BEEKEEPING FOR THE OREGON FARMER

By

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The bulletins of the Oregon Agricultural College are sent free to all residents of Oregon who request them.
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This bulletin is prepared for beginners in beekeeping, and especially for the farmer or orchardist who desires a few stands of bees for pollinating purposes and the securing of sufficient honey for home use. Beekeeping as a pastime, as well as for a permanent occupation, offers great possibilities to the people who are adapted by nature to succeed in such an industry. While beekeeping is and always will be a comparatively small industry, it will probably continue as long as man and bees exist on this earth.

Honey is a product which occurs in nature in the shape of nectar in the flowers of plants, and is made available for our use only through the aid of bees. Wax, a secondary consideration, is a product of the bees themselves, and is produced from glands within the body of the worker bee.

The pollination of fruit trees is an important consideration in the Northwest; and it has many times been shown that insects furnish the most important means of distributing pollen to self-sterile plants, and that of these the honeybee is probably the most important.

To watch the operations around a large apiary during a season when the honey flow is large might lead one to believe that the beekeeper is to be very much envied. Anyone who contemplates starting into the business on that basis, however, should spend a season or two with some successful beekeeper and learn the many difficulties that present themselves at all times. One should also take into consideration the fact that in some years the honey flow is small, and during those years beekeepers usually have to feed the bees in order to save them.

No farmer should be without a few stands of bees; for with proper care and manipulation enough honey for home consumption can be secured from one or two colonies. The fruit grower can secure a double profit from his bees in the honey and wax secured and from the added value given his fruit through cross pollination.

BEE CULTURE IN OREGON.*

Just when the first bees were brought into Oregon, I am unable to say. An investigation along this line, however, indicates that the first colonies were imported in 1849 from California. Those bees were sold to local buyers at $125 a colony. Other bees were imported at various times during the fifties and sixties, and as a result of escaping swarms many bee trees can be found throughout

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the State at the present time. One of the most interesting facts along this line is that in several localities pure Italian bees may be found, in a wild state, living in hollow trees.

Just how many colonies have been imported into the State at different times we cannot say; but apparently most of the bees now present in Western Oregon have developed from bees imported by the early settlers. In Eastern Oregon, colonies are usually imported in large numbers. With such data as we have at hand, it would be impossible to estimate correctly the status of beekeeping in Oregon. Many farmers keep from one to several stands for home use; and in all parts of the State one may find from a few to many colonies that

not only furnish honey for the home, but also give a market surplus.

In looking over the data secured in a recent survey, one might be led to infer that most of our honey is produced in Southern Oregon, but that inference is misleading. The division known as Central Oregon probably has the greatest number of large commercial apiaries, with the Columbia Basin second, and Southern Oregon third. These facts are not shown in the survey, because it was taken as a general farm survey, and of the five or six commercial apiaries in Southern Oregon, the largest happened to be recorded. On the other hand, in the survey of Central Oregon, it so happened that out of a dozen or more commercial apiaries, only two, of medium size, were recorded. With these exceptions, other data at

Fig. 1. Distribution of bees. Courtesy Oregon State Immigration Commission.
hand show that the average as finally decided is fairly representa-
tive of existing conditions. According to the data in Table I, 402
farms reported bees; a total of 1,637 farms were visited, hence on
an average one farm out of every four has bees.

The U. S. Census for 1910 reports one farm in every five as
having bees; but during the last two years the number of colonies
has increased, both at large apiaries and on small farms. A consid-
erable increase, moreover, is due to the colonies secured by orchard-
ists for pollination purposes.

With data on hand, and the figures from the U. S. Census Report
for 1910, a distribution map has been made which shows some very
interesting facts. Each figure represents 1,000 colonies, showing an
approximate total of 50,000 colonies with a value of $250,000. The
writer believes that with the present average prices, an average of
five dollars a colony is not too high, although the census report
gives the total valuation of 47,285 colonies at $150,164.

Of the 50,000 colonies, less than 20,000 are found outside of the
Willamette Valley and Coast Divisions. Apparently, then, the
honey industry is in Western Oregon, but in reality only about one-
half as much honey is produced in these two divisions as in the
others. Many of the colonies in the first two sections are barely self-
supporting, and their only value is in pollinating the fruit blossoms.
The surplus gained from the more thrifty colonies is generally small.
The large number in these sections is due to the number of small
farms with from one to thirty colonies.

Taking the State as a whole, individual apiaries produce from a
few pounds to a carload—a carload is about 40,000 pounds. The
number of colonies owned by individual beekeepers varies from a
few to six or seven hundred. In addition to the honey-producing
apiaries, there are situated at different points in the State several
queen- and bee-raising apiaries.

Discussing each region separately, we find that in the coast division
some of the finest honey produced anywhere is secured from wild
plants, such as vine maple (*Acer circinatum*), and a plant known as
fireweed (*Epilobium spicatum*). No large apiaries are found in this
section, and the average surplus is small. Section honey only is pro-
duced, and only a small amount reaches outside markets; since the
local demand is usually greater than the supply. In this section
climatic conditions regulate, to a great extent, the amount of honey
produced. Continued rains in the spring, especially during the
blossoming period of fruit trees and other plants, often result in a
decreased surplus.

In the Willamette Valley section, conditions are extremely variable.
In the valley proper there are no commercial apiaries of any size,
and in bad years many bees starve in the fall for lack of stores. Sev-
eral men in this section have found that it is more desirable to pro-
duce extracted honey, since the bees seem to gather more honey in
this way under adverse conditions. Alfalfa cannot be grown with
success, and since there are not many flowering plants to be found
after July 1, except near the hills, the surplus must be gathered in the
spring. Continued spring rains are also a factor to be contended with in the Willamette Valley, and oftentimes the blossoming period of the principal honey-producing plants passes without the bees being able to spend more than a few days in gathering honey. On the slopes of the Coast Range and the Cascade Mountains, however, more favorable conditions are found, and a fair surplus can usually be secured from the more variable honey-producing plants in the later blooming season.

The division known as Southern Oregon, comprised of only three counties, is different from the other sections of the State in that the region, while not arid, does not have as much rain as the Willamette Valley and Coast divisions. In addition to several wild honey plants, which grow abundantly in this section, alfalfa is grown successfully, and fruit bloom offers abundant pasturage while it lasts.

