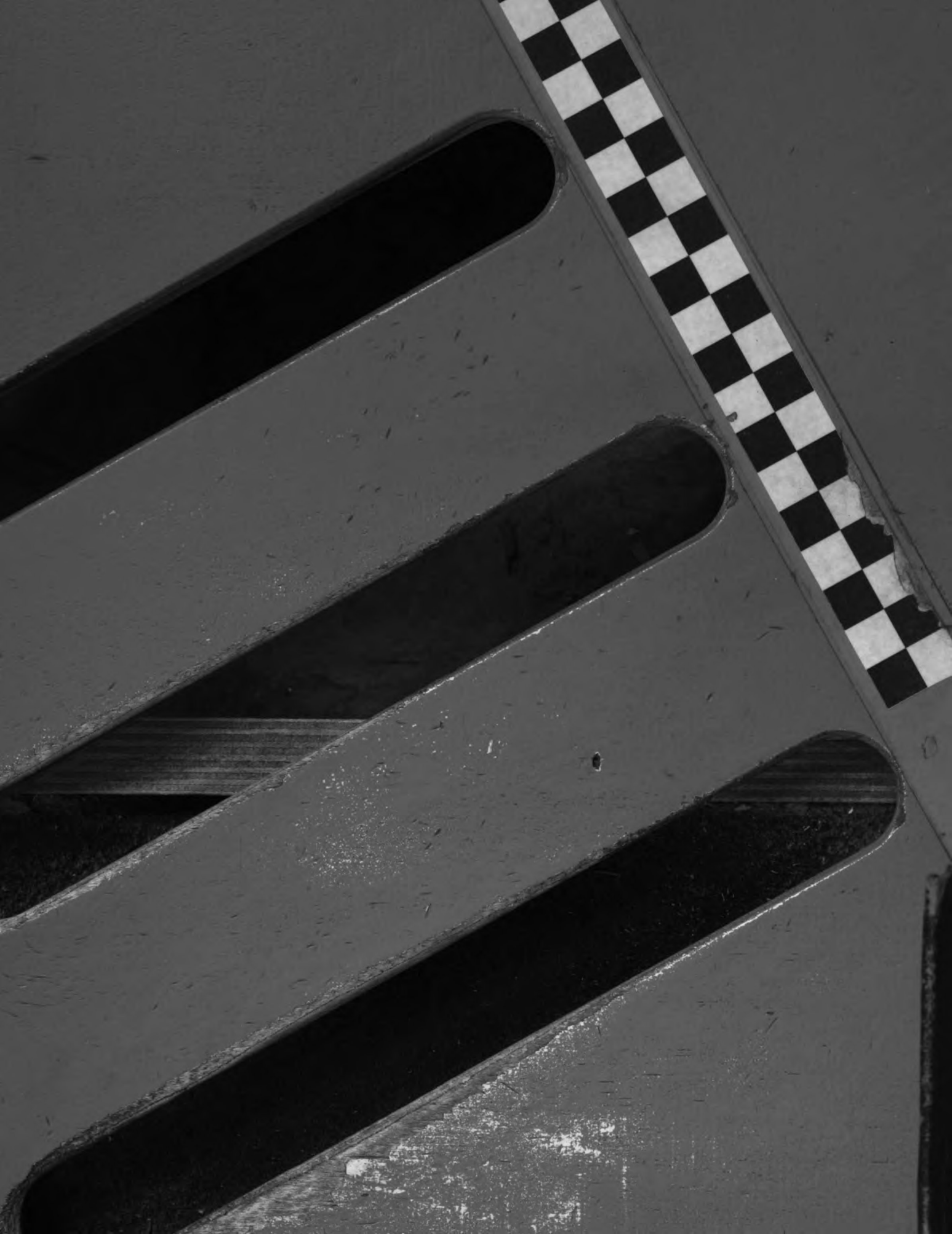
Liver - Diseases



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T H E S I S.

F O U L B R O O D.

By

John H. Rankin.

Michigan Agricultural College.
1901.

THESIS

FOUL BROOD.

