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THE AUSTRALIAN Bee Bulletin.

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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"The Australian Bee Bulletin."

A Monthly Journal devoted to Beekeeping.

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

MAITLAND, N.S.W.—.DEC 31, 1910.

EDITORIAL.

Heartiest compliments of the season and best wishes to all ! How quick the time passes. Here we are again at the entrance of new year. Looking back—have our anticipations of twelve months ago been realised ? In many parts expectations were not equalled; in others the yield was good, and thus it happened, especially as some had a good winter flow, that the supply fully satisfied the demand. What is the new year going to bring ? The prospects are excellent, and it is hoped that expectations will be realised to everyone's satisfaction. Here the flow commenced at the beginning of the month and promises well. But no swarms have issued yet.

Mr. A. T. Sharp, the Editor of "The Journal Department of Agriculture," Victoria, paid me a short visit recently and we had a very interesting chat on bee matters.

Lately an enthusiast in bees wrote to me that in one of his hives the bees died in great numbers, and he wished to know what to do to check the evil. I advised him to subject the lot to sulphur fumes, or, better still, to burn the lot; but if there are yet plenty of bees left to give them a vigorous queen . A few days after he called for further information, and wanted to know if the combs, about twelve months old, might be used again He mentioned that he had been to the Hawkesbury College, but could obtain no information there. I repeated my first advice, but he seemed very distressed to have to lose them. How can it be avoided ? Who can tell us ?

Early in spring I received two parcels of comb foundation of different grades from Messrs. Dadant & Sons, Hamilton, Illinois. These, except for sections, have been used side by side with local makes, and it is a fact that the bees utilised them more readily. The Dadants make the manufacturing of comb foundation their speciality, and they have thirty-three years' experience. During 1909 they sold eighty tons of comb foundation—none to Australia. This country is a new field for them.

In Victoria a Bee Diseases Act has been passed. Whilst it may not be perfection any more than similar acts elsewhere, nor provide all that every beekeeper desires, it may be an inducement to other States to do better. The main factor will depend on the qualification of the inspector and the full confidence of beekeepers. What say you ?

To the casual observer the best honey producing blossoms and flowers pass without notice and admiration; even at Wild Flower Shows they occupy a very insignificant place. They do not look

so pretty as the scientific produced flowers. But what do the bees show us To them art flowers have no attraction, there is no food for them; but the insignificant unattractive flowers almost unobserved by any but a beekeeper, these the bees prefer and visit for food. Bees appreciate Nature's devices in preference to what looks beautiful to the eye. This proves that what the Creator made, it was good. Here is beauty, loveliness and utility combined, while art, science and enlightment only dabbles. No matter whether the petals are white, yellow, blue, red, or shades of these intermixed, the bees like them all. No matter how unimportant they seem, and the nectaries are just of the right depth to reach the nectar therein, without a tongue a yard or two long. What would bees do if all flowers and blossoms were of the double varieties? And yet some beekeepers have attempted to point out what great results these trial-experiments should teach beekeepers to follow them as a guide in the improvement of bees. Mankind, animals, birds, etc., are also mentioned in support. But the question may be asked: "Where are the proofs; what are the benefits?" With all the advantage mankind possesses at present it is doubtful and at least disputable whether human nature is now superior to the past. The same applies to animals, birds and plants. Thousands of years ago bees gathered honey, and even stored it in the carcass of a lion. Progress has provided means whereby more comfort and convenience is given the beekeeper to handle the bees and harvest the crop; but the bees have still the same tendencies, habits, and qualities. They adapt themselves to some extent to localities; but give them different circumstances to affect them differently, and they lose the acquired points. Thus in the Leineburgh Heath districts, where thousands of stocks are subjected to sulphur every autumn, the bees have a tendency to swarm excessively, an increase from 25 stocks in spring to 200 being nothing exceptional. In sunny Italy is found the pretty well-known bee, its swarming impulse being very small, almost eliminated. A positive non-swarming strain of bees does not exist. I have hives with queens from swarm cells of two years ago, which queens are supposed to incline to swarming, but they don't.

Diseases are on the increase in all directions just as fast as science advances. Drastic and more drastic measures are recommended to combat these evils, and thus the pastoralist, agriculturalist, horticulturalist, etc., are now compelled to use poisonous compounds to eradicate existing diseases. By these means some pests are checked, but at the same time some useful creatures, such as birds and insects are also destroyed; thus the chance for pests is given. Beekeepers are left to their own devices in combating adversaries in more directions than one, whereas they should be afforded every protection. In other lands such is the case. Take foul brood. A beekeeper, neglectful or ignorant of disease is likely to prove a great changer to the systematic one, through no fault of the latter. Or take ringbarking. If the trees bore admiring blossoms that cannot be cultivated, how much support the beekeeper would get to protect these trees. And yet bees and insectivorous birds are most beneficial to agriculture, horticulture, etc.; therefore, beekeepers deserve recognition more than they get.

W. ABRAM.

FERTILITY OF QUEEN BEES.— FACTS AND FIGURES.

The Conclusions to be Drawn Therefrom.

Perhaps few, if any, of the readers of this journal have ever tried, or thought of trying to find out, to almost exact figures, the number of eggs a queen bee is laying or able to lay within a certain time. The statement that the number is about 2,000 per day is insignificant. A correct answer can only be given by taking the circumstances into consideration, as these alone direct the queen to lay more than a thousand eggs a day at one time, less at another,, and none at all at yet another. What, then, is the number of eggs a queen may lay under favourable circumstances within twenty-four hours ? What may cause an increase, what a disease ?

Before entering into an explanation on these questions it is necessary to prove what number of bees is justly to be considered for a colony most profitable to its owner. The numbers are found by weighing and counting them, which weighing is not quite satisfactory and exact, on account of the bees having more or less honey in their body, and the weight of which cannot be exactly ascertained.

