

A new species of *Cordyla* Meigen from Norway (Diptera: Mycetophilidae)

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A new species of fungus gnats in the genus *Cordyla* Meigen, 1803, *C. bomloensis* sp. n., is described based on adult material from southwestern Norway. Both the male and the female are described, photographed and their terminalia figured. The new species belongs in the *C. fusca*-group. It seems to be most closely allied to *C. brevicornis* (Staeger, 1840) and *C. pusilla* Edwards, 1925 from which it is differing prevalently by structures of the male and female terminalia. Its seemingly isolated distribution in southwestern Norway is briefly commented on.

Key words: Mycetophilidae, *Cordyla*, new species, Norway.

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INTRODUCTION

Kurina (2001) reviewed the current knowledge of the genus *Cordyla* Meigen, 1803 in the Palaearctic region. The genus is a well defined monophyletic group in the fungus gnat family Mycetophilidae, mainly characterised by having short antenna with a reduced number of flagellar segments and by having swollen antepenultimate segment of the maxillary palp. Bechev (1999) listed 19 described species from the Palaearctic region and 10 described species from the Nearctic region. Three species, *C. borealis* Wu & Zheng, 2000, *Cordyla monegrensensis* Chandler & Blasko-Zumeta, 2001 and *C. bidenticulata* Sasakawa, 2003 has later been added to the Palaearctic fauna.

Altogether 11 species of *Cordyla* are so far reported from Norway (Søli 1994, Økland & Zaitzev 1997, Kurina 2001). In this paper we describe a new species collected by the first author on the island Bømlo at the southwestern coast of Norway. The species has subsequently been found at four other localities along the southwestern coast of Norway. The type locality is a rich, mixed deci-

duous forest dominated by birch *Betula pubescens* and aspen *Populus tremula*. The climate in western Norway is Atlantic usually with much rainfall, mild winters, and cool summers.

MATERIAL AND METHODS

All specimens were collected with Malaise traps. At the type locality, **HOY**: Bømlo, Vorland, a single Malaise trap equipped with a bottle filled with 75% ethanol was operated on a weekly basis between February 15th 2002 and March 25th 2003. By examination of additional Malaise trap collections from the southwestern coast of Norway the species was also found at four other localities: **HOY**: Bømlo, Skogafjellet naturreservat, **HOY**: Os, Raudli, **RY**: Finnøy, Sevheim, and **RY**: Finnøy, Ladesteinvatnet.

Parts of the studied material were cleared and slide mounted in Canada balsam. The Holotype and male and female paratypes of the new species is deposited at the Museum of Zoology, University of Bergen, Norway (ZMUB). Paratypes and

additional material in alcohol are further deposited at the Institute of Zoology and Botany, Tartu, Estonia (IZBE), at the Museum of Zoology, Lund University, Sweden (ZMLU), and the Natural History Museum, London, United Kingdom (BMNH). The terminology follows that in Søli et al. (2000).

MEASUREMENTS AND RATIOS

All measurements were made on slide-mounted specimens and are given as the range of measured specimens followed by the mean value when 5 or more specimens were measured. The measurements from holotype are given in square brackets. The head is measured in dorsal view. Head width is measured at the widest point and head length is measured from the vertex to the frontal tubercle. Only the three apical maxillary palpomeres are measured, beginning with the swollen antepenultimate segment. The palpomere ratios are thus given as the ratio of the fourth and fifth palpomere to the length of the antepenultimate (third) segment. The wing length is measured from the distal median plate to apex of wing (Figure 1). The fork length ratio is given as the distance from the distal median plate to the branching of M (A in Figure 1) over the distance from the distal median plate

to the branching of CuA (B in Figure 1). The R_5 termination ratio is given as the distance between R_1 and R_5 termination (C in Figure 1) over the distance between R_5 and M_1 termination (D in Figure 1). The fork width ratio is given as the distance between M_1 and M_2 termination (E in Figure 1) over the distance between CuA_1 and CuA_2 termination (F in Figure 1). The M_2 is measured to the wing margin, and since it is breaking before the wing margin a ratio of the breaking distance to its entire length is also given. Otherwise the M-ratios, CuA-ratios and leg ratios follow Søli (1997).

