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On *Pulchritia* new genus, with a reappraisal of the genera of Trichotriidae (Rotifera, Monogononta)

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Abstract

During the study of rotifers collected in Eastern DR Congo, we rediscovered specimens that correspond to *Monostyla dorsicornuta* Van Oye, 1926. This species, which we redescribe, had not been seen since it's summary description, and lacked type material. Our analysis reveals that the animal belongs to Trichotriidae rather than to *Lecane* (presently considered to include *Monostyla*) or Lecanidae, but is nevertheless characterised by a foot structure that is remarkably convergent to that of Lecanidae, and different from all other genera of Trichotriidae. We conclude that the species and the closely related South American *Macrochaetus kostei* (José de Paggi, Branco & Kozlowsky-Suzuki, 2000) belong to a new genus of Trichotriidae; the two offer a rare example of African-South American vicariance in rotifers. We further provide emended diagnoses of the remaining genera of Trichotriidae, to conform these to the new information and to address some inconsistencies in these.

Keywords

Africa-South America vicariance, biogeography, *Macrochaetus*, taxonomy

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Introduction

On the occasion of the 2010 International Year of Biodiversity and the 50th anniversary of the independence of the Republic of Congo, an international expedition explored swamps, rivers and other water bodies along a ~1750km stretch of Congo River Northwest of Kisangani (Congo Biodiversity Initiative: Expedition 2010). The expedition offers a unique opportunity to study the taxonomy and biogeography of organisms from a relatively inaccessible region in Central Africa. To date, very little information on the micrometazoa of the region, especially Rotifera, exists. There is fragmentary information dating from the first half of the 20th Century (reviewed in Gillard 1957, De Ridder 1986), but very little additional data are available. The dearth of information on the old and climatically relatively stable Congo Basin probably lies at the origin of Dumont's (1983) observation, that the African continent is outstanding for its apparently poor and uncharacteristic rotifer fauna. This "African anomaly", as Dumont (1983) named it, has already been partly refuted by studies on floodplain lakes from the River Niger in Nigeria (Segers 1993, Segers et al. 1993) and by results from isolated studies describing new endemic species from different localities in Cameroon (Segers and Mertens 1997) and Kenya (Segers et al. 1994, see De Ridder 1991, 1994 for an overview of recent African records of rotifers), but studies on the Congo River Basin remained scarce: only De Smet (1988, 1989) provides detailed accounts on the rotifer fauna of freshwater habitats in the Bas Zaïre.

The samples collected during the 2010 International Congo River expedition contained an abundance of rotifer material. It also contained numerous specimens of what we believe to be an enigmatic species of which only a brief description by Van Oye (1926) exists. In the present paper we provide a redescription of the taxon, and further considerations on its phylogenetic and biogeographic significance.

Material and methods

As mentioned before, the material of this study consists of samples collected during the 2010 International Congo River Expedition. Specimens of the target taxon were found in three qualitative, 4%-formaldehyde-preserved samples only, all from running water in rivers: sample KM-028 is from Lulu River near Basoko, KM-048 and KM-049 are from Lohulu River near Bomane, all DR Congo. The samples were collected by Papy Mongindo, Ernest Tambwe and Koen Martens using a either a 30- or a 50 µm mesh-width plankton net that was hauled through surface water (maximum 1 m depth) and the littoral.

Individual rotifer specimens were separated under a WILD M10 dissection microscope and examined and measured on an Olympus BX51compound microscope at high magnification using a micrometre eyepiece. Drawings were made using a camera lucida. Photographs were taken by a camera (Olympus C-5060) connected to the microscope. Stacks of photographs were combined used COMBINEZP (Hadley 2010).

Materials are deposited in the Royal Belgian Institute of Natural Sciences, Brussels, Belgium (RBINS), and the Centre de Surveillance de la Biodiversité, University of Kisangani, Kisangani, DR Congo (CSB-UK).

Results and discussion

We found numerous specimens of our target species (Figs 1–2) which we identify, with some hesitation, as the species described as *Monostyla dorsicornuta* Van Oye, 1926, from the Ruki River near Eala, Congo. This description lacks detail and was considered to be based on some unrecognisable, poorly contracted rotifer by the authors of the candidate Rotifera part of the List of Available Names in Zoology (Jersabek et al. 2012, Segers et al. 2012). When compared to the present material, it indeed probably concerns a poorly contracted specimen. In a footnote to the rather brief original description of this animal, P. de Beauchamp noted that "Il est regrettable que des préparations n'aient pas été conservées…", indicating that no types were deposited. Nevertheless, the general round lorica shape with large antero-lateral spines, shape of retracted head, and foot and toe shape of *M. dorsicornuta* correspond to our material, albeit that the present specimens are slightly smaller in size than reported for *M. dorsicornuta* by Van Oye (1926). In view of the poor original description and significance of the species we suggest to stabilize the taxonomic status of this nominal taxon name by designating a neotype for *M. dorsicornuta* (see further).

By its trophi and lorica structure the species does not belong to Lecanidae as defined by Segers (1995). Following the key by Koste (1978), the animal keys out to Trichotriidae. Assigning the species to one of the three recognized genera appeared problematic due to inconsistencies in these definitions, and the peculiar morphology of the specimens treated here. This prompted us to the following reassessment of the diagnosis of Trichotriidae and its genera.

Family Trichotriidae Harring, 1913

http://species-id.net/wiki/Trichotriidae

Diagnosis. Trophi unspecialized, malleate; head, trunk and foot largely loricate, but head retractable. No discernible separate lorica plates or sulci on the trunk, but lorica stiffness not homogeneous. Lorica granulated and/or facetted. Distal part of trunk (anal segment) illoricate, separated from trunk proper. Foot with two pseudosegments and a pair of terminal toes.

Discussion. The diagnostic autapomorphic feature for the family is the stiffening of the tegument of the head region, especially of the neck and lateral parts of the head, which in contracted specimens folds into a characteristic, more or less symmetrical shape protruding from the head aperture. The feature distinguishes family members from Brachionidae, Epiphanidae, Euchlanidae, and Mytilinidae who have an illoricate head; Lepadellidae has a characteristic sclerotized head shield overlaying the corona but

the rest of the head is illoricate (*Colurella, Lepadella*), and not retractile (*Squatinella*). In contrast, Sørensen and Giribet's (2006) detailed phylogenetic analysis could not confirm monophyly of Trichotriidae, neither on molecular nor morphological data.

The classic diagnoses of Trichotriidae genera are problematic. They refer to features that are not present in all species of the genus (e.g., the purported synapomorphic dorsal spines in *Macrochaetus*), or features which appear to have been misinterpreted. This holds in particular for the structure of the foot which, in its basic form, consists of two foot pseudosegments bearing two toes, and is inserted on an illoricate terminal part of the trunk, termed the anal segment. This anal segment is a part of the trunk proper as it lies anterior to the (dorsal) anal opening. Its tegument is always relatively weakly sclerotized, which enables mobility of the rigid foot relative to the rigid trunk lorica, but which may also make it difficult to distinguish it from the trunk and/or from the two distal pseudosegments of the foot in contracted specimens. The structure is occasionally mistaken for a part of the foot and is then referred to as first of three foot pseudosegments. Note that in Koste and Shiel (1989) both terms (anal segment and first foot segment) appear to have been used for the same structure, and that the position of the anus as indicated in their fig. 16:1 is incorrect.

In view of these inconsistencies, and awaiting a full review, preferably integrating both molecular and morphological data of genera in this and the related Euchlanidae and Mytilinidae, we tentatively propose emended diagnoses of the trichotriid genera, and propose a new genus to accommodate *Monostyla dorsicornuta* Van Oye, 1926 and *Macrochaetus kostei* José de Paggi, Branco & Kozlowsky-Suzuki, 2000.

Genus *Pulchritia* gen. n.
http://zoobank.org/8D9FFA3E-E5D5-4D71-8D3B-479F4700FF26
http://species-id.net/wiki/Pulchritia

Type species. *Monostyla dorsicornuta* Van Oye, 1926.

Diagnosis. Body, including head and foot, loricate; head retractile, foot non-retractile, consisting of a short basal, squarish and an elongate, cylindrical foot pseudosegment terminating in two equal toes. Anal segment strongly reduced. Trunk lorica ventrally relatively flat, dorsally with a Y-shaped keel, pustulated, rounded elliptical.

Etymology. The name *Pulchritia* is derived from the Latin adjective *pulcher*, meaning "pretty, beautiful, handsome". It refers to the beauty of its type species, *P. dorsicornuta* comb. n.

Discussion. We recognize this genus as containing two species, *P. dorsicornuta* comb. n. and *Pulchritia kostei* (José de Paggi, Branco & Kozlowsky-Suzuki, 2000), comb. n.

The two share a number of features that clearly sets them apart from other Trichotriidae. Their rounded, dorso-ventrally flattened trunk shape reminds one only of *Macrochaetus*, while the anal segment being reduced is as in certain *Trichotria* (e.g., *T. buchneri* Koste, Shiel & Tan, 1988*, T. brevidactyla* Harring, 1913 (= *T. curta* (Skorikov, 1914))). The peculiar keel formation of the dorsal lorica is somewhat similar to

Figure 1. *Pulchritia dorsicornuta* gen. n., comb. n., compound photomicrograph.

T. buchneri only. The unique foot structure of the two species, however, can be considered synapomorphic and is superficially and probably functionally similar to the foot consisting of a single short foot pseudosegment and elongated, fused toes bearing terminal (pseudo)claws of some *Lecane* species.

Redescription of *Pulchritia dorsicornuta* (Van Oye, 1926), comb. n.
http://species-id.net/wiki/Pulchritia_dorsicornuta

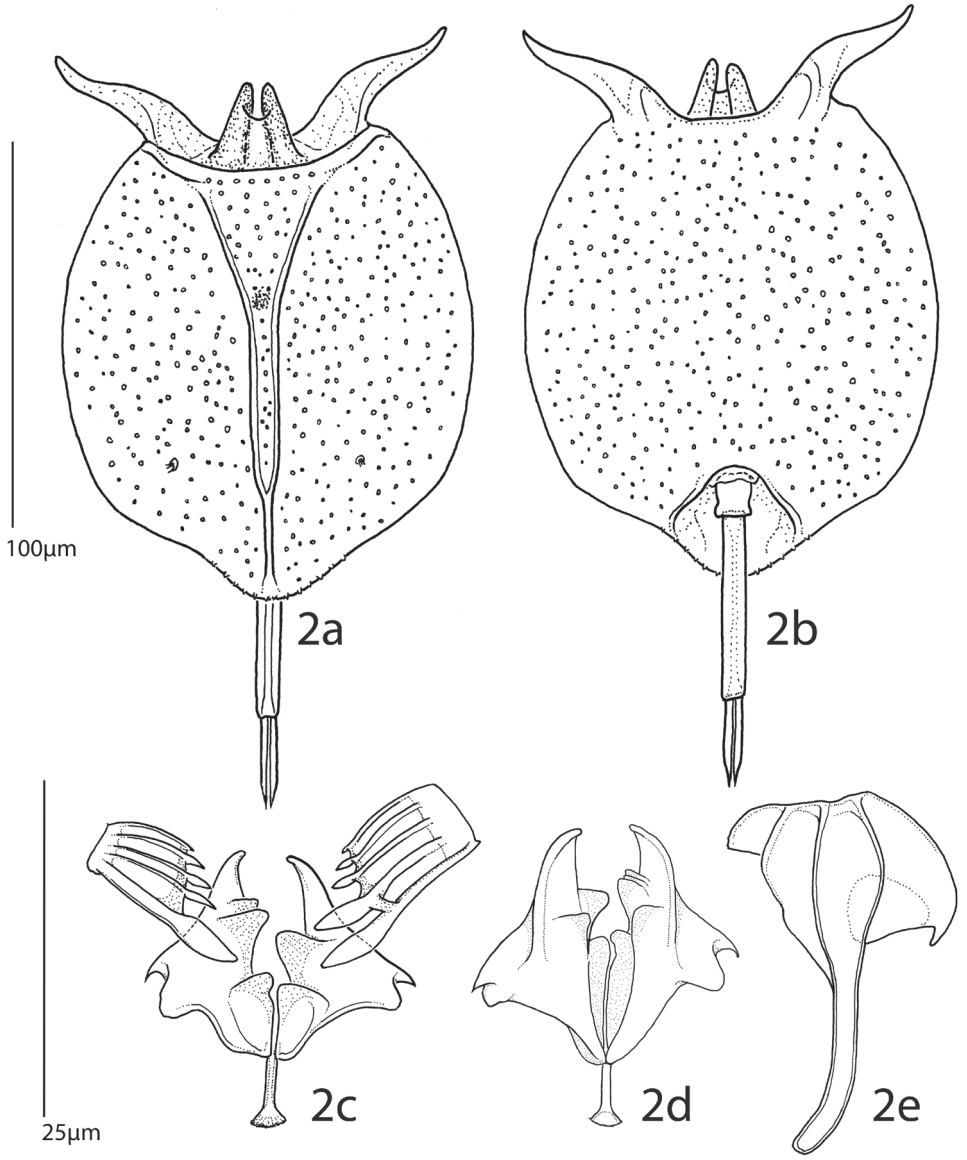
Material examined. Type material: Neotype (labelled: "*Pulchritia dorsicornuta* (Van Oye, 1926) Neotype. Lohulu River near Bomane, DR Congo, 24 May 2010 (KM-048)") in Royal Belgian Institute of Natural Sciences, Brussels Belgium (IG32450, RIR 212).

Other material: Abundant specimens of the species were found in two localities: Lulu River near Basoko (sample KM-028: 1.2958°N, 23.6497°E (DD, GPS waypoint Mac 079), altitude. ca. 350 m asl., water temp. 25.8° C, conductivity 16.5 µS/cm), and Lohulu River near Bomane (samples KM-048, KM-049: 1.2486°N, 23.7280°E (DD, GPS waypoint Mac 089), altitude. ca. 410 m asl., water temp. 24.3° C, conductivity 30.4 µS/cm, oxygen 0.45 mg/l), both in Orientale province, DR Congo. All samples are from running water. One permanent trophi preparation, and nine permanent slides containing one, three slides containing two, and three slides containing three specimens. Deposited in RBINS and in the CSB-UK.

Diagnosis. *Pulchritia dorsicornuta* comb. n. is unmistakable by the large, S-shaped antero-lateral projections of its ventral lorica. These are completely absent in its closest relative *P. kostei* comb. n.

Description. Female (Figs 1, 2a–b; male unknown): Body: Head largely retracted in trunk lorica, with two lateral stiffened elements protruding from the head aperture. A pigmented spot (eye?) present. Trunk loricate, elliptic in outline, longer than wide, dorso-ventrally compressed. Ventral and dorsal plates fused laterally and caudally, leaving a broad head aperture and a smaller foot aperture. Dorsal plate medially with two semi-longitudinal ridges forming a Y-shaped double dorsal keel, fused to a single dorsal keel terminally. Posterior of dorsal lorica with a weakly protruding rounded margin bearing two pairs of short ridges over the foot aperture. Openings of the lateral antennae in posterior third of body, about halfway between dorsal keel and lateral margin of lorica. Dorsal head aperture margin concave. Ventral plate flat, with two protruding, weakly S-shaped and diverging spines antero-laterally, these separated by a shallow U-shaped sinus. Posterior of ventral plate with a well-defined foot aperture, with rounded anterior and diverging lateral margins. Anal segment indistinct, poorly developed (also in poorly contracted specimens). Foot subterminally, consisting of a short, bilaterally constricted first and an elongate, parallel-sided second foot pseudosegment. Two long, equal toes, these mostly parallel-sided, terminating in a sharp tip.

Trophi (Figs 2c–e) malleate, almost symmetrical. Fulcrum short, with a small basal plate; rami relatively flat, triangular, with rounded postero-lateral corners and short, curved alulae, inner margins with asymmetrical, protruding teeth-shaped structures. Left uncus with two large frontal and three minor dorsal webbed teeth, right with a single large frontal and four minor teeth, all minor teeth gradually reduced in size from frontal to dorsal. Manubria symmetrical, with elongate and weakly procurved shaft. Head broad, with clear ventral, median and dorsal chambers, anterior chamber with an additional rounded triangular apophysis, dorsal chamber with a recurved hook.



Figures 2. *Pulchritia dorsicornuta* gen. n., comb. n., **a** habitus, dorsal **b** habitus, ventral **c–e** trophi **c** unci and incus, frontal **d** incus, caudal **e** left manubrium, external. Scale bars: **a–b**= 100µm, **c–e**= 25µm.

Measurements (in µm. N=12; range, mean). Total length (incl. foot): 180–205, 192; lorica width 92–122, 106; antero-lateral spine length 20–32, 27; head aperture width 37–58, 47; foot aperture width 29–40, 33; length 23–34, 28; first foot pseudosegment length 9–14, 11; second foot pseudosegment length 46–54, 48; toe length 26–32, 29.

Distribution. *Pulchritia dorsicornuta* comb. n. is only known from the two localities cited above, and from Ruki River near Eala (Van Oye 1926), near Mbandaka,

Equator province, DR Congo. Its close relative *P. kostei* com. n. is known only from a coastal lagoon, State of Rio de Janeiro, Brazil. We hypothesize that the two represent a vicariant species pair. This is remarkable as there are few examples of such vicariant sister-taxa, possibly originating from allopatric speciation, in rotifers, and patters are blurred by their purportedly superb dispersal potential (Segers 2008, Segers and De Smet 2008). Some have been identified before in the genus *Lecane* (see Segers 1996), but the most notorious example of such a vicariant species-pair is *Kellicottia longispina* (Kellicott) and *K. bostoniensis* (Rousselet), in which the former is hypothesized to be of Palaearctic, the latter of Nearctic origin (Pejler 1977).

Comments. The main feature distinguishing *P. dorsicornuta* comb. n. and *P. kostei* comb. n. is the presence of well-developed antero-lateral spines in the former. As we observed only negligible variability of the antero-lateral spines of *P. dorsicornuta* comb. n., and as there are no indications at all of such spines in *P. kostei* comb. n., we can neither exclude nor confirm the possibility that this feature results from phenotypic plasticity and as such would not be taxonomically relevant. Examples of such environmentally induced spine development are common in rotifers, including Trichotriidae (Gilbert 2011a, 2011b, Koste 1978, Luo et al. 2012, Wallace et al. 2006). We prefer to remain cautious and treat the two as separate taxa, pending proof to the contrary.

Genus *Macrochaetus* Perty, 1850

http://species-id.net/wiki/Macrochaetus

Type species. *Macrochaetus subquadratus* Perty, 1850.

Emended diagnosis. Body, including head and foot, loricate; head retractable, foot not retractable, inserted on a large, relatively soft and broad anal segment covering an equally soft and relatively broad first foot pseudosegment, and a stiff, cylindrical terminal foot pseudosegment. Trunk lorica dorso-ventrally compressed, relatively wide, pustulated, circular or with angular corners in the anterior third, head and neck lorica plates with spinulets.

Discussion. Most species of *Macrochaetus* are readily identified as belonging to this genus by the presence of long, conspicuous dorsal spines. However, three species of *Macrochaetus* (*M. aspinus* Segers & Sarma, 1993, *M. danneelae* Koste & Shiel, 1983, and *M. paggiensae* Koste, 2000) lack these dorsal spines and their presence can therefore not be confirmed as generally diagnostic for the genus. On the other hand, small lorica spinulets are present dorsally, ventrally and marginally on the trunk lorica, and on the lorica of the head and neck regions. In particular the spinulets on the head and neck lorica appear to be synapomorphic for the genus. The foot consist of a large, relatively soft anal segment covering a relatively poorly sclerotized first foot pseudosegment and a terminal cylindrical foot pseudosegment bearing two separate toes. There are 14 species in this genus, several of which are endemic to South America (Segers 2007, Segers and De Smet 2008).

Genus *Trichotria* Bory de St Vincent, 1827
http://species-id.net/wiki/Trichotria

Type species. *Trichotria pocillum* (Müller, 1776).

Emended diagnosis. Body, including head and foot, loricate; head retractable, foot only partly retractable. Trunk lorica hexagonal in cross section, facetted, granulated, longer than wide, with parallel lateral margins in anterior part of the trunk. Head aperture nearly as wide as the trunk.

Discussion. In comparison with *Wolga*, the anal segment is clearly discernible in almost all species but it is relatively weakly sclerotized; the two foot pseudosegments are cylindrical and strongly sclerotized. Retraction of the foot is not possible in those species in which the foot is situated terminally. Spines on the first foot pseudosegment and on the trunk lorica are present in most, but not all species (e.g., *T. pseudocurta* Koste, Shiel & Tan, 1988). There are seven species in the genus (Segers 2007), most are cosmopolitan, one (*T. brevidactyla*) is Holarctic, two are Australian. Regarding the latter, however, the attribution of *T. buchneri* to *Trichotria* was considered uncertain by Koste and Shiel (1989) in view of this species' peculiar triangular cross section, and foot consisting of two cylindrical pseudosegments only (apparently without, a reduced, or completely retracted anal segment in the preserved material examined?). A re-examination of the species is in order.

Genus *Wolga* Skorikov, 1903
http://species-id.net/wiki/Wolga

Type species. *Wolga spinifera* (Western, 1894).