I found them in variation from 4,500 to 5,000 to the pound, and this will prove to be pretty near the mark. Taking 5,000 bees to the pound, a swarm of 40,000 bees would weigh eight pounds. I have weighed many swarms and found the most of them weighed from five to seven pounds, and these have usually given the best satisfaction. I have also had swarms of 10 and 10½ pounds, but they did not do double the work of a swarm of five pounds; and I have sometimes united them and made them stronger than the strongest single swarm, and the result proved the same, viz., that the strong swarms are not the more profitable ones, and the original number of bees was not kept up. I therefore came to the conclusion that a swarm of from five to seven pounds was the most profitable, and that the fertility of those queens can be taken as a standard. More extensive trials in that direction have been made by Mr. Hannemann in Brazilia, who constructed immense hives and placed from 50 to 70 swarms, with a couple of queens only, in each hive. But, although his millions of bees in one hive gathered thousands of pounds of honey within a short time, they showed at the end of the season no more bees than ordinary stocks and their honey-yield did in no way equalize that of same number of swarms in separate hives. These were conclusive proofs that the fertility of the queen can reach a certain extent only; when that extent is reached it must of necessity go down again; the queen either dies from exhaustion, or she is found wanting, and consequently done away with by the bees.

Having satisfied myself that swarms of five to seven pounds occur mostly and are more profitable, I come now to the explanation as to how many eggs such queens lay daily during the height of the breeding season under ordinary circumstance. But it is also necessary to know how long the bees live in the busy time. This is easily proved with the aid of the different coloured races of bees; and I find that, although some bees live at least three months in the summer, and of course much longer in the winter, their average age is six weeks to two months. Taking this for granted, and also that almost the same number of bees remain behind in the old hive out of which the swarm issued of from 5lbs. to 7lbs., or 25,000 to 35,000 bees. Then there have been from 50,000 to 70,000 bees in that hive before swarming, and the queen has laid 50,000 to 70,000 eggs within, say,

40 days, or 1,250 to 1,750 per day. The highest point of breeding seems to be reached about 14 days before the swarm issues; as can be ascertained by examining the comb after the departure of the swarm, when most brood cells will be found sealed, consequently the highest number of eggs laid for a very short period is 2,000 per day. This does not signify that her average is 2,000 every day for the whole season. Not at all. I will further illustrate it.

In the autumn, when the bees leave off working, they stop breding also; and have no brood during the cold weather in winter; and they are weak in early spring, when breeding again commences. Assuming there are 2lbs. or 10,000 bees in the hive on August 10th, and the queen starts laying, these bees will live to the beginning or middle of October, because they are flying scarcely in August. At first the queen lays only 100 or 200 eggs per day, as the weather is yet cool; but gradually she increases the number, and on August 30th lays about 1,000 or 12,000 in 20 days, at an average of 600 every day. These 12,000 cells cover a space of 240 square inches of comb. From September 1st to 20th 12,000 bees have hatched; and the total number is now 22,000. As on September 1st bees begin to hatch, and the weather is warmer, the queen increases laying, and in another 20 days —September 1st to 20th—she laid 25,000 eggs, or 1,250 per day. These cells cover 500 inches of comb. From September 20th to October 10th these 25,000 bees have hatched, and there are 47,000 bees on the later date. Reduce therefrom half the number of wintered bees as being lost, there remain 42,000 bees. The queen has by this time reached almost the maximum of her laying capability, and her field is large. About 35,000 eggs have been laid in 20 days, or 1,750 per day; and they cover 700 square inches of comb. On October 30th these 35,000 bees hatched, and 77,000 is the total number, of which reduce the last 5,000 of wintered bees and 2,000 of those first hatched this season, and 70,000 remain; which weigh about 14lbs.; and besides there is brood in all stages to the enormous extent of about 40,000 cells, so that 2,000 eggs were laid each day for 20 days. These 40,000 cells cover 800 square inches of comb. Should the immense number of 70,000 bees not feel inclined to swarm yet, then on November 20th they would have increased to 110,000, irrespective of loss, which amounts to about 10,000; so that the actual number of bees is 100,000 or 20lbs. Whether this colossal number swarms or not is henceforth of no difference to influence the fertility of the queen. She has reached her maximum and from now decreases in laying, remaining stationary for a couple of months at about 1,000 to 1,500 eggs per day, while at the end of March, or in April, she ceases together, to begin again next spring. The large number of bees also decreases gradually, and towards winter there are not many above 20,000.

I have used round figures as near as possible to the point, and the dates are also as near as possible; although in some warmer districts the breeding begins earlier; but the thinking beekeeper can easily correct them for himself.

Occasionally a queen has laid 3,570 eggs every day for 14 days which is 51 per hour and 2½ per minute. Of course, a queen cannot be expected to lay without stoppage or resting Let us assume she lays 10 hours and rests 14 hours, then she must have laid 357 in an hour or six in a minute. Perhaps others have watched their queens as well as I have, and if so, they will agree with me that it is exceedingly seldom to see her lay six eggs in the minute, and the circumstances must be extraordinarily favourable. This was once the case with me. A hive had lost its young queen just

before her impregnation. The bees might have numbered from 12,000 to 15,000. All the combs were a year old worker cells,and mostly polished and ready for the queen to lay. A day or two after a swarm issued from a pretty strong hive; but on account of it being windy, and I think because the queen was heavy, she fell to the ground, and was only discovered when most of the bees began returning again; so that only about 12,000 settled with her. This being a weak swarm, I put it into the queenless hive. Fourteen days later I found 50,000 cells or 1,000 square inches of comb full of brood in all stages to 14 days old. I removed immediately three frames and placed empty ones instead; but when looking in again six days after I found these combs mostly filled with honey, undoubtedly because honey was more plentiful now. This queen laid 3,570 eggs per day for 14 days. She proved hereafter always very fertile, but never to the same extent again.

In another hive a young and lately impregnated queen was introduced to a strong colony. Fifteen days after her commencement of laying the brood covered 900 square inches, equal to 45,000 cells. She laid 3,000 per day. The given empty combs were also mostly filled with honey, although they were placed in the centre of the brood nest.

Another hive with a very fertile queen had a wide passage from brood to honey-room, of which passage the queen made use, and I found 1,324 square inches, or 66,200 cells of brood. The queen laid 3,310 eggs every day for 20 days. The bee hatches in 19 or 20 days after the egg is laid.

