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Morphological differences between *Exechia fusca* (Meigen, 1804) and *Exechia confinis* Winnertz, 1863 (Diptera, Mycetophilidae)

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The morphological differences between two very closed species *Exechia fusca* and *Exechia confinis* are discussed. The detailed figures of males and females genitals are given.

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Key words. Diptera, Mycetophilidae, *Exechia*.

Introduction

Exechia Winnertz, 1863 is a numerous and widely distributed genus among fungus gnats. Exechia species are distributed in all zoogeographical regions (Laffoon, 1965; Colless & Liepa, 1973; Matile, 1980, 1996; Hackman et al., 1988; Plassmann, 1995). There are 61 species recorded in Palaearctic region (Hackman et al., 1988; Zaitzev, 1996). Many species are closely related and they can be distinguished from each other by comparison of male genitals. Such species are also *Exechia fusca* (Meigen, 1804) and *Exechia confinis* Winnertz, 1863. Chandler (1978) has distinguished *Exechia fusca* group in genus *Exechia* for named two species.

E. fusca is a holarctic species (Hackman et al., 1988). *E. confinis* is widely distributed in Europe (e. g. Krivosheina et al., 1986; Hackman et al., 1988; Plassmann & Schlacht, 1990). Both species are associated with the fruit bodies of macrofungi. According to Hackman and Meinander (1979) *E. fusca* is polyphagous species. By Eisfelder (1955) it is registered on 128 species of macrofungi in Germany. Chandler (1978) mentioned this species also on Polyporaceus fungi. *E. confinis* is recorded on Lactarius piperatus (Plassmann, 1971) and Paxillus involutus (Kurina 1994). By Hackman and Meinander (1979) Exechia sp. pr. confinis has been found regularly on Paxillus involutus. According to literature (e. g. Plassmann, 1989; Grundmann, 1990) the activity of imagoes is recorded in autumn and winter. In Estonia the owerwintering of the species have been found in caves (Kurina, 1996).

Material

The material for the present communication is collected in 1970—1996 from 27 sites in Estonia. Sweep-netting, collecting by exhauster from caves and rearing from macrofungi have been used as a methods of collecting. Part of the material is already published (Kurina, 1991, 1994, 1996, 1998), but it is undergoing new critical study. The material is deposited in the Institute of Zoology and Botany of Estonian Agricultural University.

Vault, near Orissaare on Saaremaa Island and Kalmistu cave in Tartu. Altogether 39 ♂ and 10 ♀ specimens are examined.

Additional material studied. Exechia confinis Winnertz, 1863 — 1 ♂, Russia, Sablino Tsarskoselsk, u peshcheri, leg. A. Stackelberg, 02.02.1925, det. A. Stackelberg, 1940. Deposited at the Zoological Institute of Academy of Sciences, St. Petersburg, Russia.

