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A MONTHLY JOURNAL, DEVOTED TO BEE-KEEPING.

Published by E. TIPPER, West Maitland

Circulated in all the Australian Colonies, New Zealand, & Cape of Good Hope.

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JUNE 30, 1911.

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# "The Australian Bee Bulletin."

**A Monthly Journal devoted to Beekeeping.**

**Circulated throughout the Commonwealth of Australia, — New Zealand & Cape of Good Hope.**

**Published by : E. TIPPER, West Maitland, N.S.W. Aus.**

**Editor : W. ABRAM, Beecroft**

**MAITLAND, N.S.W.—JUNE 30, 1911.**

## **EDITORIAL.**

I regret that bad health prevents me from giving this heading its due. This is always left to the last, and just my health failed—for the time being, I hope.

A meeting of the "Union's" executive was called for Monday the 26th of June, but unfortunately I could not attend, and thus, as it is high time to go to print, no information is available as to what took place.

Our district is favoured with excellent weather to suit the bees, and as the nights are quite cold and wintry, it is possible that there will be an early spring. Of late the cold weather always came so late that bees were at a disadvantage.

Honey is still in good supply, but the demand is also good. Sections especially are in request.

In another part I give a condensed translation of Dr. Zander's treatise on *Nosema apis*, and hope to conclude it in our next issue.

The English bee journals are full of Isle of White disease, and opinions differ as widely as they do here. Would it not be to advantage, if Dr. Zander's investigations were adopted to apply to their trouble? Dr. Malden has done much to support my suggestion here given.

Page 28, line 11 should read—Am B.J. not B.B.J. in last issue

## **ADULT BEE DISEASE.**

### **Extracts from Professor Dr. Enoch Zander's Book**

Translated by W. Abram, Beecroft.

Whilst hithertofore brood diseases occupied the foreground of interest and investigations, diseases of the full grown bees were neglected. This may be accounted for by the fact that brood diseases are easier observed by the beekeeper than disease in adult bees, but adult bee diseases are far more destructive than brood diseases.

Everywhere where bees are kept my demonstrations "Animal Parasites as Disease Producers in Bees," delivered at Weissenfels, were read with intense interest and awakened many beekeepers of a lengthy dream. Without hesitation I make my discoveries public, and am sure that beekeepers will benefit.

Of diseases in adult bees, dysentery takes our interest. Many do not consider it a disease, but declare it a condition occasioned by various causes.

There is—1st, not infectious, and 2nd, infectious dysentery.

Although the first may cause considerable loss in bees, it is not a disease. The infectious disease assumes an epidemic character, which is caused by a parasite, discovered by me, and named *Nosema Apis*.

The opinion is very widely spread that faulty pollen causes this trouble, because the excreta channel is often filled with large quantities of refuse. Others blame something else, but these opinions are unfounded.

## NOSEMA APIS DISEASE.

### A.—The Symptoms.

Excessive discharge of excreta is generally taken as a sure sign of Nosema. Contrary thereto Nosema often prevails without any sign of excessive discharge.

The surest proof of the presence of the disease is the abnormal death-roll of bees inside and outside the hive. The bees are restless, fall from the combs to the bottom board, with more or less extended abdomen, crawl irritant out of the hive, and, unable to fly, fall to the ground, gather on grass, etc., and perish.

Often one apiary gets destroyed, while another, close by, remains quite healthy.

### B.—Cause of the Disease.

Nosema is a very infectious intestinal disease, caused by a microscopic parasite. Form and life of this parasite is most singular. Its existence and development depends on living cells, so outside the body of the bee its progress is barred. So far as is known at present the *Nosema apis* parasite does not extend farther than the middle stomach, in the sides of which it settles and prospers. The parasites are egg-shaped, 1-200 m.m. in length and 1-350 m.m. wide. These are called spores, and have the same importance as bacilli spores. Their thick shell protects them against drying up, and after the death of the bee they remain alive inside or outside the body on the ground, grass, leaves, in water, etc., and are ready to develop further as soon as suitable ground is available. Each spore has a thick shell, enclosing four kernal.

The increase goes on very rapid once a spore enters the intestine of a bee, being exceedingly aided by the peculiar digestive formation of the stomach. The constant action and renewal of the cell formation of the intestines pass also the parasite into the middle stomach. These parasites are round bodies, full of spores, a large percentage of which pass the body with the excreta; others bore themselves into the cell-structure of the stomach and soon fill the whole cell wall with spores and parasites.

This heaping up millions of spores changes the appearance of the stomach. In healthy bees it is reddish or braunish, but when full of spores its color changes to cloudy, and ultimately white. This is a sure sign of the presence of the disease. Sometimes the destruction is rapid, sometimes slow, and it may take months before milky color can be noticed.

### C.—The Behaviour of Diseased Stocks.

The activity of the parasites causes changes in the intestines which have great influence upon the behaviour of the sickened bees. It is perfectly plain that the parasites pressing into cell wall of the stomach and increasing rapidly cause the bees inconvenience and pain. In consequence they become very restless. It is an observed fact that especially in winter *Nosema*-affected stocks show great unrest. As often as these bees were investigated the disease was found in a high grade present. As the channel has lost its function there appears a desire of constant hunger, and thirst follows. It is astonishing what quantity of food *Nosema*-diseased stocks consume. In consequence the channel becomes filled with refuse, which the bees try to avoid. An eager desire for flight and cleansing takes place. Even in unsuitable weather some bees will fly out in order to pass the excreta. But of those bees not one returns to the hive. Tired

and weak they gather in little heaps and die. In the open this is not so noticeable because they remain distant from the stand; but in a closed room which permits constant control, it is very clearly seen.

The cleansing flights aid the distribution of *Nosema* extraordinarily, since thereby new infection spots are created, the avoidance of which lays beyond the bee-keepers' power. This explains why in some once affected localities it is so difficult to master the trouble.

Beside the outside infection herd there is the second inside the hive; if the bees cannot make flights they avoid inside the hive.

The excreta differs from that of non-infectious dysentery, inasmuch as it is watery, and when fresh smells sharp sour. Dried to a brown crust it reminds one of the smell of snuff.

Of the utmost consequence is the death-rate of the bees inside or outside the hive, because every bee that introduces a parasite into the stomach must surely die. The extent of depletion of the bees depends on the larger or smaller number of the inmates. Stocks thoroughly diseased are unredeemably doomed. The bees die to an insignificant remaining few, which gather around the queen.

As long as only a few bees are infected, the loss is hardly noticed, especially if the queen is strong and vigorous. But such stocks develop slower than others. It is the more harmless form; the sick ones being replaced by hatching ones. But just this form is most dangerous, as the beekeeper is paying little attention to it.

In general, only worker bees become infected, but occasionally queens and drones also suffer. It has been mentioned that perhaps the parasite is already in the egg the queen lays, but thus far there is no positive proof.

D.—Repeated Appearance of *Nosema*.

The foregoing description refers to the disease appearing in winter; but it also shows at other times of the year, more or less serious. It depends on the manner how the spores are spread. The study of *Nosema* has revealed that the spores in the excreta are mainly the means to spread the disease. The bee-keeper also helps by the use or interchange of soiled combs. By the flight of bees the whole neighborhood of the stand is strewn with spores, so that other stocks are liable to catch the disease. Especially dangerous are places where bees go for water, and the plants, the dew of which bees like to absorb. In consequence renewed outbreaks are easily possible, the more so since the disease is easily carried away by the bees.

Not infrequently the disease appears in periods, and whilst in early spring many young bees die, later in the season mostly the old bees succumb. The reason why this periodical appearance of the disease takes place needs further investigation.

(To be continued.)

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## THE DIFFERENCE BETWEEN SWARM-CONTROL AND SWARM- PREVENTION.

