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PENSOFT

Mycetobia obscura Mamaev, 1968—the first records of Mycetobiinae (Diptera, Anisopodidae) from the Baltic States

Olavi Kurina[1*], Ilmar Süda[2]

1 Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Kreutzwaldi st 5 D, 51006 Tartu, Estonia • olavi.kurina@emu.ee https://orcid.org/0000-0002-4858-4629

2 Ilmar Süda FIE, Rõõmu tee 12-5, 50705 Tartu, Estonia • ilmar.suda@eesti.ee

* Corresponding author

Abstract

Mycetobia obscura Mamaev, 1968 and the subfamily Mycetobiinae (Diptera, Anisopodidae) are recorded from Estonia as well as from the Baltic States for the first time. The morphology and biology of the species is briefly discussed and detailed photographs of the general habitus of *M. obscura* and both the male and female terminalia are provided.

Keywords

Distribution, Europe, Estonia, faunistics, Mycetobiinae

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Introduction

During the last decades the phylogeny and classification of true flies (Diptera) has received considerable attention, with both morphological and molecular datasets utilized (Wiegmann and Yeates 2017 and references therein). However, the systematic position of several dipteran subtaxa still lack an overall consensus. One of these, the genus *Mycetobia* Meigen, 1818, which has received some attention since the 19th century (Osten Sacken 1892), has been classified as a member of Anisopodidae (e.g., Amorim et al. 2016; Evenhuis and Pape 2021) or in the family Mycetobiidae (e.g., Hancock et al. 1996; Krivosheina 1997; Chandler 2013; Haarto 2014). The most recent classification provided in by Evenhuis and Pape (2021) is followed by us, with the Mycetobiinae as a subfamily of Anisopodidae and including *Mycetobia*.

The oldest representative of *Mycetobia* is known from upper Cretaceous Burmese amber (98.79 ± 0.62 mya), whereas the highest diversity of fossils (nine species) is recorded from Eocene deposits (Kania et al. 2019; Woitoń et al. 2019). To date, 28 extant species of *Mycetobia* are known, and these occur mainly in the Holarctic region (Hancock 2017, but see also Amorim et al. 2016). Of the three *Mycetobia* species recorded from Europe, *M. pallipes* Meigen, 1818 is the most widely distributed, whereas the other two species—*M. obscura* Mamaev, 1968 and *M. gemella* Mamaev, 1968—have rather scattered distributions (Chandler 2013). All three species are recorded from Fennoscandia: *M. obscura* from Sweden, *M. gemella* from Sweden and Norway (Chandler 2013; GBIF 2021), and *M. pallipes* from Norway, Sweden, and Finland (Chandler 2013; Haarto 2014; GBIF 2021). However, in the Baltic States no species have been recorded so far. *Mycetobia* species are saprophagous in their larval stage and can be found in moist decaying wood and rotting organic matter (Krivosheina 1997).

During the last decades, a considerable amount of Diptera material collected with various methods within the framework of several research projects in Estonia (e.g., Tomasson et al. 2014; Sammet et al. 2016) has been accumulated by the first author. This material includes a number of *Mycetobia* specimens which are studied and reported here.

Methods

One male and 12 female specimens collected from 11 localities across continental Estonia (Fig. 1) have been studied. The majority of them were collected from forest habitats (Fig. 2) by I. Süda using trunk window traps (TWT) which were designed in 2004 (see Süda 2009; Sammet et al. 2016). This type of trap has proved to be effective in collecting saproxylous and corticolous beetles (especially Eucnemidae species, with nocturnal activity), as well as several saproxylous and mycetophagous dipteran species (e.g., *Keroplatus* spp., family Keroplatidae; *Dynatosoma* spp., family Mycetophilidae). Additional *Mycetobia* specimens were obtained by sweep netting and hand picking from indoors. For a detailed study of the male and female terminalia, they were detached and treated in a solution of KOH, washed in distilled water, neutralized in acetic acid, and studied in glycerine (for details see Kurina 2006). Terminalia are stored as glycerine preparations in small plastic vials attached to their respective specimen. The digital images of general habitus and terminalia were combined using LAS v. 4.1.0 software from multiple image stacks taken by a Leica DFC 450 camera attached to a Leica 205C stereomicroscope or Leica DM 6000 B compound microscope. Topaz Sharpen Al and Adobe Photoshop CS5 were used for editing and compiling the figures. Morphological terminology follows Hancock (2017). All the studied material is deposited in the insect collection Institute of Agricultural and Environmental Sciences (IZBE), Estonian University of Life Sciences (former Institute of Zoology and Botany), Tartu, Estonia. For each studied specimen, the preservation method and the collection code (IZBExxxxxxx) are provided in Material examined.

