

Description of females of three species of *Ectrepesthoneura* Enderlein (Diptera, Mycetophilidae)

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Descriptions of the females of *Ectrepesthoneura hirta*, *E. colyeri* and *E. pubescens* are given, based on material from two Norwegian localities. The studied specimens were hatched from decaying wood and collected by use of Malaise traps. The three species can only be separated on differences in the outline of the terminalia, especially in the shape of the gonapophysis 9. A preliminary key for females of the studied species is given, together with detailed figures of the terminalia.

Key words: Mycetophilidae, fungus gnats, *Ectrepesthoneura*, female, description.

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INTRODUCTION

The genus *Ectrepesthoneura* Enderlein, 1911 belongs to the family Mycetophilidae in the superfamily Sciaroidea. The genus is commonly ascribed the tribe Leiini (e.g. Edwards 1925, Söli 1997), but in several respects it takes an intermediate position between the two tribes Leiini and Gnoristini. Tuomikoski (1966) and Väisänen (1986) have both argued for its inclusion in the latter.

Ectrepesthoneura is known from the Holarctic region only, with 12 species from the Palearctic and 3 from the Nearctic subregions (Table 1); two more species have been described from Baltic/German amber (Eocene/Oligocene), *E. magnifica* (Meunier, 1904) and *E. rottensis* Statz, 1944 (Evenhuis 1994). A revision of the European and eastern Nearctic species of *Ectrepesthoneura*, including an identification key for males, are given by Chandler (1980).

As for the majority of species of Mycetophilidae, most females of *Ectrepesthoneura* have never been described, or the descriptions are inadequate, without detailed illustrations of the terminalia (e.g. Caspers 1991; Chandler 1980; Zaitzev 1984). Chandler (1980) assumed that most females in the

British material studied by him, belonged to *E. hirta*, and included a very brief description, without figures, of these females and a second female tentatively ascribed *E. pubescens*. The female of *E. hirta* has been figured, but not thoroughly described by Söli (1997: Fig. 42A, B).

Chandler (1980) discussed the relationship between *Ectrepesthoneura* and *Tetragoneura* Winnertz, 1846, by American authors usually regarded as synonyms (e.g. Vockeroth 1981), and suggested that some of the ten Nearctic species described as *Tetragoneura* should be transferred to *Ectrepesthoneura*. These two genera have commonly been regarded as sistergroups (e.g. Söli 1997), but in a recent paper, Chandler (1999) suggests that *Ectrepesthoneura* is paraphyletic and that new genera will be recognized.

Hopefully, more thorough studies of female *Ectrepesthoneura* will not only prove valuable in the identification of species, but may also reveal new characters that can be valuable in future studies to solve the phylogenetic relationship of *Ectrepesthoneura* and other enigmatic genera within Mycetophilidae.

Table 1. Extant species of *Ectrepesthoneura* Enderlein, 1911.

PALAEARCTIC:

- E. bucera* Plassmann, 1980
- E. chandleri* Caspers, 1991
- E. colyeri* Chandler, 1980
- E. gracilis* Edwards, 1928
- E. hirta* (Winnertz, 1846)
- E. ledenikiensis* Bechev, 1988
- E. montana* Zaitzev, 1984
- E. nigra* Zaitzev, 1984
- E. ovata* Ostroverkhova, 1977
- E. pubescens* (Zetterstedt, 1860)
- E. referta* Plassmann, 1976
- E. tori* Zaitzev & Økland, 1994

NEARCTIC:

- E. bicolor* (Coquillett, 1901)
- E. laffooni* Chandler, 1980
- E. canadensis* Zaitzev, 1993

MATERIAL AND METHODS

Material

The material originates from two different localities: Frogn, Akershus, SE Norway, and Alta, Finnmark, N Norway. The material from Frogn was collected by use of hatching-traps attached to logs of decaying wood, and the emerging insects were collected in test tubes. These samples held three species of *Ectrepesthoneura*, *E. colyeri*, *E. hirta* and one female that could not be identified. The sample from Alta held two species, *E. hirta* and *E. pubescens*, and were collected by use of Malaise traps. The specimens were stored in 70 % alcohol, and later several of them were dissected and slide mounted according to the method described by Söli (1997). The material is kept in the collection of Zoological Museum, University of Oslo, Norway.

Measurements and terminology

The arrangement of the ocelli is described by two ocellar ratios defining the position of the lateral ocellus in relation to the median ocelli and the compound eye. Due to the strong reduction of the

second segment of palpus, the palpomere ratios are given as the length of the first segment to the length of third, fourth and fifth segment, respectively. The length of scutum was measured as a straight line from its anterior to its posterior border; and the length of thorax as a straight line from the anterior border of scutum to the posterior border of scutellum. The wing length was measured from the distal median plate to the apex of wing. Two leg ratios are used in the descriptions, given for fore, mid and hind leg, respectively: SV, the combined length of femur and tibia to the length of the first tarsomere; and BV, combined length of femur, tibia and first tarsomere to the combined length of tarsomere 2-5 (see Söli 1997). In addition, the lengths of the tibial spurs are given in relation to the diameter of the tibiae, measured apically. The arrangement of the tibial setae and bristles is indicated by use of the following abbreviations: a, anterior; p, posterior; d, dorsal; v, ventral; ad, anterodorsal; av, anteroventral; pd, posterodorsal; pv, posteroventral (McAlpine 1981).

