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Aphid parasitoids (Braconidae, Aphidiinae) of Vietnam: new records and description of 12 new species

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Abstract. Based on a collection made during the period 1999–2009, we record 27 aphid parasitoid species from Vietnam, of which 12 are new to the Vietnamese fauna (*Aphidius autriquei* Starý, 1985; *Aphidius ervi* Haliday, 1834; *Aphidius urticae* Haliday, 1834; *Binodoxys basicurvus* Shujauddin, 1973; *Binodoxys centaureae* (Haliday, 1833); *Binodoxys communis* (Gahan, 1926); *Binodoxys greenideae* Starý & van Harten, 1983; *Binodoxys rubicola* Shujauddin, 1973; *Binodoxys shillongensis* Starý, 1978; *Ephedrus nacheri* Quilis, 1934; *Ephedrus plagiator* (Nees, 1811); and *Ephedrus trichosiphoniellae* Takada, 1968), three species were previously recorded (*Lysiphlebia mirzai* Shujauddin, 1975, *Lipolexis oregmae* (Gahan, 1932), and *Aphidius rapae* (McIntosh, 1855)) and 12 species are new to science described by Tomanović & van Achterberg (*Aphidius brevis* sp. nov., *Aphidius tonkinensis* sp. nov., *Binodoxys longipetiolatus* sp. nov., *Cristicaudus ninhbinhensis* sp. nov., *Ephedrus brevistigmus* sp. nov., *Ephedrus vietnamensis* sp. nov., *Lipolexis hirsutus* sp. nov., *Praon tonkinensis* sp. nov., *Toxares brevistigmus* sp. nov., *Toxares flavus* sp. nov., *Trioxys breviflagellaris* sp. nov., and *Trioxys glabrirostris* sp. nov.). We diagnose the newly described species, discuss their relationships with known congeners, and examine the diagnostic morphological characters used. All recorded aphid parasitoid species represent a natural resource, and some are already used as biocontrol agents (*Aphidius ervi* Haliday, 1834; *Aphidius rapae* (McIntosh, 1855); *Aphidius urticae* Haliday, 1834; *Binodoxys communis* (Gahan, 1926); *Ephedrus plagiator* (Nees, 1811); and *Lipolexis oregmae* (Gahan, 1932)).

Keywords. Vietnam, aphid parasitoids, new species, new records, taxonomy.

Tomanović Ž., Lazarević M., Žikić V., Long K.D. & van Achterberg C. 2026. Aphid parasitoids (Braconidae, Aphidiinae) of Vietnam: new records and description of 12 new species. *European Journal of Taxonomy* 1117: 1–44. https://doi.org/10.5852/ejt.2026.1117.3351

Introduction

Knowledge of aphid parasitoids in Vietnam is very limited. Starý & Zelený (1983) recorded only two species – *Lipolexis scutellaris* Mackauer, 1962 (= *Lipolexis oregmae* (Gahan, 1932)) and *Lysiphlebia mirzai* Shujauddin, 1975. Long & van Achterberg (2014) reported five species (*Aphidius colemani* Viereck, 1912, *A. rosae* Haliday, 1833, *Binodoxys brevicornis* (Haliday, 1833), *Aphidius* (= *Diaeretiella*) *rapae* (McIntosh, 1855) (Popović *et al.* 2025), and *Lysiphlebia japonica* Ashmead, 1906). However, several studies have documented a much richer aphidiine fauna in Southeast Asia. Starý *et al.* (2008, 2010a, 2010b) and Martens *et al.* (2021) reported 15 aphidiine species and several unidentified species

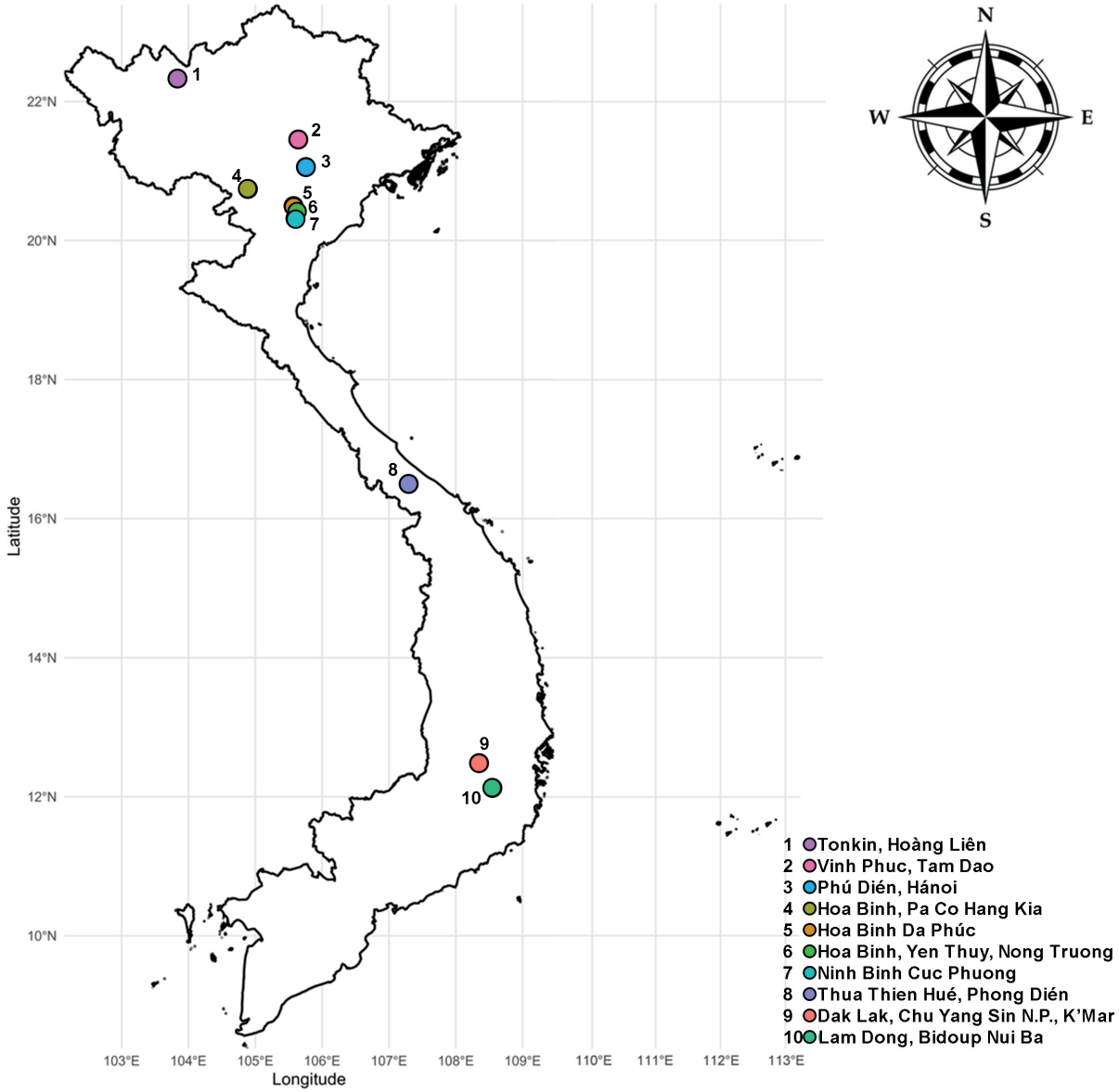


Fig. 1. Map of Vietnam with sampling localities.

from the genera *Aphidius* Nees, 1819, *Binodoxys* Mackauer, 1960, *Pauesia* Quilis, 1931, and *Praon* Haliday, 1833 in Thailand. Lomerio & Calilung (2008) reported two species in the Philippines: *Aphidius absinthii* Marshall, 1896 and *Binodoxys communis* (Gahan, 1926). Yu *et al.* (2016) reported *L. oregmae*. Although Lomerio & Calilung (2008) stated that "eleven species were collected from 19 host aphid species…" in the Philippines, they did not provide the names of these species. Two species – *L. oregmae* and *B. communis* were recorded in Malaysia (Ng & Starý 1986). Additionally, numerous studies have addressed the aphidiine fauna of India (e.g., Das & Chakrabarti 2023; Akhtar *et al.* 2011) and China (e.g., Chen & Shi 2001). Given the rich flora and diversity of habitats in Vietnam and Southeast Asia, a much more diverse aphid parasitoid fauna can be expected.

Material and methods

During the period 1999–2009, 154 aphid parasitoid specimens were sampled from ten localities in Vietnam (Fig. 1). Specimens were collected using Malaise traps or sweep nets. A total of 35 Malaise traps were set. The numbers and ranges of Malaise traps used are listed below.

All material was preserved as pinned specimens, and external morphology was examined using a ZEISS Discovery V8 and Leica M165 stereo microscopes. During the identification process, selected specimens were photographed using a Leica Flexicam C3 on a Leica M165 stereo microscope, then dissected and slide-mounted in Berlese medium, and examined using a Leica DFC490 on a Leica DM2500 microscope (Leica Microsystems GmbH, Wetzlar, Germany). Photographs of the important structures used for the descriptions of the new species were stacked using Helicon Focus software (ver. 7.6.1). We follow Sharkey & Wharton (1997) for morphological terminology. The abbreviations for geographic position (E = East, W = West, N = North, S = South, NE = Northeastern, NW = Northwestern, SE = Southeastern, SW = Southwestern, C = Central) following Vietnam indicate the cardinal and intercardinal directions. Holotypes, paratypes, and other examined material are deposited at Naturalis Biodiversity Center, Leiden (RMNH) (formerly National Museum of Natural History of the Netherlands).

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Family Braconidae Nees, 1811
Subfamily Aphidiinae Haliday, 1833
Genus *Aphidius* Nees, 1819

Aphidius autriquei Starý, 1985
Fig. 2

Aphidius autriquei Starý, 1985 in Starý *et al.* 1985: 21, 133–140, figs 1–9.

Material examined

VIETNAM • 3 ♀♀, 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♂; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH.

Remarks

Aphidius autriquei was described from Burundi (Starý *et al.* 1985). Specimens were reared from mixed colonies of *Rhopalosiphum padi* (Linnaeus, 1758) and *R. maidis* Fitch, 1856 from corn, and probably from a sample with *Aulacorthum solani* (Kaltenbach, 1843) (Starý *et al.* 1985). The authors presumed a

pantropical distribution for *A. autriquei*. This species is easily distinguished from congeners by the yellow colouration of the last two flagellar segments, along with the first one, in females (Fig. 2A–B). Males are slightly darker, with a yellow tip on the last flagellar segment or the last two flagellar segments. Our specimens have the same colour pattern on the antennae but show a more variable forewing venation pattern (e.g., the R1 metacarpal vein is equal to or clearly shorter than the pterostigma (Fig. 2E), while in the original description the R1 metacarpal vein is "somewhat longer than pterostigma"). In the examined material, the pterostigma is about 5.0 times as long as wide (Fig. 2E), while in the original description, the pterostigma is more elongate, about 6.0 times as long as wide. Cryptic speciation within *A. autriquei* is possible, but more material from interjacent areas is needed for further taxonomic research.

First record for Vietnam.

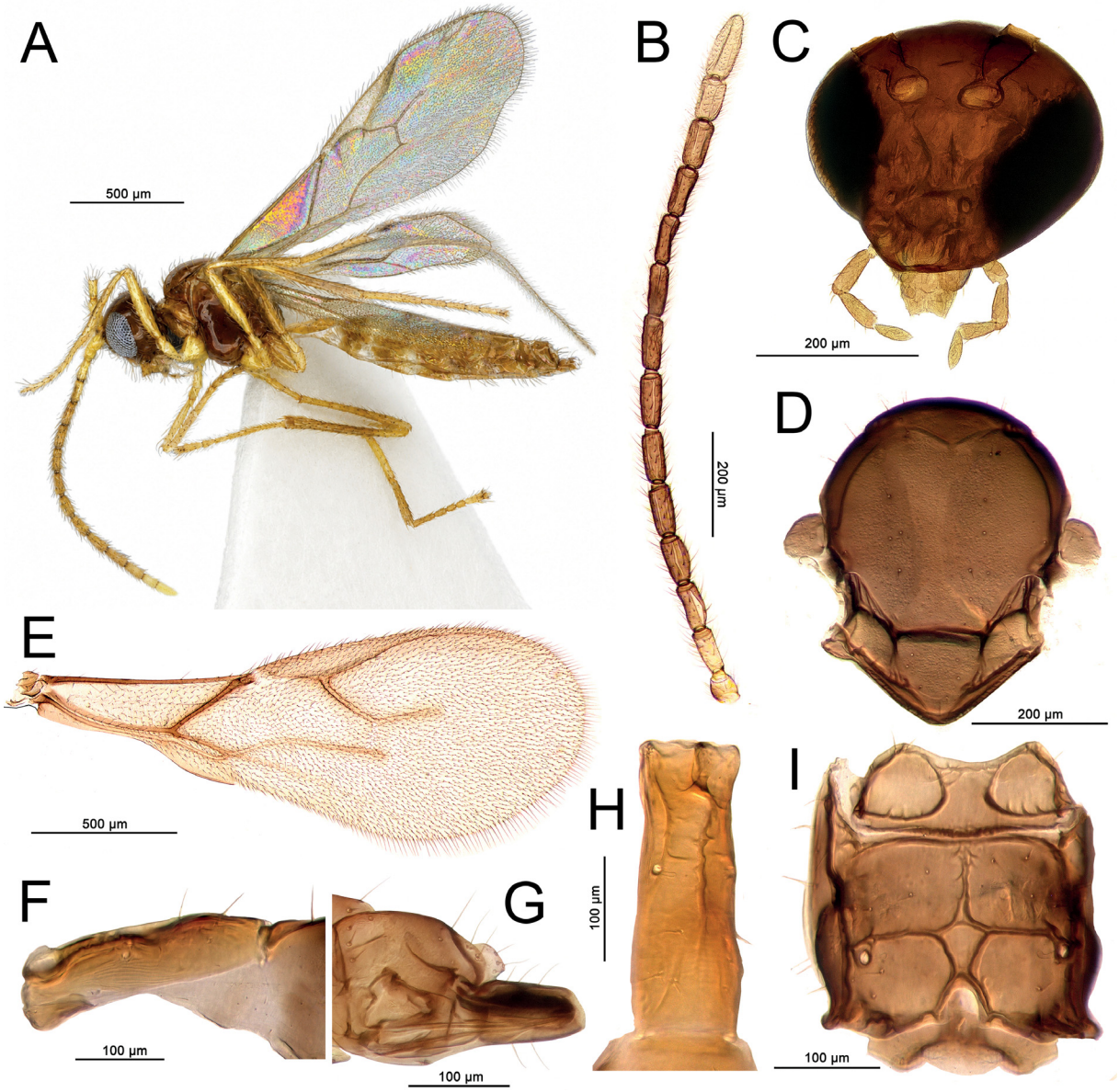


Fig. 2. *Aphidius autriquei* Starý, 1985, ♀ from Tonkin, Hoàng Liên N.R. (RMNH). **A**. Habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. First metasomal tergite, lateral view. **G**. Ovipositor sheath, lateral view. **H**. First metasomal tergite, dorsal view. **I**. Propodeum, dorsal view.

