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FOUL-BROOD IN BEES, AND ITS TREATMENT.

BY

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AND EARP.

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FOUL-BROOD IN BEES, AND ITS TREATMENT.

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THE hive-bee belongs to the family *Hymenoptera*, and is subject to diseases, as are other members of this order. The history of foul-brood, it is claimed, dates from the time of Aristotle, but this is not a certainty, although it is quite likely that he was familiar with the disease. In 1848 Dzierzon lost his entire apiary of five hundred colonies presumably from this disorder. Beekeepers have, then, from the earliest times been aware of some peculiar complaints among their colonies. The knowledge gained by the use of the microscope has led to the discovery of several bacteria, the most destructive of which in this country is *Bacillus larvæ*. The precise date at which foul-brood made its appearance in New Zealand is not known. Samples of diseased comb were forwarded to America in 1907, and Dr. E. F. Phillips, in charge of apiculture in the United States, reported that all samples showed the gross characteristics of foul-brood. For years profitable beekeeping has been rendered precarious owing to the ravages of these contagious and virulent bacteria.

CAUSE AND SYMPTOMS.

This germ disease attacks and kills the larvæ in the cells. The bees allow the resulting matter to remain there, and the number of hatching-bees decreases in proportion to the increase in the number of affected cells. The life of the worker bee is estimated in the summer at from six to eight weeks, and it is natural to find that as the disease advances the colony dwindles in numbers until it eventually dies out. The honey that is left in the combs is carried away by bees from other colonies, which also become infected and eventually die. This is responsible for widespread losses to beekeepers throughout the Dominion. No definite information has yet been obtained as to how long a colony can hold out against this dreaded disease.

When the box-hive and sulphur-pit system was in vogue the colonies were usually destroyed to obtain the honey. After the honey had been strained out the wax was generally spread out

for the bees to clean up, and in this way foul-brood was transmitted to the new colonies and neighbouring apiaries season after season. With such surroundings it was impossible even for careful beekeepers to keep their colonies free from infection. The labour involved in continual watching and treating, and the lessened output of honey, drove many of the larger beekeepers out of the business.

Foul-brood is caused by the microscopic organism, *Bacillus larvæ*, as already indicated, and is usually brought into the hive in the honey obtained from a previously infected source. The spore or bacillus finds its way into the alimentary canal of the larvæ along with the food or chyle, and at once begins to increase at an enormous rate until all the available nutriment for its development is used up. The larva in the early stages of the disease assumes an unnatural position. The colour also changes from a pearly-white to a dirty-yellow and eventually to a dark-brown, sticky, putrid mass. During these stages the smell is usually of an objectionable character, resembling very closely the odour given off by hot glue. In cases where the larva has died after being capped over, the cappings are an indication of the disease contained in the cell. They will be found to be sunken or concave, dark in colour, greasy in appearance, and in some instances perforated. This, however, is not always the case. The cappings over the cells containing healthy brood are usually convex. A good queen usually lays her eggs in circles, and the fact of a single cell remaining unhatched is suspicious. If allowed to take its course, the disease spreads rapidly to surrounding cells and combs, till finally no brood can hatch and the colony succumbs. On opening some of the cells a thin glue-like coffee-coloured mass will be noticed, which on the insertion of a splinter of wood adheres to the point, and can be drawn rope-like for some little distance out of the cells. This is one of the most distinctive features of foul-brood prevalent in many countries, and, where present, is considered conclusive evidence of the disease. Later on this glue-like substance dries up into the before-mentioned black scale-like body. When the scale is scraped off and held to the nose a strong objectionable smell can be detected. Some beekeepers may fall into the mistake of supposing a colony to be clean when there is no objectionable smell, but the foul-brood must be in an advanced stage before this is noticeable. It is through honey being put into these cells that it becomes a source of infection, and, however little disease there may be in a colony, the honey in the hive is liable to contain the germs of disease. Uncapped diseased cells may easily pass unnoticed, especially when

the comb is empty and there are no capped cells to betray its presence. To detect the disease in such a case stand with the sun shining over the shoulder from behind and hold the comb horizontally with the top bar towards the body. The light will strike on the lower side of the cells and will show up the dried scales of disease.

TREATMENT.

Experience has proved the efficacy of the McEvoy treatment all the world over. It is the only treatment recommended by this Department. When treating a colony it is necessary that there be sufficient bees to form an average-sized swarm. Where the disease is so far advanced as to have left few bees in the colony, then it would be safest to destroy the bees and bee-combs by fire. Tinkering with such a colony would be both useless and dangerous.