The other three divisions, Central Oregon, the Blue Mountain District, and the Columbia Basin, have conditions which are practically the same so far as beekeeping is concerned. That the beekeeping industry of these sections is in its infancy can hardly be doubted by one taking a trip through those sections where alfalfa can be grown successfully. In addition to those sections now under cultivation, a vast territory is found which at present is in sage brush, but may some day be planted to alfalfa, thus giving an increased area for bee pasturage. In the vicinity of Ontario and Vale, large alfalfa districts, one can find some of the State's largest and most productive apiaries. Much of the alfalfa is grown for seed, and, with the sweet clover which grows in waste places, gives an ideal pasturage for bees. There are many fine apiary locations in different sections of the State, but all sections should be thoroughly investigated before an attempt is made to start an apiary in any one of them.

**TABLE I. STATISTICS ON BEE CULTURE.**
Based on 402 Reports.

<table>
<thead>
<tr>
<th>Division</th>
<th>Number of Reports</th>
<th>Number of Stands</th>
<th>Beekeeping successful</th>
<th>Colonies profitable</th>
<th>Average price of honey</th>
<th>Total sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Coast Division</td>
<td>75</td>
<td>570</td>
<td>67</td>
<td>8</td>
<td>472</td>
<td>90</td>
</tr>
<tr>
<td>Southern Oregon</td>
<td>70</td>
<td>962</td>
<td>55</td>
<td>15</td>
<td>829</td>
<td>133</td>
</tr>
<tr>
<td>Willamette Valley</td>
<td>158</td>
<td>833</td>
<td>123</td>
<td>35</td>
<td>657</td>
<td>176</td>
</tr>
<tr>
<td>Columbia Basin</td>
<td>47</td>
<td>994</td>
<td>44</td>
<td>3</td>
<td>987</td>
<td>7</td>
</tr>
<tr>
<td>Blue Mountains</td>
<td>19</td>
<td>407</td>
<td>17</td>
<td>2</td>
<td>370</td>
<td>37</td>
</tr>
<tr>
<td>Central Oregon</td>
<td>33</td>
<td>839</td>
<td>33</td>
<td>---</td>
<td>839</td>
<td>---</td>
</tr>
<tr>
<td>State</td>
<td>402</td>
<td>4605</td>
<td>339</td>
<td>63</td>
<td>4154</td>
<td>451</td>
</tr>
</tbody>
</table>

**WHY AND WHEN BEEKEEPING DOES NOT PAY.**

Beekeeping usually does not pay for one of the following reasons:
1. The inadaptability of the person handling the bees, either through careless manipulation or lack of experience.
2. Lack of honey-producing plants wherein the nectar is available to the bees.
3. Climatic conditions, such as are sometimes found west of the Cascade Mountains where the rainy season continues until a great majority of the fruit blossoms have fallen.

4. The loss of bees through foul brood, or other diseases, often makes beekeeping unprofitable, either through destruction of entire colonies or else by keeping them in such a weakened condition that they are unable to gather a surplus greater than their immediate needs.

5. Beekeeping does not pay when the benefit derived is less than the cost of upkeep. This does not mean that bees that are kept for pollination purposes should produce an adequate surplus of honey. Oftentimes a fruit grower can afford to keep bees for pollination purposes, even where it is necessary to go to the trouble and expense of feeding them sugar syrup. While no direct returns are apparent, the increase in quantity of high-grade fruit will much more than repay for the cost of the bees.

6. Beekeeping must be conducted in a business way, and when not so conducted will seldom prove profitable.

PROFITS IN BEEKEEPING.

"Is beekeeping profitable?" is a question that is frequently asked by those desiring to add side lines to general farming. The same question is occasionally asked by people who contemplate going into apiculture as an occupation. The question is usually answered in the affirmative, but this depends upon the locality in which the questioner lives. For the actual amount of money invested, there are few agricultural pursuits that will give returns as great as those that can be made in beekeeping; but like every other agricultural industry, profits in beekeeping are secured by hard work and careful attention to business.

In a limited way, beekeeping can be conducted as a side line along with other phases of agriculture; but there are times during the year when a few days' work may mean either the making or losing of the profit of the entire season, and other work must then be excluded.

The value of a pound of honey, either extracted or in the comb, based upon comparative food values, has practically nothing to do with market prices. In Oregon, extracted honey brings from 7½ to 9 cents a pound wholesale. Comb honey usually brings about 12½ cents a pound. Bulk honey is usually sold locally, and may bring as much as 20 cents a pound.

With the large beekeeper, the average yield of honey for each colony for the United States is said to be about 25 to 30 pounds of comb honey and 40 to 50 pounds of extracted honey. I am inclined to believe, however, that this percentage will run much higher, and by careful manipulation the average farmer should be able to secure an average surplus of 50 pounds or more. In local markets, this honey should bring from 10 to 20 cents a pound.

The kind of honey to strive to produce will depend upon the market demands. For all culinary purposes, the extracted is in demand. The groceryman may demand three grades; namely, ex-
tracted or bulk, the poorer grades of section honey, and fancy honey for his more discriminating trade. Honey sells more on appearance than anything else, and nice white comb in clean sections has an alluring appearance that cannot be secured in extracted honey. Extracted honey, although selling cheaper than comb honey, and having more food value a pound, is not nearly so desirable for table use. Moreover, if it was not for the large amount of extracted honey used by the large bakers and candy manufacturers, the market would be heavily overstocked.

Along with the production of extracted honey, wax is also a consideration which, if properly handled, will give an added profit. Wax usually brings from 18 to 30 cents a pound, depending upon quality and cleanliness; and there is always a demand for it.

VARIETIES OF BEES.

All honeybees found in America belong to the same species or specified group. The names Italian, German, etc., only denote varietal differences, the principal differences being color and size. The bees more commonly found outside of large apiaries are German or hybrid bees produced by crossing the German and Italian bees.

The German or black bees are considered to be the poorest of all varieties. They are usually small and are black in color. They are easily disturbed and very excitable, oftentimes coming forth to sting if a person approaches within twenty feet of a hive. They are therefore very unsatisfactory to handle for this and other reasons. It is also said that they do not withstand disease as well as other varieties.

