

# An annotated checklist of the planthoppers of Iran (Hemiptera, Auchenorrhyncha, Fulgoromorpha) with distribution data

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## Abstract

A list of Hemiptera Fulgoromorpha (planthoppers) of Iran is provided, based primarily on literature records from 1902 to the present. In total 15 families and 235 species are recorded, with taxonomic details. Distribution data in Iran are given. *Iranissus ephedrinus* Dlabola, 1980 is transferred from Issidae to Nogodinidae. To resolve nomenclatural difficulty the following new combinations in Issidae are given: *Iranodus dumetorus* (Dlabola, 1981), *Iranodus khatunus* (Dlabola, 1981) and *Iranodus repandus* (Dlabola, 1981). Due to published generic synonymy the following are new combinations: *Duilius seticulosus* (Lethierry, 1874), *D. tamaricis* (Puton & Lethierry, 1887), *D. tamaricicola* (Dubovsky, 1966) and *D. v-atrum* (Dlabola, 1985).

## Keywords

Hemiptera, Auchenorrhyncha, Fulgoromorpha, annotated checklist, Iran

## Introduction

The infraorder Fulgoromorpha, also known as planthoppers, belong to the suborder Auchenorrhyncha of the order Hemiptera. Planthoppers are phytophagous and feed from the sap of a wide range of plants and in many habitats. They may occur in relatively large numbers in some habitats and under certain conditions.

The wide-ranging history of entomology in Iran has been well-documented by chapters in Abivardi (2001). The earliest available records of Fulgoromorpha in Iran were by Melichar (1902a, b) who described some species from Iran. Afshar (1937) was the first Iranian entomologist who recorded *Ommatissus binotatus lybicus* (Tropiduchidae) in the list of agricultural pests for the country. Subsequent taxonomic studies in the Persian literature mainly focused on the insect pests in both agricultural and forest ecosystems (Gharib 1966, 1998; Kheyri 1989; Ahmadi et al. 1986; Karimzadeh Esfahani et al. 1998 etc). Field expeditions were made to various parts of Iran during the 1970s by Czech entomologists, including Jiri Dlabola, along with entomologists from the Iranian Research Institute of Plant Protection. This resulted in a number of new discoveries of Iranian planthoppers, which were compiled in publications such as Dlabola (1974a, b, 1977a, b, 1980a, 1981, 1982a, b, 1983a, b, 1985 etc). Dlabola is responsible for the description of almost 50% of the currently known planthopper fauna of Iran.

Fifteen planthopper (Fulgoromorpha) families have been recorded from Iran to date. Table 1 gives details of the numbers of species in each family and the number (and percentage) known only from Iran at present. Large numbers of species have been recorded in the Cixiidae, the Delphacidae, the Flatidae and the Issidae. The fauna is characterized by high endemism in groups such as Issidae, which are flightless and have relatively limited dispersal and a narrow distribution. However, the planthopper fauna may also well be under-recorded, for instance around 100 species of Delphacidae are known from Greece (e.g. Drosopoulos et al. 1983) but only 34 so far recorded in Iran. Dlabola (1981) refers to the biotic zones in which species are found.

In the current study a list of Fulgoromorpha species recorded from Iran has been compiled, which is based on literature records and the addition of some new taxonomic data. Much basic taxonomic work is needed in the region and it is hoped that this checklist will facilitate further studies on Fulgoromorpha of Iran. To resolve nomenclatural difficulty the following new combinations in Issidae are given: *Iranodus dumetorus* (Dlabola, 1981), *Iranodus khatunus* (Dlabola, 1981) and *Iranodus repandus* (Dlabola, 1981). Due to published generic synonymy the following are new combinations: *Duilius seticulosus* (Lethierry, 1874), *D. tamaricis* (Puton & Lethierry, 1887), *D. tamaricicola* (Dubovsky, 1966) *D. v-atrum* (Dlabola, 1985).

## Economic importance of planthoppers in Iran

Planthoppers are of high economic importance mainly because they reduce crop yield through feeding and oviposition and they can transfer phytoplasmas and viruses to a wide range of plants. The planthoppers of economic importance in the United States have been reviewed by Wilson and O'Brien (1987) who recorded 150 species of planthoppers from 99 economic plants. At least 8 species in that list have been also recorded from Iran, on agricultural products such as date palm, potato, tomato, wheat, corn, rice (Gharib 1966, 1998; Haghshenas and Khajehali 2000; Khajehali et al. 2001;

**Table 1.** Numbers of species in each Fulgoromorpha family

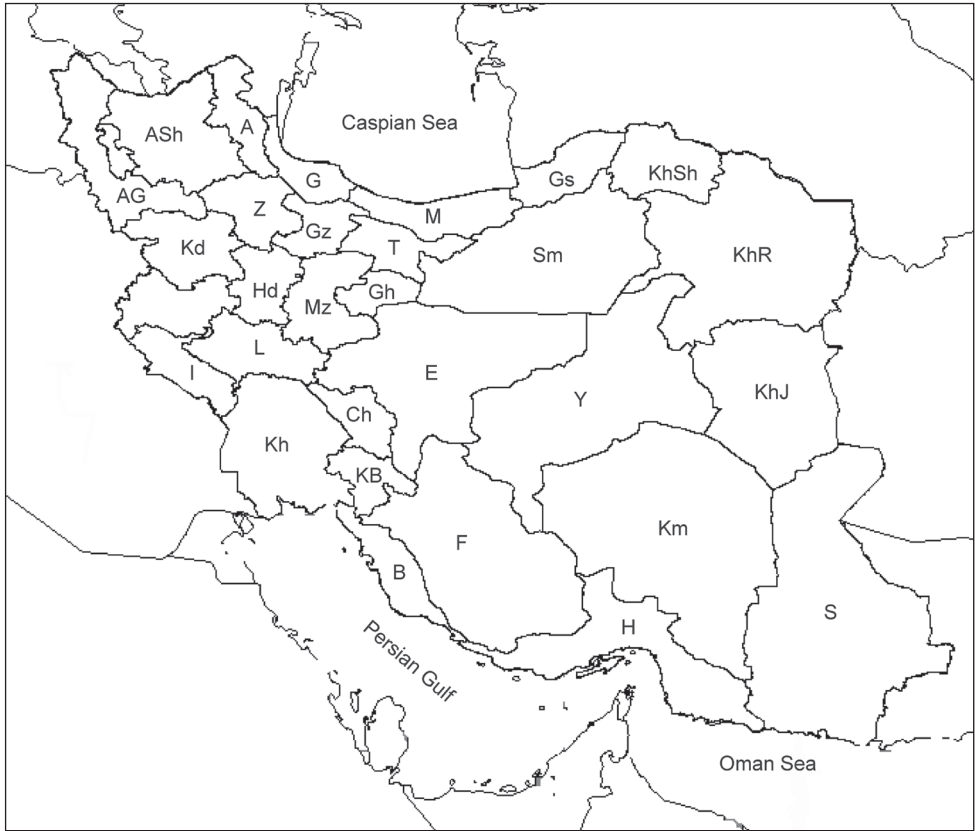
Families	No. of species	No. species/ % endemic
Caliscelidae	14	7 (50)
Cixiidae	51	19 (36)
Delphacidae	34	4 (11)
Derbidae	4	3 (75)
Dictyopharidae	19	10 (52)
Flatidae	30	19 (63)
Fulgoridae	3	0 (0)
Issidae	45	38 (84)
Kinnaridae	4	3 (75)
Lophopidae	1	0
Meenoplidae	3	1 (33)
Nogodinidae	5	5 (100)
Ricaniidae	3	1 (33)
Tettigometridae	14	1 (25)
Tropiduchidae	5	3 (60)
Totals	235	114 (48%)

Nematollahi and Khajehali 2000). A further nine species have also been recorded in Iran by Abaii (2000) as pests of forest trees.

### Annotated species checklist

The following list is intended as an annotated checklist and not a catalogue. Emphasis is given to citations where Iran is recorded. Synonyms added after the current scientific name contain the original name, next the current name followed by its authority and next those synonyms which have been used for records from Iran. Selected taxonomic papers are cited where needed for clarity. Taxa are given in alphabetical order. Where species have only been found in Iran no further details of a wider distribution are given. Species listed in references, where no further information is given beyond the name, are cited as 'listed'. Locality records are listed for each species. Furthermore a list of locality names including latitude, longitude, codes for the localities and a distribution map are also provided. The codes consist of two parts: an alphabetical one for the name of provinces and a numerical one for the locality (Figs 1, 2).

The extralimital distribution in the Palaearctic region was determined using various publications, including: Asche (1982), Asche and Wilson (1989), Demir and Demirsoy (2009), Demir (2007), Demir (2008), Dlabola (1965b, c, 1972, 1974b, 1977c, 1979d, 1980b, c, 1994), Dlabola and Jankovic (1981), Gnezdilov (2002), Gnezdilov and Wilson (2006), Holzinger et al. (2003), Holzinger (2007), Nast (1972), Novikov et al. (2006), Vilbaste (1980) and Wilson (2010a, b). The United Nations geoscheme was used for recording extralimital distributions in other regions and subregions of the world.



**Figure 1.** Location of the provinces of Iran (See list of the provinces for codes) **A** Ardabil **AG** Āzarbāiejan-e Gharbi **ASh** Āzarbāiejan-e Sharghi **B** Bushehr **Ch** Chahārmahāl–Bakhtiāri **E** Esfahān **F** Fārs **G** Gilān **Gh** Ghom **Gs** Golestān **Gz** Ghazvin **H** Hormozgān **Hd** Hamadān **I** Ilām **KB** Kohgiluyeh–Boyerahmad **Kd** Kordestān **Kh** Khuzestān **KhJ** Khorāsān-e Jonubi **KhR** Khorāsān-e Razavi **KhSh** Khorāsān-e Shomāli **Km** Kermān **L** Lorestān **M** Māzandarān **Mz** Markazi **S** Sistān–Baluchestān **Sm** Semnān **T** Tehrān **Y** Yazd **Z** Zanjān.

### Family Caliscelidae

The following species were recorded in the family Issidae, subfamily Caliscelinae in early reports from Iran. This subfamily has however, been more recently given full family status (Tishechkin 1998; Emeljanov 1999; Gnezdilov 2003).

#### ***Adenissus baluchestanicus* Dlabola, 1980**

*Adenissus baluchestanicus* Dlabola, 1980b: 184; Gnezdilov and Wilson (2006) [listed].

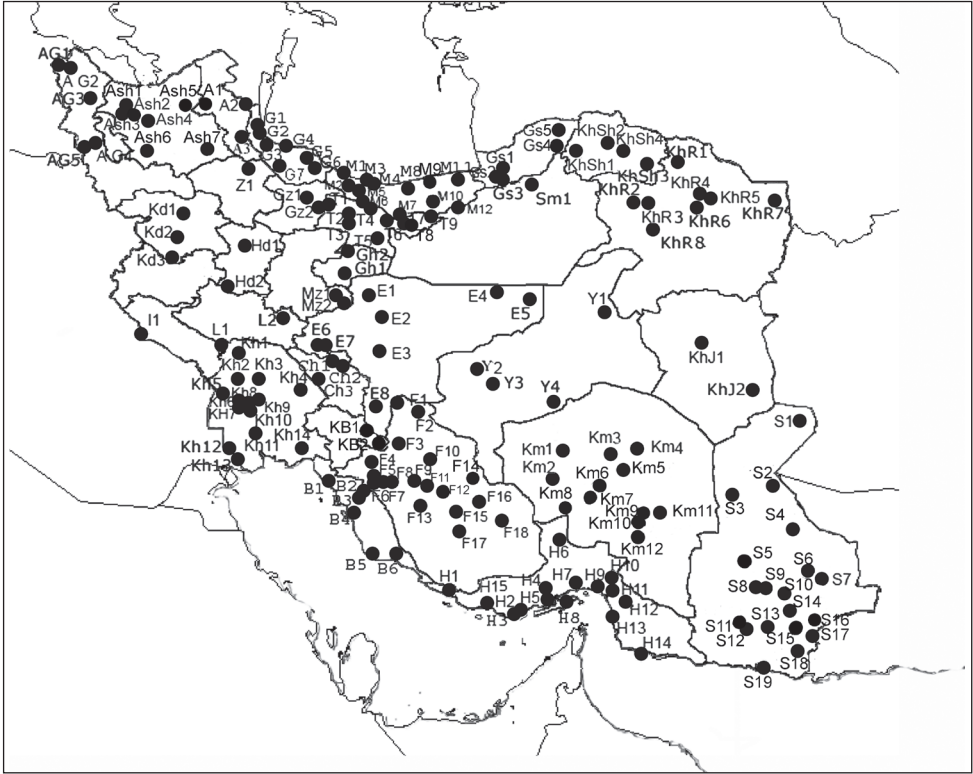
Iran localities: Tang-e Sarheh.

#### ***Adenissus isinus* Dlabola, 1980**

*Adenissus isinus* Dlabola, 1980b: 185; Gnezdilov and Wilson (2006) [listed].

Iran localities: Isin.





**Figure 2.** Locality map of Fulgoromorpha recorded from Iran (See List of localities for codes)

***Adenissus zabolicus* Dlabola, 1980**

*Adenissus zabolicus* Dlabola, 1980b: 181; Gnezdilov and Wilson (2006) [listed].

Iran localities: Nehbandān.

***Adenissus zahedanicus* Dlabola, 1980**

*Adenissus zahedanicus* Dlabola, 1980b: 182; Gnezdilov and Wilson (2006) [listed].

Iran localities: Zāhedān.

***Aphelonema brunneolutea* Dlabola 1994**

*Aphelonema brunneolutea* Dlabola 1994: 57

Iran localities: Ziārān.

***Abomocnemia chivensis* (Kusnezov, 1929)**

*Caliscelis chivensis* Kusnezov, 1929: 330

*Abomocnemia chivensis*; Dlabola (1982a).

Iran localities: Jiroft.

Extralimital distribution: Central Asia.

***Aphelonema registanica* (Dlabola, 1961)**

*Peltonotellus registanicus* Dlabola, 1961a: 262

*Aphelonema registanica*; Dlabola (1981).

Iran localities: Kandovān (Māzandarān), Saādatshahr, Tochāl Mountain.

Extralimital distribution: Central Asia.

***Chirodisca astyages* (Dlabola, 1982)**

*Caliscelis astyages* Dlabola, 1982a: 114; Mirzayans (1995).

*Caliscelis dimidiata* not Costa, 1863; Dlabola (1981) mis-identification.

*Chirodisca astyages*; comb. n. in Emeljanov (1996a).

Iran localities: Ahvāz, Bishāpur, Borāzjān, Dārbahāre, Fasā, Ferdows-e Esfandaghe, Rafsanjān, Shirāz, Sufiān, Zeidān.

Extralimital distribution: Western Asia.

***Ommatidiotus dissimilis* (Fallén, 1806)**

*Issus dissimilis* Fallén, 1806: 123

*Ommatidiotus falléni* Stål 1863: 251; Melichar (1902a); syn. by Dlabola (1987).

*Ommatidiotus (sic) dissimilis* (Fallén, 1806); Dlabola (1981).

Iran localities: Anārak- Temin, Dasht.

Extralimital distribution: Europe, Turkey, Central and Northern Asia.

***Ommatidiotus iranicus* Horváth, 1905**

*Ommatidiotus iranicus* Horváth, 1905: 380; Nast (1972) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Turkey (Demir 2008).

***Perissana bispinata* (Dlabola, 1980)**

*Anissus bispinatus* Dlabola 1980b: 179

*Perissana bispinata*; Gnezdilov and Wilson (2006).

Iran localities: Kāzerun, Kushk, Masiri, Saādatshahr.

Extralimital distribution: Iraq (Gnezdilov and Wilson 2006).

***Perissana dlabolai* Gnezdilov & Wilson, 2006**

*Adenissus circularis* Dlabola, 1980b: 186 (Preoccupied).

*Perissana dlabolai* Gnezdilov & Wilson, 2006: 15 (Replacement name for *A. circularis*).

Iran localities: Bānuchārehar, Bazmān, Dehbakri, Doborji, Estahbān, Fasā, Miānjāngal.

***Perissana jakowleffi* (Puton, 1890)**

*Issus jakowleffi* Puton, 1890; 233 Nast (1972) [listed].

*Perissana jakowleffi*; Gnezdilov and Wilson (2006).

Iran localities: Shāhrud.

Extralimital distribution: Azerbaijan.

***Reinhardema pasagarda* (Dlabola, 1982)***Homocnemis pasagarda* Dlabola, 1982a: 116*Reinhardema pasagarda*; Gnezdilov (2010a).

Iran localities: Shul.

**Family Cixiidae**

List of subfamilies, genera, and subgenera is according to Holzinger et al. (2002).

**Subfamily Cixiinae****Tribe Duilini**

New combinations given are due to generic synonymy given by Holzinger et al. (2002).

***Duilius fasciata* (Horváth, 1894), comb. n.***Hemitropis fasciata* Horváth, 1894: 183*Bitropis fasciata*; Dlabola (1985).

Iran localities: Ghāsemābād, Kermānshāh (Yazd province), Nikshahr.

Extralimital distribution: Transcaucasus, Turkey, Afghanistan, central Asia.

***Duilius seticulosus* (Lethierry, 1874), comb. n.***Haplacha seticulosa* Lethierry, 1874: 444*Hemitropis seticulosus*; Barkhordari et al. (1981) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Saudi Arabia (Dlabola 1979d).

***Duilius tamaricis* (Puton & Lethierry, 1887), n.comb.***Haplacha tamaricis* Puton & Lethierry, 1887: 309*Hemitropis tamaricis*; Dlabola (1981).

Iran localities: Marand, Robāt-e Tork.

Extralimital distribution: Turkey, Central Asia.

***Duilius tamaricicola* (Dubovsky, 1966), comb. n.***Hemitropis tamaricicola* Dubovsky, 1966: 35; Dlabola (1985).

Iran localities: Borāzjān, Dārbahāre, Ghāsemābād, Kahkom Kahurak, Kermānshāh (Yazd province), Shushtar.

Extralimital distribution: Uzbekistan.

***Duilius v-atrum* (Dlabola, 1985), comb. n.***Hemitropis v-atrum* Dlabola, 1985: 124; Mirzayans (1995).

Iran localities: Ahram, Bāghak, Bāhukalāt, Bilāi, Geno, Ghāsemābād, Kahkom, Kahnuj, Komehr, Miānjāngal, Nikshahr, Tis, Zeidān.

## Tribe Cixiini

### ***Cixius (Ceratocixius) adornatus iranicus* Dlabola, 1979**

*Cixius (Ceratocixius) adornatus iranicus* Dlabola, 1979b: 233; Mirzayans (1995).

Iran localities: Hashtpar, Khalkhāl, Nāhārkhōrān, Rezvāndeh, Sheikh-e Mahalleh, Zirāb.

### ***Cixius (Ceratocixius) cunicularius* (Linnaeus, 1767)**

*Cicada cunicularius* Linnaeus, 1767: 711

*Cixius cunicularius*; Mirzayans (1995).

Iran localities: Parehsar.

Extralimital distribution: North Africa, Europe, Central Asia, Northern and Eastern Asia.

### ***Cixius (Ceratocixius) pallipes* Fieber, 1876**

*Cixius (Ceratocixius) pallipes* Fieber, 1876: 191; Dlabola (1981), Mirzayans (1995).

Iran localities: Bandar Anzali, Bidruyeh, Dasht, Ghom, Hafttappeh, Hashtpar, Isin, Karaj, Evin, Lāhijān, Mollāsāni, Parehsar, Rek, Sanandaj.

Extralimital distribution: Southern, Western and Eastern Europe, North parts of Western Asia, Afghanistan.

Comments (M. Asche pers comm.): The occurrence of *pallipes* in Middle East is questionable. The true *pallipes* (described from Italy) is apparently geographically confined to the Central and West Mediterranean. In the East Mediterranean and Middle East there occurs a species described by China (1942) as *Cixius (Ceratocixius) wagneri*. This means that all geographical records of both species need confirmation.

### ***Cixius persicus* Distant, 1907**

*Cixius persicus* Distant, 1907: 284; Nast (1972) [listed], Dlabola (1981) [listed].

*Cixius longipennis* Melichar, 1902a: 86 (primary homonym); Melichar (1902a).

Iran localities: Nehbandān.

### ***Cixius (Ceratocixius) rufus* Logvinenko, 1969**

*Cixius (Ceratocixius) rufus* Logvinenko, 1969: 53; Dlabola (1985).

Iran localities: Asālem, Behshahr, Nāhārkhōrān, Sabzevār.

Extralimital distribution: 'S. Russia' (Nast, 1972).

### ***Cixius (Ceratocixius) simplex* (Herrich-Schäffer, 1835)**

*Flata simplex* Herrich-Schäffer, 1835: 64

*Cixius (Ceratocixius) simplex*; Dlabola (1985).

Iran localities: Pol-e Tang.

Extralimital distribution: North Africa, Europe.

***Cixius (Acanthocixius) stigmaticus* (Germar, 1818)**

*Flata stigmaticus* Germar, 1818: 199

*Cixius (Sciocixius) stigmaticus*; Dlabola (1985).

Iran localities: Kandovān (Māzandarān).

Extralimital distribution: Southern, Western and Eastern Europe.

***Tachycixius desertorum* (Fieber, 1876)**

*Cixius desertorum* Fieber, 1876: 182; Dlabola (1981, 1985).

*Tachycixius desertorum*; comb. n. in Wagner (1939).

Iran localities: Sufiān, Eslāmābād, Ziārān.

Extralimital distribution: Southern and Eastern Europe, Turkey, Israel, Central Asia

Comments: (M. Asche pers comm.). The records of *T. desertorum* from Iran need confirmation. This species is part of a group of apparently closely related species.

**Tribe Oecleini**

***Myndus genocolus* Dlabola, 1985**

*Myndus genocolus* Dlabola, 1985: 97; Mirzayans (1995).

Iran localities: Bandar Khamir, Bandar Lengeh, Geno, Isin, Kangān.

***Myndus musivus* (Germar, 1825)**

*Flata musivus* Germar, 1825: 21; Dlabola (1981), Mirzayans (1995).

Iran localities: Orumieh, Orumieh lake.

Extralimital distribution: Europe, Central Asia.

***Myndus sarbazus* Dlabola, 1989**

*Myndus sarbazus* Dlabola, 1989: 33

Iran localities: Sarbāz.

**Tribe Pentastirini**

***Anoculiarus ornatus* Dlabola, 1985**

*Anoculiarus ornatus* Dlabola, 1985: 123

Iran localities: Bānuchārehar.

***Eumecurus apunctatus* Dlabola, 1985**

*Eumecurus apunctatus* Dlabola, 1985: 107

Iran localities: Bānuchārehar, Jiroft, Zāboli.

***Eumecurus baluchestanicus* Dlabola, 1985**

*Eumecurus baluchestanicus* Dlabola, 1985: 110

Iran localities: Masiri.

***Eumecurus (Pseumecurus) frontalis* (Melichar, 1904)**

*Oliarus frontalis* Melichar, 1904: 31

*Eumecurus (Pseumecurus) frontalis*; comb. n. in Dlabola (1985).

Iran localities: Isin.

Extralimital distribution: Northern Africa.

***Eumecurus kabulus* (Dlabola, 1957)**

*Oliarus kabulus* Dlabola, 1957a: 267

*Eumecurus kabulus*; comb. n. in Dlabola (1985).

Iran localities: Geno.

Extralimital distribution: Afghanistan.

***Eumecurus octopus* Dlabola, 1985**

*Eumecurus octopus* Dlabola, 1985: 106

Iran localities: Tang-e Sarheh.

***Eumecurus superstylus* Dlabola, 1985**

*Eumecurus superstylus* Dlabola, 1985: 108

Iran localities: Jiroft.

***Eumecurus transpunctatus* Dlabola, 1985**

*Eumecurus transpunctatus* Dlabola, 1985: 103

Iran localities: Sarbāz, Sekand.

***Eumecurus vilbastei* Dlabola, 1985**

*Eumecurus vilbastei* Dlabola, 1985: 109

Iran localities: Isin.

***Hyalesthes luteipes* Fieber, 1876**

*Hyalesthes luteipes* Fieber, 1876: 197; Dlabola (1981, 1994), Mirzayans (1995)

Iran localities: Āb Āsk, Evin, Sirik, Tochāl Mountain.

Extralimital distribution: North Africa, Southern, Western and Eastern Europe, Turkey, Israel, Central Asia.

***Hyalesthes mlokosiewiczi* Signoret, 1879**

*Hyalesthes mlokosiewiczi* Signoret, 1879: 116; Farahbakhsh (1961) [listed], Nast (1972) [listed], Dlabola (1981), Hoch and Remane (1985) [listed], Behdad (1988), Mirzayans (1995), Emeljanov (1996b), Abaii (2000).

Iran localities: Āb Āsk, Āmol, Bidhend, Eskandari, Evin, Firuzkuh, Ghezel-Bolāgh, Gorgān, Karaj, Khorramābād, Malārd, Marāgheh, Marand, Robāt-e Tork, Rudbārak, Shāhrud, Shirāz, Tabriz, Tochāl Mountain, Varāmin.

Extralimital distribution: Ukraine, Transcaucasia, Turkey, Central Asia.

***Hyalesthes obsoletus* Signoret, 1865**

*Hyalesthes obsoletus* Signoret, 1865: 128; Dlabola (1971a, 1972 [listed], 1981, 1994), Behdad (1988), Kheyri (1989), Mirzayans (1995), Abaii (2000), Lashkari et al. (2009).

Iran localities: Āb Āsk, Andimeshk, Behshahr, Evin, Firuzkuh, Gorgān, Hafttapp-eh, Karaj, Marand, Paskuh, Rezvāndeh, Sanandaj, Sufiān, Tākestān- Karaj Rd, Tochāl Mountain, Yāsuj, Ziārān.

Extralimital distribution: North Africa, Southern, Western and Eastern Europe, Northern parts of Western Asia, Afghanistan and Central Asia.

***Hyalesthes philesakis* Hoch 1986**

*Hyalesthes philesakis* Hoch 1986: 95; Dlabola (1994)

Iran localities: Masiri.

Extralimital distribution : Moldova, Ukraine, Turkey.

***Hyalesthes restultus* Dlabola, 1994**

*Hyalesthes restultus* Dlabola, 1994: 44

Iran localities: Komehr.

***Hyalesthes scotti* Ferrari, 1882**

*Hyalesthes scotti* Ferrari, 1882: 82; Dlabola (1994).

*Hyalesthes luteipes* Fieber. var. *scotti* Ferrari; (Linnavuori, 1962a).

Iran localities: Dasht, Gazanak, Sufiān, Tochāl Mountain.

Extralimital distribution: Western and central Mediterranean region, perhaps also in southern parts of central Europe. (Holzinger et al. 2003).

***Hyalesthes zabolicus* Dlabola, 1985**

*Hyalesthes zabolicus* Dlabola, 1985: 121; Hoch and Remane 1985 [listed].

Iran localities: Zāboli.

***Oliarellus fulvus* (Kusnezov, 1935)**

*Hyalesthes fulvus* Kusnezov, 1935: 213

*Oliarus fulvus* (Kusnezov 1935); Nast (1972) [listed], Lashkari et al. (2009).

*Pseudoliarus circularis* Dlabola, 1981: Dlabola (1981).

*Oliarellus fulvus*; Dlabola (1985) [listed].

Iran localities: Estahbān, Ghazvin, Golestān province, Robāt-e Tork.

Extralimital distribution: Central Asia.

***Oliarus convergens* Melichar, 1902**

*Oliarus convergens* Melichar, 1902a: 87; Dlabola (1981) [listed].

Iran localities: Kermān province.

Comment: the status of this species is unclear.

***Oliarus nigrofurcatus* Signoret, 1884**

*Oliarus nigrofurcatus* Signoret 1884: 71; Melichar (1902a), Farahbakhsh (1961) [listed], Nast (1972) [listed], Dlabola (1972) [listed].

Iran localities: Nehbandān.

Extralimital distribution: Transcaucasus, Iraq, Afghanistan and Central Asia.

Comments: The identity of this species is unclear.

***Pentastira baktiaricus* (Dlabola, 1981)**

*Oliarus baktiaricus* Dlabola, 1981: 144;

*Pentastira baktiaricus*; comb. n. in Dlabola (1988).

Iran localities: Marg-e-Malek

***Pentastira major* Kirschbaum, 1868**

*Pentastira major* Kirschbaum, 1868: 44

*Oliarus major* (Kirschbaum, 1868); Dlabola (1981), Mirzayans (1995).

*Pentastira major*; (Dlabola, 1988).

Iran localities: Akhlamad, Āmol, Behshahr, Dasht-e Moghān, Divāndareh, Gazanak, Ghāemshahr, Gharechaman, Gorgān, Kahurak, Karaj, Nowshahr, Rāmiān, Sanandaj, Shemirān, Silvāneh, Zāhedān, Zoshk.

Extralimital distribution: Southern and Eastern Europe, North parts of Western Asia.

***Pentastira superspicata* Dlabola, 1985**

*Pentastira superspicata* Dlabola, 1985: 119

Iran localities: Kāzerun, Masiri.

***Pentastira shul* (Dlabola, 1985)**

*Reptalus shul* Dlabola, 1985: 115; Dlabola (1985).

*Pentastira shul*; comb. n. in Dlabola (1988).

Iran localities: Kāzerun, Masiri, Miāneh, Shul, Yāsuj.

***Pentastiridius* (*Pentastiridius*) *leporinus* (Linnaeus, 1761)**

*Cicada leporina* Linnaeus, 1761: 242

*Oliarus leporinus*; Dlabola (1971b, 1981).

*Flata pallens* Germar, 1821; synonymized by Nast (1986).

*Oliarus pallens* (Germar, 1821); Melichar (1902a), Dlabola (1960a, 1971a, 1972 [listed], 1981), Farahbakhsh (1961) [listed], Nast (1972) [listed].

*Reptalus pallens* (Germar, 1821); Mirzayan (1995).

*Pentastiridius leporinus*; Nast (1986), Mirzayans (1995).



Iran localities: Ābādeh, Albāji, Bampur, Bazmān, Birjand, Chābahār, Dālaki, Evin, Gambuyeh, Gāvbandi, Gharechaman, Hafttappeh, Hamidieh, Hāresābād, Hashtpar, Irānshahr, Kandovān (Māzandarān), Marand, Miāneh- Zanjān Rd, Mīnushahr, Mollāsāni, Shādegān, Shieh, Susangerd, Suza, Tabriz, Varāmin, Zābol.

Extralimital distribution: North Africa, Europe, Northern parts of Western Asia, Afghanistan, Central and Eastern Asia.

***Pseudoliarus fuscofasciatus* (Melichar, 1902)**

*Oliarus fuscofasciatus* Melichar, 1902a: 88; Nast (1972) [listed], Dlabola (1972 [listed], 1981), Mirzayans (1995).

*Pseudoliarus fuscofasciatus*; Dlabola 1981.

Iran localities: Ābādeh, Bazmān, Bidruyeh, Dālaki, Geno, Ghom, Isin, Jahrom, Jiroft, Mollāsāni, Zābol.

Extralimital distribution: North east Africa, Yemen, Iraq, Transcaucasia.

***Pseudoliarus palestinensis* (Linnavuori, 1962)**

*Oliarus fuscofasciatus palestinensis* Linnavuori, 1962a: 3

*Pseudoliarus palestinensis*; Dlabola (1985).

Iran localities: Ahvāz, Jāsk, Kahkom.

Extralimital distribution: Saudi Arabia (Dlabola 1980c), Turkey (Demir 2008).

***Reptalus (Trepalus) cuspidatus* (Fieber, 1876)**

*Oliarus cuspidatus* Fieber, 1876: 215; Dlabola (1981).

*Reptalus (Trepalus) cuspidatus*; new subgenus in Emeljanov (1995).

Iran localities: Jahrom.

Extralimital distribution: Southern, Western and Eastern Europe, Turkey, Central Asia.

***Reptalus (Trepalus) rufocarinatus* (Kusnezov, 1937)**

*Oliarus quinquecostatus* var. *rufocarinatus* Kusnetzov, 1937: 168

*Oliarus bitinctus* Dlabola, 1961a: 254; Dlabola (1981).

*Reptalus bitinctus*; Dlabola (1985), Kheyri (1989), Mirzayans (1995).

*Oliarus concolor* Fieber, 1876; Mirzayans et al. (1976).

Iran localities: Dasht, Esfahān, Gholhak, Ghom- Esfahān Rd, Ghom, Karaj.

Extralimital distribution: North Africa, Southern, Western and Eastern Europe, Turkey, Afghanistan, Central and Eastern Asia.

Comments: *Oliarus concolor* Fieber, 1876 is taxonomically unclear, and apparently often interpreted by various author in various manners without having studied the (type material). Dlabola (1988): 64 lists it as a separate species. Also *Oliarus bitinctus* Dlabola has had a mixed history, synonymized with *rufocarinatus* by Emeljanov (1978), revived as separate species in *Setapius* by Dlabola (1988) and now as a synonym of *rufocarinatus* in *Reptalus (Trepalus)* by Emeljanov (1995).

***Reptalus eremicus* Dlabola, 1985**

*Reptalus eremicus* Dlabola, 1985: 114; Mirzayans (1995).

Iran localities: Marand, Mashhad, Masiri, Nagsh-e Rostam, Paskuh, Rafsanjān, Robāt-e Tork, Shirāz, Yāsuj.

***Reptalus melanochaetus* (Fieber, 1876)**

*Oliarus melanochaetus* Fieber, 1876: 198; Dlabola (1981), Behdad (1988), Mirzayans (1995), Abaii (2000).

*Reptalus melanochaetus*; comb. n. in Emeljanov (1972a).

Iran localities: Bābol- Ghāemshahr, Karaj, Leshtar, Tonekābon.

Extralimital distribution: Southern, Western, and Eastern Europe, Turkey, Central Asia.

***Reptalus quinquecostatus* (Dufour, 1833)**

*Cixius quinquecostatus* Dufour 1833: 224

*Reptalus quinquecostatus*; comb. n. in Emeljanov (1972b).

*Oliarus quinquecostatus* (Dufour 1833); Behdad (1988), Abaii (2000).

Iran localities: Unknown locality (Northern and central provinces).

Extralimital distribution: Southern, Western and Eastern Europe, Turkey, Central and Eastern Asia.

Comment: The identity of this record should be checked since it is part of a complex of several closely related species.

***Reptalus reductus* Dlabola, 1994**

*Reptalus reductus* Dlabola, 1994: 53; Dlabola (1994).

Iran localities: Bāft.

***Reptalus ziaran* Dlabola, 1985**

*Reptalus ziaran* Dlabola, 1985: 118

Iran localities: Miāneh, Ziārān.

***Setapius barajus* (Dlabola, 1957)**

*Oliarus barajus* Dlabola, 1957b: 24; Dlabola (1981), Mirzayans (1995)

*Setapius barajus*; comb. n. in Dlabola (1988).

Iran localities: Irānshahr, Varāmin.

Extralimital distribution: Transcaucasia, Turkey, Afghanistan.

***Setapius lindbergi* (Dlabola, 1957)**

*Oliarus lindbergi* Dlabola, 1957b: 23; Linnavuori (1962a) [listed], Nast (1972) [listed], Dlabola (1972 [listed], 1981).

*Setapius lindbergi*; comb. n. in Dlabola (1988), Kheyri (1989), Mirzayans (1995).

*Reptalus lindbergi* (Dlabola, 1960); Kheyri (1989), Mirzayans (1995).

Iran localities: Āb Āsk, Bampur, Fasā, Gorgān, Heirān, Jiroft, Marand, Marg-e-Malek, Sarāvān, Shirāz, Tochāl Mountain, Zābol.

Extralimital distribution: Afghanistan, Cyprus, Iraq, Israel, Turkey, Dagestan, Uzbekistan (Nast 1972) Egypt (Dlabola 1974b), Saudi Arabia (Dlabola 1980c).

## Family Delphacidae

### Subfamilies and tribes follow Asche (1985)

#### Subfamily Asiracinae

##### *Asiraca clavicornis* (Fabricius, 1794)

*Cicada clavicornis* Fabricius, 1794: 41; Karimzadeh Esfahani et al. (1998), Behdad (1988), Mirzayans (1995) Abaii (2000).

*Asiraca flavicornis* (sic); Dlabola (1981, 1984).

Iran localities: Esfahān province, Golestān province, Karaj, Markazi province.

Extralimital distribution: North Africa, Europe, Northern parts of Western Asia, Afghanistan, Central and Eastern Asia.

#### Subfamily Kelisinae

##### *Kelisia praecox* Haupt, 1935

*Kelisia praecox* Haupt, 1935: 133; Dlabola (1981), Lashkari et al. (2009)

Iran localities: Tochāl Mountain, Golestān province.

Extralimital distribution: Germany, Eastern Europe, Central and Eastern Asia.

##### *Kelisia ribauti* Wagner, 1938

*Kelisia ribauti* Wagner, 1938: 12; Dlabola (1981), Mirzayans (1995).

Iran localities: Evin.

Extralimital distribution: Western, Northern and Eastern Europe, North parts of Western Asia, Afghanistan, Central Asia, Eastern Asia and Russian Far East.

#### Subfamily Stenocraninae

##### *Stenocranus major* (Kirschbaum, 1868)

*Delphax major* Kirschbaum, 1868: 211

*Stenocranus major*; Dlabola (1981).

Iran localities: Golestān province.

Extralimital distribution: Europe, Afghanistan.

## Subfamily Delphacinae

### Tribe Tropidocephalini

#### *Tropidocephala prasina* Melichar, 1902

*Tropidocephala prasina* Melichar, 1902a: 90

*Tropidocephala prasina lateralis* Melichar, 1902a: 90; Nast (1972) [listed], Dlabola (1981) [listed].

Iran localities: Bazmān.

### Tribe Delphacini

#### *Bostaera bolivari* (Melichar, 1901)

*Delphacodes bolivari* Melichar, 1901: 56

*Pseudaraeopus bolivari* (Melichar, 1901); Nast (1972) [listed].

*Bostaera bolivari*; Dlabola (1960a, 1981 [listed]), Mirzayans (1995).

Iran localities: Chābahār, Geno, Irānshahr, Isin, Ziārat.

Extralimital distribution: North West Africa, Southern Europe, Israel.

#### *Calligypona reyi* (Fieber, 1866)

*Delphax reyi* Fieber, 1866: 527

*Calligypona reyi*; Dlabola (1981).

Iran localities: Bandar Anzali.

Extralimital distribution: Europe, Turkey, Central Asia.

#### *Changeondelphax velichkovskiyi* (Melichar, 1913)

*Euidella velichkovskiyi* Melichar, 1913: 6 (type species of *Changeondelphax* Kwon, 1982)

*Calligypona oriens* Dlabola, 1961a: 276 (synonymized by Anufriev 1977).

*Chloriona oriens*; Dlabola (1981).

*Changeondelphax velichkovskiyi*; comb. n. in Kwon (1982).

Iran localities: Ghāemshahr.

Extralimital distribution: South Eastern Europe, North Caucasus Eastern Asia.

#### *Chloriona clavata* Dlabola, 1960

*Chloriona clavata* Dlabola, 1960b: 1; Dlabola (1981).

Iran localities: Gorgān, Evin.

Extralimital distribution: Kyrgyzia (Novikov et al. 2006).

#### *Chloriona unicolor* (Herrich-Schäffer, 1835)

*Delphax unicolor* Herrich-Schäffer, 1835: 66

*Chloriona unicolor*; Melichar (1902a), Dlabola (1968 [listed], 1981), Mirzayans (1972), Nast (1972) [listed].

Iran localities: Aliābād (Ghom), Evin, Gambuyeh, Marand, Temin  
Extralimital distribution: North Africa, Europe, Turkey, Central Asia

***Conomelus* sp.**

*Conomelus* sp.; Dlabola (1981).

Iran localities: Tochāl Mountain.

***Delphacodes audrasi* Ribaut, 1954**

*Delphacodes audrasi* Ribaut, 1954: 180

*Delphacodes linnavuorii* Le Quesne, 1960: 160; Dlabola (1981), Mirzayans (1995).

Iran localities: Bidruyeh, Gambuyeh, Minushahr, Sufiān.

Extralimital distribution: Southern parts of Eastern Europe, Southern Europe, Turkey, Israel.

Comments: Asche and Remane (1983) discuss the status of *Delphacodes mulsanti* Fieber and suggested that both *D. audrasi* and *D. linnavuorii* are likely to be synonyms of *mulsanti*.

***Delphacodes ornatipennis* (Haupt, 1927)**

*Megamelus ornatipennis* Haupt, 1927: 9; Dlabola (1964) [listed], 1965c [listed], 1960a, 1972).

*Delphacodes ornatipennis*; Asche and Remane (1983).

Iran localities: Irānshahr, Shādegān.

Extralimital distribution: East Mediterranean, Afghanistan.

Comments: Likely to become a synonym of *D. mulsanti* after further investigation (M. Asche pers comm.).

***Delphax inermis* Ribaut, 1934**

*Delphax inermis* Ribaut, 1934: 281; Dlabola (1977b [listed], 1994), Mirzayans (1995).

