

original references when specific numbers or critical interpretations are required. However, on balance the book should be a valuable adjunct to the library of anyone contemplating work in the field of nonmetallic magnetic solids and I would recommend its purchase subject to the qualifications noted above.

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Structural chemistry and molecular biology. Edited by ALEXANDER RICH and NORMAN DAVIDSON. Pp. iv + 907. San Francisco and London: W. H. Freeman, 1968. Price \$ 10.

The editors and authors have dedicated this volume to Linus Pauling in recognition of his outstanding contributions to structural chemistry and molecular biology over the last 40-odd years.

In a historical introduction J. H. Sturdivant demonstrates the strongly coherent development of Pauling's knowledge and understanding of molecules, beginning with the early elucidation of coordination rules governing the structures of ionic crystals, and leading, through quantum-mechanical interpretation of directed valency, to structural principles applicable to the largest molecules of biological origin. These principles combined the possibilities suggested by quantum theory and a mass of experimental observations, particularly the molecular geometry revealed by X-ray crystal structure analysis.

Pauling taught his fruitful approach to many others, and it provides a unifying theme in this book, which contains some 60 essays on a wide variety of topics. The section headings give some indication of the range: structure of proteins; chemistry of proteins; antibodies; molecular biology; nucleic acids; hydrogen-bonding, water and ice; chemistry and structure of smaller molecules; metals and minerals; chemical theory. Such diversity cannot be adequately reviewed here, but it may be useful to draw attention to some contributions which are likely to have a wide appeal as background reading.

The theme of the chemistry of proteins section is the attempt to predict the conformation of a protein molecule from its amino-acid sequence. The apparent ease with which, in nature, the molecule finds its way from disorder to order makes Edsall optimistic that we can learn how it is done. In the same section Hamilton and McConnell review the use of spin labels to investigate conformational detail.

A group of papers on inherited diseases which are associated with defective proteins is appropriate: Pauling was the first to recognize that human sickle-cell anaemia must reflect a difference in haemoglobin molecules. Among many similar variants of haemoglobin and other proteins discovered since, not all are disadvantageous to the organism; some offer useful variety in activity or in the rate of their synthesis.

The papers on hydrogen bonding are sufficiently closely related to show some 'resonance' between them. Donohue effectively criticizes four common assumptions: (1) that H-bond geometry around the acceptor atom correlates well with the arrangement of orbitals occupied by unshared electron pairs; (2) that bifurcated hydrogen bonds are readily admissible; (3) that short H-bonds must be linear; (4) that CH...O H-bonds exist. Two essays presenting different experimental approaches to the problem of structure in water both conclude that the H-bonding is sufficiently flexible for almost all molecules to take part in four bonds; separate molecular species with different numbers of H-bonds cannot be detected.

Complex intermetallic compounds whose structures are based on Friauf polyhedra are described by Samson in a beautifully illustrated essay. This is nicely complemented by the discussion of σ -phase-related transition-metal structures from David and Clara Shoemaker.

The volume concludes with a variety of papers on chemical theory, a reprint of Pauling's *Nature of the Chemical Bond* (1931) and a bibliography of his scientific publications.

The great range of topics discussed is a suitable tribute to Pauling's wide interests, and a sense of occasion has inspired the authors to produce some very shapely contributions. My only regret is that these shapes do not fit together very well: the book is most successful where a single topic is closely discussed from several different points of view.

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