Again, another hive had 800 square inches of brod. I removed the first and last comb, which contained honey and pollen, and inserted two empty combs in the centre. The queen was soon hard at laying, and five days after they were full of eggs and young larvae. These were removed and two others given, and they were almost full in another five days; but the next two were filled with honey from top to bottom as well as other cells that became empty by hatching bees. As the 800 square inches were kept full of brood and the four combs which I removed measured 400 square inches, the queen laid 60,000 eggs in 20 days.

Although a few queens have laid such large number of eggs for a short time, it must be borne in mind that these were exception that prove the rule. What some queens can accomplish, and what most queens do accomplish, that is a great difference. My expxerience resulted from the Italian bees; but other races prove about the same.

Besides those queens referred to there are many that never reach the mark of laying 2,000 eggs per day in the best breeding season. And the weather has great influence also; dry and windy weather checks breeding, moist, warm and close with fresh honey not too plentiful induces breeding. A two or three years old queen is often as fertile as a younger one, and a big queen is not superior to a middle-sized one, while a small queen is short-lived and not much good.

I have thought that if young queens were reared from the most fertile ones only they might inherit that quality and remain constant; but I found that, no matter how it is executed, they only prove to be about middle-class; while I have had excellent layers from poor laying mothers. Here again I came to the conclusion that when a certain extent is reached it goes no higher. The bees have undoubtedly a great influence over the queen. In winter, when the bees rest, the queen lays no eggs at all; again in summer a queen in a nucleus hive lays but a few eggs, but if introduced to a strong stock she lays a thousand and

more after a few days. What is the cause? Surely the food the bees give her. When a desire for a plentiful brood arises, the queen is fed accordingly to enable her to produce such quantity of eggs as her natural strength will permit; when no brood is desired the queen receives or takes such portions of food as is necessary for her existence only. Perhaps the queen's own instinct guides her actions as well as the bees theirs.

Adjoining to the above a few words in regard to the hive may not be amiss. The hive ought to be so constructed as to afford ample space for a good queen to lay 2,000 eggs per day, in which case 40,000 cells, or 800 square inches of comb are needed for brood; and as some space is taken up for honey and pollen store, this must be added to the above. My hive with 10 frames in brood chamber, has about 57,750 cells or 1,155 square inches of comb capacity. To use 55,000 cells for breeding purposes the queen must lay 2,750 eggs every day, when 2,750 cells remain for honey and pollen. If she lays 2,000 eggs per day, 17,750 cells can be utilised for storing honey, etc. And, as about 1,250 cells of honey in these combs make a pound, there is, besides, 40,000 cells for brood space for at least 12 pounds of honey, while a very fertile queen has room for nearly 3,000 eggs per day, and the number of bees may increase to 100,000. But I find usually that the bees do not allot all cells for brood if honey can be gathered. It is, therefore, evident that my hive with 57,750 cells is quite sufficiently large to be profitable.

Some other hives, the Langstroth, for instance, has 1,445 square inches of comb with 72,250 cells. If these cells shall be used for breeding, for which they are designed, then the queen must lay 3,500 eggs every day to fill 70,000 cells, when yet 2,250 cells are to hand for honey. But the queens do not lay 3,500 eggs per day, and consequently there are at least 645 square inches of comb or 32,250 cells in reserve; for what? These 32,250 cells could hold at least 25 pounds of honey. The queen is no more fertile, she will lay no more eggs in a large hive; the swarms are no bigger than in any other hive that holds 57,000 cells in the broodroom.

In conclusion I recommend these facts and figures to your serious consideration. See which come nearest to your observation on the subject, and form your opinion—but adopt the best. Accept the assurance that only after long and careful experiments and studies satisfactory conclusions can be drawn. Avoid being led astray by mistaken surmises.

W. ABRAM.

Beecroft,
near Sydney.

(This article was published in Parramatta in August, 1889, but it stands good now.)

Sorting, Grading, Packing and Preparing Honey for the Market.

Mathilde Candler.

After the comb honey supers are taken from the hives at the close of the main honey flow, there comes a let-up in bee work which is very much appreciated after having worked every day for a good many weeks, Sundays included, often from daylight to dark when the work required it. Now I take a vacation for a week or two and do "such labors of love" and other work as have been neglected during the honey season.

But the comb honey producer can not be idle long, for now comes the task of getting all those sections ready for market. As the weather is very warm, I devote this time to nailing and getting shipping cases ready, looking over and fixing up carriers, fumigating honey, and

doing such other work, preparatory to the grading and cleaning of sections as is needed.

Cleaning and sorting sections is not hard work, but no part of my bee work do I dislike so much or find so tedious. It comes at a time when the weather is delightful, and one would rather be out doors than in; and when the bee-glue is soft and sticky and sticks to fingers and scrapers and everything it touches, the work does not progress very fast. Later on the days are cooler, but I want to get the honey to market as early as I can; and, besides, there is other work yet to be done, and so I begin.

First, I fumigate the honey to kill any bee-moth and eggs that may lodge in the comb. To do this I pile the supers up carefully, three high, and place a small, shallow dish on top (save the lids of Lewis lye cans for this purpose). This I fill with Bisulphide of Carbon, which I get at the drug store at 25 cents per can. Then, three more supers and another dish, and so on, until the pile is as high as I can comfortably make it, putting two little dishes of carbon on top, covering with several thicknesses of newspaper, which are weighted down tight by putting a super or heavy board on top.

I now use mostly wide frames and plain sections. Until within the last few years, I used T supers exclusively, but I have gradually discarded them. The T super is a good super, but, in a locality where there is much propolis, it requires too much scraping. The wide frames protect the tops and bottoms of the sections so they are as clean as when first put on the hive, except for a little bit along the edge; for, as my supers are five inches high, I have to use one-fourth inch slats in my frames. This is hardly thick enough; it allows them to sag a little and thusgives the bees a chance to crowd in a little bee-glue along the edge. Three-eighths inch would have been better.

When scraping and grading sections I have a long, low table about 4 x 10 feet, and about two feet high, at my right on which to place the cases and empty supers, into which I sort the sections as I clean them. In front of me is a low table (which is really a box) on which I place the super to be emptied and cleaned. Strips of wood tacked along the edge of the table keep the propolis from falling on the floor, and several sticks placed on top to hold up the super and allow any bits of wax or bee-glue to fall below.