Iran localities: Borāzjān, Gambuyeh, Konārdān, Minushahr.

Extralimital distribution: North West Africa, Southern and Western Europe, East Mediterranean, Afghanistan.

***Dicranotropis hamata* (Boheman, 1847)**

*Delphax hamata* Boheman, 1847: 45

*Dicranotropis hamata*; Dlabola (1981).

Iran localities: Lajrān.

Extralimital distribution: North Africa, Europe, North Asia, Central Asia.

***Euides caspiana* (Dlabola, 1961)**

*Euidella caspiana* Dlabola, 1961a: 268

*Euides caspiana*; Dlabola (1981).

Iran localities: Bandar Anzali.

Extralimital distribution: Dagestan (Nast, 1972), Turkey (Demir, 2008).

***Falcotoya minuscula* (Horváth, 1897)**

*Delphax minuscula* Horváth, 1897b: 622

*Calligypona minuscula* (Horváth, 1897); Dlabola (1960a).

*Toya minuscula* (Horváth, 1897); Dlabola (1981), Dlabola (1972) [listed].

*Falcotoya minuscula*; Barkhordari et al. (1981) [listed].

Iran localities: Bandar Anzali, Irānshahr, Robāt-e Tork.

Extralimital distribution: North East Africa, France, Eastern Europe, Turkey, Afghanistan and Central Asia.

***Gravesteiniella boldi* (Scott, 1870)**

*Liburnia boldi* Scott, 1870: 68

*Gravesteiniella boldi*; Dlabola (1981).

Iran localities: Golestān province.

Extralimital distribution: Western, Northern and Eastern Europe, Cyprus, Central Northern and Eastern Asia.

***Halmyra aeluropodis* (Emeljanov, 1964)**

*Calligypona aeluropodis* Emeljanov, 1964: 9

*Halmyra aeluropodis*; Dlabola (1974a, 1981).

Iran localities: Robāt-e Tork.

Extralimital distribution: Kazakhstan (Nast, 1972), Greece (Drosopoulos et al. 1983).

***Herbalima eforiae* (Dlabola, 1961)**

*Calligypona eforiae* Dlabola, 1961b: 314

*Unkanodes eforiae*; comb. n. in Dlabola (1974a).

*Herbalima eforiae*; comb. n. in Emeljanov (1977).

Iran localities: Eynvarzān.

Extralimital distribution: Romania, Kazakhstan (Nast, 1972) Kyrgyzia (Novikov et al. 2006).

***Javesella pellucida* (Fabricius, 1794)**

*Fulgora pellucida* Fabricius, 1794: 7

*Calligypona marginata* (Fabricius, 1794); Dlabola (1960a).

*Javesella pellucida*; Dlabola (1981), Mirzayans (1995).

Iran localities: Anbarābād, Chābahār, Evin, Eynvarzān Irānshahr, Sufiān.

Extralimital distribution: North of Africa, Europe, Turkey, Afghanistan, Central, Eastern and Northern Asia.

***Laodelphax striatellus* (Fallén, 1826)**

*Delphax striatellus* Fallén, 1826: 75

*Laodelphax striatellus* (Fallén, 1826); Dlabola (1971a, 1981), Nast (1972) [listed], Ahmadi et al. (1986), Kheyri (1989), Mirzayans (1995), Karimzadeh Esfahani et al. (1998), Haghshenas and Khajehali (2000), Nematollahi and Khajehali (2000), Khajehali et al. (2001), Yarmand et al. (2006), Lashkari et al. (2009).

*Laodelphax striatella*; Mirzayans et al. (1976).

Iran localities: Ahvāz, Aliābād (Jahrom), Āmol, Asālem, Bājgāh, Bandar Anzali, Behshahr, Behshahr- Sāri, Bidruyeh, Bidzard, Chenārshāhijān, Dārāb, Darband, Dasht, Eskandari, Estahbān, Evin, Eynvarzān, Fasā, Galugāh- Eslāmābād, Gambuyeh, Gazanak, Gholhak, Gorgān, Hashtpar, Jahānābād Sepidān, Jiroft, Karaj, Marand, Miāneh- Gharechaman, Minushahr, Nurābād, Parehsar, Robāt-e gharebil- Dowlātābād, Sanandaj, Sāri- Bābolsar, Sarvestān, Shahdād, Shahr-e Kord, Shirāz, Sufiān, Tabriz, Veresk, Zarghān.

Extralimital distribution: North Africa, Europe, Western Asia, Afghanistan, Central, Northern and Eastern Asia.

***Matutinus putoni* (Costa, 1888)**

*Kelisia putoni* Costa, 1888: 16

*Calligypona typhae* Lindberg, 1960: 15 (syn. Asche and Remane, 1982); Dlabola (1981)

*Matutinus putoni*; Mirzayans (1995).

Iran localities: Anbarieh, Minushahr, Shush.

Extralimital distribution: Italy, North Africa, Israel.

***Muirodelphax amol* Dlabola, 1981**

*Muirodelphax amol* Dlabola, 1981: 154

Iran localities: Āmol.

***Muirodelphax aubei* (Perris, 1857)**

*Delphax aubei* Perris, 1857: 170

*Muirodelphax aubei*; Dlabola (1981), Lashkari et al. (2009)

Iran localities: Damāvand, Golestān province, Lajrān, Marand, Tochāl Mountain.

Extralimital distribution: North Africa, Europe, Turkey, Central and Eastern Asia.

***Pseudaraeopus curtulus* Dlabola, 1960**

*Pseudaraeopus curtulus* Dlabola, 1960a: 3; Dlabola (1981) [listed], Nast (1972) [listed].

Iran localities: Irānshahr.

***Pseudaraeopus iranicus* Dlabola, 1960**

*Pseudaraeopus iranicus* Dlabola, 1960a: 4; Dlabola (1981) [listed], Nast (1972) [listed].

Iran localities: Irānshahr.

***Ribautodelphax hyrcanus* Dlabola, 1981**

*Ribautodelphax hyrcanus* Dlabola, 1981: 157; Mirzayans (1995)

Iran localities: Golestān province, Hashtpar.

***Sardia rostrata* Melichar, 1903**

*Sardia rostrata* Melichar, 1903: 96; Dlabola (1981), Mirzayans (1995)

Iran localities: Minushahr.

Extralimital distribution: widespread in Asia and Australasia.

***Sogatella furcifera* (Horváth, 1899)**

*Delphax furcifera* Horváth 1899: 372

*Sogatella furcifera*; Lashkari et al. (2009).

Iran localities: Golestān province.

Comments: Asche and Wilson (1990) recorded no specimens of this species in Europe or Africa. It is very likely that this record refers to another species.

Extralimital distribution: Eastern Palaearctic (Asche and Wilson, 1990).

***Sogatella vibix* (Haupt, 1927)**

*Liburnia vibix* Haupt, 1927:13

*Calligypona vibix* (Haupt, 1927); Dlabola (1960a).

*Sogatella suzensis* Matsumura 1910; Linnavuori (1964) misdetermination (not *suzensis* Matsumura, 1910); Ahmadi et al. (1986), Kheyri (1989), Mirzayans (1995), Nast (1972) [listed]. *Sogatella vibix*; Dlabola (1965c, 1971a, 1972), Karimzadeh Esfahani et al. (1998), Lashkari et al. (2009).

Iran localities: Albāji, Anbarābād, Bājgāh, Bidruyeh, Dārāb, Esfahān province, Estahbān, Fasā, Firuzābād, Golestān province, Irānshahr, Isin, Jiroft, Mīnushahr, Nurābād, Sarvestān, Shabestar.

Extralimital distribution: North of Africa, North parts of Western Asia, Afghanistan.

Comments: Asche and Wilson (1990) provide full synonymy and localities.

***Toya propinqua* (Fieber, 1866)**

*Delphax propinqua* Fieber, 1866: 525

*Calligypona propinqua* (Fieber, 1866); Dlabola (1960a).

*Toya propinqua*; Ahmadi et al. (1986), Dlabola (1981), Kheyri (1989), Lashkari et al. (2009); Mirzayans (1995), Nast (1972) [listed].

Iran localities: Āb Āsk, Anbarābād, Andimeshk, Bājgāh, Bandar Anzali, Eskandari, Evin, Eynvarzān, Fasā, Gholhak, Gorgān, Hashtpar, Irānshahr, Isin, Jiroft, Kāzerun, Marand, Mīnushahr, Rudbārak, Sanandaj, Sepidān, Shirāz, Tochāl Mountain, Zarghān

Extralimital distribution: North Africa, Southern, Western and Eastern Europe, Western Asia, Afghanistan, Central Asia and Japan.

***Unkanodes latespinosa* (Dlabola, 1957)**

*Calligypona latespinosa* Dlabola, 1957a: 275

*Unkanodes latespinosa*; Dlabola (1971a, 1981), Mirzayans (1995).

Iran localities: Damāvand, Eskandari, Evin, Gholhak, Marand, Miāneh – Gharechaman, Orumieh, Robāt-e gharebil, Sanandaj, Shahdād.

Extralimital distribution: Turkey, Afghanistan and Mongolia.

***Unkanodes tanasjjevici* (Dlabola, 1965)**

*Elymodelphax tanasjjevici* Dlabola, 1965a: 658

*Unkanodes tanasjjevici*; Ahmadi et al. (1986).



Iran localities: Akbar ābād, Bājgāh, Zarghān.

Extralimital distribution: Turkey-Anatolia, Greece, Romania, (Asche,1982), Yugoslavia.

## Family Derbidae

### Tribe Cenchreini

#### ***Malenia isinica* Dlabola, 1986**

*Malenia isinica* Dlabola, 1986: 173

Iran localities: Isin.

#### ***Malenia masirica* Dlabola, 1986**

*Malenia masirica* Dlabola, 1986: 173

Iran localities: Dehbakri, Kermānshāh (Yazd province), Kushk, Masiri, Sheikh-e Mahalleh, Yasuj.

#### ***Malenia sarmatica* Anufriev, 1966**

*Malenia sarmatica* Anufriev, 1966: 46; Dlabola (1981), Mirzayans (1995).

Iran localities: Hashtpar, Lāhijān, Tonekābon, Zirāb.

Extralimital distribution: Ukraine, Transcaucasia.

### Tribe Zoraidini

#### ***Proutista jezeki* Dlabola, 1981**

*Proutista jezeki* Dlabola, 1981: 161

Iran localities: Rāsk.

## Family Dictyopharidae

### Subfamily Dictyopharinae

#### Subgenera of *Dictyophara* follow Emeljanov (2004)

#### ***Dictyophara (Ancylocrius) albata* Dlabola & Heller, 1962**

*Dictyophara albata* Dlabola & Heller, 1962: 2; Nast (1972) [listed], Dlabola (1981), Behdad (1988), Mirzayans (1995), Abaii (2000), Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Chāhkuh, Estahbān, Geno, Hichān, Irānshahr, Jahrom, Jiroft, Kahurestān, Kāzerun, Nikshahr, Sendarak.

***Dictyophara (Ancylocrius) exoptata* Dlabola & Heller, 1962**

*Dictyophara exoptata* Dlabola & Heller, 1962: 1; Nast (1972) [listed], Mirzayans et al. (1976) Dlabola (1981), Mirzayans (1995), Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Aliābād (Jahrom), Chāhkuh, Dasht-e arjan, Geno, Irānshahr, Isin, Jiroft, Kahurestān, Kāzerun, Konārdān, NikshharSendarak, Shirāz.

***Dictyophara (Chanithus) avocetta* Oshanin, 1879**

*Dictyophara avocetta* Oshanin, 1879: 131; Melichar, 1902a, Nast (1972) [listed], Dlabola (1981) [listed], Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Anārak.

Extralimital distribution: Azerbaijan, Eastern parts of Central Asia.

***Dictyophara (Chanithus) hastata* Kusnezov, 1929**

*Dictyophara hastata* Kusnezov, 1929; Mozaffarian and Emeljanov (2010) [listed].

***Dictyophara (Chanithus) kazeruna* Dlabola, 1986**

*Dictyophara kazeruna* Dlabola, 1986: 179, Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Kāzerun.

***Dictyophara (Conopenchus) pazukii* (Dlabola, 1984)**

*Philotheria pazukii* Dlabola, 1984: 25

Iran localities: Kamandān.

***Dictyophara (Dictyophara) asiatica* Melichar, 1912**

*Dictyophara asiatica* Melichar, 1912: 118; Dlabola (1981), Behdad (1988), Abaii (2000), Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Eynvarzān, Gazanak.

Extralimital distribution: Northern parts of Western Asia.

***Dictyophara (Dictyophara) europaea* (Linnaeus, 1767)**

*Fulgora europaea* Linnaeus, 1767: 704

*Dictyophara europaea*; Mirzayans et al. (1976), Dlabola (1981), Behdad (1988), Mirzayans (1995), Haghshenas and Khajehali (2000), Abaii (2000), Khajehali et al. (2001), Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Ahvāz, Bābol- Ghāemshahr, Bandar Anzali, Behshahr, Chahār mahāl- Bakhtiāri province, Eskandari, Fasā, Feizābād, Hafttappēh, Jahrom, Kāmyārān, Kandovān (Māzandarān), Khorramābād, Marand, Mollāsāni, Tābriz, Tonekābons, Varāmin, Zirāb.

Extralimital distribution: North Africa, Western, Eastern and Southern Europe, northern parts of Western Asia, Afghanistan, southern parts of Central Asia and Eastern Asia.

***Dictyophara (Euthremma) hoberlandti* Dlabola, 1974**

*Dictyophara hoberlandti* Dlabola, 1974a: 36; Dlabola (1981), Mirzayans et al. (1976), Behdad (1988), Mirzayans (1995), Abaii (2000), Mozaffarian and Emeljanov (2010) [listed].

*Dictyophara (Euthremma) hoberlandti*; Emeljanov (2004).

Iran localities: Eynvarzān, Gāvkošhak, Kāzerun, Orumieh, Sepidān, Sisakht.

***Raivuna iranica* (Linnavuori, 1962)**

*Dictyophara iranica* Linnavuori, 1962a: 7; Nast (1972) [listed], Dlabola (1981), Mirzayans (1995), Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Anbarābād, Chāhkuh, Dālaki, Evin, Ghom Lake, Hafttappēh, Hasanlangi, Irānshahr, Isin, Jiroft, Kandovān (Māzandarān), Marand, Mollāsāni, Nikshahr, Pishin, Rāsk, Sendarak, Sisakht, Yazd, Zābol.

Extralimital distribution: Turkey (Demir, 2008).

***Raivuna pallida* (Donovan, 1800)**

*Fulgora pallida* Donovan 1800: 1

*Chanithus pallidus* (= *striata* Oshanin, 1879); Dlabola (1960a).

*Raivuna pallida*; Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Anbarābād, Bampur, Irānshahr

Extralimital distribution: North Africa, Southern parts of Western Asia, Transcaucasia, Central and Eastern Asia.

Comments: Linnavuori (1962a) regarded *Chanithus* as a subgenus of *Dictyophara*. Due to problems with the identity of this species literature records may refer to a number of species.

***Raivuna striata* (Oshanin, 1879)**

*Raivuna striata* (Oshanin, 1879); Mozaffarian and Emeljanov (2010) [listed].

Iran localities: Unknown locality.

**Subfamily Orgeriinae*****Kumlika mandrita* Emeljanov, 1997**

*Kumlika mandrita* Emeljanov, 1997: 89

Iran localities: Sabzevār.

***Nymphorgerius convergens* Emeljanov, 1972**

*Nymphorgerius convergens* Emeljanov, 1972a: 25; Dlabola (1979b).

Iran localities: Shāhkuh-e Pāiin.

***Nymphorgerius emeljanovi* Dlabola, 1979**

*Nymphorgerius emeljanovi* Dlabola, 1979b: 242

Iran localities: Tochāl Mountain, Ziārān.

***Nymphorgerius mullah* Dlabola, 1979***Nymphorgerius mullah* Dlabola, 1979b: 241

Iran localities: Ziārān.

***Nymphorgerius plotnikovi* Kusnezov, 1929***Nymphorgerius plotnikovi* Kusnezov, 1929: 326; Emeljanov (1997).

Iran localities: Bojnurd.

Extralimital distribution: Kazakhstan, Turkmenia (Nast, 1972).

***Nymphorgerius rostratus* Emeljanov, 2009***Nymphorgerius rostratus* Emeljanov, 2009: 283

Iran localities: Sangrud.

***Tigrahauda ototettigoides* (Oshanin, 1913)***Orgerius ototettigoides* Oshanin, 1913: 140*Tigrahauda ototettigoides*; Emeljanov (1997).

Iran localities: Esfarāyen, Kāhe.

Extralimital distribution: Central Asia.

**Family Flatidae*****Babuflata punctata* Dlabola, 1979***Babuflata punctata* Dlabola, 1979a: 230

Iran localities: Bāhukalāt, Sirik.

***Derisa atratula* Melichar, 1902***Derisa atratula* Melichar, 1902a: 103; Dlabola (1960a, 1981), Nast (1972) [listed], Mirzayans (1995), Medler (2003).

Iran localities: Sirjān, Isin, Anbarābād, Bampur, Bazmān, Nikshahr, Bāhukalāt, Chābahār, Tis.

***Eurima astuta* Melichar, 1902***Eurima astuta* Melichar, 1902a: 102; Dlabola (1981) [listed], Nast (1972) [listed], Mirzayans (1995).

Iran localities: Bazmān, Kahurestān, Sendarak.

Extralimital distribution: Israel (Nast 1972) Saudi Arabia (Dlabola 1979d).

***Mesophantia kanganica* Dlabola, 1983***Mesophantia kanganica* Dlabola, 1983: 469 in Krampl and Dlabola (1983).

Iran localities: Bānuchārehar, Bojnurd, Hessār, Jiroft, Kangān, Nehbandān, Nosratābad, Sabzevār.

***Mesophantia pallens* Melichar, 1902**

*Mesophantia pallens* Melichar, 1902b: 18; Abaï (2000), Barkhordari et al. (1981), Dlabola (1981, 1983a), Medler (2003), Mirzayans (1995), Mirzayans et al. (1976), Nast (1972) [listed], Rajabi (1989).

Iran localities: Ābādeh, Bojnurd, Darpahn, Estahbān, Evin, Gāvkoshak, Izadkhāst, Jahrom, Kāshān, Kāzerun, Khosro- Shirin, Mashhad-e Ardehāl, Mohammadābād, Nishābur, Rafsanjān, Sangān, Shāhrud, Sisakht, Yāsuj.

***Mesophantia sabzevaranica* Dlabola, 1983**

*Mesophantia sabzevaranica* Dlabola, 1983: 466 in Krampl and Dlabola, (1983); Mirzayans (1995).

Iran localities: Denā mt (west slope), Doborji, Estahbān, Ferdows-e Esfandaghe, Gāvkoshi, Geno, Ghaderābād, Jahrom, Jiroft, Kāzerun, Kermān, Kuhenjān, Māhārlu, Miānjangal, Mohammadābād, Nishābur, Posht- e kuh, Sarāvān, Sarbāz, Shul, Sisakht.

***Mesophantia tisina* Dlabola, 1983**

*Mesophantia tisina* Dlabola, 1983: 468 in Krampl and Dlabola (1983).

Iran localities: Dehbakri, Tis.

***Persepolia columbaria* Dlabola & Safavi, 1972**

*Persepolia columbaria* Dlabola & Safavi, 1972: 2; Dlabola and Safavi (1972), Dlabola (1974a, 1981), Mirzayans et al. (1976), Behdad (1988), Rajabi (1989), Mirzayans (1995), Abaï (2000).

Iran localities: Kāzerun, Nurābād, Shirāz, Yāsuj.

Extralimital distribution: Saudi Arabia (Dlabola, 1980c).

***Persepolia jasmuriana* Dlabola, 1982**

*Persepolia jasmuriana* Dlabola, 1982b: 165

Iran localities: Bāhukalāt, Bārgāh, Bazmān, Geno, Isin, Rudān, Sarāvān, Tang-e Sarheh.

***Persepolia secunda* Dlabola, 1981**

*Persepolia secunda* Dlabola, 1981: 190

Iran localities: Zāboli.

***Persepolia servadeina* Dlabola, 1982**

*Persepolia servadeina* Dlabola, 1982b: 163

Iran localities: Bazmān, Zāboli, Pākuh, Sarāvān, Tang-e Sarheh, Zāhedān, Kermānshāh (Yazd province), Khutanābād, Kermān, Māhān, Golbāf.

***Phantia borazianica* Dlabola, 1989**

*Phantia borazianica* Dlabola, 1989: 44

Iran localities: Borāzjān.

***Phantia christophii* Rusiecka, 1902**

*Phantia christophii* Rusiecka, 1902: 423; Melichar (1902a), Dlabola (1972), Nast (1972) [listed].

Iran localities: Temin.

Extralimital distribution: Afghanistan, Turkmenia.

***Phantia crucispina* Dlabola, 1989**

*Phantia crucispina* Dlabola, 1989: 42

Iran localities: Zāhedān.

***Phantia cylindricornis* Melichar, 1902**

*Phantia cylindricornis* Melichar, 1902a: 99; Dlabola (1960a, 1972 [listed], 1989), Nast (1972) [listed], Medler (2003).

Iran localities: Anbarābād, Bāhukalāt, Chābahār, Espakeh, Hasanlangi, Irānshahr, Mīnāb, Ziārat.

Extralimital distribution: Afghanistan and Turkmenia.

***Phantia denasuta* Dlabola, 1989**

*Phantia denasuta* Dlabola, 1989: 40

Iran localities: Bāhukalāt, Bampur, Bandar Chāarak, Hasanlangi, Jāsk.

***Phantia ferganensis* Dubovsky, 1966**

*Phantia ferganensis* Dubovsky, 1966: 75; Dlabola (1989).

Iran localities: Bāhukalāt, Bampur, Jāsk.

Extralimital distribution: Uzbekistan.

***Phantia finita* Dlabola, 1989**

*Phantia finita* Dlabola, 1989: 49

Iran localities: Miānjangal.

***Phantia flavida* Rusiecka, 1902**

*Phantia flavida* Rusiecka, 1902: 424; Nast (1972) [listed], Dlabola (1981) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Azerbaijan.

***Phantia helleri* Linnavuori, 1962**

*Phantia helleri* Linnavuori, 1962b: 2; Nast (1972) [listed], Dlabola (1981, 1989), Mirzayans (1995).

Iran localities: Ahram, Bāhukalāt, Bampur, Bandar Abbās, Bandar Lengeh, Bārgāh, Bazmān, Dārāb, Dārbahāre, Darzin, Darpahn, Fāriāb, Gambuyeh, Ganāveh, Gāvkoshi, Geno, Ghasr-e Ghand, Ghom, Ghotbābād, Hājiābād, Hasanlangi, Isin, Jāsk, Jiroft, Kahnuj, Kahrestān, Kamālābād, Khutanābād, Mahārlu, Miājān, Mīnāb, Nikshahr, Nugh, Rafsanjān, Rāsk, Rudān, Sekand, Sendarak, Shirāz, Shul, Shusf, Sirik, Tāng-e Sarkeh, Tis, Zeidān.

***Phantia lactea* Rusiecka, 1902**

*Phantia lactea* Rusiecka, 1902: 424; Nast (1972) [listed], Dlabola (1981) [listed].

Iran localities: Unknown locality.

***Phantia ovatospina* Dlabola, 1989**

*Phantia ovatospina* Dlabola, 1989: 43

Iran localities: Nehbandān.

***Phantia picea* Dlabola, 1989**

*Phantia picea* Dlabola, 1989: 46

Iran localities: Bāhukalāt, Bandar Abbās, Jāsk, Nikshahr.

***Phantia putoni* Rusiecka, 1902**

*Phantia putoni* Rusiecka, 1902: 423; Dlabola (1981) [listed].

Iran localities: Unknown locality.

***Phantia rubromarginata* Rusiecka, 1902**

*Phantia rubromarginata* Rusiecka, 1902: 424; Nast (1972) [listed], Dlabola (1972 [listed], 1981 [listed]).

Iran localities: Unknown locality.

Extralimital distribution: Afghanistan.

***Phantia subquadrata* (Herrich Schäffer, 1838)**

*Poeciloptera subquadrata* Herrich Schäffer, 1838: 2

*Phantia subquadrata*; Dlabola (1989).

Iran localities: Yāsuj.

Extralimital distribution: Turkey (Demir 2007).

***Phantia viridula* Puton, 1890**

*Phantia viridula* Puton, 1890: 230; Dlabola (1972) [listed], Nast (1972) [listed], Puton (1890).

Iran localities: Shāhrud.

Extralimital distribution: Armenia.

***Tisia esfandiarii* Dlabola, 1981**

*Tisia esfandiarii* Dlabola, 1981: 192

Iran localities: Tis.

***Zarudnya fusca* Melichar, 1902**

*Zarudnya fusca* Melichar, 1902a: 101; Dlabola (1960a), Nast (1972) [listed], Medler (2003).

Iran localities: Bampur, Bazmān, Irānshahr.

Extralimital distribution: Turkmenia.

***Zarudnya interstitialis* Melichar, 1902**

*Zarudnya interstitialis* Melichar, 1902a: 101; Dlabola (1960a, 1981 [listed]), Nast (1972) [listed], Medler (2003), Mirzayans (1995)

Iran localities: Anbarābād, Bampur, Bazmān, Irānshahr, Jiroft, Kharposht, Sendarak.

Extralimital distribution: North Africa.

**Family Fulgoridae**

The genus *Dorysarthrus* was transferred from Dictyopharidae to Fulgoridae by Emeljanov (1979).

***Dorysarthrus mobilicornis* Puton, 1895**

*Dorysarthrus mobilicornis* Puton, 1895: 88; Dlabola (1981), Mirzayans (1995).

Iran localities: Bāhukalāt, Ghasr-e Ghand, Nikshahr, Sirik.

Extralimital distribution: Israel.

***Dorysarthrus simonyi* Melichar, 1912**

*Dorysarthrus simonyi* Melichar, 1912; Dlabola 1984, Mirzayans (1995).

Iran localities: Mināb.

Extralimital distribution: Saudi Arabia (Dlabola. 1979d).

***Dorysarthrus sumakovi* Oshanin, 1908**

*Dorysarthrus sumakovi* Oshanin, 1908: 471; Nast (1972) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Turkmenia.

**Family Issidae Spinola, 1839*****Anatalodus karabachicus* (Logvinenko, 1975)**

*Aeluropsis karabachica* Logvinenko, 1975: 59

*Hysteropterum ignavum* Dlabola, 1981: 179; Dlabola (1981).

*Anatalodus ignavus*; Dlabola (1982a), Mirzayans (1995).

*Anatalodus karabachicus*; Gnezdilov (2010b) [listed].

Iran localities: Ghezal-Bolāgh, Māku, Khoy, Marand, Nikshahr.

Extralimital distribution: Turkey.

***Cavatorium ardakanum* Dlabola, 1980**

*Cavatorium ardakanum* Dlabola, 1980b: 210

Iran localities: Shul.



***Cavatorium bispinatum* Dlabola, 1980***Cavatorium bispinatum* Dlabola, 1980b: 209

Iran localities: Sisakht, Yāsuj.

***Cavatorium quadrispinatum* Dlabola, 1980***Cavatorium quadrispinatum* Dlabola, 1980b: 211

Iran localities: Doborji, Fasā.

***Cavatorium sarbaz* Dlabola, 1980***Cavatorium sarbaz* Dlabola, 1980b: 212

Iran localities: Sekand.

***Eusarima (Nepalius) iranica* Gnezdilov & Mozaffarian, 2011***Eusarima (Nepalius) iranica* Gnezdilov & Mozaffarian, 2011: 457

Iran localities: Dārābād, Tehrān.

***Inflatodus astyages* Dlabola, 1982***Inflatodus astyages* Dlabola, 1982a: 124

Iran localities: Ziārān.

***Inflatodus kyaxares* Dlabola, 1982***Inflatodus kyaxares* Dlabola, 1982a: 122

Iran localities: Ziārān.

***Inflatodus persicus* (Dlabola, 1981)***Hysteropterum persicum* Dlabola, 1981: 181*Inflatodus persicus*; Mirzayans (1995).

Iran localities: Ābyek, Ghazvin, Tochāl Mountain, Zanjān.

***Inflatodus viridans* (Dlabola, 1974)***Hysteropterum viridatum* Dlabola, 1971a: 380 [Preoccupied]*Hysteropterum viridans* Dlabola, 1974a: 44 (nom. nov. for *H. viridatum* Dlabola, 1971: 380 nec Caldwell, 1945); Dlabola (1974a [listed], 1981 [listed]).*Inflatodus viridans*; Mirzayans (1995).

Iran localities: Ghezel-Bolāgh, Varāmin.

***Iranodus amygdalinus* Dlabola, 1980***Iranodus amygdalinus* Dlabola, 1980b: 205; Behdad (1988), Mirzayans (1995), Abaii (2000).

Iran localities: Bānuchārehar, Chābahār, Doborji, Ferdows-e Esfandaghe, Gotbābād, Hoseinābād, Isin, Jiroft, Kāzerun, Miānjāngal, Mohammadābād.

***Iranodus dumetorus* (Dlabola, 1981), comb. n.**

*Hysteropterum dumetorum* Dlabola 1979 nomen nudum. Species not listed or described  
*Iranodus dumetorus* (Dlabola, 1980b); 205 nomen nudum. Species listed but not described.

*Hysteropterum dumetorum* Dlabola, 1981: 185

Iran localities: Khānehkhoreh, Shirāz, Dehbid.

Comments: The species was validly described as *Hysteropterum dumetorum* in Dlabola (1981). However, the name appeared as a new combination in Dlabola (1980b) based on the species being described in Dlabola (1979), where in fact it was not mentioned. On this basis the two earlier citations of the name must be *nomina nuda*. But the new combination given as *Iranodus dumetorus* was 2 years before the species was described. Accordingly we validate the name here in the combination *Iranodus dumetorus* (Dlabola, 1981).

***Iranodus khatunus* (Dlabola, 1981), comb. n.**

*Hysteropterum khatunum* Dlabola, 1979 nomen nudum. Species not listed or described  
*Iranodus khatunus* Dlabola, 1979: Mirzayans (1995).

*Iranodus khatunus* (Dlabola, 1980b); 205 nomen nudum. Species listed but not described  
Mirzayans (1995).

*Hysteropterum khatunum* Dlabola, 1981: 187

Iran localities: Bānuchārehar, Dehpābid.

Comments: The species was validly described as *Hysteropterum khatunum* in Dlabola (1981). However, the name appeared as a new combination in Dlabola (1980b) based on the species being described in Dlabola (1979), where in fact it was not mentioned. On this basis the two earlier citations of the name must be *nomina nuda*. But the new combination given as *Iranodus khatunus* was 2 years before the species was described. Accordingly we validate the name here in the combination *Iranodus khatunus* (Dlabola, 1981).

***Iranodus nishabur* Dlabola, 1982**

*Iranodus nishabur* Dlabola, 1982a: 128

Iran localities: Birjand, Nishābur.

***Iranodus repandus* (Dlabola, 1981), comb. n.**

*Hysteropterum repandum* Dlabola, 1979 nomen nudum. Species not listed or described.

*Iranodus repandus* Dlabola, 1979; Mirzayans (1995).

*Iranodus repandum* (Dlabola, 1980b); 207 nomen nudum. Species listed but not described.

*Hysteropterum repandum* Dlabola, 1981: 183; Abaïi (2000), Behdad (1988).

Iran localities: Jahrom, Kāzerun, Shirāz.

Comments: The species was validly described as *Hysteropterum repandus* in Dlabola (1981). However, the name appeared as a new combination in Dlabola (1980b) based on the species being described in Dlabola (1979), where in fact it was not

mentioned. On this basis the two earlier citations of the name must be nomina nuda. But the new combination given as *Iranodus repandus* was 2 years before the species was described. Accordingly we validate the name here in the combination *Iranodus repandus* (Dlabola 1981).

***Iranodus transversalis* Dlabola, 1980**

*Iranodus transversalis* Dlabola, 1980b: 204; Mirzayans (1995)

Iran localities: Bāft, Lalezār.

***Mycterodus***

This large issid genus is now often treated species placed in subgenera such as *Aconosimus*. But not all *Mycterodus* species have yet been placed in subgenera, so those species found in Iran are listed under *Mycterodus* only.

***Mycterodus astragalicus* Dlabola, 1974**

*Mycterodus astragalicus* Dlabola, 1974a: 42; Behdad (1988); Abaii (2000).

*Aconosimus astragalicus*; Dlabola (1997).

Iran localities: Kuhrang.

***Mycterodus demavendinus* Dlabola, 1981**

*Mycterodus demavendinus* Dlabola, 1981: 174; Behdad (1988), Abaii (2000).

*Aconosimus demavendinus*; Dlabola (1997).

Iran localities: Damāvand, Tochāl Mountain.

***Mycterodus elbursicus* (Logvinenko, 1974)**

*Mycterodus elbursicus* Logvinenko, 1974: 838

*Aconosimus elbursicus*; Dlabola (1983b), Dlabola (1997).

Iran localities: Shāhkuh-e Pāiin.

***Mycterodus fagetophilus* Dlabola, 1980**

*Mycterodus fagetophilus* Dlabola, 1980a: 62, Dlabola (1997).

Iran localities: Chālus.

***Mycterodus guilanicus* Dlabola, 1981**

*Mycterodus guilanicus* Dlabola, 1981: 176, Dlabola (1997).

Iran localities: Lāhijān.

***Mycterodus hezarmeshedi* Dlabola, 1980**

*Mycterodus hezarmeshedi* Dlabola, 1980a: 66

*Aconosimus hezarmeshedi*; Dlabola (1997).

Iran localities: Kuh-e Hezār.

***Mycterodus inassuetus* Dlabola, 1981**

*Mycterodus inassuetus* Dlabola, 1981: 176

*Aconosimus inassuetus*; Dlabola (1997).

Iran localities: Gazanak.

***Mycterodus kandavanicus* Dlabola, 1980**

*Mycterodus kandavanicus* Dlabola, 1980a: 63, Dlabola (1997).

Iran localities: Ghazvin, Kandovān (Māzandarān).

***Mycterodus krameri* Dlabola, 1974**

*Mycterodus krameri* Dlabola, 1974b: 297; Logvinenko (1974), Dlabola (1981), Dlabola (1997) [listed], Abaïi (2000), Gnezdilov et al. (2004), Lashkari et al. (2009).

Iran localities: Behshahr, Bojnurd, Dasht, Gorgān, Rostamābād.

***Mycterodus lanceatus* Dlabola 1997**

*Aconosimus lanceatus* Dlabola 1997: 307

*Mycterodus lanceatus* Dlabola 1991, nomen nudum [The species appears not to be formally described in 1991].

Iran localities: Kelārdasht, Rudbār.

***Mycterodus peterseni* Dlabola, 1980**

*Mycterodus peterseni* Dlabola, 1980a: 68, Dlabola (1997)

Iran localities: Kandovān (Māzandarān).

***Mycterodus sexpunctatus* Dlabola, 1980**

*Mycterodus sexpunctatus* Dlabola, 1980a: 67; Gnezdilov et al. (2004).

*Aconosimus sexpunctatus*; Dlabola (1997).

Iran localities: Azādbar, Kandovān (Māzandarān).

***Mycterodus shahrudicus* Dlabola, 1980**

*Mycterodus shahrudicus* Dlabola, 1980a: 65

*Aconosimus shahrudicus*; Dlabola (1997).

Iran localities: Ghazvin.

***Pentissus bamicus* Dlabola, 1980**

*Pentissus bamicus* Dlabola, 1980b: 207; Mirzayans (1995).

Iran localities: Dehbakri, Dehpābid, Jiroft, Khutanābād, Taftān, Tamandān.

***Phasmena adyoungi* Dlabola, 1982**

*Phasmena adyoungi* Dlabola, 1982a: 131

Iran localities: Ghasr-e Ghand.

***Phasmena nasuta* Melichar, 1902**

*Phasmena nasuta* Melichar, 1902a: 93; Melichar (1906), Nast (1972) [listed], Dlabola (1981) [listed].

Iran localities: Temin.

Extralimital distribution: Turkey.

***Phasmena telifera* Melichar, 1902**

*Phasmena telifera* Melichar, 1902a: 92; Melichar (1906), Nast (1972) [listed], Dlabola (1981) [listed], Mirzayans (1995).

Iran localities: Sekand, Temin.

***Quadriva aurita* (Dlabola, 1982)**

*Hysteroodus auritus* Dlabola, 1982a: 162

*Quadriva aurita* (Dlabola, 1982a); comb. n. in Gnezdilov et al. (2004).

Iran localities: Yāsuj.

***Quadriva dehbakrina* (Dlabola, 1980)**

*Hysteroodus dehbakrinus* Dlabola, 1980b: 196

*Quadriva dehbakrina*; comb. n. in Gnezdilov et al. (2004).

Iran localities: Dehbakri.

***Quadriva lassa* (Dlabola, 1981)**

*Hysteropterum lassum* Dlabola, 1981: 178

*Quadriva lassa* (Dlabola, 1981); comb. n. in Gnezdilov et al. 2004.

Iran localities: Khānehkhoreh, Marg-e Malek, Shirāz.

***Quadriva ochaninei* (Puton, 1890)**

*Conosimus ochaninei* Puton, 1890: 232

*Conosimus oshanini*; Nast (1972) [listed].

*Quadriva ochaninei*; comb. n. in Gnezdilov (2010b).

Iran localities: Unknown locality.

Extralimital distribution: Central Asia.

Comment: Although the species had been listed in Nast (1972) from Iran, according to Gnezdilov (2010b) the species has only been collected from Central Asia.

***Quadriva proxima* (Dlabola, 1980)**

*Hysteroodus proximus* Dlabola, 1980b: 198

*Quadriva proxima*; comb. n. in Gnezdilov et al. (2004).

Iran localities: Dehbakri.

***Quadriva sabzevarana* (Dlabola, 1980)**

*Hysteroodus sabzevaranus* Dlabola, 1980b: 193

*Quadriva sabzevarana*; comb. n. in Gnezdilov et al. (2004).

Iran localities: Jiroft.

***Quadriva taftanica* (Dlabola, 1980)***Hysterodus taftanicus* Dlabola, 1980b: 197*Quadriva taftanica*; comb. n. in Gnezdilov et al. (2004).

Iran localities: Taftān.

***Quadriva tangesarhena* (Dlabola, 1980)***Hysterodus tangesarhenus* Dlabola, 1980b: 193*Hysterodus tangesarhensis*; Mirzayans (1995).*Quadriva tangesarhena*; comb. n. in Gnezdilov et al. (2004).

Iran localities: Semirom, Sepidān, Tang-e Sarheh.

***Scorlupaster asiaticum* (Lethierry, 1878)***Hysteropterum asiaticum* Lethierry, 1878: 27; Dlabola (1981).*Hysteropterum tshurtshurnum* Linnavuori 1957: 96*Scorlupaster asiaticum*; comb. n. in Emeljanov (1972b).

Iran localities: Shirāz.

Extralimital distribution: Syria, Transcaucasia, Afghanistan, Central and Northern Asia.

***Scorlupaster emersum* (Dlabola, 1981)***Hysteropterum emersum* Dlabola, 1981: 184*Scorlupella emersum*; Mirzayans (1995).

Iran localities: Robāt-e gharebil.

***Scorlupella montana* (Becker, 1865)***Issus montana* Becker, 1865*Scorlupella montana*; Mozaffarian and Gnezdilov (in press).

Iran localities: Ālmeh, Dasht, Kandovān (Āzarbāijān-e Sharghi), Matnagh, Tāzekand, Yāichi.

Extralimital distribution: South Europe, Caucasus, Central Asia, Turkey, East Mediterranean (except North Africa).

***Tautoprosopa transcaspia* (Emeljanov, 1978)***Brachyprosopa transcaspia* Emeljanov, 1978: 332*Verticisium pictifrons* (Melichar, 1906), sensu Dlabola (1979c), misidentification (see Gnezdilov 2002).*Tautoprosopa transcaspia*; Gnezdilov (2002), Gnezdilov et al. (2004).

Iran localities: Dareh gaz, Khalkānlu, Khargh, Māzandarān, Shurlukh.

Extralimital distribution: Kazakhstan, Turkmenia (Gnezdilov 2002).

## Family Kinnaridae

### ***Perloma boroumandi* (Dlabola, 1981)**

*Adolenda boroumandi* Dlabola, 1981: 138; Mirzayans (1995).

*Perloma boroumandi*; Emeljanov (1984).

Iran localities: Bāhukalāt, Geno, Ghasr-e Ghand, Nikshahr.

Comment: Listed as Cixiidae in Dlabola (1981).

### ***Perloma brunnescens* (Emeljanov, 1984)**

*Propleroma brunnescens* Emeljanov, 1984: 471

*Perloma brunnescens*; Wilson 2010a.

Iran localities: Kāravāndar.

Extralimital distribution: UAE (Wilson, 2010a).

### ***Perloma satrapa* (Dlabola, 1981)**

*Adolenda satrapa* Dlabola, 1981: 140

*Perloma satrapa*; Emeljanov (1984).

