

On the identification of Palaearctic species in the genus *Cordyla* Meigen (Diptera, Mycetophilidae); preliminary results

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The morphology of male specimens of 14 Palaearctic *Cordyla* species is studied. The species can be arranged according to the colour of the swollen segment of palpus, the number of flagellar segments and the structure of male genitalia. On the basis of the colour of the swollen segment of palpi the species can be divided into two groups, the number of flagellar segments into four groups, and the structure of the genitalia into three groups. Morphological differences between the groups are discussed with an emphasis on genital differences.

Key words: Diptera, Mycetophilidae, *Cordyla*.

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INTRODUCTION

The genus *Cordyla* Meigen, 1803 is a well defined monophyletic group in the fungus gnat family Mycetophilidae. The species are small, maximum 5 mm in size. Different authors have classified the genus in tribes Mycetophilini and Exechini, the latter is more accepted in recent publications (e. g. Tuomikoski 1966, Krivosheina et al. 1986). According to Tuomikoski (1966) the genus is characterized by apomorphies, more significant of them are: 1) short antennae with a reduced number of flagellar segments; 2) swollen antepenultimate segment of palpi; 3) presence of bristles on mesanepisternum (usually typical for Mycetophilini) and 4) m_2 does not reach the wing margin (except in *C. styliforceps* (Bukowski, 1934) and *C. crassicornis* Meigen, 1818). According to Tuomikoski (1966) the genus *Neoalldia* Edwards, 1932 is systematically the closest to *Cordyla*.

So far 19 *Cordyla* species have been recorded from the Palaearctic and 10 species from the Nearctic region (Bechev 1999). Up to now the genus has not been recorded outside the Holarctic but has

recently been recorded from the Oriental region (Laos) (Jan Sevcik, pers. comm.). Some palaearctic species lack data else than the initial description and certain problems of synonymy can arise. *C. festiva* (Costa, 1857) has not been found after its original description in Italy (surroundings of Napoli). There are slender data (only female specimens) on *C. vitiosa* Winnertz, 1863, reported mainly in the 19th century and the validity is not confirmed. *C. sixi* (Barendrecht, 1938) and *C. bergensis* (Barendrecht, 1938) are probably not valid species and are possibly synonyms of *C. pusilla* Edwards, 1925 and *C. parvipalpis* Edwards, 1925, respectively (Peter Chandler, pers. comm.). Although, that opinion needs a further investigation. The named four species have been left out of the analysis.

The only special review of the genus is that by Landrock (1926) which obviously is out of time. As only one species (*C. insons* Lastovka et Matile, 1974) has been described since 1940, the genus has been offered less attention than many other genera in the family.

In Europe (Figure 1), *Cordyla* species are most numerous in Germany (14), Estonia (13), Switzerland (12), Czech and Slovak Republics (12). The species numbers in Europe obviously do not reflect the zoogeographical distribution, but different scope and effort of investigations.

The larvae of *Cordyla* are mainly feeding on mushrooms. They are polyphagous, apparently with a preference for genus *Russula*. According to Yakovlev (1994), there are 11 species of fungivorous *Cordyla* species in the Palearctic. For the rest of species, data on larvae feeding are missing.

MATERIAL AND METHODS

The studied material comprises 430 males representing 14 species. The author has not had a possibility to work with *C. styliforceps*. The species has been put into the described morphological groups according to literature (Bukowski 1934, Chandler & Ribeiro 1995). The material has been gathered by collectors from Estonia, Finland, Sweden, Denmark and Germany.

For each specimen the genitalia were separated from the abdomen and heated in 15 % KOH for identification. This procedure removed soft tis-

