution of Blame. Causality, Responsibility, and Blameworthiness. Kelly G. Shaver. Springer-Verlag, New York, 1985. x, 194 pp. $31. Springer Series in Social Psychology.

Autoimmunity and Endocrine Disease. Robert Volpé, Ed. x, 473 pp., illus. $75. Basic and Clinical Endocrinology, 5.

Autoimmunity and the Thyroid. Paul G. Walfish, Jack R. Wall, and Robert Volpé, Eds. Academic Press, Orlando, Fla., 1985. xxviii, 450 pp., illus. $44. From a meeting, Toronto, June 1984.

The Bacteria. A Treatise on Structure and Function. Vol. 8, Archaebacteria. J. R. Sokatch *et al.*, Eds. Academic Press, Orlando, Fla., 1985. xxiv, 582 pp., illus. $85.

Behavioural Ecology. Ecological Consequences of Adaptive Behaviour. R. M. Sibley and R. H. Smith, Eds. Blackwell Scientific, Palo Alto, Calif., 1985. x, 620 pp., illus. $96; paper, $39. From a symposium, Reading, England, April 1984.

Between Theater and Anthropology. Richard Schechner. University of Pennsylvania Press, Philadelphia, 1985. xiv, 354 pp., illus. $35.

Bioactivation of Foreign Compounds. M. W. Anders, Ed. Academic Press, Orlando, Fla., 1985. xvi, 555 pp., illus. $85.

Biochemistry and Function of Vacuolar Adenosine-Triphosphatase in Fungi and Plants. Bernard P. Marin, Ed. Springer-Verlag, New York, 1985. xx, 259 pp., illus. $32.50.

Biochemistry of Storage Carbohydrates in Green Plants. P. M. Dey and R. A. Dixon, Eds. Academic Press, Orlando, Fla., 1985. xiv, 378 pp., illus. $79.

Biogeography. An Ecological and Evolutionary Approach. C. Barry Cox and Peter D. Moore. 4th ed. Blackwell Scientific, Palo Alto, Calif., 1985. viii, 244 pp., illus. Paper, $19.

Biology of Fertilization. Charles B. Metz and Alberto Monroy, Eds. Academic Press, Orlando, Fla., 1985. Two volumes. Vol. 1, Model Systems and Oogenesis. xviii, 391 pp., illus. $75. Vol. 2, Biology of the Sperm. xx, 475 pp., illus. $75. Vol. 3, The Fertilization Response of the Egg. xviii, 469 pp., illus. $75.

Biology of Menopause. The Causes and Consequences of Ovarian Ageing. R. G. Gosden. Academic Press, Orlando, Fla., 1985. xvi, 188 pp., illus. $37.50.

Change in the Amazon Basin. John Hemming, Ed. Manchester University Press, Dover, N.H., 1985. Two volumes. Vol. 1, Man's Impact on Forests and Rivers. x, 222 pp., illus. $38.50. Vol. 2, The Frontier after a Decade of Colonisation. x, 295 pp., illus. $38.50. From a symposium, Manchester, England, Sept. 1982.

Chemically Mediated Interactions between Plants and Other Organisms. Gillian A. Cooper-Driver, Tony Swain, and Eric E. Conn, Eds. Plenum, New York, 1985. x, 246 pp., illus. $45. Recent Advances in Phytochemistry, vol. 19. From a symposium, Boston, July 1984.

Chemistry. Experiment and Theory. Bernice G. Segal. Wiley, New York, 1985. xxiv, 999 pp., illus. $34.95.

Chemistry of Hydrocarbon Combustion. D. J. Hucknall. Chapman and Hall, New York, 1985. viii, 415 pp. $85.

Chronic Treatments in Neuropsychiatry. Dargut Kemali and Giorgio Racagni, Eds. Raven, New York, 1985. xviii, 219 pp., illus. $45. Advances in Biochemical Psychopharmacology, vol. 40.

Chronobiology 1982–1983. Erhard Haus and Hugh F. Kabat, Eds. Karger, Basel, 1984. xxii, 574 pp., illus. $127. From a conference, Minneapolis, Sept. 1981.

Class and Reform. School and Society in Chicago, 1880–1930. David John Hogan. University of Pennsylvania Press, Philadelphia, 1985. xxvi, 328 pp., illus. $30.

Clinical Applications of Rational-Emotive Therapy. Albert Ellis and Michael E. Bernard, Eds. Plenum, New York, 1985. xviii, 353 pp. $39.50.

Colour. Hazel Rossotti. Princeton University Press, Princeton, N.J., 1985. 240 pp., illus. Paper, $8.95.

Comets. The Swords of Heaven. David Ritchie. New American Library, New York, 1985. xii, 238 pp. Paper, $8.95.

Commodore 64 Assembly Language. A Course of Study Based on the DEVELOP-64 Assembler/Editor/Debugger. W. Douglas Maurer. Computer Science Press, Rockville, Md., 1985. xvi, 416 pp. Paper, $19.95.