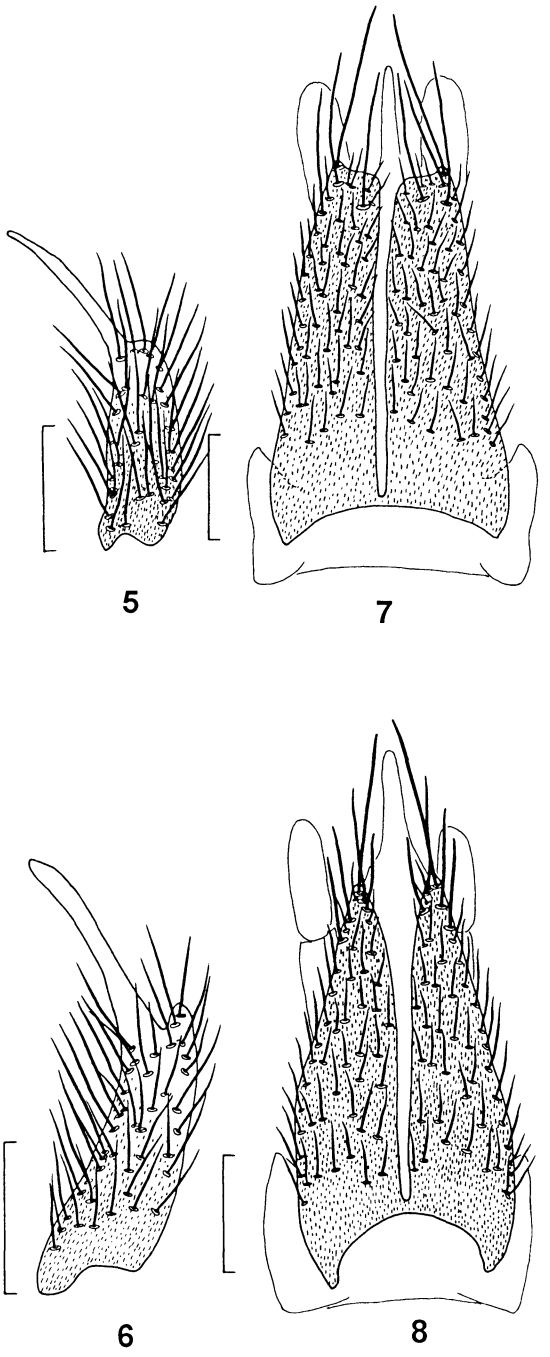
Discussion

By many authors (e. g. Edwards, 1925; Landrock, 1927, 1940; Ostroverkhova, Stackelberg, 1969; Krivosheina et al., 1986) the essential difference between *E. fusca* and *E. confinis* is the yellow lateral spots on the first segments of the abdomen of *E. confinis*. The abdomen of *E. fusca* is uniformly blackish brown. Winnertz (1863) reported the yellow spots on the third segment of the abdomen of *E. confinis*. Other authors (e. g. Landrock, 1927; Séguy, 1940; Krivosheina et al., 1986) marked the spots on the second segment. Named characteristic is very variable, in my material few specimens have no mentioned spots at all or they are indistinct.

Morphometric measurements are widely variable and overlap for these two species, as presented in Table 1. Stastically, differences can be detected, but these

Table 1. Measured lengths of wings and legs of *Exechia fusca* (n=25) and *Exechia confinis* (n=25). r-m, radial-medial crossvein; $m_{pet.}$, medial petiole; t_1, t_2, t_3, fore, mid and hind tibia; $I_{tars.}1$, $I_{tars.}2$, ..., $II_{tars.}1$, ..., $III_{tars.}1$, ..., tarsal segments of fore, mid and hind tarsus. The lengths are in millimeters.

Mesaured parts	*E. fusca*	*E. confinis*
r-m	0.30—0.43	0.33—0.43
$m_{pet.}$	0.10—0.17	0.11—0.14
t_1	0.89—1.21	1.07—1.23
$I_{tars.}1$	1.00—1.39	1.06—1.31
$I_{tars.}2$	0.59—0.86	0.59—0.83
$I_{tars.}3$	0.46—0.63	0.44—0.57
$I_{tars.}4$	0.33—0.46	0.29—0.41
$I_{tars.}5$	0.23—0.30	0.23—0.30
t_2	1.20—1.60	1.31—1.53
$II_{tars.}1$	1.07—1.51	1.17—1.44
$II_{tars.}2$	0.57—0.79	0.57—0.70
$II_{tars.}3$	0.41—0.57	0.44—0.56
$II_{tars.}4$	0.30—0.40	0.29—0.40
$II_{tars.}5$	0.21—0.29	0.23—0.29
t_3	1.57—2.10	1.81—2.07
$III_{tars.}1$	1.04—1.53	1.11—1.40
$III_{tars.}2$	0.47—0.71	0.50—0.63
$III_{tars.}3$	0.34—0.47	0.37—0.46
$III_{tars.}4$	0.24—0.32	0.26—0.31
$III_{tars.}5$	0.16—0.27	0.17—0.23



Figs 5—8. Laterodorsal view of large lateral appendage of gonostylus (5, 6), ventral view of female terminalia (7, 8).
5, 7, *Exechia fusca* (Meigen, 1804); **6, 8,** *Exechia confinis* Winnertz, 1863. Scale equal to 0.1 mm.

differences have no significance in determination of species. For both species size and coloration can probably depend on larval nutrition and environmental conditions in larval and pupal stages.

The best method for species determination is comparison of genitals. Male hypopygiums have been figured by: Landrock, 1927, plate 7, fig., 38; Landrock, 1940, fig., 145; Ostroverkhova, 1979, plate 25, fig., 8; Krivosheina et al., plate 41, fig., 1 — *E. fusca*; Landrock, 1912, fig., 17, 18; 1927, plate 7, fig., 25, 1940, fig., 146 — *E. confinis*. Nobody has figured details of inner appendages of gonostylus for both species, they are important for identification too. Female genitals have been figured by: Lundström, 1909, fig., 113, 114; Chandler, 1977, fig., 28 — *E. fusca*; Plassmann, 1970, fig., 14; Chandler, 1977, fig., 29 — *E. confinis*. More detailed drawings are given by Chandler (1977), but only in lateral view. The most important difference between female specimens are the shape of gonocoxids in ventral view, that nobody has figured yet. Differences in male and female genitals are analysed in Table 2 with respective referations to the figures.

