



# Bee World

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## Graded sections

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We make the supposition that the average "figure" of the colonies of the different years was 100 K. Then we calculate proportionally the results of each corresponding colony, for instance for the first queen of 1908 with 36.9 K, we calculate  $26.8:100 = 36.9:x$ . We find so for the figure in question 137.8 K, which gives a plus of 37.8 K above the average of 100 K. (It would take too much space to give the table of the new figures.) Then I add all the figures of one year for the queens aged one year, two years, etc., and dividing the sum by the respective number of the queens I get an average of the queens of different years. I found that

111 queens of 1 year had a minus of 572 K,  
 61 " " 2 " " plus " 525 K,  
 40 " " 3 " " minus " 40 K, and  
 10 " " 4 " " minus " 10 K.

The average for one queen gives the following figures:—

Queens of one year — 5.15 K (average of 111 queens).  
 " " two " + 8.6 K ( " 61 " ).  
 " " three " — 1.0 K ( " 41 " ).  
 " " four " — 1.0 K ( " 10 " ).

This result shows evidently the superiority of the queens of two years, and most unfavourable is it for the queens of one year. As to the queens aged three and four years, I must say that these figures are not quite conclusive, because I kept only those older queens that had distinguished themselves the years before.

In my table I did not take the year 1919; it was impossible to make an exact comparison, because it was the poorest of all those years. In Spring the colonies gave a little surplus, but hardly did July arrive when I was obliged to feed them, so that they might not starve, because most of them had not any provisions at all.

It may be somewhat surprising to see in some series the great number of young queens. The cause of it is, that I often superseded young queens which perhaps did very well, but which did not satisfy me in colour. For getting a rather pure stock I mercilessly removed all queens which showed characteristics of Italian blood.

We see, that for my district it will not pay at all to change the queens every year, not even every two years, at least if the queens were satisfying in their second year. I find that for a breeder it is quite irrational to change the queens even every second year. We are obliged to breed our queens in Spring; now the first year of the queen is seldom proving of her worth, but we do not yet know how the queen will do in her second year. For this reason I choose the queens, from which I wish to have progeny, from those three or four years old. We need not only longevity from the bees, but also from the queens. Therefore I agree perfectly with Doolittle and C. C. Miller, who leave their queens as long as possible heading their colonies.

However, I would remind my readers that my observations are applicable to districts with a moderate honey-yield; in places where abundant crops are obtainable the facts must be different. For years I have constructed brood-curves by estimating as often as possible the brood in a hive. With these curves I was able to determine the figure for the maximum of eggs, and approximately I could calculate the whole quantity of eggs which a queen laid in a season. For the years 1912 and 1913, for instance, I found the following figures:—

Year.	Age of Queen.	Maximum number of eggs laid in a day.	Total of all eggs laid in the season.	Crop.	Average of the crop.
1912	1	1,150	123,400	15.1 K	
1912	2	1,250	132,000	12.1 K	7.2*
1912	2	1,900	175,000	6.5 K	
1913	3	1,000	92,700	14.2 K	
1913	1	900	103,600	13.3 K	9.5*
1913	1	1,500	139,200	15.5 K	

From a great number of brood-curves I found that the figure of 1,900 eggs per day is quite exceptional; generally I

\* I observe that the figures of the crops prove that the frequent revisions do not do as much harm as anxious minds often think; perhaps the contrary!

can consider as the maximum 1,500 eggs. Therefore I can say: in my district and with my stock the daily maximum of eggs oviposited by the queen lies between 900 and 1,500. Doolittle speaks of 3,000 to 5,000 and also Dr. C. C. Miller found considerably higher figures than I have been able to ascertain. It is evident that in such places as those to be found in the United States, where the crop is often enormous, bees are worn out at much a higher rate than in Europe; the queens in America are obliged to work more intensively and for this reason they may not become profitable if retained to the ages of our old queens. Therefore there it may be advisable to change the queens every second year.

## Graded Sections.

By GILBERT BARRATT.

**Artificially Raised Queens.**—I was much interested in reading Mr. Hopkins's letter on artificially raised queens, also that of the Rev. Yate Allen, more so as I have for some time been coming round to the same opinion. I have done this most reluctantly, because the method has always appealed to me for its convenience, the ease of using the cell cups, and the avoidance of mutilating brood combs, but it is difficult to see how the great demand for queens is to be met, if this method is discontinued. It needs no emphasising that correct grafting is an exceedingly skilled operation, needing long experience, and few possess the delicacy of touch required, if damage to the minute fragment of life is to be avoided.

