

A new species and new records of the leafhopper genus *Taperus* Li & Wang, 1994 (Hemiptera, Cicadellidae, Evacanthinae) from China

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Abstract

The paper deals with the species of the Oriental leafhopper genus *Taperus* Li & Wang. A new species, *T. daozenensis* **sp. n.**, from Guizhou Province, China is described and new records for other Chinese species are given together with a key for their separation. The type specimens of the new species are deposited in the Institute of Entomology, Guizhou University (GUGC).

Keywords

Auchenorrhyncha, morphology, identification, China

Introduction

The leafhopper genus *Taperus* was established by Li and Wang in 1994 with *Taperus fasciatus* Li & Wang as its type species, at same time Li and Wang described two more species, *T. albivittatus* and *T. apicalis*. Subsequently, three new species were described in the genus by Cai and Shen (1997, 1999) and Li and Wang (2001). Zhang et al. (2010)

reviewed the genus and described three new species from China in addition to transferring one species from *Onukia* to *Taperus* and three species from *Taperus* to the genus *Convexana* Li.

A new species from Guizhou Province, China is here described and illustrated. A key to all known species of *Taperus* is given and new records for other Chinese species of the genus are provided. Currently eight species are included in the genus.

The specimens used in this study are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Taxonomy

Taperus Li & Wang

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

Taperus Li and Wang 1994: 374

Type species. *Taperus fasciatus* Li & Wang.

Diagnosis. *Taperus* is similar to *Onukia* Matsumura, it differs from this genus in having the median longitudinal carina of vertex very weak, nearly indistinct; area between median carina and submarginal carina of vertex nearly flat rather than concave and male pygofer with rows or groups of stout spine-like macrosetae marginally.

For detailed generic description see Zhang et al. (2010).

Key to species of the genus *Taperus* Li & Wang based on male adults

- 1 Aedeagal shaft with a triangular posterior process in lateral view; foot-like apical process of style with apex very long and slender 2
- Aedeagal shaft not or slightly developed posteriorly near base in lateral view; foot-like apical process of style with apex short and robust..... 4
- 2 Male pygofer longer than wide, with apical half distinctly narrowed in lateral view 3
- Male pygofer nearly discoidal in lateral view *T. apicalis* Li & Wang
- 3 Male pygofer with a row of long spine-like macrosetae on dorsal margin *T. bannaensis* Zhang, Zhang & Wei
- Male pygofer with short thick macrosetae at apex *T. fasciatus* Li & Wang
- 4 Male pygofer with apex truncate in lateral view 5
- Male pygofer distinctly narrowed apically with apex rounded in lateral view...6
- 5 Male pygofer somewhat rectangular in lateral view; style elongate..... *T. flavifrons* (Matsumura)
- Male pygofer nearly quadrangular in lateral view; style short *T. quadragulatus* Zhang, Zhang & Wei
- 6 Apex of aedeagus with processes..... 7

- Apex of aedeagus without processes
..... *T. luchunensis* Zhang, Zhang & Wei
- 7 Apex of aedeagus with three spine-like processes on dorsal margin and four pairs of spine-like process on ventral margin *T. albivittatus* Li & Wang
- Apex of aedeagus with two retrorse spine-like processes on dorsal margin and one big spine-like process on dorsal margin subapically (Figs 4, 5).....
..... *T. daozenensis* sp. n.

***Taperus albivittatus* Li & Wang**

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

Taperus albivittatus Li and Wang, 1994: 375; 1996: 115; Zhang et al. 2010: 39

Distribution. China (Sichuan).

Hosts. Unknown.

Material examined. 1♂ (Holotype): CHINA, Sichuan: Emeishan, Wanniansi, 3 August 1991, coll. Li Zizhong.

Notice. After reexamining the holotype of this species, we found the count of spine-like processes on the apex of the aedeagus was wrong in the original description, we corrected it in above keys.

***Taperus apicalis* Li & Wang**

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

Taperus apicalis Li and Wang, 1994: 377; 1996: 116; Zhang et al. 2010: 39

Distribution. China (Guizhou).

Hosts. Unknown.

Material examined. 1♂ (Holotype): CHINA, Guizhou: Shuicheng, 30 September 1987, coll. Li Zizhong.

***Taperus fasciatus* Li & Wang**

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

Taperus fasciatus Li and Wang, 1994: 378; 1996: 117; Zhang et al. 2010: 39

Distribution. China (Guizhou, Hainan, Guangxi, Sichuan, Fujian, Shaanxi, Hunan, Zhejiang, Jiangxi); Vietnam.

Hosts. Unknown.

Material examined. 1♂ (Holotype): CHINA, Guizhou: Daozhen, 18 September 1988, coll. Li Zizhong; 20♂♂, 17♀♀: CHINA, Guizhou: Leigongshan, Xiaodanjiang, 13–14 September 2005, coll. Li Zizhong & Zhang Bin; 6♂♂7♀♀: CHINA, Guizhou: Kuankuoshui, Chachang, 10–17 August 2010, coll. Dai Renhuai, Li Hu & Fan Zhihua; 16♂♂7♀♀: CHINA, Guizhou: Kuankuoshui, Chachang, 14–17 August 2010, coll. Yu Xiaofei; 3♂♂: CHINA, Guizhou: Kuankuoshui, Chachang, 12 August 2010, coll. Li Yujian; 2♂♂: CHINA, Hainan: Jianfengling, 10–12 July 2007, coll. Li Yujian; 2♂♂: CHINA, Guangxi: Huaping, 11 June 1994, coll. Du Yuzhou; 1♂: CHINA, Zhejiang: Longquan, 17 June 1980, coll. Tong Xuesong; 3♂♂: CHINA, Sichuan: Baishuihe, 27 August 2007, coll. Xing Jichun.

***Taperus flavifrons* (Matsumura)**

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

Onukia flavifrons Matsumura, 1912: 45

Taperus flavifrons (Matsumura), Zhang et al. 2010: 39

Distribution. China (Hainan, Taiwan); Japan.

Hosts. Unknown.

Material examined. 2♂♂: CHINA, Hainan: Wuzhishan, 13–15 July 2007, coll. Zhang Bin; 1♂: CHINA, Hainan: Wuzhishan, 13–15 July 2007, coll. Li Yujian; 1♂: CHINA, Hainan: Diaoluoshan, 16–18 July 2007, coll. Zhang Bin; 1♀: CHINA, Hainan: Wuzhishan, 13–15 July 2007, coll. Zhang Hui; 1♀: CHINA, Hainan: Wuzhishan, 13–15 July 2007, coll. Song Yuehua; 1♀: CHINA, Hainan: Diaoluoshan, 16–18 July 2007, coll. Zhang Hui; 1♀: CHINA, Hainan: Diaoluoshan, 16–18 July 2007, coll. Zhang Bin.

***Taperus bannaensis* Zhang, Zhang & Wei**

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

Taperus bannaensis Zhang et al. 2010: 44

Distribution. China (Yunnan, Hainan).

Hosts. Unknown.

Material examined. 1♂: CHINA, Hainan: Limuling, 23 May 1997, coll. Yang Maofa.

***Taperus quadragulatus* Zhang, Zhang & Wei**

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

Taperus quadragulatus Zhang et al. 2010: 44

Distribution. China (Hunan, Guizhou).

Hosts. Unknown.

***Taperus luchunensis* Zhang, Zhang & Wei**

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

Taperus luchunensis Zhang et al. 2010: 45

Distribution. China (Guizhou, Hubei, Yunnan).

Hosts. Unknown.

Material examined. 4♂♂, 5♀♀: CHINA, Guizhou: Leigongshan, Xiaodanjiang, 13-14 September 2005, coll. Li Zizhong & Zhang Bin; 1♂: CHINA, Hubei: Shennongjia, 13 August 2004, coll. Peng Jingyang.

***Taperus daozenensis* sp. n.**

urn:lsid:zoobank.org:act:35578DE4-6CF7-4389-B007-F306E375AE90

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

Figs 1–7

Measurements. ♂: body length: 6.0 mm; head width (incl. eyes): 1.1 mm; head length: 0.8 mm.

Vertex, pronotum and scutellum dark brown; pale median longitudinal band yellow, extending from apex of vertex to posterior margin of pronotum (Figs 1, 2). Face nearly pale yellow (Figs 1, 2). Forewing (Figs 1, 2) dark brown, with nearly white and transparent plaque in middle of costal area.

Male pygofer (Fig. 3) nearly triangular in lateral view, row of long macrosetae at end of dorsal and ventral margin. Apex of foot-like apical process of style very long and slender, about one third length of style (Fig. 6). Aedeagal shaft, recurved dorsally, expanded distally in lateral view, broadly rounded apically with pair of retrorse spine-like processes on dorsal margin subapically and one big spine-like process on dorsal margin near base (Figs 4, 5).

Other characteristics are as shown in Figs 1–7.

Type Material. Holotype: ♂, China: Guizhou: Daozhen, 17–22 August 2004, coll. Yang Maofa; Paratypes: 2♂♂, China: Guizhou: Daozhen, 17–22 August 2004, coll. Yang Maofa.

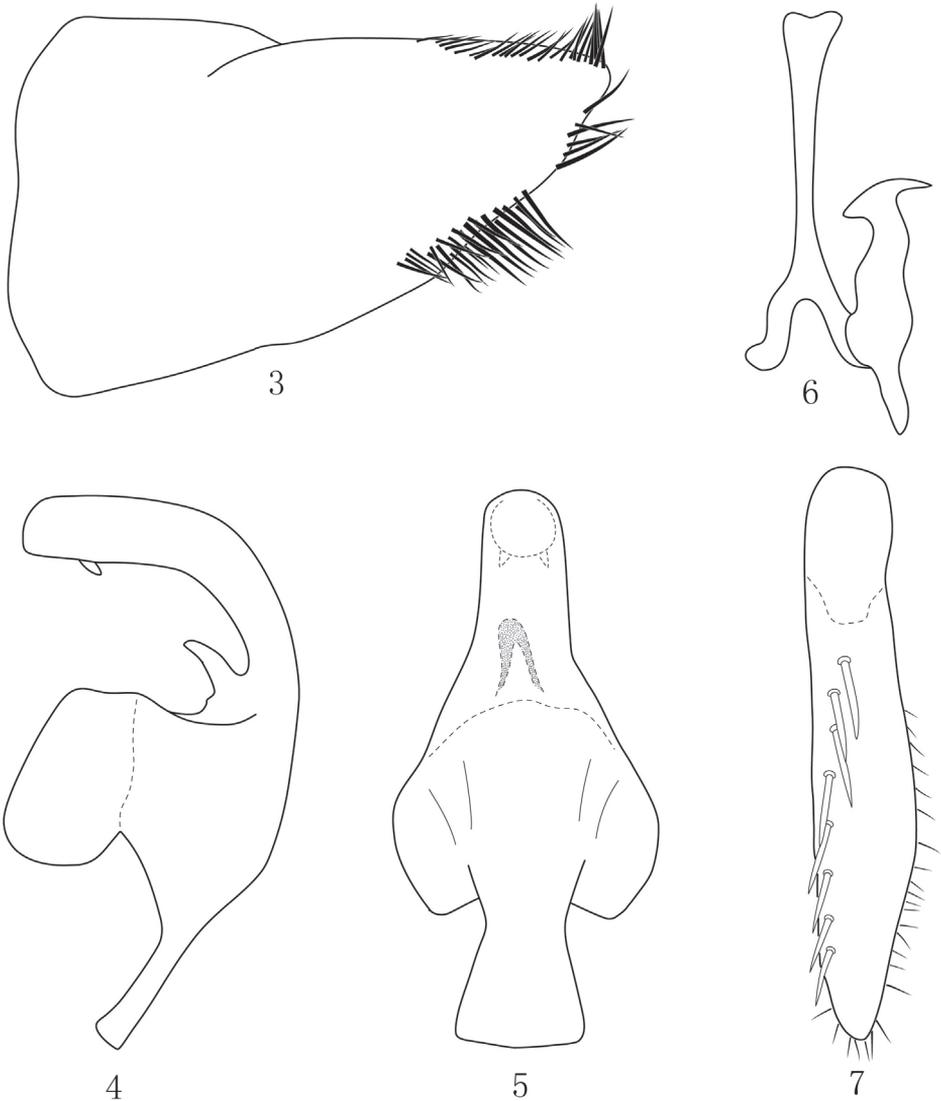
Etymology. The species is named after the locality of the type specimens, Daozhen county.

Remarks. This species resembles *T. albivittatus* Li & Wang, from which it is distinguished by: aedeagus with pair of subapical retrorse spine-like processes dorsally and



Figures 1–2. *Taperus daozhenensis* sp. n. 1–2 Male, dorsal view and lateral view.

one big spine-like process on dorsal margin near base. Apex of aedeagus of *T. albivittatus* has three spine-like processes on dorsal margin and four pairs of spine-like process on ventral margin.



Figures 3–7. *Taperus Daozhenensis* sp. n. **3** Male pygofer, lateral view **4** Aedeagus, lateral view **5** Aedeagus, ventral view **6** style and connective **7** Subgenital plate.

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Two new species of *Paratrigona* and the male of *Paratrigona ornaticeps* (Hymenoptera, Apidae)

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Abstract

Two distinctive new species of the Neotropical stingless bee genus *Paratrigona* Schwarz from Ecuador and Paraguay are described and figured. The Ecuadorian species, *P. scapisetosa* **sp. n.**, belongs to the *haeckeli-lineatifrons* group and is easily distinguished from its congeners by the unique shape and pubescence of the antennal scape, which is distinctly convex on its outer margin and bears thick, long, simple hairs along its inner margin. The Paraguayan species, *P. wasbaueri* **sp. n.**, belongs to the *lineata* group and is easily distinguished by the pattern of body pubescence in both sexes and male genitalic characters. The male of the Mesoamerican species *P. ornaticeps* (Schwarz) is described and figured. New geographical records for *P. impunctata* and *P. opaca*, and an updated key to the *haeckeli-lineatifrons* and *lineata* species groups are provided.

Keywords

Anthophila, Ecuador, Meliponini, Neotropics, Paraguay, stingless bees, taxonomy

Introduction

Stingless honey bees (Meliponini) are among the most commonly encountered bees in the tropics of the world. In the Americas, they are found from Mexico to

Brazil and northern Argentina, inhabiting a diverse variety of ecosystems, including both humid and xeric lowlands to cloud forests and Páramos in the Andes reaching up to 4000 m of altitude (Gonzalez and Engel 2004; Nates-Parra 2006; Michener 2007; Camargo and Pedro 2008). Stingless bees are both ecologically and economically important. They are among the major pollinators of many native and cultivated tropical plants (e.g., Slaa et al. 2006); pollen, honey, and wax of some species have also been traditionally used by indigenous and non-indigenous peoples in rural areas across Latin America, thus representing an important source of income for these communities (e.g., Nates-Parra 2006; Michener 2007, and references therein).

There are about 500 species of stingless bees worldwide, most of them (80%) in the Western Hemisphere (Michener 2007; Camargo and Pedro 2008; Ascher and Pickering 2011). However, given the abundance of cryptic species, such numbers are probably underestimations of the true diversity of the group (Michener 2007). Despite several decades of taxonomic exploration, many stingless bees remain to be discovered and described. Work remains also in coming to a consensus on the generic and subgeneric classification of Meliponini. Some authors prefer to emphasize the differences, recognizing species or group of species with unusual characters at the generic or subgeneric rank, resulting in some 60 supraspecific taxa; others emphasize their relationships, placing such unusual taxa in more inclusive taxonomic units, with the result that only approximately 20 supraspecific taxa are recognized worldwide (reviewed in Michener 2007). For example, morphological and molecular data indicates that the two species placed by Moure (1951) in *Aparatrigona* Moure [*P. impunctata* (Ducke) and *P. isopterophila* (Schwarz)] are the sister group of *Paratrigona* Schwarz (Camargo and Moure 1994; Rasmussen and Cameron 2010). *Aparatrigona* is morphologically very similar to *Paratrigona* and has been treated as a subgenus of *Paratrigona* (Moure 1951), as a separated genus (Camargo and Moure 1994; Camargo and Pedro 2008), or synonymized with *Paratrigona* (Michener 2007). Similar cases occur with *Partamona* Schwarz and *Parapartamona* Schwarz, or with those taxa synonymized by Michener (2007) in *Trigonisca* Moure, which are treated at the generic level by Camargo and Pedro (2008). To some extent, the recognition of at least some of those unusual taxa at the generic or subgeneric level is a matter of opinion and good examples of lumpers versus splitter views in bee systematics. Herein, we follow Michener's classification for Neotropical Meliponini, except that we recognize at the generic level those taxa he placed as subgenera of *Trigona* Jurine and *Plebeia* Schwarz (Table 1). Recent molecular analyses (Rasmussen and Cameron 2007, 2010) indicate that these "subgenera" render *Trigona* and *Plebeia* paraphyletic as previously discussed by Michener (2007) based on morphology.

The purpose of this paper is to describe two distinctive new species of *Paratrigona*, one each from Ecuador and Paraguay, and the male of the Mesoamerican species *P. ornaticeps* (Schwarz). We also provide new geographical records and an updated key to these species. Bees of this genus are small (4–6 mm in body length), often

Table 1. Summary of generic and subgeneric classification of New World Meliponini including fossils. It follows Michener (2007) except by those taxa he placed as subgenera of *Trigona* and *Plebeia* which are herein recognized at the generic level. The distribution and approximate number of species are based on Michener (2007), Camargo and Pedro (2008), and Ascher and Pickering (2011). NA = North America; CA = Central America; SA = South America; † = Extinct, Miocene Dominican and Chiapas amber; ‡ = Extinct, Mesozoic New Jersey amber; * = one species is from Chiapas amber.