THE SPECIES

Cordyla bomloensis sp. n.

(Figures 2-11)

Material examined

Holotype: 1 ♂ **NORWAY: HOY**: Bømlo, Vorland (EIS 22, UTM: 32VKM863137), 29 April - 06 May 2002, Malaise trap. J. Kjærandsen leg. (on slide, ZMUB type no. 397).

Paratypes: 1 ♀, same data as holotype (slide, ZMUB). 2 ♂♂ (on slides, ZMLU), same data as holotype except 13 - 20 May 2002. 1 M (on slide,

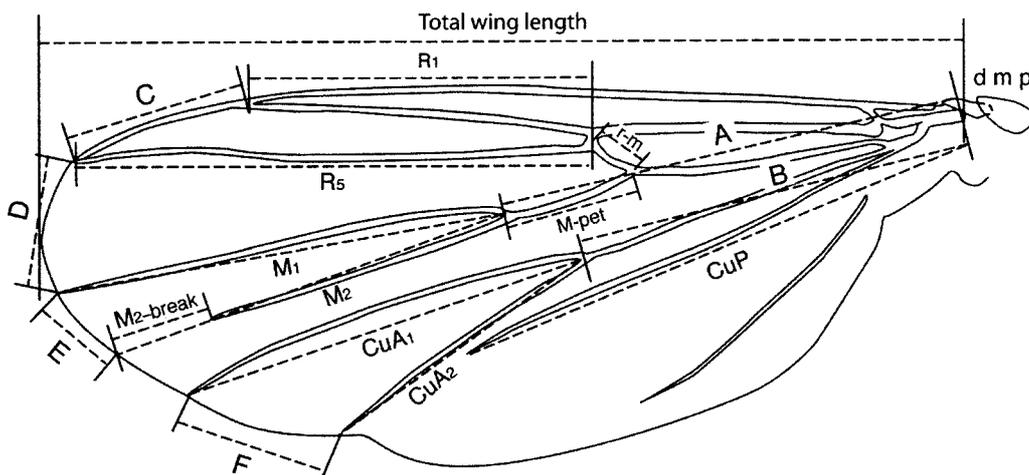


Figure 1. Wing of male *Cordyla bomloensis* sp. n., showing the points and orientation for measurements. A / B measure the fork length ratio. C / D measure the R_5 termination in relation to R_1 and M_1 . E / F measure the fork width ratios. Abbreviations: d m p = distal median plate.

ZMLU), same data as holotype except 27 May - 3 June 2002. 5 ♂♂ (2 on slides, IZBE, ZMLU), same data as holotype except 3 - 10 June 2002. 1 ♂, **HOY**: Bømlo, Skogafjellet naturreservat (EIS 22), 18 April - 31 May 2003, Malaise trap, J. Kjørandsen leg. (ZMLU). 5 ♂♂, same data as previous except 1 June - 6 July. 17 ♂♂, same data as previous except 30 August - 29 September (ZMUB, ZMLU, BMNH).

Additional material: - 1 ♂, 2 ♀♀ (on slides), **HOY**: Os, Raudli (EIS 31), 2 - 9 May 1991, Malaise trap, G. A. Halvorsen leg. (ZMLU). 1 ♂, **RY**: Finnøy, Sevheim (EIS 14), 11 - 29 May 1993, Malaise trap, J. Skarteveit leg. (ZMLU). 2 ♂♂, **RY**: Finnøy, Ladesteinvatnet (EIS 14), 11 - 29 May 1993, Malaise trap, J. Skarteveit leg. (ZMLU).

Etymology. Named after the type locality Bømlo, an island and a municipality on the western coast of Norway, using the Latin suffix *-ensis* denoting place of origin. A noun in genitive case.

