interdisciplinary approach, and the subject is dealt with in a clear and scholarly manner. Molecular biologists, toxicologists, pharmacologists, and regulatory officials concerned with public health will find much of value in it. The first section contains chapters on basic genetics, mode of action of chemical mutagens, repair of genetic damage, and methods of testing. The second section deals comprehensively with individual chemical mutagens, the data concerning which are also usefully summarized in tabular form. The authors make no attempt to present detailed protocols of test systems for chemical mutagens, restricting themselves to a discussion of the background and principles involved. From a practical standpoint, clearer distinctions between the presumptive human relevance of data derived from in vitro and in vivo systems and from nonmammalian and mammalian systems might have been helpful. However, these aspects of the subject will be complemented in a forthcoming book on *Environmental Chemical Mutagens*, edited by Alexander Hollaender, in which greater emphasis will be given to the specifics of mutagenicity testing.

The text is well illustrated by tables and figures and the references are comprehensive and up to date.

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The Use of an Instrument

Practical Electron Microscopy for Biologists. GEOFFREY A. MEEK. Wiley-Interscience, New York, 1970. xx, 498 pp., illus. $22.

Principles and Techniques of Electron Microscopy. Biological Applications. Vol. 1. M. ARIF HAYAT. Van Nostrand Reinhold, New York, 1970. xvi, 412 pp., illus. $19.50.

Today's novice in electron microscopy is fortunate in having at his disposal a number of texts and manuals purporting to guide him through the intricacies of microscope operation and specimen preparation. This plethora of advice has come into being only in the last decade or so and suggests the end of the adolescence of electron microscopy. However, current offerings either tend toward the conglomerate approach of discussing not only the fundamentals of microscopy but also photography, specimen preparation (of all kinds), and micrograph interpretation or lean heavily toward optics and theoretical principles underlying microscopy at a relatively advanced level. With approaching maturity a division of labor is appropriate and is indicated by these two new texts, one of which restricts itself entirely to specimen preparation and the other of which is devoted to a presentation of the fundamentals of optics and microscope instrumentation for the novice.

Practical Electron Microscopy for Biologists by Meek is, as its title implies, directed primarily to the elucidation of the operation of the electron microscope supported by enough theory (in qualitative terms) that the operator will have a basic understanding of the principles underlying electron microscopy, the supposition being that such a grounding in fundamentals is a prerequisite for intelligent operation of the instrument and, most important, that superior end products and greater productivity will be the result of such operation. The validity of this assumption may be questioned by some, but it enjoys rather widespread if uncritical acceptance. To accomplish its goal the book is divided into three sections that may be briefly described as: instrumentation, operation, and specimen preparation. The first section discusses the principles of optics, magnetic electron lenses, image formation, vacuum and electronic technology, and the role of these elements in a functioning microscope. Included as well are an abbreviated survey of the features of currently available commercial instruments and suggestions concerning instrument selection. Step-by-step operating instructions, performance measurements, maintenance, and the significance of expected developments in electron microscopy are presented in the second section. The third and shortest section of the book directs its attention to specimen preparation by techniques the author describes as "cook and look" (histological) and "grind and find" (particulate).

Although some sections (those on vacuum and electronic systems, for example) may seem too extensive for the nontechnically inclined operator and too superficial for those who wish to carry out rudimentary maintenance on their own instruments, the level of presentation is fairly uniform throughout and is quite suitable for the intended audience: research workers or students in the biological sciences without a foundation in physics or engineering. The step-by-step descriptions of operating procedures offer useful hints and guidance that will fill many of the gaping holes in some microscope instruction manuals but may well be superfluous in view of the completeness of others. Definitely a practical manual, the book points out to the reader many of the minor routines and pitfalls he must be acquainted with in order to uniformly obtain acceptable results from his instrument. Occasionally the author's instructions seem rather arbitrary (most noticeably in the chapters on photographic procedures, instrumental maintenance, and particulate specimen preparation) and should perhaps be interpreted as personal preference rather than rules of necessity.

Recent reports in the literature suggest that dark field microscopy may assume greater importance than the author prophesies, but there certainly is value in being made at least cursorily aware of the variety of techniques and approaches currently being used in microscope laboratories throughout the world.

Fortunately the author keeps his priorities clear and deals in only a limited fashion with techniques for specimen preparation: this subject is dealt with extensively in *Principles and Techniques of Electron Microscopy*, volume 1, by Hayat. In Hayat's book, preparative procedures are presented in much the same fashion as in Kay's *Techniques for Electron Microscopy*. By excluding all topics except preparative procedures for biological specimens and by devoting two volumes to the task (a second volume is to follow), the author will probably present the most extensive compilation of procedures available. Although a genuine effort has been made to provide a fundamental basis for some of the procedures mentioned, the paucity of applicable principles in this area restricts much of the presentation to the reporting of empirical techniques garnered from the literature or the author's laboratory. Nevertheless, anyone willing to search through the many offerings will doubtless find something useful and suitable for his particular problem.

Both of these books may be recommended: Meek's as a primer on microscope operation for the novice and Hayat's as a compendium of techniques that may serve as a reference work for the researcher and student.

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