

Nearly half of the book deals with two subjects, the neural bases of motor systems and sensory strategies of adaptation. Most of the chapters deal with insects, and they include perspectives by the elder statesmen of neuroethology—Bullock, Hoyle, Dethier, and Huber. Although Roeder did not do major work on neural development and learning, the book includes an interesting section on these subjects, which are major concerns of modern neurobiology. Murphey and Truman each show why insects are good organisms for neurodevelopmental studies. The neurobehavioral basis of feeding (slugs) is described by Gelperin, and that of foraging (bees) is described by Erber and by Menzel and Bitterman; the focus is on the role of learning in these behaviors. Predator-prey relationships occupy a major part of the book, and the section on them concentrates on the acoustic interaction between insects and their predators, bats that detect and hunt them down with biosonar signals. This emphasis is appropriate, since the subject was the highlight of Roeder's career. The contributors, who are active researchers on the subject, include Simmons, Schnitzler, Miller, and Neuweiler; Treat provides a delightful glimpse of the circumstances that led him to convince Roeder to study the ears of moths in the first place. The book concludes with a potpourri of subjects called "ecological aspects of social relations and orientation," which deals with interesting mechanisms of behavior the analysis of which does not center on the nervous system.

Many of the papers in the book are of a quality that would make it useful for an advanced seminar. One can certainly get the flavor of neuroethology by gleaning this book.

The volume edited by Aoki, Ishii, and Morita also deals with neuroethological topics, and it is dedicated to M. Kuwabara, a prominent Japanese neurobiologist. It is similar to Huber and Markl's book in its emphasis on invertebrates, especially insects, but there are important differences between the two. Aoki *et al.* have included four chapters on the neurogenetics of *Drosophila* and one on *Paramecium*; these topics are not the usual fare of neuroethology, but they are vitally important in research on comparative neurobiology and development. This book also includes treatments of central issues of neuroethology that are omitted by Huber and Markl, namely the analysis of hormonal control of behavior and circadian rhythms in vertebrates (birds, fish, and amphibians).

While Aoki *et al.* should be compli-

mented on the broad selection of topics from behavioral neurobiology, there are several aspects of the volume that make it less valuable than Huber and Markl's. For one thing, many of the reviews are too brief (five to ten pages) to be really satisfying to the specialist; for another, the illustrations are not of the quality of Huber and Markl's—in particular, the reproduction of photographs is terrible. Some major contributors to this book—Huber, Wyman, Hotta, Heiligenberg, Ewert, and Yamaguchi—have reviewed their work elsewhere and at greater length. It is too bad that a book that covers so many interesting aspects of behavioral neurobiology is flawed by the brevity of its reviews, so that it is of limited value, even for the professional bookshelf.

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Skeletal Tissue

Cartilage. BRIAN K. HALL, Ed. Academic Press, New York, 1983. In three volumes. Vol. 1, Structure, Function, and Biochemistry. xvi, 385 pp., illus. \$55. Vol. 2, Development, Differentiation, and Growth. xiv, 409 pp., illus. \$55. Vol. 3, Biomedical Aspects. xiv, 353 pp., illus. \$49.50.

This treatise aims to cover in depth all aspects of cartilage, an ambitious aim in which it partly succeeds.

Volume 1, "Structure, Function, and Biochemistry," containing 12 chapters, treats chondrogenic differentiation and normal and abnormal development from the standpoint of cell biology. There is an interesting comparison between vertebrate and invertebrate cartilages. A chapter on cell kinetics contains a critique of current methods of estimating mitotic indexes. The ultrastructure of cartilage is beautifully illustrated by both transmission and scanning electron micrographs that serve to remind those working with isolated chondrocyte cultures of the complexity of the matrix and the microenvironment of the chondrocyte.

An authoritative review of cartilage collagens, including minor collagens, includes a section on immunolocalization of collagen. Given the experience of the authors, a critical assessment by them of this technique, which is being increasingly used, would have been valuable. An account of the chemistry of proteoglycans and their constituent glycosaminoglycans is somewhat old-fashioned and

overlooks some crucial facts, although it does cite several main reviews.

A review of the metabolism of cartilage attempts to encompass far too many aspects of the subject, including anabolic and catabolic factors, hormones, prostanooids, and mechanical stress. Some of these topics could be subjects of chapters themselves, and some are in any case covered elsewhere in the book. Calcification of cartilage has long been a subject about which there is contention. In an interesting and forcefully argued contribution on the role of matrix vesicles it is pointed out that deposition of apatite crystals is a different process from metaphyseal bone growth, which involves accretion and nucleation on existing crystals.

An admirable survey of biomechanics explains basic concepts and theoretical models without mathematical treatment, giving some idea of how mechanical properties of cartilage are explained in bioengineering terms and the meaning of the tests that are used.

Volume 2, "Development, Differentiation, and Growth," contains ten chapters, some very good and some mediocre and rather descriptive. The variations in quality are partly reflections of variations in the state of knowledge of the topics under review. The central topic of this volume is chondrogenesis in fetal development and in postfetal life. Many of the contributors discuss current concepts of limb morphogenesis. The chick embryo is the main model system used. The importance of cell-cell interaction, cell condensation, and tissue interaction is made clear. A hypothesis is put forth concerning how cells within the developing limb possess positional information. It seems that a crucial process of cell sorting takes place at the precartilage stage of chondrogenesis. Shape and form are presented as the outcome of the interplay between specific factors intrinsic to the cells and nonspecific factors due to the environment within the embryo. The question of how differential growth is programmed in different species is carefully considered. Certain achondroplasias in which the biochemical defect is known have thrown some light on this question.