Diagnostic characters. Male antennae 2+10 segmented. Swollen antepenultimate palpal segment brown, about 0.9 times as long as height of compound eye. M_2 does not reach wing margin. Posterior fork begins distinctly before base of median fork. Male mid and hind tibiae with three small spinules-like setae ventroapically. Male eight sternite with short spinules-like setae. Gonostylus longitudinally compressed; dorsal and ventral appendages sub-equal in length. Dorsal appendage of gonostylus without comb, medial appendage undivided with small apical projection. Female tergite VI with pointed apical edge laterally and deeply excavated dorsally

Description

Male

($n = 5$, except where otherwise stated). Total length 2.5 - 3.6, 3.1 ($n=10$) mm. Wing length 2.16 - 2.4, 2.31 [2.16] mm, or 3 - 3.24, 3.12 [3] times as long as profemur. Mesonotum length 0.88 - 1, 0.94 mm, or 0.4 - 0.42, 0.41 [0.41] times as long as wing.

Coloration (Figure 2). Antenna with scape light brown, pedicel and flagellum yellow. Head dark

brown. Maxillary palp brown. Thorax dark brown to blackish, without thoracic stripes. Wings unmarked, wing veins yellow with dark setae. Legs variable, mainly yellow but sometimes with darker femora. Abdominal tergites dark brown to blackish, with basal segments generally paler. Terminalia light brown, cercus yellow.

Head. Round, width / length to frontal tubercle 1.21 - 1.36, 1.31 [1.33]. Antenna (Figure 5) short, compressed with 10 flagellar segments, length of antenna 0.51 - 0.62, 0.59 [0.51] mm. First flagellomere 1.5 - 1.82, 1.67 [1.7] times as long as second flagellomere. Second flagellomere 0.4 - 0.44, 0.42 [0.43] times as long as wide. Two ocelli present, set close to compound eyes. Length / width of clypeus 0.29 - 0.42, 0.35 [0.29]. Antepenultimate segment 0.23 - 0.25, 0.24 [0.23] mm long, palpomere ratios 1: 0.63 - 0.71, 0.66 [0.68]: 0.71 - 0.93, 0.84 [0.82].

Thorax. Scutum densely covered with small, decumbent, black setae. Proepisternum covered with black setae of variable size. Anepisternum covered with black, small setae, 3-5, 4 [3] larger setae along posterior margin. Laterotergite with 12-22, 19 [12] long setae centrally.

Wings (Figure 4). Costa and radius with setae both dorsally and ventrally. Wing length to length of R_1 2.45 - 2.55, 2.49 [2.51]. R_2 slightly sinusoid, wing length to length of R_3 1.79 - 1.82, 1.8 [1.8]. Crossvein r-m with small, distinct white spot. Length of r-m to length of M-petiole 0.31 - 0.4, 0.35 [0.4]. Fork length ratio (A/B) 1.1 - 1.28, 1.2 [1.15]. R_3 termination ratio (C/D) 1.13 - 1.18, 1.15 [1.13]. Fork width ratio (E/F) 0.45 - 0.53, 0.48 [0.47]. M-ratios 0.92 - 1.03, 0.99 [1] and 0.98 - 1.13, 1.07 [1.13]. M_2 break 0.21 - 0.25, 0.23 [0.23] of its length before wing margin. CuA-ratios 0.78 - 0.96, 0.86 [0.96] and 1.05 - 1.31, 1.17 [1.31]. CuP distinct basally, length 0.61 - 0.67, 0.64 [0.64] to length of wing. A_1 distinct, shorter.

Legs. Anterior face of forecoxa covered with short, black setae. Mid and hind tibiae with three small, spinules-like setae ventroapically. Leg ratios given for fore, mid and hind leg: LR 0.76 - 0.8, 0.78 [0.76]: 0.77 - 0.84, 0.8 [0.77]: 0.7 - 0.74, 0.72 [0.71]; SV 2.89 - 3.1, 2.99 [3.1]: 2.53 - 2.75, 2.63 [2.62]: 2.76 - 2.92, 2.86 [2.91]; BV 1.65 - 1.84,

1.71 [1.68]: 1.93 – 2.04, 1.99 [1.93]: 2.25 – 2.38 [2.38] (n=4); TR 1.29 – 1.37, 1.32 [1.3]: 1.53 – 1.63, 1.58 [1.56]: 1.7 – 1.81, 1.75 [1.81].

