

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 42.

APICULTURE

—IN—

BRITISH COLUMBIA.

—BY—

L. HARRIS

and

F. DUNDAS TODD.



THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

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EXCHANGE

Department of Agriculture,

Victoria, B. C., March 22nd, 1912.

Hon. Price Ellison,

Minister of Agriculture.

Sir:—

I have the honour to submit herewith Bulletin No. 42, entitled "Apiculture in British Columbia", which deals with modern methods of bee-keeping as adapted to our Province, and also embodies Reports of Foul Brood Inspectors for 1911.

I have the honour to be,

Sir,

Your obedient servant,

WM. E. SCOTT,

Deputy Minister of Agriculture.

*dlc
csl* *add*



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CHILLIWACK VALLEY.

by F. Dundas Todd.

Between Mount Cheam and the trees in the foreground lie thousands of acres of white clover. On the foothills in May the maple trees and vine maples yield nectar so plentifully that strong colonies make considerable surplus.

APICULTURE IN BRITISH COLUMBIA

PART I.

REPORT OF FOUL BROOD INSPECTORS

By L. Harris, Foul Brood Inspector.

Beginning the work of the inspection of apiaries for foul brood in British Columbia, we commenced work on April 19th at Okanagan Landing. The weather was ideal for the first week, but at the end of the month the temperature became too low, so that we were unable to make much progress.

After examining the greater part of the bees in the Vernon district, we proceeded to Hatzic where by arrangement we had agreed to meet Mr. Todd to decide as to the respective territory to be worked, either by Mr. Todd or myself.

Here again the elements were all against us, the temperature being much too low for examining the hives, and after waiting nearly a week for the rain to give place to more congenial weather, we were compelled to leave Hatzic.

From thence we then went together to Lytton. Here we found more favourable conditions for getting to work. Mr. Todd and myself went through a number of hives belonging to Mr. Alex. Lochore and Miss Rud-duck, who are living 18 miles from Lytton. This district appeared to be a very good one for beekeeping.

After journeying together back to Lytton, Mr. Todd and I separated, he going West, and I coming East.

I next went to Ashcroft, where I found a number of beekeepers. At first sight this district does not give a very good impression, "from a bee-keeper's viewpoint," but when getting about one sees some favourable spots where a limited number of beehives could be kept profitably.

My next place to call was Spatsum, where Messrs. Wood and Campbell keep a number of colonies which appear to thrive. Spences Bridge was my next stopping place, where I found Mr. Moren, who had 10 or 12 very good colonies. After leaving Spences Bridge I made for Nicola. Here is a splendid district that would support quite a large number of bees; it has all the sources of supply that the bees need early in the spring to enable them to build up ready for the main honey flow, which will be white clover, of which there appears to be at least more than a hundred acres solid blossoms. This district certainly does not appear to be overstocked with bees. I was able to locate two hives only throughout the valley when there in May. The stage connection from Nicola to Princeton, I was informed, ran twice a week, but it proved to be only once, so that quite a little time was lost in waiting at Nicola.

My next point of interest was Keremeos. Here there were several interested in bee culture, but had lost their bees. They are making a new

start. Keremeos is an excellent locality for the apiarian. From Keremeos to Penticton by auto stage is very interesting travelling, and one sees a veritable Eden of flowers, and the nature of the road over the hills affords enough excitement to make the trip very enjoyable.

More bees should be kept at Penticton, it will prove to be a very good district for bee culture. There are very few here at present. A good deal of interest was shown, and quite a few are to get bees next spring.

I was unable to locate any beekeepers at Naramata, but there are several interested, and anticipate getting bees.

Summerland and Peachland are well known to be very good locations for the beekeeper. Having no names of persons keeping bees at the time I was in the district, I did not go to Westbank so am unable to say anything at all about the possibilities for beekeeping in that region. I believe however that some bees were taken into this district lately.

Kelowna appears to me as being one of the best locations in the Okanagan, but as no great results have been obtained possibly I am not sufficiently acquainted with the district to know the conditions that prevail; anyhow, I would like to see a few hives tried there.

Vernon compares equally with most of the other districts in the Okanagan, "no better, no worse."

If bee flora is any indication of the suitability for bee culture in any particular district, then Armstrong, Enderby, and Mara should prove good locations for the beekeeper. But taking the Okanagan Valley generally, I believe the same conditions prevail in a more or less degree from one end to the other. The same remarks apply to Revelstoke and district. Here I was told that the flowers begin to bloom very early in the spring, and continue to blossom up the sides of the hills until quite late in the fall, so that this should be a good bee country.

Going from Revelstoke to Arrowhead, immediately around Arrowhead we do not find much to encourage the beekeeper, no large areas of bee pasture. Halls Landing might be good for bee-keeping, I did not get an opportunity to go over to that side of the lake, but by what could be seen from the Arrowhead side, there appeared to be huge crops of something growing, so that no doubt there would be something for the bees.

Nakusp is fairly good for bee keeping, and will greatly improve as the land gets cleared up and cultivated.

At East Arrow Park there are two or three enthusiasts in bee keeping, and I believe that their location is good for the business. Westley, Robson, Castlegar, does not appeal to me as being an ideal position for bee keeping. Area in bee flora too limited. Brilliant "Kinnard" is good for the bees.

The Doukhobors keep a number of hives, and a man gives the whole of his attention to the bees. Last season from 21 hives, spring count, they secured over 2000 lbs. of surplus honey, which is disposed of among their own community.

Rossland would appear to be an excellent district according to results we have seen, but it might be overdone if there were too many hives kept there.

The district along the valley between Thrums and Nelson would support a respectable number of colonies, plenty of clover, milkweed, willow-herb, and other plants valuable to the bees. The district immediately around

L. Harris, Foul Brood Inspector, examining a hive.



Nelson is not so good comparatively, for the production of quantities of honey.

Along the river from Nelson to Willow Point the bee area is too limited to support many bees, yet enough honey can be produced to supply the home requirements.

Getting away to Harrop we find better conditions prevailing.

Proctor is fairly provided with the right conditions for keeping bees; here it was I found the first case of foul brood this season. It was imported directly from England. The owners had been taking a holiday trip to England, and returning brought a hive of bees with them. About the same time they bought a hive from a local beekeeper. The diseased colony survived the winter, but gradually became weaker, and at last died. The hive, with the combs, were stored in an open outhouse, where the bees in the neighborhood soon found them, and cleaned up the honey left in the diseased combs, and at the same time carried the disease to their own hives. Four hives were found to have contracted the disease, and were promptly destroyed, According to the Foul Brood Act, 1911.

Creston, where there are large areas of cleared and partially cleared lands already, is sure to develop the bee keeping industry in that particular district. There are quite a number of beekeepers here already.

Cranbrook, being very elevated, makes the season short for honey production. The beekeepers there, however, appear satisfied with their location.

At Kaslo, Lardo, and Gerrard, the area of pasturage appeared to me to be somewhat limited, at least from the point of view of a large beekeeper. Any beekeeper who pins his faith to willow herb, commonly called fire weed, as a honey producing plant could find a good opportunity for testing his belief, by trying the Slocan Valley, where large tracts of timber have been burnt, and as a consequence, fire weed has sprung up in abundance.

Continuing up the valley to Slocan City, I took the boat for New Denver, Silverton and Rosebery. Mr. J. C. Harris of Silverton has a number of colonies, which appeared to me to be very satisfactory, while Mrs. Brockman of Rosebery is a very enthusiastic beekeeper, and no doubt will make it a success.

Coming back to Walhachin and Kamloops, I would not consider these districts ideal for beekeeping. But getting up to Salmon Arm, a country well adapted to bee culture is found, while Seymour Arm is good, and will be excellent in the future.

Going along the Canadian Pacific Railway to the Windermere district, via Golden, I found the prospects for bee keeping fairly good, yet being about the same altitude as Cranbrook, the season must be short. There are a few beekeepers in this district who are hoping to make a success of it.

Grand Forks will be a good bee country in future. Already there are a number of beekeepers there. Greenwood would support a few colonies, while Midway also might be good for a few.

If we take British Columbia as a whole, I think we shall find it is not a country where unlimited numbers of colonies of bees can be kept together in large apiaries, as in some parts of the United States, or Eastern Canada, because often the areas available for cultivation are comparatively small, and it is seldom we find very large tracts, or cultivated fields of honey-producing plants such as white clover, alsike, alfalfa, etc., and it is pretty

well understood that an acre of any of the above mentioned plants will yield more honey, if well cultivated, than five acres of the same plants uncultivated, simply because there are more than five blossoms on the cultivated, to one on the uncultivated plants, besides each blossom on the cultivated giving a larger yield of nectar than from the uncultivated.

Then some of the valleys are comparatively narrow, and the bees have not the range of flight as if they had an open range all around. We have sometimes found that the range was open on two ends only, and that the sides are hemmed in either by a lake, or by an almost perpendicular mountain of solid rock, with perhaps a strip of land half a mile wide and several miles long on one side, but as bees do not store much surplus if they have to go more than two miles, length alone does not count; we have found bees in such locations in British Columbia, so that the beekeeper here must spread out his colonies in fifties, or at most a hundred in one location, and so on, adopting methods suitable to himself and the peculiarity of the country.

Having dwelt at some length with the different districts, perhaps an idea of the results from beekeeping in British Columbia will not be out of place.

Taking the country from Lytton on the West, Cranbrook, on the East, Keremeos on the South, and Seymour Arm on the North, there are something like 175 beekeepers, owning between them in April, 1911, 626 colonies, or an average of a fraction over four hives each, mostly in 8 and 10 frame hives.

The amount of honey produced from these hives, with their increase, was about 11,917 lbs., or an average of a fraction over 19 lbs. per hive. The largest amount produced by an individual hive was 350 lbs. We have found that one of the mistakes the beginner generally makes is trying to get ahead of his experience by extending his operations too rapidly. He divides his colonies up to such an extent that half of them never build up strong enough to survive the winter, and many of them become queenless. Four or six really good strong colonies will survive the winter and give better results the following year than 20 of these small colonies, because half of them will not live through the winter, and it will take the other half most of the following season to build up strong enough to take advantage of the honey flow. The general practice in British Columbia for wintering is to leave the hives outside and give them some extra protection. A few winter their bees in cellars, and by what we have seen, one way appears to be as good as the other. The winter losses from October, 1910, to April, 1911, were about twenty-five per cent.

The demonstration work, provided by the Department of Agriculture, has been highly appreciated through out the Province, and a great many of the beekeepers have become very enthusiastic.



Apiary of W. L. Coupar, Hatzic, B. C.

By F. Dundas Todd, Foul Brood inspector.

Acting under the instructions of Mr. W. E. Scott, Deputy Minister of Agriculture, I started from Victoria on the last day of April for Hatzic where I had arranged to meet with Mr. L. Harris of Vernon, Foul Brood Inspector for the district east and south of Lytton. As there was very little definite information in existence as to the number of bee-keepers in British Columbia or where they were located, Mr. Harris and I agreed to make a rough division of the Province into the dry and wet belt districts, Lytton being considered the point of separation, with the understanding, however, that if either one found conditions calling for energetic measures he would at once call upon his colleague.

Hatzic was chosen as the meeting point for Mr. Harris and myself because some months before an apiary of about 50 colonies had been brought in there from one of the eastern provinces. Since the only known case of foul brood in British Columbia up to that date had been imported by a settler from the East it was felt advisable to inspect this apiary at the earliest opportunity.

April had been a month of delightful weather, but unfortunately for us and our work, conditions changed and our arrival at Hatzic was marked by the advent of cold temperature and rain. After waiting rather impatiently for a week hoping that we might be favored with better weather conditions we decided to move on to Lytton where we felt there might be a chance of brighter skies.

It may be worth while to remark here that the rainy weather during the first week in May at Hatzic gave one an opportunity to observe the close relationship existing between bees and fruit trees. During our stay many of the trees were in blossom, but all the time not a single bee was on the wing as far as we could see. Later in the year the orchardists found that the trees which bloomed during that spell were practically devoid of fruit. At Chilliwack one bee-keeper pointed out to me that a very heavy crop of apples was borne by the trees that bloomed in the latter part of April, but only a few on the trees that blossomed during the wet weather in the first half of May.

The weather conditions all summer were very exceptional, in fact one of the oldest ranchers in the Hatzic district tersely described it as a "freak year," the like of which he had never seen in British Columbia. While the middle and eastern parts of this continent were sweltering under unbearable heat, nature balanced the account by giving abnormal cool and rainy spells in British Columbia. As it was impossible to do inspection work with such conditions a great deal of valuable time was lost, in fact on 43 days the atmospheric conditions prohibited the opening of hives.

We arrived at Lytton on May 8, in rain. Next morning we proceeded by stage to the ranch of Mr. Alexander Lochore which is located about 28 miles above Lytton. Rain accompanied us all the way, but on our arrival the sun broke out and we got to work on what proved to be a well managed and very successful apiary. Personally I felt cheered with so hopeful a start, but little realised that almost two weeks were to elapse before I would again see as well kept hives.

On our way back to Lytton we spent a few hours at a ranch where a young woman with no one to guide her was endeavoring to manage over a dozen strong colonies in a good region but without success. As we felt that

first aid to the beekeeper was as much our duty as the discovery of foul brood we straightened out the combs and otherwise put the hives into workable shape. For years this apiary had produced no honey; the season of 1911 gave a crop worth about \$60 which was only about a fourth of the possible harvest; but in any case it shows that a foul brood inspector in addition to his regular duty can earn his cost in increased honey production.

Mr. Harris and I parted at Lytton. Careful enquiry on the train indicated that there were no beekeepers between Lytton and Agassiz, so I started for that town. Fifteen beekeepers are located here with 57 colonies on the first of April. To say the bees were housed in hives would hardly be telling the truth, as boxes of many varieties predominated.