To save my dress, an apron, which is nothing more than an old gunny-sack, is tacked to the table by its lower end, while a string is attached to the other end to form the strap that goes round my neck.

For scraping, I have used a case knife, carpenter's scraper, sandpaper, broken glass, but I like best a little triangular-shaped, sharp-edged piece of steel, having a handle set in the centre. It is a little wider than the width of a section and is a little awkward to use at first, but, with a little practice, it works better than a knife. I also have a tack hammer, case knife, lead pencil, paste, some tooth picks to pick out a dead bee or ant or a lump of propolis from the cells, and a glass of water and a small artist's brush to wash off any spotting on the nice comb. A cloth and pail of water to wipe up any dripping honey and a pail or jar to hold the broken pieces of comb, completes my outfit.

To put the paper tray in the case, I use a push board just fitting inside the case. This is not made of one solid board but of two boards set a little apart, so that the paper does not cling to the board when it is withdrawn. I also use a kind of frame which exactly spaces the strips at the bottom of the case.

Many beekeepers tack the strips to the bottom, but I like paste, or even honey, better, to fasten them with. Flour paste is good, but it sours soon. A library paste, which I make myself, does not sour and will stick every time. Here is the way to make it : Wheat Flour, 6 oz.; powdered alum, ¼ oz.; water, 1½ pt.; glycerine, 1½ oz.; oil wintergreen, ⅛ oz. (1 teaspoonful). Mix water, flour and alum to a smooth paste and boil till it thickens. Be careful not to let it boil or cook too much. Take from fire, add oil and glycerine and mix thoroughly.

If too thick, thin with a little water. To paste on tin, add about a teaspoonful of muriatic acid. I make it without the acid, as I wish to use it on other things besides tin. To paste on tin, just scratch the tin a bit with a knife or a piece of sandpaper.

In grading, I try to let the sections at the glass give an idea of what there is in the case; and, as I put in each section, I turn the best side towards the front. As I do this with all, it gives amuch more even appearance.

I sort into four grades: Fancy, No. 1, No. 2 and unfinished. The first two grades are shipped to market. As much of the No. 2 grade is sold in the home market as it will take; the culls are sold as chunk honey; the rest is extracted along with the unfinished sections and used for baits the following year.

I used to grade into six different cases, putting sections of about the same appearance in each case, but making only three grades, fancy, No. 1 and No. 2. In this way all the sections in a case run very even and it is much the most satisfactory way. But since the No. 2 sections have been thrown out of the market, I have fallen in line with other beekeepers and I sort them into three cases the way they do.

I think it is a mistake that there is no market established for No. 2 comb honey. Such honey is produced at a loss and to have to extract them as we must, if our market will not take them, only adds to that loss, for it is work that is not paid for. Therefore, beekeepers are not as critical and do not grade as close as they would do if they could dispose of them better. They are a "by product" for which a market ought to be found.—"Review."

Freeing Supers of Bees, Extracting and Outwitting Robbers without using Bee Escapes.

R. F. Holtermann.

(Continued from last issue.)

Extracting a short Distance from the Apiary.

I first began extracting by carrying combs in comb buckets. This was followed by eight-frame supers; then 12-frame supers; next a wheelbarrow. By a rare streak of good fortune, owing to a mistake, the bees were put some distance from the place to extract, and we took a light spring wagon. That last plan has been good enough for us ever since. We put 6- 8- 10- and even 12-frame Langstroth supers on this wagon, the number being according to road, and the strength of the help. We have heavy cloths, made out of large, thick bags, to cover all supers with combs; and let me say, right here, that it is a very bad practice to have standing about the apiary, or in the wagon, uncovered, during robbing-time, supers freshly taken from the hives, even if there is no honey about them. The interior of the hive odour excites and attracts the bees.

I like for extracting, to have three to work outside, even if they have to help inside at times. If a man or a woman has to work alone in robbing-time, and there is much to do at one time, the operator is badly handicapped. The colony in hand is first smoked at the entrance, just a little, it is then smoked at the top. I shake the bees in front of the hive until I come to the latt super to be taken off, when I shake them into the vacant space in that super. Unless the bees are of some special strains, which has a strong disposition to stick to the combs, I can, when the cells are capped, shake practically all the bees from the comb. But, if not, then a person stands on the other side of the hive, wielding in each hand a German bee brush. I hold the comb for him in such a way that he can, with one sweep, brush both sides of the comb. How can that be, it might have been asked, had I not given the key to the situation in the two brushes. I had a Mr. Fred. Mehlenbacher, of Fisherville, Ont., help me for a few days in extracting. As he was a man who takes an interest in his work, and thinks, and sometimes has good ideas, he said to me, although he had never used a German bee brush before, "Now, if I only had two brushes, so I could brush both sides at once." In five minutes we had the second brush, and that saves a lot of time, and deprives the bees of chances to rob, and that is now our method.

I will guarantee that, after a good flow in a properly run apiary, I could take off 10,000 pounds of honey in a day, by the above method, and have the honey warm to extract; and not have to lift heavy supers, putting the bee escapes between, and replace the supers with the edges boiling more or less with bees, which are in danger of being crushed. I extract not one super at a time, but everything clear down to the brood chamber; and that is why I do not want to use the bee escape as I am situated, and as I judge the Hutchinsons are situated .

Of recent years, when there is much tendency to rob, or where I do not want, owing to the location, to excite the bees, we leave the wet combs in the extracting house or barn until the last thing at night. That means that I begin so late in the day that we can get them all on the hive before dark. In any case, unless honey is coming in very fast, it is a bad practice to bring wet combs into the apiary and keep them standing out until

room is made for them by taking out combs of honey. Of course, when bees are not liable to rob, it is more expeditious to have the combs ready. To put combs, which have been extracted, on the last thing at night during robbing-time is a great factor in the prevention of robbing; by morning the combs have been made dry and they no longer excite.

It is my temperament to forsee danger and try and guard agianst it when I can. That is what is needed in preventing robbing. Where we extract the second day, I am careful to clean up all I can at night and be on the ground in the morning before the bees get busy. Such well-known methods as exposing no honey on the wagon, cloth or supers are so well known, I need not enlarge on them.