Terminalia (Figures 7-9). Gonocoxite subsquare in dorsoventral view, with a deep u-shaped incision ventrally. Cercus short, ovate. Dorsal appendage of gonostylus short, round, externally setose; with apicomedial short lobe; without comb. Medial appendage of gonostylus undivided, short, subsquare; with small apical projection and two strong seta. Ventral appendage of gonostylus short, subsquare in ventral view; with heavily sclerotized comb along entire external surface; without setae. Sternite VIII with narrow base, basal half widening and apical half pointed with bluntly rounded tip; apical half densely covered with black, short, strong spinules-like setae.

Female

(n = 3, except where otherwise stated). Total length 3.2 – 4.1 mm. Wing length 2.22 – 2.44 mm, or 3.26 – 3.68 times as long as profemur. Mesonotum length 0.74 – 0.84 mm, or 0.32 – 0.36 times as long as wing.

Coloration (Figure 3). As for male, except more distinctly darker apically on femora and terminalia light brown

Head. Round, width / length to frontal tubercle 1.46 – 1.48. Antenna (Figure 6) short, compressed, with 9 flagellar segments, length of antenna 0.51 – 0.6 mm. First flagellomere 1.5 – 1.92 times as long as second flagellomere. Second flagellomere 0.6 – 0.67 times as long as wide. Two ocelli present, set close to compound eyes. Length / width of clypeus 0.46 – 0.52. Antepenultimate segment 0.2 – 0.22 mm long, palpomere ratios 1: 0.72 – 0.75, 0.73: 0.79 – 1, 0.91.

Thorax. Scutum covered with larger, black setae, intermingled with smaller, decumbent, black setae. Proepisternum covered with black setae of variable size. Anepisternum covered with black, small setae, 2-3 larger setae along posterior margin. Laterotergite with 12-19 setae centrally.

Wings. Costa and radius with setae both dorsally and ventrally. Wing length to length of R_1 2.27 – 2.78. R_5 slightly sinusoid, wing length to length

of R_5 1.69 – 2. Crossvein r-m with small, distinct white spot. Length of r-m to length of M-petiole 0.26 – 0.29. Fork length ratio (A/B) 1.04 – 1.06. R_5 termination ratio (C/D) 1.13 – 1.19. Fork width ratio (E/F) 0.62 – 0.73. M-ratios 0.94 – 0.96 and 1.02 – 1.04. M_2 break 0.21 – 0.31 of its length before wing margin. CuA-ratios 1.07 – 1.09 and 1.5 – 1.55. CuP distinct basally, length 0.4 – 0.42 to length of wing. A_1 distinct, shorter.