J. E. HAND.

Friend Hutchinson,—Your remarks at the close of my article, which you copied on page 375 of December "Review" would seem to indicate that I have not succeeded in making myself understood in the description of my system of swarm-control. In order to receive a correct impression concerning a method or system that is being described, it is important that we have a correct knowledge of the terms that are used to designate them. While the terms "swarm-control" and "swarm-prevention" are scarcely distin-

guishable by the average beekeeper, yet they have a separate and distinct meaning. Even the editors of some of the leading bee journals have fallen into the error of considering the terms synonymous. Swarm-control is different from swarm-prevention, in that the former does not prevent swarming; it forestalls the event by substituting the artificial for the natural swarm. Thus, by working in harmony with the instinct of bees, we pay tribute to the demands of Nature: the swarming instinct is satisfied, swarming is controlled; and our bees are placed in that highly desirable psychological condition, without which it is impossible to secure best results in honey production; a condition which cannot be produced by shaking, brushing, or otherwise unduly disturbing them.

While many have laid claim to swarm-prevention, such claims have invariably been invalidated for want of evidence to sustain them. I do not wish to be understood as saying that swarming cannot be prevented; the idea that I wish to convey in this connection is that, in order to accomplish it the colony is thrown so far from a normal condition as to render it practically unproductive during an ordinary honey flow; therefore, as a rule, it is neither practical nor profitable, to attempt to entirely prevent swarming.

Perfect control of bees in its broadest sense, can be attained only by applying correct principles in harmony with the God-given instinct of bees. Its usefulness is by no means limited to swarm-control. Its principles are so intimately connected, as well as closely entwined around every necessary manipulation with bees, as to eliminate all unnecessary labor.

Your statement that the basic principle underlying my system is identical with that of the Langdon system that had its day of disappointment and doom some 17 years ago, is literally true, but you

seem to have overlooked the fact that the difference between the two methods of applying that principle is so wide as to admit of no comparison.

The fact that the Langdon system was intended to prevent instead of control swarming was sufficient reason for its failure. It is not a difficult matter for one who has made a special study of the principles that accelerate or retard swarming, to point out the factors that were directly responsible for the downfall of that system. The one fact that its principles were applied in direct opposition to the laws that govern the successful control of bees, was sufficient to seal its death warrant. A system that would double the working force of an already strong colony at swarming-time, without the application of principles that would satisfy the swarming-instinct, could only result in failure, the promiscuous intermingling of adult bees from strange colonies at swarming time would also have a tendency to defeat the plans of swarm-control. Furthermore, a system that would necessitate the closing of the entrance of a strong colony of bees at swarming-time is not worthy of further consideration from intelligent beekeepers. Such a practice, if it did not result in the loss of the colony from suffocation, would certainly cause sufficient injury to render it practically unproductive during the remainder of the harvest. Again, a system that would compel bees to travel 20 inches through a tube, only to find an entrance guarded by strange bees, who, if not in open hostility, would certainly regard them as unwelcome intruders, can have no part in solving the problem of perfect control of bees.

That the Hand system has nothing in common with such methods should be apparent to all who will take the time to acquaint themselves with its principles as well as with the methods of applying

them. The secret of the success of this system lies with the habits of bees, coupled with a faithful observance of the principles that minimize labor.

While this is virtually a system of swarm-control by substituting the artificial for the natural swarm, two colonies may be worked together, if desired, without violating the principles that govern the successful control of bees. While we prefer strong colonies at the beginning of the harvest, working them singly, all colonies are not strong at this time, in which case we unite two medium colonies by placing one on top of the other, separated by a queen-excluding honey-board, this being done before the main harvest so that there will be no intermingling of strange bees when they are shifted over into the empty hive containing a frame of brood and the queen from the top colony. Ten days after making the first shift, another shift is made in the same direction by throwing the switch on the back side, thus reinforcing the swarm with an influx of bees.

Subsequently operations will depend upon whether or not increase is desired; if not, a specially constructed bee-escape is pushed into the entrance of the depleted colony, back of the switch lever, which will discharge the bees in close proximity to the main entrance into which they must enter, since no bee can again enter the original hive.

A noticeable feature of the equipment is that the appearance and position of the main entrances remain unchanged and are always open full width. After the second shift in the same direction, the strong colony will have an entrance at each end, and, if desired, one on the side. Furthermore, the side-entrances may be used as safety valves against the possibility of weakening a colony so as to cause the loss of unsealed brood. The fact that there is only one entrance on a side, centrally located, precludes the

possibility of the mixing of bees. It should further be understood that there is absolutely no "trading" of bees during the process of shifting.

While we do not, as a rule, advise the shifting of bees into a hive already containing a colony, yet, by the method of placing one colony on top of the other, as previously mentioned, and shifting the bees over into the top hive after placing it down upon the vacant side of the switch board, we have never yet known a colony so treated to cast a swarm; however, it may not work in all locations.

There are many ways in which the new principle may be applied to the successful control of bees. While the principle is equally effective in all locations, the method of applying it must be governed by the location, time and duration of the honey flow.

Every well informed beekeeper can testify to the truth of the assertion that the shook-swarming system is the only one that has ever amounted to anything by way of swarm-control; the objection to it in the past has been the labor that is required to operate it. Besides, there is no convenient method of holding the brood in reserve to reinforce the swarm which is perceptibly weakened in the midst of the harvest by the dropping off of old bees with no young ones to fill up the depleted ranks. The new system accomplishes all that shook-swarming does, with the added advantage of a continuous influx of young bees, by which the swarm is continually increasing in numerical strength. Add to this the fact that the arduous labor of lifting heavy hives, shaking and brushing bees, etc., is entirely eliminated, and we can better realise what the new system means to beekeeping, but it is only by actual use that we can fully comprehend its possibilities along the line of controlling bees and minimizing labor, which are the two crying needs of apiculture.

as well as the most important factors in the cost of honey production.

I am aware that many will attempt to make the equipment from the description, without a sample to work from, and, doubtless, will condemn the system, when the fault will be improper construction. In order to obviate this nuisance, the inventor has thought best to protect it by patents, furnishing the equipment to the public through his regular authorised agents.

In conclusion, I invite honest criticism, and would be especially pleased to have experienced beekeepers name the weak points of the system as they see them. A system that will not bear the closest scrutiny is not worthy of a place in the ranks of modern beekeeping methods. My advice to all is, go slow, prove all things and hold fast that which is good. —“Review.”

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### BREEDING FOR BEST BEES.

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#### Some of the Desirable Traits, and the Steps Necessary to Secure Them.

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The average beekeeper pays very little attention to the breeding of his bees. A few men have turned their attention in this direction, and are reaping rich rewards. Mr. Geo. B. Howe, of Black River, N. Y., is one of these pioneers. About a year ago he gave the readers of the “Review” an outline of his methods of breeding, and ever since then, there has been a steady call for “more” from his pen. At the Albany convention of the National, last fall, he read a short paper on “Selection in Breeding to Increase the Honey Crop.” It is something in the same line as the article that he contributed to the “Review,” but sufficiently different to make it worth while to copy it. Here is what Mr. Howe said at Albany:

In trying to impart to you one of the most essential things in apiculture and yet the most neglected, for we have been told that it was impossible to improve the honey bee, I often wonder what reason anyone has for such an idea. We all know what has been said on the subject, and yet a few years in selecting and breeding not only contradicts, but proves beyond a doubt that it was all theory. Theory is all right, used as it should be, but facts are what we want. In my breeding I have been led by facts, not by color or any other hobby. I wish that my most beautiful bees would produce for me as much honey as the other less standard stock.