Last summer I had with me a young man from Ohio, who was at the National Convention at Detroit. He came to learn how to produce extracted honey, and, having previous knowledge of bees, he picked up ideas rapidly, as he himself said. Before leaving, he stated that it had been his full intention to use bee escapes, but, after seeing with his own eyes our methods, he was thoroughly satisfied that our method without the bee-escape was better and quicker.—"Review."

BREEDING ENTIRELY FROM ONE QUEEN IN A SEASON.

Do We Require an Island Apiary for Breeding the Best Queens?

By Samuel Simmins.

In my 1888 edition, and in each succeeding issue of my book, I stated that 'unretricted or indiscriminate swarming is totally at variance with all true principles of breeding. To obtain the best results it is absolutely necessary that all queens be carefully bred from the best stock only."

I believe most advanced beekeepers are now agreed upon these points; but many do not follow the plan set out in the last sentence. It will be observed that all queens are to be reared for the season from one stock, or, to be more explicit, from just one queen only. In my own practice I go further than this, for, while breeding the whole of my queens for any one season from one selected queen only, I also rear my drones for the same period from the daughter or granddaughter of one other queen which was used for producing the queens in some preceding year. In this way I have been able to register a pedigree strain for the last ten years through the male parentage as well as the descent of the queen-rearing mothers, thus securing all the most desirable traits in a fixed strain of honey-gatherers.

Thus, if once in two or three years I find one among a number imported has some very desirable trait worth appropriating she is used for rearing queens one year, and in succeeding years her granddaughter, whose parent and grandparent were also mated to my pedigree drones, will carry the combined qualities forward in the male line. In occasionally bringing in one of my own home reared queens, already in the line of pedigree stock, as a queen-mother for the season, she has been under close observation for at least the whole of one season, or it may be between two or three seasons, maintaining certain good qualities without variation. The practice of allowing bees to swarm, and leaving their own selection of young queens to follow, is as bad as that of allowing stocks to supersede queens at their own sweet will. Moreover, in the average apiary drones are allowed to be reared in a number of stocks, while queens are bred from several mothers during the

same season. No wonder, then, that the apiarist, whether he be a honey-producer or queen-rearer, is pretty much at a standstill, or finds his stocks sometimes just a little better, or more often a great deal worse, than the average.

I am able to state from long experience that there is no hope of securing genuine progress as regards standard breeding stock, and hence, for all purposes, where more than one queen-mother is used for the season, or more than one other queen for drones during the same year. Furthermore, that no fixed strain, having all-round desirable traits, will be secured where the pedigree is not definitely registered through the drone-mother succession, even more than by the registration of the queen mothers, though that, of course, can not be neglected.

Aids to Isolation.

Now, is isolation on some island, or within some large unoccupied area, really necessary. The unoccupied locality might be difficult to find, or, of found, would perhaps be inconveniently situated; while a small island would probably be equally inconvenient, possibly a very windy spot, and at the same time the bees would most likely require feeding all the time with both syrup and artificial pollen. This process would not only be costly, but certainly productive of negative results.

But as a matter of fact, where the queen-rearer has determined to use only one queen for the males, and one for producing his queens to mate with those drones, then I am assured he has already started on the right road—toward isolation. That is his first step, and thereafter he will know just what drones his queens have mated with, as I have already proved in my own experience. Presuming the rearer is using Italians he will produce drones quite different from any in the neighbourhood; and if his selection has been made on the right lines, any ordinary Italians or mongrel drones that may exist near him will not be so stong on the wing as his own, and therefore he will have but a small proportion of mismated queens, and certainly not enough to account for the expense or inconvenience of setting up an isolated or island apiary.

Definite Control and Selection of Drones.

But suppose I told you I had already a method of actually controlling the act of mating, do you think I would try to mate aqueen to just one selected drone, or one in ten, or even one in twenty? Does the reader not imagine that the very drone the apiarist would himself pick out might be less fit, less hardy, less virile, than fifty others? No! I would allow the queen to have the choice from at least fifty to one hundred males in full flight (from my selected drone mother), when the chances are she would mate with the best—the most hardy, strong-winged, and fully virile male in fifty or one hundred as the case might be.

I do not imply that, in ordinary circumstances, the breeder will leave for open flight the whole of the drones his best queen may be able to produce at the expense of normal stores; but that he will constantly be weeding out such as do not appear to him to conform to the type he is striving to maintain.

With regard to the definite control of fertilization, I may say this has been the dream of my many years of experimental and practical bee culture. Fertilization by hand and mechanical means I have tried with untiring patience, but without much success hitherto; and in years gone by the process was repeatedly conducted at my apiary in the presence of the late F. R. Cheshire, who was able to report a partial success resulting from one of my experiments.

The flight of drones and queens in confined areas has also given me much unprofitable occupation, except that such experiments may at last have led me to the real solution of the whole problem, as I can now see quite clearly just why all such trials have been doomed to failure. I hope to refer again to this most interesting subject at no distant date.—"Gleanings."

Points to be Considered in Breeding. Longevity of Much Importance.

F. Dundas Todd.

It may seem rather absurd for one who has raised only a few queens to say anything on such an important subject, but, nevertheless, I have read much on the problem and thought carefully over all the data I have gathered together, trying to get hold of some definite, basic principle that would be all-inclusive. Recently, I have had the experience of being associated a good deal with a poultry expert, and in the course of his lectures, he deals with problems similar to those that interest beekeepers. Some breed poultry for points, some for flesh, others for egg production. The latter quality is the one commercially desirable in this part of the world; so my friend is always urging the farmers to secure a good egg laying strain; always insisting that the strain is more important than the breed. He also warns his hearers that the most prolific egg layer may not necessarily be the mother of hens like herself. He seems to place more faith in selecting breeding stock by shape rather than by egg production. The opinion I formed was that, in many respects, the breeding of poultry is just as nebulous as is that of bee breeding. There is the want of an all-inclusive principle.

Some apiarists breed from the best queen by honey production; others from the queen whose daughters show the best results; and this looks as if the latter condition should cover almost everything, but, in my short experience, I have found, not infrequently, that the colony giving the greatest honey returns in one year had a great struggle to exist the following spring.

