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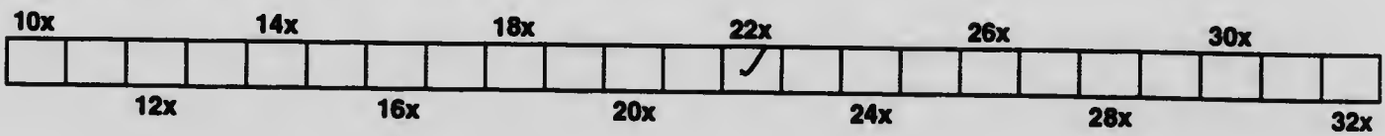

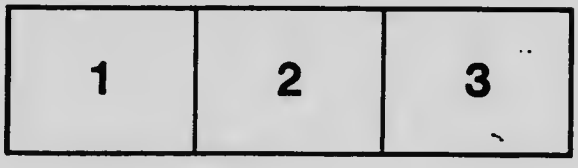

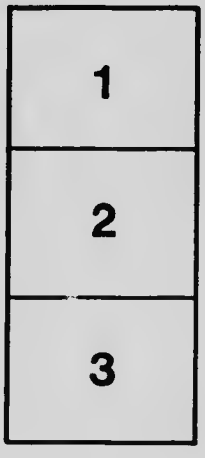

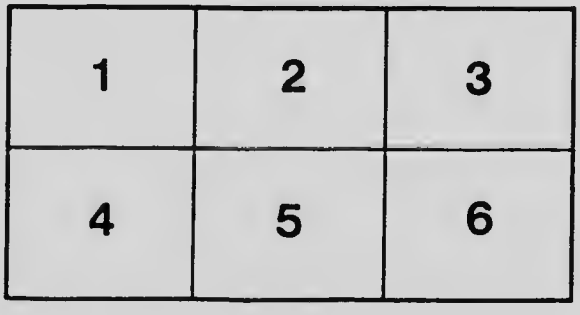

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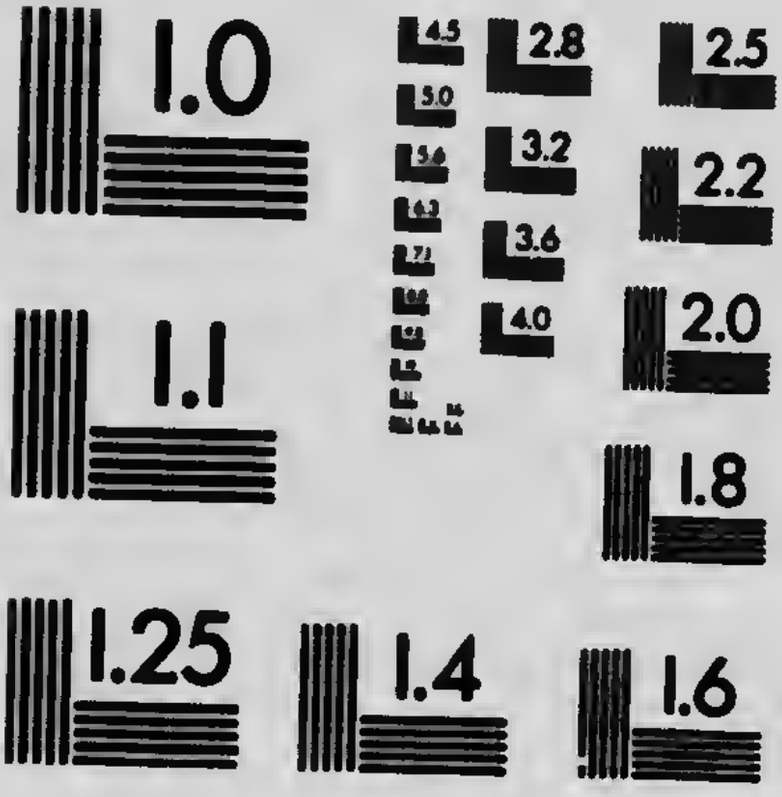

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BULLETIN 197.] FEBRUARY, 1912.

Ontario Department of Agriculture

FRUIT BRANCH

Bee Diseases in Ontario

By Morley Pettit, Provincial Apiarist.

Much dissatisfaction with beekeeping as a business is caused by so-called "bad luck," which is really due to a definite bee disease which any beekeeper can learn to cure. Bees are quite as liable to disease as any other live-stock, and to be able to treat such disease intelligently is quite necessary to success.

Bee-moths are often blamed for the ravages due to disease; but moths never destroy a healthy, normal colony, as they only feed on the deserted combs after the bees are nearly all gone. Heavy winter losses can often be attributed to disease. In fact, whenever a colony is not doing well the exact cause of its failure should be carefully sought to make sure there is no bacterial disease.

On the other hand, disease often makes its appearance in the best colonies in the apiary, because infection is usually carried by robbing, and that is generally done by strong colonies. If not checked on the start it soon spreads through the whole apiary, and from it to other apiaries in the neighborhood.