Abbreviations used: NatP = National Park, NT = Nature Park, NR = Nature Reserve, mya = million years ago.

Results

***Mycetobia obscura* Mamaev, 1968**
Figure 3

Material examined. ESTONIA – **Lääne county** • Matsalu NatP, Meelva village (Fig. 1: No. 1); 58.7144°N,

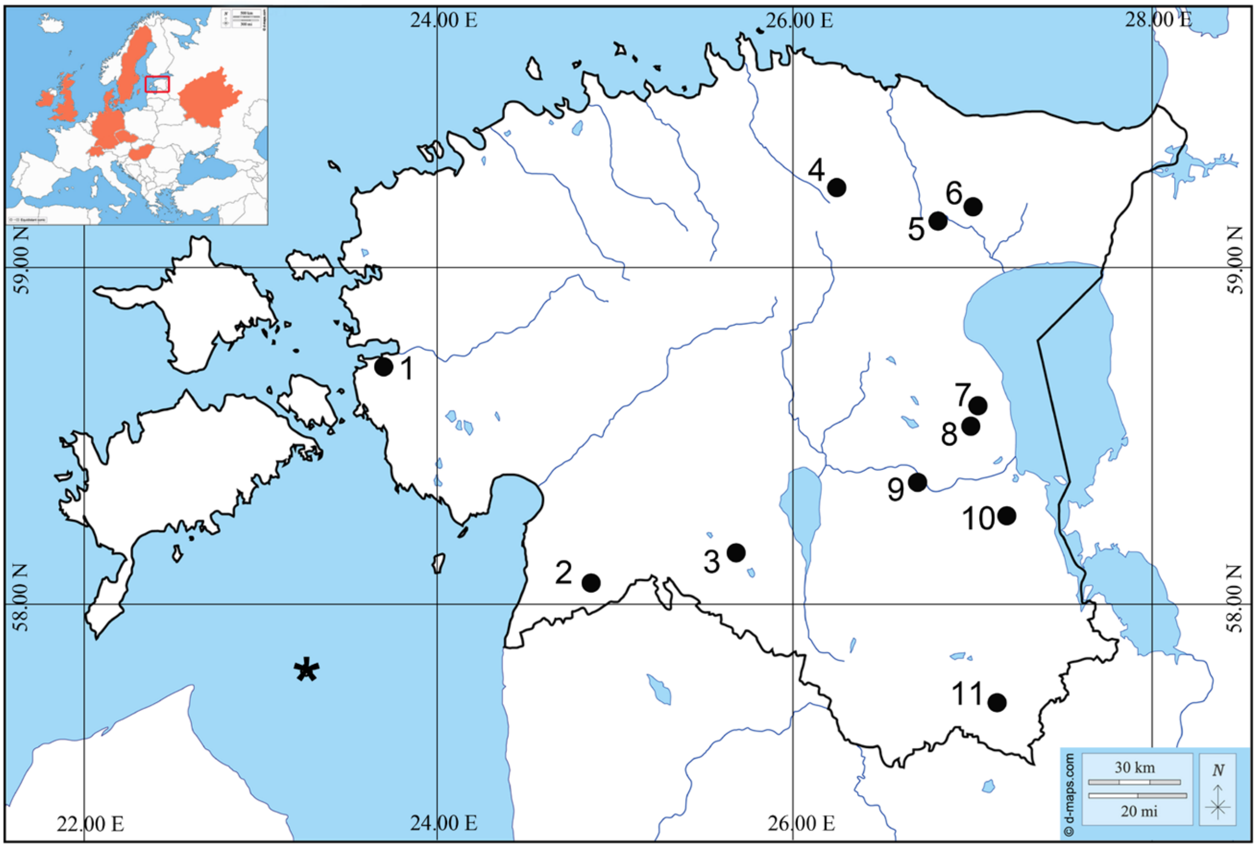

Figure 1. Sampling localities in Estonia: 1 = Meelva in Matsalu NatP, 2 = Kalita NR, 3 = Muti NR, 4 = Lasila, 5 = Tudusoo NR, 6 = Kautvere, 7 = Padakõrve NR, 8 = Välgi NR, 9 = Tartu, 10 = Peipsiveere NR, 11 = Haanja NP. * = Ruhnu Island wherefrom an unidentified *Mycetobia* specimen was collected. The orange color denotes the distribution of *M. obscura* in Europe according to Chandler (2013). Base maps of Europe and Estonia: © 2007–2021 https://d-maps.com (accessed on 2021-7-11).