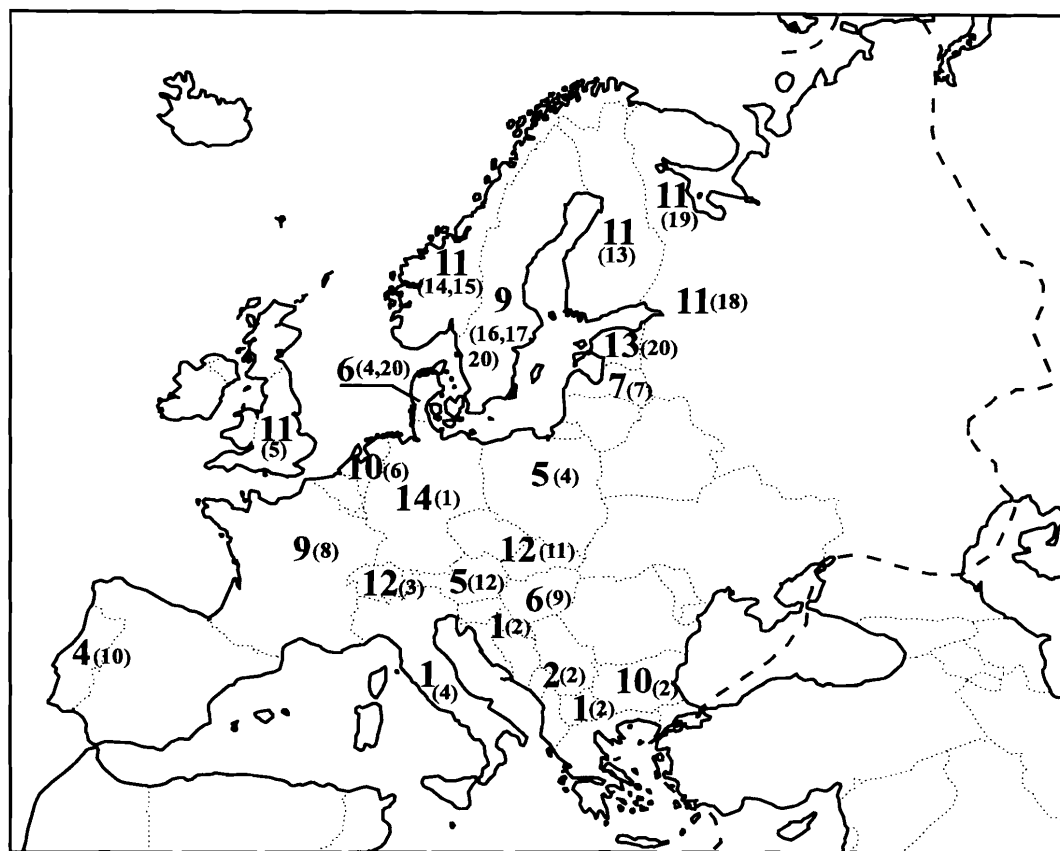


Figure 1. Number of *Cordyla* Meigen, 1803 species recorded in Europe. Numbers in parenthesis indicate references: 1-Kallweit & Plassmann (1999); 2-Bechev (1997); 3-Chandler (1998); 4-Hackman (1988); 5-Edwards (1925); 6-de Meijere (1939); 7-Lackschewitz (1937); 8-Matile (1977); 9-Dely-Draskovitiš (1974); 10-Ribeiro (1990); 11-Košel et al. (1997); 12-Plassmann (1996); 13-Hackman (1980); 14-Søli (1994); 15-Økland (1995); 16-Plassmann (1978); 17-Plassmann (1980); 18-Krivosheina et al. (1986); 19-Yakovlev (1994); 20-original data not previously published.

sue which otherwise would have rendered identification difficult. The remaining chitinous parts were washed with distilled water and inserted into glycerin for observation. The genitalia were preserved as glycerin preparations. Antennae were observed without dissection, when possible; or they were removed from the head and treated with the method described for genitalia. Stereomicroscope OLYMPUS SZ4045TR (6.7 - 240 X) and microscope AY-12 (70 - 300 X) were used.

DISCUSSION

For identification of male specimens three sets of characters can be used.

1. The colour of the swollen segment of palpi can be used to distinguish between two species: *C.*

fasciata Meigen, 1830 and *C. flaviceps* (Staeger, 1840). All other species have the segment of brownish to blackish colour. Some specimens of *C. flaviceps*, however, have a two-colored swollen segment (yellow and brownish).

2. The number of flagellar segments allows to distinguish 4 groups of species:

those with 10 flagellar segments (3 species, viz. *C. brevicornis* (Staeger, 1840), *C. pusilla* Edwards, 1925, and *C. bicornuta* Landrock, 1926); those with 11 flagellar segments (5 species, viz. *C. fasciata* Meigen, 1830, *C. parvipalpis* Edwards, 1925, *C. fissa* Edwards, 1925, *C. crassicornis* Meigen, 1818, and *C. insons* Lastovka et Matile, 1974); those with 12 flagellar segments (5 species, viz. *C. nitens* Winnertz, 1863, *C. fusca* Meigen, 1804, *C. flaviceps* (Staeger, 1840), *C. styli-*