Taxa	Species	Distribution
Genus <i>Cephalotrigona</i> Schwarz	5	CA, SA
Genus <i>Cretotrigona</i> Engel‡	1	NA
Genus <i>Duckeola</i> Moure	2	SA
Genus <i>Frieseomelitta</i> Ihering	16	CA, SA
Genus <i>Geotrigona</i> Moure	21	CA, SA
Genus <i>Lestrimelitta</i> Friese	21	CA, SA
Genus <i>Melipona</i> Illiger	68	CA, SA
Genus <i>Meliwillea</i> Roubik, Segura & Camargo	1	CA
Genus <i>Nannotrigona</i> Cockerell	10	CA, SA
Genus <i>Nogueirapis</i> Moure	4*	CA, SA
Genus <i>Oxytrigona</i> Cockerell	11	CA, SA
Genus <i>Paratrigona</i> Schwarz	33	CA, SA
Genus <i>Paratrigonoides</i> Camargo & Roubik	1	SA
Genus <i>Partamona</i> Schwarz		
Subgenus <i>Parapartamona</i> Schwarz	7	SA
Subgenus <i>Partamona</i> Schwarz	34	CA, SA
Genus <i>Plebeia</i> Schwarz	40	CA, SA
Genus <i>Proplebeia</i> Michener†	4	CA
Genus <i>Scaptotrigona</i> Moure	21	CA, SA
Genus <i>Scaura</i> Schwarz	7	CA, SA
Genus <i>Schwarziana</i> Moure	2	SA
Genus <i>Tetragona</i> Lepeletier de Saint Fargeau & Serville	19	CA, SA
Genus <i>Tetragonisca</i> Moure	4	CA, SA
Genus <i>Trichotrigona</i> Camargo & Moure	1	SA
Genus <i>Trigona</i> Jurine	32	CA, SA
Genus <i>Trigonisca</i> Moure	39	CA, SA

with a dull, dark brown to black integument and conspicuous, contrasting maculae on the head and mesosoma. There are 32 currently recognized species ranging from Mexico to southern Brazil, most of them known from the worker caste (Table 2). Although Meliponini taxonomy is based on workers, the study of the nesting behavior, males, and queens may provide additional characters useful in recognizing cryptic species and in phylogenetic analyses. Unfortunately, the nest and the male of *Paratrigona* are known for less than half of the species while the queen is only known for two species (Schwarz 1948; Camargo and Moure 1994; Nates-Parra et al. 1999; Fernández et al. 2010).

Material and methods

Morphological terminology follows that of Michener (2007), while the format for the descriptions generally follows that used by Gonzalez and Vélez (2007), with variation in color in parentheses. Photomicrographs were taken using a Keyence® VHX-500F Digital Imaging System. Measurements were made with an ocular micrometer attached to a Leica MZ12 stereomicroscope. Measurements in descriptions are for the holotype, with values for paratypes in parentheses. The symbol for female and that word itself are used below for worker, not queen.

Institutional acronyms used herein are:

- BBSL** U.S. National Pollinating Insects Collection, Bee Biology and Systematics Laboratory, Utah State University, Logan, UT, USA.
DZUP Departamento de Zoologia, Universidade Federal do Paraná, Brazil.
SEMC Snow Entomological Collection, Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA.
USNM National Museum of Natural History, Washington, DC, USA.

Systematics

Tribe Meliponini Lepeletier de Saint Fargeau, 1836

Genus *Paratrigona* Schwarz, 1938

Paratrigona scapisetosa sp. n.

urn:lsid:zoobank.org:act:E7B29A75-9CEE-4245-877C-276952559457

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

Figs 1–4

Holotype. ♀, ECUADOR: Mor. [Morona] Santiago, Miazal, 50 km. SE Macas, 1-4/7-1-1993, 300 m., M & J. Wasbauer Coll. (BBSL).

Diagnosis. This species belongs to the *haeckeli-lineatifrons* species group *sensu* Camargo and Moure (1994) recognized by the anterior margin of scutum rounded and the presence of maculations on frons, gena, mese- and metepisternum. It is most similar to *P. haeckeli* (Friese) sharing the maculations on face, thick antennal scape (1.4–1.5 times width of third flagellomere), and body predominantly ferruginous. It can be easily distinguished from that species and any other species of the genus by the distinctive shape and pubescence of the antennal scape. In *P. scapisetosa* the scape is distinctly convex on its outer margin, abruptly narrowed on basal one-fourth, and bears long (0.5 times width of third flagellomere), stiff, erect, simple hairs along its inner margin (Fig. 4). In *P. haeckeli* the scape is gently convex on its inner margin, straight or nearly so on its outer margin, and lacks long hairs (Fig. 5). Also, *P. scapisetosa* differs from *P. haeckeli* in the preoccipital margin laterally with few stiff, erect simple hairs as those on scape, and the propodeum yellow laterally (Fig. 1).



Figures 1–5. Female holotype of *Paratrigena scapisetosa* Gonzalez and Griswold, sp. n. (1–4), and *Paratrigena haeckeli* (5). **1–3** Lateral, dorsal, and frontal views, respectively **4,5** Antennal scape in profile view.

Description. *Worker.* Total body length 4.3 mm; head width 1.7 mm; forewing length 3.5 mm. Head slightly wider than long; inner orbits of compound eyes converging below (Fig. 3); malar area subequal to width of third flagellomere; clypeus about twice as broad as long; interalveolar distance equal to median ocellar diameter, shorter (0.8x) than alveolar diameter; alveolocular distance 1.7 times alveolar diameter, 2.1 times interalveolar distance; interocellar distance about two times median ocellar diameter, 1.2 times longer than ocellocular distance; ocelloccipital distance about 1.3 times median ocellar diameter; scape 3.3 times longer than wide, 1.5 times broader than width of third flagellomere, distinctly convex on outer margin, abruptly narrowed on basal one-fourth; pedicel about as long as broad, slightly shorter than first flagellomere; flagellomeres slightly broader than long, except apical flagellomere much longer than broad (Fig. 4); compound eye 2.7 times longer than broad; gena 0.7 times narrower than compound eye in profile. Scutum with anterior margin rounded, 1.2 times broader than long, about twice as long as scutellum; scutellum 1.4 times broader than long, narrowly rounded on distal margin (long-paraboloid *sensu* Camargo and Moure 1994); hind tibia 2.6 times longer than broad; hind basitarsus about twice as long as broad, strongly projecting on posterodistal margin.

Integument in general finely and densely punctate, dull, as in other species of the genus; propodeum without impunctate midline.

Color predominantly ferruginous, except: black on upper two-thirds of frons, apex of scape, pedicel, flagellum; dark reddish brown on subantennal area, epistomal sulcus, malar area, mandible distally (darker on teeth), mesepisternum ventrally, hind tibia distally, outer surfaces of middle and hind basitarsi; yellow maculations as follows: mandible basally, labrum, scape, face (Fig. 3), gena and vertex with complete, thin band (at most as wide as median ocellar diameter), pronotum, pronotal lobe, anterior one-third of tegula, costal sclerite, mesepisternum laterally, metepisternum entirely, propodeum laterally, scutum laterally with broad band (as wide as median ocellar diameter), axilla, lateral and distal margins of scutellum with narrower band than on scutum, apices of middle and hind femora, outer surfaces of fore and middle tibiae with narrow band, hind tibia with band on posterior margin, fore and middle basitarsi basally. Wing membrane subhyaline with weak greenish and coppery reflections; veins and stigma dark brown (Figs 1, 2).

Body sparsely covered with minute, appressed, simple yellowish to whitish hairs except as follows: inferior margin of mandible, labrum, and hypostomal area with long (about as long as median ocellar diameter), erect hairs; scape with stiff, erect, simple hairs (0.5 times width of third flagellomere) along inner margin (Fig. 4); gena laterally with few stiff, erect hairs as those on scape; mesepisternum ventrally, middle and hind coxae, sterna with much longer, erect simple hairs (about twice as long as median ocellar diameter); sides of propodeum with dense, branched, semierect hairs (0.5 times median ocellar diameter) partially obscuring integument.

Male: Unknown.

Queen: Unknown.

Etymology. The specific epithet is a combination of the Latin words “*scāpus*” and “*sae-tae*”, in reference to the distinctly long hairs along the inner margin of the antennal scape.

Comments. An additional female specimen of *P. scapisetosa* from Sierra de Chiribiquete in Colombia (Department of Caquetá) has been examined by one of us (VHG) but it was not available for study. The propodeum laterally with yellow maculations of *P. scapisetosa* is a character only shared with *P. ornaticeps*.

***Paratrigona wasbaueri* sp. n.**

urn:lsid:zoobank.org:act:EB384673-259D-46E3-B2F6-825BE6088FC2

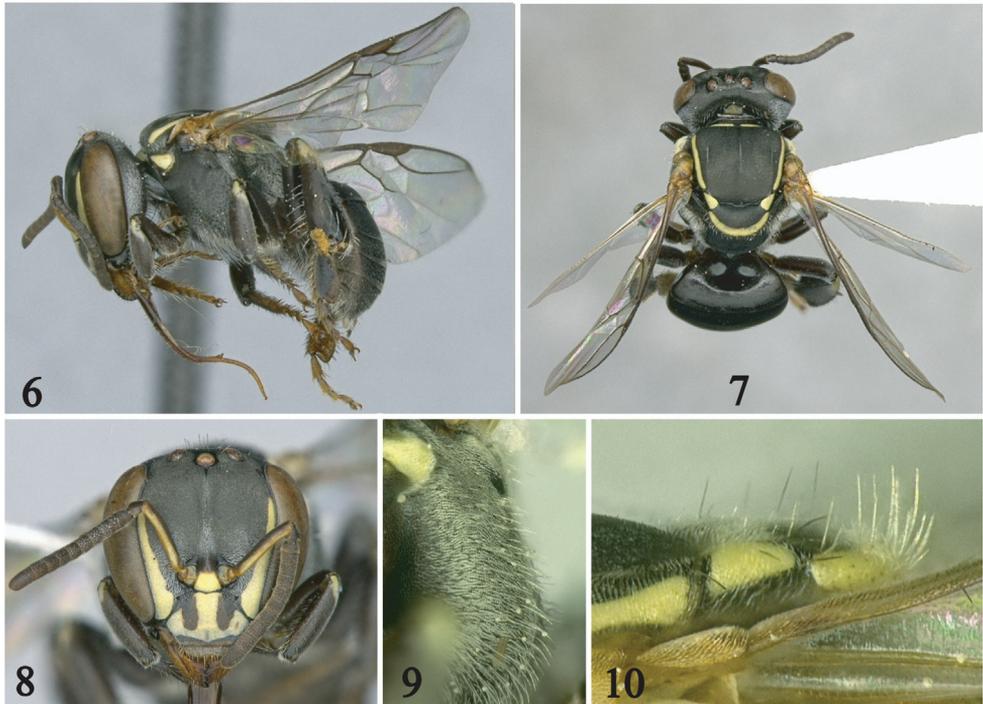
http://species-id.net/wiki/Paratrigona_wasbaueri

Figs 6–19

Holotype. ♀, PARAGUAY: San Pedro, Cororo-Rio Ypane, XII-5/9-1983, Malaise Trap, M. Wasbauer coll. (BBSL).

Paratypes. 54♀, 28♂, with same data as holotype but collected on November 24–30, and December 1–4 (BBSL, DZUP, SEMC).

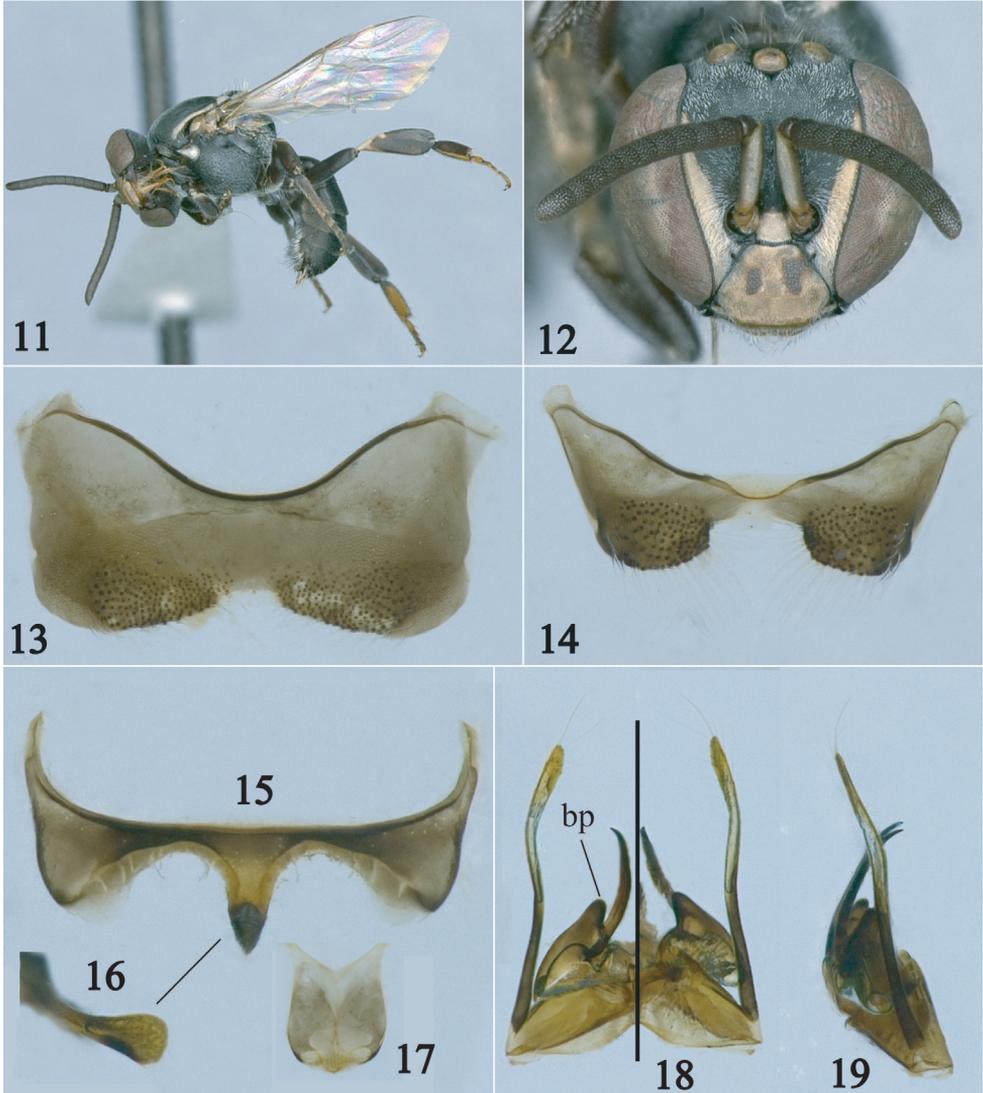
Diagnosis. This species belongs to the *lineata* species group *sensu* Camargo and Moure (1994) recognized by the anterior margin of scutum rounded and the absence of maculations on frons, gena, mese- and metepisternum (Figs 6–8). It is most similar to *P. lineata* (Friese) sharing the narrow antennal scape (narrower than width of third flagellomere), and the presence of hairs on the disc of scutellum distally and mesepisternum dorsally (Figs 9, 10). It can be easily distinguished from that species by the absence of hairs on the disc of the scutum in both sexes and the digitiform basal projection of the penis valve in the male (Figs 18, 19). The new species also resembles *P. glabella* Camargo & Moure and *P. incerta* Camargo & Moure in the absence of erect hairs on the scutum; however, in those species the mesepisternum lacks erect hairs dorsally and the erect hairs of the scutellum are either short (at most half median ocellar diameter) or restricted to its distal margin or inferior surface. Also, the basal projection of the penis valve of the male is short and pointed in *P. glabella* (male of *P. incerta* unknown), not digitiform as in *P. wasbaueri* (cf., Camargo and Moure 1994; fig 143).



Figures 6–10. Female holotype of *Paratrigona wasbaueri* Gonzalez and Griswold, sp. n. **6–8** Lateral, dorsal, and frontal views, respectively **9** Mesepisternum dorsally in profile **10** Apex of scutum, axilla, and scutellum in profile.

Description. *Worker:* Total body length 4.2 mm (3.8–5.2 mm); head width 1.6 mm (1.6–1.7 mm); forewing length 3.6 mm (3.6–3.8 mm). Head slightly wider than long; inner orbits of compound eyes converging below (Fig. 8); malar area about half width of third flagellomere; clypeus 1.8 times broader than long; interalveolar distance

1.2 times median ocellar diameter, about equal to alveolar diameter; alveolocular distance 1.3 times alveolar diameter; interocellar distance 2.1 times median ocellar diameter, 1.8 times longer than ocellocular distance; ocellocipital distance about 1.3 times median ocellar diameter; scape 6.3 times longer than wide, narrower (0.8 times) than width of third flagellomere; pedicel about as long as broad, slightly shorter than first flagellomere; flagellomeres slightly broader than long, except apical flagellomere much



Figures 11–19. Male of *Paratrigena wasbaueri* Gonzalez and Griswold, sp. n. **11** Lateral habitus **12** Facial view **13** Fourth sternum **14** Fifth sternum **15** Sixth sternum **16** Apex of sixth sternum in profile **17** Seventh sternum **18** Genitalia in dorsal (left half) and ventral (right half) views **19** Genitalia in profile. **bp** = basal projection of penis valve.

longer than broad; compound eye 2.8 times longer than broad; gena 0.8 times narrower than compound eye in profile. Scutum with anterior margin rounded, slightly broader than long, 2.8 times longer than scutellum; scutellum about twice as long as broad, broadly rounded on distal margin (short-semicircular *sensu* Camargo and Moure 1994); hind tibia 2.6 times longer than broad; hind basitarsus about twice as long as broad, strongly projecting on posterodistal margin.

Integument in general finely and densely punctate, dull, as in other species of the genus; propodeum without impunctate midline.

Color black, except: light reddish brown on mandible (darker on teeth), tegula, margins of middle and posterior basitarsi, distitarsi; yellow maculations as follows: labrum, scape, face (Fig. 8), pronotum dorsally with medially interrupted band, pronotal lobe, scutum laterally with narrow band (about half width median ocellar diameter), axilla, lateral and distal margins of scutellum with broader band than on scutum, tibiae basally. Wing membrane hyaline with weak greenish and coppery reflections; veins and stigma dark brown (Figs 6, 7).

Body sparsely covered with minute, appressed, simple whitish hairs except as follows: inferior margin of mandible, labrum, vertex, hypostomal area, mesepisternum dorsally, distal margin of scutellum dorsally and ventrally, sides of propodeum with long (about as long as median ocellar diameter) erect hairs; mesepisternum ventrally, middle and hind coxae, sterna with much longer, erect simple hairs (about twice as long as median ocellar diameter); sides of propodeum with dense, branched, semierect hairs (0.5 times median ocellar diameter) partially obscuring integument; inner surface of tarsi with yellowish to ferruginous hairs.

Male: As in female except for longer body pubescence, brownish legs, and the following: Total body length 4.4–5.3 mm; head width 1.6–1.7 mm; forewing length 3.7–3.8 mm. Inner orbits of compound eyes strongly converging below (Fig. 12); malar area linear; clypeus 1.3 times broader than long; interalveolar distance subequal to median ocellar and alveolar diameters individually; alveolocular distance about as long as alveolar diameter; interocellar distance about twice median ocellar diameter, 2.8 times longer than ocellocular distance; ocellocipital distance about 0.7 times median ocellar diameter; scape 3.6 times longer than wide, slightly narrower than width of third flagellomere; pedicel longer than first flagellomere; first flagellomere about twice as broad as long, 0.5 times shorter than second flagellomere; gena about half width of compound eye in profile. Hind tibia about 3 times longer than broad; hind basitarsus 3 times longer than broad. Genitalia and associated sterna as in Figs 13–19.

Queen: Unknown.

Etymology. The specific epithet is a patronym honoring Marius Wasbauer, friend and colleague, who has contributed much of the material we have studied, including the species described in this paper.