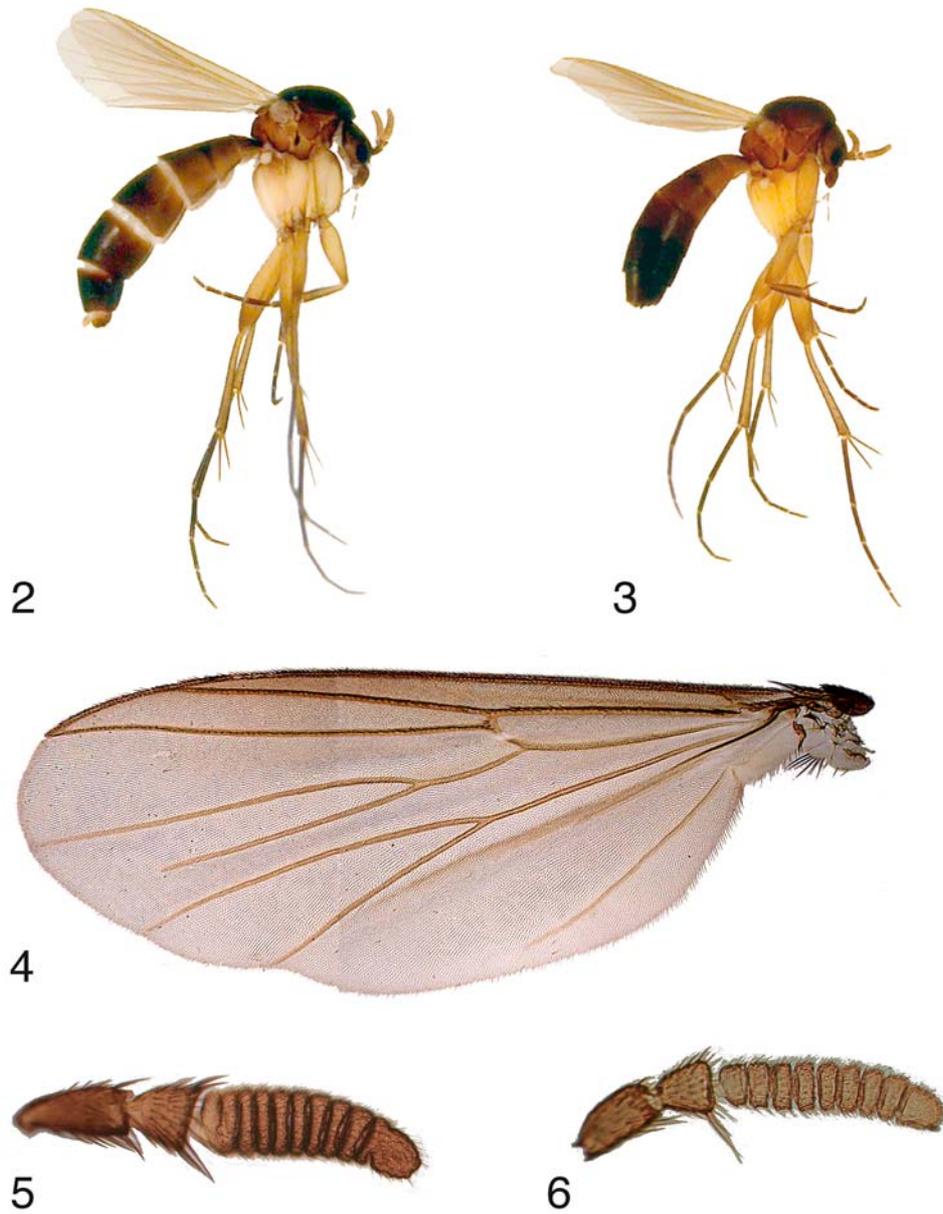
Legs. Anterior face of forecoxa covered with short, black setae. Mid and hind tibiae without spinules-like setae ventroapically. Leg ratios given for fore, mid and hind leg: LR 0.83 – 0.91: 0.75 – 0.8: 0.66 – 0.71; SV 2.75 – 3.01: 2.59 – 2.74: 2.78 – 3.02; BV 1.65 – 1.71: 2.1 – 2.23: 2.69 – 2.86; TR 1.36 – 1.46: 1.68 – 1.71: 2.12 – 2.24.

Terminalia (Figures 10-11). Long oviscapt, usually retracted within segment VI. Tergite VI with pointed apical edge laterally, evenly excavated dorsally. Tergite VII and VIII similar, less pointed apically. Sternite VI - VIII medially divided. Cercus 2-segmented, basal segment long ovate, covered with short, stiff setae; apical segment small, rounded, with a few strong setae apicomediaally. Gonapophysis 8 membranous, subtriangular in lateral view; with single apical seta. Labia present as sclerotized strip overlying gonapophysis VIII.