Total length is calculated as the combined length of head, thorax and abdomen. When five or more specimens were measured the mean value is given in brackets after the range.

The morphological terminology follows Söli (1997).

Association of females

As all but one of the samples obtained by hatching held just one species, the presence of males and females in the same sample was considered a reliable evidence for the association of the sexes. The sample with two species contained *E. colyeri* and an unidentified female. Females of *E. colyeri* were primarily associated on the basis of another sample containing just one species. In the material from Frogn, *E. colyeri* and *E. hirta* were found in two different habitats, giving further support to the association. On the basis of the association of females from Frogn and by use of species keys (Chandler 1980; Hutson *et al.* 1980), males and females of *E. hirta*, and males of *E. pubescens*, were identified in the material from Alta. Consequently the remaining female specimens in the sample from Alta were considered to be *E. pubescens*.

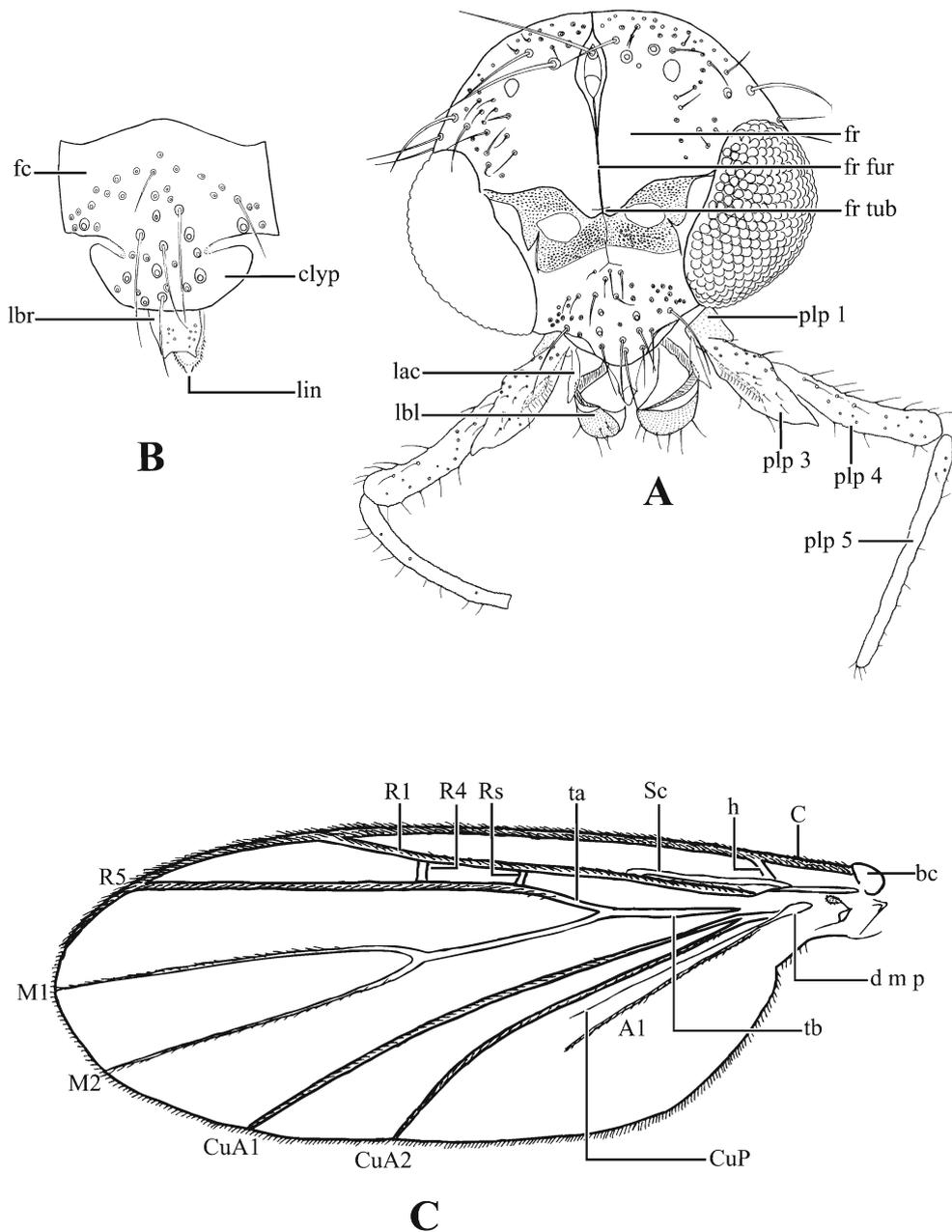


Figure 1. - A. Head of *Ectrepesthoneura colyeri* Chandler. - B. Face and clypeus of *E. hirta* (Winnertz). - C. Wing of *E. colyeri*. Abbreviations: A = anal vein; bc = basicosta; C = costa; clyp = clypeus; CuA1 and CuA2 = anterior branches of cubitus; CuP = posterior branch of cubitus; d m p = distal median plate; fc = face; fr = frons; fr fur = frontal furrow; fr tub = frontal tubercle; h = humeral; lac = lacinia; lin = lingua; lbl = labellum; lbr = labrum; M1 and M2 = branches of media; plp = palpomere; R1 = anterior branch of radius; R4 and R5 = posterior branches of radius; Rs = radial sector; Sc = subcosta; ta = anterior transversal; tb = basal transversal.