Another writer in your own paper says he finds it all right to breed from a queen whose brood is uniformly laid and evenly capped, indicating that she and her progeny are methodical—have good business habits. I have had no chance to experiment along this line, so can say nothing as to facts, but, on general principles, I can not see anything conclusive. I can not contravert; will not even turn cold water on the idea, because the scientific world has long ago learned that no fact is too trivial for observation; as the secret of a great principle may be solved from the knowledge of a very small fact.

As my colonies increase in numbers, my records are becoming more interesting; and, let me say, more voluminous, as regards the individual colonies. Then, as a new idea strikes me, I sit down with the hive book and a few sheets of clean paper, and spend many a pleasant evening hour working out percentages from the data recorded. The results are more than interesting; they are fascinating.

The Death-rate in Winter is a Pointer

In the middle of February, I changed bottom boards to give the bees clean, sanitary conditions, and was much impressed with the difference in the quantity of dead bees on the floor. I jotted down the condition roughly, under the headings of "many" and "few" dead. Now, at the end of May, I have just gone over my book to compare results, and I find that out of those with "few" dead in February, 63 per cent. are strong; 9 per cent. are fair; 28 per

cent. tried to supersede the queens, while none are dead. On the other hand, of those with "many" dead in February, 17 per cent. are strong to-day; 17 per cent. fair; 33 per cent. tried to supersede and 33 per cent. are dead. Broadly speaking, 75 per cent. of those with few dead in February are now in shape for the honey flow, while only 34 per cent. of those that had many dead, are now ready for business. The wintering conditions were as uniform as I could make them.

The very strongest colony had no stores at all in the middle of March, so I gave it about a pint of syrup. I had to leave town for several weeks, so it, and many others, had to get along asbest they could, but it went booming ahead all the same, turning all nectar from dandelions into brood as fast as it came in. On the other hand, some colonies that were weak in bees, but having an abundance of stores, strengthened very slowly. The conclusion is, therefore, that plenty of bees in spring is the most important factor for the building up of a colony for the honey flow.

As I studied over the data, the idea was developed in my mind that, perhaps, the most important factor to be considered in a strain of bees is that of physical vigor, in a word longevity, sufficient stamina to keep them alive during the period of repose in winter and until they have brought their successors on the stage in April and May. Just as I had arrived at this conclusion, had decided from what queen I was to raise new stock, from what hives I was to permit drones to fly, there appeared in "Gleanings" a very interesting article by Mr. Simmins, of England, insisting strongly that the most important factor about bees is longevity, and that if we secure this in our strain we will get a big honey production as a natural consequence.

This summer, therefore, I am going to raise my new queens from the colony that showed the fewest dead on the bottom board, and permit drones to fly from the hives that approached the nearest to the best.—"Review."

THE EFFECT OF ODOR AND COLOR ON BEES.

How Insects have Altered the Flowers; Highly Flavoured Honey Comes from the Strong-scented Flowers; Bees do not Prefer any One Color, though they are Attracted More by Dark Shades.

By Ph. J. Baldensperger.

When at Jaffa, in Palestine, I clearly remarked the effect of odor as well as of colors on bees. The immense orange-gardens are grouped about the old town in a great semicircle, with the base at the sea. Arriving by sea in the months of March and April, all the air for miles is filled with the orange-blossom perfume, and, as a matter of course, also toward the land. Now, the bees of large apiaries situated in a village about three miles north of Jaffa visited regularly the gardens. They used to stream in as a river of bees overhead on calm days, higher in the air, and on windy days almost sweeping the surface to and from their apiaries in search of honey.

We all know that a bee rarely if ever gathers honey or pollen from flowers of different odors or colors on the same trip, and often they do not mix the pollens of different colors in the same cell. Is the sense of art so much developed, or is it simply because the odor of the one flower visited is so strong as to surround the worker altogether and carry her, so to speak, in a perfumed cloud from one flower of the same species to the other in order to have the aim accomplished for which odors and colors

were set forth—that is to say, fertilization? Nature has lavished its agents by placing hundreds or thousands where only one or two are wanted; thus for one drone necessary, thousands fill the air; and as for pollen, thousands of insects carry it away from flowers for their own private use, leaving an infinitely small part, as they pass, in the flower expected to be in need of it.

Colors vary in the flowers, in the pollen, and in the honey; and light-colored flowers may give dark honey or light-colored honey, just as the season is dry or wet, or other atmospherical influences prevail. So the honey is sometimes granulated in the comb, and sometimes it may be very thin for some time after extracting. Here in the South we more often have thick honey, and, as a rule, highly flavoured, because most honey-plants are of the highly scented kind.

As above stated, when the bees are in search of honey they are guided by odor; but when in search of a home or on the way to their hives, in large apiaries, they depend on their senses of sight. Probably they depend more on the colors of their hives than on the shape or surroundings. Sir J. Lubbock supposes that bees prefer one color to another, and gives experience. M. Maeterlinck, too, says that his bees preferred on one occasion blue when he painted a number of hives; thus, some rose color, others yellow, and others blue. He says the swarms chose the blue ones.

For the last twenyt-five years or more I have always painted my hives three different colors, and, though sometimes I have hundreds of them, I could not see that the bees showed any preference.

When there are many hives in one flat piece of country it is very useful to have them of many colors, as it is easier for the workers and the returning queens to strike their own hives without difficulty. On one occasion I had to work with about 400 hives in one square flat field. The hives were placed in rows of three different colors alternately. The bees flew out and in without hesitation. One day one of the blue rows had to be replaced by white hives. The next white row was the third one behind, the distance from row to row being about 10 feet. On returning, the bees of the third row (the white one) alighted on the first which was blue and had become white. Evidently they had noticed the blue row before, and knew that theirs was white; and not finding a blue one, but one of their own color, they settled there, quite confident that it was their own. Encouraged (or, rather, puzzled) by this novel experience (this was more than twenty years ago), the white row was replaced by a blue one, and right away the bees went over to the third line behind their former row. This test proved proved to me that bees not only fix certain points in their memory, but that the color motion was peculiar to them. I can not find a preference for blue any more than for white.