Italian bees seem to be most favored by the beekeepers of America, and they have been highly developed in the United States and Canada. The original type, as brought from Italy about 1860, was a leather-colored bee, which we still find as a standard. By a long process of selection, a secondary variety of the Italians has been evolved, known as the Golden Italian. Most beekeepers differ as to the good qualities of these two strains. Some of them believe that the Goldens are more excitable on account of intensive breeding. Either of these strains, however, generally prove to be very satisfactory. They do not show the tendency to sting as shown by the German bees, and, when properly cared for, are easily handled. In size, they are larger than the German bees, and are designated as being brown or leather colored. With the Goldens, the brown is developed to a bright or golden-brown in five bands on the abdomen.

Cyprian bees are found on the Island of Cyprus, and have been imported to the United States in limited numbers. They are light yellow in color, with a bright yellow shield on the top of the thorax. They are gentle and easily handled. On account of the fact, however, that the Cyprian bees fill the cells to the capping, thereby causing them to appear watery, they are not considered good bees for the production of comb honey.

Carniolian bees are native to Carniola in the south of Austria. They are gray-colored bees and somewhat larger than the Italians.
Men in the bee industry, who have worked with this strain, are of the opinion that it should be considered in the future development of apiculture. The Carniolian bees are said to be more gentle than most bees. Moreover, they withstand the winter very well. The only objection to the Carniolian strain is its tendency for excessive swarming.

**Caucasian** bees are said to be the gentlest bees in the world. They are now being imported quite extensively into the United States and give general satisfaction. They are gray like the Carniolians, but are smaller.

In addition to the varieties enumerated above, there are several others of which so little is known as to make it unnecessary to include them in this paper.

**THE BEE FAMILY.**

An apiary consists of any number of colonies of bees. A colony consists of, during the summer months, a queen, two or three thousand drones, and from ten to sixty thousand or more workers. After the summer season, when all swarming is at an end, the drones are driven from the hives and allowed to perish. This they soon do, since they cannot gather nectar for themselves. During the winter months the older worker bees die, and each colony is usually greatly reduced in numbers in the spring.

The life of a queen bee is from three to six years, and her sole mission in life is to lay eggs in the cells provided by the workers. As soon as she begins to decline, the bees rear a new queen to supersede her, and in such cases it is not uncommon to find a mother and daughter queen in the hive at the same time. As soon as the young queen matures and is able to supply a plentiful number of eggs, the old queen crawls away and dies, or is disposed of by the workers.

The workers are undeveloped females, and they attend to the gathering of pollen, nectar, propolis, water, etc., and to the general care
of the hive. During the working season, the workers are said to live about six weeks; and during the inactive season, they live from fall until the following spring.

The drones are developed from early spring until the end of the swarming season, and may be found present in the hives during that period. The development of all these different forms varies considerably for each one. The queen is capable of laying both unfertilized and fertilized eggs. The first always produce drones, the latter workers or queens, depending upon the food the larvae receive.

Two kinds and three different sizes of cells occur in every colony of bees. First, we have the hexagonal cells for the drones and workers. Both are the same shape, but those of the drones are the largest. Then we have the large peanut-like cells of the queens, which are built on the edges of the main combs and hang downward. As the queen crawls about over the combs laying eggs, she apparently lays them in rows of cells, filling a certain area before going on. If in worker cells, the eggs are fertilized, and if in drone cells, they are unfertilized.

Each spring when the weather becomes warm, the bees become active and the development of brood begins. The queen bee lays a single egg in each cell, laying, it is said, from 2,000 to 3,000 eggs each day. Regardless of whether they are to form drones, workers, or queens, each egg requires three days to hatch. The larva of the worker then spends five days in the larval stage and thirteen days in the resting or pupal stage. (The pupal stage is the period when the cell is capped over.) The total number of days required for the complete development is twenty-one.

![Diagram of honeybee life cycle stages](image)

The queen requires three, five and one-half, and seven days, respectively, for the same periods, and matures in fifteen and one-half days. The drone requires three, six, and fifteen days for the various stages, and a total of twenty-four days for complete development.
Table II shows the number of days spent in different stages by queen, worker, and drone.

<table>
<thead>
<tr>
<th></th>
<th>Egg Days</th>
<th>Larva Days</th>
<th>Pupa Days</th>
<th>Adult stage reached in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>3</td>
<td>5½</td>
<td>7</td>
<td>15½</td>
</tr>
<tr>
<td>Worker</td>
<td>3</td>
<td>5</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Drone</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>24</td>
</tr>
</tbody>
</table>

For the first three days after the eggs hatch, all larvae are fed on royal jelly, a substance which comes from glands in the head of the worker bee. The larvae which are to become queens are fed royal jelly the remaining two and one-half days of the larval stage. The worker and drone larvae are changed to a diet of beebread, a mixture of pollen and honey, after three days, and it is claimed that this difference in feeding governs the development of larvae from fertilized eggs; and workers or queens are developed at the will of the worker bees.

**BEE PRODUCTS.**

Bee products may be summed up as direct products, those secured from within the body of the bee; and indirect products, those secured in part or entirely without the body.

The direct products are:

1. Silk.
2. Bee poison in the sting.
4. The food of the young bees, known as royal jelly.

The indirect products are:

1. Nectar.
2. Honey.
3. Pollen or beebread.
4. Propolis.
5. Combs.

1. **Silk.** The bee larvae produce a small amount of silk from glands in the head and use it for lining the pupal cells. This lining of the cells is what prevents the ready melting-out of the wax. When the bees become mature, these glands become atrophied and disappear.

2. **Bee poison** is a liquid substance formed by two sets of glands at the base of the sting, and a set of sacks, with valves, act as pumps to force the poison out and into the wound. This poison causes the irritation and pain in the wound.

3. **Beeswax** is secreted in plates from glands on the under side of the last four segments of the body. These plates are passed forward by the feet and are worked into the combs by the mandibles or mouth parts.

4. **“Royal jelly”** is a substance secreted from glands in the head of the worker bee and fed to the bee larvae, in the case of the drones and workers, until they are three days old, and to the queen larvae through the entire larval stage, as well as during the egg-laying periods.
5. **Nectar**, a saccharine liquid secreted by flowers and gathered by the bees for food and honey.

6. **Honey**, nectar collected by bees and converted into honey by the addition of one or more secretions from glands in the body of honeybees. In addition, it must pass through a certain manipulation known as the “ripening process.”

7. **Pollen**, or beebread, is collected from flowers by the worker bees and is used as food for the young. It is of various colors, and is carried on the hind legs in receptacles known as pollen baskets.