STUDIED FEMALES OF *ECTREPESTHONEURA*

General morphology

Coloration. Head dark brown. Palpi and mouthparts yellow. Thorax dark brown. Halteres yellow to whitish. Wings clear without markings; costa and radius dark, remaining veins yellowish. Legs mainly yellowish, trochanters and sometimes also the basalmost part of coxae brown. Coxa, trochanter and femur with pale setae. Tibial spurs yellowish. Abdominal tergites brown or with yellow markings.

Head (Figure 1A, B). Three ocelli in linear arrangement on top of head. Vertex and lateral portions of frons evenly covered with setae of variable size. Height of compound eye about 0.5 times height of head. Eyes with shallow invaginations above antennal socket; 3-4 small interommatidial setae. Frontal furrow usually distinct and complete. Scape with setae on apical half; pedicel with row of apical setae, one bristle. Flagellum with 14 flagellomeres. Surface of each flagellomere with trichia and rounded depressions, probably representing campaniform sensilla. Fused face and clypeus with numerous setae of variable size. Labrum apically broad. Lingua pointed, with several apical fringes. Palpus with 5 segments: first segment short; second strongly reduced, hardly traceable; third segment thickened at middle, with specialised sensilla along inner surface; fourth attached to third about 1/3 from its distal end; fifth segment long and slender. Segment 3-5 of palpus with some setae. Lacinia oblong.

Thorax. Scutum with pale setae arranged in indistinct, broad rows. Most setae small, but posteriorly some long and pronounced bristles. Scutellum with two pairs of bristles, and additional small intermittent setae. Antepnotum and proepisternum evenly covered with setae, some long and pronounced. Remaining pleural sclerites bare. Anapleural suture complete, declining posteriorly.

Wings (Figure 1C). Costa produced beyond tip of R5. Sc reaching 0.5 to 0.6 distance to base of Rs. R4 present, forming small, oblong radial cell. Length of crossvein ta subequal to or longer than radial cell. R1 short, 0.8 to 1.6 times as long as

crossvein ta. Median and posterior fork complete; stem of posterior fork very short. All veins with setae except h, Sc, tb, R4, Rs, stem of M, basal portion of M1, M2 and crossvein ta.

Legs. Hind coxa with one row of long and several smaller setae posteriorly, and additional group of setae anteriorly, near apex. Tibia and tarsi densely clothed with short, unevenly arranged, dark trichia. Fore tibia only with setae apically.

Terminalia (Figures 2-5). Pair of broad gonocoxites 8 intimately fused with posterior border of sternite 8, evenly clothed with small setae and several bristles posteriorly. Pair of weakly sclerotized, subtriangular gonapophyses 8 located dorsally of gonocoxites 8. Median, membranous labia located between gonocoxites 8 and gonapophyses 8. Tergite 8 narrow. Tergite 9 longer than tergite 8, setose. Pair of gonocoxites 9 located laterally of tergite 9, densely covered with trichia. Gonapophyses 9 plate-like and membraneous, usually with longitudinal sclerotized keel. Spermathecal eminence usually distinct, ending in membraneous area probably representing vestiges of sternite 9. Spermathecal ducts weakly sclerotized. Tergite 10 narrow, with transverse row of long setae posteriorly, median portion of basal border prolonged cephalad. Sternite 10 narrow, bare. Cerci two-segmented; second, ovate segment much smaller than first segment.

Key to females of *E. colyeri*, *E. hirta* and *E. pubescens*

1. First segment of cercus produced apically beyond the attachment of second segment (Figure 2C, D). Wing length equal to or less than 3 times as long as profemur *colyeri*
 - Second segment of cercus attached at the extreme apex of first segment. Wing length more than 3 times as long as profemur 2
2. Viewed laterally, dorsal border of gonocoxites 8 distinctly invaginated (concave) towards apex (Figure 4C). Gonocoxites 8 with a collection of strong apical setae. First segment of cercus about 3 times as long as second *pubescens*
 - Viewed laterally, dorsal border of gonocoxites

