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**BOOK REVIEWS**

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**Annual Review of Biophysics and Biophysical Chemistry**, 1988, Vol. 17, pp. 592, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94306, USA), Price: USA \$ 49, Elsewhere \$ 53.

This volume contains a variety of articles on theoretical and experimental tools for the analysis of proteins and nucleic acids, transport phenomena, muscle function and a few articles on biophysical techniques.

The article on the CD spectral analysis of protein secondary structure (pp. 145-166) describes methods of recording the data in the far uv region. An analysis of the information of CD data by singular value decomposition technique suggests that far uv data are required for obtaining reliable structural information. Recent progress in preparing crystalline arrays and single crystals of membrane bound proteins has demonstrated the possibilities of their crystallographic analysis. However, spectroscopic techniques such as Fourier transform IR (pp. 541-570) provide information on protein dynamics and hence complement structural studies. Several methods for predicting the secondary structure of protein, based on their amino acid sequence with varying degrees of success have been developed. A critical evaluation of these prediction techniques is presented on pp. 1-22.

With the development of nucleic acid sequencing methods, a large number of RNA sequences have become available. In order to understand the function of these molecules, one of the necessary steps is the prediction of their secondary structure. The currently available methods for predicting secondary and tertiary structures either by phylogenetic comparison with known structures or free energy considerations are presented on pp. 167-192. Genes in all the living cells are regulated by short stretches of nucleotide sequences recognized by certain proteins that bind and alter the gene expression. Methods of locating and analysing these consensus sequences using a sequence data base and a suitable computer are dealt with on pp. 241-263. DNA, which was believed to have a rigid structure, might undergo a variety of distortions which appear to have important biological consequences. Certain

experimental approaches and theoretical considerations of the quantitative flexibility of DNA are discussed on pp. 265-286. Water appears to play a stabilizing role in the three-dimensional structure adopted by nucleic acids. Its role in DNA polymorphism as deduced by crystallographic analysis is discussed on pp. 125-144. Details of a newly developed technique for the analysis of large DNA fragments, pulsed-field gel electrophoresis, are presented on pp. 287-304.

Several articles deal with higher order structures of biological macromolecules, their assembly and function. Experimental evidence for the mode of packaging of single stranded DNA in filamentous phages based on characteristics of viral nucleic acid and protein are presented on pp. 509-539. The likelihood of a positive immune reaction of an antipeptide antibody with the cognate protein in which the peptide appears and possible implications of this reaction to an understanding of protein folding and production of synthetic vaccines is discussed on pp. 305-324. Experimental evidence for the existence of interconvertible, energetically different conformational substates of proteins, such as ligand binding, Rayleigh scattering, Mössbauer spectroscopy and X-ray diffraction are presented on pp. 451-480 while the genetic methods available for studies on protein folding are covered on pp. 481-508.

Two models for ATP formation, not necessarily mutually exclusive, by chemical potentials across or within biological membranes (pp. 71-98) and sensory rhodopsin of halobacterium halobium, important for energy conversion as well as sensory transduction (pp. 192-216) are articles dealing with the aspects of transport phenomena.

Mechano electric processes of vertebrate hair cells which lead to auditory reflexes (pp. 88-124) and vertebrate skeletal muscle thick filament assembly (pp. 217-240) deal with functions of organelles while the possible functions of myosin in non-muscle cells are dealt with on pp. 23-46.

Transparency of eye lens (pp. 47-70), structure function relations in small ribosomal subunits of *E. coli* (pp. 349-368), cytoskeletal structure and function (pp. 397-430), submicroscopic properties of cytoplasm (pp. 369-398) and movement of chromosomes in mitosis (pp. 431-450) are some of the other articles appearing in this issue.

As usual the review will be welcomed by scientists specializing in Biophysics.

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*Annual Review of Neuroscience*, 1988, Vol. 11, pp. 580. (ed.) W. M. Cowan, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94306, USA), Price: USA \$34; Elsewhere \$38.

The volume in its opening chapter contains interesting reminiscences of T. P. Feng (Shanghai) who started his career in neurophysiology about 60 years ago, starting his work under the guidance of Ralph Gerard (Chicago). Subsequently he worked with A. V. Hill (London), E. D. Adrian (Cambridge), and C. S. Sherrington (Oxford), all Nobel laureates. Later Feng also came into contact with Henry Dale, another distinguished neuroscientist and Nobel laureate. It was a rare story of great experiences for Feng now heading the Institute of Physiology of China at Shanghai.

Substance P is the first neuropeptide to be discovered nearly 40 years ago. Since then two more tachykinins (substance K/neurokinin A, neuromedin K/neurokinin B) have been discovered. The present status of knowledge on the tachykinins and their receptors has been reviewed by J. E. Maggio. Microtubules present in axons and dendrites require certain important proteins to ensure stability. Recent information on the properties of the micro-tubules-associated proteins has been reviewed by A. Matus. Serotonergic (5-HT) neurons have been implicated in regulating mood states. The receptors of 5-HT are getting characterized in recent years. In the review of S. J. Peroutka, the characteristics of probable functional roles of six types of 5-HT receptors have been described.