Emended diagnosis. Tegument of head, and anterior part of trunk loricate, both head and foot entirely retractable. Anal segment relatively large, annulated; foot pseudosegments short, only the distal one sclerotized. Trunk lorica box-shaped, dorsoventrally compressed, longer than wide, with relatively flat ventral and dorsal parts; facetted. No marginal spines or spinulets.

Discussion. The published generic diagnosis refers to absence of an anal segment (Koste 1978; Koste and Shiel 1989). This does not appear to be correct; the illustration of a non-contracted animal by Western (1894, reproduced by Koste (1978) and Koste and Shiel (1989)) depicts a foot consisting of a first element having numerous transverse folds indicating its high mobility, and two additional, relatively short pseudosegments; all but the terminal part may be indistinct in preserved specimens. We interpret the first element as being the anal segment. The foot is situated subterminally and can be retracted entirely into the lorica by which the anal segment becomes indiscernible; there are two separate toes. It is unlikely that the presence of short spines over the lateral antennae is diagnostic at the genus level.

Western (1894) notes that the lorica of the species would consist of plates connected with a membranous lateral invagination. While the lateral parts of the trunk lorica may be concave, they do not appear distinctly less sclerotized as in, e.g., many species of *Lecane*.

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SHORT COMMUNICATION

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Notes on the Chinese species of *Dianous* group I (Coleoptera, Staphylinidae)

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Abstract

Dianous zhujianqingi Tang & Li, 2011 **syn. n.** is synonymised with *Dianous cyaneovirens* (Cameron, 1930). Additional records of *Dianous yao* Rougemont, 1981, *Dianous haraldi* Puthz, 2000 and *Dianous huanghaoi* Tang & Li, 2011 are provided.

Keywords

Coleoptera, Staphylinidae, *Dianous*, new synonym, new records

Introduction

The Chinese species of *Dianous* group I were reviewed by Tang and Li in 2011. This group includes nine species: *D. yao* Rougemont, 1981, *D. tonkinensis* (Puthz), 1968, *D. limitaneus* Puthz, 2001, *D. viriditinctus* (Champion), 1920, *D. fengtingae* Tang & Li, 2010, *D. zhujianqingi* Tang & Li, 2010, *D. huanghaoi* Tang & Li, 2010, *Dianous shan* Rougemont, 1981 and *D. viridicupreus* Rougemont, 1985. Subsequently, more material was received. A study of this material yielded new locality records and a new synonymy.

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Material and methods

For examination of the male genitalia, the last three abdominal segments were detached from the body after softening in hot water. The aedeagus and other dissected parts were mounted in Euparal (Chroma Gesellschaft Schmidt, Koengen, Germany) on plastic slides. Photos of sexual characters were taken with a Canon G7 attached to an Olympus SZX 16 stereoscope; habitus photos were taken with a Canon macro photo lens MP-E 65 mm attached to a Canon EOS40D camera.

The type specimens treated in this study are deposited in the following public and private collections:

cSme private collection Aleš Smetana, Ottawa, Canada
NHMW Naturhistorisches Museum Wien, Austria (Harald Schillhammer)
SNUC Department of Biology, Shanghai Normal University, P. R. China (Li-Zhen Li)

Taxonomy

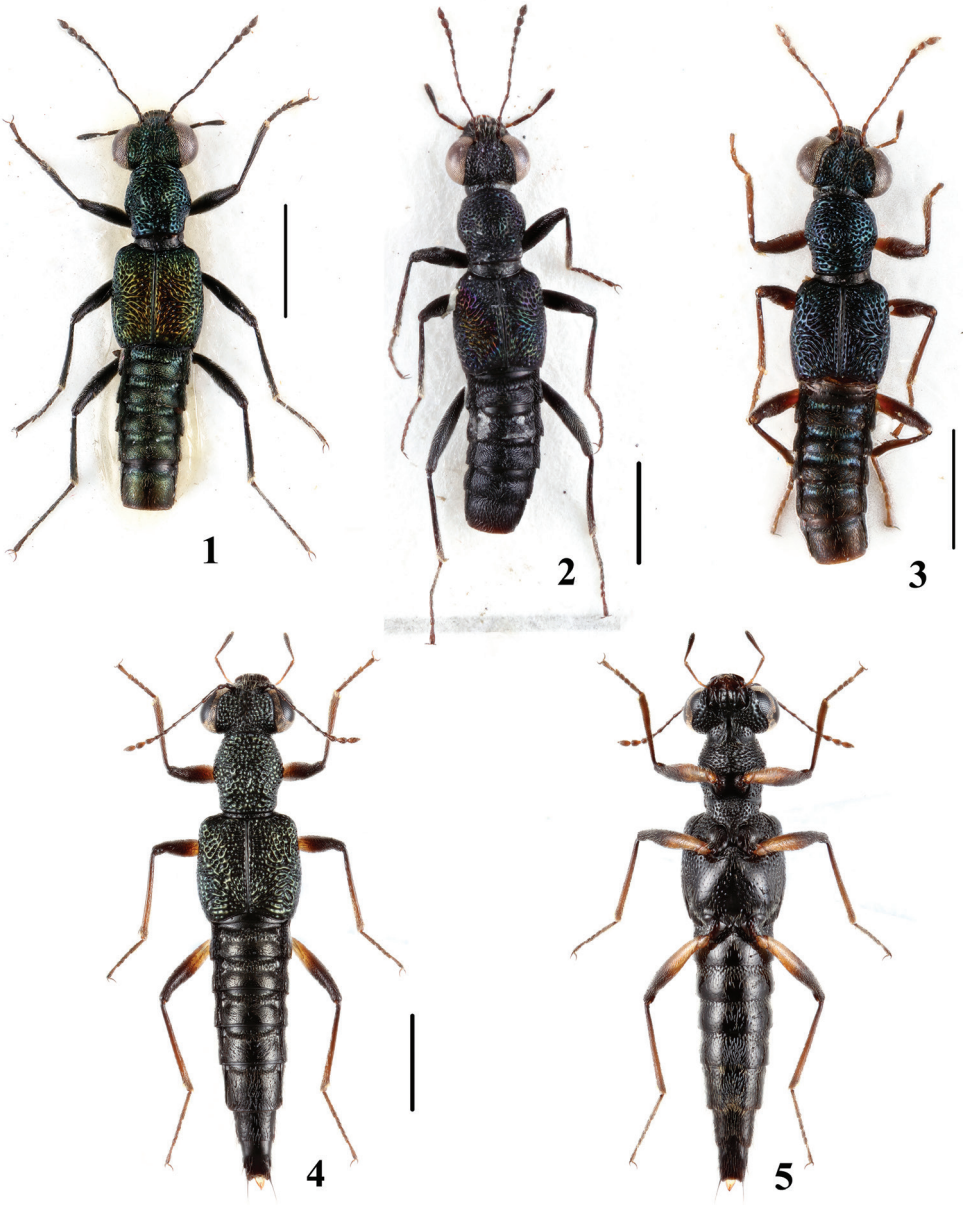
***Dianous cyaneovirens* (Cameron, 1930)**
http://species-id.net/wiki/Dianous_cyaneovirens
Figs 1, 2, 6

Stenus cyaneovirens Cameron, 1930: 335
Dianous cyaneovirens; Puthz 1981: 106; Rougemont 1985: 131; Rougemont 1987: 49.
Dianous zhujianqingi Tang & Li, 2011: 73. syn. n.

Material examined. China: Jiangxi, Guizhou: Type series of *D. zhujianqingi* (SNUC); **Guangxi:** 1♂, Jinxiu County, 16 km, 900m, 29.VII.2011, Peng Zhong leg.; 1♀, Jinxiu County, Shengtangshan, 800–1100m, 28.VII.2011, Peng Zhong leg. (SNUC); **Yunnan**: 6♂♂14♀♀, Baoshan City, Baihualing, 1100-1350m, 25°16'N, 98°47'E, 22.IV. 2013, Song, Dai & Peng leg. (SNUC); **Myanmar:** 1♂1♀, Kachin State, ca. 12 km S Putao, W Mularshidi Vill., 500–550m, 27°14.98'N, 97°24.40'E, 2.VI.1999, Schillhammer & Schuh leg. (NHMW); **Nepal:** 1♂2♀♀, Khandbari Dis., Arun Valley at Num main bridge, 1000m, 21.IV.1984, Smetana & Löbl leg. (cSme); 1♂, Khandbari Dis., Induwa Khola Valley, 2000m, 15.IV.84, Smetana & Löbl leg. (cSme)

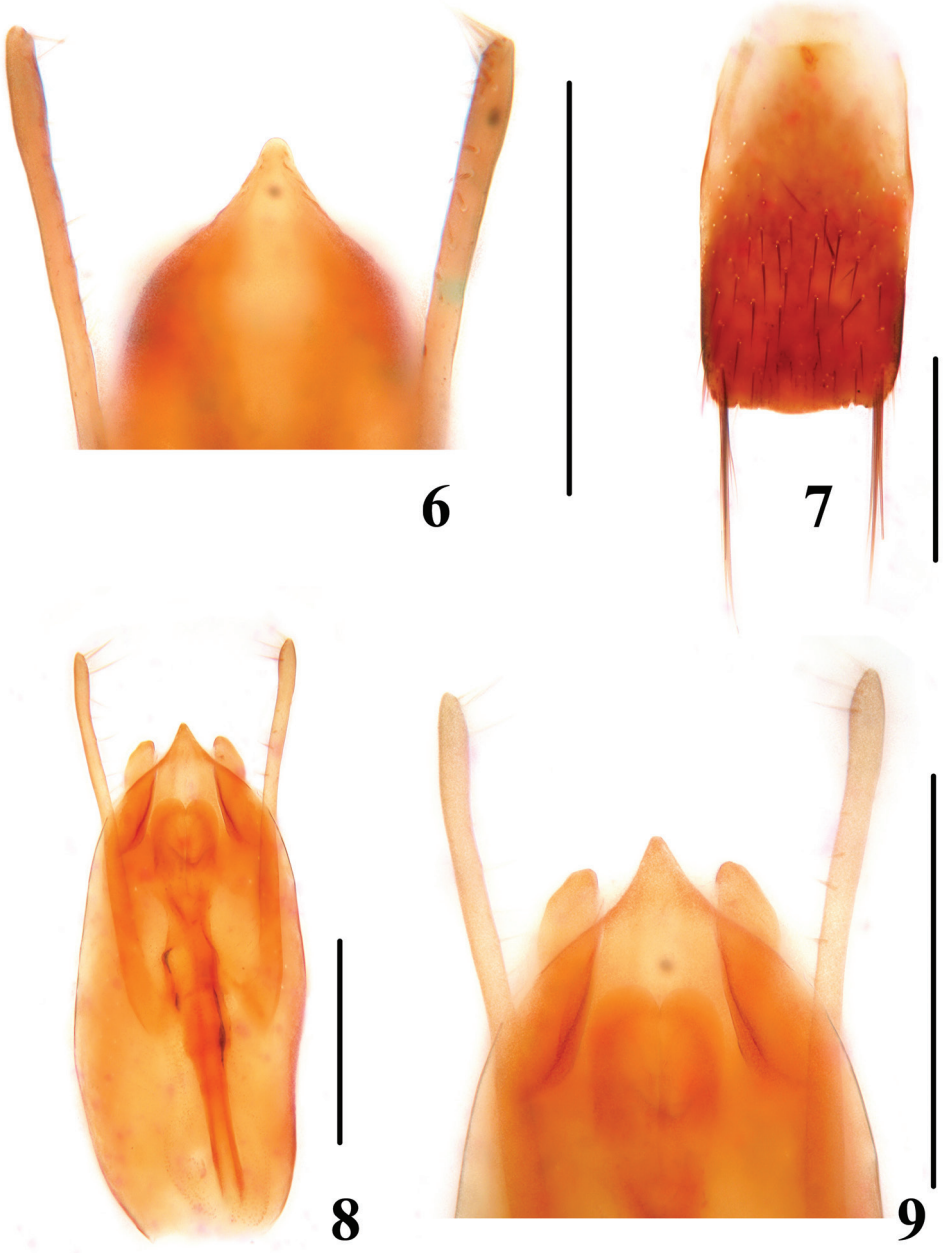
Distribution. China (Jiangxi, Guizhou, Guangxi, Yunnan), Myanmar, Nepal.

Remarks. The species is reported from the Chinese provinces Yunnan and Guangxi and from Myanmar for the first time. According to the original description of *D. zhujianqingi*, the main differences between this species and *D. cyaneovirens* are the different coloration and different lengths of the apical portion of the median lobe. Additionally, there was a huge distributional gap between Nepal and East China. However, with more material examined, this distribution gap is filled. The coloration of the species is found to be greatly variable: in the Nepalese populations, the metallic



Figures 1–5. Habitus of *Dianous.* **1** *D. cyaneovirens* (Myanmar) **2** *D. cyaneovirens* (Nepal) **3** D. *haraldi* **4, 5** *D. yao*. Scales = 1 mm.

tint of the species varies from golden green to blackish blue, while it is golden green or blue in specimens from Myanmar and China (Guangxi and Yunnan). In the type series of *D. zhujianqingi*, all 39 specimens have a faint plumb-coloured tint, except for two specimens from Jiangxi which have a strong brassy tint. The length of the api-



Figures 6–9. 6 apical portion of median lobe of *D. cyaneovirens* (Myanmar) **7–9** *D. haraldi:* **7** male sternite IX **8** aedeagus **9** apical portion of median lobe. Scales = 0.25 mm.

cal portion of the median lobe is also variable: the length is intermediate in specimens from Myanmar and China (Yunnan and Guangxi). For these reasons, *D. zhujianqingi* is synonymised with *D. cyaneovirens*.

***Dianous haraldi* Puthz, 2000**
http://species-id.net/wiki/Dianous_haraldi
Figs 3, 7–9

Dianous haraldi Puthz, 2000: 432.

Material examined. China: Yunnan: 1♂, Xishuangbanna, ca. 6km NW Mengla, 700m, 8.VIII.1999, Jäch et al. leg. (CWBS 356) (NHMW)

Distribution. China (Yunnan), Laos.

Remarks. The species is a new record for China

To accommodate *D. haraldi*, the recently published key to the Chinese species of *Dianous* group I (Tang, Li and Cao 2012) is modified at couplet 6 as follows:

6 Forebody black with plumb-coloured lustre, sometimes elytra with brassy reflection; femora unicolored **7**
– Forebody distinctly metallic blue; femora bicolored **7a**
7a Punctation of elytra more confluent; posterior margin of male sternite VII with indistinct median emargination. Habitus (Fig 3), aedeagus (Fig 8, 9) ... . ***D. haraldi***
– Punctation of elytra less confluent; posterior margin of male sternite VII with deep median emargination **8**

***Dianous huanghaoi* Tang & Li, 2011**
http://species-id.net/wiki/Dianous_huanghaoi

Dianous huanghaoi Tang & Li, 2011: 75.

Material examined. China: Yunnan: 1♂, Binchuan County, Jizushan, 2400m, 18.VII.2010, Tang leg. (SNUC)

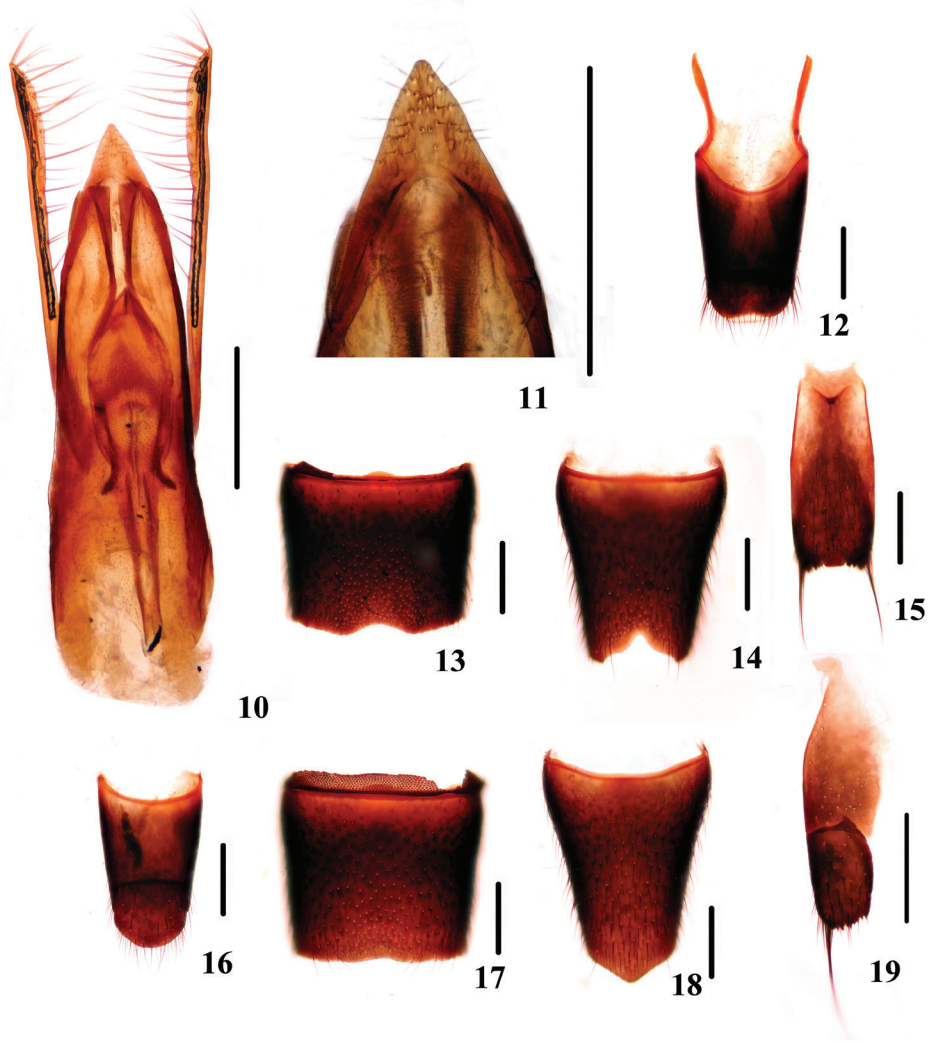
Distribution. China (Yunnan).

Remarks. Previously, the species was only known from Yulongshan and Hutiaoxia in Yunnan.

***Dianous yao* Rougemont, 1981**
http://species-id.net/wiki/Dianous_yao
Figs 4, 5, 10–19

Dianous yao Rougemont, 1981: 330.

Material examined. China: Yunnan: 35♂♂31♀♀, Baoshan City, Baihualing, 1100-1350m, 25°16'N, 98°47'E, 22.IV. 2013, Song, Dai & Peng leg. (SNUC)



Figures 10–19. Sexual characters of *D. yao*. **10** aedeagus **11** apical portion of median lobe **12** tergites IX uand X **13** male sternite VII **14** male sternite VIII **15** male sternite IX **16** female tergites IX and X **17** female sternite VII **18** female sternite VIII **15** valvifer. Scales = 0.25 mm.

Distribution. China (Guizhou, Yunnan); Myanmar, Thailand.
Remarks. The species is new to the Chinese province Yunnan.

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RESEARCH ARTICLE

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Larinus berti sp. n. (Coleoptera, Curculionidae, Lixinae) from North Africa

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Abstract

A new species, *Larinus berti* **sp. n.** is described from Morocco and assigned to subgenus *Cryphopus* Petri, 1907 (Curculionidae: Lixinae; Lixini). Diagnostic characters of the new species are large size, elongate-ovate body, bisulcate sub-quadrangular rostrum, triangularly raised dorsum of rostrum, flat subgena and submentum, Y-shaped apodeme of sternite VIII of female and thin nodulus of spermatheca.

Keywords

Larinus, *Cryphopus*, taxonomy, new species, Lixini, Curculionidae

Introduction

The weevil genus *Larinus* Dejean, 1821 is considered a beneficial group in the fight against invasive thistles of the tribe Cardueae (Asteraceae) (Ter-Minasian 1967; Zwölfer et al. 1971; Gültekin 2006; Gültekin et al. 2008). According to the world catalogue by Alonso-Zarazaga and Lyal (1999), this genus is divided into four subgenera: *Cryphopus* Petri, 1907, *Larinus*, *Larinomesius* Reitter, 1924 and *Phyllonomeus* Gistel, 1856. In a

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recently prepared catalogue by Gültekin and Fremuth (2013), *Larinus* approximately consists of 100 species in the Palaearctic Region, with its highest species richness in the Mediterranean. Five species are assigned to *Cryphopus* and their distribution is confined to the Western Mediterranean (Gültekin and Fremuth 2013). Its diagnostic characters are the expanded outer apical angle of the protibia and the unequal length of the tarsal claws. This paper deals with the description of a new species from this subgenus.

Materials and methods

Measurements were taken using an ocular micrometer attached to a Leica MZ75 stereo microscope and are defined as follows: body length: from anterior margin of eye to posterior margin of elytra; rostrum length: from apex of rostrum to anterior margin of eye in side view; prothorax length: from anterior margin to the posterior margin of scutellar lobe along midline. For the morphological study, dry adults were placed in lukewarm clean water overnight and their genitalia were dissected. Parts with muscles and other tissues were stored in 10% KOH overnight, cleaned with distilled water and 70% ethanol. Genitalia were observed and photographed in glycerine under a stereo microscope, and kept in glycerine microvials or allowed to dry and glued onto cards under the pinned specimens from which they were dissected. Photographs were taken with a Leica DFC 420 digital camera attached to the stereo microscope using LeicaLAS software for montage. The digital images were then imported into Adobe Photoshop 8.0 and CorelDRAW X4 for labelling and plate composition.

