

## Ontario Bee-Keepers' Association.

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(Continued from issue January 15.)

THE subject next taken up was

## FOUL BROOD,

PAPER BY S. CORNEIL.

The subject of foul brood among bees is too extensive to be treated fully in a single paper. I shall in the first place attempt to discuss the origin of the disease, and the means by which it is spread, noticing some popular errors which have crept into the current bee literature. In order, if possible, to present this branch of the question in such a way that it may be understood correctly, I shall avail myself, as far as may be, of the work already done by some of the leading bacteriologists of the day regarding this and kindred diseases, and afterwards shall give some odds and ends which seem to be of importance with respect to the propagation, prevention, and cure of the disease, without attempting to exhaust these branches of the subject.

In cases where putrid chilled brood is followed by foul brood, the microbes present are of two different kinds, "septic" and "pathogenic." The term "septic" is applied to microbes or bacteria which generally live and multiply in decomposing organic matter and in dead bodies only. Bacterium termo, one of the most common of these microbes, is ever present in the air, water, and soil. Septic microbes are *par excellence* the microbes of putrefaction, and for their operations chilled brood in the hive would furnish a most congenial soil.

On the other hand those microbes are termed "pathogenic" which always characterize, by their presence, a special disease, epidemic or contagious, and possessing special symptoms, such as scarlet fever and small-pox, in man, splenic fever in domestic animals, and pebrine in silk-worms. Unlike the septic microbes they attach themselves as parasites to living animals, and grow and multiply within the body, or on its surface at the expense of their host. Such is bacillus alvei, the microbe of foul brood. As it has been proved by experiment that it may be own and propagated in a mixture composed of beef-tea and gelatine, and also in a culture composed of the crushed larva of bees, it is reasonable to suppose that in the temperature of the hive its germs, floating in the air, or in the water, in the case of drowned brood, may

find a lodgment and grow and multiply in dead brood, side by side with the microbes of putrefaction. Such is the opinion of Professor Cook, T. W. Cowan and others. Dead brood may thus become a factor in starting foul brood in hives which otherwise might escape, and this for the following reasons. In the first place, it has been shown by Dr. Watson Cheyne, of London, that the success of the attack of contagious germs on the cells of living tissues often depends on their number. He found for instance that where a certain number of microbes had no effect when injected into the circulatory system, twenty five times as many caused death. With some kinds, however, it was found that a single bacillus was sufficient to cause death. These effects are explained as a struggle between the growing cells of the animal tissues and the bacteria. In the struggle victory will in most cases remain with the cells, and the bacteria will disappear. The writer of the article on schizomycetes in the Encyclopaedia Britannica says "the living tissues of a healthy animal exert actions which are antagonistic to the parasitic invader." Pasteur might also be quoted in favor of this contention. In view of the foregoing we can see that after the microbes had multiplied, in the rich soil of the chilled brood, their spores might, by sheer force of numbers, have gained a foothold amongst the live brood, where before they might have failed to do so.

Again, Cheshire says "pricking a needle into a diseased larva and then touching a larva in a healthy hive with it is, five times out of six, enough to start a vigorous attack." The bees would be likely to carry more or less of the matter containing foul brood germs, on their antennae and feet to healthy larvae, and in this way spread the disease in the hive.

There is another reason why putrid chilled brood in the hive may be favorable to the attack of bacillus alvei. There is a very poisonous substance developed, as the ultimate product of the putrid fermentation of organic matter, called ptomaine, twelve millegrammes of which will kill a dog. Its effect on the cells of growing tissues is to weaken their action, and if brought into contact with the living brood, by the bees, it would increase the chances of success on the part of the attacking microbes. These are the only ways in which the putrefactive matter of chilled brood can assist the spread of foul brood.

We must guard against the error of supposing that foul brood is ever produced spontaneously as the result of putrefaction caused by septic microbes, that these microbes can successfully