bacillus without change in its morphology. This reaction occurred only when the serum and the bacillus came from the same individual. A second essential for the reaction is that the patient should have a fever temperature. This is explained by the author by the assumption that a substance is formed in the body which will act upon the bacilli in the characteristic way only if the infection is intense, and the most common index of intensity is fever.

Immunity and Serotherapy against Yellow Fever.—SANARELLI (*Annales de l'Institut Pasteur*, October, 1897) says that most of the autopsies which he made in yellow fever were made shortly after death, and he often found the blood in the heart not coagulated, and collected the serum. The appearance of the serum varies: it may be transparent and clear, or slightly colored by blood or bile admixture. The yellowish serum may take a greenish tint by exposure to light. The serum of the cadaver produces the phenomena of agglutination on cultures of the bacillus *icteroides*, but the reaction is very variable. It has no inhibiting action against the organism. He obtained a considerable amount of serum from a convalescent eleven days after recovery, the man being still jaundiced. The serum was greenish, limpid, and transparent. It produced agglutination very slowly, and had a feeble inhibiting action against the organism when inoculated. Simultaneous injection of the serum with the virus was effective, but there was no effect when the serum was injected twenty-four hours before the inoculation. The organism is not destroyed in the serum, but remains alive for a long time. Other sera had no action. Antidiphtheritic serum and antityphic serum had no agglutinating action on the bacillus. Immunity against the disease is conferred in man by an attack. In experiments on the production of artificial immunity he gave up the use of rabbits, sheep, and goats on account of their sensitiveness to the organism. The immunity experiments were carried out on the guinea-pig, the dog, and the horse. The guinea-pig is difficult to immunize. He used for some weeks small doses of the filtered cultures or the pleural and peritoneal exudation of a goat killed by inoculation with the bacillus. After about one month of the treatment, and some days after the last injection, 0.1 c.c. of the virus was withstood. This quantity is absolutely fatal to the non-treated animal. During the treatments the weight of the animal reduces and by following the oscillation of this the treatment may be increased or diminished. Even with the greatest care these vaccinations produce a high mortality. In most cases it takes six or seven months before an animal is thoroughly immunized. The dog can be immunized much more rapidly than the guinea-pig. Immunity can be produced simply by injecting filtered cultures or cultures sterilized by ether. This proceeding produces infiltration and large purulent collections in the tissue. After this come the intravenous injections. The dogs are extremely sensitive to these injections; they vomit and have fever for several days. In seven or eight months they have an immunity against toxic doses of the bacillus. No matter how well vaccinated, the dogs are not proof against very large doses of the toxins. The beef stands subcutaneous injections better than the horse, but cannot stand the intravenous injections. The horse is given small doses (5 to 10 c.c.) of the filtered culture subcutaneously. These injections are followed by elevation of temperature,

which lasts several days. During this period the injections are discontinued. Intravenous injections should begin with small doses of the filtered cultures. They are well-tolerated, and only produce a slight elevation of temperature. After each injection there are trembling and dyspnea. Care must be taken not to inject outside of the vein. Five or six months after the beginning of the treatment injections with living cultures may be attempted. The production of immunity is in any case a slow and painstaking matter. He kept up the vaccination so long that some of the animals could be considered as hyper-vaccinated. One c.c. of the serum of a guinea-pig so inoculated was effective when injected twenty-four hours before a fatal dose of the virus. Of twenty-six guinea-pigs inoculated with the virus, twenty were treated with serum; six not. The six died in six to twelve days; of the twenty treated, three died between the tenth and sixteenth day. The dog-serum was strong. It gave the phenomena of agglutination to a marked degree. The efficacy of the serum of the dog does not seem due to antitoxic properties. The preventive action is more efficacious than the curative action. Ill success was met with in the production of horse-serum—two of the horses dying. A third horse gave a serum which was feeble.

[The sera were only tried with the guinea-pig—an animal which is rather resistant to the virus—and the results obtained, though interesting, do not give much hope for the application of serum-therapy against the disease.]

Staining of Müller's Granules.—NICHOLLS (*Philadelphia Medical Journal*, February 26, 1898) reports the successful staining of the "dust bodies" of the blood, first described by Müller in 1896. His method consists in adding minute quantities of Ehrlich's neutrophile stain to 0.5 per cent. saline solution and allowing it to flow under a cover-slip of fresh blood sealed with vaseline. Eosin added in the same way stains the large granules. This he considered as completing the chain of evidence necessary to prove the theory of Stokes and Wegarth.

The Presence in the Blood of Free Granules Derived from Leucocytes, and their Possible Relations to Immunity.—STOKES and ARTHUR WEGARTH (*Johns Hopkins Hospital Bulletin*, December, 1897) refer to the observations of Müller, who described small round colorless bodies as constantly present in the blood of both healthy and diseased persons. Müller did not attempt to explain the origin or composition of these bodies. The authors were able to demonstrate the presence of such bodies in blood taken from the lobe of the ear in 500 individuals, of whom 100 were healthy. They found the granules were most easily seen in artificial light obtained from a Welch burner. The granules are increased in number by the addition of dilute solutions of acetic acid to the blood, and they are believed to come from the granular leucocytes of the blood, either the oxyphile or the eosinophile. A number of observations have shown that the bactericidal powers of the blood-serum are diminished when it is collected without leucocytes, and that such serum may be made bactericidal by the addition of leucocytes. The authors filtered dog-serum through porcelain filters, and found a decided difference in the bactericidal powers of the serum before and after filtration. The unfiltered serum produced agglutination in the cholera, Finkler-Prior,