of men. He was an imaginative creator of ideas. He was a supersalesman of the excitement of science. He was a talented scrounger who in the early stages of the development of the cyclotron was able to find an available 85-ton magnet.

As his successful development of the cyclotron became better known, Lawrence was able to obtain substantial financial support. Young men were eager to join him. His laboratory and its work commanded the attention and admiration of the world's leading physicists as well as that of many leaders from other branches of science and other walks of life. In 1939 he was awarded the Nobel Prize.

Following his meteoric rise during the '30's, it was inevitable that Lawrence should be an important figure during World War II and after. He was a Nobel laureate, a scientist with a reputation of being able to deliver on his promises even when he promised what might seem impossible. He was an experienced manager backed by a highly competent team. In the last half of this book the author portrays Lawrence's use of power. First, there are described Lawrence's wartime activities, including his efforts in bringing about the Manhattan Project, and his subsequent participation in that project. Then, his efforts of the following decade are recorded; during this period Berkeley was in the vanguard in developing machines for high energy physics and in exploiting them. The author also covers Lawrence's participation in the development of the hydrogen bomb and describes how an accumulation of tensions associated with this effort, including his estrangement from Oppenheimer, found Lawrence vulnerable. He suffered from an ulcerative colitis, and his worst bouts with the disease were clearly emotionally related. Ultimately the disease killed him.

In assembling his book the author worked under the handicap that he had never met Lawrence. Nevertheless, he has succeeded in presenting a unique and valuable biography. He has tapped many resources, including voluminous personal correspondence, official records, and personal recollections. He has avoided becoming a captive of his subject. Perhaps this cannot be said of all the hundreds of acquaintances who furnished material to the author. There is some evidence that time has softened their memories of some of the tougher aspects of Lawrence's character. For example, the author in two places mentions the possibility that Lawrence might have been a "slave driver." Then he quotes witnesses who deny the possibility. Perhaps they are correct, but my memory of graduate school at Berkeley is that any time I worked less than a hundred hours a week I was made to feel that I was a "weak sister."

The author does not attempt to analyze or interpret his subject; rather he has chosen to be a careful reporter. Nevertheless, the reader will find that Lawrence emerges in the book sharply etched. For example, the influence of his upbringing is there—his lack of profanity and his exemplary honesty. Throughout the book are many evidences of Lawrence's unusually deep loyalty and attachment to old friends and former colleagues. Also evident is Lawrence's consistent refusal to be petty either through gossip or through jealousy of the successes of others. For those who did not know Lawrence or the era in which he lived the author may present more details than they care to read. However, those who have some memory of the man will find this book fascinating, and historians will find it a rich source.

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Science

Techniques for Biology

Magnetic Resonance in Biological Systems. Proceedings of the 2nd international conference, Stockholm, June 1966. A. EHRENBERG, B. G. MALMSTRÖM, and T. VÄNNGÅRD, Eds. Pergamon, New York, 1967. viii + 431 pp., illus. $21.50. Wenner-Gren Center International Symposium Series, vol. 9.

This volume of proceedings of the Second International Conference on Magnetic Resonance in Biological Systems includes a wide range of contributions based on most of the principal magnetic resonance techniques—high-resolution nuclear resonance (NMR) and relaxation, electron spin resonance (ESR), electron-nuclear double resonance (ENDOR), and Mössbauer spectroscopy. The proceedings of the first conference (Boston, 1964, reported in *Science* **146**, 552) were not published, and there are no plans to publish the proceedings of the third, to be held this year. The book is therefore likely to remain a unique public record of an otherwise closed series of meetings. With the emphasis on scope—which is highly commendable if the reader is to assess the relative power and merits of the different techniques—one is not surprised to find that the volume faithfully reflects the unevenness of achievement in different areas. The contributions range from more or less definitive solutions of biochemical problems, to exploratory surveys, to discussions of basic theory without obvious applications, to purely instrumental developments. There is not much question that the standard of achievement in this field is set by the successful use of magnetic resonance to solve a biologically relevant problem—just as the determination of a protein structure today sets the standard in protein x-ray crystallography. Nor is there much question that magnetic resonance is not just another spectroscopic tool. In principle it is able to provide unique and very detailed information in at least two areas: (i) structure, conformation, and interactions of macromolecules in solution (largely NMR, but also ESR in problems of conformation) and (ii) structure of crystal fields surrounding metal ions and the nature of metal ion catalysis. But the record makes it plain that only in rare instances has this potential been exploited to the full extent.

Among the highlights of the volume are the pioneering studies of McDonald and Phillips with the 220-megacycle NMR spectrometer, clearly showing that at least partially interpretable NMR spectra of proteins can now be obtained, and the elegant experiments of McConnell illustrating the usefulness of labeling proteins with synthetic free radicals (spin labeling) in studies of protein conformation. It is of course true that these and several other important developments that have occurred since 1966 are recorded more completely in the more recent literature than in the collected volume—yet this is to be expected in a rapidly growing field.

The book is not for the novice. A fair degree of familiarity with at least the elementary theory of magnetic resonance is needed to read the text. Still, the erudite nonexpert can get from it an admirable bird's-eye view of the direction in which the field is moving. The thoughtful reader will also gather that a successful marriage of virtuosity in the theory and practice of physics with sound biological intuition is still a very rare thing.

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