Comments. In most paratypes the yellow maculations are pale, discolored, most likely due to preservation in alcohol for an extended period.

***Paratrigona ornaticeps* (Schwarz, 1938)**

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

Figs 20–27

Trigona (Paratrigona) opaca ornaticeps Schwarz, 1938

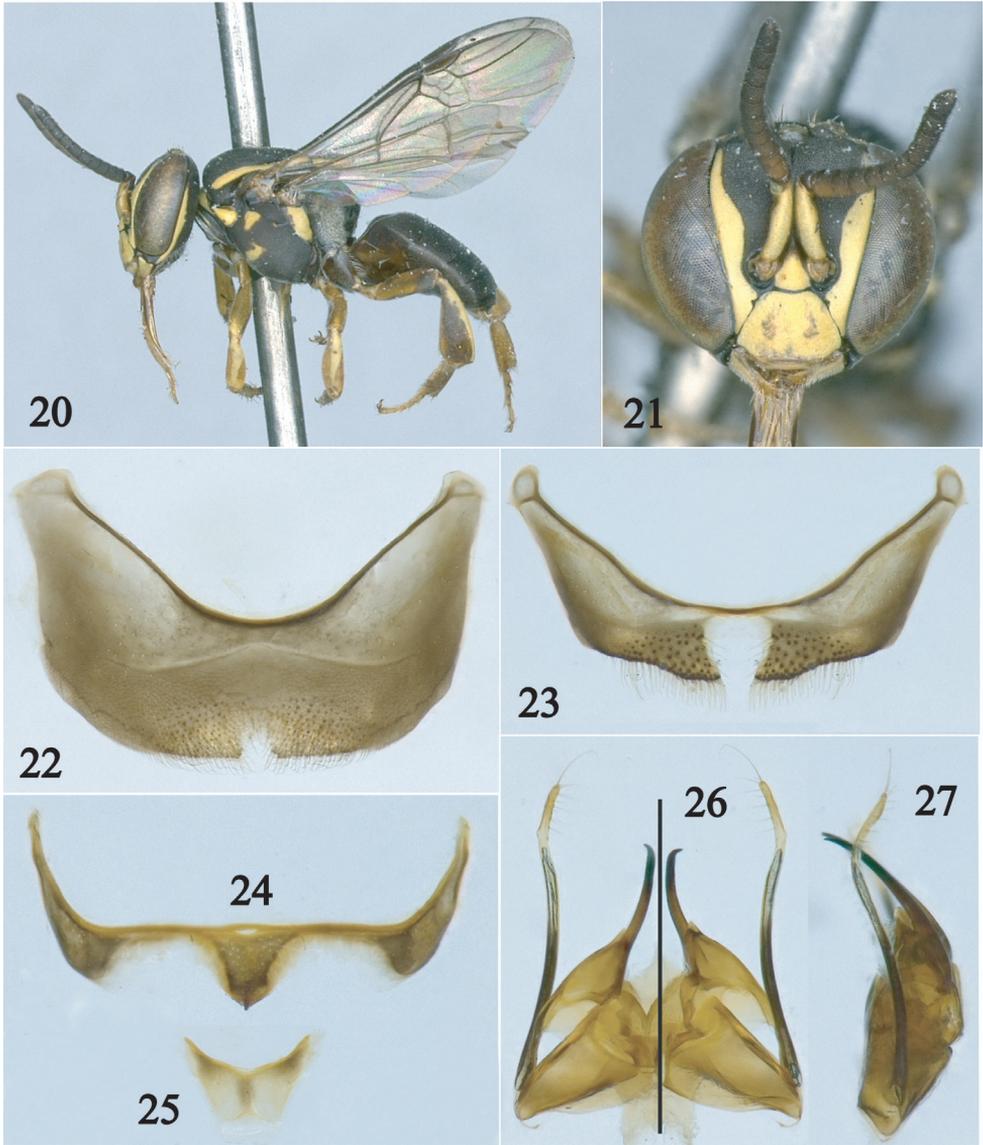
Diagnosis. The female of this species can be separated from other species of the *haeckeli-lineatifrons* group by the following combination of characters: frons with broad and long inverted Y-shaped maculation; paraocular area with complete, long, broad maculation; supraclypeus yellow; and clypeus with broad, inverted T-shaped maculation (cf., Camargo and Moure 1994; fig 115). *Paratrigona ornaticeps* can be confused with *P. uva* Gonzalez & Vélez and *P. compsa* Camargo & Moure by the shape of the facial maculations but in those species they are much narrower and the metasoma is ferruginous (cf., Camargo and Moure 1994; fig 118; Gonzalez and Vélez 2007; fig 1).

The male of *P. ornaticeps* can be separated from that of *P. haeckeli*, the only other male known of the *haeckeli-lineatifrons* group (Table 2), by the sixth sternum, which has a broader midapical projection, and the shape of the gonostylus, which is more strongly curved apically in profile (compare Figs 26 and 27 with Camargo and Moure 1994; figs 130, 132).

Description. *Male:* Total body length 4.7–5.1 mm; head width 1.6–1.7 mm; forewing length 3.7–3.8 mm. Head slightly wider than long; inner orbits of compound eyes strongly converging below (Fig. 21); malar area very short, about one-fourth width of third flagellomere; clypeus 1.5 times broader than long; interalveolar distance slightly shorter (0.9x) than median ocellar and alveolar diameters individually; alveolocular distance 1.3 times alveolar diameter, 1.2 times interalveolar distance; interocellar distance 1.5 times median ocellar diameter, 2.7 times longer than ocellocular distance; ocellocipital distance about 0.7 times median ocellar diameter; scape 2.8 times longer than wide, slightly broader than width of third flagellomere; pedicel about as long as broad, slightly longer than first flagellomere; first flagellomere 1.5 times broader than long, 0.7 shorter than second flagellomere, remaining flagellomeres slightly broader than long, except apical flagellomere much longer than broad; compound eye 2.6 times longer than broad; gena about half width of compound eye in profile. Scutum with anterior margin rounded, 1.1 times broader than long, 2.3 times longer than scutellum; scutellum 1.5 times broader than long, broadly rounded on distal margin (long-paraboloid *sensu* Camargo and Moure 1994); hind tibia about 3 times longer than broad; hind basitarsus 2.6 times longer than broad. Genitalia and associated sterna as in Figs 22–27.

Integument in general finely and densely punctate, dull, as in other species of the genus; propodeum with faint midline.

Color predominantly black, except: brownish on anterior surface of flagellum, tegula, legs (legs light yellow to ferruginous with pale maculations); yellow maculations as follows: mandible, labrum, anterior surface of scape, face as in Fig. 21 (frons sometimes maculate along middle line, never with inverted broad Y-shaped maculation as in fe-



Figures 20–27. Male of *Paratrigona ornaticeps* (Schwarz). **20** Lateral habitus **21** Facial view **22** Fourth sternum **23** Fifth sternum **24** Sixth sternum **25** Seventh sternum **26** Genitalia in dorsal (left half) and ventral (right half) views **27** Genitalia in profile.

male), gena basally with thin band (less than half median ocellar diameter), vertex with small spot laterally, pronotum, pronotal lobe, tegula with small spot on anterior half, costal sclerite, mesepisternum laterally with spots, metepisternum almost entirely, scutum laterally with broad band (about half median ocellar diameter), axilla, lateral and distal margins of scutellum with narrower band than on scutum, apices of middle and hind femora, outer surfaces of fore and middle tibiae with narrow band, hind tibia with

band on posterior margin, fore and middle basitarsi basally. Wing membrane subhyaline with weak greenish and coppery reflections; veins and stigma dark brown (Fig. 20).

Body sparsely covered with minute, appressed, simple yellowish to whitish hairs except as follows: vertex, hypostomal area, middle trochanter with long (about half median ocellar diameter), erect hairs; hind coxa, seventh tergum with much longer erect hairs (at least as long as median ocellar diameter); sides of propodeum with dense, branched, semierect hairs (about 0.5 times median ocellar diameter) partially obscuring integument.

Material examined. ($n = 33\text{♀}$, 39♂) COSTA RICA: 1♀, 1♂, Turrialba, VII-15-19-65, P.J. Spangler; 2♀, 5♂, S.J. [San José, San Isidro General, Feb. 1993, F. D. Parker; 1♀, 13♂, Alaj. [Alajuela], 20 km S Upala, collected on 1–10 April, 20–31 March, 22–31 May, 3–21 June 1991, and 1–10 August 1991, F. D. Parker; 25♀, 18♂, Alaj., Bijagua, 20 km S Upala, collected on 6–29 January, 12 February, 5–28 March, 10 April–6 May, 1–11 June, 1–15 July, 1–12 Aug, 1–15 Sep, 9–19 October, 1–20 November, and 25–30 December 1991, F. D. Parker; 4♀, Cart. [Cartago], Turribalba, CATIE, 26–29 June 1986, W. Hanson, G. Bohart; 2♂, Guan [Guanacaste], 14 km S Cañas, collected on 17 March, 11–12 June 1991, F. D. Parker (BBSL, USMN).

Comments. Unlike the female, the yellow maculations in the male are usually reduced on gena, vertex, pronotum, frons, and sides of propodeum.

Paratrigona impunctata (Ducke)

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

Melipona impunctata Ducke, 1916: 101 [♀].

New records. ($n = 5\text{♀}$, 2♂) ECUADOR: 2♀, 2♂, Napo Province, Huahua Sumaco, km. 45 on Hollin-Loreto road, XII-16-20, 1989, Malaise trap, M. & J. Wasbauer. Collrs; 1♀, Misahualli nr. Tena, 3–8 Oct., 1999, Steven R. Keller; 1♀, Yasuni Res. Sta. 19–30 Oct. 1998, W.J. Hanson, 250 m / 6°36'W, 0°38'S; *idem*, 1♀, 30 Sept.-11 Oct. 2002, C. Brammer, 250 m M.T [Malaise trap], 0°40.566'S, 076°23.851'W (BBSL).

Comments. These new records expand the distribution of this species from its previously known range: Brazil, Colombia, French Guiana, Guyana, Peru, and Suriname (Table 2).

Paratrigona opaca (Cockerell)

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

Trigona opaca Cockerell, 1917: 126 [♂].

New record. ECUADOR: 3♀, 5♂, Napo Province, Huahua Sumaco, km. 45 on Hollin-Loreto road, XII-20, 1989, Malaise trap, M. & J. Wasbauer, H. Real (BBSL).

Comments. This new record expands the range of this species from its previously known distribution: Colombia, Costa Rica, Guatemala, Mexico, and Panama (Table 2).

Table 2. Summary of currently included species in *Paratrigona* with information on the known sexes, nest and distribution. Sex/caste: ♀ = worker; ♂ = male; ♀♂ = queen. Nest: A = aerial; C = inside tree cavity; F = inside ant nest; S = subterranean; T = inside termite nest; - = unknown. The distribution and nesting site are based on Camargo and Moure (1994) and Camargo and Pedro (2008), with some modifications from Gonzalez and Vélez (2007), Fernandez et al. (2010), and present study.

Species	Sex	Nest	Distribution
“ <i>guatemalensis</i> species group”			
<i>P. anduzei</i> (Schwarz, 1943)	♀♂	A	Colombia, Venezuela
<i>P. eutaeniata</i> Camargo & Moure, 1994	♀♂♀	A	Colombia
<i>P. guatemalensis</i> (Schwarz, 1938)	♀	A	Costa Rica, Guatemala, Mexico
<i>P. lophocoryphe</i> Moure, 1963	♀♂	-	Colombia, Costa Rica, Panama
<i>P. rinconi</i> Camargo & Moure, 1994	♀	-	Colombia
“ <i>haeckeli-lineatiformis</i> species group”			
<i>P. compsa</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. euxanthospila</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. femoralis</i> Camargo & Moure, 1994	♀	-	French Guiana
<i>P. guigliae</i> Moure, 1960	♀	-	Bolivia
<i>P. haeckeli</i> (Friese, 1900)	♀♂	-	Brazil, Peru
<i>P. lineatiformis</i> (Schwarz, 1938)	♀	T	Brazil
<i>P. melanaspis</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. onorei</i> Camargo & Moure, 1994	♀	-	Bolivia, Ecuador
<i>P. ornaticeps</i> (Schwarz, 1938)	♀♂	C	Costa Rica, Panama
<i>P. scapisetosa</i> Gonzalez & Griswold, sp. n.	♀	-	Ecuador
<i>P. uwa</i> Gonzalez & Vélez, 2007	♀	-	Colombia
“ <i>impunctata</i> species group”			
<i>P. impunctata</i> (Ducke, 1916)	♀♂	T	Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname
<i>P. isopterophila</i> (Schwarz, 1934)	♀♂	-	Colombia, Panama
“ <i>lineata</i> species group”			
<i>P. crassicornis</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. incerta</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. glabella</i> Camargo & Moure, 1994	♀♂	-	Argentina, Bolivia
<i>P. lineata</i> (Lepeletier, 1836)	♀♂	S	Bolivia, Brazil
<i>P. nuda</i> (Schwarz, 1943)	♀	F	Bolivia, Peru
<i>P. prosopiformis</i> (Gribodo, 1893)	♀♂	-	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>P. subnuda</i> Moure, 1947	♀♂	S	Brazil
<i>P. wasbaueri</i> Gonzalez & Griswold, sp. n.	♀♂	-	Paraguay
“ <i>peltata-opaca</i> species group”			
<i>P. catabolonota</i> Camargo & Moure, 1994	♀	-	Brazil
<i>P. lundelli</i> (Schwarz, 1938)	♀	-	Belize, Guyana
<i>P. myrmecophila</i> Moure, 1989	♀	F	Brazil

<i>P. opaca</i> (Cockerell, 1917)	♀♂	F	Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama
<i>P. pacifica</i> (Schwarz, 1943)	♀♂‡	A	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>P. pannosa</i> Moure, 1989	♀	-	Brazil, French Guiana
<i>P. peltata</i> (Spinola, 1853)	♀	-	Brazil
<i>Incertae sedis</i>			
<i>P. permixta</i> Camargo & Moure, 1994	♀	-	Venezuela

Key to species of the *haeckeli-lineatifrons* and *lineata* species groups of *Paratrigena* (workers)¹

- 1 Maculations absent on frons, gena (except for some small spots in some specimens of *P. subnuda*), mesepisternum, and metepisternum (*lineata* species group)..... **2**
- Maculations present on frons, gena, mesepisternum, and metepisternum (*haeckeli-lineatifrons* species group) **9**
- 2(1) Antennal scape broad, about 1.3 times width of third flagellomere; submarginal angle (between Rs and Rs+M) obtuse (>100°); malar area longer than half width of third flagellomere..... ***P. prosopiformis* (Gribodo)**
- Antennal scape, at most, slightly broader than width of third flagellomere; submarginal angle acute (<90°); malar area narrower than half width of third flagellomere **3**
- 3(2) Scutellum short-paraboloid, length about 0.55 times its width; paraocular band usually sinuous at the level of antennal alveolus..... ***P. nuda* (Schwarz)**
- Scutellum short-semicircular, length between 0.50 and 0.51 times its width; paraocular band not sinuous at the level of antennal alveolus..... **4**
- 4(3) Scape narrower than width of third flagellomere **5**
- Scape about as broad as, or broader than, width of third flagellomere **8**
- 5(4) Disc of scutum with distinctly long, erect, simple hairs ***P. lineata* (Lepelletier)**
- Disc of scutum without long, erect, simple hairs..... **6**
- 6(5) Mesepisternum dorsally with long, erect, simple hairs (Fig. 9); scutellum dorsally with long (about as long as median ocellar diameter), erect, simple hairs on distal half (Fig. 10) (Paraguay) ***P. wasbaueri* sp. n.**
- Mesepisternum dorsally without long, erect, simple hairs; hairs on scutellum short (at most half median ocellar diameter) or absent **7**
- 7(4) Scutellum with erect hairs on distal margin and some on dorsal surface; face with pale yellow maculations; northern Argentina to Bolivia ***P. glabella* Camargo & Moure**
- Scutellum with erect hairs on inferior surface only, absent on distal margin; face with bright yellow maculations (northern Minas Gerais, Brazil)..... ***P. incerta* Camargo & Moure**

¹ This key is a modification of couplets 11–24 in Camargo and Moure (1994).

- 8(4) Scape distinctly broader (1.2–1.3 times) than width of third flagellomere (Pará, Amazonas, Brazil) ***P. crassicornis* Camargo & Moure**
- Scape about as broad as or slightly broader than width of third flagellomere (southeastern Brazil) ***P. subnuda* Moure**
- 9(1) Scape thick, about 1.5 times width of third flagellomere; body ferruginous
..... **10**
- Scape, at most, slightly broader than width of third flagellomere; body black, especially head and mesosoma **11**
- 10(9) Scape distinctly convex on its outer margin, abruptly narrowed on basal one-fourth, inner margin straight or nearly so, with long (0.5 times width of third flagellomere), stiff, erect, simple hairs (Fig. 4) ***P. scapisetosa* sp. n.**
- Scape straight or nearly so on its outer margin, not abruptly narrowed on basal one-fourth, inner margin gently convex, without long hairs (Fig. 5).....
..... ***P. haeckeli* (Friese)**
- 11(9) Hind femur with superior margin protuberant on basal third **12**
- Hind femur unmodified, without superior margin protuberant on basal third **13**
- 12(11) Paraocular band broad, 1.4 times broader than width of third flagellomere, inferiorly filling the space between the compound eye and epistomal sulcus to the level of the tentorial pit ***P. euxanthospila* Camargo & Moure**
- Paraocular band narrow, about as broad as width of third flagellomere, inferiorly not filling the space between the compound eye and epistomal sulcus to the level of the tentorial pit ***P. femoralis* Camargo & Moure**
- 13(11) Maculations absent or reduced on inferior paraocular area and clypeus; paraocular band present above superior tangent of antennal alveolus; frontal maculation separated in two small spots, one below median ocellus, the other in the middle of frons; mesepisternum dorsally with spot as large as that on pronotal lobe; malar area short, slightly longer than half width of third flagellomere ***P. melanaspis* Camargo & Moure**
- Maculations of face not reduced on clypeus and supra-clypeus; paraocular band reaching inferior tangent of antennal alveolus; frontal maculation usually complete; mesepisternum dorsally with or without spot; malar area variable in length **14**
- 14(13) Antennal scape robust, slightly broader than width of third flagellomere, black or with small basal spot; clypeus with reduced maculations, at most yellow along middle line; paraocular band narrower than width of third flagellomere, not reaching epistomal sulcus; mesepisternum black or with small spot; malar area short, slightly shorter than width of third flagellomere
..... ***P. onorei* Camargo & Moure**
- Antennal scape slender, at most as broad as width of third flagellomere, maculate on anterior face; clypeus with well developed maculations, not restricted to middle line; paraocular band of variable width, reaching epistomal sulcus; mesepisternum with large spot; malar area variable in length **15**

- 15(14) Paraocular band narrow, slightly broader than half width of third flagellomere, about the same width along entire length; genal band narrow, not reaching vertex..... *P. lineatifrons* (Schwarz)
 – Paraocular band broad, 1.4 times broader than width of third flagellomere wider in the middle or below antennal alveolus; genal band complete, reaching vertex and joining paraocular band or slightly interrupted **16**
- 16(15) Paraocular band very broad inferiorly, occupying space between compound eye and epistomal sulcus below tentorial pit..... *P. ornaticeps* (Schwarz)
 – Paraocular band narrowed inferiorly, not occupying space between compound eye and epistomal sulcus below tentorial pit..... **17**
- 17(16) Malar area about as long as, or slightly longer than, width of third flagellomere; frontal maculation widest in the middle, just above bifurcation; clypeus yellow along distal margin (Andes, Colombia)
 *P. uwa* Gonzalez & Vélez
 – Malar area length about 2/3 width of third flagellomere; frontal maculation not distinctly broad above bifurcation; clypeus entirely yellow, at most, darkened on disc (Amazonas, Brazil)..... *P. compsa* Camargo & Moure

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The genera *Deuterixys* Mason, 1981 and *Wilkinsonellus* Mason, 1981 (Hymenoptera, Braconidae, Microgastrinae) from China, with description of two new species

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Abstract

The genus *Deuterixys* Mason, 1981 of the tribe Cotesiini (Hymenopteran, Braconidae, Microgastrinae) is recorded from China for the first time. Two new species, *D. bifossalis* Zeng & Chen, **sp. n.** and *D. curticalcar* Zeng & Chen, **sp. n.**, are described and illustrated, and a key to the Old World species of *Deuterixys* is given. In addition, *Wilkinsonellus paramplus* Long & van Achterberg, 2003 is recorded from China for the first time and illustrated.