The old theory is that it matters very little what drone a queen mates with, if she has a good mother. I have the proof that it does make all the difference in the world, if you wish the very best queens. Just stop and think seriously about this. Does not every breeder of animals put as much dependence on the male in breeding? You will find that he does, and more.

It is a wonder that we have as good honey-gatherers as we have. And let me explain just why it is so. It is all in the law of the nature of bees, for the strongest drone is pretty sure to mate with the queen. You all know, or should know, that in years past our very best honey-getters were ruthlessly killed with sulphur fumes, because they made the most honey.

I find after years of records of the best queens that I could rear or buy, it was the colonies that were very dark, some showing only two yellow bands unless filled with honey. So I have found that colonies with bees too yellow, or too dark or black, were not the largest producers.

There is a standard in color to go by, and it has yet never failed with me. In all fancy stock there is so much to sacrifice for beauty. Now, then, it is an easy

matter to select a good breeding queen. Rear a few queens from her; and if the average is high and even, she is a good breeder. Otherwise she would not be used.

#### Longevity in Bees.

There is one way to prove this trait in your bees, and that is in the working season. It will surprise many to know that ten days, or even five, on a bee's life means many dollars in the beekeepers' pocket. Don't think that if your bees winter perfectly that they have this trait. Test it in the working season. It is the only sure test. Be sure that every queen-mother has this trait. Also your drone mothers.

#### Heredity.

Here hangs our success or failure in selecting a breeding queen. Never use a queen just because she is a wonderful honey-producer. Test her to know that she produces her desirable traits in her daughters. Not every queen is a breeder; very few, in fact, that are what they should be; but I find that in being led by facts, and not by any theory I am gaining in getting more good queens. I put great stress on by breeding queens, whose bees show vitality to fly in the rain and when it is cool. Also they should have long wings. Some Italian bees carry as much as a third more honey than the black bees. Bear in mind these trivial things,—as they will look to many beekeepers,—for they are of vital importance, and should not be overlooked.

Remember, any bee will gather and store honey when there is an abundance of nectar in the flowers, but in selecting my breeders. I prefer a poor season. Then we surely know that when they store a good surplus in such season she is worth the price. Any one can easily tell when bees have the most desirable traits, with a little patience. Longevity you all know. Certain colonies will have as many bees in the hives as other colonies

that have a third more brood. Furthermore, those same colonies keep their numbers steadily increasing, while the other colonies come to a standstill. If you will take a frame of brood from these best bees, and put it into a colony of black bees, keeping a careful record when the last bees hatch, and when the last bees disappear, of these bees that you are testing, you will surely know, if in the working season, that you are right.

Prolificness is all right, and all breeding queens should be prolific, but without the other traits to go with it, it counts for nothing, and I think we have been misled by some writers advocating it so strongly.

We must watch our bees to learn their range of flight. It will surprise some to know that some colonies in the same apiary fly less than half the distance that other colonies do. These are facts, and I will say that the trait of long range in our yellow bees is in this direction. I think we, as a whole, have been led too much by color alone, losing sight of traits that great honey-producers must have. I find that my best colonies winter perfectly, and unless they do, we should not use them as breeders in this northern country, at least.

This trait of longevity is separate from hardiness, and should not be confounded with it. And if bees do not show length of life in the working seasons over other colonies, we will not know they possess this most valuable trait. I bring this up to be sure that you understand it. No race of bees shows the trait or characteristic of hardiness like the black or German bee, to my knowledge. But there are too many poor colonies of this race. So stick to the dark Italians, every time, if your bread and butter depends upon honey as a business.

The drone has been sadly neglected and unless we select our drone-mothers as persistently, and know that they pos-

sess all the desirable traits of our queen-mothers, we will never succeed in producing the very best honey-gatherers.

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## MAKING \$4,000 FROM SUCCESSFUL MIGRATORY BEEKEEPING—

### A NOVEL SCHEME.

H. C. AHLERS.

Last February my attention was attracted to an advertisement in one of the bee journals, offering 160 colonies of bees for sale at \$3.00 per colony. The bees were at Kenner, Louisiana. A correspondence ensued with the owner. Partly for my health I decided to take a trip to Louisiana. I arrived at Kenner Feb. 25th, and looked over the bees. I found 134 colonies that had queens. I sent a cheque for the amount, and became the owner of the bees. I bought 19 colonies more from another party. The larger lot had mostly young, prolific queens, but were deficient in comb—probably an equivalent of nine combs per colony.

#### Getting a Crop in the South.

When I arrived the bees were carrying in pollen very rapidly from willow. About March 1st, they began getting honey from the same source. I had no extra combs, so I ordered 200 pounds medium brood foundation by express. The bees were now breeding very rapidly, starting to draw out comb and soon built up to two-story, 10-frame colonies. Every effort was made to keep the bees warm, and strengthen the colonies in order to secure a honey crop. The flow from willow lasted till April 1st. Three days later my total honey crop was 6,000 pounds. I had a full barrel of drained cappings, which gave me 60 pounds of fine wax.

After April 3rd, with the assistance of one man, I made divisions as fast as possible. A number of nuclei had been made a week earlier with the old queens. The bees, still getting honey, had started a great many very fine cells. The

divisions were made by taking four to five combs of capped brood, with adhering bees, to a new stand, either a comb with cell or a capped cell in cell protector, was given at the same time, if ready; otherwise a cell in protector a few days later. By this method I doubled the number of colonies.

The spring was dry and very warm in the South. April 22nd I loaded the car. The thermometer registered 84 degrees in the shade. It was soon 90 degrees in the car. I had a fruit car and seven tons of ice in the bunkers. Although the ventilators were all open, the car did not cool perceptibly till after midnight.

The bees arrived at West Bend, their destination, in 90 hours from the South. They were closed in the hives from Friday till Wednesday. I arrived here two days after the big snow storm. The bees arrived in good condition. The colonies had sufficient honey and lots of new pollen. The large amount of capped brood hatched. All hives were quickly filled up again with brood in all stages. By June 10th, most colonies covered three sets of combs with bees.

The confinement and subsequent shaking up causes the consumption of most the unsealed brood. This I think is actually a gain. The young larvae are a better food than honey. The eating of it gives the bees a setback, and prevents, or delays, swarming. The bees, however, are stimulated to a great degree. The queen is fed heavily, and large quantities of eggs, and just hatched larvae, are found when the hive is opened.

The honey from willow is dark green in color, rather rank and of an aromatic flavor. I fed 1,500 pounds of it to my home apiary. It is the best stimulative feed that I ever used.

Some of the colonies when loaded on the car had virgin queens, or capped cells. Most of these turned out worth-

less. The weather was very cold, and the queens failed to mate, or were very imperfectly mated. These colonies with worthless queens were united with others of medium strength in the following manner: After the queen was sifted out, the worthless colony was smoked till the bees were well filled with honey. Then the colony to receive them was smoked in like manner. A third hive was placed on the stand having the laying queen. The combs with brood were first shaken at the hive entrance, and the combs placed in the third box. Then the other combs were shaken in the same manner. In no instance did the bees quarrel or return to the old stand. The extra combs were used to the best advantage.

#### Getting a Harvest in the North.

I started the season in Wisconsin with 450 colonies. The season was a poor one. I took 23,000 pounds of honey from clover. There was only a little basswood in bloom, and it yielded no honey. For a number of years my crop averaged 100 pounds per colony from these two sources.

#### Moving for a Fall-Flow.

August 26th (one month too late) I loaded 225 two-story hives on a car and shipped them to Illinois, on the Illinois river. These hives started with an average of about four pounds of honey on their trip. One colony starved. 3,500 pounds of surplus honey was extracted Oct. 4th and 5th. This was pure Spanish needle. When the bees had been set in a pasture lot, just outside the levee, hundreds of acres of Spanish needle were beginning to bloom. Now the bees were coming in very fast with aster honey. The Illinois river bottom was covered on both sides, where the land had not been cultivated, with a sea of white flowers.