Aphidius brevis Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:92DDD55A-122C-420B-A59E-2F86E6200C24
Fig. 3

Diagnosis

Based on the following combination of characters: thickened antennae with 15 antennomeres, short flagellomere 1 (F1 length/width ratio about 2.90) (Fig. 3B), four maxillary and two labial palpomeres (Fig. 3F), distinguish this species from all its congeners. Based on the number of antennomeres, the short F1, and the pattern of maxillary and labial palpomeres, it is morphologically similar to *Aphidius*

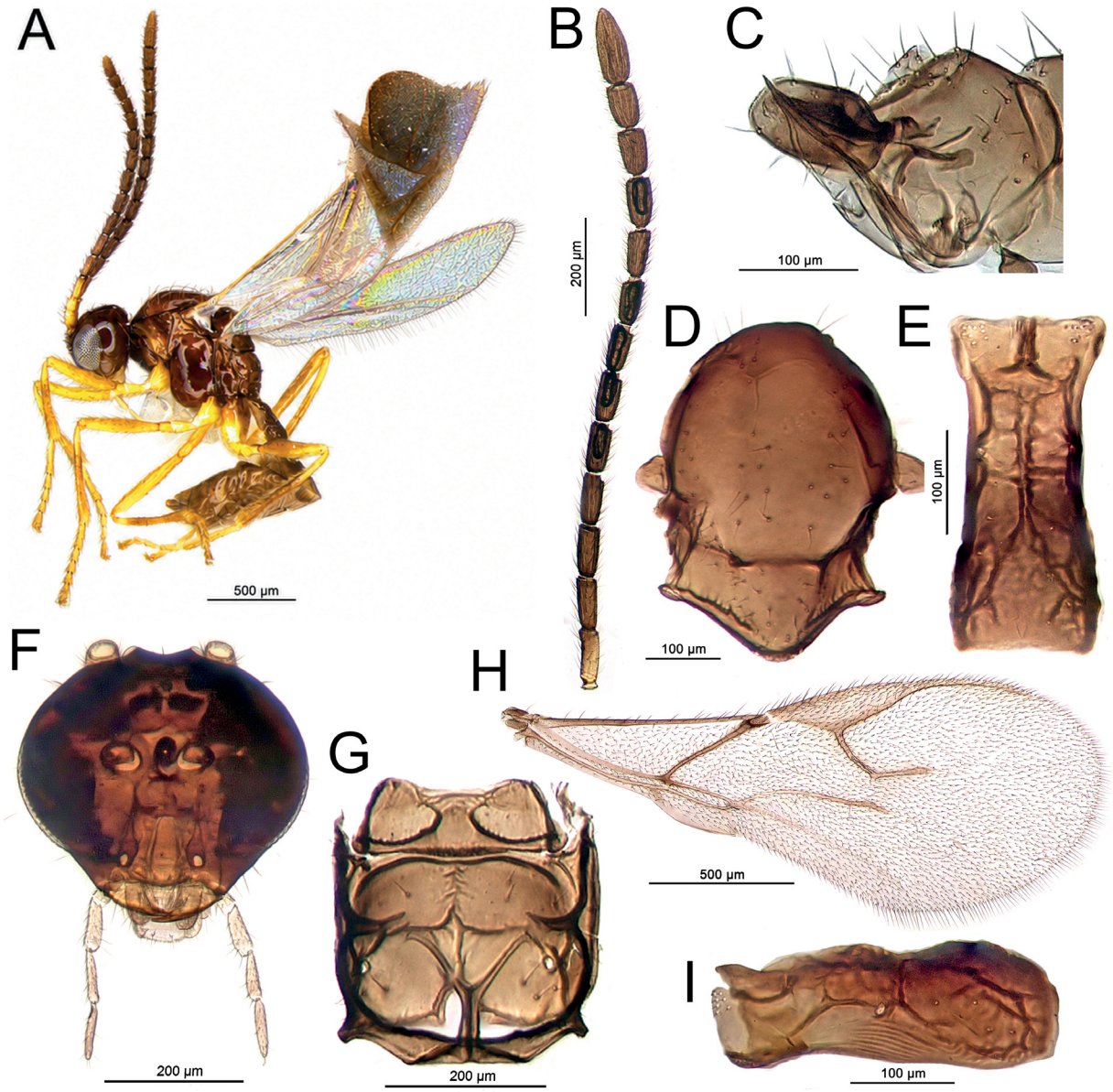


Fig. 3. *Aphidius brevis* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna, **C**. Ovipositor sheath, lateral view. **D**. Mesoscutum, dorsal view. **E**. First metasomal tergite, dorsal view. **F**. Head, frontal view. **G**. Propodeum, dorsal view. **H**. Fore wing. **I**. First metasomal tergite, lateral view.

eglanteriae Haliday, 1834 and *A. hortensis* Marshall, 1896. However, it is easily distinguished from these species by its thickened antennae, compared to the more flagellate antennae of *A. eglanteriae* and *A. hortensis*, as well as by its more elongate first metasomal tergite (= petiole), which is about 3.0 times as long as wide at the level of the spiracles, whereas the first metasomal tergite of *A. eglanteriae* and *A. hortensis* are stouter, being 2.5–2.8 times as long as wide.

Etymology

The name of the new species is derived from its short antennae.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 1.8 mm.

Colouration (Fig. 3A). Pedicel, scape, and F1 yellow to light brown. Mouthparts yellow; remaining parts of head brown. Pronotum light brown to brown; remaining parts of mesosoma brown. Legs yellow. Metasoma yellow to light brown. Ovipositor sheath light brown.

Head (Fig. 3F) rounded. Face setose. Tentorial index (tentoriocular line/intertentorial line) 0.41. Malar space 0.2 times as long as longitudinal diameter of eye. Mandible bidentate, covered with long setae. Clypeus with 10 long setae. Maxillary palp with four palpomeres; labial palp with two palpomeres (Fig. 3F). Antenna thickened at the apex, with 15 antennomeres (Fig. 3B) and dense setae longer than half the flagellomere diameter. Flagellomere 1 (F1) as long as F2 (Fig. 3B). Length/width ratio of F1 about 2.9; F2 approximately 2.7. F1 without, F2 with three longitudinal placodes.

Mesosoma. Mesoscutum (Fig. 3D) with notaulices only in the short ascending part of its anterolateral area, outlined by two rows of long, dense setae mediolaterally, extending almost to the scutellum. Scutellum densely setose laterally. Propodeum areolate, with seven setae on upper areoles and three setae on lower areoles (Fig. 3G). Central areola narrow.

Wings. Pterostigma about 3.7 times as long as wide, clearly longer than the R1 metacarpal vein, with the ratio between the length of the pterostigma and R1 metacarpal vein about 1.3 (Fig. 3H).

Metasoma. First metasomal tergite about 3.0 times as long as wide at spiracle level (Fig. 3E), with 14 costulae at the anterolateral area (Fig. 3I). First metasomal tergite rugose dorsally, with prominent central carinae diverging in posterior half (Fig. 3E). Ovipositor sheath stout with sub-parallel sides and straight on dorsal side in lateral view (Fig. 3C).

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Aphidius ervi Haliday, 1834

Aphidius (*Aphidius*) *ervi* Haliday, 1834: 100.
Bracon infirmus Nees, 1811: 28–29.
Aphidius ulmi Marshall, 1896: 576–577.
Aphidius medicaginis Marshall, 1898: 249–250.
Aphidius fumipennis Györfi, 1958: 133.
Aphidius nigrescens Mackauer, 1962a: 642–643.
Aphidius caraganae Starý, 1963: 603–604.
Aphidius mirotarsi Starý, 1963: 605–607.

Material examined

VIETNAM • 1 ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH.

Remarks

This specimen has a 16-segmented antenna and a moderately rugose anterolateral area of the first metasomal tergite, which is very variable within known *A. ervi* populations. *Aphidius ervi* has a cosmopolitan distribution, with (17)18–19(20)-segmented antennae and a usually clearly rugose anterolateral area of the first metasomal tergite (Starý 1973; Tomanović *et al.* 2023).

First record for Vietnam.

Aphidius rapae McIntosh, 1855

Aphidius rapae McIntosh, 1855: 194.

Diaeretiella rapae (McIntosh, 1855) – Starý *et al.* 1977: 169 (Réunion). — Quilici *et al.* 1988: 114 (tab. 3: biol., Réunion).
Aphidius (=*Diaeretiella*) *rapae* (McIntosh, 1855) – Popović *et al.* 2025: 736.

Material examined

VIETNAM • 15 ♀♀, 14 ♂♂; Phú Dién, Hánoi; 16 Jan. 2002; Bi Cai Kahn leg.; RMNH • 1 ♀; NW, Hoa Binh, Da Phúc; 15 Oct. 2002; Mai Phu Quy leg.; Malaise trap; RMNH • 1 ♀, 2 ♂♂; NW, Hoa Binh, Yen Thuy, Nong Truong; 28 Aug. 2003; Mai Phu Quy leg.; Malaise trap; RMNH.

Aphidius tonkinensis Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:8A47513D-C530-43F7-A2DD-E0EEB030B74D
Fig. 4

Diagnosis

Based on the following combination of characters: 16–17 antennomeres, four maxillary and two labial palpomeres, prominent and well-developed notaulices, and a narrow pterostigma (4.35–4.70 times as long as wide) equal in length to the R1 metacarpal vein, this species can be distinguished from all its congeners.

Etymology

The name of the new species is derived from the Tonkin area, where specimens were collected.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Paratypes

VIETNAM • 2 ♀♀, 2 ♂♂; NW Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa, 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; paratype females slide-mounted, paratype males dry mounted; RMNH.

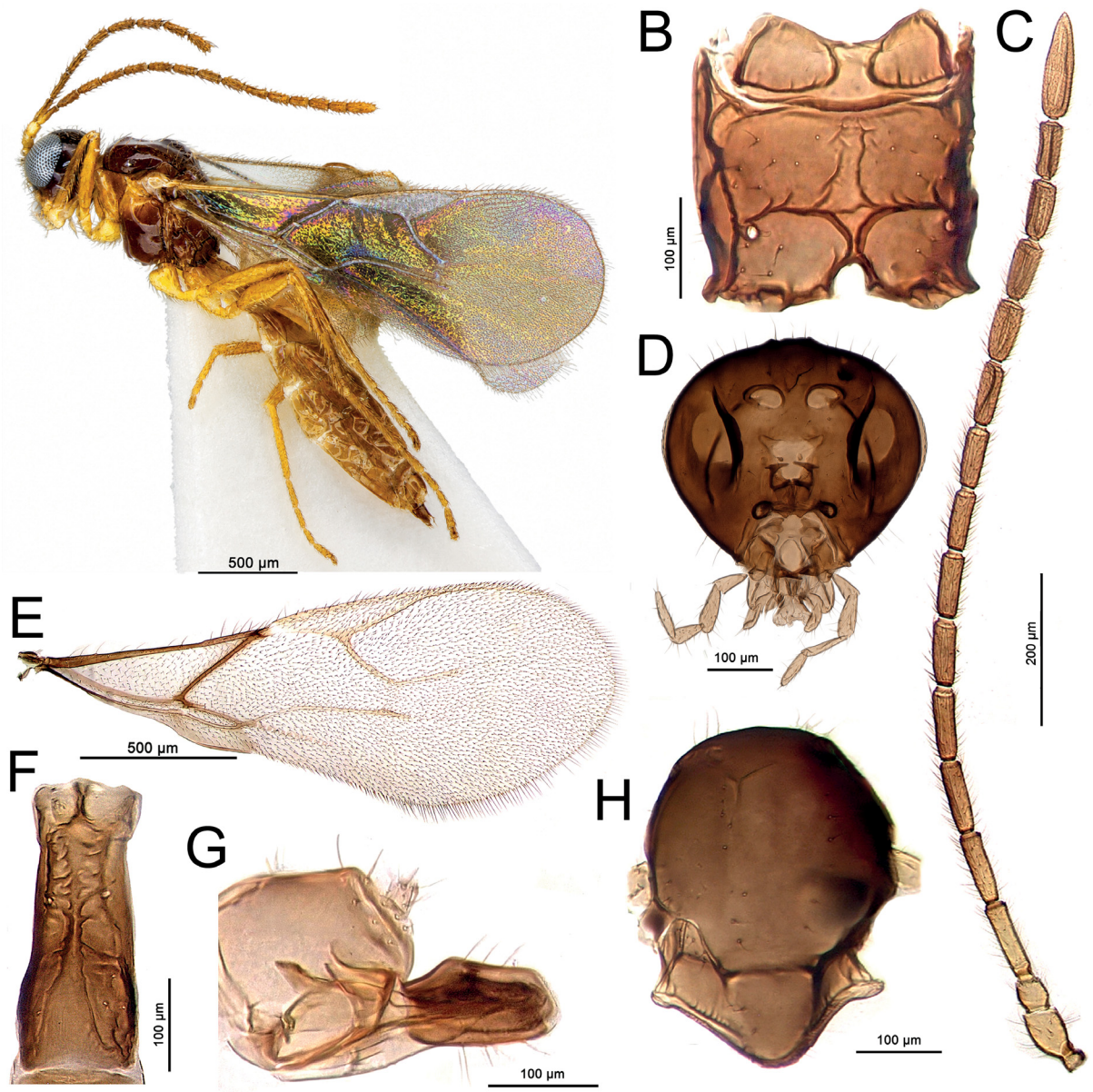


Fig. 4. *Aphidius tonkinensis* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Propodeum, dorsal view. **C**. Antenna. **D**. Head, frontal view. **E**. Fore wing. **F**. First metasomal tergite, dorsal view. **G**. Ovipositor sheath, lateral view. **H**. Mesoscutum, dorsal view.