Preferably the treatment of foul-brood should be done in the evening, but this is not always possible. When hives are in close proximity to those about to be treated it is safer to close their entrances. This will prevent the bees from the diseased hive gaining admission, and also stop robbing. Prepare a set of frames with a $\frac{1}{2}$ in. strip of foundation wax (called a "starter") in each. Next place these prepared frames into an empty body ready to receive the bees. Shift the diseased hive to one side, and place the prepared hive on the old stand previously occupied by the diseased colony. Now place an empty super on the hive containing starters. The combs with adhering bees are then removed one by one, every bee being brushed off into the prepared hive. The diseased combs are put into a spare hive-body, and covered up as quickly as possible; then remove every portion of the infected hive, including the diseased combs, out of reach of the bees. When these operations are completed, remove the super, place a mat on the top of the frames, and put the roof on. In four days' time the frames containing the starters are removed and full sheets of foundation put in their place. The bees must be brushed off quickly and quietly without using much smoke, so that they get very little of the infected honey that has been stored in the combs built from the starters. The above treatment, if carried out carefully and according to instructions, will effect a complete cure. This is accomplished by the bees utilizing the diseased honey in their honey-sacs for the purpose of comb-building; thus when shifted again at the end of four days they start clean. The colonies should then remain healthy unless further infection be gathered from an outside source.

SAVING HEALTHY BROOD.

When there is a large amount of healthy brood which is only slightly infected the hospital treatment may be followed with advantage. Place a queen-excluder over a strong, slightly infected colony above which supers containing infected brood are placed. The excluder prevents the queen from making use of the affected combs while the brood is emerging. In fourteen days most of the brood will have hatched out, after which the supers can be removed and the combs stored in a place of safety. Now proceed to treat the colony as previously explained. In cold weather do not tier up too high, as there will not be sufficient bees to take care of the brood, and some of it may be chilled.

INFECTED MATERIAL.

The combs, if not too badly infected, may be melted into wax, or, if insufficient in quantity for that purpose, they and their frames had better be burned and the ashes buried. Where the beekeeper decides to convert his combs into wax, the utmost care should be taken to destroy by fire all refuse. The ashes and water should be put into a deep hole and buried.

The hives and appliances may be treated by boiling in a strong solution of caustic soda and water, or, if preferred, the inside of the hives may be scorched with a painter's blow-lamp.

The beekeeper himself is often the cause of spreading disease by carelessly manipulating foul-broody stocks, and then healthy ones. Prevention is better than cure. It is therefore recommended that he should disinfect his hands and appliances with any of the well-known germicides.

NOTES AND CAUTIONS.

On no account should honey be fed to bees; sugar syrup is cheaper and better. Honey from diseased hives may be used for table purposes.

Take the precaution to dig round about the hive so as to bury any honey which may have been spilt.

No treatment will be successful when the bees are allowed to get at any of the combs or honey from an infected hive.

"Eternal vigilance" should be the watchword of every beekeeper who hopes to control diseases.

Combs should not be exchanged from one hive to another until the apiary is free from disease.

Occasionally colonies swarm out after treatment, but this is not likely to occur when honey is being gathered freely. It can be guarded against by placing queen-excluding zinc across a wide entrance until there is brood in the combs.

All swarms from an infected apiary should be treated as if they were diseased.

Keep robbing in check as much as possible.

Should the weather be unfavourable for honey-gathering, it is advisable after treatment to feed a little sugar syrup.

INSTANCE OF THE LOSS WHICH MAY BE SUFFERED.

Some idea of the actual loss which may occur through the ravages of foul-brood may be gained from the following instance:—

An apiarist, a schoolmaster and a very careful man, with a fair knowledge of beekeeping, discovered foul-brood in his apiary in the month of November, 1912. By the end of the season he had been compelled to destroy with sulphur no fewer than sixteen out of thirty-two colonies. The following year he commenced the season with sixteen colonies, increasing to twenty-six as the season advanced. Towards the end of the season he found it necessary to treat every colony for the disease. In all, 840 combs were melted up for wax. The loss, therefore, in the two seasons may be put down as follows:—

1912.		£	s.	d.
Sixteen swarms of Italian bees sulphured, at £1 10s. per colony		24	0	0
320 combs melted down, valued at 1s. each		16	0	0
		40	0	0
Wax received from 320 combs, at 1s. 3d. per lb., 40 lb. . .		2	10	0
Actual loss		<u>£37</u>	<u>10</u>	<u>0</u>
1913.		£	s.	d.
Foundation for treating twenty-six colonies, at 2s. 3d. per pound (brood-chamber)		4	7	9
Foundation for supers, at 2s. 3d. per pound		4	7	9
Probable loss of honey from sixteen colonies sulphured the previous year at an average of 100 lb. per colony (1913 season)		26	13	4
520 combs melted down, at 1s. each		26	0	0
		61	8	10
Wax received from 520 combs melted down, at 1s. 3d. per pound, 65 lb.		4	1	3
Loss 1913		57	7	7
Loss 1912		37	10	0
Total loss		<u>£94</u>	<u>17</u>	<u>7</u>