Keywords

Hymenoptera, Braconidae, Microgastrinae, Cotesiini, *Deuterixys*, *Wilkinsonellus*, new species, key, China

Introduction

The tribe Cotesiini (Braconidae, Microgastrinae) was established by Mason (1981) with most members parasitizing on Macrolepidoptera. A few species of this tribe have been used in biological control of lepidopteran pests. The genera *Deuterixys* and *Wilkinsonel-*

lus are two small genera of this tribe, and both characterized by a longitudinal median groove at least at basal half of the first tergite and without an areolet of fore wing.

The genus *Deuterixys* proposed by Mason (1981) includes four Old World species of Nixon's (1965, 1976) *carbonarius* group of *Apanteles* Förster. This genus includes 14 described species widespread in the world except in the Afrotropical region, of which seven occur in the Old World and seven in the New World (Nixon 1965; Tobias 1971, 1976; Papp 1983b, 1990; Whitfield 1985; Austin and Dangerfield 1992; Marczak and Buszko 1994; Yu et al. 2005). Most species of the known hosts of this genus are leaf miners, including the genera *Bucculatrix* and *Leucoptera* of the family Lyonetiidae and *Stigmella* of the family Nepticulidae (Lyle 1925; Wilkinson 1936, 1940; Telenga 1955; Nixon 1965; Tobias 1976, 1986; Papp 1983a; Whitfield 1985; Marczak and Buszko 1994; Gates et al. 2002), which may cause damage in forests. Therefore, species of *Deuterixys* may play an important role in controlling those forest pests. Recently two new species of this genus are found in China among specimens of Parasitic Hymenoptera Collection of Zhejiang University (ZJUH) and described in this paper. They represent the first record of the genus *Deuterixys* Mason for China.

The genus *Wilkinsonellus* was proposed by Mason (1981) to include four Old World species of Nixon's (1965) *henicopus* and *daira* group of *Apanteles* Förster, including five described species occurring in Oriental region, four in the Australasian region and one in the Afrotropical region (De Saeger 1944; Nixon 1965; Austin and Dangerfield 1992; Chou 1999; Long and van Achterberg 2003; Chen and Song 2004; Ahmad et al. 2005; Yu et al. 2005). One species, *Wilkinsonellus iphitus* (Nixon 1965) was previously recorded from Hainan and Taiwan of China (Chou 1999; Chen and Song 2004). Here we report another species of this genus, *W. paramplus* Long & van Achterberg, 2003, from China for the first time.

Material and methods

Specimens studied are deposited in the Parasitic Hymenoptera Collection of Zhejiang University, Hangzhou, China (ZJUH). Descriptions and measurements were made under a stereomicroscope (Zeiss Stemi 2000-C). All figures were made by a camera (Q-Imaging, Micropublisher, 3.3 RTV) attached to a stereomicroscope (Leica MZ APO, Germany) and Auto-Montage Pro version 5.0 software.

Terminology and measurement follows Nixon (1965) and Mason (1981), vein terminology follows the modified Comstock-Needham system (van Achterberg 1979). Abbreviations used in this paper are as follows: POL = postocellar line, OOL = ocular-ocellar line, OD = ccellar diameter; TI = the first tergite of metasoma, TII = the second tergite of metasoma, TIII = the third tergite of metasoma; L = length, W = width.

Taxonomy

Genus *Deuterixys* Mason, 1981

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

Deuterixys Mason 1981, 115: 123; Whitfield 1985, 61(1): 60; Marsh et al. 1987, 13: 31; Whitfield and Wagner 1991, 25: 737; Austin and Dangerfield 1992, 6(1): 23.

Type species: *Microgaster carbonarius* Wesmael, 1835. Designated by Mason 1981.

Diagnosis. Areolet of fore wing absent; propodeum polished and bearing a strong long medial carina; T1 of metasoma with medio-basal longitudinal groove; TII and III broad, rectangular, and noticeably constricted or abruptly widened at the suture between them; ovipositor sheaths short, decurved and subexserted.

Key to the Old World species of the genus *Deuterixys* Mason, 1981

- 1 TII+III enlarged to form a coarsely rugose carapace that completely hides the more apical segments; posterior margin of this carapace finely crenulate laterally. [Mesoscutum shiny, closely, rather strongly punctate for the size of the insect; hind coxa and underside of metasoma bright yellow; propodeum polished and with a strong medial keel; length: 1.8 mm] ***D. patro* Nixon, 1965**
- TII+III not thus enlarged, notched at the position of second suture but its posterior margin is membranous and smooth, the more apical segments exposed **2**
- 2 TII less transverse, at most 1.7–1.8 times wider behind than long medially; legs yellow, hind tibia and tarsus more or less infuscate **3**
- TII more transverse, twice wider behind than long medially; legs dark brown, blackish to black **4**
- 3 Vein 2-CU1 of fore wing twice as long as vein 1-CU1; TIII rugose to rugulose; preapical segment of antenna short, hardly twice as long as wide ***D. condarensis* (Tobias, 1960)**
- Vein 2-CU1 of fore wing as long as vein 1-CU1; TIII smooth and shiny; preapical segment of antenna long, more than twice as long as wide ***D. bifossalis* Zeng & Chen, sp. n.**
- 4 TIII densely rugulose or subrugulose, dull; TII with rugosity almost similar to that of T1; T1 parallel- or indistinctly subparallel-sided; propodeum medially with more or less transverse rugulosity along medial longitudinal keel, otherwise propodeum smooth **5**
- TIII chagreened or almost smooth, shiny; T1 converging apically; propodeum smooth, at most with a few and very short rugulae along hind carina and above lunule **6**

- 5 TI subrectangular, 1.2–1.3 times as long as wide; TII almost as long as TIII; inner hind tibial spurs much longer than half length of hind basitarsus
..... *D. carbonaria* (Wesmael, 1837)
- TI more than 1.5 times longer than wide; TII distinctly longer than TIII; inner hind tibial spurs shorter than half length of hind basitarsus
..... *D. curticalcar* Zeng & Chen, sp. n.
- 6 Vein 1-R1 of fore wing as long as or slightly shorter than pterostigma. [TI posteriorly weakly to moderately converging, its basal width at most 1/3 greater than its apical width. Pterostigma less wide, 2.7–2.9 (-3.0) times longer than wide. First tergite always entirely black. Tegula brownish black to brownish yellow. Middle and hind femora black(ish)]
..... *D. rimulosa* (Niezabitowski, 1910)
- Vein 1-R1 slightly longer than pterostigma 7
- 7 TI wedge-shaped, 1.6–2 times longer than wide at base; TII shorter than TIII, somewhat less transverse, twice wider behind than long medially; pterostigma 2.3–2.4 times longer than wide.....
..... *D. plugarui* (Tobias, 1975)
- T1 widest about 2/3 distance from its base, anterior third and posteriorly with weakly converging sides, about 1.5 times longer than wide; TII slightly longer than TIII, somewhat more transverse, 2.2 times wider behind than long medially; pterostigma about 3 times longer than wide.....
..... *D. anica* Austin & Dangerfield, 1992

***Deuterixys bifossalis* Zeng & Chen, sp. n.**

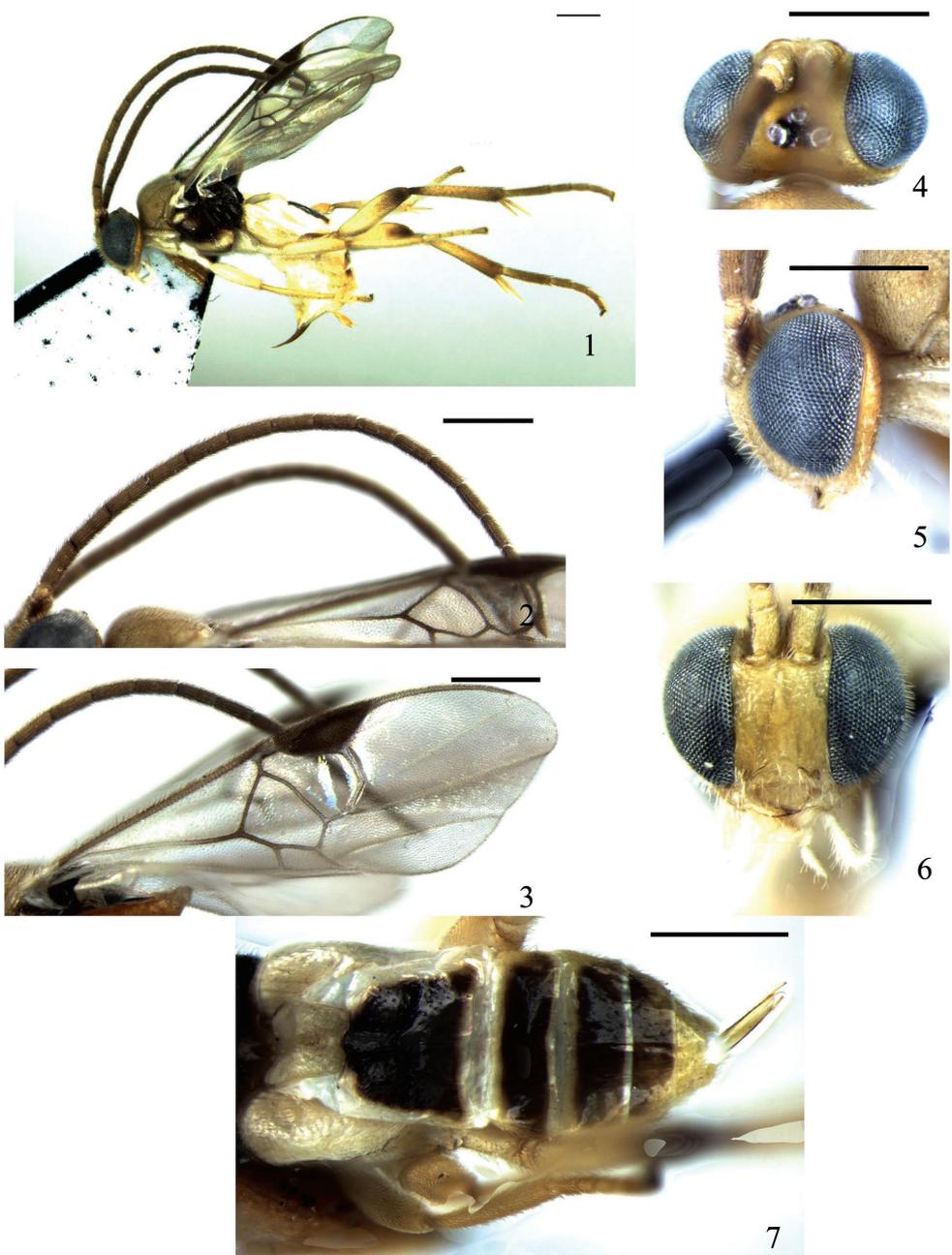
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http://species-id.net/wiki/Deuterixys_bifossalis

Figs 1–7

Description. Female. Body length 3.68 mm, fore wing length 3.20 mm.

Head. In frontal view antennal sockets just above middle level of eyes, 1.6 times as wide as long and 1.1 times as that of mesoscutum. Ocelli large and in an equilateral triangle, POL: OD: OOL=3.6:4.0:2.7. Frons and vertex smooth and shiny, scattered with short fine setae; vertex sharply narrowed behind eyes, area behind ocellar area sharply oblique, smooth and shiny, without setae; temple and gena feebly punctate and shiny, with dense setae. Face and clypeus shiny but feebly rugulose-punctate, with dense short fine setae; width of face 0.5 times height of eye and clypeus combined (16.3:31.2); inner margins of eyes adjacent to face parallel-sided; eyes very large, 1.5 times as high as wide (31:21), temple behind eyes very short. Tentorial pits large, distance between tentorial pits 5 times distance from pit to eye margin; malar space very short, 0.1 times as long as eye height; apical segment of labial palp longer than the two preceding segments, respectively. Antenna longer than body; flagellomeres with placodes arranged regularly in 2 ranks; the third flagellum slightly longer than the



Figures 1–7. *Deuterixys bifossalis* Zeng & Chen, sp. n. **1** habitus, lateral view **2** antennae **3** fore wing **4** head, dorsal view **5** head, lateral view **6** head, frontal view **7** gaster, dorsal view. Scale line = 0.5 mm.

fourth flagellum; apical segment as long as preapical one; preapical segment 2.3 times as long as wide. Flagellomere proportions: 2 L/W=2.92, 8 L/W=2.40, 14 L/W=2.50; L 2/14=1.40; W 2/14=1.20.

Mesosoma. Mesoscutum densely and evenly punctate and setose; notauli not impressed, but indicated by a band of shallow and dense duller sculpture. Disc of scutellum also densely punctate, its rugose tip interrupting the posterior, polished band of scutellum, with dense short setae all over; scutellar sulcus deep with a few strong carina and 1.2 times as long as scutellum (15.5:12.8). Propodeum highly polished, virtually without sculpture except for a strong medial longitudinal carina and weak transverse ridges in immediate vicinity of longitudinal carina and lateral margin, with strong rugae distal to spiracle. Epicnemial furrow distinct, area before it raised above rest of mesopleuron; precoxal sulcus short, shallow, only indicated by few punctures anteriorly. Mesosternum with dense setigerous punctures. Lateral metanotum mostly smooth and shiny, with longitudinal striae posteriorly and below spiracle.

Wings. Forewing without areolet, radial vein r arising from distal third of pterostigma; veins r and 2-SR meeting at a 165–170 degree angle; r:2-SR: length of pterostigma = 13:10:31; vein 1-R1 1.3 times as long as pterostigma, pterostigma 2.5 times as long as wide. 1-CU1:2-CU1:m-cu=11:11:8. Hind wing narrow.

Legs. Hind coxa shiny, feebly punctate, scattered with short setae. Hind tibia gradually swollen apically and about 0.9 times as long as hind tarsi (54.5:63.9); inner hind tibial spurs about 0.9 times as long as hind basitarsus (22.0:25.8); fourth tarsal segment slightly shorter than fifth tarsal segment (7.8:8.4). Hind tibia with few spines on outer side, rather fine and not dense enough to give the tibia a markedly prickly appearance.

Metasoma. T1 dilated medially, the greatest medial width 1.5 times its apical width, with strong medial longitudinal groove almost reaching to posterior margin, 1.5 times as long as its greatest width and 2.1 times as long as TII, medial groove with a shallow transverse carina. TII+III slightly constricted at extreme apex of second suture. TII subtrapezoid, 0.6 times as long as its basal width and 0.9 times as long as TIII, with a pair of strong rugulose-marked longitudinal grooves delimiting a median field that slightly narrowed posteriorly. TIII rectangular, smooth and shiny, with anterior margin arched medially, median field not indicated. Tergites posterior to TIII more membranous, shiny. All tergites scattered with setae. Ovipositor sheath shorter, 0.7 times as long as hind basitarsus. Hypopygium strongly and evenly sclerotized, blunt but not truncated apically, sparsely clothed with short setae.

Colour. Body mostly yellow; head evenly yellow except for black ocellar area; mesosoma brown except for yellow mesoscutum and scutellar disc; mesopleuron yellow except epicnemium. Antenna evenly yellowish brown, scape brownish dorsally, pedicel yellow; palpi and tegula whitish yellow. Legs whitish yellow basally, slightly darkened toward apex, claws brown, extreme apex of hind femur and tibia and extreme base of hind tibia brownish. Sternites of metasoma whitish yellow; T1 light yellow, the other tergites brown and gradually paler apically. Wings hyaline, very slightly infuscate; veins brown but veins 1-R1, A and M+Cu grey, pterostigma brown.

Male. Unknown.

Host. Unknown for this species, but all previous host records from Europe and North America indicate that *Deuterixys* spp. are parasites of *Bucculatrix* spp. (Bucculatricidae) (Nixon 1965, Mason 1981, Whitfield 1985).

Materials examined. Holotype: ♀, Mt. Qingliangfeng (118°52' ~119°12'E, 30°04' ~30°31'N), Linan, Zhejiang, 2005. VIII. 9, leg. Min Shi, No. 200607234. Paratype: 1♀, Mt. Yinggeling (109°31'E, N19°04'N), Hainan, 2007. V. 24–25, leg. Jingxian Liu, No. 200702641.

Etymology. The specific name “bifossalis” derives from the Latin prefixion “bi-” and adjective “fossalis”, referring to both distinct lateral grooves enclosing a median field of the second tergite.

Distribution. China (Zhejiang, Hainan).

Remark. This species is similar to the Palaearctic species *Deuterixys rimulosa* (Niezabitowski, 1910), but can be distinguished from the latter by having TI not transverse (more transverse in *D. rimulosa*), and vein 1-R1 of fore wing longer than pterostigma (the latter subequal to or slightly shorter). It also differs from the other Oriental species *Deuterixys patro* (Nixon, 1965) by TII and TIII not forming a carapace and having exposed the following tergites (the latter TII and TIII enlarged to form a carapace and following tergites retracted).