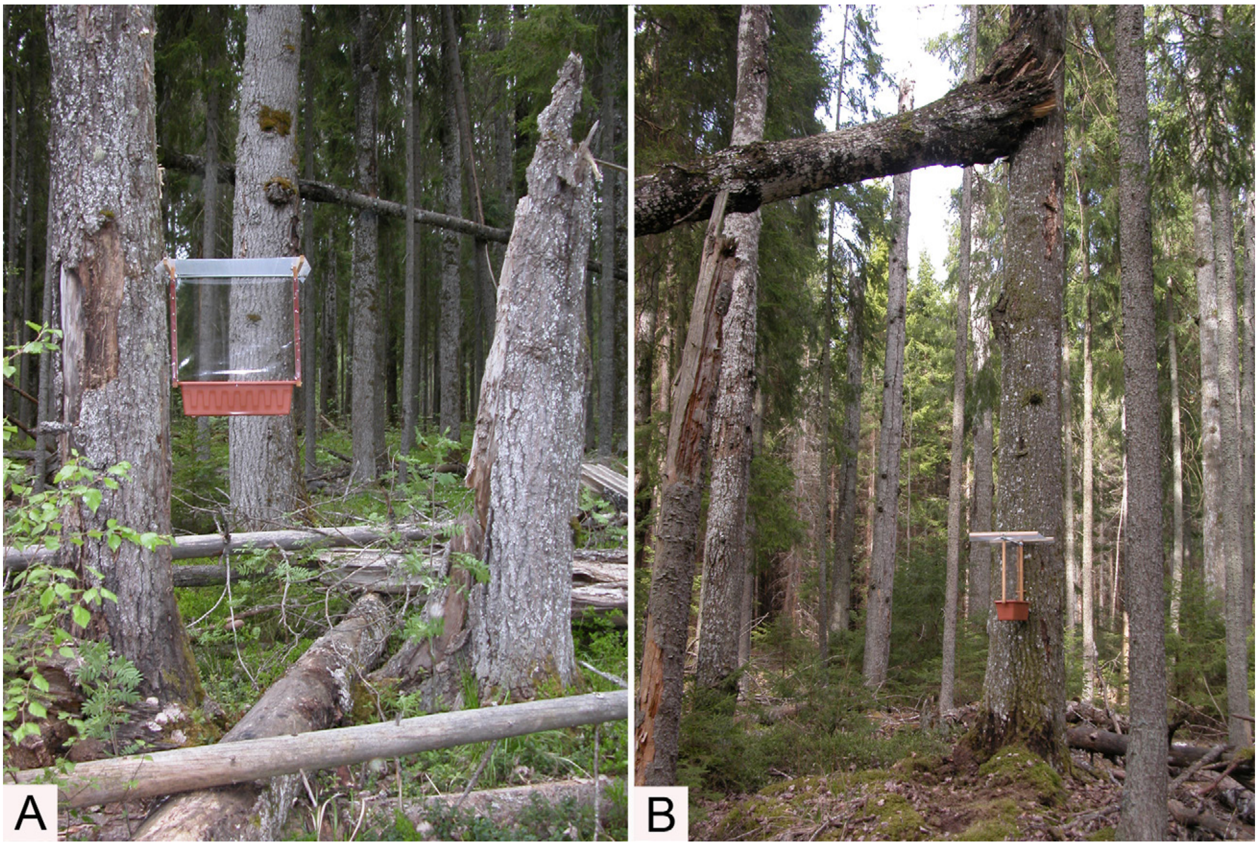

Figure 2. Trunk window trap operating on trunk of old dead aspen. **A.** At Tudusoo NR. **B.** At Peipsiveere NR. Photos by I. Süda.

023.6897°E; 29.V–17.VI.2009; I. Süda leg.; window trap on oak tree; 1♀, IZBE0252060, in alcohol, terminalia in glycerin – **Pärnu county** • Kalita NR (Fig. 1: No. 2); 58.0711°N, 024.8608°E; 22.VI–25.VII.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252061, in alcohol, terminalia in glycerin – **Viljandi county** • Muti NR (Fig. 1: No. 3); 58.1403°N, 025.6806E; 21.VI–24.VII.2017; I. Süda leg.; window trap on dead birch; 1♀, IZBE0252062, in alcohol, terminalia in glycerin – **Lääne-Viru county** • Lasila (Fig. 1: No. 4); 59.2633°N, 026.2378°E; 27.V.2018, O. Kurina leg.; sweep net; 1♀, IZBE0228768, pinned, terminalia in glycerin • Tudusoo NR (Fig. 1: No. 5); 59.0811°N, 026.7711°E; 27.V–25.VI.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252063, in alcohol, terminalia in glycerin – **Ida-Viru county** • Alutaguse, Kautvere (Fig. 1: No. 6); 59.1400°N, 026.9522°E; 26.V–25.VI.