The inspectors of apiaries can do a great deal for the health of bees in Ontario; but to be of real value their work must be supplemented by the earnest efforts of the individual beekeepers. Every one should be his own inspector, carefully *examining every comb of every colony in the apiary at least once a year,* remembering that it is far better to detect it on the start in strong colonies than to wait until they are practically ruined and the disease has spread through the whole neighborhood. Only one cell of infectious disease makes it necessary to treat even the best colony in the apiary. And because one has kept bees for a number of years without seeing a case of disease is no reason why it should not make its appearance this year. Plenty of people have died of smallpox after having escaped it for fifty years.

When a case of infectious disease is suspected the beekeeper must first notify the Minister of Agriculture, Toronto, Ont., who will see that the case is attended to as soon as possible. It often means a loss of time for the beekeeper to correspond with the local inspector, because that official has no authority to make extra trips without instructions from headquarters. If the case cannot have immediate attention the beekeeper should go ahead and treat the diseased colonies according to directions given in this bulletin.

Examining an Apiary for Disease.

The diseases which cause the most damage in Ontario attack the developing brood, causing much of it to die in the comb, and so reducing it that the colony soon dwindles from lack of young bees to replace the old.

When examining an apiary for disease the prime consideration is to avoid robbing. The best time is during a good honey flow as early as possible in the season.

It is necessary to have a good smoker, a hive tool for taking out combs, and a supply of wooden toothpicks for testing the brood.

In opening the hive just enough smoke should be used to keep the bees in subjection. Remove each comb in turn from the brood-chamber and examine the brood. It is best to sit on a box close to the hive with your back to the sun, and hold the comb so that it will shine into the cells, and throw a strong light directly on the lower sides and bottoms of the cells. If there is no disease, the empty cells will be bright and clean, and the uncapped larvae will be plump in form and of a pearly white color. At first a number of cells of capped brood should be opened with the pick, until you are quite familiar with the outward appearance of healthy capped brood. Cappings which to any but the best-trained eye appear quite healthy often cover dead larvae. When diseased cells are present they are quite frequently found around the lower edge of the comb. If any of the brood cappings appear darker than the rest, or are flat, sunken, or perforated, they should be opened to see whether the brood they cover is dead. Healthy brood is sometimes found under flat, or perforated cappings; but there is a difference in appearance which experience soon teaches one to detect. Brood sometimes develops without ever being fully capped. This is no indication of disease. When each hive is finished the pick used there should be left in the hive, and if any honey is daubed on hands or tools they must be washed thoroughly before opening the next hive.

There are three brood diseases prevalent in the apiaries of Ontario; American Foul Brood, European Foul Brood, and Starved or Pickled Brood. The first two are known to be infectious; the last is not so considered, although its cause is not well understood.

Distribution.

American Foul Brood is pretty evenly distributed over that portion of Ontario lying south and west of the Trent Valley. European Foul Brood is spreading rapidly from three main centres of infection, so that the following counties are now diseased: Carleton, Russell, Renfrew, Northumberland, Hastings, Prince Edward and Welland. A slight outbreak was reported in 1911 in York.

These two diseases are costing the Province of Ontario hundreds of thousands of dollars annually, not only in loss of bees and honey and of

fruit, clover seed and buckwheat, but in their disheartening effect on the men engaged in the industries concerned.

Much, however, is being done by the Department of Agriculture towards restoring a well-grounded confidence in beekeeping as a business by various methods of instruction. To be effectual this government work must be supplemented by an earnest effort on the part of beekeepers themselves to keep their bees in a healthy condition. American Foul Brood must be reported and treated whenever discovered. So far as is known the race of bees does not affect the virulence of this disease. It is different with European Foul Brood, which simply cannot be cured in common black bees. Those who introduce Italian queens to their colonies

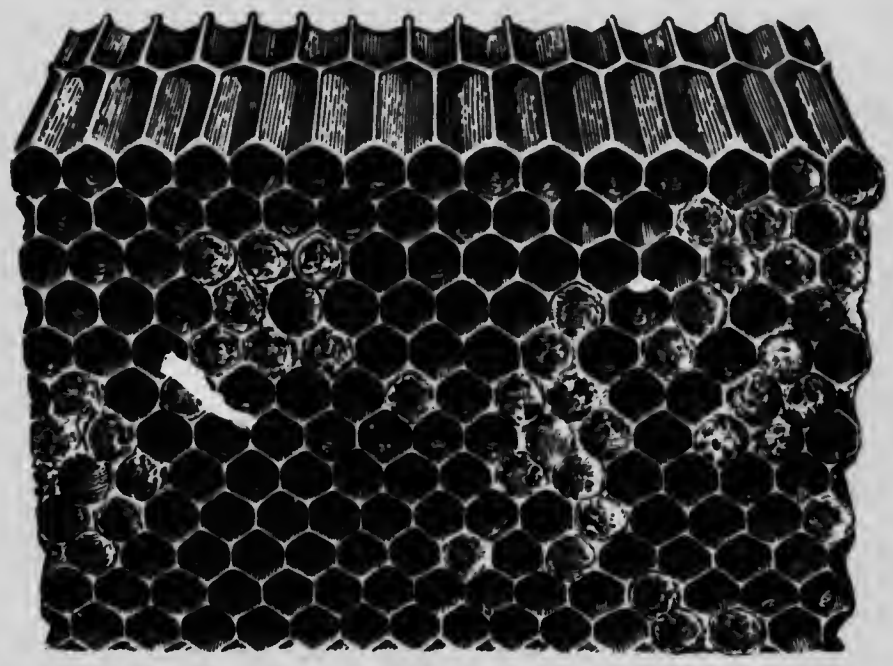

Fig. 1.—American Foul-Brood comb, showing irregular patches of sunken cappings and scales. The position of the comb indicates the best way to view the scales. (U.S. Dept. of Ag. Far. Bul. 442.)

