Electron-tomography of the adult retinal cells in *Drosophila melanogaster.*

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High voltage electron microscopy (HVEM) has been a natural outgrowth of the desire to obtain 3-dimensional information due to problems related to interpretations of 3-dimensional images from 2-dimensional electron microscopes. Four main advantages of using HVEM are increased resolution, increased specimen penetrating capacity, increased depth of information, and less damage to the specimen due to less electron interaction with the specimen. With such advantages, information in the section can be imaged almost all depths within the section, providing important 3-D information. Since the great depth of information exhibited by HVEM, images may be taken in pairs with tilting for stereo pairs. Viewing structures from two different angles is the key to obtaining 3-D depth perception. Also, through serial section, HVEM has been the technique to gain 3-D[1,2].

The fine-structure preservation of cells or tissues can be achieved by using fast-freezing followed by freeze-substitution techniques. The fast freezing is so much better due to the speed of fixation, which freezing virtually means stopping all molecular movement. It is estimated that samples prepared by high pressure freezing are fixed in 20-50 msec, as compared to the minutes by chemical fixations. Fast-freezing also freezes every cell component regardless of its chemical fixatives that are selective in their cross-linking[3].

In this study, the adult retina of *Drosophila Melanogaster* was investigated employing HVEM, fixation by high pressure freezing followed freeze-substitution, thick serial sections, and electron tomogram. The thickness of section was 200 nm and HVEM images were obtained from about the serial section. From all these images the distribution of microtubules, mitochondria, nuclei, and other cell organelles were reconstructed as three-dimensional structure using IMOD program. The current data provide us more precise

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cellular information and better understanding on the animal vision mechanism in new dimension.

Reference

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