

**A form of commensalism occurring in *Xyleborus* species?
(Studies on the biology of Indonesian Scolytoidea, Nr. 6) *)**

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When collecting pin-hole borers from a multiple infested log of *Cinnamomum camphora* lying in the Tjibodas Gardens (W. Java, N. slope of Mount Gedé, 1500 m, August 1923) it struck me that in a few instances the entrance holes of two species of *Xyleborus*, differing somewhat in size, had been bored very close to each other. In one case the larger hole was even flanked by two small holes. There was no apparent reason why the mother beetles had selected such a small spot for boring into the log, which was a large one, and which for the rest showed a more or less equal infestation over most of its length.

On a later occasion, while investigating pieces of old stems of *Eupatorium pallescens* with a varied borer fauna, which had been gathered near Tapos (N.W. slope of Mount Gedé, 800—1000 m, July 1932), the same peculiarity was found of 2 or 3 entrance holes of slightly different sizes occurring just above one another.

In both cases the cutting open of the wood showed that the galleries in the wood were also very near to each other, possibly even having an open connection in one or two instances. The photographs of some of the holes in *Eupatorium* reproduced here may illustrate the peculiar feature better than words (fig. 1).

Now it is the rule rather than the exception that the sections of a host plant which is rendered in a condition favourable for infestation by pin-hole borers, may serve as a breeding medium for more than one and even for several species simultaneously, and that their galleries may be crowded and intertwined to some extent. However, in the cases just described the suggestion forced itself on me, that here the close vicinity of the holes was not accidental, but had to be explained in another way. It appeared likely that the larger *Xyleborus* species had first entered the wood and that the small species had followed-after, boring its entrance hole almost in contact with that of the first.

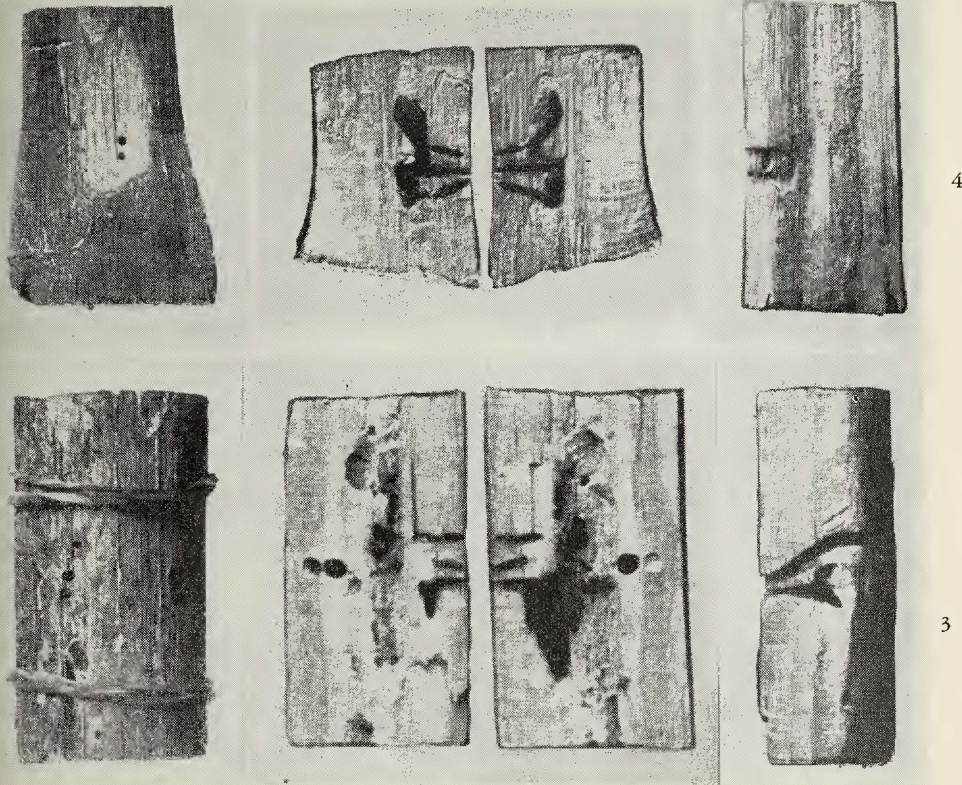
Now it was not clear what were the causes and consequences of this behaviour of the beetles. Originally I was inclined to suppose that the last coming species did not carry its own ambrosia fungus and depended on the pioneering species for supplying it, but Mr. F. G. BROWNE, with whom I corresponded about the matter, kindly pointed out that he had taken the alleged dependent species (*X. justus*, see below) living quite freely on its own. Mr. BROWNE further stated that he had noticed the crowded boring of entrance tunnels fairly often but had always put it down to exact conditions attracting two or more species to the same spot.