8. **Propolis**, or bee glue, is a kind of resinous material, collected from the buds of trees—mostly willows and poplars,—and is used to fill up holes and cracks inside the hive.

9. **Combs**. An arrangement of hexagonal cells formed by the bees and made out of beeswax. The complete comb consists of rows of cells, five to the inch for workers, and four to the inch for drones. The cells are used as brood chambers for the young, and for storing honey and pollen.

**HOW TO SECURE BEES.**

Bees may be secured in two ways: first, by buying; secondly, by swarms and the division of colonies. When buying bees, the buyer will find that they are sold on the market the same as stock, in the form of so-called hybrid and pure bred strains. Pure bred Italian bees can be bought for from six to ten dollars a colony, and those at six dollars, if strong and free from disease, are well worth the money if they are in good, movable, frame hives.

Hybrid bees in old boxes, or gums, may be bought for from one to five dollars a colony. They are seldom worth more, because the added expense of securing new hives and queens for them will bring the cost up to very nearly the cost of pure bred colonies. The comparative cost is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Hybrid colonies</th>
<th>Standard colonies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of original colony</td>
<td>$3.00</td>
<td>Six to ten</td>
</tr>
<tr>
<td>Cost of new hive</td>
<td>2.00</td>
<td>dollars.</td>
</tr>
<tr>
<td>Cost of new queen</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>Labor and time expended in transferring</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$6.50 and ?</td>
<td></td>
</tr>
</tbody>
</table>

If the hybrid colonies are in good hives with movable frames, they are worth two to three dollars a colony more than those in old gums. If it is desirable to increase the number of colonies, division should be resorted to rather than swarming. A strong colony may be divided into two or three colonies at the time when queen rearing is going on within the hive. This division is made as follows: Select a good strong colony for the division and prepare an empty hive, with the frames containing full sheets of foundation, or, better yet, if you have them, frames in which the cells have been built out. Take from the beecless hive the four central frames and stand them beside the colony to be divided. Now look through the original colony, locate the queen, and cage her with a few bees. At the same time,
the frames of brood should be inspected and four of them selected to go in the new hive. At least one of those left in the old hive should contain developing queens.

If any of the frames to be placed in the new hive contain queen cells, they should be cut out, all the bees brushed from them into the old hive, and the frames placed in the new hive with the four empty frames. If only one frame contains queen cells, it should be left in the old hive. The old hive is then moved some distance away, and the new hive is put in its place. One empty frame may be left out for awhile, and the cage containing the queen may be put down between the frames of brood. Do not uncage her until the following day.

In the meantime, practically all of the old bees will come back to the place where the original hive stood and will enter the new hive. The young bees in the old colony will remain with it, and as soon as one of the queens has hatched and been fertilized, the progress of the old colony will again be made normal through the production of eggs by the new queen. If it is desired to introduce a new, tested queen rather than to develop one with the chances of hybrid fertilization, the queen cells may be removed from the frames of the old hive, and the tested queen introduced in the regular manner.

If it is desired to make three colonies from one, the number of frames from the old hive may be divided three, three, and two. All of the frames in the latter case should contain some brood, and there should be queen cells in at least two of them; the queen to be left in the other.

