

**CIHM
Microfiche
Series
(Monographs)**

**ICMH
Collection de
microfiches
(monographies)**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1999

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming are checked below.

- Coloured covers / Couverture de couleur
- Covers damaged / Couverture endommagée
- Covers restored and/or laminated / Couverture restaurée et/ou pelliculée
- Cover title missing / Le titre de couverture manque
- Coloured maps / Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black) / Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations / Planches et/ou illustrations en couleur
- Bound with other material / Relié avec d'autres documents
- Only edition available / Seule édition disponible
- Tight binding may cause shadows or distortion along interior margin / La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure.
- Blank leaves added during restorations may appear within the text. Whenever possible, these have been omitted from filming / Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- Additional comments / Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured pages / Pages de couleur
- Pages damaged / Pages endommagées
- Pages restored and/or laminated / Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed / Pages décolorées, tachetées ou piquées
- Pages detached / Pages détachées
- Showthrough / Transparence
- Quality of print varies / Qualité inégale de l'impression
- Includes supplementary material / Comprend du matériel supplémentaire
- Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image / Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.
- Opposing pages with varying colouration or discolourations are filmed twice to ensure the best possible image / Les pages s'opposant ayant des colorations variables ou des décolorations sont filmées deux fois afin d'obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below /
Ce document est filmé au taux de réduction indiqué ci-dessous.

| | | | | | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 10x | | 14x | | 18x | | 22x | | 26x | | 30x | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | 12x | | 16x | | 20x | | 24x | | 28x | | 32x |

The copy filmed here has been reproduced thanks to the generosity of:

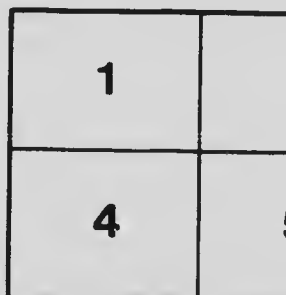
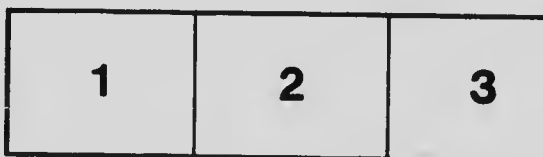
University of Saskatchewan
Saskatoon

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol \rightarrow (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



anks

L'exemplaire filmé fut reproduit grâce à la générosité de:

University of Saskatchewan
Saskatoon

ity
ility

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmege.

imed
n
pres-
l
the
-
ted

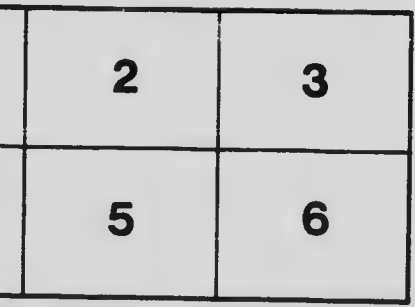
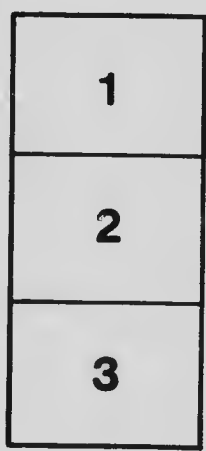
Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par le première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

i-
)

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ∇ signifie "FIN".

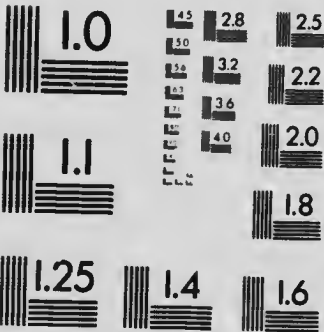
be
o
e

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.



MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc

1653 East Main Street
Rochester, New York 14609 USA
(716) 482 - 0300 - Phone
(716) 288 - 5989 - Fax

DOC
CAI DA 313
17C105

BEE DISEASES

BY

C. B. GOODERHAM, B.S.A., *Apiarist*

There are comparatively few diseases of a serious nature among bees, but these are such that their identification and treatment must be certain if the beekeeper would avoid heavy losses.

Diseases of adult bees are of small importance, but those affecting the brood or young of the bee are causing heavy losses each year to the beekeepers in Canada.

It is important to be able to recognize the different diseases, as a wrong diagnosis may result in great damage, especially where American foul brood is concerned.

Healthy brood have the following characteristics: Newly hatched larvae are very small. They grow rapidly and on the sixth or seventh day are capped over. Up to the time they are sealed over the larvae lie curled up in the base of the cells and are pearly white in colour. The colour of cappings over healthy brood varies from light yellow to dark brown—according to the age of the combs. These cappings are slightly raised or convex.

