

after a large number of transfers; and in the following experiments I have endeavoured to meet any objections that might be made as to the virulence of my cultures, by isolating *B. alvei* from a badly diseased hive and then growing at once sufficient spores for the purposes of the experiment. Thus but three transfers from a diseased larva were made; and all the spores used in the following experiments were obtained in this manner:

Two small hives, each containing strong healthy swarms, were selected and placed side by side.

Hive A was given spores of *B. alvei* in syrup containing one-third of a gramme of naphthol B. to a litre of syrup.

Hive B was given spores of *B. alvei* in syrup containing from 1.6 to 1.8 c.c. formic acid to a litre of syrup.

The spores given were scraped from the surface of an agar slope culture, put into 10 c.c. of sterile water, and well shaken in order to obtain a good suspension of spores. The water and spores were poured into medicated syrup and the mixture thoroughly stirred. It was then given to the bees and was readily accepted. This procedure was continued four days a week for three weeks, and at the end of this time each hive had received the whole of the growth from twelve sloped agar tubes. During the feeding period the combs containing the brood were carefully examined, but none of the usual symptoms of the disease appeared, although cultures were obtained from different parts of the hives and from the digestive tract of the workers. At the end of three weeks the medicated syrup was discontinued for a week. Then ordinary syrup containing spores was given, and at the end of ten days typical symptoms began to be noticed, and after sixteen days the disease was well established. Both hives, so far as I was able to judge, were the same—no disease to be seen in either whilst medicated syrup was fed, but infection manifest in both soon after the formic acid and naphthol B. were discontinued. This experiment goes to prove the benefit of feeding with syrup a substance which is antiseptic and which hinders the germination of the spores. It also confirms Lortet's opinion that the digestive canal of the nurse bee is alone infected. I have never been able to obtain Cheshire's results, viz., the isolation of the bacillus from the blood of the worker, but I have frequently found it in the digestive canal of bees from diseased colonies.

From the results of the above experiments I conclude that in certain cases the use of chemicals is beneficial, but I would not say that other measures, such as starvation and stamping out, should be abandoned as unnecessary or useless. Some of the drugs used are of very little, if any, value; but others, such as formic acid and naphthol B., are undoubtedly very useful. In some cases, especially those in which the disease is very virulent, it may be advisable to resort to more drastic measures.

TOXINS.

I endeavoured to find out whether or not the feeding of toxin (filtrate from a two weeks old culture of *B. alvei* in saccharose bouillon) mixed in syrup would enable healthy bees to withstand the disease. Small amounts of this filtrate were given in syrup to a healthy colony every other day for three weeks. The amount of filtrate fed was gradually increased, but as the amount got larger the bees refused to take it, so it had to be poured over the combs. At the end of three weeks spores of *B. alvei*, freshly isolated, were fed, and symptoms of the disease followed about fourteen days later. So the toxin had little or no effect, but further experiments are being made.