mation on the synthetic procedures used for commercially available resins and discuss the general properties of these resins. A mathematical treatment of the bases of equilibrium, kinetics, and chromatographic plate theory forms the theoretical core of the book. This treatment is presented with adequate experimental support, including detailed descriptions of the manner in which supporting data were acquired. The subject of ion exchange chromatography is treated the most extensively from this mathematical point of view, and it is the authors' obvious intention to integrate analytical ion exchange into a generalized view of chromatography.

Since chromatography is the principal subject of the work and the one of most interest to analytical chemists, the theoretical treatment is accompanied by descriptions of techniques and tables of separations for both inorganic ions and organic compounds. The tables provide rapid reference for the practicing chemist. References run through 1967.

The separation of organic compounds by the use of ion exchange resins, where the underlying principles are not ion exchange at all but depend on van der Waals or Donnan forces, receives considerable attention. Salting out and solubilization chromatography are treated at length, and a comparison with gas-liquid chromatography is attempted. The authors maintain enough perspective to note that only in special cases is elution through exchange resins advantageous over gas-liquid methods.

The application of less common exchange materials is also detailed. These include macroreticular resins, ion retardation resins, ion exchange membranes and papers, liquid ion exchangers, and inorganic exchangers of the hydrous oxide types. The coverage here is extensive enough to allow the reader to become aware of the many existing possibilities.

The book is well printed and contains only a few errors in typography. Indexes and references are adequate. The authors have made a comprehensive study of ion exchange theory and capabilities and have exercised sufficient restraint so that the reader may obtain a realistic view of ion exchange among the many branches of chromatography.

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Biological Spectroscopy

Fluorescence Assay in Biology and Medicine. Vol. 2. SIDNEY UDENFRIEND. With a contribution by J. D. Winefordner, P. A. St. John, and W. J. McCarthy. Academic Press, New York, 1969. xii, 660 pp., illus. $19.50. Molecular Biology series.

Fluorescence spectroscopy, once the province of the analytical chemist, has recently emerged as an important technique for the study of macromolecules. It is gratifying that the second volume of *Fluorescence Assays in Biology and Medicine* has been expanded to satisfy the needs of newcomers interested in this aspect of fluorescence.

This monograph is actually a compromise between a second volume and a new edition of the previous book. Whole sections have been rewritten and considerable new information has been introduced, and the volume stands as a complete entity and may easily be read independently of the previous version.

Initial chapters give an excellent review of the basic concepts of fluorescence and phosphorescence couched in nonmathematical terms, providing a readable and rewarding introduction to fluorescence for graduate students and other novices in the field. The section on instrumentation is extensive and has been updated since the first volume. It gives detailed information regarding various commercial spectrophotofluorometers and also includes descriptions of several laboratory-constructed instruments.

The recent literature abounds with the presentation of uncorrected fluorescence spectra. Frequently the possibility of various artifacts has been ignored. It is fortunate that this volume includes a clear and detailed discussion of the practical aspects of spectrophotofluorometer calibration and some proposals for standardization of the reporting of fluorescence spectra. The discussion of several of the artifacts common to fluorescence measurements should be extremely helpful, particularly to those who have newly become interested in the technique.

In recent years there has been a renewed interest in fluorescence lifetime measurements. Advances in instrumentation and theory have led to novel applications of this technique in studies of macromolecules. It is unfortunate that this aspect of fluorescence is treated only in a cursory manner.

The main portions of the monograph are devoted to detailed descriptions of the fluorescence of amino acids, lipids, coenzymes, and drugs, as well as of carbohydrate and nucleic acid derivatives. There is also considerable information regarding the fluorescence of proteins and peptides, including the relation of fluorescence to protein structure.

The novel subject of fluorescence probes is treated in some detail; new sections on probes per se and on fluorescence polarization and energy transfer provide more detail than was available in the first volume.

The monograph will continue to be useful as a reference work for those who are interested in a particular assay as well as for those who desire a general introduction to fluorescence.

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Embryological Technique

Organ Culture. J. ANDRÉ THOMAS, Ed. Translated from the French edition (Paris, 1964) by the Express Translation Service. Academic Press, New York, 1970. xiv, 512 pp., illus. $29.50.

The practice of organ culture owes a great debt to Etienne and Emilienne Wolff and the group that has worked under their direction at the Institute of Embryology and Experimental Teratology in Paris for about a quarter of a century. J. A. Thomas, himself a pioneer in tissue and organ culture, edited (for publication in French in 1964) a series of lectures delivered in 1963 by the members of this group. The present book is a translation of that work. Each chapter has been supplemented with an addendum reviewing work since 1964. It is a measure of the rapid growth of the use of organ culture techniques that, for example, the chapters on synthetic media, on hormones and inhibitors, and on invertebrate organ culture have smaller bibliographies than their respective appendices.

Though the emphasis is on the work of the Paris school, from which most of the examples and the numerous illustrations are drawn, relevant studies elsewhere are adequately covered by most of the contributors. No other book dealing so extensively with the many manifestations of organ culture is available. The perspective of the