

Observations on the parasites of *Xyleborus* twig-borers in Java*)

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Notes found in early literature

During his earliest investigations WURTH very often found the various stages of a Chalcidid in the bore-holes of his *Xyleborus coffeae* (now *X. morigerus* Bldf.). He gave a short description of the imago — which has a blue-green metallic lustre — and of the larva and pupa, and also published drawings of these stages (1908). The parasite occurred in holes still containing stages of the borer.

DUPORT (1911) observed a Chalcidid parasite commonly occurring in the brood-chambers of a *Xyleborus* twig-borer on coffee in Indochina. The borer was considered to be identical with the Java species**). The Chalcidid appears not to have been identified at the time, but might well have been the same as, or related to, the wasp mentioned by WURTH.

ROEPKE (1914) investigated the parasite in 1913 and identified it as a Chalcidid near the genus *Apostrocetus*.

Much later WURTH (1921) published some figures about the parasite inhabited holes as observed on an estate in East Java. In a plot where the infested branches had regularly been removed, only 22% of the nests contained the parasite, against 43% of the nests in a plot where no removal of borer-attacked branches had taken place; the total number of brood-chambers investigated being about 460 in both cases.

BEGEMANN (1927) compared the number of borer specimens, in various stages, with those of the parasite, in branches regularly collected on two E. Java estates during a full season. The graph published by him shows that the population of the parasite roughly follows the same line as that of the borer, the latter being mainly dependent on the rainfall.

Observations of the author

I was fortunate enough to observe some 8 specimens of the little wasp visiting the borer-infested branches of *Swietenia mahagoni* saplings which had grown naturally under a plot of 56-year old trees in the forest range of Tempuran — near Kedungdjati in Central Java — on 7 July 1922. The wasps were seen exploring the branches, tapping them with their antennae near the few bore holes. Two of these holes were plugged by the mother beetle with its declivity. The wasps would fly away for some time to return again for their explorations. When a wasp had chosen a spot to intrude its ovipositor it placed the tip of its abdomen

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The description of the parasitic wasp is to be found on page 256 of this issue.

**) A note on the identity of the *Xyleborus* species from Tonkin will appear in a later issue of this periodical.

— formed by a sheath protecting the needle-like ovipositor — vertically on the bark, the body being lifted in the act. Then the abdomen was straightened again and the ovipositor was pressed down into the tissue with helping movements of the body. Next followed a series of some 15 up and down movements of the body whereby the ovipositor was deeply pressed down every turn, apparently in the act of probing the brood-chamber of the borer and intruding the eggs in the host specimens within reach. The whole act lasted 10—35 seconds. One of the wasps was seen to remain on the place after oviposition and to chase other wasps that tried to alight on the same spot away; the defender having its wings raised in a typical fighting attitude.

With regard to the effectiveness of the parasite's activities, I found the following in the notes made during my investigations of the *X. morigerus* infestation of mahogany species in the teak area of Central Java. In one instance, out of 24 bore holes in the stems of seedlings, six contained stages of the parasite in company of the borer, while on another occasion, five out of six holes in twigs of mahogany trees were found occupied by the parasite, which had totally finished the *morigerus* brood in two of them. No parasites were met in the holes formed by the borer in the tap-roots of the seedlings, showing that these were out of reach for them.

The parasite was also found by me in borer-infested *Tectona* (teak) shoots and in *Leucaena* stems. In a sample of teak shoots only one brood out of nine examined was parasitised, the hole containing 2 young imagos, 5 pupae and 2 larvae of the Chalcidid. In some 60 galleries opened in the stems of *Leucaena* in one plantation, traces of the parasite were only found in five of them.

No evidence of the presence of parasites was found in the numerous borer-infested roots and stem-bases of tea (*Thea*) seedlings, examined by VERBEEK (1930) and by myself.

OBSERVATIONS ON A SECOND PARASITE AND ADDITIONAL NOTES OF BETREM

In 1926 BEGEMANN (1927a : 10, 1927b : 330) discovered a second parasite of *Xyleborus morigerus* in twigs of coffee, the wasp presumably belonging to the Proctotrypoidea. The imago of this species appeared to enter the galleries of the borer and to paralyse the larvae and pupae before laying an egg on them. BEGEMANN succeeded in rearing this parasite in the laboratory.

BETREM (1931, 1932a) found the same two parasites active on the brood of *X. morstatti* Hag., and shortly after (1932b) he published a short note on their life-history in the text accompanying a series of drawings. These included figures of the ♀ and ♂ pupae and adults of parasite no. 1 (*Tetrastichus* sp.) and of the deformed twig-borer larvae infested by this parasite. He also figured an adult of parasite no. 2 — an ectoparasite said to belong to the Bethyridae — as well as its young larvae attached to a larva and a beetle of *X. morstatti*, and the cocoon of the parasite's pupa.

