
BOOK REVIEWS

Annual Review of Biochemistry, (eds) C. C. Richardson, P. D. Boyer, I. B. David and A. Meister, 1986; Vol. 55, pp. 1294, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94306, USA), Price: USA \$33, Elsewhere \$36.

This year's prefatory article is written by Martin D. Kamen, entitled "A Cupful of Luck, a Pinch of Sagacity", describing the chance and sagacity that went into his scientific creativity in introducing use of isotopes in biology, particularly ^{18}O , ^{14}C , ^{32}P . This article is recommended for reading by all those interested in the tracer work to understand the dramatic circumstances that led to the birth of these isotopes. These most valuable tools in biochemistry have been discovered and put to use largely by his efforts. The most single valuable tool, ^{14}C , contributed immeasurably to the study of life processes, as well as those of death as elaborated in the dating technique. It is with ^{18}O , Kamen showed that photosynthetic oxygen originates from water and not CO_2 as believed by Warburg till then. Kamen muses that from childhood he was conditioned to avoid "crowds", and in science "hot areas" of research and was opening doors through which many others pass and prosper. This he did well.

It is difficult to give even a superficial treatment for these articles that cover an extensive area in the frontiers of biochemical research. I will divide these articles into four groups and give some perspective of these developing fields, highlighting some.

Under the group of "Membranes and Cellular Organelles", there are nine articles. Targetting of lysosomal enzymes has suddenly become an active field, with the discovery of 30 disorders linked with lysosomes. It is now shown that mannose-6-phosphate as the recognition marker for protein targetting and a receptor of 214 Kd involved. Transmembrane transport of Diphtheria toxin and related protein toxins which disrupt biochemical pathways and cause "molecular pathogenesis" utilizes receptor mediated endocytosis. Other articles dealt with periplasmic permeases, anion-exchange proteins in RBC, vacuolar acidification obtained by a H^+ -ATPase, voltage-sensitive Na channels, tumor cells and basement membranes, genetics of mitochondrial membrane biogenesis and protein transport in chloroplasts.

In the second group of 6 articles on "Receptors and Binding Proteins", the articles dealt with lectins (much-heralded as the tools of biomedical research, which are approaching centenary of discovery), with companion aspects on proteins/enzymes capable of binding to carbohydrates, proteoglycan core protein families, opiate receptors enkephalins and neuropeptides, metallothioneins and the newly developing area of actin binding proteins including "capping protein" that stops polymerization.

The third group of 8 articles on "Metabolism and Regulation" has a variety of subjects. One of the currently most active fields of research is on arachidonic acid metabolism involving action of cyclooxygenase and endoperoxidases yielding prostaglandins and leukotrienes. The major step in these reactions is the stereospecific removal of hydrogen at different carbons leading to highly reactive carbon radicals. Another lipid with high biological activity is 1-alkyl-2-acetyl glycerol-3-phosphocholine and its properties as a platelet activating factor have been described. The biochemical effects of taurine and beta-aminoacids have been covered in two articles. Purification and reconstitution of ubiquitous sugar:iron cotransport have been described and another article dealt with hormonal regulation of glucose transport, particularly of insulin and this subject is getting more complex with evidence being obtained for involvement of Ca^{2+} -dependent protein kinase and phosphoinositides. Using cytochrome oxidase as the model for discussion, actions of reactive oxygen radicals have been described. The article on extralysosomal protein degradation gives information on how proteolytic enzymes of type B and Ca^{2+} -activated neutral protease are responsible for post-translational modifications of target proteins.

Special mention needs to be made to the article on "Biological Catalysis by RNA". Reading of this is a must for all biochemists as this is one of a trend-changing type. For over 60 years we believed that biological catalysis is the exclusive property of proteins. This edifice is cracking. Firstly, of the three tenets of catalysis—accelerate rates by lowering activation energy, specific to substrates and not being consumed in the reaction—the last one is not strictly followed in the case of type I restriction endo-nuclease, poly(ADP-ribose) synthesis and transmethylation of O^6 methylguanine.

Stoichiometric interaction at specific sites within proteins or nucleic acids, occurs in intramolecular catalysis resulting in a physical change in the macromolecule. Secondly, RNA can act as a true catalyst in intramolecular RNA splicing, cleavage of T₄ RNA and site specific cleavage by tRNA and metal ions.