The material examined is deposited in the following collections:

MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain.
SMNH The Swedish Museum of Natural History, Stockholm, Sweden.

Taxonomy

***Larinus* (*Cryphopus*) *berti* Gültekin & Alonso-Zarazaga, sp. n.**
http://zoobank.org/EECCA20D-0AE2-4878-8432-7ABAA9613811
http://species-id.net/wiki/Larinus_berti

Diagnosis. *Larinus berti* Gültekin & Alonso-Zarazaga, sp. n. can be recognized because of its elongate-ovate large sized body (Figs 1–2), bisulcate sub-quadrangular rostrum, triangularly raised dorsum of rostrum (Fig. 3), flat subgena and submentum, Y-shaped apodeme of sternite VIII of female (Fig. 14) and thin nodulus of spermatheca. The new species is related to *Larinus griseus* Capiomont, 1874 but the latter clearly differs in the following characters: apodeme of sternite VIII of female is not Y-shaped, the subgena of rostrum is depressed, the submentum is distinctly raised at apex, and the central keel of dorsum is tricarinate.

Description. *Measurements* (in mm): Body length: 13.60–14.40. Rostrum: length 2.70–2.80, width 1.50–1.60. Prothorax: length 4.00–4.20, width 5.30–5.50. Elytra: length 9.00–9.20, width 6.30–6.80.

Body elongate-ovate (Figs 1–2).

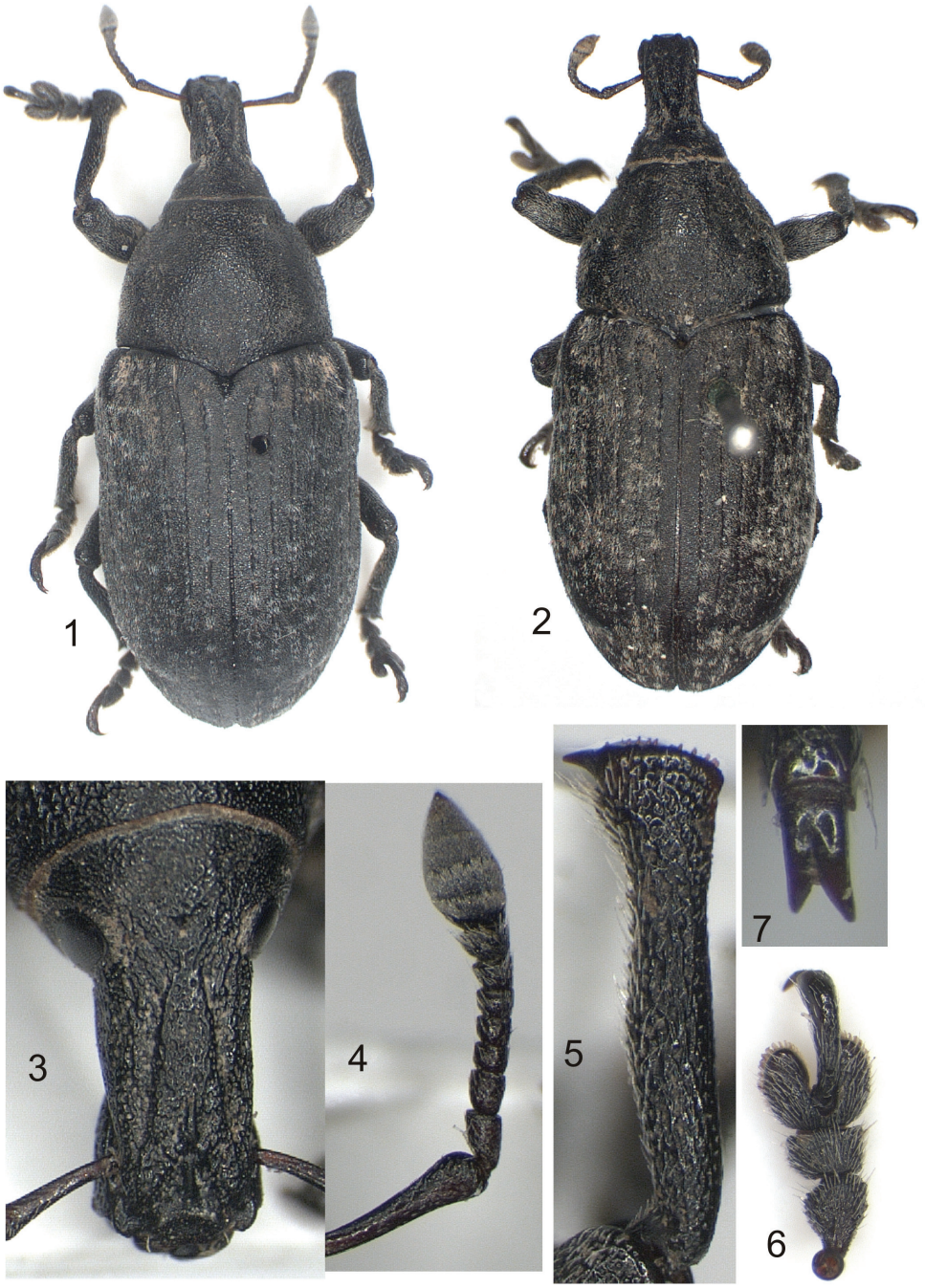
Vestiture. Ventral and lateral surface of head, dorsum of rostrum, pronotum and elytra with very short sparse greyish piliform scales; on elytra whitish grey pubescence forming small patches especially along striae; submentum, prosternum, medial part of metasternum, legs and abdominal ventrites with somewhat longer, denser and partly suberect hair-like pubescence; coxae, sides of metasternum and ventrite I, metanepisternum, mes- and metepimeron with bifid scales; mesosternum and mesanepisternum with 4- and 5-fid scales; scales on posterior part of metanepisternum and metepimeron very dense. Apical margin of prothorax with short dense piliform scales, longer on prosternum and ocular lobes. Tibial praemucro with a tuft of setae projecting towards uncus.

Head spherical, hind ventral margin with a small notch, vertex weakly visible, frons flat in female, slightly convex in male, frontal pit small, superficial, rounded. Eyes elliptical, weakly convex, ventral half narrower than dorsal. Rostrum (Fig. 3) sub-quadrangular in section, in dorsal view parallel-sided, weakly widened at apical third, with two deep longitudinal sulci reaching apical fourth and convergent caudad, area between sulci distinctly raised, with median keel at apical third, a transversely curved ridge present immediately before epistomal area, dorsolateral margins of rostrum obtuse, rostral pit invisible in female, distinct in male on median keel, minutely and coarsely punctured (as well as forehead); in side view straight. Scrobes with ventral margin partly visible dorsally. Antenna (Fig. 4) inserted about 0.30× from apex of rostrum in male, 0.40× in female. Scape slightly shorter than funicle, dorsoventrally depressed, weakly curved at middle, abruptly widened at apex, wider than desmomere 1, desmomeres 1–2 subconical, desmomere 1 about 1.30× as long as desmomere 2, desmomere 3 short, subisodiametric, about 0.65× as long as desmomere 2, desmomeres 4-7 gradually widening, desmomere 7 widest; club moderately elongate with acute apex, about 1.70× as long as wide.

Prothorax in dorsal view sub-trapezoidal, base moderately and triangularly arched towards scutellum, lateral margins of prothorax gradually and gently converging from base to apical half, rather strongly rounded apicad of it and then abruptly constricted in a short collar at apical 1/6; anterior margin very gently emarginate on dorsal part, evenly curved towards slightly developed postocular lobes; prosternum with anterior margin moderately emarginate. Pronotal surface convex, with dense, minute punctures, somewhat larger punctures scattered sparsely and partly confluent on prescutellar area.

Scutellum small and not clearly visible.

Elytra subparallel-sided in basal 2/3, gradually and roundly narrowed towards apex, constricted before mid-length; humeral calli moderately developed, preapical prominences distinct and located at end of intervals 4-7; interstriae flat, subequal in width on disc, narrower caudad, about 5× as wide as a stria on disc, interstria 10 wider than others in basal third, interstria 11 sinuate, weakly curved towards metanepister-



Figures 1–7. *Larinus berti* sp. n.: **1** holotypus (male) **2** paratypus (female) **3** rostrum (male) **4** antenna (male) **5** protibia (male) **6** protarsus (male) **7** claws.

num; striae mostly formed by rounded and separate punctures, these partly confluent along basal part and on posterior declivity, stria 10 sinuate and deeply sulciform.

Abdomen with ventrites 3 and 4 in male, and 3 only in female medially depressed.

Legs. Femora edentate, medially swollen, narrower than rostrum. Outer margin of protibia slightly, inner margin distinctly sinuate, apical part dilated outwards, about twice as wide as base, apex weakly curved, inner margin in male obtusely serrate, in female 3-4 small denticles present at apical half, serrate in basal half, denticles closest to uncus slightly larger than others (Fig. 5). Inner margins of meso- and metatibia nearly straight, outer margin slightly sinuate, mesotibia with 2-3 denticles, metatibia serrate in both sexes. Uncus sharp, moderately sized, gradually smaller from pro- to metatibia. Apical comb of spines short on protibia (longer on meso- and metatibia), bases of spines partly connate. Tarsi (Fig. 6) wide, tarsomere 3 1.40× as wide as tarsomere 2, 1.25× as wide as long, solea complete. Onychium stout, curved, gradually widened from base to apex, 0.65× as long as total length of tarsomeres 1-3; claws connate at basal third, of unequal length, inner claw shorter than outer, moderately divergent in apical half (Fig. 7).

Male terminalia and genitalia. Penis in dorsal view stout, elongate, gradually narrowing from base to apical fourth, constricted in this part and narrowing again towards apex (Figs 8–9), incompletely sclerotized medially from basal third to ostium; apical plate triangular, 0.75× as long as wide; in lateral view, penis strongly curved at basal third, apical fourth almost straight (Fig. 10). Tegmen forming a ring with short ventral apodeme, parameroid lobes absent. Spiculum gastrale thin, stick-shaped, curved outwards, slightly shorter than penis (Fig. 11). Sternite VIII forming a single plate (Fig. 12), well sclerotized, apical margin with sparse, short setae.

Female terminalia and genitalia. Tergite VIII semicircular (Fig. 13), posterior margin with a dense row of hairs. Sternite VIII with lamina transversely oval, prolonged cephalad in an apodeme bifid at apex (Fig. 14); lateral arms wide, angularly arched outwards; margin angularly emarginate with a small medial triangular notch. Coxite well sclerotized, narrowed to apex, stylar base conical, stylus cylindrical, slightly longer than base (Fig. 15). Spermatheca nearly C-shaped, ramus well developed, distinctly wider than nodulus, the latter thin and cylindrical with a small tubercle at inner apical part, apex of cornu obtuse, gland well developed, subspherical (Fig. 16).

Variation. Size variation is presented above under the Measurements section. A detailed variation cannot be presented because there are only two specimens available, and no further specimens have been traced in the rich Moroccan collections of the MNHN (Paris) and MNCN (Madrid). The female specimen shows a partly worn out vestiture, especially on elytra.

Type material. Holotype (male) (Fig. 1), MOROCCO, Mischliffen, Md. Atlas, Marruecos, 2000 m, 5.VII.1988, Fdz-Rubio leg. [MNCN, Madrid]. Paratype (female) (Fig. 2), Afrique varia, "4", [Chevrolat Coll.] [SMNH, Stockholm].

Etymology. The new species is named after our good friend Bert Viklund (The Swedish Museum of Natural History, Stockholm).

Figures 8–16. Terminalia and genitalia of *Larinus berti* sp. n. (**8–12** male; **13–16** female): **8–9** dorsal view of penis **10** lateral view of penis **11** spiculum gastrale **12** sternite VIII **13** tergite VIII **14** sternite VIII **15** coxite **16** spermatheca.

Key to the species of subgenus *Cryphopus*

The known species of the subgenus *Cryphopus* can be separated as follows:

1 Body broadly ovate. Protibia strongly widened outwards, outer margin strongly sinuate. Claws strongly unequal in length..... **2**

– Body elongate-ovate. Protibia moderately widened outwards at apex, outer margin nearly straight. Claws moderately unequal in length **4**

2 Length more than 15 mm. Apex of protibia hammer-shaped..... ..... ***L. bombycinus* Lucas, 1847**

– Length less than 8 mm. Apex of protibia not hammer-shaped **3**

3 Protibia with uncus and praemucro well separated..... ..... ***L. ferrugatus* Gyllenhal, 1835**

– Protibia with uncus and praemucro tangent... ***L. maroccanus* Capiomont, 1874**

4 Subgena and apex of submentum flat. Apodeme of female sternite VIII bifid at apex ..... ***L. berti* Gültekin & Alonso-Zarazaga, sp. n.**

– Subgena depressed, apex of submentum strongly raised. Apodeme of female sternite VIII simple..... **5**

5 Rostrum in dorsal view subparallel-sided, thick, 1.25× as wide as maximum width of profemora, with a thin median keel ... ***L. reichei* Capiomont, 1874**

– Rostrum in dorsal view compressed at middle, ca. as wide as maximum width of profemora, with a thick median keel and two deep sulci..... ..... ***L. griseus* Capiomont, 1874**

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RESEARCH ARTICLE

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The first *Cordyla* Meigen species (Diptera, Mycetophilidae) from continental Australia and Tasmania

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Abstract

A new species of Mycetophilidae, *Cordyla australica* **sp. n.**, is described from continental Australia and Tasmania, representing the first *Cordyla* record in the region. A detailed description of its morphology with illustrations of male and female terminalia and a map of the collecting localities are provided. According to the structure of male terminalia, *C. australica* **sp. n.** belongs to the *C. murina* species-group that has 13 species worldwide. Within the group *C. australica* **sp. n.** resembles *C. murina* but has a unique outline of the hypoproct and medial branch of the gonostylus. The observed distributional pattern is restricted to the rainforest of eastern Australia and Tasmania.

Keywords

Diptera, Mycetophilidae, *Cordyla*, new species, Australia, Tasmania

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Introduction

The genus *Cordyla* Meigen, 1803, a member of the tribe Exechiini of Mycetophilidae, is a well delimited monophyletic clade of fungus gnats (Diptera: Sciaroidea). Having been treated earlier also in Mycetophilini (since Edwards 1925), the genus was transferred to Exechiini by Tuomikoski (1966). Within the tribe, *Cordyla* has a rather isolated position forming by Rindal et al. (2009) a common clade with *Brachypeza* Tuomikoski. However, the recently described genus *Brachyradia* Ševčík & Kjærandsen including two species from the Oriental and Australasian (Papua New Guinea) regions shares several synapomorphies with *Cordyla*, and thus may be the closest relative instead of *Brachypeza* (cf. Ševčík and Kjærandsen 2012). The *Cordyla* species are characterized mainly by short antennae with reduced number of flagellomeres and swollen antepenultimate palpal segment (Tuomikoski 1966) while by characters in male terminalia, the species are divided into three subgeneric groups (Kurina 2001). *Cordyla* specimens are easily recognisable by small size, humpbacked habitus in combination with mainly dark coloration and, especially, by swollen antepenultimate segments of palpi.

Thirty-eight described *Cordyla* species are known worldwide at present, viz. twenty-four from the Palaearctic region (Kurina 2005 and references therein, Sasakawa 2008), ten from the Nearctic region (Bechev 2000), three from the Oriental region (Ševčík 2001, Kurina 2005) and one from the Autralasian region: Northeastern Papua New Guinea (Kurina 2005). The genus is also known from undescribed species from the Neotropical region (Colombia (Oliveira et al. 2007) and Central America (Vockeroth 2009, OK and SSO *pers. obs.*)). There are no published records of *Cordyla* species from Afrotropical region.

The aim of this paper is to describe and illustrate the first *Cordyla* species from continental Australia and Tasmania and discuss its systematics.

Material and methods

The material was collected from seven localities in Tasmania using mostly Malaise traps, in few cases also pitfall traps or sweeping. A good amount of material comes from the Warra Long-Term Ecological Research Site (for details see Brown et al. 2001). In the Australian continent, the material was collected: 1) from Carrai and Werrikimbe Plateaus (both in NSW) during the tree trunk invertebrate survey by sticky traps (for details see Bickel and Tasker 2004); 2) from Brisbane Forest Park by Malaise traps and 3) from Victoria, Coopracambra National Park by Malaise traps. For collecting localities see Fig. 15. All specimens were stored initially in ethyl alcohol within which most of them – after studying under a stereomicroscope Leica S8APO or Leica MZ16 – are still preserved. In case of several specimens, for more detailed study of male terminalia, they were detached and macerated in a solution of KOH, followed by neutralization in acetic acid and washing in distilled water. The remaining chitinous parts were thereafter inserted into glycerine for study including illustrations and preserved as glycerine preparations in polyethylene microvials (cf. Kurina 2003). A few specimens including their terminalia were slide mounted in Euparal following the method described by Kurina

(2008). The holotype was mounted from alcohol, using a chemical method described by Vockeroth (1966), and double-pinned. The preservation method of each specimen is indicated in the material section. The measurements are given as the range of measured specimens followed by the mean value. While not otherwise stated, five specimens were measured, while the measurements and setosity information from the holotype are given in square brackets. The ratios of the three apical palpal segments are given as 3^{rd}:4^{th}:5^{th}. All measurements are taken from specimens in alcohol. Morphological terminology follows generally that of Søli et al. (2000) while the interpretation by Kjærandsen (2006) and Oliveira and Amorim (2012) are used for terminalia and thorax, respectively.

The habitus photo has been made in alcohol medium using the Canon 7D camera in combination with Canon MP-E65 (F2.8 1–5×) lens (see Kurina et al. 2011). The photos of terminalia were combined by software LAS V.4.1.0. from multiple gradually focused images taken by a camera Leica DFC 450 attached to the compound microscope Leica DM 6000 B. Adobe Photoshop CS5 was used for enhancing the figures and compiling the plate. The map was done plotting the coordinates at the Google website and then edited in the Adobe Photoshop 8.0.1.

The following acronyms are used for depositories:

AMSA	Australian Museum, Sydney, Australia
ANIC	Australian National Insect Collection, Canberra, Australia
IZBE	Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences [former Institute of Zoology and Botany], Tartu, Estonia
MZUSP	Museu de Zoologia da Universidade de São Paulo, Brazil
SMNH	Swedish Museum of Natural History, Stockholm, Sweden
TFIC	Tasmanian Forest Insect Collection, Hobart, Australia

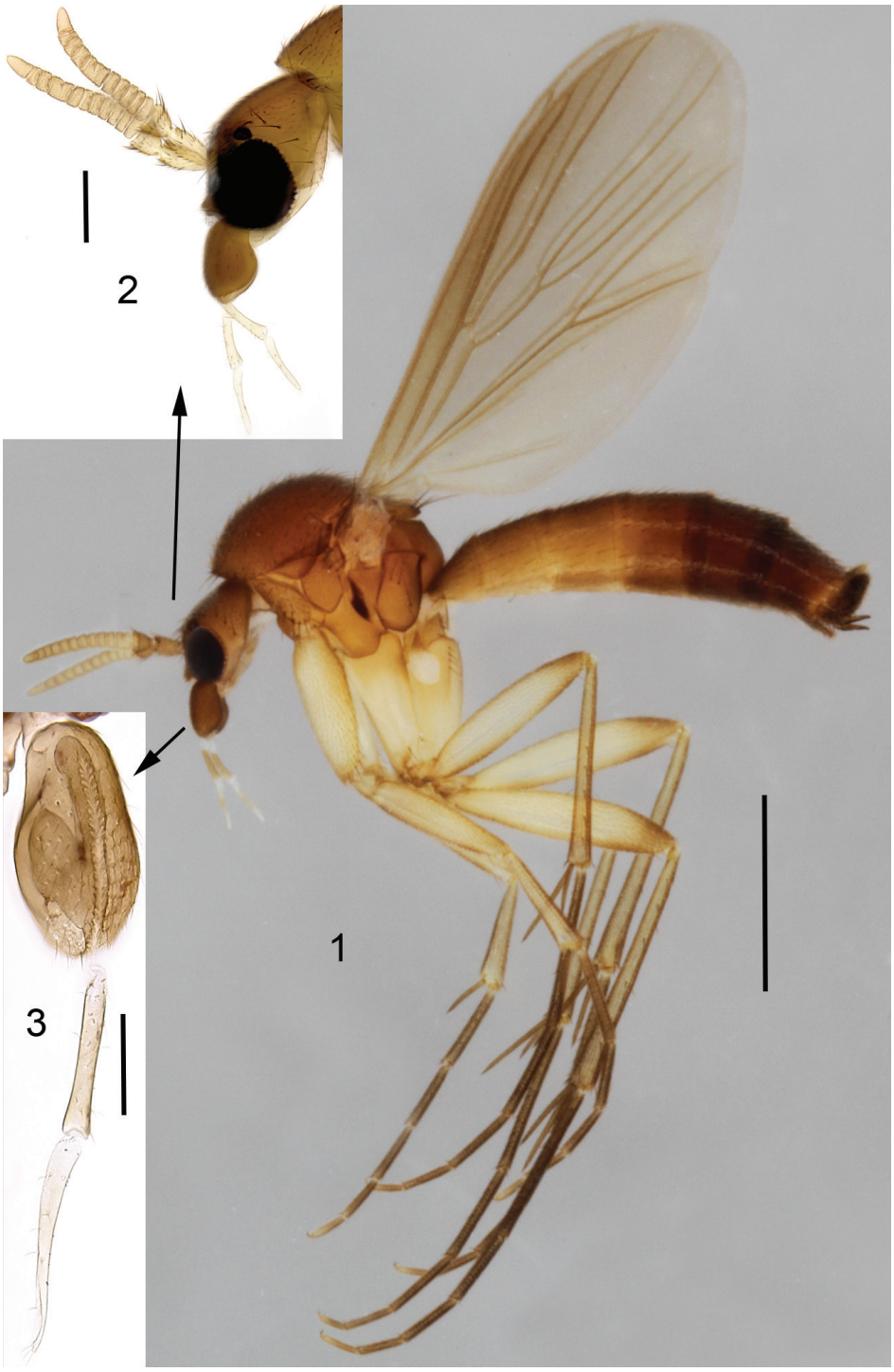
Data resources

Specimen information is available for download in Darwin Core 1.4 format at GBIF, the Global Biodiversity Information Facility, http://ipt.pensoft.net/ipt/resource.do?r=cordyla.