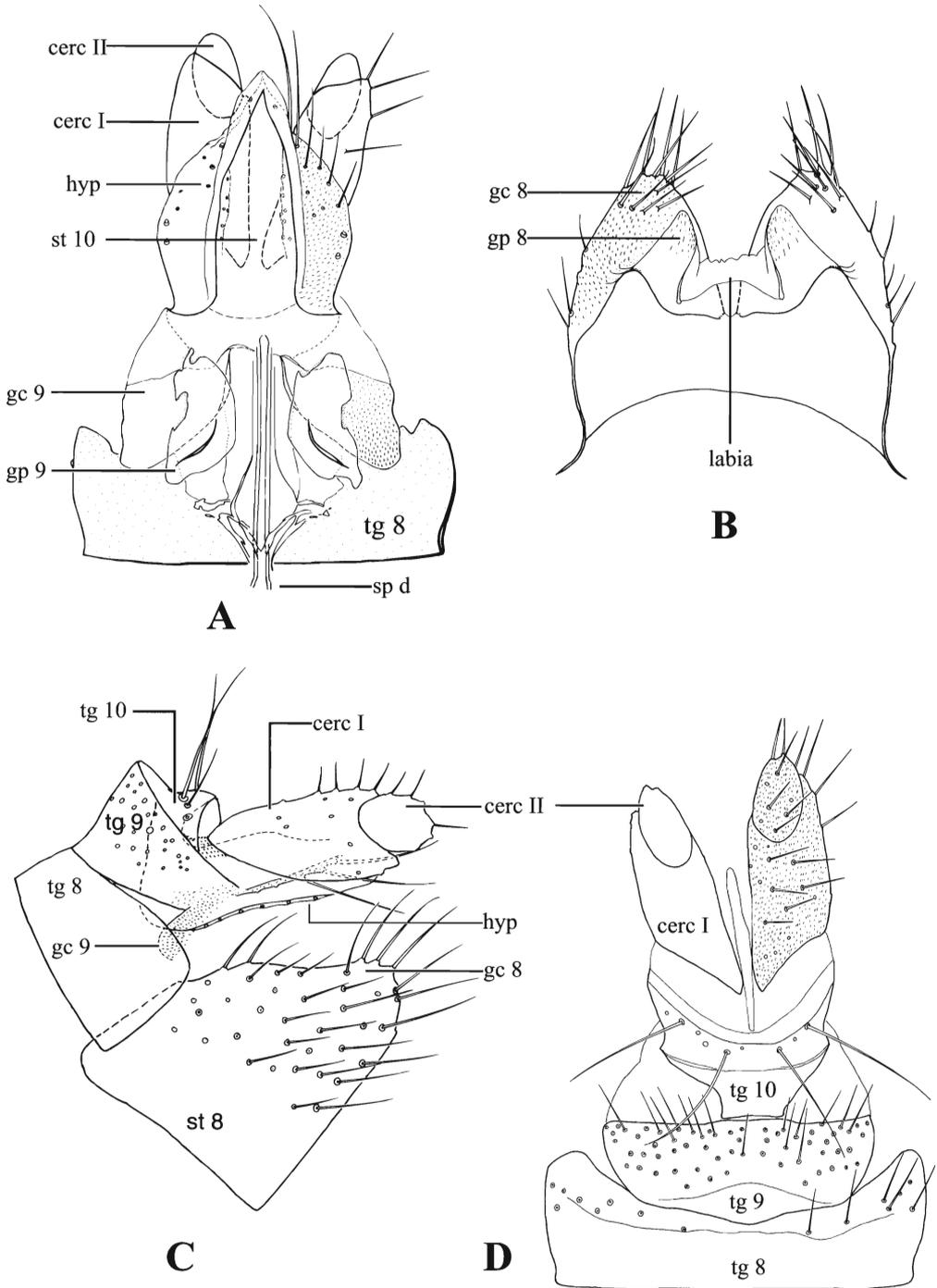


Figure 2. Female terminalia of *Ectrepesthoneura colyeri* Chandler. - A. Ventral view, sternal parts removed. - B. Dorsal view, tergal parts removed. - C. Lateral view. - D. Dorsal view. Abbreviations: cerc = cercus; gc = gonocoxite; gp = gonapophysis; hyp = hypoproct; sp d = spermathecal duct; st = sternite; tg = tergite.

8 even or slightly convex towards apex (Figure 3C). Gonocoxites 8 with setae evenly dispersed. First segment of cercus distinctly less than 3 times as long as second *hirta*

The difference in the ratio used in the first couplet to separate *E. colyeri* from the remaining two species is small, and the character should be used with care.

***Ectrepesthoneura colyeri* Chandler**

Figures 1A, C and 2.

Ectrepesthoneura colyeri Chandler, 1980: 32.

Studied material. **AK** Frogn: Danemark (EIS 18), 9 ♀♀ 5 ♂♂ 13 May - 8 July 1997, 2 ♀♀ 1 ♂ 8 July - 26 August 1997 (hatching-traps), B. Økland & L. Martinsen.

Description (female)

Total length 3.52-4.07 (3.69) mm (n=8).

Coloration. Antennae with scape dark brown, pedicel and first flagellomere yellow; remaining flagellomeres brown, not as dark as scape. Trochanters dark. Femora slightly darkened basally, very weakly on fore leg. Hind femur darkened at apical fourth to apical third. Abdominal tergites brown with yellow markings: 1 and 2 with yellow areas laterally; 3 and 4 with yellow areas posterolaterally making the brown area triangular-shaped; 5 with a slim yellow area on hind margin; 6 and 7 completely brown. Abdominal sternites: 1-4 yellow, 5-7 brownish. Terminalia brown, except for yellow cerci.