**EQUIPMENT.**

The amount of equipment that is required for beekeeping will depend upon the size of the apiary. A certain amount is essential and absolutely necessary. It is not economical, nor a good practice, however, to have needless equipment. For the beginner, the equipment as listed will be sufficient:

```
From one to five colonies of bees at an average of $7.00 per colony $35.00
Five complete hives (extra) 9.00
One smoker 1.25
One bee veil (nome-made 10c) .50
One hive tool .15
Five Alexander feeders 1.20
One wire imbedder .20
One 1-pound spool of No. 30 tinned wire .35
½ doz. Queen excluding boards 3.00
20 extra Hoffman frames .80
One pair gloves without fingers .45

Total $51.90
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In addition to the above, the beginner should secure a copy of an up-to-date book on bees, and subscribe for one of the several bee journals being published at this time. A list of books and magazines will be found at the end of this bulletin. As the beginner gains experience certain other pieces of equipment will suggest themselves, and the beekeeper can use his own discretion as to their worth in his case.
The type of hive in general use in this country is known as the Langstroth hive, and is the one that should be used by the beginner on account of its simplicity, both in construction and handling. Hives made to hold eight or ten frames are more generally used. Some beekeepers, especially those who work on a large scale, use hives with as high as sixteen frames. The beginner should use the eight-frame hive. While such hives may be made at home with less cost than they can be bought, manufactured hives are, as a rule, more satisfactory. All hives and parts should be of the same size and without complicated parts. Hives should be painted not only to prevent weathering and decay on the outside, but also to give a good general appearance. Do not use dark colored paints; white is to be preferred.

Fig. 4. A 10-frame hive with comb-honey super and perforated zinc queen excluder.
Fig. 5. Winter stand for bee hives (original).

Fig. 6. Root's (Improved Cornell). A good smoker. Courtesy Portland Seed Co.
HIVE STANDS.

All hives should be slightly raised from the ground to avoid the decay which occurs when wood of any kind rests on the ground. Blocks of wood, stone, concrete, etc., will answer the purpose very well. In Oregon, where it is not necessary to put bees in cellars, or to put the colonies in cases during the winter, the hives should be placed under shelter both from wind and rain. Figure 5 shows the type of stand in use at the Oregon Station. The stand may be made for from six to eight dollars, and each one will easily hold six hives. They are made in parts so that the top and sides may be removed during the summer without disturbing the base.

SMOKERS.

There does not seem to be much choice of smokers of a given capacity. They are, however, made in different sizes, and where one is needed for a considerable length of time, the larger ones give better satisfaction, since they do not have to be supplied with fuel as often as the smaller ones.

BEE VEILS.

Bee veils are usually home-made. Those on the market, however, are satisfactory; but since the cost of materials is small, and the trouble in making is practically nothing, the home-made veil is

Fig. 7. A home-made bee veil.
usually the more desirable. A piece of black netting in the shape of a sack and open at both ends does very well. In ready-made veils, the face part is usually made of tulle.

The most satisfactory veil, in the writer's opinion, is one made of window screen and canvas, as shown in Figure 7. Secure a piece of screen about fourteen inches wide and long enough to form a cylinder that will go over the head. This should be large enough so that the bees cannot reach the face and ears through the meshes of the screen. The top of the cylinder may then be covered with canvas, and two canvas flaps fitted to the bottom to keep out the bees. One flap comes in front and one behind, the edges coming together on top of the shoulders. If the canvas used is rather heavy, the flaps will lie close to the clothing and the bees have little chance to get under the veil. Light colored netting or screen is hard to see through, and should never be used.

**HIVE TOOLS.**

On account of the fact that bees fasten down the hive covers with propolis and bee glue, and also spread it all over the inside of the frames, it is necessary to have a small tool for prying the hive cover loose. There are several kinds, any one of which can be secured from your dealer at 15c to 25c. A screw-driver works very well as a substitute.

*Queen excluders* are zinc sheets containing perforations through which worker bees may pass, but the queens, on account of their size, cannot. They are placed between the body of the hive and the supers to keep the queen from ascending and laying eggs in the extracting frames. The zinc sheets are plain, or are fastened to wooden frames, so that they stand about one-fourth inch above the top of the frames in the main body. The latter kind is preferable.

*Feeders* will be discussed under *Feeding.*

*The wire imbedder* is a toothed roller used in pressing the wire of the frames into the wax.

A catalogue of bee supplies and equipment will be furnished by any of the leading seed firms of Portland.
MANIPULATION OF HIVES AND BEES.

Always approach a hive from the side, and never stand in front of it while handling frames. Many experienced beekeepers, and some amateurs, can work with bees, needing neither veil nor smoker, but the amateur had best have his veil on and the smoker going good before attempting to open the hive. Black clothing of all kinds should be avoided. An old straw hat, on account of its color and stiffness, is desirable for headgear, if netting is used as a veil.

![Fig. 10. Handling the frame; first position.](image)

If the operator happens to be stung during any of the manipulations, he should not begin striking about, but quietly move to one side and remove the sting by scraping it out with a knife or the finger nail. Trying to pick it out with the thumb and finger will mean squeezing the poison sack and the forcing of more poison into the wound.

Puff a few whiffs of smoke in at the entrance, and rap on the top of the hive. This disturbance will cause the bees to begin filling up
on honey, and will, to a great extent, prevent their flying out to attack the operator when the hive is opened. The next step will be to insert the edge of the hive tool under the cover and to pry it loose. As the cover is raised, puff some more smoke under it and down between the frames. After giving the bees a minute or two to get settled, the frames should be loosened and taken out. They will usually be stuck together with propolis and may be hard to separate. Avoid breaking them apart with a jerk, for in so doing you may crush some of the bees, and possibly the queen. Quick motions of all kinds should be avoided, and in handling the frames make each movement slow and deliberate.

In lifting out the frames be careful to avoid rolling the bees between the frames. This excites and angers them, and may cause some bad stings. Hold the frame vertical while examining it, holding it over the hive until the loose bees have dropped off. In working with a hive, the operator should first locate the frame containing the queen, and do not set any frame outside the hive until assured that the queen is not on it. The frame containing the queen should be moved to one side of the hive during the examination of the others, or set in an empty hive if it is desired to clean out the old one.

To examine the side of the frame away from the operator reverse it as shown in Figures 11-12. First, raise the right hand until the top bar is vertical, then reverse as in Figure 12, and lower the right hand while looking over the frame. To get the frame back to its normal position, reverse it in the same way. If the beekeeper does not follow these directions he is liable to have a whole section of comb break out, dropping honey and brood to the ground and causing a bad mess. All frames should be wired in order to support the combs.

If it is desirable to set most of the frames outside the hive, a convenient rack may be made, which will also serve as a convenient carrier if frames are being changed from one hive to another. If it is desired to get the bees from a frame, they may be brushed off by one of the several brushes made for that purpose, or else most of them may be shaken off by a quick jerk or jar. Hold the frame
upright over the hive and hit the top side with the side of the fist. All but a few bees will be jarred loose and the remainder may be brushed or pushed off with the finger.

Locating the queen is not as hard a job as the unexperienced person might think, but a little experience is necessary to do it easily. The beginner should have some more experienced person examine the frames of one or more hives and point out the queens, the brood, etc.

GENERAL MANAGEMENT.