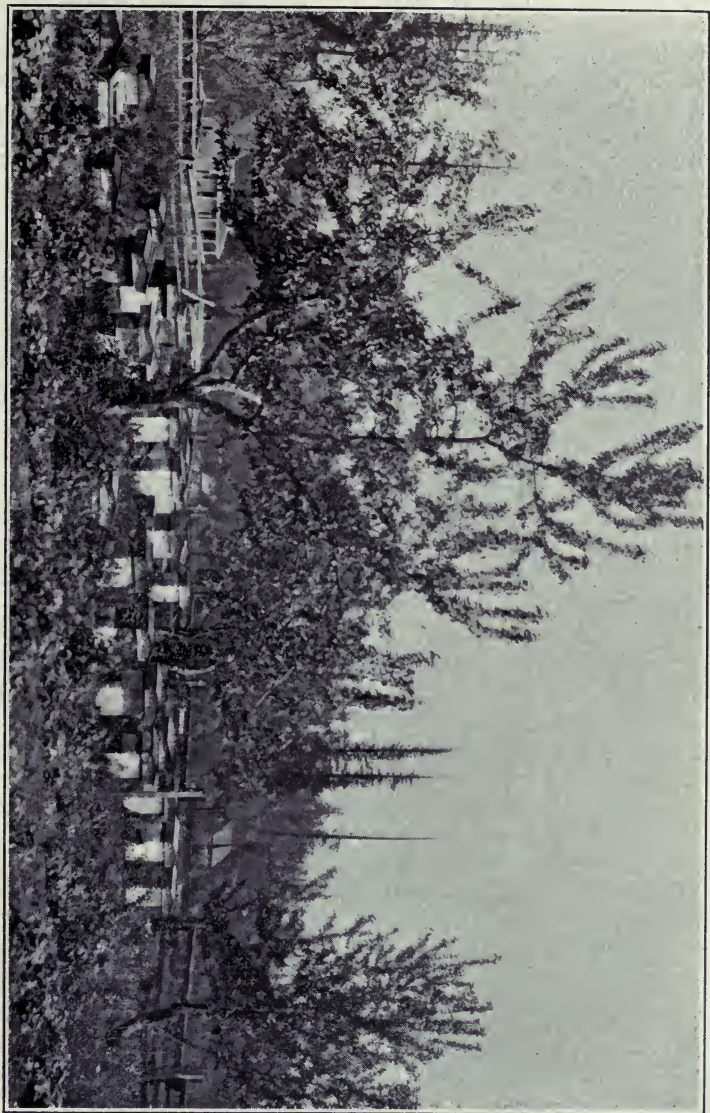
In the past the honey crop has been practically nil, but I feel certain the result is due more to apiarian conditions than to the lack of nectar bearing plants. I found in May the bees all in great strength, combs crowded with brood, while a splendid honey-flow from the large leafed maple was piling up surplus honey in hives where there was accommodation for it. So plentiful are these maple trees that I am convinced a skilful beekeeper ought to get quite a crop of what is a very delicious honey from this source alone.

On May 19 I proceeded to Chilliwack. In this district, comprising Chilliwack, East Chilliwack, Cheam, Munro, Rosedale and Sardis I found 65 beekeepers, and in addition called upon a considerable number of ranchers who were reported to have bees, but whose stock had died out, generally in the winter. In such cases I investigated the cause of the loss and examined the empty hives where such were available, but generally found that insufficient stores, the cold of winter, or insufficient winter protection were reasonable explanations.

Bees have been kept in the Chilliwack district for a great many years, but generally in a very neglected way. The hives in common use have long ceased to be favored by good beekeepers as they need high skill to handle them, and it may frankly be said that the average beekeeper in this locality follows no method whatever in caring for his stock. The result is that so far as the possibility of handling the frames is concerned, which is the fundamental need of modern beekeeping, the bees might as well be housed in ordinary packing boxes. To inspect the average hive in this region one has first to pass a long-bladed knife between the frames so as to cut through all the cross combs, then if one wants to give the beekeeper a start towards better conditions the combs on the individual frames have to be trimmed and trued.

There is considerable variety in the floral conditions in this stretch of flat country, which is probably 20 miles long by 6 miles wide. Towards the mountains the big leafed maple is common and probably is as helpful as at Agassiz. As we approach the river they gradually die away. Over most of the territory the honey-flow is from white clover and snowberry bush, but in East Chilliwack there are many acres covered with a variety of Euphorbia, locally known as the Prairie Queen, which yields a very thick honey, rather presentable in appearance, but lacking the fine flavor and aroma so characteristic of white clover.

The largest apiary, 50 hives, is situated on Fairfield Island, being owned by Mr. H. L. Johnstone. Its location is not the best possible in the district by any means but it is so excellently managed that it produced an average of 66 pounds a hive.



Apkary of H. L. Johnston, Chilivack, B. C.

Early in June a spell of cold wet weather set in, so I took the opportunity to run into Victoria and report verbally on conditions as I found them. On the way back I spent one day at the Experimental Farm at Agassiz where transferring was in progress, and another with Mr. J. A. Catherwood, Mission City, to learn about the condition of the honey-flow which was due. A start had evidently been made as both here and at Agassiz I found about 20 pounds of honey in many of the supers, but the bees had stopped working, indicating that the clover had ceased to secrete nectar. As a matter of fact from the beekeeper's standpoint it was a very tantalising month. There was abundance of clover blossoms everywhere, just the proper size,—not the large heavy flower, but the little one such as we see by the roadside, yet not a bee could be seen at work on them. Here are brief extracts from my notes at this time:—

June 16. Honey coming in fast. Bees busy on snowberry and rasps; saw only two on clover.

“ 17. Cold. Temperature under 60 deg. until after 3 p.m.

“ 18. Do.

“ 19. Temperature at 10 a.m. 56 deg. Bees busy on locusts.

“ 20. Temperature at 10 a.m. 52 deg.

“ 22. Cold. Rain.

“ 23. Do.

“ 24. Afternoon warm.

“ 25. Bees rushing on clover. (Note the effect of heat on the secretion of nectar).

“ 26. Rain.

“ 27. Cool. Bees on clover, aster and snowberry, but not on fireweed.

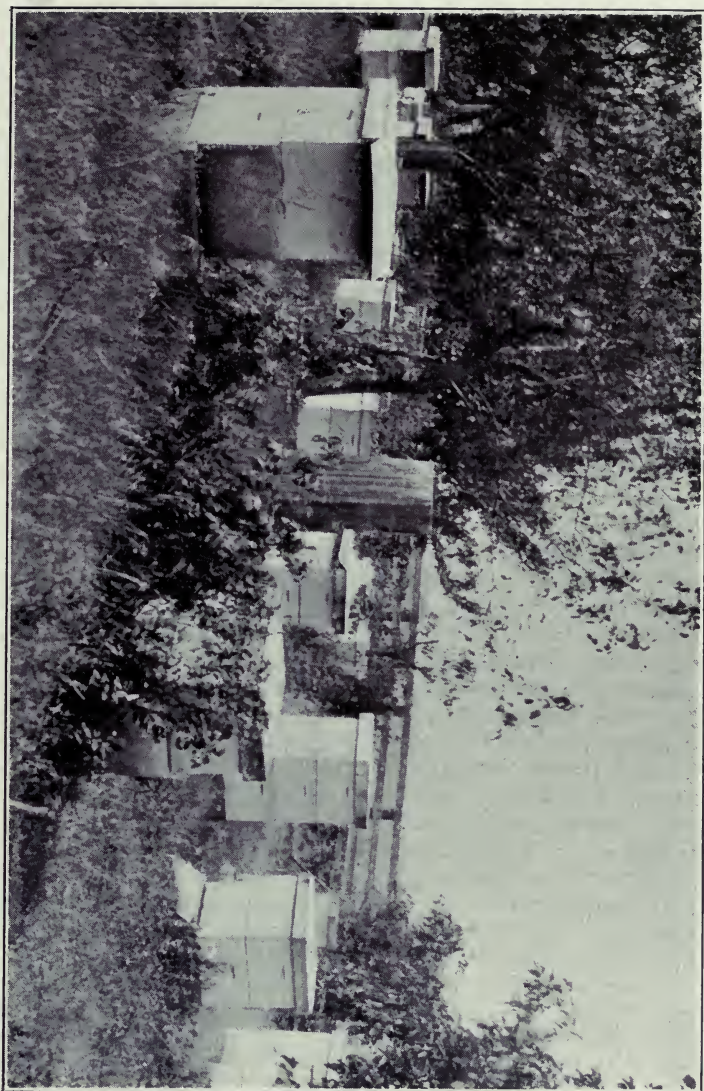
“ 28. Cold. Rain.

“ 30. Cool, saw only one bee in the course of a long walk.

It was not until after the middle of July, near the end of the clover season, that the nights became warm enough to permit the secretion of nectar.

I finished with Chilliwack on June 21 and proceeded to Hatzic the following day. The weather was cold and wet, so I spent the day with Mr. W. L. Coupar who owns an apiary of 50 colonies which he had brought in from Saskatchewan late in the fall. The journey from a region of severe cold to one of mild climate had been rather hard on the bees, and they had not yet fully recovered, so that they were not as strong as the local hives. The owner, like all newcomers, was discovering that he had to learn local conditions and that some of the methods which were excellent on the prairie were entirely unsuited for the Pacific Coast. Our long mild spring is a great stumbling block to a beekeeper who has been accustomed to the sudden jump from zero to warm weather that is characteristic of the central part of this continent.

In Hatzic I found 11 beekeepers owning a total of 119 hives. This is the only locality in my summer's work where I found it was possible to secure the honey crop in the form of section honey. The usual thing here is for the beekeeper to put on a section super some time in May, and leave it alone until the summer is past. Again and again I had the satisfaction of taking off a super full of section honey, in fine condition and well ripened. The only regret was that a second super at least had not been given as I am sure it also would have been filled. The raising of section honey is far more difficult than getting the crop in the form of extracted



Aplary of C. G. Stevens, Nanaimo, B. C.

honey, so when I consider all the conditions I feel sure Hatzic must be a good district for bees. It is a region largely given over to the cultivation of rhubarb, strawberries, small fruits, apples and pears. The sources of spring nectar are excellent and plentiful. In the honey-flow season raspberry, fireweed, clover and snowberry are in abundance.

The bees in Hatzic are better housed than in Agassiz and Chilliwack, in fact most of them are in modern hives with frames that are movable. The credit for this condition is due to Mr. J. A. Catherwood who introduced bees into the region and handled them by modern methods. His example influenced the community.

On July 5 I moved to Dewdney, expecting to cover the ground there in a couple of days at the most. On the first day I found two apiaries that were doing well, one with a creditable showing of section honey. The other, which was run for extracted honey, was well taken care of so far as the brood chambers were concerned, but although the colonies were in powerful strength and a good honey-flow was on, more than half of the hives were without supers so that a fine honey-crop was running to waste. At four o'clock that afternoon rain began to fall, and cool wet weather continued for about a week.

From July 18 to 23 I spent between North Wellington and Ladysmith, on Vancouver Island, calling on 23 beekeepers, only one of whom was on an extensive scale, namely Mr. C. G. Stevens of Nanaimo, who owns about 50 hives. This apiary was the only one that had a crop.

Next week was devoted to the Islands in the Gulf of Georgia, where I visited 15 apiaries, none of them with more than 7 colonies. To my mind there is really little hope of successful bee culture in this region for years to come as so little impression has been made upon the virgin forest, and consequently there is very little acreage in clover and nectar-bearing plants. One ranch on Pender Island got a crop of fine honey from an acre of alfalfa growing in ground sloping towards the sea-shore.

On August 3 I proceeded to the Comox district where in ten days I made 30 visits. This district appears to be admirably adapted for bee culture as in the valley many hundreds of acres have been brought under cultivation, while clover abounds along the sides of the roads. The apiary of the Rev. T. Menzies is situated on the edge of the valley, at Sandwick, not the best location by any means, yet from its 7 colonies, spring count, he secured 1100 pounds of fine clover honey. Here is the obverse side of the shield—78 other colonies produced a total crop of 93 pounds, an average of little more than a pound to the hive. The yield secured by Mr. Menzies shows very plainly the possibilities of the district; the meager returns gained by the others is a fair measure of their apiarian knowledge and skill.

My summer's work thus far indicated that in the western half of the Province the bees were in good healthy condition, and that there was no cause of anxiety. The crying need of the ranchers clearly was education in the elementary principles of beekeeping, so the facts of the case were presented to the Minister of Agriculture who agreed it was worth while covering the same territory a second time, to prepare the hives for the winter, learn the facts of the honey-crop, what were the possibilities of each district, and what was the ratio of success to the opportunities offered.

In my opinion the second visit was really worth while. The data secured provide a quick and definite answer as to the honey possibilities of a region, and this is part of the information so many new arrivals are

anxious to find out. Then it enabled the inspector to point out right on the spot why no honey was secured, and often at the actual defect that hindered, and this latter condition was not uncommon by any means. While theoretically education was not included in the inspector's work, it practically formed a major part of it, so on this second trip I endeavoured to place a monetary value on the gains made by individual beekeepers as the result of my efforts. It will be readily understood that only those visited before the honey-flow could show results in the material form of increased honey production, and that therefore limits the range of the estimate to the months of May and June. I find that out of 79 beekeepers called on in these months I aroused in eight of them a definite desire to be better beekeepers and that as a result the value of their honey-crop amounted to \$720, instead of no crop as in previous years. From now on it is to be presumed they will improve in skill and do better in future years, and, not less important by any means, influence materially to their advantage other beekeepers in their locality. It may also be safely assumed that ten per cent. of those visited after the end of June were equally affected.

On this second trip I left Victoria on August 17 for Agassiz. It rained on the day of my arrival, also the following morning, so I started for Lytton, where I called on the two beekeepers who are located about midway between that town and Lillooet. This valley has great apiarian possibilities as there is considerable acreage devoted to alfalfa, which according to the experience of Mr. Lochore produces about 100 pounds of surplus honey to the acre, no mean revenue, and what is better still, gained with but little work.

Lillooet has seen several attempts made in bee culture, and learning that several ranchers there had bees I thought it advisable to pay them a visit since I was so near. As one approaches the town the character of the vegetation changes from fir trees to sagebrush, but unfortunately the latter does not appear to be of the nectar bearing variety. In Lillooet I found one apiary of two colonies which were intelligently handled without success. As I was here a couple of days I examined on foot the country for several miles round, and what puzzles me is not the absence of surplus honey, but the fact that the bees were able to live in a region that apparently is devoid of nectar bearing plants.

Between Lillooet and Ashcroft a considerable acreage of alfalfa is seen from the stage, how much I had no means of estimating but assuredly there is opportunity for considerable beekeeping. About a dozen miles out from Lillooet I found on one ranch half a dozen colonies whose bees had died in winter time. The combs were full of fine honey, but not a trace of disease was apparent. After examination of conditions and close inquiry I came to be of opinion that the bees had been smothered by the moisture of the hives condensing on the walls, trickling down, then freezing hard at the very small entrance, and so preventing the necessary change of air. Special reference is made to this kind of hive in the second part of this bulletin where its dangers are pointed out. A few miles farther on is located another apiary of 6 colonies which although not skilfully handled gave indications that successful beekeeping is possible in this region.

From August 27 to September 2 was spent at Agassiz. The Experimental Farm apiary had been all worked over into modern hives and in addition a crop of honey had been secured, the first in the history of the farm. But I regret to say that the example had not been followed by the

other beekeepers, so the season closes with 24 colonies in boxes in the district.