Description

Female

Measurements. Length of body 2.0 mm.

Colouration (Fig. 4A). Pedicel, scape, and F1 yellow; F2 brown or light brown to one third; head brown, mouthparts yellow. Pronotum yellow to light brown; remaining parts of mesosoma brown. Legs yellow to light brown. First metasomal tergite light brown. Metasoma yellow to light brown. Ovipositor sheath light brown.

Head (Fig. 4D) rounded. Face sparsely setose. Tentorial index 0.4. Malar space 0.2 times as long as longitudinal diameter of eye. Mandible bidentate, covered with dense, long setae. Antenna filiform, with 16–17 antennomeres (Fig. 4C) and setae subequal to half the flagellomere diameter. Flagellomere 1 (F1) as long as F2. Length/width ratio of F1 is 3.2–3.6, and F2 is 2.9–3.3. F1 without, F2 with two longitudinal placodes. Maxillary palps with four palpomeres, labial palps with two palpomeres (Fig. 4D). Clypeus with 13 long setae.

Mesosoma. Mesoscutum (Fig. 4H) with well-developed and clearly visible notaulices in the ascending part of its anterolateral area, outlined by two rows of long, scattered setae (9–10 per row) laterally, extending almost to scutellum. Scutellum with 2–3 setae laterally. Propodeum areolate, with 5–7 setae on upper areoles and 3 setae on lower areoles (Fig. 4B). Central areola not clearly closed dorsally and moderately wide.

Wings. Pterostigma 4.35–4.70 times as long as wide. Pterostigma subequal to R1 metacarpal vein, with its ratio between length of pterostigma and R1 metacarpal vein 1.0–1.2 (Fig. 4E).

Metasoma. First metasomal tergite 2.9–3.3 times as long as wide at spiracle level, with about 10 curved costulae at the anterolateral area. First metasomal tergite rugose dorsally, with a prominent central carinae gradually diverging towards the base, and short sub-parallel lateral carinae along the entire dorsal view. (Fig. 4F). Ovipositor sheath moderately elongate and concave dorsally, as in Fig. 4G.

Male

Antennae 18-segmented. Scape and pedicel yellow; F1 with a narrow yellow ring at the base; remaining segments of the antennae light brown to brown. Head brown, mouthparts light brown, eyes black. Mesosoma light brown to brown. Legs yellow with dark apices. Metasoma light brown.

Host

Unknown.

Distribution

Vietnam.

Aphidius urticae Haliday, 1834

Aphidius urticae Haliday, 1834: 100.
Aphidius longulus Marshall, 1896: 560–561.
Aphidius lonicerae Marshall, 1896: 572–573.
Aphidius singleness Marshall, 1896: 603–604.
Aphidius goidanichi Quilis, 1932: 50–52.
Aphidius aulacorthi Starý, 1963: 601–603.

Material examined

VIETNAM • 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♀; S, Central Highlands, Dak Lak, Chu Yang Sin N.P., Krong K'Mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 13-23; RMNH.

Remarks

First record for Vietnam.

Aphidius sp. 1

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Dak Lak, Chu Yang Sin N.P., Krong K'Mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries, leg.; Malaise trap[s] 13-23; RMNH.

Remarks

This specimen has 18-segmented antennae, flagellomeres F1 and F2 short, length/width ratio ca 2.6; F1 with 2, F2 with 5 longitudinal placodes respectively. It is morphologically close to *Aphidius funebris* Mackauer, 1961, but is easily distinguished by the long R1 metacarpal vein. Additional specimens needed for future taxonomic treatments.

Aphidius spp. indet.

Material examined

VIETNAM • 1 ♀, 3 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15 Oct.–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♂; Phú Dién, Hánoi; 16 Jan. 2002; Bi Cai Kahn leg.; RMNH • 1 ♀; S, Central Highlands, Dak Lak, Chu Yang Sin N.P., Krong K'Mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries, leg.; Malaise trap[s] 13-23; RMNH.

Genus *Binodoxys* Mackauer, 1960

Binodoxys basicurvus Shujauddin, 1973

Trioxys (*Binodoxys*) *basicurvus* Shujauddin, 1973: 9–14, figs 1–3, 10.

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1600–1650 m a.s.l.; 12–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 13-18; RMNH.

Remarks

First record for Vietnam.

Binodoxys centaureae (Haliday, 1833)

Aphidius (*Trioxys*) *centaureae* Haliday, 1833: 1, 490.

Trioxys centaureae – Marshall 1891: 554. — Szépligeti 1904: 190.
Trioxys (*Trioxys*) *centaureae* – Mackauer 1959: 157.
Trioxys (*Binodoxys*) *centaureae* – Mackauer 1960: 141.

Material examined

VIETNAM • 1 ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1600–1650 m a.s.l.; 12–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 13-18; RMNH.

Remarks

First record for Vietnam.

Binodoxys communis (Gahan, 1926)

Trioxys communis Gahan, 1926: 1–7.

Material examined

VIETNAM • 1 ♀; NW, Hoa Binh, Pa Co Hang Kia N.R.; 1030 m a.s.l.; 12 Oct. 2009; C. van Achterberg leg.; sweep netting; RMNH.

Remarks

First record for Vietnam.

Binodoxys greenideae Starý & van Harten, 1983

Trioxys (*Binodoxys*) *greenideae* Starý & van Harten, 1983: 29–32, figs 9–17.

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH.

Remarks

First record for Vietnam.

Binodoxys longipetiolatus Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:49689C6E-49CE-4803-9434-22F499784B85
Fig. 5

Diagnosis

Binodoxys longipetiolatus sp. nov. is closely related to *B. greenideae* Starý & van Harten by the presence of seven stout, short setae on the dorsal side of the ovipositor prongs (Fig. 5G). However, it differs from *B. greenideae* in having a distinctly longer first metasomal tergite (ratio of first metasomal tergite length to width at level of spiracles is 4.4 in *B. longipetiolatus* (Fig. 5H), compared to about 3.0 in *B. greenideae*), a longer R1 metacarpal vein (Fig. 5E) (*B. longipetiolatus* has a pterostigma length/R1 metacarpal vein ratio of about 1.3 vs 2.8–3.0 in *B. greenideae*), and one stout, dilated seta at apex of ovipositor prongs in *B. longipetiolatus* (Fig. 5G), while *B. greenideae* has two simple setae. *Binodoxys longipetiolatus* differs from all its congeners by the yellow F7.

Etymology

The name of the new species is derived from its long first metasomal tergite.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 1.7 mm.

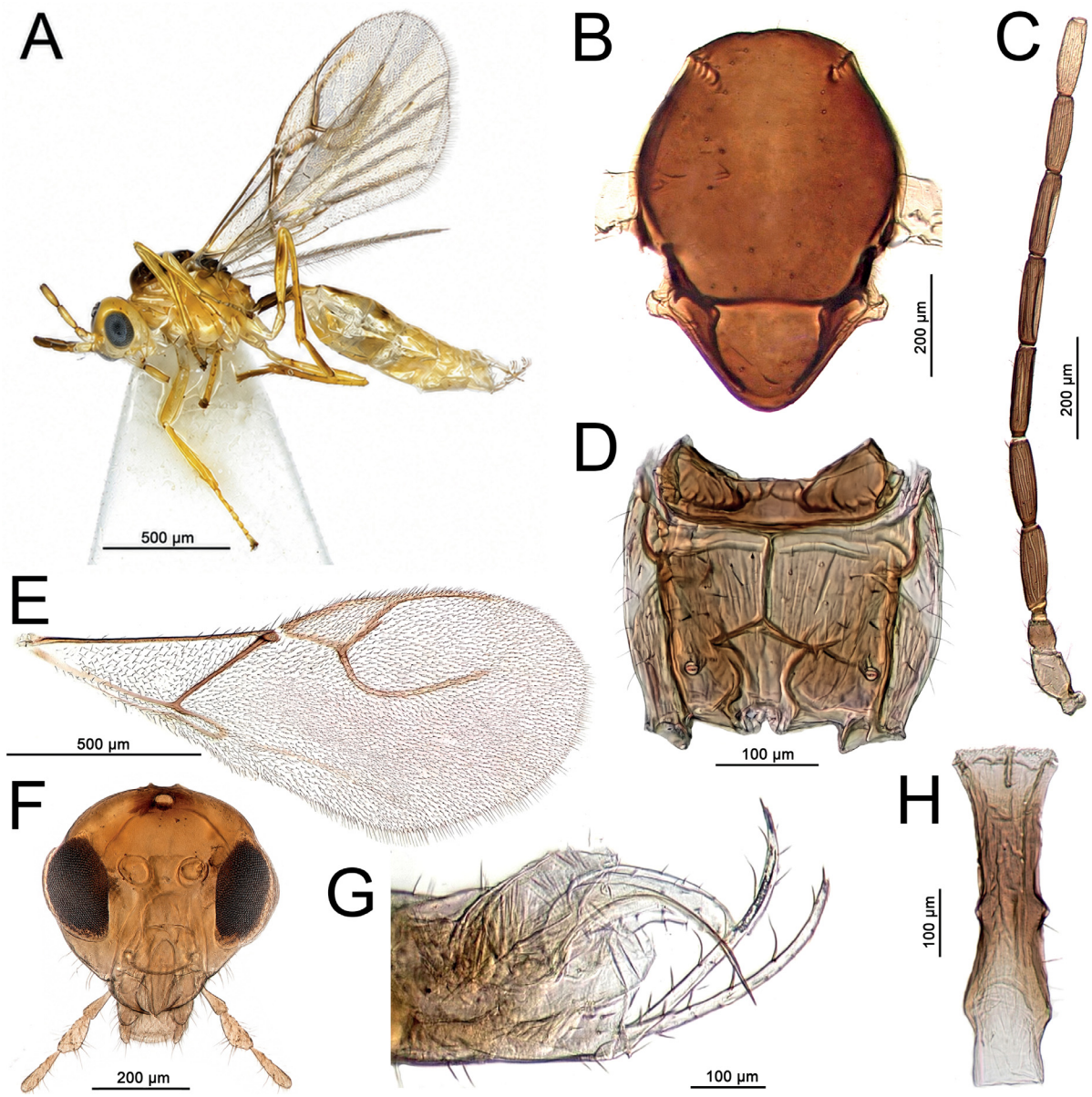


Fig. 5. *Binodoxys longipetiolatus* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Mesoscutum, dorsal view. **C**. Antenna. **D**. Propodeum, dorsal view. **E**. Fore wing. **F**. Head, frontal view. **G**. Ovipositor sheath, lateral view. **H**. First metasomal tergite, dorsal view.

Colouration. Body predominantly yellow. Head yellow except for black eyes and vertex (Fig. 5A). Scape, pedicel, F1, and F2 yellow to light brown. F3 to F6 brown to light brown. F7 yellow (Fig. 5C). Dorsal part of mesosoma brown; mesoscutum mostly black (Fig. 5B), remaining parts yellow. Legs yellow with dark apices (Fig. 5A). First metasomal tergite brown (Fig. 5H). Other metasomal segments yellow. Ovipositor sheath and prongs yellow (Fig. 5G).

Head (Fig. 5F). Head oval. Eyes oval, slightly converging toward the clypeus. Malar space equal to 0.2 times the longitudinal eye diameter. Face sparsely covered with two rows of setae, with 3–4 setae in each row; clypeus with 10 long setae. Tentorial index about 0.4. Antennae broken, only 7 antennomeres obtainable, probably filiform, with semierect setae much shorter than half the diameter of the segments (Fig. 5C). Flagellomeres F1 and F2 about 3.1 times as long as their median width, with 6 and 7 longitudinal placodes, respectively. F1 equal to F2 (Fig. 5C). Maxillary palps 4-segmented, labial palps 2-segmented.

Mesosoma. Mesonotum with notaulices distinct only in the anterior part, effaced on the disc (Fig. 5B), with sparse setae in two rows. Scutellum with 5–6 setae laterally. Propodeum (Fig. 5D) areolate. Upper part with a 9–10 long setae on each side. Lower part with 2–3 setae.

Wings. Pterostigma about 3.2 times as long as its width and about 1.3 times as long as R1 metacarpal vein (Fig. 5E). r and RS vein coinciding with the end of the R1 metacarpal vein. Forewing margin with long setae.

Metasoma. First metasomal tergite elongate, about 4.4 times as long as wide at level of spiracles (Fig. 5H), with five long setae between primary and secondary spiracular tubercles and a single seta at the posterodorsal area. Dorsal carina on first metasomal tergite well developed. Distance from spiracles to apex of first metasomal tergite about 2.2 times as long as wide across the spiracles. Distance between primary and secondary spiracles 1.25 times as long as width across spiracles. Ovipositor sheath subquadrate at base, with three setae ventrally and one at the dorsal margin (Fig. 5G). Prongs strongly upcurved at tip, with seven stout, short dorsal setae and one stout, dilated seta at the apex of the prongs. Length of ovipositor sheath about 3.3 times its maximum width at base and about 5.7 times its minimum width at tip.