Foul brood is a disease of bees found in all parts of the State of Michigan and one which is fast ruining a most pleasant and profitable industry. It spreads through an apiary, affecting the strongest as well as the weakest colonies, because it is one of the malignant and contagious diseases due to the presence of a germ called by the scientists bacillus alvei. Adult bees are supposed to be beyond the reach of this germ, and the disease is therefore confined to larvae between the ages of one and ten days. Just how this young larva becomes affected is not definitely known. It may be through contagion from the diseased comb or food while contagion is brought to the young larvae by the nurse bees, but in all probability the germ is introduced with the food. It has been said that foul brood develops from chilled or starved brood. This has been proven beyond a doubt not to be true. Since it is a germ disease it cannot develop when the germ which causes it is not present. On the other hand, the disease is so highly infectious that one drop of infected honey may ruin a whole apiary.

Symptoms.

The first apparent evidence of the presence of the disease manifests itself in the behavior of the bees which do not seem to possess their usual activity but have a lazy, indolent manner. There is apt to be more litter in the entrance of the hive as though the bees were loath to "clean house." A few bees may lan at the entrance. After the disease is well advanced a foul smell resembling melting glue may be detected without removing the cover even, and at some little distance from the hive.

On removing the cover for examination of an infected colony reveals the following peculiarities: The brood is not compact, but scattered. The empty cells, those not containing brood, may contain a dry scale in the bottom. The cappings over the dead larvae are depressed slightly and darker than the healthy ones. There is often a hole in the center of the cap. Many larvae, however, die before the cell is sealed.

If the examination is made when the disease is just beginning, the affected larvae are no longer curled up, but either lie extended in the cell or are moving about unnaturally. As the disease progresses they lose their plump appearance, become flabby and finally die.

As decomposition begins the larvae at first take on a yellowish appearance, and later turn brown. If a toothpick is inserted into the dead larva at this time and later and is slowly drawn out it will show a long, ropy, tenacious matter, which upon breaking, when drawn out to its fullest extent, flies back into the cell. This ropy, putrid mass slowly dries down and adheres to the bottom of the cell, forming a scale. The bees seem reluctant to remove these dead larvae, instead of hastening their removal as they do in other instances when larvae die. Or it may be that the dead larvae adhere so firmly to the cell that it is impossible for the bees to remove them. Whatever the cause may be, when the larvae are killed by this disease they are not removed.

As a result of the disease the colony becomes weakened since the brood fails to hatch, and soon dwindles down to such an amount that it is utterly defenseless and is then liable to be robbed. As soon as the rotting begins the disease is transferred to other colonies, and unless the bee-keeper is watchful the whole apiary soon is infected.

It has been said "a bee-keeper who does not discover foul brood before his neighbors remind him that something is wrong is no man to treat the disease." It would be more proper to say that a

bee-keeper who does not discover that something is wrong before his nostrils tell him of the presence of foul brood is slow to treat the disease, for foul brood is often found in the apiary of an owner who was not acquainted with it, but the odor having once impressed us as to its nature and importance has always decided a complete cure. Dr. Howard says,"I would ignore the use of any and all drugs in the treatment of foul brood as a useless waste of time and material, wholly ineffectual, inviting ruin and total loss of bees. Any method which does not, for its object the entire removal of all infectious matter beyond the reach of bees and brood will prove detrimental and destructive and surely encourage the recurrence of the disease."

The one method that has proven the most universal satisfaction is that provided by Canada's inspector of apiaries, William McEvoy. His method is given below in his own words:

McEvoy Treatment.

