Book Reviews

Biochemistry and Cell Function

Biological Structure and Function. Proceedings of the First IUB/IUBS International Symposium, Stockholm, 1960. vol. 1 (375 pp. Illus. $10.50); vol. 2 (681 pp. Illus. $18). T. W. Goodwin and O. Lindberg, Eds. Academic Press, New York, 1961.

This two-volume set contains the proceedings of the Conference on Biological Structure and Function, held in Stockholm in September 1960, under joint auspices of the International Union of Biochemistry and the International Union of Biological Sciences. Volume 1 contains 26 contributions in three major areas: macromolecular structure and function (10 papers), microsomes and protein synthesis (12 papers), and polysaccharides (4 papers). Volume 2 contains 41 contributions, grouped into sections on mitochondria (17 papers), chloroplasts (11 papers), membrane transport (5 papers), and studies on intact cells (8 papers). This collection is fairly typical of the growing number of volumes on biological symposia. The contributions range from brief discussions of work in progress to significant reviews of research areas. Much of the material has already appeared in journal form, and in a field where advance is rapid, and occasionally phenomenal, certain contributions are almost necessarily already dated.

Among the articles in volume 1 that I found particularly interesting is the paper in which Wilkins discusses the interpretation of x-ray diffraction data for DNA (deoxyribonuclic acid), and the extent to which these provide an exact structure for the molecule. Fourier analysis has served to increase the likelihood that the method of base pairing proposed by Watson and Crick is essentially correct. Work on structure-activity relationships for ribonuclease A is reviewed by Hirs, Halmann, and Kycia. Loss of enzyme activity has been produced by deamination of a single lysine residue, although functional activity resides in the interaction of numerous widely separated groups.

Chargaff's review of the analytical approach to problems of nucleotide sequence in DNA can serve as a reminder of the complexities that remain ahead in the comparative study of DNA base sequences. Two papers on cell fine structure, by Porter and by Haguenau and Hollmann, consider the morphological aspects of protein synthesis. They are representative of the current progress made by electron microscopists toward a functional interpretation of the complexities of cytoplasmic membrane systems. The analysis and function of ribosomes is discussed in several papers, including a report by Perlmann and Morgan on combined agar gel precipitin and radioautographic studies of the microsome fractions of different rat organs, and a paper by Hultin, von der Decken, Arrhenius, and Morgan in which they discuss the effect of various carcinogens and other poisons on the incorporation of labeled amino acids into isolated liver microsomes and ribosome preparations. The stimulatory effects of corticosteroids on preparations from liver and sea urchin eggs is also described.

Volume 2 contains an important collection of papers on mitochondria and chloroplasts, and it certainly presents one of the best current symposia on this area. Papers by Lehninger and by Lindberg, Löw, Conover, and Ernster describe the effects of thyroxin and its analogs on mitochondrial phosphorylation and swelling. This includes interesting speculations on whether thyroxin-induced changes in morphology represent a cause or an effect of altered metabolic function. Other contributions are concerned with mechanisms of ascorbate-induced mitochondrial lysis (Hunter), integrated mitochondrial oxidations, as controlled by the activity of ATP-synthesizing enzymes (Chappell), and the probable role of contractile proteins in the metabolic control of mitochondrial structure (Packer; Holton and Tyler). Several papers deal with specific aspects of electron transport (Chance; Ernster) interaction with mitochondrial lipids and ubiquinone (Redfearn; Ziegler), pyridine nucleotides, and levels of ATP (Slater, Bailie, and Bouman; Klingenberg).

Partly because their structure is simple, in comparison with the chloroplasts of higher plants, bacterial chromatophores have provided new insight on certain basic aspects of photosynthesis. Papers on photosynthetic bacteria include Kamen's on heme proteins and Bergeron and Fuller's on *Chlorobium* macromolecules. Arnon has contributed a characteristically extensive review of photosynthetic phosphorylation, and aspects of this system are also discussed by Jagendorf and Kahn, by Vennesland, and by Baltscheffsky.

A series of papers—by Runnström, Mazia, Gustafson, Loomis, Prescott, Zeuthen, R. Allen, and Afzelius—provides a very brief glimpse into studies on intact cell systems. These contributions serve to demonstrate that correlations between structure and function in such complex systems as amoeboid motion and cell division are still speculative and fragmentary. The field of intact cell cytology has a long way to go before it can match the impressive recent progress in our understanding of mitochondrial function. The concluding papers (four) on membrane transport include an interesting discussion of the role of membranes in cell metabolism by Mitchell and a discussion of ferritin uptake in amoebas by Nachmias and Marshall.

The merits of these volumes lie both in their international representation and in their orientation around those areas of biochemistry which have so far provided the greatest insight into problems of cell function. "Molecular Biology," although popular in theory, is obviously in need of sound general principles. These volumes, by offering a good sampling of work in this area, will help in the endeavor.

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