A great deal of work has been done on the effects of hormones, vitamins, and growth factors. The book brings this work together, though no clear picture emerges, probably because, as is pointed out in the book, many growth factors are impure and different workers use tissues at different stages of development. There is some duplication between chapters. In particular, a diffuse and unselective first

chapter (occupying about a quarter of the volume) attempts to review the origin of cartilage, thus preempting the contents of many later chapters. The chapter does contain a useful compilation of the authors' extensive work on a partially characterized protein, known as bone morphogenetic protein, that induces ectopic cartilage in adult tissues.

Volume 3, "Biomedical Aspects," consists of ten largely unrelated essays. There is an excellent survey of current work on mechanisms of resorption and remodeling of cartilage. Therapeutic advances will depend on understanding intercellular signals that control cellular mechanisms. Cartilage plays a central role in regeneration, and the volume includes discussions both of epimorphic regeneration (replacement of lost appendages), in which a polarized blastema develops beneath wound epidermis, and of tissue regeneration, in which the granulation is unpolarized. Some unusual examples are given.

There are many age-related and degenerative disorders of cartilage, and the reader is guided through them by a foremost authority. The reader has to guide himself or herself through a comprehensive list of human tumors affecting cartilage, however. A discussion of neoplasia, metaplasia, and the formation of ectopic cartilage leaves one bewildered, partly because, as is pointed out in the book, there are differences in susceptibility of prechondrogenic cells to conversion, differences among species, and differences in stimuli employed.

Genetic defects of cartilage in humans include mutations affecting craniofacial development, some of which have bizarre results. They are of unknown etiology and are discussed in terms of developmental processes. In animals the mutations discussed are those that affect morphogenesis or tissue-specific macromolecules. An example of such a mutation is described in detail by an author who has identified the biochemical defect involved.

Volume 3 includes an excellent critical review of the immunology of cartilage that explains why cartilage is feebly antigenic in normal circumstances. There is a balanced assessment of the debated role of autoantibodies to cartilage constituents in autoimmune diseases such as rheumatoid arthritis.

A clear and wholly non-mathematical discussion of competing theories of joint lubrication makes refreshing reading. The discussion is written in a style that may annoy cognoscenti but is direct and comprehensible.

Bioelectricity, once regarded with

skepticism, is rapidly gaining acceptance. Hence a review of its effects on cartilage is timely. Electrical and electromagnetic field stimulation have different effects. Being non-invasive, the latter has considerable therapeutic potential, but the underlying mechanisms await rigorous experimental analysis.

Though there is considerable overlap among chapters in this treatise and some authors describe their own work in detail and take insufficient account of the contributions of others, the volumes make an important compendium of current knowledge.

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Reprints of Books Previously Reviewed

Archetypes and Ancestors. Palaeontology in Victorian London, 1850-1875. Adrian Desmond. University of Chicago Press, Chicago, 1984. Cloth, \$22.50. *Reviewed* 219, 1058 (1983).

The Ecology of Algae. F. E. Round. Cambridge University Press, New York, 1984. Paper, \$39.50. *Reviewed* 218, 990 (1982).

A Feeling for the Organism. The Life and Work of Barbara McClintock. Evelyn Fox Keller. Freeman, San Francisco, 1984. Paper, \$8.95. *Reviewed* 223, 482 (1984).

The Self and Its Brain. Karl R. Popper and John C. Eccles. Routledge and Kegan Paul, Boston, 1984. Paper, \$14.95. *Reviewed* 200, 1040 (1978).

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Airborne Pollutants from Coal Fired Power Plants. Water Pollution Problems. S. H. Jenkins and P. Schjodtz Hansen, Eds. Pergamon, New York, 1983. iv, 133 pp., illus. Paper, \$40. *Water Science and Technology*, vol. 15, No. 12. From a conference, Copenhagen, Aug. 1982.

Alexander Fleming. The Man and the Myth. Gwyn Macfarlane. Harvard University Press, Cambridge, Mass., 1984. xvi, 304 pp. + plates. \$20.

Biochemistry of Vision. Hitoshi Shichi. Academic Press, New York, 1983. xii, 279 pp., illus. \$42.

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Controversies in Pediatric Surgery. Benjy Frances Brooks, Ed. University of Texas Press, Austin, 1984. xxiv, 232 pp., illus. \$35. From a symposium, Houston, 1978.

Counting the Eons. Isaac Asimov. Avon, New

York, 1984. 224 pp. Paper, \$3.95. Reprinted from *The Magazine of Fantasy and Science Fiction*. Reprint, 1982 edition.

A Critical Psychology. Interpretation of the Personal World. Edmund V. Sullivan. Plenum, New York, 1984. xvi, 195 pp. \$29.50. *PATH in Psychology*.

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Deserts and Arid Lands. Farouk El-Baz, Ed. Nijhoff, The Hague, 1984 (U.S. distributor, Kluwer Boston, Hingham, Mass.). viii, 222 pp., illus. \$46. *Remote Sensing of Earth Resources and Environment*.

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Handbook of Cognitive Neuroscience. Michael S. Gazzaniga, Ed. Plenum, New York, 1984. xii, 416 pp., illus. \$45.

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Optical Waves in Crystals. Propagation and Control of Laser Radiation. Amnon Yariv and Pochi Yeh. Wiley-Interscience, New York, 1983. xiv, 589 pp., illus. \$49.95.

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Technostress. The Human Cost of the Computer Revolution. Craig Brod. Addison-Wesley, Reading, Mass., 1984. xiv, 242 pp. \$16.95.

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