



Originality is the one thing which unoriginal minds cannot feel the use of.—J. S. MILL.

An Enemy of the Mites in the Bee-Hive.†

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In number 11 (for 1891) of the "Deutsche Illustrierte Bienenzeitung," by the late Gravenhorst, I drew the attention of beekeepers to an interesting guest, which our bee-hives are sheltering, the book-scorpion (*Chelifer cancroides*), which lives under the covers of the English and American hives and between the splits of the frames, and which doubtless supports itself with the microscopical beings in the hives. Dr. John Rennie and Miss E. J. Harvey having found seven different kinds of mites in bee colonies, there is no denying the fact that the book-scorpion finds a lot of food. The occurrence of *Tarsonemus woodi* has now also been established in Germany and Switzerland (cf: *Archiv. Für Bienenkunde*, Vol. III., 6; 1921, and *Schweizerische Bienenzeitung*, 1922, 3, 4). It is not unlikely that this parasite is always to be met with in bee colonies and that by solid research it may be also found in America and Australia. The reasons why Acarine disease leads, under certain circumstances, the bee colonies to death, may be discussed later on.

Thirty years having passed since the publication of my work, I had often the opportunity to observe this interesting and funny little animal, and to see hundreds of them. The book-scorpion belongs to the family of pseudo-scorpions with the shallow abdomen, similar to that of a bed bug, which consists of ten segments. The female individual lays about twenty eggs, which she carries on the ventral side of the first abdominal segment and from which the larvæ develop. When they come out, they have on the front side of their body an excrescence, similar to a snout, which represents the labrum, and behind it, the maxillae, while the abdomen is bent to the ventral side of the body. The animal, growing now very quickly, the four walk-legs appear behind the maxillae, and before them the palpi maxillares and on the abdomen, still being bent to the ventral side, four stumpy arrangements appear, which, however, disappear later on. Just so the great labrum is stunted. When the abdomen is stretched, the animal shows the form of the grown up book-scorpion. A lot of pale coloured specimens are to be seen, a proof that this interesting animal grows still into a more perfectly developed state.

This nice and interesting creature runs aside and backwards. On account of its shallow form, it is able to shove in narrow fissures and escapes, if we approach with the finger-tip. The book-scorpion lives, as its names implies, in old books, in herbariums, in entomological collections, but is also to be found in beehives.

Specimens which have filled their great shallow body with plenty of food will be often seen. Because they take their nourishment within the beehive, it may be taken for granted that they must consume an immense number of mites. The book-scorpion is about 2-3, 5 millimetres long, i.e., about one-tenth inch. It is not easy to deny the increase in mortalities among bees corresponding to the decrease or absence of the book-scorpions in the hive. We know by many examples that the biological attack of noisome animals plays a great rôle

in the agricultural sphere. In the United States, for instance, the lady-cow (*Coccinella septempunctata*) was cultivated and introduced into the fruit plantations of California, because the larvæ of which consumed the vine-fretter (*Aphidae*). Twenty years ago a French entomologist, who lived in Northern America, sent for some cocoons of the gipsy-moth (*Lymantria liparis dispar*) from his native country. Some of these cocoons were blown into his garden by a current of air, the caterpillars came out and covered the fruit trees, and in a short time nearly all the States had to suffer under a terrible plague from the invasion of the gipsy-moth, since the mature caterpillars had been taken everywhere by the motor cars. To combat this scourge, American entomologists fifteen years ago bought thousands of caterpillars and chrysalis of the gipsy-moth in Europe and brought them to the United States, in order that the characteristic enemies of this moth, the caterpillar-fly and the ichneumon-fly, the larvæ of which live on the caterpillars of the gipsy-moth, should develop and become naturalised. The problem was successfully solved on those lines and the dissemination of the gipsy-moth was brought down to a normal proportion. Five years later two pairs of the musquash (*Ondrata*) were introduced in Dobris in Bohemia, for they were intended to be cultivated on account of their precious skin. The immense increase of these animals (to-day they are calculated at about four millions) followed only because their natural enemies were missing in

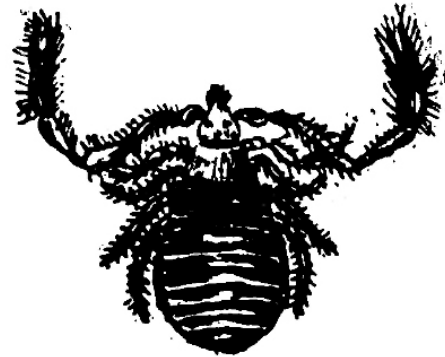


Fig. 1.—The Book-Scorpion (*Chelifer cancroides*).—Magnified.

the new country. To-day this experiment is much regretted, for soon the whole of Europe, with the exception of the isles, will be menaced by this terrible rodent. The attention of scholars, for analogous reasons, is therefore drawn to the interesting guest of the bee colonies, above discussed, as a practical means of controlling Acarine disease. Proper scientific tests should be highly interesting.