The species

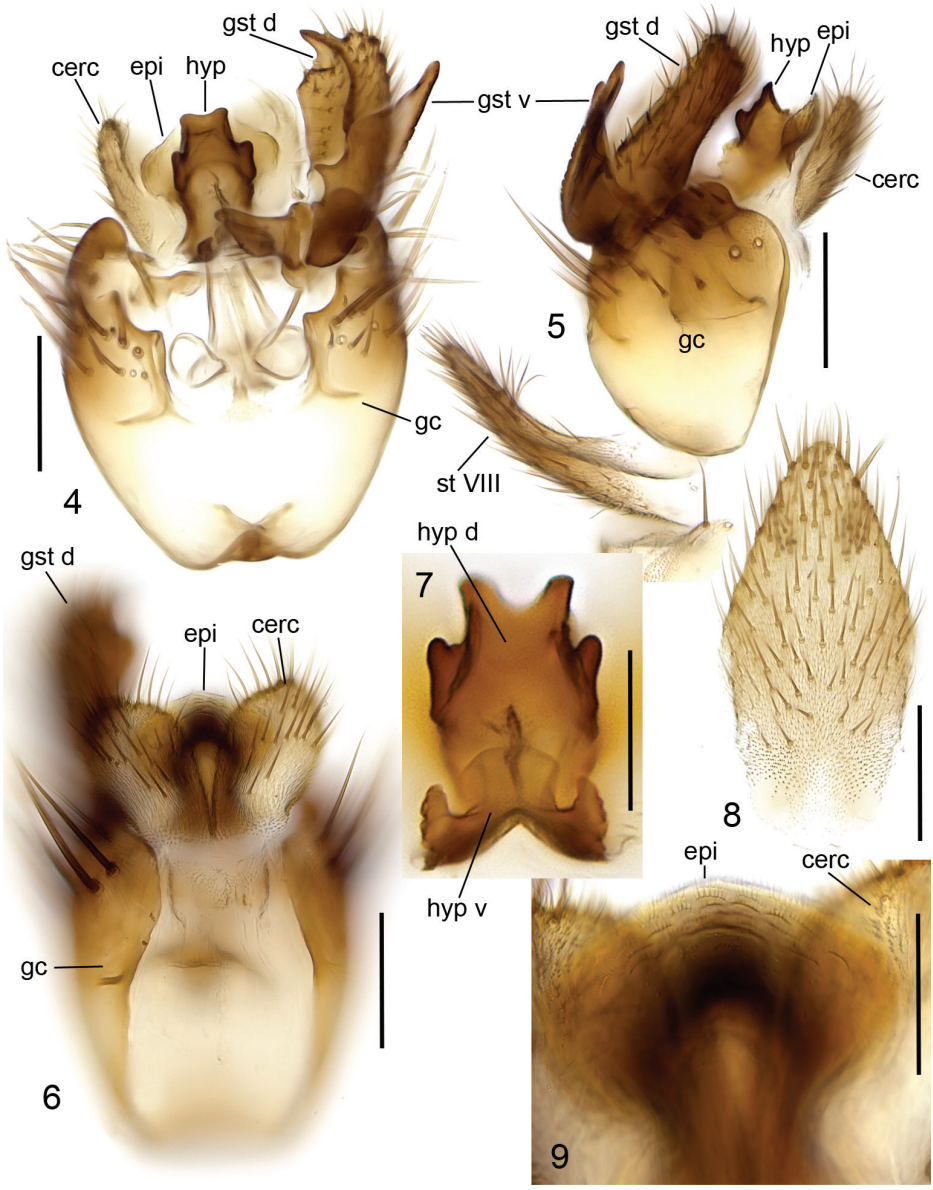
***Cordyla australica* sp. n.**
http://zoobank.org/22F4AE20-D2B3-42EE-9089-0A29BC3E9ECF
http://species-id.net/wiki/Cordyla_australica
Figs 1–15

Type material. *Holotype.* 1♂, AUSTRALIA: Tasmania, Warra LTER: Manuka Road, Malaise trap, 43.07°S, 146.67°E, 20.iv.2004, R. Bashford leg., plot code: SST-SMA254, sample code FT30575 (mounted from alcohol, in AMSA).



Figures 1–3. *Cordyla australica* sp. n. **1** male habitus **2** head with antennae and maxillary palpi, closer view **3** three apical segments of maxillary palpus. Scale bar = 1 mm (**1**), 0.2 mm (**2**) and 0.1 mm (**3**).

Paratypes. 5♂♂, same as holotype (in alcohol, 2 in TFIC, 3 in IZBE); 8♂♂, same as holotype except 19.vii.2004, plot code: SSTSMA254, sample code: FT30660 (in alcohol, 3 in AMSA, 5 in IZBE); 15♂♂ 2♀♀, same as holotype except 1.vii.2005, plot code: SSTMID280 and sample code: FT36772 (in alcohol, in IZBE); 2♂♂, same as holotype except 1.vii.2005 and plot code: SSTEAS094, sample code FT36767 (in alcohol, in TFIC); 1♂, same as holotype except 2.v.2003, plot code: SSTTOP060, sample code FT29026 (in alcohol, in TFIC); 1♂, same as holotype except 1.iii.2005, plot code: SSTEAS318, sample code FT35684 (in alcohol, in IZBE); 2♂♂, same as holotype except 13.x.2002, plot code: SSTSMA254, sample code FT28944 (in alcohol, in IZBE); 3♂♂, same as holotype except 19.v.2004, plot code: SSTCON059, sample code FT30632 (in alcohol, in IZBE); 1♂, same as holotype except 19.v.2004, plot code: SSTTOP060, sample code: FT30634 (in alcohol, in IZBE); 1♂, same as holotype except 13.x.2002, plot code: SSTMID160, sample code FT7034 (in alcohol, in IZBE); 2♂♂, same as holotype except 1.iv.2005, plot code: SSTWES120, sample code FT35962 (in alcohol, in IZBE); 1♂, same as holotype except 2.iv.2007, plot code: SSTCON059, sample code FT40220 (in alcohol, in IZBE); 1♂, same as holotype except 3.ix.2007, plot code: SSTCON059, sample code FT40745 (in alcohol, in IZBE); 1♂, same as holotype except 5.iii.2007, plot code: SSTCON059, sample code FT40115 (in alcohol, in IZBE); 1♂ same as holotype except 24.iii.2000, plot code: SSTSMA663, sample code FT28616 (in alcohol, in IZBE); 2♂♂, Tasmania, Mount Warra - Mt. Weld alt. Transect 100, Malaise trap, 43.07S, 146.67E, 27.ii.2002, N. Doran & R. Bashford leg., plot code WR0100M, sample code FT5923 (in alcohol, in IZBE); 1♂, same as previous except 27.ii.2001, sample code: FT19 (in alcohol, in IZBE); 6♂♂, same as previous except 27.iv.2001, sample code: FT199 (in alcohol, in IZBE);1♂, same as previous except 27.ii.2001, plot code: WR0200M, sample code: FT26 (in alcohol, in IZBE); 3♂♂, AUSTRALIA, Tasmania, Ewart creek, 150m dstr bridge on A10, 221 m.a.s.l., Malaise trap, loc 12, 41°58.576'S, 145°27.708'E, 22.ii–03.iii.2006, Jönsson, N., Malm, T. & Williams, D. leg. (on slides, in SMNH); 23♂ 1♀ AUSTRALIA, Tasmania, Ewart creek, Malaise trap ethanol, 41°58'S, 145°28'E, 16.i–02.ii.1983, I.D. Naumann & J.C. Cardale leg. (1♂ 1♀ on slides, in MZUSP; 22♂♂ in alcohol, 5♂♂ in MZUSP other in ANIC); 23♂♂ 2♀♀, AUSTRALIA, Tasmania, Central Plateau, small creek flowing into Arthur's Lake, 50m dst 1st bridge on gravel road from Rd B51 to Little Lake, 1006 m.a.s.l., Malaise trap, loc 17, 41°57.237'S, 146°51.928'E, 25.ii–04.iii.2006, Jönsson, N., Malm, T. & Williams, D. leg. (1♂ 1♀ on slides other in alcohol, 3♂♂ in IZBE other in SMNH); 5 ♂♂, AUSTRALIA, Tasmania, Cradle MTN NP. creek from Crater Lake to Ronny Greek 100m upstr broadwalk, 867 m.a.s.l., Malaise trap, loc 14, 41°38.667'S, 145°56.775'E, 23.ii–04.iii. 2006, Jönsson, N., Malm, T. & Williams, D. leg. (1♂ on slide other in alcohol, in SMNH); 1♂, AUSTRALIA, Tasmania, Southwest National Park, in forest 20m off Rd C607, 300m south off Creepy Crawly Walk, 573 m.a.s.l., Malaise trap, loc 9, 42°50.012'S, 146°22.866'E, 21.ii.–01.iii.2006, Jönsson, N., Malm, T. & Williams, D. leg. (in alcohol, in SMNH); 5♂♂, AUSTRALIA: Queensland, Brisbane Forest Park, Enog-



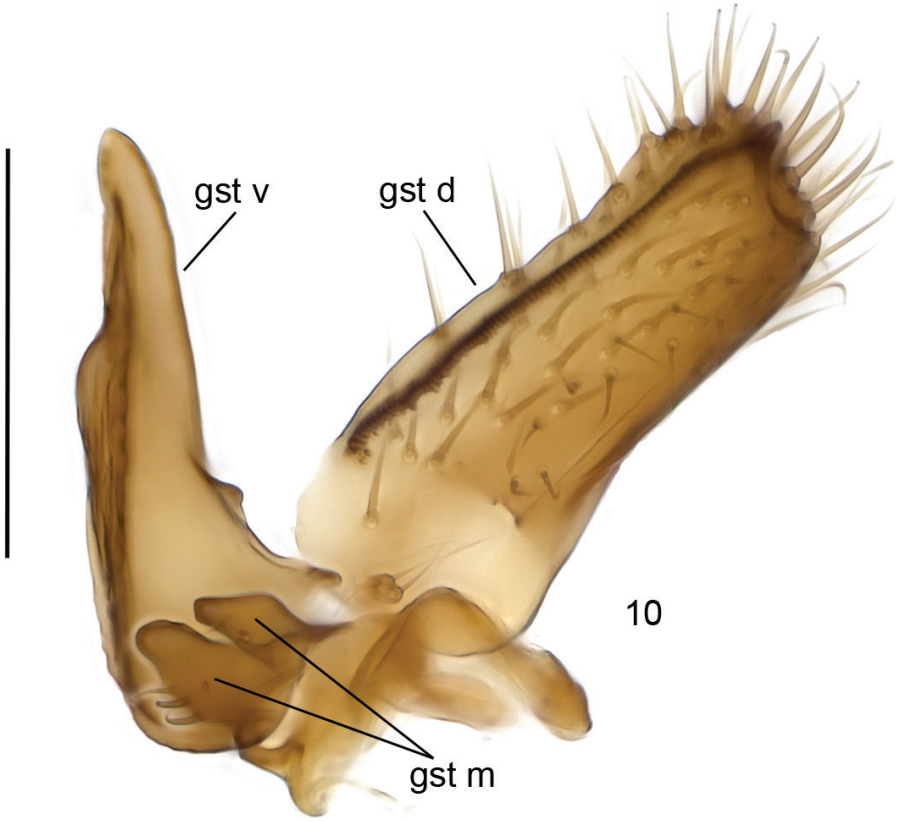
Figures 4–9. *Cordyla australica* sp. n., male terminalia. **4** ventral view **5** lateral view **6** dorsal view **7** hypoproct, ventral view **8** sternite VIII, ventral view **9** epiproct, dorsal view. Scale bar 0.1 mm (**4, 5, 6, 8**) and 0.05 mm (**7, 9**). Abbreviations: cerc = cercus; epi = epiproct; gc = gonocoxite; gst d = dorsal branch of gonostylus; gst m = medial branch of gonostylus; gst v = ventral branch of gonostylus; hyp = hypoproct; st VIII = sternite VIII.

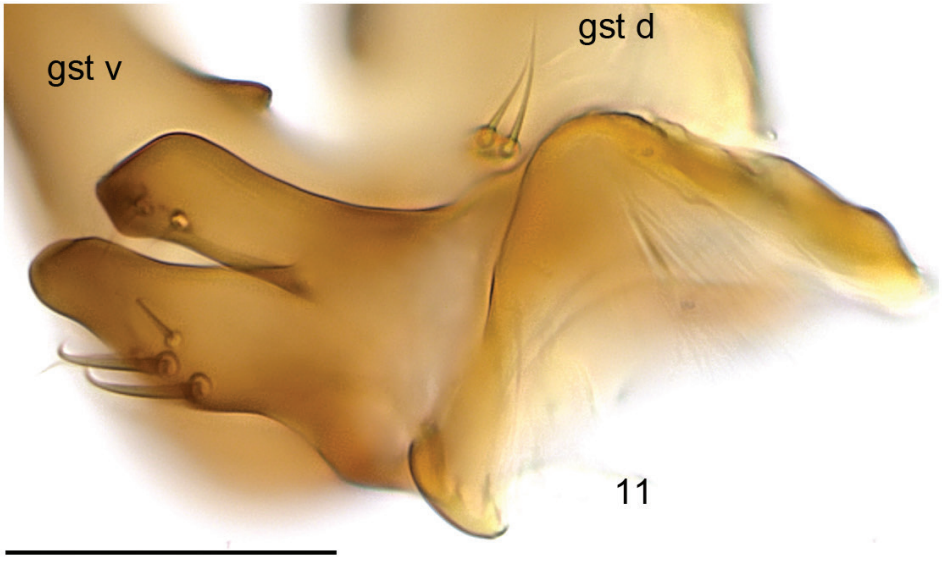
gera Creek at Scrub Road crossing, in tropical rain forest with *Eucalypus* spp., Malaise trap, 27°25'42"S 152°50'33"E, 14–29.xi.1995, 1–7.xii.1995, 7–27.xii. 1995 and 28.xii.1995–4.i.1996, Irwin, M.E. leg. (in alcohol, 3 in ANIC, 2 in IZBE).

Other material studied (not included in paratypes due to quality of material from sticky traps). 1♀, AUSTRALIA: New South Wales, Werrikimbe National Park, 31°16'50"S, 152°03'19"E, 1045m, sticky trap on *E. saligna*, 1.xii–7.xii.1997, E. Tasker leg., WS-FC-127-6 (K377114, in alcohol, in AMSA); 1♀, AUSTRALIA: New South Wales, Werrikimbe National Park, 31°10'23"S, 152°09'45"E, 1060m, sticky trap on *E. saligna*, 1.xii–7.xii.1997, E. Tasker leg., WS-KF-127-6 (K377115, in alcohol, in AMSA); 1♀, AUSTRALIA: New South Wales, Carrai State Forest, 30°58'48"S, 152°17'06"E, 975m, sticky trap on *E. obiqua*, 11–16.i.1998, E. Tasker leg., CR-RO-018-4 (K377116, in alcohol, in AMSA); 1♀, AUSTRALIA: New South Wales, Werrikimbe National Park, 31°16'50"S, 152°03'19"E, 1045m, sticky trap on *E. campanulata*, 1.xii–7.xii.1997, E. Tasker leg., WS-FC-127-3 (K377117, in alcohol, in AMSA); 2♀♀, AUSTRALIA: New South Wales, Carrai State Forest, 30°59'45"S, 152°16'23"E, 930m, sticky trap on *E. campanulata*, 3.xii–8.xii.1997, E. Tasker leg., CS-FZ-127-4 (K377118, in alcohol, in AMSA); 1♂1♀, AUSTRALIA: New South Wales, Carrai State Forest, 30°59'45"S, 152°16'23"E, 930m, sticky trap on *E. saligna*, 3.xii–8.xii.1997, E. Tasker leg., CS-FZ-127-5 (K377119, in alcohol, in AMSA); 1♂, AUSTRALIA: New South Wales, Carrai State Forest, 30°54'19"S, 152°17'36"E, 1055m, sticky trap on *E. campanulata*, 3.xii–8.xii.1997, E. Tasker leg., CC-DP-127-4 (K377120, in alcohol, in AMSA); 1♀, AUSTRALIA: New South Wales, Carrai State Forest, 30°54'35"S, 152°16'26"E, 1090m, sticky trap on *E. obiqua*, 3.xii–8.xii.1997, E. Tasker leg., CC-FK-127-3 (K377121, in alcohol, in AMSA); 4♂♂, AUSTRALIA: New South Wales, Werrikimbe National Park, 31°16'50"S, 152°03'19"E, 1045m, sticky trap on *E. obiqua*, 3.vii–8.vii.1998, E. Tasker leg. WS-FC-078-1 (K377122, 1♂ in slide, 3♂♂ in alcohol, in AMSA); 1♀, AUSTRALIA: New South Wales, Carrai State Forest, Feltons Knob, 30.9097S, 152.2739E; 1090m, 24.iv–30.iv.1998, E. Tasker, P. German leg., CC-FK-048-3 (K377123, in alcohol, in AMSA); 2♂♂1♀, AUSTRALIA: New South Wales, Werrikimbe National Park, 31°16'50"S, 152°03'19"E, 1045m, sticky trap on *E. obiqua*, 3.vii–8.vii.1998, E. Tasker leg., WS-FC-078-3 (K377124, in alcohol, in AMSA); 1♂1♀, AUSTRALIA: New South Wales, Carrai State Forest, 30°54'33"S, 152°16'28"E, 1075m, sticky trap on *E. campanulata*, 3.xii–8.xii.1997, E. Tasker leg., CC-CR-127-2 (K377125, in alcohol, in AMSA); 2♂♂, AUSTRALIA: Tasmania, King William Creek Site, 43 08 84E, 5 22 76 00N [these label data are unclear, the approximate geographic coordinates are 42°12'S, 146°8'24"E], pitfall, 23.ii.2000, M. Driessen leg. (K377126 and K377128, in alcohol, in AMSA); 1♂, AUSTRALIA: Tasmania, Lake St Clair, Site: SCRW, sweep, 28.viii.1999, (K377127, in alcohol, in AMSA); 43♂♂, AUSTRALIA: Victoria, Coopracambra National Park, Beehive creek, 27 Km NNE Cann R., 347 m, Malaise traps, 37°20'01"S, 149°14'12"E, 5.xii.2004–12.i.2005, C. Lambkin & N. Starick leg., ANIC sample 2608 (material from ANIC in donation to SSO, housed at the Universidade de São Paulo, campus of Ribeirão Preto).

Description. Male (Fig. 1). Total length 2.4–3.7, 2.9 [3.1] mm (n=10).

