

Remarks on the taxonomy, distribution and ecology of *Trypodendron laeve* EGGERS, 1939

(Coleoptera: Scolytidae)

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Abstract

Resulting from the unclarified status and faulty synonymy of several species of the genus *Trypodendron*, the existence of a further ambrosia beetle in Europe has been widely ignored or overlooked in many studies on forest entomology. *Trypodendron laeve* EGGERS was first found in Austria in 1982. Several further records connected with imported conifer wood from Russia led to the view that the species is introduced to Central Europe and not native here. Records from the Bavarian Alps, the Bavarian Forest National Park and the Sumava National Park now suggest that this is a widely distributed and native, but mostly unrecognized boreo-montane species.

Introduction

Not even the correct name of the genus seems clear: *Trypodendron* STEPHENS, 1830, and *Xyloterus* ERICHSON, 1836, are both used as valid in current literature. *Trypodendron laeve* EGGERS, 1939, was described from Japan and *T. piceum* STRAND, 1946, from Norway (STRAND 1946). MARTIKAINEN 2000 considered *T. laeve* and *T. piceum* to be junior synonyms of *T. proximum* NIJIMA, 1909, already described from Japan. EHNSTRÖM & AXELSSON 2002 list *T. proximum* as a member of the Swedish fauna. According to KNIZEK (pers. comm. 2008), *T. laeve* and *T. proximum* are however separate, valid species. This opinion was also expressed by KREHAN & HOLZSCHUH 1999, MANDELSHTAM & POPOVICHEV 1999 and ZELENY & DOLEZAL 2004. In the identification handbook for European bark beetles (GRÜNE 1979), neither *T. laeve* nor *T. piceum* is mentioned. In FREUDE, HARDE & LOHSE, the standard work for the identification of Central European beetles, SCHEDL 1981 places *T. laeve* and *T. piceum* as synonyms of *Xyloterus lineatus* (OLIVIER, 1795). This was first corrected in the supplementary volume of 1994, where *Xyloterus laeve* is treated as a valid species with *T. piceum* as its synonym (PFEFFER 1994). This confusion has led to a lack of awareness in many studies in forest entomology of the existence of a further species of ambrosia beetle in Europe (MARTIKAINEN 2000).

World distribution and records from Central Europe

According to KNIZEK (pers. comm. 2008) *Trypodendron proximum* occurs only in the East Palaearctic, not in Europe. Distribution of *Xyloterus laeve* is given by PFEFFER 1995 as Japan, Norway, Sweden and Lower Austria. According to HOLZSCHUH 1995 & 1999 and KREHAN & HOLZSCHUH 1999 the species is also known from Russia, China, Poland, Finland, Estonia and the Czech Republic. MARTIKAINEN (pers. comm. 2008) states that the specimens recorded by MARTIKAINEN 2000 as *Trypodendron proximum* from Finland are actually *T. laeve*. The species was first reported in Finland in 1990 (MUONA 1990), but according to MARTIKAINEN 2000 is widely distributed and abundant there and considered to be native. *T. laeve* was first discovered in Austria in 1982 in the federal state of Lower Austria and shortly thereafter in Burgenland (HOLZSCHUH 1990a), Upper Austria and Styria (HOLZSCHUH 1990b, KREHAN & HOLZSCHUH 1999). HOLZSCHUH 1990a/b & 1995 regards *T. laeve* as a forest pest which has been introduced to Austria. This is based on the fact that

records were concentrated around storage and handling yards containing conifer timber imported from East Europe.

In Germany *Xyloterus laeuae* (sic!) is only recorded from Bavaria (KÖHLER & KLAUSNITZER 1998). The first German record is from 1953 in the Allgäu Region (leg. HANSEN, "Oberstdorf"?). This specimen has been traced and its identity confirmed (pers. comm. BÖHME 2008). In May-August 2007 ten specimens of *T. laeuae* (2♂♂ and 8♀♀, leg. MÜLLER, det. BUßLER & BÜCHE, vid. KNIZEK) were sampled with flight interception traps near ground level, run as part of the biodiversity and climate project of the Bavarian Forest National Park (**Tab. 1**). It is perhaps significant, that the first record of this species in the Bavarian Forest resulted from research on biodiversity and that *T. laeuae* was not detected in any of the numerous previous investigations on forest entomology. *T. laeuae* is also present in the neighbouring Sumava National Park, where ZELENY & DOLEZAL 2004 even suggest that it is a species of significance for nature conservation.

Tab. 1: Records of *Trypodendron laeuae* in 2007 in the Bavarian Forest National Park

Geographic coordinates	month	specimens	a.s.l. (m)
X: 4593446 Y: 5441326	May	2	1150
X: 4600979 Y: 5424642	July	2	916
X: 4600979 Y: 5424642	Juni	1	916
X: 4601091 Y: 5425026	July	1	959
X: 4601175 Y: 5425314	July	2	989
X: 4601818 Y: 5427522	August	1	1352
X: 4603000 Y: 5421368	July	1	782

Identification, biology and ecology

Trypodendron laeuae is immediately distinguishable by its extensively blackened legs, which are always pale in *T. lineatum*. The morphology of *T. laeuae* is however more similar to *T. signatum* (FABRICIUS, 1787) than to *T. lineatum*. Conspicuous is the sexually dimorphic structure of the antennal club in *T. laeuae*. In the male this is inverted egg-shaped and resembles the club of *T. signatum*; in the female it is nearly spherical, as in *T. lineatum*. Further characters for separating *T. laeuae* and *T. lineatum*, including a comparison of the male genitalia, are presented in full by HOLZSCHUH 1990a.