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Binodoxys rubicola Shujauddin, 1973

Trioxys (*Binodoxys*) *rubicola* Shujauddin, 1973: 9–14, figs 5–6, 8, 11.

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH.

Remarks

First record for Vietnam.

Binodoxys shillongensis Starý, 1978

Trioxys (*Binodoxys*) *shillongensis* Starý, 1978 in Starý & Ghosh, 1978: 77–80, figs 1–5.

Material examined

VIETNAM • 1 ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH.

Remarks

First record for Vietnam.

Binodoxys spp. indet.

Material examined

VIETNAM • 2 ♀♀, 6 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♂; N, Hoàng Liên N.P., Pansi Pan Mt; 2320 m a.s.l.; 24 Apr.–2 May 2000; Mai Phu Quy and Nguyen M. Tam leg.; prime forest; RMNH • 4 ♂♂; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH • 2 ♂♂; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1680–1700 m a.s.l.; 12–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s]; 19–23; RMNH.

Genus *Cristicaudus* Starý & Remaudière, 1982

Cristicaudus ninhbinhensis Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:D2751AB0-ADC9-444D-943C-EFBD8477B5A4
Fig. 6

Diagnosis

Cristicaudus ninhbinhensis sp. nov. (Fig. 6A, D) is morphologically similar to *C. indicus* Das & Chakrabarti, 1991 in the shape of the first metasomal tergite (the ratio of length to width at level of spiracles in *C. ninhbinhensis* is 3.2–3.3 (Fig. 6F), while it is 2.9–3.3 in *C. indicus*) and the shape of the pterostigma (ratio of length to width 2.5–2.8 in *C. ninhbinhensis* (Fig. 6H), 2.6 in *C. nepalensis* (Takada, 1970), 2.7–2.9 in *C. indicus*, and 2.7–3.0 in *C. garhwalensis* Das & Chakrabarti, 1991). However, *C. ninhbinhensis* is easily distinguished from *C. indicus* by having subequal F1 and F2 (Fig. 6G), while F1 is clearly shorter than F2 in *C. indicus*, and by a more elongate F1 (Fig. 6G) (ratio of length to width of F1 is 3.5–3.6 in *C. ninhbinhensis*, while 2.4–3.2 in *C. indicus*). *Cristicaudus ninhbinhensis* differs from *C. nepalensis* and *C. garhwalensis* by having a more elongate first metasomal tergite (3.2–3.3 in *C. ninhbinhensis* (Fig. 6F), while 2.2–2.5 in *C. nepalensis* and *C. garhwalensis*). *Cristicaudus ninhbinhensis* possesses one long and one shorter seta at top of prongs (Fig. 6E), while all its congeners have one or two long setae at top of prongs.

Etymology

The new species has been named after the province of Ninh Binh in Vietnam, where it is recorded.

Type material

Holotype

VIETNAM • ♀; N, Ninh Binh, Cuc Phuong N.P., nr entrance; ca 225 m a.s.l.; 1–15 May 2000; Mai Phu Quy leg.; Malaise trap; slide-mounted; RMNH.

Paratype

VIETNAM • 1 ♀; N, Ninh Binh, Cuc Phuong N.P.; nr centre; ca 225 m a.s.l.; 14 Apr.–1 May 2000; Mai Phu Quy leg.; Malaise trap; slide-mounted; RMNH.

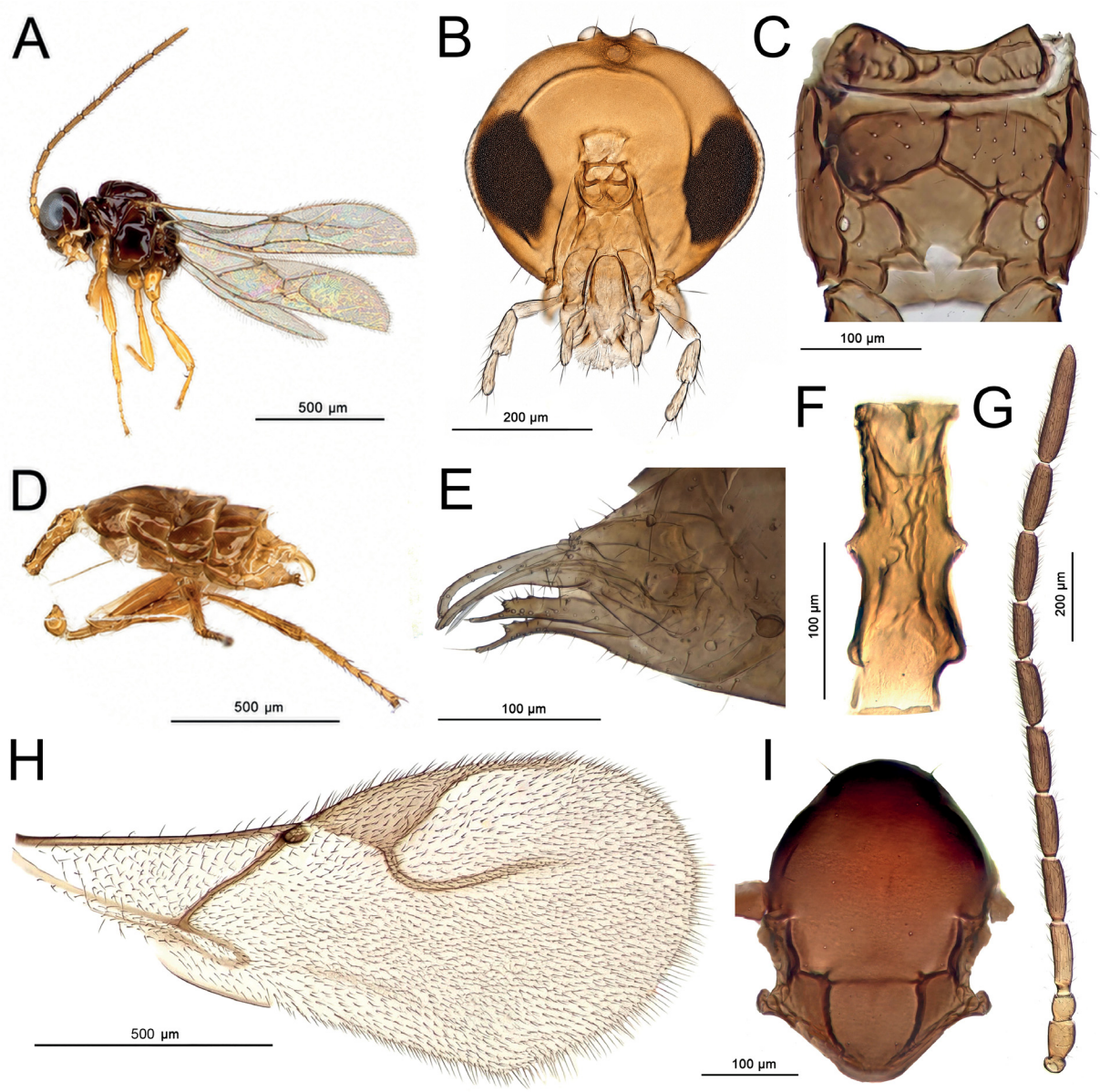


Fig. 6. *Cristicaudus ninhbinhensis* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Head, frontal view. **C**. Propodeum, dorsal view. **D**. Metasoma, lateral view. **E**. Ovipositor sheath, lateral view. **F**. First metasomal tergite, dorsal view. **G**. Antenna. **H**. Fore wing. **I**. Mesoscutum, dorsal view.

Description

Female

Measurements. Length of body 1.50 mm.

Colouration (Fig. 6A, D). Head brown, mouthparts yellow. Antenna light brown; scape, pedicel, and F1 yellow. Mesosoma brown with yellow legs. Metasoma light brown to yellow. Ovipositor sheath and prongs yellow to yellow-brownish.

Head. Eye large (Fig. 6B), only slightly converging toward the clypeus; malar space equal to 0.2 of longitudinal eye diameter. Face and malar space sparsely setose. Clypeus with six long setae. Tentorial index 0.40–0.43. Maxillary palp with four palpomeres, labial palp with two palpomeres (Fig. 6B). Mandible bidentate, bearing 3–4 long setae on the outer surface. Antennae (Fig. 6G) 11-segmented, filiform, mostly with semi-erect setae that are subequal to or shorter than diameter of segments; flagellar segment 1 (F1) 3.5–3.6 times as long as its median width, with 3–5 longitudinal placodes; F2 2.7–3.1 times as long as its median width, with 5–7 longitudinal placodes; F1 subequal to F2 (Fig. 6G).

Mesosoma. Mesonotum with very short notauli, distinct only anteriorly, with 3–4 setae on each lateral side (Fig. 6I). Scutellum (Fig. 6I) oval, with three setae on each side. Propodeum (Fig. 6C) areolate, with a large central pentagonal areola; postero-central carinae regular; upper part with a row of 9–10 long setae on each side; lower part with 2–3 long setae below spiracles on each side.

Wings. Pterostigma (Fig. 6H) elongate, 2.50–2.80 times as long as its width and 1.60–1.80 times as long as the R1 metacarpal vein. r and RS vein reaching the end of the R1 metacarpal vein at maximum length. Forewing surface densely covered with medium-sized setae and with long marginal setae (Fig. 6H).

Metasoma. First metasomal tergite (Fig. 6F) elongate, 3.2–3.3 times as long as wide at level of spiracles, with a pair of short setae on posterolateral aspect at second pair of spiracles. Prongs square at anterior part and narrowing apically, with 7–8 setae dorsally and 6 setae ventrally (Fig. 6D–E). Prongs with a single long and one shorter seta at top (Fig. 6E). Ovipositor sheath (Fig. 6D–E) straight and long, slightly curved at apex, bearing 3–4 long and 4 short setae dorsally.

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Genus *Ephedrus* Haliday, 1833

Ephedrus brevistigmus Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:D0ECABDB-539B-4597-9860-AE4C02C4074F
Fig. 7

Diagnosis

Ephedrus brevistigmus sp. nov. belongs to the '*plagiator*' species group, characterised by the 3RSa forewing vein being longer than 2RS (1.20–1.40 times longer) (Fig. 7E), short or intermediate antennae,

and a broader pterostigma (less than five times as long as wide). It differs from other species in the '*plagiator*' group by its long r vein (the ratio between pterostigma width and r vein length [Ptw/r] is 1.25–1.43), elongate pterostigma (4.3–4.6 times as long as wide) (Fig. 7E), and elongate flagellomere 1 (4.3–4.4 times as long as wide) (Fig. 7C). All members of the '*plagiator*' group have a pterostigma width to r vein length ratio of 1.5–2.9.

Etymology

The new species is named after its comparatively broad pterostigma.

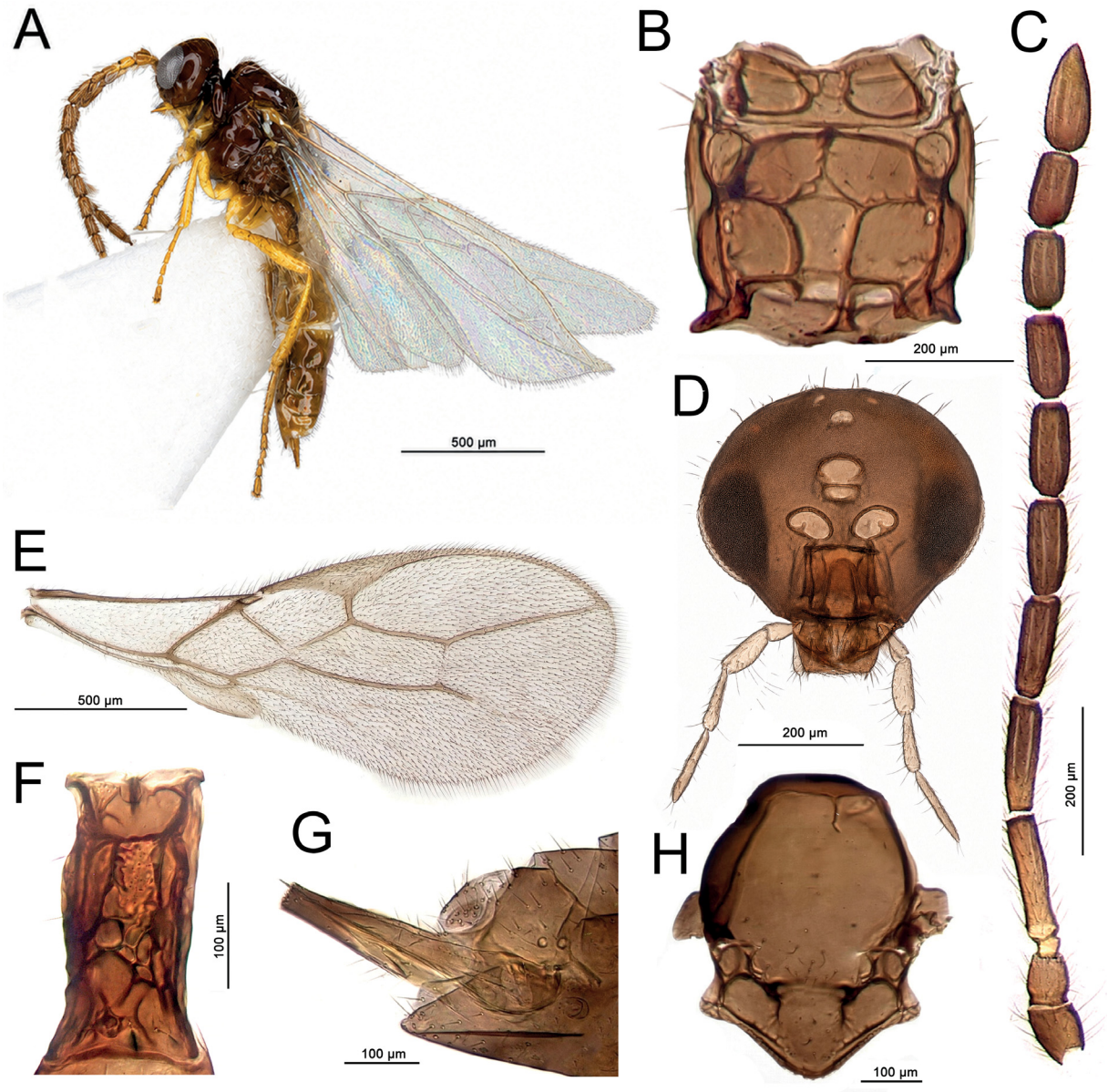


Fig. 7. *Ephedrus brevistigmus* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Propodeum, dorsal view. **C**. Antenna. **D**. Head, frontal view. **E**. Fore wing. **F**. First metasomal tergite, dorsal view. **G**. Ovipositor sheath, lateral view. **H**. Mesoscutum, dorsal view.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Paratypes

VIETNAM • 3 ♀♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 2.0 mm.