#### Going South for the Winter.

Oct. 24th, when I closed in these bees, the hives were very heavy with aster honey. With the help of five men, the bees were ready to haul in seven and a half hours. At 9. p.m. they had been hauled three blocks and were loaded, except the bracing. The car went out 24 hours later, and arrived at Kenner, Louisiana, in four days more. This car of bees shipped in perfect condition. Some colonies had five combs of honey to spare. I had to use some of these surplus combs to help 74 colonies that I bought which were short of provisions. On account of continuous rains the bees secured very little in the summer and fall in the South.

I found many of my colonies, Nov. 1st, that had four combs pretty well filled with brood in all stages. Many colonies in Wisconsin had no sign of brood since Oct. 1.

The bees start to get pollen from soft maple in Louisiana about January 1st. I will be compelled to extract some old honey at the beginning of the flow, about March 1st.

This is the story of my trip with a car load of bees. Moving three times in one season; securing 32,500 pounds of honey and leaving the bees in the best place, in a perfect condition. No winter chances. No fall and practically no spring work.

I fancy I hear a number of progressive beekeepers asking questions. I will try and answer some of these questions at once. There is a limit to the amount of work that a man can do. I hire the necessary help to do practically all the work. I direct the work, look after the tools; keep the men supplied with the right sizes of nails, and examine every hive for leaks. Various sizes of screen and tacks are ready for emergency. I work four men on two rows of hives. They start at the same point. Each pair

will try to do as much as the other. A fifth man does all the odd jobs, as directed.

#### Preparing Bees for Shipment.

I use a screen frame 16 x 20 inches on top and bottom. This screen frame has a  $1\frac{5}{8}$ -inch-space under the bottom, and over the top edge of the hive. It allows the bees a lot of space to cluster. They will cluster mostly underneath the combs. The two stories are nailed together with four pieces of lath. The screen frames are nailed on and under with four, ten-penny nails. When the frames are not of the Hoffman pattern, or spaced nine-to-the-body, then thin strips 16 inches long, are nailed with  $\frac{1}{2}$ -inch nails to each frame.

Strips one inch square, and eight feet four inches long, are used to place between the hives in the car. (Stock car is warm enough.) Six hives are placed on the first tier. Two strips are nailed on, with a sixpenny nail driven at each end through the screen frame. The second, and following tiers, contain only five hives each; equally spaced apart. This secures splendid ventilation to all hives. I use the regular ten-frame Dove-tailed hive. Nine hives can be placed end for end in each half of the car, and leave a little more than door space to hold the other accessories. Now, if the lower tier contains six hives, then the car will accomodate 288 hives, two-stories high. By placing two strips over the third tier, two more tiers of hive bodies, or boxes, with 60-pound cans, may be placed in the car. The empties should be on top. They shade the bees. This keeps them more quiet. As the hot air always rises it keeps the bees cooler at the bottom.

Before moving anything to the car, I know exactly how many hives and packages I want to move. I figure out how high I must load. I finish loading each tier as I go along. If there are any

hives of a different pattern, or size, I load them from the other end.

When all the bees and empties are loaded, I proceed to brace both ends. Take two six-inch planks, the exact length of the width of the inside of the car. Place one piece against the first and second tiers. Nail with twelve-penny nails through the side of the car into the ends. Then reinforce the brace by nailing a piece 1 x 4 inches, two feet long, tight against it. Don't save nails. Place the second strip so as to hold the lower edge of the upper tier of bees in the same manner. Barricade the other end the same way. Now fit a plank tight from centre of lower brace to the centre of the other lower brace. Toe-nail well. Counter-brace the two upper braces in the same manner. If the hives have been well packed, nothing short of a wreck will injure the bees. Fresh combs, not wired, spaced wide, with much honey in, may break down. A few in each hive do little damage. When packed in this manner, in a stock car, no watering is needed.

The bees were shipped to Illinois in a stock car. Then again to Louisiana. In Illinois the bottom screens were used as a bottom during the honey flow. The screen as partly pried down at one end. The entrance was spaced with a clam shell.

I had a great many inner covers sawed, while in Louisiana last spring, from cypress. They are 16 x 20 inches, in two pieces. They are used as combination cover or bottom. A rim has been nailed on one side. When placed with this side down it is used as a cover. On the other side only the two sides and one end have a rim. This side is used as a bottom. All the extra ones are used to nail up the extra boxes with empty combs. When these hives are put to use, or sooner, each hive gets an extra cover. This makes it a ventilated cover; which is very important,

since it is always warm or hot where the bees are. The cover is always ready to be used as a bottom for nucleus, and the extra cover can be placed on top. The combination avoids the handling of the bulky bottoms and covers, and saves much space in the car. I use a burlap cloth over the combs during a dearth of honey.

The bees bought in the South are a mixture—black blood predominating. With their young queens, they have compared well with my Italian apiary. I much prefer this mixed breed to the five banded stock, and to the blacks in Wisconsin. All things being equal, I think my three-banded Italians are superior. I have marked a few hives of my best honey gatherers, and will requeen every colony from this stock in April. In the South is the right place to requeen every colony, every spring.

#### What Bees cost in the South.

Bees can be bought in the South in the spring from one to five dollars per hive. Usually two or three dollars are asked for bees on movable combs, in dilapidated hives. I would not advise to transfer old combs from box hives. I have found that this discourages most colonies. Put the bees on combs or full sheets of foundation, on the plan as given in E. D. Townsend's book. If one is handy with the saw, and wants to economize, hives can be made very cheaply from cypress lumber. First, common boards can be bought for \$25.00 per 1000 feet, double-dressed. Frames should be secured from a supply dealer.

#### Cost of Transportation.

The freight on the car of bees from Kenner, Louisiana to West Bend, Wisconsin, was \$146.00 From West Bend to Illinois river, \$80. From there back to Kenner, \$108.00 The rate is third class north of the Ohio river, and fourth class south of the Ohio. Minimum weight,

20,000 pounds. Attendant must accompany car, and should pay first class fare. I was allowed free transportation on the Wabash railway after signing a contract.

My large and growing honey business takes up all of my time in the office, when I am not on the road with some bees. I am compelled to hire lots of help. I have not one expert apiarist. I pay from \$25.00 to \$28.00 per month, good room, and board, to green hands, and teach them enough to do my work; or teach them enough to work somewhere else. In Illinois I paid twenty cents per hour and secured good, inexperienced help. In Louisiana I pay a dollar per day for colored laborers. They board themselves. The white assistants have some experience and get more pay.

#### Shipping Bees South in the Winter.

Jan. 17th, I expect to ship South another car of bees—237 colonies. These bees are all I have left in the cold North. They are all ready for immediate shipment. They were closed in No. 18th. Screen frame on top. Inner cover under bottom, nailed with four sixpenny, cement-coated box-nails. In single hives. They were placed in my large cement bee cellar. Two windows and a door are open. A ten-inch ventilator was put in the northeast corner of cellar this fall. The bees are fairly quiet in their confinement. They will be shipped in a good grain car, with the ventilator left partly open at each end.

A half-interest has been sold in one car of bees. This car will be taken to the northern peninsula in Michigan the latter part of May. This is a money-making venture. The spot has been selected. The location should yield a bumper crop of raspberry, basswood and fireweed honey. The hives and combs will be bought by advertising. The bees will be dequeened in July, all cells removed ten days later. The honey will be extracted as it becomes sufficiently

ripe. At the end of the season every drop of honey will be taken and the combs piled away for another season.

