

of soap (sodium oleate) precipitate the diplococci in an adherent mass which afterwards undergoes complete solution in water or salt solution. Solutions of soap of a strength of 1 to 10,000 do not produce visible changes in the bacterial suspensions but reduce slightly the number of viable cocci. Solutions of 1 to 15,000 or 1 to 20,000 do not affect the viability in cultures but reduce somewhat the virulence. At the same time the diplococci appear somewhat swollen but not otherwise altered.

Untreated diplococci begin to multiply at once in the peritoneal cavity of rats. The treated diplococci at first almost entirely disappear from the cavity and begin to multiply after eight or more hours and cause death at a later period than the controls. There is a greater emigration of leucocytes in the case of the treated cocci than in that of the controls. There is little or no phagocytosis. Normal goat serum does not affect the process appreciably; but immune goat serum prevents multiplication of the treated cocci and brings about recovery of the rats but, under the conditions of the experiment, not of the control rats injected with untreated cocci. Phagocytosis does not play a direct part in the recovery.

The experiments can be repeated *in vitro* with approximately similar results. The soap-treated cocci are subject to serum lysis, while the untreated are not, and the lysis is not assisted but rather hindered by the presence of living leucocytes. The study is being continued.

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The influence of shaking upon trypsin and rennin and a comparison of this influence with that upon pepsin.

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At the December meeting of this Society we mentioned our studies of the effects of shaking upon ferments and reported that pepsin can be practically destroyed by shaking. Our studies were extended to other digestive ferments and we wish now to report very briefly that shaking proves to be very injurious also to trypsin

and to rennin. Trypsin was tested by the casein method of Gross and the rennin was determined by the method of Blum and Fuld with slight modifications which will not be discussed here. Both ferments were shaken at room temperature, and at 33°C.; also the influence upon the results of different rates of shaking and of changes in other conditions were investigated. We shall, however, state here only that the destructive effect of shaking upon trypsin and rennin is, as for pepsin, distinctly increased by increasing the rate of shaking and by increasing the temperature at which the shaking is carried on. There is a pronounced difference in the resistance to shaking between pepsin and trypsin under the conditions thus far studied, the latter being more readily affected. The destructibility of rennin runs practically parallel with that of pepsin.

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The influence of sodium and calcium upon direct and indirect muscle irritability and their mutual antagonistic actions.

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By the researches of Kühne, Biedermann, Ringer, Loeb, and many others, it is established that solutions of sodium chloride cause rhythmical movements of the muscles of the frog, and that the addition of a small quantity of calcium will stop them. By the researches of Locke, Carslaw, Cushing, Poljakoff and Overton, it is further established that solutions of sodium chloride abolish indirect irritability, and that the addition of a small dose of calcium restores it. There has been very little work done on the *primary* effect of calcium upon the direct and indirect irritability of the skeletal muscles of the frog and there are practically no researches on the action of sodium upon the primary effects of calcium.

In our experiments, sodium and calcium chlorides were employed in M/10 solutions and were introduced by infusion through the abdominal aorta according to the method described by Cushing.¹ The graphic records were obtained from the gastro-

¹ Cushing: *American Jour. of Physiol.*, 1902, vi, 77.