the observations can be explained on the basis of other considerations, there still remains the impression that in some way the metabolism of galactose is intimately related to that of glucose. Further studies along these lines are in progress.

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Purification of Diphtheria and Other Bacterial Toxins by Adsorption.

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Current methods of purification of diphtheria toxin include precipitation by acidification or by the addition of salts, and dialysis or ultrafiltration. Glenny and Walpole[1] by a combination of ultra filtration and acidification have succeeded in attaining a relatively high degree of purification. The method of adsorption, however, has not received sufficient attention. Various adsorbants such as calcium phosphate, aluminum chloride and zinc salts have been used with indifferent results, due either to poor adsorption or to destruction of the toxin. That adsorption can be almost complete has been demonstrated by Coplans,[2] who showed that finely divided asbestos removes 99.9% of diphtheria toxin from its broth.

Recently Fuchs[3] succeeded in adsorbing prothrombin to magnesium hydroxide. This fact suggested the use of magnesium hydroxide for the isolation of diphtheria toxin. It was found that when magnesium hydroxide (in colloidal suspension) was added to diphtheria broth, adsorption of the toxin occurred. The supernatant liquid retained less than 4% of its original toxicity. Following repeated washings with distilled water and subsequent treatment of the precipitate with CO_2 or ammonium phosphate the toxin was recovered. Dialysis removed traces of magnesium and ammonium salts. Injection of the adsorbed toxin into guinea pigs produced death with hemorrhagic adrenals and a gelatinous peritoneal exudate. Control animals receiving 10 times this amount of adsorbed toxin mixed with antitoxin survived. Titration of the adsorbed

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[1] Glenny, A. T., and Walpole, G. S., *Biochem. J.*, 1915, ix, 298.

[2] Coplans, M., *J. Path. and Bact.*, 1914, viii, 581.

[3] Fuchs, H., *Z. f. Immunitätsf.*, 1928, lviii, 14.

toxin by the usual method indicated a degree of adsorption in excess of 94%. The M.L.D. of the original toxin was 0.0035 cc. while that of the adsorbed toxin was less than 0.0037 cc.

Nitrogen determinations (by micro-Kjeldahl) indicated that the nitrogen loss sustained during the process of purification was in excess of 90%.

Tetanospasmin and staphylolysin were similarly adsorbed to and eluted from the magnesium precipitate. Tetanolysin, however, was destroyed.

Conclusions: (1) Magnesium hydroxide in colloidal suspension adsorbs diphtheria toxin which can be eluted without destruction of the toxin. (2) The adsorption is approximately 94% complete. (3) The nitrogen loss per M.L.D. sustained during the process is in excess of 90%. (4) The method has been used with success in the adsorption of tetanospasmin and staphylolysin but not with tetanolysin and indicates possibilities for the purification of other bacterial products.

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Further Observations Concerning the Effect of Posture on the Velocity of Blood Flow in Man.*

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We have previously shown that a much longer time is required for blood to move from an arm vein to a foot vein or the reverse, when an individual is in the standing still position than when he is in the recumbent position.[1, 2, 3] This observation was in harmony with the work of several observers[4, 5, 6, 7, 8] who have shown that, in

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[1] Thompson, W. O., Alper, J. M., and Thompson, P. K., *J. Clin. Invest.*, 1928, v, 605.

[2] Thompson, W. O., Thompson, P. K., and Dailey, M. E., *Proc. Nat. Acad. Sci.*, 1928, xiv, 94.

[3] Thompson, W. O., Thompson, P. K., and Dailey, M. E., *J. Clin. Invest.*, 1928, v, 573.

[4] Piorry, P. A., *Arch. Gén. de Méd.*, 1826, xii, 527.