

*Biochemical Spectroscopy*

by R. A. Morton

Adam Hilger, London, 1975

2 Vols., xvi + 381 pages and 489 pages. £ 80

It is difficult now, at a time when sophisticated equipment for all branches of spectroscopy is available commercially, to recall the extent to which absorption spectroscopy in the visible and ultraviolet dominated both the analytical and structural aspects of biochemistry in the thirties and forties. The contents list of my copy, the second edition (1942), of Professor Morton's earlier book, *The Application of Absorption Spectra to the Study of Vitamins, Hormones and Coenzymes*, is a reminder of the central role of this branch of spectroscopy in the study of the steroids, the fat-soluble and water-soluble vitamins, purines and pyrimidines, proteins and coenzymes, but casts a merciful veil over the technical problems associated with the measurement of absorption spectra in the pre-photoelectric era. Over 30 years later, in the sumptuous 2-volume work under review, appropriately from the same publisher, Morton now reviews a very much wider range of biochemical themes to which spectroscopy has made major contributions. As in the earlier work an attempt is made to discuss the spectroscopic findings in a biochemical context, and although some attention is given to other spectroscopic techniques, the emphasis is still on electronic absorption spectra, although fluorescence, infrared, proton n.m.r. and mass spectroscopic data are listed where they are relevant.

The book as a whole is best regarded as a collection of monographs of varying length on areas of biochemical interest or on classes of natural products, supplemented by a few sections on background material relating to the general topic of electronic absorption spectroscopy. In each monograph the purpose is to demonstrate the understanding that spectroscopic methods have provided concerning the structures, reactions and functions of the

particular class of compounds under consideration. All the familiar topics discussed by Morton in his earlier book are discussed here in more detail and with the increase in comprehension that has come from thirty years of further study. The new topics also reflect the impact of both conventional and specialized spectroscopic techniques on new areas of biochemical research, including photosynthesis, vision research, bioluminescence, phytochemistry, insect biochemistry, compounds of toxicological interest, and some aspects of food science and bio-analytical problems. The largest single section is that on vitamins and coenzymes, followed by those on proteins and enzymes (with a section on fluorescence spectroscopy) and heterocyclic compounds, including nucleotides and nucleic acids. As might be expected in view of Morton's important contributions to the subject, the section on quinones of biochemical interest is particularly impressive, and there is also a brief but welcome chapter on flavanoids and anthocyanidin pigments.

Any one of these chapters could be read with profit as a first reference by a biochemist wishing to come to terms with the spectroscopic aspects of a particular area of biochemistry, or with finding a spectroscopic solution to a biochemical analytical problem.

There are some defects to be noted. A large number of small errors and misprints have persisted, and some of the spectra reproduced show their age. The main criticism must, however, be directed at the very high price of this lavishly produced book, which can surely only limit the availability of a work which should be widely available in the laboratory and not entombed on a library shelf.

G. H. Beaven

Fourier transform infrared (FTIR) and Raman spectroscopy are complementary techniques, typically called vibrational spectroscopy. Both techniques allow simple, rapid, non-destructive, specific, providing fingerprint spectra, and real-time analytical. Single-molecule force spectroscopy with the atomic force microscope provides molecular level insights into protein function, allowing researchers to reconstruct energy landscapes and understand functional mechanisms in biology. With steadily advancing methods, this technique has greatly accelerated our understanding of force transduction, mechanical deformation, and mechanostability within single- and multi-domain polyproteins, and receptor-ligand complexes. In this focused review, we summarize the state of the art in The purpose of this chapter is to provide practical guidance in the clinical application of proton MR spectroscopy (MRS) of the brain. It must be understood at this point in the maturation of clinical MR that MRS is only an adjunctive tool in the diagnostic neuroradiology armamentarium. Despite the initial excitement about the specificity and added value of metabolic information, the reality is that MRS has value, but that value is complementary and only rarely trumps other imaging findings.