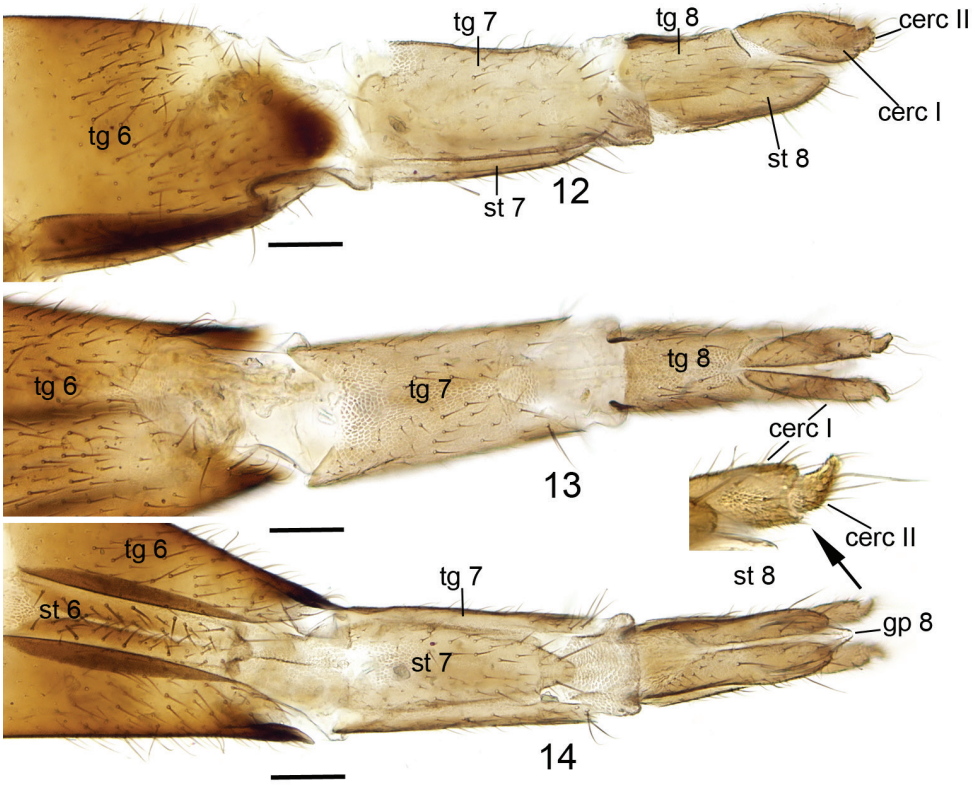
Head (Fig. 2) brown, mouthparts yellowish. Two ocelli encircled by dark brown areas, close to compound eyes. All three visible palpal segments (Fig. 3) setose, swollen antepenultimate segment blackish brown, succeeding segments light brown, basally pale. 4th segment





Figures 10–11. *Cordyla australica* sp. n., gonostylus. **10** internal view **11** lobes of medial branch of gonostylus. Scale bar = 0.1 mm (**10**) and 0.05 mm (**11**).

slightly widening apically, 5th segment apically tapering. Swollen palpal segment 1.7–2.1, 1.9 [2.1] times as long as broad medially from lateral view, and 1.0–1.2, 1.1 [1.1] times as long as height of compound eye. Ratios of three apical palpomeres 1.0: 0.8–0.9, 0.8 [0.9]: 0.9–1.0, 1.0 [0.9]. Antenna light brown with 2+12 segments. Scape and pedicel with brown setae, flagellum with somewhat paler setosity. Scape elongate cup-shaped, 2.0–2.3, 2.1 [2.0] times as long as wide apically. Pedicel cup-shaped, 0.7–0.8, 0.8 [0.7] times as long as wide apically. Flagellomeres rectangular, about twice as wide as long. Apical flagellomere conical, about 1.6 times as long as wide basally. **Thorax** brown, mesonotum and hind margin of laterodergite somewhat darker. Anterior part of mesepimeron with a blackish patch leaving anteroapical corner light brown. Haltere with pale knob, stem basally pale and apically brown. All setosity on thorax brown. Scutum entirely covered with decumbent setae, scutellum with setae including two pairs of marginal bristles, laterals considerably shorter than internals. Antepronotum with setae including 4-5 [4] bristles, proepisternum with setae including 6–8 [8] bristles. Anepisternum with 4–6 [6] bristles at hind margin and with ca. 40 setae on its upper two third. Mesepimeron and katepisternum bare. Laterotergite with 4 bristles and ca. 10 setae. Mediotergite bare. Metepisternum with 3–5 [5] bristles and ca. 10 setae. **Wing** with yellowish tinge, otherwise clear. Length 1.9–2.8, 2.3 [2.6] mm (n=10). Ratio of length to width 2.5–2.8, 2.6 [2.5]. All veins light brown. Radial veins seem darker because of setae on both surface; other veins bare. Crossvein r-m apically disjunct. M-stem about 4 times as long as r-m. R5 slightly sinusoid. M2 not reaching wing margin, broken 0.8–1.2, 1.0 [0.9] times of m-stem length before it. Cu-fork begins very slightly before medial fork. **Legs** yellow, with fore-femur infuscated ventrally and mid- and hind femurs infuscated at apical fifth. Tarsi seem darker because of dense brown setae. Hind coxa with 4–5 [5] posteroleteral bristles basally, with one lateral and one posterior bristle apically, and with ca. 25 weaker setae along posterolateral margin. Ratio of femur to tibia for fore-, mid- and hind legs: 1.3–1.4, 1.4 [1.4]; 1.0, 1.0 [1.0]; 0.9–1.0, 0.9 [0.9]. Ratio tibia to first tarsomere for fore-, mid- and hind legs: 1.1–1.2, 1.2 [1.1]; 1.2, 1.2 [1.2]; 1.4–1.5, 1.5 [1.5]. Fore-tibia with a spur about 0.5–0.6, 0.5 [0.6] of fore basitarsus; mid-tibia with anterior spur about 0.3–0.4, 0.4 [0.3] and with posterior spur about 0.6–0.7, 0.6 [0.6] of mid basitarsus; hind tibia with anterior spur about 0.5– 0.6, 0.5 [0.6] and with posterior spur about 0.6–0.7, 0.6 [0.6] of mid basitarsus. **Abdomen** with 3 or 4 segments dorsally brown, laterally and ventrally yellow; succeeding segments brown to dark brown. **Terminalia** (Figs 4-11) two-coloured: basal part of gonocoxite and cerci yellow; apical part of gonocoxite and gonostylus brown; sternite 8 seems brownish because of dense setosity. Sternite 8 ovate with bluntly rounded apex, basal quarter membranous and bare, setae on apical quarter somewhat stronger than rest of them. Gonocoxite slightly oblong, with broad ventral incision about half of gonocoxite height. Dorsal medial margin of gonocoxite bulging mesiad at apical third. Cerci setose, basally membranous and fused, apically rounded, protruding well over gonocoxite. Ventral margin of gonocoxite angular. Basal half of gonocoxite bare, apical half with strong bristles. Dorsal branch of gonostylus rectangular, apically drawn into a pointed lobe, with a sclerotized comb on its ventral surface, as long as branch height. Setosity homogeneous without any deviations. Dorsal branch of gonostylus with a basal tubercle on its ventral surface close to base of medial branch; tubercle with two



Figures 12–14. *Cordyla australica* sp. n. female terminalia. **12** lateral view **13** dorsal view **14** ventral view. Scale bar = 0.1 mm. Abbreviations: cerc= cercus, gp= gonapophysis, st= sternite, tg= tergite.

apical setae. Ventral branch of gonostylus bare, subequal to dorsal branch, with serrated lateral margin and with a hump on basal third of medial margin. The apical third of ventral branch is well tapering in ventral view. Medial branch of gonostylus divided at apical two third into two subequal lobes: ventral lobe apically rounded, medially somewhat swollen, slightly curved dorsad, with three setae on its ventral margin medially; dorsal lobe apically angular with two setae on apical third. Epiproct campaniform with small setulae that arise in lines of 4 to 8 from small ridges. Hypoproct consists of basally connected dorsal and ventral parts: both parts are with well-outlined lateral shoulders, the dorsal part is apically notched while the ventral part is apically convex.

Female. Total length 2.2–3.4, 3.0 mm. Wing length 1.6–2.8, 2.2 mm. Ratio of length to width 2.5–2.9, 2.7. Antennae 2+9 segments. By setosity and coloration similar to male, except for entirely light brown abdomen in some specimen. Terminalia (Figs 12-14) light brown. Cercus two-segmented: apical segment small, apically tapering and bent laterad in ventral and dorsal views, with 2-3 long setae deviating from other setosity; basal segment long ovate, slightly sinusoidal and wider than apical segment. Gonapophysis VIII membranous, visible in ventral view, apically somewhat pointed. Tergite VIII rectangular, subequal to length of basal segment of cercus, api-

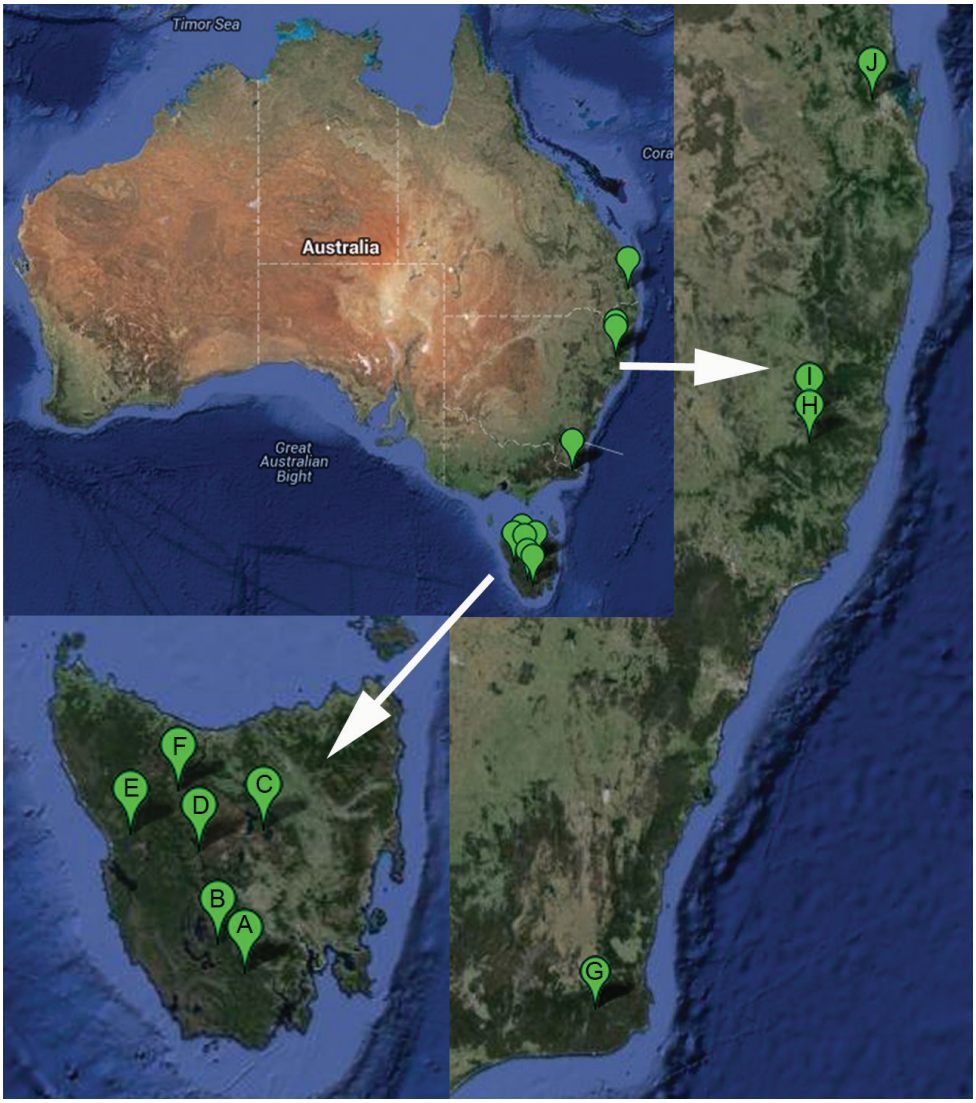


Figure 15. Collecting localities of *Cordyla australica* sp. n. in the continental Australia and Tasmania. **A** Tasmania, Warra long-term ecological research site **B** Tasmania, Southwest National Park **C** Tasmania, Central Plateau **D** Tasmania, King William Creek **E** Tasmania, Ewart creek **F** Tasmania, Cradle Mountain **G** Victoria, Coopracambra National Park **H** New South Wales, Werrikimbe National Park **I** New South Wales, Carrai State Forest **J** Queensland, Brisbane Forest Park.

cally angular, basally emarginated in dorsal view. Sternite VIII lateroapically conical, with deep ventral cleft. Tergite VII about twice as long as tergite VIII, with basal and apical broad incision dorsally and with a few apical stronger setae deviating from other setosity. Sternite VII apically conical, subequal to length of tergite VII. Tergite VI with conical and sclerotized apical edge laterally and with broad incision apicodorsally.

Biology. Unknown.

Etymology. The species is named to indicate its discovery in Australia.

Comments. The species shows high variation (up to 35%) in body size that is, however, continuous and observed also in other *Cordyla* species (e.g. in European *C. crassicornis* Meigen, 1818: OK *pers. obs.*) and colour variation including some specimens darker than others. Despite of that, we have not found any species level morphological differences within the studied material.

Discussion

According to structure of male terminalia, *Cordyla australica* sp. n. belongs to the *C. murina* species-group as outlined by Kurina (2001). The species of this group have gonostylus with medial branch divided into two lobes of which outline and setosity are species-specific. Thirteen species belong to the group as follows: seven and five in the Palaearctic and Nearctic region, respectively and one from the Australasian region. Within the group, in respect to the number of flagellomeres – an important character for species grouping since Landrock (1926) – males of *C. australica* sp. n. shares 12 flagellomeres with 4 species, viz. *C. murina* Winnertz, 1863 (widely in Palaearctic), *C. styliforceps* (Bukowski, 1934) (southern Europe), *C. bidenticulata* Sasakawa, 2003 (Japan) and *C. toraia* Kurina, 2005 (South Sulawesi and Papua New Guinea). Having antepenultimate palpal segment dark brown to blackish, ventral branch of gonostylus with one serrated margin and notched dorsal part of hypoproct *C. australica* sp. n. is most similar to *C. murina*. However, the dorsal part of hypoproct is deeply notched and without lateral shoulders in *C. murina*, while the notch is shallow and lateral shoulders are well developed in *C. australica*. In the ventral part of the hypoproct, *C. murina* has lateral shoulders protruding over the slightly convex medial area, while the latter is well convex with subequal lateral shoulders in *C. australica* sp. n. *Cordyla murina* has the lobes of medial branch of gonostylus apically slightly swollen and billed, while they have a different outline in *C. australica* (cf. Fig 11). According to the key of Oriental and Australasian species (Kurina 2005), *C. australica* runs to the couplet 2 (*C. toraia*) but differing by the dark brown antepenultimate palpal segment (yellow in *C. toraia*), outline of hypoproct (cf. Fig. 7 and Kurina 2005: fig. 11) and other details in male terminalia.

In spite of wide range of the studied Australian samples (SSO *pers. obs.*), *Cordyla australica* sp. n. is apparently found only in wet forest of eastern Australia and Tasmania (Fig. 15).

Acknowledgements

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Appendix

Occurence data of Australian *Cordyla.* (doi: 10.3897/zookeys.342.6045.app) File format: Mircosoft Excel file (xls).

Explanation note: Occurence data of a new species – *Cordyla australica* Kurina & Oliveira, 2013 – based on material from Austarlian mainland (Victoria, New South Wales, Queensland) and Tasmania are provided.

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Citation: Kurina O, Oliveira SS (2013) The first *Cordyla* Meigen species (Diptera, Mycetophilidae) from continental Australia and Tasmania. ZooKeys 342: 29–43. doi: 10.3897/zookeys.342.6045 Occurence data of Australian C*ordyla*. doi: 10.3897/zookeys.342.6045.app

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RESEARCH ARTICLE

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An unusually rich scuttle fly fauna (Diptera, Phoridae) from north of the Arctic Circle in the Kola Peninsula, N.W. Russia

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Abstract

64 species of Phoridae, in 6 genera, are reported from the Kola Peninsula, north of the Arctic Circle. The new species *Megaselia elenae* and *M. kozlovi* are described. 33 species of *Megaselia*, only known from females, are given code numbers. Keys to the species of all the females of *Megaselia* and *Phora* are provided; and also a key to the males European *Megaselia* species with a notopleural cleft.

Keywords

Taxonomy, Phoridae, new species, Kola Peninsula

Introduction

The only published record of scuttle flies (Diptera: Phoridae) from the Kola Peninsula refers to *Megaselia opacicornis* Schmitz parasitizing the pupae of the leaf beetle *Chrysomela lapponica* (L.) (Chrysomelidae) (Disney et al. 2001). The town of Monchegorsk (67°55'N, 32°50'E) is situated north of the Arctic Circle. It is the centre for the smelting of copper and nickel in the Kola Peninsula and is one of the most polluted towns in the Russian Federation (Kozlov et al. 2009; Eeva et al. 2012). During 2009

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and 2010 a study of the impact of this pollution on the insect fauna was undertaken (by Dr Mikhail Kozlov (University of Turku). The analysis of the results for all insect families will be reported elsewhere. For this study the samples of Phoridae were sent to me for identification. These samples included 64 species of scuttle flies, of which 3 proved to be undescribed and the females of a further 34 species of *Megaselia* can not be named until linked to their males. One new Megaselia (Disney 2011b) and a new species of *Abaristophora* are described elsewhere (Pape et al. 2013). Two new species are described below and females are characterized by means of keys to those of all the species of *Megaselia* and *Phora* obtained.

Materials and methods

Samples were collected in 10 study sites located between 1 km North and 40 km South of Mochegorsk. In 2009 insects were collected in traps baited with dead mice, the trap being described by Ermakov (2010). In 2010 yellow traps (manufactured by Russell IPM) were employed. These traps have the inner walls of the container treated with a contact insecticide. The specimens were preserved in about 70–80% ethanol and subsequently mounted on slides in Berlese Fluid (Disney 2001). This method allows examination of gut contents and whether females are gravid, etc. The samples from the yellow traps exhibited a much higher frequency of damaged specimens than those collected in 2009.

The species

BT refers to specimens caught in the traps baited with dead mice in 2009. 1335 scuttle flies were obtained. YT refers to those caught in the yellow traps in 2010. 344 scuttle flies were trapped. Voucher specimens, including all the type material, are deposited in the University of Cambridge, Museum of Zoology (UCMZ).

The gut contents has been noted for several specimens. Amorphous detrital material is almost certainly derived from carrion fluids.

Abaristophora kolaensis Disney: YT - 1 male. This species has been recently described (Pape et al. 2013).

Anevrina thoracica (Meigen): BT - 2 females. A new record for Russia west of the Urals.

Anevrina unispinosa (Zetterstedt): BT - 155 males, 140 females. The males were 11.6% of the phorids obtained in the traps baited with dead mice and the females were 10.5%. Together they were 22.1%. None were collected in the yellow traps. A new record for Russia west of the Urals. This species has been reared from dead snails (Keilin 1919) and carrion baits, including liver, dead molluscs and earthworms, and from rotting wheat flour, vegetation and mushrooms (Buck 1997, 2001).

Megaselia albiclava Schmitz: BT - 3 males, 10 females. YT- 1 female. None of the females were gravid. One had amorphous detrital material in the gut.

Megaselia basseti Disney: BT - 7 females. YT – 1 male, 13 females. The recognition of this species has recently been clarified (Disney 2011b). About half the females were gravid and some had amorphous detrital material in the gut.

Megaselia breviterga (Lundbeck): BT - 13 females. Some females had amorphous detrital material in the gut, which in one case included a few fungus spores. Gravid females had 5 or 7 eggs. The recognition of this species has been recently clarified (Disney 2012) and its supposed occurrence in the Nearctic Region called into question.

Megaselia cirriventris Schmitz: BT – 1 male. YT – 1 male. This species is prevalent in Greenland. When providing a redescription of this species Schmitz (1958: 482) erroneously synonymised *M. piliventris* Schmitz (1937: 119; a replacement name for *M. pilifera* Schmitz, 1936: 227) with it and then produced a hybrid description (Disney 2004). Both sexes of *M. piliventris* are keyed, and critical features illustrated, by Disney (2009).

Megaselia coccyx Schmitz: YT - 1 male, 1 female.

Megaselia crellini Disney: YT – 1 male. This species belongs to a species complex previously treated as a single species (Disney 2011a).

Megaselia eccoptomera Schmitz: BT - 1 male, 8 females. YT - 2 males, 2 females.

***Megaselia elenae* sp. n.**

http://zoobank.org/788A81AD-928F-45A6-929D-9B0FCC74CE80
http://species-id.net/wiki/Megaselia_elenae
Fig. 1

Diagnosis. In the key to the males of the species of the British Isles (Disney 1989) the males will run to couplet 291. At least six other European species will run to this couplet, two of which have been described since this key. However, it belongs to a subgroup of species within those reviewed by Buck and Disney (2001). This subgroup comprises species with a bare mesopleuron, only two bristles on the notopleuron and in front of these a notopleural cleft. This subgroiup is keyed below and includes this new species.

Etymology. Named after Elena Zverevra, who asked me to identify the Phoridae obtained in this study.