Colonies should be examined for disease during a honey flow, as the bees are less likely to rob when nectar is coming in. Further, the examination should be made during the first honey flow of the season, as infected colonies can then be treated before the main flow comes on. However, it may be necessary to feed the treated colonies during the possible dearth between the first and main honey flows. A second examination should be made during the fall flow to discover any colonies that may have escaped the first examination, or may have become affected during the summer.

Before opening a colony for examination, a few puffs of dense smoke should be blown into the entrance and then into the top of the hive when the cover is removed. The examiner should stand with his back to the sun, holding the comb so that the light may fall directly into the cells. A better examination can be made if most of the bees are shaken from the comb. Each comb should be examined carefully and no combs of honey or broods should be exchanged, or colonies united, unless there are absolutely no symptoms of American foul brood.

The three diseases affecting the brood or young of bees are as follows: American foul brood, European foul brood and Sacbrood. One or more of these are prevalent in most parts of Canada. In certain provinces there are foul brood laws and special inspectors to cope with the diseases and prevent their spread.

AMERICAN FOUL BROOD

The most deadly brood disease—and the one most feared—is American foul brood. It spreads very slowly, but once a colony becomes infected, the bees are unable to clean out the infected larvae and the colony will gradually weaken and finally die out altogether. The disease is caused by an organism known as *Bacillus*

DOMINION EXPERIMENTAL FARMS.

E. S. ARCHIBALD, B.A., B.S.A.,

Director.

F. W. L. SLADEN,

Dominion Apiarist.

BEE DIVISION, DEPARTMENT OF AGRICULTURE

EXHIBITION CIRCULAR No. 105

larvæ, which is distributed to healthy larvæ through infected honey, given by means of nurse bees. Infection takes place some time during the feeding stage of the larvæ, but the disease is seldom noticed until after the brood is capped over.

SYMPTOMS OF AMERICAN FOUL BROOD

1. The sealed brood, instead of being uniform in appearance, will be irregular.
2. The cappings of certain cells will be dark and somewhat sunken or concave. Some of these cappings may be perforated.
3. The larvæ or pupæ beneath these cappings will be stretched out and fallen down to the lower side of the cell and will be light to dark brown in colour.
 - (a) If the larva has entered the pupal stage, the tongue will usually adhere to the upper wall of the cell.
4. If a pointed object is inserted into the dead larva and slowly withdrawn, a certain viscidness will be observed and the mass will stretch out to one or more inches.
5. After death the larvæ will dry up to dark brown scales, which adhere so firmly to the lower side of the cell that the bees cannot remove them. These scales contain large numbers of spores which resist unfavourable conditions and carry over the disease many years.

American foul brood seldom attacks Queen or drone larvæ.

TREATMENT

The bees must be separated from the infected colony and established in a new hive. This treatment should be given during a honey flow. If the colonies are badly infected, or very weak, two or more colonies should be united about two weeks before treatment. One new hive must be ready, containing nine frames fitted with full sheets of foundation—and one dry comb which should be in the centre of the hive. An empty hive should also be ready to receive the diseased combs. The colony should be lightly smoked and removed from the stand, upon which should then be placed the new hive. Bees should be transferred from the diseased colony by being shaken or brushed from the combs on to large sheets of paper directly in front of the new hive. Infected combs should then be placed in the empty hive and covered. All infected material should be moved to a bee tight building and the paper on which the bees were shaken and the brush or wing used to brush them from the combs, should be burned. *Twelve hours after the bees are transferred, remove the comb from the new hive and burn it, replacing it with a full frame of foundation.*

Where only a few colonies are treated the safest plan is to burn all infected combs, and thus safeguard against the disease spreading. Where a large number of colonies are treated, the combs can be boiled down and the wax extracted, but must not be allowed to gain access to the infected combs, or reinfection of the winter apiary may take place. Hive bodies, floor boards and covers can be disinfected by lightly burning over the insides. A gasoline torch is most suitable for this purpose.

Some beekeepers may prefer the older method which consists of first shaking the bees on to starters of foundation and three days later again shaking them on to full sheets of foundation. The second shaking, however, often discourages the bees and causes them to swarm; therefore, the dry comb method is preferable. Where the beekeeper has no dry combs this method must be used.

If the colonies are found affected in the fall and the beekeeper has some full combs of honey from healthy colonies, the bees can be transferred to these combs in a new hive. All combs from the diseased colonies must be destroyed and all hives disinfected by burning. The best time for this treatment is early in the fall when the bees are still flying, but care must be taken to prevent robbing.

All short-cut methods for treatment of colonies affected with American foul brood should be avoided. They may prove successful in the hands of an expert, but he is the least likely to employ them.

EUROPEAN FOUL BROOD

Unlike American foul brood, this disease spreads very rapidly through an apiary, especially where black or hybrid bees are kept. The disease is caused by a specific organism known as *Bacillus plutor*. Manipulation as in American foul brood has no effect on European foul brood.