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252064, in alcohol, terminalia in glycerin • Alutaguse, Kautvere (Fig. 1: No. 6); 59.1397°N, 026.9528°E; 26.V–25.VI.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252065, in alcohol, terminalia in glycerin – **Jõgeva county** • Padakõrve NR (Fig. 1: No. 7); 58.5853°N, 027.0192°E; 14–30.V.2015, I. Süda leg.; window trap on dead *Pinus sylvestris* L.; 1♂, IZBE0252066, in alcohol, terminalia in glycerin – **Tartu county** • Välgi NR (Fig. 1: No. 8); 58.5517°N, 026.9383°E; 21.VII–21.VIII.2017, I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252067; in alcohol, terminalia in glycerin • Tartu, Marja 14 (Fig. 1: No. 9); 58.3861°N, 026.7115°E; 30.VIII.2007; O. Kurina leg.; indoors; 1♀, IZBE0228769, pinned, terminalia in glycerin • Peipsiveere NR (Fig. 1: No. 10); 58.2978°N, 027.1497°E; 17.V–19.VI.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252068, in alcohol, terminalia in glycerin – **Võru county** • Haanja NP (Fig. 1: No. 11); 57.7353°N, 027.0639°E; 18.V–20.VI.2017; I. Süda leg.; window trap on dead aspen; 1♀, IZBE0252069, in alcohol, terminalia in glycerin.