Here in the Alps my apiaries are far apart, and all in rugged mountain regions. So far as this goes I lament sometimes, not as the Israelites of old, 'after the flesh-pots of Egypt," but after the flowery and splendid "plains of Sharon," where I could spread my apiaries in symmetry. They are now in a line, now in ups and downs, and colors are no longer any object to the bees; yet I keep on painting the hives in different colors, not for any particular object, as I did years ago, to break the monotony and fly the national colors—red, white, and blue, even on the hives. Now I often have empty hives containing built comb. In spring these hives are often repeopled by amateur or vagabond swarms. I had in one apiary four red hives and several blue ones; now, the

four red hives were filled first, spontaneously, and the blue were chosen when there were no others. In another apiary, two white and two blue ones were filled alternately by swarms. Again, in a third apiary two hives, one blue and one white, received the visit of swarms at the same time. Finally, in another apiary with two blue and two white empty hives, the two blue ones were preferred first. Of all this, the only possible conclusion is that bees have no preference whatever for color in hives, at least, and are more guided by odor than by color of flowers.

Our experience shows us that light-colored hives absorb less heat than dark ones; and they radiate less; but does the bee know this? Most likely it does not; and when a place to lodge the swarm in seems convenient to the scouts before the arrival of the swarm they adopt it without reflecting on the outward color. Runaway swarms sometimes build their comb in the open air along the branch of a tree or against a rock; but more often they choose the hollow stems of olive-trees, dark and warm though they be.

Notwithstanding all I have said, bees do notice dark colors much more than light ones. Perhaps light colors are imperceptible to insect eyes. I can not explain the reason, but I can point to the fact that light colors do not attract their attenion, while black colors or even dark ones fairly irritate them. As a rule, when at work in the apiary I wear a white helmet as used in Asia and Africa, and rarely do the bees fly at the hat; but sometimes I go among the bees with a black felt hat; and when they are uncovered they will attack the brim at once, sometimes in great numbers. I rarely put on a veil here in Europe; and the veil, if used, is white, for the same purpose as for the hat. If in full work I would pull off the white head; the bees will attack my hairy head; and perhaps should a bald-headed man try, under the same circumstances, he would be sting-proof, just as when I pull up my sleeves to the elbows when working, yet never receive a sting on the arms. Everybody knows how angry bees become when a dog or a horse comes near the hives. It is not only the disagreeable smell, but the hairy business they dislike.

When we first begin work in the apiary, and irritate the bees in some way or other, they will be furious for some time, and then calm down again; but they will often attack, without any visible reason. This refers to our European races. With the oriental races it is often the reverse. They will be quite calm to begin with, and stand human interference for some time without showing their bad humour; but when once their patience is exhausted, nothing will calm their anger; and if you have to continue work it is best to put on a very tight veil and even gloves; for in their vindictiveness they will find any loose part and penetrate toward the more perceptible parts of your person. In the East, when work pressed hard and we could not afford to do slow work and thus avoid irritating them, we had white working clothes, veils, and gloves; but now, when the gloves become soiled the bees will attack the dark parts, but will leave off the attack when these parts are whitened by chalk or any other whitening product. Clearly enough, the dark color irritates them, more especially when excited; and they seem to ignore white, wherever it may be. Again, I have often known them to attack my eyes rather than any other exposed part of my face, simply because these are the dark corners in the human face. This is what I think of color and odor and their effect on bees.—"Gleanings."

SWARMING.

Some of the Causes that Induce it; Can the Swarming Instinct be bred out? An Elementary Discussion that will prove Helpful to Beginners.

By Geo. W. Williams.

It is generally understood that swarming, or, rather, the interruption of work, before and after the swarming act, costs a large per cent. of the honey we could otherwise secure. It is true that we can, by more or less complex systems of management, partially overcome this loss; but we pay the price in added work, and in worry and uncertainty. What a boon it would be if we could eliminate this troublesome tendency! But can we do it? The logical way would seem to be by selection and judicious breeding, both of which are advocated by some of our best writers. But if we are to succeed we must fully analyze the difficulties that must be overcome.

We must always keep before us the fundamental truth that bees are not reasoning beings to any appreciable extent, but are governed entirely by instinct. We must also remember that, while instinct is knowledge, it is inherited knowledge, and it is as unchangeable as the laws of the Medes and the Persians. Hence, under similar conditions the actions and conduct of bees will always be the same, regardless of location. Allow me to emphasize this thought, and put it in the form of an unvarying principle: Under similar conditions, any given stimulus will at any time produce the same results.

Another fact we must consider is that bees, being governed entirely by instinct, can have no initiative of their own, but must of necessity be stimulated to any action whatever by outside influences.

Now it follows, that, as bees are governed by instinct, and instinct is stimulated to action by outside influences, if we are to change results from what we have at present, we must change either the instinct of the bee or the surrounding influences. Either one will secure results.

We know that bees will not swarm at all under certain conditions. Given room, a cool and uniform temperature, and freedom from the excitement of other bees swarming, they will not swarm. Inversely, contract and crowd the abode, raise the temperature, and place them among swarming colonies, any bees will swarm. Unfortunately, the conditions that stimulate them to do their best work in storing also stimulates the swarming instinct. This limits the field for improvement in this direction to a choice among the half-dozen systems of more or less successful control by manipulation.

After a trial of any or all of these systems our minds invariably turn toward the other and very desirable thing of changing the instinct of bees so that they will not desire to swarm, no matter how we crowd them nor how rapid a pace we induce them to maintain.

Upon a careful analysis, this seems less hopeful than the other scheme, unless we could control mating as we control it in our other live stock; for any tendency to improvement in this direction is levelled down by the crushing mass of adverse influences.

When we can successfully control the mating, we can hope for practical results along this line, and not before; for instinct, as I stated before, is simply inherited knowledge handed down from generation to generation from some remote ancestor who somehow acquired it, and it is as real and tangible a portion of the nervous system as the legs or wings are of the body. Hence

the young bee does not have to learn to gather honey nor to build comb, but the knowledge comes to it ready made along with the knowledge of walking or flying. So it seems that, if we are to change the actions of the bees and not change the conditions surrounding them, we must really change their physical structure. We all know what a gigantic undertaking it is to change the length of our bees' tongues, even with millions of tubes of red clover tempting them every day in June, calling on nature to add just one tiny bit to the tips of their tongues so as to sip the precious nectar almost, but not quite, in reach.