Communication Problems in Autism. Eric Schopler and Gary B. Mesibov, Eds. Plenum, New York, 1985. xviii, 333 pp. $35. Current Issues in Autism. From a conference, 1983.

Computer Work Stations. A Manager's Guide to Office Automation and Multi-User Systems. Herman Holtz. Chapman and Hall, New York, 1985. xvi, 302 pp., illus. $24.50.

Concert Hall Acoustics. Yoichi Ando. Springer-Verlag, New York, 1985. xii, 151 pp., illus. $41.50. Springer Series in Electrophysics, vol. 17.

Connected Speech. The Interaction of Syntax and Phonology. Ellen M. Kaisse. Academic Press, New York, 1985. viii, 206 pp. $39.50.

Consensus and Penalties for Ignorance in the Medical Science. Implications for Information Transfer. J. Michael Brittain, Ed. Taylor Graham, London, 1985. iv, 188 pp. Paper, $22. British Library Research and Development Report 5842.

Consider a Spherical Cow. A Course in Environmental Problem Solving. John Harte. Kaufmann, Los Altos, Calif., 1985. xvi, 283 pp., illus. $24.95; paper, $12.95.

Cooperation and Competition on the Path to Fusion Energy. National Academy Press, Washington, D.C., 1984. x, 131 pp. Paper, $10.95.

Culture and the Evolutionary Process. Robert Boyd and Peter J. Richerson. University of Chicago Press, Chicago, 1985. viii, 331 pp. $29.95.

Cutting Edge Technologies. National Academy of Engineering. National Academy Press, Washington, D.C., 1984. viii, 192 pp., illus. Paper, $18.95.

Data for Radioactive Waste Management and Nuclear Applications. Donald C. Stewart. Wiley-Interscience, New York, 1985. xii, 297 pp., illus. $54.50.

Day of Trinity. Lansing Lamont. Atheneum, New York, 1985. xii, 364 pp. + plates. Paper, $11.95. Reprint, 1965 ed.

Density Functional Methods in Physics. Reiner M. Dreizler and João da Providência, Eds. Plenum, New York, 1985. viii, 533 pp., illus. $85. NATO ASI Series B, vol. 123. From an institute, Alcabideche, Portugal, Sept. 1983.

The Diabetic Pancreas. Bruno W. Volk and Edward R. Arquilla, Eds. 2nd ed. Plenum, New York, 1985. xxiv, 628 pp., illus. $79.50.

Differential Manifolds and Theoretical Physics. W. D. Curtis and F. R. Miller. Academic Press, Orlando, Fla., 1985. xx, 396 pp. $69.

Disposal of Chemical Munitions and Agents. National Academy Press, Washington, D.C., 1984. xviii, 216 pp., illus. Paper, $16.50.

Disposal of Industrial and Domestic Wastes. Land and Sea Alternatives. Board on Ocean Science and Policy, National Research Council. National Academy Press, Washington, D.C., 1984. xiv, 210 pp. Paper, $16.50.

Doctors and Medicine in Early Renaissance Florence. Katharine Park. Princeton University Press, Princeton, N.J., 1985. xii, 299 pp. $40.

Drawing with Computers. Mark Wilson. Putnam, New York, 1985. 128 pp., illus. Paper, $9.95. A Perigee Book.

Dynamic Light Scattering. Applications of Photon Correlation Spectroscopy. Robert Pecora, Ed. Plenum, New York, 1985. xiv, 420 pp., illus. $59.50.

Dynamical Phenomena at Surfaces, Interfaces and Superlattices. F. Nizzoli, K. H. Rieder, and R. F. Willis, Eds. Springer-Verlag, New York, 1985. xiv, 329 pp., illus. $29.50. Springer Series in Surface Sciences, vol. 3. From a school, Erice, Italy, July 1984.

Dynamical Properties of Solids. Vol. 5, Mössbauer Effect, Structural Phase Transitions. G. K. Horton and A. A. Maradudin, Eds. North-Holland, New York, 1984. viii, 500 pp., illus. $96.25.

Dynamical Systems and Cellular Automata. J. Demongeot, E. Golès, and M. Tchuente, Eds. Academic Press, Orlando, Fla., 1985. xvi, 399 pp., illus. $39.50. From a conference Luminy, France, Sept. 1983.

Einstein in America. The Scientist's Conscience in the Age of Hitler and Hiroshima. Jamie Sayen. Crown, New York, 1985. xii, 240 pp., illus. $17.95.

Electricity and Magnetism. Munir H. Nayfeh and Morton K. Brussel. Wiley, New York, 1985. xvi, 619 pp., illus. $31.95.

Electrochemical Synthesis of Inorganic Compounds. A Bibliography. Zoltán Nagy. Plenum, New York, 1985. xiv, 474 pp. $75.

Electronic Synthesis of Speech. R. Linggard. Cambridge University Press, New York, 1985. x, 149 pp. $29.95.

Greenland Ice Core. Geophysics, Geochemistry,

(Continued on page 343)