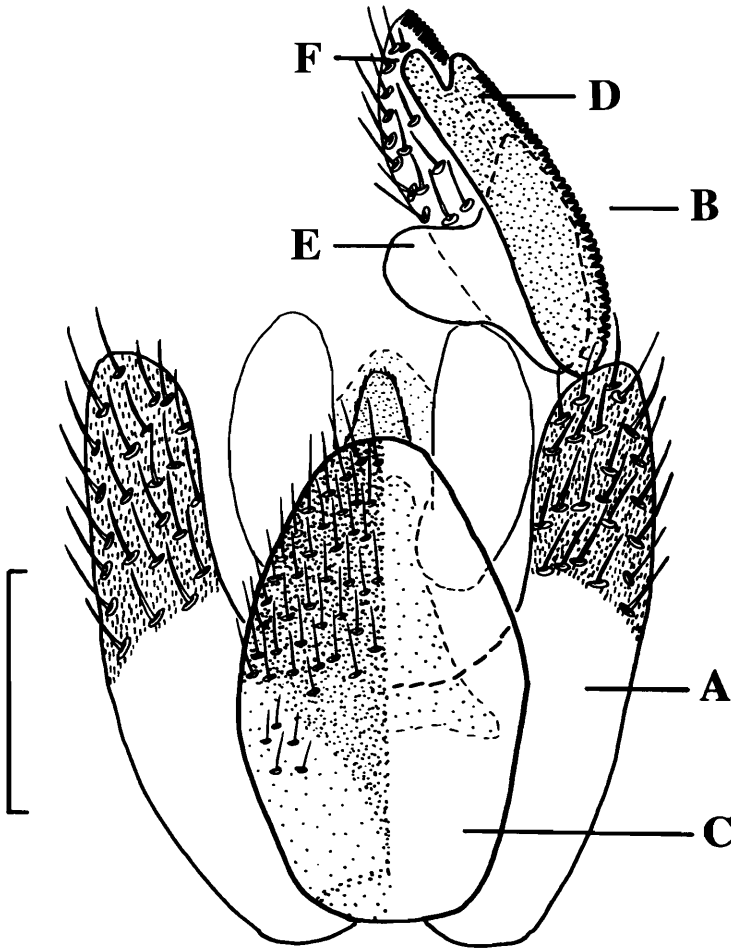


Figure 2. *Cordyla flaviceps* (Staeger, 1840), ventral view of hypopygium; left gonostylus removed. A, gonocoxite. B, gonostylus. C, VIII sternite. D, ventral appendage of gonostylus. E, medial appendage of gonostylus. F, dorsal appendage of gonostylus. Scale bar: 0.1 mm.

forceps (Bukowski, 1934), and *C. murina* Winternitz, 1863); and those with 13 flagellar segments (2 species, viz. *C. semiflava* (Staeger, 1840), and *C. nitidula* Edwards, 1925). The number of flagellar segments is commonly regarded to be a constant characteristic, but some specimens of *C. crassicornis* have 10 flagellar segments, while some *C. murina* have 13.

3. The most important group of characters can be found in the structure of male genitalia, in particular in medial and ventral parts of the gonostylus (Figure 2E,D). For all species the serrated ventral margin of the ventral appendages is typical. Few authors have used the shape of VIII sternit (Figure 2C) as a characteristic for determination, but it is variable and allows to identify only the species *C. semiflava* by its protruding top, distinctly differing from the rest of species.

In most papers only the lateral and ventral views of the gonostylus are presented, thus not showing the shape of the medial appendages. The medial appendages can be observed only after separating the gonostylus (Figure 2B) from the gonocoxites (Figure 2A). The structure of the gonostylus allows to distinguish between three groups, primarily recognized on the outline of the medial parts of the gonostylus.

A. The *semiflava* group comprises five species: *C. semiflava*, *C. murina*, *C. parvipalpis*, *C. styli-forceps*, and *C. insons*. In these species, the medial part of gonostylus is formed from two ventrally or medially directed appendages. In the group *C. parvipalpis* differs by short ventral appendage. For other species the structure of medial appendages is significant. Male genitalia are most similar in this group.

B. The *crassicornis* group comprises two species: *C. crassicornis* and *C. fissa*. Both species have the dorsal part of gonostylus with protruding appendage. The medial part of gonostylus consists of a large branched appendage and a medially directed two-forked appendage. The gonostylus of *C. fissa* is bigger and the protruding appendage on the dorsal part is clearly outlining. The ventral part of *C. fissa* has a cut on the top.

C. The *fusca* group comprises eight species: *C.*

fusca, *C. nitidula*, *C. nitens*, *C. flaviceps*, *C. fasciata*, *C. brevicornis*, *C. pusilla*, and *C. bicornuta*. This is the most variable group with the medial part of gonostylus formed from one or two appendages with various outgrowths. They do also differ in the shape of the ventral part of gonostylus. For example *C. fusca* and *C. nitens* have a semi-hooked ventral appendage; *C. flaviceps* has a deep cut on the top (Figure 2 D); *C. fasciata* slender and longer than the tergal appendage, while *C. nitidula* has a ventral appendage, clearly rounded on the top.

It should be observed that the species groups distinguished by the number of flagellar segments and male genitals do not coincide. Some characteristics can be variable, consequently all of them have to be studied in order to identify species. However, the structure of male genitalia is the most important. In destroyed material or material in bad condition the species can be identified only by genitalia.

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