N-methyl-D-aspartate (NMDA) is known as an important excitatory amino acid neurotransmitter. C. W. Cotman and D. T. Monaghan describe in their review, the properties of the receptor subclasses of NMDA and also discuss their role in the regulation of developmental plasticity of synapses during learning. MPTP (1-methyl-4-phenyl-1, 2, 3, 6-

tetrahydropyridine) has been discovered recently (through drug abusers) that it produces the syndrome of Parkinson's disease, and leads to the hypothesis that environmental factors also may subscribe to the pathogenesis of major diseases like Parkinson's. The intense interest in the MPTP research on experimental animals has been reviewed by I. J. Kopin and S. P. Markey. MPTP is metabolized to its pyridinium derivative MPP by the action of the enzyme MAO-B within glia and in serotonergic neurons. Later, MPP enters dopaminergic and noradrenergic neurons in which it is toxic.

ATP-sensitive potassium channels have been discovered in recent years in skeletal and cardiac muscle, and also in beta cells of pancreas. These channels probably play a role in tuning the cellular activity to metabolites like glucose. These and related aspects have been reviewed by F. M. Ashcroft. I. B. Levitan provided a comprehensive review on the theme of modulation of ion channels in neurons and other cells. The review discusses three broad types of regulation of the channels: the rapid gating as in the unification of the nicotinic cholinergic receptor-channel, the long lasting channel modification involving protein phosphorylation, and the intermediate duration modification of the channel involving G-protein modulation and noncovalent interaction of proteins. R. L. Barchi reviewed the recent knowledge on the molecular structure of the voltage-sensitive sodium channel that serves the role of propagation of electrical signals of neurons.

In recent years, a great deal of interest has arisen to understand the parallel processing mechanisms in brain. Parallel pathways anatomically linking primate association cortex have been reviewed by P. S. Goldman-Rakic. The role of proprioceptors in movement control, both in smoothening the motor patterns and in sensing the physical environment, has been reviewed by Z. Hasan and D. G. Stuart. D. B. Kelley reviewed the mechanisms of nervous system development in causing the sexually different behaviours, considering the hormone-sensitive properties of neurons in certain areas of brain during development.

Recent advances in the understanding of internal neuronal organisation of the cortical laminae of primary visual cortex of primate (monkey) have been reviewed by J. S. Lund. The principles of topographic representation and mapping in the sensory regions of central nervous system have been reviewed in the light of recent information by

S. B. Udin and J. W. Fawcett. They conclude that different types of mechanisms are involved in different sensory systems in the formation of topographic maps. Current views about the Pavlovian conditioning of behaviour have been reviewed by R. A. Rescorla. It is pointed out that associations can form between unconditioned stimuli that may or may not evoke responses regularly, and conditioned stimuli that may be behaviourally neutral or elicit their own responses.

Studies on mRNA of central nervous system have been advancing with great rapidity in recent years due to the availability of several new techniques of molecular biology. The recent knowledge on the transcript structures of different genes has been well summarized in the review of J. G. Sutcliffe.

A new technology has emerged in recent years enabling gene transplantation and the study of how neural circuits are established. The potentialities of this field and the progress achieved so far have been reviewed by M. G. Rosenfeld *et al.*

Biological systems have oscillatory functions or rhythms. The genetics of the clocks of the rhythms has been reviewed by J. C. Hall and M. Rosbash.

Study of learning in mutants of *Drosophila* has contributed knowledge on the genetic basis of learning behaviour. These researches also offered examples to study the interplay of nature and nurture in the shaping of the behaviour of organisms. These interesting aspects have been reviewed by Y. Dudai.

A. Caramazza reviewed the information processing disturbances in the aphasia of lexical system occurring after brain damage. Social communication in some groups of fishes is by electrical signals. The understanding of this mode of communication offered new ethological perspectives and these have been reviewed by C. D. Hopkins.

R. W. Williams and K. Herrup reviewed the recent advances in understanding the factors that determine final neuron numbers, considering the neuron production and neuron death during early development. This field of research has contributed new aspects which were previously not anticipated in the shaping of the brain development.

The volume is, as in previous years, a very illuminating contribution. It will benefit as a reference source to all those who are working in neurosciences.

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**Microstructural Characterisation**, (ed.) E. Metcalfe, (Published by The Institute of Metals, 1 Carlton House Terrace, London SW1Y 5DB) 1988, pp. 349, Price: Not known.

This book is a part of a series of seven books dealing with the characterization of high temperature materials. The six chapters of the book cover in a broad brush fashion crystallography, optical microscopy, scanning electron microscopy, transmission electron microscopy, X-ray diffraction and specialist techniques for microstructural characterization and are dealt with by practitioners of these techniques. The treatment is at a level which would give the new graduates and technicians entering industry an appreciation of the techniques of microstructural characterization. The topics covered are important, as we have a variety of microscopes covering several decades in magnification and resolution. The description of the techniques of microscopy is lucid with emphasis on principles and areas of application. There are useful tables and lists of references for advanced study of these topics. The book is a welcome addition to the collection of books on techniques of microstructural characterization.

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