[Dr. John Rennie, F.R.S.E., comments on this article as follows:—

"I am able to confirm the occurrence of the book-scorpion (*Chelifer cancroides*) in beehives, although in my experience its presence in such situations is extremely rare. It has been found in our apiaries here on only one occasion during many years, but it may, of course, have been overlooked. I imagine its distribution in hives is very casual; and only in ill-kept apiaries, where damp, debris, and dead bees are dominant features, is there likely to be a sufficiency of mites to attract *Chelifer* in numbers, should these be a determining factor. It is sometimes found on the bodies of insects."

Assuming the Alfonsus theory to be correct (and this has yet to be shown), it will adequately serve as one of the reasons for the epidemic occurrence of Acarine disease in the past, following a period of beekeeping prosperity in which mites were apparently reduced to very small numbers that were inadequate for and unfavourable to the propagation of *Chelifer cancroides*. This creature, it has been suggested, sucks the juices of insects, and therefore might annoy the bees. But considering its absence from many hives in this country, its parasitic behaviour towards bees (if at all correct) must be quite negligible and that, apparently, there is no fear on that account of propagating it in districts where the disease

† Authorised translation by Herbert Schering, Berlin.

is endemic (at least for experimental tests to begin with). In view of Dr. Rennie's comments, one wonders whether the less hygienic skep of the past was more favourable to the growth of *Chelifer* than the modern hive, properly kept. In any case, with prolific breeding of bees in large hives, every beekeeper has now an excellent method of combating Acarine disease; and no skep, however rich in its population of bees and *Chelifer* (if the latter is at all helpful) would appeal to us better than, for instance, a "Modified Dadant Hive," in occupation by a stronger colony of bees and without our scorpion friend. We prefer to rely more on the Queen Bee and rational management as the best prophylactics to Acarine disease. Nevertheless, we shall welcome proper research on the thoughtful and interesting lines indicated by Mr. Alfonsus, for in this may lie in store for us another useful weapon against *Tarsonemus woodi* in its most dangerous or migratory stage of activity.—Ed.]



By R. WHYTE.

Fertilisation of Queens Artificially.—The experimental work accomplished by Mr. Barratt (see *Bee World*, December, 1919, pp. 141-142) on the fertilisation of the bee's egg suggests, as I have already emphasised, great possibilities in the matter of purity of strain. The climax to this work ensuring *absolute* purity of race could only be achieved by artificially impregnating the queen. This, I find, has been done as long ago as 1885 by Mr. Nelson W. McLain, Apicultural Expert to the Department of Agriculture, Illinois, U.S.A. In his report on this subject he mentions many unsuccessful experiments but he was successful in three cases in *directly fertilising virgin queens*. The following from his report is interesting:—

"When the virgin queen was six days old orgasm occurred, and on the evening of the seventh day we removed her from the hive and placed drops of the male sperm upon the vulva as she was held back downwards, by gently grasping the thorax between the thumb and finger. The instant the male sperm was pressed from the testes and seminal sack of a mature drone upon the excited and distended vulva, it was curious to observe the effect. The action of the abdomen and vulva resembled that of young birds while being fed. There was the reaching up after the seminal fluid, and an action of the parts resembling the opening of the mouth and swallowing food. As much seminal fluid as could be obtained, by the imperfect method employed, from three or four drones, was utilised and readily absorbed by the queen, after which her wings were clipped, and she was dropped on a frame covered with bees and returned to the hive, and the bees were liberated. Up to this time her appearance and actions were those of a virgin queen. The next morning, 12 hours after exposure to the seminal fluid, her abdomen was distended, and her appearance and actions in all respects were those common to fertile laying queens. She was moving about slowly over the combs, and peering into the cells, and in 24 hours afterwards she had 400 or 500 eggs. In due time the worker-larvæ appeared, and at this date (November 13th) worker bees in considerable numbers are being hatched. We then reared two queens from the eggs laid by this artificially fecundated queen, in queenless colonies, and as soon as they were hatched I clipped their wings, and when orgasm appeared they were treated as before described, and in three days one laid a few eggs in worker cells. The other has the appearance and action of a fertile queen, but has laid no eggs, and the lateness of the season forbids advantageous continuance of the experiments."

