

# Notes on *Gnathotrichus materiarius* (Col. Scolytidae), a timber beetle new to the Netherlands

by

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## ABSTRACT

The imported Pine timber-beetle, *Gnathotrichus materiarius*, was first found in 1965 in timber of a Douglas fir and again in 1966 in timber of various coniferous trees. This paper contains an account of the distribution and life history of the insect, along with notes on its morphological characters.

## INTRODUCTION

*Gnathotrichus materiarius* (Fitch), an Ambrosia-beetle, was probably introduced into Europe between 1930 and 1940 from the eastern parts of the U.S.A. or Canada. In North America the common name Pine timber-beetle or timber-beetle is used not only for this insect, but also for two other species, *G. retusus* (Leconte) and *G. sulcatus* (Leconte). All three species are known to cause considerable damage to felled, unbarked trunks of various conifers when these have not been removed from the forest before the swarming period.

In the Netherlands *G. materiarius* was first noticed in 1965, in the forest section Niersen of the estate of the Crown near Vaassen (BRAKMAN, 1966). In the middle of June I found large numbers in a felled Douglas trunk which was conspicuous by a layer of white dust around the trunk. This was supposed to be an isolated case, because this species was not found in similar infestations of Douglas fir near Garderen and Putten (DOOM, 1965).

In 1966 I searched more intensively for infestations by *G. materiarius* in the Veluwe area. It appeared that the species occurred in five localities between Vaassen and Arnhem and almost everywhere in large numbers. This convinced me that it had established itself. ELTON c.s. (1964), who from 1949—1953 investigated the insect communities in stumps of Scots pine in the National Park De Hoge Veluwe, did not find *G. materiarius* in the area they studied. But in the same area I found holes of *G. materiarius* in four year old stumps of Scots pine. This suggests that the insect must have reached De Hoge Veluwe between 1954 and 1962. Unfortunately it is not possible to obtain more exact data about the arrival of the insect, because stumps more than five years old have decayed too far.

Some data on the biology of the species could be obtained in June 1966 when the beetle was found in masses in De Hoge Veluwe in logs of Scots pine which had fallen over in February, due to the weight of glazed frost. The data are incomplete because they are based on observations during one season only. Yet they offer a basis for further research. I have added some data from the literature.

## HISTORY

FITCH (1859) described the beetle as *Tomicus materiarius* from New York State. ZIMMERMAN (1868) transferred it to the genus *Crypturgus*, LECONTE and

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HORN (1876) to *Pityophthorus*. EICHHOFF (1868) described *Gnathotrichus corthyloides* from Carolina, but supposed that it might be the same as *Tomicus materiarius* Fitch. In 1878 EICHHOFF first introduced the combination *Gnathotrichus materiarius*, which was generally accepted around 1890.

#### DISTRIBUTION

The area of distribution in America is given (BLACKMAN, 1931) as the eastern part of North America, with finds in Texas, Mississippi and Arkansas. In Europe the species was first detected in 1933 in France, only one specimen having been found near Fontainebleau. In 1948 beetles were found in large numbers about 100 km from the first locality and therefore BALACHOWSKY (1949) considered the species as established. Curiously enough there are no further European records, not even from France, until the species was found in the Netherlands and in Germany (SCHEDL, 1966). I therefore assume that the insect did not reach our country by active migration, but was brought here passively (tourism, cargo-traffic).

In 1966 *G. materiarius* was observed in large numbers at Vaassen (in *Larix leptolepis* and *Picea abies*), Kootwijk (in *Pinus sylvestris*), De Hoge Veluwe (two localities at about one kilometer from each other in trunks or stumps of *Pinus sylvestris*) and, according to Mr. P. J. BRAKMAN, near Apeldoorn under the bark of *Pinus sylvestris* at a charcoal burner's.\*)

#### MORPHOLOGY

SCHEDL (1931) published a revision of the genus with extensive descriptions of the genus and the various species, and BLACKMAN (1931) wrote a monograph on the morphology of the genus, quoting in full the descriptions of *G. materiarius* by FITCH and by EICHHOFF (1878). I have chosen those characters that are important for the recognition of this species which now might become a pest in Europe.