To successfully winter or run your chances to winter a colony of bees, will require very much more than fifty pounds of honey from July 15th, till June 10th, the next season. It will take less than forty pounds of honey to place a good colony of bees on those combs again in June, from the South.

Another car of bees will be shipped to West Bend, and one to Jackson, Wisconsin. These 600 colonies will be run for clover and basswood honey. At the close of the harvest they will be taken at once to Illinois again.

I predict that there will be a time when the shipping of bees from the South to the North in the spring will be practiced very extensively.

A man owning two or three carloads of bees, or more, in the North can select one carload having his choicest queens, and ship them South in the fall, increase them 300 per cent., and know that every colony is strong when he ships them back in the spring. All old queens should be replaced with choice young ones, which cost little to raise when making increase. The balance of the apiaries should be dequeened at the proper time, and all the honey taken. It will be easy to produce a large crop of honey with all young queens, and an unlimited number of combs.

It is necessary to have at least three sets of combs for every colony, to make a success with bees. If you find two sets enough for you, there is something wrong with your bees, or your locality. You can't make a change too quickly.

(Since the foregoing was put in type the following letter has come to hand from friend Ahlers.—Ed. "Review.")

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Saint Rose, La., Feb. 8, 1911.

Friend Hutchinson:—

We have rigged up four beds, writing table, reading table, dining table, and very numerous chairs (60-pound can boxes.)

We live up stairs in an old plantation house. Front gallery—view on Mississippi river. Rear gallery—view of three-fourths of apiary. Back ground—ancient pecan trees (15) four feet thick, with a ton or more of Spanish moss on each tree. I must have some photos made if I can get them before I leave. The lower story is used for a warehouse and extracting room. The workshop is under a wide gallery, on the north side of the building. Have already nailed and wired 3,000 frames. Bees are getting lots of pollen, and enough honey to supply daily needs. The season is unusually early and warm. To-day, while you are freezing, the thermometer reads 75 degrees at 11.30 a.m. After a light rain, it is very sultry. I am splendidly located and can live reasonably cheap. Have a good general store one mile away and the merchant is very accomodating, and delivers all our provisions.

Everything is working according to schedule, with the exception that many of my colonies were very much weakened while being closed in, and in my cement cellar from November. (It is very seldom that bees can be fastened in and not suffer while in the cellar. I think Mr. Ahlers would have been the gainer not to have fastened them in until the time came for shipment.—Ed. "Review.") Some were dead when loading. But all colonies were so thoroughly shaken, that the energy derived therefrom will make up the loss in short order.

The hives were opened here 16 days ago. Some colonies now have brood in seven combs. Almost every colony has young bees hatching from the centre of capped brood. The queens are laying

beautifully and regularly. I am looking for a small crop of honey here this season, yet I may be agreeably surprised. But, I'll have the bees, of the right age, right number, at the right time, and at the right places for the rest of the season.

Sincerely yours,

H. C. AHLERS.

## MOVING BEES IN FRAME AND BOX HIVES.

### Hints on Packing for Transport.

By I. HOPKINS.

The great progress and expansion of commercial beekeeping now taking place throughout New Zealand, has already necessitated much moving of bees to new localities. Beginners who intend to adopt beekeeping as a business, and who have been working up a decent sized apiary for a season or two, often find it to their advantage to remove their bees to a more promising district. There again, the formation of new out-apiaries by established beekeepers, which is taking place every season, makes the transport of bees necessary, so that a few hints on the matter from one who has had a good deal of experience in packing bees for transport, may help those who are shifting bees for the first time, to carry out the work successfully.

The best time of the year for moving bees long distances, when it may be necessary to confine them for two or more days up to a week or two, is, in the warmer parts of New Zealand, or say, any part of the North Island, from the middle of June till the end of the third week in July. In the South Island the bees would be ready for shifting a week or two earlier, and can be left till early in August.

At the times stated there would not, in the ordinary course, be any brood in

the hives, and the colonies would be sufficiently reduced in strength to be comfortably confined to the lower compartment of the hives or brood chambers. When there is brood in the combs and the bees are confined for a day or two, the brood invariably dies, and soon becomes a putrid mass, risking the life of the whole colony. If, therefore, it is absolutely necessary to move bees during the breeding season when there would be much brood in the combs, and it cannot be disposed of by giving it to other colonies, then it would be best to cage the queens nearly, or quite three weeks beforehand, so that all the brood would have matured, and the young bees had emerged before packing the hives.

Plenty of ventilation, and plenty of room for the bees, that is, not overcrowded, with, of course, ample food for the inmates, are the essentials for safe transport.

If the hives are furnished with self-spacing Hoffman frames, and the combs are wired, all the better. With colonies small enough to allow of abundance of room, the ten frames will only need pressing together with small wedges from one side of the hive. But, if the hive is fairly full of bees without being over-crowded, and they are to be confined for more than a day, it is better to withdraw one frame and to insert small wedges between each of the remaining nine, to give more room for ventilation.

### PACKING FRAMES.

The packing frames, of which two are required for each hive, can be made out of 4 x  $\frac{3}{4}$  or 4 x 1 in. battens, nailed together just to fit the top of the hives, and in fitting the top, it will fit the bottom also. Two 2 $\frac{1}{2}$  in. battens were used on each end in the place of one 4 in., but the frames on the hives are constructed wholly of 4 in. battens. The frames being

nailed together, neither side of it will be flush, but one side must be made so by filling up the two ends with short battens. There will then be a space in the centre of the frame of about  $12\frac{1}{2}$  in. x 8 in. which should be covered with small mesh wire netting on the flush side (queen cage wire cloth is best and cheapest).

The packing frames being ready, and the frames of the hive secured, place one of the former on the ground, or better still, on a spare bottom board alongside the hive, flush side uppermost; remove the cover and mat, and place the second packing-frame on top, flush side downward. Next have ready four  $2\frac{1}{2}$  in. x  $5\frac{1}{2}$  in. batons to reach from the upper to the lower frames, one for each side which should be attached to the frames by screws for convenience of putting on and removing. It will be noticed when the hives are packed in this manner the packing frames insure ventilation both top and bottom, and the hives may be packed one above another without interfering with it. One thing more, the bees when confined for more than one day should be supplied with some water. I use the cheapest sponges;—a sixpenny one usually makes three. This should be tied on the upper wire netting and be moistened with water once a day. If the owner is not travelling with the bees, paste directions for watering on each hive.

#### PLACING THE HIVES ON WAGONS AND TRAINS.

When travelling by road, the hives should be placed on the vehicle with the hive-frames running across the way on, from side to side, as the jar over a rough road comes sideways on. When travelling by rail, however, any jar usually comes from the front, therefore it is best for the frames to run parallel with the train.

#### MOVING BEES IN BOXES.

I don't know that I am justified in speaking of box hives in a New Zealand Journal unless to condemn them, but as "The Farmer" has a large circulation outside of the Dominion, the information may be useful to some readers. Fairly open and strong paper-hanger's scrim is the best material for packing box hives in. Pieces large enough to tie securely around the boxes should be cut, and a supply of strong string (bind-er-twine is best) should be on hand. A good bee-smoker by which to quieten the bees should also be available. Blow a few pugs of pungent smoke (old dry sacking makes excellent smokers' material) into the entrance, then wait for a minute or two, and then give more smoke. The box can then be turned upside down, the scrim put over, and tied securely, and while travelling, the box should remain in the same position—upside down. The reason is, the combs being secured to the top of the box, they cannot break away very readily, and better ventilation is secured. Water can be given by wetting the scrim.

It may be well to mention that the bees should, in both cases, be packed the evening before removal, after the bees are all in, and be shaded from the sun when travelling; in fact, they are better in the dark.—"N. Z. Farmer."

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#### BEGINNING BEEKEEPING.

