its original activity, practically unchanged, even when distillation was carried to dryness. Our experiments fail to indicate volatility of the lytic principle of d'Herelle at 45-50° C.

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Effect of alcohol on the so-called bacteriophage of d'Herelle.

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D'Herelle[1] has reported that by precipitating a culture of antidysentery bacteriophage with nine volumes of 96 per cent alcohol, decanting the supernatant fluid after 48 hours and re-dissolving the precipitate in saline, he obtained a substance slightly lytic for dysentery bacilli (titer 5 cc.). This lytic action, however, was not transmissible in series. D'Herelle concluded that the alcohol, while destroying the living ultra-microbe (bacteriophage), had precipitated its endo-enzyme.

Hauduroy,[2] repeating these experiments, obtained similar results by precipitating sterile bouillon with alcohol. He decided that the apparent lytic action of the precipitate obtained by d'Herelle was due to a bacteriostatic effect of the alcohol adsorbed by this precipitate. Arnold[3] was not able to obtain any active substance by precipitation with alcohol. More recently, Appelmans[4] failed to destroy completely the lytic activity of bacteriophage by exposure of bacteriophage to 50 per cent alcohol, but he does not state whether the activity of the precipitates was transmissible in series.

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1 D'Herelle, F., The Bacteriophage, English Trans., Williams & Wilkins Co., 1922, 123.

2 Hauduroy, P., Sur les Lysins du Bacteriophage d'Hérelle. *Compt. rend. Soc. Biol.*, 1922, ii, 964.

3 Arnold, L., Basteriophage Phenomena. *J. Lab. and Clin. Med.*, 1923.

4 Appelmans, R., Le Dosage du Bacteriophage. *Compt. rend. Soc. Biol.*, 1921, ii, 1098.

In the course of some experiments in which we had occasion to precipitate filtrates of so-called "bacteriophage" with alcohol, it was observed that in some instances the re-dissolved alcoholic precipitates manifested appreciable lytic action. Considering the divergent results reported by the previously mentioned observers and in view of the interest that the effect of alcohol on the activity of the lytic principle might have in connection with the question of the living nature of the bacteriophage, we have attempted to study this question further.

Several portions of active filtrate of 1 cc. each were placed in sterile centrifuge tubes. To each was added 10 cc. of 95 per cent alcohol and after thorough mixing of the contents, the tubes were kept for varying lengths of time both at room and at ice-box temperature. At stated intervals the contents of tubes were centrifuged and the liquid portion decanted off. The precipitates thus obtained were each dissolved in 1 cc. of sterile salt solution and the lytic titer determined. In order to ascertain whether the alcohol adsorbed by the precipitate exerted any bacteriostatic effect, the experiment was repeated after preliminary inactivation of the lytic filtrate at 90° C. for 20 minutes.

All dilutions for titration were made in 10 cc. of broth containing about 250,000,000 susceptible bacteria per cubic centimeter. Fresh pipettes were used for each dilution. The activity of dilutions exhibiting a doubtful degree of lysis was checked by transfer to agar slants. Those showing complete clearing were tested for serial transmission of lysis.

The experiments reported in this paper were made with two strains of dysentery bacteriophage,[5]—one active against *B. dysenteriae Shiga,* the other against *B. dysenteriae Flexner*—and with one strain of bacteriophage active against *B. coli.* Later, after the adaptation of the above lytic agents to other strains of the colon dysentery group, the experiments were repeated with the filtrates thus obtained. While in individual experiments there were observed some slight quantitative variations, the results were, in general, as follows:

Exposure of lytic filtrates to alcohol causes a rapid destruction of more than 99.9 per cent of the lytic substance within the first

[5] These bacteriophages were isolated October, 1923, from the stools of patients at the Babies' Hospital. The specimens were obtained through the courtesy of Doctor Martha Wollstein.

15 minutes, both at room and ice-box temperature. Less than 0.1 per cent is recovered in the precipitate, while traces can be demonstrated in the supernatant alcohol. The titer of precipitates is usually about 1×10^{-5} cc. and that of the supernatant alcohol about 1×10^{-2} cc. At room temperature the deterioration of the lytic principle proceeds very rapidly with the further exposure to alcohol so that at the end of from three to eight hours not a trace of the lytic action can be detected, either in the precipitates or in the supernatant alcohol. At ice-box temperature, on the other hand, the lytic titer of 1×10^{-5} cc. remains unchanged for at least five to six days and begins to deteriorate slowly with further exposure to the action of alcohol. This lytic action is not due to the bacteriostatic effect of alcohol but is transmissible in series exactly as in the case of the original filtrates.

90 (2322)

Kidney changes in pyloric obstruction.

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Four cases of pyloric obstruction have been studied with particular reference to the microscopic changes in the kidney. Of the four, two showed typical tetany, presumably of gastric origin. One of these was under observation only 24 hours, and was unoperated, dying shortly after admission to the hospital. The other case, in which a huge gastrectasia was demonstrated by Roentgen-ray, developed tetany following operative resection of stomach. The two cases without tetany had symtoms of gastric ulcer with signs of obstruction, and were treated surgically.

The kidney changes were not appreciated before death, and were only discovered in course of routine microscopical examination of autopsy material. The four cases show almost identical kidney changes. These consist in degeneration of cells lining the spiral and terminal straight portions of the first convoluted tu-