ahead of the disease, or even at the time of treating, are saved heavy loss and are able to build up a good business. It is no more possible to check the spread of European Foul Brood among black bees than it is to stop a fire that is sweeping over a town of dry wooden buildings. But as in a fire-swept town progressive men will rebuild better than before, so in the disease-swept counties progressive beekeepers are now making more money than ever by the use of the well-bred Italian bees which they were compelled to adopt.

AMERICAN FOUL BROOD.

This disease is caused by bacteria known to scientists as *Bacillus Larvae* (not *B. Alvei*, as was formerly supposed). It reaches the healthy young larvae by means of infected food unsuspectingly fed to them by the nurse bees. In most cases the larva dies when nearly ready to seal up, and most of the cells containing infected larvae are capped. The dead larva softens, settles to the lower side of the cell in a shapeless mass, at first white or yellow, changing to coffee-color and brown. At this stage it becomes glutinous, so that if it is picked with a toothpick the contents will rope out half an inch or so when the pick is slowly withdrawn. It adheres to the cell so it cannot be lifted out entire. It has the odor of a poor quality of glue. When the larva dries it forms a tightly adhesive scale, of very dark brown color, which cannot be removed without tearing the cell wall.

"Pupae also may die of this disease, in which case they, too, dry down (fig. 2, *o*, *d*), become ropy, and have the characteristic odor and color. The tongue frequently adheres to the upper side wall, and often remains there even after the pupa has dried down to a scale. Younger unsealed larvae are sometimes affected. Usually the disease attacks only worker brood, but occasional cases are found in which queen and drone brood are diseased."—(*U. S. Dept. of Ag. Farmers' Bul.* 442.)

Where the infected larvae are capped the cappings turn a darker color and become flat or sunken; the workers, perceiving that something is wrong, usually start to tear off the capping, but, discovering the condition of the contents, they generally leave it with a small perforation in the centre until quite dry, then the capping is removed, and in time honey may be stored in the cells containing the scales of disease The millions of disease spores then float out into the honey, which becomes a medium for carrying the disease to other healthy larvae by robbing, in the same or some other apiary. Some of the honey is also carried into the supers, to make room for alterations in the brood nest, and is marketed in the form of bottled or section honey. It goes into many homes, especially in towns and cities. The wooden sides of the sections, and many of the empty bottles, or washings from them, are thrown out by housekeepers and cleaned up by bees of the neighborhood, and the disease is carried home to their healthy brood. This is why our inspectors find more disease in the apiaries around towns and cities than elsewhere.

The Treatment.

Now, to be cured of this disease a colony must be freed from all this infected brood, comb and honey. To do this we simply take it away. But in the operation some precautions are necessary. We must see that the colony will get healthy food as soon as the unhealthy food is taken away, and have means for building new comb at once. So the operation should be performed during a honey flow, and to make it perfectly sure it is a good plan to insert a division board feeder of sugar syrup.

We must take precautions against starting robbing, or causing the treated colony to scatter to other hives or swarm out, be lost, and carry infection to other places. So the operation should be performed in the evening, when the bees are settling down for the night, and the entrance should be covered with queen-excluding metal to hold the queen in case of swarming out the next morning. A regular queen-excluder laid on the bottom board under the brood chamber will answer the latter purpose. They should also be given a clustering space to occupy, as in the case of a natural swarm. Whenever bees are disturbed in their hives they will fill their honey sacs with honey from the comb. As this will happen when the hive is being treated, and some of this diseased honey might be

FIG. 2.—American Foul Brood: *a*, *b*, *f*, normal sealed cells; *c*, *j*, sunken cappings, showing perforations; *g*, sunken capping not perforated; *h*, *l*, *m*, *n*, *q*, *r*, larvae affected by disease; *e*, *i*, *p*, *s*, scales formed from dried-down larvae; *d*, *o*, pupae affected by disease. Three times natural size. (U.S. Dept. Ag. Far. Bul. 442.)

stored in the new combs, it is necessary to make them eat it before they can find a place to put it. To make sure of this, not one bit of comb of any kind can be left in the hive. Even sheets of foundation are unsafe, as some cells can be so quickly drawn out, enough to deposit a little infected honey. The hive must be quite empty so far as comb or founda-

tion is concerned, except that very narrow starters of foundation may be placed in the frames to indicate where the combs are to be built. Thus the diseased honey will be consumed in wax secretion before any of it can be deposited in the hive.

Method of Treatment.

