
BOOK REVIEWS

BIOPHYSICS

MAGNETIC RESONANCE OF BIOMOLECULES: AN INTRODUCTION TO THE THEORY AND PRACTICE OF NMR AND ESR IN BIOLOGICAL SYSTEMS

P.F. KNOWLES, D. MARSH and H.W.E. RATTLE

John Wiley and Sons, New York, 1976, pp. 343, ISBN 0 471 49575 1 (Cloth), \$9.95

These authors of long lists of publications on the applications of magnetic resonance techniques have certainly written an excellent book, albeit not entirely a balanced one. The subtitle describes the contents well. An organic chemist will not be disappointed by the theoretical treatments of various aspects of both NMR and ESR or by the coverage of the more recently developed techniques used to obtain additional information. In fact, he will be surprised to find that much of the "biological" material is comprehensible to him and in the process of reading or leafing through the book, he will appreciate that biomolecular problems are vast, challenging, complex and yet capable of solution to a certain degree. A biochemist well-versed in the physical techniques should come across a number of familiar experimental systems and spectra carefully selected for illustrative purposes. Besides, for those teachers of biophysical techniques, this book will reduce the pains of searching the literature and collected papers for good examples of applications in magnetic resonance. But, despite efforts at simplification by the authors, those students and researchers with a minimal chemical and mathematical background will find some parts slow going owing to the multifaceted information provided. But they will without doubt discover certain ways of doing experiments hitherto unknown or thought infeasible by them.

The book is abundantly illustrated to aid visualization of concepts and equipment. Published spectra are in ample supply and their sources are given. Each chapter contains a summary and a list of relevant papers, reviews and books. There is a short glossary of some 200 technical terms at the back to make reading easier for those who are strictly physical or biochemical. Biomolecular systems incorporated are numerous: amino acids, synthetic polypeptides, proteins, histone, chromatin, enzymes, nucleotides, tRNA, hormones, drugs, lipids, metalloproteins, free radicals, membranes and tissues. Among the newer techniques recently used for gaining further insight into the structure and behaviour of biomolecules and macromolecular aggregates are, e.g., ^{13}C NMR, ^{31}P NMR, Pulse Fourier Transform NMR, Nuclear Overhauser Enhancement, Internuclear Double Resonance, relaxation kinetics, shift reagents, ESR hyperfine splitting, spin labelling, Electron Nuclear Double Resonance, and Electron Electron Double Resonance. Finally, the instruments and their operation are given treatments adequate enough for a novice to contemplate magnetic resonance experiments without undue fear.

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ANTHROPOLOGY

THE RIDDLE OF THE PYRAMIDS

KURT MENDELSSOHN, F.R.S.

Oxford University, Praeger Publishers, New York, 1974, pp. 224 (85 illustrations).

Everyone must surely have read or seen something about the pyramids of ancient Egypt, even if only the celluloid version of Hollywood. But have the true role and function of the pyramids been satisfactorily established? Professor Mendelsohn, the distinguished low-temperature physicist, has put forward his thesis that they must be more than just royal tombs.

The period of construction of all the large pyramids was less than one hundred years and, moreover, the era was at the very dawn of the ancient Egyptian civilization that was to extend to over three thousand years. 25 million tons of quarried limestone, all accurately shaped and surfaced, and vast labour force and organization were used to bury three pharaohs? Later pharaohs were buried more discreetly. Other puzzling features pointed out in this book include the high proportion of the number of tombs compared to the number of pharaohs and, more significantly, the simultaneous construction of more than one large pyramid.

The book describes in chronological order each pyramid, their structure, tomb chambers and passages. From these technological evidences Professor Mendelsohn has put forward his theory that pyramid construction, *per se*, was the force that ruled Egypt during that critical period of its history. The ultimate goal of the pyramids was to transform a tribal society into a national state; a new social order that, once attained, would give up the wasteful project.

The book also reveals candidly the thinking process of an eminent scientist as he grapples with an intellectual problem. The pyramids had intrigued Professor Mendelsohn for several years, but he had made no attempt to tackle the riddle. Then, a natural phenomenon, totally unrelated to pyramids, became the vital central clue that made all the accumulated observations fit together into a simple logical pattern. A theory is proposed, to be tested, debated and judged by the scientific community.

There is a short chapter on Mexican pyramids, a Bibliography and an Index. As an incentive to read the book, I would like to mention that Professor Mendelsohn offers a simple solution to the curious geometrical property of the pyramids. Namely, a pyramid with an angle of elevation of $51^{\circ} 52'$ has the value of the ratio of the geometrical height to its circumference of $\frac{1}{2}\pi$. The Pyramid of Khufu (Cheops), the largest pyramid at Giza near Cairo, gives this ratio correct to better than one part in a thousand. In one paragraph the author has dismissed a century of numerology and astrology based on the pyramid measurements.

For those who are unable to obtain a copy of this book, Professor Mendelsohn has written two articles on the pyramids in *Science Journal* 4, 48 (1968) and *American Scientist* 59, 210 (1971).

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