Iran localities: Ghasr-e Ghand, Kāzerun.

Comment: Listed as Cixiidae in Dlabola (1981).

### ***Perloma zarudnyi* (Emeljanov, 1984)**

*Propleroma zarudnyi* Emeljanov, 1984: 474

*Perloma zarudnyi*; Wilson (2010a).

Iran localities: Kāravāndar.

## Family Lophopidae

### ***Lophops pallidus* Melichar, 1902**

*Lophops pallidus* Melichar, 1902a: 90

*Lophops pallida*; Nast (1972) [listed], Dlabola (1981) [listed].

Iran localities: Anārak.

Extralimital distribution: Saudi Arabia (Dlabola, 1980c).

## Family Meenoplidae

### ***Anigrus farsicus* Dlabola, 1986**

*Anigrus farsicus* Dlabola, 1986: 171

Iran localities: Borāzjān, Rāsk.

***Meenoplus albosignatus* Fieber, 1866**

*Meenoplus albosignatus* Fieber, 1866: 510; Dlabola (1984), Mirzayans (1995).

Iran localities: Sepidān.

Extralimital distribution: Southern Europe, Caucasus, North parts of Western Asia.

***Nisia nervosa* (Motschulsky, 1863)**

*Meenoplus atrovenosus* Lethierry, 1888: 466

*Nisia nervosa*; Mirzayans (1995).

Iran localities: Isin.

Extralimital distribution: widely distributed from subtropical and tropical regions of Old World. North of Africa, North parts of Western Asia, UAE and Eastern Asia.

**Family Nogodinidae*****Hadjia nerii* Dlabola, 1981**

*Hadjia nerii* Dlabola 1981: 197

Iran localities: Isin.

***Hadjia quadrifasciata* Dlabola, 1981**

*Hadjia quadrifasciata* Dlabola 1981: 195

Iran localities: Doborji, Geno, Ghotbābād, Hājiābād.

***Iranissus ephedrinus* Dlabola, 1980, new placement**

*Iranissus ephedrinus* Dlabola, 1980b: 201

Iran localities: Bānuchārehar, Ferdows-e Esfandaghe, Geno, Hājiābād, Jiroft, Mohammadābād, Tis.

Comment: This species was described and placed in Issidae, We here transfer the species to Nogodinidae. (Suggested transfer by V. Gnezdilov pers. comm. and confirmed by MRW by examination of specimens).

***Morsina persica* Melichar, 1902**

*Morsina persica* Melichar, 1902a: 98; Nast (1972) [listed], Dlabola (1981), Mirzayans (1995).

Iran localities: Bazmān, Geno, Gorgān, Jāsk, Jiroft, Mumān, Sendarak.

***Philbyella glarea* Dlabola & Heller, 1962**

*Philbyella glarea* Dlabola & Heller, 1962: 2; Dlabola (1981), Mirzayans (1995), Nast (1972) [listed].

Iran localities: Bandar Abbās, Chābahār, Fāriāb, Kahnuj, Sirjān, Tang-e Sarheh.



**Family Ricaniidae*****Pochazia umbrata* Melichar, 1896**

*Pochazia umbrata* Melichar, 1896: 385; Nast (1972) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Turkmenia, Russia (Siberia) (Nast, 1972).

***Ricania hedenborgi* Stål, 1865**

*Ricania hedenborgi* Stål, 1865: 162; Mirzayans et al. (1976), Dlabola (1981, 1983a [listed], 1984), Mirzayans (1995), Haghshenas and Khajehali (2000)

Iran localities: Chahārmahāl- Bakhtiāri province, Kāzerun, Shirāz, Sarvestān, Alīābād (Jahrom), Hamadān, Asadābād, Izeh.

Extralimital distribution: Greece, Turkey, Armenia.

***Ricania soraya* Dlabola, 1983**

*Ricania soraya* Dlabola, 1983a: 93

Iran localities: Ghaderābād, Kāzerun, Masiri.

**Family Tettigometridae*****Eurychila pantherina* (Horváth, 1891)**

*Tettigometra pantherina* Horváth, 1891: 81

*Eurychila pantherina*; Dlabola (1981, 1984), Mirzayans (1995).

Iran localities: Meshkinshahr, Minushahr.

Extralimital distribution: Transcaucasus, Afghanistan and Central Asia.

***Mitricephalus macrocephalus* (Fieber, 1865)**

*Tettigometra macrocephalus* Fieber, 1865: 569

*Mitricephalus macrocephalus*; Dlabola (1981).

Iran localities: Kandovān (Māzandarān), Lajrān, Tochāl Mountain.

Extralimital distribution: Europe, Turkey, Afghanistan, Central and Northern Asia.

***Tettigometra angulata* Lindberg, 1948**

*Tettigometra angulata* Lindberg, 1948: 19; Dlabola (1972) [listed], Nast (1972) [listed], Mirzayans (1995).

Iran localities: Evin, Kāshān, Rafsanjān.

Extralimital distribution: Transcaucasia, Turkey, Israel, Afghanistan and Central Asia.

***Tettigometra costulata* Fieber, 1865**

*Tettigometra costulata* Fieber, 1865: 572; Melichar (1902a), Dlabola (1971a, 1972, 1981), Nast (1972) [listed], Behdad (1988), Rajabi (1989), Mirzayans (1995), Abaii (2000).

Iran localities: Aliābād (Ghom), Bazmān, Evin, Gazanak, Geno, Ghom, Karaj, Kuhrang, Māku, Marand, Mohammadābād.

Extralimital distribution: North Africa, Southern Europe, Yugoslavia, Transcaucasia, Northern parts of Western Asia, Afghanistan, Central Asia.

***Tettigometra demavenda* Dlabola, 1981**

*Tettigometra demavenda* Dlabola, 1981: 170; Dlabola (1981).

Iran localities: Gazanak, Lajrān.

***Tettigometra depressa* Fieber, 1865**

*Tettigometra depressa* Fieber, 1865: 563; Nast (1972) [listed].

Iran localities: Unknown locality.

Extralimital distribution: North Africa, Southern, Western and Eastern Europe, North West of Asia.

***Tettigometra eremi* Lindberg, 1948**

*Tettigometra eremi* Lindberg, 1948: 27; Nast (1972) [listed], Dlabola (1972, 1981), Mirzayans (1995).

Iran localities: Ābyek, Āmol, Eynvarzān, Gazanak, Kandovān (Māzandarān), Lajrān, Robāt-e gharebil.

Extralimital distribution: Ukraine, Transcaucasia, Turkey, Afghanistan and Central Asia.

***Tettigometra hexaspina* Kolenati, 1857**

*Tettigometra hexaspina* Kolenati 1857: 428; Dlabola (1984)

Iran localities: Kāzerun, Khoy.

***Tettigometra pseudovitellina* Mitjaev, 1971**

*Tettigometra pseudovitellina* Mitjaev, 1971: 75; Dlabola (1981)

Iran localities: Āb Āsk, Marand.

Extralimital distribution: Kazakhstan (Nast, 1972).

***Tettigometra sordida* Fieber, 1865**

*Tettigometra sordida* Fieber, 1865: 571; Nast (1972) [listed].

Iran localities: Unknown locality.

Extralimital distribution: Western and Eastern Europe.

***Tettigometra sororcula* Horváth, 1897**

*Tettigometra sororcula* Horváth 1897a: 90; Dlabola 1994 [listed].

Iran localities: unknown locality.

Extralimital distribution: Southern Europe.

***Tettigometra sulphurea* Mulsant & Rey, 1855**

*Tettigometra sulphurea* Mulsant & Rey, 1855: 209; Mirzayans et al. (1976), Dlabola (1981), Mirzayans (1995).

Iran localities: Ābyek, Dārān, Delijān, Evin, Gāvkosshak, Geno, Ghazvin, Ghom-Esfahān Rd, Kandovān (Āzarbāijān-e Sharghi), Karaj, Rudehen.

Extralimital distribution: Southern, Western and Eastern Europe, North parts of Western Asia, Afghanistan and Central Asia.

***Tettigometra varia* Fieber, 1865**

*Tettigometra varia* Fieber, 1865: 565; Dlabola (1981), Mirzayans (1995).

Iran localities: Ghom, Robāt-e gharebil.

Extralimital distribution: Eastern Europe, Jordan, Afghanistan and Central Asia.

***Tettigometra vitellina* Fieber, 1865**

*Tettigometra vitellina* Fieber, 1865: 566; Barkhordari et al. (1981) [listed], Dlabola (1981), Mirzayans (1995), Mirzayans et al. (1976), Nast (1972) [listed].

Iran localities: Damāvand, Dasht-e arjan, Evin, Firuzkuh, Gazanak, Ghazvin, Kandovān (Māzandarān), Karaj, Māku, Marand, Robāt-e Tork, Saādatsahr, Tehrān.

Extralimital distribution: Yugoslavia, Transcaucasia, Northern parts of Western Asia, Afghanistan and Central Asia.

**Family Tropiduchidae**

***Kazerunia leguaniforma* Dlabola, 1977**

*Kazerunia leguaniforma* Dlabola, 1977a: 164; Dlabola (1977a, 1981 [listed]).

Iran localities: Chābahār.

***Kazerunia ochreata* Dlabola, 1974**

*Kazerunia ochreata* Dlabola, 1974a: 41; Dlabola (1977a).

Iran localities: Fasā, Kāzerun.

***Kazerunia undulata* Dlabola, 1977**

*Kazerunia undulata* Dlabola, 1977a: 166

Iran localities: Ghasr-e Ghand, Sarbāz.

***Ommatissus lybicus* Bergevin, 1930**

*Ommatissus binotatus* Fieber, 1876; Afshar (1937), Gardenhire (1959) [listed], Farahbakhsh (1961), Gharib (1998), Dlabola (1994), Mirzayans (1995), Abaii (2000).

*Ommatissus binotatus lybicus* Bergevin 1930: 20; Gharib (1966), Behdad (1988, 1991).

Iran localities: Bāfgh Kahkom, Bam, Bandar Abbās, Geno, Isin, Jahrom, Jandagh, Khorramshahr, Khur va Biābānak, Mehrān, Shahdād, Tabas.

Comments: Asche and Wilson (1989) recognized the variety *lybicus* as a distinct species.

Extralimital distribution: Middle East (Asche and Wilson 1989), Saudi Arabia (Dlabola, 1979d), UAE (Wilson 2010b).

***Trypetimorpha fenestrata* Costa, 1862**

*Trypetimorpha fenestrata* Costa, 1862: 60; Dlabola (1981), Mirzayans (1995).

Specimens from Iran do not conform exactly to the male genitalia structure illustrated in Huang and Bourgoïn (1993. Figs 40-47) but fall into the variation described for the species.

Iran localities: Dasht.

Extralimital distribution: Cyprus, Yugoslavia, Algeria, Israel, Italy (Huang and Bourgoïn 1993), Kyrgyzia (Novikov et al. 2006).

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### **List of the localities, their coordinates and the codes (Fig. 2)**

- Ābādeh 31°09'N, 52°39'E (F2)  
Ābāsk 35°53'N, 52°10'E (M7)  
Ābyek 36°02'N, 50°31'E (Gz2)  
Ahram 28°53'N, 51°16'E (B4)  
Ahvāz 31°19'N, 48°40'E (Kh10)  
Akbarābād 29°14'N, 52°46'E (F11)  
Akhlamad 36°36'N, 58°57'E (KhR4)  
Albāji 31°29'N, 48°37'E (Kh8)  
Aliābād (Ghom) 35°08'N, 50°59'E (Gh2)  
Aliābād (Jahrom) 29°30'N, 52°35'E (F17)  
Ālmeh 37°23'N, 56°8'E (Gs4)  
Āmol 36°28'N, 52°21'E (M8)  
Anārak 26°44'N, 62°15'E (S16)  
Anbarābād 28°25'N, 57°50'E (Km10)  
Anbarieh 32°19'N, 48°08'E (Kh1)  
Andimeshk 32°27'N, 48°20'E (Kh1)  
Asadābād 34°47'N, 48°07'E (Hd2)  
Asālem 37°43'N, 48°54'E (G2)  
Āzādbar 36°07'N, 51°10'E (T2)

Bābol 36°34'N, 52°42'E (M9)  
Bābolsar 36°41'N, 52°38'E (M9)  
Bāfgh 31°35'N, 55°24'E (Y4)  
Bāft 29°14'N, 56°36'E (Km7)  
Bāghak 28°54'N, 51°07'E (B4)  
Bāhukalāt 25°43'N, 61°25'E (S18)  
Bājgāh 29°43'N, 52°35'E (F9)  
Bam 29°06'N, 58°21'E (Km11)  
Bampur 27°11'N, 60°27'E (S9)  
Bandar Abbās 27°11'N, 56°16'E (H7)  
Bandar Anzali 37°28'N, 49°27'E (G4)  
Bandar Chārak 26°43'N, 54°16'E (H15)  
Bandar Khamir 26°56'N, 55°35'E (H5)  
Bandar Lengeh 26°33'N, 54°52'E (H3)  
Bānuchārehar 28°30'N, 57°00'E (Km8)  
Bārgāh 27°38'N, 57°42'E (Km12)  
Bazmān 27°49'N, 60°11'E (S5)  
Behshahr 36°41'N, 53°32'E (M11)  
Bidhand 33°14'N, 50°18'E (E2)  
Bidruyeh 32°46'N, 48°13'E (Kh1)  
Bidzard 29°21'N, 51°51'E (F6)  
Bilāi 26°30'N, 57°06'E (H12)  
Birjand 32°53'N, 59°12'E (KhJ1)  
Bishāpur 29°43'N, 51°24'E (F5)  
Bojnurd 37°28'N, 57°19'E (KhSh2)  
Borāzjān 29°16'N; 51°12'E (B3)  
Chābahār 25°18'N, 60°37'E (S19)  
Chāhkuh 26°37'N, 54°58'E (H2)  
Chālus 36°39'N, 51°25'E (M3)  
Chenārshāhijān 29°51'N, 51°34'E (F5)  
Dālaki 29°25'N, 51°17'E (B2)  
Damāvand 35°44'N, 52°03'E (T7)  
Dārāb 28°45'N, 54°32'E (F18)  
Dārābād 35°48'N; 51°26'E (T4)  
Dārān 32°58'N, 50°24'E (E6)  
Dārbahāre 30°26'N, 49°54'E (Kh14)  
Darband 36°01'N, 51°28'E (T4)  
Dareh gaz 27°51'N, 56°17'E (H7)  
Darpahn 26°44'N, 57°28'E (H12)  
Darzin 27°58'N, 55°58'E (H6)  
Dasht 37°17'N, 56°07'E (Gs4)  
Dasht-e arjan 29°39'N, 51°58'E (F8)  
Dasht-e Moghān (A)



Dehbakri 29°03'N, 57°55'E (Km9)  
Dehbid 30°38'N, 53°13'E (F10)  
Dehpābid 28°37'N, 60°46'E (S4)  
Delijān 33°59'N, 50°40'E (Mz1)  
Denā mt (west slpe) 30°49'N, 51°35'E (KB1)  
Divāndareh 35°55'N, 47°01'E (Kd1)  
Doborji 28°27'N, 55°06'E (F18)  
Dowlatābād 28°20'N, 56°38'E (Km8)  
Esfahān 32°40'N, 51°40'E (E3)  
Esfarāyen 37°05'N, 57°29'E (KhSh4)  
Eskandari 32°48'N, 50°25'E (E7)  
Eslāmābād 37°42'N, 56°5'E (Gs5)  
Espakeh 26°47'N, 60°14'E (S8)  
Estahbān 29°07'N, 54°02'E (F16)  
Evin 35°40'N, 51°26'E (T4)  
Eynvarzān 35°39'N, 52°12'E (T8)  
Fāriāb 27°28'N, 57°06'E (H10)  
Fasā 28°55'N, 53°38'E (F15)  
Feizābād 36°52'N, 54°33'E (Gs1)  
Ferdows-e Esfadaḡhe 28°44'N, 57°15'E (Km10)  
Firuzābād 28°50'N, 52°34'E (F13)  
Firuzkuh 35°45'N, 52°45'E (T9)  
Galugāh 36°43'N, 53°48'E (M11)  
Gambuyeh 31°23'N, 48°30'E (Kh7)  
Ganāveh 29°34'N, 50°31'E (B1)  
Gāvbandi 27°12'N, 53°03'E (H1)  
Gāvkoshaḡ 29°38'N, 51°48'E (F7)  
Gāvkoshi 28°38'N, 57°12'E (Km10)  
Gazanak 35°54'N, 52°12'E (M6)  
Geno 27°24'N, 56°12'E (H6)  
Ghaderābād 30°20'N, 53°21'E (F2)  
Ghāemshahr 36°28'N, 52°53'E (M9)  
Gharechaman 37°36'N, 47°08'E (Ash4)  
Ghāsemābād 27°10'N, 60°20'E (S8)  
Ghasr-e Ghand 26°12'N, 60°45'E (S13)  
Ghazvin 36°16'N, 50°00'E (Gz1)  
Ghezel-Bolāḡh 39°22'N, 44°12'E (AG1)  
Gholhak 35°46'N, 51°26'E (T4)  
Ghom 34°38'N, 50°53'E (Gh1)  
Ghom Lake (Gh1)  
Ghotbābād 27°46'N, 56°06'E (H6)  
Golbāf 29°51'N, 57°44'E (Km5)  
Gorgān 36°50'N, 54°25'E (Gs2)

Hafttappeh 32°02'N, 48°23'E (Kh2)  
Hājiābād 28°08'N, 55°52'E (H6)  
Hājiābād 28°18'N, 55°54'E (F18)  
Hamadān 34°47'N, 48°30'E (Hd1)  
Hamidieh 31°28'N, 48°26'E (Kh6)  
Hāresābād 36°07'N, 57°36'E (KhR2)  
Hasanlangi 27°21'N, 56°52'E (H9)  
Hashtpar 37°48'N, 48°54'E (G1)  
Heirān 38°22'N, 48°34'E (A2)  
Hessār 36°02'N, 59°20'E (KhR6)  
Hezār mt (Peak) 29°31'N, 57°15'E (Km6)  
Hichān 26°20'N, 60°03'E (S11)  
Hoseinābād 28°51'N, 54°14'E (F18)  
Irānshahr 27°12'N, 60°41'E (S9)  
Isin 27°19'N, 56°17'E (H7)  
Izadkhāst 31°30'N, 52°07'E (F1)  
Izeh 31°49'N, 49°51'E (Kh4)  
Jahānābād 29°42'N, 53°51'E (F14)  
Jahrom 28°30'N, 53°33'E (F17)  
Jandagh 34°03'N, 54°24'E (E4)  
Jāsk 25°38'N, 57°46'E (H14)  
Jiroft 28°40'N, 57°43'E (Km10)  
Kāhe 35°06'N, 58°09'E (KhR8)  
Kahkom 28°12'N, 55°46'E (Y3)  
Kahnūj 27°33'N, 57°42'E (Km12)  
Kahurak 29°26'N, 59°39'E (S3)  
Kahurestān 27°12'N, 55°34'E (H4)  
Kamālābd 29°17'N, 53°02'E (F12)  
Kamandān 33°18'N, 49°27'E (L2)  
Kāmyārān 34°47'N, 46°56'E (Kd3)  
Kandovān (Āzarbāijān-e Sharghi) 37°54'N, 46°05'E (Ash2)  
Kandovān (Māzandarān) 36°08'N, 51°17'E (M6)  
Kangān 27°50'N, 52°04'E (B6)  
Karaj 35°49'N, 50°58'E (T2)  
Kāravāndar 27°57'N, 60°43'E (S4)  
Kāshān, 33°59'N, 51°26'E (E1)  
Kāzerun 29°36'N, 51°39'E (F6)  
Kelārdasht 32°32'N, 50°20'E (M5)  
Kermān 30°14'N, 56°58'E (Km3)  
Kermānshāh (Yazd province) 31°20'N, 54°54'E (Y2)  
Khalkānlu 37°05'N, 58°44'E (KhR1)  
Khalkhāl 37°37'N, 48°31'E (A3)  
Khānekhoreh 30°51'N, 53°08'E (F2)

Khargh 36°57'N, 58°00'E (KhSh3)  
Kharposht 32°49'N, 59°02'E (KhJ1)  
Khātunābād 29°28'N, 57°48'E (Km9)  
Khorramābād 36°45'N, 50°53'E (M2)  
Khorramshahr 30°25'N, 48°11'E (Kh12)  
Khosro- Shirin 30°53'N, 52°00'E (F2)  
Khoy 38°21'N, 44°50'E (AG5)  
Khur va Biābānak 33°46'N, 55°05'E (E5)  
Komehr 30°26'N, 51°52'E (F3)  
Konārdān 28°37'N, 53°20'E (F17)  
Kuhenjān 29°19'N, 52°54'E (F11)  
Kuhrang 32°32'N, 50°20'E (Ch3)  
Kushk 30°31'N, 51°30'E (F4)  
Lāhijān 37°12'N, 50°00'E (G5)  
Lajrān 35°16'N, 52°08'E (T7)  
Lalezār 29°31'N, 56°48'E (Km6)  
Leshtar 32°02'N, 50°16'E (Ch1)  
Māhān 30°05'N, 58°18'E (Km5)  
Mahārlu 29°21'N, 52°49'E (F11)  
Māku 39°17'N, 44°31'E (AG2)  
Malārd 35°40'N, 50°58'E (T3)  
Marāgheh 37°22'N, 46°14'E (Ash6)  
Marand 38°25'N, 45°46'E (Ash1)  
Marg-e-Malek 32°29'N, 50°29'E (Ch1)  
Mashhad 36°17'N, 59°35'E (KhR5)  
Mashhad-e Ardehāl 34°1'N, 51°2'E (E1)  
Masiri 30°15'N, 51°30'E (F4)  
Matnagh 37°50'N, 46°31'E (Ash2)  
Mehrān 33°06'N, 46°09'E (I1)  
Meshkinshahr 38°23' 56N; 47°40' 55E (A1)  
Miāneh 37°25'N, 47°42'E (Ash7)  
Miānjangal 29°06'N, 53°42'E (F15)  
Mijān 28°42'N, 57°56'E (Km10)  
Mināb 27°08'N, 57°05'E (H11)  
Minushahr 30°20'N, 48°13'E (Kh13)  
Mohammadābād 28°57'N, 57°55'E (Km9)  
Mollāsāni 31°35'N, 48°52'E (Kh9)  
Mumān 25°35'N, 60°29'E (S19)  
Nagsh-e Rostam 29°59'N, 52°54'E (F10)  
Nāhārkhōrān 36°45'N, 54°27'E (Gs2)  
Nehbandān 31°41'N, 60°02'E (KhJ2)  
Nikshahr 26°13'N, 60°13'E (S12)  
Nishābur 36°03'N, 59°06'E (KhR3)

Nosratābad 29°03'N, 57°56'E (Km8)  
Nowshahr 36°38'N, 51°30'E (M4)  
Nugh 34°17'N, 58°09'E (KhR8)  
Nurābād 30°06'N, 51°31'E (F4)  
Orumieh 37°33'N, 45°4'E (AG4)  
Orumieh lake (AG)  
Pākuh 27°55'N, 61°30'E (S6)  
Parehsar 37°37'N, 49°02'E (G3)  
Paskuh 27°33'N, 61°38'E (S6)  
Pishin 26°04'N, 61°25'E (S17)  
Pol-e Tang 32°51'N, 48°02'E (L1)  
Posht- e kuh 29°25'N, 56°50'E (Km6)  
Rafsanjān 30°24'N, 55°58'E (Km1)  
Rāmiān 37°01'N, 55°08'E (Gs1)  
Rāsk 26°14'N, 61°23'E (S15)  
Rek 32°15'N, 59°7'E (KhJ1)  
Rezvāndeh 37°33'N, 49°09'E (G3)  
Robāt-e gharebil 37°21'N, 56°16'E (KhSh1)  
Robāt-e Tork 33°44'N, 50°50'E (Mz2)  
Rostamābād 36°54'N, 49°27'E (G7)  
Rudān 27°32'N, 57°25'E (H10)  
Rudbār 36°48'N, 49°23'E (G7)  
Rudbārak 36°04'N, 52°32'E (M5)  
Rudehen 35°44'N, 51°51'E (T6)  
Sāadatshahr 30°06'N, 53°07'E (F10)  
Sabzevār 36°12'N, 57°40'E (KhR2)  
Sanandaj 35°19'N, 46°59'E (Kd2)  
Sangān 28°35'N, 61°19'E (S4)  
Sangrud 36°40'N, 49°38'E (G7)  
Sarāvān 27°08'N, 62°14'E (S7)  
Sarbāz 26°39'N, 61°14'E (S14)  
Sāri 36°33'N, 53°02'E (M9)  
Sarvestān 29°16'N, 53°12'E (F12)  
Sekand 26°43'N, 61°31'E (S14)  
Semirom 31°24'N, 51°34'E (E8)  
Sendarak 26°50'N, 57°25'E (H12)  
Sepidān 29°58'N, 52°23'E (F3)  
Shabestar 38°10'N, 45°41'E (Ash3)  
Shādegān 30°39'N, 48°40'E (Kh11)  
Shahdād 30°25'N, 57°42'E (Km4)  
Shāhkuh-e Pāiin 36°34'N, 54°26'E (Gs3)  
Shahr-e Kord 32°19'N, 50°51'E (Ch2)  
Shāhrud 36°25'N, 55°01'E (Sm1)

Shemirān 35°49'N, 51°24'E (T4)  
Shieh 35°05'N, 50°10'E (G6)  
Shirāz 29°37'N, 52°31'E (F9)  
Shul 30°02'N, 52°09'E (F9)  
Shurlukh 36°20'N, 60°35'E (KhR7)  
Shusf 32°00'N, 59°53'E (KhJ2)  
Shush 32°11'N, 48°14'E (Kh2)  
Shushtar 32°02'N, 48°51'E (Kh3)  
Silvāneh 37°25'N, 44°51'E (AG3)  
Sirik 26°30'N, 57°06'E (H13)  
Sirjān 29°26'N, 55°40'E (Km2)  
Sisakht 30°47'N, 51°33'E (KB1)  
Sufiān 38°16'N, 45°58'E (Ash3)  
Susangerd 31°33'N, 48°11'E (Kh5)  
Suza 26°46'N, 56°03'E (H8)  
Tabas 33°35'N, 56°54'E (Y1)  
Tabriz 38°05'N, 46°17'E (Ash2)  
Taftān 28°36'N, 61°07'E (S4)  
Tākestān 36°03'N, 49°42'E (Gz2)  
Tamandān 28°36'N, 61°04'E (S4)  
Tang-e Sorkheh 26°29'N, 60°02'E (S11)  
Tāzekand 38°16'N, 47°14'E (Ash5)  
Tehrān 35°41'N, 51°24'E (T4)  
Temin 28°40'N, 61°08'E (S4)  
Tis 25°21'N, 60°37'E (S19)  
Tochāl Mountain 35°53'N, 51°26'E (T4)  
Tonekābon 36°49'N, 50°52'E (M1)  
Varāmin 35°19'N, 51°39'E (T5)  
Veresk 35°56'N, 52°58'E (M12)  
Yāichi 37°35'N, 46°11'E (Ash2)  
Yāsuj 30°39'N, 51°35'E (KB2)  
Yazd 31°54'N, 54°20'E (Y2)  
Zābol 31°02'N, 61°29'E (S1)  
Zāboli 27°07'N, 61°40'E (S10)  
Zāhedān 29°29'N, 60°51'E (S2)  
Zanjān 36°40'N, 48°28'E (Z1)  
Zarghān 29°46'N, 52°43'E (F10)  
Zeidān 27°58'N, 51°31'E (B5)  
Ziārān 36°06'N, 50°31'E (T1)  
Ziārat 27°41'N, 57°05'E (H11)  
Zirāb 36°10'N, 52°59'E (M10)  
Zoshk 36°20'N, 59°10'E (KhR4)



# Synopsis of *Falsocis* Pic (Coleoptera, Ciidae), new species, new records and an identification key

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## Abstract

Three new species of *Falsocis* Pic are described: *F. aquilonius* **sp. n.** from Panamá, Costa Rica and Colombia, *F. egregius* **sp. n.** from a single locality in northern Brazil and *F. occultus* **sp. n.** from two localities in southeastern and southern Brazil. New records, comparative notes and an identification key for male and female specimens of *Falsocis* species are also provided.

## Keywords

Minute tree-fungus beetles, Ciinae, Neotropical, Tenebrionoidea

## Introduction

*Falsocis* Pic, 1916 is a distinctive but relatively uniform genus of Neotropical Ciidae, recently redescribed by Lopes-Andrade (2007) and currently including two species: *F. opacus* Pic, 1916, from French Guyana and northern Brazil; and *F. brasiliensis* Lopes-Andrade, 2007, an endangered species occurring in small remnants of the Brazilian

Atlantic Forest in the states of Minas Gerais, Espírito Santo and Bahia. *Falsocis* species are not frequently collected and few specimens are known from museum collections.

The aims of this work are to provide new records and comparative notes on *Falsocis*, descriptions of three additional species of the genus and an updated identification key for the species.

## Material and methods

Slide preparations of male terminalia, and methods for photographing slide preparations and specimens, followed mostly Lopes-Andrade (2011), except for the stereos microscope and camera used, a Zeiss Stemi 2000-C and a Canon EOS 1000D attached, respectively. Terms for external morphology of ciids are explained and discussed by Lopes-Andrade and Lawrence (2005) and Lopes-Andrade (2008). It must be emphasized that “tegmen”, as used here, is synonymous with “paramere”, “parameral piece” or “apicale” and not with the same term as used in Cucujoidea, Chrysomeloidea and Curculionoidea, which is essentially synonymous with phallobase or basal piece (see Lawrence and Lopes-Andrade 2010). The terms “low”, “medium” and “high” (or “minor”, “intermediate” and “major”; Scott 1926) refers to the conspicuousness of secondary sexual characters in male head and pronotum of ciids. Low males are the ones with the weakest horns and/or tubercles, being barely discernible from females. In medium males, these features are conspicuous but not developed at their most. High males have the most prominent horns and/or tubercles. Such variation in male development is common in ciids and usually seen as two categorical forms, low and high, in species known from few localities and/or small series (e.g. *Cis pickeri* Lopes-Andrade et al. and *Xylographus seychellensis* Scott; see Lopes-Andrade et al. 2009; Scott 1926) and seen as a continuum in widely distributed and frequently collected ciids (e.g. *Ceracis cornifer* Mellié; Lopes-Andrade pers. obs.). The new species described here were compared to named specimens of both described *Falsocis* species, and all type specimens were examined. Images of all described and new species are provided, but images of male terminalia of *F. opacus* and *F. brasiliensis* are available in Lopes-Andrade (2007) and not repeated here. The identification key was elaborated to work for both male and female specimens. However, it is not advisable to identify any *Falsocis* based on female specimens alone, since secondary sexual characters and male terminalia are important features for recognizing species.

Range, mean and standard deviation are given for measurements and ratios. Measurements of antennomeres were taken from the holotypes. The following abbreviations are used for measurements and ratios: CL, length of the antennal club; EL, elytral length (median length from base of scutellum to elytral apex); EW, greatest elytral width; FL, length of the antennal funicle; GD, greatest depth of the body; PL, pronotal length along midline (including the anterior pronotal plate in males); PW, greatest pronotal width; TL, total length (EL+PL; head not included). The ratio GD/EW was taken as an indication of degree of convexity; TL/EW indicates degree of body elonga-



tion. Values for TL and TL/EW of the type series of *F. brasiliensis* and the unique available male *F. opacus* are also provided here, since in Lopes-Andrade (2007) TL included the length of the head seen from above. Each description is based on the holotype, which is a fully pigmented male. Differences among paratypes are given in the section on "Variation", together with standard measurements and ratios of the type series.

The distribution map (Fig. 41) was created using latitude and longitude coordinates estimated by tracking localities in the freeware Google Earth 6.0.3 (Google Earth 2011) and plotting them in a map using the freeware DIVA-GIS 7.3.0 (Hijmans et al. 2001).

### The following acronyms are used in this paper:

<b>ANIC</b>	Australian National Insect Collection, CSIRO Entomology (Canberra, Australia)
<b>CMN</b>	Canadian Museum of Nature (Ottawa, Ontario, Canada)
<b>CMNH</b>	Carnegie Museum of Natural History (Pittsburgh, Pennsylvania, USA)
<b>CNCI</b>	Canadian National Collection of Insects (Ottawa, Ontario, Canada)
<b>FMNH</b>	Field Museum of Natural History (Chicago, Illinois, USA)
<b>LAPC</b>	Cristiano Lopes-Andrade Private Collection (Viçosa, MG, Brazil)
<b>MNHN</b>	Muséum National d'Histoire Naturelle (Paris, France)
<b>MTD</b>	Museum für Tierkunde Dresden (Dresden, Germany)

## Taxonomy

### *Falsocis aquilonius* Lopes-Andrade & Lawrence, sp. n.

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[http://species-id.net/wiki/Falsocis\\_aquilonius](http://species-id.net/wiki/Falsocis_aquilonius)

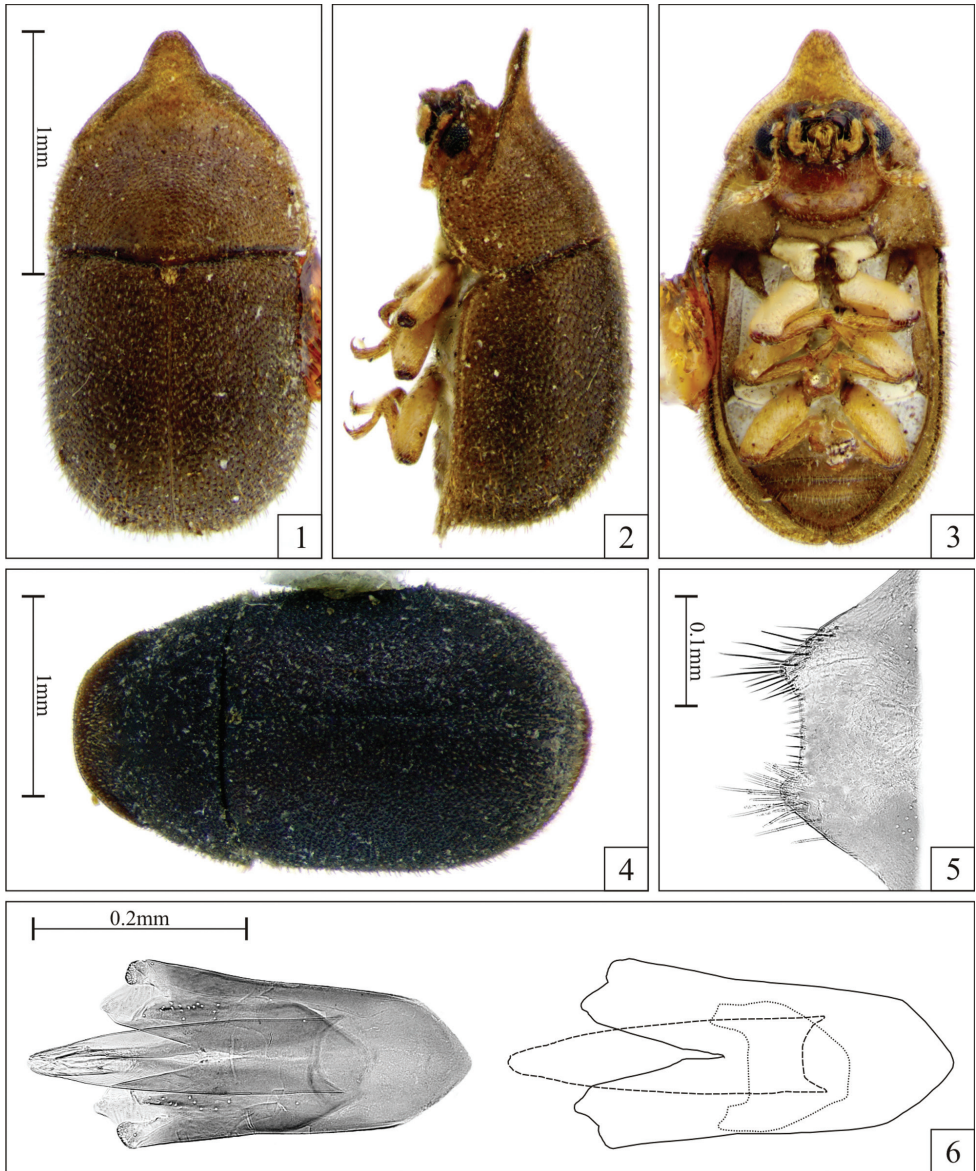
Figs 1–9, 41

**Type locality.** Cerro Campana, in the province of Panamá, Panama (8°26'N, 81°17'W).

**Etymology.** The specific epithet is from the Latin "aquilonius" (adjective), which means "from the North", in reference to its occurrence at the northernmost locality for *Falsocis* species.

**Diagnosis.** Epipleura enlarged posteriorly, but just slightly explanate (Figs 2–3), not or barely visible from above, with external margin simple (not crenulate). Pronotum with lateral margins visible for their entire lengths from above. Male abdominal sex patch small with a diameter of one-fifth the length of the first abdominal ventrite.

**Description.** Male holotype (Figs 1–3), measurements in mm: TL 2.21; PL 0.95; PW 1.11; EL 1.26; EW 1.16; GD 0.89. Ratios: PL/PW 0.86; EL/EW 1.09; EL/PL 1.33; GD/EW 0.77; TL/EW 1.91. Body oblong, strongly convex, mostly yellowish brown; coxae and femora pale yellow; mesoventrite, metaventrite and first abdominal ventrite whitish. Head not visible from above; frontoclypeal ridge slightly raised,



**Figures 1–6.** *Falsocis aquilonius* Lopes-Andrade & Lawrence, sp. n., male holotype **1–3**, shown in the same scale, female paratype from Puntarenas, Costa Rica **4** and slide preparation of male terminalia of a paratype **5–6**. **1** Dorsal view **2** Lateral view **3** Ventral view **4** Dorsal view **5** Eighth sternite **6** Aedeagus (left) and gross outline of aedeagus (right) showing tegmen (continuous line), penis (dashed line) and basal piece (dotted line).

bearing two very short, barely pronounced tubercles; disc slightly convex, closely and coarsely punctate, glabrous; in between punctures finely granulate. Eyes coarsely faceted; greatest eye width 0.15mm. Each antenna (left antenna measured; FL 0.18mm; CL 0.18mm; CL/FL 1.00) with length of antennomeres (in mm) as follows: 0.08;

0.06; 0.06; 0.05; 0.03; 0.02; 0.02; 0.05; 0.05; 0.08. Pronotum with single and coarse punctation; punctures very close to each other on disc and near the lateral and posterior margins, but somewhat shallower and separated by a distance of about one puncture-width at the anterior projection; in between punctures finely granulate; vestiture grayish, dual (seen in lateral view under a magnification of 100×), consisting of conspicuous stout erect bristles (~0.05mm) and very small decumbent setae (a bit less than 0.02mm); anterior angles rounded, produced forward; anterior edge explanate and produced forward forming a plate that slightly curves upward and tapers toward a rounded apex; lateral margins slightly explanate and visible for their entire lengths from above, irregularly crenulate. Hindwings fully developed. Scutellum subtriangular, densely covered by stout decumbent bristles (better seen in lateral view); basal width 0.15mm. Sides of elytra parallel at basal three-fourths, broadly rounded posteriorly (seen from above) and converging to a blunt apex; punctation single and confused; punctures coarse and separated by a distance of one puncture-width or less; in between punctures dull; vestiture dual, similar to that of pronotum; lateral and apical margins not visible from above; epipleura tapering from base to middle, then enlarging to apex, with external margin simple (not crenulate). Ventral surface of thorax and abdomen finely granulate, with vestiture of decumbent slender setae. Prosternum flat; prosternal process laminate, three-fourths the length of procoxae. First abdominal ventrite twice as long as the second at midline; setose sex patch circular and margined, located near the posterior margin and with a diameter of one-fifth the length of the ventrite at midline.

**Male terminalia in paratypes (Figs 5–6).** Eighth sternite (Fig. 5) with posterior margin straight; posterior angles slightly produced forming two small lateral prominences. Basal piece (Fig. 6) nearly one-third the length of tegmen. Tegmen (Fig. 6) with anterior portion subtriangular; lateral margins straight, slightly diverging to apex; posterior portion with a median V-shaped emargination of about one-third the length of tegmen, forming two lateral lobes. Penis (Fig. 6) as long as tegmen, subcylindrical; lateral margins straight for half of their lengths then slightly curved inwards to a narrowly rounded apex.

**Females (Fig. 4).** Similar to males, but frontoclypeal ridge straight, barely sinuous, with rounded angles. Anterior pronotal margin broadly rounded. Abdomen devoid of sex patch.