Table 2. Differences between genitals of *Exechia fusca* (Meigen, 1804) and *Exechia confinis* Winnertz, 1863

Exechia fusca	*Exechia confinis*
MALES	
Medioventral appendage of gonocoxid	
rounded on apex, minimum twice as long as wide, compare fig. 1, A;	with depression apex, as long as wide, compare fig. 2, A.
Inner structure connected with cercus	
with two bristles on apex, compare fig. 1, B;	with four bristles on apex, compare fig. 2, B.
Aedeagus	
with depression on apex, compare fig. 1, C;	with small mound on apex, compare, fig. 2, C.
Apex of large lateral appendage of gonostylus	
narrower as inner appendages of gonostylus, compare fig. 3, D, E;	as wide as inneres appendages of gonostylus, compare fig. 4, D, E.
Large lateral appendage of gonostylus on basis of asetose elongated part	
without lobe, compare fig. 5;	with small lobe, compare fig. 6.
FEMALES	
Apex of gonocoxid ventrally	
blunt, compare fig. 7;	conical, compare fig. 8.

Very close to the two species is *Exechia styriaca* Strobl, 1898. The species has been fond only in Austria (3♂ 2♀). According to Strobl (1898), the species is very similar to *E.confinis*, and by Strobl (1910) to *E. fusca*. In Strobl (1898) it is marked, that the most outstanding difference between *E. styriaca* and *E. confinis* is almost entirely brown coloration of hind tibia of *E. styriaca*. Possibly *E. styriaca* can be synonym to *E. confinis*, but confirmation to this can not be found without type material.

Acknowledgements

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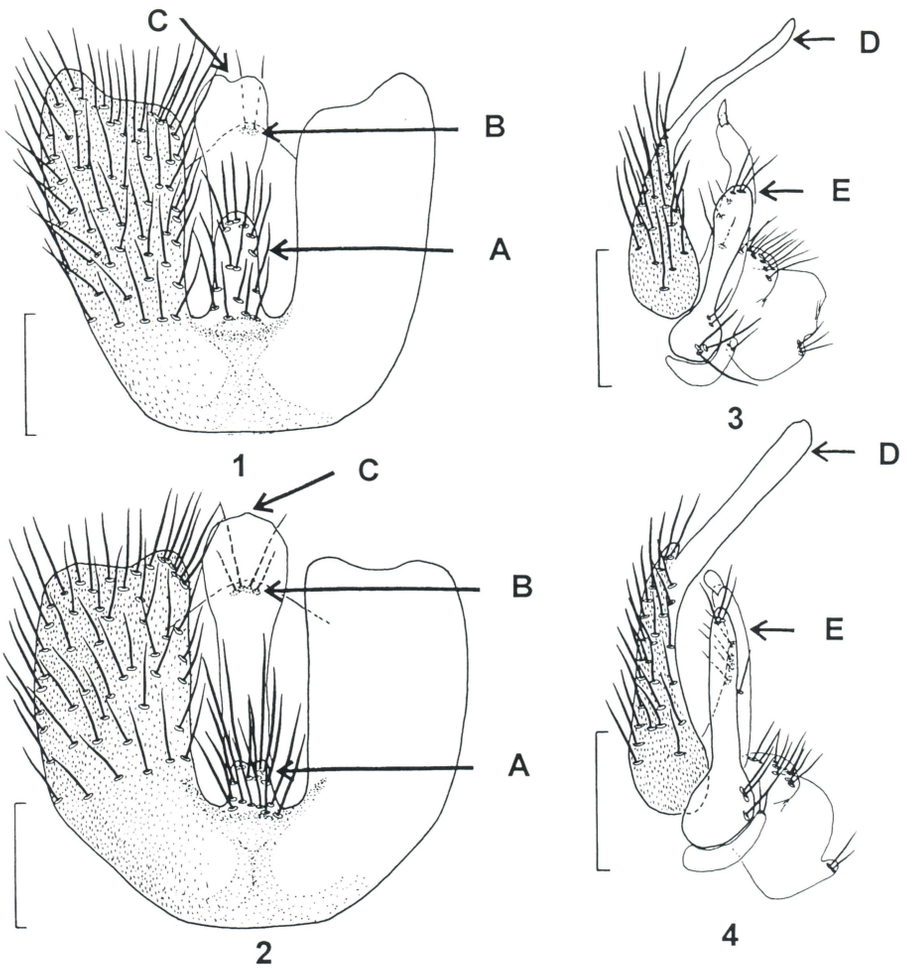

Figs 1—4. Ventral view of gonocoxid (1, 2) and ventral view of gonostylus (3, 4).
1, 3, *Exechia fusca* (Meigen, 1804); **2, 4,** *Exechia confinis* Winnertz, 1863.