We have so many inquiries from beginners as to the best way of making a start that it is not out of place to refer now to some points of considerable importance to the uninitiated in the hope that they may be able to avoid disaster, annoyance, and expense.

Beginners, often in their eagerness to be able to secure honey, purchase stocks of bees. This is not the proper thing to

do, and in many cases ends in failure. Avoid the purchase of old stocks at any price. A swarm in May should be the foundation of every new apiary. An experienced beekeeper might secure a bargain; it is probable that a beginner would not do so. There are many contingencies, such as the proper preparation of the colony for wintering, and the care it has had through the previous winter, to say nothing of disease, that make it very risky for a beginner to commence with old stocks. A swarm will be more likely to go to work with energy, and will afford a means for study, which, if properly done, will give the novice a large insight into the science.

Be sure before purchasing the swarm to have a new hive ready, properly furnished with full sheets of comb-foundation. Any of the dealers who advertise in our columns would supply a really useful hive at a moderate price. Here again we would emphasise the importance of leaving second-hand hives severely alone by those commencing beekeeping. Their faults may be many; for instance, they may be contaminated by foul brood or other diseases, leaky, not having standard frames, or of an antiquated, and therefore not such a useful pattern, and possibly of a generally rickety constitution. Old combs may also provide foul brood and wax moth, neither of which is conducive to success, and which handicap the tyro at the very start. Nor should various odd fittings offered cheaply tempt our friend while he is still on the threshold of the study. The actual requisites are few, so that it is better first to find out what is absolutely necessary and then to get it. A good many promising beekeepers have thrown up the pursuit in disgust, because they have been led into unnecessary expense at the outset. It is all very well to study dealers' catalogues, but it is better to obtain only what is indispensable, and eschew the numerous fads that are frequently not only of little

use, but a hindrance to successful manipulation. When once started, the beginner must keep a watchful eye on anything which is heralded as about to revolutionise beekeeping completely. Were many of these much-vaunted articles generally adopted there would no doubt be a revolution in beekeeping, but not in the honey-extractor, which, after all, is the principal consideration of the honey-producer. To an old experienced beekeeper it is often amusing to watch the resurrection of some old exploded idea, but it is not so with the novice, who takes it up and when too late wishes he had not done so.

The articles absolutely necessary are: A hive having ten to twelve standard frames fitted with full sheets of comb-foundation, a division-board, smoker, feeding-bottle, quilts, veil, super fitted with sections provided with thin foundation, and the bees. For all these an outlay of 30s. to £2 should be sufficient. It is important that the hive and other things be procured some time beforehand, so as to be ready for the bees when the swarm arrives, and the winter months are the best time for getting these requisites, as then the dealers are not so busy, and orders can be more promptly executed. It is no use leaving it until the swarming season, for then the dealers are so busy executing orders that considerable delay may occur, and a good part of the season would thus be lost.—“B.B.J.”

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The men who have achieved success are the men who have worked, read and thought more than was absolutely necessary; who have not been content with knowledge sufficient for the present need, but have sought additional knowledge, and stowed it away for the emergency reserve.—C. K. Davis.

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## THE ANATOMY OF THE HONEY-BEE.

### Many of the Accepted Facts Shown to be Fallacies.

By R. E. SNODGRASS.

"What's the use of knowing so much, when so much you know ain't so?"—Josh Billings.

For more than three centuries the honey-bee has been the innocent victim of the grossest kind of anatomical misrepresentation. No other insect has suffered so at the hands of unskilled dissectors, no other has been so maligned by unscrupulous artists. After looking over the great mass of published accounts and drawings purported by their authors or copies to illustrate the structure of the honey-bee, and after comparing these with the actual parts of the bee itself, the writer here takes the occasion of assuring the beekeeping public or any suspecting entomologist that the bee is not nearly so bad as it has been painted. The detailed results of this investigation have been published as a bulletin from the office of apiculture, of the Bureau of Entomology, of the United States Department of Agriculture (Technical Series No. 18). While full credit must be given to those authors of conscientious work who have described and figured what they saw, even though they did not see rightly, we can not condone the practice common among many writers on bees of making full descriptions, and especially complete pictures of things they saw only in part. While, perhaps, few writers have actually put into words descriptions of organs and structures they had not seen, few, on the other hand, have hesitated at publishing pictures of things they never saw clearly, or at filling in elaborate details from their imaginations. This attitude is hard to explain; for why is it not just as reprehensible to publish a

drawings that depicts for facts things that were never seen as it is to describe for truth what one never saw?

When Swammerdam wrote about bees, away back in the seventeenth century, and drew pictures of their anatomy, he probably did the best he knew how to do or could do in his time and circumstances. But we can not see any excuse for some of the gross inaccuracies made by writers during the last fifty years, some of whose productions are so far from the truth that a mere mistake of observation could never account for them. For example, Samuelson and Hicks (*The Honey-bee*, 1860) represent the mandible of the worker as having a row of seven teeth on its cutting edge! Girdwoyn (*Anatomie et physiologie de l'abeille*, 1876) and Girard (*Les abeilles*, 1878) are responsible for some of the worst, and, at the same time, some of the most widely spread examples of anatomical absurdities in pictures. The former wrote a pretentious memoir on the anatomy and physiology of the bee, accompanied by twelve large plates which received two medals at the time in Austria. This is the source of the much copied illustration of the respiratory system (see the *Honey-bee*, 1904, Fig. 27). Some of Girard's drawings are probably the crudest ever published in insect anatomy. In his book we find the original of that common picture of the bee's heart, which represents the latter as a pale band extending through the middle of a black field supposed to have the outlines of a bee's body (see *The Honey-bee*, Fig. 28). This is too ridiculous to deserve comment. It is safe to assume that the artist never saw the dorsal vessel of the bee. Girard's illustration of the sting is a design with absolutely no anatomical meaning, and is physiologically impossible. His pictures of the male and female reproductive organs, while crude, are better than some of the others, and are evidently taken from

Clerici (L'Ape sua anatomia—suoi nemici, 1875).

To Leuckart we are indebted for several very instructive pictures of the interior of the bees. His combination drawing of the alimentary canal, the respiratory system, and the nervous system has been very widely copied. (see Lang's Text book of Comparative Anatomy, Fig. 320; Packard's Text-book of Entomology, Fig. 426; Root's A B C and X Y Z of Bee Culture, page 11; Cowan, The Honey-bee, frontispiece; Cook, Bees and Beekeeping, Fig. 27. Cowan copies a modification of the drawings from Witzgall, while Cook makes a modification from Cowan.) The picture, as just stated, is instructive in a general way; but the shape of the air-sacs and the disposition of the tracheal tubes are nothing like those organs in the bee itself.

The popularising of any subject in science has always been a difficult task because the public wants something interesting to read, and the bare facts in most cases can not be made into entertaining literature; while, on the other hand, an embellishment of these facts by additions from the writer's fancy is not science. Of all the books written on the bee, there is no doubt that the first volume of Cheshire's Bees and Bee-keeping (18 6) has done more than any other to popularise the subject of bee anatomy. But there is also no doubt that Cheshire was careless in his observations of details and that he did not appreciate the true value of evidence. Therefore he was prone to build up theories on altogether too small a basis of fact. His work, however, is probably the most readable and most read of all descriptions of insect anatomy. His pictures are good from an artistic standpoint, are intelligible, and have been widely copied even into purely scientific texts. Yet it will be evident to anyone who carefully examines the internal organs of the bee in nature that Ches-

hire made little effort to reproduce faithfully the exact shapes of the organs and their parts. A scientific picture depends for effect upon detail. This, Cheshire's illustrations have, but in far too many cases it is an artificial detail.

