
LIGHT AND ELECTRON MICROSCOPIC OBSERVATIONS OF THE BACTERIAL NUCLEUS

A. EISENSTARK, Oklahoma A.&M. College, Stillwater

The nature of the bacterial nucleus has been a matter of controversy ever since these minute organisms were first observed. Several hundred papers have been written presenting a variety of theories. These theories may be grouped into the following categories:

- (1) the bacterial cell has no nucleus,
- (2) the bacterial cell has a well-defined central nucleus,
- (3) the bacterial nucleus is diffused throughout the cell,
- (4) the bacterial cell is a complete naked nucleus without cytoplasm,
- (5) the bacterial cell has several nuclei.

The diversity of theories may be understood if one realizes the minuteness of size of the bacterial cell. If a bacterium has a diameter of 0.75 microns, a possible central nucleus might be smaller than 0.2 microns in diameter. This latter figure approximates the limits of resolution of the ordinary light microscope.

In recent years, new instruments and techniques have been developed which offer promise to the problem of the nature of the bacterial nucleus. The purpose of this paper is to report observations by three methods; (1) electron microscopy, (2) phase contrast microscopy, (3) Robinow (1) or Feulgen nuclear staining.

Over 2000 photographs of bacterial cells, mostly of *Escherichia coli* and *Azotobacter agilis*, have been taken by the author during the past four years. Based upon these results with electron, phase and ordinary microscopy, the following conclusions have been made: (1) distinct, orderly bodies exist in bacterial cells which seem to represent nucleus-like structures; (2) these structures may differ somewhat from species to species; (3) in most rod-shaped bacteria, there seem to be two nucleus-like structures in each cell which double just before cell division.

LITERATURE CITED

1. ROBINOW, C. F. 1942. A study of the nuclear apparatus of bacteria. Proc. Roy. Soc., B., 130: 299-324.
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