Spring. As soon as the weather will permit, examine every colony and see what is necessary to be done to have them in good shape by the time the honey flow begins. Do not handle them any more than is necessary, but inspect each colony carefully and plan for the treatment of each one. If the stores are short or spring dwindling is bad, stimulate the bees by feeding. Weak colonies should be united unless increase is desired. Where an increase is desired, the weak colonies should be confined to a part of the hive, the hive being covered with paper or burlap to give added warmth. From one-half to a pint of warm syrup should be given the bees each evening as long as they will remove it. The Alexander feeder is the best one for this kind of feeding.

In inspecting the colonies, be sure to see that a live queen is present in every colony; for the queens sometimes die during the winter. When such a colony is found, if it is a weak colony, it is best to unite it with some other colony. If it is a strong colony and you cannot secure brood for them from another colony, in order that they may raise a queen, send to some Southern breeder and secure a new queen. Such colonies as are strong and developing plenty of brood should be confined to the body of the hive until the honey flow starts, and then the super should be added.

Summer. See that the surplus-producing colonies are furnished with plenty of space, and remove the honey as soon as the cells are all capped over. Watch the honey flow, and when it begins to diminish remove unstarted sections, or frames, until all others are filled and capped over.

Fall. Remove the extra supers. In Western Oregon prepare supers with gunny bagging, or some other absorbing material, and place one on each hive. These will catch the moisture that collects in the hive and prevent its dropping onto the bees and combs. Do not use oilcloth covers in Western Oregon. Remove empty frames; cut down the chamber space by removing the others together; and cut off the empty part with the division board. Feed colonies that do not seem to have sufficient supply of stores for winter. Each hive, exclusive of the winter super, should contain sufficient stores to make it weigh 20 to 30 pounds, depending upon the size of the colony.

Winter. On account of the excessive rainfall in Western Oregon, the hives should be placed under some kind of a shelter. Dispose of honey and wax. Build hives, frames, and other necessary articles,
and get your equipment in shape so that it will always be ready whenever you need it.

**Details of Management.** In preparing a hive for use, wire all frames with No. 30 tinned wire; and the writer believes that in all cases where honey production is the main idea, it will be found advisable to use full sheets of foundation in brood frames and three-quarter sizes in sections. Foundation comes in three grades—thick, medium, and thin. In sections, use the thin; in brood or extracting frames, use whichever experience shows to be the more desirable.

**FEEDING.**

There are various times during the year when some colonies need stimulation and assistance by food supplies. It is rarely necessary to feed bees during the summer months; but it frequently happens that the amateur takes too much of the surplus away in the fall, and if the bees are not given more sugar syrup or honey in the spring they usually starve. For numerous reasons, some colonies will finish the summer without sufficient food for the winter, and in such cases sufficient stores should be given to carry them through the winter. At the beginning of winter, each colony should weigh from 20 to 30 pounds total, depending upon the size of the colony. By a few observations the beekeeper will be able to determine for himself about the correct average.

In the western part of Oregon and Washington, many colonies of bees starve on account of an inadequate supply of honey in the spring. In February, March, and April, warm spells oftentimes occur, which cause the bees to become quite active, and they start rearing brood. In many cases the supply of food is short and is soon used up. Prolonged spring rains usually follow, and the bees, being unable to gather nectar, starve. In such sections, therefore, the beekeeper should examine all of his colonies in the spring, and if the food supply is short, feed the bees sugar syrup. Sugar syrup is

![Fig. 13. Feeder set in collar under hive body.](image-url)
made by adding equal parts of sugar and water. Do not feed honey to bees unless you know its history, and even then be sure that it is free from disease. Cheap sugar or molasses is dangerous to the health of the bees. Colonies weak in numbers should be given plenty of food so that brood rearing will continue in full force. The stronger the colony, the better the production of honey.

There are a number of feeders that may be used with good results, but the most convenient, and probably the most satisfactory in feeding without opening the hive, is the Alexander feeder, which may be set under the back of the hive and the food poured in at one end. (Fig. 13.) Each feeder has a cap for the part that extends beyond the hive. During warm weather, the feeding may be done with an ordinary pan placed in a super, as shown in the diagram. In order

![Fig. 14. Pan in super arranged for feeding.](image)

that the bees will have something to rest on, be sure to put a number of chips or some clean oat straw in the pan. Otherwise many of them will be crowded into the syrup and will be drowned.

UNITING BEES.

The beekeeper is frequently confronted with the problem of what to do with queenless or depleted colonies. During the swarming season some of the swarms are small. If two of these swarms come off at the same time, it may be desirable to unite them to secure a good-sized colony. Do not unite two, large, thrifty colonies, unless a colony is found queenless and it is impracticable to introduce a new queen into the queenless colony.

If two colonies with queens are to be united, the least desirable queen should be removed and caged until the other queen is accepted by the uniting bees. If the first queen is killed, then the other may be introduced in the regular way. If the bees from a queenless colony have been without a queen for some time, there will prob-
ably be very little danger of their injuring the queen in the receiving colony, but as every colony has its own distinct odor, both colonies should be smoked heavily. If a few tobacco leaves are put in the smoker, the hive odor will be better covered, and the bees will also be stupefied to some extent. Do not apply enough to stupefy the bees so that they drop from the frames or many of them will not survive.

In connection with the above process, it is a good plan to transfer the bees from their respective hives to a third one. Smoke the hive good before any bees are put into it, and then if the bees are smoked and the frames mixed as they are put over into the new hive, they will become used to one another before the confusion ends. The hive should be examined at intervals of a half hour or more until the bees are quiet, and if any of them are found fighting, smoke them until they seem settled.

Colonies that are very weak in the fall will stand a better chance of withstanding the winter if united. Colonies that are in a weakened condition in the spring should be united, unless the beekeeper is working to increase the number of colonies. Then the weak colonies should receive food and should be attended to with a view to producing increased brood rearing.

An important phase of bee behavior should be kept in mind in uniting, and that is that the bees have a tendency to go back to the old stand when they leave the hive for flight. When uniting two colonies that are not close together, begin by moving the hives about a foot nearer each day until they are side by side. If colonies some distance from each other are united, a board or some brush should be stood against the hive over the opening. This will cause the bees to note a difference in their surroundings, and they will take new bearings before leaving.

**TRANSFERRING.**

Transferring bees from old boxes, barrels, and other like make-shifts, to modern, movable, frame hives is an absolute necessity for efficient honey production. This operation may be done any time in the year, but is easiest done in the spring just after the honey flow starts. The easiest and simplest way is to prepare a modern hive, with each frame containing full sheets of foundation, or better yet, if you have them, replace two or three of the new frames with drawn out frames.

Remove the top from the new hive and the bottom from the old one. Then place the old hive on top of the new one, first inserting a queen excluder between the two. In many cases the shape of the old hive will necessitate making a special board to lay between the two hives, a hole being cut to fit the smaller of the two. The top of the old hive should then be removed and the bees smoked down. Take plenty of time and smoke them gradually. After most of them are down, remove the upper hive and look on top of the excluder for the queen. If she is on the excluder, she may be removed to the new hive, and the excluder left in place so that she cannot get back into the old hive.
