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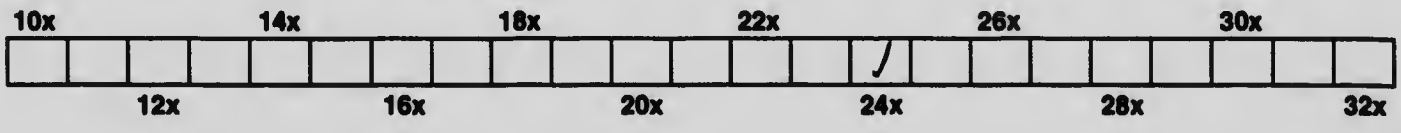

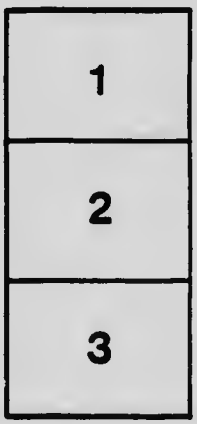

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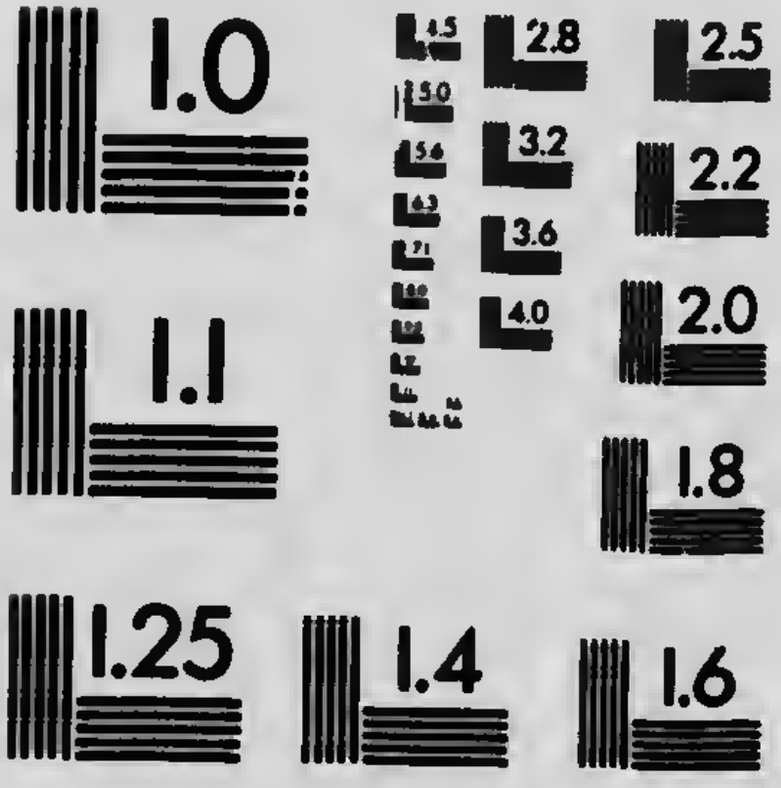

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BULLETIN NO. 233] [MAY, 1915

Ontario Department of Agriculture
FRUIT BRANCH

Natural Swarming of Bees and How to Prevent It.

MORLEY PETTIT, PROVINCIAL APIARIST.

THE PROBLEM.

There are three great problems in bee management in Ontario, viz., Brood Diseases, Wintering, and Swarming. While the first two are very real, the swarming problem comes home to every beekeeper whether he realizes it or not.