Colouration (Fig. 7A). Head brown. Mouthparts yellow. Scape and pedicel light brown to yellow. F1 yellow to light brown distally. Sometimes the base of F2 is yellow to light brown (Fig. 7C). Remaining antennal segments brown. Pronotum light brown to yellow; remaining parts of mesosoma usually brown. Legs yellow with light brown tarsi. Metasoma light brown. First metasomal tergite light brown to yellow (Fig. 7F). Ovipositor sheath light brown to yellow (Fig. 7G).

Head (Fig. 7D). Eyes medium-sized, oval, and prominent. Clypeus somewhat convex, bearing 10–15 long setae. Frons with few setae. Tentorial index 0.56–0.62. Malar space to longitudinal eye diameter ratio 0.28–0.32. Maxillary palps with four palpomeres, labial palps with two, all densely setose. Antennae 11-segmented, filiform, with dense semierect setae subequal to the flagellar segment diameter (Fig. 7C). First flagellar segment (F1) 4.3–4.4 times as long as wide, bearing 2–4 longitudinal placodes. F2 3.5–3.7 times as long as wide, with 2–5 longitudinal placodes. Apical flagellar segments subquadrate (e.g., F9 = 1.8–1.9 times as long as wide; F10 = 1.7–1.8 times as long as wide).

Mesosoma. Mesoscutum with slightly crenulated notaulices, distinct only in the anterior part (Fig. 7H). Along dorso-lateral sides of mesoscutum, 15–25 setae are present. Propodeum areolate with regular carinae and a pentagonal central areola (Fig. 7B). Upper and lower areolae with 4–6 and 2–3 setae, respectively.

Wings (Fig. 7E). Fore wings long and equal to body length (Fig. 7A). Pterostigma 4.3–4.6 times as long as wide, width to r ratio (Ptw/r) 1.25–1.43. 3RSa/r-m and 3RSb/3RSa vein ratios 1.6–2.0 and 1.9–2.2, respectively. 3RSa clearly longer than 2RSa vein, with a ratio of 1.2–1.4.

Metasoma. First metasomal tergite 2.2–2.5 times as long as wide at spiracle level (Fig. 7F). Central carina short or absent, while dorso-lateral carinae are strong. Along lateral sides of first tergite, with 1–2 long setae and 4 long setae at posterior part. Ovipositor sheath elongate, 5.6–6.0 times as long as wide at the middle, bearing sparse setae along the surface (Fig. 7G).

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Ephedrus nacheri Quilis, 1934

Ephedrus nacheri Quilis, 1934: 17–19.

Material examined

VIETNAM • 1 ♀; N, Vinh Phuc, Tam Dao; 1050–1175 m a.s.l.; 14–17 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise trap; RMNH.

Remarks

First record for Vietnam.

Ephedrus plagiator (Nees, 1811)

Bracon plagiator Nees von Esenbeck, 1811: 17–18.
Aphidius parcicornis Nees von Esenbeck, 1834: 16.
Ephedrus japonicus Ashmead, 1906: 187.

Material examined

VIETNAM • 3 ♀♀, 3 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH.

Remarks

First record for Vietnam.

Ephedrus trichosiphoniellae Takada, 1968

Ephedrus trichosiphoniellae Takada, 1968: 75.

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-12; RMNH • 2 ♀♀, 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH.

Remarks

First record for Vietnam.

Ephedrus vietnamensis Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:AC92890A-8048-4D2F-A3CB-33D1170898D5
Fig. 8

Diagnosis

Ephedrus vietnamensis sp. nov. (Fig. 8A) belongs to the '*lacertosus*' species group, characterised by long antennae, an elongate pterostigma, and the 3SR vein subequal to the 2SR vein. Due to its elongate F1 (Fig. 8B), it is morphologically similar to *E. lacertosus* (Haliday, 1833) and *E. longistigmus*

Gärdenfors, 1986 (5.5–5.8 proportion between length and width of F1 in *E. vietnamensis* (Fig. 8E) vs 5.7–6.5 and 5.3–6.2 in *E. lacertosus* and *E. longistigmus*, respectively). By shape of pterostigma, it is morphologically similar to *E. longistigmus* Gärdenfors, 1986 and *E. trichosiphoniellae* Takada, 1968 (7.6–8.6 proportion between length and width of pterostigma in *E. vietnamensis* (Fig. 8E) vs 8.0–9.0 and 7.0–9.0 in *E. longistigmus* and *E. trichosiphoniellae*, respectively). However, it is easily distinguished from *E. lacertosus* by the absence of a mesoscutal fovea (Fig. 8F), and from *E. longistigmus* by the proportion between the lengths of F1 and F2 (1.2–1.3 vs 1.4–1.5 in *E. longistigmus*) (Fig. 8B) and by F2 being brown (Fig. 8B), whereas it is partly light brown in *E. longistigmus*. *Ephedrus vietnamensis* is easily distinguished from *E. longiarticulatus* Rakhshani & Tomanović, 2012 by the shorter F1 (5.5–5.8 ratio between the length and width of F1 in *E. vietnamensis* (Fig. 8E) vs 6.5–7.0 in *E. longiarticulatus*),

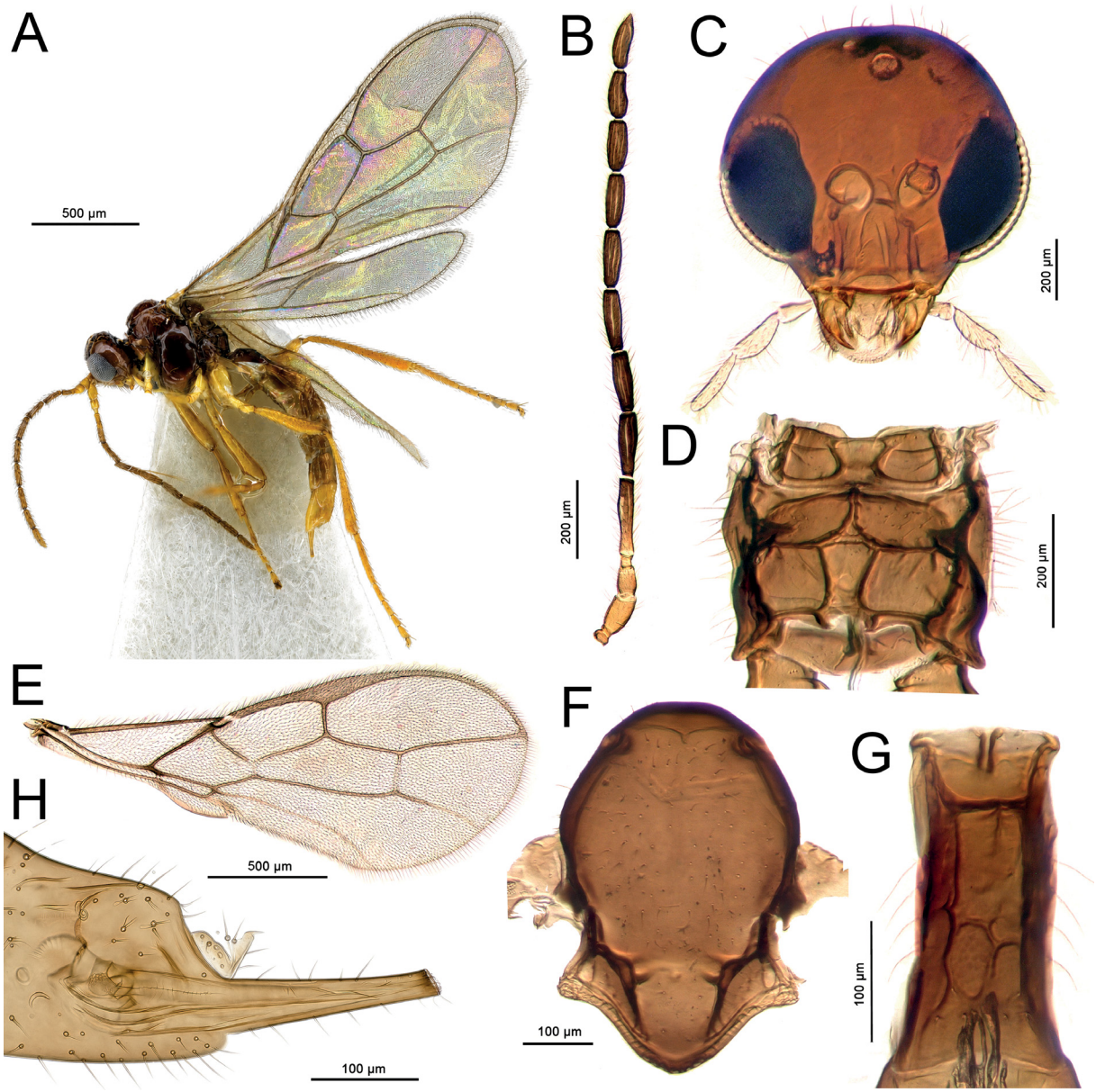


Fig. 8. *Ephedrus vietnamensis* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Propodeum, dorsal view. **E**. Fore wing. **F**. Mesoscutum, dorsal view. **G**. First metasomal tergite, dorsal view. **H**. Ovipositor sheath, lateral view.

and by the ratio between the lengths of F1 and F2 (1.2–1.3 vs 1.5–1.6 in *E. longiarticulatus*). *Ephedrus vietnamensis* has a fore wing clearly longer than the body.

Etymology

The species name is derived from its current distribution.

Type material

Holotype

VIETNAM • ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1680–1700 m a.s.l.; 12 Oct.–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 19-23; slide-mounted; RMNH.

Paratypes

VIETNAM • 3 ♀♀, 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; paratype females slide-mounted, paratype male dry mounted; RMNH • 1 ♀; NW Tonkin, Hoàng Liên N.R., 10 km SW of Sa Pa; 1550 m a.s.l.; 22–29 Oct.1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH • 1 ♂; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1680–1700 m a.s.l.; 12 Oct.–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap 19-23; dry mounted; RMNH.

Description

Female

Measurements. Length of body 2.2 mm.

Colouration (Fig. 8A). Head brown. Mouthparts yellow to light brown. Scape and pedicel yellow, F1 usually yellow in the first half, remaining antennal segments light brown. Pronotum light brown to brown, remaining parts of mesosoma usually brown. Legs yellow with dark apices. Metasoma light brown to yellow. Ovipositor sheath yellow with dark apex.

Head. Eyes medium-sized, oval, and prominent (Fig. 8C). Clypeus somewhat convex, bearing 10–21 long setae. Frons with few setae. Tentorial index 0.4–0.5. Malar space to longitudinal eye diameter ratio 0.21–0.28. Maxillary palps with four palpomeres, labial palps with two, all densely setose. Antennae 11-segmented, filiform, with semierect setae subequal to the diameter of the flagellar segments (Fig. 8B). First flagellar segment (F1) 5.5–5.8 times as long as wide, bearing 1–3 longitudinal placodes (Fig. 8B). F2 3.4–4.0 times as long as wide, with 3–5 longitudinal placodes. Proportion between length F1 and F2 1.2–1.3 (Fig. 8B).

Mesosoma. Mesoscutum with slightly crenulated notaulices, distinct only in its anterior part (Fig. 8F). Mesoscutum densely setose, though in some specimens it is sparsely setose (Fig. 8F). Propodeum areolate with regular carinae and a pentagonal central areola (Fig. 8D). Upper and lower areolae with 5–10 and 1–2 setae, respectively.

Wings. Pterostigma 7.6–8.6 times as long as wide (Fig. 8E). Pterostigma width to r ratio (Ptw/r) 0.6–0.8. 3RSa/r-m and 3RSb/3RSa vein ratios 1.95–2.05 and 1.6–1.8, respectively. 3RSa and 2RSa veins subequal, with a length ratio of 1.0–1.1 (Fig. 8E). Fore wing longer than body length (body/fore wing length 0.8/1.0).

Metasoma. First metasomal tergite slender, 2.2–2.5 times as long as wide at spiracle level (Fig. 8G). Central carina not clearly defined, while dorso-lateral carinae are strong (Fig. 8G). Along lateral sides of first metasomal tergite with 3–4 long setae, and 4 long setae at posterior part. Ovipositor sheath narrow and elongate, 6.0–7.0 times as long as wide at the middle, bearing sparse setae on its surface (Fig. 8H).

Male

Head brown, eyes black, mouthparts yellow to light brown. Scapus light brown; pedicel and one quarter of F1 yellow; remaining parts of F1 light brown. Other flagellomeres brown. Mesosoma brown; legs yellow with dark apices. First metasomal tergite brown; remaining parts of metasoma light brown.

Host

Unknown.

Distribution

Vietnam.

Ephedrus spp. indet.

Material examined

VIETNAM • 4 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH.