**Variation.** Males, measurements in mm ( $n = 6$ , including the holotype): TL 2.00–2.84 ( $2.45 \pm 0.32$ ); PL 0.74–1.32 ( $1.02 \pm 0.20$ ); PW 1.00–1.37 ( $1.16 \pm 0.12$ ); EL 1.21–1.47 ( $1.37 \pm 0.11$ ); EW 1.05–1.42 ( $1.23 \pm 0.12$ ); GD 0.84–1.16 ( $0.97 \pm 0.13$ ). Ratios: PL/PW 0.74–0.96 ( $0.87 \pm 0.09$ ); EL/EW 1.04–1.17 ( $1.12 \pm 0.05$ ); EL/PL 1.12–1.64 ( $1.37 \pm 0.18$ ); GD/EW 0.74–0.88 ( $0.79 \pm 0.05$ ); TL/EW 1.90–2.17 ( $1.99 \pm 0.10$ ). The anterior plate (projected anterior margin) of pronotum in males varies from very small (Fig. 7), medium size (Fig. 8, similar to that of holotype) to extremely projected (Fig. 9); but the apex of this plate is rounded or blunt and devoid of tufts. Females, measurements in mm ( $n = 5$ ): TL 2.21–2.53 ( $2.38 \pm 0.14$ ); PL 0.79–0.89 ( $0.83 \pm 0.04$ ); PW 1.11–1.37 ( $1.24 \pm 0.10$ ); EL 1.37–1.63 ( $1.47 \pm 0.11$ ); EW 1.16–1.47



**Figures 7–9.** *Falsocis aquilonius* Lopes-Andrade & Lawrence, sp. n., male paratypes, dorsal view, shown in the same scale. **7** Low male from Cerro Campana (Panama) **8** Medium male from La Lola (Costa Rica) **9** High male from Puntarenas (Costa Rica).

( $1.33 \pm 0.13$ ); GD 0.95–1.16 ( $1.05 \pm 0.08$ ). Ratios: PL/PW 0.60–0.81 ( $0.67 \pm 0.08$ ); EL/EW 1.04–1.27 ( $1.12 \pm 0.09$ ); EL/PL 1.63–1.94 ( $1.78 \pm 0.15$ ); GD/EW 0.74–0.95 ( $0.80 \pm 0.09$ ); TL/EW 1.68–2.14 ( $1.81 \pm 0.19$ ).

**Type series.** *Holotype.* (ANIC) **Panama:** \R.P.: Panama Cerro Campana Feb. 22, 1975 Lawrence, Erwin \ *Phellinus* sp. \ J.F. Lawrence Lot [printed] 3799 [handwritten] \ *Falsocis aquilonius* Lopes-Andrade & Lawrence HOLOTYPUS [printed on red paper]. *Paratypes.* **Panama:** 1 male and 1 female (ANIC), same data as holotype; 3 males (1 ANIC, 2 LAPC), 4 females (2 ANIC, 1 LAPC) \2.5mi S.W.Rincon Puntarenas, Costa Rica, Mar. 1–7, '67 \ J.F. Lawrence Lot. [printed] 2175 [handwritten] \ R. Andrews Collector. **Costa Rica.** 1 male (ANIC) \La Lola, C.R. III-8–1958 M.J. Stelzer [handwritten] \ MS 58.4 [handwritten]; 1 female (ANIC) \Puerto Viejo COSTA RICA VIII-4–65 \ J.F. Lawrence Lot [printed] 1611 [handwritten]. **Colombia.** 1 male (Marseul Collection, MNHN) \Dupont Colomb [18]41 [handwritten in circular green paper] \ MARSEUL [handwritten in rectangular small green paper] \ [circular blue paper, without information] \ FALSOCIS SPP. [handwritten] det. J.F. Lawrence 19 [printed]. All paratypes distinguished labeled \ *Falsocis aquilonius* Lopes-Andrade & Lawrence PARATYPUS [printed on yellow paper].

**Comments and comparative notes.** One specimen collected in an unidentified *Phellinus*. This is the only *Falsocis* species known from Central America, but it also occurs at the northernmost South America (Fig. 41). Recent field collections in Colombia were unsuccessful in recapturing the species, so the country record is based only on a single old male without precise locality data. In *F. opacus*, the epipleura is much more enlarged, easily visible from above, with external margin crenulate; the male eighth



sternite is similar, but basal piece is strongly developed and is almost half the length of aedeagus; tegmen is elongate, four times as long as wide. In the remaining *Falsocis*, the epipleura is narrower near the apex.

***Falsocis egregius* Lopes-Andrade & Lawrence, sp. n.**

urn:lsid:zoobank.org:act:E6BFE936-A896-449F-8D6A-ADE8528F8728

[http://species-id.net/wiki/Falsocis\\_egregius](http://species-id.net/wiki/Falsocis_egregius)

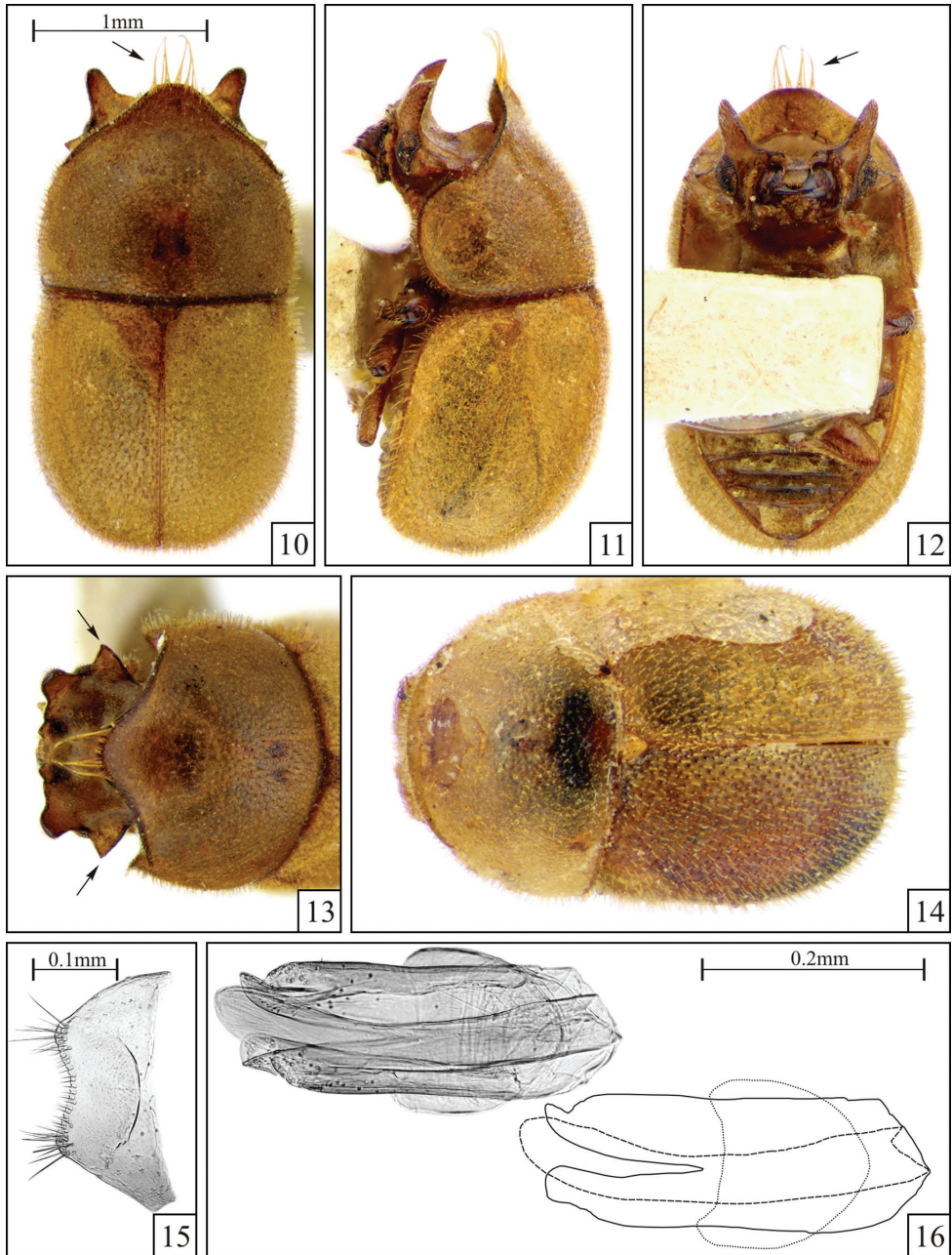
Figs 10–16, 41

**Type locality.** Santarém, in the state of Pará, northern Brazil (2°26'S, 54°42'W).

**Etymology.** The specific epithet is from the Latin “egregius” (adjective), which means “singular”, “extraordinary”, in a reference to the outstanding head morphology of males.

**Diagnosis.** Head of male with sides of vertex produced laterally to form a pair of triangular plates, each with acute apex (Fig. 13, arrows); frontoclypeal horns wide at base and tapering to apex, slightly arcuate. Pronotum with anterior angles broadly rounded, barely produced forward; males with a row of long setae along the apex of the anterior projection but not forming distinct tufts (Figs 10, 12, arrows).

**Description.** Male holotype (Figs 10–13), measurements in mm: TL 2.85; PL 1.25; PW 1.50; EL 1.55; EW 1.55; GD 1.35. Ratios: PL/PW 0.83; EL/EW 1.00; EL/PL 1.24; GD/EW 0.87; TL/EW 1.84. Body oblong, strongly convex, mostly light yellowish brown; mouthparts and apices of femora reddish brown; ventral vestiture consisting of very fine decumbent setae. Head strongly developed, the anterior and lateral margins easily visible from above; dorsum concave, slightly tumid on disc; punctuation relatively fine, shallow, sparse; in between punctures finely granulate; frontoclypeal ridge explanate, each side produced upward forming a conspicuous horn that is slightly arcuate, bearing two small tubercles between them; each side of vertex explanate and produced laterally forming a conspicuous triangular plate with an acute apex (Fig. 13, arrows). Eyes coarsely faceted; greatest width 0.18mm. Each antenna (left antenna measured; FL 0.22mm; CL 0.23mm; CL/FL 1.05) with length of antennomeres (in mm) as follows: 0.12; 0.07; 0.08; 0.04; 0.04; 0.03; 0.03; 0.06; 0.06; 0.11. Pronotum with shallow, coarse, single punctuation; punctures separated by a distance about a puncture-width; in between punctures smooth at disc and finely granulate at the anterior projection; vestiture indistinctly dual, consisting of conspicuous yellowish stout erect bristles (~0.05mm) and very fine decumbent setae (<0.02mm); anterior angles broadly rounded, just slightly produced forward; anterior margin (beyond anterior angles) explanate, produced forward forming a plate that slightly curves downward and narrows toward a slightly arcuate apex with a row of very long slender setae (>0.35mm; Figs 10, 12, arrows). Scutellum subtriangular; punctuation finer than those of pronotum and elytra; vestiture consisting of stout decumbent bristles (better seen in lateral view); basal width 0.21mm. Hindwings fully developed. Elytra subparallel at basal two-thirds, with posterolateral angles broadly rounded (as seen from above) and then converging to a blunt apex; punctuation single and confused, a bit sparser than that of



**Figures 10–16.** *Falsocis egregius* Lopes-Andrade & Lawrence, sp. n., male holotype **10–13** and female paratype **14** shown in the same scale, and slide preparation of male terminalia of a paratype **15–16**. **10** Dorsal view (pronotal tuft of long setae, arrow) **11** Lateral view **12** Ventral view (pronotal tuft of long setae, arrow) **13** Head and pronotum view from above (triangular plate behind eyes, arrows) **14** Female **15** Eighth sternite **16** Aedeagus (left) and gross outline of aedeagus (right) showing tegmen (continuous line), penis (dashed line) and basal piece (dotted line).

pronotum; in between punctures smooth; vestiture indistinctly dual, consisting of conspicuous stout erect bristles ( $\sim 0.07$  mm) and very minute decumbent setae ( $< 0.02$  mm); lateral and apical margins not visible from above; epipleura tapering from base to apex. Surface of the ventral thoracic and abdominal sclerites granulate, somewhat rugose. Prosternum flat; prosternal process laminate, almost half the length of procoxae. First abdominal ventrite more than twice as long as the second at midline; setose sex patch circular and margined, located at the middle of the ventrite and with a diameter of one-third the length of the ventrite at midline.

**Male terminalia in paratypes (Figs 15–16).** Eighth sternite (Fig. 15) with posterior margin curved inward; angles not produced. Basal piece (Fig. 16) almost half the length of tegmen. Tegmen (Fig. 16) with anterior portion broadly rounded; lateral margins almost straight; posterior portion bearing a deep V-shaped emargination reaching the middle of the structure and forming two lateral lobes. Penis (Fig. 16) subcylindrical, lateral margins straight for most of their lengths and a bit expanded to a rounded apex; the penis is turned and lays laterally in the slide preparation.

**Female (Fig. 14).** Similar to males, but frontoclypeal ridge straight, barely sinuous, with rounded angles. Anterior pronotal margin broadly rounded. Abdomen devoid of sex patch.

**Variation.** Males, measurements in mm ( $n = 5$ , including the holotype): TL 2.75–2.95 ( $2.87 \pm 0.08$ ); PL 1.20–1.35 ( $1.26 \pm 0.05$ ); PW 1.50–1.55 ( $1.52 \pm 0.03$ ); EL 1.50–1.65 ( $1.56 \pm 0.05$ ); EW 1.55–1.65 ( $1.57 \pm 0.04$ ); GD 1.30–1.40 ( $1.35 \pm 0.04$ ). Ratios: PL/PW 0.80–0.87 ( $0.83 \pm 0.03$ ); EL/EW 0.97–1.00 ( $0.99 \pm 0.01$ ); EL/PL 1.15–1.32 ( $1.24 \pm 0.06$ ); GD/EW 0.84–0.87 ( $0.86 \pm 0.02$ ); TL/EW 1.77–1.87 ( $1.83 \pm 0.05$ ).

Female, measurements in mm ( $n = 1$ ): TL 2.50; PL 0.95; PW 1.45; EL 1.55; EW 1.50; GD 1.05. Ratios: PL/PW 0.66; EL/EW 1.03; EL/PL 1.63; GD/EW 0.70; TL/EW 1.67.

**Type series.** *Holotype.* (CMNH) **Brazil:** \Santarem Brazil Acc. No.2966 \ CM \ *Falsocis egregius* Lopes-Andrade & Lawrence HOLOTYPUS [printed on red paper]\. *Paratypes.* **Brazil:** 4 males (1 ANIC; 2 CMNH; 1 LAPC, dissected) and 1 female (CMNH) \Santarem Brazil Acc. No.2966 \ CM\, same data as holotype. All paratypes distinguished labeled \Falsocis egregius Lopes-Andrade & Lawrence PARATYPUS [printed on yellow paper]\.

**Comments and comparative notes.** The species is currently known from a single collection in Santarém, northern Brazil (Fig. 41). Only one female was available for examination. The series is very small, but species sufficiently distinct to allow description. Differs from *F. aquilonius* sp. n. and *F. opacus* in having the epipleura narrow posteriorly. *Falsocis occultus* sp. n. has deeper and closer pronotal punctation. Very similar to *F. brasiliensis*, but differing mainly in features mentioned in the diagnosis and in the conspicuous basal piece of male terminalia. In *F. brasiliensis*, the eighth sternite has the anterior margin only slightly curved inward; the basal piece was not observed in the available slide preparations and is possibly membranous (Lopes-Andrade 2007); the tegmen has a subtriangular posterior portion, subparallel lateral margins and anterior V-shape emargination is only one-fourth to one-third deep.

***Falsocis occultus* Lopes-Andrade & Lawrence, sp. n.**

urn:lsid:zoobank.org:act:EF30CDE6-0A8A-444A-9A89-0ECB68E9CB17

[http://species-id.net/wiki/Falsocis\\_occultus](http://species-id.net/wiki/Falsocis_occultus)

Figs 17–25, 41

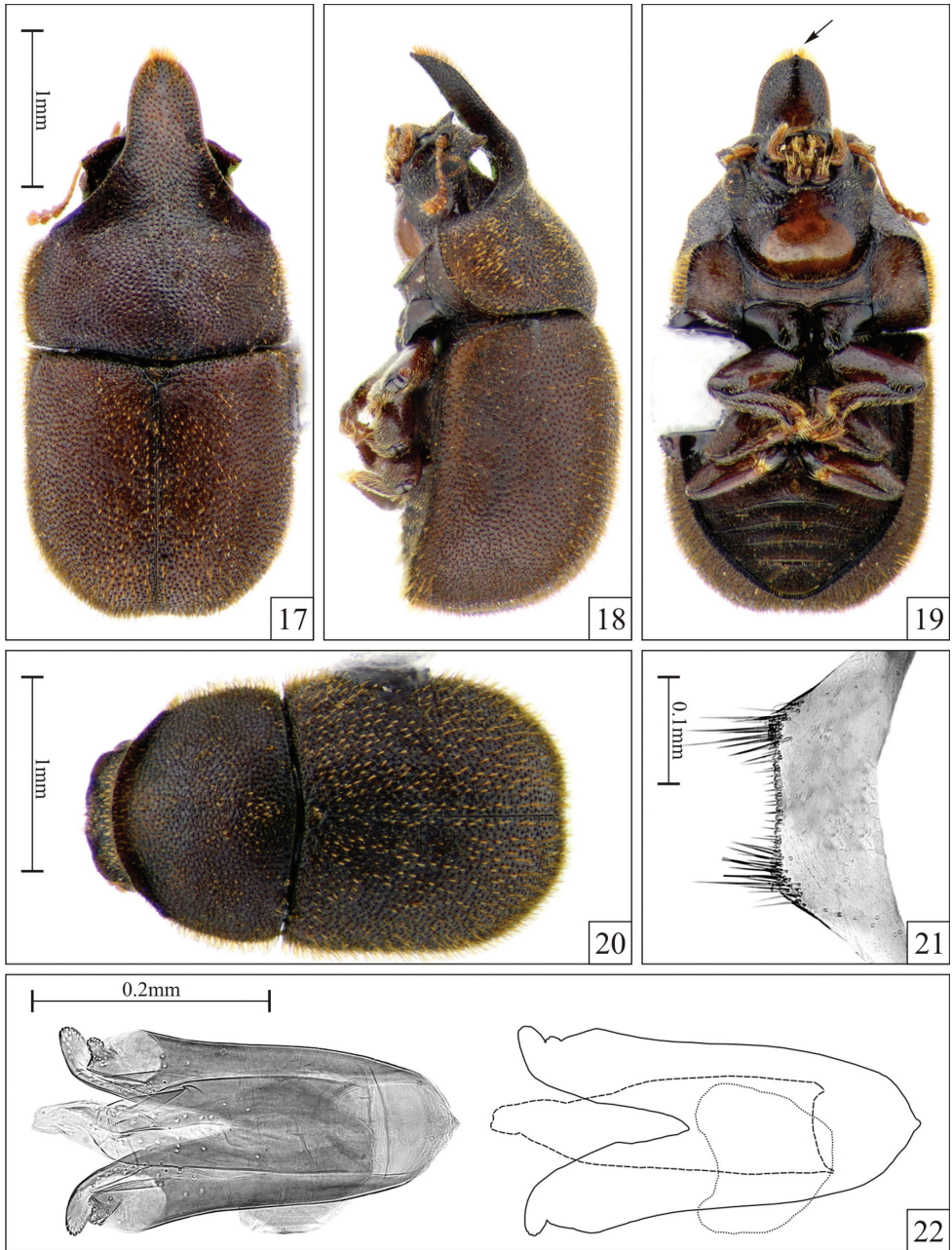
**Type locality.** Linhares, in the state of Espírito Santo, southeastern Brazil (19°23'S, 40°04'W).

**Etymology.** The specific epithet is from the Latin “occultus” (adjective), which means “hidden”, in reference to the fact that the population from the type locality stayed hidden among fungi forgotten in a field-base for near four years.

**Diagnosis.** Pronotum with anterolateral angles not produced forward; lateral margins not visible from above; male with anterior projection ending in an acute apex (Figs 19, 23–25, arrows) bordered by medium-size bristles.

**Description.** Male holotype (Figs 17–19), measurements in mm: TL 3.55; PL 1.70; PW 1.75; EL 1.80; EW 1.75; GD 1.40. Ratios: PL/PW 0.97; EL/EW 1.03; EL/PL 1.06; GD/EW 0.80; TL/EW 2.03. Body oblong, strongly convex, mostly dark brown; mouthparts, antennae and tarsi dark yellowish brown; femora and tibiae dark reddish brown. Head concealed by the anterior pronotal projection (seen from above) except for its anterolateral angles; dorsum concave with disc slightly tumid; punctation coarse, shallow; in between punctures finely granulate; frontoclypeal ridge explanate and produced forming a broad acute triangular plate at each anterior angle, with two small tubercles between them. Eyes coarsely faceted; greatest eye width 0.21mm. Each antenna (left antenna measured; FL 0.30mm; CL 0.28mm; CL/FL 0.93) with length of antennomeres (in mm) as follows: 0.15; 0.09; 0.08; 0.08; 0.06; 0.05; 0.03; 0.08; 0.08; 0.12. Pronotum with single, coarse, relatively deep punctation; punctures very close to each other, separated by a distance of one puncture-width or less; in between punctures smooth but not shining; vestiture yellowish, indistinctly dual (seen under a magnification of 100×), consisting of stout erect bristles (~0.05mm) and small decumbent setae (~0.03mm), both better seen in lateral view; anterior angles not produced forward; anterior margin (beyond anterior angles) explanate, strongly produced forward forming a plate that slightly curves downward and narrows toward an acute apex (Fig. 19, arrow) ornamented by a row of increasingly stout bristles in either side (Figs 17–19); lateral margins slightly crenulate, not visible from above, bearing a row of stout bristles. Scutellum subtriangular, its margins indistinct so that it seems to be contiguous with elytra; punctation conspicuous but slightly finer than those of pronotum and elytra; vestiture consisting of stout decumbent bristles (better seen in lateral view); basal width 0.20mm. Hindwings fully developed. Elytra parallel at basal three-fourths, posteriorly broadly rounded (as seen from above) and converging to a blunt apex; punctation single and confused, slightly finer than that of pronotum, consisting of relatively deep punctures separated by a distance near a puncture-width; in between punctures smooth, dull; vestiture distinctly dual, the erect bristles about 0.1mm long





**Figures 17–22.** *Falsocis occultus* Lopes-Andrade & Lawrence, sp. n., male holotype **17–19** and female paratype **20** shown in the same scale, and slide preparation of male terminalia of a paratype **21–22**. **17** Dorsal view **18** Lateral view **19** Ventral view (acute pronotal apex, arrow) **20** Dorsal view **21** Eighth sternite **22** Aedeagus (left) and gross outline of aedeagus (right) showing tegmen (continuous line), penis (dashed line) and basal piece (dotted line).



**Figures 23–25.** *Falsocis occultus* Lopes-Andrade & Lawrence, sp. n., male paratypes **23–24** shown in the same scale, dorsal view (acute pronotal apex, arrows). **23** Low male from Linhares (in the state of Espírito Santo, southeastern Brazil) **24** Medium male from Linhares **25** The unique specimen known from Nova Teutônia (in the state of Santa Catarina, southern Brazil).

and the decumbent setae about 0.03mm long; lateral and apical margins not visible from above; epipleura tapering from base to the basal one-sixth, then continuing as a narrow line to the apex. Ventral surfaces of thorax and abdomen finely granulate; vestiture consisting of slender decumbent setae. Prosternum flat; prosternal process laminate, two-thirds the length of the procoxae. First abdominal ventrite more than twice as long as the second at midline; setose sex patch suboval and margined, located at the middle of the ventrite and with a diameter of one-third the length of the ventrite at midline.

**Male terminalia in paratypes (Figs 21–22).** Eighth sternite (Fig. 21) with posterior margin almost straight; angles not produced. Basal piece (Fig. 22) nearly one-third the length of tegmen. Tegmen (Fig. 22) with anterior portion mostly rounded but apex acute; lateral margins slightly sinuous and diverging; posterior portion bearing a deep V-shaped emargination reaching the middle of the structure, forming two lateral lobes. Penis (Fig. 22) subcylindrical; lateral margins subparallel for most of their lengths; apical third subtriangular, membranous.

**Females (Fig. 20).** Similar to males, but frontoclypeal ridge straight, barely sinuous, with rounded angles. Anterior pronotal margin broadly rounded. Abdomen devoid of sex patch.

**Variation.** Males, measurements in mm (n = 15, including the holotype): TL 2.11–3.55 (2.84 ± 0.42); PL 0.84–1.70 (1.28 ± 0.25); PW 1.16–1.75 (1.48 ± 0.17); EL 1.25–1.80 (1.53 ± 0.19); EW 1.21–1.84 (1.52 ± 0.17); GD 0.95–1.47 (1.22 ± 0.16). Ratios: PL/PW 0.73–0.97 (0.86 ± 0.07); EL/EW 0.86–1.07 (1.01 ± 0.05); EL/PL 1.00–1.50

(1.22 ± 0.15); GD/EW 0.72–0.93 (0.80 ± 0.05); TL/EW 1.73–2.03 (1.86 ± 0.09). In the unique specimen from Nova Teutonia, a teneral male, pronotal and elytral bristles are larger (0.08mm and 0.15mm, respectively) than in specimens from Linhares. In small males, the anterior pronotal plate is barely projected (Fig. 23). However, all males have an acute pronotal apex (Figs 19, 23–25, arrows). Females, measurements in mm (n = 15): TL 2.30–3.15 (2.63 ± 0.27); PL 0.80–1.16 (0.97 ± 0.11); PW 1.05–1.75 (1.42 ± 0.19); EL 1.40–2.00 (1.64 ± 0.18); EW 1.10–1.85 (1.50 ± 0.19); GD 1.05–1.50 (1.23 ± 0.15). Ratios: PL/PW 0.62–0.81 (0.69 ± 0.05); EL/EW 1.00–1.41 (1.11 ± 0.10); EL/PL 1.50–2.00 (1.71 ± 0.15); GD/EW 0.79–0.95 (0.83 ± 0.04); TL/EW 1.64–2.23 (1.77 ± 0.14).

**Type series.** *Holotype.* (LAPC) **Brazil:** \BRASIL: ES Linhares 11–21.x.2004 P.C. Grossi leg. \ *Falsocis occultus* Lopes-Andrade & Lawrence HOLOTYPUS [printed on red paper]\. *Paratypes.* **Brazil:** 56 (27 males, 1 dissected, and 19 females, LAPC; 5 males and 5 females, ANIC), same data as holotype; 1 male (FMNH) \Nova Teutonia, Sta. Catharina, BRAZ. 300–500m alt. Fritz Plaumann leg [printed] XI:1940 [handwritten] \ [circular red paper, without information] \ *Falsocis* sp. 115 \. All paratypes distinguished labeled \ *Falsocis occultus* Lopes-Andrade & Lawrence PARATYPUS [printed on yellow paper]\.

**Other specimens examined.** 26 specimens, gender not determined (2 CNCI for molecular analysis, 4 LAPC in absolute alcohol, 20 MTD), same data as holotype.

**Comments and comparative notes.** Known from two localities, in southeastern and southern Brazil (Fig. 41). The specimens from Linhares (in the state of Espírito Santo, southeastern Brazil) were collected in *Hexagonia papyracea* Berk. (Polyporaceae) and bred in the laboratory until December 2009 in the original basidiomes, without addition of either water or nutrients. In male *F. brasiliensis* and *F. egregius* sp. n., the apex of the pronotal projection bears a row of setae that are comparatively longer (Figs 10–12, 26–29, 33–34). Differs from *F. aquilonius* sp. n. and *F. opacus* in having the epipleura narrow posteriorly.

## **New distributional data, additional comments and comparative notes**

### ***Falsocis brasiliensis* Lopes-Andrade, 2007**

[http://species-id.net/wiki/Falsocis\\_brasiliensis](http://species-id.net/wiki/Falsocis_brasiliensis)

Figs 26–34, 41

**Additional records.** **Brazil:** 1 female (LAPC) \BRASIL: ES Santa Maria de Jetibá 08.xii.2003 leg. Furieri & Nunes\; 3 males (1 LAPC, in absolute alcohol; 2 CNCI, for molecular analysis) and 1 female (LAPC, in absolute alcohol) \BRASIL: MG Viçosa “Belvedere” 03.ii.2011 leg. L.S. Araújo, C.A. Carvalho\; 2 males and 1 female (LAPC) \BRASIL: MG Viçosa Mata da Biologia, ponto 37 16.iv.2010; leg. T. Mariani & C. Lopes-Andrade; ex *Hymenochaete luteobadia*\; 2 males (LAPC) \BRASIL: MG Viçosa Mata da Biologia, ponto 048 20.iv.2011; C. A. Carvalho & C. Lopes-Andrade; ex *Hymenochaete luteobadia*\.

**Comments.** The specimens from Viçosa (in the state of Minas Gerais, southeastern Brazil; Figs 26–31) were all collected in *Hymenochaete luteobadia* (Fr.) Höhn. & Litsch.





**Figures 26–31.** *Falsocis brasiliensis* Lopes-Andrade, 2007, specimens from Viçosa (in the state of Minas Gerais, southeastern Brazil), all shown in the same scale. **26** Dorsal view (produced angles, large arrows; two tufts of long setae, small arrows) **27** Lateral view **28** Ventral view (produced angles, large arrows; two tufts of long setae, small arrows) **29** Head and pronotum view from above **30** Low male **31** Female.

(Hymenochaetacea). This fungus was previously misidentified as *Phellinus* sp. (Lopes-Andrade 2007, Graf-Peters et al. 2011). After its description, the species was recollected in Viçosa and a single female was found in Santa Maria de Jetibá (in the state of Espírito Santo, southeastern Brazil; Fig. 32). The species is restricted to forests, known only from small remnants, and was never found in open areas. Specimens from Venda Nova do Imigrante (Espírito Santo; Fig. 33) are reddish, and the ones from Jussari (in the state of Bahia; Fig. 34) are dark brown. In low males (Fig. 30), the frontoclypeal and pronotal projections are very weak and the pronotum narrower anteriorly. TL (in mm, not including the head) and TL/EW of the type series are as follows: Males (n = 10, including the holotype), TL 2.00–2.80 (2.25 ± 0.22), TL/EW 1.54–1.81 (1.64 ± 0.07); Females (n = 5), TL 2.00–2.35 (2.14 ± 0.14), TL/EW 1.48–1.68 (1.60 ± 0.08).



**Figures 32–34.** *Falsocis brasiliensis* Lopes-Andrade, 2007, dorsal view, shown in the same scale. **32** The unique female specimen from Santa Maria de Jetibá, in the state of Espírito Santo, southeastern Brazil **33** Male paratype from Venda Nova do Imigrante, Espírito Santo (two tufts of long setae, arrows) **34** Male paratype from Jussari (in the state of Bahia).

***Falsocis opacus* Pic, 1916**

[http://species-id.net/wiki/Falsocis\\_opacus](http://species-id.net/wiki/Falsocis_opacus)

Figs 35–37, 41

**Comments.** The subspecies *F. opacus flavus* Pic, 1922 was based on a single female collected in Bas-Maroni (French Guyana, near Cayenne), and it is merely a teneral specimen of *F. opacus* (J. F. Lawrence pers. obs.). The type of *F. opacus* (MNHN) is 2.10mm long, rather than 3mm as mentioned in the description (Pic 1916), but other measurements were not taken by the time it was examined. In the unique male *F. opacus* measured by Lopes-Andrade (2007), TL is 3.05mm and TL/EW 1.91, not including the head.

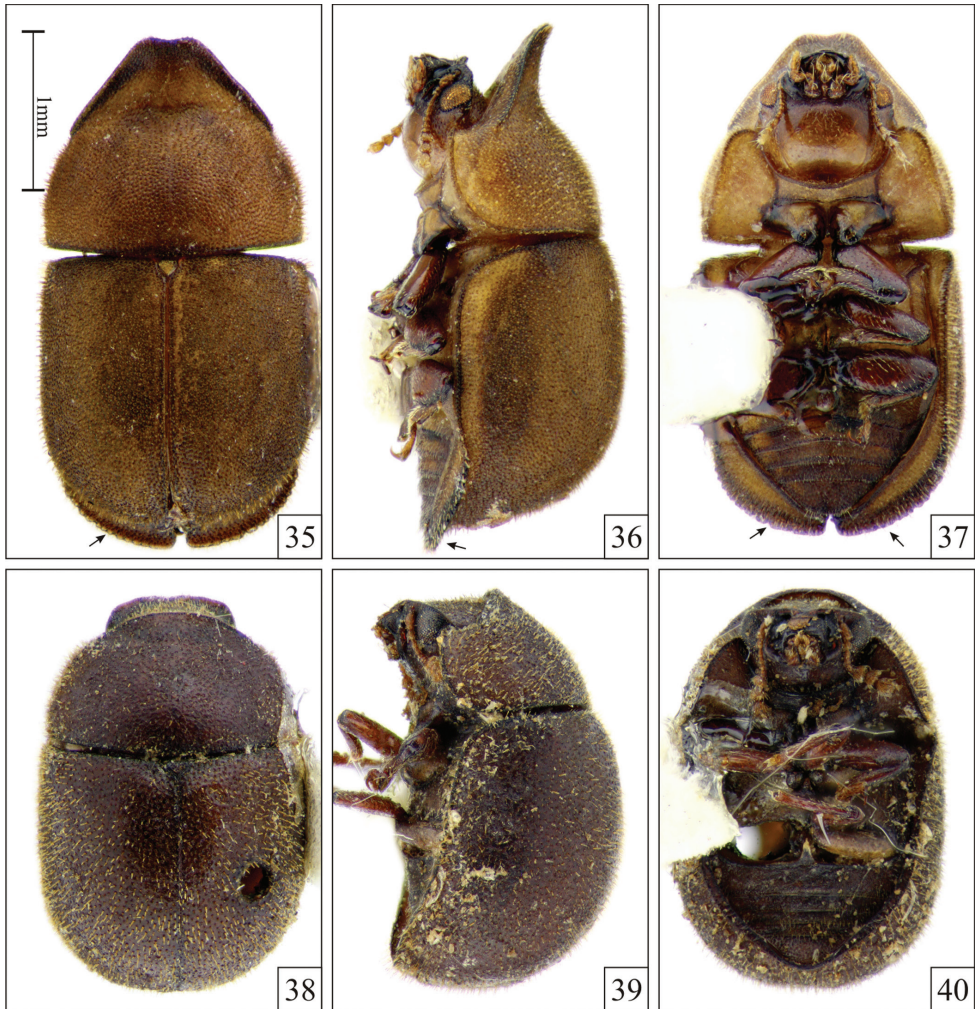
***Falsocis* sp.**

<http://species-id.net/wiki/Falsocis>

Figs 38–41

**Record.** 1 female (MNHN) **Peru:** \Mission de Sarayacu (Riv. Ucayale) [Ucayali] [handwritten in green paper] \ CO 47 [handwritten in a circular yellowish paper] \ MUSEUM PARIS PÉROU PAMPAS [sic] DEL SACRAMENTO DE CASTELNAU 1847 [written in light brown paper] \ [circular blue paper, without information] \.

**Comments and comparative notes.** The specimen was collected at Sarayacu Mission (6°47'S, 75°07'W, Fig. 41) during the French Scientific Expedition to the Pampa del Sacramento, Peru, in 1847. It resembles females of *F. brasiliensis*, *F. egregius* sp. n.



**Figures 35–40.** *Falsocis opacus* Pic, 1916, from Altamira, in the state of Pará, northern Brazil **35–37**; arrows pointing out the explanate outer apical margins of epipleura and *Falsocis* sp., female from Peru **38–40**, all shown in the same scale. **35, 38** Dorsal view **36, 39** Lateral view **37, 40** Ventral view.

and *F. occultus* sp. n. in having the epipleura narrow posteriorly. However, the shallow punctation of pronotum resembles mostly that of the former two species. Female *F. brasiliensis* from Jussari (Brazil) are similar in color, but body is more elongate. It is very large, with a length of near 3mm. Only females of *F. occultus* sp. n. reach such a length. A subquadrate body is also observed in a few *F. brasiliensis*, but the largest females of this species are only 2.4mm long. The very transverse pronotum, twice as long as wide, does not occur in any other known *Falsocis* species. This female from Peru possibly belongs to another new species, but description is not possible without examining a male. Measurements (in mm) and ratios are as follows: TL 3.05; PL 1.00; PW 2.00; EL 2.00; EW 2.11; GD 1.68; PL/PW 0.50; EL/EW 0.95; EL/PL 2.00; GD/EW 0.80; TL/EW 1.45.





**Figure 41.** Distribution map for *Falsocis* Pic species. *Falsocis aquilonius* sp. n. (full circle), *F. brasiliensis* Lopes-Andrade (full squares), *F. egregius* sp. n. (open triangle), *F. occultus* sp. n. (open circles), *F. opacus* Pic (x) and *Falsocis* sp. (open star inside full circle). The question mark indicates an imprecise location of *F. aquilonius* sp. n. in Colombia.

**Identification key to the species of *Falsocis* Pic**

- 1 Epipleura enlarged posteriorly, forming a slightly or strongly explanate posterolateral margin in elytra, conspicuously or barely visible from above.....2
- 1' Epipleura narrowing to apex, forming a narrow, not explanate, posterolateral margin in elytra, not visible from above .....3
- 2(1) Pronotum with lateral margins visible from above. Posterior elytral margin (outer margin of epipleura) simple (not crenulate), barely visible from above. Known from Panamá, Costa Rica and Colombia ... ***Falsocis aquilonius* sp. n.**
- 2' Pronotum with lateral margins not visible from above. Posterior elytral margin (outer margin of epipleura) crenulate, easily visible from below and above (Figs 35–37, arrows). Known from Brazil (Altamira, in the state of Pará) and French Guyana ..... ***Falsocis opacus* Pic, 1916**
- 3(1') Pronotal punctation deep and coarse, with punctures usually separated by half a puncture-width or less at disc. Anterior plate of pronotum in males

- devoid of tufts of very long setae and acute at apex (Figs 19, 23–25).....
- ..... ***Falsocis occultus* sp. n.**
- 3' Pronotal punctation shallow and fine, with punctures usually separated by about a puncture-width at disc. Anterior plate of pronotum in males with slender setae usually as long as to twice as long (or more) than an eye-width, with apex straight, barely emarginated or slightly rounded..... 4
- 4(3') Anterior pronotal angles distinctly produced forward and somewhat acute (Figs 26, 28, large arrows). Males with head devoid of conspicuous projection behind each eye (Fig. 29); long setae of anterior pronotal plate organized in two tufts (Figs 26, 28, 33, small arrows) .....
- ..... ***Falsocis brasiliensis* Lopes-Andrade, 2007**
- 4' Anterior pronotal angles barely produced forward and rounded (Figs 10-12). Males with head bearing a conspicuous triangular plate, projected outward, behind each eye (Fig. 13, arrows); long setae of anterior pronotal plate organized as a row, not forming tufts (Figs 10, 12, arrows) .....
- ..... ***Falsocis egregius* sp. n.**

**Discussion**

The phylogenetic position of *Falsocis* is uncertain. In the available phylogenetic analysis of the family, based on molecular data, *F. brasiliensis* was not part of any defined clade (Buder et al. 2008). It is morphologically related to *Acanthocis* Miyatake from Japan, with a unique combination of features among Ciini (Lopes-Andrade 2007): prominent outer apical angle of protibiae, forming an acute tooth; laminate prosternal process; and subconical procoxae. However, these features are also observed in *Porculus* Lawrence, in which species also have a very elongate female ovipositor similar to that of *Falsocis*, male terminalia with tegmen bearing a deep V-shaped emargination and subcylindrical penis (Lopes-Andrade pers. obs). *Porculus* differs from *Falsocis* and *Acanthocis* in the single punctation of pronotum and elytra, and dorsal vestiture consisting of minute setae (Lawrence 1987, Lopes-Andrade 2007). A strongly sclerotized female ovipositor devoid of gonostyli was observed in *P. grossus* Lawrence (Lawrence and Lopes-Andrade 2010), but in *P. brunneus* (Mellié) the structure is complete and less sclerotized, similar to that of *Falsocis* species. *Falsocis* and *Porculus* are restricted to the Neotropical region (sensu Morrone 2002), and *Acanthocis* is known only from Japan (Lawrence and Lopes-Andrade 2010). These three genera possibly constitute an independent lineage of Ciinae.

Species of *Falsocis* are not frequently collected and all are allopatric. They are known only from forests or forest remnants and usually one or few specimens are found together in the field. The greatest series is that for *F. occultus* sp. n., which was reared in laboratory. Accurate data on host fungi are scarce. Available information on *F. brasiliensis* suggests the species is monophagous (Graf-Peters et al. 2011). It was considered an endangered species by Lopes-Andrade (2007). However, not only this species but possibly all *Falsocis* are seriously threatened or endangered. For instance, besides great collection efforts in the state of Rio Grande do Sul, southern Brazil (Graf-Peters et al. 2011) and in an unpublished



survey in Pará, northern Brazil (Lopes-Andrade pers. obs.), no *Falsocis* was collected. Most of the recent records (from 2000 up to know) are from the Brazilian Atlantic Forest, from small remnants in southeastern and the most southern portion of northeastern Brazil. The single old record of *F. occultus* sp. n. from Nova Teutônia, in the state of Santa Catarina, suggests the species would have had a very broad distribution throughout the Atlantic Forest. This biome has been seriously affected and fragmented by land use and urbanization, and less than 8% of the original forests still remain (Colombo and Joly 2010).