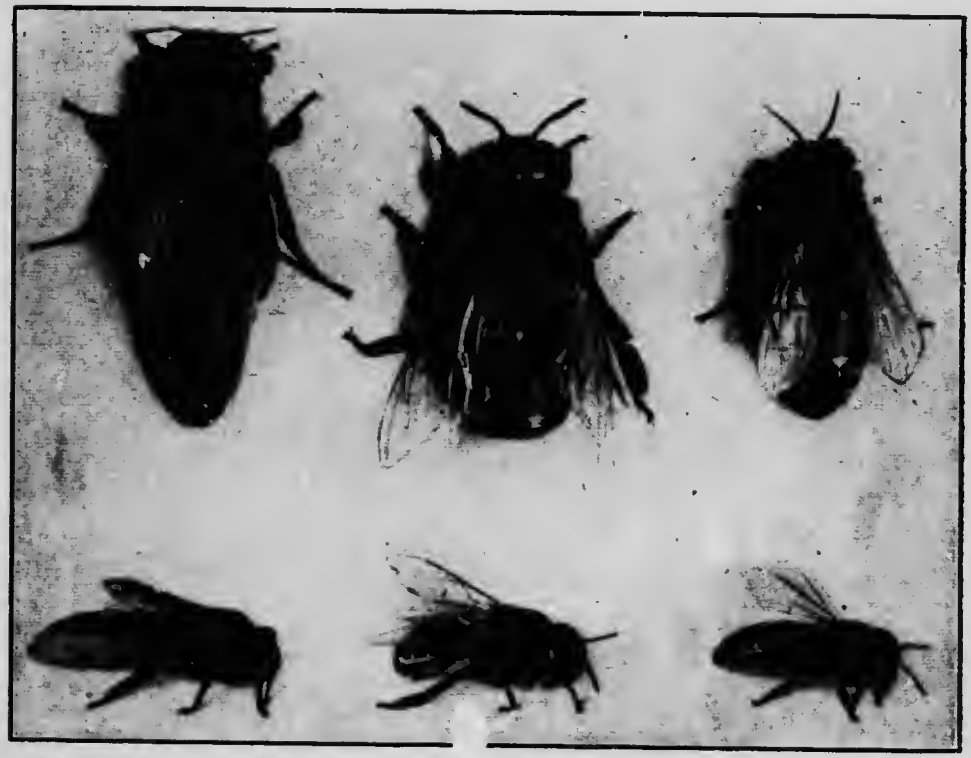

Fig. 1.—Queen, Drone and Worker of the Honey Bee. (*Gleanings in Bee Culture.*)

If his bees build up strong enough to gather a good crop of honey they are sure to develop the swarming impulse if left to themselves. If he cannot control this impulse to swarm, the beekeeper must either spend a great deal of time watching for and hiving swarms, or else lose enough swarms to take the profits off his bee

Other live stock require atten two or three times a day throughout the year, and the results of neglect are immediately manifest. Bees do not need such frequent attention, nor does the casual observer notice the results of neglect; but they are just as real and are frequently quite serious.

The Spring Cleaning.

Let us suppose that Monday is Apiary day. On the first fine Monday in May, when a little honey is coming in and it is warm enough for bees to fly freely, the hives should be overhauled and their insides, as well as the frames of combs and queen excluders, scraped clean of superfluous wax. This can be done by

Fig. 2.—Bee veil on straw hat.

transferring the comb and bees of each hive in succession into a clean hive. In this operation care should be taken to expose brood as little as possible to hot sun, cold wind, or robbers, and to keep the combs in exactly the same order. It should also be remembered that the scrapings make beeswax, a valuable by-product of the apiary.

Clipping Queens.

Queens should have their wings clipped at this time. This is no factor in the prevention of swarming, but it usually prevents the escape of natural swarms that do occur. It is also the best way of marking queens for keeping a record of their age and efficiency.

Weekly Examination.

Every week after the beginning of fruit bloom, each colony is examined t note the progress of its development and give necessary treatment.

Before opening or even smoking any hive, study the actions of the bees at the entrance to see whether the colony seems strong or weak, whether they are working or loafing, whether robbers are about, etc. You will learn to judge internal conditions by outside appearances in a way which cannot be explained on paper. It is a thing to strive after to be able to tell without opening a hive what attention that colony needs.

To do this the weather and the progress of the honey flow must also be taken into account. For instance a colony will need different treatment at the beginning of the honey flow from what it would need for the same condition later on.

The clover honey flow usually begins in earnest about ten days after the first white clover blossom is noticed by the observant beekeeper. Up to that time

Fig. 3.—Hive Tool, Screw-driver and Wall Scraper—all handy apiary tools.

the effort is to get a large working force of bees in the hive by uncapping or feeding and turning all honey into brood. At the same time room and ventilation are given to prevent any chance of swarming impulse.

Turning Honey Into Workers.

At each visit some of the old honey is uncapped and placed next the brood. Regulate the uncapping so as to have all the old honey used in brood rearing by the opening of the clover bloom in June. Do not transfer combs from one hive to another unless necessary to feed a needy colony, and then not unless you are perfectly sure you have no foul brood.

