tron microscopy is generally regarded as tedious and time-consuming and this is the case with ultrastructural investigations of cells and tissues. This book should, however, highlight the fact that E.M. methods for analysis of purified molecules are relatively simple and rapid. The step-by-step preparative procedures described in the book should encourage more biochemists, geneticists and biologists of similar interests to take advantage of the demonstrated potential of high resolution electron microscopy.

The instructions in chapters 1 and 2 for the preparation and experimental manipulation of nucleic acids are straightforward. These chapters also include descriptions of the basic methods of preparation of grids and support films. Repetition of these has been carefully avoided by cross references in other chapters.

Chapter 3 presents in a concise manner a collection of procedures for examining protein-nucleic acid complexes. Chapter 4 describes routine methods for spreading chromatin and this is followed in chapter 5 by three adaptations of the original Miller technique for visualizing active genes from different sources. Readers are warned about the empirical nature of some of the steps and that further modifications may be called for with other materials. Readers interested in the procedures in chapter 3 are likely to benefit from reading chapter 4 as well before commencing work. To cite an example, the instructions on page 84 (3.1.3.iv) do not specify which side of the grid should face upwards when it is introduced into the meniscus. This is made clear on page 107 (iii). A similar example for those interested in chapter 4 is on page 107 (ii); here the authors do not say whether the alternative procedure for hydrophilization of carbon surface described in chapter 3 on page 81 (2.2) would suffice if glow-discharge equipment is not available.

An adequate summary of the methods for visualization of proteins by negative staining is given in chapter 6. The procedural details have changed little during the last two decades. The additional method of rotary metal shadowing for better visualization of long rod-shaped proteins is described in chapter 7. The procedures at times are complicated but the account nevertheless makes a valuable contribution to efforts aimed at clarifying protein structure and sites of protein-protein association. Long hours at the microscope are promised in some instances.

The immunological procedures covered in chapter 8 may be expected to be particularly useful to newcomers to the field. In addition to standard protocols, readers are offered many useful tips in order to avoid unexpected pitfalls. The emulsion-coating method for autoradiography in chapter 9 appears complicated and tends to leave readers confused. The limited applications of this technique so far to preparations of spread molecules has perhaps inhibited consideration of simpler methods. The superficial treatment of the theoretical aspects might well have been omitted, leaving readers to refer to appropriate publications.

Chapter 10 describes protocols for mapping repetitive sequences in chromatin and chromosomes. The chapter extends the scope of the classical *in situ* hybridization technique and is a timely innovation.

On the whole, the protocols described are complete and the book with its many electron micrographs showing results obtained is a worthwhile buy. The instructions from authors with first hand knowledge and experience should enable beginners to embark with confidence. The theoretical aspects of the techniques and the principles underlying procedures are beyond the scope of such a compilation, and readers are rightly directed to suitable references at the end of chapters. Typographic errors are rare. This reviewer spotted only two instances; one on page 205, line 18 and the other on page 207, line 14. The hazard warnings relating to some chemicals in common usage in EM laboratories are welcome in the interests of safety and are most appropriate in laboratory manuals of this type. The index is a useful feature but minor discrepancies may have crept in; for instance, the citation for uranyl acetate staining to pages 111–112.

As the editors point out in the Preface, this is not a manual on the use of the electron microscope. Since the final outcome depends on the effective use of the EM the reviewer's advice to the uninitiated is to collaborate with a practising electron microscopist if one can be found.

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Build Your Own DNA Kit. By WILLIAM G. THILLY and ALEXANDER VARSHAVSKY. London: Butterworths. £17.25. ISBN 0 409 90094 X.

Twenty-five years or more ago I remember strings of plastic 'popper-beads' being used by biologists to help them to think about such topics as DNA replication and recombination. The kit consists of the same type of bead, but with the important addition of a second connector arm, so that two chains of beads may be linked together to represent a double-stranded DNA molecule. The two arms are arranged at 90° to one another, and each consists of a 'stick' and 'ball'. There are two 'sockets' on each bead, diametrically opposite the arms, into which the 'ball' of another bead may be fitted. Thus it is possible to build two chains of beads, linked by connectors at 90° to the chains, and there is sufficient rotational movement of the 'balls' in the 'sockets' to allow the chains to be twisted into a two-chain helix, with down to seven beads per turn to represent a double stranded DNA molecule. The helix diameter to pitch ratio however is close to one, instead of approximately six as in B form DNA.

Since all the beads are identical, this construction inevitably leaves a spare connector arm projecting

from half of the beads. This is not shown in the illustrations in the brochure, which also seem to show beads with shorter connectors. Perhaps the extra arms are designed to be cut off, or kept in reserve as desired. By the time I had connected all the beads I had managed to break off six connectors. I also had sore fingers, as the beads are rather crudely moulded, with a hole through the middle which has rough edges and no apparent function. In addition I found some 'sockets' that were not deep enough to receive the 'balls', and some 'balls' that were too small.

The beads come in four colours, and thus could be helpful in thinking about events in interactions between two double-stranded DNA molecules. The origin of any strand of DNA is clearly identified in any subsequent structure by its colour. Also, as two linked chains of beads may be twisted into a helix, a three-dimensional representation results, which is not possible on paper. The kit would also be useful for illustrating double-strand interactions to students, and at £17.25 it is probably good value if it meets a need, but it must be handled gently.

The kit however, is no good for illustrating supercoiling, although this is proposed as a major use in the brochure. When a double-stranded DNA molecule is over- or under-wound, and made into a covalently closed ring, then, quoting from the brochure, 'the ring minimizes its departure from the above energetically favoured pitch by coiling about its helix axis'. But the model kit has no 'energetically favoured pitch'. It can have *any* pitch, down to that corresponding to seven beads per turn. Models of supercoiled DNA can be built with the kit, but the *process* of supercoiling cannot be shown. A kit which does illustrate the process very convincingly is two strands of plastic covered multi-core electrical wire twisted together.

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