***Deuterixys curticalcar* Zeng & Chen, sp. n.**

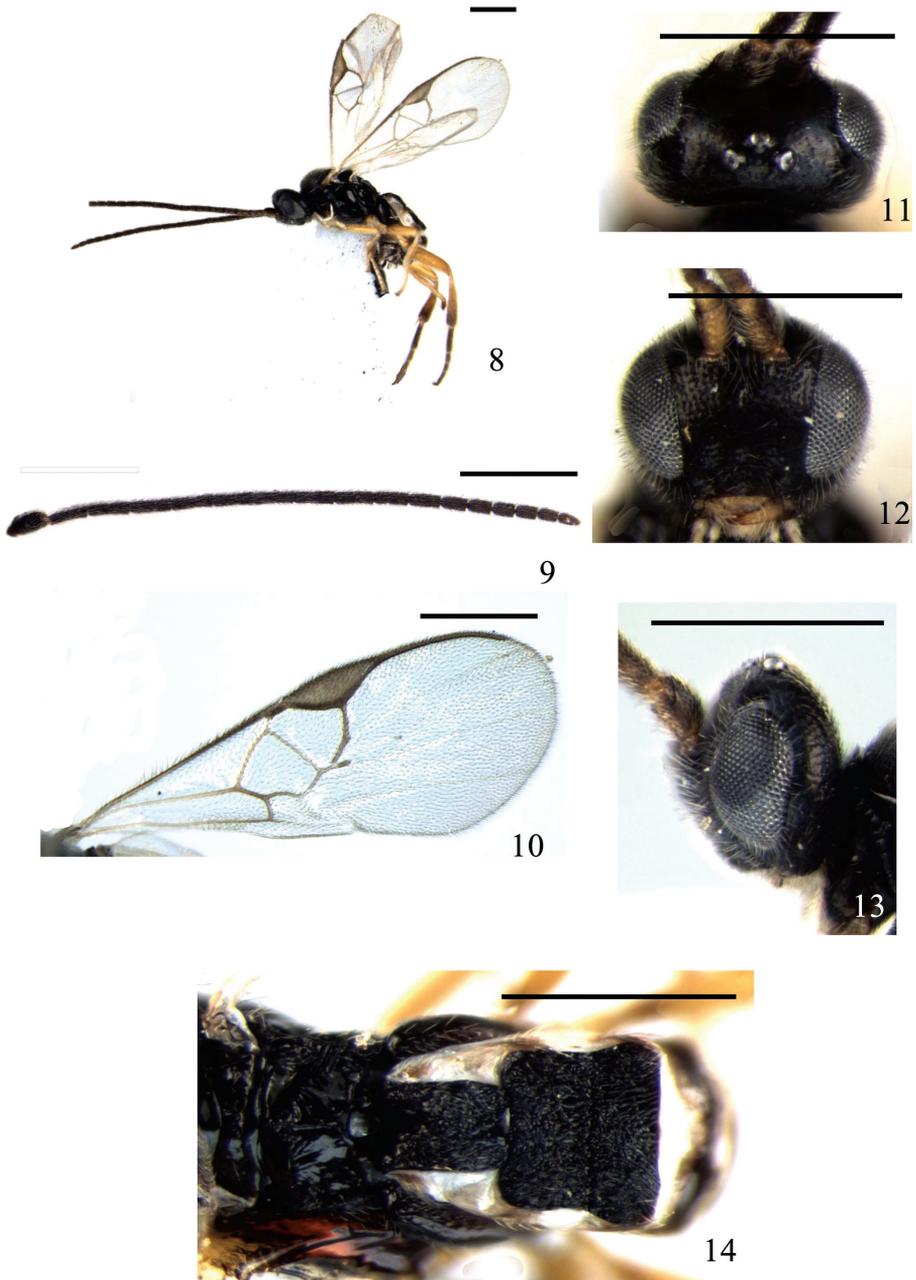
urn:lsid:zoobank.org:act:34B734EE-BBE6-44D0-AA54-8275B151633F

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

Figs 8–14

Description. Female. Body length 2.04 mm, fore wing length 2.24 mm.

Head. In frontal view antennal sockets distinctly above middle level of eyes, head 1.6 times as wide as long and 1.1 times as that of mesoscutum. Ocelli small and in a high triangle, POL: OD: OOL=4.0:2.4:6.2. Frons and vertex smooth and shiny, covered with dense short fine setae; vertex sharply narrowed behind eyes, area behind ocellar area sharply oblique, smooth and shiny, without setae; temple and gena feebly striate and shiny, with dense setae; face shiny and discretely but distinctly punctate, 0.9 times as wide as height of eye and clypeus combined, with dense setae; inner margins of eyes adjacent to face slightly converging ventrally; eye moderate size, 1.7 times as high as wide (15.6:9.0), temple behind eyes subequal in length to width of eye. Clypeus feebly rugulose, with dense short fine setae; tentorial pits small, distance between tentorial pits twice distance from pit to eye margin (5.7:2.8); malar space short, 0.2 times as long as eye height; apical segment of labial palp longer than the preceding segment but shorter than the next preceding segment. Antenna longer than body; flagellomeres with placodes arranged regularly in 2 ranks except the apical 6 segments; the third flagellomere subequal to the fourth flagellomere in length; apical segment slightly longer than preapical one. Flagellomere proportions: 2 L/W=4.10, 8 L/W=4.05, 14 L/W=1.88; L 2/14=2.00; W 2/14=0.92.



Figures 8–14. *Deuterixys curticalcar* Zeng & Chen, sp. n. **8** habitus, lateral view **9** antennae **10** fore wing **11** head, dorsal view **12** head, frontal view **13** head, lateral view **14** propodeum and T1-III, dorsal view. Scale line = 0.5 mm.

Mesosoma. Mesoscutum densely and evenly punctate, with normal setae; notauli absent. Disc of scutellum as densely punctate as mesoscutum, with normal setae; the posterior, polished band of scutellum continuous, not interrupted medially; scutellar sulcus shallow with a few weak carinae and as long as scutellum. Propodeum highly polished, virtually without sculpture except for a strong medial longitudinal carina and very short transverse ridges in immediate vicinity of longitudinal carina and lateral margin, with strong rugae around spiracle. Epicnemial furrow indistinct, area before it slightly raised above rest of mesopleuron; precoxal suture indistinct, only indicated by a large shallow depression. Mesosternum with dense fine setigerous punctures. Laterally metanotum mostly smooth and shiny.

Wings. Forewing without areolet, radial vein *r* arising from middle of pterostigma; veins *r* and 2-SR meeting at an angle of almost 170 degree; *r*:2-SR:length of pterostigma = 7.5:6.5:23.0; vein 1-R1 1.1 times as long as pterostigma, pterostigma 2.6 times as long as wide. 1-CU1:2-CU1: m-cu=6.5:7.0:7.3. Hind wing narrow.

Legs. Hind coxa shiny, highly polished, scattered with short setae on anterior 2/3. Hind tibia gradually swollen apically and 0.9 times as long as hind tarsus (33.0:38.8); inner hind tibial spurs 0.4 times as long as hind basitarsus (6.0:15.5); fourth tarsal segment much shorter than fifth tarsal segment (4.5:7.0). Hind tibia without trace of spines on outer side.

Metasoma. T1 parallel-sided, with a very feebly rugose triangular area and a strong and smooth medial longitudinal groove on anterior 2/5, densely rugulose and turns over on posterior 3/5, 1.6 times as long as its greatest width and 1.5 times as long as tergite II. T2+T3 constricted at the level of the crenulate second suture. T2 rectangular, densely and strongly rugose, with strong longitudinal striae posteriorly, without trace of median field, 0.6 times as long as its basal width and 1.7 times as long as tergite III. T3 transverse, broadened posteriorly, longitudinally aciculate-rugulose and densely and strongly rugulose. Tergites posterior to T3 more membranous, shiny; all tergites with scattered short fine setae. Ovipositor sheath very short, only 0.4 times as long as hind basitarsus, curved downwards. Hypopygium short, strongly and evenly sclerotized, truncated apically, sparsely clothed with long setae.

Colour. Body mostly black; metasoma brownish to light brown except black T1 to T3. Antenna almost brown, basal third yellowish ventrally. Mouthparts yellow with brown margin, palpi white. Tegula brown. Legs yellow, somewhat whitish; fore and middle coxae brownish laterally, all claws brown; hind coxa and tarsus brown; hind tibia brownish and darkened apically, its apical third strongly darkened. Wings hyaline; veins grey except brown submarginal vein, pterostigma grey and laterally brown.

Variation. Vein 1-SR 1.1–1.4 times as long as pterostigma, pterostigma 2.6–3 times as long as wide. Veins and pterostigma light brown, more or less transparent. Antenna, mouthparts and tegula sometimes darkened.

Male. Unknown.

Host. Unknown for this species but all previous host records from Europe and North America indicate that *Deuterixys* spp. are parasites of *Bucculatrix* spp. (Bucculatricidae) (Nixon 1965, Mason 1981, Whitfield 1985).

Materials examined. Holotype: ♀, main peak of Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Shimen, Hunan, 2009. VII. 12, legs. Zeng Jie, No. 200900720. Paratype: 2♀♀, Main peak of Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Shimen, Hunan, 2009. VII. 12, legs. Zeng Jie, No. 200900716, 200900745; 1♀, Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Sanhecun, Shimen, Hunan, 2009. VII. 13, legs. Zeng Jie, No. 200901663; 2♀♀, Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Sanhecun, Shimen, Hunan, 2009. VII. 11, legs. Tang Pu, No. 200901072, 200901079; 2♀♀, Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Sanhecun, Shimen, Hunan, 2009. VII. 11, legs. Ma Li, No. 200901910, 200901952; 1♀, Mt. Huping (110°45'–110°55'E, 30°02'–30°07'N), Sanhecun, Shimen, Hunan, 2009. VII. 13, legs. Ma Li, No. 200901011; 1♀, Mt. Jingang (114°06'–114°10'E, 26°31'–26°34'N), Jiangxi, 2007. VIII. 13, legs. He Junhua, No. 200704967; 1♀, Jietou (98°37'–98°39'E, 25°22'–25°27'N), Tengchong, Yunnan, 2006. VII. 11–12, legs. Zeng Jie, No. 200801766; 1♀, Nankang (98°46'–98°47'E, 24°48'–24°49'N), Lujiangba, Baoshan, Yunnan, 2009. V. 9, legs. Zeng Jie, No. 200904232; 1♀, Mt. Leigong (118°03'–118°15'E, 26°21'–26°25'N), Xiaodanjiang, Guizhou, 2005. VI. 4, legs. Zhang Hongying, No. 200606086; 1♀, Kuankuoshui Natural Reserve (107°24'–107°26'E, 30°37'), Guizhou, 2010. VI. 5, legs. Zeng Jie, No. 201004665; 1♀, Datianding, Mt. Dawuling (111°11'–111°13'E, 22°16'–22°18'N), Guangdong, 2001. X. 3, legs. Xu Zaifu, No. 20020629; 1♀, Mt. Chebaling (114°14'–114°16'E, 24°43'–24°44'N), Shixing, Guangdong, 2003. VIII. 21, legs. Xu Zaifu, No. 20053046; 2♀♀, Baotianman (111°55'–111°58'E, 33°29'–33°32'N), Neixiang, Henan, 1998. VII. 14, legs. Chen Xuexin, No. 988733, 988741; 1♀, Hongxia tree farm, Mt. Liupan (106°13'–106°17'E, 35°43'–35°45'N), Jingyuan, Ningxia, 2008. VI. 1, legs. Liu Jingxian, No. 200905594; 1♀, Guamagou, Mt. Liupan (106°19'–106°21'E, 35°46'–35°47'N), Pengyang, Ningxia, 2008. VI. 9–10, legs. Liu Jingxian, No. 200904351; 1♀, Yehegu, Xixia tree farm, Mt. Liupan (106°13'–106°17'E, 35°29'–35°31'N), Jingyuan, Ningxia, 2008. VI. 11–12, legs. Liu Jingxian, No. 200905857.

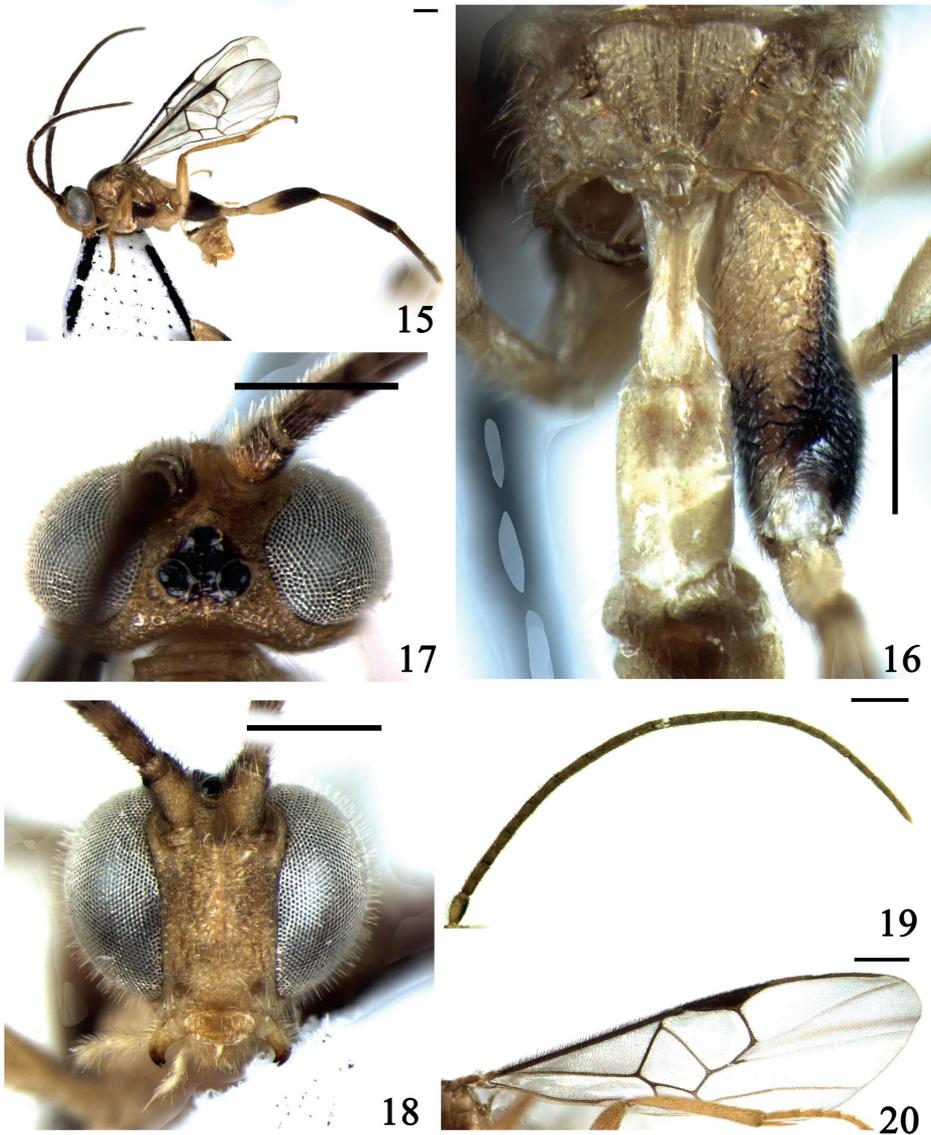
Etymology. The specific name “curticalcar” derives from the Latin prefixion “curti-” and noun “calcar”, referring to the short hind tibial spurs.

Distribution. China (Jiangxi, Henan, Hunan, Guangdong, Guizhou, Yunnan, Ningxia).

Remark. This species is similar to the Palaearctic species *Deuterixys carbonaria* (Wesmael, 1837), but can be distinguished from the latter by having TI long, more than 1.5 times as long as wide (TI subrectangular, 1.2–1.3 times as long as wide in *D. carbonaria*); TII much longer than TIII (TII almost as long as TIII); and inner hind tibial spurs shorter than 0.5 times hind basitarsus (much more than 0.5 times hind basitarsus).

Genus *Wilkinsonellus* Mason, 1981

Wilkinsonellus Mason, 1981, 115: 122; Austin & Dangerfield, 1992, 6(1): 23; Chen & Song, 2004: 202; Whitefield, 1997, 1: 12. Type species: *Apanteles iphitus* Nixon, 1965. Designated by Mason, 1981.



Figures 15–20. *Wilkinsonellus paramplus* Long & van Achterberg, 2003 **15** habitus, lateral view **16** propodeum and anterior tergites of gaster, dorsal view **17** head, dorsal view **18** head, frontal view **19** antennae **20** fore wing. Scale line = 0.5 mm.

Diagnosis. Areolet of fore wing absent; nervellus of hind wing not sinuate. Propodeum often with a medial longitudinal carina, sometimes smooth or rugulose or strigose with indistinct carina. TI–TIII not forming a carapace; TI 4–5 times as long as its apical width, more or less constricted medially and deeply grooved almost to apex.

***Wilkinsonellus paramplus* Long & van Achterberg, 2003**

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

Figs 15–20

Wilkinsonellus paramplus Long & van Achterberg, 2003, 77(10): 223. Holotype female, pinned with labels as follows: “[Vietnam], Hoa Binh (Yen Thuy), 20°23’N, 105°36’E, fruit orchard, MT, 20–30.v.2002, K.D. Long, Mic. 243” (IEBR).

Materials examined. 1♀, Mt. Nanling (112°59’09" ~113°05’28"E, 24°53’46" ~24°56’42"N), Ruyuan, Guangdong, 2003. VII. 23, Xu Zaifu, No. 20049062; 1♀, Shiwandashan Forest Park(107°53’ ~107°55’E, 21°53’ ~24°55’N, 310m), Guangxi, 2001. XI. 29, Ma Yun, No. 20021580.

Distribution. China (Guangdong, Guangxi), Vietnam. New record for China.

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A new species of genus *Pseudaspidapion* Wanat, 1990 (Coleoptera, Apionidae) from China

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Abstract

Pseudaspidapion botanicum **sp. n.** from China is described and figured. Its host plant is *Grewia biloba* G. Don var. *parviflora* (Bunge) Hand.-Mazz (Malvaceae: Grewioideae). The genus *Harpapion* Voss, 1966 is recorded as new for China and Vietnam and two **comb. n.** are proposed: *Harpapion vietnamense* (Korotyaev, 1985) (from *Aspidapion*) and *H. coelebs* (Korotyaev, 1987) (from *Pseudaspidapion*). A key to the known species of the genus *Pseudaspidapion* from China is presented.

