the serum. However, with the three dysentery strains, where the natural charge is low (5 mv.) the effect of the specific sera is to raise the charge. In all cases, no matter what the initial charge, the effect of the serum in high concentration is to bring the charges of the bacteria to a *common potential level* (8-14 millivolts). It is known that bacterial agglutinins are included in the globulin fractions of immune sera. Euglobulin particles from human ascitic fluid were tested in electrolyte solutions similar to those used in the preceding experiments, and their charge falls into the potential zone noted above. Also, the globulin particles of a Type I pneumococcus serum were thrown down by the addition of distilled water, and the charges on these particles and on sensitized Type I pneumococci were compared (Fig. 2), and were found to be practically identical, *i. e.,* the sensitized bacteria act essentially like globulin particles, or in other words, the bacteria are coated by the agglutinin.

From these findings it may be concluded that the first step in the specific agglutination of bacteria is a selective coating of the organism by its particular agglutinin, that the changes in electrical charge accompanying the phenomenon are the result alone of this coating, and that the changes in charge, although perhaps contributory, do not, *per se,* have great importance in the mechanism of specific bacterial agglutination.

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Notes on the mechanism of paroxysmal hemoglobinuria.

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The assumption that the Landsteiner[1] phenomenon constitutes the actual mechanism in paroxysmal hemoglobinuria has been questioned on clinical grounds, and has led to several attempts to demonstrate some other factor promoting intravascular hemoly-

[1] Donath, J., and Landsteiner, K., *München. Med. Wchnschr.,* 1904, li, 1590.

sis in this disease. Hijmans, van den Bergh and Hijmans,[2] and Hannema and Rytma[3] have reported an activating effect on the hemolysin by CO_2. They found that, in the presence of CO_2, the hemolytic mechanism operates at room temperature. The effect was observed when the hemoglobinuric serum was set up with normal cells as well as with the patient's cells, and when the serum alone was exposed to CO_2 and afterwards mixed with the red cells and complement. The action of CO_2 therefore seemed to be on the hemolysin alone.

Two patients with this disease have recently been under observation. They are congenital syphilitics 5 and 8 years of age. One has frequent spontaneous attacks of hemoglobinuria even in temperatures above 16 degrees C. He has a low titer of hemolysin in his serum. The other has spontaneous attacks only after outdoor exposure on the coldest days of winter, or after immersion of an extremity in ice water. The hemolysin in his serum is present in a high titer. Hence in these patients the susceptibility to spontaneous attacks is inversely proportional to the titer of Landsteiner hemolysin in the serum, suggesting that some other factor in addition to the Landsteiner mechanism is operative. The presence of anti-complementary substances in the serum of the patient with a low hemolysin titer and high clinical susceptibility has been excluded. Repeated efforts to show with the blood of these patients that CO_2 acts *in vitro* as an activator of the Landsteiner hemolytic mechanism have been unsuccessful. The serum of each of these patients and mixtures of serum, cells and complement have been exposed at room temperature to concentrations of CO_2 varying from 3.5 per cent to 80 per cent with no hemolysis, upon subsequent warming to 37.5 degrees C. Nor has the titer of the hemolysin been any higher when the usual chilling test was carried out in the presence of CO_2 in concentrations from 20 to 40 per cent.

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[2] Hijmans, van den Bergh, A. A., and Hijmans, C., *Berl. klin. Wchnschr.*, 1909, xlvi, 1251.

[3] Hannema, L. S., and Rytma, J. R., *Lancet*, 1922, (II), 1217.