

threaten to abort, in the toxemias of pregnancy, in premature labor, in late death of the fetus. Before intelligent therapy of these complications can be developed, the relationship of progesterone metabolism to these conditions must be understood.

Summary.—A rapid, accurate colorimetric method for the quantitative determination of pregnanediol based on the methods of Venning, Talbot and Guterman is described. Serial determinations in normal pregnancy and pregnancy complications have been carried out in

over 100 patients. Pregnanediol excretion in the last 28 weeks of the gestation can be used as a quantitative measure of uteroplacental circulation. During this period the placenta is the chief source of this urinary metabolite for corpus luteum activity wanes rapidly after the first trimester. Serial determinations in normal pregnancy and the complications of pregnancy may throw light on the adequacy of the placenta as the essential organ for the survival of the fetus.

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Symmetrical Patterns of Bacteriophage Production.

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In a previous note¹ it was shown that the problem of how bacteriophages are produced can be directly approached through the electron microscopy of metal shadowed "replicas" of the surfaces of agar cultures on which bacteria and bacteriophage are growing together. Such studies of several different bacteriophages are showing many of the phenomena involved in the production of these virus-like objects. The processes are complex and depend not only on the type of bacterium and the strain of bacteriophage but also on such factors as the rate and the duration of growth of the culture. Detailed evidence furnished by the electron microscope will be described elsewhere.

One of the most impressive aspects of the development of bacteriophage from bacterial protoplasm is its completeness, and in certain instances its regularities. With the T3 bacteriophage against the colon bacillus, the pattern of this conversion shows a symmetry as perfect as that of the molecular particles in a crystalline array² (Fig. 1). As in this figure

the pattern often covers the entire surface of a bacterium; but it is also to be seen spreading throughout extruded protoplasm (Fig. 2). It extends into and includes the thick masses which were bipolar bodies in the original cells. When most clearly visible, the pattern is one of concavities but in many places the separate indentations are filled with spherical bodies having the size of free bacteriophage particles. Photographs have been obtained of this honeycomb structure starting to form within cells that otherwise seem normal; but it is often difficult to be sure whether these indentations are places where fully formed particles have escaped or where relatively immature particles are just beginning to form.

Correspondingly complete conversion to bacteriophage has been observed with other strains but highly symmetrical nets of particles have not been seen following infection with any of the "tailed" bacteriophages.

The many electron micrographs already made suggest far-reaching speculations into the nature of bacteriophages and of any viruses that may exhibit similar mechanisms of increase; but the techniques being used offer opportunities for gaining further information that make discussions of this nature seem premature.

¹ Edwards, O. F., and Wyckoff, R. W. G., *Proc. Soc. Exp. Biol. and Med.*, 1947, **64**, 16.

² Price, W. C., and Wyckoff, R. W. G., *Nature*, 1946, **157**, 764; Markham, R., Smith, K. M., and Wyckoff, R. W. G., *ibid.*, 1947, **159**, in press.



FIG. 1.
A chromium-shadowed electron micrograph of a colon bacillus infected with the T3 strain of bacteriophage. The regular pattern of concavities extends over the entire surface of the organism. Magnification *ca.* 40,000.

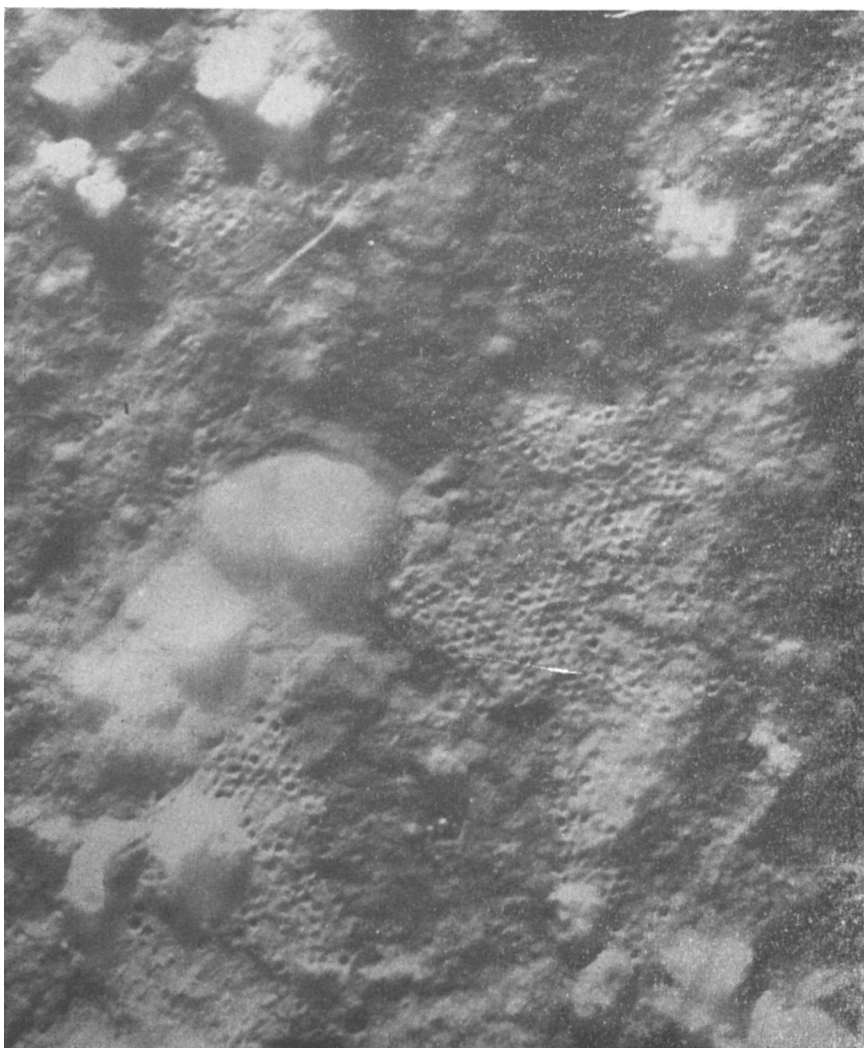


FIG. 2.

A region of bacterial protoplasm left by the lysis of colon bacilli infected with the T3 strain of bacteriophage. An intact bacterium lies to the left of center of the field. Magnification *ca.* 30,000.