Keywords

Weevils, *Pseudaspidapion botanicum*, *Harpapion*, Beijing, Shaanxi, new species, new combination, morphology, systematics, biology, key

Introduction

M. Wanat (1990) erected the genus *Pseudaspidapion* relating it to the genus *Aspidapion* Schilsky, 1901. Alonso-Zarazaga and Lyal (1999) placed it in the tribe Aspidapiini

Alonso-Zarazaga, 1990 of the subfamily Apioninae Schoenherr, 1823 (Coleoptera, Curculionioidea). This genus is quite similar to *Aspidapion*, but it can be distinguished from the latter by relatively equal width of elytral striae and interstriae, the presence of fenestrae in the tegminal plate, and the absence of protibial mucrones in males, among other features (Wanat 1990). Apart from the type species, *Apion spadiceum* Wagner, 1908, Wanat also proposed 15 new combinations for species coming from East Africa, India and South China. At present, there are 17 paleotropical species included in the genus. In the Chinese fauna, there were 4 species recorded only from Yunnan province, and these specimens were all collected during the 1950's (Korotyaev 1985, 1987).

In 2008, we collected a series of specimens of a *Pseudaspidapion*. Further specimens were later found. We consider them to represent a species new to science that we describe below.

In addition to the description of the adult characters, we also provide some biological data for the new species after one year of survey in the Beijing area.

Material and methods

Materials examined of new species for this study are to be deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS), the Museo Nacional de Ciencias Naturales, Madrid (MNCN), the Zoological Institute of Russian Academy of Sciences, Moscow (ZIN), the Museum of Natural History, University of Wrocław (MNHW) and the Beijing Botanical Garden, Beijing (BBG).

Type specimens were obtained from ZIN on loan or belong to IZCAS and their data are summarised in Table 1. Information about their condition and taxonomy is given in the Discussion section.

Descriptions were made and photographs were taken with a CCD Qimage MicroPublisher 5.0 RTV mounted on a Zeiss SteREO Discovery V.12. Extended focus images were generated with Auto-Montage Pro 5.03.0061 and edited with Adobe Photoshop CS 5.0 if required. Microscopic slides were studied under a Leica DM 2500 microscope and photos were taken with a Nikon CoolPix 5400. The map was made with the software ArcGIS 9.3. Drawings were made from the original photographs by using the software Adobe Illustrator CS5.0, or directly by using a drawing tube linked to the microscope.

Nomenclature of the rostral parts follows Alonso-Zarazaga (1989) and that of genitalia follows Alonso-Zarazaga (1990).

The dissecting method used follows Alonso-Zarazaga (1990). Abdomens were put into 10% NaOH for several hours until the inner tissues were digested, and the resultant structures were placed on a temporary microscope slide for examination.

After description, the genitalia and other parts of each specimen were placed in DMHF on a plastic card for long term conservation (Steedman 1958; Bameul 1990).

Labels are described as they are (in Chinese), with pinyin romanization or comments in square brackets; labels are separated by semicolons and lines by slashes.

Table 1. List of studied type specimens and depositories.

Species	Depository	Examined type material
<i>Aspidapion inarmatum</i> Korotyaev, 1985	IZCAS	2 paratypes
<i>A. panfilovi</i> Korotyaev, 1985	IZCAS	Holotype and 1 paratype
<i>Pseudaspidapion coelebs</i> (Korotyaev, 1987)	ZIN	1 paratype
<i>P. kryzhanovskii</i> (Korotyaev, 1987)	ZIN	1 paratype
<i>P. medvedevi</i> (Korotyaev, 1985)	ZIN	Holotype
<i>P. topali</i> (Korotyaev, 1985)	ZIN	1 paratype
<i>P. vietnamense</i> (Korotyaev, 1987)	ZIN	Holotype
<i>P. yunnanicum</i> (Korotyaev, 1985)	IZCAS	Holotype and 3 paratypes
<i>P. zagulajevi</i> (Korotyaev, 1987)	ZIN	2 paratypes

Taxonomic treatment

Pseudaspidapion botanicum Alonso-Zarazaga & Wang, sp. n.

urn:lsid:zoobank.org:act:88656E61-918F-4F1B-A3BD-6A3FA714A237

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

Figs 1–28 (from paratypes)

Diagnosis. This new species resembles *P. yunnanicum*, but it can be distinguished from the latter by the characters in the table 2.

Description (male holotype, except where indicated). *Measurements* (in mm): Standard length: 1.82. Rostrum: length: 0.71, maximum width: 0.17. Pronotum: median length: 0.49, maximum width: 0.59. Elytra: median length: 1.38, maximum width: 1.08.

With the general characters of genus *Pseudaspidapion* as described in Wanat (1990). *Integument.* Generally piceous black (Figs. 1–2).

Vestiture composed of thick, longer white piliform scales with truncate apex and thin, shorter brownish to greyish acute hairs; scales present on coxae, femora and tibiae, sides of pronotum, meso- and metaventre, mesoventral process, base of 3rd elytral interstria, metarostrum, and weak subocular patch, sometimes intermediate types present. Antennal scape apex and pedicel with sparse short greyish hairs, club and desmomerer 2–7 covered with dark hairs only. Pronotal vestiture centrifugal, scales both on apex and base perpendicular to the margins, hairs on disc distinctly longer than those on elytra, reaching middle of preceding hair. Elytral vestiture white at base and sides, brownish on disc, interstitial scales large, longer than 2/3 of the interstitial width, in two rather regular rows per interstria, one specialized seta on apical region of 9th interstria.

Rostrum cylindrical and moderately robust, in dorsal view 4.18× as long as maximum width, 1.45× as long as pronotum in midline, widest at mesorostrum, pro- and metarostrum with sides almost parallel, metarostrum with two very fine, punctulate dorsal submedial sulci shortened at mesorostral level, and two weak dorsal sublateral sulci, dorsal submedial sulci prolonged on frons, separated, dorsal sublateral sulci prolonged close to ocular margins, metarostrum microreticulate, matt, pro- and

Table 2. Comparative diagnostic characters for *P. botanicum* sp. n. and *P. yunnanicum*.

	<i>P. yunnanicum</i>	<i>P. botanicum</i> sp. n.
Scales on pronotal disc	Finer, sparser, shorter, tips of posterior scales not or hardly reaching the base of anterior ones	Thicker, denser and longer, tips of posterior scales surpassing the anterior by almost the basal half
Scape	Slender, ca. 0.26 mm long, 7.20–7.60× as long as wide, 1.66–1.85× as long as mesorostral width	Robust, ca. 0.20 mm long, 5.00–5.80× as long as wide, 1.24–1.67× as long as mesorostral width
Rostrum (♀)	Longer, 1.91–2.25× as long as pronotum, thinner, 7.35–10.30× as long as maximum width	Shorter, 1.35–1.53× as long as pronotum, more robust, 4.00–5.07× as long as maximum width
Metarostrum (dorsal view)	Microreticulate	Nearly smooth
Pronotum	Strong subapical constriction and sides moderately rounded behind it	Weaker subapical constriction, sides weakly rounded behind it
Prescutellar fovea	Deep, distinct, lanceolate, not prolonged apicad	Shallow, indistinct, sublinear, prolonged apicad to middle
Scutellum	Two basal tubercles separated medially by a distinctly deep notch, in anterior view tubercles not fused basally	Two basal tubercles separated medially by a weak notch, in anterior view tubercles basally fused

mesorostrum smooth, shining, sparsely punctulate; in lateral view weakly and evenly curved, ventral margin forming a weak angle at mesorostrum, each side with a very thin low dorsal sublateral keel running from front margin of eye to upper margin of scrobe and beyond, limiting ventrally the dorsal sublateral sulcus, prostrum with a marked ventral sublateral sulcus under this keel.

Head transverse, frons weakly convex with four rows of relatively deep punctures running from metarostrum and hardly surpassing hind margin of eyes, occiput almost reaching hind eye level, subocular keel reaching middle of eyes, the area between subocular keels microreticulate and impunctate, with a low, fine median keel. Eyes round, moderately convex.

Antennae inserted at basal 0.26 of rostral length, scape 5.00× as long as wide, as long as club, 1.18× as long as mesorostral width. Pedicel 2.14× as long as wide, as long as desmomer 2+3, desmome 2 1.67× as long as wide, desmomer 3–5 1.33× as long as wide, desmome 6 1.14× as long as wide, desmome 7 1.25× as long as wide, shortly obconical. Club oblong, compact, 2.5× as long as wide, as long as the last 5.5 desmomer, sutures well marked (Fig 7).

Pronotum campaniform, transverse, 0.83× as long as wide, widest just behind middle, constrictions weak, sides weakly dilated at middle, base 1.31× as wide as apex, bisinuate with moderate medial rounded projection towards scutellum, basal flange moderately developed. Prescutellar fovea shallow, as broad as one puncture's diameter, as long as 2–3 diameters, prolonged in a very fine sulcus reaching middle of pronotum. Discal punctures relatively deep, ca. 0.5–1× diameter apart, interspaces slightly convex, microreticulate.



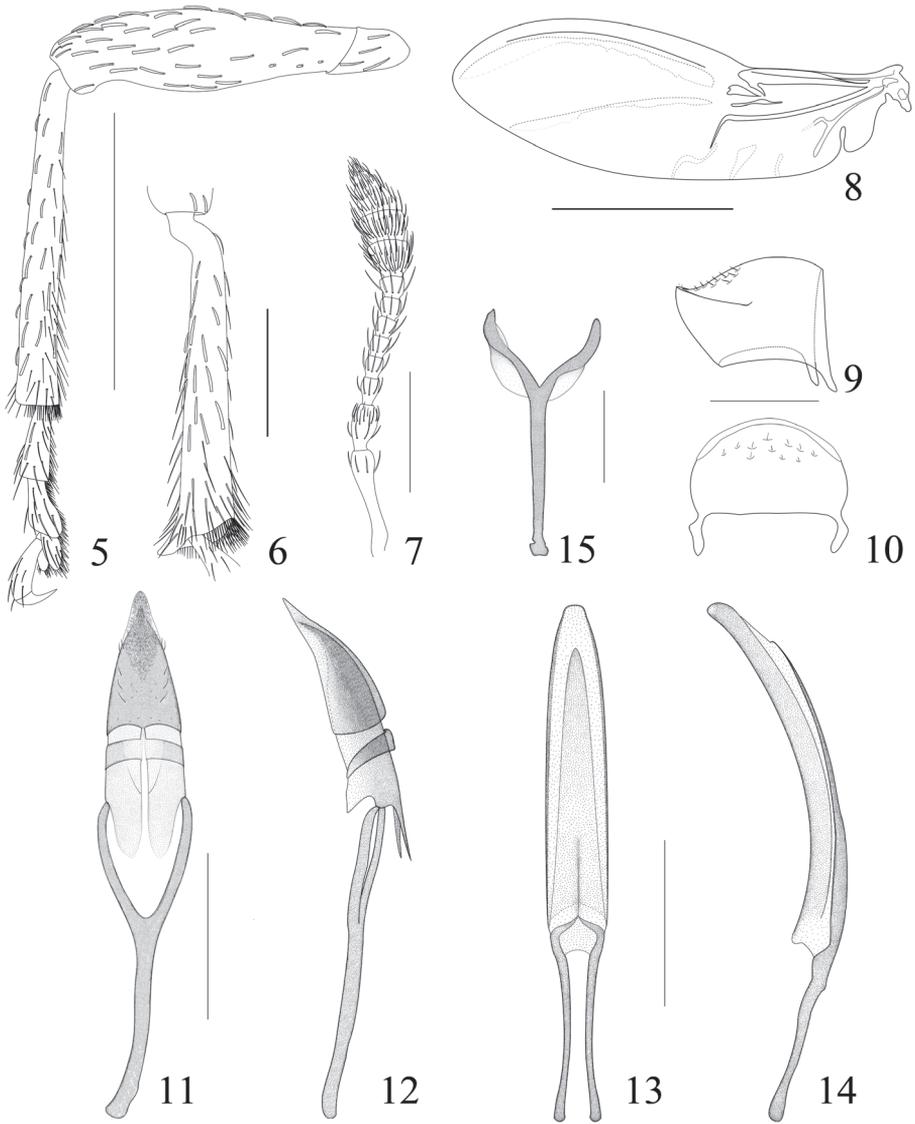
Figures 1–4. *Pseudaspidapion botanicum* Alonso-Zarazaga & Wang, sp. n. **1** male paratype, dorsal view **2** male paratype, lateral view **3** female paratype, head and rostrum, dorsal view **4** female paratype, head and rostrum, lateral view. Scales: 1–2: 1000 μm ; 3–4: 500 μm .

Scutellum large, elongated, triangular, $1.63\times$ as long as wide, with two basal tubercles separated by a weak median depression, in lateral view subacutely prominent, in front view tubercles fused basally; apex constricted and moderately raised, distinctly visible in lateral view.

Elytra $1.23\times$ as long as wide, $2.82\times$ as long as pronotum, widest almost at the middle, humeri distinct; striae deep, about as wide as interstriae at base and apex, about half as wide at elytral disc, distinctly catenulate-punctate, punctures round to oblong, space between punctures about $2.00\times$ as long as puncture length, striae apically connected 1+2+9, 3+4, 5+6, 7+8. Interstriae evidently convex with small punctures, surface distinctly wrinkled, not microreticulate, shining. Macropterous (wing of paratype, Fig 8).

Ventral areas. Mesocoxae and metacoxae narrowly separated by a distance of $0.26\times$ and $0.38\times$ of their transverse diameter, respectively. Metaventricle ca. as long as mesocoxae. Mesoventral process more prominent than metaventral process. Anterior metaventral rim present, weak. Abdominal ventrites microreticulate, with length ratios along midline: 31-17-6-7-16. Ventrites 1–2 coarsely and densely punctate, 3–4 and base of 5 very sparsely and minutely punctate, apical half of 5 densely punctate with a median convexity. Suture I distinct, distance from hind margin of metacoxae, as long as ventrite 2. Ventrite 5 subsemicircular, transverse, $0.41\times$ as long as wide.

Pygidium (from paratype) semicircular, $0.69\times$ as long as wide, apical edge of arc with a flat and glabrous side, punctate medially with interspace microreticulate (Figs 9–10).



Figures 5–15. *Pseudaspidapion botanicum* Alonso-Zarazaga & Wang, sp. n., male paratype **5** front leg **6** hind tibia **7** antenna **8** hind wing **9** pygidium, lateral view **10** pygidium, dorsal view **11** tegmen, dorsal view **12** tegmen, lateral view **13** penis, dorsal view **14** penis, lateral view **15** spiculum gastrale. Scales: 5: 500 μ m; 6–7, 9–15: 200 μ m; 8: 1000 μ m.

Legs. Metafemora a little more robust than pro- and mesofemora, profemur $2.15\times$ as long as wide, widest at middle, minutely punctate. Protibia almost straight, $6.50\times$ as long as wide (Fig 5). Protarsomere 1 $2.29\times$ as long as wide, tarsomere 2 $1.22\times$ as long as wide, tarsomere 3 bilobed, $0.8\times$ as long as wide, lobes narrow, not much dilated outwards, onychium $3.25\times$ as long as wide, projecting from lobes of tarsomere 3 for $0.54\times$ its length. Meso- and metatibiae similarly mucronate, mucro subconical (Fig 6), about $0.50\times$ as long as tibial apical width. Tarsal claws with conspicuous obtuse basal tooth.

Genitalia and terminalia (from topotypic paratypes). Ninth sternite (spiculum gastrale) Y-shaped and slightly winged near arm base, manubrium ca. $2.00\times$ as long as arms (Fig 15). Penis depressed, moderately curved, pedon with apical plate straight in side view, truncate and slightly constricted apicad in side view; temones about $0.50\times$ as long as pedon; endophallus without large structures (Figs 13–14). Tegminal plate articulated with free ring, laterally developed, enveloping, with parameroid lobes not notched apically, membranous area rhombic in general outline, microsetose apically, reaching middle of parameroid lobes, basal sclerotized area large, each side with 5 short macrochaetae, 2 latero-apical and 3 latero-medial, several sensilla distributed on middle part and posterior margin; fenestrae short, transverse, narrowly separated; linea arquata visible; prostegium bidentate, apex of projection rounded; median unsclerotized strip moderately elongate, reaching hind margin of fenestrae; manubrium with apex not broadened (Figs 11–12).

Variation. Male paratypes. Measurements (in mm) ($n=10$): Standard length: 1.38–2.05 (mean= 1.735). Rostrum: length: 0.52–0.82 (mean= 0.722), maximum width: 0.13–0.19 (mean= 0.164). Pronotum: median length: 0.36–0.53 (mean= 0.479), maximum width: 0.44–0.68 (mean= 0.594). Elytra: median length: 1.06–1.54 (mean= 1.406), maximum width: 0.78–1.18 (mean= 1.038).

Rostrum 1.44 – $1.58\times$ as long as pronotum, 4.00 – $4.63\times$ as long as wide. *Ventrite 5* sometimes slightly subtriangular. Otherwise as in holotype.

Female paratypes (Figs 3–4). Measurements (in mm) ($n=10$): Standard length: 1.56–2.05 (mean= 1.831). Rostrum: length: 0.52–0.76 (mean= 0.669), maximum width: 0.130–0.155 (mean= 0.143). Pronotum: median length: 0.37–0.53 (mean= 0.460), maximum width: 0.48–0.65 (mean= 0.571). Elytra: median length: 1.24–1.62 (mean= 1.444), maximum width: 0.88–1.14 (mean= 1.032).