Genus *Lipolexis* Förster, 1863

Lipolexis hirsutus Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:F54B3186-7D7A-4EC2-84BE-F9985241B0CB
Fig. 9

Diagnosis

Lipolexis hirsutus sp. nov. (Fig. 9A) belongs to the '*oregmae*' group, which is characterised by having the first metasomal tergite bearing lateral longitudinal carinae and being dilated at the base (Fig. 9G). Currently, two species are known from the '*oregmae*' group: *L. oregmae* and *L. bengalensis* Tomanović & Kocić, 2020. The new species differs from *L. bengalensis* in possessing three maxillary and one labial palpomere (Fig. 9C), while *L. bengalensis* has three maxillary and two labial palpomeres. Additionally, *L. hirsutus* has a subquadrate scutellum (Fig. 9D), while *L. bengalensis* has a triangular scutellum. *Lipolexis hirsutus* differs from the nominal *L. oregmae* by having a shorter F1 (Fig. 9B) (the proportion between length and maximum width at the middle of F1 in *L. hirsutus* is 3.4–3.6 vs 4.5 in *L. oregmae*) and a shorter first metasomal tergite (Fig. 9G) (the proportion between length and width of first metasomal tergite at level of spiracles in *L. hirsutus* is 2.7–2.8 vs 3.3 in *L. oregmae*). Finally, *L. hirsutus* differs from all known *Lipolexis* species, including *L. oregmae*, by possessing a very setose mesoscutum with two rows of very dense setae along its latero-dorsal parts (Fig. 9D).

Etymology

Lipolexis hirsutus sp. nov. takes its name after the dense setose laterodorsal parts of the mesoscutum.

Type material

Holotype

VIETNAM • ♀; N, Vinh Phuc, Tam Dao; 1050–1175 m a.s.l.; 14–17 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise trap; slide-mounted; RMNH.

Paratypes

VIETNAM • 1 ♀; C, Thua Thien Hué, Phong Dién N.R., nr base camp 15 km W Phong My; 80–210 m a.s.l.; 22 Mar.–6 Apr. 2001; C. van Achterberg and R. de Vries leg.; Malaise trap; slide-mounted; RMNH

• 1 ♀; C, Thua Thien Hué, Phong Dién N.R., nr base camp 15 km W of Phong My, ca 60 m a.s.l.; 22 Mar.–6 Apr. 2001; C. van Achterberg and R. de Vries leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

MEASUREMENTS. Length of body 1.5 mm.

COLOURATION (Fig. 9A). Head yellow. Eyes black. Scape, pedicel, and F1 yellow to light brown; remaining antennal segments light brown to brown. Mesosoma and legs yellow. Metasoma light brown to yellow. Ovipositor sheath yellow.

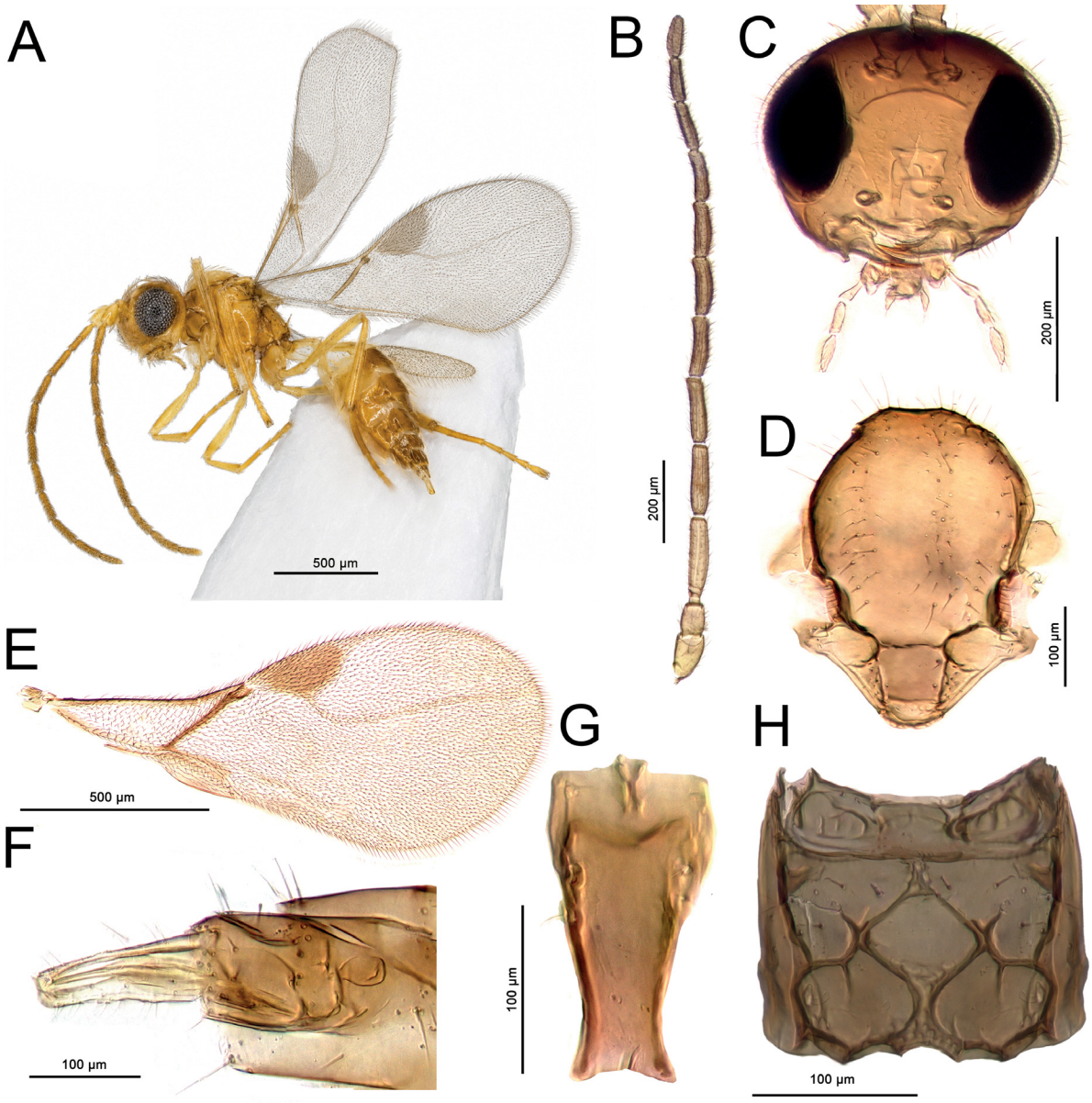


Fig. 9. *Lipolexis hirsutus* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. Ovipositor sheath, lateral view. **G**. First metasomal tergite, dorsal view. **H**. Propodeum, dorsal view.

Head (Fig. 9C) slightly transverse, wider than the mesosoma at the tegulae (proportion between width of head and mesoscutum 1.55), with long, dense setae (Fig. 9D). Eyes large, oval. Face with dense, long setae. Clypeus with nine long setae. Tentorial index 0.39–0.42. Malar space equal to 0.18–0.21 times as long as longitudinal eye diameter. Mandible bidentate, with 10–12 long setae on the outer surface. Maxillary palps with three palpomeres. Labial palps with one palpomere (Fig. 9C). Antenna 12-segmented (Fig. 9B), filiform; antennal segments long and cylindrical with semi-erect setae shorter than half the diameter of the flagellomeres. F1 (Fig. 9B) subequal to F2; F1 and F2 bearing 4–5 and 5 longitudinal placodes, respectively. Proportions between length and maximum width at the middle of F1 and F2 are 3.4–3.6 and 3.2–3.6, respectively (Fig. 9B).

Mesosoma. Mesoscutum (Fig. 9D) smooth; notaulices distinct in a very short ascending portion of the anterolateral margin, effaced dorsally. Mesoscutum very setose, with more than 40 setae in two rows along the laterodorsal parts (Fig. 9D). Additionally, with dense setae laterally. Scutellum subquadrate, bearing two long setae on the lateral margins (Fig. 9D). Propodeum (Fig. 9H) areolate, with a wide almost quadrate central areola. Upper and lower areolae of the propodeum with 7–8 and 1–2 long setae on each side, respectively.

Wings (Fig. 9E) densely pubescent with setae longer than those on the surface; pterostigma triangular, 2.4–2.7 times as long as wide and subequal to the R1 metacarpal vein (proportion between pterostigma length and R1 metacarpal vein length 0.9–1.1) (Fig. 9E); vein r & RS long, reaching near the apex of the wing.

Metasoma. First metasomal tergite (Fig. 9G) slender, widened basally and narrowing apically; length 2.7–2.8 times as long as wide at level of spiracles, slightly prominent at the lateral margin. Ovipositor sheath (Fig. 9F) long, wide at the base, slightly curved downwards; distally slightly dilated, upper part of the ovipositor sheath more sclerotized along the whole length. Ovipositor sheath as in Fig. 9F.

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Lipolexis oregmae (Gahan, 1932)

Diaeretus oregmae Gahan, 1932: 754.
Lipolexis scutellaris Mackauer, 1962b: 43–44.

Material examined

VIETNAM • 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♀; N, Ninh Binh Cuc Phuong N.P., nr centre; ca 225 m a.s.l.; 1 Nov.–20 Dec. 1999; Mai Phu Quy leg.; Malaise trap; RMNH • 1 ♀; N, Ninh Binh Cuc Phuong N.P., nr centre; ca 225 m a.s.l.; 15–27 May 2000; Mai Phu Quy leg.; Malaise trap; RMNH • 2 ♂♂; C, Thua Thien Hué, Phong Dién N.R., nr base camp 15 km W of Phong My; ca 60 m. a.s.l.; 22 Mar.–6 Apr. 2001; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 1-3; RMNH • 1 ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg

and R. de Vries leg.; Malaise trap[s] 1-12; RMNH • 2 ♀♀; S, Central Highlands, Dak Lak, Chu Yang Sin N.P., Krong K'Mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 13-23; RMNH.

Lipolexis sp.

Material examined

VIETNAM • 1 ♀; S, Central Highlands, Dak Lak, Chu Yang Sin N.P., Krong K'Mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 13-23; RMNH.

Genus *Lysiphlebia* Starý & Schlinger, 1967

Lysiphlebia mirzai Shujauddin, 1975

Lysiphlebia mirzai Shujauddin, 1975: 415–417.

Material examined

VIETNAM • 3 ♀♀, 2 ♂♂; NW, Hoa Binh, Da Phúc; 15 Oct. 2002; Mai Phu Quy leg.; Malaise trap; RMNH • 4 ♀♀, 9 ♂♂; NW, Hoa Binh, Yen Thuy, Nong Truong; 28 Aug. 2003; Mai Phu Quy leg.; Malaise trap; RMNH.

Remarks

Following the original description of *L. mirzai*, which distinguished it from *L. japonica* (Ashmead, 1906) by the R1 metacarpal vein being longer than the pterostigma and the absence of a propodeal mid-longitudinal carina, we retain *L. mirzai* as a separate species (Shujauddin 1975).

Genus *Praon* Haliday, 1833

Praon tonkinensis Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:537B3E02-4E7A-4BD6-83FC-9AB8E4E903EC
Figs 10–11

Diagnosis

By the number of antennal segments and fore wing venation patterns (Fig. 10C–D), *P. tonkinensis* sp. nov. (Fig. 10A) is morphologically close to *Praon volucre* (Haliday, 1833). However, it differs from *P. volucre* by shorter R1 metacarpal vein (proportion of pterostigma to R1 metacarpal vein length 1.20–1.35 in *P. tonkinensis* vs 1.5–1.9 in *P. volucre*) (Fig. 10D), more elongate pterostigma (3.5–3.9 times as long as wide in *P. tonkinensis* vs 3.0–3.6 times as long as wide in *P. volucre*) (Fig. 10D) and the yellow colouration of F1 (Fig. 10C), instead of brown or light brown with a light brown ring at its base in *P. volucre*. It differs from *P. flavinode* (Haliday, 1833) by the colour of flagellomeres 1 and 2 (F1 yellow in *P. tonkinensis* while F1 yellow and F2 yellow or light brown up to two-thirds in *P. flavinode*) (Fig. 10C), the number of antennal segments (19-segmented antennae in three specimens of *P. tonkinensis* vs (16)17–18 in *P. flavinode*) (Fig. 10C), and a shorter metacarpal vein (proportion of pterostigma to R1 metacarpal vein length 1.20–1.35 in *P. tonkinensis* vs 1.6–1.8 in *P. flavinode*) (Fig. 10D). By the number of antennal segments, colouration, and shape of F1, *P. tonkinensis* is morphologically similar to *P. yomenae* Takada, 1968, but differs clearly by the more setose lateral sides of the mesoscutum (*P. yomenae* usually has a large glabrous area on lateral side of mesoscutum) (Fig. 10E), coloured m-cu vein in *P. tonkinensis* (usually

colourless in *P. yomenae*) (Fig. 10D), and a shorter R1 metacarpal vein (proportion of pterostigma to R1 metacarpal vein length 1.20–1.35 in *P. tonkinensis* vs 1.4–1.8 in *P. yomenae*) (Fig. 10D).

