

hydroxylase by phosphorylation has been reviewed by R. E. Zigmond *et al.* Recent research on altered brain proteins in Alzheimer's disease has been reviewed by D. J. Selkoe. J. R. Sanes discusses the role of extracellular matrix molecules in migration and differentiation of neurons. R. H. Miller *et al.* discuss recent understanding of cell lineages and functions of astrocytes and oligodendrocytes of rat optic nerve.

The 1989 *Annual Review of Neuroscience* is an outstanding collection of reviews in some of the most exciting frontiers of neuroscience. It will be of great use for reference and study to all neuroscientists.

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Molecular physiology

Annual Review of Physiology 1989. Vol. 51. Joseph F. Hoffman, ed. Annual Reviews, Palo Alto, USA, 1989. 903 pp.

This volume has as its theme the molecular and cellular basis of physiological mechanisms and functions. It opens with the role of Na^+, K^+ -ATPase in transport. Its coverage of renal physiology includes cellular events lead-

ing to renal hypertrophy, autocrine and paracrine regulation of renal epithelial cell growth, and influence of epidermal growth factors and their characterization. The focus on gastrointestinal physiology relates to gastrointestinal transport regulation and covers recent developments in the understanding of the role of calcium in hepatocytes and pancreas, chloride transport, dietary regulation of sodium cotransport, and transport of bile acids by non-membrane-bound proteins in liver.

In the area of cardiovascular research the use of new cellular and molecular techniques in understanding the mechanism of cardiac growth and development, hormonal control of heart and vascular functions, and the linkages between hormonal and mechanical stimuli appear to be the main thrust. Physically, often electrically, coupled contractile cells of smooth muscle show extraordinary functional diversity. The unravelling of intracellular mechanisms governing contraction and smooth muscle energetics links their importance to the functioning of all organ systems. The diversity of channels, carriers and pumps reflected in the variety of integral membrane proteins that carry out these functions forms the basis of the section on cell and molecular physiology.

Optical measures are being increasingly used to monitor physiological events in the nervous system, ranging from fine neuronal processes to cortical imaging. In the section on comparative physiology, studies on the mechanism

underlying transport of nutrients from the environment to organisms and, following ingestion, within organisms reflect the tone of the renaissance in the field of nutrient uptake and the attempts to find unifying principles. Endocrine regulation of gene expression—molecular mechanisms that translate the interaction of a hormone with its target cell—is the present trend-setter of research progress in the field.

The sorting of molecules into specific organelles within the cell and the role of membranes in this process have attracted considerable attention, particularly in polarized tissues. The work that has examined polarity-determining signals has been directed towards understanding the sorting processes for cellular and membrane proteins, including endogenous and viral proteins.

The section on respiratory physiology addresses itself to the precise cellular and molecular mechanisms by which partial pressure of oxygen (pO_2) is sensed. Peripheral chemoreceptor function; control of mitochondrial respiration; erythropoietin-producing cells; heterogeneity of renal tissue pO_2 ; and oxygen transport in muscle, with particular reference to myoglobin in facilitating this flux, are the topics discussed in this context.

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