When there is a good honey flow on, go to the colony in the evening, remove it from its stand, and set in its place a clean, disinfected hive containing clean frames with small foundation starters, and, if convenient, a division board feeder with thin sugar syrup. The entrance of this hive must be covered with queen-excluding metal. Now shake the bees from the combs of the old hive into the new; but if any fresh nectar flies out in shaking it will be necessary to brush instead of shaking. Get these combs immediately under cover, and clean up very carefully any honey that may be around, so that robbers from healthy colonies cannot carry home disease.

Fig. 3.—The ropiness of American Foul Brood. (U.S. Dept. Ag. Far. Bul. 442.)

When the diseased colonies are weak in bees, the bees of two or three should be put together into one clean hive, so as to get a good-sized colony with which to start the cure.

But in doing this diseased colonies must be united with their next-door neighbor, and not carried to another part of the apiary, as flying bees will be sure to return and may enter adjoining healthy colonies, carrying disease.

You have now made an artificial swarm of this colony. It must be given the conditions a new swarm likes, or it will leave and carry its disease to parts unknown, or perhaps into some healthy hive in the apiary. A new swarm likes plenty of ventilation and shade, and also plenty of clustering room. To satisfy this natural desire it is sometimes necessary to place an empty hive under the one containing the starters for a few days. This simple precaution will generally prevent the swarming out which so often happens in treating foul brood; but as an extra precaution it is best to use the excluder on the entrance as well.

All combs from the supers as well as from the brood-chamber of the diseased colony must be either burned or melted and boiled thoroughly before the wax is fit to use again. The honey that is removed is entirely

unfit for bee feed, and should be buried deep enough to be out of the reach of any bees.

If directions have been followed carefully and thoroughly, the treatment should be successful. To make sure, however, the brood must be examined again in about three weeks and again the following season. If the disease reappears in any colonies they can be treated again. If the brood is perfectly healthy on the second examination combs containing too much drone can be replaced by frames of foundation or clean worker combs.

Saving Brood.

Brood from badly diseased colonies is of no value, and dangerous, and should be burned, buried or otherwise destroyed at once. Brood from colonies having only a few cells diseased may be placed over an average colony slightly diseased, and the queen caged. In ten days treat as given above.

Saving Combs.

It is never safe to use super-combs that have been on diseased colonies. Even though they may appear white and clean, germs of the disease are apt to lurk in them from year to year. To melt these down is no serious loss, as the wax will more than make foundation for new ones.

Disinfecting.

Hives which have formerly contained diseased colonies, or in which diseased combs have been stored or carried, should be burned over inside with a gasoline or oil torch.

Fall Treatment.

If the disease is discovered late in the season, and the colony is still strong, leave it until November, take the diseased combs away, and supply honey from a healthy colony, in full sealed combs. *Be sure that the combs are all sealed, and that they are from a colony which has no disease.*

If the colony is not strong enough to be worth this treatment it should be destroyed at once, as one great source of spread is the spring robbing out of combs left by the winter death of such colonies.

EUROPEAN FOUL BROOD.

Until 1907 the only infectious brood disease known to exist in Ontario was the one already described. But another then made its appearance. It is called European Foul Brood (sometimes "Black Brood").

European Foul Brood has destroyed the apiaries in great areas of different states in the Republic to the south of us. It is now known to be

rampant in at least seven counties of Ontario. In one way it is much more to be dreaded than American Foul Brood, because it runs its course and destroys an apiary much more rapidly, and because the method of spread is not fully understood.

In the part of Ontario where it was first discovered apiaries were wiped out at first something like this:

112 colonies reduced to 23 in two years.

180 reduced to 21 in one year.

60 colonies reduced to 44 in one year, and the balance all diseased the second year.

FIG. 4.—European Foul Brood: *a, j, k,* normal sealed cells; *b, c, d, e, g, i, l, m, p, q,* larvae affected by disease; *f, h, n, o,* dried-down larvae or scales. Three times natural size. (U.S. Dept. Ag. Far. Bul. 442.)

As was stated above, nothing but the introduction of Italian queens by the beekeepers concerned will check its spread.

The best description of this disease which has been published is found in U. S. Department of Agriculture Farmers' Bulletin 442, "The Treatment of Bee Diseases," by E. F. Phillips, Ph.D. It is as follows: "European foul brood was formerly called 'black brood,' or 'New York bee disease.' The name 'black brood' was a poor one, for the color of the dead brood is rarely black, or even very dark brown. European foul brood usually attacks the larva at an earlier stage of its development than

