

the actual concentrations of the final mixture. A sufficient volume was injected in each case to represent one L+ dose of toxin.

This experiment has been confirmed several times.

This experiment clearly demonstrates the fact that the concentration of both the soap and the toxin is of fundamental importance, of more importance than the actual quantity of toxin injected. It also clearly shows that equilibrium must be reached in a relatively short time, since both sets show about the same results.

Other experiments have been performed in which it was shown that the action of the soap upon the toxin is a reversible one in which the toxin is not destroyed. This was done by preparing a mixture of soap and toxin that would protect, so that when the guinea pig was injected it showed no ill effects. After this mixture had stood for 24 hours, long enough to establish an equilibrium, the equilibrium could be disturbed by adding a quantity of salt solution, as evidenced by the fact that it would now no longer protect.

These experiments tend to show that the neutralization of toxin by sodium ricinoleate is an adsorption phenomenon.

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Antidiphtheritic immunization using sodium ricinoleate as a detoxifying agent.

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The property of sodium ricinoleate to detoxify bacterial toxins has been pointed out in previous papers.^{1, 2} We have studied this problem further to determine whether it is possible to immunize children and adults against diphtheria with toxin which has been detoxified in this way.

A quantity of toxin was mixed with a 1 per cent solution of

¹ PROC. SOC. EXP. BIOL. AND MED., 1924, xxi, 278.

² *Ibid.*, 1924, xxii, 194.

sodium ricinoleate, so that each cc. of the mixture contained 0.125 L+ toxin. Immediately after mixing, 1 cc. of the mixture was injected subcutaneously into the arms of a group of laboratory workers and volunteer medical students. In all the cases there developed a local redness with some induration, which persisted for five or six days. There were no general reactions observed. Another group was injected with like amounts of soap toxin which had stood at room temperature for six hours to allow the soap-toxin to come to equilibrium. In this group there were either no local reactions or mild reddening at the point of inoculation. No general reactions were observed. In another group, injected with soap-toxin which had stood at room temperature for twelve hours, there were no local reactions.

One hundred forty-nine cases of children and adults with positive Shick tests have been treated with one dose of soap-toxin. Sixty-nine of these have been retested within six weeks after treatment. Of this group 50.2 per cent gave negative skin reactions. We have frequently found the Shick test to be negative as early as four weeks after inoculation.

We wish to emphasize the importance of using only toxin-soap solutions which are perfectly clear. Injections of cloudy solutions are invariably followed by severe local reactions. This point has been emphasized in an earlier publication in which animal experiments were reported.² It is imperative that the soap solution as well as the soap-toxin mixtures be kept in hard glass containers.

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The preparation of pure sodium ricinoleate.

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The sodium ricinoleate used by Larson in his work on toxin neutralization has been prepared from commercial castor oil.

Castor oil is a triglyceride of ricinoleic acid. It contains small amounts of stearic, hydroxystearic, and oleic acids. The object