Description. Male. Frons brown, clearly broader than long, with 50-60 hairs and dense but very fine microtrichia. Supra-antennal bristles (SAs) with the lower pair clearly shorter and less robust than the upper pair. [Note: the right side of frons lacks its antial bristle but has 2 pre-ocellars. The following positions of these bristles is based on the left side]. The antials slightly lower on frons than upper SAs and anterolaterals, which are about level with the latter, and about midway between upper SAs and AL bristles. Pre-ocellars slightly further apart than either is from a mediolateral bristle, which is about the same level on frons. Cheek with 4 bristles and jowl with two. The subglobose postpedicels brown, each with more than 40 subcutaneous pit sensilla (SPS) vesicles which are about 0.01 mm in diameter. Palps yellow, at most a third as broad as postpedicel but slightly longer than breadth of latter, with 6-7 bristles, the most apical being shorter

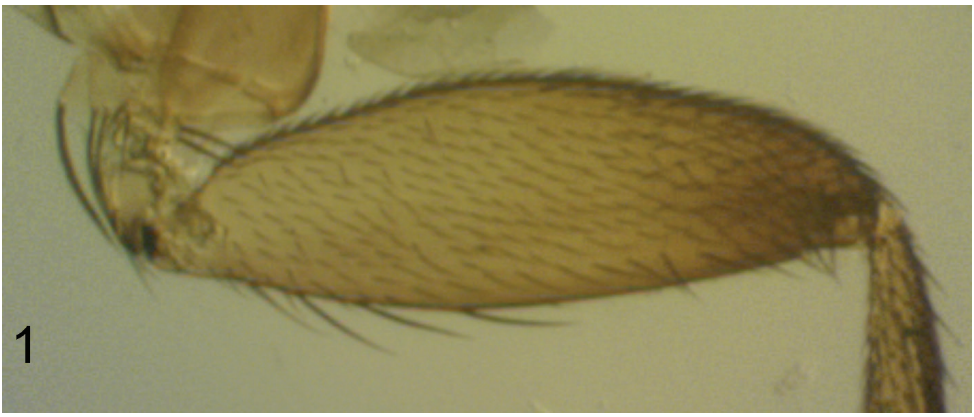


Figure 1. *Megaselia elenae* sp. n. male, anterior face of hind femur.

than a lower SA but the longest subequal to latter, and as many hairs. Labrum yellowish brown and about half as wide as a postpedicel. Labella coloured as palps but with light brown bands on upper sides towards margins and with very few short spinules below. Thorax brown. Two notopleural bristles and a cleft in front of these, which ends just before reaching a c-shaped ridge across its path. Mesopleuron bare. Scutellum with an anterior pair of small hairs and a posterior pair of bristles. Abdominal tergites brown with small hairs except for clearly longer hairs at rear of T6. Venter brown, and with a few hairs on segments 3–6, those at rear of segment 5 being longer, and those at rear of T6 being clearly the longest. The (damaged) hypopygium is brown, with a pale brown anal tube, which is clearly longer than the length of the dorsal face of the epandrium. Each side of the latter 16–18 hairs, which are longer and stronger anteriorly but are smaller and weaker behind, and with a strong bristles (about 0.13 mm long). The hairs of the proctiger are as long and clearly thicker than hairs of the cerci. The left lobe of the hypandrium is pale grey, about 0.06 mm long, and lacking micritrichia. The right lobe is also pale grey and bare, but is only 0.02 mm long (and only 0.03 mm wide at its base). With 4 rectal papillae. Legs yellowish brown with the hind femora being the darkest and the front legs the more yellowish. Fore tarsus with a posterodorsal hair palisade on segments 1–5 and 5 a little longer than 4. Dorsal hair palisade of mid tibia extends about two thirds of its length. Hairs below basal half of hind femur clearly longer than those of anteroventral row of outer half, which are themselves long (Fig. 1). Hind tibia with 10 differentiated posterodorsal hairs and spinules of apical combs simple. Wings 1.4 mm long. Costal index 0.54 Costal ratios 3.1 : 2.7 : 1. Costal cilia (of section 3) 0.13–0.14 mm long. Hair at base of vein 3 as small as costal cilium at base of costa. With 3 axillary bristles, all shorter than costal cilia. Sc not reaching R1. All veins yellowish grey, with thin veins 4–6 being darkest. Membrane lightly tinged grey (just evident to naked eye when viewed against a white background). Haltere knob yellow.

Type material. Holotype ♂, RUSSIA, Kola Peninsula, near Monchegorsk, in yellow trap, 26.vi–6.vii.2010, M. Kozlov (UCMZ, 17-89).

Megaselia haraldlundi Disney: YT – 1 female.

Megaselia humeralis (Zetterstedt): BT – 1 male. This species parasitizes the pupae of the leaf beetle *Chrysomela lapponica* (Chrysomelidae) (Disney and Zvereva 2008).

Megaselia immodensior Disney: BT – 1 male, 1 female. YT – 1 male. This species is a little variable and the specimens from the Kola Peninsula extend the range of variation a little. For example the costal index of the male is only 0.42, but in the type series it is more than 0.44 (Buck and Disney 2001). The CI of the female from the Kola Peninsula is 0.45 to 0.46.

Megaselia fallobreviseta Disney: BT – 3 females. YT – 5 males, 2 females. This is sibling species of *M. breviseta.* The males are almost indistinguishable but the females of the two species are readily distinguished (Disney 2011b). It has been reared from the caterpillar tents of an ermine moth (*Yponomeuta* sp.) in Germany.

Megaselia fuscovariana (Schmitz): BT – 1 male, 1 female. YT - 1 male, 1 female.

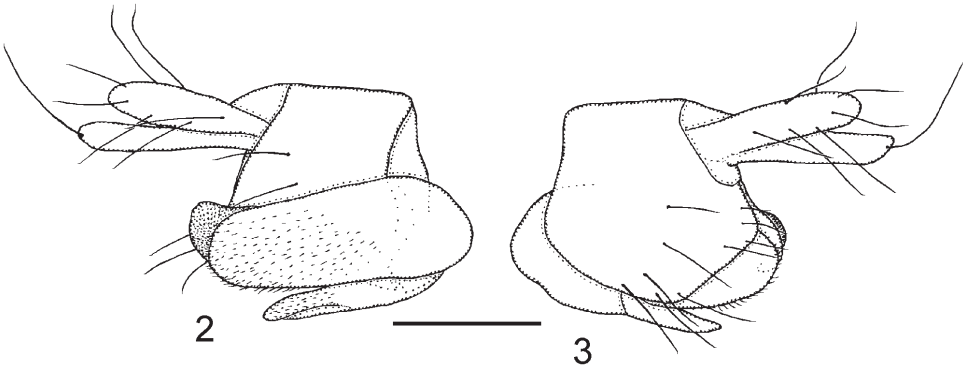
***Megaselia kozlovi* sp. n.**

http://zoobank.org/33869855-A189-4460-B780-E546125885AD
http://species-id.net/wiki/Megaselia_kozlovi
Figs 3–7

Diagnosis. In the key to the males of the species of the British Isles (Disney 1989) the males will run to couplet 245, Lead 1, where one is directed to return to couplet 241. It runs out there to Lead 1, but the species of this lead is covered by a revision of a group of species (Buck and Disney 2001) from which the new species is immediately excluded by having 3, not 2, bristles on the notopleuron. Furthermore, the small anterior pair of hairs on the scutellum contrast with the bristle like anterior scutellars of the species it most resembles in this complex.

Etymology. Named for its collector Mikhail Kozlov.

Description. Male. Frons brown, clearly broader than long, with 30–42 hairs and very dense but very fine microtrichia. Supra-antennal bristles (SAs) unequal, the lower pair being about as long as the longest (apical) bristle of the palp but less robust than it. The antials lower on frons than anterolaterals, and more than twice as far from upper SAs as either is from an AL bristle. Pre-ocellars slightly closer together than either is from a mediolateral bristle, which is very slightly higher on frons. Cheek with 2–3 short bristles and jowl with one long and one short bristle. The subglobose postpedicels brown, without SPS vesicles. Palps yellow, at most a third as broad as postpedicel but about 1.4 times as long as breadth of latter, with 5–8 bristles, 3–4 being long and the rest short, and 1–3 hairs. Labrum pale yellow and about 0.8 times as wide as a postpedicel. Labella a little paler than palps, with only a few short spinules below but with several pale teeth along their inner edges.. Thorax brown. Three notopleural bristles and no cleft in front of these. Mesopleuron bare. Scutellum with an anterior pair of small hairs and a posterior pair of bristles. Abdominal tergites brown with T6 being longest and with longer hairs at its rear margin than on the rest of the tergites. Venter



Figures 2–3. *Megaselia kozlovi* sp. n. male, hypopygium. **2** right face **3** left face. Scale line: 0.1 mm.

grey, and with fine hairs on segments 3–6. Hypopygium brown, with a light brown anal tube, and as Figs 2–3. Legs with yellowish brown hind femora and otherwise dusky yellow (apart from the largely brown mid coxae). Fore tarsus with segments 1–3 somewhat stout and with at least one row of hairs below each reduced to short pale spinules. A posterodorsal hair palisade on segments 1–4 and 5 about as long or slightly shorter than 4. Dorsal hair palisade of mid tibia extends about two thirds its length. Hairs below basal half of hind femur longer than those of anteroventral row of outer half. Hind tibia with 11–12 differentiated posterodorsal hairs and spinules of apical combs simple. Wings 1.3–1.4 mm long. Costal index 0.48–0.50. Costal ratios 3.0–3.6 : 2.0–2.4 : 1. Costal cilia (of section 3) 0.07–0.08 mm long. No hair at base of vein 3. With 2 axillary bristles, the outer being a little longer than costal cilia. Sc not reaching R1. Thick veins and vein 7 yellowish grey, thin veins 4–6 grey. Membrane tinged grey (evident to naked eye when viewed against a white background). Haltere knob yellow.

Female. Head similar to male except palps with 7–8 bristles, the longer ones being a little shorter than those of male, and with 3–7 hairs. Thorax as male. Abdominal tergites brown. T3-T7 as Fig. 4. Venter grey, and with hairs below segments 3–6. Sternite 7 an isosceles triangle tapering to an anterior point and with 4 longer hairs at its straight hind margin and at least as many smaller hairs further forward. The single lobe at rear of sternum 8 as Fig. 6. Cerci and epiproct as Fig. 5. With 4 rectal papillae. Furca not evident. Dufour's crop mechanism as Fig. 7. Legs similar to male except the front tarsus has segment 1–3 as slender as the rest, segment 5 is a little longer than 4 and 5 may or may not have a posterodorsal hair palisade. Wing as male except 1.4–1.6 mm long. Costal index 0.47–0.49. Costal ratios 2.8–3.9 : 1.5–2.5 : 1. Costal cilia 0.08–0.09 mm long. Otherwise it and haltere as male. Two females were gravid, one with 5 eggs and the other with 6. These eggs measured 0.3–0.4 mm long and 0.16–0.17 mm wide.

Type material. Holotype ♂, RUSSIA, Kola Peninsula, near Monchegorsk, at dead mouse, 18–25.vii 2009, M. Kozlov (UCMZ, 17-40). Paratypes, 2F the same except (17-48 & 72), 1 F, 25.vii–1.viii.2009 (UCMZ, 17-44), 1 male, in yellow trap, 6-16.vii.2010 (UCMZ, 17-83).

Figure 4. *Megaselia kozlovi* sp. n. female, abdominal tergites 3–7.

Figure 5. *Megaselia kozlovi* sp. n. female, tip of abdomen from above.

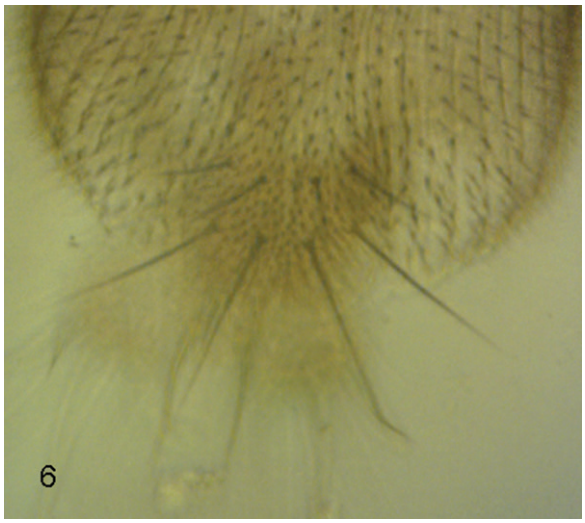


Figure 6. *Megaselia kozlovi* sp. n. female, lobe at rear of abdominal sternite 8.

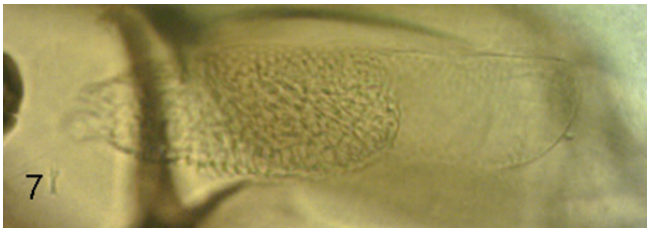


Figure 7. *Megaselia kozlovi* sp. n. female, Dufour's crop mechanism (anterior end to left).

Megaselia limburgensis (Schmitz): YT – 1 male.

Megaselia nudiventris (Wood): YT – 1 male. This species has recently been rescued from synonymy (Disney 2011a).

Megaselia parnassia Disney: BT – 1 male, 10 females. YT – 2 males. A gravid female had 4 eggs (HF = 0.8-0.9 mm long). Some females had amorphous detrital material in the gut, which in two cases included several fungus spores. This is mainly a boreo-alpine species of northern Europe and Canada.

Megaselia petraea Schmitz: BT – 2 males, 12 females. One female was gravid.

Megaselia sordida (Zeterstedt): BT – 744 females, which is 56.3% of the phorids obtained in the traps baited with dead mice. This was the commonest species in the traps. YT – 12 males, 74 females. Thus the males were 3.4% of the phorids obtained in yellow traps and the females were 20.8%. Only a few had amorphous detrital material in the gut. Only a few were gravid. Of these one had 19 eggs, which measured 0.67 mm long and 0.25 mm wide (HF = 1.02 mm long). One had 32 half developed eggs (HF = 0.99 mm long).

The following species are only known in the female sex and are given code numbers only until they can be linked to their males. The sequence of numbers is incomplete as some females were subsequently linked to their males.

Megaselia species 3: BT – 25 females. YT – 3 females. None were gravid but more than 40 immature eggs were recorded. There was no evidence of feeding on carrion fluids.
Megaselia species 4: YT – 1 female.
Megaselia species 5: BT – 30 females. These were 2.2% of phorids caught at dead mice. YT – 94 females, which was 27.3% of the phorids in the yellow traps. None were gravid and one had amorphous detrital material in the gut.
Megaselia species 6: BT – 6 females. One with 2 relatively large eggs, that were 0.74 mm long and 0.28 mm wide (HF = 0.91 mm long). There was no evidence of feeding on carrion fluids.
Megaselia species 7: BT – 2 females. None was gravid and there was no evidence of feeding on carrion fluids.
Megaselia species 8: BT – 11 females. YT – 8 females. None were gravid and there was no evidence of feeding on carrion fluids.
Megaselia species 10: BT – 7 females. YT – 1 female. None were gravid but one had fungus spores in the crop.
Megaselia species 11: BT – 1 female. With amorphous detrital material in the gut.
Megaselia species 12: BT – 1 female. With amorphous detrital material in the gut.
Megaselia species 13: BT – 1 female.
Megaselia species 16: BT – 29 females. YT – 7 females. Most had amorphous detrital material in the gut and in one case this included short, thick walled, fungus bodies. One had 2 mature eggs remaining, the rest of the batch evidently having been deposited.
Megaselia species 17: BT – 2 females.
Megaselia species 18: BT – 5 females. Three with amorphous detrital material in the gut, one of which included a few spindle-shaped fungus spores.
Megaselia species 19: BT – 20 females. Three with amorphous detrital material plus fungus spores in the gut, the spores being round in one case and spindle shaped in two. A few pollen grains were present in guts of two specimens. One with 24 half developed eggs.
Megaselia species 20: BT – 3 females.
Megaselia species 21: BT – 2 females.
Megaselia species 24: BT – 1 female, with dark amorphous material in the gut.
Megaselia species 25: BT – 1 female.
Megaselia species 26: BT – 1 female.
Megaselia species 27: BT – 1 female. With amorphous detrital material in the gut.
Megaselia species 28: BT - 1 female.
Megaselia species 29: BT – 1 female. With amorphous detrital material in the gut.
Megaselia species 30: BT – 1 female. With pollen grains in gut.
Megaselia species 31: BT – 2 females. One was gravid, with 8 eggs which measured 0.51 long and 0. 25-0.26 mm wide (HF = 0.90 mm long). The other with amorphous detrital material in the gut.

Megaselia species 33: BT – 2 females. One had a single egg remaining. It measured 0.32 mm long and 0.12 mm wide (HF = 0.49 mm long).

Megaselia species 34: BT – 3 females. One had two eggs remaining, they measured 0.51-0.54 mm long and 0.21-0.23 mm wide (HF = 0.73 mm long). Another had granular material in the gut.

Megaselia species 36: BT – 1 female. With a little amorphous detrital material in the gut.

Megaselia species 37: BT – 1 female. YT – 10 females.

Megaselia species 38: BT – 1 female.

Megaselia species 39: BT – 1 female.

Megaselia species 40: BT – 1 female. The gut had fine amorphous debris. Fungus mycelium was present in the abdomen.

Megaselia species 42: BT – 2 females. Both had fungus spores in the gut. One was gravid. The eggs are 0.99-1.00 mm long and 0.32 mm wide and have a plastron running the length of the dorsal face. There were 14 eggs (HF = 1.21 mm long).

Megaselia species 46: BT – 1 female.

Megaselia species 47: BT – 1 female. There was a single relatively large egg measuring 0.66 mm long and 0.29 mm wide; this egg being longer than the length of the hind femur (at 0.47 mm).

Microselia forsiusi (Schmitz): BT – 1 female. This species was previously only known from Finland.

Concerning the genus *Phora*

The recognition of the species in this genus is based on the males, with particular attention to the hypopygium. In his keys to the Palaearctic species, Schmitz (1953, 1955) divided the species into three groups. Section I species have 2 or 3 anterior bristles on the basal half of the hind tibia. Those of Section II have only 1 such bristle on the hind tibia, and 2 anterior bristles on the basal half of the mid tibia. The species of Section III have only 1 of each of such bristles on the mid and hind tibiae. However, *P. dubia* in Section I (under a synonym, *loc. cit.,* 1955: 342) has 1 or 2 bristles on its hind tibia, and in some specimens there is 1 on one leg and 2 on the other. Likewise *P. stictica* in Section II occasionally has 2 bristles on the hind tibia and only 1 bristle on the mid tibia; and *P. artifrons* in the same section likewise sometimes has only 1 bristle on the mid tibia. Such variation has to be taken into account when trying to match up females with their males. In addition there is evidently some sexual dimorphism in these bristle number differences. For example for some *P. atra* (Meigen) males I have obtained mating there were 4 or 5 dorsal bristles on the mid tibia, but only 2 or 3 on those of their female partners. Furthermore, some males of this species occasionally have 2 anterior bristles on at least one mid tibia; which means they would be in Schmitz's Section II instead of Section III. One specimen attributed to *P. holosericea* has no anterior bristles on the mid tibiae. Other variation occurs with respect to colour, such as the costa, the thin veins and the wing membrane (including the extent of the regions devoid of microtrichia), and the front tibia and tarsus. As none of the females were gravid, apart

from one with immature eggs, some of the paler specimens were probably only recently emerged from their pupae and were not fully darkened. The result of these variations is that females are still poorly known in this genus. However, Cook and Mostovski (2002) have shown the use of 16S mitochondrial sequences in linking unknown females to their correct males, and then correlating these molecular signatures with small morphological differences. In the collections from the Kola Peninsula only five species represented by males were obtained. I have therefore identified the females on the assumption that only these five species needed to be considered. A tentative key to the species of females from the Kola Peninsula is given below.

Phora artifrons Schmitz: YT – 1 male.
Phora dubia (Zetterstedt): BT – 2 females. YT – 1 male, 2 females.
Phora holosericea Schmitz: BT – 41 females, which was 3.1% of the phorids caught at dead mice. YT – 4 males, 83 females. Thus the females were 23.4% of the phorids caught in the yellow traps. Larvae prey upon the root feeding Aphididae and Pemphigidae (Yarkulov, 1972).
Phora pubipes Schmitz: BT – 5 females. YT – 3 males, 1 female. One female had 20 immature eggs (HF = 1.9-2.0 mm long).
Phora stictica Meigen: YT – 2 males, 11 females. These represented 3.7% of the phorids caught in the yellow traps.
Triphleba palposa (Zetterstedt): Bt – 1 female.

The female of this species was only briefly described by Schmitz (1943) and without any figures. The abdominal sternite 7 was described thus "anscheinend gross, an den Seiten weit hinaufreichend". Figs 8–9 illustrate this.

Triphleba renidens Schmitz: YT – 1 female.

Key to *Megaselia* females of species recorded in the Kola Peninsula

This key provides a preliminary sorting only. Identification requires checking out the details given under the brief description of each species.

Note: Variable species are keyed both ways at several couplets

1 Mesopleuron with hairs and sometimes with differentiated bristles near rear margin **2**
– Mesopleuron bare **32**
2 With three bristles on the notopleuron **3**
– With two bristles on the notopleuron. (Vein Sc runs into vein 1 and fuses with it. Abdominal tergite 3 with concave hind margin and shorter than both T2 and T4. (Hind femora yellow. Haltere knobs yellow. Scutellum with an anterior pair of hairs and a posterior pair of bristles. Mesopleuron with hairs only) ..... **Species, 30**

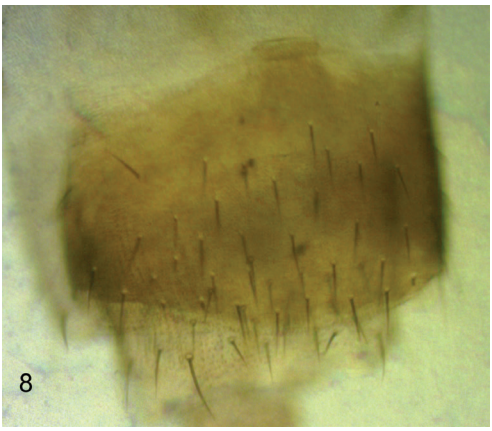


Figure 8. *Triphleba palposa* female, abdominal sternite 7.

