**105. Electron Microscopy of Ultrathin Sections of
Mycobacterium. III
Process of Cellular Division**

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Electron microscopy of the process of cellular division has been reported in *Bacillus cereus* by Chapman and Hillier¹⁾ and in *Mycobacterium* by the present authors.²⁾ Although these observations imply many important findings, the technic for ultrathin sectioning used in the above experiments seems to have been insufficient to disclose the precise process of the division. Recent improvements in the technic for ultrathin sectioning in our laboratory³⁾ have revealed the entire process of cellular division of mycobacteria much more clearly and precisely than in previous experiments.

Mycobacterium avium Jucho strain³⁾ was cultivated with aeration for 16 hours in 4 per cent glycerol broth. The cells were fixed and embedded according to the method described in a previous paper.³⁾ Sections were cut with a Porter-Blum ultramicrotome and were examined by a JEM 5C electron microscope.

The cell wall and the cytoplasmic membrane of mycobacteria are composed of three layers as described before.³⁾ At the beginning of the division a three-layered cross-wall with cytoplasmic membrane grows centripetally from the cell wall (Fig. 1). The closing orifice of the cross wall appears broadened; the cytoplasm around there appears denser (Fig. 1). The inner dense layer of the cell wall where the cross wall is attached is still clearly visible (Fig. 1). A dense line is observable in the middle of the cross wall (Fig. 1) and becomes denser and clearer (Figs. 2 and 3). The cross wall is then completed (Fig. 2). The three-layered cytoplasmic membrane is observed on both sides of the cross wall (Fig. 2). Thereafter the inner dense layer of the cell wall, where the cross wall is attached, disappears (Fig. 2). Later, the dense line observable in the middle of the cross wall thickens and divides into the two outer layers of the cell-wall of the daughter cells (Fig. 3) and separation occurs.

Recently Chapman⁴⁾ has presented detailed observations of the process of cellular division in an unidentified bacteria. In his report the single-layered cytoplasmic membrane undergoes a centripetal growth to form a septum which divides into the double membrane.

Figs. 1-3. Electron micrographs of ultrathin sections of actively growing cells of *Mycobacterium avium* Jucho strain

Thereafter, the cell wall material deposits on the membrane and the separation of the two daughter cells is completed. This process is entirely different from the findings obtained in this experiment. The difference may be attributable to the difference in the bacterial species employed in the experiments.

References

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