How, then, can we hope for any great results in changing a tendency that was implanted ages before Sampson found the swarm in his lion's dried carcass, and has ever since been fostered and encouraged by systems of "taking up" the heavy new swarms and keeping the swarm.

If we are to change the physical structure we must do so by subjecting the bees to a sustained condition that does not excite the swarming tendency, long enough so that this portion of the nervous system shall become eliminated by disuse. How long this may be I do not know. I knew two instances where colonies had remained 25 years without swarming, and, when placed in ordinary conditions, they swarmed as freely as if they had never had a vacation. I imagine that, if we were to put a colony into a case isolated from other bees, and leave them a couple of thousand years or so without swarming, and then restore them to ordinary conditions, they would not swarm more than once in two or three years any way; but I should not expect much better results.

There is one thing that offers some slight hope for improvement; and that is, the tendency of some offspring to vary slightly from the parent stock. But in bees and ants the effect of their habits of mating has been to equalise and fix the racial instincts so firmly in their physical structure that sports are rare indeed; but they do occur, and by a combined effort in selecting the non-swarming queens to breed from we may improve in this respect; but it will be a slow process, and in the meantime we comb-honey producers must use the best system we can find to overcome the tendency. At any rate, these troubles of swarming, foul brood, etc., are not without their benefits. I can control foul brood, and I can, by a proper system, direct the energies of the bees into the proper channels, and, by my system of shaking, keep their energy keyed up to the proper pitch while the flow lasts; and while I can do these things at a profit, others who possibly could do them, but do not take the trouble to learn how, do not do them, and fail. Otherwise they might be troublesome competitors.

By the way, did it ever occur to you that, if the swarming impulse were eliminated, the building of drone comb would also be eliminated? The thought has occurred to me that, if we could establish and maintain the conditions favourable for building worker comb only (always excepting the time of superseding), the swarming question would be solved.

I have been able to establish, but not to maintain, this condition indefinitely. —"Gleanings."

IMPROVEMENT OF BEES.

From time to time the advice is given to breed from the best so as to increase the average per colony, yet probably only a small number of beekeepers act upon the advice. In the average apiary it will likely be found that some colony

produces double the average yield, while another does not produce half as much as the average. Indeed there may be found a colony which, in an ordinary year produces nothing. And yet that non-producer is allowed to continue, because it does not enter the head of the owner that it is a loss to him. It is a loss in two ways. It consumes just as much stores as his best storing colony, provided the colonies are equally populous, thus using up what might be stored as surplus by other colonies. That is bad enough, but perhaps the greater loss occurs from the fact that the drones from this poor colony meet the young queens of the better colonies, thus bringing down the average yield for the future. So it might be a profitable thing to brimstone such a colony rather than to let it continue on its own way.

A little figuring may do no harm. Suppose an apiary of 100 colonies which average, one year with another, 75 pounds of honey per colony, which is sold at 8 cents per pound. Suppose the best colony in the apiary yields double the average, or 150 pounds. Now if the owner requeen his apiary with young queens of that best stock, and if each colony in the apiary then yields 150 pounds each; or, in other words, if he increases the average yield 75 pounds per colony, that 75 pounds at 8 cents a pound will be $6, and that will amount to an increase of $600 a year for the whole apiary. Would not $600 a year pay him pretty big wages for the work of requeening ?

But that "if" in the case is to be reckoned with, and it may as well be said at once that no such result would follow. For future storing depends not only upon the young queens that are reared, but also upon the drones with which they are mated. If the beekeeper rears all his queens from that 150-pound colony, and if all his young queens meet drones from his own apiary, these drones being of average 75-pound stock, then the resultant will be an average of 150 and 75, or 112½. That would make an average increase of 37½ pounds, or an increase of 3,750 pounds for the whole apiary. At 8 cents a pound that comes to just $300. Even that would be good pay.

But again there is an "if." "If" his queens meet drones from his own apiary. They may meet drones from surrounding apiaries. Possibly these may be better than his own drones; probably worse. The larger his own apiary, and the fewer surrounding bees, the better his chances. If his apiary is of considerable size, he may improve his chances by encouraging drones only in his best colonies.

Although it may not be practical to reduce the matter to exact figures, enough is clear to show that the beekeeper who has colonies of varying degrees of excellence (and that takes in nearly all beekeepers), may make a tidy sum by giving attention to the rearing of queens from its best stock.

In many cases, however, the best colony in an apiary is nothing to boast of, and as a preliminary step one or several good queens should be purchased from some reliable dealer.

LONGEVITY IN BEES.

Occasionally some one gives expression to the thought that longevity is an important factor in the beekeeping world. Certainly a worker which lives a few days longer than the average would be expected to gather more than the average, provided the few additional days of its life be added to the length of time it spends as a fielder. But how are we to determine which bees have the longest lives ? F. Dundas Todd, writing in the "Beekeepers' Review," takes the num-

ber of dead bees found on the bottom-board in winter as an index, and says :

"This summer, therefore, I am going to rear my new queens from the colony that showed the fewest dead on the bottom-board, and permit drones to fly from the hives that approached the nearest to the best."

As a general principle this may be accepted as correct, but there are things that make exceptions, and these things must be considered in making any decision. The colonies must be of equal strength to make a fair comparison. They must stop breeding in the fall at the same time. A colony that stops breeding in August ought to show a greater proportion of dead bees than one which continues a month or two later.

Why not measure the longevity of the workers by the longevity of the queen ? If the queens of one strain of bees live longer than those of another strain, is it not a fair guess that there will be a proportionate difference in the lives of the workers ? One man says his queens do their best work in their first year, and that he wants to requeen annually. Another says his queens do as good work in the second, or even in the third, as in the first year. The difference may be in the bees themselves. But the question still remains : If a worker lives longer than the average, will the nurse-period and the field-period be both extended, or will the extension apply only to the field-period of its life ?—"American Bee Journal."