vide concise information such as the recommended treatment schedules, sample forms for registering patient data, approaches to analyzing noncompliance in treatment programs, usefulness of different methods of identification of *Mycobacterium tuberculosis* from clinical specimens, hypotheses on the spread of tuberculosis, and many others. The number of references vary from some chapters with 1–2 pages of references to chapters with 10 or more pages of references. Most of the references are from the 1980's or before, but there are a small number of references with 1991 and 1992 dates.

This text is highly recommended for clinicians who require considerable practical information about tuberculosis. It is not the ultimate text for those seeking information on the history or pathogenesis of tuberculosis; whole books are available on these and other related subjects. Specialists in pulmonary medicine or infectious diseases, or libraries used by primary care and specialist clinicians will find this a text that includes all the practical information about tuberculosis they need. Those who have only occasional need for information about tuberculosis may be put off by the price, listed as $195. This circumstance is unfortunate because these individuals would also benefit from the information about the changing epidemiology and the international face of this disease, material which is usually lacking in general medical texts.

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**ANIMAL CELL CULTURE: A PRACTICAL APPROACH.** Edited by R. Ian Freshney. New York, Oxford University Press, 1993. 329 pp.

Since the publication of the first edition of this book in 1986, the wealth of information concerning the *in vitro* culture of animal cells has grown not only with the measured march of micro evolution, but has made larger leaps in the development of particular new species of techniques and approaches. The newest volume from this accomplished culturist reflects this growth with widespread updating and substantial revision of several chapters. Many may know Freshney by his widely read *Culture of Animal Cells: A Manual of Basic Technique*. This book, in its most recent, 1987 incarnation, is a detailed, step-by-step guide to cell culture from designing and equipping a tissue culture lab to acquisition, maintenance, and characterization of primary cultures and cell lines. Detailed experimental protocols are the rule. In contrast, and despite the similar title, *Animal Cell Culture: A Practical Approach* forgoes the detail of basic techniques for a sophisticated and complete analysis of theories of cell culture with an additional emphasis on methods of cell analysis. In the chapter "Introduction to basic principles" he assumes that the technical aspects of cell culture are known to the reader and focuses instead on considerations of choice of culture system. Readers interested in conceptual details and protocols introduced here are referred throughout to specific subsequent chapters, increasing the usefulness of the book as a reference tool.

The following chapter covers the state-of-the-art growth of cells in serum-free, chemically defined media. The importance of eliminating variables introduced by inconsistent serum stocks, as well the economic advantage of avoiding serum, are discussed. Protocols and tables inform the user's choice of proven media components and concentrations for specific cell types. Particularly commendable is the author's discussion of current thinking on the rationale for each requirement.

Scale-up of culture systems is the subject of chapter three. Industrial laboratories will find the comparison of various culture systems for large scale culture exhaustive. "Small
"scale" culturists will find the theoretical considerations of scale-up a revealing look at nutritional and environmental requirements of cells. Whereas standard petri dishes and incubators have been optimized for general tissue culture, high-output culturing requires more detailed understanding and treatment of the culture environment.

Subsequent chapters on cell line preservation and characterization, and in situ hybridization deserve recognition for their inclusion of clear protocols useful to the researcher at the bench, with book in hand, without sacrificing the strong theoretical considerations that are the foundation of this book. Classical as well as "cutting edge" techniques of organ culture are also represented.

The final two chapters are devoted to two technical methods for the specific separation of mixed populations of cells: centrifugal elutriation and flow cytometry. Both chapters stress that despite the apparent complexity of these approaches, they are easily mastered once a basic understanding of the underlying principles is gained. Of equal importance here is the discussion of the interpretation of data generated using these two systems. An uninformed user of new technologies may not fully appreciate the wealth of information the data obtained from these devices can provide.

Although Animal Cell Culture: A Practical Approach is, indeed, geared to practice, the completeness of the theoretical considerations leaves no doubt that this is not merely a technical manual. This book will serve particularly well not only those who are new to the techniques discussed, but it will also serve as an excellent reference for the established culturist.

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