American foul brood, and while it is still curled up at the base of the cell (Fig. 4, *r*). A small percentage of larvae dies after capping, but sometimes quite young larvae are attacked (Fig. 4, *e*, *m*). Sunken and perforated cappings are sometimes observed, just as in American foul brood (Fig. 2, *c*, *g*, *j*). The earliest indication of the disease is a slight yellow or gray discoloration and uneasy movement of the larva in the cell. The larva loses its well-rounded, opaque appearance and becomes slightly translucent, so that the tracheae may become prominent (Fig. 4, *b*), giving the larva a clearly segmented appearance. The larva is usually flattened against the base of the cell, but may turn so that the ends of the larva are to the rear of the cell (Fig. 4 *p*.), or may fall away from the base (Fig. 4, *e*, *g*, *l*). Later the color changes to a decided yellow or gray and the translucency is lost (Fig. 4, *q*, *h*). The yellow color may be taken as the chief characteristic of this disease. The dead larva appears as a moist, somewhat collapsed mass, giving the appearance of being melted. When the remains have become almost dry (Fig. 4, *c*), the tracheae sometimes become conspicuous again, this time by retaining their shape, while the rest of the body content dries around them. Finally, all that is left of the larva is a grayish-brown scale against the base of the cell (Fig. 4, *f*, *h*), or a shapeless mass on the lower side wall if the larva did not retain its normal position (Fig. 4, *n*, *o*). Very few scales are black. The scales are not adhesive, but are easily removed, and the bees carry out a great many in their efforts to clean house.

"Decaying larvae which have died of this disease are usually not ropy as in American foul brood, but a slight ropiness is sometimes observed. There is usually little odor in European foul brood, but sometimes a sour odor is present, which reminds one of yeast fermentation. This disease attacks drone and queen larvae* almost as quickly as those of the workers.

"European foul brood is more destructive during the spring and early summer than at other times, often entirely disappearing during late summer and autumn, or during a heavy honey flow. Italian bees seem to be better able to resist the ravages of this disease than any other race. The disease at times spreads with startling rapidity and is most destructive. Where it is prevalent a considerably larger percentage of colonies is affected than is usual for American foul brood. This disease is very variable in its symptoms and other manifestations and is often a puzzle to the beekeeper."

One exception, however, will be taken to the above description. In most cases examined in Ontario the odor is found to be very pronounced and offensive, like decayed fish; in fact, on a warm, moist morning it is noticed on entering the apiary, and, when a diseased comb is held up for inspection, is almost sickening.

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* The tendency of this disease to attack queen larvæ is a serious drawback in treatment. Frequently the bees of a diseased colony attempt to supersede their queen, but the larvæ in the queen cells often die, leaving the colony hopelessly queenless. The colony is thus depleted very rapidly.

Use Same Treatment and Italianize.

The same treatment already described for American Foul Brood is effectual if applied to the whole apiary at once. But the cure is only permanent when pure-bred Italian queens are introduced to all black or hybrid stocks. It is quite impossible to cure an apiary of black bees of European Foul Brood without introducing pure Italian queens to all colonies.

We know of no reason why this plague should not sweep over Ontario as it has over most of the United States. If it does all apiaries of black bees will be practically destroyed within the next few years. Its progress in the districts mentioned above has been appalling. No Government expenditure can touch the situation without the co-operation of the men themselves whose property is in danger. There is a remedy, however, right at hand. Pure-bred leather-colored Italian bees are almost immune to this disease, which works so much havoc among the common blacks.

It is very important, then, that all apiaries, especially in or near infected neighborhoods, should be Italianized at once, without waiting for a destructive outbreak of disease.

STARVED OR PICKLED BROOD.

A disease slightly resembling Foul Brood is called by some "Starved Brood," and by others "Pickled Brood." The most positive difference in the diagnosis of this disease is the absence of ropiness and of the glue-pot smell, which are always found in American Foul Brood. In Pickled Brood the larva decays from the inside, leaving the skin tough and in its natural shape; In European Foul Brood or American Foul Brood, the skin of the larva softens as the contents become glutinous, and all the natural wrinkles become smooth as the mass settles to the lower side of the cell. In Pickled Brood the larva often dries up so as to become loose in the cell and fall out when the comb is inverted. In American Foul Brood it always cements fast to the lower cell wall, so it cannot be removed without tearing the cell. European Foul Brood attacks the larva generally at an earlier stage in its existence than Pickled Brood.

The cause of Pickled Brood is not definitely known. It is not considered to be infectious. McEvoy asserts that it is caused by an insufficient feeding of the larvae, due to a sudden check of the honey flow, or a constitutional weakness of workers. The latter he charges to in-breeding of the queens. Re-queening with vigorous queens from other apiaries will often effect a cure, and it often disappears of its own accord.

Some Precautions.

Since disease is so widely distributed some precautions should be observed by all beekeepers.

1. Great care should be taken in spring to prevent robbing, particularly if any diseased colonies are in the apiary or neighborhood.

2. Since honey is the means of transmitting disease it is a safe rule to never feed honey to the bees. Syrup made from granulated sugar is quite as good as the best of honey for winter stores.

3. So far as possible supply your home market with honey, to avoid the danger of infected honey being shipped in.

4. When buying queens it is a safe rule to destroy the cages, candy, and worker bees that accompany them, using a fresh cage for introducing.

5. Persons buying bees from any beekeeper in Ontario can get information from the Provincial Apiarist as to the condition of the apiary in question.

INSPECTION OF APIARIES.

The Inspection of Apiaries is provided for by an Act passed by the Legislative Assembly of the Province of Ontario which allows the appointment of what inspectors are required by the Lieutenant-Governor in Council upon the recommendation of the Minister of Agriculture. The duties and powers of these inspectors are also defined, and provision is made to ensure the prompt reporting and careful treatment of cases of disease.