"In the honey season, when the bees are gathering freely, remove the combs in the evening and shake the bees into their own hives; give them frames with comb foundation starters and let them build comb for four days. The bees will draw the starters into comb in four days and store the diseased honey in them, which they took with them from the old comb. Then in the evening of the fourth day

take out the new combs and give them to the foundations to work out, and then the cure will be complete. By this method of treatment all the diseased honey is removed from the bees before the full sheets of foundation are worked out. All the old foul brood scales must be burned or made into wax after they are removed from the hives, and all the honey that is taken out of the combs during the four days must be burned or made into wax, on account of the disease honey that would be stored in them. All the curing or treating of diseased colonies should be done in the evening, so as not to have any roaming bees or robbing of the bees from the diseased colonies to mix and go with bees of cured colonies. By doing all the work in the evening it gives the bees a chance to settle down nicely before morning and then there is no confusion or trouble. This method of curing colonies of foul brood can be carried on at any time from May to October, when the bees are not getting any honey by feeding plenty of sugar syrup in the evenings to take the place of honey flow. It will start the bees robbing and spread the disease to work with foul brood colonies in wet days when the bees are not gathering honey, and for that reason all work must be done in the evenings, when no bees are flying. When the diseased colonies are work in bees, put the bees of two, three or four

colonies too th r, so as to get a good start to start the cure with, as it was not safe to spread the disease with li tle weak colonies.

""hen the bees are gathering honey, my apiary can be cured of foul brood by treating the diseased combs in the evening,and giving the bees frames with comb foundation starters on. Then also in the evening feed the bees plenty of sugar syrup, and they will draw out the foundation and store the diseased honey which they took with them from the old combs; in the morning remove the new combs made out of the starters and give the bees full sheets of comb foundation and feed plenty of sugar syrup each evening until every colony is in first-class order. Make the syrup out of granulated sugar and put one pound of water to every two pounds of sugar and then bring it to a boil. As previously stated, all the old combs must be burned or made into wax when removed from the hive, and so must all the new combs made during the four days. No colony is cured of foul brood by the use of any drug. All the old combs must be removed from every diseased colony and the bees got away from the bees before the brood rearing is commenced in the new clean combs."

F. E. Pro ce, inspector of apiaries of "isconsin, says, "All the difference from the McEvoy treatment that I practice, I dig a deep pit on level

ground [illegible] spring, [illegible] after getting a fire in the pit, [illegible] combs, frames, etc., to be burned, are [illegible] in this pit in the evening and the fresh earth from the pit returned to cover all from sight. If diseased combs with honey in are burned on surface of soil there is great danger the [illegible] honey will run on the soil and in the burning the wax in bees will be lost by taking loose the diseased honey.

"Also I cover the queen while bees are on six or eight strips of cotton cloth, to prevent any swarming or desertion."

The equipment necessary for the McEvoy treatment is a large canvas or sheet, a broad pail partly filled with the corrosive sublimate solution, a sponge or rag, a [illegible] brush similar to a dogshall, a screw driver, or some other tool for prying the frame loose, and a set of frames containing only starters of foundation. The only time of day suited to the treatment is toward evening, when the bees have ceased flying to and from the fields. A bright moonlight night answers the purpose if many colonies are to be treated, though the bees are perhaps more easily handled just at dusk than in the moonlight. At this time we have little to fear from robbers or from infected bees flying to healthy colonies.

The [illegible] procedure is about as follows:

Spread the canvas over the old stand, place the hive on the canvas. Carefully shake the bees off the old combs into the hive, and brush all the bees off the old combs into the hive body. Remove the hive from the canvas, which should be gathered up by the corners in order to allow the bees to be shaken from it into the hive; then add the remainder of the colony members. Be sure that every bee is secured and placed in the hive for a single escaping bee might fly to a neighboring hive and infect the colony.

Every precaution must be exercised to prevent robbing. Before the work is done, all scattering drops of honey must be removed by washing with the corrosive sublimate and all bits of comb must be picked up. Never let one drop of honey get away to infect other colonies.

When you have a set of combs partly full of honey, it seems a pity to destroy them but unless you have upwards of ten colonies to treat, it will not pay to try to save an ounce of honey or wax. If you are a careful person you may melt the combs into wax, but the honey may be saved by adding a little water and heating it at the boiling point for two hours.

The old hive bodies may be scraped, the scrapings burned, and the inside painted with kerosene and set on fire. When it has burned well,

[illegible] to [illegible] of [illegible] clay
on the [illegible]. [illegible] from the [illegible]
and [illegible] will [illegible] the [illegible] of the [illegible].