BETREM specified that parasite no. 1 infected its host by intruding its ovipositor right through the tissue of the twig, which confirmed my observations of 1922, here published for the first time. He had already observed (1931) that the *Tetrastichus* was also found active in the galleries of the secondary ambrosia beetle

Eccoptopterus bicornis Egg. which is not uncommonly found living in dying coffee branches right after the attack of the primary borers. And he furthermore stated that this parasite was able to suppress gradations of the brown twig-borer, *X. morigerus*, but apparently was not able to do so for the black borer, *X. morstatti*. Parasite no. 2 was reported to be less common than no. 1 and — unlike the latter — not specific for twig-boring *Xyleborus* species.

In the chapter on the pests of coffee in Java, written by BETREM in collaboration with DE FLUITER in a planter's manual (Vraagbaak, 1941), both twig-borers are assigned to the genus *Xylosandrus* Reitt., and the main parasite of the larvae is mentioned as "Tetrastichus xylosandri Betr.". This indication, apparently a "nomen nudum", has been cited afterwards by ULTÉE in his general paper on the coffee cultivation in an agricultural handbook (1949).

The shift of parasite no. 1 from its original host to *X. morstatti*

In a recent paper (KALSHOVEN 1958) I dealt extensively with the spread of *X. morstatti* in Central and East Java where it gradually replaced *X. morigerus*. In the paragraph on the ecological relations between both species, I referred to BETREM's observations (1932) concerning the peculiar behaviour of parasite no. 1 under these circumstances. Where *X. morigerus* was still present and the percentage of parasitism in its brood was high, the parasite was also found attacking the invading *X. morstatti*. Where the former species was disappearing from the district the parasite was also decreasing in numbers and was then not to be found any more in the broods of *X. morstatti*. Where *X. morigerus* had been practically replaced, *X. morstatti* was still free from parasites for some time, getting the opportunity to multiply freely. It took some time before parasite no. 1 began to reappear, now infesting the *X. morstatti* broods. This state of affairs was observed in plantations on Mount Kelut but had not yet reached the Besuki district, in October 1931, according to 's JACOBS (1931) who gave an explanation of the matter at a planter's meeting basing his communications on BETREM's studies.

It may be further recalled here that BETREM found indications in his experiments that the parasite living on *X. morstatti* where this species had become the only one present, did not attack *X. morigerus* any more. He tentatively suggested that the parasite was developing a form better able to attack *X. morstatti* and was following the invading species where the latter expanded its area.

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Nieuwe vindplaatsen van *Cerastis leucographa* Schiff.

door

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Deze soort werd in ons land ontdekt door DELNOYE (1948, *Ent. Ber.* 12 : 232) en wel in Zuid-Limburg te Spaubeek. Sindsdien is dit een trekplaats voor entomologen, welke de soort in hun collectie wensen.

Vooruitlopend op een geregelde inventarisatie van het Savelsbos te Gronsveld, die ter hand zal worden genomen, o.a. door gebruik te maken van een mothtrap, werd op 30 maart 1960 incidenteel met de menglichtlamp te Gronsveld gevangen. De weersomstandigheden waren op die avond allesbehalve gunstig, heldere lucht, damp, sterke afkoeling. Desondanks bevonden zich tussen de kleine bezetting aanvliegers drie exemplaren van *Cerastis leucographa* Schiff., waarmee dus een tweede vindplaats van deze soort werd ontdekt. Merkwaardigerwijs werd geen *G. leucographa* op dezelfde avond te Spaubeek gezien, noch op smeer, noch op wilgekatjes en menglichtlamp.

Het gezelschap, dat gelijk met de drie *G. leucographa*'s op licht kwam, bestond uit de uilen:

<i>Orithosia incerta</i> Hufn.	<i>Cerastis rubricosa</i> F.
„ <i>munda</i> Schiff.	<i>Conistra vaccinii</i> L.
„ <i>gothica</i> L.	<i>Eupsilia transversa</i> Hufn.
„ <i>stabilis</i> Schiff.	<i>Scoliopteryx libatrix</i> L.
„ <i>cruda</i> Schiff.	

Weinig en niets bijzonders dus, evenals de spanners:

<i>Alsophila aescularia</i> Schiff.	<i>Nothopteryx carpinata</i> Bkh.
<i>Biston stratarius</i> Hufn.	

Enige tijd later werd *C. leucographa* bij een incidenteel lamponderzoek (lichtvangst) in het Vijlenerbos (gem. Vaals)esignaleerd, de derde vindplaats in Zuid-Limburg. Practisch in dezelfde tijd werd de soort ook in Zuid-Brabant aangetroffen in de gemeente Best, zodat het erop gaat lijken, dat *C. leucographa* inheems is in de bosgebieden in het uiterste zuiden van ons land, vanaf Vaals tot in Brabant.

Stellig zullen er meer vindplaatsen worden gevonden bij een stelselmatig onderzoek in de rijke en niet te droge bossen in dat gebied, waaruit ook weer blijkt hoe weinig er feitelijk nog maar bekend is van de verspreiding van nage-noeg alle vlindersoorten en welke taak er nog weggelegd is voor de serieuze entomologen, die niet alleen collecties willen verrijken (en derhalve maar al te