Etymology

The name of the new species is derived from the Tonkin area where specimens were collected.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

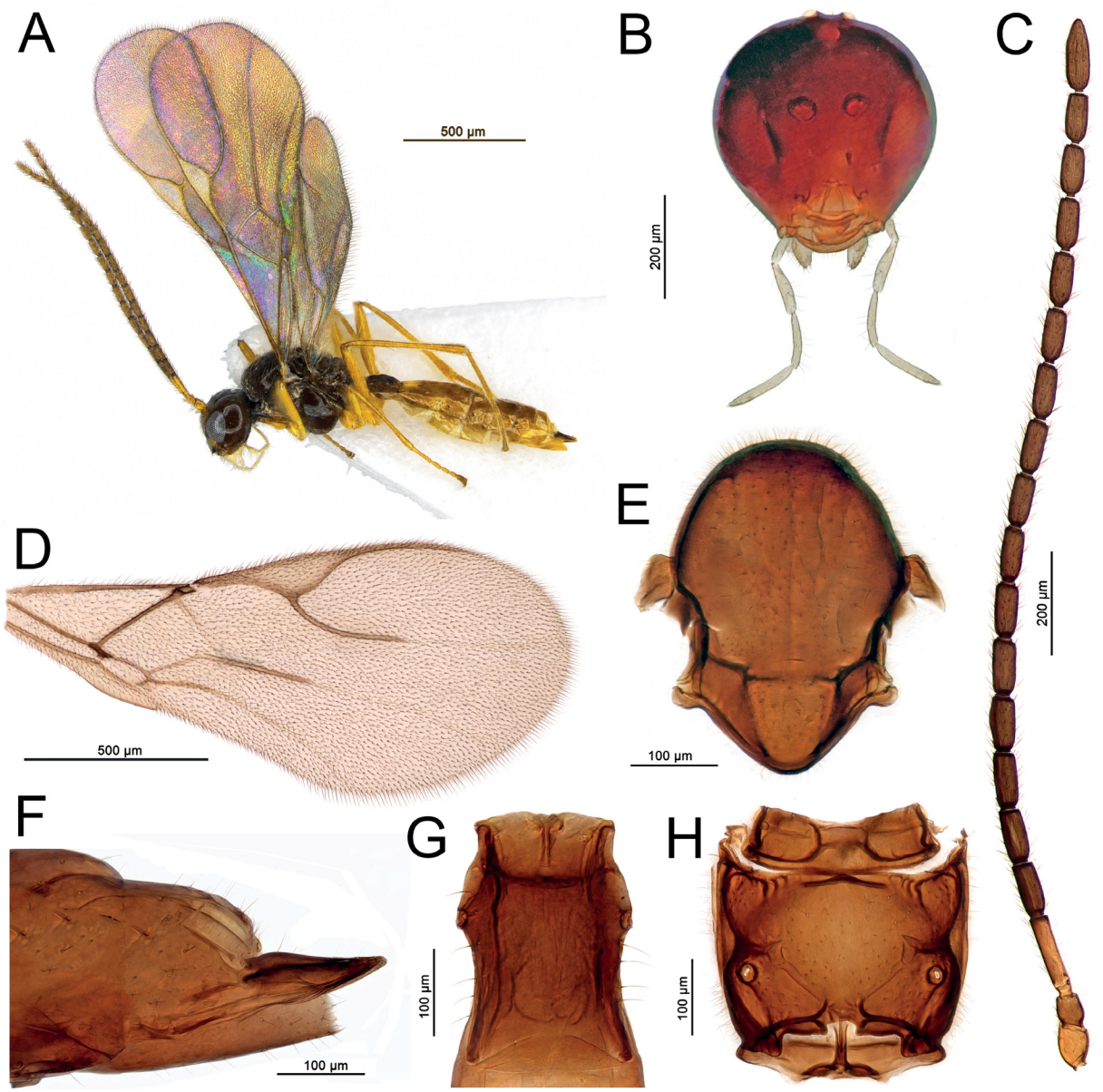


Fig. 10. *Praon tonkinensis* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Head, frontal view. **C**. Antenna. **D**. Fore wing. **E**. Mesoscutum, dorsal view. **F**. Ovipositor sheath, lateral view. **G**. First metasomal tergite, dorsal view. **H**. Propodeum, dorsal view.

Paratypes

VIETNAM • 2 ♀♀, 2 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; paratype females slide-mounted, paratype males dry mounted; RMNH.



Fig. 11. *Praon tonkinensis* Tomanović & van Achterberg sp. nov., paratype, ♂ (RMNH), lateral view.

Description

Female

Measurements. Length of body 3.50 mm.

Colouration (Fig. 10A). Scapus, pedicel, and flagellomere 1 yellow, remaining part of antenna brown. Mouthparts and part of face yellow, eyes black; remaining parts of head brown. Propleuron yellow, remaining parts of mesosoma brown. Legs yellow. First metasomal tergite and metasoma light brown to yellow.

Head (Fig. 10B). Malar space equal to 0.15–0.16 of longitudinal eye diameter. Clypeus oval with about 30 long setae. Tentorial index 0.26–0.30. Maxillary palps 4-segmented, labial palps 3-segmented. Antennae 19-segmented, filiform, with semierect setae subequal to half the segment diameter (Fig. 10C). F1 and F2 elongate, 4.5–5.2 times as long as wide and 2.4–3.0 times as long as wide, respectively (Fig. 10C). F1 1.4–1.6 times as long as F2. F1 without, and F2 with 3–4 longitudinal placodes.

Mesosoma. Mesoscutum (Fig. 10E) with central lobe covered with dense setae. Lateral lobes of mesoscutum with hairless areas (Fig. 10E). Scutellum densely setose. Notaulices deep and distinct throughout. Propodeum (Fig. 10H) smooth, densely pubescent with small central hairless areas.

Wings. Pterostigma 3.5–3.9 times as long as wide (Fig. 10D), and 1.20–1.35 times as long as distal abscissa of R1 metacarpal vein. m-cu vein sclerotized and coloured (Fig. 10D); Rs+M vein colourless (Fig. 10D).

Metasoma. First metasomal tergite elongate, 1.30–1.45 times as long as wide (Fig. 10G), at the level of the spiracles. Distance between spiracles and apex less than width at level of spiracles (proportion between width at level of spiracles and distance between spiracles and apex of first metasomal tergite 1.5–1.7), with 2–5 long setae along the first metasomal tergite sides. Ovipositor sheath (Fig. 10F) almost straight at dorsal margin. Apex rounded, with two conical spines on its upper and lower edge.

Male

Antennae with 20 segments (Fig. 11). Scapes light brown, remaining parts of antennae brown. Head brown, eyes black, mouthparts light brown. Mesosoma brown, legs yellow with dark apices. First metasomal tergite brown, remaining parts of metasoma light brown.

Host

Unknown.

Distribution

Vietnam.

Praon sp.

Material examined

VIETNAM • 3 ♂♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH • 1 ♀; NW, Hoa Binh, Da Phúc; 15 Oct. 2002; Mai Phu Quy leg.; Malaise trap; RMNH.

Genus *Toxares* Haliday, 1840

Toxares brevistigmus Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:D2D06AA1-E467-452E-9FB5-0712EE0AC991
Fig. 12

Diagnosis

Toxares brevistigmus sp. nov. (Fig. 12A) morphologically differs from all its congeners by the following combination of characters: developed notaulices extending about one quarter of mesoscutum (Fig. 12D) (present only in *T. fovealis* Tomanović & van Achterberg, 2024), fovea with 2–3 foveal pits (Fig. 12D), short pterostigma, about 4.5 times as long as wide (Fig. 12E) (present only in *T. fovealis*, while all other congeners have a more elongate pterostigma, 5.2–7.0 times as long as its width), short first flagellomere (Fig. 12B) (present only in *T. zakai* Shujauddin, 1974 (about 3.35 times as long as wide vs 3.0 in *T. zakai*), while all other congeners have a proportion of 3.5–4.8 between length and width of first flagellomere), and 18-segmented antennae (Fig. 12B). By the presence of long notaulices on the mesoscutum (Fig. 12D) and a short pterostigma (Fig. 12E), it is similar to *T. fovealis*, but is easily distinguished by its 18-segmented antennae (Fig. 12B) (vs 22-segmented in *T. fovealis*) and more elongate first metasomal tergite (Fig. 12G) (ratio of first metasomal tergite length to width at level of spiracles is about 2.8 in *T. brevistigmus*, while it is 2.1 in *T. fovealis*). By its short first flagellomere (Fig. 12B), it is similar to *T. zakai*, from which it is easily distinguished by the shorter pterostigma (Fig. 12E) (the ratio of pterostigma length to width in *T. brevistigmus* is about 4.5, while it is much more elongate in *T. zakai* at 6.0) and by the yellow colouration of F1, F2, and the light brown of F3 (Fig. 12B), while only the base of F1 is yellow in *T. zakai*. It can be easily distinguished from *T. shigai* Takada, 1965 by having a shorter F1 (3.35 times as long as wide in *T. brevistigmus* vs 4.0 in *T. shigai*) and a shorter pterostigma (about 4.5 times as long as wide vs about 7.0 times as long as wide in *T. shigai*).

Etymology

The name of the new species is derived from the short pterostigma.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 2.2 mm.

Colouration (Fig. 12A). Scape, pedicel, and F1–F2 yellow, F3 light brown, remaining antennal parts brown. Face and mouthparts yellow. Head brown. Mesosoma brown except for light brown propleuron. Legs yellow with brown apices. First metasomal tergite light brown. Metasoma brown to light brown. Ovipositor sheath yellow.

Head (Fig. 12C) rounded. Face with dense setae. Frons setose laterally, with a hairless central part. Eyes large and oval (Fig. 12C). Tentorial index about 0.3. Clypeus with about 10 long setae. Malar space about 0.2 times the longitudinal eye diameter. Mandible bidentate, with 4–5 setae on the outer surface. Maxillary palps with four palpomeres, labial palps with three palpomeres. Antenna 18-segmented, flagellate (Fig. 12B). Flagellomere 1 equal to flagellomere 2 and about 3.35 times as long as its maximum width at the middle. F2 about 2.9 times as long as its width at the middle (Fig. 12B). F1 without and F2 with one longitudinal placode. Flagellomeres uniformly covered with semierect setae subequal to half the diameter of the antennal segments (Fig. 12B).

Mesosoma. Mesoscutum smooth, rounded, with a fovea bearing 2–3 foveal pits in the middle posterior part (Fig. 12D). Notaulices distinct for about one quarter of the mesoscutum length (Fig. 12D). Mesoscutum with two rows of very few short setae (5–6) along its dorso-lateral part (Fig. 12D). Scutellum oval, bearing 10–11 long lateral setae. Scutellar sulcus divided into 5 parts (Fig. 12D). Propodeum (Fig. 12H) areolate with a large central areola. Upper propodeal areolae with 8 long setae and lower areolae with 1–2 long setae each.

Wings (Fig. 12E) densely pubescent, with long marginal setae. Pterostigma short, about 4.5 times as long as its width and subequal to the R1 metacarpal vein (Fig. 12E). Forewing 2RS vein shorter than 3RSa vein (2RS/3RSa = 0.55) and 3RSa shorter than 3RSb vein (3RSa/3RSb = 0.76). Forewing 3RSa/r-m = 2.8 and pterostigma width twice as long as r vein.

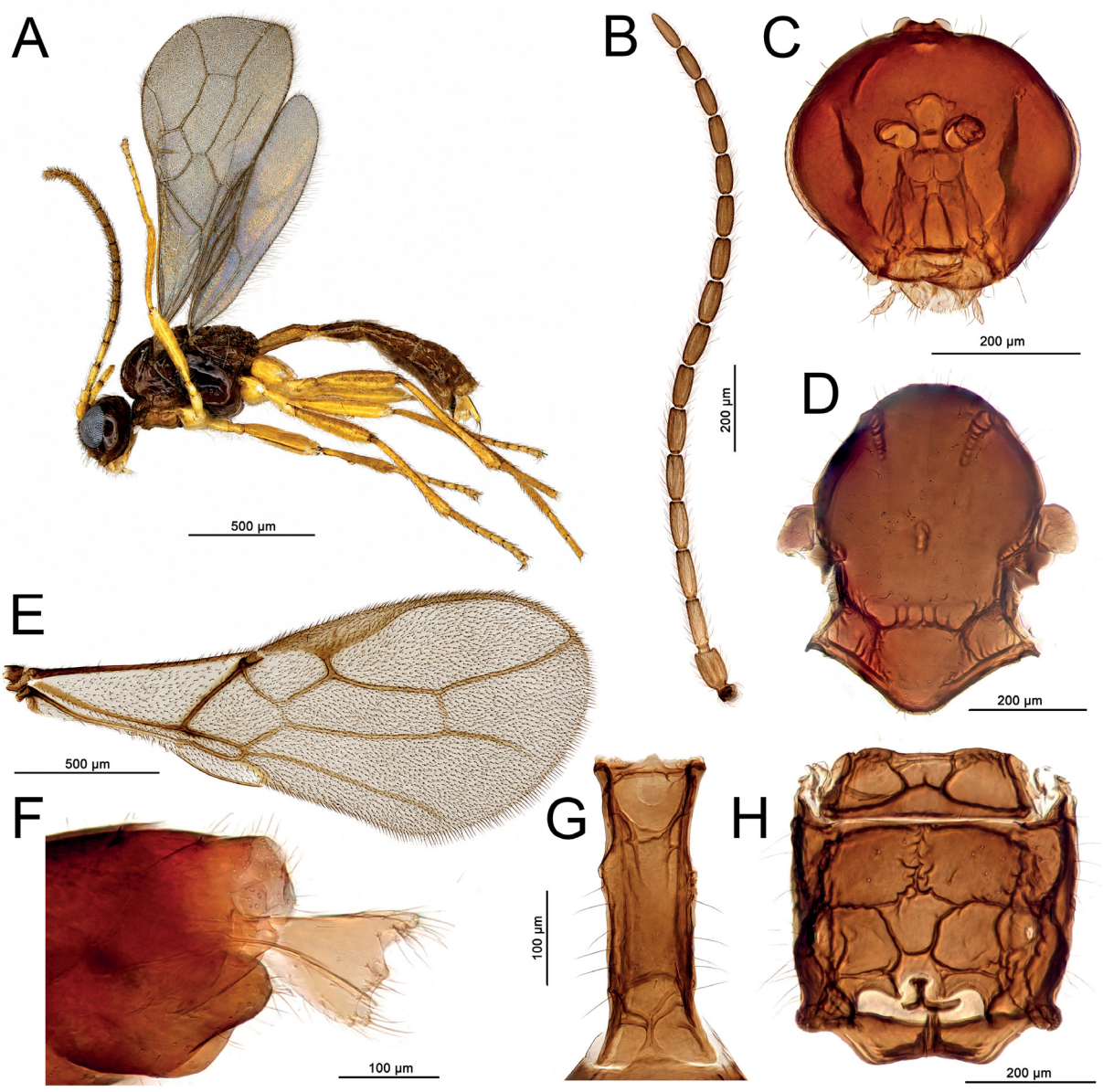


Fig. 12. *Toxares brevistigmus* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. Ovipositor sheath, lateral view. **G**. First metasomal tergite, dorsal view. **H**. Propodeum, dorsal view.

