LETTERS TO THE EDITORS

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Internal Structure in Virus Particles

Previous electron microscopic studies of chick embryo chorioallantoic membranes infected with herpes simplex virus have revealed that the development of virus in susceptible (ectodermal) cells apparently begins in the nucleus and is completed in the cytoplasm[1]. In the nucleus, the smallest particles considered to be virus measured 40–60 mμ in diameter and the largest did not exceed 130 mμ in diameter. Larger particles, some having a maximum linear dimension of 250 mμ, were seen in the cytoplasm or in extracellular locations. These observations were made on thin sections of tissue from which the methyl methacrylate had been dissolved by amyl acetate.

More recently, particles thought to be transected herpes simplex virus have been seen in ultra-thin sections of infected chorioallantoic membrane from which the embedding substance was not removed. Within the nuclei of cells the virus appeared to consist of a central, spherical body (40–60 mμ in diameter) of varying density, often surrounded by a single membrane (70–130 mμ in diameter), as illustrated in Fig. 1. Within the cytoplasm the particles were generally larger than 130 mμ in diameter and usually possessed a double membrane, as illustrated in Fig. 2. The membranes were separated from each other and from the central body by zones of lesser density. It thus seems reasonable to infer that herpes simplex virus has a definitive inner structure which may be related to its cycle of development within the cell. In this connexion, attention may be directed to the hypothesis of viral structure advanced by Pollard from purely theoretical considerations[2]. The observations reported here tend to support his concept of a central body and an inner zone or membrane in the mature or complete viral particle.

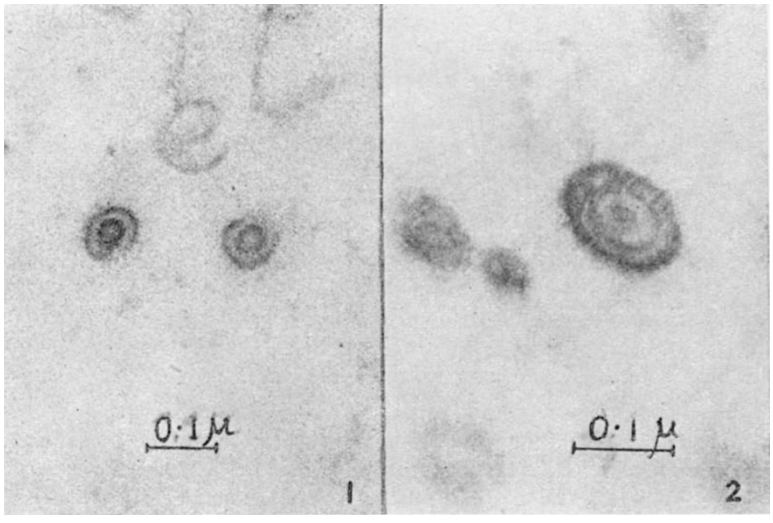

Fig. 1. Two intranuclear particles showing central bodies and single outer membranes
Fig. 2. A particle in the cytoplasm showing the characteristic double outer membrane and central body

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Since submitting the above communication, which deals only with the virus of herpes simplex, an internal structure has been observed in both vaccinia and influenza virus. In vaccinia virus a body strikingly similar to a cell nucleus may be seen; the structure of influenza virus more closely resembles that of herpes simplex virus. These observations are being extended.

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[1] Morgan, C., Ellison, S. A., Rose, H. M., and Moore, D. H., *Proc. Soc. Exp. Biol. and Med.*, **82**, 454 (1953); Riassunti delle Communicazioni, VI Congresso Internazionale di Microbiologia, Roma, September 1953, **2**, 82.

[2] Pollard, E. C., "The Physics of Viruses", 195 (Academic Press, New York, 1953).

A Method for the Rapid Differentiation of Certain Non-pathogenic, Asporogenous Bacilli

It is the experience of most microbiologists that the differentiation of the non-pathogenic, asporogenous, non-pigmented rods is of considerable difficulty. These bacilli form an appreciable part of the air–soil–water microflora and, in materials from marine environments, such as fish, in which our interests are focused, they comprise 60–80 per cent of the total number of species isolated[1]. The main difficulty is that, by the usual tests, most of these micro-organisms appear to be biochemically inert, and the classification, based on a series of negative characters, is not very determinative. The types of organism we have in mind are usually classified among the Pseudomonadaceae, Achromobacteriaceae and Bacteriaceae of Bergey[2] and Prévot[3]. In Bergey, the Pseudomonadaceae comprises, among others, the genera *Pseudomonas*, *Vibrio* and *Spirilla*, and the Achromobacteriaceae the genera *Achromobacter* and *Flavobacterium*. In Prévot, however, the *Vibrios* are removed from the Pseudomonadaceae and form a genus of the Spirillales, while the *Achromobacter* and *Flavobacterium* become genera of the Pseudomonadaceae. Comparison with a recent Russian determinative system[4] shows even wider divergences, the Achromobacteriaceae disappearing altogether, being grouped as *Bacterium* spp. under the Bacteriaceae.

A good example of the present difficulties is the differentiation between the *Pseudomonas* and *Vibrio* spp. According to Bergey, the former are more or less straight rods, usually forming a diffusible pigment, whereas the latter are usually curved rods with no pigment production. In practice, this