But neither of the above-mentioned writers touched upon the main cause of queen deterioration as related to artificial production. If a batch of cells furnished with royal jelly and larvæ is placed in the cell-rearing stock, or any queenless stock, and then examined half an hour afterwards, the larvæ will be found to be bone dry in every case; the bees always remove the royal jelly, whether furnished from their own hive or another, they then commence feeding only those grubs which they select. This fact may be easily proved by anyone taking the trouble to test it. The effect on prospective queens must therefore be serious; it may be avoided by double grafting; that is, as soon as the bees have removed the royal jelly and replaced it with their own, the larvæ may be carefully removed, avoiding disturbance of the jelly, and fresh ones substituted, when it will be found that all will be accepted. This fact has been noted by at least one American breeder, who advertises all his queens as double grafted, but in quantity production, and at competitive prices, this adds to the cost, both in time and labour. Nevertheless, if only the best are good enough, double grafting must inevitably be practised. Another point bearing upon the subject is, that when the choice is left to the bees, they invariably raise their queens from the egg (in the case of removing their queen, they select larvæ in their haste to remedy this, but this is not a natural condition). It is a debated point whether there is any difference between the egg and a 36 hours larva. Certainly all larvæ appear to be fed at birth with royal jelly, but we know that the bees have the power to modify and dilute this in varying proportions, and we cannot be sure that larvæ destined to become workers are supplied with royal jelly of the same value as that given to intended queens; so that again, if only the best are good enough, and we object to the trouble of double grafting, we must rear our queens from the egg. Another cause of queen deterioration is the travelling cage and candy food. No queen is ever quite the same after a journey in a travelling cage and after feeding on candy; a fertile queen is fed on glandular food by the workers, but in the cage the escort bees are demoralised, and the queen may be seen feeding on the candy along with the rest of the bees, and this unnatural change must have an effect upon her; yet here, again, it appears to be a necessary evil, if the trade in queens is to be maintained.

**Eggs as a Commercial Proposition.**—This brings us to another point which, as far as I know, has not been raised in any bee literature, and that is the sale of pedigree eggs for queen-rearing, as an adjunct to the sale of queens. Last season I removed combs of freshly laid eggs from several stocks, and left them in empty hives and other places for periods varying

from five days to a fortnight; they were then given to queenless bees, and in all cases were converted into queen cells and sealed brood. This suggests the possibility of procuring eggs in comb from the best breeders abroad, and rearing queens therefrom. I am writing to several American friends for eggs, and hope to report results in due time. It is a generally known fact that the bees can delay the hatching of eggs by withholding the royal jelly, and no egg will ever hatch unless and until food is added. How long hatching may be retarded is not known, but from the experiment above mentioned it appears that eggs may be kept at least a fortnight without losing their fertility.

**Repairing Combs.**—It is often a difficult matter to cut out natural queen cells without mutilating the brood combs. The method I employ is to procure empty canisters of various sizes; these are used as cutters, the queen cells being cut out with a good supply of comb. A comb from the stock or nucleus requiring a queen cell is then taken, and the same cutter used to remove a portion of comb; the queen cell then fits accurately into this comb, and the removed portion into the space vacated by the queen cell. By this method a ripe queen cell may be given a day sooner after the removal of a fertile queen. These cutters are also useful in removing patches of drone cells from otherwise good brood combs, a piece of foundation being cut to replace the drone cells, but in this case the lid of the canister is used for the foundation, and being slightly larger, a tighter fit is assured. Combs thus repaired are indistinguishable except for the lighter colour of the new comb. The cutters work better if slightly warmed. If a wire intervenes, use the cutter as far as the wire and then snip with a pair of scissors.

**Simplicity.**—Amongst the very many interesting contributions in the February *B. W.* is a letter by Mr. John Protheroe (p. 228) urging the simplifying and standardisation of British equipment. This matter has received quite a lot of attention in our Press, but there the matter appears to rest; one would think that if our appliance manufacturers can gather around a table and arrange a standard price for their goods, they could give us at least two plain simple standard hives, extra parts for which could be purchased from any or all of them, with the assurance that they would fit such parts as were already possessed. The suggestion has been previously made for a hive of the single walled type, and one with a separate brood box. As Mr. Protheroe rightly says, *commercial bee-keeping in this country will never make much headway until appliances are placed upon a commercial footing.*

**Royal Jelly.**—Since writing the above notes, I have received the March issue of *Gleanings*, which contains a most interesting article on the constitution of royal jelly, written by Prof. C. W. Aeppler, of Wisconsin University. In undertaking the chemical analysis of larval food, Prof. Aeppler used the contents of ten thousand queen cells, gathered over a period of two years. After giving tables of analysis the writer says, "We know that the feeding period of the queen larvæ is about 5½ days, or about 132 hours. All that any bee, queen, drone or worker, will deliver in terms of efficiency is determined during the larval feeding period. For every hour less than 132 hours that a queen larva is not fed on an excessive amount of larval food, at least one per cent. should be deducted in terms of decreased efficiency."

