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The effect of the surface tension of the medium upon bacterial toxins.

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Tetanus toxin, diphtheritic toxin, botulinus toxin and endotoxin, obtained from the actinomyces gypsoides, were treated with castor oil soap to determine its effect upon these various toxins. Tetanus toxin and diphtheritic toxin were found to be completely detoxified when sufficient castor oil soap was added to reduce the surface tension below forty dynes. Guinea pigs treated with one hundred lethal doses of the respective toxins, with the soap, failed to develop symptoms.

Botulinus toxin appears to be more resistant to soap than the other two soluble toxins. This observation offers a possible explanation of the fact that neither diphtheritic nor tetanus toxins are absorbed in toxic form by way of the digestive tract; while botulinus toxin is readily absorbed by the digestive organs. The contents of the intestinal canal having a low surface tension, because of the bile and soaps present, probably destroy tetanus and diphtheritic toxins, but not botulinus toxin.

Nelson and Henrici[1] have shown that the actinomyces gypsoides, an organism very pathogenic for guinea pigs, possesses a potent endotoxin which kills rabbits and guinea pigs regularly. When shaken in a two per cent solution of castor oil soap, so as to effect a thorough "wetting", this organism loses its pathogenicity, and its endotoxin is also completely destroyed.

Whether or not the effect of soap on bacterial toxins is entirely a surface effect, or is due, in part, to some other property of the soap, cannot be determined definitely at this time.

Control experiments have convinced us that the action of the soap upon the bacterial toxins is not due to the low hydrogen ion. The effect of soap on the antigenic properties of bacterial toxins will be discussed in a future paper.

[1] Nelson, E., and Henrici, A. T., PROC. SOC. EXP. BIOL. AND MED., 1921, xix, 351.