If short of stores, colonies may be fed in spring as follows:—Make syrup of granulated sugar and water in equal proportions, fill the cells of empty combs with this and hang them in the brood chamber next the brood. This should be done towards evening to avoid robbing. There are a number of feeders on the market which would answer as well or better.

Giving Ventilation and Room.

As the strength of the colony increases, enlarge the entrance gradually, until about June 1st to 10th, according to the season, when all except weaklings should be given an entrance the full width of the hive and an inch and a quarter deep.

Every colony that is found to have its brood chamber crowded with bees before the clover flow should be given an extra set of worker combs, without an excluder, so the queen may have free range of this double brood chamber. It is very important to give the queen this extra room before any swarming impulse starts. At the commencement of the clover flow the queen must be again confined to one brood chamber by means of the queen excluder. Every colony should then have at least one super above an excluder, and when that is half filled with honey another placed between it and the brood chamber.

Dark Honey all Out.

When clover honey begins to come in freely every vestige of dark honey must be removed from the hives. This is one of the most important things in the production of white honey. Not one speck of dark honey must be left even in the brood chamber, as the bees are liable to transfer it to the super at any time and make room for the queen to lay.

Causes vs. Preparations.

There are two things one must learn in order to prevent natural swarming:—

1. The conditions which usually cause it. These must be learned so that when one sees them one will know that unless they are removed the bees are almost sure to get the swarming impulse if they have not got it already. When found they must be removed as far as practicable.

2. The preparations a colony generally makes before it swarms. When these are known in every stage, the apiarist must know, at whatever stage he finds them in the hive, what to do to stop them, and keep the colony from swarming.

There must be no confusion between preparations for swarming and causes of swarming. Preparations are not causes. To hinder preparations without removing causes is of little use. To remove causes after preparations are well under way is not nearly so satisfactory as to prevent the causes even before they occur. A division of the working force of the hive can be prevented by keeping all hands contented and at work; but a colony once determined to swarm will carry out its programme in spite of all but the most radical measures.

Causes of Swarming.

Some causes of swarming are the following:—

(*a*) It is the natural method of increasing the number of colonies.

(*b*) Some strains of bees are more inclined to swarm than others.

(*c*) Bees with an old or failing queen are more inclined to swarm.

(*d*) They often swarm when superseding an old queen.

(*e*) Brood nest crowded with brood, or "bound" with honey—needs laying space in middle for queen.

(*f*) Supers crowded with honey, and flow still on.

(*g*) Hive is poorly ventilated or has too much hot sun—or both.

(*h*) Weather conditions, such as excessive heat and humidity.

(*i*) A long continued, slow flow.

(*j*) The season—including (*h*) and (*i*) and other factors not determined—makes a difference in tendency to swarm.

The Colony Prepares to Swarm.

The preparations for swarming are as follows, and in the order named:—

(*a*) Queen-cell cups built along the lower edges of the combs, or in any other convenient place in the brood chamber.

(*b*) Eggs in some of the cell-cups.

(*c*) Larvæ in some of the cell-cups.

(*d*) Capped queen-cells.

The swarm comes almost immediately after that.

Queen-cells do not necessarily cause swarming. They are a part of the swarming operation when built for that purpose. Simply cutting them out after they are built does not remove the cause, and often does no more than delay the swarm for a few days. In the meantime it makes the bees discontented and may check honey gathering. The successful prevention of swarming, then, is not simply cutting out queen-cells, as many suppose. It is preventing or removing the conditions which cause them to be built.

Importance of Good Queens.

A colony with a young, vigorous queen is much less inclined to swarm than one having a queen that is beginning to fail.

The swarming instinct is stronger in some strains of bees than in others.

These two points have to be carefully observed in swarm prevention; the former by requeening where queens are failing, the latter by rearing queens from non-swarming stock. Some of our most successful beekeepers requeen each colony every year towards the end of the honey flow, others keep a supply of young queens on hand to replace those that are found to be failing from time to time. In either case, the careful beekeeper will rear his queens from good stock that does not show an inclination to swarm. One authority, after taking ordinary precautions to prevent swarming, kills every queen that takes out a swarm, and requeens from non-swarming stock.

The loss from poor queens also shows itself in winter and spring. From 10% to 20% of winter losses are caused by the death of queens which were failing and should have been replaced the fall previous. Another 10% of queens fail in spring and cause the loss of the colonies which would otherwise have wintered. Many which survive the spring spend the summer superseding and their colonies gather no crop.