Body less than 3.5 mm long, nearly cylindrical, more than three times as long as wide, dorsally very smooth, slightly shining, dark reddish brown to blackish brown. Head deflexed, blackish, more or less punctured, but with a slightly elevated, smooth median line. Antennae with the club 1.5 times as long as the shaft, in the female with a few very long, curved hairs on the outer side of the club and the shaft, but in the male without these long hairs. Sides of the pronotum not constricted before the middle, with the summit anterior to the middle, and with an elevated transverse carina. Fore tibiae near the apex with three blunt teeth in sockets. Elytra twice as long as wide, sides parallel, narrowly rounded behind, with the posterior margin extended, moderately shining, rugulose. Strial punctures fine, in fairly regular rows.

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\*) After completion of this paper still more finds, all in June 1967, were recorded. They were: Almen and Wekerom (both in Gelderland) in Scots pine stumps; Austerlitz (province of Utrecht) in felled, unbarked larch trunks, together with *Xyloterus lineatus* Oliv.



## BIOLOGY

Like most wood-boring scolytids *Gnathotrichus materiarius* belongs to the Ambrosia beetles, the larvae and adults of which live on fungi (probably *Ceratocystis* sp.) growing in their burrows. The beetle penetrates through the bark, preferably using the fissures, into the wood of felled or dead conifers. According to my observations trunks with a thick bark were more strongly infested than those with a thin, smooth bark. The entrance tunnel has a round hole of about 1 mm diameter. It first runs radially, then branches at a depth of 1.5—3 cm into two, sometimes more, transverse galleries which follow the growth rings. In these galleries the female cuts small niches of about 1 mm deep at distances of 1—5 mm (average 3 mm) from each other, in which eggs are deposited. The niches are directed both upwards and downwards, i.e. towards the crown and roots respectively (fig. 1). The eggs, which I found on 21 June 1966 together with first instar larvae in boles of spruce and larch, were white and more or less bean-shaped ( $0.5 \times 1$  mm) with a transparent, flexible shell, through which the brownish mouthparts of the embryo were clearly visible. The newborn larvae were of the normal scolytid type and 0.7 mm long. The pigmentation of the head capsule had developed to a stage in which, laterally, brown areas were visible. On both sides of the median suture of the head capsule the vertex had sparse yellowish setae.

The system of tunnels, strongly resembling that of *Xyloterus lineatus* (Oliv.), is mostly restricted to the sapwood, but sometimes I found a branch penetrating into the heartwood. Although lateral niches were also observed in the heartwood, these did not contain eggs or larvae, and neither does the Ambrosia fungus seem to grow well in the heartwood.

On August 8th infested parts of trunks were once more examined, and it was found that a large part of the progeny had failed to develop. Several egg niches contained only remains of larval skins and of egg shells. From the largely abandoned niches that had been excavated to the normal size of  $1 \times 3$  mm, only three teneral beetles could be collected. One may conclude that oviposition took place in the beginning of June, after the beetles had reached their breeding places in the second half of May. This is confirmed by the observation that Scots pine trees felled in January, but barked between 14 and 16 May, were not infested on June 14th, but all their stumps (unbarked) were at that date heavily infested. PREBBLE & GRAHAM (1957) state that in British Columbia infestations by *G. sulcatus*, one of the western timber beetles, are mainly found in June and July. SCHEDL (1966) classifies *G. materiarius* as an early flier, but perhaps he has only consulted data from the southern states of the U.S.A.

The young beetles appear around the middle of July. Possibly they burrow somewhere else, in other suitable material, but it has not yet been decided whether actually a second generation occurs, or whether the old beetles oviposit a second time. PREBBLE & GRAHAM (1957) report that *G. sulcatus* have a second swarming period in late summer or in the fall, during which they fly to previously uninfested trunks. According to these authors a second generation occurs which may overwinter in any stage of development. On 10th October I found a considerable number of young and old beetles, which did not show a tendency to fly, on Scots pine trunks which had been strongly infested in June. I should mention that these

