each with its own historical density, for a book as brief as this to treat adequately. Edison scholars will also recognize Wachhorst's limited familiarity with the technical detail of Edison's methodology and major inventions of the 1870's and 1880's.

Despite these flaws, the book is a genuine contribution. It is a pleasure to read, and the Edison material is organized in the most helpful manner achieved to date. Those who wish to understand Edison's place in American culture can ill afford to ignore the critical reading of the Edison image provided here. Wachhorst succeeds, finally, because he cares for his subject. His reinterpretation of Edison is not flawed, as was Robert Conot's recent *Streak of Luck*, with carping iconoclasm. Thus it is his affection for his subject, both myth and man, that permits a growth in critical awareness for the reader.

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Biological Recognition

Structural Aspects of Recognition and Assembly in Biological Macromolecules. Proceedings of a conference, Rehovot and Kibbutz Nof Ginossar, Israel, Feb. 1980. MIRIAM BALABAN, Ed. Balaban International Science Services, Philadelphia, 1981. In two volumes, illus., + stereoviews. Vol. 1, Proteins and Protein Complexes, Fibrous Proteins. xxii, 486 pp. Vol. 2, Nucleic Acids and Nucleic Acid Complexes, Viruses. xvi pp. + pp. 487–962. The set, $128.

To cover structural aspects of recognition and assembly in biological systems and to try to derive some general principles governing them from the point of view of macromolecular structure is an ambitious project. And yet the two volumes that result from the proceedings of a conference in honor of Aharon Katzir-Katchalsky provide the reader with a fascinating and comprehensive description of what we have learned of structure in biology from the viewpoints of both form and function. The volumes also demonstrate, with a wealth of detail and many thoughtful reviews of general principles, the impact that structure determination by diffraction methods has had on the fields of biochemistry and molecular biology. Four main subjects are covered: proteins and protein complexes and fibrous proteins in volume 1; nucleic acids and nucleic acid complexes and viruses in volume 2. Color stereoslides, produced by Richard Feldmann, and a stereo viewer are provided. The results of x-ray diffraction analyses are, as expected, the main subject of discussion because so much information has come from this method. However, many other techniques have been used for the work described—neutron diffraction, fluorescence spectroscopy, nuclear magnetic resonance, electric dichroism, ultrasonic absorption, electron microscopy, photo–cross-linking, hydrodynamic measurements, kinetic studies, amino acid sequencing, chemical modification, and antibody studies.

Much has been learned about "recognition" in biological systems from an analysis of enzyme-substrate and enzyme-inhibitor interactions, and many papers are devoted to the subject. The question of whether there is a conformational change in an enzyme on binding substrate or inhibitor leads to a discussion of "induced fit" versus selective binding and hence to consideration of protein flexibility, folding, and domain definition. It appears that an enzyme is flexible until the correct inhibitor binds, at which point it generally becomes more rigid. The consequences of this, such as a maintenance of the order to the steps in the docking process, and the possibility of a biological response, such as a signal or message, are well described. Some interesting papers on domains in globular proteins are included. Methods for defining and analyzing such domains and for describing them by techniques such as distance matrix analyses are suggested. The ordering of water and the solvent accessibility of groups in a macromolecule are discussed throughout. Another field involving recognition is immunology. Models of insulin based on the crystal structure have been built with varying amino acid replacements found in nature, and the results analyzed to give likely conformations at the principal area of "recognition."

Enzymes studied include protease A, trypsin and its protein inhibitor, trypsinogen, glutathione reductase, aspartate aminotransferase, subtilisin BPN' and its protein inhibitor, KDPG aldolase, metaquohemerythrin, cytochrome c_3, sickle cell and normal hemoglobin, hemocyanins, blood clotting proteins, creatine kinase, bacteriorhodopsin, soy bean agglutinin, various immunoglobulins, insulin, phospholipase A_2, and snake neurotoxins. A section on fibrous proteins mainly covers tropomyosin and collagen, together with a discussion of computer modeling, studies of muscle action in general, and an analysis of the assembly of collagen in vitro.

The papers on nucleic acids stress variability in DNA structure. Just as flexibility was considered for proteins, so breathing, deformation, and flexibility are all important for nucleic acids and are discussed in detail. For example, such fluctuations lead to base unstacking and allow drugs and dyes to intercalate in DNA.

One of the most exciting experimental results of the '70's was the determination, to atomic resolution, of the structures of transfer RNA's by diffraction techniques. The first structures were those of elongator tRNA's. Now that the structures of several more elongator tRNA's and of an initiator tRNA have been determined, analyses are under way to determine what structural feature makes one tRNA an elongator and another an initiator. One model is presented here. To understand the tRNA's completely one needs to know the binding to the nucleic acid and the nature of the interaction of the tRNA with the synthetase. Structural studies are in process for some synthetases. Photocrosslinking experiments are also described. The structural work on nucleosome crystals has yielded some very significant results. Nucleosome crystals have also been studied (at low resolution) by neutron diffraction. Some preliminary work has also been done on portions of ribosome structure.

In the sections on viruses the major topic of discussion is, as expected, the "assembly" of protein, but the recognition of viral RNA is also discussed. For example, oligonucleotides soaked into tobacco mosaic virus protein disk crystals reveal a possible RNA binding site. Papers on such viruses and their related macromolecules as southern bean mosaic virus, tomato bushy stunt virus, turnip crinkle virus, tobacco mosaic virus, Pfl filamentous bacterial virus, adenovirus coat protein, influenza virus neuraminidase, CRO regulatory protein from bacteriophage λ, T4 prehead core, and interferon all give information, beautifully illustrated, on virus form and function.

In short, this is a superb book, ideal for anyone wanting to learn about recognition and assembly, enzyme action, nucleic acid or virus structure, and some general principles of structural aspects of biochemistry or molecular biology. It is highly recommended.

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