Head. 0.8-0.9 (0.9) times as long as wide. Lateral ocellus separated from eye border and median ocellus by 3.2-4.3 (3.6) and 3.2-3.8 (3.5) times its own width, respectively. Frontal furrow distinct and complete. Length of flagellum 1.0-1.1 mm, or about 1.2-1.4 (1.3) times as long as scutum. Flagellomeres 1-13 and 14, 1.4-2.0 and 2.5-3.6 times as long as wide, respectively. Fused face and clypeus with about 40 setae. Palpomere ratios 1:3.1-5.0:3.7-5.3:4.7-8.9.

Thorax. Total length 0.90-0.98 (0.93) mm. Length of scutum 0.77-0.84 (0.81) mm.

Wings. Wing length 2.57-2.78 (2.67) mm. Wing length to length of R1 6.67-8.19 (7.40). Wing length to length of profemur 2.81-3.00 (2.91). Costa covering about 0.7 distance between R5 to

M1. Crossvein ta subequal in length to radial cell, with 2-4 setae apically. R1 somewhat longer than ta and fused with costa for short distance. Median fork starting at, or slightly before, level of R4. Veins M1 and M2 without setae on basal 1/5 and 1/7, respectively; crossvein ta without setae on basal half.

Legs. Mid tibial setae: 4-5 small p apically, 6 pv, 4 pd, 3 ad, and several additional setae on apical border. Hind tibial setae: 7-10 small p, 15-19 pd, 13 ad, and a group of small setae posterior apically. Leg ratios: femur to tibia 1.06-1.08 (1.07), 1.19-1.23 (1.21), 0.86-0.90 (0.89); SV 2.81-3.03 (3.93), 3.00-3.30 (3.16), 3.75-3.96 (3.87); BV 2.91-3.18 (3.05), 3.23-3.48 (3.38), 3.94-4.31 (4.12); spurs 2.2-2.7; 2.6-3.0, 3.11-4.2; 2.5-3.1, 3.4-4.0.

Terminalia. Viewed laterally, gonocoxites 8 evenly rounded. Tergite 8 with one row of setae posteriorly and few additional setae laterally. Gonocoxites 9 plate-like, weakly sclerotized. Gonapophyses 9 plate-like with uneven border, weakly sclerotized, with keel about 1/4 from basal border. Sternite 10 subtriangular. Hypoproct with setae laterally, a few long basally. First segment of cerci produced apically beyond attachment of second, and about 2.5 times as long as this.

Biology. Specimens of *E. colyeri* were hatched from a rotten trunk of oak (*Quercus robur*).

***Ectrepesthoneura hirta* (Winnertz)**

Figures 1B and 3.

Tetragoneura hirta Winnertz, 1846: 19. Fig. 8.

Ectrepesthoneura hirta (Winnertz, 1846), Enderlein 1911: 155

Studied material. **AK** Frogn: Smihagen (EIS 28), 4 ♀♀ 4 ♂♂ 8 July - 26 August 1997, 3 ♂♂ 13 May - 8 July 1997 (hatching-traps), B. Økland & L. Martinsen; **FV** Alta: Detsika, Buolamalia (EIS 173), 3 ♀♀ 44 ♂♂ 11 June - 3 July 1995 (Malaise trap, sandy slope), L. O. Hansen & H. Rinden.

Description (female)

Total length 3.57-4.05 mm (n=4).

Coloration. Antennae with scape dark brown, pedicel and base of first flagellomere yellow, remaining flagellomeres brown. Trochanters, base of