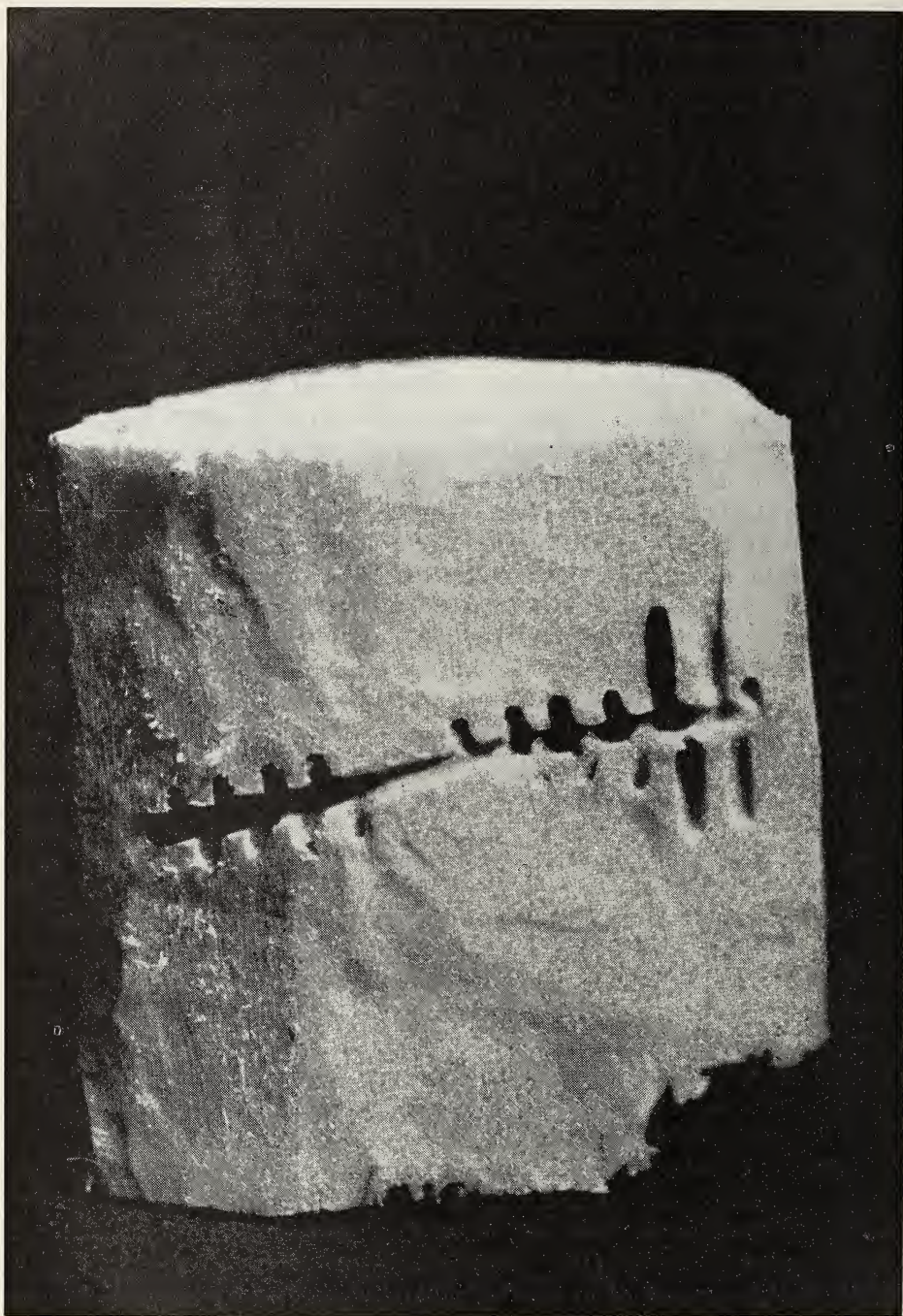


Fig. 1. Piece of Spruce wood with mother gallery and niches of *G. materiarius*.