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# Rainforest understory beetles of the Neotropics, *Mizotrechus* Bates 1872, a generic synopsis with descriptions of new species from Central America and northern South America (Coleoptera, Carabidae, Perigonini)

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## Abstract

Information on the single previously described species, *Mizotrechus novemstriatus* Bates 1872 (type locality: Brazil – Amazonas, Tefé), is updated and 17 new species for the genus from Nicaragua, Costa Rica, Panamá, Colombia, Venezuela, and Guyane are described. The species records in the literature and on determined specimens in some collections of *M. novemstriatus* Bates from Central America are not that species; currently, *M. novemstriatus* is known only from its type locality in Amazonian Brazil. For the new species described, their known general distributions are as follows: *Mizotrechus batesi* **sp. n.** (Guyane), *Mizotrechus bellorum* **sp. n.** (Guyane), *Mizotrechus brulei* **sp. n.** (Guyane), *Mizotrechus beveledere* **sp. n.** (Guyane), *Mizotrechus costaricensis* **sp. n.** (Costa Rica), *Mizotrechus dalensi* **sp. n.** (Guyane), *Mizotrechus edithpiafae* **sp. n.** (provenance unknown), *Mizotrechus fortunensis* **sp. n.** (Panamá), *Mizotrechus gorgona* **sp. n.** (Colombia), *Mizotrechus grossus* **sp. n.** (Guyane), *Mizotrechus jefe* **sp. n.** (Panamá), *Mizotrechus marielaforetae* **sp. n.** (Guyane), *Mizotrechus minutus* **sp. n.** (Guyane), *Mizotrechus neblinensis* **sp. n.** (Guyane, Venezuela), *Mizotrechus poirieri* **sp. n.** (Guyane), and *Mizotrechus woldai* **sp. n.** (Panamá). Long-term use of flight intercept traps in Guyane provided so many new species that apparently the use of FITs is the way to collect adults of this taxon, previously known from very few specimens. Many more species of this genus can be expected to be discovered throughout the

Neotropics; the present contribution is a preliminary synopsis with identification key and adult images of all known species. Likely numerous species are yet to be discovered throughout tropical climes.

### Keywords

Flight Intercept Traps (FITs), light traps, Neotropics, Nicaragua, Costa Rica, Panamá, Colombia, Venezuela, Guyane, Brazil

### Resumen

Se actualiza la información sobre la única especie descrita anteriormente, *Mizotrechus novemstriatus* Bates 1872 (localidad tipo: Brasil – Amazonas, Tefé) y se describen 17 nuevas especies dentro del género provenientes de Nicaragua, Costa Rica, Panamá, Colombia, Venezuela y Guayana Francesa. Los registros para la especie en la literatura y en especímenes identificados en algunas colecciones de *M. novemstriatus* Bates de Centroamérica no son esa especie; actualmente, *M. novemstriatus* se conoce solamente de su localidad tipo en el área amazónica de Brasil. Para las nuevas especies que se describen, sus distribuciones conocidas son las siguientes: *Mizotrechus batesi* sp. n. (Guayana Francesa), *Mizotrechus bellorum* sp. n. (Guayana Francesa), *Mizotrechus brulei* sp. n. (Guayana Francesa), *Mizotrechus belvedere* sp. n. (Guayana Francesa), *Mizotrechus costaricensis* sp. n. (Costa Rica), *Mizotrechus dalensi* sp. n. (Guayana Francesa), *Mizotrechus edithpiafae* sp. n. (procedencia desconocida), *Mizotrechus fortunensis* sp. n. (Panamá), *Mizotrechus gorgona* sp. n. (Colombia), *Mizotrechus grossus* sp. n. (Guayana Francesa), *Mizotrechus jefe* sp. n. (Panamá), *Mizotrechus marielaforetae* sp. n. (Guayana Francesa), *Mizotrechus minutus* sp. n. (Guayana Francesa), *Mizotrechus neblinensis* sp. n. (Guayana Francesa, Venezuela), *Mizotrechus poirieri* sp. n. (Guayana Francesa), y *Mizotrechus woldai* sp. n. (Panamá). El uso prolongado de trampas de intersección de vuelo en Guayana Francesa proveyó tantas nuevas especies que aparentemente el uso de estas trampas es la única manera para coleccionar adultos de este taxón, previamente conocido de muy pocos especímenes. Muchas más especies de este género se esperan descubrir a través de los Neotrópicos; esta contribución es una sinopsis preliminar con clave de identificación e imágenes de los adultos de todas las especies conocidas. Probablemente numerosas más especies están por encontrarse en los trópicos.

### Palabras clave

Trampas de intersección de vuelo, trampas de luz, Neotrópicos, Nicaragua, Costa Rica, Panamá, Colombia, Venezuela, Guayana Francesa, Brasil

### Introduction

Bates (1872) proposed the genus *Mizotrechus* for several species including, *Mizotrechus novemstriatus* Bates 1872. The other species were later transferred by him (Bates, 1883) to *Perigona* Laporte de Castelnau 1835. Thus, *Mizotrechus* has been thought to be monobasic since Bates' action in 1883. Bates (1883) also regarded a specimen from Chontales, Nicaragua collected by Janson to be the same species he described from Ega (now Tefé), Brazil. Careful study reported herein of male genitalia and body proportions indicates Bates' determination to be incorrect. Now that many new species have emerged from Guyane (French Guiana and "Cayenne" of earlier authors) and Central American collections and I have been able to study Bates' Ega type, I regard all Central American specimens identified as *Mizotrechus novemstriatus* Bates to be misidentifications. Given the uniformity of shape and color of species in this genus (Figs 1–18) and

the previous paucity of specimens to study, it is understandable that mistakes could have been made. With the incredible new collections from Guyane, some species in ample series, it is time to set this genus on the road to a better understanding; that is the purpose of this paper which is predictably just the beginning.

## Methods and specimens

Methods and species concepts follow those previously described (Erwin and Kavanaugh 1981; Kavanaugh and Erwin 1991). The species validation and diagnosis format follows as closely as possible that suggested in Erwin and Johnson (2000). Measurements of length (ABL, SBL) and width (TW) follow those of Ball (1972) and Kavanaugh (1979): ABL (apparent body length), measured from apex of labrum to apex of longer elytron (in adults of this genus, the abdomen often protrudes beyond the elytral apex, thus the ABL often is much larger than the SBL; SBL (standardized body length), equals the sum of the lengths of the head (measured from apex of clypeus to a point on midline at level of the posterior edge of compound eyes); PL (pronotum length) is measured from apical to basal margin along midline; LE (elytron length) is measured from apex of scutellum to apex of the longer elytron; and TW (total width) measured across both elytra at their widest point with suture closed. Attributes of the elytron include the basic elytral structure occurring between the elytral intervals that frequently has been expressed as a “stria,” or “row of punctures,” etc. I refer to this structure as an interneur (Erwin 1974). Attributes of the abdominal ventral sterna are referred to using the numbering system generally accepted in Carabid studies, i.e., the sternum divided medially by the hind coxae is sternum II (the first being hidden) and the last visible is sternum VII (Liu et al., 2011). In describing attributes of the male genitalia, the proximal end of the median lobe has traditionally been referred to as the “basal bulb” in studies of Carabidae. However, in many more basal groups, the proximal end is not a sclerotized bulb as it is in most higher groups such as the Lebiini. In my revision of the genus *Pericompsus* (Erwin, 1974), I encountered the same problem with the term “stria” for features of the elytra. The result was the use of the term “interneur” to apply to the attribute lying between intervals. Through use of this term, one could describe the feature as interneur striate, punctate, striatiopunctate, etc. The same holds true for the proximal end of the median lobe. In Snodgrass (1935), the term “phallobase” is used, and I have adopted it here. So, by extension, in Carabidae we can say phallobase hooded (Lebiini), phallobase of two parallel sclerotized struts (basal trechines and *Andinodontis*), phallobase of two uneven struts (*Bembidion*), etc. Kavanaugh (pers. comm.) points out that with struts there is still a connecting membrane surrounding the struts forming a “bulb.”

Included in this study are a total of 56 specimens: ten from the National Museum of Natural History, Washington, DC (NMNH) in my charge, 41 specimens received from SEAG (Société Entomologique Antilles-Guyane) in Guyane, a single specimen from INBIO collected in Costa Rica and sent to me by Angel Solis, and a single specimen from the University of Alberta, Edmonton, Canada (UASM) collected in Colom-

bia and sent to me by George E. Ball. Also studied were the lectotype of *Mizotrechus novemstriatus* Bates from the Muséum National d'Histoire Naturelle, Paris (MHNP, Azadeh Taghavian, Collection Manager) along with an unidentified specimen determined by Bates simply as “Mizotrechus/G<sup>er</sup>Bates,” and the specimen from Nicaragua that Bates identified incorrectly came from the Natural History Museum in London (BMNH, Beulah Garner, Collection Manager).

The habitus images of the adult beetles portray most of the character states referred to in the key provided. Illustrations of male genitalia are standard for descriptive taxonomy of carabid beetles in both preparation and aspects presented, as is the presentation of the female genitalia. The habitus images of the adults were made with a Visionary Digital™ high resolution imaging system rendered using Photoshop to become “Digital Photo-illustrations.” Figure captions include an ADP number, which is a unique identification number for the specimen that was illustrated or imaged and links the specimen and associated illustrations and/or images to additional information in electronic databases at the NMNH. Representative specimens will be transferred to Guyane when they have a museum in which to keep them secure.

Geographical data are presented for species based on all known specimens available at the time of manuscript preparation, including those in the literature. Georeferences have been determined from locality information provided on specimen labels; only those exact georeferences reported in decimal degrees that are provided on the label are placed in quotes, otherwise I have estimated these as closely as possible from places, mileage, etc., listed on the label and searched with Google Earth. Latitude and longitude are reported in decimal degrees. Distribution maps are provided for the species (Figs 39–41). Here, vernacular names in English are proposed, as common names are becoming increasingly needed in conservation and/or agricultural and forestry applications. These names are based on criteria set forth in Erwin (2011b) and applied in Erwin (2011a).

## Taxonomy

### *Mizotrechus* Bates 1872

#### Trough beetles

<http://species-id.net/wiki/Mizotrechus>

*Mizotrechus* Bates, 1872:199

**Type species.** *Mizotrechus novemstriatus* Bates, 1872:199

**Number of species.** Previously one, now 18.

**Taxonomy.** Stable herein as of this publication, yet many new species expected in Central and South America, particularly south of the main Amazon channel. Adelphoton: probably *Perigona* Laporte de Castelnau 1835.

**Proposed English vernacular name.** Trough beetles. An attribute of adults of the Tribe Perigonini is the peculiar setiferous trough-like margin at the latero-apical por-

tion of the elytron. While Bates' use of "mizo" as part of the genus name is unclear, I found that the French translation of the Japanese word, *mizo*, is ditch or pit in English. Perhaps Bates (who published much on Japanese beetles) was referring to the long marginal setiferous "trough" near the apex of the elytron.

**Distribution.** Presently known from Central and (northern) South America and here predicted to be found throughout the Amazon Basin and possibly north into México.

**Habitat.** Tropical rainforest, dry forest, and cloud forest possibly in leaf litter, or more likely subcortical (under loose bark). I suggest that these beetles are subcortical based on their coloration, robust exoskeleton, markedly expanded distal antennomeres, prolonged sharp mandibles, serrate or undulating humerus in some species, and somewhat depressed form. Some of these attributes are found in the adults of genera *Pachyteles*, *Holmalomorpha*, *Catapiesis*, *Inpa*, and *Morion*, among others, whose adult members are known to be subcortical inhabitants for part of their life history.

**References.** Bates (1872, 1883)

**Diagnostic combination.** Differing in adult attributes from those of its probable adelphotaxon, *Perigona* Laporte de Castelnau 1835 and from *Diploharpus* Chaudoir 1850 by the following: 1) adult *Mizotrechus* possess markedly expanded distal antennomeres (neither adults of *Perigona* nor *Diploharpus* adults have such); 2) both male and female *Mizotrechus* adults have the foreleg femur modified in some manner (except *M. batesi*, sp. n.) such as dentate, serrate, swollen or ridged (lacking in adults of both *Perigona* and *Diploharpus*); 3) adult *Mizotrechus* lack discal setae of the elytra (present in *Perigona* at apex of interneur 5 and in *Diploharpus* at middle and apical third in interneur 3); 4) adult *Mizotrechus* have umbilicate setae at apical third off-set and surrounded by a dense patch of short setae (both *Perigona* and *Diploharpus* have the umbilicate setae in-line and with few if any short setae); 5) adult *Mizotrechus* have a dense patch of setae in the apical trough of the elytron (neither *Perigona* nor *Diploharpus* have such a patch, although some species have a few setae); 6) sternum III of both sexes of *Mizotrechus* species have a short row of reclinate setae medially set between two narrowly spaced ambulatory setae (neither adults of *Perigona* nor *Diploharpus* nor a new genus (Erwin, in prep) have such).

**Distribution.** Lowland tropical rainforests in Central and northern South America, as well as midland cloud and dry forests in Central America.

**Included species.** The species list below, as well as arrangement of descriptions that follow is ordered alphabetically.

<i>Mizotrechus batesi</i> sp. n.	Guyane
<i>Mizotrechus bellorum</i> sp. n.	Guyane
<i>Mizotrechus belvedere</i> sp. n.	Guyane
<i>Mizotrechus brulei</i> sp. n.	Guyane
<i>Mizotrechus chontalesensis</i> sp. n.	Nicaragua
<i>Mizotrechus costaricensis</i> sp. n.	Costa Rica
<i>Mizotrechus dalensi</i> sp. n.	Guyane



<i>Mizotrechus edithpiafae</i> sp. n.	?
<i>Mizotrechus fortunensis</i> sp. n.	Panamá
<i>Mizotrechus gorgona</i> . sp. n.	Colombia
<i>Mizotrechus grossus</i> sp. n.	Guyane
<i>Mizotrechus jefe</i> sp. n.	Panamá
<i>Mizotrechus marielaforetae</i> sp. n.	Guyane
<i>Mizotrechus minutus</i> sp. n.	Guyane
<i>Mizotrechus neblinensis</i> sp. n.	Guyane, Venezuela
<i>Mizotrechus novemstriatus</i> Bates 1872	Brazil
<i>Mizotrechus poirieri</i> sp. n.	Guyane
<i>Mizotrechus woldai</i> sp. n.	Panamá

### Key to the species of *Mizotrechus* Bates 1872

- 1 Elytron with striatopunctate interneurs, punctures small, evident, regularly spaced. Foreleg femur (Fig. 19) unmodified posteriorly. Size very small (ABL = 4.4–4.6 mm)..... ***Mizotrechus minutus* sp. n.**
- 1' Elytron with smooth or uneven interneurs, punctures if evident not regularly spaced. Foreleg femur modified posteriorly, either slightly swollen, ridged, dentate, or serrate. Size small to large (ABL = 5.9–8.9 mm) ..... **2**
- 2(1') Form narrow, parallel-sided (Fig. 1), pronotum nearly square; size small (ABL = 5.9 mm, narrow body)..... ***Mizotrechus batesi* sp. n.**
- 2' Form broad, pronotum sub-cordiform; size larger (ABL = 5.9 (broad body) – 8.9 mm)..... **3**
- 3(2') Elytral margin behind humerus evidently serrate, the narrowly explanate margin dentate with minute seta at point of each tooth ..... **4**
- 3' Elytral margin behind humerus not evidently serrate, smooth or rough, if rough explanate margin interrupted by minute setae and interval between setae blunt ..... **8**
- 4(3) Elytron with all interneurs deep and evenly impressed throughout. Foreleg femur (Fig. 23) slightly swollen along base of postero-ventral margin in form of long ridge ..... ***Mizotrechus brulei* sp. n.**
- 4' Elytron with discal interneurs moderately deep, lateral interneurs much less impressed. Foreleg femur (as in Fig. 24) serrate along basal third to half of postero-ventral margin ..... **5**
- 5(4') Size larger (ABL = 8.4 mm)..... **6**
- 5' Size smaller (ABL = 6.6–7.4 mm) ..... **7**
- 6(5) Pronotum markedly convex; lateral margin straight before hind angle, a small acute tooth behind posterior; lateral seta (ABL = 8.4 mm) ..... ***Mizotrechus gorgona* sp. n.**
- 6' Pronotum barely convex; lateral margin sinuate before right hind angle, (ABL = 8.4 mm) ..... ***Mizotrechus costaricensis* sp. n.**



- 7(5') Pronotum barely convex, narrow; hind angle about right (ABL = 6.6 mm) ...  
..... *Mizotrechus jefe* sp. n.
- 7' Pronotum markedly convex, broad; hind angle a small tooth (ABL = 7.4 mm)..... *Mizotrechus woldai* sp. n.
- 8(3') Elytron with all interneurs deep and evenly impressed throughout..... 9
- 8' Elytron with discal interneurs moderately deep, lateral interneurs much less impressed..... 12
- 9(8) Size large (ABL = 8.4 mm). Pronotum markedly convex, large with markedly arcuate side margins. Foreleg femur (Fig. 22) dentate on postero-ventral margin ..... *Mizotrechus edithpiafae* sp. n.
- 9' Size smaller (ABL 6.5–7.1 mm). Pronotum barely convex, longer than wide, nearly quadrate. Foreleg femur (as in Fig. 21) with a short ridged on postero-ventral margin..... 10
- 10(9') Pronotum with hind angle sharp, about a right angle, not produced as a small denticle..... *Mizotrechus chontalesensis* sp. n.
- 10' Pronotum with hind angle sharp, produced as a small denticle..... 11
- 11(10') Pronotum nearly quadrate (W/L = 1.356).....  
..... *Mizotrechus novemstriatus* Bates
- 11' Pronotum much wider than long (W/L = 1.996–2.228) .....  
..... *Mizotrechus neblinensis* sp. n.
- 12(8') Pronotum with posterior lateral margin moderately lobed just anterior to dentiform hind angle ..... *Mizotrechus belvedere* sp. n.
- 12' Pronotum with posterior lateral margin straight just anterior to dentiform hind angle or right hind angle ..... 13
- 13(12') Size large (ABL 7.6–9.4 mm) ..... 14
- 13' Size smaller (ABL 6.0–6.8 mm) ..... 16
- 14(13) Form elongate and narrow. Elytron with margin behind humerus rough, undulating between microsetae. Foreleg femur (as in Fig. 24) serrate on postero-ventral margin..... *Mizotrechus fortunensis* sp. n.
- 14' Form broader and shorter. Elytron with margin behind humerus smooth, not undulating between microsetae. Foreleg femur (Fig. 20) dentate on postero-ventral margin ..... 15
- 15(14') Elytra very convex, at least interneurs 1–3 deep and complete. Pronotum with margin anterior to hind angle slightly arcuate ... *Mizotrechus dalensi* n. sp
- 15' Elytra rather depressed, only interneur 1 deep and complete. Pronotum with margin anterior to hind angle straight..... *Mizotrechus grossus* sp. n.
- 16(13') Pronotum with margin anterior to hind angle slightly arcuate.....  
..... *Mizotrechus poirieri* sp. n.
- 16' Pronotum with margin anterior to hind angle straight..... 17
- 17(16') Form elongate and narrow. Elytron with at least 4 interneurs deep and complete, 2–4 about equal to 1 in depth. Foreleg femur (as in Fig. 21) ridged on postero-ventral margin ..... *Mizotrechus marielaforetae* sp. n.

- 17' Form short and broad. Elytron with only interneur 1 deep and complete, 2–4 much shallower. Foreleg femur (as in Fig. 22) dentate on postero-ventral margin ..... *Mizotrechus bellorum* sp. n.

## Accounts of taxa

### *Mizotrechus batesi* sp. n.

#### Bates' trough beetle

urn:lsid:zoobank.org:act:897D9EB5-D50F-4021-9818-A79D5C86175A

[http://species-id.net/wiki/Mizotrechus\\_batesi](http://species-id.net/wiki/Mizotrechus_batesi)

Figs 1, 40

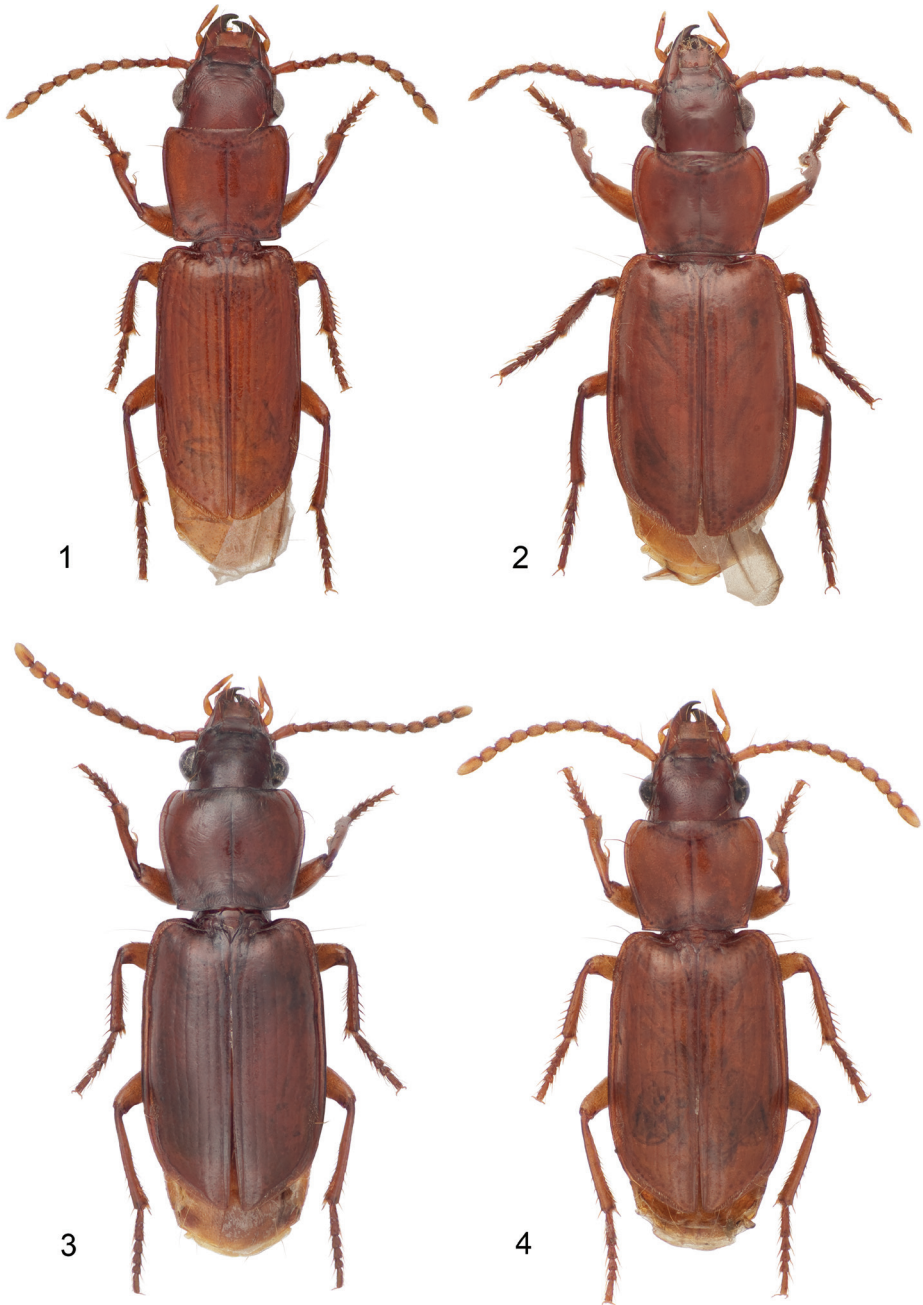
**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 30 November 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124884, male).

**Derivation of specific epithet.** The epithet “*batesi*” is an eponym, based on the family name of Henry Walter Bates, whose eleven years of collecting beetles in South America capturing adults of many new species, and genera such as this, would qualify him for the Hall of Fame of beetle collectors and describers, if there was such a Hall.

**Proposed English vernacular name.** Bates' trough beetle.

**Diagnosis.** With the attributes of the genus as described above and small sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose and punctulate. Occiput punctulate. Pronotum quadrate with lateral margin shallowly emarginate just anterior to hind angle; base densely punctulate. Elytra narrow and elongate, about the width of pronotum across anterior third, and with 8 well-impressed interneurs, intervals flat; margin behind humerus shallowly serrulate. Foreleg femur with slightly produced ridge on postero-ventral margin.

**Description.** (Fig. 1). *Size:* See Appendix 1. Small for genus, ABL = 5.9 mm, SBL = 4.9 mm, TW = 1.8 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny. *Head:* Labrum quadrate and medially notched apically. Eye small, moderately convex. Gena long, straight. Frons, occiput and gena glabrous. *Prothorax:* Broad, narrowed slightly toward base, margin beaded, not explanate except at hind angle; surface punctulate, punctures widespread, glabrous. *Pterothorax:* Elytron moderately convex, intervals slightly costate, interneurs striate, not punctate, apex slightly oblique and slightly rounded, sutural apex narrowly truncate. Metasternum sparsely setiferous in male. *Legs:* Normal in male; foreleg femur (as in Fig. 21) with slightly produced long ridge on postero-ventral margin and with a very short secondary ridge basally and above end of long ridge, not dentate; posterior trochanter tapered to point, length nearly half that of femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae; sternum VII medially notched in male. *Male genitalia:* Aedeagus and parameres missing from sin-



**Plate I.** Digital Photo-illustrations, habitus, dorsal aspect: **1** *Mizotrechus batesi* sp. n., ABL = 5.9 mm, male holotype, ADP124884; type locality. **2** *Mizotrechus bellorum* sp. n., ABL = 6.9 mm, male holotype, ADP124890; type locality. **3** *Mizotrechus belvedere* sp. n., ABL = 7.2 mm, male holotype, ADP129201; type locality. **4** *Mizotrechus brulei* sp. n., ABL = 6.7 mm, female paratype, ADP124926; type locality.

gle known male holotype, although the ring sclerite is present. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. The adult holotype was active in November, at the end of the dry season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 40). This species is currently known only from the type locality in the lowlands of Guyane.

### *Mizotrechus bellorum* sp. n.

#### Bells' trough beetle

urn:lsid:zoobank.org:act:E336EDFB-B152-4B87-8C8E-1AE5A4B8B377

[http://species-id.net/wiki/Mizotrechus\\_bellorum](http://species-id.net/wiki/Mizotrechus_bellorum)

Figs 2, 25, 40

**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 13 September 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124890, male)

**Derivation of specific epithet.** The epithet “*bellorum*” is an eponym, based on the family name of Ross and Joyce Bell, with a special thanks for a career that brought light to the rhyssodine clade of very interesting beetles with colors and tough cuticle also found in adults of *Mizotrechus* species.

**Proposed English vernacular name.** Bells' trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons at sides with evident rugae, punctulate. Occiput at sides with evident rugae, punctulate. Pronotum nearly quadrate, narrowed behind, with straight margins to hind angle, hind angle dentate, tooth small; base sparsely rugulose. Elytra broad and short, much wider than the width of pronotum across anterior third, and with only interneurs 1–3 moderately engraved, 4–8 evident yet shallowly impressed, more so toward margin, not punctate; margin behind humerus uneven, yet not serrate. Foreleg femur subdentate at the base of postero-ventral margin.

**Description.** (Figs 2, 25). *Size*: See Appendix 1. Medium sized for the genus, ABL = 6.9 mm, SBL = 5.87 mm, TW = 2.55 mm. *Color*: see diagnosis, above. *Luster*: Head, pronotum, and legs shiny, elytra slightly duller due to shallowly engraved slightly stretched microsculpture. *Head*: Labrum quadrate and apico-medially emarginate. Eye large, moderately convex. Gena moderately short, straight. Frons, occiput and gena glabrous. *Prothorax*: Narrow, quadrate, narrowed slightly toward base, margins not emarginate before hind angle, angle dentate, tooth small, margin moder-

ately explanate except wider at hind angle; surface punctulate, punctures widespread, glabrous. *Pterothorax*: Elytron moderately convex, disk flat, intervals flat, interneurs not punctate, apex moderately oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs*: Normal in male; foreleg femur (as in Fig. 20) with a small obtuse tooth at basal third of postero-ventral margin; posterior trochanter narrowly acute at apex, about half the length of the femur. *Abdomen*: Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae. *Male genitalia*: Median lobe (Fig. 25) elongate and robust with ostium moderately elongate, over half the length of the median lobe; apex a losp. n. tulate distal end less bent ventrad than in *M. dalensi* and thicker in cross section, moderately curved in lateral aspect, ventral margin proximal to apex straight then evenly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded, not crested, opening more or less 30 degrees off axis with that of shaft. Parameres large, left a half longer than the right, both broadly rounded, asetose. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. Adults are active in September, near the end of the dry season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 40). This species is currently known only from the type locality in the lowlands of Guyane.

### *Mizotrechus belvedere* sp. n.

#### Brule's trough beetle

urn:lsid:zoobank.org:act:8239C95E-35C9-450D-93A0-6FF8B48ED39F

[http://species-id.net/wiki/Mizotrechus\\_belvedere](http://species-id.net/wiki/Mizotrechus_belvedere)

Figs 3, 26, 40

**Holotype.** GUYANE, Saül, Commune de Saül, Belvédère de Saül, 283–325 m, 3.6223°N, 53.2159°W, 17 February 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP129201, male).

**Derivation of specific epithet.** The epithet “*belvedere*” is a singular Latinized masculine noun in apposition, based on the name of the area in which these beetles are found.

**Proposed English vernacular name.** Belvédère trough beetle.

**Diagnosis.** With the attributes of the genus as described above and moderately large sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose above and behind eye in an arc and moderately punctulate. Occiput moderately punctulate. Pronotum longer than wide with lateral margins moderately explanate and basally notched; base moderately microrugose. Elytra moderately broad and short, apex prolonged, wider than the width of pronotum

across anterior third, and with 5 well-impressed irregularly punctulate interneurs, intervals not convex; margin behind humerus rough, intervals between microsetae blunt. Foreleg femur with slightly produced postero-ventral margin.

**Description.** (Figs 3, 26). *Size:* See Appendix 1. Moderately small for genus, ABL = 7.2 mm, SBL = 6.14 mm, TW = 2.48 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny, elytra matte. *Head:* Labrum quadrate, apico-medially slightly V-notched. Eye moderately large and convex. Gena with very slight bulge. Frons, occiput and gena glabrous. *Prothorax:* Moderately narrow, narrowed slightly toward base, margin moderately explanate, wider before hind angle; surface punctulate, punctures moderately dense, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, interneurs with well-impressed irregularly-spaced punctulate, apex slightly obliquely prolonged and slightly rounded at extreme sutural apex. Metasternum sparsely setiferous in male. *Legs:* Normal in male; foreleg femur (as in Fig. 23) with slightly produced ridge along postero-ventral margin, not dentate, without short dorsal ridge at base of longer ridge; posterior trochanter tapered to rounded point in male, length half that of femur. *Abdomen:* Abdominal sterna moderately setiferous, densely so medially on II and III; sternum III of male with short dense patch of decumbent setae medially set between two ambulatory setae; sternum VII shallowly and medially notched in male. *Male genitalia:* Median lobe (Fig. 26) short and robust with ostium moderately elongate, over half the length of the median lobe; apex a short blunt distal end that is less prominent than in *M. brulei*, slightly curved in lateral aspect, ventral margin proximal to apex evenly curved; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less 20 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, aseptose. *Female genitalia:* Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. The holotype was active in February, the rainy season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 40). This species is currently known only from the type locality in the lowlands of Guyane.

### *Mizotrechus brulei* sp. n.

#### **Brule's trough beetle**

urn:lsid:zoobank.org:act:59CE9DC7-C3BF-4DAE-9CE1-D72FF093AAA6

[http://species-id.net/wiki/Mizotrechus\\_brulei](http://species-id.net/wiki/Mizotrechus_brulei)

Figs 4, 27, 40

**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 13 September 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124886, male).



**Derivation of specific epithet.** The epithet “*brulei*” is an eponym, based on the family name of Stephané Brule, whose team in Guyane has been collecting beetles using Flight Intercept Traps and capturing adults of many new species, such as this one.

**Proposed English vernacular name.** Brule’s trough beetle.

**Diagnosis.** With the attributes of the genus as described above and small sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose only at extreme anterior angles and punctulate. Occiput punctulate. Pronotum quadrate with lateral margins basally shallowly emarginate; base moderately microrugose. Elytra moderately narrow and elongate, wider than the width of pronotum across anterior third, and with 8 well-impressed interneurs, intervals not convex; margin behind humerus moderately serrulate. Foreleg femur with slight swelling near the base on the postero-ventral margin.

**Description.** (Figs 4, 27). *Size:* See Appendix 1. Moderately small for genus, ABL = 6.0–6.8 mm, SBL = 5.53–6.41 mm, TW = 2.03–2.22 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny. *Head:* Labrum quadrate, apico-medially barely emarginate. Eye small, moderately convex. Gena long, straight. Frons, occiput, and gena glabrous. *Prothorax:* Broad, narrowed slightly toward base, margin beaded, not explanate except at hind angle; surface punctulate, punctures widespread, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, interneurs striate, not punctate, apex slightly oblique and slightly rounded, sutural apex narrowly truncate. Metasternum sparsely setiferous in male. *Legs:* Normal in both sexes; foreleg femur (Fig. 23) with slightly produced ridge along postero-ventral margin, not dentate, without short dorsal ridge at base of longer ridge; posterior trochanter tapered to acute point in male, acuminate in female, length half that of femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae; sternum VII medially notched in male, slightly emarginated in female. *Male genitalia:* Median lobe (Fig. 27) short and robust with ostium moderately elongate, over half the length of the median lobe; apex short, blunt, distal end more prominent than in *M. belvedere*, slightly curved in lateral aspect, ventral margin proximal to apex evenly curved; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less in line with axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, asetose. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult specimens were collected in flight intercept traps in the rainforest understory. Adults are active in April and September, in both the rainy and dry seasons.

**Other specimens examined. Paratypes:** GUYANE, Montagne des Chevaux, Commune de Roura, RN2 PK22, 90 m, 4.7127°N, 52.3966°W, 14 April 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124960, female), 9 January 2011

(NMNH: ADP124924, female), 6 March 2010 (NMNH: ADP127159, male), 8 August 2010 (NMNH: ADP129205, male), 22 August 2010 (NMNH: ADP128729, male, ADP128727, female), 3 October 2010 (NMNH: ADP128731, male), Saül, Commune de Saül, Belvédère de Saül, 283–325 m, 3.6223° N, 53.2159° W, 29 October 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124926, female).

**Geographic distribution.** (Fig. 40). This species is currently known only from three lowland localities in Guyane.

*Mizotrechus chontalesensis* sp. n.

**Chontales trough beetle**

urn:lsid:zoobank.org:act:638541F2-014B-45D7-8A7E-C0D80817DEA5

[http://species-id.net/wiki/Mizotrechus\\_chontalesensis](http://species-id.net/wiki/Mizotrechus_chontalesensis)

Figs 5, 21, 39

**Holotype.** NICARAGUA, Chontales, ? nr. Santo Domingo, 514 m, 12.262°N, 85.083°W, (EM Janson)(BMNH: ADP127181, female).

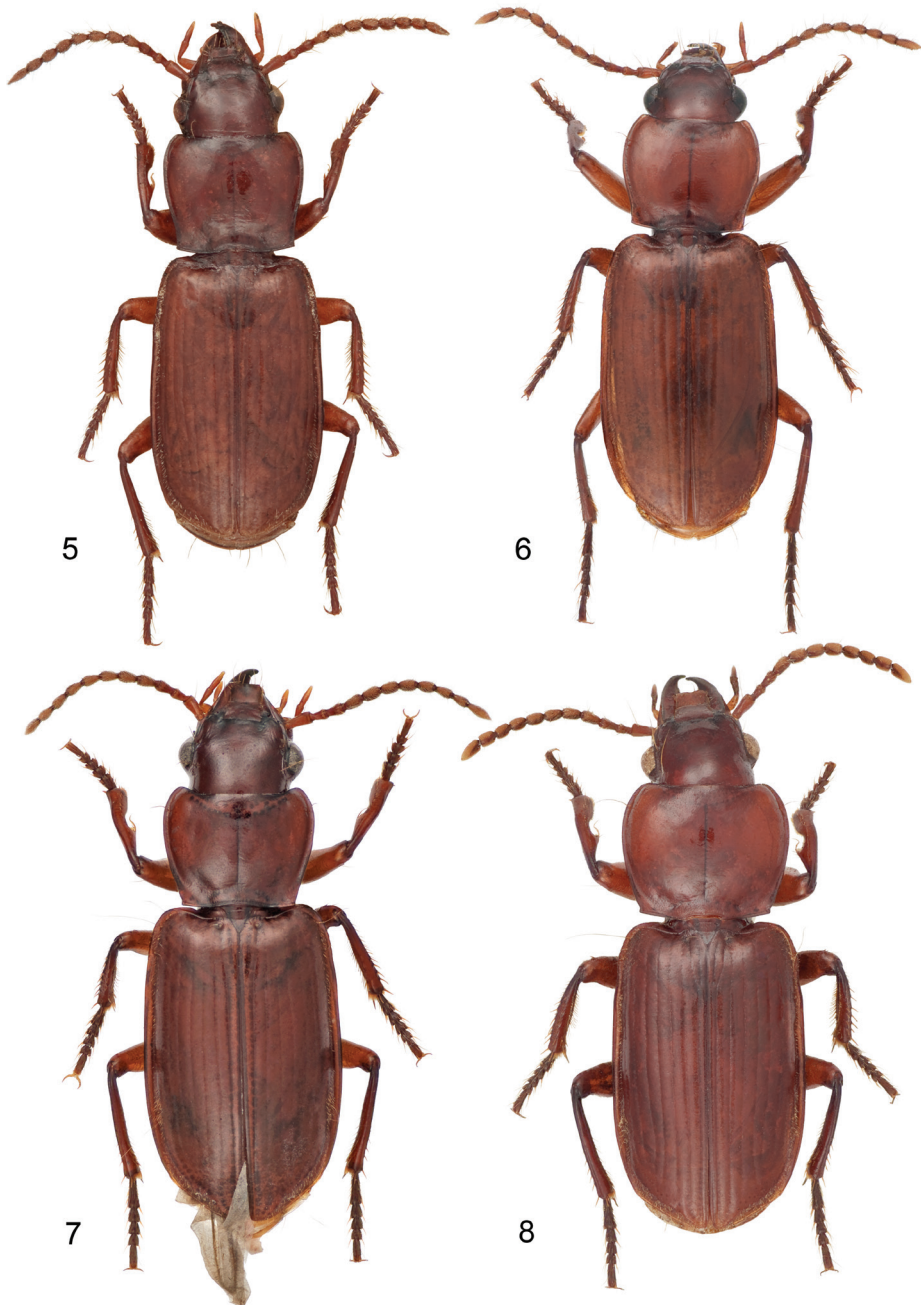
**Derivation of specific epithet.** The epithet “*chontalesensis*” is a Latinized noun in apposition, based on the name of the area in which these beetles are found.

**Proposed English vernacular name.** Chontales trough beetle.

**Diagnosis.** With the attributes of the genus as described above and moderately large sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons and occiput quite smooth, without regular rugae; micropunctation widespread and hardly evident. Pronotum longer than wide with lateral margins narrowly explanate and basally shallowly emarginate with sharp, not denticulate, hind angles; base smooth, without regular microrugosity. Elytra moderately broad and short, apices not prolonged, wider than the width of pronotum across anterior third, and each with 8 well-impressed irregularly punctulate interneurs, intervals not convex; margins behind humeri rough, intervals between microsetae blunt. Foreleg femur with slightly produced ridge on postero-ventral margin.

**Description.** (Figs 5, 21). *Size:* See Appendix 1. Moderately sized for genus, ABL = 7.1 mm, SBL = 5.87 mm, TW = 2.29 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, elytra, and legs shiny. *Head:* Labrum quadrate, apico-medially barely emarginate. Eye small and barely convex. Gena straight. Frons, occiput, and gena glabrous. *Prothorax:* Moderately narrow, narrowed slightly toward base, margin narrowly explanate, slightly wider before hind angle; surface punctulate, punctures widespread, very fine, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, all interneurs with well-impressed irregularly-spaced punctures, apex not prolonged, slightly rounded at extreme sutural apex. *Legs:* Normal in female; foreleg femur (Fig. 21) with slightly produced, short, arcuate ridge on postero-ventral margin at basal fourth, not dentate; posterior trochanter tapered to rounded point in female, length half that of femur. *Abdomen:* Abdominal sterna moderately setiferous, densely so medially on II and III;





**Plate 2.** Digital Photo-illustrations, habitus, dorsal aspect: **5** *Mizotrechus chontalesensis* sp. n., ABL = 7.1 mm, female holotype, ADP127181; type locality. **6** *Mizotrechus costaricensis* sp. n., ABL = 8.4 mm, male holotype, ADP128620; type locality. **7** *Mizotrechus dalensi* sp. n., ABL = 8.2 mm, male holotype, ADP124894; type locality. **8** *Mizotrechus edithpiafae* sp. n., ABL = 8.4 mm, female holotype, ADP124948; locality unknown.

sternum VII barely medially emarginate in female. *Male genitalia*: Unknown. *Female genitalia*: Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** Unknown.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 39). This species is currently known only from the type locality in the dry tropical forested lowlands of Nicaragua.

