treatment of centrifugal distortion has been applied to several molecules. A good deal of the more recent work in microwave spectroscopy has involved internal rotation. Such refinements and advances were not dwelt on by Townes and Schawlow, but are covered here.

The text is clearly written. Equations, matrix elements, symmetry tables, and the like abound. The treatment is detailed enough for a reader fluent in quantum mechanics to follow, yet rarely complete enough to eliminate the need to refer to the original literature. Citations are made to a list of 1710 references.

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Animal Disease

Pathology of Laboratory Rats and Mice. Papers presented at a conference, London, April 1966. ERNEST COTCHIN and FRANCIS ROE, Eds. Davis, Philadelphia, 1967. xxiv + 848 pp., illus. $29.

This volume contains 24 papers which were prepared for presentation at a conference sponsored by the Nuffield Foundation. The conference was convened expressly to compile knowledge about spontaneous lesions in rats and mice. The papers, on chosen topics, are reviews of current knowledge, with emphasis on description of gross and microscopic lesions. The rather lengthy papers were made possible through the means of precirculation among the invited participants with only brief presentations during the conference itself.

With one exception the first 16 chapters are developed from a systematic view. The last eight chapters deal with infectious conditions and age-associated lesions. Some chapters are devoted exclusively to the rat or the mouse and some to both species. Naturally, the chapters tend strongly to reflect the special interests of the authors, and this results in some deficiencies. For example, the discussion of the digestive tract is limited to neoplasms, and a chapter is devoted to cardiovascular disease in rats, while the mouse is neglected.

The authors are well known and well qualified, and the papers are well written and detailed. Most authors have documented their material thoroughly. Some, however, list as few as a dozen references; others give several hundred. The book is generously illustrated with excellent photomicrographs that are well reproduced. Although related material tends to be scattered throughout several chapters the reader is directed to this material in the text. The chapter on fungal disease in rats and mice is the first review published on this subject. The subject index takes up 17 pages. This is followed by lists of references to specific strains of rats and mice.

While it can be said that much of the material presented in this book has been published elsewhere, this after all is a characteristic of textbooks and reference books. It should be emphasized that this book far surpasses the published proceedings of many previous conferences on diseases of laboratory animals. The length alone is some indication of this, but more important are the planning and organization, the many illustrations, and the detailed index and strain reference lists.

I feel that *Pathology of Laboratory Rats and Mice* admirably fulfills the avowed purpose of bringing together widely scattered information on spontaneous diseases. It should be useful to all who interpret lesions in rats and mice, especially to the relatively uninitiated.

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Cytology Technique

Tritium-Labeled Molecules in Biology and Medicine. LUDWIG E. FEINENDEGEN. Academic Press, New York, 1967. x + 430 pp., illus. $17. Monograph Series on Radiation Biology.

The analysis of growth processes is one of the major historic challenges to experimental biology. Until recently, techniques were lacking for analyzing quantitatively the complex chemical reactions inherent in the kinetics of cellular growth or cell proliferation, but now a most productive technique is afforded by isotope-labeled compounds. The implications of this development for the understanding of the hereditary makeup of all organisms, including man, are immeasurable.

Tritium, the radioactive isotope of hydrogen, has played a prominent role in this development because of its particularly favorable physical and chemical properties: Tritium-labeled compounds of relatively high specific activity can be obtained by simple and comparatively inexpensive methods. Autoradiographs can be made that allow the localization of radioactivity at the intracellular level because of the short range of the tritium beta particles. The amount of tritium in biological materials can be accurately measured with relatively simple techniques such as liquid scintillation counting. Last, and probably most important, high resolution autoradiography and liquid scintillation counting can be combined in what may be considered an attempt to bridge the existing gap between radiochemical and morphological investigations.

Biological and medical researchers have been quick to exploit tritium-labeled precursors as these have become available or been recognized, and the resulting literature is voluminous and growing rapidly. It is therefore appropriate that a comprehensive reference is finally available that not only deals with "advances" in tritium technology but also supplies comprehensive detail and a somewhat critical review. Feinendegen emphasizes that critical attention should be paid to the cell cycle and its control mechanisms in evaluating the various factors that influence the cellular incorporation of tritium-labeled precursors of nucleic acids and proteins. He also draws attention to the mechanism of cell reproduction and the role of labeled compounds in investigations of cell differentiation. In addition, he focuses on the maintenance of balance between cell loss and cell reproduction, this in relation to aging, malignancy, and tissue replication.

The book will be a valuable addition to the bookshelf of any scientist engaged in studies in which radioactive tracers are used to examine cellular systems and their regulatory mechanisms. The investigator will not, however, find immediate solutions to the questions that have been raised concerning how tritiated precursors are incorporated into key biological macromolecules. These questions revolve around the interpretation of quantitative biological effects of such incorporation, the estimation of energy absorption by these molecules during the decay process, and the comparison of the effects of this type of radiation with other ionizing radiation. Perhaps the greatest contribution to be expected from this monograph is the invitation to the biologist who is not acquainted with radioisotopes as tools in cell studies to explore the applicability of tritium to his problem.

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