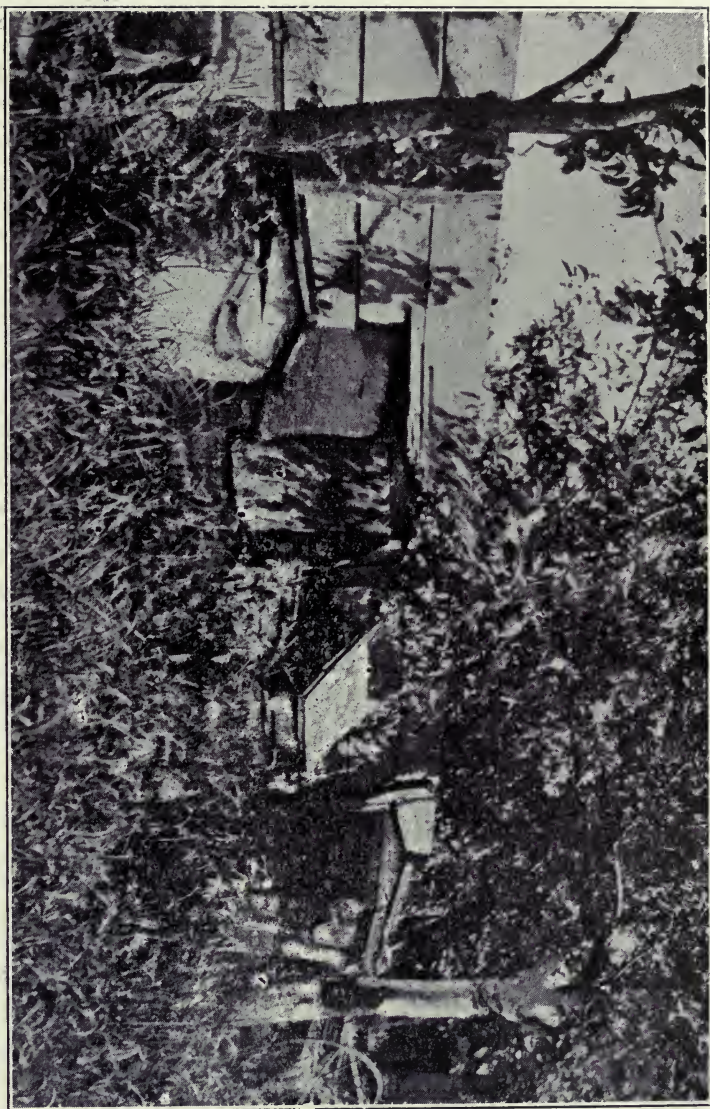
Until September 27 I was in the Chilliwack district. The weather was very unsettled all the time, in fact I lost 12 days through rainy, cold weather. The honey-flow was late, but where the hives had been skilfully handled a crop averaging 66 pounds per hive had been secured. The honey was of excellent quality. If we except the largest apiary, which from 50 hives got 3300 pounds of honey, we have left 64 others with a total of 266 hives. These produced a crop of 3575 pounds, an average of a little over 14 pounds to the hive. Forty-one of them containing 115 hives got no honey at all. These figures tell better than words how great is the need for a radical change in both appliances and methods in the Chilliwack district. I am convinced I under estimate when I say that at least \$2000 worth of honey was lost in this region in 1911 through poor beekeeping, the value being based on the actual wholesale price paid the biggest producer for his crop in bulk. At retail it would amount to 50 % more. The proprietor of one of the largest grocery stores in town said he sold on an average fifty pounds a week of California honey, but that he had been unable to buy more than 300 pounds of local honey in four years, and this was in the form of chunk honey cut out of the frames. For it he had paid 12 cents a pound, then had to strain it in the oldfashioned way to prepare it for the market. The marvel is that he could sell any such product in these days, but he said it went quickly because it was locally produced.

However I feel another season will see a forward movement in the Chilliwack district. Very many of the ranchers are bending all their efforts to the serious task of removing stumps off their land and they feel that every minute is precious. Their case has been specially considered in the second part of this bulletin, so that they may be able to handle their bees with the least possible expenditure of time. But the crying need in Chilliwack district, so far as bees are concerned, is the introduction of modern hives and the use of foundations in the frames so as to get straight workable combs. As a matter of fact the inside condition of the average hive in the district is to all intents and purposes as unmanageable as that of any packing box makeshift.

Hatzic and Dewdney kept me busy until October 4. Almost every beekeeper here got honey, much of it in sections. The highest yield was 400 sections from eight hives, average 50 sections. The rancher was just beginning, but he was alive to one essential, he had ready plenty of supers filled with sections, and as fast as the bees filled one he put on another. Had the others been as well prepared they would have fared just as well. This particular rancher stands out in bold relief in my memory, because in the course of my summer's work I so rarely found anybody ready with anything.

The day after I left Dewdney I helped judge the honey exhibits at New Westminster Fair. They were of excellent quality, flavor and aroma, but I was disappointed with the small number of entries and the commonplace arrangement of the exhibits. They certainly were not worthy of so important an exhibition, nor of a district where I had seen, handled and tasted so much excellent honey. I had the opportunity of talking the matter over with a few beekeepers and they frankly said they felt that in the past the judging had been done by men unskilled in apiculture and consequently an award meant nothing.

The following day I spent on Lulu Island just to learn a little about con-



A neglected apiary. Honey crop, 1911—nothing.

ditions. At one apiary at Steveston I happened in while the rancher was busy bottling the season's harvest for the market, and I had the pleasure of admiring 1800 pounds of beautiful clover honey, which had been gathered by 30 colonies, spring count, an average of 60 pounds to the hive.

This finished the work for the season. I am glad to say that nowhere did I come across anything that suggested the presence of foul brood. Here and there I found pickled brood, but this is to be found almost anywhere at sometime or another and is not contagious. In all I called on 155 beekeepers who on April 1 owned 780 colonies of bees, and on October 1 1073 colonies. A second visit was made to 117 of them, making a total of 272 calls. In addition quite a number of visits were made to ranchers who at one time kept bees, but for various reasons had ceased to be interested.

As a matter of curiosity I kept a note of the mileage travelled. I find I covered 597 miles in May, 469 in June, 540 in July, 833 in August, 234 in September, 225 in October. Total, 2898 miles. To destinations I travelled by train 989 miles, by steamer 816 miles, by stage 150 miles, by rural tram-car 135 miles, by motor-car 18 miles, by river launch 18 miles. In calling on beekeepers I drove 701 miles, walked 67 miles, and canoed 4 miles. The day's drive often reached 25 miles, the average about 18 miles.

Before concluding I cannot do less than express my grateful appreciation of the kindness I received on every hand. The inspector was more than welcome, he was a felt want. My great regret is that with so many wanting help and advice I had to cut my visits short, and that I was unable to respond to urgent appeals that came to me from beekeepers outside of the districts I was working. Travelling so much on trains and steamers I came to be known, and was greatly helped by getting the names of beekeepers in various parts of my territory from fellow-travellers.

In conclusion, the honey crop of 1911, and my estimate of the possibilities of the Province indicate that had accomplishment equalled opportunity there would have been no need to import from foreign countries. Furthermore, the home product in the western half of the Province is mainly from clover, and therefore has the flavor to which most of its inhabitants have been accustomed. Much of the imported honey is too mild to suit the taste of those accustomed to the clover honey of Britain, or the clover and basswood of the eastern provinces.



PART II.

FAILURES AND THEIR CAUSE

During the summer of 1911 the inspectors spent fully five months in the field working among the beekeepers in their respective districts. Mr. Harris covered thoroughly the territory east and south of Lytton. Mr. Todd worked west of Lytton, spending the months of May, June and half of July with the beekeepers between Mission and the mountains; from the middle of July to the middle of August was devoted to those in the Gulf Islands and from Ladysmith north to Comox. A second trip through the localities on the mainland first visited wound up the season's work.

In covering districts thoroughly the inspectors had every opportunity to get acquainted with the beekeepers, to comprehend their everyday working conditions, to size up the possibilities of each district from the standpoint of honey production by making notes of every plant on which bees were seen to work, and by actual tabulation of the honey crop secured by each beekeeper; and, not the least important, they had the chance to learn the kind of appliances in general use, and the methods that were followed.

As a general rule the inspector on calling at a ranch would find the beekeeper busy at work in the field, so the first duty was to go for him. On the way back there was a good opportunity to learn about the troubles and annoyances that accompany unskilled beekeeping. The story was almost invariably the same—a friend had given him a swarm, or he had bought a hive at some sale, as he wanted a little honey for home use; all he wanted was about 25 pounds a season, but though he had now half a dozen hives all he got for the money invested was the annoyance of being called in from his work to hive swarms when minutes were precious. Now would the inspector just tell him offhand how to prevent swarming, and so save him time, temper and trouble. A little questioning too often showed that Mr. Beekeeper had not read the chapter on swarming in Bulletin No. 30 issued by the Department of Agriculture, because he had no time. But right in the middle of the day, when time was specially valuable, and when a stoppage of labor meant a couple of idle horses as well, these very men would again and again drop the task on hand to hive a swarm. Yet five minutes spent in close reading of the chapter on swarming would have taught him how to prevent at least three-fourths of the swarms that did come out, and, better still, have secured for him a fair crop of honey. The big honey crop is got from the strong colony that does not swarm. The first swarm when skilfully managed may produce surplus honey. The second and following swarms rarely yield surplus honey, and this is nearly always true of the old hive from which the swarms issued.

THE PURPOSE OF THIS BULLETIN.

The aim of this bulletin then is above all things concerned with the prevention of swarming, secondly with such mistakes in management by beekeepers as were found to absolutely prevent any possibility of the storage of surplus honey even where the bees were in splendid condition to gather a crop, and nectar was in plenty.

Let us first look a few facts in the face. In 1911 the largest apiary between Lytton and Lillooet yielded almost 100 pounds extracted honey to the hive; in the Chilliwack district the best harvest was 66 pounds per hive in an apiary of 50 colonies; Nanaimo shows a crop of 50 pounds on an

average from 20 colonies; Comox, 160 pounds a hive from 7 colonies—all spring count. The season was undoubtedly a favorable one yet the average yield in the regions worked by the inspectors was only 19 pounds a hive. In Comox district there were 78 hives from which the owners got just one pound each on an average, yet most of these were far more favorably situated for honey production than those from which the big crop was secured.

It is not enough to say that the failures were due to lack of skill, we must put our finger on the mechanical conditions that hindered. Broadly speaking these were insufficient ventilation, lack of room, and mechanical obstructions. There were many minor hindrances which will be dealt with in due course, but we will first and most fully attack the three we have enumerated.

ON HIVES.

The hives in general use in the province we regret to say are not suited for present-day methods of beekeeping. As a district was settled some one started to keep bees and whatever form of structure he housed them in has become the standard of that locality. So we find a region where ordinary packing boxes predominate, another where the hives are the same in width, depth and height, with bottom boards firmly nailed to the body, and with an entrance three inches wide and half an inch in height; still another where the Langstroth dimensions which are the standard of this continent are practically followed; but these are not so common as they might be.

Now as a matter of fact, so far as the bees are concerned, one form of housing is just about as good as another, provided its size is suited to their needs, and shelters them from inclement weather conditions. But a bee-keeper keeps bees so that he may get honey, and so the hive must be designed to facilitate his purpose. The aim of the bees is to gather honey not only to sustain their own life, but to so swell their numbers to such a multitude that they can afford to still further increase the bee population by throwing off new colonies in the form of swarms. The aim of the bee-keeper is to keep each colony intact and to secure for his own use the honey which in the ordinary course of nature would be used to build combs and raise young bees in the new colony. We thus see that while the packing box is sufficient for the purpose of the bees it is utterly useless as a means of honey production. The inspectors came across many colonies that were housed in boxes but in not one instance was a yield of honey reported. This form of beekeeping then is merely a source of trouble to the bee-keeper.

But the keeping of bees in packing boxes has a more serious phase that must be plainly stated. That terrible scourge generally known as Foul Brood, notwithstanding such steps as are being taken to fight it, is spreading over this continent at a swift pace. At least twice it has found a lodgement in this province, having been imported by settlers, but each time has been ruthlessly wiped out, and so far as the inspectors know British Columbia is free of it at the date of writing, but it is moving towards us on the south and at no distant date we must face its onslaught. So far we have had only preliminary skirmishes. When the real attack comes every bee-hive in the province must be in such shape that its internal condition can be learned by removing the combs. With a box hive a thorough inspection is simply impossible, therefore the Foul Brood Act of

1911 gives every inspector the power to destroy by fire every colony of bees that is not housed in a hive with removable frames. During the past season the inspectors did not enforce this part of the Act as they felt timely warning should be given, but at the first hint of the advancing wave reaching the boundaries of the Province they will be compelled in justice to careful beekeepers, and to the fruit growers, whose success is largely dependant upon the pollination of the blossoms by the activities of hosts of bees, to carry out the intent of the law. It is incumbent therefore upon every one who has bees in ordinary boxes to transfer them to regular hives as speedily as possible. By so doing he will benefit himself by making a crop of honey possible, and remove a menace that threatens his neighbours. How to make the change will be told later on.

In the district of which Chilliwack is the center the hive in general use has many objectionable features. Its dimensions, which are about 14 inches in every direction, were at one time quite popular with many beekeepers, but it is no longer manufactured by any of the large firms. As used in this district it has two serious defects. The bottom board is firmly nailed to the body of the hive, so that it is not possible to remove in the spring the thousands of dead bees that sometimes gather below the combs during the winter, unless one transfers all the frames to a clean hive. Again and again in the apiaries of well-intentioned men one came across colonies in which many thousands of dead bees were rotting in deep pools of water that had gathered on the bottom-boards after a rainstorm, being unable to escape on account of the tight nailing. Bees are very cleanly creatures and it is too much to expect them to do good work in a hive where an overwhelming stench prevails. As a matter of fact they make little headway, for the combs are mouldy.

The second objectionable feature of these hives is the small entrance. In the month of May and onward all summer one of these hives contains 50,000 bees and almost as many young at various stages of development, all of whom must depend for their supply of fresh air through this little doorway. Such a condition is intolerable, so the bees remedy it in the only possible way, by swarming, which at once cuts down enormously the numbers depending upon this source. On a ranch in Chilliwack district a hive with a small entrance, and situated in an angle of the house that faced the southwest, rather startled its lady owner by throwing out seven swarms in the course of the summer, and of course produced no honey. It was her first venture in beekeeping so before the inspector arrived on the scene she had visions of the whole ranch dotted with bee-hives, an ever-increasing number of dollars spent yearly for homes, and not a cent of income. A little explanation as to the cause of the trouble brought peace to her mind, accompanied by a determination to provide plenty of ventilation in the future.

