

APPENDIX 3

Production of Electron Micrographs

Although our Hitachi H-600 microscope is equipped with a sheet film camera, we use a 35-mm camera exclusively for micrograph production. The argument that the image must be recorded at the greatest possible size in order to achieve maximum micrograph resolution is less convincing in view of the extremely fine grained emulsions that are available on roll film and the high resolution that modern microscopes are capable of obtaining.

At present, the primary factor limiting resolution in the electron microscopy of stained biological specimens appears to be the characteristics of the stain itself: grain size, penetration of tissues or particles, inherent contrast, etc. The Philips Company has recognized that large film formats do not automatically convey greater image resolution and have supplied 35-mm cameras, as well as the conventional large format sheet/plate cameras, as standard equipment on the Philips 201C electron microscope. The sales brochure for that microscope presents comparative micrographs of the same area of a negatively stained specimen of TMV on both large format and 35-mm films. The micrographs, enlarged to the same final magnification from both film sizes, are virtually indistinguishable.

The savings in time and materials of the 35-mm format over the cut film/glass plate format are substantial, and filing is more compact. The amount of space that would be required for filing if the nearly 40,000 micrographs that we have taken had been preserved on glass plates rather than 35-mm filmstrips, would have been prohibitive. The ease of recording and processing 35-mm film allows the operator to take numerous photographs, and spares him the bother of deciding if a certain image is worth preserving on an expensive sheet or plate.

Although there are roll films made specifically for electron microscopy, we find Kodak Technical Pan 2415 (TP2415) is nearly ideal for micrograph production. The Kodak company does not at this time suggest the use of TP2415 for electron micrographs; but it has extremely fine grain and resolving power, allowing it to be enlarged to magnifications of $50\times$ or better, and the contrast of TP2415 can be controlled by choosing an appropriate developer (this capability makes the film useful for many laboratory applications other than electron microscopy). A tendency for this film to fog when used for high contrast work can be controlled by the addition of an antifogging agent to the developer.

A procedure for developing Kodak Technical Pan 2415 35-mm roll film to a contrast suitable for electron microscopy follows.