I do wish Mr. Barratt would continue his splendid work in this direction. He has proved how we can have 50 per cent. control in breeding; will he and other interested researchers find out for us if it is possible by a certain practical method to control the full 100 per cent.?

N.Z. Foulbrood Situation.—In this clash of opinion between Mr. Hopkins and myself, beekeepers everywhere, but more

particularly those in Britain, may be able to judge as to the success or otherwise of legislation of the type tested in Canada, U.S.A. and New Zealand. Despite minor difference in these enactments they are all fundamentally of a kind. These last few years have brought forth responsible admissions of failure from all over the Continent of America, and they are at the turning point of policy in dealing with foulbrood so far as the New World is concerned. When Mr. Hopkins time and again proclaimed the success of the N. Z. Act, I felt a bit sceptical and wondered if time would bear out Mr. Hopkins's expectations. I have no hesitation now in saying that the foulbrood situation, judging by analogy, will get worse and worse if the present police methods are persisted in.

When, in a previous issue of the *Bee World*, I asked for information as to New Zealand I thought I might have got some information about the *actual* disease situation; but no. Some generalities as to the progress of apiculture but *not a word* about the terrible foulbrood situation presently existing. This want of frankness led me to dot the i's and cross the t's of Mr. Hopkins's letter in the October *B. W.* In doing this, I went to the very fountain head, *viz.*, the Official Report of the three days' Conference of N. Z. Beekeepers in 1920. What I said was mild compared to the unanimous resolutions passed at this Conference. Is Mr. Hopkins serious when he says: "I have fallen into a mare's nest, and thereby have been unconsciously led to make statements utterly misleading"? When I quoted "the unanimous finding of this Conference representative of N. Z. beekeepers that this Act had not accomplished the primary object for which it had been placed on the statute book," am I to believe, as Mr. Hopkins hints, that these men were bluffing? And when the President submits a remit from the Executive "That in spite of our Apiaries Act and inspectorial staff, we are not making nearly sufficient progress in the checking of disease. In some districts it is questionable whether disease is not causing greater ravages than ever . . ." are you to believe that I have "fallen into a mare's nest"? It is only fair to say that Mr. Hopkins was not at this 1920 Conference, but Mr. W. B. Bray, whom Mr. Hopkins introduces into this matter, was; and if Mr. Bray thinks these reports were in any way exaggerated, the place to say that was at this Conference rather than in the *B. W.* The opinions of Mr. Bray and the Government Apiary Inspector are interesting, and most ably put; *but*, is the logic of events not against them?

It is eminently unsafe to prophesy, but I am almost tempted to say that as the years go on your foulbrood situation will get worse unless you mend your methods.

I feel like stopping now, yet there are some minor points in Mr. Hopkins's letter that call for remark. Mr. Hopkins, I feel, is unfair to me in his latest criticisms (pp. 278-279). He mentions that *they* back their Act up "by offering to tax themselves to help pay for the administration of its provisions. . . Is Mr. Whyte prepared to advocate a self-imposed tax among beekeepers, and to render his dole to carry out his educational scheme?" Is this sort of argumentation (?) necessary? *I know Mr. Hopkins's wholehearted work for apiculture is world-wide, but this does not give him the right to hint at stinginess on the part of one who sees things in a different way to him.* But is Mr. Hopkins quite right in what he says about taxing themselves. In the 1921 Report of N. Z. Conference re "Apiary Tax.—This matter was still under discussion with the Department. . . He understood there was a lack of unanimity on the question, as the Secretary would show by the result of canvass of the branches for their opinion."

I notice in this 1921 Report that the Standing Committee report that "The resolution that the importation of bees, queens and honey should be immediately stopped." These regulations *had been gazetted!*

Great Britain is New Zealand's best customer for honey. Thousands of tons of foul-broody honey have been shipped to this country; the cheapness of this honey inducing many beekeepers, ignorant of the state of affairs in N. Z., to feed their bees on it. If we should follow the precedent of New Zealand and enact legislation in the hope of keeping our bees healthy, we would be justified, following precedent again, in debarring N. Z. honey from getting into this country. Des-