A — medioventral appendage of gonocoxid; **B** — inner structure connected with cerci; **C** — aedeagus; **D** — elongated asetose part of lateral appendage of gonostylus; **E** — inner appendages of gonostylus. Scale equal to 0.1 mm.

Exechia fusca (Meigen, 1804)

118 ♂ and 90 ♀ specimens were reared by me from 27 species (42 fruit bodies) of Agaricales s. l.. Material was collected at Islet of Abruka near Saaremaa Island, Viidumäe Nature Reserve, Orissaare on Saaremaa Island, Puhtu near Virtsu, Vormsi Island, Oonga southeast of Haapsalu, Rannametsa south of Pärnu, Nigula Nature Reserve, Tamsa-Altmäe near Elva, Vapramäe northeast of Elva, Tiksoja near Tartu, Järvselja southeast of Tartu, Kohala northeast of Rakvere and Varudi northeast of Rakvere. 36 ♂ specimens were sweep netted by me at Orissaare, Piiri on Muhu Island, Riguldi, Kasemetsa south of Saku near Tallinn, Oonga, Nigula Nature Reserve, Taevaskoja north of Põlva, Järvselja, Tiksoja, Rähni near Tartu, Voore east of Jõgeva and Kohala. 1 ♂ specimen was collected by Prof. H. Remm at Kääriku, southwest of Otepää, but method used is not known. 2 ♂ specimens collected by me with a exhauster from Kalmistu cave in Tartu. Altogether 157 ♂ and 90 ♀ specimens are examined.

Exechia confinis Winnertz, 1863

6 ♂ and 10 ♀ specimens were reared by me from 5 fruit bodies of Paxillus involutus, collected at Pallasmaa on Muhu Island, Oonga, Pikasilla northeast of Tõrva, Tamsa-Altmäe and Kohala. 10 ♂ specimens were sweep netted by me at Orissaare, Oonga, Nigula Nature Reserve, Melliste southeast of Tartu and Mäetaguse south of Jõhvi. 23 ♂ specimens collected by me with exhauster from Maasi Castle

Vault, near Orissaare on Saaremaa Island and Kalmistu cave in Tartu. Altogether 39 ♂ and 10 ♀ specimens are examined.

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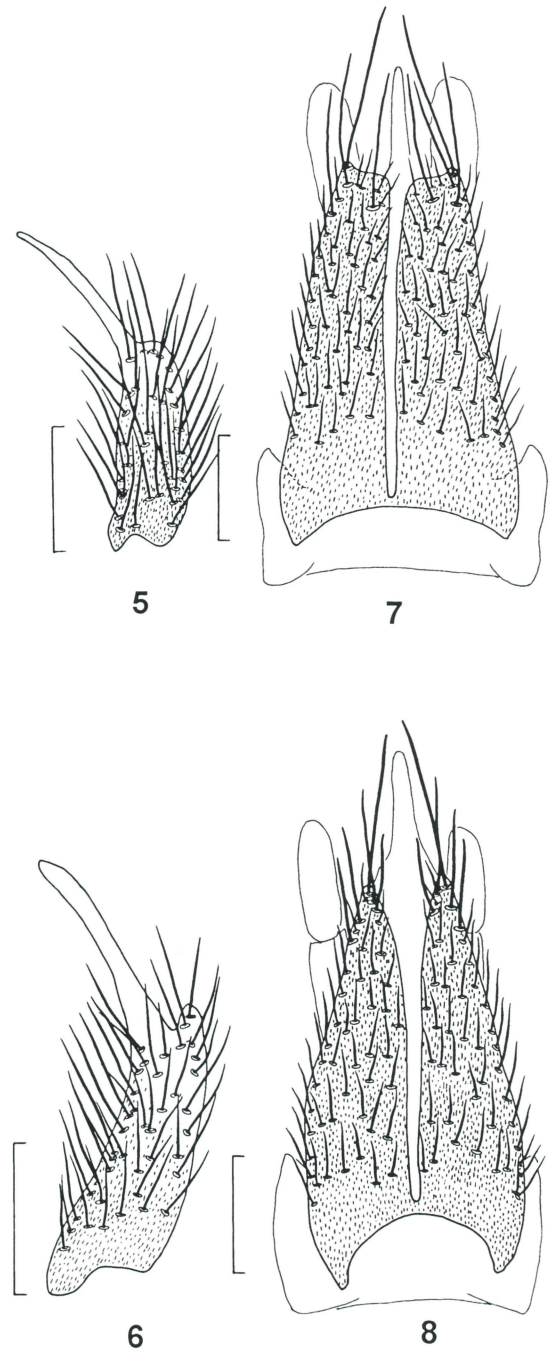

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