The disease usually appears in the spring or early summer, especially in localities where there is little or no honey coming in; the disease usually disappears at the beginning of the main flow from clover. It does most damage in localities where the main flow does not come until late in the season—such as from buckwheat. Colonies that are most susceptible are those that are weak and slow in building up in the spring, and in these the disease may persist during the entire season. Strong colonies headed by vigorous Italian queens of a resistant strain suffer little from European foul brood.

SYMPTOMS

1. Affected larvae usually die before being capped over, changing from pearly white to light yellow, the colour deepening as the disease advances.
2. Some affect unnatural positions, settling down to the base of the cell in an oily looking mass and finally drying up into non-adhesive scales.
3. Others maintain their curled-up positions, gradually drying up into grey-coloured scales having a segmented appearance in the base of the cell. These scales are easily removed by the bees.
4. During the decaying stage of the larvae, there is occasionally a slight viscosity noticed. The dead masses do not rope out as in American foul brood, but may stretch as much as half an inch and have rather the appearance of worn-out rubber.
5. In some cases a putrefactive odour may be present. Queen and drone larvae are also affected by European foul brood.

PREVENTION AND TREATMENT

With European foul brood prevention is better than cure, and as preventive measures are the same as good beekeeping practice, this disease should not cause beekeepers much alarm. Losses from this disease will be reduced to a minimum if weak and queenless colonies are united in the spring and only good strong colonies, headed with Italian queens from good resistant stock, are kept, together with plenty of wholesome stores for the winter. If the disease does occur in strong colonies it seldom becomes serious. If the disease is already present it may be controlled by making the colonies strong by uniting and introducing young Italian queens from resistant stock to all infected colonies. This should be done in the early spring, as most of the damage is done during the spring and early summer. There is no need to destroy or disinfect any combs or supplies when dealing with European foul brood.

SACBROOD

This disease seldom causes any serious losses among the bees. Colonies may become weakened and the honey crop may be affected, but a colony is seldom killed outright by it. To the inexperienced the symptoms of Sacbrood may be confused with those of American or European foul brood. The disease usually appears during the spring and early summer, disappearing again shortly. There are few cases in the summer when the main honey flow is on.

SYMPTOMS

1. Both sealed and unsealed brood may be affected.
2. Larvae dead of the disease will usually be found stretched out on the lower side of the cell and often with the anterior end turned up towards the upper wall of the cell.

3. The colour varies from yellow to very dark brown or grey.
4. If a sharp object is inserted into the dead mass, it can be lifted out like a small sac, the contents of which are watery.
5. Queen and drone larvæ may also be affected with Sacbrood. Strong colonies will remove the dead larvæ, so that no scales will be found unless the colony is very weak.

TREATMENT

The disease is of such a character that where only strong colonies headed with vigorous queens, and good beekeeping methods are practised, no other treatment is necessary. If a colony becomes weakened and the disease is persistent, a young vigorous queen should be introduced.

DISEASES OF ADULTS

Among the few adult bee diseases in Canada, dysentery is the most important. Dysentery is caused by the bees retaining the fæces within the intestines for an unnatural length of time, or through the consumption of unwholesome winter stores. Therefore, dysentery is more prevalent during the early spring and often just after the bees have been confined to their hives during dull weather in the summer. Dysentery may also be caused by any undue excitement within the hive during the winter, or by late fall breeding when the young bees are unable to take a flight before going into winter quarters. After one or two good flights, however, the disease soon disappears. Healthy bees eject their fæces during flight, but during the months of winter when flight is impossible the fæces will accumulate in the intestine, in some cases to such an extent that it will be voided inside the hive and the combs and hive will become badly stained. A disagreeable odour is always present with dysentery.

The beekeeper should see that his bees go into winter quarters with plenty of wholesome well-ripened honey, and also that the bees receive no excessive disturbance from the time they are placed away for the winter until they are brought out in the spring. Where the honey in the hive is of uncertain quality, it is well to feed the bees with 15 to 20 pounds of sugar syrup in the fall.

"Disappearing Disease" and "Paralysis" are names given to obscure diseases, which usually appear in the apiary during the spring and early summer, or after a long spell of wet weather. Only in rare cases do they persist during the entire season.

The infected bees appear to be paralyzed. They can only fly a few feet, falling to the ground and after crawling about for a short time they soon die. The abdomen is usually distended, as in cases of dysentery. Infected colonies may become seriously weakened, but seldom die out entirely. A colony showing symptoms of disease one year may be entirely free from it the following season. These diseases do not appear to spread rapidly; one colony in an apiary may be affected without others becoming infected. The treatment recommended is strong colonies headed by young, vigorous queens. Very little is known of these diseases and further investigations may reveal other diseases now classified under these names.

Samples of diseased brood, or brood showing any unnatural condition, should be sent to the Bee Division, Central Experimental Farm, Ottawa, where an examination will be made if desired, and the cause of the trouble determined. Samples of comb sent should not be less than four inches square and should be typical of the affected brood.

USA



901000864940