When a practical bee-keeper writes a the methods of manipulation, he can not be expected to include any thing original on the subject of anatomy, and he would make a great mistake in attempting it. Hence we pass over the host of such writers who have taken their anatomical information from those who have pretended to make a special study of this subject, and who have credited their illustrations to the proper sources. But we can not understand how a professed scientist can write a book on the structure of the bee, and illustrate it with so many ridiculous drawings as occur to-day in one of the most popular works on the subject. It would not be so bad if the author did not pretend to have made a personal study of anatomy; but since we have reason to suppose that the author had at least looked inside of a bee, how then are we to explain his use of many drawings that give no conception of what the parts look like.

Let us examine a few of the figures found in this book. First it is Witzgall's modification of Leuckart's combination drawing of the alimentary canal and the tracheal and nervous systems, on a black background. It may be enough to show two cylindrical air-sacs on each side and a number of tubes going out from these in the abdomen through the thorax and into the legs, and call it the tracheal system; but anyone who has ever looked into a bee knows that the air-sacs do not have any thing like the shape shown in this picture, while a careful examination shows that the tracheal tubes are altogether different. Again we find an original drawing to illustrate the mouth-parts. The idea probably was to simpli-

fy the facts for the sake of "the student," for there are several drawings extant that might have been used, showing these organs pretty much as they are in the bee. On another page we find Girdwoyn's illustration of the "aerating system." The artist may be credited with having seen two air-sacs in the abdomen, but he certainly did not see any thing else that he drew. However, the original author may not have known better; but we wonder how "the students" are reconciled to the absolute nonconformity between this picture of the tracheal system and that shown elsewhere. In another place we come to that masterpiece by Girard which shows the heart of the bee as a tube running straight through the body, and having swellings in the abdomen, thorax, and head. As a representation of the dorsal vessel of the bee this is an absurdity; but it is evident that it is intended for such by the black silhouette of a bee's body in which it lies. Now, how can an entomologist use a picture that represents the heart of any insect as widest in the thorax, and that depicts it as having two chambers in this region and one in the head? The statement in the text, that "there are five ventricles," adds nothing that counteracts the falseness of the drawing. There is shown an original drawing of the sting and its larger poison-gland. Here, again, details are very greatly simplified, and things are shown as they do not appear in nature. Further along, we find Girard's picture of the male reproductive organs, probably taken from Clerici. There may be something present in this figure to represent most of the parts present in nature, but they certainly have no such appearance in the natural condition.

The wording of a text may be such that while it gives little or no information, it at the same time avoids saying any thing that is untrue. On the other

hand, in a picture every line drawn says something; and in a book purporting to give scientific information the drawings should tell the truth or else not be used.

The writer hopes that, after this brief review, the reader may be impressed with some doubt of the value of many published works on bee anatomy. On the other hand, many very excellent contributions to the subject have been made by scientific workers; but these do not come so often to the knowledge of beekeepers. Such works are discussed and given full credit in the bulletin above re-

A secondary object of this investigation is to point out the limits of our actual knowledge concerning many of the common functions of the bee. In almost all cases the evidence is insufficient to warrant the acceptance of any particular theory or prevalent opinion. For example, nothing is yet really known about the process of digestion. Honey and pollen, which constitute the food of adult bees, are ordinarily supposed to be digested and even absorbed in the stomach. Cheshire says, "the chyle stomach is lined by an intima, or inner membrane, carrying a cell layer, the cells composing which appear to be of two kinds, having distinct functions, one secreting a digestive fluid (gastric juice) from the surrounding blood into the stomach, so that the contents of the pollen grains may be made fit for assimilation by a transformation not unlike that liquefying gluten in our own case; the other absorbing the nutriment as prepared, and giving it up to the blood—these cells representing the absorbent vessels of ourselves and higher animals generally." It scarcely needs to be pointed out that all this description is, most evidently, made up out of the writer's imagination. No kind of evidence is offered as proof, and the statement is a very fair sample of a great many of Cheshire's lucid explanations. They sound like descriptions of real facts, just as his drawings

look like portrayals of real things. The present writer has found, from the examination of the contents of many stomachs, that there is much reason to doubt that either digestion or absorption of pollen takes place in the stomach. Honey and nectar may be absorbed from this organ, but the pollen certainly appears to be digested in the small or even also in the large intestine.

This subject of digestion leads to a discussion of the origin of brood food, concerning which writers on bee physiology are divided into two classes—one holding that this substance is produced in certain large glands situated within the head of the workers, the other claiming that it is formed in the stomach, and is simply regurgitated "chyle." On each side there seems to be evidence contradictory of the opposite view. In the first place, the mouth of the stomach is so constructed that regurgitation of its contents looks impossible; yet Schonfeld claims to have produced regurgitation by artificial stimulation of the stomach. The contents of the stomachs of bees examined by the writer, however, show no resemblance to the brood food or to royal jelly, being a dark brown mucilaginous slime containing pollen grains. On the other hand, Cowan points out that the work of Planta, showing that there is a constant difference in the food of the various forms of the brood at different stages, indicates that the substance is not produced by glands. Cheshire, after advancing his arguments in favour of the glandular origin, ends with the statement that "the naturalist will, in delight, realise that his bee is more a wonder of wonders than he had before imagined." But the days of delight in imagination are over, and we need some hard investigation of all the facts bearing on the subject before we can have any opinion worth having on the origin of the brood food and royal jelly.

Another of the "wonders of nature" usually pointed out in the bee is the so-called stomach-mouth, supposed to be for the purpose of taking the pollen from the nectar within the honey-stomach. Again looking to Cheshire we get the information that, "while the little gatherer is flying from flower to flower, her stomach-mouth is busy in separating pollen from nectar." This is a very pretty sentiment, but the author does not give us sufficient evidence as to how such hidden secrets were revealed to him. It is hardly enough to catch a bee in the field, cut it open, and see the stomach-mouth working, for it does this on any occasion when dissected from a freshly killed bee, whether there is pollen in the honey-sac or not. To the writer it seems much more probable that the stomach-mouth simply an organ for passing any kind of food from the honey-stomach to the true stomach, comparable with the similar organ possessed by other insects, rather than a special structure of the bee for separating pollen from nectar.

These are but a few of the problems directly suggested by a study of the anatomy of the bee. A thorough knowledge of anatomy is, of course, fundamental to a study of physiology, and a knowledge of physiology is again most essential in the investigation of all forms of diseases—a subject of vital importance to all beekeepers. If we add to these subjects a study of the senses of the bee, its behaviour, and its place in nature, the field for future work enlarges without limit, and the student realises that a lifetime might be spent in exploiting this small insect. Since, however, all of us seem to prefer to do several things in a lifetime, it is evident that it will require several investigators to find out yet all there is to know about this already much studied creature, the honey-bee.—"Gleanings."

**HEREDITARY INFLUENCES.****The Swarming Tendency Can Not Be Eliminated Any More Than Lambs' Tails Can Be Shortened.**

By M. E. PRUITT.

Geo. W. Williams, referring to swarming, in "Gleanings," for May, says: "What a boon it would be if we could eliminate this troublesome tendency! But can we do it?" I should say, no, not any more than sheep-men can cause ewes to produce lambs with short tails. Haven't they chopped them off for generations and generations? Aren't they just as long as they always were.

For the last several years we have kept down swarming by raising the major part of the brood and giving frames with starters in the place of it, so arranging the upper frames of brood that they do not come exactly over the lower ones. We do no "dumping on the grass," as Mr. Gately so comically puts it.

Chickens, as a Rule, Eat Drones only.