How to Tell a Poor Queen.

A poor queen may be known by the following points: First—By the uneven appearance of the brood. The queen does not lay regularly in every cell, but skips back and forth, producing brood where capped cells are interspersed with empty cells and open brood. Second—More than one egg in the cell when the colony is strong. This condition in summer always indicates either a poor queen or laying workers. The latter will be known by the fact that there are usually quite a

number of eggs in the cell, and these produce only drones. Sometimes in the spring a good queen will place two eggs in some of the cells, because the cluster of bees is so small that she cannot find protected cells enough to hold the eggs she is prepared to lay. Third—A poor queen will leave the worker brood and go down to the corners of the combs to lay in drone cells. A good, young queen will not lay drone eggs at all on the start. Fourth—Crippled queens are not usually good. Fifth—Old queens are usually shiny and slippery looking. They are often stiff in their movements and slow. Sixth—When bees are cross or do not work well, it is sometimes the fault of the queen. Seventh—Drones in worker cells are an indication of a poor queen. Eighth—A queen which goes through the queen excluder is always a nuisance, and, especially if she does this for the purpose of finding drone combs, she should be disposed of.

How to Tell a Good Queen.

A good queen, on the other hand, is known by possessing the opposite qualities to those given above, and some others. She will start laying in the middle of a

Fig. 4.—Frame of Wired Foundation.

comb and lay in every cell in a circle from day to day, so that, as the brood develops, each comb presents an even appearance. She will fill the combs right out to the end, down to the bottom, and up to the top; not leaving a rim of honey along below the top bar, if there is super room above for the honey to be stored. We do not expect the brood chamber to be used for the storage of honey; we expect the brood combs to be filled from end to end and top to bottom with brood. She will place her eggs evenly, all pointing in the same direction and only one in each cell. She will leave any bits of drone comb in the brood chamber until the season is advanced before she starts laying in them. She will have at least eight or ten combs of Langstroth size filled right up with worker brood in the height of the breeding season. She is well developed in appearance, graceful and strong in her movements; not excitable nor easily frightened, but on the other hand, neither awkward nor sluggish.

A good queen is known by the workers which hatch from her eggs. We shall look for a moment at the kind of workers we would expect from good queens. First—They will be industrious workers. There is a great deal of difference in

the working of different colonies of equal strength, as we learn by keeping records of the amount of honey produced. Second—The workers are good nurses, that is, they feed the larvæ well. This difference can be noticed by examining the unsealed brood. If they are well fed there should be a little milky fluid around each one as it lies in the bottom of the cell. Well fed larvæ produce stronger workers and are better able to resist disease. This brings us to the third point, which is, resistance to robbers and disease. Some colonies will defend themselves against robbers and European Foul Brood much better than others. The fourth point is gentleness of the workers. You should always requeen a colony which is particularly vicious. There are gentle bees which work just as well as any savage ones and are much nicer to handle. Fifth—Some of our colonies swarm much less than others. There is no doubt that the swarming instinct can be bred out to a certain extent by selecting queens from non-swarming colonies. We know that queens reared under the impulse of swarming are always strong and vigorous and, as it is the easiest way, it is always a great temptation to simply use ripe queen cells found in colonies which have swarmed, for raising young queens. This selection of breeders that swarm is not wise.

Examining the Brood Chamber.

Certain points should be observed in every examination of the brood chamber. First, the health of the colony. Watch for symptoms of disease as described in Bulletin 213. Second, the queen condition of the colony. The presence or absence of eggs indicates whether a laying queen is present. The other symptoms previously described show whether she is doing well or is failing. If you have a record showing that she is old, and the appearance of brood, etc., indicates that she is failing, the sooner you replace her with a young queen the better. Third, see that general conditions as to amount of comb space for egg laying and honey storage are right, then watch for signs of the swarming impulse.

Not much attention will be paid to queen cell cups without eggs, except to look a little more carefully to the ventilation, room and general comfort of the hive, but where eggs or larvæ are found in cell-cups, some action must be taken.

Swarming, Supersedure or Requeening.

Not all queen cells are built for swarming, however, and when they are found, conditions must again be studied to know whether the intention is swarming, supersedure or replacing a lost queen. Queen cells for swarming are built with great care on lower edges of brood combs or in holes or hollows of the same. For supersedure, the same care in building is shown and it is often difficult to be sure whether supersedure or swarming is intended. The general index of queen condition, as previously described, is the best guide.