***Mizotrechus costaricensis* sp. n.**

**Costa Rica trough beetle**

urn:lsid:zoobank.org:act:FE064F4E-01E2-456D-8B59-6374BDECCF4F

[http://species-id.net/wiki/Mizotrechus\\_costaricensis](http://species-id.net/wiki/Mizotrechus_costaricensis)

Figs 6, 28, 39

**Holotype.** COSTA RICA, Alajuela, San Ramón, Reserva Biologica Alberto Brenes, Rio San Lorenzo, 850 m, 10.2283°N, 84.5857°W, 30 June – 5 July 1999 (J Rodriguez) (INBIO: ADP128620, INB0003057334, male).

**Derivation of specific epithet.** The epithet “*costaricensis*” is a Latinized noun in apposition, based on a geographic name formed from “Costa Rica,” the country in which an adult of this species has been found, and the Latin suffix “*-ensis*,” meaning of, or from that place.

**Proposed English vernacular name.** Costa Rica trough beetle.

**Diagnosis.** With the attributes of the genus as described above and large sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons and occiput shallowly rugose above and behind eye in an arc asp. n.r.sely and finely punctulate. Pronotum subcordiform with lateral margins moderately explanate and basally emarginate before right hind angles; base shallowly and regularly micro-rugose. Elytra moderately narrow and short, apex prolonged, wider than the width of pronotum across anterior third, and with 5 well-impressed irregularly punctulate interneurs, intervals not convex; margin behind humerus rough, intervals between microsetae blunt. Foreleg femur with markedly serrate postero-ventral margin.

**Description.** (Figs 6, 28). *Size*: See Appendix 1. Large for genus, ABL = 8.4 mm, SBL = 6.88 mm, TW = 2.88 mm. *Color*: see diagnosis, above. *Luster*: Head, pronotum and legs shiny, elytra matte. *Head*: Labrum quadrate, apico-medially slightly produced. Eye moderately small and convex. Gena straight. Frons, occiput, and gena glabrous. *Prothorax*: Moderately narrow, narrowed slightly toward base, margin narrowly explanate, wider before hind angle; surface sparsely punctulate, punctures very fine, glabrous. *Pterothorax*: Elytron barely convex, intervals nearly flat, 5 interneurs with well-impressed irregularly spaced punctures, apex not prolonged, slightly rounded at extreme sutural apex. Metasternum sparsely setiferous in male. *Legs*: Normal in

male; foreleg femur (as in Fig. 24) with markedly serrate postero-ventral margin, not dentate; posterior trochanter tapered to acute point in male, length half that of femur. *Abdomen*: Abdominal sterna moderately setiferous, densely so medially on II and III; sternum III of male with short row of decumbent setae medially set between two ambulatory setae; sternum VII shallowly and medially notched in male. *Male genitalia*: Median lobe (Fig. 28) short and robust with ostium moderately elongate, over half the length of the median lobe; apex with a very short and narrow distal end, slightly rounded in lateral aspect, more twisted laterally than in *M. fortunensis*, ventral margin proximal to apex straight then briefly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less 30 degrees off axis of shaft. Parameres large, left a twice longer than the right, both broadly rounded, asetose. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The holotype was collected in an aerial net. Adults are active in early July, the area's dry season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 39). This species is currently known only from the type locality in premontane rainforests of Costa Rica.

### *Mizotrechus dalensi* sp. n.

#### Dalens' trough beetle

urn:lsid:zoobank.org:act:1FAB3B90-4F18-4690-825D-B13F8510E82E

[http://species-id.net/wiki/Mizotrechus\\_dalensi](http://species-id.net/wiki/Mizotrechus_dalensi)

Figs 7, 20, 29, 40, Plate 11

**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 30 November 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124894, male).

**Derivation of specific epithet.** The epithet "*dalensi*" is an eponym, based on the family name of P.H. Dalens, whose team in Guyane has been collecting beetles using Flight Intercept Traps and capturing adults of many new species, such as this one.

**Proposed English vernacular name.** Dalens' trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose and punctulate. Occiput shallowly rugose at sides and punctulate. Pronotum quadrate with lateral margins basally straight to slightly toothed hind angle; base moderately rugose. Elytra broad and moderately short, much wider than width of pronotum across anterior third, and with two well-impressed interneurs, the remainder shallower toward margin; margins behind humeri not serrulate. Foreleg femur dentate basally on postero-ventral margin.

**Description.** (Figs 7, 20, 29, Plate 11). *Size:* See Appendix 1. Medium-sized for genus, ABL = 7.6–8.2 mm, SBL = 6.40–7.09 mm, TW = 2.64–3.11 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny; elytra dull due to marked slightly stretched well-impressed microsculpture. *Head:* Labrum quadrate, apico-medially barely emarginate. Eye moderately large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax:* Broad, narrowed slightly toward base, margin beaded, not explanate except at hind angle; surface punctulate, punctures widespread, and with shallow yet evident transverse microsculpture, surface glabrous. *Pterothorax:* Elytron moderately convex, intervals flat, interneurs striate, not punctate, becoming shallower toward margin, apex slightly oblique, straight, sutural apex narrowly and slightly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in both sexes; foreleg femur (Fig. 20) dentate at basal third on postero-ventral margin; posterior trochanter tapered to acute point in male, slightly acuminate in female, length half that of femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae; sternum VII medially V-notched in male, U-notched in female. *Male genitalia:* Median lobe (Fig. 29) elongate and robust with ostium moderately elongate, over half the length of the median lobe; apex a losp. n.tulate distal end less bent ventrad than in *M. poirieri*, moderately curved in lateral aspect, ventral margin proximal to apex straight then evenly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded and crested, opening more or less 40 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, asetose. *Female genitalia:* (Plate 11). Ovipositor with broad laterotergite (**lt**) and two gonocoxites (**gc 1**, **gc 2**); gonocoxite 1 apico-laterally setose; gonocoxite 2 falcate, base (**b**) medium-size, narrow, blade (**bl**) elongate, with two dorsal ensiform setae (**des**), and one ventral ensiform seta (**ves**), all ensiform setae moderately long and robust; with ventral preapical nematiform setae (evident on A, hidden on B). Reproductive tract (Plate 11A) proximally with short, broad bursa copulatrix (**bc**), continuous at its distal end with common oviduct (**co**) and long robust spermatheca (**sp**), latter slightly narrowed distally; spermathecal gland (**sg**) bulbous; spermathecal gland duct (**sgd**) long, slender, attached to spermatheca at base of its broadened portion.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adults at four localities were collected in flight intercept traps in the rainforest understory. Adults are active in March and November, in both the rainy and dry seasons.

**Other specimens examined. Paratypes:** Guyane, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 23 November 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124896, male); Mount Itoupe, 570 m, 3.0148°N, 53.0721°W, 17 March 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP126485, male); Montagne des Chevaux, Commune de Roura, RN2 PK22, 90 m, 4.7127°N, 52.3966°W, 8 August 2010 (NMNH: ADP129203, female), 1 November 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124956, female), Saül, Com-

mune de Saül, Belvédère de Saül, 283–325 m, 3.6223°N, 53.2159°W, 20 December 2010 (NMNH: ADP127167, male), 4 January 2011 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124922, female), 36 km W Regina, Petite Montague Tortue, P17, 94 m, 4.3204°N, 52.2404°W, 23 June 2010 (G Lamarre)(NMNH: ADP127161, male).

**Geographic distribution.** (Fig. 40). This species is currently known from five localities in the lowland and midland rainforests of Guyane.

*Mizotrechus edithpiafae* sp. n.

**Piaf's trough beetle**

urn:lsid:zoobank.org:act:6D88FB32-8C21-49DA-BEAD-719E3ABB3AB6

[http://species-id.net/wiki/Mizotrechus\\_edithpiafae](http://species-id.net/wiki/Mizotrechus_edithpiafae)

Figs 8, 22, 30

**Holotype.** Locality unknown. Specimen, (BMNH: ADP128624, male), labeled (Bates' handwriting) "Mizotrechus / G<sup>er</sup> Bates."

**Derivation of specific epithet.** The epithet "*edithpiafae*" is an eponym, based on the full name of Edith Piaf, the famous French singer, 19 December 1915–11 October 1963, whose voice had an incredible range of diversity, as is that found in the carabid species richness of Guyane, and who sang a variety of "torch songs", and here I play on the word "torch", the same word that applies to what is used to ignite the trees of the unique tropical rainforests of South America, an Armageddon in our own times.

**Proposed English vernacular name.** Piaf's trough beetle.

**Diagnosis.** With the attributes of the genus as described above and large sized for the genus as it is presently understood. Adults with darkly infuscate integument, elytra slightly paler, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture black. Frons and occiput smooth above and behind eye asp. n.rselv and finely punctulate. Pronotum quadrate and highly convex with lateral margins narrowly explanate and basally straight before slightly denticulate hind angles; base shallowly and regularly microrugose. Elytra very broad and short, apex not prolonged, wider than the width of pronotum across anterior third, and with 8 well- impressed irregularly punctulate interneurs, intervals not convex; margin behind humerus rough, intervals between microsetae blunt. Foreleg femur with markedly dentate ventral margin.

**Description.** (Figs 8, 22). *Size:* See Appendix 1. Large for genus, ABL = 8.4 mm, SBL = 7.16 mm, TW = 2.94 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, and legs shiny, elytra slightly matte. *Head:* Labrum quadrate, apico-medially moderately v-notched. Eye moderately small and convex. Gena straight. Frons, occiput, and gena glabrous. *Prothorax:* Broad, barely narrowed toward base, margin narrowly explanate, wider before hind angle; surface sparsely punctulate, punctures very fine, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, 8 interneurs with well-impressed irregularly-spaced punctures, apex not prolonged, slightly rounded at extreme sutural apex. Metasternum sparsely setiferous in male. *Legs:* Normal in male; foreleg femur (Fig. 22) ridged along



the postero-ventral margin and markedly produced at middle of ridge ; posterior trochanter tapered to rounded point in male, length half that of femur. *Abdomen*: Abdominal sterna moderately setiferous, densely so medially on II and III; sternum III of male with short dense row of decumbent setae medially set between two ambulatory setae; sternum VII shallowly and medially notched in male. *Male genitalia*: Median lobe (Fig. 30) short and robust with ostium moderately elongate, over half the length of the median lobe; apex with a moderately long narrow distal end, slightly curved in lateral aspect, ventral margin proximal to apex evenly curved, ventral margin proximal to apex straight; endophallus (everted) with complexly folded tracheal fields and a narrow sclerotized rod; phallobase not fully hooded, opening 20 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, asetose. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** Unknown.

**Other specimens examined.** None.

**Geographic distribution.** Unknown.

### *Mizotrechus fortunensis* sp. n.

#### **Fortuna trough beetle**

urn:lsid:zoobank.org:act:CCCF2C24-8587-42A0-83A5-BD953EF41585

[http://species-id.net/wiki/Mizotrechus\\_fortunensis](http://species-id.net/wiki/Mizotrechus_fortunensis)

Figs 9, 31, 39

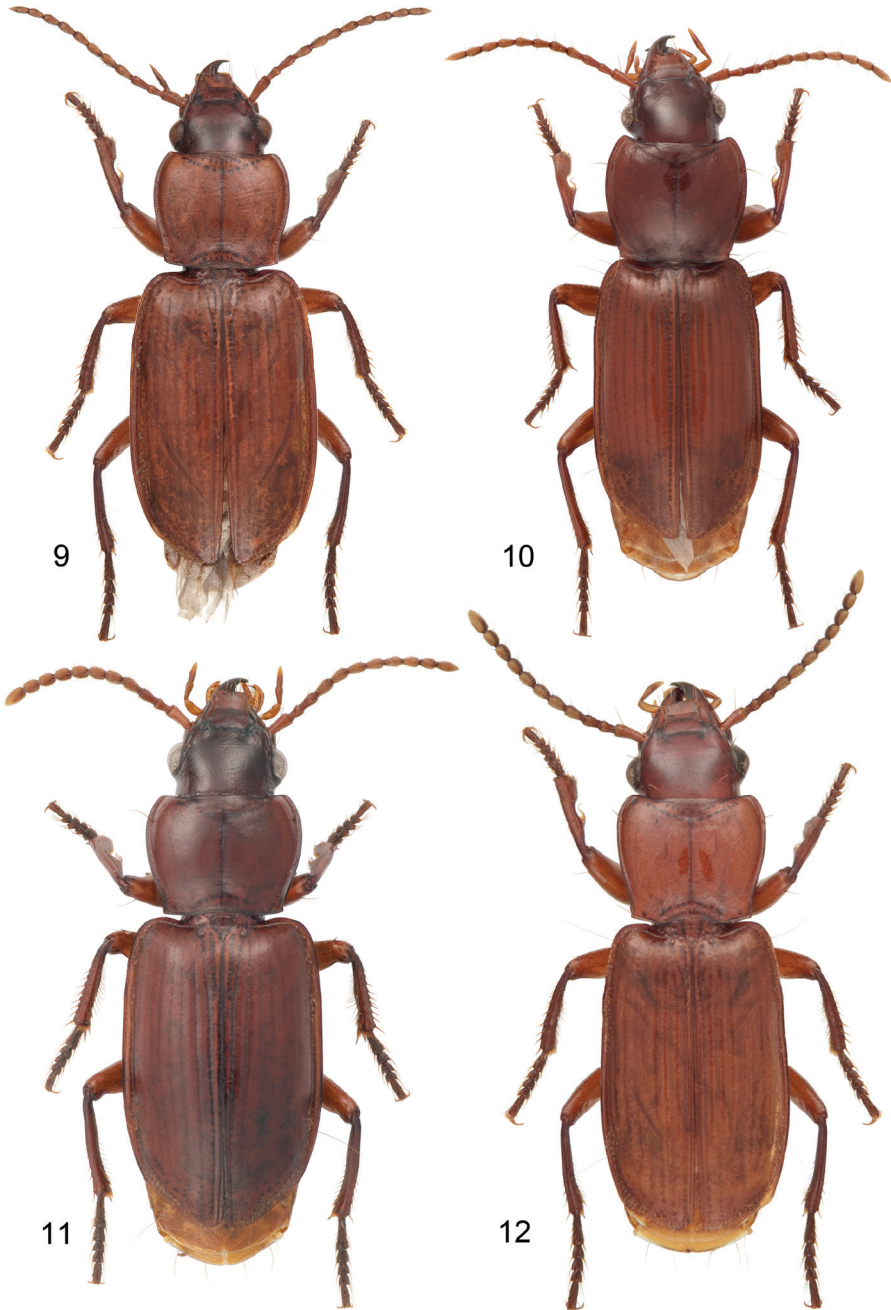
**Holotype.** PANAMÁ, Chiriquí Province, Fortuna, 1050 m, 8.7341°N, 82.2701°W, 13 August 1978 (H. Wolda)(NMNH: ADP124968, male).

**Derivation of specific epithet.** The epithet “*fortunensis*” is a Latinized noun in apposition, based on a geographic name formed from “Fortuna” (Panamá) the place in which adults of this species have been found, and the Latin suffix “-ensis,” meaning of, or from that place.

**Proposed English vernacular name.** Fortuna trough beetle.

**Diagnosis.** With the attributes of the genus as described above and large sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons smooth, not or barely rugose near eye, surface punctulate. Occiput smooth, punctulate. Pronotum quadrate with lateral margins basally shallowly emarginated, hind angles slightly toothed; base densely microrugose. Elytra broad and short, much broader than width of pronotum across anterior third, and with 3 well-impressed interneurs, others shallower toward margin; margins behind humeri shallowly serrulate. Foreleg femur serrate on postero-ventral margin.

**Description.** (Figs 9, 31). *Size*: See Appendix 1. Large-sized for genus, ABL = 8.5–8.7 mm, SBL = 7.02–7.66 mm, TW = 2.93–3.03 mm. *Color*: see diagnosis, above. *Luster*: Head, pronotum, and legs shiny; elytra dull due to marked slightly stretched



**Plate 3.** Digital Photo-illustrations, habitus, dorsal aspect: **9** *Mizotrechus fortunensis* sp. n., ABL = 8.7 mm, male holotype, ADP124968; type locality. **10** *Mizotrechus gorgona* sp. n., ABL = 8.4 mm, female Holotype, ADP128622; type locality. **11** *Mizotrechus grossus* sp. n., dorsal aspect, ABL = 8.9 mm, male paratype, ADP127169; type locality. **12** *Mizotrechus jefe* sp. n., ABL = 6.6 mm, male paratype, ADP011173; type locality.



well-impressed microsculpture. *Head*: Labrum quadrate, entire apically. Eye moderately large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax*: Quadrate, narrowed slightly toward base, margin beaded, not explanate except at hind angle, hind angle feebly dentate; surface punctulate, punctures widespread, and with microsculpture nearly effaced, surface glabrous. *Pterothorax*: Elytron moderately convex, disk flat, intervals flat, interneurs striate, not punctate, shallower toward margin, apex slightly oblique, straight, sutural apex narrowly and slightly rounded. Metasternum sparsely setiferous in male. *Legs*: Normal in both sexes; foreleg femur (as in Fig. 24) serrate on postero-ventral margin; posterior trochanter narrowly rounded in both sexes, length half that of femur. *Abdomen*: Abdominal sterna moderately setiferous; sternum IV of male without medial patch of decumbent setae; sternum VII medially and shallowly V-notched in male. *Male genitalia*: Median lobe (Fig. 31) short and robust with ostium moderately elongate, over half the length of the median lobe; apex with a very short and narrow distal end, slightly rounded in lateral aspect, less twisted laterally than in *M. costaricensis*, ventral margin proximal to apex straight then briefly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less 20 degrees off axis of shaft. Parameres large, left twice longer than the right, both broadly rounded, asetose. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The six adults were collected at UV light trap in premontane forest understory. Adults are active in May, July, and August, in the rainy and early dry seasons.

**Other specimens examined. Paratypes:** Panamá, Chiriqui Province, Fortuna, 1050 m, 8.7341°N, 82.2701°W, 15 May 1978 (H. Wolda)(NMNH: ADP124964, male), 7 July 1978 (H. Wolda)(NMNH: ADP124964, male), 19 July 1978 (H. Wolda)(NMNH: ADP124952, male), 27 July 1977 (H. Wolda)(NMNH: ADP070275, male), 13 August 1978 (H. Wolda)(NMNH: ADP124954, male).

**Geographic distribution.** (Fig. 39). This species is currently known only from the type locality in the premontane forested midlands of Panamá.

### *Mizotrechus gorgona* sp. n.

#### Isla Gorgona trough beetle

urn:lsid:zoobank.org:act:14F5ED42-8D4B-4720-829E-5F1145C10EA9

[http://species-id.net/wiki/Mizotrechus\\_gorgona](http://species-id.net/wiki/Mizotrechus_gorgona)

Figs 10, 24, 39

**Holotype.** COLOMBIA, Cagua, Isla Gorgona Mancora, 60 m, 2.96°N, 78.18°W, 26 June – 18 July 2000 (H Torres)(UASM: ADP128622, female).

**Derivation of specific epithet.** The epithet “*gorgona*” is a Latinized noun in apposition and is the name of the island off Colombia where these beetles are found.

**Proposed English vernacular name.** Isla Gorgona trough beetle.

**Diagnosis.** With the attributes of the genus as described above and moderately large sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose above and behind eye in an arc, not extended on occiput, and moderately punctulate. Occiput moderately punctulate. Pronotum longer than wide with lateral margins narrowly explanate and basally with sharp, not denticulate, hind angles; base smooth, without regular microrugose. Elytra moderately narrow and elongate, apex prolonged, wider than the width of pronotum across anterior third, and with 7 well-impressed irregularly punctulate interneurs, intervals not convex; margins behind humeri serrate, intervals between microsetae dentate. Foreleg femur with markedly serrate postero-ventral margin.

**Description.** (Figs 10, 24). *Size:* See Appendix 1. Moderately large for genus, ABL = 8.4 mm, SBL = 7.15 mm, TW = 2.86 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, and legs shiny; elytra matte. *Head:* Labrum quadrate, apico-medially barely emarginate. Eye small and barely convex. Gena straight. Frons, occiput, and gena glabrous. *Prothorax:* Moderately broad, narrowed slightly toward base, margin narrowly explanate, slightly wider before hind angle; surface punctulate, punctures widespread, very fine, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, all interneurs with well-impressed irregularly-spaced punctures, apex prolonged, slightly rounded at extreme sutural apex. *Legs:* Normal in female; foreleg femur (Fig. 24) with markedly serrate postero-ventral margin, not dentate; posterior trochanter tapered to rounded point in female, length half that of femur. *Abdomen:* Abdominal sterna moderately setiferous, densely medially on II and III; sternum VII barely medially notched in female. *Male genitalia:* Unknown. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The type specimen was collected in a Malaise trap in the rainforest understory at the type locality. Adults are active in late June, or early July during the “relatively” dry season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 39). This species is currently known only from the type locality on an island off the Pacific coast of Colombia.

### *Mizotrechus grossus* sp. n.

#### Gross trough beetle

urn:lsid:zoobank.org:act:2C262CC2-85AE-4CA2-8BEB-07BEE80B4ADF

[http://species-id.net/wiki/Mizotrechus\\_grossus](http://species-id.net/wiki/Mizotrechus_grossus)

Figs 11, 32, 40, Plate 12

**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 27 March 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP126301, male).

**Derivation of specific epithet.** The epithet “*grossus*” is a Latin adjective that adequately describes this species with large robust adults.

**Proposed English vernacular name.** Gross trough beetle.

**Diagnosis.** With the attributes of the genus as described above and very large sized for the genus as it is presently understood; adults have dark castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons shallowly rugose at sides and overall punctulate. Occiput punctulate. Pronotum cordiform with lateral margins straight to well-developed hind angle which is dentate; base densely microrugose. Elytra broad and short, moderately wider than the width of pronotum across anterior third, and with 3 well- impressed interneurs, outer interneurs more shallow toward margin; margins behind humeri uneven, but not evidently serrulate. Foreleg femur dentate on postero-ventral margin near base.

**Description.** (Figs 11, 32, Plate 12). *Size:* See Appendix 1. Large for genus, ABL = 8.1–8.9 mm, SBL = 7.07–7.71 mm, TW = 2.72–3.26 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny; elytron shiny but with evident shallow and slightly stretched microsculpture. *Head:* Labrum quadrate and medially emarginate. Eye moderately large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax:* Broadly cordiform, narrowed moderately toward base, margin narrowly explanate, more broadly near base, hind angle dentate; surface punctulate, punctures widespread, glabrous, microsculpture nearly effaced. *Pterothorax:* Elytron moderately convex, intervals flat, interneurs striate, not punctate, apex oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in both sexes; foreleg femur (as in Fig. 20) markedly dentate on postero-ventral margin at basal third; trochanter acute in both sexes, about half the length of the femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae. Defense gland system (Plate 12) with two very large, medially slightly concave, bean-shaped pygidial gland reservoirs, each with a markedly long and narrow annulated collecting canal connected to the efferent duct near the base of the gland. *Male genitalia:* Median lobe (Fig. 32) elongate and robust with ostium moderately elongate, over half the length of the median lobe; apex with a losp. n.tulate distal end slightly more bent ventrad than in *M. poirieri*, moderately curved in lateral aspect, ventral margin proximal to apex straight then evenly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded and slightly crested, opening more or less 40 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, asetose. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The type series was collected in a flight intercept trap in the rainforest understory at four locations in Guyane. Adults are active in March, April, June, August, October, November, and December, during both the rainy and dry seasons.

**Other specimens examined. Paratypes.** Guyane, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 26 April 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP127064, female), 15 June 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP127062, ADP127062, females), 24 August 2009 (S Brule,

PH Dalens, & E Poirier)(NMNH: ADP124892, female), 10 October 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124898, male), 30 November 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124900, female); Mount Itoupe, 570 m, 3.0148°N, 53.0721°W, 17 March 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP126484, 126486, males); Montagne des Chevaux, Commune de Roura, RN2 PK22, 90 m, 4.7127°N, 52.3966°W, 9 August 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124958, male), 13 December 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124962, male); Reserve Tresor, Commune de Roura, Route de KAW km 18, 250 m, 4.6104°N, 52.2790°W, 21 November 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124972, male), Saül, Commune de Saül, Belvédère de Saül, 283–325 m, 3.6223°N, 53.2159°W, 17 November 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP127169, male), Commune de Regina, Reserve Naturelle des Nouragues Inselberg, Petit Plateau, 144 m, 4.0833°N, 52.6833°W, 5 June 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP127157, male), 27 October 2010 (NMNH: ADP127165, male).

**Geographic distribution.** (Fig. 40). This species is currently known from six localities in the lowlands and midlands of Guyane.

***Mizotrechus jefe* sp. n.**

**Jefe trough beetle**

urn:lsid:zoobank.org:act:3CE7E44F-2EBC-4B71-8251-F041B37D6081

[http://species-id.net/wiki/Mizotrechus\\_jefe](http://species-id.net/wiki/Mizotrechus_jefe)

Figs 12, 33, 39

**Holotype.** PANAMÁ, Panamá Province, Cerro Jefe, 700–750 m, 9.2311°N, 79.3496°W, 20 May 1972 (RT Allen)(NMNH: ADP011173, female).

**Derivation of specific epithet.** The epithet “*jefe*” is a place name, based on the area where the type specimen was collected.

**Proposed English vernacular name.** Jefe trough beetle.

**Diagnosis.** With the attributes of the genus as described above and moderately small sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons with rugae nearly effaced, punctulate. Occiput punctulate. Pronotum narrowly cordiform with lateral margins shallowly emarginated; base rugulose. Elytra narrow and short, slightly wider than the width of pronotum across anterior third, and with 8 well-impressed interneurons; margins behind humeri moderately serrulate. Foreleg femur with slightly produced ridge on postero-ventral margin.

**Description.** (Fig. 12). *Size:* See Appendix 1. Moderately small for genus, ABL = 6.6 mm, SBL = 5.84 mm, TW = 2.27 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum and legs shiny; elytra shiny yet with evident isodiametric microsculpture. *Head:* Labrum quadrate and medio-apically slightly emarginate. Eye moderately large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous.

*Prothorax*: Moderately narrow, narrowed slightly toward base, margin narrowly explanate throughout, hind angle about right, not dentate; surface punctulate, punctures widespread, glabrous. *Pterothorax*: Elytron slightly convex, disk flat, intervals flat, interneurs striate, not punctate, apex moderately oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in female. *Legs*: Normal in female; foreleg femur (as in Fig. 21) with slightly produced, short, slightly arcuate ridge on postero-ventral margin at basal fourth, not dentate; trochanter narrowly rounded. *Abdomen*: Abdominal sterna moderately setiferous; sternum IV of female with median patch of setae that is more dense than elsewhere. *Male genitalia*: Unknown. *Female genitalia*: Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected along a road in the cloud forest understory. Adults are active in May, during the rainy season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 39). This species is currently known only from the type locality in the midlands of Panamá.

### *Mizotrechus marielaforetae* sp. n.

#### Laforêt's trough beetle

urn:lsid:zoobank.org:act:552D9468-9A77-49AF-A12D-5774041E1875

[http://species-id.net/wiki/Mizotrechus\\_marielaforetae](http://species-id.net/wiki/Mizotrechus_marielaforetae)

Figs 13, 30, 40

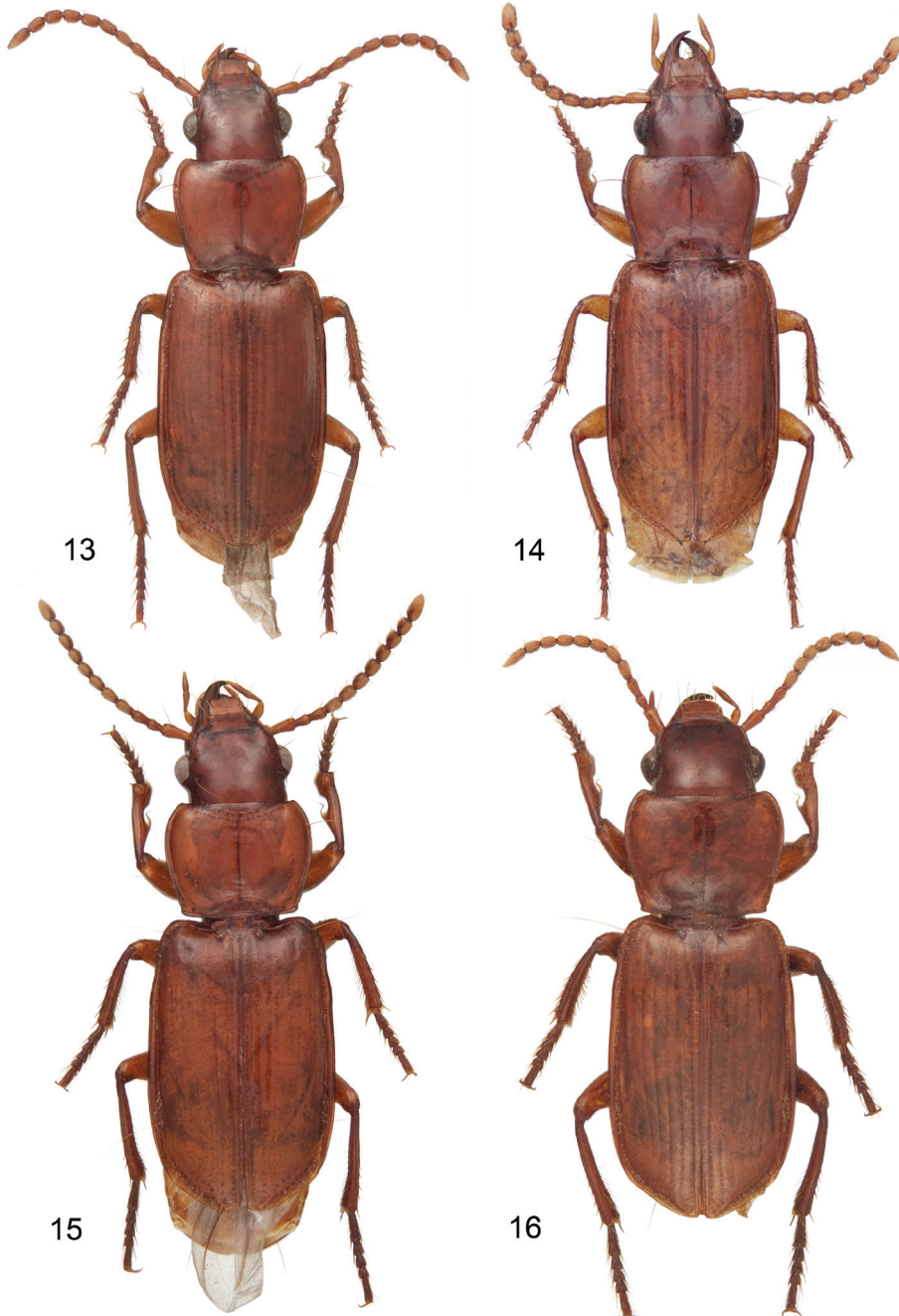
**Holotype.** GUYANE, Montagne des Chevaux, Commune de Roura, RN2 PK22, 90 m, 4.7127°N, 52.3966°W, 28 November 2010 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP127183, male).

**Derivation of specific epithet.** The epithet “*marielaforetae*” is an eponym, based on the full stage name of Marie Laforêt, the famous French actress and singer, 5 October 1939 – present, whose voice has a range of diversity like that found in the carabid species richness of Guyane, and who sang a variety of “torch songs”, and here I play on the word “torch”, the same word that applies to that being used to ignite the forests of the unique tropical rainforests of South America, an Armageddon in our own times.

**Proposed English vernacular name.** Laforêt's trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons without evident rugae, punctulate. Occiput at sides with evident rugae, punctulate. Pronotum nearly quadrate, quite narrowed behind, with lateral margins straight to hind angle, hind angle dentate, tooth small; base densely punctate. Elytra moderately broad and short, slightly wider than the width of pronotum across anterior third, and with only interneur 1 deeply engraved, 2–5 readily evident yet more shallowly





**Plate 4.** Digital Photo-illustrations, habitus, dorsal aspect: **13** *Mizotrechus marielaforetae* sp. n., dorsal aspect, ABL = 5.9 mm, male paratype, ADP127183, type locality. **14** *Mizotrechus minutus* sp. n., ABL = 4.4 mm, female paratype, ADP124920; Guyane, Commune de Saül, Belvédère de Saül. **15** *Mizotrechus neblinensis* sp. n., dorsal aspect, ABL = 6.9 mm, female holotype, ADP124944; type locality. **16** *Mizotrechus novemstriatus* Bates 1872, ABL = 7.2 mm, female lectotype, ADP127163; type locality.



impressed, 6–8 traceable, none punctate; margins behind humeri entire, slightly emarginate. Foreleg femur with slightly produced ridge on postero-ventral margin.

**Description.** (Figs 13, 30). *Size:* See Appendix 1. Moderately small sized for the genus, ABL = 5.9 mm, SBL = 5.12 mm, TW = 2.18 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, and legs shiny, elytra duller due to shallowly engraved slightly stretched microsculpture. *Head:* Labrum quadrate and apico-medially emarginate. Eye large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax:* Narrow, quadrate, narrowed moderately toward base, margins straight before hind angle, angle dentate, tooth small, margin moderately explanate except wider at hind angle; surface punctulate, punctures widespread, glabrous. *Pterothorax:* Elytron moderately convex, intervals flat, proximal interneurs not punctate, distal interneurs somewhat punctate, apex moderately oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in male; foreleg femur (as in Fig. 23) with slightly produced ridge on postero-ventral margin, not dentate; posterior trochanter narrowly rounded at apex, about half the length of the femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae. *Male genitalia:* Median lobe (Fig. 30) short and robust with ostium moderately elongate, over half the length of the median lobe; apex with a short narrowly rounded distal end, ventral margin proximal to apex straight, then abruptly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less 40 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, aetose. *Female genitalia:* Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. Adults are active in November, at the end of the dry season.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 40). This species is currently known only from the type locality in the lowlands of Guyane.

### *Mizotrechus minutus* sp. n.

#### Minute trough beetle

urn:lsid:zoobank.org:act:90504CC6-C4AD-4077-98F4-D5E501F72EB7

<http://species-id.net/wiki/>

Figs 14, 19, 34, 40

**Holotype.** GUYANE, Saül, Commune de Saül, Belvédère de Saül, 283–325 m, 3.6223°N, 53.2159°W, 10 December 2010 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124966, male).

**Derivation of specific epithet.** The epithet “*minutus*” is a Latin adjective that adequately describes this species with very small adults.

**Proposed English vernacular name.** Minute trough beetle.

**Diagnosis.** With the attributes of the genus as described above and very small sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons with rugae nearly effaced, punctulate. Occiput punctulate. Pronotum quadrate with lateral margins shallowly emarginated; base nearly smooth. Elytra broad and short, slightly wider than the width of pronotum across anterior third, and with 8 well-impressed punctate interneurs; margins behind humeri not serrulate.

**Description.** (Figs 14, 19, 34). *Size:* See Appendix 1. Very small, ABL = 4.4–4.6 mm, SBL = 3.77–3.88 mm, TW = 1.49–1.58 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, elytra, and legs shiny; microsculpture effaced. *Head:* Labrum quadrate and apico-medially emarginate. Eye moderately large, moderately convex. Gena moderately long, straight. Frons, occiput, and genae glabrous. *Prothorax:* Broad, narrowed slightly toward base, margin slightly explanate to hind angle, angle about right, not dentate; surface punctulate, punctures widespread, glabrous. *Pterothorax:* Elytron moderately convex, intervals slightly convex, interneurs striato-punctate, apex moderately oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in both sexes; foreleg femur unmodified (Fig. 19); trochanter narrowly rounded. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae. *Male genitalia:* Median lobe (Fig. 34) elongate and narrow with ostium moderately elongate, over half the length of the median lobe; apex with a long narrow distal end, straight in lateral aspect and narrowly rounded, ventral margin proximal to apex straight; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less 15 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, aetose. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. Adults are active in December, at the end of the dry season.

**Other specimens examined. Paratypes:** Guyane, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 11 December 2009 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124902, male), Saül, Commune de Saül, Belvédère de Saül, 283–325 m, 3.6223°N, 53.2159°W, 10 December 2010 (S Brule, PH Dalens, & E Poirier)(NMNH: ADP124920, female).

**Geographic distribution.** (Fig. 40). This species is currently known only from two localities in the lowlands of Guyane.

***Mizotrechus neblinensis* sp. n.****Tipui trough beetle**

urn:lsid:zoobank.org:act:11B2AD1D-46FC-45BD-8F93-4BA20D3CA2CF

[http://species-id.net/wiki/Mizotrechus\\_neblinensis](http://species-id.net/wiki/Mizotrechus_neblinensis)

Figs 15, 35, 40, 41

**Holotype.** VENEZUELA, Amazonas, Cerro de la Neblina (Smithsonian Basecamp), 140 m, 0.0148°N, 66.1604°W, 10–20 February 1985 (PJ Spangler, PM Spangler, RE Faitoute & WE Steiner)(NMNH: ADP124944, female).

**Derivation of specific epithet.** The epithet “*neblinensis*” is a Latinized noun in apposition, based on a geographic name formed from Pico de Neblina, a tipui on the border of Venezuela and Brazil, the area in which adults of this species have been found, and the Latin suffix “*-ensis*,” meaning of, or from that place.

**Proposed English vernacular name.** Tipui trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons with nearly effaced rugae, punctulate. Occiput punctulate. Pronotum nearly quadrate with lateral margins straight to hind angle, hind angle a very small tooth; base densely rugulose. Elytra broad and short, slightly wider than the width of pronotum across anterior third, and with 6 evident shallowly impressed interneurs, 7–8 nearly effaced; margins behind humeri moderately serrulate. Foreleg femur with markedly developed and produced ridge on postero-ventral margin.

**Description.** (Figs 15, 35). *Size:* See Appendix 1. Medium sized for the genus, ABL = 6.4–6.9 mm, SBL = 5.54–6.12 mm, TW = 2.25–2.46 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, elytra and legs shiny, microsculpture absent. *Head:* Labrum quadrate and apico- medially emarginate. Eye large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax:* Broad, narrowed slightly toward base, margin narrowly explanate except wider at hind angle, hind angle a very small tooth; surface punctulate, punctures widespread, glabrous. *Pterothorax:* Elytron moderately convex, disk flat, intervals flat, interneurs striato-punctate, punctures small, shallow, apex oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in both sexes; foreleg femur (as in Fig. 22) ridged along the postero-ventral margin and markedly produced at middle of ridge; posterior trochanter narrowly rounded at apex, about half the length of the femur. *Abdomen:* Abdominal sterna moderately setiferous; sternum IV of female with denser patch of setae at midline. *Male genitalia:* Median lobe (Fig. 35) short and robust with ostium moderately elongate, over half the length of the median lobe; apex a short blunt distal end, slightly curved in lateral aspect, ventral margin proximal to apex evenly arched and barely curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded, opening more or less five degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, aetose. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. Adults are active in February, in the rainy season.

**Other specimens examined. Paratypes:** Guyane, Montagne des Chevaux, Commune de Roura, RN2 PK22, 90 m, 4.7127°N, 52.3966°W, 19 September 2009 (NMNH: ADP124970, male), 31 October 2010 (NMNH: ADP128733, male). Venezuela, Amazonas, Cerro de la Neblina (Smithsonian Basecamp), 140 m, 0.0148°N, 66.1604°W, 10–20 February 1985 (PJ Spangler, PM Spangler, RE Faitoute & WE Steiner)(NMNH: ADP124948, female).

**Geographic distribution.** (Figs 40, 41). This species is currently known from lowland localities, one each in Guyane and Venezuela.

### *Mizotrechus novemstriatus* Bates, 1872

#### Nine-lined trough beetle

[http://species-id.net/wiki/Mizotrechus\\_novemstriatus](http://species-id.net/wiki/Mizotrechus_novemstriatus)

Figs 16, 41

**Lectotype.** (labeled by me in Paris, early 1970's): BRAZIL: Amazonas, Ega (Tefé) approximately 3.35°S, 64.71°W, 46 m (HW Bates)(MNHP: female). ADP127163.

**Derivation of specific epithet.** The epithet “*novemstriatus*” is descriptive Latin, meaning 9-lined and referring to the elytral interneurs, including the scutellar striae.