Now, I don't see that it is so remarkable that a chicken eats drones and not workers. What is remarkable is the fact that they have sense enough to learn the difference. Nearly all our incubator chickens will go to the yard to get a meal. We used to feed drones daily to them when they were little tots. In their greediness to gobble every thing that fell they would occasionally grab a worker and get stung. That lesson was learned right there and then, that some of those juicy morsels had fire in them, and that some did not; and they soon learned to distinguish them by the sound of the hum. Little chicks can be easily trained. One lesson or two at the most is enough to teach them any thing that is within bounds.

When to Drive the End-Spacing Staple.

Everybody seems to have trouble driving the staples in the frames; and it

seems to me they must put them in after the frame is built. We put the staple in the end-bar first, and then build the frame. The saw-kerf block sent with the knock-down frames is placed on the end-bar, the open end of the saw-kerf being flush with the bottom of the notch made for the top-bar. We are careful always to have the V edge of the end-bar toward us, holding the same in the left hand with the top end of the top-bar pointing to the right hand. The shorter point of the staple is placed toward the right hand, with the longer flush with the closed end of the saw-kerf. The staple is then driven (with a light hammer) until almost flush with the block. Others may use this method; but if they do they do not so express themselves in words or illustrations. Where the staple is put in first, one has something solid to hammer on, and the frame is not weakened, as is bound to be the case to a greater or less extent with the other method.

Who Pays the Cost of Honey-Cans?

As to "who pays the cost of the cans?" Why, the consumer, of course, just as he does when buying coffee, lard, or any other product that is sold in cans. We either charge enough extra per pound for the honey to cover the cost of the vessel, or sell the full weight of honey and vessel, selling both at the same price per pound, or collect a similar vessel in the place of it and knock off a pound of the total weight. We get the price of the vessel or its equivalent in any case.—"Gleanings."

**A BEESWAX EXPLOSION.**

Yesterday, if we had been told that beeswax would explode we would not have believed it; but, nevertheless, one of our men is to-day suffering from severe burns about the face and hands as the result of beeswax apparently exploding that was being heated during the

progress of an experiment. The details of the incident are as follows: About a pound and a half of wax was being heated in a deep wash-dish over an ordinary stove. The dish had a rounding bottom, was about a foot in diameter at the top, and perhaps six inches deep. The melted wax occupied not more than  $1\frac{1}{2}$  inches space at the bottom of the dish. When fine bubbles of wax commenced coming to the top, showing that the boiling-point had nearly been reached, about half a pint of water from a tea-kettle was poured in, the idea being to cool the wax and prevent it from boiling. Without any warning, however, there was a sudden explosion, all the hot water and wax being thrown violently into the face of the one who was performing the experiment; and, as the wax had to be scraped off with a knife, it caused some quite severe burns before it cooled.

Now, did this wax, like nitro-glycerin or gunpowder, simply explode of its own accord? There was no exposed flame or fire at any time, and, fortunately, nothing caught fire afterward. Our explanation of the trouble is as follows: Wax boils at a much higher temperature than water; hence, although the wax in the dish on the stove had not quite reached the boiling-point, its temperature must have been considerably above the boiling-point of water. When the hot water from the tea-kettle was poured in, its tendency was to go to the bottom of the dish because the wax is lighter; but the high temperature immediately volatilized the water; and as the steam had no exit except through the wax, it fairly lifted the whole contents of the dish into the air.

If wax is being heated over boiling water, there is no such danger if our explanation is the correct one, for the wax could get no hotter than the boiling water underneath; hence it hardly seems correct to say that wax may be boiled over water. It is true that the water

underneath boils; but the wax above does not reach its own boiling-point, although the steam from below, rising through the wax, agitates it and gives it the appearance of boiling.

All this only goes to show that it is much safer, when melting wax, to put water in the bottom of the vessel before the wax is thrown in. The wax will then not reach its own boiling-point. In the experiment described above, the wax was already above the temperature of boiling water before the water was introduced. Very serious results would surely follow if a large quantity of wax were brought nearly to its boiling-point, being heated in a dry vessel, and then water introduced. If a large quantity of cold water were put in there might not be bad results, as it would have a tendency to cool the wax, although the first of the water put in might make trouble before the larger volume had cooled down the body of the wax. If we are not sound in our reasoning, we shall be glad to be corrected.

Fires from burning wax are very hard to extinguish; and the greatest precautions should be taken, not only to prevent wax from boiling over, but to prevent such occurrences as this.—“Gleanings.”

“I can not see why anybody should think that he can buy better queens than he can rear at home.” The man with average bees can always buy better queens than he can rear, simply because some one else has better bees than he has. If he buys a queen of better stock than he already possesses, even should that queen after her journey prove a poor layer, he can from her rear queens that will beat his old stock.

#### PROTECTION AND BEEKEEPING

A few years ago, when manufacturers got an export bonus, which the consumer had to pay, we had the pleasure of paying a higher price over here than you

paid for German sugar in London. But Protection is dogged by more blessings. What do you know of artificial honey in your market? Here every shop is stocked with this stuff, that is sold retail at 4d. to 5½d. per pound. Of the quality of foreign honey that is penetrating your market very little reaches Germany, where, however, immense quantities of the much more inferior variety from Chili, &c., are constantly being dumped down. Of what quality this honey is you might guess when I mention that in Hamburg it is offered for about 14s. and upwards per cwt. The import duty of 20s. per cwt. soon imparts a value to this very stuff, that is subjected to some cleaning operations and blended with sugar-syrup to cover its too-pronounced flavour before it is put on the market and sold at a price of more than 8d. a pound. How this stuff is converted into finest extracted bee-honey, under which flag it is sailing in the market, is, of course, a trade secret. Some years ago a large firm, doing probably the largest business in this very line, took out a patent for a process of throwing out the impurities of foreign honey by means of an extractor. The product of this cleaning operation was labelled, "Extracted honey"! How far he impudence of the foreign honey trade really goes you might judge from the fact that at a recent honey and bee show I bought some "finest extracted bee-honey" at about 1s. a pound. The stuff, if I am not greatly mistaken, is derived from the same source as a sample I tasted more than a year ago in a London shop, and for which I was asked 6d. a pound!—"B. B. J."

#### EXTRACTING HEATHER-HONEY.

I am at present testing an interesting machine the inventor placed at my disposal for that purpose. Heather-honey, when derived from common ling, is ordinarily not extractable, however great the speed of the extractor might be and

however much the combs are warmed previously. But it is a fact, already known for a long time, that if the contents of a cell filled with pure ling-honey have once been stirred the honey will easily leave the cell after a few rotations in the extractor. By a simple experiment everyone interested in this phenomenon might see for himself the magic result of the action of stirring. Take a comb or a section with ling-honey (in most combs there are always some cells filled with bell-heather honey, which readily leaves the cells in the extractor, and so reveals the nature of its source), stir the contents of a number of cells in the middle of comb by inserting the head of a nail to the bottom of the cells, and then try extracting. The result is really striking. The cylinder of the extractor is soon covered with lumps of heather-honey.

The inventor bases the construction of his machine on this fact. The machine consists of a framework on which a large number of steel needles are kept hanging at such a distance that for every cell there is a needle ready to plunge into it. The weight of each needle is so balanced by its length that it suffices for penetrating the jelly-like honey, and by that action to neutralise the adhesion of the latter. But if a needle meets the wall or bottom of a cell it is lifted, and in that way prevented from damaging the comb. It takes about five minutes' time to treat both sides of a shallow-frame comb with this machine. Very little honey remains in the cells—perhaps hardly more than when dealing with more liquid honey. My own tests cannot give normal results, because of the season being too much advanced for work of this nature. Nevertheless, it is doubtful whether it would pay to work for extracted honey during the heather-time even now that heather-honey can be extracted. But for extracting the brood-nest, which, as a rule, the bees choke up with heather-honey, the machine will prove a boon.—"B.B.J."

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