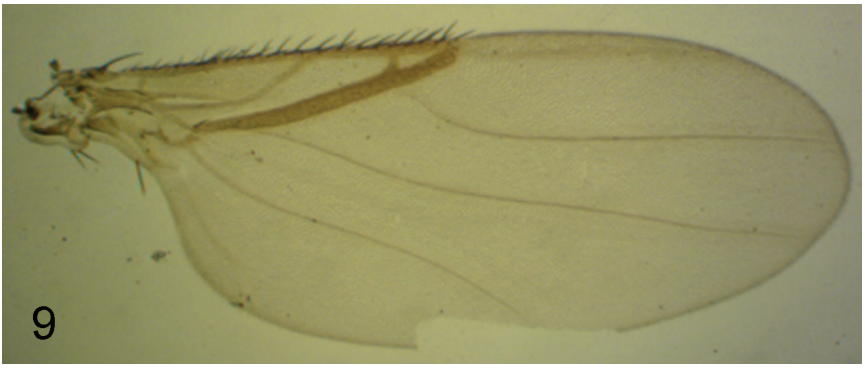


Figure 9. *Triphleba palposa* female, right wing.

Figure 10. *Megaselia breviterga* female, abdominal tergites 2–6.

3 Vein Sc runs into vein 1 (R1) and fuses with it **4**
– Vein Sc ends before reaching vein 1 ..... **5**
4 Scutellum with two pairs of robust bristles, but the anterior pair are shorter than those behind. Palps dusky yellow or brown **5**
– Scutellum with an anterior pair of hairs and a posterior pair of bristles. Palps clear yellow ..... **Species, 24**
5 Haltere knob brown or greyish brown **6**
– Haltere knob yellow **20**
6 Mesopleuron in addition to hairs with one or more short bristles near hind margin **7**
– Mesopleuron with hairs only **8**
7 Scutellum with two pairs of robust bristles, but the anterior pair are shorter than those behind. Palps yellow ..... ***basseti*** **Disney**
– Scutellum with an anterior pair of hairs and a posterior pair of bristles Palps brown **8**
8 Palps yellowish brown to brown **9**
– Palps yellow **10**
9 Ventral edge of hind femur slightly concave just beyond base. Wings distinctly grey when viewed against a white background ..... ***eccoptomera*** **Schmitz**
– Ventral edge of hind femur straight. Wing only faintly grey when viewed against a white background **10**
10 Hind femora yellow **11**
– Hind femora light brown or darker **12**
11 Scutellum with two pairs of robust bristles, but the anterior pair are shorter than those behind. Cerci about 3× as long as broad **20**
– Scutellum with an anterior pair of hairs and a posterior pair of bristles. Cerci less than twice as long as broad ..... **Species, 21**
12 Base of vein 3 with a hair, which is sometimes minute **13**
– No hair at base of vein 3 ..... **18**
13 Scutellum with an anterior pair of hairs and a posterior pair of bristles **14**
– Scutellum with two pairs of robust bristles, but the anterior pair are shorter than those behind **20**
14 The hairs below basal half of hind femur about as long or shorter than those of anteroventral row in outer half **15**
– Some of these hairs clearly longer than hairs of anteroventral row in outer half ..... **Species, 49**
15 The lower faces of labella with only a few short spinules **16**
– Lower faces of labella with numerous short spinules (at least 40 on each) .... **Species, 36**
16 The costal cilia of section 3 clearly longer than outermost axillary bristle ... **17**
– The costal cilia of section 3 about as long as outermost axillary bristle **20**
17 Costa less than half length of wing **18**
– Costa more than half length of wing **20**

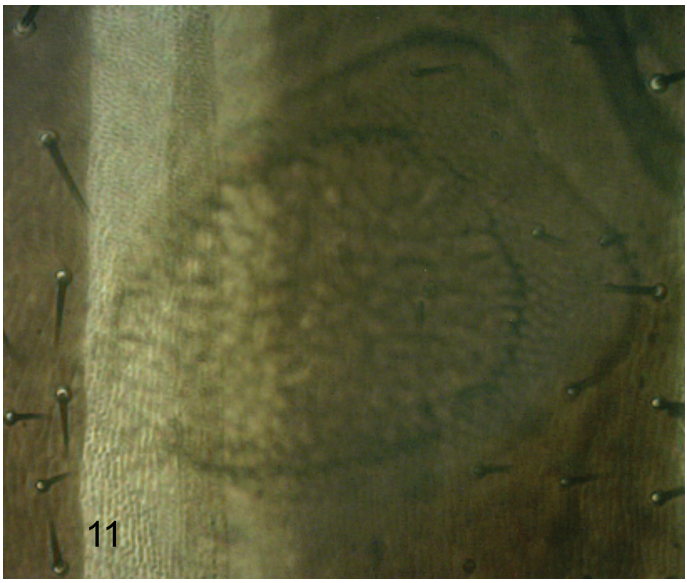


Figure 11. *Megaselia breviterga* female, Dufour's crop mechanism (anterior end to left).

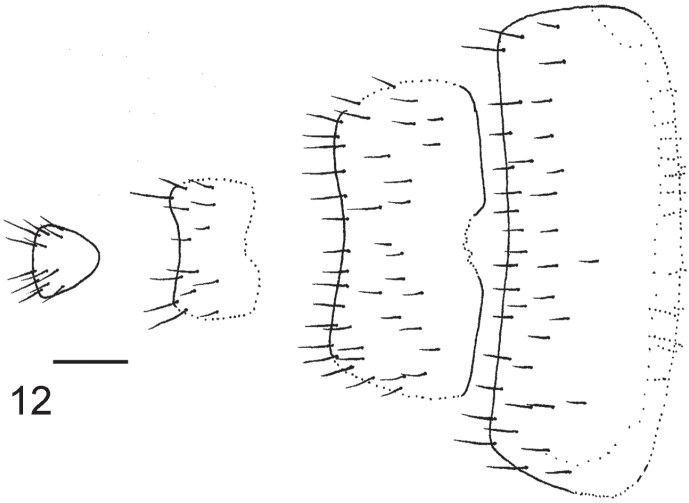


Figure 12. *Megaselia cirriventris* female, abdominal tergites 5–8.

18 Mesopleuron with hairs only gradually increasing in size towards rear margin... **19**

– Mesopleuron with small hairs contrasting strongly with the single bristle at rear margin. (Abdominal tergites 5 to 8 as Fig. 10) ..... ***cirriventris* Schmitz**

19 With more than 3 bristles on axillary ridge of wing. Labrum brown and wider than diameter of postpedicel ..... **Species, 5**

– With only 2 axillary bristles. Labrum pale yellow and not as wide as postpedicel.. ..... **Species, 13**

20 Scutellum with two pairs of robust bristles, but the anterior pair are shorter than those behind **1**

– Scutellum with an anterior pair of hairs and a posterior pair of bristles (or rarely with a single pair of bristles only) **23**

21 Wing more than 2.5 mm long and costa extends at least half the length of wing **22**

– Wing less than 2.5 mm long and costa less than half length of wing **24**

22 Hind femora yellow with brown tips and hairs below basal halves clearly longer than those of anteroventral rows in outer halves ..... **Species, 39**

– Hind femora pale chestnut brown and the hairs below basal halves clearly shorter than those of anteroventral rows in outer halves ..... **Species, 16**

23 Hind femora yellow or yellow with brown tips, or shading to brown in outer half **24**

– Hind femora uniformly brown **26**

Note. Variable species are keyed both ways.

24 Hind femora with at least their tips brown. Axillary ridge with at least four bristles. Vein 3 with a hair at base, but it may be very small (and occasionally absent) **25**

– Hind femora entirely yellow. Axillary ridge of wing with fewer than four bristles. No hair at base of vein 3. (Postpedicels yellowish grey. Labella large, pale and with numerous microtrichia and small spinules below) ..... **Species, 34**

25 With at most 6 axillary bristles. Hairs below basal halves of hind femora shorter that those in anteroventral rows of outer halves **26**

– With more than 6 axillary bristles. Hairs below basal halves of hind femora about as long as those in anteroventral rows of outer halves ..... **Species, 26**

26 Lower faces and apical lateral regions of labella with relatively few short spinules (less than 20 below each) **27**

– Lower faces and apical lateral regions of labella with numerous short spinules (at least 30 on each) **29**

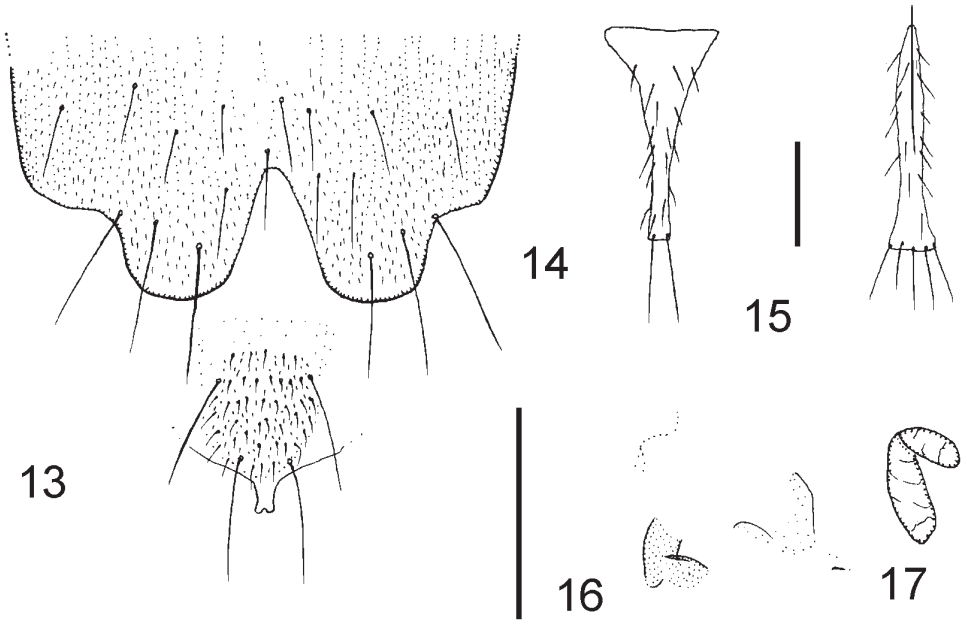
27 Hind femora entirely brown **28**

– Hind femora yellow with brown tips. (Postpedicels with SPS vesicles. Labrum yellow. DCM with narrow posterior region) ..... ***fuscovariana*** **(Schmitz)**

28 Hairs below basal half of hind femur shorter than those of anteroventral row of outer half. Front femora usually almost as dark as mid and hind femora. Labrum typically chestnut brown. Wings lightly tinged grey. DCM narrow, the width being at most a quarter of the length ..... ***sordida*** **(Ztterstedt)**

– Hairs below basal half of hind femur at least as long as those of anteroventral row of outer half. Front femora usually distinctly more yellowish brown than mid and hind femora. Labrum yellow to yellowish brown. Wings darker and more yellowish grey. DCM broader, its width being about half its length ..... ***albiclava*** **Schmitz**

29 All femora dark brown. Lower supra-antennal bristles (SAs) longer and more robust than bristles on palps **30**



Figures 13–17. *Megaselia fallobreviseta* female, details of abdomen. **13** rear of sternum 8 and hypoproct **14** tergite 7 **15** sternite 7 **16** furca **17** tubular organ. Scale lines: 0.1mm.

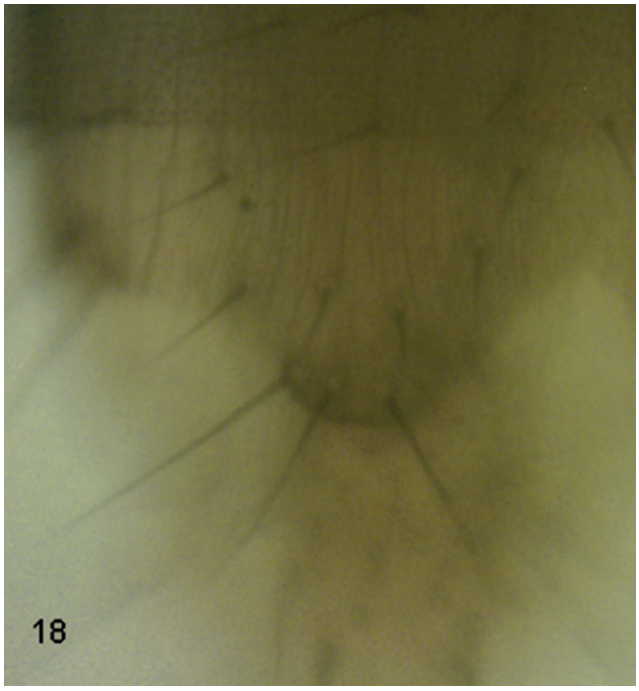


Figure 18. *Megaselia haraldlundi* female, left lobe at rear of abdominal sternum 8.

– Front and middle femora more yellowish brown or paler. Lower SAs shorter and less robust than bristles on palps **31**

30 Palps clear yellow. Abdominal tergite 7 broader than long..... ***coccyx* Schmitz**

– Palps yellowish brown. T7 clearly longer than broad ..... **Species 37**

31 Costal cilia (of section 3) less than 0.12 mm long. Sc almost always reaching vein 1..... ***limburgensis* (Schmitz)**

– Costal cilia more than 0.12 mm long. Sc clearly ending before vein 1 ...**Species, 8**

32 Vein Sc runs into vein 1 (R1) and fuses with it..... **33**

– Vein Sc ends before reaching vein 1 ..... **45**

33 Hind femora brown and haltere knob brown or if a little yellowish the hind femora are clearly brown..... **34**

– Hind femora yellowish brown to yellow with brown tip and haltere knob yellow, but when a little dusky the hind femora are mainly yellow..... **40**

34 Notopleuron with three bristles **35**

– Notopleuron with only two bristles **36**

35 Scutellum with an anterior pair of hairs (subequal to those near rear of scutum) and a posterior pair of robust bristles. Abdominal tergite 2, apart from anterolateral processes, clearly narrower than T1 and with a concave hind margin. T3 with its front margin narrower than its hind margin, T7 a Y shape and clearly narrower than T6 ..... **Species, 11**

– Scutellum with four robust bristles. T2 a little wider than T1 and with a straight hind margin. T3 with front margin slightly wider than hind margin. T7 broader than long and wider than T6. (T6 is longer than broad)..... **Species, 42**

36 Scutellum with four robust bristles **37**

– Scutellum with a posterior pair of robust bristles and an anterior pair of hairs (at most subequal to those near rear of scutum or rarely absent) **38**

37 Abdominal tergite 6 longer than greatest breadth and its rear margin is narrower than the front margin of T7. The outermost axillary bristles are longer than the costal cilia of costal section 3. DCM rounded behind ... **Species, 42**

– T6 clearly broader than long and wider than the narrow T7. The outermost axillary bristles are shorter than the costal cilia of section 3. DCM bilobed behind ..... **Species, 38**

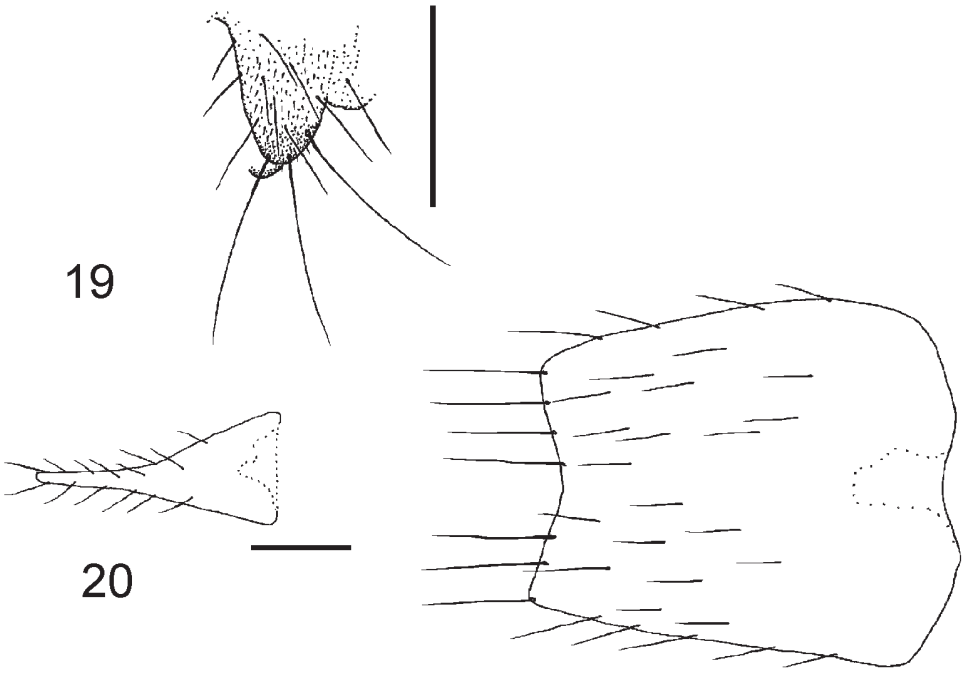
38 Cerci at least 2.5× as long as broad. Lobes at rear of abdominal sternum 8 short and broader than long..... **39**

– Cerci at most twice as long as broad. The lobes at rear of S8 at least 3× as long as broad ..... **Species, 12**

39 Abdominal tergite 7 broad, its greatest width being about half that of rear margin of T6 ..... **Species, 46**

– T7 narrow, being at its widest at most only a third as wide as rear margin of T6 ..... ***petraea* Schmitz**

40 Scutellum with a posterior pair of robust bristles and an anterior pair of hairs (at most subequal to those near rear of scutum or rarely absent) **41**



Figures 19–20. *Megaselia humeralis* female details of abdomen. **19** right lobe at rear of sternum 8 **20** tergites 6 and 7.

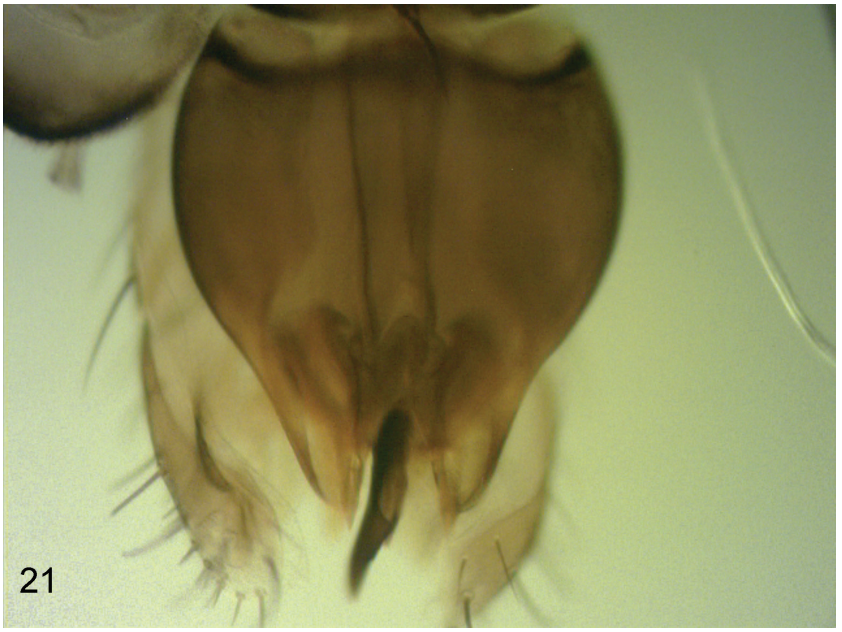


Figure 21. *Megaselia humeralis* female, labrum.