Now replace the old hive on top of the new, put on the cover and let stand for twenty-one days. At the end of this time all of the bees in the old hive will have hatched out, the transfer having thus been made without the loss of brood or bees. The bees may then be driven into the new hive. The old hive may be broken up, the honey saved or fed to the bees, and the wax melted and prepared for sale.

Practically this same process, but in another way, can be used with the same results. In this method it is more difficult to locate the queen, and, in the case of the amateur, she may be removed from the old hive and get into the new one without being seen at all. Dr. Phillips describes this method as follows:

"The box hive should be moved a few feet from its stand and in its place should be put a hive with movable frames containing full sheets of foundation. The box hive should be turned upside down and a small, empty box inverted over it. By drumming continuously on the box hive with sticks for a considerable time, the bees will be made to desert their combs and go to the upper box, and when most of them are clustered above, the bees may be dumped in front of the entrance of the hive which is to house them. The queen will usually be seen as the bees enter the hive, but, in case she has not left the old combs, more drumming will induce her to do so. It is necessary that the queen be in the hive before this manipulation is finished. The old box hive containing brood may now be placed right side up in a new location, and in 21 days all of the worker brood will have emerged, and probably some new queens will have been reared. These bees may then be drummed out and united with their former hive mates by vigorously smoking the colony and the perforated zinc to keep out the young queens. The comb in the box hive may then be melted up and any honey which it may contain used as the beekeeper sees fit. By this method good straight combs are obtained. If little honey is being gathered, the colony in the hive must be provided with food."

A quick but very messy and destructive method, and one for which the writer can see but little use, is to drum the bees into a box, then tear the hives apart, cut out the straight pieces of comb and fasten them into frames by means of string, fine wire, etc. The frames may be set in the new hives as fast as they are prepared, and the trapped bees allowed to go in. The bees will soon fasten the comb to the frames, the string or wire may be removed, and fairly good comb will result. On account of the brood destroyed and the honey which gets onto the operator's hands and clothes, this method is a very disagreeable one and is not recommended except in extreme cases.

Mr. F. J. Cartan of Corvallis uses the following plan which has worked very successfully at this Station:

Prepare the new hive as for the other methods; remove the bottom of the new hive and the top of the old one; then set the new hive on top of the old and do not disturb for a number of days. If you have used foundation in your frames it will be necessary for the bees to
build out the comb before the next step can be taken; if built out combs are used, it may be done in a few days.

As soon as the combs are built out and the bees are storing honey in them, the queen will find her way to the upper hive and will begin laying eggs there. Watch for this period, and when eggs are found in the upper hive lift it up, slip a queen excluder between it and the lower one, and do not disturb again for four days. At the end of that time the frames of the upper hive should be examined and if eggs are found, one will know that the queen is imprisoned above the excluder; and the lower hive may be removed at the end of twenty-one days, the period required for the development of the brood in the lower hive. Finally, remove the excluder, put the bottom board under the new hive, and the transfer will be complete.

**SWARM MANAGEMENT.**

Swarming is brought about by the natural instinct of the bees, and it is their method of propagating and continuing the species. With the approach of the time for honey flow in the spring, and the development of additional thousands of bees, the older bees and queen seem to become aware of the need of finding new quarters. They therefore prepare to leave the old hive by developing a number of cells and a large number of young bees. Then the mother, with the older bees of the colony, flies out from the hive in what is known as a swarm.

Formerly it was the custom to bring forth the dinner bells and old tin pans, and the bees were persuaded, so the people thought, to settle on a nearby limb. In more recent years, however, we have learned that the bees settle of their own accord in preparation for their flight to their future home, which has already been located by scouting bees, and that the drumming of pans and ringing of bells has no affect upon them.

Most large beekeepers have practically no trouble in controlling swarming, but to the amateur, swarming is ever a troublesome problem, because the bees are sure to swarm during his absence or at inconvenient times. There is no certain indication as to the exact hour when bees will swarm, but by inspecting the hives frequently during the season when swarming is due, the operator can gain some idea of when to expect swarming. In most cases the swarm will not come off until one or more queen cells are about ready to hatch. If the beekeeper finds that the cells are uncapped, it will be at least a week before there is danger of swarming, as seven days are required for the development of the queen from the time the larval cell is capped over. Bees gathering in large clusters on the front of the hive sometimes indicates swarming, but they oftentimes do the same thing during hot days of the summer, apparently to allow more room for air circulation in the hive. At such times it is advisable to block up one end of the cover to a height of one inch.

There are many different recommendations for the prevention and control of swarming, all of which work at times. The most of these, when sifted down, however, depend upon a few well-known prin-
ciples that are true under most conditions. One of the first principles seems to be in giving the bees plenty of room, since crowded quarters always give an added tendency to swarm. If the beekeeper has only a few hives, swarming can be prevented by examining the colonies every ten days, during the swarming period, and cutting out the queen cells.

Probably the best and most generally practiced plan to prevent the loss of swarms is to clip one wing of each queen, then when she comes out of the hive she cannot get away, and will be found running about in front of the hive trying to raise herself into the air. The bees will not leave without her, and if she is put back in the hive they will soon all come back again.

If the colony is a strong one, cage the queen and put her in an empty hive, with frames containing full sheets of foundation, and put it in place of the old one, which may be set to one side. If a frame containing some developing brood is put in with the frames, the swarm will come back and will probably not attempt to leave again. As soon as the bees are settled, the queen may be let loose in the hive.

In clipping the queen's wing be very careful not to injure her by squeezing, and extreme care must be used to avoid clipping off one or more legs, for she will usually work her legs back and forth in attempting to get away. If clipping is practiced, weeds and grass must be kept down around the hive, for otherwise the queen will get lost when she comes out and it will be impossible to find her.

Some beekeepers use queen traps to catch the queen when she comes out. These are constructed so as to cover the entrance to the hive, and are made of wood and zinc; the zinc being perforated with holes just large enough so that the worker bees may come and go, but not large enough for the queen to pass through. There are two compartments to the trap, and the queen is supposed to work her way into the upper part, where she is away from the crowding of the workers. The same trap is also used for trapping drones. The writer is of the opinion that traps are not as satisfactory as clipping, and that they are bothersome and detrimental to the bees. In several instances observed by him, queens have been injured, or smothered to death in the trap, by the crowding of drones and workers.

MOVING BEES.

In moving bees there are three things to be considered: First, are they to be moved for a long distance? Second, are they to be moved from one apiary to another? Third, are they to be moved about in the local yard? Bees are frequently transported from one section of the country to another in box cars, and seem to withstand a several weeks' journey with little loss. Even car-load lots are among these, and some beekeepers move their bees long distances several times each year.