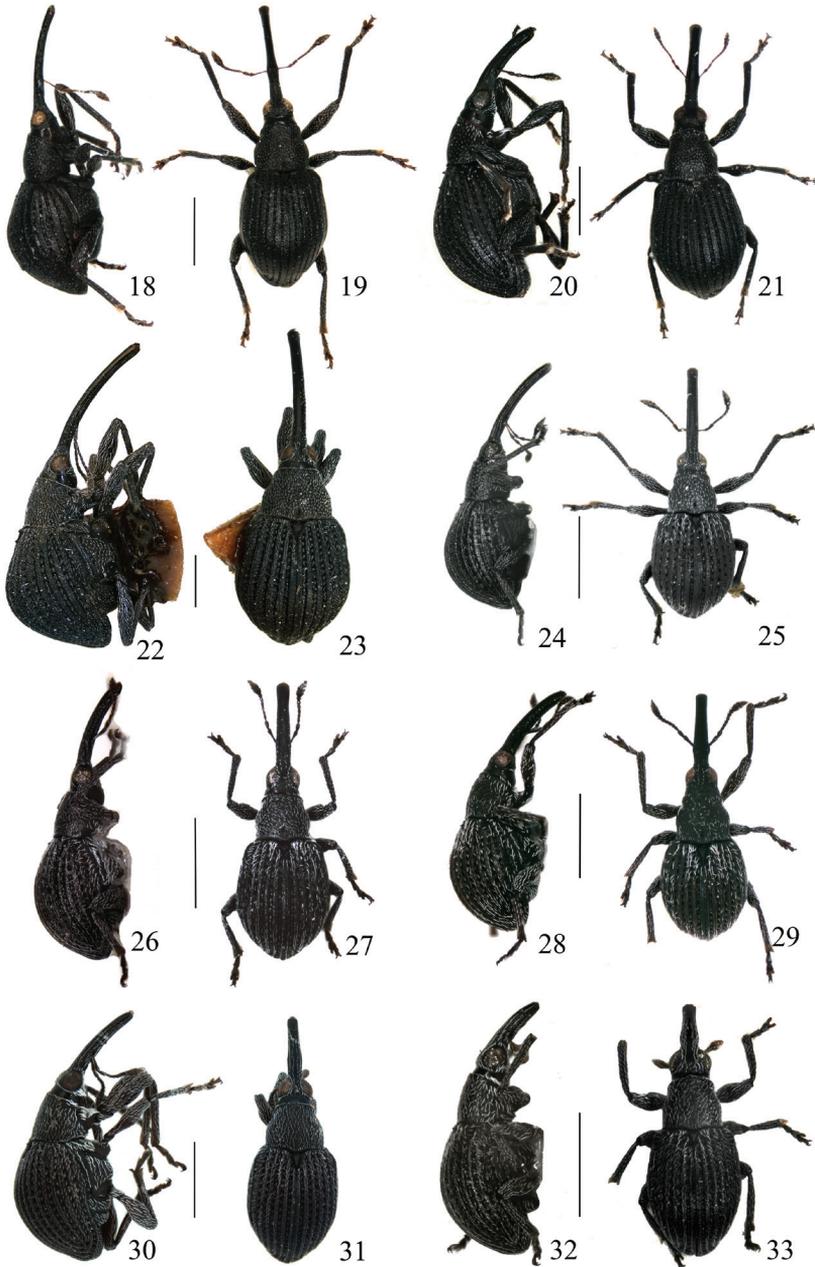
Sexual dimorphism rather weak in this species, females differ from males by a weakly thinner and more evenly curved rostrum with a brighter and less sculptured metarostrium, and all the tibiae without mucros. *Rostrum* 1.35 – $1.53\times$ as long as pronotum, 4.00 – $5.07\times$ as long as wide. *Antennae* inserted at ca. basal 0.27 of rostrum. *Ventrite 5* almost flat, hardly punctured. Otherwise practically as in male.

Material examined. Holotype: ♂: (white, printed): 北京植物园樱桃沟 [Běijīng zhīwùyuán Yīngtáogōu] / 2008.VI.1 / Leg. 王志良 [Wáng Zhīliáng]; (white, printed): IOZ(E)1638667, deposited in IZCAS. This is the Beijing Botanical Garden at Yingtaogou ($40^{\circ} 0' 51.41''$ N $116^{\circ} 12' 14.34''$ E), Haidian district, Beijing (P. R. of China). Paratypes (132♂137♀): 4♂7♀: (white, printed and handwritten): 北京三堡 [Běijīng Sānpù]; (white, printed and handwritten): 1964.VII.20 / leg. 马文珍 [Mǎ Wénzhēn]; (white, printed): IOZ(E)1638668–1638678; 3♀: (white, printed and handwritten):



Figures 16–17. *P. botanicum* Alonso-Zarazaga & Wang sp. n. **16** female resting on underside of leaf **17** female boring a bud for oviposition, with guarding male.

北京三堡 [Běijīng Sānpù] / 600m; (white, printed and handwritten): 1964.VIII.21 / leg. 李铁生 [Lǐ Tiěshēn]; (white, printed): IOZ(E)1638679-1638681; 1♂1♀: (white, printed and handwritten): 北京三堡 [Běijīng, Sānpù] / 1979.VIII.8; (white, handwritten): leg. 廖素柏 [Liào Sùbǎi]; (white, printed): IOZ(E)1638682-1638683; 5♂5♀: (white, printed and handwritten): 北京上方山 [Běijīng Shàngfāngshān]; (white, printed and handwritten): 1980.VIII.2 / leg. 廖素柏 [Liào Sùbǎi]; (white, printed) IOZ(E)1638684-1638693; 2♂: (white, printed and handwritten): 北京上方山 [Běijīng Shàngfāngshān]; (white, printed and handwritten): 1979.VII.25 / leg. 陈元清 [Chén Yuánqīng]; (white, printed): IOZ(E)1638694-1638695; 2♂2♀: (white, printed and handwritten): 北京居庸关 [Běijīng Jūyōngguān] / 500m; (white, printed and handwritten): 1964.VIII.20 / leg. 李铁生 [Lǐ Tiěshēn]; (white, printed): IOZ(E)1638696-1638699; 1♂: (white, printed and handwritten): 北京八达岭 [Běijīng Bādǎlíng] / 700m; (white, printed and handwritten): 1963.VII.25 / leg. 李铁生 [Lǐ Tiěshēn]; (white, printed): IOZ(E)1638700; 8♂8♀: (white, printed): 北京香山 [Běijīng Xiāngshān]; (white, printed and handwritten): 1963.V.30 / leg. 李铁生 [Lǐ Tiěshēn]; (white, printed): IOZ(E)1638701-1638716; 1♀: (white, printed and handwritten): 北京香山 [Běijīng Xiāngshān]; (white, printed and handwritten): 1964.V.5 / leg. 马文珍 [Mǎ Wénzhēn]; (white, printed): IOZ(E)1638717; 1♀: (white, handwritten): 北京香山 [Běijīng Xiāngshān] / 1957.VIII.16; (white, printed): IOZ(E)1638718; 1♂: (white, printed and handwritten): 北京卧佛寺 [Běijīng Wòfósi] / 50m; (white, printed and handwritten): 1962.VI.25 / leg. 王春光 [Wáng Chūnguāng]; (white, printed): IOZ(E)1638719; 1♀: (white, printed and handwritten): 北京卧佛寺 [Běijīng Wòfósi]; (white, printed and handwritten): 1963.IX.3 / leg. 姜胜巧 [Jiāng Shèngqiǎo]; (white, printed): IOZ(E)1638720; 1♀: (white, printed and handwritten): 北京卧佛寺 [Běijīng Wòfósi] / 50m; (white, printed and handwritten): 1962.VIII.31 / leg. 谢汝忠 [Xiè Rǔzhōng]; (white, printed): IOZ(E)1638721; 1♂: (white, printed and handwritten): 北京潭柘寺 [Běijīng Tánzhèsi] / 1975.VII.24; (white, printed and handwritten): leg. 王书永 [Wáng Shūyǒng]; (white, printed): IOZ(E)1638722; 1♀: (white, printed and handwritten): 1964.VII.20 / leg. 马文珍



Figures 18–33. Types of *Pseudaspidapion*, *Aspidapion* and *Harpapion*, in lateral and dorsal views **18–19** *A. panfilovi* Korotyaev, 1985, female holotype **20–21** *P. zagulajevi* (Korotyaev, 1987), female paratype **22–23** *P. kryzhanovskii* (Korotyaev, 1987), female paratype **24–25** *P. yunnanicum* (Korotyaev, 1985), female holotype **26–27** *P. topali* (Korotyaev, 1985), male paratype **28–29** *P. medvedevi* (Korotyaev, 1985), male holotype **30–31** *H. coelebs* (Korotyaev, 1987), male paratype **32–33** *H. vietnamense* (Korotyaev, 1987), male holotype. Scales: 18–33: 1000 μ m.

[Mǎ Wénzhēn]; (white, printed): IOZ(E)1638723; 2♂3♀: (white, printed and handwritten): 北京圆明园 [Běijīng Yuánmíngyuán] / 1980. VII.7 / leg. 姜胜巧 [Jiāng Shèngqiáo]; (white, printed): IOZ(E)1638724-1638728; 2♂10♀: (white, printed): 北京门头沟军庄西杨坨村 [Běijīng Méntóugōu Jūnzhuāng Xiyángtūn] / 2008. VII.27 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): 寄主: 小花扁担木 [Jìzhǔ: Xiǎohuābiǎndānmù] / *Grewia biloba* G. Don var. *parviflora* (Bunge) Hand.-Mazz; (white, printed): IOZ(E)1638729-1638740; 5♂8♀: (white, printed): 北京怀柔九渡河镇怀九河 [Běijīng Huáiróu Jiùdùhézhèn Huáijiùhé] / 2008.VI.15 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638741-1638753; 1♀: (white, printed): 北京怀柔三渡河 [Běijīng Huáiróu Sāndùhé] / 2008.V.24 / leg. 王志良 [Wáng Zhìliáng]; (white, printed) IOZ(E)1638754; 46♂24♀: (white, printed): 北京香山植物园樱桃沟 [Běijīng Xiāngshān Zhíwùyuán Yīngtáogōu] / 2008.VIII.19 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638755-1638770, IOZ(E)1638784-1638790, IOZ(E)1638804-1638850; 28♂41♀: (white, printed): 北京植物园樱桃沟 [Běijīng zhíwùyuán Yīngtáogōu] / 寄主: 小花扁担木 [Jìzhǔ: Xiǎohuābiǎndānmù] / 2008. VI.1 / Leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638851-1638900, IOZ(E)1638911, IOZ(E)1638928-1638945; 7♂7♀: (white, printed): 北京海淀百望山 [Běijīng Hǎidiàn Bǎiwàngshān] / 2009.VI.21 / leg. 杨干燕 [Yáng Gānyàn]; (white, printed): IOZ(E)1639912-1638918, IOZ(E)16398920-1638926; 2♂1♀: (white, printed and handwritten): 陕西华阴县孟塬 [Shǎnxī Huáyīn Mèngyuán] / 450m / 1972.VIII.9; (white, printed): IOZ(E)1639562-1639563, IOZ(E)1639540, deposited in IZCAS.

10♂10♀: (white, printed): 北京香山植物园樱桃沟 [Běijīng Xiāngshān Zhíwùyuán Yīngtáogōu] / 2008.VIII.19 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638781, IOZ(E)1638801, IOZ(E)1638771-1638779, IOZ(E)1638791-1638799, to be deposited in MNCN.

1♂1♀: (white, printed): 北京香山植物园樱桃沟 [Běijīng Xiāngshān Zhíwùyuán Yīngtáogōu] / 2008.VIII.19 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638780, IOZ(E)1638800, to be deposited in BBG.

1♂1♀: (white, printed): 北京香山植物园樱桃沟 [Běijīng Xiāngshān Zhíwùyuán Yīngtáogōu] / 2008.VIII.19 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638783, IOZ(E)1638803, to be deposited in ZINM.

1♂1♀: (white, printed): 北京香山植物园樱桃沟 [Běijīng Xiāngshān Zhíwùyuán Yīngtáogōu] / 2008.VIII.19 / leg. 王志良 [Wáng Zhìliáng]; (white, printed): IOZ(E)1638782, IOZ(E)1638802, to be deposited in MNHW.

The male holotype has not been dissected to avoid any damage, since there are many specimens collected with it.

Etymology. The new species is named after the first locality where it was found during a collecting visit: the Beijing Botanical Garden. It is a Latin adjective.

Distribution. The species is known for the moment only from the municipality of Beijing and the province of Shaanxi.

Biology. *P. botanicum* sp. n. was collected from *Grewia biloba* G. Don var. *parviflora* (Bunge) Hand.-Mazz (Malvaceae: Grewioideae) (Stevens 2011), which is a com-

mon shrub in Beijing and adjacent provinces, blooming from June to July (Tang et al. 1989), this being the season in which the parasite was found on the plant. The adults feed on leaves and flower buds of their host, while they mate and oviposit in the bud. The egg is located in the androecium, and then the larva feeds on the pistil and pupates there.

Discussion

During this research, we were able to study types of several of the species placed in the genera *Pseudaspidapion* and *Aspidapion* in China in the recent Palaearctic catalogue (Alonso-Zarazaga 2011) (table 1). Until now, females of *P. coelebs* and *A. vietnamense* are unknown, and the same can be said of the males of *P. kryzhanovskii* and *A. panfilovi*. We found that the holotype (and only known specimen) of *Aspidapion vietnamense*, which has been previously dissected and whose pygidium and tegmen were not conserved, shows several differences from *Aspidapion*, namely, the metatibial mucros are evidently elongate and knicked at their apices (subdentate at the outer margin), the rostrum is clearly dilated at the antennal insertion and distinctly constricted apicad, the setae on the front margin of pronotum are parallel to it, and the apex of the penis is distinctly curved in lateral view, dorsally dentate near the apex. All these characters suggest it is a *Harpapion* Voss, 1966. After a study of the type species of this genus, *Harpapion considerandum* (Fåhraeus, 1871), we consider that, even in the absence of these diagnostic parts, it can be unmistakably considered a member of this genus and consequently is here transferred: *Harpapion vietnamense* (Korotyaev), comb. n. The same can be said about *Pseudaspidapion coelebs* (Korotyaev, 1987), which show also the characters of the latter genus, and is here formally transferred as well: *Harpapion coelebs* (Korotyaev, 1987), comb. n. This genus will be the subject of a forthcoming paper.

The systematic placement of *A. inarmatum* is unclear at the moment, but it belongs neither to *Aspidapion* nor to *Pseudaspidapion* or *Harpapion*.

Aspidapion panfilovi, known from females until now, possesses several coincident characters with some *Pseudaspidapion*: its more elongate and apparently glabrous elytra, the shallow striae with interstriae about twice as broad as striae on the disc of the elytra, etc. Although it resembles the female of *P. zagulajevi* very much, we think it is better to postpone any decision on its placement until the male is discovered. This highlights the difficulty of placing in their correct genera the species of Apionidae described only from females, a practice that should be avoided, as that of designating females as name bearing types.

Previously, the genus *Pseudaspidapion* was not known to exceed the Tropic of Cancer. However, the new species *P. botanicum* reaches 40°N latitude, an area clearly belonging to the Eastern Palaearctic region (Fig. 34). Thus this genus shows a broader distributional range extending from the Afrotropical across the Oriental to the Palaearctic region. On the other hand, we identified in the collection of IZCAS several specimens of *Aspidapion validum* (Germar, 1817), from Altay prefecture in northern Xinjiang

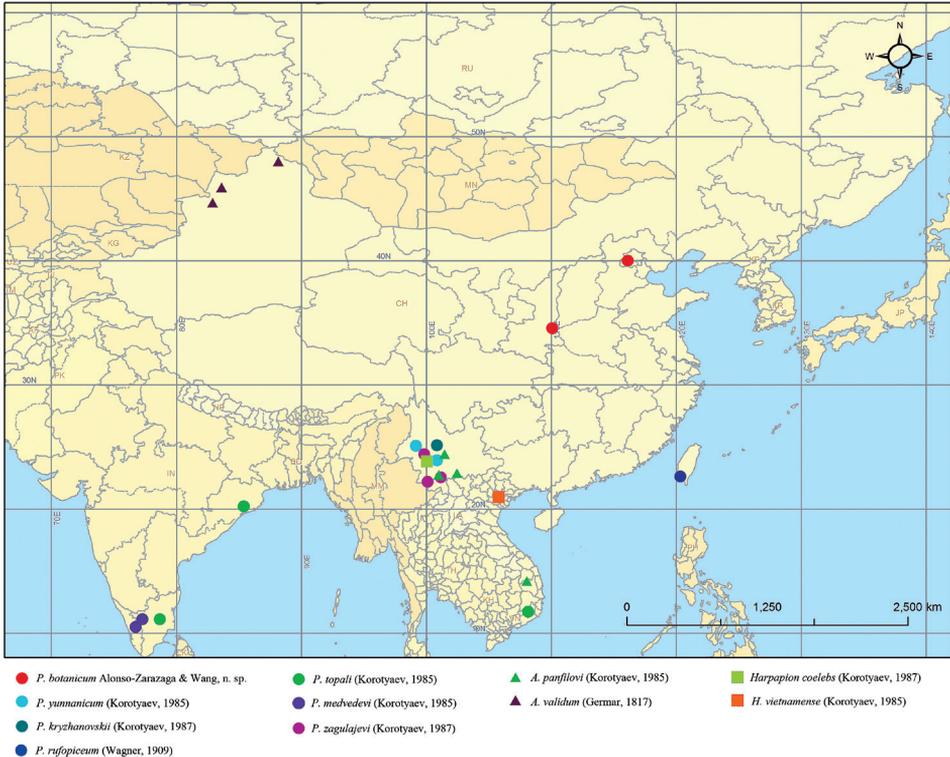


Figure 34. Distribution of the species of *Pseudaspidapion*, *Harpation* and *Aspidapion* mentioned in the text.

(China). Apart from the species *Aspidapion panfilovi*, whose placement may need a revision as mentioned above, these specimens represent the easternmost distribution record of the otherwise Western Palearctic genus *Aspidapion*. Therefore, the distribution pattern of *Pseudaspidapion* is mainly Palearctic but has expanded to Philippines (Wanat 1990) and to North China while *Aspidapion* is distributed in the Palearctic region but has also expanded to northeast tropical Africa (Eritrea, Ethiopia). The two genera can still be distinctly separated from each other. Also, we suppose that the blank distributional area of *Pseudaspidapion* between Shaanxi and South China represents a lack of collection records rather than an actual distributional range limit, because the vegetation between these two points includes most of the range of *G. biloba* (which includes also Korea) and many other congeneric species of the host genus.

Some of these species are described only from one sex, which makes it difficult to key all of the Chinese species. However, we have tried to provide a key to the known Chinese species (see below). Consequently, more field work is needed to gather specimens of both sexes, and complete our knowledge. We have not studied specimens of *P. rufopiceum* (Wagner, 1909), a related species, which is included below from the data in its original description.

Key to the Chinese species of *Pseudaspidapion*

This key includes also *Aspidapion panfilovi* Korotyaev, 1985 (only known from female), which seems to be related to these species. Body length excludes rostrum.