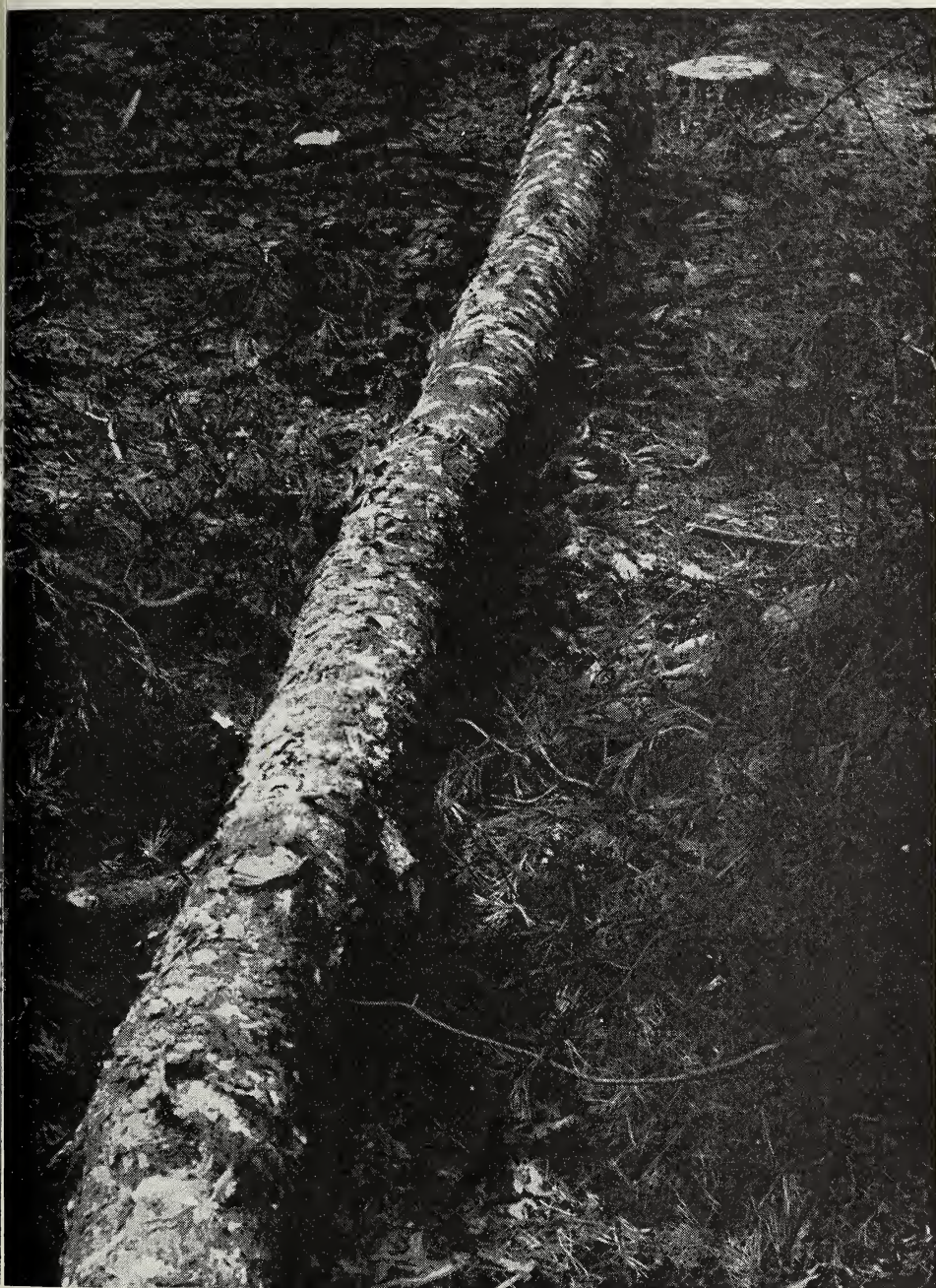


Fig. 2. Scots pine trunk, peeled by woodpeckers, heavily infested by *G. materiarius* (July, 1966).

trunks had in the meanwhile been peeled by woodpeckers (fig. 2), searching for larvae of various bark beetles, such as *Myelophilus piniperda* (L.), *Hylurgops palliatus* (Gyll.) and *Ips laricis* (F.). About 50 of the autumn beetles of *G. materiarius* were collected. Most of them were dead the next day. Their sex was determined, and a sex ratio of 1 : 1 was found. The same ratio was found in beetles collected in June from the tunnels in the wood. This disagrees with BALACHOWSKY (1949) who found only one male among 150 females. It would seem that he had first removed the bark and then collected the beetles which had just penetrated into the wood.

My studies on both sexes in the tunnels showed that the adults strongly resemble those of *Xyloterus lineatus* as to occurrence and behaviour (cf. HADORN, 1933). The males were mostly found in the bark, near the entrance holes, where they remove the dust produced by the females in the breeding galleries. I believe that the females are fertilized before they penetrate into the bark, just as HADORN found in *X. lineatus*. Copulation in the wood is less likely, because pairing-chambers are absent.

#### DAMAGE

The economic importance of *G. materiarius* depends on the use to be made of the trunks. If the trunks are to serve as posts or as pitprops, the damage by this insect is of very little importance, because the required properties of the wood are hardly altered. If, however, the trunks are to be used for timber, the presence of the tunnels and the rapidly blackening Ambrosia fungus badly lower the quality of this wood. Of course, such infested boles are also almost useless for the cellulose producing industries, because of the black discolorations.

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