III) indicated that infection occurred by direct extension through the cervix. Histological examination showed a correlation between the response of the tissues to estrogen and the presence of bacteria.

The types of organisms isolated varied in different animals. Most common were *Bact. alkaligenes* and an unidentified Gram-positive diplococcus, usually found together. *Bact. coli,* hemolytic and non-hemolytic streptococci and staphylococci were occasionally found. Frequently a single type of organism was obtained. Cultures of the vagina yielded similar organisms.

9584 P

Production of Phage in the Absence of Bacterial Cells.*

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In recent publications[1, 2] it was shown: (a) that during one phase of the reaction between phage and bacteria in the presence of 0.25M NaCl phage is formed without concomitant bacterial growth; (b) that when pH and temperature are properly adjusted the bacterial substrate can be maintained in the resting state while [phage] rises logarithmically with time at the rate of a ten-fold increase per hour.

The obvious inference of these experiments is that bacterial growth, long held to be the prime conditioning factor for phage-formation, is actually not essential at all. Instead it would appear quite possible that resting cells may produce some sort of phage-precursor which in the presence of phage is promptly converted into more phage. This hypothesis is supported to a considerable extent by our observations during the past 3 years on the increase in phage-titer that occurs when cell-free ultrafiltrates of bacterial suspensions are added to known quantities of phage. Young cultures of susceptible organisms are washed in saline solution to free them from phage-inhibitor.[3, 4] Dense suspensions of the washed cells are

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1 Scribner, J., and Krueger, A. P., *J. Gen. Physiol.*, 1937, **21**, 1.

2 Krueger, A. P., and Fong, J., *J. Gen. Physiol.*, 1937, **21**, 2.

3 Levine, P., and Frisch, A. W., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 993.

4 Burnet, F. M., *J. Path. and Bact.*, 1934, **38**, 285.

placed in infusion-broth of pH 7.4 at 36°C. for 2 hours. The fluid portion of the mixture is then separated from the cells by ultrafiltration through a 2% or 2.5% acetic-collodion membrane.[5] When equal quantities of the ultrafiltrate and known phage-preparations are mixed an increase in phage-titer occurs. For example when 1 ml. of ultrafiltrate is added to 1 ml. of phage containing 1×10^9 activity-units/ml.[6] the final titer remains 1×10^9 activity-units/ml. Such yields, 100% increases in the amount of phage originally added, are quantitatively significant inasmuch as the method of titration is capable of detecting differences in [phage] of $\pm$ 5%. Furthermore, when a solution of phage is subjected to serial dilution, using the ultrafiltrate as diluent, the actual titers are consistently higher than the concentrations calculated from the original amount of phage added and the difference between these values becomes progressively greater as the range of dilution is extended. That is, the phage-ultrafiltrate mixtures tend to maintain the original titer while plain phage diluted with broth or saline solution becomes increasingly weaker.

The fact that cell-suspension ultrafiltrates are active in producing this effect in only 80% of experiments has led us to a careful investigation of possible sources of error. Among these, 3 possibilities are worth mentioning in this preliminary paper.

A. Cultures occasionally become lysogenic and spontaneously produce phage without the addition of phage to the organisms. Our ultrafiltrates have been regularly tested for the presence of phage and to date have been entirely negative.

B. If bacterial cells pass through the ultrafilters their addition to solutions of phage along with the ultrafiltrate would naturally result in an increase in the phage-content of the mixtures. But the ultrafiltration-membranes are quite uniform, and rigorous testing of our ultrafiltrates for sterility has revealed no organisms in them.

C. It was considered that the apparent increase in titer might be due to some effect of the ultrafiltrate on the titrative setup. Phage is quantitatively determined by its activity. Consequently if the small quantities of ultrafiltrate carried over into the titration-tubes somehow stimulated the phage-producing mechanism, the time of lysis would be reduced and the mixtures would have a fictitiously increased original content of phage. Control-experiments have ruled out this possibility.

Most of our experiments have been independently repeated in this

[5] Krueger, A. P., and Ritter, R. C., *J. Gen. Physiol.*, 1929, **13**, 409.

[6] Krueger, A. P., *J. Gen. Physiol.*, 1930, **13**, 557.

laboratory by Mundell, Fong and Strietmann with essentially the same results. We do not know at this time what the substance is in ultrafiltrates of susceptible bacterial cultures which, when added to phage, apparently results in the production of more phage. However, a considerable mass of experimental data leads to the conclusion that normal bacterial cells produce some sort of a phage-precursor which is converted into phage by phage itself. A detailed description of such properties of the precursor as we have been able to determine will appear in another paper.

9585 P

"Glandular" Cells in the Pars Nervosa and Stalk of the Hypophysis.

I. GERSH. (Introduced by Carl G. Hartman.)

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This note summarizes the results of an investigation of the possible glandular nature of the parenchymatous cells of the pars nervosa of the hypophysis. Functional histological analysis in rats of various ages under experimental conditions leads to the conclusion that these cells produce and secrete anti-diuretic substance for the control of the water metabolism of the animal.

This "glandular" cell has been seen in the pars nervosa of almost every class of mammals, and of pigeons and chickens. The cell is distinguished by the presence of granules or of lipoid droplets which were first seen in fresh mounts. The inclusions fill the cytoplasm, and extend out into the cell processes. These intracellular elements are of approximately the same size in any one cell, though they may vary somewhat in size in adjacent cells. Histochemical analysis of the droplets or granules shows that in the rat they are rich in neutral unsaturated fats; no other lipoids have been identified. In some other animals, the granules contain no visible lipoids. The inclusions are preserved best by Maximow's fluid in the mouse and white rat.

The characteristic features of the glandular cell appear very early in the rat's embryonic life, being easily recognizable in a 23 mm. embryo. The number and size of the cells and of their inclusion bodies increase throughout life to become most prominent in rats 2½ years old. The cells are distributed more or less evenly in the pars nervosa except at its junction with the hypophyseal stalk;