In a complete non-swarming system these cells cannot be left, because a young queen will often take out a small swarm. Where indications point strongly to supersedure, the old queen should be killed and all cells removed. The queenless colony can then be united with a nucleus having a laying queen as described below, or a queen may be introduced by one of the approved methods. This will give better results than to allow the colony to raise and mate its own queen. Good large capped cells from either swarming impulse or supersedure produce good queens, and can be given to newly-made nuclei.

Queens sometimes die suddenly from various causes. Then cells are built hastily on the sides of the combs wherever eggs or very young larvæ are found. These cells are always easily distinguished, and this sudden queenlessness is proven by the absence of eggs and young larvæ. All cells built under such conditions should be destroyed, as they are likely to produce poor queens. The colony is then hopelessly queenless. A good way to dispose of a queenless colony at any time is to unite it with one having a queen. This is done as follows:—

Requeening by Uniting.

Towards evening remove its cover and spread over the frames a sheet of newspaper having a small hole in the middle. Place over this a nucleus having a good young laying queen. The bees will gnaw away the paper and unite peaceably. There should always be a supply of nuclei in the apiary for this purpose, and for what increase is desired.

Fig. 5.—Two Colonies ready for uniting.

To Prevent Swarming.

The method of management to prevent natural swarming consists in judiciously from week to week studying the conditions of each hive, as a doctor studies each individual patient, and letting alone or giving treatment as each case requires. Experience enables one to do this rapidly and without the detailed examination which the novice must use. A knowledge of the habits of bees is necessary, and will be acquired by this work.

In the weekly examination when conditions which would cause swarming are discovered, they must be removed or counteracted in some other way. When preparations for swarming are found, the factors known to be opposed to swarming must be increased and the preparations removed if far advanced.

Essentials.

The essentials for swarm control are *room, ventilation* and *shade, given in time; also a good young queen of a non-swarming strain.* These all can be given in various ways.

Making Increase.

It is not at all necessary to allow natural swarming for the sake of increase. This can be made artificially by means of nuclei and the bees kept under control while doing it.

Making a Nucleus.

To make a nucleus proceed as follows:—When the main honey flow has well begun, place two or more combs of brood, mostly capped, and a comb having plenty of honey, in the super of a strong colony. At the next visit, a week later, bring queens that have been secured from a reliable queen breeder, or good ripe cells of your own rearing, and proceed as follows:—First examine the combs of brood and destroy any cells that may have been started because of the exeluder separation from the brood chamber. Do this carefully so as not to drive the bees

Fig. 6.—Two Colonies united by newspaper plan.

down out of the super. If the brood is from a good colony and good cells are built, it is as well to leave the best of these as to destroy them and introduce others.

You now have in this super a proper nucleus, with hatching brood and young bees which will not return to the parent hive, and which will easily accept a strange queen, and because of the week's separation from the queen, there is no open brood to perish from neglect. Now set the whole super gently off on a bottom board, contract the entrance to about two inches, introduce the queen or cell, and carry this new hive to its own stand wherever desired. Nuclei should be made as early as possible and not as a rule later than the middle of July. The safest way to introduce a new queen is to a nucleus, and the safest way to requeen a strong colony is to unite with a nucleus.

METHODS OF SWARM PREVENTION

Numerous methods of swarm prevention have been advocated in bee literature and at conventions. Several of these have been tested in the apiary of the O.A.C., and by co-operative experimenters of the Experimental Union. The three most successful methods will now be described.

No. 1. Swarm Prevention in Production of Extracted Honey.

As previously described, each strong colony has been given an extra set of worker combs without queen excluder in fruit bloom. Allowing the queen this extra laying space has put a strong check on the swarming impulse. When clover honey starts coming in June the queen is again confined to the old brood chamber with an excluder and the watch for swarming impulse begins in earnest.

Fig. 7.—Apiary of Homer Burke, Highland Creek.

It will be seen that this apiary is well supered up for extracted honey production.

On the next visit a week later the brood above the excluder must be examined for queen cells, which may have been started because of the separation from the queen. If the colony is of a desirable strain these may be used with the brood and adhering bees in making nuclei for increase or queen rearing. In any case they must not be left in the colony for fear of their presence inducing swarming.