The point bearing upon my notes above is, if the efficiency of a queen is increased by an excessive amount of royal jelly, how much is it decreased by withholding it altogether, however brief the period, when the bees remove it in ordinary queen grafting in contrast to double grafting?

## Melting Brood—"European" Foul Brood.

By JOHN BROOKS.

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This brood disease amongst bees has seemed to defy any and every form of treatment, notwithstanding that all the foremost scientists and experts in the country have been engaged on the problem for years. Every pamphlet that

makes its appearance only helps to make the beekeepers more discouraged, for there is not one that has thrown any real light on the subject. The most that has been accomplished has been discovered by the practical apiarist; all other work done has merely proved that the exciting cause is *Bacillus pluton*, and that two or three other germs follow in its wake and complete the destruction of the larvæ.

In this article it is not the intention to give any new treatment or suggestions, but only to review the experiments of various scientists and others working on the problem.

*Unfortunately the disease is very variable in manifestations and each locality seems to have a form all its own.* In some parts of the United States it yields to very nearly any form of recognised treatments and yet in other places it absolutely refuses to budge under the same treatment—thus causing a great deal of confusion and controversy in articles published in the bee Press.

The spread of the disease seems to be the factor which has occupied much of the time of the experimenters and which has given the least result inasmuch as the spread from colony to colony is yet only a guess. The late Dr. C. C. Miller seems to have accounted for the internal spread of the disease by the fact that the nurse bees suck the food and juices from the bodies of the dead larvæ in an attempt to salvage food. And he goes on to say, "When the nurse bees go to feed the next healthy larvæ, in goes one or two (*sic*) of these germs from the diseased grub." This would of course account for the spread of the disease within the hive but could hardly be reckoned with as a factor in spreading the disease from colony to colony, as the nurses do not as a rule go from the hive with a load of food and enter another hive with it. Although this theory has not been contradicted or disproved it is only one way the larvæ come in contact with the disease. [The nurse bees have every opportunity for infecting the honey stores of their colony, should brood disease be present. Old bees feeding on that honey and happening to drift to other colonies in the same apiary may accidentally transmit the infection.—ED.]

Dr. White, of Washington, has proved to his own satisfaction that the germs can live in honey somewhere around six months and in pollen about double that length of time, but they have never been found resting there from choice, honey and pollen is not their home but only the stomach of the larvæ. Hives and equipment were also found *not* to be a serious means of contact, so we must look in other quarters for the spread from hive to hive.

Mr. Stewart, a large beekeeper in New York State, gives his theory as follows: "While inspecting some bees which were golden Italian he found the disease very bad in a few of the colonies. On inspecting an apiary of black bees some four miles away he noticed there were a few golden Italians scattered through the blacks and that wherever he found the golden bees there were traces of the disease which he thought had been carried by the Italians."

In *Gleanings in Bee Culture* for November, 1918, page 663, Will Klabuhn makes the assertion "that queens taken from a diseased hive and introduced to a healthy stock will be responsible for the appearance of the disease in 95 per cent. of the healthy colonies."

The Roots, of Medina, Ohio, U.S.A., tried an experiment to disprove this theory. They introduced 37 queens from diseased stocks to 37 healthy colonies. And in no case did the disease appear. There seems to be something wrong with either the bees or the queens of Mr. Klabuhn or perhaps the bees of the Root Co. were of the immune type.

Samuel Simmins, of Heathfield, Sussex, England, blames the spread of the disease to the beekeeper himself, for he says, "The germs are easily carried on the clothing and taken from an infected colony to a healthy one." The same author contends that the germ is always with us only waiting for a suitable ground for its development such as a weakened stock or one of low vitality. For he argues immediately honey comes in from the fields and the colony becomes rejuvenated and prosperous the disease gradually disappears, only to return again as soon as conditions are ripe for its growth. Drones are given credit for carrying the disease from one hive to another as they are allowed to enter any diseased colony during a honey flow. It is also argued that the pathogenic