When shipped in this manner a bed of straw should first be put in the car, and the hives stacked up in tiers, with space between each tier for air. Bees may be sent short distances by express, or carried
by wagon. In moving them about from apiary to apiary, they may be stacked up on a hay wagon. The bed should first be covered with a thick layer of straw to act as a cushion. In all cases, the hives should be properly prepared for shipping, and should be carefully fastened in the car or to the wagon. In moving bees from one part of the yard to another, it is not necessary to nail up the hive or to fasten down the cover. Bees should be moved at dusk or early in the morning before they are flying out.

_How to Prepare the Hive for Shipping._ First, overhaul the hives and fasten every frame so that it will be solid and cannot jar loose. Then place a piece of wire window screen over the top of the hive so that the bees cannot get out. This is best done by means of thin strips of wood or tin. Wooden strips should be used at both ends and they should extend one-fourth to one-half inch above the side pieces to admit air. The cover may then be fastened on by one nail in each side, and the bottom board fastened to the hive by cleats. At dusk, when the bees are all in the hive, a piece of wire screen may be fastened across the opening and the bees will be ready for shipment. Do not fasten the entrance hole until the night before the bees are to be shipped, and let them out as soon as they reach their destination.

Where bees have been moved for several miles or more, it is not necessary to guard against the bees going back to the old stand and getting lost, but where they are moved for short distances it is advisable to keep the hive closed for one day after being moved. The second day open up the hive, smoke the bees good, and put a board or some branches before the entrance to cause the bees to note the change of surroundings. Where bees are to be moved about in a small apiary, it is advisable to move them by degrees. Move the hive a few feet nearer its final destination each day until finally located.

BUYING AND INTRODUCING QUEENS.

In buying queens, locate some reliable dealer and ask for prices so that there will be no misunderstanding. Queen bees are usually sold as untested, tested, or breeding queens.

_Untested queens_ cost from 75c to $1.00 each, and the buyer takes the chances of their being mated pure. They are queens that have been fertilized, but the breeder does not know whether the offspring will be true to type or not.

_Tested queens_ are those that are held by the breeder until sufficient offspring appears to indicate to him that they are true to type. Ordinary tested queens can be bought for from $1.50 to $2.00 each.

_Breeding queens_ are supposed to be extra fine and are sold chiefly to queen breeders. They bring from $5.00 to $25.00 or more apiece.

Each queen will come in a small cage by mail. The cage is also used for introducing the queen into the hive. One section of the cage is filled with bee candy. At the end of the section containing the candy will be found a small hole covered with a strip of paper. It is through this opening that the bees reach the queen and liberate her.
As soon as possible after the queen reaches the beekeeper, remove
the old queen and destroy her or confine her so that she cannot get
back into the hive. Then insert the mailing cage between two frames
so that the bees can get at the end designated, and replace the cover.
If the bees have not cut away the cardboard over the escape on the
following day, it is best to remove it. Under ordinary circumstances,
it will not be necessary to look at them again for six or seven days.
At the end of seven days, however, the queen should be laying eggs
and the colony progressing as usual.

ROBBING.

Like people, bees are always on the lookout for easily gotten
gains. At all times, except during the honey flow, the beekeeper
should watch for robber bees. Any sweetened substance—honey,
sugar, fruit juices, etc., when left uncovered and in any quantity,
may serve as the exciting cause to throw a whole apiary into great
confusion. If any bees, or a colony of bees, can gain access to these
substances, and are permitted to carry a quantity away with them,
they will be looking for more for a number of days, and many of the
old bees will try to get into nearby hives.

Feeding, transferring, etc., often start robbing, and therefore feed-
ing should be done in the evening. Do not permit combs or honey
to remain in the open around the apiary. To prevent robbing, watch
weak colonies and keep the entrance narrowed down to where they
can easily protect it. If robber bees gain an entrance to the hive
of a weak colony, they will soon bring back many others, and most
of the bees in the weak colony will desert and go with the intruders.

Robbing can usually be stopped by smoking the colonies that are
doing the robbing, and by putting some wet grass loosely before the
entrance of the hive that is being robbed.

BEE DISEASES AND ENEMIES.

"Foul brood," so-called, is a very serious handicap to the bee in-
dustry in the United States. It is a bacterial disease and there are
two distinct kinds, one known as American foul brood and the other
as European foul brood. As the name indicates, they affect the
brood and destroy it so that there are no bees hatching out to take
the place of the old bees as they die off.

The name "foul brood" is applied because of the musty or glue-
like odor given off by infected combs. The larvae are attacked in
both cases, although in American foul brood the larvae usually be-
come full fed and the cells are capped over. Later the bees make
small holes in the cappings and these indications with the diseased
larvae should cause the beekeeper to investigate the trouble.

Send diseased comb and bees to this Station, and we will give you
recommendations for treatment, if the disease can be treated. For a
complete discussion of bee diseases and treatment, write to the U. S.
Department of Agriculture at Washington, D. C., for Farmers' Bulletin 442, "Treatment of Bee Diseases." It is free.
The principal enemies of bees are the two wax moths, and there seems to be only one of these present in Oregon. Reports are often received at this Station saying that the wax moths have, or are, destroying the bees. The beeswax moth itself cannot do any harm to either bees or wax, but they lay the eggs that produce the white larvae or “worms” found tunneling through the combs. The writer has never found any of these larvae destroying brood, but they are reported as doing so, and they have been found in the middle of combs which were full of honey.

Beeswax-moth larvae, under ordinary circumstances, cannot thrive in a strong, healthy colony, and if the beekeeper finds them present in a hive, he should attempt to determine what is amiss. More damage to combs and stores is done outside the hives than in, and these should be kept in dry, insect-tight boxes or cupboards and should be examined from time to time for indications of the larvae. If found in a hive, see that the bees can reach all parts, and if there is any indication that through lack of numbers the bees are not covering all the combs, remove the ones not being used. If a colony is weak, build it up by stimulative feeding or by the addition of brood from the outside.

Ants, mice, and other animals occasionally cause some damage, but only the first need be counted at all troublesome, and in Oregon they are not numerous enough to cause worry.

Black or hybrid bees do not seem to take as good care of their hives as the other strains and are more easily overcome by disease and enemies.
BOOKS.


MAGAZINES.

"The Beekeepers' Review," the official organ of the Oregon and the National Beekeepers' Association. $1.00 a year. 50c additional will entitle you to membership in the National and Oregon Associations.
"Gleanings in Bee Culture," A. I. Root Co., Medina, Ohio. $1.00 a year.
"The American Bee Journal," published at Hamilton, Ill. $1.00 a year.
"The Western Honey-Bee," California State Beekeepers' Association, Los Angeles, Calif. $1.00 a year.

WHERE SUPPLIES MAY BE HAD.

If you cannot get your supplies from a local dealer, write to any of the leading seed companies of Portland. Such firms carry what you want or can get it for you. They also handle books which deal with bees and beekeeping, as well as to take subscriptions for the apicultural magazines.

QUEEN BREEDERS.

There are a number of reliable breeders both in Oregon and Washington. Those known to me are:

James I. Davis, Oakland, Douglas County, Oregon.
Herman Ahlers, Necanicum, Clatsop County, Oregon.

BULLETINS.

The following bulletins relating to bee culture are for free distribution, and may be obtained by addressing the Secretary of Agriculture, Washington, D. C.:

Farmers' Bulletin 442—"The Treatment of Bee Diseases."
Farmers' Bulletin 447—"Bees," (A General Discussion.)
Farmers' Bulletin 503—"Comb Honey" (How to produce),