**Proposed English vernacular name.** Nine-lined trough beetle.

**Diagnosis.** With the attributes of the genus as described above and moderate sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons smooth, scattered rugulae not organized, moderately punctulate. Occiput smooth, moderately punctulate. Pronotum subcordiform with lateral margins narrowly explanate and basally with sharp, not denticulate, hind angles; base with regular rugulae. Elytra broad and short, wider than the width of pronotum across anterior third, and with 8 well-impressed irregularly punctulate interneurs, intervals not convex, apex not prolonged, margins behind humeri rough, intervals between microsetae blunt. Foreleg femur with evident ridge on postero-ventral margin.

**Description.** (Fig. 16). *Size:* See Appendix 1. Moderate sized for genus, ABL = 7.2 mm, SBL = 6.05 mm, TW = 2.48 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, elytra, and legs shiny. *Head:* Labrum quadrate, apico-medially v-notched. Eye small and moderately convex. Gena straight. Frons, occiput, and gena glabrous. *Prothorax:* Moderately broad, narrowed slightly toward base, margin narrowly explanate, slightly wider before hind angle; surface punctulate, punctures widespread, very fine, glabrous. *Pterothorax:* Elytron barely convex, intervals nearly flat, all interneurs with well-impressed irregularly-spaced punctulate, apex not prolonged, slightly rounded at extreme sutural apex. *Legs:* Normal in female; foreleg fe-

mur (as in Fig. 22) ridged along the postero-ventral margin and markedly produced at middle of ridge; posterior trochanter tapered to rounded point in female, length half that of femur. *Abdomen*: Abdominal sterna moderately setiferous, densely medially on II and III; sternum VII barely medially notched in female. *Male genitalia*: Unknown. *Female genitalia*: Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** Unknown.

**Other specimens examined.** None.

**Geographic distribution.** (Fig. 41). This species is currently known only from the type locality in the lowlands of Brazil.

### *Mizotrechus poirieri* sp. n.

#### Poirier's trough beetle

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[http://species-id.net/wiki/Mizotrechus\\_poirieri](http://species-id.net/wiki/Mizotrechus_poirieri)

Figs 17, 36, 40

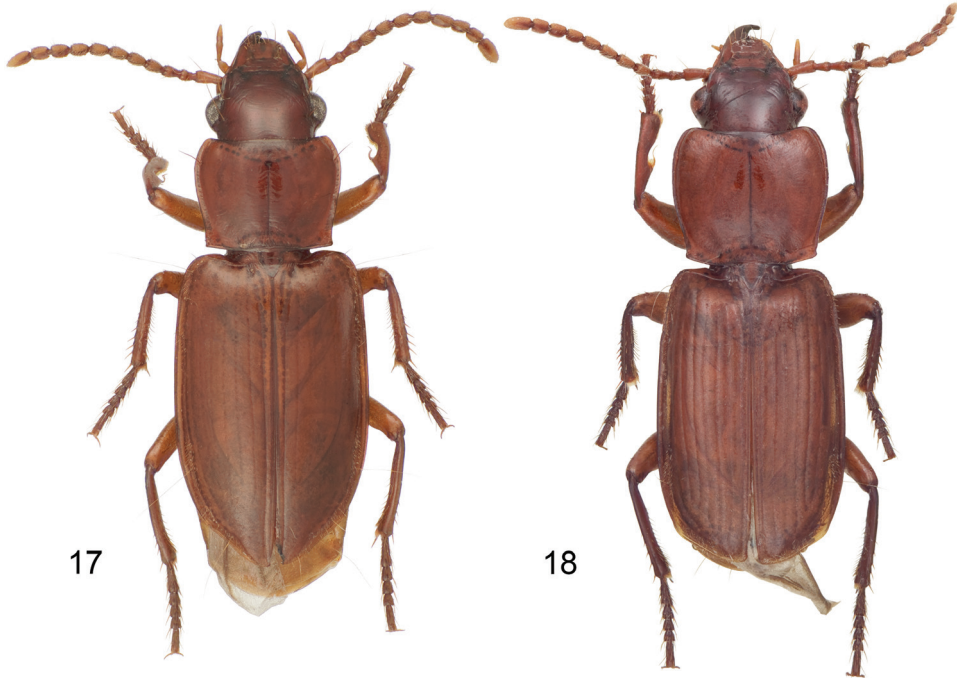
**Holotype.** GUYANE, Saut Pararé, Arataie River, Nouragues Field Station, 51 m, 4.0378°N, 52.6725°W, 30 November 2009 (S Brule, PH Dalens, & E Poirier) (NMNH: ADP124888, male).

**Derivation of specific epithet.** The epithet “*poirieri*” is an eponym, based on the family name of E. Poirieri, whose team in Guyane has been collecting beetles using Flight Intercept Traps and capturing adults of many new species, such as this one.

**Proposed English vernacular name.** Poirier's trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons with evident rugae, punctulate. Occiput with evident rugae, punctulate. Pronotum nearly quadrate with lateral margins slightly emarginate to hind angle, hind angle about right, not dentate; base sparsely rugulose. Elytra broad and short, much wider than the width of pronotum across anterior third, and with only interneur 1 deeply engraved, 2–8 evident yet shallowly impressed, not punctate; margins behind humeri entire. Foreleg femur with slightly produced swelling on postero-ventral margin.

**Description.** (Figs 17, 36). *Size*: See Appendix 1. Medium sized for the genus, ABL = 6.6 mm, SBL = 5.65 mm, TW = 2.42 mm. *Color*: see diagnosis, above. *Luster*: Head, pronotum, and legs shiny, elytra duller due to shallowly engraved slightly stretched microsculpture. *Head*: Labrum quadrate and apico-medially emarginate. Eye large, moderately convex. Gena moderately long, straight. Frons, occiput, and gena glabrous. *Prothorax*: Narrow, quadrate, narrowed slightly toward base, margins slightly emarginated before hind angle, angle about right, not dentate, margin moderately ex-



**Plate 5.** Digital Photo-illustrations, habitus, dorsal aspect: **17** *Mizotrechus poirieri* sp. n., ABL = 6.6 mm, male holotype, ADP124888; type locality. **18** *Mizotrechus woldai* sp. n., dorsal aspect, ABL = 7.4 mm, female holotype, ADP124946; type locality.

planate except wider at hind angle; surface punctulate, punctures widespread, glabrous. *Pterothorax*: Elytron moderately convex, disk flat, intervals flat, interneurs not punctate, apex markedly oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs*: Normal in male; foreleg femur (as in Fig. 20) with a minute setose tooth on postero-ventral margin, subdentate; posterior trochanter narrowly acute at apex, about half the length of the femur. *Abdomen*: Abdominal sterna moderately setiferous; sternum IV of male with narrow and dense patch of decumbent setae. *Male genitalia*: Median lobe (Fig. 36) elongate and robust with ostium moderately elongate, over half the length of the median lobe; apex a losp. n.tulate distal end that is more bent ventrad than in *M. dalensi*, moderately curved in lateral aspect, ventral margin proximal to apex straight then evenly curved to apex; endophallus with complexly folded tracheal fields; phallobase hooded and crested, opening more or less 20 degrees off axis of shaft. Parameres large, left a third longer than the right, both broadly rounded, asetose. *Female genitalia*: Unknown.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.

**Way of life.** The adult holotype was collected in a flight intercept trap in the rainforest understory. Adults are active in November, at the end of the dry season.

**Other specimens examined.** None.



**Geographic distribution.** (Fig. 40). This species is currently known only from the type locality in the lowlands of Guyane.

*Mizotrechus woldai* sp. n.

**Wolda's trough beetle**

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[http://species-id.net/wiki/Mizotrechus\\_woldai](http://species-id.net/wiki/Mizotrechus_woldai)

Figs 18, 39

**Holotype.** PANAMÁ, Canal Zone, Barro Colorado Island, 99 m, 9.1628°N, 79.8395°W, 5 May 1978 (H Wolda)(NMNH: ADP 124946, female).

**Derivation of specific epithet.** The epithet “*woldai*” is an eponym, based on the family name of H. Wolda, long time scientist with the Smithsonian Tropical Research Institute in Panamá, whose persistent light trapping produced many new and interesting species, such as one adult of this new species.

**Proposed English vernacular name.** Wolda's trough beetle.

**Diagnosis.** With the attributes of the genus as described above and medium sized for the genus as it is presently understood; adults have castaneous integument, except anterior parts of mandible, baso-lateral corner of labrum, and clypeal suture piceous. Frons with evident rugae, punctulate. Occiput without rugae, punctulate. Pronotum nearly quadrate with lateral margins slightly emarginate to hind angle, hind angle dentate, tooth small; base sparsely rugulose. Elytra broad and short, slightly wider than the width of pronotum across anterior third, and with only interneurs 8 deeply engraved, not punctate; margins behind humeri serrate.

**Description.** (Fig. 18). *Size:* See Appendix 1. Medium sized for the genus, ABL = 7.4 mm, SBL = 6.04 mm, TW = 2.29 mm. *Color:* see diagnosis, above. *Luster:* Head, pronotum, and legs shiny, elytra duller due to shallowly engraved slightly stretched microsculpture. *Head:* Labrum quadrate and apico-medially emarginate. Eye large, moderately convex. Gena moderately short, straight. Frons, occiput, and gena glabrous. *Prothorax:* Very broad, quadrate, narrowed slightly toward base, margins slightly emarginated before hind angle, angle dentate, margin beaded, moderately explanate at hind angle; surface punctulate, punctures wide-spread, glabrous. *Pterothorax:* Elytron flat, disk flat, intervals flat, interneurs not punctate, apex moderately oblique and straight, sutural apex narrowly rounded. Metasternum sparsely setiferous in male. *Legs:* Normal in female; foreleg femur (as in Fig. 21) with slightly produced, short, arcuate ridge on postero-ventral margin at basal fourth, not dentate. *Abdomen:* Abdominal sterna moderately setiferous. *Male genitalia:* Unknown. *Female genitalia:* Not investigated; however, it is likely similar to that illustrated on Plate 11.

**Dispersal potential.** These beetles are macropterous and capable of flight. They are moderately swift and agile runners.



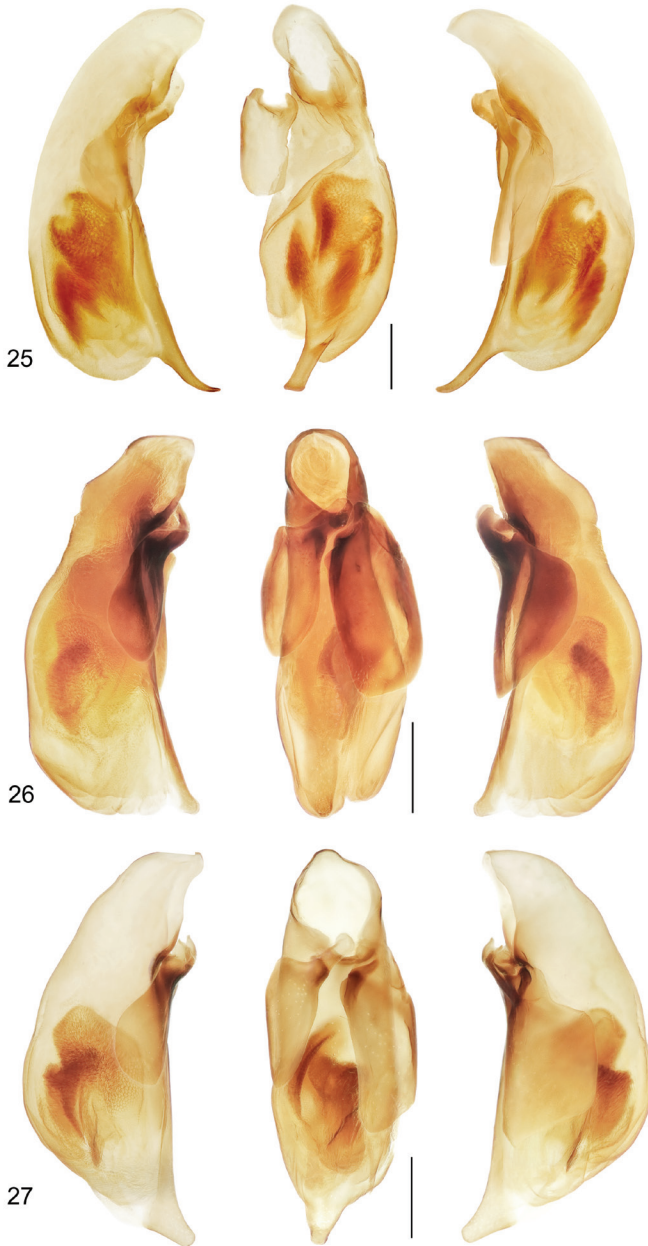
**Plate 6.** Digital Photo-illustrations, anterior femur, ventral aspect: **19** *Mizotrechus minutus* sp. n., ADP124966; type locality. **20** *Mizotrechus dalensi* sp. n., ADP124896; type locality. **21** *Mizotrechus chontalesensis* sp. n., ADP127181; type locality. **22** *Mizotrechus edithpiafae* sp. n., ADP124948; type locality. **23** *Mizotrechus brulei* sp. n., ADP129205; type locality. **24** *Mizotrechus gorgona* sp. n., ADP128622; type locality.

**Way of life.** The adult holotype was collected in a ground level UV light trap in the rainforest understory. Adults are active in May during the heavy rainy season in Panamá.

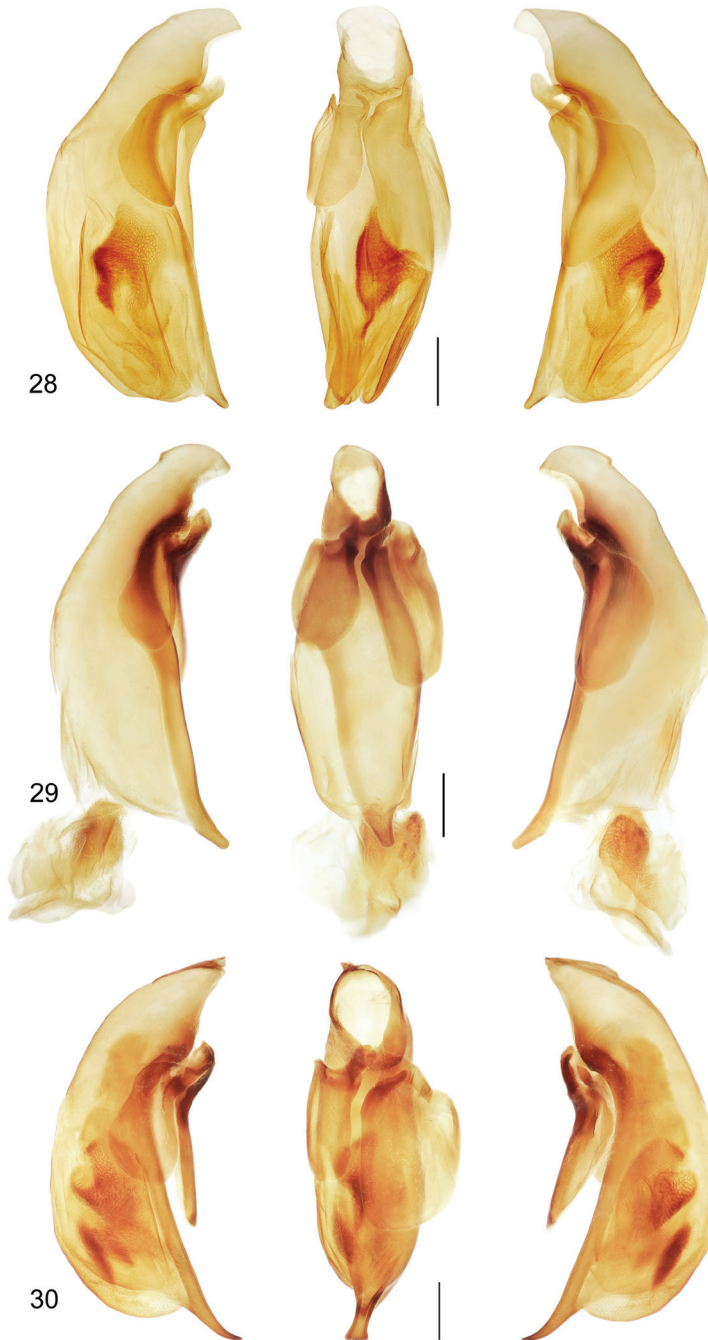
**Other specimens examined.** None.

**Geographic distribution.** (Fig. 39). This species is currently known from a single lowland locality in Panamá.

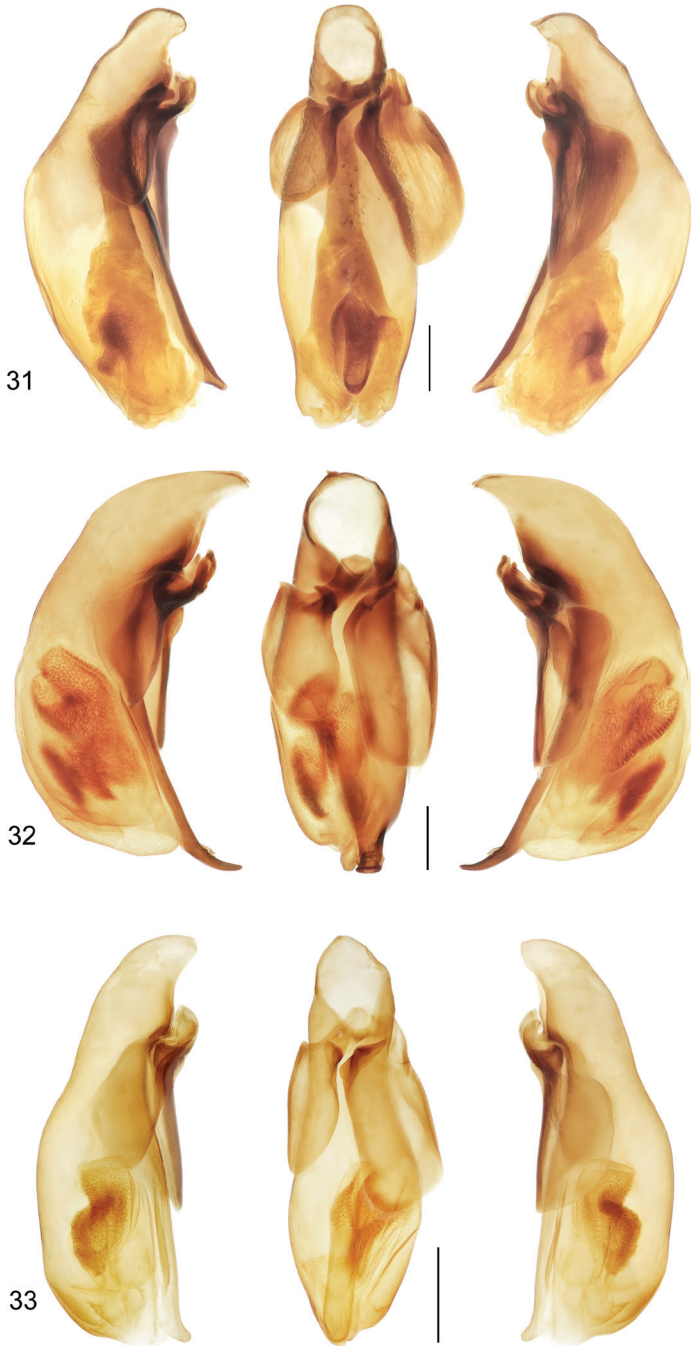
**Note.** Considering the hundreds of specimens of carabids collected by Wolda in a series of suspended light traps from canopy level to ground level, it is curious that no other specimens of this species were collected (see *M. fortunensis* above, where many specimens were collected by Wolda at light traps).



**Plate 7.** Digital Photo-illustrations, male genitalia, median lobe and parameres, left lateral, dorsal, and right lateral aspects: **25** *Mizotrechus bellorum* sp. n., ADP124890; type locality. **26** *Mizotrechus belvedere* sp. n., ADP129201; type locality. **27** *Mizotrechus brulei* sp. n., ADP127159, Guyane, Montagne des Chevaux, Commune de Roura.

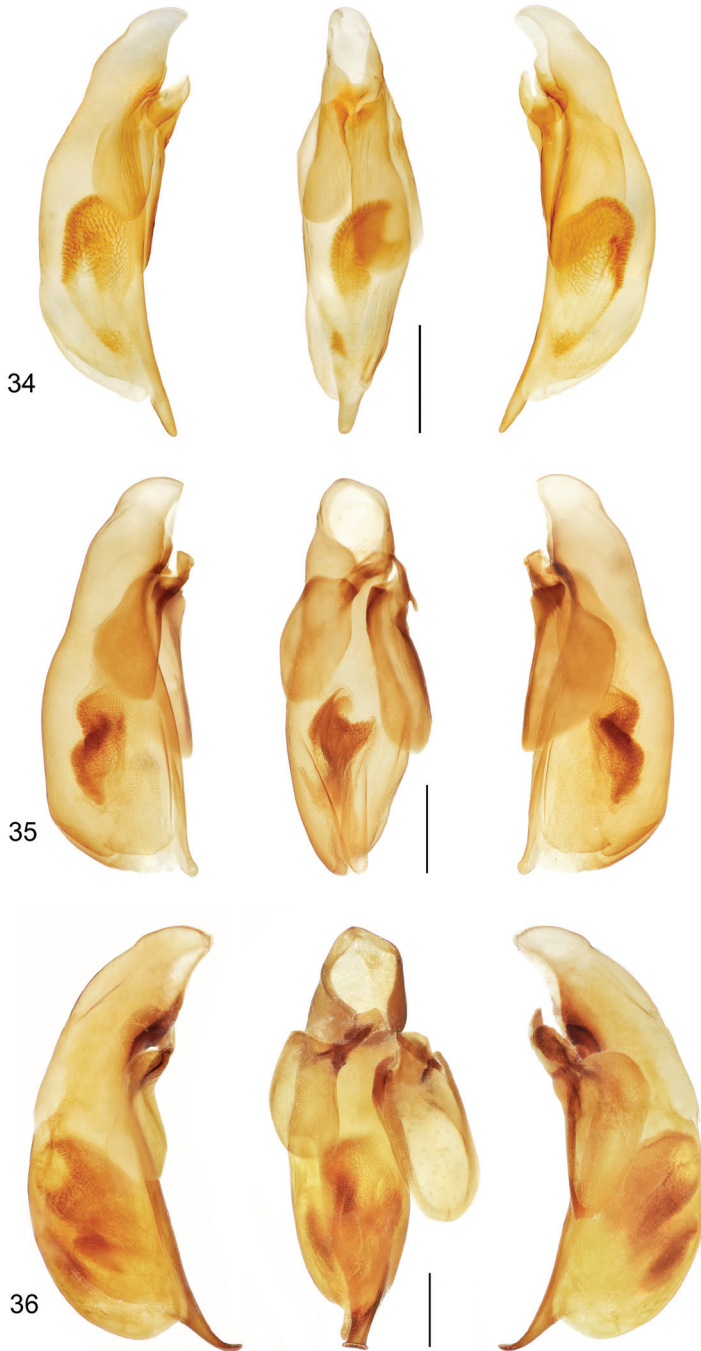


**Plate 8.** Digital Photo-illustration, male genitalia, median lobe and parameres, left lateral, dorsal, and right lateral aspects: **28** *Mizotrechus costaricensis* sp. n., ADP128620: type locality. **29** *Mizotrechus dalensi* sp. n., ADP129203, Guyane, Saut Pararé, Arataie River, Nouragues Field Station. **30** *Mizotrechus edithpiae* sp. n., ADP129203; G<sup>st</sup> ?locality (see text).



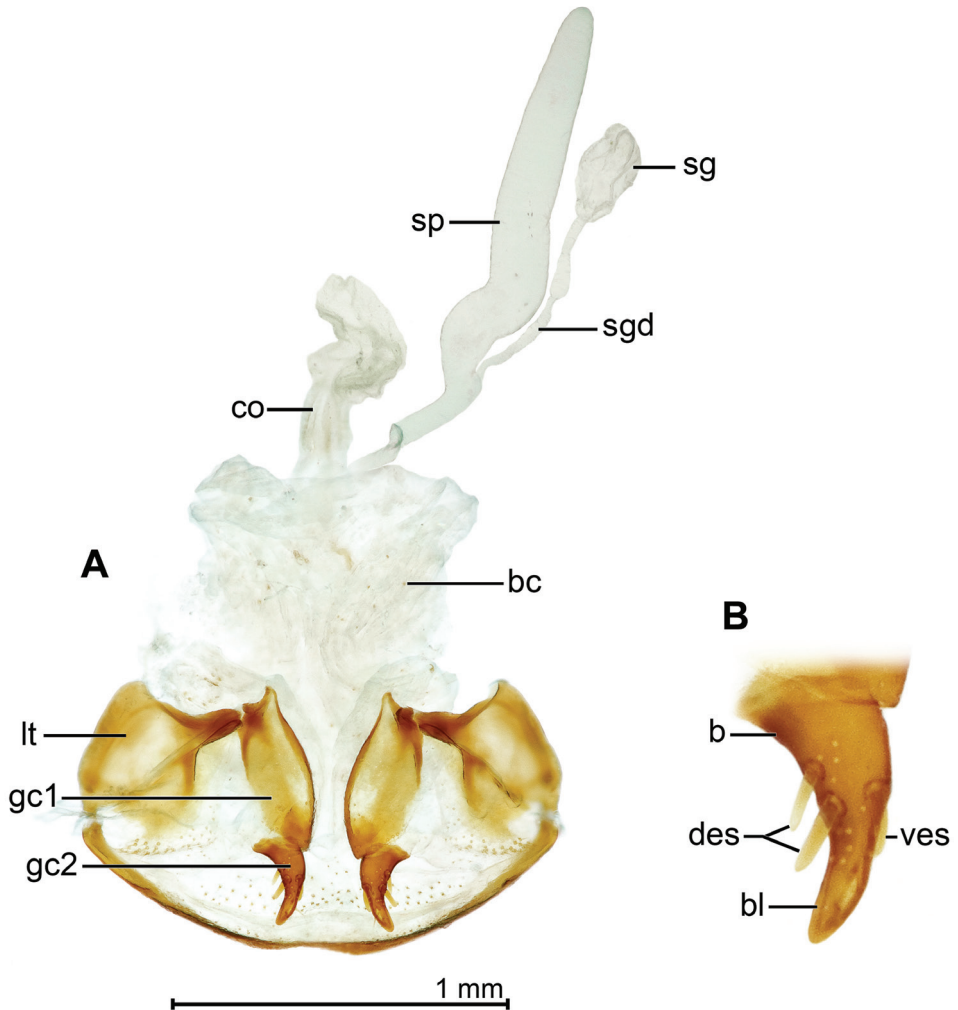
**Plate 9.** Digital Photo-illustration, male genitalia, median lobe, left lateral, dorsal, and right lateral aspects: **31** *Mizotrechus fortunensis* sp. n., ADP124590; type locality. **32** *Mizotrechus grossus* sp. n., ADP127165; type locality. **33** *Mizotrechus marielaforetae* sp. n., ADP127183; type locality.



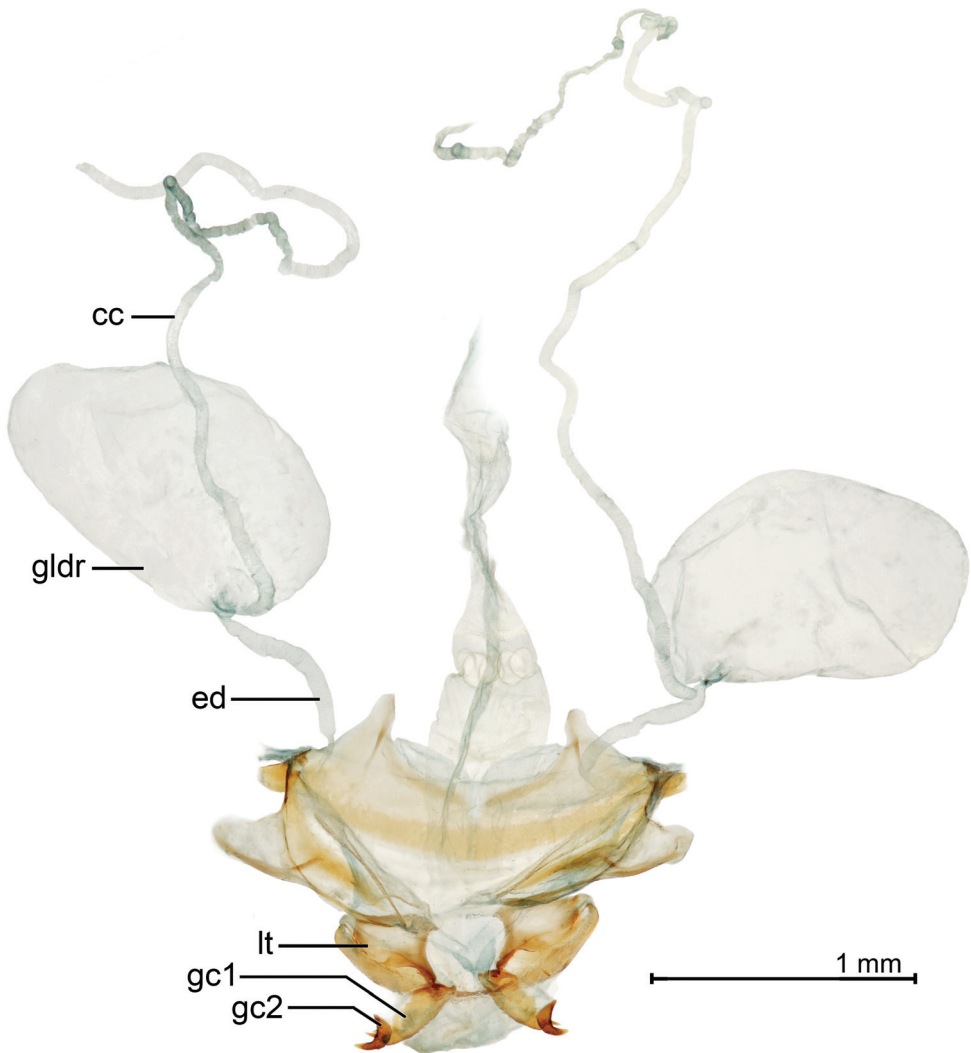


**Plate 10.** Digital Photo-illustration, male genitalia, median lobe, left lateral, dorsal, and right lateral aspects: **34** *Mizotrechus minutus* sp. n., ADP124902; type locality. **35** *Mizotrechus neblinensis* sp. n., ADP124944; type locality. **36** *Mizotrechus poirieri* sp. n., ADP124888; type locality.

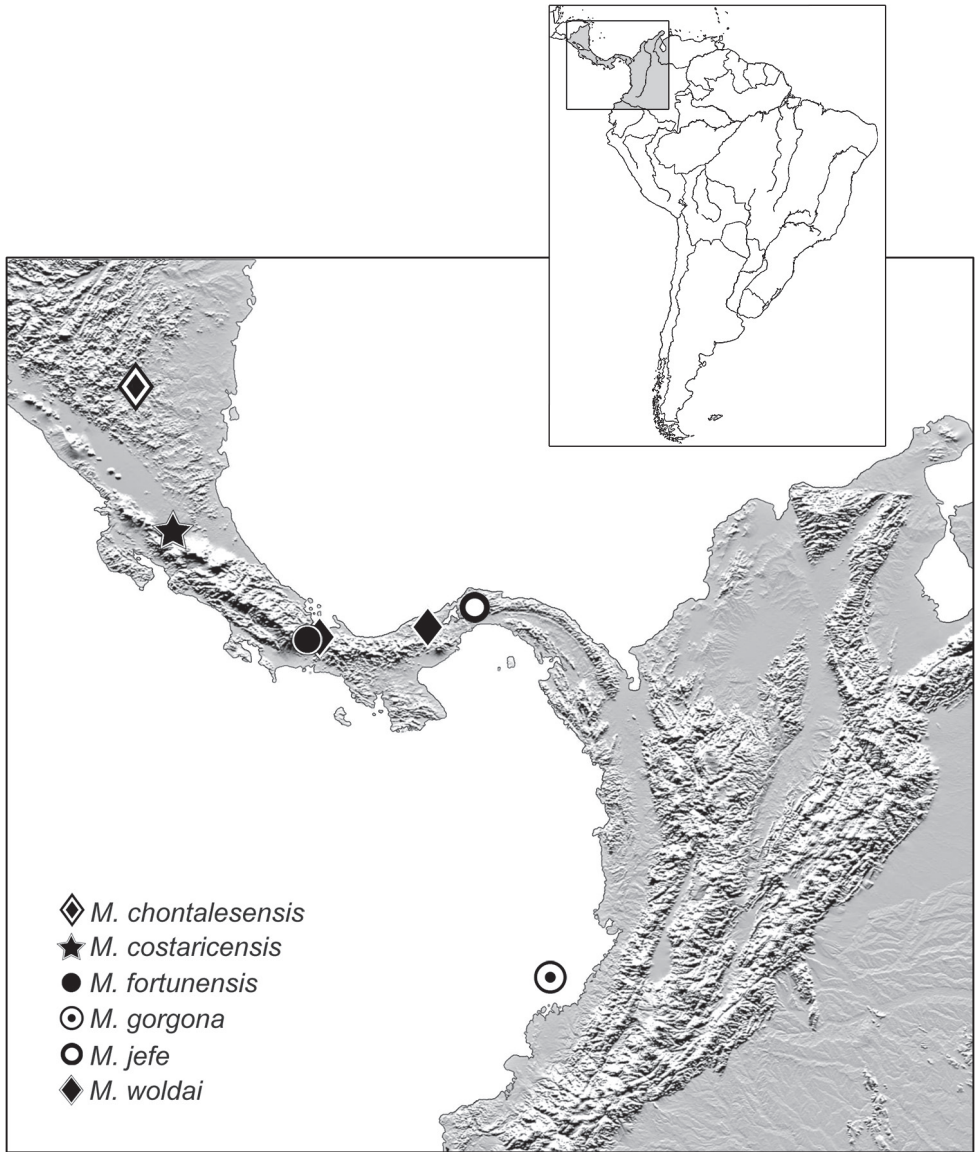




**Plate 11.** Digital Photo-illustration, female genitalia: *Mizotrechus dalensi* sp. n., ADP127161; Petite Montague Tortue, Guyane. A. Dorsal aspect. Legend, **bc**, bursa copulatrix; **co**, common oviduct; **sg**, spermathecal gland; **sgd**, spermathecal gland duct; **sp**, spermatheca. dorsal aspect; **vc**, villous canal; **lt**, laterotergite; **gc1**, gonocoxite 1; **gc2**, gonocoxite 2. B. Gonocoxite 2, dorsal aspect: Legend, **b**, base of gonocoxite 2; **bl**, blade of gonocoxite 2; **des**, dorsal ensiform seta; **ves**, ventral ensiform setae.

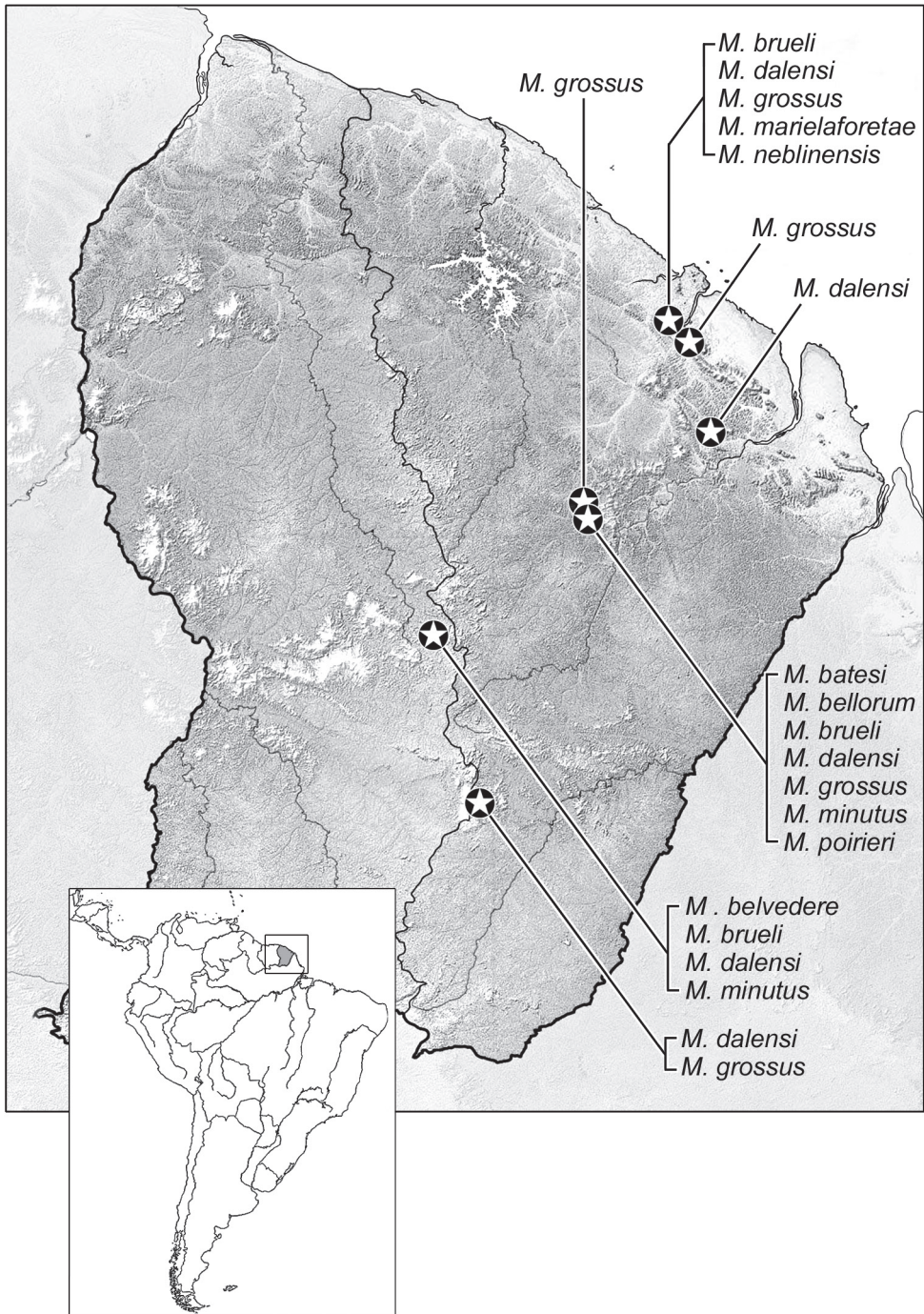


**Plate 12.** Digital Photo-illustration, pygidial (defense) gland system: *Mizotrechus grossus* sp. n., dorsal aspect, ADP127064; type locality. Legend: **cc**, collecting canal; **ed**, efferent duct; **edbl**, efferent duct, basal lobe; **gldr**, pygidial gland reservoir. Ovipositor sclerites, Legend: **gc1**, gonocoxite 1; **gc2**, gonocoxite 2; **lt**, laterotergite.



**Figure 39.** Distribution symbol map for known localities of *M. chontalesensis*, *M. costaricensis*, *M. fortunensis*, *M. gorgona*, *M. jefe*, *M. woldai*, spp. n.





**Figure 40.** Distribution symbol map for known localities of *M. batesi*, *M. bellorum*, *M. belvedere*, *M. brueli*, *M. dalensi*, *M. grossus*, *M. marielaforetae*, *M. minutus*, *M. poirieri*, *M. neblinensis*, spp. n.



**Figure 41.** Distribution symbol map for known localities of *M. neblinensis*, sp. n., *M. novemstriatus* Bates.

## Discussion

For 108 years, adults of *Mizotrechus* Bates 1872 have flown “under the radar,” so to speak. Then, along came the FITs (Flight Intercept Traps) used by the SEAG group in Guyane. Since collection of the unique holotype of *M. novemstriatus* Bates from Ega (now Tefé), Brazil, and a misidentified (by Bates) specimen collected by Janson in Nicaragua, this genus has remained an enigma and rarely collected. All the very few specimens that have resided in collections have been determined as *M. novemstriatus* Bates, because the genus was thought to be monobasic. The synopsis presented in this paper is an opening salvo, only. There is no question that the use of FITs, in the rest of the Orinoco and Amazon Basins and in Middle America, will produce many new spe-



cies in addition to those described herein. The type locality of the type species is south of the Amazon River; and this suggests that there may be many more species residing on the Brazilian Shield, just as there are on the Guyana Shield, as revealed by this study.

With the increase in our knowledge from two specimens to 56 specimens and from one species to 18 species, this poorly known genus now has become recognized as a likely dominate subcortical (or leaf litter?) inhabitant of the Neotropics. The Tribe Perigonini is little known overall and has never been a group seriously studied in the Western Hemisphere. It is very likely that the other two described genera, *Perigona* Laporte de Castelnau 1835 and *Diploharpus* Chaudoir 1850, and a third as yet undescribed genus (Erwin, in prep) will also be replete with new species, as is *Mizotrechus*, once they are studied. For example, *Diploharpus* is now known to have 13 described species assigned to it throughout its entire range from México south to Bolivia and Brazil. In the Guyane FIT samples alone, I have sorted out 27 morphospecies of *Diploharpus*.

