

# reviews

THERE comes a stage in the development of any powerful new experimental technique, microscopical or otherwise, when its value for research is so well established that an authoritative survey is essential to its full exploitation in science and technology generally, beyond the circle of enthusiastic pioneers. Transmission electron microscopy has long reached that position, and the need is being satisfied by a number of monographs and treatises, including Professor Hayat's *Basic Electron Microscopy Techniques* (a conveniently short volume) and his *Principles and Techniques of Electron Microscopy: Biological Applications*, published by the same house. Whether his *Electron Microscopy of Enzymes* (two volumes, so far) is equally timely I am not qualified to judge. But I am in little doubt that a similar treatment of the biological applications of scanning electron microscopy is at best premature and at worst likely to be misleading. There simply has not been enough work done in the subject to serve as basis for it. Only a limited number of biologists throughout the world are seriously applying themselves to the problems of specimen preparation and observation, as distinct from the exploratory use of the instrument.

However useful it may be to newcomers in the field, the title borne by Hayat's new series covering scanning electron microscopy is a misnomer. In effect, it is a journal of biological scanning electron microscopy, largely devoted to articles describing the work of the individual contributors. True, there is an article descriptive of the instrument itself, compressed into 42 pages and failing to mention the two major treatments by Hearle *et al.* (1972) and Oatley (1972). There are also excellent descriptions of the critical point drying technique (60 pp.) and of the preparation of stereomicrographs (14 pp.), both of which are deserving of a wider readership. Nearly all the remaining 19 articles are short accounts (averaging 17 pp.) of special applications of the instrument in the study of spores, leaf surfaces, plant cell walls, wood, intracellular structures, marine teleosts, ciliated epithelia, lung, bone, and so on. To do him justice, the editor is quite frank in his preface to the second volume: "This treatise [*sic*] departs from the tradition that a book on methodology presents only the contemporary consensus of knowledge. It is written by scholars [who have] anticipated the potential usefulness of a new method."

## Microscopy

V. E. Cosslett

*Principles and Techniques of Scanning Electron Microscopy: Biological Applications*. Edited by M. A. Hayat. Vol. 1: Pp. 273; £11.95. Vol. 2: Pp. xii+171; £10.60. (Van Nostrand Reinhold: New York and London, October 1974.)

*Principles and Techniques of Electron Microscopy: Biological Applications*. Edited by M. A. Hayat. Vol. 3: Pp. xii+321; £11.35. Vol. 4: Pp. xi+216; £10.60. (Van Nostrand Reinhold: New York and London, November 1974.)

If I had to advise a library on its buying policy, my opinion would be that Volume 1 may be worth its price as an introduction to the subject if *The Use of the Scanning Electron Microscope* by Hearle *et al.* is not already on the shelves, but that Volume 2 should only be bought if urgently requested by local biologists. They would do better, however, to consult the original papers in their field of interest, most, if not all, of which they will find listed in the *Bibliography on Biomedical Applications of Scanning Electron Microscopy* compiled by Boyde *et al.* and published in *Scanning Electron Microscopy 1973*, the proceedings of one of the annual meetings on the subject at the Illinois Institute of Technology.

*Principles and Techniques of Electron Microscopy: Biological Applications* (Volumes 3 and 4) can be viewed more favourably. This series, now planned to extend to eight volumes, sets out to cover the whole range of knowledge involved, including the operation of the microscope itself in its various modes.

The current volumes contain seven and eight articles, respectively. They vary greatly in nature and style, from a broad survey of a topic to a monograph on an author's special field of work. Understandably, the latter form is usually the more readable and useable, and includes articles on high resolution, dark-field microscopy, in-focus phase contrast and stereological techniques in Volume 3, and in Volume 4 on optical shadowing, relative mass determination in dark-field, microscopy of single cultured cells, denaturation mapping of DNA and the examination of polysomes from cardiac muscle. At the other extreme lie collections of recipes for specimen preparation: selective staining of molecules, sub-

cellular fractionation in the ultracentrifuge, and critical point-drying (surely the hyphen is misplaced?) in Volume 3; and ultramicroincineration in Volume 4. The latter volume also contains a comprehensive if uncritical account of preparatory [*sic*] methods for electron probe analysis by X-ray spectrometry. Two articles fall outside these categories: a general introduction to the electron microscope and its operation in Volume 3 and an account of methods for counting virus particles in Volume 4.

Granted that the subject is now so wide ranging as not to be encompassed in a treatise by a single author, the best method of covering it by multi-authorship has to be solved. The treatment planned by the editor of this series falls somewhere between two others now becoming available: the encyclopaedic *Methodensammlung der Elektronenmikroskopie* (Wissenschaftliche, Stuttgart) and *Practical Methods in Electron Microscopy* (North-Holland, Amsterdam). The former breaks down electron microscopy into a great number of sub-topics, treated at a high level of expertise in relatively short compass, whereas each volume of the latter comprises two or three long articles in which a rather broader subject is dealt with in greater depth. Dr Hayat's series covers much the same subject matter, but unevenly and rather randomly. Apart from the first two volumes, which described basic preparative techniques, the two under review (and the remaining four as listed) contain an unrelated assortment of contributions. Some of these are by acknowledged leaders in a subject, others by recipe collectors. The level of approach varies from elementary to advanced; the proof reading varies from excellent to execrable (even the editor's name is misspelt in one place); and the current-awareness varies from yesterday to the day before. In such a rapidly moving subject it is regrettable to find few references in Volume 3 later than 1970 or in Volume 4, later than 1971, apart from cross-references within the series.

That said, these volumes have the merit of purveying in compact form a great deal of information, some of value to present practitioners and most of help to the beginner. He, she or they are likely to decide that one or the other of them is sufficiently valuable to be bought, even at these rather high prices. The whole series ought to be available in any biological laboratory making regular use of the electron microscope. □