

Recensiones

The Purines — Theory and Experiment. Edited by Ernst D. Bergmann and Bernard Pullman. 614 pages. The Israel Academy of Sciences and Humanities, Jerusalem 1972 (distributed by Academic Press, New York). \$ 29.

In the course of my first reading of this book I have been fascinated by its content. And I think that everyone who is interested in the problem will share my feelings.

The book comprises forty-eight original papers of varying length presented at the International Symposium held in Jerusalem, 4–8 April 1971. The bulk of the papers presented by an international selection of chemists (from which representatives of Eastern Europe except one from Rumania were unfortunately absent) can be placed in four main subject areas: 1. the application of quantum-chemistry for the description of the properties of purines, 2. the molecular structure of purines, their nucleosides and nucleotides and of purine adducts, 3. physico-chemical properties of purines, 4. the organic, biological and medicinal chemistry of purines and related compounds.

Comparatively few papers dealt with the theoretical aspects of the purine structures. Among them A. Pullman and B. Pullman have shown on selected examples how the quantum theory interprets the essential properties of the purines and H. Berthod and B. Pullman have described the molecular orbital calculations on the conformation of purine nucleosides. These two papers together with the reviews by Pullman, B., Pullman, A.: *Advan. Heterocyc. Chem.* **13**, 77 (1971) and by Pullman, A., *Topics in Curr. Chem.* **31**, 45 (1972) represent important contributions on the quantum chemistry of purines.

A large number of papers was devoted to the determination of purine structures mostly by means of the X-ray crystallography although several papers refer to IR, NMR, UV and fluorescence spectroscopies, circular dichroism etc. Among them a number are, in my opinion, particularly outstanding: "Molecular Structures of Rare Nucleosides of Transfer RNA" by M. Sundaralingam, "Conformations in Polynucleotides" by S. Arnott, "The Structure of Adenosine Triphosphate" by O. Kennard, W. W. Isaacs, W. D. S. Motherwell and D. G. Watson, "Solid-State Stacking Patterns of Purine Bases" by C. E. Bugg and two papers by H. M. Sobell, "Hydrogen-Bonding Studies of Base Pairing in Solution and in the Crystalline State" and "The Stereochemistry of Actinomycin Binding to DNA". These papers and related ones present in a beautiful form the experimental aspects of the crystallographic studies on the nucleic acids.

The contributions in the general area of the physico-chemical properties of the purines include the IR and NMR studies on purine-pyrimidine base pairing, IR study on protonation sites in purines, NMR, ESR, UV, luminescence, ORD, CD studies on purines and their nucleosides, mass spectra of purines, charge-transfer spectra of the complexes of purines with different partners etc. These papers contain a large amount of experimental facts, which have not yet been interpreted theoretically. Unfortunately, one paper on NMR studies of the tautomerism of nucleic acid bases has now been shown to be erroneous. A conclusion that guanine and cytosine can exist in solution in a large fraction (~15%) in rare tautomeric forms has been drawn from the analysis of the NMR spectra of insufficiently purified samples [cf. Wong, Y. P.: *J. Am. Chem. Soc.* **95**, 3511 (1973), Pieber, M. *et al.*: *J. Am. Chem. Soc.* **95**, 3408 (1973)].

A number of lectures was devoted to the organic chemistry of purines (e.g. the synthesis of purine-like compounds), biochemistry of purines (e.g. semi-conductivity of double-stranded DNA, radiation damage, free-radicals or photodynamic degradation of purines) and medicinal chemistry (e.g. carcinogenic compounds, chemotherapeutic aspects or chemical modifications of purines).

The papers were submitted to a critical audience. It has been particularly interesting to read not only the critical remarks but also the impressions and opinions of the participants on several problems connected with the properties of the purines. It is one of the merits of the book that the main aspects of the discussion have been largely included (they occupy about 14% of the whole book). Moreover,

the final chapter "Concluding Remarks" by E. D. Bergmann is a good guide over the themes of the contributions.

As is usual with the other books of the series of Jerusalem Symposia on Quantum Chemistry and Biochemistry the quality is very high and the editors are to be congratulated for their editorial work. The book is highly recommended for the large amount of factual material that is in many cases presented in a fascinating form. To my knowledge, there is no other book on purines which covers quite as large an area and does it to such a depth.

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