The following is a copy of the Act:

AN ACT FOR THE SUPPRESSION OF FOUL BROOD AMONG BEES.

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. This Act may be known as "The Foul Brood Act."

2. The Lieutenant-Governor in Council, upon the recommendation of the Minister of Agriculture, may from time to time appoint one or more Inspectors of Apiaries to enforce this Act, and the Inspector shall, if so required, produce the certificate of his appointment on entering upon any premises in the discharge of his duties. And the Minister shall instruct and control each Inspector in the carrying out of the provisions of this Act. The remuneration to be paid to any Inspector under this Act shall be determined by order of the Lieutenant-Governor in Council.

3. The Inspector shall, whenever so directed by the Minister of Agriculture, visit without unnecessary delay any locality in the Province of Ontario and there examine any apiary or apiaries to which the said Minister may direct him, and ascertain whether or not the disease known as "foul brood" exists in such apiary or apiaries, and wherever the said Inspector is satisfied of the existence of foul brood in its virulent or malignant type, it shall be the duty of the Inspector to order all colonies so affected, together with the hives occupied by them, and the contents of such hives, and all tainted appurtenances that cannot be disinfected, to be immediately destroyed by fire under the personal direction and

superintendence of the said inspector; but where the inspector, who shall be the sole judge thereof, is satisfied that the disease exists, but only in milder types and in its incipient stages, and is being or may be treated successfully, and the inspector has reason to believe that it may be entirely cured, then the inspector may, in his discretion, omit to destroy or order the destruction of the colonies and hives in which the disease exists.

4. The inspector shall have full power in his discretion, to order the owner or possessor of any bees dwelling in box or immovable frame hives, to transfer them to movable frame hives within a specified time, and in default the inspector may destroy, or order the destruction of such hives and the bees dwelling therein.

5. Any owner or possessor of diseased colonies of bees, or of any infected appliances for beekeeping, who knowingly sells or barters or gives away such diseased colonies or infected appliances, shall, on conviction thereof, before any Justice of the Peace, be liable to a fine of not less than $50 or more than $100, or to imprisonment for any term not exceeding two months.

6. Any person whose bees have been destroyed or treated for foul brood, who sells or offers for sale any bees, hives or appurtenances of any kind, after such destruction or treatment, and before being authorized by the inspector so to do, or who exposes in his bee-yard, or elsewhere, any infected comb, honey, or other infected thing, or conceals the fact that said disease exists among his bees, shall, on conviction before a Justice of the Peace, be liable to a fine of not less than $20 and not more than $50, or to imprisonment for a term not exceeding two months, and not less than one month.

7. Any owner or possessor of bees who refuses to allow the inspector to freely examine said bees, or the premises in which they are kept, or who refuses to destroy the infected bees and appurtenances, or to permit them to be destroyed when so directed by the inspector, may, on the complaint of the inspector, be summoned before a Justice of the Peace, and, on conviction, shall be liable to a fine of not less than $25, and not more than $50 for the first offence, and not less than $50 and not more than $100 for the second and any subsequent offence, and the said Justice of the Peace shall make an order directing the said owner and possessor forthwith to carry out the directions of the inspector.

8. Where an owner or possessor of bees disobeys the directions of the said inspector, or offers resistance to, or obstructs the said inspector, a Justice of the Peace may, upon the complaint of the said inspector, cause a sufficient number of special constables to be sworn in, and such special constables shall, under the direction of the inspector, proceed to the premises of such owner or possessor and assist the inspector to seize all the diseased colonies and infected appurtenances and burn them forthwith, and if necessary the said inspector or constables may arrest the said owner or possessor and bring him before a Justice of the Peace to be dealt with according to the provisions of the preceding section of this Act.

9. Before proceeding against any person before a Justice of the Peace, the said inspector shall read over to such person the provisions of this Act or shall cause a copy thereof to be delivered to such persons.

10. Every beekeeper or other person who is aware of the existence of foul brood, either in his own apiary or elsewhere, shall immediately notify the Minister of the existence of such disease, and in default of so doing shall, on summary conviction before a Justice of the Peace, be liable to a fine of $5 and costs.

11. Each inspector shall [illegible]rt to the Minister as to the inspection of any apiary in such form and man[illegible]s the Minister may direct, and all reports shall be filed in the Department of [illegible]iculture, and shall be made public as the Minister may direct or upon order of the Legislative Assembly.

12. Chapter 283 of the Revised Statutes of Ontario, 1897, intituled "An Act for the Suppression of Foul Brood Among Bees," is repealed.

Inspectors' Duties.

It will be seen by Sec. 3 that it is an inspector's duty to work under the direction of the Minister of Agriculture or the one he may appoint to administer the Act. Where foul brood is found he is to destroy by fire the worst cases, especially where the beekeeper is not making a successful effort to cure. It is only in cases where "the inspector has reason to believe that it may be entirely cured" that he "may, in his discretion, omit to destroy."

Transferring Bees.