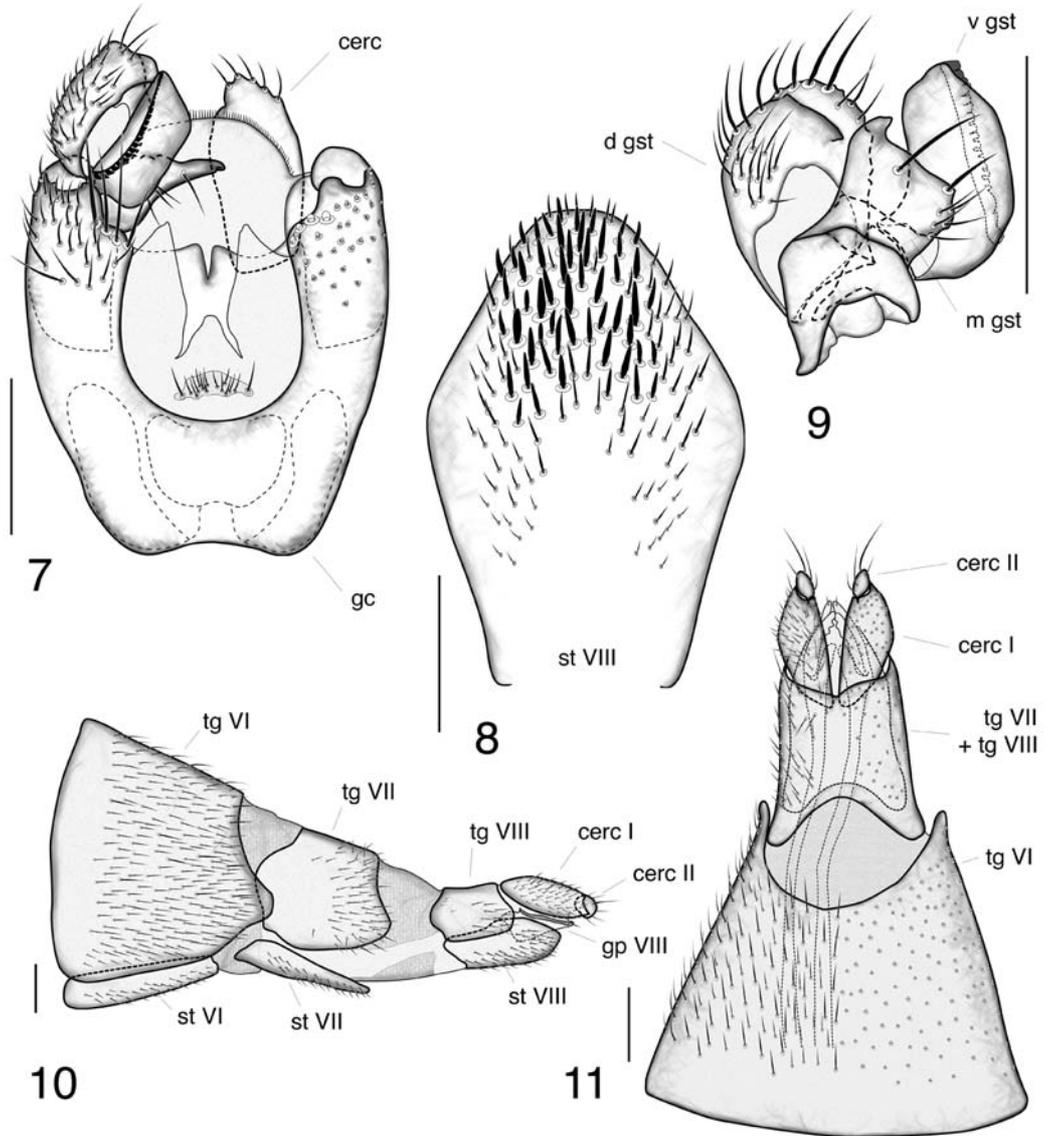
Distribution and flight period. The new species is so far only known from the southwestern coast of Norway where it seems to be locally common at several localities. Based on available material the flight period seems to be primarily in May and in September.

