THE LONG-TAILED PARASITE OF TORTRIX.*

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This address deals with the advances made in dealing with Tortrix on biological lines.

When I first came to Ceylon, at the end of 1929, my principal line of work was to be devoted to the development of an egg parasite for the suppression of Tortrix. This was a very minute, wasp-like insect that raised its progeny in the eggs of various moths and butterflies, the process of doing so killing the eggs. At that time, this parasite, *Trichogramma*, had been used in other parts of the world for the same purpose on other pests, and was very popular on account

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of the ease by which millions could be raised within the compass of a small room. This led to commercial exploitation, and the parasite could be purchased at so much a thousand. However, it never fulfilled the hopes placed in it, and it has almost gone out of production now. It proved a complete failure in Ceylon also, and when I realised it was likely to do so, I began to look about for something else.

Knowing that Java also harboured the Tea Tortrix, and that it did little harm there, it seemed well within the bounds of possibility that parasites existed there which were unknown in Ceylon, and which were responsible for keeping it down within reasonable limits. Past literature supplied me with sketches of some of these which had not been found in Ceylon, and one of them was a species of *Macrocentrus*. Other species of this kind found elsewhere in the world are known to be useful parasites, so it seemed that this was one to try. We communicated with Java on this subject in 1932, but it was not until the Chairman and Director visited Java in 1935 that we were able to establish contact and arrange for some material to be sent over.

This consignment arrived in November, 1935, and consisted of a mass of Tortrix caterpillars on tea in cages. Out of these we obtained several species not hitherto found in Ceylon, one of which was the one I was so anxious to get hold of. This *Macrocentrus* is a small, slender, Ichneumon type of wasp, the females of which are distinguished from the males by having a long ovipositor at the business end, which is about equal to the length of the body. On account of this structure, I have named it "The Long-Tailed Parasite."

From our first consignment we obtained 488 parasites, which were divided into three parts. Some were retained in the laboratory for breeding purposes and for observation. Some were put out in a wire gauze cage I had had constructed for the purpose round some tea bushes in the field, and the remainder numbering 378 were let loose in one of our fields which showed a certain amount of Tortrix, and which was not due to be pruned for over a year.

Although we were informed that there was no difficulty in breeding these things in the laboratory in Java, we were quite unsuccessful here. Similar lack of success was experienced in the field cage, although it had been well stocked with Tortrix in anticipation. Very little was seen of those liberated in the field. In January, 1936, one cluster of cocoons was found, and thereafter nothing until June, when another was found from which emerged only males. As time

went on and we could find no more, I reluctantly came to the conclusion that colonisation had failed. However, I determined to make further trials and another consignment was received in September, 1936, from which 117 were let loose in the field.

It was at the end of December 1936 before we found a few cocoon clusters in the field again, and their position left no doubt that the first lot of parasites had not failed after all. For the next few months they were quite common, and no difficulty was experienced in finding them. In February, 1937 I therefore made a survey to determine the extent of their spread and found that they covered an area of something over 50 acres, and their population was estimated at about half-a-million. Now this was extremely encouraging, for it showed that the parasites could maintain themselves in times of great scarcity of hosts which is usual during the South-West Monsoon period. Since that time the parasite has extended its range over the whole of St. Coombs and well into two adjoining estates. Its rate of parasitism has reached over 50 per cent, even when caterpillars are very scarce. This rate is many scores of times greater than all other parasites put together.

I will break off here, now, to say a few words about the parasite itself. So far as we know it attacks nothing but Tortrix, which is a point of the greatest importance for it means that it hunts none but it and does not spread its energies over several different insects.

It goes to work in a peculiar fashion. The female having alighted on a folded leaf in which a Tortrix is at home, gets very excited walking up and down and at length raises its abdomen, curls its ovipositor down and drives it through the leaf into the caterpillar and then deposits an egg inside. The victim does not suffer all this to go on entirely without response. He can sense at once the arrival of the foe, and then without moving his position starts a series of jerks. Presumably this is intended to frighten, but the intruder is quite indifferent to these manœuvres and attains her purpose without difficulty.

The eggs laid in the caterpillar hatch into legless grubs which feed on the juices in which they are immersed, and grow in size as a consequence. They become full grown after about a month, and during this period the caterpillar is strange to say, not only alive but feeding. However, it seems to become somewhat comatose towards the end of the growth period of grubs, which then break through the skin and proceed to spin cocoons in which they pass to the next, or pupal, stage. Thus one may see one day the caterpillar alive, on the next a bundle of small cigar-like objects. There is nothing to be

seen of the caterpillar except its head. The further development of the parasite occupies about three weeks, so that the total cycle is about seven weeks, when that of the Tortrix is about 10 weeks.

The rate of development of the long-tailed parasite is therefore about half as quick again as that of Tortrix, and as its mortality rate, except when the number of hosts diminish greatly, is comparatively low, this constitutes a second favourable factor. Now we know that there are five generations of Tortrix each year up here, and that there is a regular rise and fall in its numbers during the year. During the minimum period in the middle part of the year, the parasite must necessarily diminish in numbers, so that when the cycle of increase in Tortrix begins the parasite is at first left — in other words, Tortrix will always retain the initiative. But it seems likely at present that this parasite may be able to prevent a really severe attack such as has happened in the past.

To return to the spread of *Macrocentrus*. When plenty of these were found on St. Coombs, I looked about for fresh places to start propagation, but unfortunately no one seemed to have Tortrix just then — so I had to wait. Hearing of some appearing in Maskeliya this year I went over and examined a number of places in October with a view to release. And then we found that the parasite had almost cleared St. Coombs of Tortrix, and there were very few parasites to be had. Fortunately, I found a nice attack of Tortrix on a neighbouring estate, about ¾-of-a-mile away, and to my great delight found quite a lot of parasites amongst them. So I was able to liberate some in two places in Maskeliya, which were fairly well stocked with Tortrix. I have little doubt that they will be able to propagate themselves satisfactorily, as they have done in St. Coombs under less favourable circumstances.

In conclusion, I must sound a note a warning. It is yet too early to say what status this parasite is going to achieve in the Tortrix complex. We know it has settled in well — we know it is far more effective than any indigenous parasite. We cannot tell yet whether it will prove the complete answer to the Tortrix problem. It will be necessary to wait and see. But the signs, it seems to me, are favourable — and if it fulfils my hopes, there will be an end of eggmass collections.