Identification. According to characters in wing venation, the studied material is congeneric with *Mycetobia* because the discal cell (d) is absent, vein M is three-branched, vein R_{2+3} ends in a costal vein (C), C extends beyond vein R_{4+5}, and vein A is very faint (see the key to genera by Hancock 2017). The species-level identification relies completely on detailed study of the terminalia. Males of *M. obscura* have terminalia (Fig. 3C–E) with the gonostylus considerably smaller than the gonocoxite, while the other two European species have a large gonostylus (cf. Hancock et al. 1996: fig. 1). Moreover, the apical lobes of the gonocoxite are devoid of strong setae and the dorsomedial lobe of the gonocoxite (= aedeagus according to Mamaev (1968)) is apically sagittiform, extending to the level of the gonostylus apically and with preapical aggregation of fine setae on both sides. Females of *M. obscura* have the genital fork medially almost transparent, basally slender, whip-like, and chitinised. The plate proximal to the hypogynial valves is broad (Fig. 3F), while it is rounded and considerably smaller in the other European species (cf. Hancock et al. 1996: fig. 1).

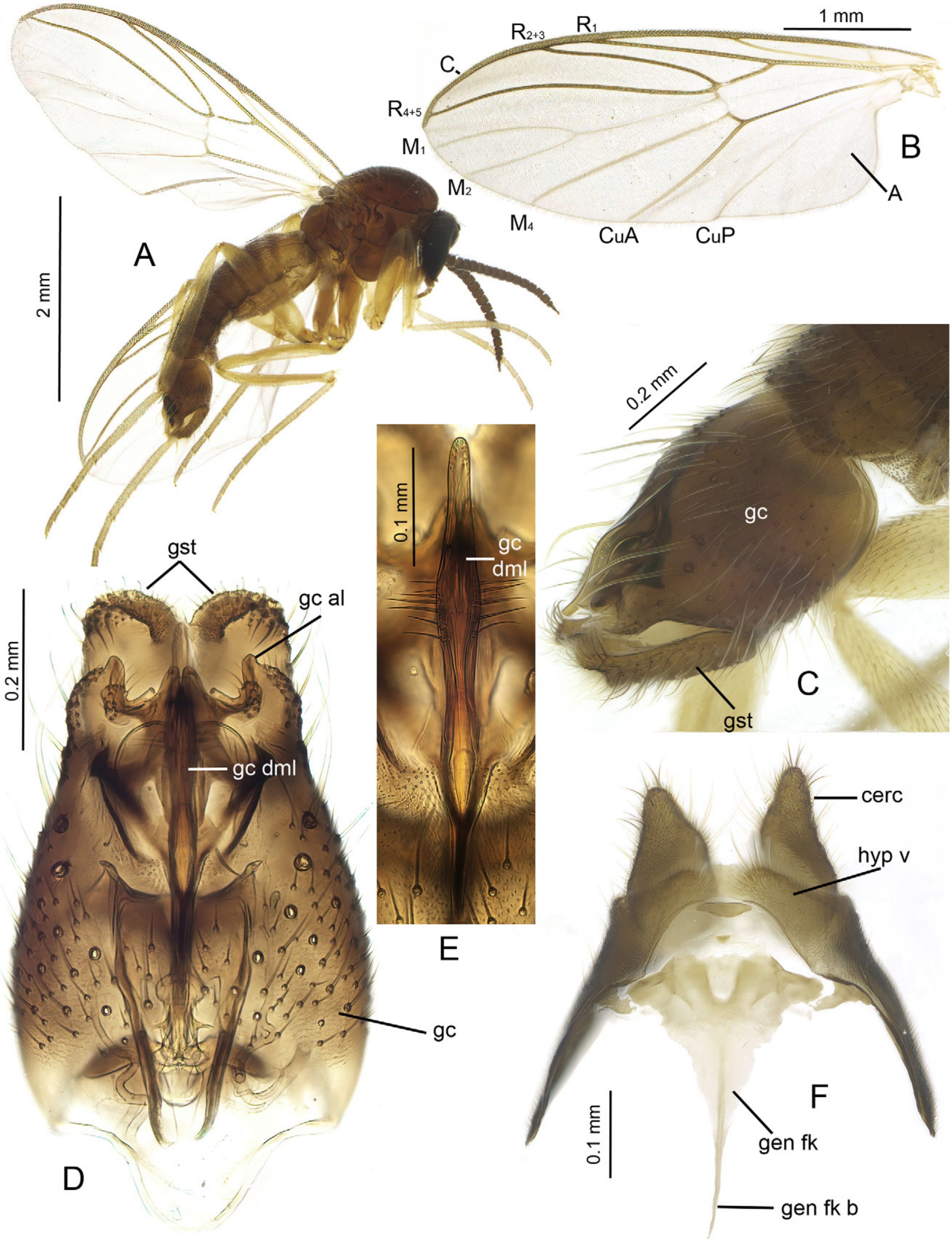

Figure 3. *Mycetobia obscura* Mamaev, 1968. **A.** Habitus, male. **B.** Wing, female. **C.** Male terminalia, lateral view. **D.** Male terminalia, dorsal view. **E.** Details of male terminalia, dorsal view. **F.** Female terminalia, ventral view. Abbreviations: cerc = cercus, gc = gonocoxite, gc al = apical lobe of gonocoxite, gc dml = dorsomedial lobe of gonocoxite, gst = gonostylus, gen fk = genital fork, gen fk b = basal part of genital fork, hyp v = hypogynial valve.

Discussion

In Estonia, true flies have been rather superficially studied. About 3,100 species known, but this represents no more than 60% of the estimated species diversity (Kurina 2019). Therefore, it is not a surprise that a species new to the Estonian fauna has been found but recording a subfamily new to the fauna is noteworthy. Structure of the terminalia allow distinguishing between three European species. However, identification of the females is more challenging as differences in their terminalia (with emphasis on the genital fork and hypogynial valves) are less pronounced (cf. Hancock et al. 1996). It is remarkable that the vast majority of the studied specimens were females and only one male specimen was available for study. This bias can probably be explained by higher mobility of the females, resulting in collecting them with TWTs.