These same hives have a third feature, not necessarily a bad one, but it is so in actual practice in the hands of the average man—the frames are not self-spacing. It is the nature of bees to build their combs about $1\frac{3}{4}$ inches from center to center, and the modern hive is filled with frames that almost automatically adjust themselves in the right place; furthermore it is impossible to put in more than the proper number of frames, while a shortage of even one is apparent. The hives under consideration are intended for nine frames, but it was no unusual thing to find as many as ten,

on the other hand seven, and even as low as five were not uncommon. To make matters worse these non-spacing frames are free to move in almost any direction. Let us see what happens when a swarm clusters at some distance from the bee-yard. The beekeeper gets a hive containing frames,—we will be generous and assume that the correct number of nine has been put in,—and hastens with it to the bush or tree where the swarm is hanging. Setting it on the ground he adjusts the frames, then he cuts the branch and dumps the bees on top of the frames. As soon as they have all gone down he places the quilt on top, then the cover and carries the hive to its stand. As he makes the trip the frames wobble round freely, only coming to rest when the hive is set in its place. The beekeeper assumes everything is all right, but when the inspector comes along he finds the frames all jammed tight to one side of the hive. The bees think it is an ordinary box, and build their combs accordingly. The inspector is pretty much of their opinion. Before he can do anything with it he has to pass a longbladed knife between frames so as to cut through the crosscombs, then if he wants to give someone who says he is anxious to be a good beekeeper a fair start, he will out of the kindness of his heart trim up the angular faces of the combs, force them into line, space the combs truly, and go on his way full of the happy feeling that he has helped at least one earnest soul in the course of the day. On his return visit a couple of months later he not infrequently finds that the enthusiasm was a little flicker in the pan, that his two hours' well intentioned help were apparently wasted. However he has experiences even more discouraging, as for instance the cases where he puts all the hives in workable shape even to putting on the supers, and finds on his return that the rancher has begun to wonder why the inspector has not been around to take off the supers for him. As autumn advances the inspector smiles quite benignly when he finds that the bees have been carrying the super honey down into the brood-chamber.

THE KIND OF HIVE TO USE.

After a summer in the field among beekeepers, sizing up the floral and climatic conditions, considering the amount of time the average rancher has to spend with his bees and his lack of skill with them, the inspectors are agreed in recommending that the 10-frame self-spacing Langstroth hive be adopted in this province. The frame is in almost universal use, and is stocked by all the manufacturers and dealers on both sides of the line, while the 10-frame size is not only made by all of them, but is apparently out-selling the 8-frame size which was popular for many years. There is unfortunately a little disagreement as to the width of this hive, some manufacturers making it wide enough to allow the use of a follower, while others do not. The inspectors prefer the type where a follower is available as its presence facilitates the handling of the frames.

The bottom-board they prefer is of the reversible type, that is to say, when one side is turned up the entrance is three-eighths of an inch in height and the full width of the hive; when the other side is up the entrance is almost one inch in height and the full width of the hive. The narrow entrance is for winter, and can be contracted during March and April by placing blocks on each side. The wide entrance is used when the colony becomes strong and is continued until the end of the honey-flow in July. The large doorway provides great possibilities for ventilation and so tends to prevent swarming.

The bottom-board should project about six inches in front of the hive so as to provide a large landing place for the bees, something very essential during the summer months when they arrive heavily laden with nectar and pollen.

The covers, in the opinion of the inspectors, should be of the telescope variety, that is to say there should be a downward rim of at least two inches to slip over the sides of the hive so as to prevent the ingress of rain. In many districts the wet winters and very dry summers are rather trying on wood-work so they recommend that the covers have galvanized iron or zinc tops, which add but a little to the cost.

A timely warning may not be out of place here. To any one with little or no experience in beekeeping anything that looks like a hive is a hive. As a matter of fact it is not necessarily so. Bees work to very accurate dimensions and a hive maker must do the same. First-class hives are made only in factories where large quantities are turned out by the aid of special machinery from carefully selected wood thoroughly seasoned. The best of hives are not dear when one considers the beauty of their accuracy. Second-class goods made in a planing mill when business is slack are a little cheaper, but the saving in price is not an economy, it is useless waste of money.

MECHANICAL CAUSES OF FAILURE WITH ORDINARY HIVES.

Before he starts out to search for Foul Brood the inspector's experience has ordinarily been limited to hives that have been kept in rather good condition. He has usually a few beekeeping friends who visit among themselves during the summer, comparing methods and experiences, and it is needless to say that all in all their apiaries are at about the same condition of equipment and efficiency. He comes to believe that all beekeepers have as much pleasure in keeping bees as he has and care for them accordingly, so it is rather a shock to him when he enters a strange apiary to find that to open a hive he really needs a hatchet, crowbar, saw and butcher's knife. The very first hive entered by one of the inspectors was built up in this fashion:—The bottom-chamber consisted of an ordinary packing box from which the bottom had been removed. Instead of frames the owner had run bars across, hoping that the bees would take the hint and build nice straight combs, but they ignored the suggestion and constructed them at a forty-five degree angle with the entrance. Above this chamber was an ordinary section super in really good condition. Above this had been placed a heavy canvas cloth, and the bees had by persevering effort made a number of large holes in it. The cloth itself was made firm and strong by liberal applications of propolis and wax. The third storey was a duplicate of the bottom-chamber. At one time it must have been the limit of height, for a canvas cloth also rested upon it, and of course channels of communication had been pierced through it. Chamber number four was an ordinary super without frames or sections, so the bees had a splendid chance to still further vary the style of their architecture, and they took advantage of the opportunity. A high gable roof crowned the structure. Since there was no obstruction to hinder they quite naturally built their combs into the apex. To still further complicate matters the cover telescoped a couple of inches over the upper chamber so that at first glance it seemed impossible to make an entrance.

This apiary contained two dozen colonies in hives all constructed along similar lines. It had been in existence for many years, and until 1911 had not so far as is known ever produced a pound of honey. It seemed as if the beekeeper had planned to introduce into the hives every mechanical obstruction to free movement of the bees that he could devise.

When an inspector has opened up several hundred hives of this type, the moment he removes the cover and begins to pull off the quilt he has a pretty definite idea as to the conditions below. Come with him for a visit to a small bee-yard. The owner is explaining that he never gets any honey, only lots of swarms, and that he is convinced this is a poor bee country. He takes care that the section super goes on early but the bees refuse to go up into it, they swarm instead. The inspector pries off the cover, rolls back the quilt, and sure enough not a bee is to be found in the section super. Then the super is removed and the secret of the failure is found. There is no bee space between the two parts of the hive and as a consequence the sections are resting on the top of the frames, and since they differ in width there is no possibility of a passageway. This condition was found not once but dozens of times.

Take another variation of the same trouble. A very intelligent, well read and experienced beekeeper in a rather poor bee region keeps two hives as a little hobby. There is sufficient clover round for that number of colonies and no more, but every year he gets enough honey for family use. But the inspector found him in blank despair. The bees are rushing on the clover, but not one is to be seen in the super, and the beekeeper is at his wit's ends to find a cause. The inspector looked at the outside of the hive, saw a queen excluder between the brood-chamber and super, and had his suspicions as he had been up against this kind of thing before. On removing the cover not a bee was in sight, but he noted that the bee-space of this particular super was above, and quickly reasoned in this fashion:—There is no bee-space below, and in all likelihood the zinc of the queen-excluder is in contact with the section frames. He mentioned his guess to the beekeeper who protested that he had used that excluder for ten years. But the inspector sprang off the excluder and super as one and then the cause of the trouble was apparent. The device was a homemade one and so long as it was placed on the hive with the zinc side down it worked all right, but this season the beekeeper had put it on upside down. The penalty for his mistake was the loss of a good honey-crop.

The hives in the Chilliwack district have the frames running parallel back of the hive must pass underneath the frames. Some of the hives are very old and falling to pieces, so it was not unusual to find the lower bars with the front of the hives, so that the bees in making their way to the of the frames resting on the bottom-board, thus stopping all movement excepting round the end-bars of the frames. This condition is very, very bad, but even worse is the hindrance to ventilation, and so swarming is the natural result.

In the same region where, as has already been said, the bottom-boards are nailed firmly to the bodies, the hive is often so standing that the rear is lower than the front, thus admitting the rain, which cannot escape. The dead bees that fall off the combs drop into the water from which their living sisters cannot seemingly move them, and so a layer gathers which stops all movement and ventilation. The condition is a filthy one and is

far too common. Little wonder is it that the bees seize the first opportunity to move to new and cleaner quarters.

Another mechanical obstruction that was found to be almost universal was the heavy accumulation of wax and propolis along the top-bars of the frames. All good beekeepers scrape the top-bars clean along in the month of May at the latest. It is a simple job, all over in a minute, but the inspectors usually found the deposit of years as much as one and two inches thick, and solid across the frames from side to side of the hive. As many as three layers of cotton quilting have been found embedded in the accumulations, with a pop-hole here and there. Now there are needed many thousands of bees passing into and out of a super all the time when the honey-flow is on, so it is utterly impossible for bees to store surplus honey with such conditions.

In many parts along the lower Fraser River there is in use a modern style hive that has a very objectionable entrance. The board is the width of the hive, and about a couple of inches longer. At the front end there has been gouged out a V-shaped cavity that extends back a few inches. The idea underlying the construction is this, in winter the entrance can be contracted by pushing back the hive until the rear is flush with the bottom-board, on the other hand by hauling the hive forward in summer the doorway will be enlarged. The theory sounds all right, but if we adjust to summer conditions we find that while the entrance viewed from the outside looks large, an examination on the inside shows that it is only about three inches wide, and this as we have seen is far too small for the comfort and convenience of the bees, so swarming is encouraged. In not a few instances it was found during very hot weather that the young larvae had been cooked by the high temperature inside the hive that could not be reduced on account of the small opportunity for ventilation.

There is still another risk with this entrance, it is apt to be a winter killer of the inmates. Again and again cases of winter losses were met with where this bottom-board was in use and a little questioning showed that the deaths were probably due to suffocation. During very cold weather the moisture given off by the breathing of the bees condenses into water on the sides of the hive, runs down to the bottom-board, and on meeting the frosty air at the entrance is formed into ice, which in time seals up the passageway so tightly that no fresh air can enter. The smaller the entrance, the quicker will asphyxiation occur. When set as recommended by the maker for winter use the entrance of this bottom-board is about one inch wide by less than three-eighths of an inch in height.

It is strongly recommended that where this bottom-board is in use that a cleat one-quarter of an inch thick and almost an inch wide be nailed on both sides and the end for the hive to rest on, so that an entrance the full width of the hive may be secured. For summer use, nail similar cleats, but an inch thick on the other side of the bottom-board, and turn this side up when the hives become strong, probably about the beginning of May.

The inspectors cannot finish this portion of their remarks without pointing out that much as they have emphasised the topic of ventilation, they feel they cannot lay too much stress upon it.

THE BEE SPACE.

In Bulletin No. 30 quite a considerable time was devoted to explaining the importance of the bee-space in a hive, for modern beekeeping is prac-

tically based upon it. As experience in the field has demonstrated that very few apiarists in the Province have realised its real importance, it may be worth while to dwell upon it a little longer.

The brood-chamber of a hive contains little more than a cubic foot of space into which are crowded in the month of May often as many as 50,000 bees and nearly as many young in various stages of development, hence every nook and cranny must be utilised to the utmost advantage, but, on the other hand every part must be accessible to the inmates. There must be structures of wax called combs, and there must be passage-ways between them. Both are of equal importance, for the one is valueless without the other, but any unnecessary space devoted to passages is by that much a loss in cell accommodation. The bees must have at least a quarter of an inch width in their streets and alleys, and will tolerate as much as three-eighths of an inch, but beyond that they will endeavor to utilise the space by building comb. Knowing this habit of the bees first-class hive-makers so make their wares that the bees will have no option but build their combs so that man's convenience will be well suited while that of the insects is in no way interfered with. For instance the modern frame has projections on the end bars that automatically regulate the distance between the combs to just three-eighths of an inch.

In planning a hive the maker has to consider that one chamber has to be placed above another, and that the bee-space of three-eighths of an inch must be between the upper and lower sets of frames. The important question at once arises, in which box shall it be given and where. The style of the bottom-board would appear to determine its position, because where the body rests on cleats projecting above the board, a space is naturally formed below the frames, therefore these may be flush with the lower edge of the hive. The hive above being built in like fashion it follows that the bee-space must be provided between the top-bars of the frames and the upper edge of the hive.

In the case of the bottom-board with the V-shaped entrance that has been already referred to at some length, since the hive body is in contact with the board the bee-space must be given underneath the frames, hence the top-bars are flush with the upper edge of the hive. Let us see what happens with a beekeeper who has a hive of this type. He buys a super from another dealer, probably gets one where the bee-space is at the top, so when he places it on the brood-chamber the bottom of the sections rest on the top-bars of the frames, and all communication between the two is prevented.

There is another phase of the matter, and here the beekeeper is frequently to blame. The bees have a great fondness for daubing propolis in every cranny, so that when the ends of the frames rest on wood they are apt to be fastened rather tightly. To reduce this effect to a minimum the hive maker cuts the rabbet a little deeper and provides a strip of tin to be nailed at the proper height so that the frames will rest on a thin edge of metal. Not realising the importance of these many beekeepers omit to put them in, hence the frames hang too low and prevent communication below.

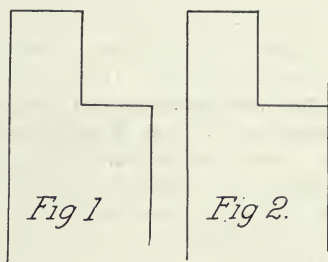


Fig. 1 shows a cross section of the end board of a hive as it comes from the factory, Fig. 2 how it looks when the rabbit tin is in position.

Speaking of frames calls to recollection the fact that the inspectors came across a dozen instances where the pieces had been simply stuck together, not nailed, merely pushed into place with the very natural result that in the hive they had all fallen apart. It is really surprising to find that there are bee-men so constituted that they will buy first-class hives, frames and full sheets of foundation, then practically waste all this good material by neglecting to nail the frames. There is only one possible excuse, the lack of the proper size of nail. It is a pleasure to be able to announce that the biggest beeware factory in Canada has decided to supply from now on sufficient nails for all the parts sent out. This is the custom elsewhere, born of necessity, for the first example that was met was on a ranch, thirty miles from the nearest hardware store. The inspector was anxious to put the frames into good condition but it was problematical if nails small enough could be found within a distance of ten miles.

PUTTING HIVES TOGETHER.

First, get the hive, and get it early. One inspector smiles when he recalls an incident that happened about the end of June, when he met the owner of about a dozen hives driving rapidly along the road. He pulled up to say he was hurrying to the nearest town, at least three miles away, to get a hive for the biggest swarm he had ever seen. It was suggested to him that it might be gone before his return. But his bees were rather well behaved, for they would usually hang for several days patiently waiting the time when he could spare a few minutes to start them off in their new abode. A few days later the inspector learned that this particular swarm was different, for when the beekeeper got back it had vanished into thin air.

The first swarm that was encountered by the western inspector occurred on May 11th, and from that date to the end of June he met them in plenty. This fixes in some measure the date by which everything required for the season's work should be ready, hives nailed and painted, frames nailed with foundation in place, in fact everything in perfect condition for immediate use.

Now as to the necessary equipment. There ought to be on hand at least one hive body or brood-chamber for every colony in the yard, two would be still better. The purpose of these extra bodies is not to take care of new swarms, but to prevent if possible any swarms issuing, and to store the surplus honey.

