

tion of the bees. The appearance of fungous growths was only a secondary matter.

Schonfeld (22) infected several hives with foul brood and when it had fully developed he took a comb of the rotten brood to the Physiological Institute at Breslau, and had it submitted to a microscopical examination by Drs. Cohn and Eldam (22). This examination showed that in every dead larva, and in each foul broody cell, whether the contents were yet white and fluid or brown, tenacious and ropy, there were to be found long oval bodies, which Preuss called "micro-cocci." "Olose to and among them, Cohn was the first to find, with the most powerful of the five microscopes that were used, a countless number of slender pale rods, joined together, and which he at once identified as bacteria of the genus *bacillus*. The length of a single rod was about 6 micromillimetres, but many of them were two and three jointed, so that these foul brood bacteria microscopically resembled the anthrax bacteria, though of course they were different physiologically and in the manner in which they acted as ferments."

It is not surprising when we remember the state of bacteriological knowledge in 1870, that Preuss should have mistaken micrococci for the spores of a bacillus. In 1885, Cheshire & W. Oheyme (23) confirmed Cohn's conclusions and demonstrated that the disease, foul brood, was caused by a bacillus to which they gave the name of *Bacillus alvei*; and they worked out the following requirements of the causal relation of this bacillus to the disease, usually spoken of as Koch's rules:

1. Constant association of this germ (*B. alvei*) with the disease in the larvae of bees.
2. Isolation of the germ from the diseased larvae, and study of the same in pure cultures on various media
3. Production of the characteristic symptoms of the disease by inoculation of pure cultures.
4. Discovery of the same germ in the re infected larvae. Re-isolation, and growth on various media, comparable to that previously isolated.

The infection brought about by Cheshire was accomplished by spraying a particular part of the comb with a culture of *B. alvei* in milk. This part and no other became affected with foul brood. Adult bees were also infected by feeding them with these cultivated bacilli. The experiments of Cheshire and Oheyme convinced everyone, and since that date *B. alvei* has been generally regarded as the causal agent in the production of this disease.

Dickel (24) wrote in 1888 that several species of bacilli were able to produce foul brood. There was one form of the disease which affected the unsealed brood, and another which affected the sealed brood; and even a third, a mixed form, which seemed to be most malignant.

Klamann (25) supported Dickel's researches, but stated that it was not necessary to count more than two kinds of the disease, as there were certainly several other microbes which contributed to the ruin of the hive. Klamann stated that he found seven and was persuaded that he would be able to isolate an even greater number of bacteria from the diseased larvae. It seemed to him certain that *B. alvei* was the most virulent, and that this germ alone was to be considered the cause of foul brood.

SYMPTOMS OF THE DISEASE.

The disease principally affects the larvae. In a healthy comb the young larvae lie at the bottom of the cells, curled up in the shape of the letter O and in color are of a pure pearly whiteness, plump in appearance, with full

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