[illegible] of [illegible] [illegible] with sufficient
care, the colony will be [illegible] from the disease, but
it will require close attention [illegible] part of
[illegible] of the [illegible] condition in which the
bees will be after the new treatment, and the
discouragement following the loss of all their brood.
This treatment may be used at any time during the
summer, preferably when honey is coming in, as
the [illegible] from robbing is then at a minimum.

There is [illegible] may [illegible] a
mild case of foul brood in their own [illegible]
hood, and it is possible that a case of foul brood
may occur in a mild form only in the spring, and
disappear as the [illegible] opens, only to reappear
later in the season. It is possible that this state
of affairs is due to the fact that the honey in the
cells is infected with the germs, and when the
young bees begin to come in freely, it is used
to feed the brood, which, being honey, owing free
from germs, is eaten by the brood with impunity
until the cells become full of healthy brood and the
dead larvae finally disappear.

Perhaps the most favorable condition for the
spread of the disease occurs [illegible] it becomes present
in the yard of the bee-keeper who does not examine
his colonies frequently. A colony [illegible]

from the failure of the breed to ... cure and the keeper may not know that anything is wrong with the colony. Such bees may show no ... nothing colonies. Such colonies are strong, but ... in this way lose from this ... caused colony is ... n to nearly every hive in the yard and ... ually to the strong ... such diseased ... units.

The extractor is an important factor in ... spread ... disease. A case of ... , ... from a diseased colony, and after extraction ... back into half a dozen hives, may bring infection to each one of them.

In the winter of 1908-9 ... s were fitted in ... ber at the station. They were tiered ... in the cellar in alternate rows with the ... ctions of the hives removed. A diseased colony ... placed ... ng the healthy ones and marked. During the winter ... bees did not ... quiet but ran out over the hives to quite an extent. In the spring the four hives, which had ... in direct contact with the diseased one, were also diseased.

This ... ns that when ... ing the colonies in cellars with the ... ctions of the hives removed, ... may also need ... in spreading the disease.

Another way in which the honey may ... be infected is ... y the carelessness ... of the owner.

[illegible], and [illegible] [illegible], or [illegible] [illegible] [illegible] of the hive" [illegible] to clean up." The [illegible] on the wax extractor is thrown out where the bees can have access to it. A hive in which the colony has died is set at once when out of the reach of the bees, not allowed to stand in the yard and the entrance of the hive not fully protected. This is wrong. Even if there were no danger of disease, the hive should be cleaned as soon as the colony is dead, and the refuse from the wax extractor burned, never leaving it where the bees can get at it. Such careless [illegible] [illegible] is an important factor in the spread of the disease. The extractor need not be discarded for the practice of colony swapping, but every bee-keeper should make himself so acquainted with the disease, keep a vigilant watch, and stamp it out as soon as it appears. To leave one diseased colony in an apiary may cost the total ruin of all the other colonies. Even one drop of infected honey, if left where the bees have access to it, may ruin the industry of the whole apiary. The owner must then take extreme precautions to prevent the entrance of the disease. He must then go to the trouble of [illegible] his hands, and the hive tools he uses, antiseptic by washing them in a three per cent solution of carbolic acid, which would be about four teaspoonfuls to a gallon of water. Or a solu-

of the drug to a solution of water. Right here it should be remembered that corrosive sublimate is a deadly poison, and must be handled with great caution. A very small amount spilled on the honey or comb intended for use will convert it into a violent poison. The disease may be introduced to a healthy stock simply by the operator handling the frames of the healthy one after he has been examining a diseased colony. It is impossible to be too careful. For those who wish to put the above precautions, the best method of procedure for him to pursue in case of the disease is to burn all diseased colonies and nuclei.

I am indebted for much of the subject matter of this bulletin to E. F. France, Inspector of Apiaries of Wisconsin, William McEvoy, Inspector of Apiaries of Canada, and to Prof. F. C. Harrison of Guelph.

27 [redacted]

Feb 3 59