DISCUSSION

Cordyla bomloensis sp. n. belongs to the *C. fusca*-group, which was outlined by Kurina (2001). It is most similar to *C. brevicornis* (Staeger, 1840) and *C. pusilla* Edwards, 1925, differing prevalently by structure of the male and female terminalia. Within the *C. fusca*-group the males of *C. bomloensis* sp. n. shares two characters with *C. brevicornis* and *C. pusilla*: 1) The antenna has 10 flagellar segments, and 2) the dorsal appendage of the gonostylus is without a sclerotized comb. Further the males shares with *C. fusca* Meigen,



Figures 2 – 6. Digital photos of *Cordyla bomloensis* sp. n. – 2. Habitus of male paratype. – 3. Habitus of female paratype. – 4. Left wing of holotype. – 5. Antenna of holotype, lateral view. – 6. Antenna of female paratype, lateral view.



Figures 7 – 11. Terminalia of *Cordyla bomloensis* sp. n. – 7. Male terminalia, ventral view, sternite VIII and left gonostylus removed. – 8. Male sternite VIII, ventral view. – 9. Internal face of male left gonostylus. – 10. Female terminalia, lateral view. – 11. Female terminalia, dorsal view. Abbreviations: gc: gonocoxite, gp: gonophysis, d gst: dorsal lobe of gonostylus, m gst: median lobe of gonostylus, v gst: ventral lobe of gonostylus, st: sternite, tg: tergite. Scale bars represent 0.1 mm.

1804 and *C. nitens* Winnertz, 1863 the characteristic of having three spinules-like setae apicoventrally on the mid and hind tibiae. All other *Cordyla* species have normal setae apicoventrally on the mid and hind tibiae, more than 10 flagellar segments, and one or two combs on the dorsal appendage of the gonostylus.

In *C. bomloensis* sp. n. the swollen antepenultimate segment of the maxillary palp is brown, analogous to *C. pusilla*, but it is somewhat more slender than in both *C. pusilla* and *C. brevicornis*. The gonostylus (Figures 7 and 9) is longitudinally compressed compared to other *Cordyla* species. Both the dorsal and ventral appendages of the gonostylus are uniquely shaped; the dorsal appendage being short, rounded and subequal in length to the subsquare ventral appendage. All other *Cordyla* species have the dorsal appendage longer and/or both appendages remarkably more slender. The medial appendage of gonostylus consists of one undivided lobe, somewhat similar to that of the Nearctic *C. scutellata* Garrett, 1925. The male sternite VIII is very characteristic in *C. bomloensis* sp. n., having short spinules-like setae like no other known *Cordyla* species. The wing venation is like in most of *Cordyla* species, with M_2 not reaching to wing margin (break-off ratio 0.21 – 0.25, 0.23 in the male and 0.21 – 0.31 in the female). The cubital fork begins clearly before the base of medial fork in the male (average fork length ratio 1.2), less clearly so in the female (fork length ratio 1.04 – 1.06).

Despite having studied lots of *Cordyla* material from throughout the Fennoscandian region the second author has not found *C. bomloensis* sp. n. elsewhere. The distribution of the new species is also unlikely to be explained as the result of post-glacial immigration from areas outside Scandinavia. Hence, and although admitting that we still have very limited knowledge of the distribution of fungus gnats in Scandinavia, it is intriguing to speculate why this species seems to have a restricted distribution in southwestern Norway. The supposedly endemic distribution associates perhaps best with the theory of glacial refugia in Scandinavia (e.g. Lindroth 1969), where oceanic species may have survived in fluctuating glacial-free areas. The finding of *C. bomloensis* sp. n. on the is-

lands Bømlo and Finnøy conforms well with a postulated refugium around Boknafjorden (see Manglerud 1973). The unique morphology, especially in the male genitalia, points in the direction of a preglacial relict that has not been able to expand its distribution after the last ice age. However, the theory of ice-free refugia in Scandinavia is controversial and has been heavily disputed (e.g. Manglerud 1973, Nordal 1987).

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