– Scutellum with four robust bristles. (The lobes at rear of S8 taper to a point. Abdominal tergite 4 not as wide as front margin of 3) ..... **Species, 28**

41 Wing more than 1.6 mm long **42**

– Wing less than 1.5 mm long (its membrane pale and likewise veins 4–6) **45**

42 Abdominal tergite 3 with a more-or-less straight hind margin and at least as long as T4 ..... **43**

– T3 with a concave hind margin and typically shorter than T4 (Fig. 10). (Dufour's crop mechanism as Fig. 11) ..... ***breviterga* (Lundbeck)**

43 Cerci with rounded tips. Hypoproct with small denticles as well as the larger microtrichia **44**

– Cerci tapered towards tips. Hypoproct lacks small denticles. (S8 lobes symmetrical so that their rounded tips are directed rearwards) ..... **Species, 7**

44 Hairs below basal half of hind femur clearly longer than adjacent hairs of anterior face. Postpedicels with SPS vesicles. (Lobes of abdominal sternite 8 asymmetrical and with the sides longer than the inner edges, so that the tips are inclined towards the midline) ..... **Species, 19**

– Hairs below basal half of hind femur about as long or only slightly longer than adjacent hairs of anterior face. Postpedicels without SPS vesicles ..... **Species, 4**

45 Scutellum with four robust bristles, but the anterior pair may be a little shorter and less robust than those behind **46**

– Scutellum with a posterior pair of robust bristles and an anterior pair of hairs (at most subequal to those near rear of scutum or rarely absent) **54**

46 Abdominal sternite 7 a narrow bar that is narrowest at the rear end where it bears a single bristle. The lobes at the rear of sternum 8 are rounded with dusky bare rims beyond the bristles..... **Species, 20**

– Without this combination **47**

47 All femora yellow or dusky yellow apart from brown tips to hind femora ... **48**

– All femora essentially brown to dark brown **51**

48 Abdominal tergite 6 longer than broad (Fig. 20). Posterodorsals of hind tibia strongly differentiated **49**

– Not so **50**

49 Labrum massive (Fig. 21). Postpedicels yellow at base, darker apically and without SPS vesicles. Vein 3 with 1–2 hairs at base. Hairs below basal half of hind femur shorter than those of the anteroventral row in the outer half ..... ***humeralis* (Zetterstedt)**

– Labrum less massive (e.g. Fig. 22). Postpedicels uniformly brown and with SPS vesicles. Vein 3 with minute hair (shorter than width of vein) or without hair. Hairs below hind femur longer than those of a-v row of outer half ... **51**

50 With more than 30 hairs on segments 3 to 5 of abdominal venter as well as many on 6, which has longer hairs at rear margin. Furca not evident. Lobes at rear of sternum 8 as Fig. 18. (Costal index exceeds 0.46. Costal cilia of section 3 at least 0.10 mm long) ..... ***haraldlundi* Disney**

Figure 22. *Megaselia parnassia* female, labrum.

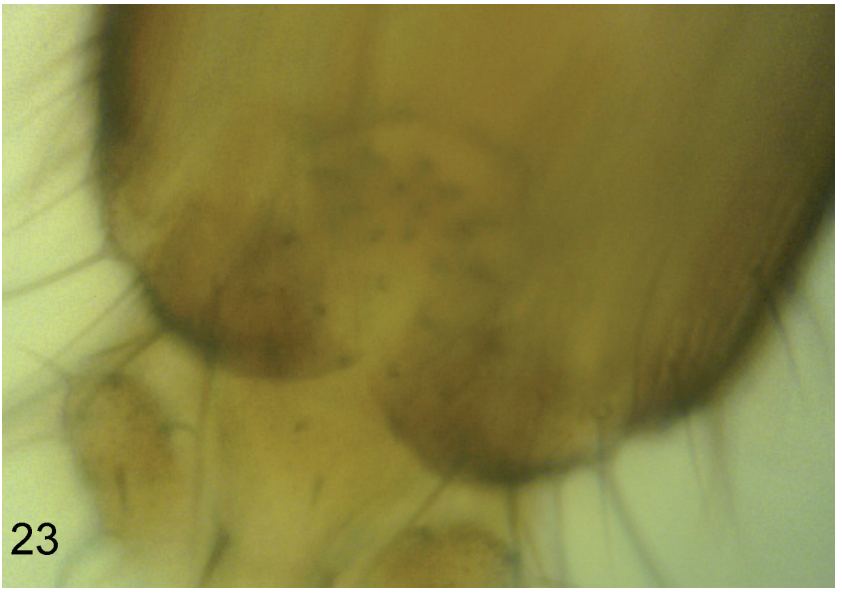


Figure 23. *Megaselia parnassia* female, lobes at rear of abdominal sternum 8.

– With less than 15 hairs on segments 3–5 of venter. A strongly sclerotised furca present (Fig. 25). Lobes at rear of abdominal sternum 8 rounded as Fig. 24 ... . **Species, 6**

51 Abdominal tergite 7 as Fig. 14. Sternite 7 as Fig. 15. Lobes at rear of S8 and hypoproct as Fig. 13. Internal tubular organ as Fig. 17. Furca as Fig. 16 .... ***fallobreviseta*** **Disney**

– Without these features combined..... **52**

52 The S8 lobes, with their bare rounded extremities beyond the most posterior bristles, are pale..... **53**

– The S8 lobes are conspicuously brown (Fig. 23). (Labrum as Fig. 22)..... ..... ***parnassia*** **Disney**

53 Abdominal tergite 6 clearly broader than long. Arista pale (as palp). Furca absent ..... **Species, 25**

– The greatest breadth and length of T6 subequal. Arista brown. A long, heavily sclerotised, furca present ..... **Species, 29**

54 Notopleuron with three bristles (or rarely four) **55**

– Notopleuron with only two bristles **60**

55 Cerci short (at most 1.6 times as long as greatest breadth, e.g. Figs 5 and 28) . **56**

– Cerci longer (at least twice as long as wide)..... **57**

56 Hairs below basal half of hind femur longer than those of the anteroventral row in outer half. A single lobe with many hairs at rear of abdominal sternum 8 (Fig. 6)..... ***kozlovi*** **sp. n.**

– Hairs below basal half of hind femur shorter than those of the anteroventral row in outer half. A pair of lobes at rear of S8..... **Species, 18**
Note. This is one possibility for the undescribed female of *M. crellini* Disney, but it is more likely the poorly diagnosed female of *M. nudiventris* (Wood)

57 Hind femora brown, even if a little paler in basal halves. Postpedicels and labrum brown..... **58**

– Hind femora yellow with brown tips. Postpedicels yellowish brown. Labrum straw yellow..... **Species, 3**
Note. This is another possibility for the undescribed female of *M. crellini* Disney

58 Knob of haltere yellow..... **59**

– Knob of haltere dark brown. (T6 longer than greatest breadth) ....**Species, 31**

59 Abdominal venter dark grey. Tergite 6 longer than T5. Cerci light brown.... ..... **Species, 40**

– Abdominal venter light grey. T6 at most as long as T5. Cerci whitish yellow . ..... **Species, 27**
Note. If neither applies and hairs below basal half of hind femur are shorter than those of the anteroventral hairs of outer half try couplet 50, lead 2.

60 Haltere knob yellow. Postpedicels lack SPS vesicles. Hind femur yellow with brown tip and hairs below basal half of hind femur are longer than those of the anteroventral hairs of outer half. With a strongly sclerotised furca

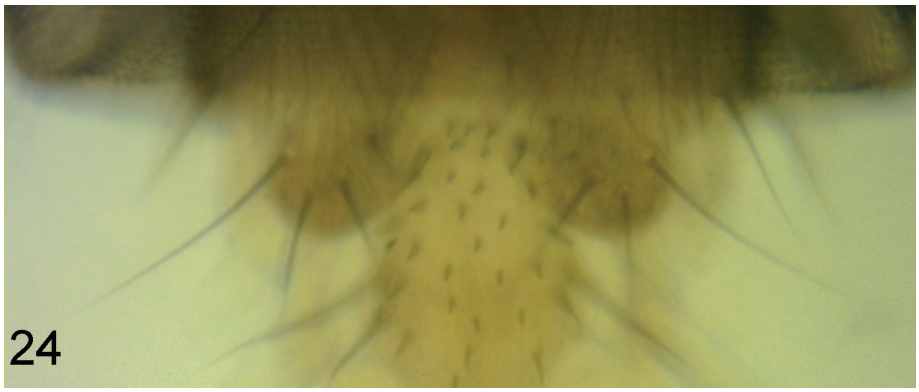


Figure 24. *Megaselia* Species 6, female, lobes at rear of abdominal sternum 8.

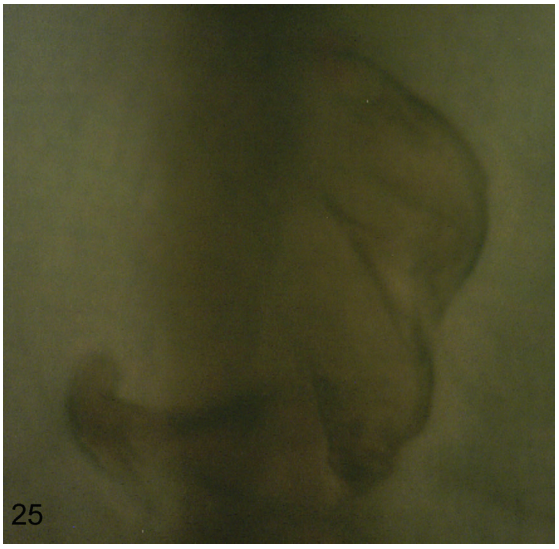


Figure 25. *Megaselia* Species 6, female, furca.

(Fig. 26). (Lobes at rear of sternum 8 as Fig. 27. Costal index less than 0.45 and costal cilia less than 0.10 mm long)..... **Species, 17**

– Without this combination **61**

Note. If it agrees except it lacks such a furca return to couplet 50, as *M. haraldlundi* sometimes has its anterior scutellars only 0.6 times as long as the posterior pair.

61 Haltere knob brown. Postpedicels lack SPS vesicles **62**

– Haltere knob yellow. Postpedicels with SPS vesicles..... **63**

62 Palps and labrum brown and cerci pale brown. (T6 with maximum width greater than length. Venter light grey. Front femora yellowish brown)..... **Species, 10**

– Palps, labrum and cerci pale yellow (Upper supra-antennal bristles further apart than pre-ocellar bristles)..... **Species, 33**

63 Cercus less than 3 times as long as broad. Apical bristles of palp longer than glossa **64**

– Cercus more than 4 times as long as broad. Apical bristles of palp shorter than glossa ..... ***immodensior*** **Disney**
Note. The unknown female of *M. elenae* sp. n. will run to this lead.

64 At least mid and hind femora brown. Wing length more than 1.8 mm. Costal cilia more than 0.13 mm long. Lobes at rear of abdominal sternum 8 with 3 bristles ..... **Species, 2**

– All femora yellow. Wing length less than 1.5 mm and costal cilia less than 0.12 mm long. Lobes at rear of S8 with only 2 bristles..... **Species, 47**

Key to the males of European species of *Megaselia* with a notopleural cleft

Fig. 29 depicts the notopleural cleft of *M. giraudii.* Reference to most figures are in D (Disney 1989) or in B (Buck and Disney 2001) unless indicated otherwise.

1 Thorax brown **2**

– Thorax yellow. (Hypopygium as B figs 15 and 16. Hind femur yellow with brown tip) ..... ***hexanophila*** **Buck**

2 Halteres entirely brown..... **3**

– Haltere knob pale yellow **5**

3 Palps brown and labella with only a few small spinules below..... **4**

– Palps yellow and labella with numerous, densely crowded, small spinules below. (Hypopygium as D fig. 380) ..... ***hendersoni*** **Disney**

4 Hypopygium as D fig. 494. Costa clearly less than half wing length. Postpedicels lack SPS vesicles..... ***subnudipennis*** **(Schmitz)**

– Hypopygium as Fig. 30. Costa about half wing length. Postpedicels with SPS vesicles..... ***prodroma*** **(Lundbeck)**

5 Hind femora brown..... **6**

– Hind femora yellow with brown tips. (Hypopygium as Fig. D fig. 393. Palps with short bristles and as B fig. 1) ..... ***malhamensis*** **Disney**
Note: *M. intermedia* (Santos Abréu), only known from the Canary Islands, will run down here. Its hypopygium (Fig. 37 in Disneyet al. 2010) will immediately distinguish it from *M. malhamensis.*

6 Postpedicels with SPS vesicles..... **7**

– Postpedicels without SPS vesicles. (Hypopygium as D fig. 437. Upper supra-antennal bristles clearly wider apart than pre-ocellars (D fig. 432. Palps brown) Front coxae partly yellow) ..... ***minuta*** **(Aldrich)**

7 Labella densely spinose below (each with more than 80 small spinules). Postpedicels with at most a dozen SPS vesicles **8**

– Labella with many fewer spinules (less than 50 on each). Postpedicels more than a dozen SPS vesicles..... **9**

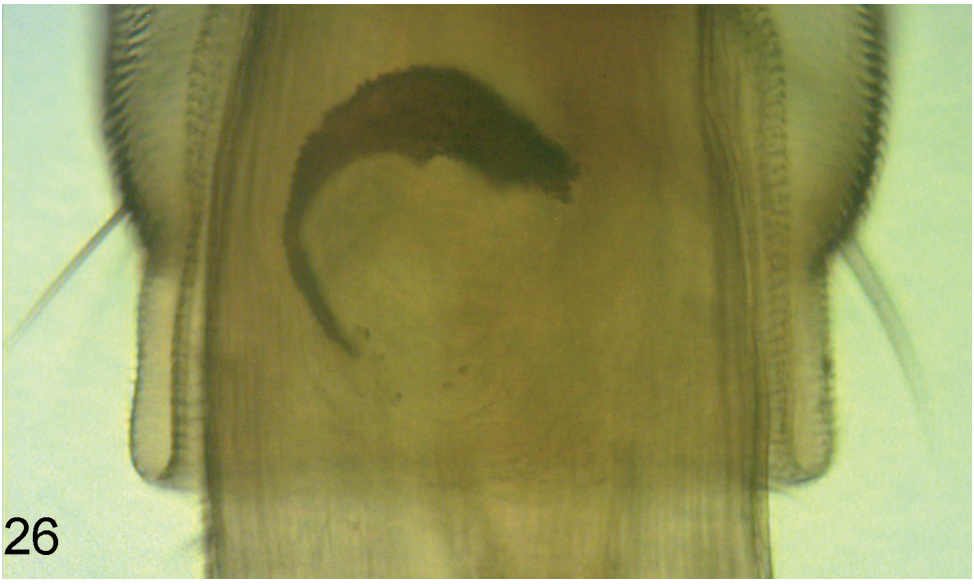


Figure 26. *Megaselia* Species 17, female, furca.

Figure 27. *Megaselia* Species 17, female, left lobe at rear of abdominal sternum 8.

8 Notopleural cleft ends behind where it encounters a curved dorsoventral ridge (as Fig. 29). Hypopygium as D fig. 397, each circus having more than 10 hairs..... ***albicans* (Wood)**

– Notopleural cleft does not end behind by encountering such a ridge. Hypopygium as B fig. 19, each cercus having fewer than 10 hairs .... ***offuscata* (Schmitz)**
Note. The unknown male of *M. septentrionalis* may key out here, if it has a notopleural cleft.

9 Cerci at least twice as long as broad (B fig. 17 and D fig. 400). Wing with at least 3 axillary bristles and costal cilia (of section 3) more than 0.1 mm long..... **10**

– Cerci clearly less than twice as long as broad (D fig. 446). With only 2 axillary bristles and costal cilia less than 0.1 mm long ..... ***brevicostalis* (Wood)**

10 Left lobe of hypandrium with numerous microtrichia (D figs 400 and B 17) **11**

– Left lobe of hypandrium lacks microtrichia..... ***elenae* sp. n.**

11 Hypopygium as D fig. 400, the left hypandrial lobe being tinged brown and the microtrichia below proctiger tend to be recurved forwards.... ***parnassia* Disney**

– Hypopygium as B fig. 17, the left hypandrial lobe being pale and the microtrichia below proctiger being semi-erect and pointing rearwards..... ***giraudii* (Egger)**

Tentative key to *Phora* females of species recorded in the Kola Peninsula

1 Basal half of mid tibia with two anterior bristles. Wing length more than 2.4 mm..... **2**

– Basal half of mid tibia with only one anterior bristle (very rarely with none). Wing length less than 2.4 mm..... **4**

2 Hind tibia with a single anterodorsal bristle in basal half..... **3**

– At least one hind tibia with two anterodoral bristles in basal half..... ..... ***dubia* (Zetterstedt)**

3 Costal cilia at level of tip of vein 1 at most two thirds the length of axillary bristles. Segments 2–5 of front tarsus relatively stout ..... ***stictica* Meigen**

– Costal cilia at level of tip of vein 1 at least four fifths the length of axillary bristles. Segments 2–5 of front tarsus not so stout..... ***artifrons* Schmitz**

4 The separation of the females of *P. pubipes* Schmitz and *P. holosericea* Schmitz has been based on minute differences in the distribution of microtrichia on the hind trochanters and microsculpture on the hind femora. However, there are probably better differences in the proboscis. At present I only have two poor females of *P. holosericea* that were procured mating with males. Until better voucher specimens of both species, and other species of *Phora,* are available for both these species reliable differences cannot be proposed with any confidence. Apart from mating pairs, reared series or specimens for which molecular barccodes have been determined are required.

Figure 28. *Megaselia* Species 18, female, cerci from above.

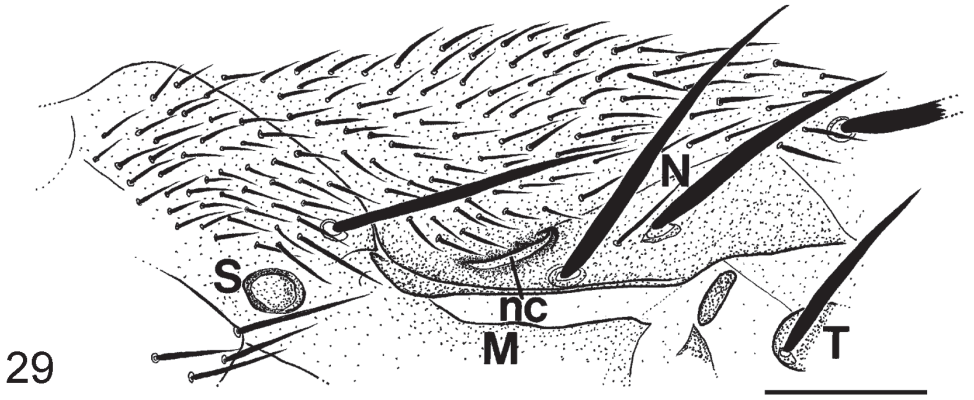
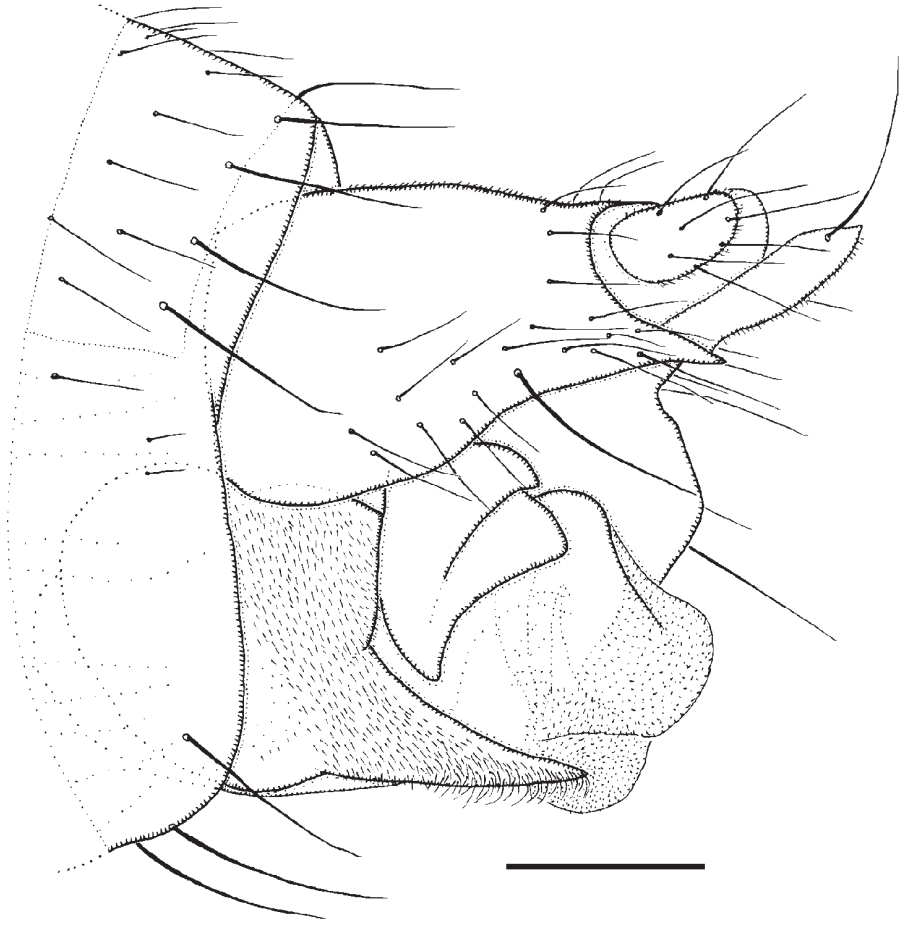


Figure 29. *Megaselia giraudii* male, left notopleuron (nc = notopleural cleft M= mesopleuron, n = notopleural bristles S= anterior spiracle T= tegula at base of wing).



30

Figure 30. *Megaselia prodroma* male, left face of hypopygium. Scale line: 0.1 mm.

Discussion

The number species recorded above is far larger than expected. Only six species are known to occur in Greenland, with only three established north of the Arctic Circle (Disney, in press). For Iceland, which lies immediately south of the Arctic Circle, 11 species have been recorded (Prescher et al. 2005). For the British Isles more than 340 species have been recorded so far, with at least 80 of these being recorded in my suburban garden in Cambridge. In the Antarctic one species being accidentally introduced by man has been reported (Nickolls and Disney 2001) and a second species introduced by man has become established on islands in the South Atlantic Ocean to the north of the Antarctic Circle (Hänel and Disney 2006, Jones et al. 2003). It would seem that the impoverished faunas of these situations is due more to their remoteness than to their high latitudes. By contrast the Kola Peninsula is attached to the mainland of Europe.

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