pole, and not because true antitoxin had been formed. It was not until 1904 that any attempt was made to determine the nature of the electric charge carried by particles of toxin or antitoxin; this research, done in Von Behring's laboratory by Romer, gave only negative results. Again in 1905, Biltz, Much, and Siebert, working in the same laboratory were unable to decide this question.

The failure of these workers was due, we believe, to the disturbing influence of the products of electrolysis. To eliminate this factor we substituted for the U-shaped tube used in the above experiments three beakers connected by agar-filled tubes, semicircular in shape and about 20 cm. long and 1 cm. in diameter. The middle beaker, into which both agar tubes dipped, contained the toxin or antitoxin to be tested; the end beakers held the platinum electrodes surrounded by distilled water, which was changed every half hour during the passage of the current. At the end of four hours, the agar was removed from the tubes, chopped into fine pieces and allowed to stand for one hour in distilled water. The agar was then removed by filtering through gauze and the toxic or antitoxic value of the fluid determined by tests on guinea pigs.

The results of our experiments were decisive. Both toxin and antitoxin particles were found to travel toward the cathode and must therefore carry positive charges. This holds true when the fluid tested is made either acid or alkaline in reaction.

Since a true chemical reaction can take place only between ions carrying charges of opposite sign, the fact that toxin and antitoxin are both electropositive would indicate that the combination of these two substances represents not a chemical union, but rather the adsorption of one colloid by another.

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Nuclein metabolism in a dog with an Eck fistula.

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A dog with an Eck fistula was maintained in nitrogenous equilibrium on a diet consisting of cracker meal, plasmon and lard, and the following chemical observations were made:

1. The output of uric acid was compared with that of a normal dog. An increase in the output was noted.

2. The influence of nuclein, nucleic acid and of adenin on the uric acid elimination was studied. It was observed that all these substances caused an increase in the uric acid elimination.

3. The fate of thymin ingested with the food was investigated. The greater part of the ingested thymin was recovered from the urine.

4. An attempt was made to find thymin in the urine of the same dog after feeding on nuclein and on nucleic acid. The endeavor was not successful.

5. The influence of a diet containing a small proportion of protein but abundant in calories was studied. It was noticed that this diet occasioned an increase in the uric acid output.

6. The influence of fasting on the uric acid output was observed. It was noted in the course of the fast that the uric acid elimination was above the normal.

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On the fractionation of agglutinins and antitoxin.

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E. P. Pick in 1901 associated a number of anti-substances individually with the one or the other of the two serum globulin fractions of the Hofmeister classification. In the pseudoglobulin [3.4 to 4.6 sat. $(NH_4)_2SO_4$ solution[1]] group of antibodies he placed the diphtheria and tetanus antitoxins and the typhoid agglutinin of horse serum; the lower or euglobulin fraction (2.9 to 3.4 sat.) comprises diphtheria and tetanus antitoxin and cholera lysin in the goat, typhoid agglutinin in the goat, rabbit and guinea pig, and finally cholera agglutinin in the horse and goat. It becomes possible, according to Pick, to separate the individual specifically reacting anti-substances by fractioning appropriate mixtures of sera. Such a possibility suggested the application of this method to the further study of certain anti-bodies, especially of the relation of specific and group agglutinins developed by immunization against a single strain of organism. Preliminary experiments in the course of our inves-

[1] The degrees of saturation, as here expressed, indicate a concentration equivalent to a content in 10 c.c. of solution of 3.4 c.c. and 4.6 c.c. of saturated ammonium sulphate solution respectively.