However, an obvious result of the behaviour of the beetles must be that the

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2b Photog. G. v. d. BERG, Zool. Lab., Amsterdam

Fig. 1. Strikingly adjacent entrance holes and cavities of *Xyleborus* species in sections of *Eupatorium* stems. 1. Two holes of different size. 2a. Three holes, one smaller than the other two (the 4th, separate hole on the shaded side is of *X. tegalensis*). 2b. The same piece split in two to show the situation of the brood-chambers. 3 and 4. Two cavities of different species occurring side by side. 5. Split piece with three adjacent cavities belonging to at least two different species.

last coming species forms its tunnel in wood tissues already infested by the ambrosia fungus of the first-coming species. Therefore the former species has the ambrosia growth to its disposition at an earlier date than when it has to bore an entirely separate hole and this, it seems to me, may be looked upon as an advantage. The peculiar behaviour of the small species can then be considered as a tendency to commensalism.

In offering this suggestion, I may remind that some species of bark-boring Scolytids have been found using the entrance holes made by an allied species (see SCHWERDTFEGER, 1957), in this way circumventing the necessity of boring entrance holes of their own through the bark.

Yet it must be admitted that the whole matter is still very speculative as there is nothing known about the particular fungus species living in association with

these *Xyleborus* species, nor about the competition between the ambrosia fungi with each other and with other organisms with which the wood becomes infected at the moment the borers penetrate the tissues. It is to be regretted therefore, that there was no opportunity at the time to investigate the supposed interaction of the *Xyleborus* species in any further detail.

At the time the observations were made, several *Xyleborus* species were found for the first time and the identifications were received much later (see the introduction in KALSHOVEN 1958 and 1959). Moreover there was a large variety of species in both cases — some 14 in the *Cinnamomum* log and some 20 in the *Eupatorium* stems — including, besides the *Xyleborus* species, some Cryphalini, *Thamnurgides* species and Platypodidae, which made the whole picture rather complex. This, added to the fact that the original samples were rather small and that today the specimens are no more completely at my disposal, renders it impossible for me to state with certainty what species were involved in the assumed relationship.

It seems likely however, that the small, later coming species was *X. justus* Schedl, which is 1.5—1.9 mm in size, and that the pioneer species associated with it were *X. difficilis* Egg. (1.8—2.0 mm), *X. cancellatus* Egg. (2.9—3.2 mm) and *X. javanus* Egg. (2.3—2.8 mm). There are also indications in my notes that another small species, *X. quadrispinosulus* Egg., 1.55—1.75 mm in size, may have a similar tendency to commensalistic habits.

For further details on the plant hosts and habitat of these species the reader may be referred to my recent paper on the habits of Indonesian ambrosia-feeding Scolytids (KALSHOVEN 1959).

It is to be hoped that the whole matter, which still is for the present rather hypothetical, may be checked and investigated by other field entomologists.

Summary

Observations are mentioned which have led the author to the opinion that particular species of *Xyleborus* are inclined to make their entrance holes quite near to those of other species of the same genus, with the result that they bore right into tissues already occupied by the ambrosia fungus of the pioneering borer, which makes the food immediately available for the later coming species. Herein a tendency to commensalism is seen.

References

- KALSHOVEN, L. G. E., 1958, *Tijds. Entom.* 101 : 157.
 KALSHOVEN, L. G. E., 1959, *Tijds. Entom.* 102 : 135.
 SCHWERDTFEGGER, F., 1957, *Zeits. ang. Entom.* 40 : 495.

Het aanvreten van bloemen door wespen. Op de „Hoge Veluwe” werd waargenomen, dat wespen (*Vespa* spec.) op grote schaal in een tuin de bloembladen van pronkbonen aanvrat. Dit gebeurde op verschillende plaatsen bij de bloemen, ook aan de rand, het was dus niet een weg banen naar het centrum. Ik schreef hierover naar Pater BENNO. Deze kende het verschijnsel niet, althans niet in deze vorm.

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