Let the beekeeper make this his standard of excellence: There is to be in his apiary in the autumn no more colonies than there were on the first day of April, and no swarms are to be allowed to get away. There are men in the Province attaining this standard right along, and they are the ones who get the bumper crops of honey. Furthermore their work among the bees is trifling compared with the time wasted by others gathering in three and four swarms from each hive. A first-class colony in a good season will need at least two extra bodies and frequently three. But they must all be ready by the first of May in most parts of the Province.

On unpacking a hive received in the flat set the four pieces on edge, and side by side to see if they are all the same width. Goods of indifferent make are far too common in this part of the world, and it is nothing unusual to find a variation of an eighth, a quarter, and even as much as three-eighths of an inch. These should be rejected without hesitation as first-class wares can be bought just as cheaply.

Another important feature is the character of the joint. The beekeeping world as a whole prefers the lock-joint, often known as the dove-tail, as it is much the strongest and the easiest to fit together. As a matter of fact first-class beeware is so finely made that it could be put together in the best room in the house without making more untidiness than a child playing with a toy. These points are insisted on thus strongly because the beekeepers in British Columbia have not as a rule been getting the quality to which they were entitled, for the price they paid.

The half check joint is much weaker than the lock-joint and therefore must be nailed much more. At least four nails should be driven on each side, making a total of thirty-two to the chamber.

Once the four pieces are fastened together, the rabbet-tins should be nailed in position. The best made have one edge folded over about one-eighth of an inch. This part rests on the bottom of the rabbet, so there is no difficulty in placing the tins in their proper position. But it is different with the plain tins for there is no guide where they should be put. If the beekeeper will remember the necessity for the bee-space he will have no trouble. If it be located at the top of the hive let him drop in a frame against the tin, then adjust the latter until the top-bar of the frame is just three-eighths of an inch from the edge of the hive. If the bee-space be at the bottom then make the top-bar of the frame flush with the upper edge of the hive.

ON FRAMES AND FOUNDATION.

These subjects were dealt with so thoroughly in the previous bulletin that experience in the field suggests very little additional matter. In the first place foundation must be used even if it be only a strip. The bees will not follow a bar because it happens to be there, but they will accept the line marked out by foundation. All in all it is false economy to use only a narrow strip as this leaves to the bees the choice of the size of cell they make. From the standpoint of the beekeeper they use poor judgment as too frequently they build thousands of drone cells; sometimes as much as thirty-three per cent. of the whole comb will be of this variety. This is detrimental in at least two ways. First, it prevents by that much the breeding of workers who are the only honey gatherers and so lessens the honey-crop; second it brings into existence thousands of drones who bring in no honey; worse still it has been estimated that each drone consumes

as much honey as is produced by three workers. They are a most expensive luxury in any hive, so their number ought to be kept down to the lowest possible minimum.

One more and a very important point about foundation, make sure that it is fastened securely. Dozens of times the inspectors met with cases where full sheets of foundation had dropped out of the frames because the wedge had not been firmly driven in. It is not enough to tap the wedge at different parts, one must set a strip of wood along its whole length and pound firmly on that with a hammer. Better still, make certain that the wedge will stay where it is put by driving a short nail into each end and one at the middle.

MANAGEMENT OF THE APIARY.

On the mainland most hives were found to be in splendid condition as early as the first week in May, in fact the inspectors never saw them in better shape at the same date anywhere. Even in neglected apiaries, and there are far too many such, the hives were simply bursting with bees, brood being raised in nearly every comb. Everywhere more room for the queen was needed in the form of a brood chamber on top of the original hive but nowhere was it given. Being crowded and suffering from want of ventilation the bees prepared to swarm, and by the middle of the month they were mending the intolerable conditions by sending out new colonies. Now a vast amount of fruit is being raised in many districts, most of which is in bloom at this period, and it seems probable that such powerful colonies if kept together should store up considerable surplus this month. But they are permitted to scatter their forces and the flood of nectar is used to build new combs instead of finding its way into the surplus chamber where the beekeeper hopes to see it. That it does not get there is largely due to his own neglect.

Let us consider the case of the average rancher who keeps a few hives that he may have a little honey for family use, and try to figure out the least he must do to succeed in his aim, and when he must do it. To start with, let him get a smoker, veil and bee-gloves that are actually efficient, for let it be frankly said they are not that for ten per cent. of the time. A good smoker is illustrated in the former bulletin, so no more need be said. A simpler bee-veil than the one shown in the same bulletin can be made out of plain cotton cloth made in the form of a sack open at both ends. It must be wide enough to slip over the hat, and long enough to fall below the shoulders. A piece of elastic run in at the top end will draw it tight round the hat. The lower end hangs loose. In front cut out a square of about eight inches size, and fill up the space with a piece of mosquito wire netting, and let the color be black or dark green. In use the veil is dropped down over the shoulders, then the coat is put on and buttoned in front.

For gloves use a pair of the riding variety with a glossy surface, but lengthen the gauntlets by sleeves that will come well up the arm and cling tight by the aid of elastic. A bee-dress that permits a single insect to sting one is worthless. In some districts the strain of bees is a specially vicious one, perhaps the very worst are those on the northern half of Vancouver Island, for these will terrify a whole neighbourhood for several days after the hives have been disturbed. Such a condition should not be tolerated more than one summer; every queen should be killed off and replaced by one of gentler character. Gentle bees ordinarily will not attempt



Fig. 3.—A swarm clustering.

to sting when smoke is used, but one inspector found a strain on Vancouver Island so intensely vindictive that they poured in through an open window and attacked the inmates of the room. It was the first experience of the kind he had even seen or heard of.

Now for the season's procedure. In March when the bees are flying freely make sure that the bottom-boards are clean. This task will take but a few minutes.

Towards the end of April remove the cover, turn back the quilt and note the strength of the hive. If bees are grouped plentifully from edge to edge of the hive, more room is needed so at once put a second brood chamber above the first, thus doubling the capacity of the hive. Then make sure they have plenty of ventilation by having an entrance the full width of the hive, and at least three-eighths high. Double that height would be even better. The work at this time will take only a few minutes.

The bees now have plenty of room for increase and opportunity to get fresh air, so that swarming will be at least postponed if not prevented. Should a swarm issue about the end of May, it will be a big one, fit to do fine work if nectar be plentiful.

WHAT TO DO WITH A SWARM.

Remember, our aim is to prevent increase in the number of colonies in the apiary, so should a swarm issue from a hive we are going to re-unite the forces—but not at once. If we run the bees back into the hive from which they came, they will repeat their little performance a little later in the day or the day following.

We will go about the work in this fashion, taking advantage of a few little habits of bee nature. When the swarm is clustering we get an empty hive body, also one with frames filled with foundation or old combs.

Then we proceed to the old hive, lift it off the stand and set it about a couple of feet to one side of its old position, and with its entrance at right angles to the old one. If it formerly faced the south it will now look east if on the right side of the old stand, and west if on the left side. Then we place a new bottom-board on the old stand, on that the empty hive body, above that the one with the frames, lastly the cover, slipping under it a match or similar thickness of wood to prevent the cover fitting down close. The swarm is a big one, the bees are very much excited and full of movement, so if there is not plenty of fresh air in the hive they are apt to fly off and seek more congenial quarters.



Fig. 4.—Smoking the swarm.

Many of the old bees are returning from the field and they are now entering the new hive, distractedly running round and wondering what has happened to their beloved home during their absence.

Then we will gather in the swarm and run it into the new hive on the old stand. Now see what happens. The bees in the old hive do not know that it has been shifted so when they return from the fields laden with nectar or pollen they naturally seek the old stand, and so every minute our swarm is being augmented by the field workers, while the old hive is getting correspondingly weaker, so weak in fact will it become that there is very little chance of its throwing off a second swarm that season.

In about twenty-four hours the swarm will have settled down to steady work, so we go to the hive and remove the empty chamber from underneath, and place it on top of the one containing the frames. Then we turn to the old hive and proceed to weaken it still more by taking from its top story all the combs that contain honey, bees and all, and placing them above the new swarm, looking over the frames carefully for queen cells which we destroy if found. Next we close up both hives, then turn the entrance of the old hive round a few inches so that it begins to point in the same direction as it did before the swarm issued. Each day we turn the old hive round a few inches until on the fifth day the entrances of the old hive and the new are side by side.

On the seventh day we are ready for the last step. On top of the hive containing the swarm we place an empty hive body, then from the old hive we take the frames one by one and transfer them with the adhering bees to the hive on the old stand, as before looking for queen cells and destroying them. Last of all we remove the empty brood-chamber and the bottom-board from the stand, so that all the flying bees will have to join the swarm on the old stand.

This looks like a lot of work, but all told it is a great deal less than taking care of two swarms. Then look at the difference in results. When unlimited swarming is permitted, we have at least three colonies in place of one with very little prospect of a honey-crop. By combining we have only one colony, as when we started, with the certainty of a big honey-crop if the season be favorable. This method of handling swarms is the one followed by one British Columbian beekeeper who figures on putting into winter quarters every season eighteen hives. His increase each summer is just equal to his winter loss. His honey production runs steadily 100 pounds extracted per hive. The biggest honey yield from one hive in British Columbia so far as is known to the inspectors was 400 pounds produced by a beekeeper on Lulu Island, who manipulated the colony in almost similar fashion. The total time devoted to this hive probably did not exceed a couple of hours in the course of the year, nevertheless its product sold for eighty dollars.

HOW TO HANDLE A SWARM.

This subject was dealt with rather extensively in the previous bulletin, but the writer of it regretted that at the time it was written it was impossible for him to make a series of photographs showing the various stages from the cluster to the hive, as the swarming season was long past. He determined however to secure a good set at the first opportunity. Luck was specially kind to him in the matter. One morning as he was starting out on a pre-arranged day's work right in the middle of the honey-flow,



Fig. 5.—Shaking the swarm into a dish-pan.

the idea came into his head he ought to make a special call on one large beekeeper just to see what the bees were doing. He was greatly rewarded for in the apiary he found a visitor in the form of one of Ontario's most successful beekeepers, a man who for 35 years had made his living entirely from bees and who had filled the position of inspector for several seasons. The advent of a swarm gave the inspector the chance to suggest that the visitor should show how swarms were handled in Ontario.

He started out by asking for a big tin dish-pan, a sheet and a smoker. The sheet was placed in front of the new hive so that the bees might have a fairly flat surface to move around on, for when they are dumped upon grass their movements are seriously handicapped. He next explained that he preferred a large tin basin to any other utensil for the simple reason that its highly polished surface formed a rather poor foothold for the bees and that it was therefore very easy to shake out the insects in front of the hive. It was the first time the inspector had ever heard of the dish-pan being preferred for this work, but later in the season he met a successful apiarist who used it, but this gentleman hastened to add a word of warning to the effect that the pan should not be allowed to lie in the sun before being used, as it will become so hot that the instant the bees come in con-

tact with the metal they will rise in a cloud so furiously angry that they will sting every living thing in sight.

The request for a smoker created some little discussion as its use at swarming time is generally considered unnecessary. He however explained that in his opinion there were guards set on the outside of the cluster just as there is at the entrance of the hive when the bees are pursuing their routine activities, and his purpose in smoking the swarm before shaking it was to subdue the vigilance of the watchers.

Little needs to be said about the individual photographs of the series. Fig. 3 shows the swarm clustered on the branch, and it may be considered as fairly typical. Of course there are many instances when they are not conveniently lodged for handling, in fact it is not uncommon to find their position to be such that the easiest way to gather them in is to cut off the branch and carry the whole thing to the hive. In Fig. 4 we see the swarm being smoked.

Figure 5 indicates how the bees drop into the pan when a sudden downward jerk is given the branch. When the shock is a sudden one a repetition of the movement is rarely necessary.

In Fig. 6 the camera catches the beekeeper shaking out the bees on the



Fig. 6.—Shaking the bees in front of the hive.



Fig. 7.—“There’s the Queen.”

sheet in front of the hive, and here one saw the advantage of using the tin basin as the very first easy jerk landed most of the bees on the sheet.

When a swarm is entering a hive, and this is especially true if the cluster be landed about a foot from the entrance, one can often see the queen hurriedly making her way as if anxious to get out of sight. It is always an intensely interesting moment even to a beekeeper when he sees her long supple form gliding rapidly over the bodies of the other bees, and so it is not unusual for even such experienced men as we see in Fig. 7 intently watching for her, to shout triumphantly “There’s the queen” as she comes into their field of vision.

The last photograph in the set, Fig. 8, merely exhibits the conditions as the bees gradually find entrance to their new quarters.

FORM IN WHICH THE HONEY CROP MAY BE SECURED.

It may safely be said that the ambition of ninety per cent. of the beekeepers in British Columbia is to secure only sufficient honey for family use, in fact many of them with half a dozen hives say they would be perfectly satisfied if their total crop amounted to fifty sections, that is less than ten sections a hive. This is not an ambitious standard by any means, yet it is one that is rather difficult of attainment in the Province as a whole. As was explained in the previous bulletin the cool nights are against success in the production of section honey, and this is true of almost every district. Here and there one meets with a locality where it is seemingly easy to raise honey in sections, such locations being situated with fine southern exposures, and protected by hilly country on the north. Hatzic is an excellent example of this kind of region, in fact the western inspector

found in half a dozen apiaries there more section honey than in all of the districts he visited put together.

Another obstacle in the way of raising section honey, one that holds good everywhere, is the breaking of the direct communication in the upward passage-ways between the combs. We know that in an 8-frame hive there are eight combs, but in the section super for such a hive there are only six rows of sections. The result is that when the bees in their upward journey reach the top of the frames in the brood-chamber they must change direction horizontally across the top of the frames, then turn upward, making their way through small entrances into the section boxes. Seemingly they dislike the tortuous windings and prefer to swarm rather than to wrestle with such complications.