The following tree species have been recorded as hosts of *T. laeuae*: *Picea* (HOLZSCHUH 1995), *Picea abies* (STRAND 1946), *Picea jezoensis*, *Picea obovata*, *Picea abies* and *Pinus sylvestris* (PFEFFER 1994, 1995), *Picea abies* and *Pinus sylvestris* (MARTIKAINEN 2000). The appearance of galleries made by the brood of the conifer ambrosia beetles *T. laeuae* and *T. lineatum*, with radial "ladder-rung" passages, is very similar. *T. laeuae* appears very early in the year, and compared to *T. lineatum* apparently has only a short period of peak adult activity. In 1999 the flight period of the species in Austria ended as early as the last week of April (KREHAN & HOLZSCHUH 1999). The

specimens recorded from the Bavarian Forest National Park in July and August are probably young beetles which were searching for places to overwinter. According to studies in Finland, flight activity begins at temperatures as low as 13°C and reaches its peak at 15°C, which is the threshold for start of flight activity in *T. lineatum*. The flight periods of these two species hardly overlap. *T. laeve* appears to overwinter mainly under the bark of standing trees, or standing dead wood, which enables it to become active even when a closed covering of snow is present (MARTIKAINEN 2000). This may represent an important competitive advantage to *T. laeve* over *T. lineatum*, because closed coverings of snow often lie until late in May in the montane zone.

Discussion

Trypodendron laeve was first found in Austria in 1982 near Gahns at an altitude of 1300 m above sea level, and thereafter several times at timber yards, which caused it to be regarded as an introduced species (HOLZSCHUH 1990a/b & 1995, KREHAN & HOLZSCHUH 1999). The first record in Bavaria and at the same time first record for Central Europe is however from 1953 in the Allgäu. The most recent records in the Bavarian Forest and Sumava National Parks prompt us to question whether *T. laeve* might in fact be a native, boreomontane, relict species, which in most studies on forest entomology has been either ignored or overlooked, and so remained practically unrecorded until recently. Localities for the species in the Bavarian Forest National Park were between 782 and 1352 m a.s.l. A significant indication that the species may be indigenous, is that it is there found together with other, partly extremely rare, boreomontane faunal elements, e.g. *Bius thoracicus* F., *Corticaria interstitialis* MANNH., *Corticaria obsoleta* STRAND (REIKE & LIEPOLD 2004), *Orthocis pseudolinearis* LOHSE, *Xestobium austriacum* RTT., *Dryocoetes hectographus* RTT., *Anastrangalia reyi* HEYDEN or *Judolia sexmaculata* L. Above all, the occurrence of two *Corticaria* species in the Bavarian forest which were described from Swedish and Finnish Lapland, shows that eurytopic northern or mainly Fennoscandian species are also present in the Bavarian Forest.

Commencing in spring 2008, the distribution and abundance of *T. laeve* in the Bavarian Forest National Park will be studied more thoroughly, using pheromone traps. It will still however be necessary to search for this species in Germany in the Alps and in other, lower ranges of mountain.

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Zusammenfassung

Auf Grund des ungeklärten taxonomischen Status verschiedener Arten der Gattung *Trypodendron* und fehlerhafter Synonymisierung wurde die Existenz einer weiteren Nutzholzborkenkäferart in Europa in vielen forstentomologischen Untersuchungen bisher weitgehend ignoriert. *Trypodendron laeve* EGGERS wurde in Österreich erstmals 1982 gefunden. Mehrere weitere Nachweise im Zusammenhang mit importiertem Nadelholz aus Russland führten bisher zu der Ansicht, dass die Art nach Mitteleuropa eingeschleppt wurde und hier nicht heimisch ist. Funde aus dem Jahr 1953 im Allgäu, 2007 im Nationalpark Bayerischer Wald und aus dem Sumava Nationalpark im angrenzenden Tschechien lassen jedoch vermuten, dass es sich um eine verbreitete und autochthone, aber bisher weitgehend verkannte, boreomontane Art handelt. Felddiagnostisch ist *Trypodendron laeve* durch seine meist umfangreich geschwärzten Beine von *Trypodendron lineatum*, mit immer hellen Beinen,

unterscheidbar. Weitere Unterscheidungskriterien zwischen *T. laeve* und *T. lineatum*, inklusive einem Vergleich der männlichen Genitalstrukturen, werden bei HOLZSCHUH 1990a ausführlich dargestellt. *T. laeve* brütet in Europa in Fichte (*Picea abies*) und Kiefer (*Pinus sylvestris*). Die Art erscheint sehr früh im Jahr, hat aber im Unterschied zu *T. lineatum* anscheinend nur eine sehr kurze Flugzeit, die sehr früh im Jahr ihren Höhepunkt erreicht. Nach Untersuchungen in Finnland beginnt die Flugaktivität von *T. laeve* bereits bei 13°C und erreicht ihren Höhepunkt bei 15°C, dem Schwellenwert für den Flugbeginn von *T. lineatum*. Die Flugperioden der beiden Arten überschneiden sich kaum. *T. laeve* scheint vor allem unter der Rinde von stehenden Bäumen, bzw. stehendem Totholz zu überwintern, was es der Art ermöglicht, auch bei noch geschlossener Schneedecke auszufliegen. Ab Frühjahr 2008 werden im Nationalpark Bayerischer Wald mittels Pheromonfalleneinsatz Verbreitung und Abundanzen von *T. laeve* genauer untersucht. Wünschenswert sind in Deutschland aber auch gezielte Untersuchungen in den Alpen und Mittelgebirgen.

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