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Responsible Investigator: W. M. Stanley
University Department: Virus Laboratory
Financial Support 1954-55: ACS \$16,301.00.

Title of Project: Electron Microscope Study of the Early
Stages of the Reproductive Cycle of Bacterial Viruses.

Understanding of the cancer problem demands more
 knowledge of the fundamental biological processes of
 reproduction and mutation. A detailed picture has begun
 to emerge of the mechanism by which a bacterial virus--
 an excellent model of these processes--invades a cell.

The present project concerns the initial steps of
 this invasion, and, specifically, a detailed study of the
 structure and function of the bacterial virus tail.

This "tail" has the specialized function of attachment
 to the cell and presumably mediates the invasion. The
 primary problem was to isolate the virus tails. As a
 result of many trials one method--repeated freezing and
 thawing of the virus--has been shown by electron microscope
 study to give separate tails which retain their original
 biological activity, i.e. the ability to attach themselves
 to bacterial cells. We have unexpectedly found that
 each tail contains a core of, as yet, unknown function
 and composition and that the core can be separated from
 the rest of the tail, leaving segments with a central hole.

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This is the first direct evidence to support current theories which postulate that the genetic substance of the virus is "injected" into the cell through the tail, as through a hypodermic needle.

The immediate goals of the project consist of the further isolation and study of the biological function and chemical properties of the virus tails.

Publications To Date: None.

(This report covers only work done since July 1, 1954, the date of activation of this grant.)

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