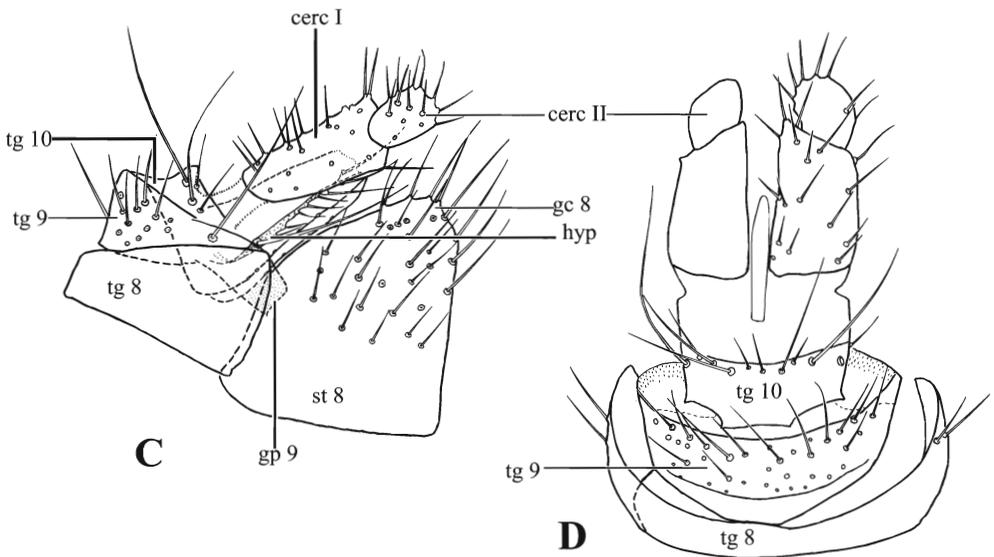
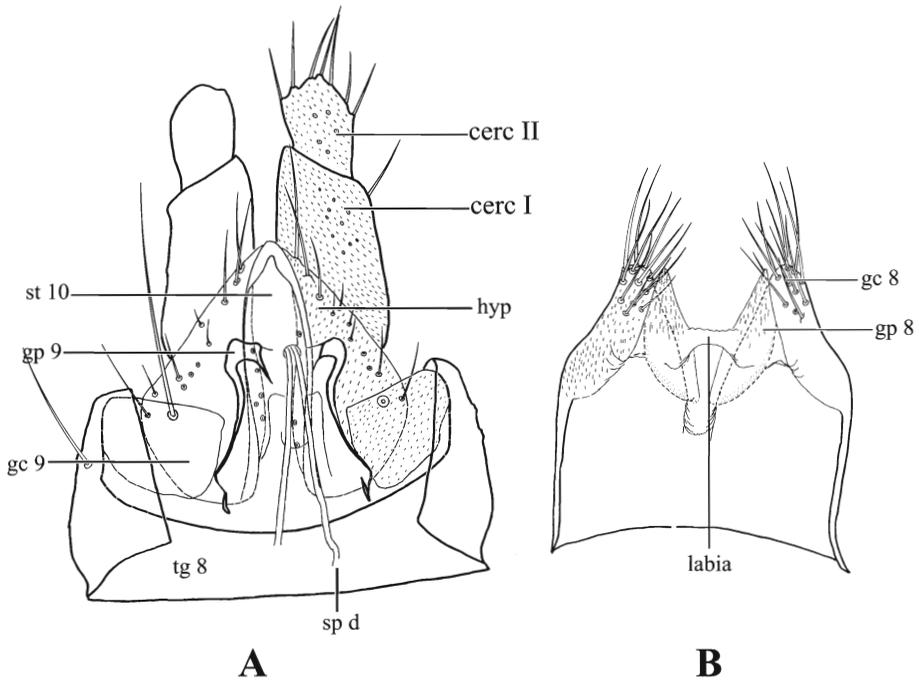


Figure 3. Female terminalia of *Ectrepesthoneura hirta* (Winnertz). - A. Ventral view, sternal parts removed. - B. Dorsal view, tergal parts removed. - C. Lateral view. - D. Dorsal view. Abbreviations: see Figure 2.

femora, extreme apex of mid femur, apical fourth of hind femur and the basalmost part of hind coxa dark brown. Abdomen uniform dark brown, or tergite 1-5 with yellow bands apically. Terminalia yellow, except for brown cerci.

Head. 0.7-1.0 times as long as wide. Lateral ocellus separated from eye border and median ocellus by 2.2-2.5 and 2.6-3.1 its own width, respectively. Frontal furrow distinct, with rupture near frontal tubercle. Several long, pronounced setae posteriorly on vertex, reaching down to level of antennal attachment. Length of flagellum 1.04-1.08 mm, or about 1.1-1.4 times as long as scutum. Flagellomeres 1-13 and 14, 1.6-1.9 and 2.1-3.3 times as long as wide, respectively. Fused face and clypeus with about 50 setae. Palpomere ratios 1:2.5-2.7:2.7-4.0:4.2-6.0.

Thorax. Total length 0.90-1.08 mm. Length of scutum 0.78-0.93 mm.

Wings. Wing length 2.62-3.36 mm. Wing length to length of R1 6.08-6.60. Wing length to length of profemur 3.19-3.38. Costa covering about 0.7 distance between R5 and M1. Crossvein ta longer than radial cell, with 8 setae. R1 short, but longer than ta. Median fork starting at level of R4. Basal 1/6 of M1, extreme bases of M2 and crossvein ta without setae.

Legs. Mid tibial setae: 4 p, 6 small pv, 3 pd, 4 ad, and several additional setae on apical border. Hind tibial setae: 6-8 small p, 12 pd, 1 d basally, 14 ad, and a group of small setae posterior apically. Leg ratios: femur to tibia 0.92-1.11, 0.93-1.08, 0.79-0.83; SV 2.60-2.73, 2.87-3.07, 3.44-3.82; BV 2.35-2.83, 2.98-3.35, 4.12-4.46; spurs 2.1-2.9; 3.1-3.3, 3.3-4.3; 2.9-3.1, 3.0-3.9.

Terminalia. Viewed laterally, gonocoxites 8 evenly rounded. Tergite 8 with some lateral setae. Gonocoxite 9 plate-like. Gonapophyses 9 with well sclerotized, curved lateral border; otherwise weakly sclerotized. Vestiges of sternite 9 as very weakly sclerotized rectangular plate. Sternite 10 oblong. Hypoproct with several lateral setae, basalmost very long. First segment of cercus cylindrical, 2.1-2.4 times as long as second; second segment ovate, situated at extreme apex of first.