It is necessary for one who is beginning the study of swarm prevention to look at every brood comb of every hive once a week for the next few weeks until the swarming season is past. This seems like a lot of work; but it does not take nearly so much time as one would think. The stirring up the bees get makes them work all the better, and it is a great satisfaction after one day spent in the apiary to be able to go off about other work and know there will not be any swarming

for a week at least. When one compares this with the worry of fussing with swarms and losing them before and after they are hived, the work of the weekly examination sinks into insiguificance.

Giving the Queen Room.

When on the weekly examination we find cell-cups with eggs and indications do not point to supersedure or requeening it is time to start giving the queen room. Remove a comb from the outside of the brood chamber, and put an empty worker comb or frame of wired foundation in the centre of the brood nest. If the colony is quite strong, or if the queen cells contain larvæ, it may be given two or three such frames. All queen cells with eggs or larvæ must be destroyed. To miss destroying even one, may mean that it would be developed and a swarm issue. In every case alternate foundation or empty combs with brood.

In removing combs from the brood chamber follow this order, first empty combs and combs of honey till they are all out, then sealed brood. If the empties are clean and the honey white, place them in the extracting supers of the same hive (if they will fit), also the brood, unless it is needed for making increase or building up weak colonies. When open brood is placed in a super it should be examined next week and chance queen cells removed.

When queen cells for swarming are found far advanced the final remedy is to take away all the combs of brood but the one which has the least brood and give empty worker combs or frames of wired foundation.

In case cells seem to be built for requeening or supersedure, follow instructions given above.

See that the extracting supers do not get at all crowded with honey. It is most important to have lots of supers. It saves time during the busy season, and also gives a much better quality of honey to tier up supers and not extract until the close of the white honey season. On the other hand, it is necessary to remove all the white honey that is ripe just before the bees begin to gather dark honey. This in most sections is about the first of August.

If this method is followed carefully the colony will be held together throughout the season, giving best returns in honey and a good strong colony for winter. Desired increase may be obtained most economically by means of nuclei. For five years experimenters throughout Ontario have tested this method, along with others. It is still the most popular method where extracted honey is produced, and many flattering testimonials as to its value have been received.

No. 2. Swarm Prevention and Comb Honey Production.

For Comb Honey Production the work in the supers has to be so crowded to get well-filled sections that it is practically impossible to keep the bees from contracting the swarming impulse. In fact the best work in comb honey supers is usually done by first swarms newly hived on starters. They are full of energy due to the completely changed conditions, they have no brood to care for and having narrow foundation starters instead of full sheets or combs in the brood chamber they throw their working force strongly into the supers.

About the only way to avoid having natural swarms is to make artificial ones. Just as good results are obtained, and the expense is far less, when artificial swarms are made properly.

Artificial Shaken Swarms.

In the first place every effort is made to retard swarming by putting on extracting supers and gradually enlarging entrances during fruit bloom. When white honey begins coming in, the extracting supers are removed and comb honey supers put in their places, without queen excluders. Entrances are enlarged to the full width of the hive and an inch or more in depth.

When on the weekly examination we find queen cell-cups with eggs and the indications point to swarming impulse it is time to make an artificial swarm. This is done as follows:—

First, a hive filled with frames containing half-inch starters of foundation and one worker comb in the middle is set on its bottom board a few inches behind the hive to be treated. The operator, who sits at the left of the hive, removes two frames from the new hive and shoves over the remaining frames so as to have the empty space next him. He now lifts the comb nearest him from the brood chamber, shakes it almost free of bees, and places it in the new hive next the left

Fig. 8.—Showing method of making Artificial Shaken Swarm.

wall, the next comb has a double space for shaking off bees in the old hive. It takes its place beside the first comb and the return motion of the hands carries a frame with starter from the new hive to the old. Comb number three is shaken, carried to the new hive and frame number two is brought back. The fourth frame exchanges places with the third comb, and so on. If any good capped queen cells are found they may be saved and introduced to nuclei for queen rearing. In this case they must not be shaken, as a sudden jar is liable to injure or kill the embryo queens within. When the last comb has been shaken in its own hive and transferred to the new, and the old hive filled out with the starters, we put on the supers, close the hive, and the bees have been swarmed.

There is now a swarm hived on starters on the old stand, under conditions fairly natural, at the convenience of the beekeeper, without fuss, excitement or acrobatic feats. Leaving them in the old hive is merely a matter of convenience.