On the other hand the beekeeper whose ambitions are limited to a little honey for family use does not want to invest nearly twenty dollars in buying an extractor. The problem before the inspectors has been to reconcile the conflicting conditions, that is to say, to secure the honey in the comb and at the same time preserve for the bees direct communication between the brood-chamber of the hive and the super. The solution will probably be found in the production of "chunk" honey, that is to say honey raised in frames, not in the ordinary section boxes. For this form of honey production a shallow extracting super, less than six inches deep, is used in which are placed shallow frames a little over five inches in depth. The combs in these frames are about 17 inches long and 4 inches wide, which is not ordinarily a marketable size, but "chunks" cut from one as needed are all

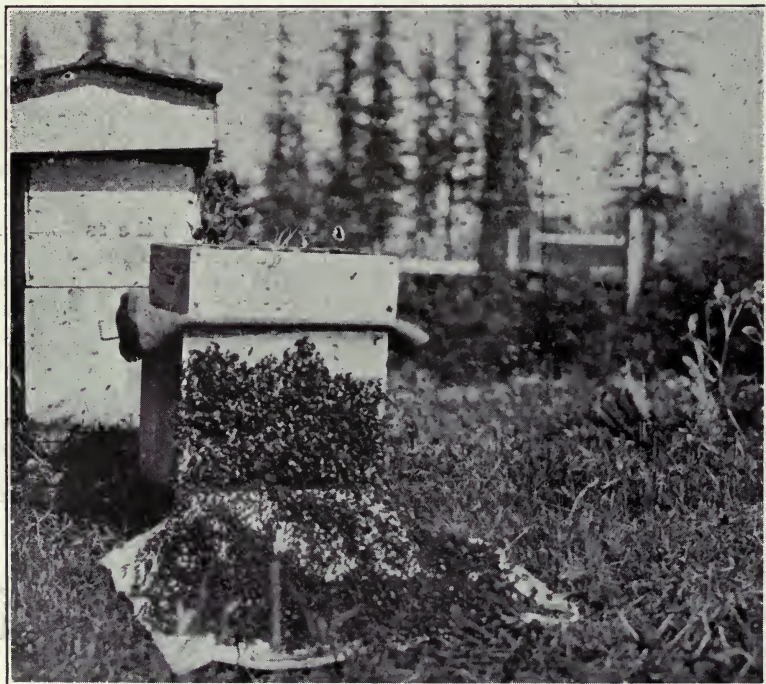


Fig. 8.—Homeward bound.

right for home consumption. In preparing these frames for use, foundation starters not much more than half an inch wide are put in, just enough to give the bees a line to follow. When the comb is cut out of the frame, at least half an inch of it is left adhering to the top bar so that the bees may get to work at once. It would be worth while for every beekeeper in a small way to try at least one of these shallow frame supers. In all likelihood the venture would not cost over a dollar.

REMOVING EXTRACTING COMBS FROM THE HIVE.

In one apiary of fifty colonies one inspector was lucky enough to be present when extracting was under way so he secured a series of photographs illustrating the various stages as far as was possible. The pictures almost speak for themselves. On looking over the set it will be noticed that in addition to the ordinary tools the beekeeper has two others, consisting of a whisk broom, generally known as a bee-brush, and a comb-box. His aim is to get the combs transferred from the hive to the honey-house, where he is to do the extracting, without taking any bees along.

The bee-brush is simply an ordinary whisk broom, thinned down considerably by cutting away about half of the fibre. Some men say that a feather from the wing of a turkey is even better.

The comb-box can be made of an ordinary hive by nailing a bottom of light boards on it, and then adding a close fitting lid with hinges.

We will now follow this beekeeper through the various steps in his work at the hive. First he removes the cover, which is stood up against the side of the hive. Then as is shown in Fig. 9 he peels up the quilt, blowing smoke across the frames as he does so. Next he drives down the bees out of the super, as is illustrated in Fig. 10. Perhaps a speedier and easier way to get the bees out of the super is to apply a carbolised cotton cloth a little larger than the surface of the hive. To prepare the cloth add a little carbolic acid to a tea-cupful of water, enough to make it smell, then soak the cloth in the mixture, next wringing it thoroughly, finally rolling it up nicely. Now turn back the quilt from one of the sides, and at once place the roll in position on the wood in such a way that it can be easily unrolled. Now turn back the quilt and unroll the carbolised cloth at the same time. Bees simply detest carbolic acid, and every one reached by its odor will hasten down into the lower chambers to get beyond the reach of its influence. In some parts of Europe the carbolised cloth is used in preference to smoke for all hive manipulations as it will subdue even very vicious bees.

Fig. 11 shows a frame of honey being removed from the hive, while the next photograph, Fig. 12, illustrates how the adhering bees are shaken off the comb on to the entrance of the hive by a sudden jerk. The bee-brush is next brought into requisition, and those that still cling to the surface of the combs are got rid of by sweeping strokes. (Fig. 13). In the next picture, Fig. 14, we see the cleared comb being put in the comb-box. When this has been accomplished the lid will be turned over so that not a bee can reach the combs. In the last figure of the series, Fig. 15, we see the cappings of the comb being removed by an upward stroke of the knife. The whole process of extracting is treated rather fully in Bulletin No. 30 so it is unnecessary to say more about it here.

The carbolised cloth will be found specially useful in removing comb-



Fig. 9.—Removing the quilt.



Fig. 10.—Smoking down the bees.



Fig. 11.—Removing a comb.



Fig. 12.—Shaking bees off comb.



Fig. 13.—Brushing off the few adhering bees.



Fig. 14.—Placing frame in honey box.



Fig. 15.—Uncapping the cells.

honey supers from the hive, as in a few minutes every bee will be driven out.

Notwithstanding the warning given in the previous bulletin a number of beekeepers were found extracting honey before it was perfectly ripe. On the second trip the inspectors were not a bit surprised to find that the crop had turned sour.

QUEEN EXCLUDERS.

These are used during the honey-flow, especially in regions where it is slow, to prevent the queen entering the super and laying eggs in the combs

intended for honey only. Almost everywhere the plain sheet of perforated zinc was found in use, and too often it did much harm and no good. Its natural tendency is to sag, so over and over again it was found resting tight on the top-bars of the frames, where it was glued down with propolis and every hole plugged up. Of course this stopped communication with the super above and no honey was got.

One beekeeper was found who had left the extracting supers on all winter without removing the excluder from between the two parts of the hive. He claimed to have four hives alive, but examination showed that only one was really worthy of that description, as three of them were queenless. Some time during the winter the bees had used up all the stores in the lower story, and so had to move on to the honey in the chamber above. The queen was unable to pass through the holes in the excluder, and was consequently left behind. She was probably frozen to death. The wood and zinc excluder illustrated in Bulletin No. 30 is preferable to the all zinc excluder.

DRONE TRAPS.

Drone traps are as useful as queen excluders, and just as dangerous in the hands of one who does not understand their use. For instance one beekeeper was found who put them in front of the entrances and kept them there all through the summer months. He even used them at once with swarms. The inspector on going through his hives found about a third of them queenless. Here is about what happened. The first swarm is usually headed by the old queen, so a young queen will head the old hive. If a drone trap be put on the hive before she has mated she will be caught as she attempts to leave on her nuptial flight, and perish in the trap. The second and following swarms are headed by virgins and these must fly to meet the drone, but when drone traps are on the hives their fate is to die in the trap. The moral is this, a beekeeper who never examines his hives and consequently does not know what is going on inside should never use a drone trap.

ANOTHER CAUSE FOR LOSS OF QUEENS.

On two occasions one inspector came across apiaries where a score of hives stood on a platform side by side as close as they could stand. He wanted to know if many of them did not die off on account of queenlessness. The owners did not know anything about that, but said the winter losses were very heavy. The gaps were filled up each season from swarms. The honey-crop was usually but a few pounds a hive. On the second visit it was easy to show the owners that many of the colonies were queenless.

When a young queen returns from her mating flight, if she enters the wrong hive she is killed by the inmates. When colonies stand side by side, and no one has a distinct and permanent marking, as is the condition in these apiaries, it is almost impossible for the young queen to avoid making a mistake, and her life is the price demanded for her blunder. No more than three hives should stand side by side in a group, even then it is better to vary the appearance by placing some conspicuous object on top of a hive or near the entrance.

WINTERING CONDITIONS.

A summer's work such as the inspectors experienced gave them a splendid opportunity to form an opinion as to the best methods of preparing the

bees for the winter's rest. This is a subject that is of perennial interest in the bee journals, in fact scarcely a number is issued that does not contain the results of experiments made by beekeepers on every part of this continent, and varied are the recommendations as to the best methods of taking care of the insects. The inspectors took especial interest in the subject, and their note-books record the observations they made so that at the end of the season they might be able to make sound recommendations as to what is best.

It may be worth while to make a few extracts from one inspector's notes: "On this ranch were found two dozen colonies, mostly in boxes. Nothing appears to have been done excepting to hive swarms. In a few instances there were regular hives, on top of some of which there were placed supers with sections, on others supers without sections, while in many instances there were frameless boxes piled one above another, and all apparently had been in that condition for years. All the entrances were small, just half an inch by three inches. Some leaked air upwards freely, but others were sealed tight with propolis so that the only source of ventilation was through the entrance. Notwithstanding the variety of conditions most of the colonies were in magnificent shape so that wintering must have been very good. One miserable swarm had been hived in a thin fruit packing box whose bottom-board, now the roof, was made of $\frac{3}{8}$ -inch lumber. Before winter the swarm had been unable to build a full set of combs, in fact the completed patch was only about ten inches square and deep, occupying little more than one-third of the available space. The roof leaked freely as the boards did not meet by at least one-eighth of an inch. In rainy weather the combs must have been sodden wet, in fact were so when the inspector first saw them in May, yet the colony had survived the winter and was struggling to make headway, although thousands of dead bees were still adhering to the combs. Winter temperature ran to 11 deg. below zero, while the rainfall averaged about six inches monthly all winter."

Out of curiosity the inspector cleaned out the dead bees, laid oilcloth along the crack and placed a board on top to shed the rain. It seemed impossible that a handful of bees in such a miserable shelter could ever amount to anything, but he wanted to see what could be done. Exactly a month later a second visit was made to this apiary, when this colony was found to have grown large enough not only to cover the old combs, but to build an equal amount of new. Arrangements were made to transfer it into a regular 10-frame hive, and by the middle of August it was sold to an experienced beekeeper from England who was delighted with its condition.

Here is a note that occurs frequently, "Two-story all winter," or "Story with empty combs above all winter; very strong, one of the best colonies that has been seen."

Another condition is briefly put in this remark, "Wintered on summer stands, with no direct protection, but under rainproof shed which was closed at back and at both ends. In fairly strong condition. Owner says that when the sun shone brightly on cold winter days the bees were tempted to fly out, got chilled, dropped down and died. Bees faced south."

To those who understand, this note is very illuminative. The closed space soon warms up under the sun's direct rays and the warmth tempts the bees to venture out. The rainproof roof is all right, but the closed

back is a mistake, so the beekeeper was urged to remove the boards behind the hives.

So far as the wet belt is concerned the inspector's opinion is that the most important conditions for successful wintering are, a colony strong in bees, plenty of stores, and a little upward ventilation which may be easily secured by folding back the edge of the quilt at the rear of the hive about a quarter of an inch, this being done in October when brood-raising is practically over. Instead of turning over the quilt, this may be removed, a hive of empty combs set on top of the brood-chamber, and the quilt replaced on top of it. Whichever system is followed, whenever in spring pollen is seen to be carried in, all upward leakage of air must be stopped and only the brood-chamber be left for the use of the bees.

In the dry belt colonies that are strong in the fall and with plenty of stores come easily through the winter without special protection of any kind. In one district where the thermometer falls to 31 deg. below zero and frost lasts for weeks at a time, the inspectors found the colonies very strong the first week of May.

REMEDYING DEFECTS IN COMBS.

In but few instances did the inspectors come across really first-class combs in a hive. A really good comb should be as flat as a planed board, occupy the whole frame, be attached to the center of the top and side bars, and not be swung out of line at any part. But rarely did they meet combs that could be removed from the hive without considerable manipulation. Generally speaking, no foundation whatever is used by the average beekeeper, and as a consequence the bees usually build the combs diagonally across the hive. Before such combs can be inspected they must be cut to pieces, entirely upsetting the routine work of the colony, killing lots of brood and making a woeful mess with streaming honey. Good beekeeping is not possible while such conditions exist, and every owner of such a hive should make an effort to get rid of them. To put the combs into a workable but not first-class shape is a fairly easy task. The only extra tool necessary is a knife with a long blade, one long enough to reach to the bottom of the hive. This is passed between the frames, reaching right down to the bottom-board, thus cutting the combs and making it possible to lift out the frames one by one. The outside frame is first removed, the bees shaken or brushed from it, as conditions allow, then it is laid flat on a large board. The pieces of comb overlap each other, presenting V-shaped edges. With the knife cut down through both combs, remove the trimmings, and push the parts that are left into place so that the newly-cut edges touch and are in line. Take the next comb from the hive and replace the first one. By treating each comb this way in turn one can get a set of fairly true combs with little more than 15 minutes' work. The bees will make the necessary repairs in twenty-four hours.

When the trouble is less serious, such as a bulging of the comb at top, ends or bottom, all that is necessary is to cut through the connecting wax at the defective part, push the comb into place, and return the frame to the hive.

Where much drone comb is present the piece containing the cells should be cut out with a pocket-knife.

TRANSFERRING TO GOOD COMBS.

How can the bees be transferred from boxes, or it may be from combs, into a modern hive, with the least possible trouble? This question is frequently asked the Department these days, indicating that a real live interest is being taken in modern beekeeping, for unless combs are movable and easily removable from the hive it is impossible to follow modern methods. Knowing the many duties and cares of the average beekeeper in the summer months, the inspectors do not feel it advisable to recommend a system of direct transferring, which consists in cutting the old combs out of the boxes and fastening them into the frames of the new hive. One of the inspectors has had quite an extensive experience with the direct method, and he does not feel like advising a novice to undergo what might turn out to be a rather trying ordeal. To his mind an indirect method, that is to say one by which the bees are gradually worked over into the new hive, but the combs are left behind, is far better adapted to the conditions of the average man.

First let us take the case where the bees are in regular hives, but the combs are in so chaotic a condition that it is impossible to remove a frame from the hive. This is a rather easy case. The beekeeper provides himself with a new hive, one in which the frames are furnished with full sheets of foundation, also a queen excluder. When the bees are so strong that they occupy the full width of the hive, which should be about the first week in May, remove the cover of the old hive, and place the new one on top of the brood-chamber, then replace the cover. The bees will soon take possession of the addition, in fact if there be a good flow of nectar from fruit blossoms they will draw out, that is build, new combs very rapidly. Almost as fast as these are made the queen will lay eggs in the cells. The problem for the beekeeper at this stage of the proceedings is to pen the queen in the top-chamber so as to prevent her laying below in the old one. So, about a week after the new hive has been given he should lift one of the middle frames and look into the cells. If he sees eggs or larvae it is proof that the queen is laying above. We will suppose that these are found. The queen is in one of the chambers, but we do not know which. If little or no smoke has been used she will probably be above, but if much was blown down the frames she is almost certain to have run down into the lower chamber to escape the deluge. We will replace the frames and wait till next day, so that normal conditions will reign. On the second visit we take the queen-excluder along and lean it against the hive where it will be easily got when wanted. Now smoke the bees through the entrance, and wait a minute or two. The smoke will not only subdue the bees, but will tend to drive the queen above should she happen to be in the bottom hive. Next, without removing the cover, lift the upper division away to one side, clap the excluder on the lower hive, then restore the top story to its former position.

We do not know for certain where the queen is but the chances are greatly in favor of the assumption that she is above the excluder, but in three days we can learn where she really is by examining the middle frames in the top story. An egg hatches in three days after it is laid, so should we find lots of eggs in these frames on the fourth day after inserting the excluder we know she is above it, but if there are no eggs then she must be below. When she is above nothing needs to be done for 21 days. At the end of that time all the young brood below the excluder will have hatched out, so the old hive may be at once removed from the stand, also the excluder which has finished its work and is no longer needed.