In the fourth group on "Nucleic Acids and Molecular Biology", there are 11 articles which covered the rapidly advancing knowledge on biochemistry of RNA and DNA. The class of proteins that bind to single-stranded DNA (ss DNA) with high affinity and no sequence specificity participate in DNA metabolism, in stoichiometric, but not catalytic, amounts. These were originally thought to be "unwinding proteins" or "helix-destabilizing proteins". The events related to termination of transcription at the 3'-end of a gene, the efficiency, modulation by attenuator sites, anti-termination factors, processing and modifying signals and their effects on gene expression are reviewed. The movement of genetic information from one locus to another carried by DNA is known as transposition and to distinguish that mediated by RNA is named retroposition indicating reverse flow and transfer of genetic information. An article covered the non-viral retroposition and summarizes the position thus: eukaryotic genes are not as tidy as the genome of prokaryotes. Introns, huge intragenic regions, satellite sequences, pseudogenes and many families of transposable elements suggest that excess DNA is often not subject to strong negative selection. Another article described the discontinuous transcription in trypanosomes, the unicellular eukaryotic flagellates and the causative agents of sleeping sickness and Chagas disease in man. Eukaryotic DNA replication may be somewhat simpler than previously thought and is supposed to be guided by only five proteins-RNA polymerase, initiator pre-priming proteins, DNA polymerase-primase and helicase. This understanding of the process had been made possible due to studies on adenovirus, SV 40 and yeast which brought cellular replication proteins into prominence. Polymorphism is due to difference in primary sequence of genomic DNA. Studies on electrophoretic or antigenic protein variants have now been explained by recombinant DNA techniques which permit direct analysis delineating the alterations of base sequence and can be extended to intervening sequences, flanking sequences and regulatory sites.

Some yeast strains carry 5 nonhomologous species of double-stranded RNA (ds RNA), showing non-Mendelian inheritance, somewhat like intracellular virus-like but non-infective particles. Each of the ds RNA encodes a secreted protein, "killer toxin". The sole product of RNA polymerase I, ribosomal RNA (rRNA) (35-47S), precursor to the mature 18S RNA, 28S RNA and 5-8S RNA of the ribosomes constitutes 50% of the transcriptional capacity, although 10,000 different RNA species are produced. New aspects of processing of rRNA are described and understanding the termination of polymerase I is being made. Another article describes the different modes of alternative RNA processing and the resulting diversity is reviewed. Splicing RNA is achieved by soluble reactions to accurately process exogenously added substrate RNA. This applies to mRNA, tRNA precursors and ribosomal and mitochondrial RNA precursors. During this process of splicing mRNA, a novel form, called lariat RNA, with a circular component with extending tail, formed by a branch with an adenosine residue linked through 2'-5' phosphodiester to the 5'-end of the intervening sequence, is released intact. The multicomponent complexes with sedimentation velocity coefficient of 40-60S which includes the intermediate structure, have been called spliceosomes.

The rapidity in advances makes it impossible even to keep pace with one's limited field. Reading these reviews is the only way to know what is happening in biochemistry.

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Approaches for Incorporating Drought and Salinity Resistance in Crop Plants, (eds) V. L. Chopra and R. S. Paroda, 1986, pp. 132, (Published by Oxford and IBH Publishing Co., 66, Janpath, New Delhi 110 001), Price: Rs. 75.

The book deals mainly with the different aspects of breeding for drought and salinity tolerance in crop plants. The first chapter "Salt affected soils" written by a well known Soil Scientist, I. P. Abrol has brought out the problem of salinity and alkalinity in India, kind of salt affected soils and their management. Crop tolerance to salinity and factors in-

fluencing salt tolerance are also discussed. The chapter "Breeding crop varieties for salt affected soils" by R. S. Rana deals with the basic concept of salt resistance in crop varieties, breeding of crops for enhancing their salinity stress resistance including various breeding techniques for inducing salt resistance in crop plants. The information on salt-resistant rice varieties is very useful. The chapter "Drought resistance in crop plants: A physiological and biochemical analysis" by S. K. Sinha brings out very valuable information on the fundamental and basic concepts of drought tolerance, effect of drought on crop yields, analysis of crop for drought resistance and crop characteristics suitable for dry land condition. The chapter "Breeding approaches for drought resistance in crop plants" by R. S. Paroda deals with the various parameters of drought resistance in crops and different breeding techniques

and approaches for inducing drought resistance in crop plants. The chapter "Screening techniques for drought resistance in rice" by T. T. Chang and G. C. Loresto has brought out various screening techniques for selecting rice varieties for drought resistance and the relative yield reduction under water stress. The book will be a very useful source of information for research workers and students in the field of drought and salinity stresses and their resistance in crop plants.

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