- 1 Meso- and metatibiae mucronate. (males).....**2**
- Meso- and metatibiae unarmed. (females).....**4**
- 2 Body length 3.1–3.6 mm. Elytral interstitial scales minute, shorter than 1/3 width of interstria, subtransparent, elytra appearing glabrous...***P. zagulajevi***
- Body length 1.3–2.2 mm. Elytral interstitial scales larger, longer than 2/3 of the interstitial width, white or dark brown, elytra appearing pubescent.....**3**
- 3 Body length in general smaller: 1.3–1.6 mm. Body dark reddish-brown, appendages light reddish-brown. Pedicel little longer than wide...***P. rufopiceum***
- Body length in general larger: 1.5–2.2 mm. Body and appendages dark brown to piceous black. Pedicel at least 2 × as long as wide.....
.....***P. yunnanicum* / *P. botanicum* sp. n.** (see Table 2 for separation)
- 4 Body length more than 3.7 mm. Rostrum ca. 2.5 × as long as pronotum. Elytra short, rounded, in side view strongly convex. Scutellum large, base about as wide as interocular distance, triangular, sides straight; in side view completely prominent above elytral outline ***P. kryzhanovskii***
- Body length less than 3.7 mm. Elytra oblong-elliptical, in side view moderately convex. Scutellum small, base at most 2/3 as wide as interocular distance, sides concave, forming a basal subpentagonal area prolonged apically in a shaft; in side view, at most some of the tubercles prominent above elytral outline **5**
- 5 Body length more than 2.5 mm. Elytral interstitial scales minute, shorter than 1/3 width of interstria, subtransparent, elytra appearing glabrous.....**6**
- Body length less than 2.5 mm. Elytral interstitial scales larger, longer than 2/3 width of interstria, white or dark brown, elytra appearing pubescent **3**
- 6 Rostrum ca. 1.8 × as long as pronotum, robust, mesorostrum wider than interocular distance. Basal tubercles of scutellum large, acutely prominent in side view. Body length: 3.1–3.6 mm***P. zagulajevi***
- Rostrum ca. 2.0 × as long as pronotum, fine, mesorostrum at most as wide as interocular distance. Basal tubercles of scutellum small, hardly visible in side view. Body length: 2.7 mm ***A. panfilovi***

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Review of the stiletto fly genus *Actenomeros* Winterton & Irwin (Diptera, Therevidae, Agapophytinae)

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Abstract

The endemic Australian genus *Actenomeros* Winterton & Irwin, 1999b is reviewed. Three species are transferred from *Nanexila* Winterton & Irwin, 1999a: *A. aureilineata* (Winterton & Irwin, 1999a) **comb. n.**, *A. intermedia* (Winterton & Irwin, 1999a) **comb. n.** and *A. paradoxa* (Winterton & Irwin, 1999a) **comb. n.** A new species (*A. budawang* **sp. n.**) is described and figured from New South Wales. A key to species is presented.

Keywords

Asiloidea, Therevidae, Australia.

Introduction

The completely endemic Australasian stiletto fly (Diptera: Therevidae) fauna is composed of 370 described species in 26 genera, exclusively placed in two subfamilies, Agapophytinae and Therevinae (Winterton 2009, 2011). A key to genera of the region can be found in Winterton (2011). *Actenomeros* Winterton & Irwin, 1999b is a small genus of two described species endemic to eastern Australia, previously classified in the

poorly defined *Taenogera* genus-group (Winterton et al. 1999b), but now classified in Agapophytinae (Winterton 2006, 2011). Placement of the genus based on morphological characters is problematic with analyses indicating either a close relationship with *Taenogerella* Winterton & Irwin (Winterton et al. 1999b) or a clade comprising *Taenogera* Kröber, 1912, *Johnmannia* Irwin & Lyneborg, 1989 and *Eupsilocephala* Kröber, 1912 (Lambkin et al. 2005). Morphological similarities between *Actenomerus* and *Nanexila* Winterton & Irwin, 1999a include the presence of subapical anteroventral setae on the hind femur, antennae with a short, cylindrical scape and conical flagellum, flattened frons, wing cell m_3 open, and lack of velutum patches on the femora and gonocoxites. Winterton et al. (1999a) erected the genus *Nanexila* with three species groups. One of these species groups (i.e. *Nanexila atricostalis* species group) was considered very different from the other members of the genus, but the lack of males for most species precluded the erection of a separate genus. It was noted though in Winterton et al. (1999b) that females of this species group (specifically *N. paradoxa* Winterton & Irwin, 1999a) were similar to *Actenomerus*. Males are now known for *N. paradoxa* and have the key taxonomic features of *Actenomerus*. The generic concept of *Actenomerus* is revised slightly in light of this; synapomorphies for the genus include multiple rows of postocular macrosetae in both sexes, and greatly reduced or absent articulated gonocoxal processes in the male (Winterton et al. 1999b). The gonocoxite has a large horn-like process in the males of the two previously described species of *Actenomerus* but are absent in the new species described herein (*Actenomerus budwang* sp. n.) and three species transferred to *Actenomerus* from *Nanexila* [i.e. *A. aureilineata* (Winterton & Irwin, 1999a) comb. n., *A. intermedia* (Winterton & Irwin, 1999a) comb. n. and *A. paradoxa* (Winterton & Irwin, 1999a) comb. n.]; this character is no longer considered synapomorphic for the genus. The discovery of this new species described herein from New South Wales increases the number of species in *Actenomerus* to six.

Material and methods

Adult morphological terminology follows McAlpine (1981) as modified by Winterton et al. (1999a) and Winterton (2006). Genitalia were macerated in 10% KOH at room temperature for one day to remove soft tissue, then rinsed in distilled water and dilute acetic acid, and dissected in 80% ethanol. Preparations were then placed into glycerine, with images made with the aid of a digital camera mounted on a stereomicroscope. Specimen images at different focal points were taken using a digital camera and subsequently combined into a serial montage image using Helicon Focus (©HeliconSoft). Genitalia preparations were placed in glycerine in a genitalia vial mounted on the pin beneath the specimen.

The following collection acronyms are cited in the text:

CAS California Academy of Sciences, San Francisco, California, USA

ANIC	Australian National Insect Collection (Canberra)
ASCU	New South Wales Dept of Agriculture, Orange Agricultural Institute, Agricultural Scientific Collections Unit

Taxonomy

Actenomeros Winterton & Irwin, 1999b

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

Type species: *Actenomeros corniculaticaudus* Winterton & Irwin, 1999b: 280.

Diagnosis. Head sub-spherical; frons grey to gold pubescent; minute, dark setae sometimes present; frons flat to rounded, width sexually dimorphic, male frons narrower, but eyes not contiguous; occiput concave; two-three poorly defined rows of postocular macrosetae, rarely a single row in female; antenna length shorter than head; scape and pedicel short cylindrical, with strong dark setae; flagellum conical, compressed laterally, style terminal; sternopleuron glabrous medially; legs pale yellow, tarsi darkened distally; mid coxa without setae on posterior surface; hind femur with dark, anteroventral setae sub-apically; fore and hind femora without velutum patches; scutal chaetotaxy: np, 3–4; sa, 2; pa, 1; dc, 2–4; sc, 1; wing cell m_3 open; abdomen black, male often with extensive abdominal velutum, female often with triangular patches of velutum laterally on segments; male genitalia without velutum patches on ventral surface of gonocoxites; gonocoxite with outer process present, often long, upward directed and horn-like; articulated gonocoxal process greatly reduced or absent; ventral lobe of gonocoxite sometimes greatly enlarged; hypandrium triangular, glabrous, fused to gonocoxites laterally; gonocoxal apodeme relatively short; distiphallus narrow, straight; dorsal apodeme of parameral sheath “T”-shaped; ejaculatory apodemes relatively small, narrow; ventral apodeme forked; female genitalia with A1 and A2 acanthophorite spines well developed; tergite 8 with narrow process on anterior margin; furca sclerotized in a narrow ring; three spherical spermathecae; spermathecal sac shape trilobate, spermathecal duct arrangement paired, one spermathecal duct joining to each spermathecal sac duct or rarely alternating along common spermathecal sac duct (*A. intermedia*).

Comments. Winterton et al. (1999b) noted that this genus superficially resembles *Nanexila* but is differentiated by 2–3 rows of postocular setae and male genitalic features such as a reduced or absent articulated gonocoxal process and sometimes a large horn-shaped outer process on the gonocoxite. The remaining species in the *Nanexila atricostalis* species-group (i.e. *N. atricostalis* Winterton & Irwin and *N. jimrodmani* Winterton) retained in *Nanexila* have a well-formed articulated gonocoxal process and can be distinguished from *Actenomeros* species using the key to Australasian genera in Winterton (2011). The horn-like process on the gonocoxites is only present in *A. corniculaticaudus* and *A. onyx*. Males are unknown for *A. aureilineata* comb. n. and *A. intermedia* comb. n.; females of these two species are described by Winterton et al. (1999b).

Included species. *Actenomeros aureilineata* (Winterton & Irwin) comb. n., *A. budawang* sp. n., *A. corniculaticaudus* Winterton & Irwin, *A. intermedia* (Winterton & Irwin) comb. n., *A. onyx* Winterton & Irwin and *A. paradoxa* (Winterton & Irwin) comb. n.

Key to *Actenomeros* species

- 1 Wing with costal area dark infuscate; scutal pubescence brown with gold medial stripe ***A. aureilineata* (Winterton & Irwin) comb. n.**
- Wing hyaline or at most, uniformly smoky infuscate **2**
- 2 Postocular macrosetae with anterior row black, posterior row yellowish; single pair of supra-alar macrosetae; three notopleural macrosetae ***A. intermedia* (Winterton & Irwin) comb. n.**
- Postocular macrosetae black; two pairs of supra-alar macrosetae; four or more notopleural macrosetae **3**
- 3 Gonocoxite without enlarged, ‘horn’-like process; articulated gonocoxal process absent **4**
- Gonocoxite with greatly enlarged, ‘horn’-like process posterolaterally; articulated gonocoxal process present, greatly reduced **5**
- 4 Setae along costal margin short, length approximately equal to width of costal vein; posterior margin of scutellum with yellow margin (sometimes faint); male terminalia yellow with brown medially; ventral lobe of gonocoxite elongate, rounded (Fig. 5 F-G) ***A. paradoxa* (Winterton & Irwin) comb. n.**
- Setae along costal margin elongate, length approximately twice width of costal vein; scutellum uniform grey pubescent; male terminalia brown-black; ventral lobe of gonocoxite shorter, anvil shaped (Fig. 5 B-C) ***A. budawang* sp. n.**
- 5 Male gonostylus with two narrow, ventrally directed processes, one basal and the other distal ***A. corniculaticaudus* Winterton & Irwin**
- Male gonostylus with single, ventrally directed process near apex ***A. onyx* Winterton & Irwin**

Actenomeros budawang sp. n.

urn:lsid:zoobank.org:act:E80EF2AB-394D-44C6-B70C-32DAAF665FE5

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

Figs 1–4, 5A–E, H

Type material. Holotype male, AUSTRALIA: **New South Wales:** Budawang National Park, ca. 5km on Western Distributor Road, 250m asl, MV lamp & UV fit, [-35.334, 150.034], 22.ix.2004, A. Zwick (ANIC).

Paratypes. AUSTRALIA: **New South Wales:** female, same data as holotype (CAS); male, 2 km W Thirlmere Lakes National Park, 25.ix.1988, G.R. Brown, M.A.Terras



Figure 1. *Actenomeros budawang* sp. n. Male habitus, lateral. Body length = 8.5 mm.

[-34.228, 150.536] (ASCU); 4 males, Warrumbungle National Park, Wambelong Creek, [-31.323, 149.027], 21.i–9.ii.2009, Malaise trap across creek, S.L. Winterton (CAS).

Diagnosis. Setae along costal margin elongate, length approximately twice width of costal vein; scutum uniform grey pubescent; articulated gonocoxal process completely absent; process on gonocoxite straight, elongate, not horn-like; ventral lobe of gonocoxite relatively short, anvil shaped, female with two rows of dark postocular macrosetae.

Description. Body length: 8.0–9.5 mm [male]; 10.0 mm [female]. *Head:* Frons gold pubescent, short dark setae present in female, male frons narrower than anterior ocellus and narrowest point; occiput grey pubescent, postocular ridge with 2–3 poorly defined rows of black setae in both sexes; gena grey pubescent, admixed with fine dark setae; parafacial grey pubescent, without setae; mouthparts pale orange; scape and pedicel yellow, combined length approximately equal to flagellum length, numerous strong, dark setae present except on medial surface (Fig. 5H); flagellum with 3 segments, yellow with dark suffusion dorsally and distally, without dark setae on basal flagellomere; style dark. *Thorax:* Scutum and scutellum grey pubescent with three irregular brown pubescent stripes, numerous fine dark setae scattered over surface, longer in male; pleuron and coxae grey pubescent; fine pale setae sparsely scattered over proepisternum, anepisternum, katepisternum, pteropleural callus and coxae; strong dark macrosetae on anterior surface of coxa; legs pale yellow, trochanters brown, tarsi darkened distally; halter dark yellow to brown;



Figure 2. *Actenomerus budawang* sp. n. Male habitus, oblique view. Body length = 8.5 mm.



Figure 3. *Actenomerus budawang* sp. n. Female habitus, lateral. Body length = 10.0 mm.



Figure 4. *Actenomeros budawang* sp. n. Female habitus, oblique view. Body length = 10.0 mm.

wing uniformly smoky infuscate, venation dark; setae along costal margin elongate, length approximately twice width of costal vein. Scutal chaetotaxy: np, 4–5; sa, 2 (rarely 3); pa, 1; dc, 3–5; sc, 1 (rarely 2). *Abdomen*: Abdomen glossy brown-black, male with extensive silver velutum on segments 1–7, reduced to posterior margins of tergites 2–6 in female; numerous fine, white setae on all segments, shorter in female; terminalia brown with black setae. *Male Genitalia* (Fig 5A–E): Epandrium elongate, sub-quadrangular, narrowed posteriorly, numerous strong, dark setae laterally; posterior margin of tergite 8 medially emarginate, posteriorly directed setae on posterolateral corners; hypandrium triangular, relatively small, fused to gonocoxites laterally; gonocoxite with strong dark setae over outer surface; ventral lobe dark sclerotized with ventral directed process apically; gonocoxal apodeme relatively short; posteriorly directed process of gonocoxite straight, narrowed apically; articulated gonocoxal process completely absent; gonostylus well developed with strong spinose processes laterally and dorsally, setae along lateral surface; distiphallus straight, ridged like dorsally; dorsal apodeme broadly T-shaped; minute spines on distiphallus and dorsal apodeme; lateral ejaculatory apodeme relatively small, narrow. Female genitalia: tergite 8 with narrow process on anterior margin; furca sclerotized in a narrow ring, spermathecal sac shape trilobate as in figure 5I,

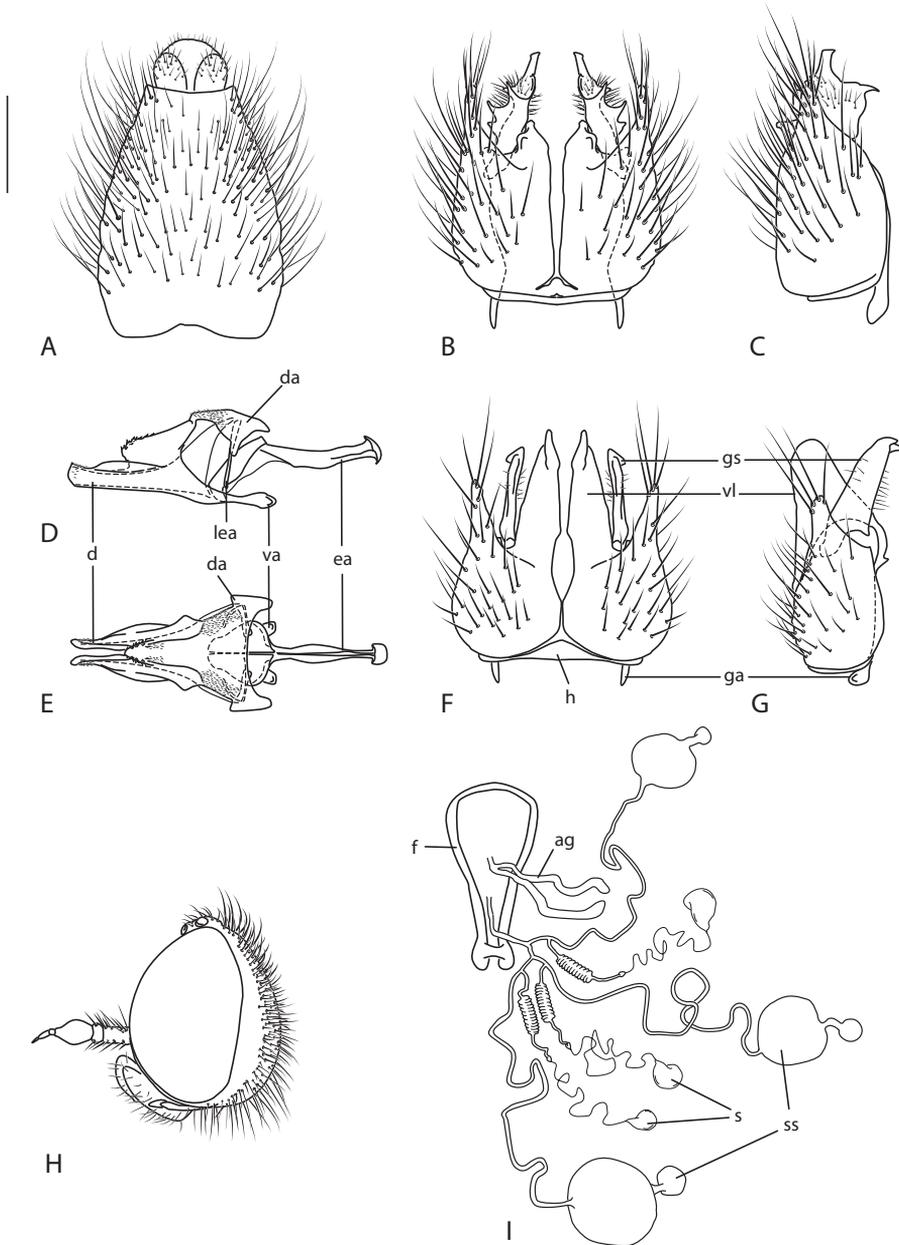


Figure 5. *Actenomerus* spp. *Actenomerus budawang* sp. n.: male genitalia: **A** epandrium, dorsal view **B** gonocoxites, ventral view **C** gonocoxite, lateral view **D** aedeagus, lateral view **E** aedeagus dorsal view. *Actenomerus paradoxa* (Winterton & Irwin) comb. n.: male genitalia: **F** gonocoxites, ventral view **G** gonocoxite, lateral view **H** *Actenomerus budawang* sp. n.: male head, lateral view. *Actenomerus paradoxa* (Winterton & Irwin) comb. n.: female internal genitalia, dorsal view. Abbreviations: *ag*, accessory gland; *c*, cercus; *d*, distiphallus; *da*, dorsal apodeme of parameral sheath; *ea*, ejaculatory apodeme; *f*, furca; *ga*, gonocoxal apodeme; *gs*, gonostylus; *h*, hypandrium; *lea*, lateral ejaculatory apodeme; *s*, spermatheca; *ss*, spermathecal sac; *va*, ventral apodeme of parameral sheath; *vl*, ventral lobe. Scale line = 0.2 mm.

spermathecal duct arrangement paired, one spermathecal duct joining to each spermathecal sac duct.

Etymology. This species is named after the type locality, Budawang National Park, in central-southern New South Wales.

Comments. *Actenomeros budawang* sp. n. is similar in appearance to *A. paradoxa* comb. n., suggesting a likely close relationship. The former can be distinguished by the greatly enlarged ventral lobe, lack of 'horn'-like gonocoxal process and complete absence of the articulated gonocoxal process. The scutal chaetotaxy is variable in this species *A. budawang* sp. n.

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