Biology. Specimens of *E. hirta* were hatched from decaying trunks of ash (*Fraxinus excelsior*). The species has previously been hatched from rotten wood of beach, pine and *Corylus versicolor*, and from fungus encrusted bark (Chandler 1980).

***Ectrepesthoneura pubescens* (Zetterstedt)**

Figure 4.

Sciophila pubescens Zetterstedt, 1860: 6559

Ectrepesthoneura messaurensis Plassmann, 1975: 10.

Studied material. **FV** Alta: Detsika, Buolamalia (EIS 173), 14 ♀♀ 14 ♂♂ 11 June - 3 July 1995 (Malaise trap, sandy slope), L. O. Hansen & H. Rinden.

Description (female)

Total length 3.43-3.67 (3.61) mm (n=6).

Coloration. Scape dark brown, pedicel and basal half or entire first flagellomere yellow. Remaining flagellomeres brown. Fore and mid coxae slightly darkened at extreme base. Trochanters and extreme base of femora dark. Mid femur darkened at extreme apex. Hind femur darkened at apical third. Tibial spurs yellowish. Abdominal tergites brown. Terminalia light brown.

Head. 0.7-0.9 (0.8) times as long as wide. Median ocellus slightly smaller than laterals. Lateral ocellus separated from eye border and median ocellus by 2.5-3.3 (2.8) and 2.5-3.7 (3.0) times its own width, respectively. Frontal furrow nearly distinct, with rupture near frontal tubercle. Length of flagellum 0.80 mm (n=1), or 1.3 times as long as scutum. Fused face and clypeus with 30-35 setae. Palpomere ratios 1 : 2.5-2.7 : 2.8-3.6 : 4.4-6.3.

Thorax. Total length 0.73-0.80 (0.74) mm. Length of scutum 0.58-0.68 (0.63) mm.

Wings. Wing length 2.16-2.45 (2.31) mm. Wing length to length of R1 7.06-9.07 (8.09). Wing length to length of profemur 3.35-3.50 (3.43). Costa covering about half or somewhat more of distance from R5 to M1. Crossvein ta subequal in length to radial cell, with 5-6 setae. R1 somewhat longer than ta. Median fork starting at, or slightly before level of R4. Basal fourth of ta, extreme base of M1 and basal third of M2 without setae.

