and that constitutional infection is a secondary affair.

And now, having reviewed our pathological anatomy, let us look into our pathogeny. It will be convenient for me to take up this matter where I first studied it in the years 1874 and 1875, when in conjunction with Dr. Edward Curtis, Pathologist of the N. Y. Board of Health, we made about a couple of hundred experiments on the subject, mainly in the line of Oertel's* work that had been published in 1871. Our report was published in 1877.† In the propositions that we submitted as the result of our work, we laid stress on the belief that "the poisonous quality *(in diphtheria)* inhered in some particulate thing."

It should be stated here that Oertel had described various forms of round and rod-shaped bacteria in the membranes; but thought the former caused the disease. Oertel's work was most elaborate, and had created a profound sensation in medical circles, abroad and here. The work of the next thirteen years, however, resulted in relegating these spherical microzymes to a position of inferior importance, Cornil, the well-known French histologist, insisting that they were identical with the micrococcci of pyæmia. And now the almost universal opinion is that they are in some way connected with suppurating processes.

About ten years ago, Loeffler called attention to a bacillus which he thought existed in the membrane only. It had a length of from 2.5 to 3 micromillitres, and a breadth of from 0.5 to 0.8 micromillimetres. He thought it had no spores, but Babes now claims that he has seen them, and says they are large and bright, and can resist a temperature of 100 C. The bacilli are quite irregular, and do not stain evenly.

Usually they are straight or slightly curved, but sometimes they are dumb-bell shaped. There are three ways of demonstrating them. One by the cover-glass method, that is applicable for bedside or rapid work; by cultures in suitable media; or by inoculations on susceptible animals. It is apart from the purpose of this paper to describe these methods, for they are to be found in all the recent text books on bacteriology.

But there are opportunities for error that are numerous, especially for one who has not been carefully trained in this delicate work. Through faulty technique the bacilli may not be stained, or they may have disappeared from the membrane. Or they may be confounded with several other varieties of bacteria. These chances for error lessen in proportion to one's increase in bacteriological experience, and also as one goes on to culture and inoculation on animals; the latter test being the one on which we should place the most reliance. But how greatly even practical bacteriologists have differed as to the importance of some of these tests, may be gathered from a few facts.

In 1888-'90, Roux and Yersin found the Lœffler bacillus in only seven cases out of forty-three admitted into hospital for diphtheria—16%.

But it is quite apparent that they use the word diphtheria in a loose sense, and that many of the cases were in no respect diphtheritic. But a prominent New York observer‡ in the year 1889, failed entirely to find them in 24 cases; afterwards it appeared that some of the patients had measles and scarlet fever, as complications. But later investigations have tended almost universally to sustain Lœffler, and the same American observer§ just alluded to, in a later paper, embodying the results of newer work, has given in his adhesion to Lœffler's later views.

Three more citations from the best laboratory work in Berlin, Paris and New York, will show how the matter stands to-day.

In 1892, Bajinsky‖ made rapid microscopic cover-glass examinations in 154 cases turned over to him as diphtheria, and found the Lœffler bacillus in 78%.

In the same year, but a little later, Martin,¶ of Paris, also made cover-glass examinations of material from 200 children, sent to hospital with a clinical diagnosis of diphtheria. The Lœffler bacillus was found in 64%. He usually found it at his first examination. But he noted three things: That when the larger bacilli were found, they usual-

*Oertel. *Loc. cit.*

†Curtis and Satterthwaite's Report of Investigations on the Pathogeny of Diphtheria. N. Y., 1877. Published by the *N. Y. Bull. of Health.*

‡Prudden, Am. St. of the Med. Sc. May, 1889, p. 328.

§*Med. Rec.*, April, 1891.

‖Bajnisky, *Berl. Klin. Woch.* Feb., 1892, p. 183.

¶Martin, Annales de l'Institut de Pasteur. May 1, 1892, p. 332.