But supposing we find no eggs above on the fourth day after inserting the excluder. Then we know the queen must be below, consequently we remove the excluder for 24 hours so as to give the queen a chance to go above, then try all over again. It takes a little while to tell how these things are done, but in practice the work takes only a few minutes, something that can be done just after the noonday meal.

The condition is a little complicated when the hives are of different sizes. For instance the old hive may be 14 inches square while the new hive may be 14x20, or 16x20. There will thus be quite a gap left at one end at least when the one hive is put on top of the other, and the bees will not tolerate any such condition. Before the new, and supposedly larger, hive is placed on top of the old one, a strip of wood of sufficient size must be fastened with a few small nails across the bottom at what will be the back end of the hive, so that the fit will be snug. A piece of corresponding size will have to be fastened to the excluder. When the time comes to insert the excluder the strip on the bottom of the new hive must be taken off, and this is the reason why it ought to be nailed but lightly.

Let us now consider the case of a box used as a home for the bees. There is really very little uniformity in the dimensions. In one apiary one may find boxes ten inches square and thirty inches high, while not over a mile away there may be found bees enjoying the luxury of a home twelve inches in height, eight inches wide and two feet long. Where the box nearly conforms to the dimensions of a regular hive it can be handled fairly well by turning it upside down and setting the new chamber on top. The bees object to going down into their home and soon transfer their quarters to the upper portion, so in a month the chances are the lower part will be practically free of bees, especially if additional room be added above as found necessary.

Another method of transferring the bees from a box is to wait until it swarms, and this plan is the best suited for all odd sizes, such as the ten inch square one just mentioned, nail kegs, old trunks of trees and such like. While the swarm is in the air remove the box from the stand and set it a couple of feet to one side with the entrance at right angles to the old position. Put the new hive on the old stand and run in the swarm. Since the old bees are not aware of the change in position they will return to the old stand, thus augmenting very considerably the strength of the swarm, but weakening the original colony in the box to an equal extent. Our purpose is to drain every bee from the box and add it to the new hive. For a few days there will be very few bees flying from the box, but on the fourth day the younger bees will begin to take up the field work. We now prepare to entice them into the new hive by working the entrance of the box towards that of the hive occupied by the swarm, so each night we turn it a few inches towards its old location. By the seventh day from that on which the swarm issued the two entrances should be side by side. Next day when flight is free, say after midday, the box should be lifted to the other side of the hive with the entrance turned away, looking west if on the west side of the hive. The flying bees on returning will find no home, and after a little hesitation will enter the new hive and be welcome as they will be laden with supplies.

Our box colony is now getting weaker, but there are still lots of young bees in it, and thousands of larvae to be hatched out, so we proceed to

repeat the first process all over again. In three days we begin to turn the entrance towards that of the new hive, then on the seventh lift to the other side. A third time we proceed as before, then lift the box back to the west side. All the young bees have hatched out by this time, but it will be at least a week before they will become field workers, so we go through the routine a fourth time, then take away the box altogether. The young queen is left with a few young bees and a little brood, but these must be sacrificed and the box broken up.



FOUL BROOD

Like all other forms of life bees are liable to attacks by diseases, some of which affect the adults, others the young. It is with those forms that destroy the latter during the larval, that is the magot, stage the beekeepers of British Columbia are most concerned, because in recent years they are spreading over this continent at a rate that has so far been uncontrollable. There are two varieties, well recognised today, that attack the larvae, both generally known as Foul Brood, probably because of the disgusting odour that prevails when the virulent stage is reached.

Only by long and patient research on the part of highly skilled investigators have the causes of these deadly maladies been found. In 1885 an Englishman named Cheyne ascribed the cause of the disease to a microscopic form of plant life that he found present in the dead larvae, and he named it *Bacillus alvei*, that is the hive bacillus. Recent investigations confirm his discovery, differing in this, that he had found the cause of only

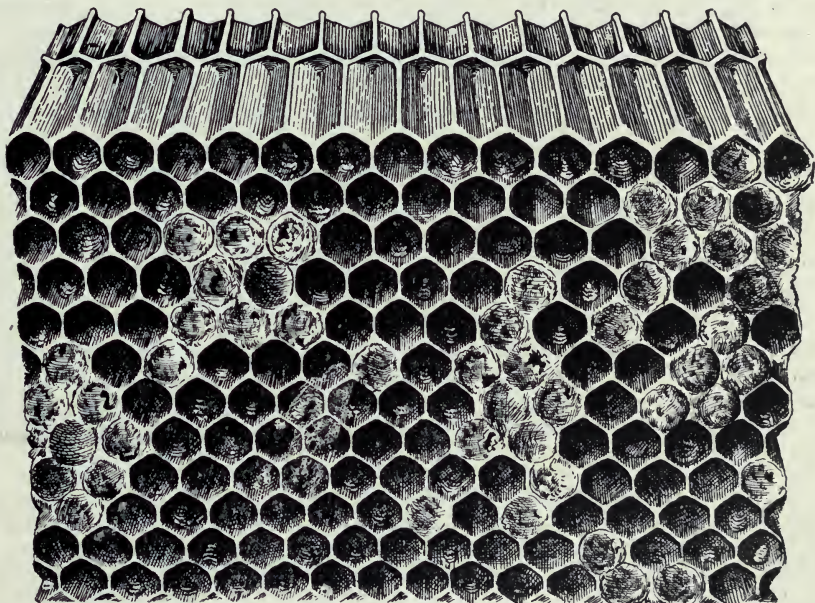


FIG. 16.—American Foul-Brood comb, showing irregular patches of sunken cappings and scales. The position of the comb indicates the best way to view the scales. (U. S. Dept. of Ag. Far. Bul. 442.)

one form of Foul Brood. Dr. White of the U. S. Department of Agriculture at Washington, D. C., after several years of careful work succeeded in isolating another bacillus which is always present in the larvae that have died from the other form of the malady, and all indications suggest that it is probably the cause of the disease. Dr. White gives the name of *Bacillus larvae* to this humble but deadly form of plant life.

Since the cause of one form of larval disease was first discovered in Europe, the beekeepers of this continent have agreed that this form of the malady shall be known as European Foul Brood, while the other variety is to be called American Foul Brood. But it should be clearly understood that both the diseases are prevalent on this continent and in Europe.

It is an accepted principle that like begets like, therefore many beekeepers are in error when they suppose a form of Foul Brood may develop from an insanitary condition of the hive. Before European or American Foul Brood can attack the young larvae the bacillus must first be introduced into the hive from the outside, hence it is well for the beekeeper to know how the infection may be carried in. Dr. White found that while the greatest number of infecting germs of *Bacillus alvei* were to be found in the bodies of dead larvae, he also got many from the pollen in the cells of the Foul Brood combs, smaller numbers in the honey stored in these combs; he found them also on the surface of the combs and frames; likewise on the wings, legs, head, thorax and abdomen, and in the intestinal contents of adult bees in the infected colonies.

These facts give us a working hypothesis. We know that bees are quick to rob the honey of a weak colony. Just as soon as Foul Brood has lowered its population sufficiently to make defence of the stores impossible, the bees of the neighbourhood at once carry off its honey to their own hive, and as a consequence implant the germs in their home, which in turn becomes a new center of infection to other colonies. One diseased hive in a locality means sooner or later, generally sooner, the total extermination of the bees in that district.

Let us consider how Foul Brood may be brought into British Columbia. We have learned by experience that it can be introduced by settlers bringing their bees along with them. To minimise this channel of infection, the Department of Agriculture puts all imported bees on combs into quarantine for nine months.

The disease may reach us by spreading from an infected area. This is the most serious cause for anxiety at the present time, for American Foul Brood is close to the boundary line on the south. The forests are full of "bee trees" over which man has no control so that the beekeepers near the international line will be the first to feel the onslaught. It is the duty of these men to be specially watchful and to report to the Department the first suspicious symptoms.

Dr. White reports that he was able to isolate the bacillus of European Foul Brood from the queens of three badly infected hives, which fact suggests that it is possible for the germs to be imported along with a queen, though it should be said that the large queen breeders are exceedingly careful.

It is the opinion of some that the present rapid dissemination of Foul Brood may be due to the very general custom of buying queens from breeders, but few facts have been advanced in support of the theory.

We have seen that the germs may be present in the honey from a diseased apiary. Over one hundred thousand pounds of honey are imported into this province annually, much of it from infected regions, and it is more than probable that much of it carries disease germs. It is therefore extremely unwise to feed to bees honey that has been bought in a store, especially if the source of origin is unknown. The retailers word is not sufficient, for the writer recently bought a section of honey guaranteed to be raised in Chilliwack, yet not one pound of section honey was produced in that district the previous summer. The only safe feed for bees is sugar syrup.

SYMPTOMS OF FOUL BROOD.

In depositing her eggs the queen lays them with remarkable uniformity, in small patches early in the year, but in ever increasing areas as the hive becomes stronger and the weather conditions more favorable. Hatching-out in a healthy hive is just as regular. When however a larva dies the symmetry is broken, so here and there we find cells that are not, so to speak, keeping time with the others on the same frame. When these are quite numerous it is high time for the beekeeper to take special note of

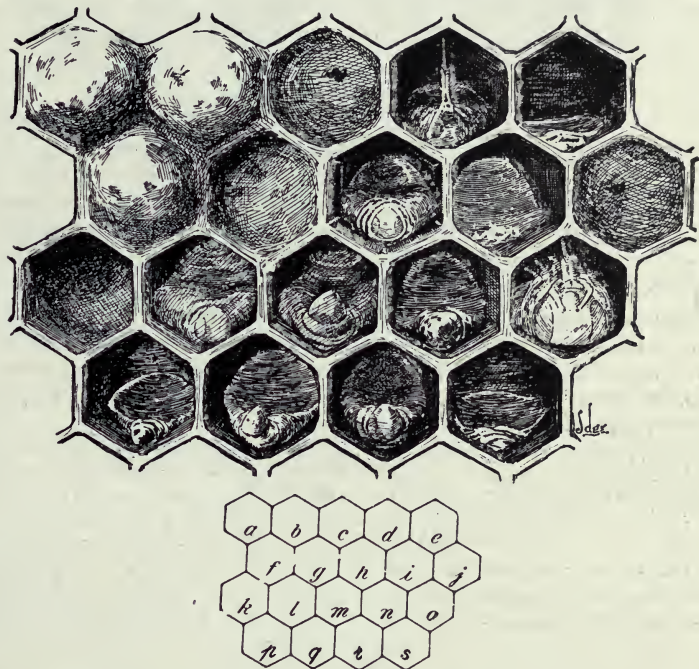


FIG. 17.—American Foul Brood: a, b, f, normal sealed cells; c, j, sunken cappings, showing perforations; g, sunken capping not perforated; h, l, m, n, q, r, larvae affected by disease; e, i, p, s, scales formed from dried-down larvae; d, o, pupae affected by disease. Three times natural size. (U. S. Dept. Ag. Far. Bul. 442.)

their appearance. In ordinary conditions the dead larvae are removed by the workers, and the queen deposits another egg in the cell. But the odor given off by larvae that have died of Foul Brood appears to overpower even the most enthusiastic workers, so the dead maggots are permitted to remain in the cells. In American Foul Brood death seems to occur after the cells have been capped over, so when the workers find cells that refuse to hatch they puncture the cappings, in order to remove the dead matter, but are driven from the task by the offensive smell. The first suspicious sign therefore is a number of scattered cells whose cappings have been perforated by the workers and left in that condition.

The cappings of healthy cells is rounded upwards, that is a little dome is over each cell, but those affected by Foul Brood are sunken. A combination of scattered, sunken and perforated cells is therefore very suspicious, one that demands further investigation. This is done by means of a tooth-

pick, a match or a sliver of wood sharpened to a point. The capping is removed, when a dead larvae will be found in the cell. The tooth-pick is pushed into the dead magot, then slowly withdrawn. If the decaying mass adheres to the point of the wood and stretches out like melted glue, lengthening anywhere from half an inch to several inches before it breaks, then

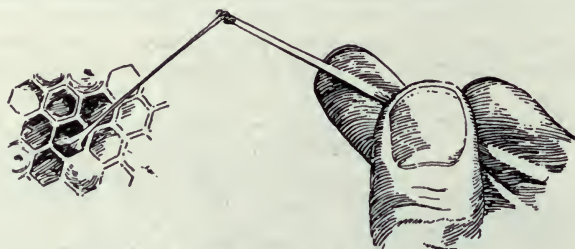


FIG. 18.—Showing the ropiness of American Foul Brood.

the probability is that American Foul Brood was the cause of death. This is the form of the disease that is apt to reach this province first as it is very prevalent on the Pacific Coast.

The colour indications deserve consideration. When the larvae are first affected they turn to a light chocolate colour, then as decay advances, they become darker, resembling roasted coffee in colour. When the larvae dries it forms a tightly adhering scale of very dark brown colour, which can be best observed when the comb is held so that a bright light, say from the direct rays of the sun, strikes the lower cell wall.

A hive affected by American Foul Brood has a very characteristic odour, resembling a poor quality of glue. In the early stages it is not very pronounced but grows stronger as the disease spreads.

EUROPEAN FOUL BROOD.

European Foul Brood is most prevalent in the east, so our risk of infection is from imported bees. It attacks the larvae earlier than does American Foul Brood, hence only a small part of the diseased larvae are ever capped. Those that are capped over have the sunken and perforated appearance as in the case of the American form.

When first affected the larvae show a small yellow spot on the body near the head. After death they turn first yellow, then brown, finally almost black. When the tooth-pick test is tried, the decaying matter very rarely stretches out in a long thread.

The dried bodies of larvae that have died from American Foul Brood adhere firmly to the bottom of the cell, those whose death has been caused by European Foul Brood do not adhere strongly. There is very little odour from the decaying larvae, and it is not nearly so noticeable as the "glue-pot" smell from American Foul Brood.

European Foul Brood is much more infectious than the American type and spreads more rapidly.

TREATMENT OF FOUL BROOD.

Very careful experiments prove that drugs and chemicals, no matter how applied, whether in food or for fumigating combs, have no effect upon the germs that produce Foul Brood.

With a condition of immunity such as British Columbia enjoys at present the only wise thing is to stamp out the infection as soon as it secures a foothold. Up to the present time before any suspected hive has been

destroyed samples of the combs have been submitted to bacteriological experts, and only after their report had been received has action been taken; consequently the beekeepers of the province may have every confidence that the Inspectors will do nothing hastily. They realise that their duty is to help, not to hurt.