If there is no honey in the supers it is best to smoke and disturb the bees and give them time to fill themselves.

No. 3. Swarm Prevention by Manipulation of Hives.

When a colony is found to be ready for a super, that is when the brood chamber is full of bees, lift the hive and set it to one side, off its stand. Place an extra bottom board on the old stand and set on that a brood chamber of worker combs. If worker combs are not available use frames of wired foundation, or both together, but the more combs the better. Next remove the colony from its bottom board and set it on top of this, cover up warmly, contract the entrance if necessary, and leave until the next visit. We now have on the old stand a hive consisting of the following parts:—Bottom board, brood chamber of empty worker combs or frames of wired foundation (let us call this the new brood chamber), above that the old brood chamber and then the cover. As heat always rises, the brood is now in the warmest part of the hive for the changeable weather of spring. Any dark spring honey brought in will also be stored in the old brood chamber at the top. Whenever this becomes crowded with brood or honey, the queen goes down into the new brood chamber to lay. If she does not need the extra room it does no harm.

Once a hive is fixed in this way, there is not much more to do to it until the clover season opens, unless it is short of stores and has to be fed. When honey begins coming in freely from clover, which will generallly be from the 10th to the 20th of June, lift the old brood chamber off and set it down on a hive stand. Then examine the new brood chamber to see if the queen has gone down to lay yet. If there are no eggs, take out one comb and exchange for it a comb of open brood from the old brood chamber. There must be some open brood in the new brood chamber to which the queen is now to be confined. Next put a queen excluder on the new brood chamber, on that a super of extracting combs, and an empty super on top of all. Now proceed to shake the bees from the combs of the old brood chamber in front of the hive, taking care that there is a good runway up to the entrance, so the queen will not get lost on the ground. As the brood combs are freed of bees, place them in their regular order in the empty super on top. The object of this shaking is to make sure that the queen is located in the new brood chamber underneath the excluder. When all the combs are in place, cover the hive. The latter now consists of bottom board, new brood chamber containing the queen, queen excluder, super of extracting combs, old brood chamber and cover.

Most of the young bees immediately go upstairs to feed the brood, but some will stay with the queen, because she has some young brood with her. If she were left without brood she would be practically deserted. As it is, however, she will have enough attendants to make her satisfied to go on laying, and with the great number of empty cells available for brood there will be no more thought of swarming. Honey storing will continue in the old brood chamber, but as it has been on top all the time there will not be much room, especially if the queen has done her duty. Storing will now start in the extracting super. The young bees, finding that the queen does not come to lay eggs in the old brood chamber, will start queen cells there. If, however, by any chance the queen should be left in the old brood chamber, cells would be started down below. These would have to be removed and the queen put down on the next visit.

Now the swarming impulse has been disposed of for the whole season, especially if the queen is young and vigorous and ordinary precautions are taken to provide storage room and ventilation.

Disposing of Old Brood Chambers.

There is still the old brood chamber to be disposed of. If left where it is the cells vacated by hatching brood would be filled with clover honey, which, when extracted, would mix with the fall and spring honey, producing an inferior grade. In fact this is one of the most valuable features of this method of management, namely, the fact that the removal of the old brood chamber takes all dark honey from the hive at the beginning of clover.

Use Brood for Nuclei.

If you have been successful in getting the queen into the new brood chamber below the excluder, you will find next apiary day that the brood in the old brood chamber is nearly all capped, and has a number of nice queen cells. It is now in prime condition to lift off for a nucleus, according to directions given above. In doing this no precautions should be taken to prevent bees returning to the colony from the nucleus. The brood in the latter, being capped, requires very few bees to care for it, and the colony needs workers for the harvest.

To Requeen the Apiary.

This nucleus should be left beside or just behind the colony for one week, or until young queens are nearly ready to hatch, then removed to another part of the apiary to cheat it of its flying bees and knock out any idea of sending out what might be called an "after-swarm." It will be better to give it a super of extracting combs, if possible. If the queen is not one from which you care to breed, you might destroy all the cells and put in a cell from a good queen.

After the young queen starts to lay she can be introduced to any full colony, according to the directions given under "Requeening." This is a very good way to see that each colony has a young queen for going into winter quarters. If one is buying or rearing queens from selected stock, they can be introduced to these nuclei at the time of setting off. In that case the queen cells would have to be destroyed.