Eleven specimens from nine localities were collected by TWTs from old growth (>100 years) mixed or deciduous forests. Seven of them were caught by traps placed on trunks of old dead aspen (*Populus tremula* L.); see Figure 2 for traps in Tudusoo NR and Peipsiveere NR. According to Hancock et al. (1996) and Krivosheina (1997), the larvae of *M. obscura* inhabit moist and rotting wood of deciduous trees. According to Rotheray et al. (2001), larvae of *M. obscura* were recorded from a sap exudate on a live aspen. Moreover, Falk and Chandler (2005) reared the species from rot holes in oak, live aspen wood, and sappy material near a small rot hole from birch wood.

All 13 studied specimens of *M. obscura* were collected from continental Estonia. However, one additional female specimen of *Mycetobia* was collected from the remote island of Ruhnu, but the specimen (Saare county • Ruhnu Island; 57.8007°N, 023.2615°E; 27.VI–02.VIII.2011; I. Süda leg.; window trap on *Pinus sylvestris* L.; 1♀, in alcohol; indicated by an asterisk in Fig. 1) was too damaged for species-level identification. The habitat on Ruhnu Island was a coniferous forest dominated (about 90%) by *Pinus sylvestris* L. (Scotch Pine) though there were a few live deciduous trees nearby (*Betula* L. sp., *Alnus glutinosa* (L.) Gaertn.). Another European *Mycetobia* species—*M. gemella*—has been recorded exclusively in connection with coniferous trees (Mamaev 1968; Hancock et al. 1996; Falk and Chandler 2005). Therefore, the possible conspecificity of our destroyed specimen with *M. gemella* cannot be excluded, but additional intact material is needed for validation.

In summary, there are no obvious limits preventing the occurrence of all three European *Mycetobia* species in Estonia as well as in the other Baltic States. All three species are known from Great Britain, Scandinavia, Hungary, and central European Russia (Chandler 2013). The scattered distribution on the European mainland probably only reflects the limited study effort, taking into account that adult *Mycetobia* specimens are rarely encountered in samples.

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Authors' Contributions

Conceptualization: OK. Data curation: IS. Investigation: OK, IS. Visualization: OK, IS. Writing – original draft: OK. Writing – review and editing: IS.

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