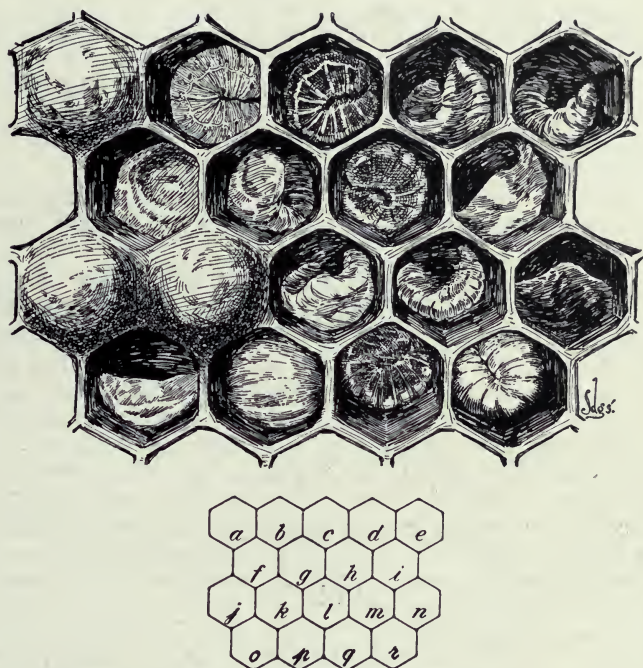


FIG. 19.—European Foul Brood: a, j, k, normal sealed cells; b, c, d, e, g, i, l, m, p, q, larvae affected by disease; f, h, n, o, dried-down larvae or scales. Three times natural size. (U. S. Dept. Ag. Far. Bul. 442.)

PICKLE BROOD.

There is a diseased condition of the brood called by beekeepers "pickle brood," but practically nothing is known of its cause. In some instances its symptoms resemble those of Foul Brood. For instance when the larvae are capped over, the cappings may be punctured, but they do not become dark. On removing the perforated capping the larvae will be found to present a swollen, watery appearance, and on being touched by the toothpick will slide out bodily. There is no ropiness. There need not be any anxiety about "pickle brood" as it generally disappears of its own accord.

Several times during the season of 1911 the Inspector in the Lower Fraser district met cases of dead brood whose death he judged to be the result of cold or starvation. The season had been unusually wet with spells of rather chilly weather right up to the first week of July providing sufficient cause for the death of many larvae, especially those located near the edges of the comb or on the outside frames of the brood nest. All affected hives were noted and visited before the end of the season; in every instance all signs of disease had disappeared.

After a month's fine weather in early spring, the season of 1912 in the same district turned cold and wet. For a period of ten weeks the

average temperature may be described as chilly and damp with occasional warm spells that lasted for a few days. It was a rather anxious time for the Inspector. He came across hundreds of hives containing much dead brood, while again and again closely observing bee-keepers reported sudden outbreaks of Foul Brood and wanted their colonies destroyed. With his previous season's experience behind him, the Inspector could not agree with the beekeepers, much as he admired the fine public spirit that influenced them to get rid of a supposed menace to the community. To make assurance doubly sure, again and again he submitted samples of suspected brood from different districts to the Department of Agriculture at Washington, D. C., and in every instance the report was that the diseased condition was not of a contagious nature.

The work of the Inspectors during 1912, therefore, indicates that the Province of British Columbia is still free from the disease known as Foul Brood.

The Inspector in whose territory was found the diseased brood conditions naturally devoted considerable effort to the study of the literature of beekeeping in the hopes of finding a reference to similar conditions and effects, and was rewarded by discovering the following by Wm. McEvoy, a very noted Beekeeper and Foul Brood Inspector in Ontario:—

"When the weather conditions are favorable bees gather a good deal of honey all through fruit-bloom, and while they are bringing in honey daily the brood-chambers will be kept well supplied with 'unsealed' honey, and as long as the 'unsealed' honey (which is the first used) lasts, all the brood will be extra-well fed. But in some springs, when the bees are working well in fruit-bloom, and going into brood-rearing on a large scale, wet weather sets in, and shuts off honey-gathering for days. Just as soon as this occurs the bees quickly feed the 'unsealed' honey to the brood, and when this is gone they do not uncap the sealed stores fast enough to keep pace with all the brood that requires feeding, and the result is more or less starved brood. Some of the brood that dies of starvation, while in the coil form, 'turns a little yellow at first, and later to a dark brown, and dries down in its skin.'

"All brood that dies of starvation when the bees have it about ready for capping, will be found on the lower side-wall of the cell, with the end turned up a little, and will have a dark and tough skin on, and like all starved brood it 'dries down in its skin,' and turns to a dark, dry crust on the bottom and lower side-wall of the cells; and after that it can be easily cleaned out by the bees.

"Bees always feed the brood much better when they have plenty of unsealed stores, but when the colonies run out of 'unsealed' honey for days at a time between fruit-bloom and clover, it is then that the bees fail to get all the brood fed, and the result is starved brood. When a bee-keeper examines his colonies then and finds starved brood, he, like others, will say that his colonies have 'pickled brood.'

"On the night of May 28, 1889, we had a killing frost all over the Province of Ontario, followed by several days of wet weather, shutting off all honey-gathering for some time. This awfully sudden check coming after one of the most favorable springs for bees that I ever saw, and so near the honey season, caught all colonies very full of brood. I knew that the 'unsealed' honey would soon be fed, and to help the bees to keep feeding the brood just as much as if nothing had happened, I fed warm

syrup to all colonies every evening for some time, and often was surprised when I examined the combs to see how much syrup it took to feed all the brood well when the bees were not bringing in any honey. My colonies gave a much larger average yield of clover and basswood honey that season than any that I have heard of."

The following observations of the appearance of an affected comb were made conjointly by the Inspector and a Bee-keeper. The case is a typical one; in fact a few days later at another apiary belonging to an old-time bee-keeper, who once had fought Foul Brood in California, the description was found correct for a diseased comb in one of his colonies.

On each side of the frame were found about 200 cells in which were dead larvae, practically all of them being sealed over. They were scattered fairly evenly over the whole frame.

The cappings of the diseased cells were a trifle darker than the others, probably due to the age of the cell, as those containing dead larvae of more recent date were of the same color as the other cells.

As a whole cappings of the diseased cells were convex, that is they were curved upward just like healthy cells, but here and there one could be found slightly sunken in the centre.

Where perforated, the hole was very small, rarely over 1-32 of an inch in diameter and usually in the centre. An occasional cell showed a double perforation. In no case had the larvae dried down to a scale. In fact, the Inspector cannot recall having found one instance where the scale condition had been reached.

One larvae that had died before being capped and had shrunken, was skin whole and of yellowish gray color. Another of the same age had shrivelled up to the nearly dry stage. It was black and had its head turned up. It came out of the cell easily, and apparently was not adhering. One not so far advanced in decomposition was a trifle yellow on the abdomen and roped just a little.

The color of those that died after being capped was usually of the color of a wooden toothpick but a trifle darker, though a few were quite black. All were skin whole and full of fluid, but broke when touched with a toothpick. A healthy larva is markedly white when compared with a toothpick.

In ninety per cent. of the cases death occurred after the larva had been capped.

In one apiary when the ailment first appeared a young Italian Queen was given to the affected colony but two months later the dead brood was as plentiful as before. The weather conditions had not improved any in the meantime.

The lesson to be learned from the weather conditions that prevailed on the Lower Fraser in the spring and summer of 1912 is very plain. When rain prevents the bees flying for more than three days, the bee-keeper must feed sugar syrup daily until flight is resumed.

FOUL BROOD ACT

CHAPTER 18.

An Act for the Suppression of Foul Brood Among Bees.

[1st March, 1911.]

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

1. This Act may be cited as the "Foul Brood Act, 1911."

2. (1.) The word "Minister," whenever used in this Act, shall mean the Minister of Finance and Agriculture for the Province of British Columbia.

(2.) The word "Inspector" shall mean Inspector of Apiaries for the Province of British Columbia.

3. The Lieutenant-Governor in Council may from time to time appoint such person or persons as he shall think proper to act as Inspector or Inspectors to carry out the provisions of this Act, and such Inspectors shall be under the direction and control of the Minister.

4. (1.) The said Inspector shall, whenever so directed by the Minister, visit without unnecessary delay any locality in the Province of British Columbia and there examine, such apiary or apiaries as the said Minister may direct, and ascertain whether or not the diseases known as "foul brood" or "black brood," or either of them, exist in such apiary or apiaries, or in their vicinity.

(2.) Wherever the said Inspector is satisfied of the existence of such disease in its virulent or malignant type, he shall order all colonies so affected, together with the hives occupied by them, and the contents of such hives and all tainted appurtenances or appliances that cannot be disinfected, to be immediately destroyed by fire under his personal direction and superintendence, and in such manner as may be necessary to prevent the spread of the said disease, and to thoroughly disinfect any appurtenances or appliances capable of being disinfected.

(3.) 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 has reason to believe that it may be entirely cured and eradicated, then the Inspector may omit to destroy or order the destruction of the colonies and hives in which such disease exists, but shall give the owner or caretaker of the diseased apiary or apiaries full instructions how to treat said cases. The Minister shall cause said apiary or apiaries to be visited from time to time, as he may deem best, and if after proper treatment the said bees shall not be cured of the disease, then he may cause the same, with the hives and all tainted appurtenances and appliances, to be destroyed as in the preceding subsection hereof provided.

(4.) After inspecting infected hives or fixtures or handling diseased bees, the Inspector shall, before leaving the premises, or inspecting any other colony of bees or proceeding to any other apiary, thoroughly disinfect his own person and clothing, and shall see that every assistant with him also thoroughly disinfects his person and clothing.

5. The inspector shall have full power, in his discretion, to order any owner or possessor of bees dwelling in box hives (being mere boxes without frames) to transfer such bees to movable frame hives within a specified

time; and in default of such transfer, the Inspector may destroy or order the destruction of such box hives and the bees dwelling therein, or may himself cause such bees to be so transferred.

6. Any owner or caretaker of diseased colonies of bees, or of any affected appliances, who knowingly sells, or barter, or gives away such diseased colonies or any bees, comb, or honey therefrom, or any infected appliances, shall, on conviction thereof before any Justice of the Peace, be liable to a fine of not less than fifty dollars and not more than one hundred dollars, or to imprisonment for any term not exceeding two months.

7. Any person whose bees have been destroyed, or are being or have been treated for foul brood or black brood, who sells or offers for sale any honey-comb, honey, bees, hives, appurtenances or appliances of any kind after such destruction or treatment, and before being authorised by the Inspector so to do, or who knowingly 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 twenty dollars and not more than fifty dollars, or to imprisonment for a term not exceeding two months and not less than one month, or both such fine and imprisonment.

8. Any owner or caretaker of bees who refuses to allow the Inspector or his assistant or assistants to freely examine his 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, or who refuses to transfer bees dwelling in box hives to movable frame hives, when so directed by the Inspector, shall, on conviction before a Justice of the Peace, be liable to a fine of not less than twenty-five dollars and not more than fifty dollars for the first offence, and not less than fifty dollars and not more than one hundred dollars for the second or any subsequent offence, and the said Justice of the Peace shall make an order directing the said owner or possessor forthwith to carry out the direction of the Inspector.

9. When an owner or caretaker of bees disobeys the directions of the said Inspector, or offers resistance to or obstructs the said Inspector in the performance of his duties, a Justice of the Peace shall, upon the demand 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 caretaker and assist the Inspector to seize all the diseased colonies and infected appurtenances and appliances and burn them forthwith; and if necessary the said Inspector or constables may arrest the said owner or caretaker and bring him before a Justice of the Peace, to be dealt with according to the provisions of the preceding section of this Act.

10. Every bee-keeper or other person who is aware of the existence of foul brood or black 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 not less than five dollars nor more than twenty-five dollars and costs for each such offence.

11. Upon receiving the notice mentioned in the preceding section, or in any way becoming aware of the existence of foul brood in any locality, the said Minister may direct the said Inspector to immediately proceed to and inspect the infected premises; but where the person giving such notice is unknown to the Minister, or there is reason to believe that the information

in said notice is untrustworthy, or that the person giving such notice is actuated by improper motives, then the Minister may require the person giving such notice to deposit with him such sum as the Minister may decide, not exceeding ten dollars, as a guarantee of good faith, before the said notice is acted upon, and if it proves that said notice was properly given, then the said deposit shall be returned to the person giving such notice, but otherwise the said deposit shall be forfeited.

12. The Minister shall have power to order into quarantine at the point of entry into the Province of British Columbia, or such other place as he may appoint, for a period of not more than nine months, and if found to be infected may order to be destroyed, any or all bees imported into the Province of British Columbia; also to order the disinfection of all bee appliances that have been in use, and to order the destruction by fire of all combs and frames in empty hives.

13. The Inspectors appointed under the provisions of this Act shall be paid such salary or remuneration as the Minister may from time to time determine.

14. The Minister may from time to time, subject to the approval of the Lieutenant-Governor in Council, make rules and regulations for carrying out the purposes of this Act.



CONDITIONS ON LULU ISLAND AND IN THE VANCOUVER-NEW WESTMINSTER DISTRICTS.

The western Inspector regrets that so far he has had no opportunity to investigate thoroughly the floral conditions in the region between New Westminster and the sea but the successful bee-keepers in the district have promptly and kindly put their experience at his service.

On Lulu Island there is a fine acreage of clover providing material for a splendid honey flow in June and July. But there is a great dearth of nectar and pollen-bearing blossoms between willow bloom and clover, and another just after the honey flow. As a consequence, brood raising comes almost to a standstill during April and May, while honey dew is gathered in the fall. Round Ladner is the densest bee population the Inspector has yet met, there being something like 500 hives in the town and immediate vicinity, but the honey production of the average hive is practically nothing.

The problem here is to prevent the bees gathering honey dew in the fall and to ensure sufficient stores in the hives in April and May. After many experiments, Mr. J. Reagh, of Ladner, finds the following system to work well. After the honey flow is over and before the honey dew appears, he fills a hive solid with frames full of honey and sets it under the brood chamber and removes from the latter all frames excepting those containing brood. As soon as the brood hatches out, these frames are taken away. The bees are thus forced to cluster on the solid comb, and since there is no room for more storage they do not gather honey dew and thus endanger their health in the winter.

Usually the honey given early in the fall is sufficient to carry the colony through until the honey flow in June.

Mr. Reagh says he finds this system works better than feeding sugar syrup in the fall and again in the late spring months.

So far, the Inspector has learned of no one who has made a real success of bee-keeping in the district between Vancouver and New Westminster. Fireweed is scattered plentifully in this region, providing fine possibilities in July and August, but unfortunately, as in Lulu Island, there is a dearth of nectar after dandelion bloom is past. The bee-keepers of this district might, with advantage, ponder over Mr. Reagh's method.

THE MATSQUI DISTRICT.

For a perfect sequence of pollen and nectar-bearing plants the western Inspector knows of nothing that surpasses the Matsqui and Sumas prairie districts. In these regions from the willow bloom until the end of August there does not appear to be a break of even one day in nectar and pollen production. Willow, dandelion, fruit blossoms, big leafed and vine maples, white clover, alsike clover, fireweed, euphorbia and many others overlap each other in an ideal way. So early as the last week of April, 1912, he found double storey colonies packed with bees on all of twenty frames, a magnificent army with which to accomplish great results in the honey flow, if kept intact, but alas too frequently allowed to divide itself into half a dozen swarms, with the necessary consequence that the bee-keeper secured very little surplus honey.