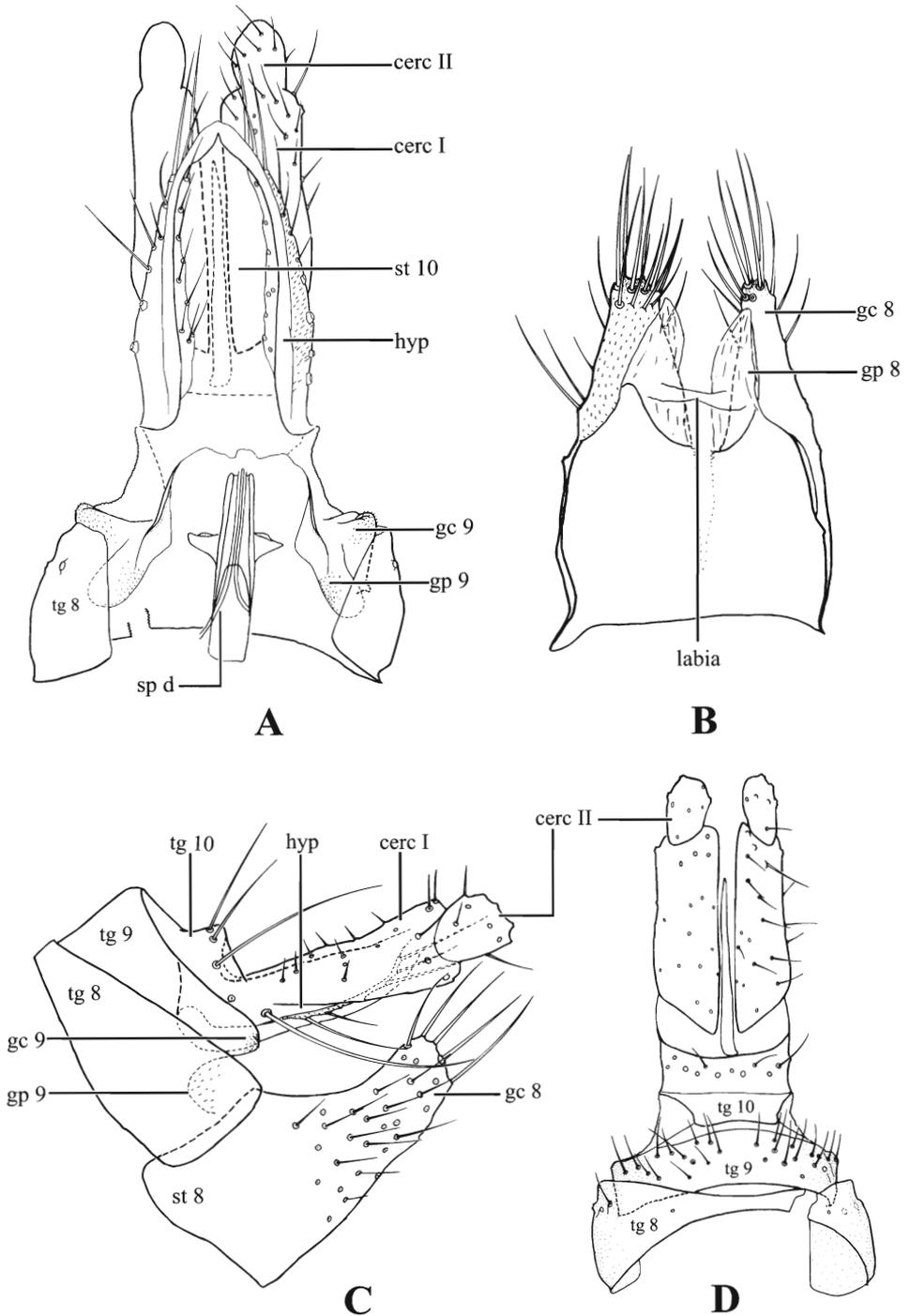


Figure 4. Female terminalia of *Ectrepesthoneura pubescens* (Zetterstedt). - A. Ventral view, sternal parts removed. - B. Dorsal view, tergal parts removed. - C. Lateral view. - D. Dorsal view. Abbreviations: see Figure 2.

Legs. Mid tibial setae: 2 small p, 4 small pv, 2 pd, 4 ad, and several additional setae on apical border. Hind tibial setae: 10 minute p, 12 pd, 8 ad, and a group of small setae posterior apically. Leg ratios: femur to tibia 1.03-1.08 (1.05), 1.12-1.22 (1.15), 0.83-0.86 (0.84); SV 2.93-3.33 (3.14), 3.24-3.42 (3.33), 3.58-4.05 (3.77); BV 3.07-3.35 (3.26), 3.48-4.16 (3.72), 4.10-4.50 (4.30); spurs 2.2-2.3; 2.8-3.0, 3.6-3.7; 2.4-2.6, 3.1-3.4.

Terminalia. Viewed laterally, gonocoxites 8 tapered towards apex, with numerous apical setae giving brushy appearance. Tergite 8 with 2 small, median setae; additional setae laterally. Gonocoxites 9 rounded, small. Gonapophysis 9 curved, plate-like, with trichia. Sternite 10 rectangular with pointed apex. Hypoproct with setae laterally, basalmost very long. First segment of cercus long, cylindrical, 2.8-3.3 times as long as second; second segment ovate, situated at extreme apex of first.

CONCLUSIVE REMARKS

In the keys given by Chandler (1980) and Hutson *et al.* (1980) several non-genital characters are used in the identification of *E. colyeri*, *E. hirta* and *E. pubescens*. Due to intraspecific variation these characters were found to be unreliable in the present study; in females such variation was found to be even larger than in males. Hence, only characters dealing with the terminalia have so far, proved to separate satisfactorily between females of the studied species.

In addition to characters used in the key, the characters that most clearly distinguish between females applies to the chaetotaxy and/or outline of gonocoxites 8, labia, gonocoxites 9, gonapophysis 9 and the area surrounding the spermathecal eminence. Except for the outline of gonocoxites 8, these characters can only be studied in cleared, preferably slide mounted specimens.

In *E. pubescens* the most prominent setae on gonocoxites 8 are located distally, seemingly forming a thin brush; in *E. hirta*, and most clearly in *E. colyeri*, these setae are more evenly dispersed. Moreover, in *E. pubescens* the two gonocoxites 8 are more slender than in any of the other

species. Despite being difficult to observe, the shape and position of labia seems to be a good character to separate between the species. In *E. colyeri*, labia is clearly attached laterally to gonapophysis 8, but not so in any of the other observed species. *E. colyeri* also has the broadest labia, while in *E. pubescens* labia can only be observed as a transverse, narrow bridge. The gonocoxites 9 vary slightly in shape and attachment to tergite 9 in the studied species, but *E. pubescens* is the only species with trichia basally on gonapophysis 9.

Females of *E. pubescens* are in general smaller than females of both *E. colyeri* and *E. hirta*. Body size, however, is known to vary considerably within species of Mycetophilidae (e.g. Väisänen 1984, Söli 1997), and can usually not be used as a diagnostic character. Colouration and colour pattern represent another type of character that should be used with great care. In some genera, however, such characters seem rather constant and apparently separate well between species. This may also be true for *E. colyeri* and *E. hirta*, of which the former has brown terminalia with yellowish cerci, while *E. hirta* has yellowish terminalia and brown cerci.

The single female that could not be identified was hatched from decaying oak wood, together with *E. colyeri*. The species differed most pronounced in the large, rounded gonocoxites 9, and in the position of the two gonapophyses 9, bordering the spermathecal ducts medially. Most probably the female belongs to one of the species already recorded from SE Norway, viz. *E. tori*, *E. bucera*, *E. referta* or *E. nigra* (see e.g. Økland & Zaitzev 1997).

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