While writing descriptions and creating the key, it became apparent that certain specific attributes have begun to form biogeographic patterns. The serrate humerus is found in the Central America/Colombia species and one Guyane species, and the serrate femur in the same species in Central America/Colombia only; the dentate femora only in the Guyane species. When more species are discovered and documented/described, this genus has the potential of contributing to a better understanding of the biogeography of the Central American/northern South American connections.

As I have documented with my fogging assemblages, a novel collecting technique opens new and exciting faunal components to scientific investigation and knowledge. Unfortunately, the opening of new taxonomic vistas with these new collecting techniques, and discovery of the new and/or rare species found, comes at a time when taxonomists themselves are becoming rare (Pearson et al. 2010; Cardosa et al. 2011). While these authors provide some solutions, the question remains: Will those solutions be enough and in time, while biodiversity is still here, to help us fully grasp what global species richness means (Erwin et al. 2005)?

## Acknowledgements

In addition to the museum curators and collection managers noted above, I also extend a hearty thanks to Charyn Micheli and Karolyn Darrow (both of the Department of Entomology at the Smithsonian Institution) for the Resumen, measurements, and friendly review of the manuscript, and images and review of the Figure Captions, respectively; and Gary Hevel of the Department of Entomology at the National Museum of Natural History, Smithsonian Institution (specimen preparation of all the Guyane specimens); to Elizabeth Driscoll (Sonora, CA) for an editorial review of the manuscript; and, a hearty thanks to David H. Kavanaugh who also provided a scientific review of the ultimate draft.



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## Appendix I.

Tables with measurements and ratios for adults of species of *Mizotrechus* Bates 1872. All measurements in millimeters. Apparent body length (ABL) provided in the descriptions.

TOTAL LENGTH (SBL)						
Species	Males			Females		
	N	Range	Mean	N	Range	Mean
<i>batesi</i>	1	4.897				
<i>bellorum</i>	1	5.874				
<i>belvedere</i>	1	6.142				
<i>brulei</i>	2	5.535–5.644	5.59	7	6.408–7.096	6.759
<i>chontalesensis</i>				1	5.886	
<i>costaricensis</i>	1	6.888				
<i>dalensi</i>	4	6.404–7.101	6.736	4	6.408–7.096	6.759
<i>edithpiafae</i>	1	7.162				
<i>fortunensis</i>	6	7.02–7.66	7.256			
<i>gorgona</i>				1	7.15	
<i>grossus</i>	10	7.068–7.711	7.301	4	6.986–7.643	7.257
<i>jefe</i>				1	5.836	
<i>marielaforetae</i>	1	5.123				
<i>minutus</i>	1	3.767		2	3.7341–3.879	3.807
<i>neblenaensis</i>	2	5.665–5.69	5.678	2	5.539–6.118	5.829
<i>novemstriatus</i>				1	6.045	
<i>poirieri</i>	1	5.649				
<i>woldai</i>				1	6.404	

MAXIMUM WIDTH						
Species	Males			Females		
	N	Range	Mean	N	Range	Mean
<i>batesi</i>	1	1.792				
<i>bellorum</i>	1	2.556				
<i>belvedere</i>	1	2.484				
<i>brulei</i>	2	2.036–2.046	2.041	7	1.986–2.224	2.123
<i>chontalesensis</i>				1	2.286	
<i>costaricensis</i>	1	2.888				
<i>dalensi</i>	4	2.646–2.964	2.813	4	2.724–3.114	2.833
<i>edithpiafae</i>	1	2.942				
<i>fortunaensis</i>	6	2.928–3.032	2.972			
<i>gorgona</i>				1	2.86	
<i>grossus</i>	10	2.72–3.114	2.974	4	2.846–3.262	2.994
<i>jefe</i>				1	2.272	
<i>marielaforetae</i>	1	2.178				
<i>minutus</i>	1	1.49		2	1.51–1.576	1.543
<i>neblenaensis</i>	2	2.256–2.358	2.307	2	2.3–2.464	2.382

<i>novemstriatus</i>				1	2.48	
<i>poirieri</i>	1	2.418				
<i>woldai</i>				1	2.286	

## W of HEAD/W of L. ELYTRON

Species	Males			Females		
	N	Range	Mean	N	Range	Mean
<i>batesi</i>	1	1.434				
<i>bellorum</i>	1	1.191				
<i>belvedere</i>	1	1.196				
<i>brulei</i>	2	1.459–1.495	1.477	7	1.213–1.434	1.307
<i>chontalesensis</i>				1	1.358	
<i>costaricensis</i>	1	1.139				
<i>dalensi</i>	4	1.199–1.274	1.234	4	1.170–1.287	1.229
<i>edithpiafae</i>	1	1.218				
<i>fortunaensis</i>	6	1.057–1.151	1.109			
<i>gorgona</i>				1	1.192	
<i>grossus</i>	10	1.201–1.324	1.238	4	1.186–1.281	1.227
<i>jefe</i>				1	1.3	
<i>marielaforetae</i>	1	1.198				
<i>minutus</i>	1	1.27		2	1.280–1.282	1.281
<i>neblenaensis</i>	2	1.207–1.238	1.223	2	1.276–1.306	1.291
<i>novemstriatus</i>				1	1.325	
<i>poirieri</i>	1	1.191				
<i>woldai</i>				1	1.358	

## PRONOTUM: WIDTH (at widest part)/LENGTH

Species	Males			Females		
	N	Range	Mean	N	Range	Mean
<i>batesi</i>	1	1.179				
<i>bellorum</i>	1	1.283				
<i>belvedere</i>	1	1.208				
<i>brulei</i>	2	1.192–1.236	1.214	7	1.204–1.308	1.248
<i>chontalesensis</i>				1	1.226	
<i>costaricensis</i>	1	1.236				
<i>dalensi</i>	4	1.333–1.362	1.347	4	1.305–1.414	1.362
<i>edithpiafae</i>	1	1.281				
<i>fortunaensis</i>	6	1.179–1.249	1.215			
<i>gorgona</i>				1	1.194	
<i>grossus</i>	10	1.303–1.383	1.344	4	1.295–1.360	1.324
<i>jefe</i>				1	1.206	
<i>marielaforetae</i>	1	1.222				
<i>minutus</i>	1	1.311		2	1.315–1.316	1.315
<i>neblenaensis</i>	2	1.262–1.328	1.295	2	1.281–1.347	1.314
<i>novemstriatus</i>				1	1.356	
<i>poirieri</i>	1	1.308				
<i>woldai</i>				1	1.168	

LENGTH OF PRONOTUM / LENGTH OF HEAD						
Species	Males			Females		
	N	Range	Mean	N	Range	Mean
<i>batesi</i>	1	1.938				
<i>bellorum</i>	1	1.897				
<i>belvedere</i>	1	2.29				
<i>brulei</i>	2	2.059–2.121	2.09	7	1.965–2.201	2.073
<i>chontalesensis</i>				1	2.243	
<i>costaricensis</i>	1	2.4				
<i>dalensi</i>	4	2.061–2.231	2.134	4	1.95–2.186	2.06
<i>edithpiafae</i>	1	2.456				
<i>fortunaensis</i>	6	2.144–2.347	2.206			
<i>gorgona</i>				1	2.275	
<i>grossus</i>	10	1.942–2.265	2.08	4	1.938–2.288	2.087
<i>jefe</i>				1	2.075	
<i>marielaforettae</i>	1	2.263				
<i>minutus</i>	1	2.113		2	2.097–2.233	2.165
<i>neblenaensis</i>	2	2.001–2.257	2.129	2	1.996–2.228	2.112
<i>novemstriatus</i>				1	2.188	
<i>poirieri</i>	1	1.892				
<i>woldai</i>				1	2.812	

# Two new species of *Harpactea* (Araneae, Dysderidae) from Turkey

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| [urn:lsid:zoobank.org/author:8DB0B243-5B2F-4428-B457-035A8274500C](https://doi.org/urn:lsid:zoobank.org/author:8DB0B243-5B2F-4428-B457-035A8274500C)

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## Abstract

Two new species, *Harpactea arnedoi* **sp. n.** and *H. kencei* **sp. n.**, are described on the basis of both sexes from the eastern Mediterranean and Aegean regions of Turkey. *H. kencei* **sp. n.** can be easily distinguished from all other Turkish and European representatives of the genus by the structure of the flattened, massive embolus on the male copulatory organ. Although resembling *Stalagtia* in palpal morphology, we describe one of the new species as *Harpactea arnedoi* **sp. n.** For both Turkish species, detailed morphological descriptions and diagnoses are presented together with figures of the copulatory organs.

## Keywords

Dysderidae, Harpacteinae, Eastern Mediterranean, Aegean



## Introduction

The first records of the genus *Harpactea* from Turkey were *H. babori* from İstanbul Province and *H. sturanyi* from Konya Province (Nosek 1905). However, the majority of Turkish *Harpactea* species were described by Brignoli (1978a-b, 1979). In recent years, Lazarov and Deltshv (2008) and Lazarov (2010) re-described *H. sanctaeinsulae* and *H. babori* respectively, which were previously only known from males. Bayram et al. (2009) described *H. christodeltshevi* from the south-eastern Anatolia and Kunt et al. (2010) described *H. erseni*, from the Aegean region. Currently 20 species are known from Turkey (Bayram et al. 2011).

During our surveys of the Turkish spider fauna, we have encountered two new species of *Harpactea* from the eastern Mediterranean and Aegean regions. The purpose of this study is to describe and diagnose these two new species on the basis of both sexes.

## Materials and methods

Specimens were collected by means of pitfall traps, sifter and hand collecting from two different provinces of Turkey (Fig. 1). Digital images of the pedipalps and vulvae were taken with a Leica DFC295 digital camera attached to a Leica S8AP0 stereomicroscope, with 5–15 photographs taken in different focal planes and combined using image stacking software. Photographic images were edited using PHOTOSHOP CS2 and COREL-DRAW X3 was used to create the plates. All measurements are in mm. Terminology for the body measurements and copulatory organs follows Chatzaki and Arnedo (2006).

The following abbreviations are used in the text and figures: Carapace and abdomen: AL, abdominal length; CL, carapace length; CWmax, maximum carapace width; CWmin, minimum carapace width. Eyes: AME, anterior median eyes; PLE, posterior lateral eyes; PME, posterior median eyes; AMEd, diameter of anterior median eyes; PLEd, diameter of posterior lateral eyes; PMEd, diameter of posterior median eyes. Chelicera: ChF, length of cheliceral fang; ChG, length of cheliceral groove; ChL, total length of chelicera (lateral external view). Legs: Ta, tarsus; Me, metatarsus; Ti, tibia; Pa, patella; Fe, femur; Tr, trochanter; C, coxa; D, dorsal; Pl, prolateral; Rl, retrolateral; V, ventral. Male bulb: AA, accessory apophysis; Co, conductor; E, embolus. Vulva: aba, anterior basal arc; As, anterior spermatheca; bras, basal transverse part of the anterior spermatheca; dc, distal crest; des, distal expansion of the spermatheca; pd, posterior diverticulum; rsas, rod-shaped part of the anterior spermatheca; tb, transverse bar. Depository: AUZM, Anadolu University, Zoology Museum, Eskişehir, Turkey; cKBK, Personal collection of Kadir Boğaç Kunt, Ankara, Turkey; SMF, Senckenberg Museum, Frankfurt am Main, Germany.



Figure 1. Type localities of the new species. ★ *H. arnedoi* sp. n. ■ *H. kencei* sp. n.

## Taxonomy

### Family Dysderidae C. L. Koch, 1837

### Genus *Harpactea* Bristowe, 1939

#### *Harpactea arnedoi* sp. n.

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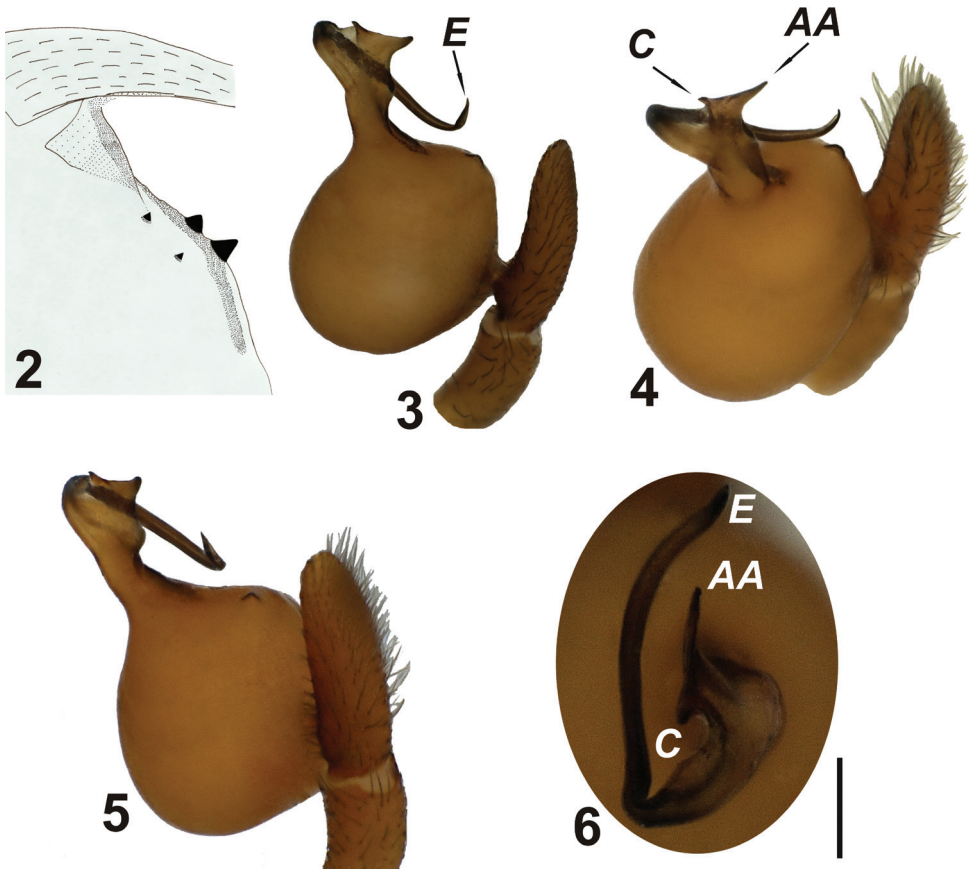
[http://species-id.net/wiki/Harpactea\\_arnedoi](http://species-id.net/wiki/Harpactea_arnedoi)

Figs 2–8

**Material examined.** **Holotype** ♂ (AUZM), Turkey, Gaziantep Province, Kuşçubeli Pass [37°6'50.20"N; 36°36'34.20"E], 13.XI.2010, under leaf litter, leg. E.A.Yağmur. **Paratypes** 1 ♀, 1 ♂ (AUZM); 2 ♀♀, 2 ♂♂, 9 juveniles (cKBK & SMF), same data as holotype.

**Derivatio nominis.** The new species is dedicated to the Spanish arachnologist, Dr. Miquel Arnedo (Barcelona University, Barcelona, Spain), who has made important contributions to the taxonomy of the family Dysderidae.

**Diagnosis.** *H. arnedoi* sp. n. differs from all other *Harpactea* species in the structure of the copulatory organs. However, the general morphology of the male palp resembles that of *H. zoiyai* Gasparo, 1999 known from Greece (see Gasparo 1999). The male of *H. arnedoi* sp. n. differs in having an uneven spherical shape of the palpal bulb; the region between the bulb and the distal continuation is elongated and has a funnel-like appearance; the embolus is shorter, hook-like and bends downwards towards the tip. The vulva is apparent and characterized by a peripherally sclerotized posterior diverticulum and folded distal expansion.



**Figures 2–6.** *Harpactea arnedoi* sp. n. **2** Cheliceral teeth **3** left palp, retrolateral view **4** ditto, nearly anterior view **5** ditto, nearly retrolateral view **6** ditto, distal view. Scale line: 0.5 mm.

**Notes.** While describing *H. arnedoi* sp. n., it was difficult to decide whether it would be best assigned to *Harpactea* or to *Stalagtia*. By the characteristic structure of the male copulatory organ (globular tegulum, long embolus, poorly developed conductor), the new species is similar to members of *Stalagtia*. However, the male palp possesses a poorly developed conductor (Fig. 4), and the female copulatory organs are similar to those of *Harpactea* species in having a short posterior diverticulum and anterior spermathecae. Thus, we feel the new species is correctly placed in *Harpactea*. Further evidence in support of this generic placement is the absence of ventral spines on the anterior tibiae and metatarsi in the new species, particularly as Deeleman-Reinhold (1993) stated that their presence was diagnostic of *Stalagtia*. However, the only known Turkish species of *Stalagtia*, *S. thaleriana* Chatzaki & Arnedo, 2006, does not possess ventral spines on the anterior tibiae and metatarsi, as was mentioned earlier by Chatzaki and Arnedo (2006) and Kunt et al. (2009).

**Description.** Measurements: [Holotype ♂ / Paratype ♀]: AL 2.26 / 2.50; CL 1.75 / 1.73; CWmax 1.45 / 1.35; CWmin 0.63 / 0.65; AMEd 0.10 / 0.11; PLEd 0.09 /

0.09; PMed 0.08 / 0.08; ChF 0.37 / 0.38; ChG 0.18 / 0.19; ChL 0.62 / 0.64 mm. Leg measurements are given in Table 1.

**MALE:** Small sized spider. Carapace greenish - light brown, with smooth surface and distinct fovea. AME, PLE and PME closely grouped; AME separated. Sternum, labium, gnathocoxae and chelicerae light brown. Sternum dark brown laterally, with thin, long hair near margins. Cheliceral groove with four teeth: retromargin with two tiny teeth; promargin with two strong teeth, largest tooth closest to base of the cheliceral groove (Fig. 2). Top of the labium and gnathocoxae with short, strong hair, sparsely distributed. Abdomen greyish-light brown, with short, thin blackish hair over the entire surface. Legs yellowish-light brown with sparse blackish setae. Ventral surface of coxae with long, thin, black sparse hair. Leg IV > Leg I > Leg II > Leg III. Tarsi with three claws. Tarsi III and IV with fine scopulae. Legs III and IV with fine metatarsal scopulae covering slightly less than the distal half of the segment (ventral surface only). Prolateral part of coxae III and IV with 1 spine. Dorsal parts of femora, tibiae and metatarsi with spines. Number of spines can vary among individuals. Detailed leg spination of *H. arnedoi* sp. n. is given in Table 2.

Palpal tarsus of the male covered with thin and elongated setae. Tegulum yellow, lighter than the legs. Bulb almost spherical. The anteroventral region of the bulb has a chitinized edge. Between bulb and distal appendages there is a neck-shaped transition region (Figs 3–5). This region is lightly chitinized and dusky in patches. From the base of the embolus, conductor and accessory apophysis have dark brown tips. Embolus is slender and cylindrical up to its hook-like tip and it is not so heavily sclerotized. At the periphery it is membranous and projects downwards, parallel to the palpal tibia. Conductor and accessory apophysis are developed at the end of the neck-shaped transition region, on the opposite tips of an ear-shaped structure. Both are triangular in shape, whereas the accessory apophysis is longer and jagged (Fig. 6). The relative positions of the distal appendages are most easily seen at a 90 degree angle in ventral view. Embolus separated from conductor and accessory apophysis by a broad base, at first it follows the course of the conductor, but later bends with a sharp curve and accompanies the accessory apophysis.

**FEMALE:** No differences found between male and female, in terms of body colour and morphology. Vulva sclerotized almost uniformly. Distal crest long and butt-ended at the tip. Distal expansion of spermatheca convoluted. Rod-shaped part of the anterior spermatheca short and cylindrical. Basal transverse part of the anterior spermatheca separates from rod-shaped part laterally at an acute angle and forms a triangular shape. Anterior basal arc lies linearly through the centre and periphery, but widens at the edges. Transverse bar short and crescent-shaped with tips turned downwards. Posterior diverticulum shaped as a membranous sac and is sclerotized at the periphery (Figs 7, 8).

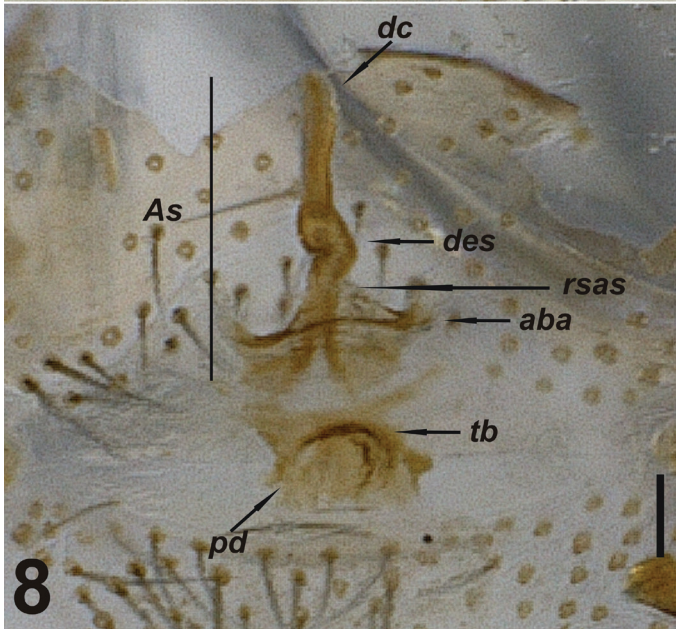
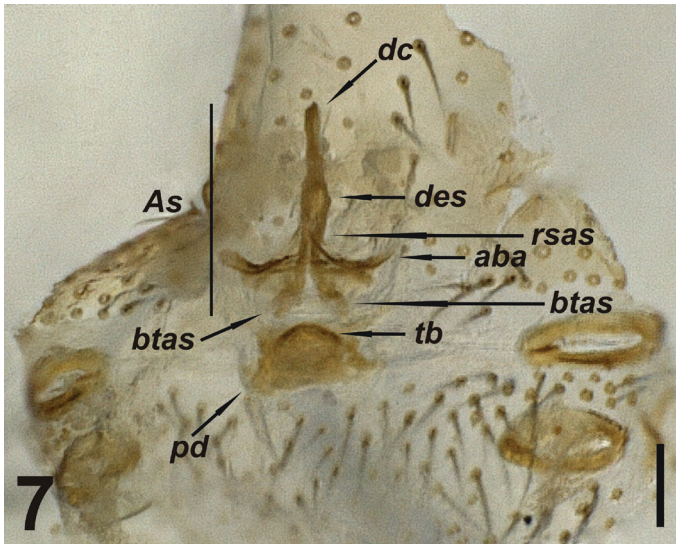
**Ecology.** Specimens were collected in Kuşçubeli Pass, located in the Amanos Mountains, from habitats covered by Turkish Pine (*Pinus brutia*) and scrub type oak forests (*Quercus infectoria*). A variety of herbaceous plants and low shrubs such as *Ruscus aculeatus* are also widely represented in those forests. Sampling was done by sifting leaf litter during the early winter.

**Distribution.** *H. arnedoi* sp. n. is known from the type locality only.



**Table I.** Leg measurements of *H. arnedoi* sp. n.

(Holotype ♂ / Paratype ♀)	Fe	Pa	Ti	Me	Ta
<b>Leg I</b>	1.42 / 1.23	0.80 / 0.73	1.15 / 0.98	1.05 / 0.78	0.38 / 0.32
<b>Leg II</b>	1.10 / 1.17	0.80 / 0.75	1.12 / 0.93	1.05 / 0.85	0.37 / 0.31
<b>Leg III</b>	1.05 / 1.00	0.55 / 0.55	0.83 / 0.63	1.02 / 0.95	0.37 / 0.32
<b>Leg IV</b>	1.63 / 1.50	0.83 / 0.78	1.40 / 1.25	1.50 / 1.35	0.40 / 0.33

**Figures 7–8.** Vulva of *Harpactea arnedoi* sp. n. **7** dorsal view **8** ventral view. Scale lines: 0.1 mm.

**Table 2.** Leg spination of *H. arnedoi* sp. n.

♂ (Holotype)	Leg I	Leg II	Leg III	Leg IV
C	0	0	1 Pl	1 Pl
Fe	2 Pl	1-2 Pl	1, 1 Pl 1, 1, 1 D	2 Pl 1 D
Pa	0	0	1 Rl	0
Ti	0	0	1, 1 Pl 2, 1, 1 Rl 1, 1, 2 V	1, 1 Pl 1 D 2, 1, 1 Rl 1, 1, 2 V
Me	0	0	1, 1 Pl 1, 1, 1 Rl 1, 1, 2 V	1, 1, 1 Pl 1, 1, 1 D 4 Rl 1, 1, 2 V
♀ (Paratype)				
C	0	0	1 Pl	1 Pl
Fe	2 Pl	1 Pl	1 Pl 1, 1 D	2 Pl 2 D
Pa	0	0	1 Rl	0
Ti	0	0	1, 1 Pl 2, 1, 1 Rl 1, 1, 2 V	1, 1, 1 Pl 1 D 2, 1, 1 Rl 1, 1, 2 V
Me	0	0	1, 1, 1 Pl 1, 1 Rl 1, 1, 2 V	1, 1, 2 Pl 1, 1 D 4 Rl 1, 1, 2 V

***Harpactea kencei* sp. n.**

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[http://species-id.net/wiki/Harpactea\\_kencei](http://species-id.net/wiki/Harpactea_kencei)

Figs 9–15

**Material examined.** **Holotype** ♂ (AUZM), Turkey, Muğla Province, Milas District, Kırıkkışlacık Village [37°16'38.80"N; 27°33'47.97"E], 13.XI.2010, under stones, leg. M.Elverici. **Paratypes** 1 ♀ (AUZM), 1 ♀ 5 ♂♂ (cKBK & SMF), same data as holotype.

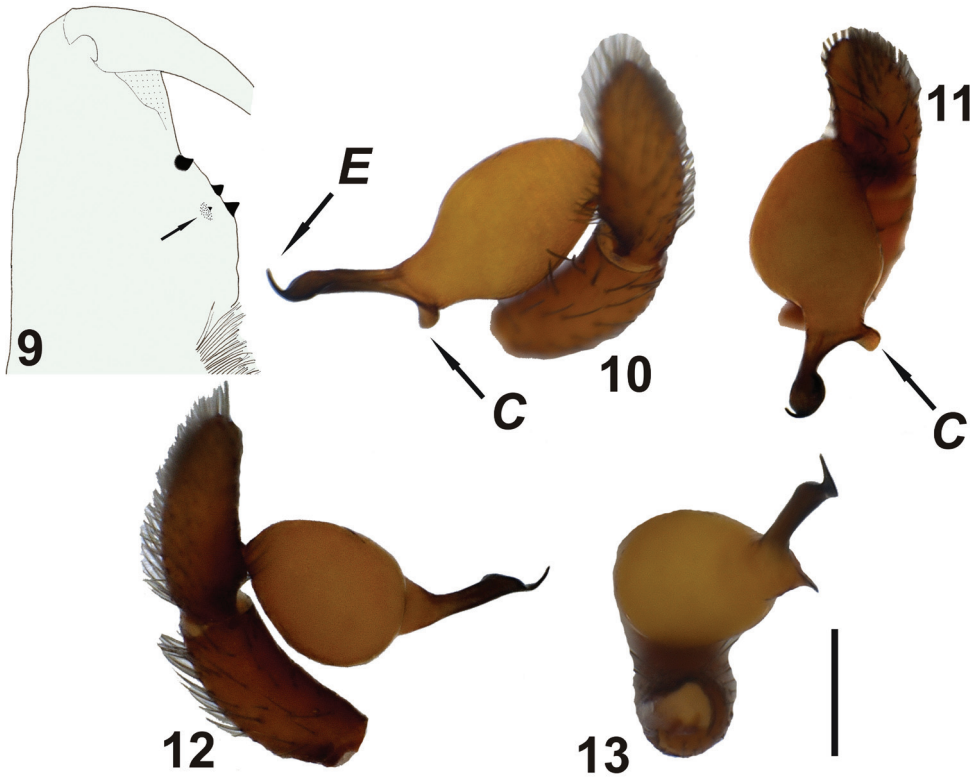
**Derivatio nominis.** The new species is named in honor of the well-known Turkish biologist Prof. Dr. Aykut Kence (Middle East Technical University, Ankara, Turkey) for his important contributions to Turkish biology.

**Diagnosis.** *H. kencei* sp. n. can be easily distinguished from all other Turkish *Harpactea* by the unique structure of the male palp and broad, grooved sides, crescent like anterior basal arc-shaped structure of the female vulva. In general appearance the embolus is well sclerotized, thorn-like and with a hook-shaped tip. Towards the tip, the embolus flattens like a spoon and ends with a thorn-like tip inflecting upon itself. On the embolar base there is a small ear-shaped conductor relatively well sclerotized at its peripheries. This is attached to the embolus at an angle of 90 degrees. Unique embolus (not a simple thornlike structure) and the presence of the conductor differentiate *H. kencei* sp. n. from *H. diraoi*, *H. isaurica*, *H. sanctaeinsulae* and any other similar Turkish species, which all have simple spini-form embolus structures (see Brignoli 1978b).

**Description.** Measurements: [**Holotype** ♂ / **Paratype** ♀]: **AL** 2.13 / 2.25; **CL** 1.63 / 1.96; **CW<sub>max</sub>** 1.35 / 1.53; **CW<sub>min</sub>** 0.63 / 0.75; **AMEd** 0.07 / 0.08; **PLEd** 0.05 / 0.07; **PMEd** 0.05 / 0.06; **ChF** 0.34 / 0.37; **ChG** 0.21 / 0.27; **ChL** 0.64 / 0.71 mm. Leg measurements are given in Table 3.

**MALE:** Small to medium sized spider. Carapace reddish dark brown, with smooth surface and distinct fovea. AME, PLE and PME closely grouped; AME separated. Difference between width of eyes region and thoracic region of cara-





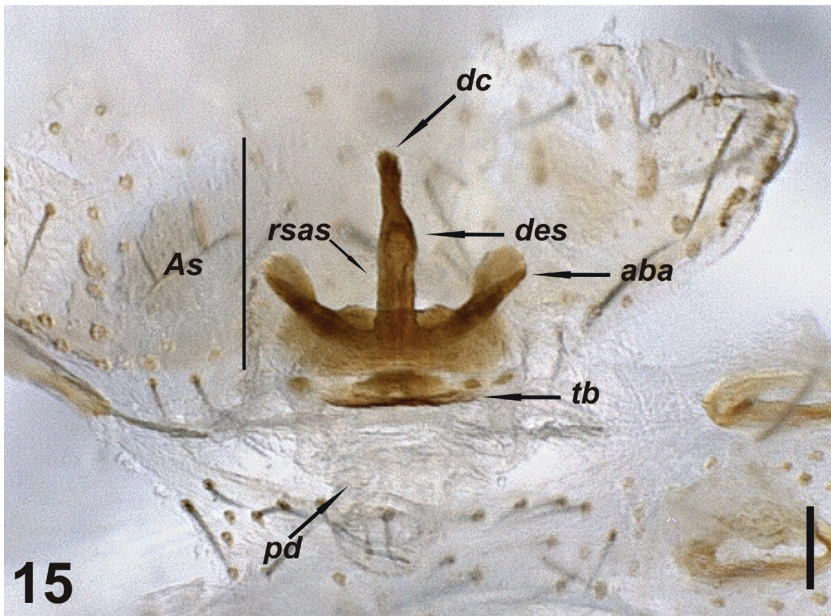
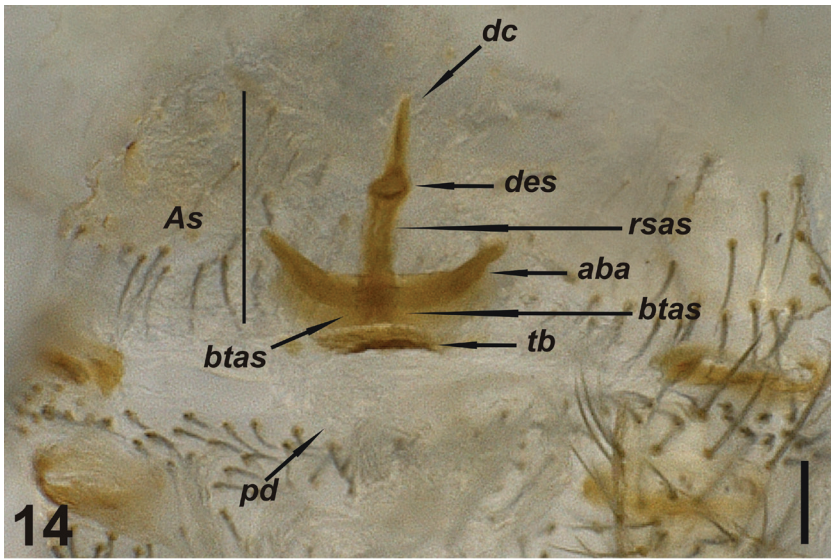
**Figures 9–13.** *Harpactea kencei* sp. n. **9** Cheliceral teeth **10** left palp, retrolateral view **11** ditto, nearly anterior view **12** ditto, prolateral view **13** ditto, distal view. Scale line: 0.5 mm.

pace remarkable. Sternum, labium, gnathocoxae and chelicerae reddish-brown. Sternum with long, thin hair near the margin, while centrally smooth and shiny. Cheliceral groove with four teeth: retromargin bears a tiny tooth at the base of the groove and a strong tooth at the top; promargin with two strong teeth of almost equal sizes (Fig. 9). Labium with short, strong hair, sparsely distributed along the surface; hair cover denser at the top. Gnathocoxae also with moderately strong hair, denser and slightly longer at the margins. Abdomen yellowish-light brown, with short, thin blackish hair over the entire surface. Legs yellowish-light brown with sparse blackish setae. Anterior legs slightly darker than posterior legs. Leg IV > Leg I > Leg II > Leg III. Tarsi with three claws. Tarsi III and IV with fine scopulae. Legs III and IV with fine metatarsal scopulae covering slightly less than the distal half of the segment (ventral surface only). Prolateral part of coxae III and IV with 0-5 spines. Detailed leg spination of *Harpactea kencei* sp. n. is given in Table 4.

Tegulum yellowish brown, longer than wide, cylindrical. Embolar base broad, embolus and conductor reciprocally located at peripherals. Accessory apophysis absent. Embolus blackish brown, flattens like a spoon through the tip and ends with a thorn-

**Table 3.** Leg measurements of *Harpactea kencei* sp. n.

(Holotype ♂ / Paratype ♀)	Fe	Pa	Ti	Me	Ta
<b>Leg I</b>	1.57 / 1.61	0.95 / 0.96	1.28 / 1.29	1.25 / 1.27	0.48 / 0.48
<b>Leg II</b>	1.48 / 1.50	0.80 / 0.82	1.23 / 1.25	1.20 / 1.22	0.40 / 0.40
<b>Leg III</b>	1.13 / 1.17	0.56 / 0.63	0.80 / 0.88	0.90 / 1.13	0.40 / 0.40
<b>Leg IV</b>	1.62 / 1.63	0.82 / 0.87	1.45 / 1.57	1.52 / 1.75	0.51 / 0.53

**Figures 14–15.** Vulva of *Harpactea kencei* sp. n. **14** dorsal view **15** ventral view. Scale lines: 0.1 mm.

**Table 4.** Leg spination of *Harpactea kencei* sp. n.

♂ (Holotype)	Leg I	Leg II	Leg III	Leg IV
C	0	0	1Pl	5 Pl
Fe	2, 1 Pl	1, 1, 1 Pl	1, 1 D 1, 1 Rl	3, 1, 1 D
Pa	0	0	1 Rl	0
Ti	0	0	1, 2 Pl 2, 1, 2 Rl 1, 1, 2 V	2, 1, 1 Pl 2, 1, 1 Rl 1 1, 1, 2 V
Me	0	0	1, 1, 1 Pl 5 Rl 2 V	1, 1, 1 Pl 1, 1, 1 Rl 3, 2 V
♀ (Paratype)				
C	0	0	0	1 Pl
Fe	2 Pl	2 Pl	1, 1 D 1, 1 Rl	2, 1, 1 D
Pa	0	0	1 Rl	0
Ti	0	0	1, 1 Pl 2, 1, 1 Rl 1, 1, 2 V	2, 1, 1 Pl 2, 1, 1 Rl 1 1, 1, 2 V
Me	0	0	1, 1 Pl 6 Rl 2, 2 V	1, 1, 1 Pl 1, 1, 1 Rl 2, 1, 2 V

like tip inflecting upon itself. Conductor small, flattened and ear-shaped, separated from embolus at the base.

**FEMALE:** No differences found between male and female, in terms of body colour and morphology. Distal crest of vulva short, with conical tip. Distal expansion of spermatheca spherical, with triangular shape. Basal transverse part of the anterior spermatheca short, linear and peripherally sclerotized. Rod-shaped part of the anterior spermatheca elongated. Anterior basal arc crescent-like and grooved. Tips membranous, in the shape of half of a heart. Transverse bar smooth, well sclerotized at the center. Posterior diverticulum membranous (Figs 14–15).

**Ecology.** Specimens were collected in the course of field studies aiming to determine the spider fauna of olive groves found in Kıyıkışlacık Village. The area was surveyed periodically over one year using pitfall traps, sweep nets, active searching at ground level and under stones both during the day and at night, sifting tree litter and by shaking tree branches. The altitude of the study area varied from sea level up to 100 m at its maximum.

Individuals of the new species were found under stones and collected from pitfall traps in olive groves and shrub forest associations dominated by *Quercus* trees. The first adult specimen was collected in November and additional specimens were found during March and April. It is likely that this species is most active during the early spring.

**Distribution.** *H. kencei* sp. n. is known from the type locality only.

**Comments.** According to the classification established by Deeleman-Reinhold (1993), *H. arnedoi* sp. n. and *H. kencei* sp. n. can be placed within the species group *rubicunda* (D) because they possess the following characteristics:

1. Posterior diverticulum of the female vulva membranous in both species.
2. Embolus of *H. arnedoi* sp. n. is spiniform, while it is massive-spiniform and flattened in *H. kencei* sp. n.
3. Conductor massive in both species.
4. Patellae and coxae with spines in both species.

## Discussion

The genus *Harpactea* is represented in Turkey by 20 described species. Of these, *H. agnolettii*, *H. colchidis*, *H. galatica*, *H. lazonum*, *H. lyciae*, *H. medeae*, *H. pisidica*, *H. sbordonii* and *H. vignai* were described on the basis of females only; while *H. christodeltshevi*, *H. erseni* and *H. korgei* were described on the basis of males. Due to the inadequacy of the existing descriptions, and the unavailability of many of the type specimens for further investigations, it is currently not possible to draw accurate conclusions about the status of the genus *Harpactea* in Turkey. Nevertheless, the relevant literature shows that most of the recorded species belong in the species group *rubicunda* (D) and *Harpactea* species belonging to this group have often been described from Thrace, Aegean and the Mediterranean coast (see Brignoli 1978a-b, 1979; Lazarov and Deltshev 2008; Lazarov 2010).

With the descriptions of *H. arnedoi* sp. n. and *H. kencei* sp. n. presented herein, the total number of *Harpactea* species reported from Turkey is now 22. With the exception of *H. babori*, *H. mithridatis* and *H. sturanyi*, all other species are only known only from their type localities or proximate vicinities. *H. babori*, with the type locality in Büyüka-da (Insel Prinkipo), has a distribution pattern ranging from Belgrad Forest (Silva Belgradensis) which is one of the last remaining relict forests in İstanbul, and lies along the Istranca Mountain range (both Bulgarian and Turkish sides). As the predominant harpacteid spider species of the Istranca Mountains, *H. babori* has been recorded from Shumen Town in Bulgaria as the northernmost record and from Stara Planina as the westernmost record of its known distribution range. *H. mithridatis* has been recorded from Ordu province (East Black Sea Region) in Turkey and from Adzharia region (Khu-lo) in SW Georgia; while *H. sturanyi*, in addition to its type locality in Konya (Central Anatolia), has also been recorded from the Aegean coast of Turkey (Denizli, İzmir and Muğla provinces; senior author, pers. obs.) and from the Bulgarian side of the Istranca Mountain (see Drensky 1936, 1938). What we would like to emphasize here is the fact that the native *Harpactea* species, which were also recorded from other countries, are principally distributed through zones with similar ecological conditions. Moreover, it is a known fact that other than some exceptional species like *H. hombergi*, *H. lepida* and *H. rubicunda*, species in the genus *Harpactea* show narrow distribution patterns in general. Furthermore, the geological, floristic and climatic conditions of Turkey appear to have been conducive to creating opportunities for isolation and diversification of species within the genus *Harpactea*. With our ongoing research on the spider fauna of Turkey, we expect there will be many more additions to the genus in the near future.

Chatzaki and Arnedo (2006) expressed the taxonomic situation of the genus *Harpactea* in their remarkable revision on the epigeal harpacteid spiders of Crete with such words: “*Harpactea* is one of the most ill-defined genera in the whole family and a major taxonomic revision of this genus is urgently called for”. We agree with this and believe that the *Harpactea* fauna of Turkey will play a key role in any future revision of the genus because Anatolia constitutes a transition region between Europe, the Balkans, and the Caucasus and the Middle East.



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