temperature in all the animals lasting 15-20 minutes, after which it returned to normal. Three control animals sensitized on the same day with 1.0 cc. of the original serum, diluted 1:10, showed after the intravenous injection of 0.5 cc. of the same serum dilution a heavy anaphylactic shock, associated with a decrease of the body temperature to below 35°C. which returned to normal only after 45 minutes.

In a second set of experiments the sensitizing injections consisted of 3 cc. of the same eluate; a control group received 3 cc. of the serum diluted 1:10. The second intravenous injections were carried out with 1.0 cc. of the eluate and with 0.5 cc. and 1.0 cc. respectively of undiluted serum. The animals treated with eluate showed a small drop in the body temperature lasting 15 minutes, while those treated with the original serum suffered a severe shock accompanied by a decrease of the body temperature to below 35°C. lasting 1 to 1½ hours. An intravenous injection of the eluate, or of a corresponding glycocol-sodium chloride solution, into untreated guinea pigs gave the same drop in body temperature as that noted in treated animals. It is apparent, therefore that the injection of glycocol eluates did not induce sensitization either against the injection of eluate or of original serum.

Repeated injections of eluates into rabbits (*i. v.*, 0.5 cc., 1.0 cc. and 1.5 cc.) did not yield precipitins either against the eluate or against the original serum.

It may be concluded that the eluates of antibodies found by sensitive chemical tests to be free from proteins have neither sensitizing nor precipitinogenic properties.

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Antigenic Power of Ultra-Violet Irradiated Tetanus Toxin.

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It has been shown by one of us[1] that tetanus toxin is destroyed by a few minutes' exposure to ultra-violet light if toxic broth be diluted to decrease the concentration of protein and reduce the color absorptive factor. Previously, however, it has not been deter-

[1] Welch, H., *J. Prev. Med.*, 1930, **4**, 295.

mined whether toxin so treated retains its antigenic potency. Lowenstein's[2] tetanus toxin, treated with 0.2% formalin and subjected to ultra-violet light was atoxic and antigenic, but since it is now well known that formalin alone renders certain toxins atoxic while preserving their antigenic powers, the effect of the irradiation in his experiments is uncertain. An experiment was therefore undertaken using as an immunizing agent tetanus toxin rendered atoxic by ultra-violet light. A mixture of 2 tetanus toxins after titration was diluted to contain 1 M.L.D. in each 1 cc. This was irradiated with "C" carbons (National Carbon Co.) at a distance of 25 cm. in the apparatus described in a previous publication,[3] keeping the toxin below room temperature by a current of cool air.

A 2-minute irradiation period failed to destroy the toxin completely, as about half of the inoculated animals developed late tetanus. A further irradiation of 2 minutes rendered the material atoxic. Using not more than a quantity originally containing 1 M.L.D, 9 guinea pigs were given 5 subcutaneous injections of this irradiated toxin at 6 or 7 day intervals and were inoculated 3 weeks later with freshly titrated tetanus toxin in doses of from 1 to 10 M.L.D.'s. No signs of tetanus developed. The period of observation was 45 days.

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Hematopoietic Function in Avitaminosis. IV. Further Studies of Vitamin A Deficiency.*

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In a previous publication[1] we have suggested the occurrence of a secondary anemia in vitamin A deficiency. Our results, however, were not conclusive. We, therefore, continued this investigation with 30 more animals, 18 of which received our vitamin A deficient ration 1749.† Twelve of these rats were allowed a modification of

[2] Lowenstein, E., *Z. Exp. Path. u. Ther.*, 1914, **15**, 279.

[3] Perkins, R. G., and Welch, H., *J. Prev. Med.*, 1929, **3**, 363.

* Research Paper No. 198, Journal Series, University of Arkansas.

[1] Sure, B., Kik, M. C., and Walker, D. J., *J. Biol. Chem.*, 1929, **83**, 375.

† Composition of ration 1749 is as follows: Casein (hot-alcohol extracted), 20; N. W. yeast, 10; McCollum's salts No. 185 (2), 4; lard, 2; dextrin, 64. This ration was irradiated for 30 minutes with a mercury quartz vapor lamp to insure an adequacy of vitamin D.