Persons having bees in the kind of hives described in Sec. 4. will make it easier for the inspectors and themselves as well by making preparations for transferring as soon as possible. The following is one method of performing this operation:

The best time to transfer bees out of box hives into frame hives is at the beginning of the swarming season. Choose a time when as many bees as possible are in the field and nicely out of the way. About 10 a.m. will probably be the best time if it is a warm, still day. The following appliances will be needed: a good smoker, a bee veil, a hive tool of some sort such as a screwdriver or a wall scraper used by paperhangers, and the new hive, preferably ten-frame Langstroth with wired frames filled with sheets of foundation.

Blow a little smoke in at the entrance to the hive, tip the old hive over sideways and blow in more smoke to drive the bees down among the combs; let it stand upside down to one side and place the new hive where it formerly stood, with the entrance exactly in the place of the old one. Put down a newspaper in front of the new hive with one edge under the entrance. The bees returning with pollen and honey now alight and go into the empty hive. Place a small box over the inverted hive large enough to receive the whole cluster of bees. Now drum on the sides of the hive with a couple of sticks until the bees run into the box above, which should be removed as soon as a majority of them have gone up into it and placed to one side until the bees cluster like a swarm; then dump the bees down on the newspaper in front of the new hive and let them run in in the same manner that a new swarm is hived. It will be best to watch for the queen, because if the queen is not with them they will all return to the old hive. Set the old hive upright on its bottom board just to one side of the new hive and let it stand there for two weeks until nearly all the brood is hatched, then transfer the bees from it again into the new hive. At that time the old combs can be taken out and melted down into beeswax.

Disposing of Bees or Appliances.

Section 5 puts a heavy penalty on disposing of diseased bees or appliances in any way, and, according to Section 6, persons whose bees have been treated or destroyed for disease shall not dispose of any bees or appliances whatever without permission from the inspector, or expose

in the apiary or elsewhere any infected material or honey on penalty of fine or imprisonment.

Information Concerning Location of Disease.

Sections 7, 8 and 9 give inspectors power to act. Section 10 requires every person who is aware of the existence of foul brood to report the same to the Minister of Agriculture, and Section 11 requires the inspectors to report on all their work to the same authority.

EDUCATIONAL METHODS.

In this war against foul brood the most powerful weapon is Education, for it will never be mastered until the majority of beekeepers learn to know and treat it for themselves. Various methods of instruction are employed by the Department of Agriculture. First, a letter is written in the early spring to each beekeeper in districts where disease is suspected, warning him or her against the danger of the spread of disease by robbing; also advising all owners of bees dwelling in box hives to make preparations for transferring into modern hives during the swarming season. Next, the present Disease Bulletin, revised from year to year, is mailed in the spring to the complete mailing list of beekeepers in Ontario, now about 7,000. Next the inspectors visit beekeepers where disease is suspected, pointing out symptoms and explaining instructions given in the bulletin.

A new feature of the campaign of 1911 was a series of Apiary Demonstrations conducted by the Provincial Apiarist, the Apiary Inspectors and others under the auspices of the Apiculture Department of the Ontario Agricultural College, and with the assistance of the local Beekeepers' Associations. The value of such demonstrations is apparent. The average person learns how to do things far more quickly by seeing them done than by being told how. The inspector cannot afford to show everyone individually how foul brood is treated; he must simply give an explanation, leave printed instructions, and go on. But if a score or more people gather by appointment in an apiary he can meet with them and show them all at one time exactly what the disease looks like, how it should be treated to cure, and how the wax can be saved from the diseased combs. During May and June, 1911, twenty-seven demonstration meetings were held in apiaries in seventeen counties. They were remarkably well received by the local beekeepers, the highest attendance being seventy-five and the average about thirty.

In addition to these methods considerable information is given by speakers provided for the regular meetings of county Beekeepers' Associations, also by special bee institutes held in the worst infected districts during the winter.

Fuller information can be had on any of the points mentioned in this bulletin by applying to the Provincial Apiarist, Ontario Agricultural College, Guelph, Ontario.

AMERICAN FOUL BROOD.

From the reports of the inspectors of apiaries of recent years, we find that American Foul Brood is prevalent in the following townships. This does not mean that townships not mentioned in this list are guaranteed to be free from this disease, because the apiaries of Ontario have not all been inspected as yet:

BRANT: Brantford, Dumfries South.
BRUCE: Arran, Brant, Bruce, Culross, Elderslie, Greenock, Kinloss, Saugeen.
CARLETON: Goulbourn, Osgoode.
DUFFERIN: Garafraxa East, Luther East, Mono.
DUNDAS: Winchester.
DURHAM: Darlington.
ELGIN: Dorchester South, Malahide, Yarmouth.
ESSEX: Gosfield North, Maidstone, Rochester, Sandwich East, Sandwich West.
FRONTENAC: Kingston Township.
GREY: Artemesia, Collingwood, Euphrasia, Glenelg, Keppel, Osprey, Proton, St. Vincent, Sarawak, Sydenham.
HALDIMAND: Cayuga, Walpole.
HALTON: Esquesing, Nelson, Trafalgar.
HURON: Grey, Morris, Turnberry, Wawanosh West.
KENT: Harwich, Howard, Romney, Tilbury East.
LAMBTON: Bosanquet, Moore, Warwick.
LANARK: Lanark.
LEEDS: Bastard, Elizabethtown, Kitley, Yonge.
LINCOLN: Louth.
MANITOULIN: Bidwell, Gordon.
MIDDLESEX: Adelaide, Biddulph, Delaware, Lobo, London, McGillivray, Metcalfe, Westminster, Williams East, Williams West.
MUSKOKA: Draper, Macaulay, Muskoka.
NORFOLK: Charlotteville, Townsend, Walsingham, Windham, Woodhouse.
ONTARIO: Brock, Pickering, Reach, Scott, Thorah, Uxbridge, Whitby East.
OXFORD: Blandford, Blenheim, Dereham, Norwich North, Norwich South, Oxford East, Zorra East.
PEEL: Albion, Caledon, Chinguacousy, Toronto.
PERTH: Blanshard, Downie, Easthope North, Easthope South, Ellice, Elma, Fullarton, Hibbert, Mornington, Wallace.
SIMCOE: Adjala, Essa, Gwillimbury West, Innisfil, Medonte, Nottawasaga, Orillia, Sunnidale, Tay, Tecumseh, Tiny, Vespra.
STORMONT: Cornwall.
VICTORIA: Bexley, Eldon, Mariposa.
WATERLOO: Dumfries North, Waterloo, Wellesley, Wilmot.
WELLINGTON: Garafraxa West, Guelph, Luther West, Nichol, Puslinch.
WENTWORTH: Ancaster, Barton, Beverly, Binbrook, Glanford.
YORK: Etobicoke, Gwillimbury East, King, Markham, Scarborough, Vaughan, Whitchurch, York.

EUROPEAN FOUL BROOD.

From the reports of the inspectors of Apiaries we find that European Foul Brood is prevalent in the following townships. As this disease is spreading rapidly, it is very likely to appear in the townships adjoining these during the season of 1912. All beekeepers should be very much on the alert and examine their bees carefully for the symptoms of this disease.

CARLETON: Fitzroy, Gloucester, Huntley, Nepean.
HASTINGS: Huntingdon, Rawdon, Sidney.
NORTHUMBERLAND: Brighton, Cramahe, Haldimand, Murray, Percy, Seymour.
PRESCOTT: Plantagenet North.
PRINCE EDWARD: Ameliasburg, Hallowell, Hillier.
RENFREW: McNab.
RUSSELL: Cumberland.
WELLAND: Bertie.

The names of cities and towns located in these townships are omitted for brevity, but, as a matter of fact, bees in cities and towns are more often diseased than in the country.

No Disease Found.

In the following townships some inspection work has been done, and so far no disease has been found:

BRANT: Burford.
BRUCE: Albemarle, Amabel, Carrick, Kincardine.
CARLETON: Gower North, March.
DUNDAS: Mountain.
ELGIN: Southwold.
ESSEX: Colchester South, Malden, Mersea, Tilbury West.
FRONTENAC: Palmerston, Storrington.
GLENGARRY: Charlottenburg, Kenyon, Lancaster, Lochiel.
GREY: Bentinck, Normanby, Sullivan.
HALDIMAND: Oneida, Rainham, Seneca.
HASTINGS: Hungerford, Thurlow.
HURON: Ashfield, Colborne, Goderich, Hay, Howick, McKillop, Stephen.
KENT: Raleigh.
LAMBTON: Enniskillen, Plympton, Sarnia.
LANARK: Bathurst, Beckwith, Burgess North, Dalhousie, Drummond, Elmsley North, Montague, Ramsay.
LEEDS: Crosby South, Crosby North, Rear of Escott, Leeds, Lansdowne.
LENNOX: Ernesttown.
LINCOLN: Caistor, Clinton, Gainsborough, Grantham, Grimsby South, Grimsby North.
MANITOULIN: Billings, Campbell, Carnarvon, Gore Bay, Howland, Mills, Sheguindah.
MIDDLESEX: Caradoc, Ekfrid, Nissouri West.
MUSKOKA DISTRICT: Monck.
NORFOLK: Middleton.
NORTHUMBERLAND: Hamilton.
ONTARIO: Whitby West.
OXFORD: Nissouri East, Oxford West, Zorra West.
PERTH: Logan.
PETERBORO: Asphodel, Smith.
PRESCOTT: Caledonia, Hawkesbury East, Hawkesbury West, Longueuil, Plantagenet South.
PRINCE EDWARD: Athol.
RENFREW: Admaston, Bagot, Bromley, Grattan, Horton, Pembroke, Stafford, Wilberforce.
RUSSELL: Clarence, Russell.
SIMCOE: Flos, Oro.
STORMONT: Finch, Osnabruck, Roxborough.
VICTORIA: Fenelon.
WELLAND: Crowland, Thorold, Wainfleet, Willoughby.
WELLINGTON: Arthur, Erin, Marlborough, Minto.
WENTWORTH: Flamboro East, Flamboro West, Saltfleet.