Metasoma. First metasomal tergite (Fig. 12G) dorsally slightly rugose with two short lateral carinae visible only at anterior part. First metasomal tergite length about 2.8 times its width at the base of the spiracles, with 5–6 long setae along each side (Fig. 12G). Ovipositor sheath widely deltoid-shaped, unstalked and sparsely setous at tip (Fig. 12F).

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Toxares flavus Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:0C825399-DDD7-4EDC-9A42-CE0CD0457BC1
Figs 13–14

Diagnosis

Toxares flavus sp. nov. (Fig. 13A) morphologically differs from all its congeners by the following combination of characters: elongate first metasomal tergite about 3.2 times as long as wide at level of spiracles (all other congeners have first metasomal tergite 2.1–3.0 times as long as wide) (Fig. 13E), elongate pterostigma about 7.5 times as long as wide (present only in *T. shigai* Takada, 1965, about 7.0 times as long as wide, while all other congeners have a pterostigma 4.5–6.7 times as long as wide) (Fig. 13H), short first flagellomere about 3.6 times as long as wide (Fig. 13B) (present in *T. zakai* (3.0), *T. fovealis* (3.6), and *T. macrosiphophagum* Shujauddin, 1974 (3.5), while all other congeners have a 3.75–4.80 proportion between length and width of flagellomere 1) and yellow antennal segments, with light brown F3–F5 segments (Fig. 13A–B) (all other congeners have yellow or light brown F1–F3 or F1–F2, or a light brown basal part of F1), and 18-segmented antennae (Fig. 13B). It differs from *T. zakai* by having a more elongate first metasomal tergite (3.2 in *T. flavus* vs 2.5 in *T. zakai*) (Fig. 13E), a longer flagellomere 1 than flagellomere 2 (1.2 times longer in *T. flavus*, while equal in *T. zakai*) (Fig. 13B), and yellow antennae (only F1 yellow at the base in *T. zakai*) (Fig. 13A–B). It differs from *T. macrosiphophagum* by a more elongate first metasomal tergite, about 3.2 times as long as wide at level of spiracles (Fig. 13E) (2.5 in *T. macrosiphophagum*), flagellomere 1 longer than flagellomere 2 (Fig. 13B) (equal in *T. macrosiphophagum*), and 18-segmented antennae (usually 16-segmented in *T. macrosiphophagum*) (Fig. 13B).

Etymology

The name of the new species is derived from the yellow antennae in the female.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Paratype

VIETNAM • 1 ♂; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 2.2 mm.

Colouration (Fig. 13A). Scape, pedicel, and all flagellomeres yellow, except F3–F5 light brown. Face and mouthparts yellow. Head brown. Mesosoma brown except yellow to light brown propleuron. Legs yellow with brown apices. Metasoma brown to light brown, except yellow at the posterior end. Ovipositor sheath also yellow.

Head (Fig. 13F) laterally widened. Face densely setose. Frons setose laterally, but central parts hairless. Eyes large and oval. Tentorial index 0.55. Clypeus with 8 long setae. Malar space equal to 0.2 of

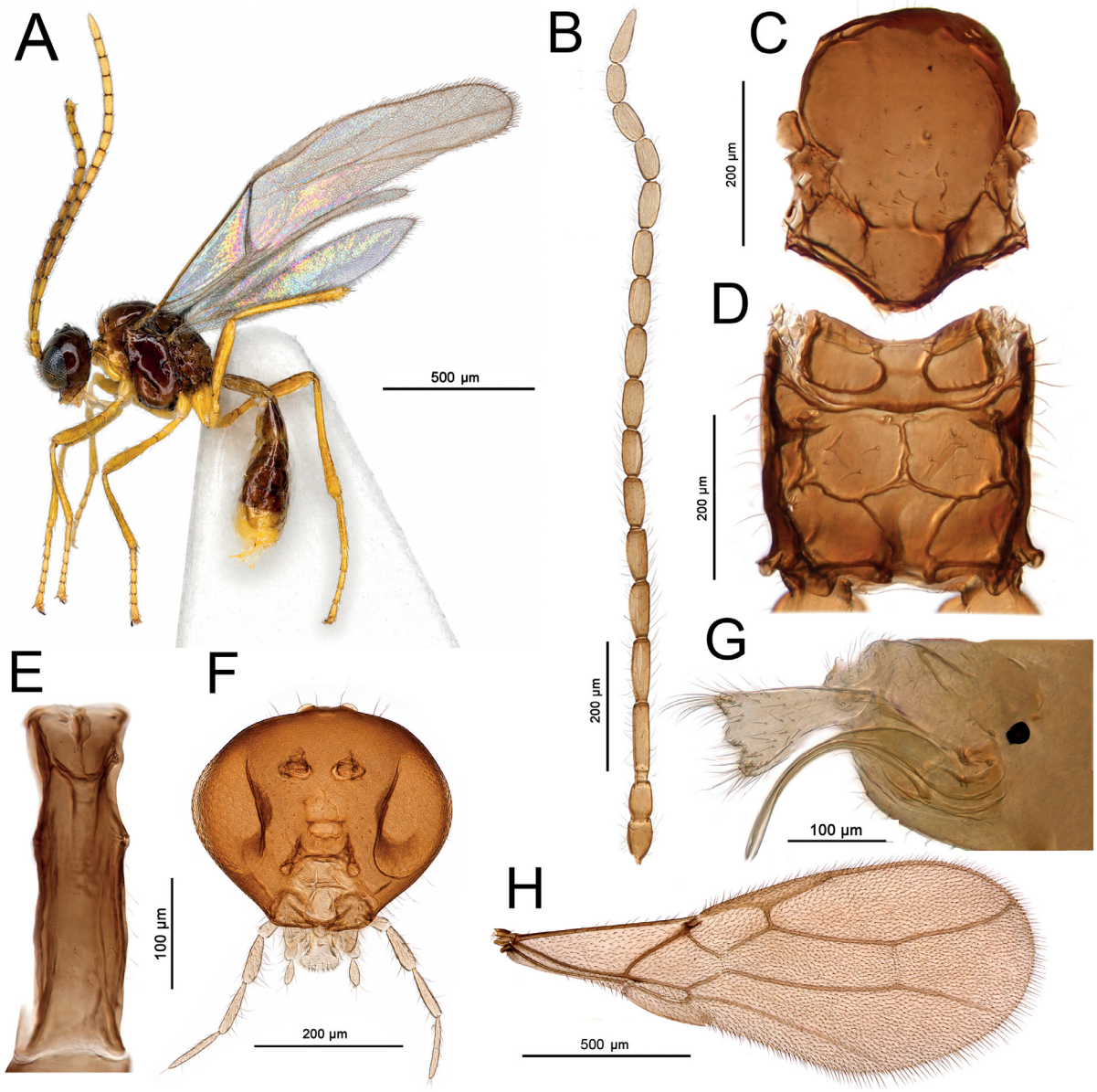


Fig. 13. *Toxares flavus* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Mesoscutum, dorsal view. **D**. Propodeum, dorsal view. **E**. First metasomal tergite, dorsal view. **F**. Head, frontal view. **G**. Ovipositor sheath, lateral view. **H**. Fore wing.

longitudinal eye diameter. Mandible bidentate, with 6–7 setae on the outer surface. Maxillary palps with four palpomeres, labial palps with three palpomeres (Fig. 13F). Antenna 18-segmented, flagellate (Fig. 13B). Flagellomere 1 clearly longer than flagellomere 2 (1.2 times longer) and about 3.6 times as long as its maximum width at middle. F2 about 3.0 times as long as its width at middle. F1 without and F2 with one longitudinal placode (Fig. 13B). Flagellomeres uniformly covered with semierect setae subequal to half diameter of antennal segments.

Mesosoma. Mesoscutum smooth, rounded, with a fovea in the middle posterior part (Fig. 13C). Notaulices distinct only at the base of the mesoscutum. Mesoscutum with two rows of sparse long setae along dorso-lateral part (Fig. 13C). Scutellum suboval, bearing 7–8 long setae in the central part. Scutellar sulcus not divided (Fig. 13C). Propodeum (Fig. 13D) areolate with a large central areola. Upper propodeal areolae with 7–8 long setae and lower areolae with 2 long setae each.

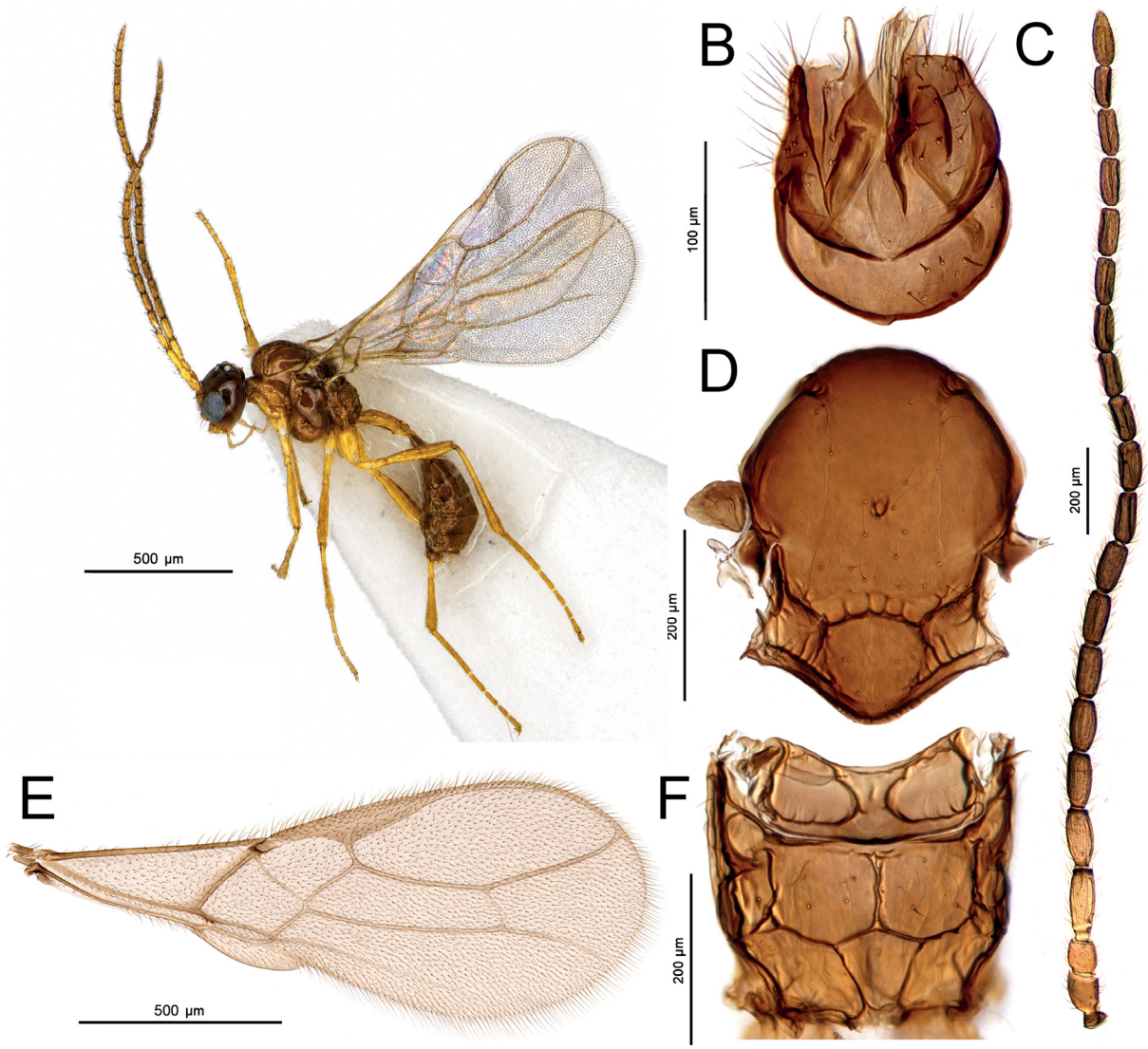


Fig. 14. *Toxares flavus* Tomanović & van Achterberg sp. nov., paratype, ♂ (RMNH). **A**. Male habitus, lateral view. **B**. Male genitalia, dorsal view. **C**. Antenna. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. Propodeum, dorsal view.

Wings (Fig. 13H) densely pubescent, with long marginal setae. Pterostigma elongate, about 7.5 times as long as its width, 0.8 times as long as R1 metacarpal vein (Fig. 13H). Forewing 2RS vein shorter than 3RSa vein (2RS/3RSa = 0.51) and 3RSa shorter than 3RSb vein (3RSa/3RSb = 0.87). Veins 3RSa/r-m = 2.92 and pterostigma width 1.20 times as long as r vein (Ptw/r).

Metasoma. First metasomal tergite (Fig. 13E) about 3.2 times as long as its width at base of spiracles. Ovipositor sheath deltoid-shaped, narrow at the base and moderately widened at the top. Densely setose laterally at the top (Fig. 13G).

Male

Antennae 20-segmented (Fig. 14C). Pterostigma about 6.0 times as long as wide (Fig. 14E). Forewing 2RS vein shorter than 3RSa vein (2RS/3RSa = 0.53) and 3RSa shorter than 3RSb vein (3RSa/3RSb = 0.86). Veins 3RSa/r-m = 2.73 and pterostigma 1.75 times as wide as r vein (Ptw/r). Scape, pedicel, F1, and F2 yellow, remaining parts of antennae brown (Fig. 14A–C). Mouthparts light brown. Mesosoma light brown to brown (Fig. 14D). Legs yellow to light brown. First metasomal tergite light brown. Propodeum light brown (Fig. 14F). Metasoma brown. Male genitalia as in Fig. 14B.

Host

Unknown.

Distribution

Vietnam.

Genus *Trioxys* Haliday, 1833

Trioxys breviflagellaris Tomanović & van Achterberg sp. nov.

urn:lsid:zoobank.org:act:025866BF-C61B-42EA-A969-17FD38487CA5

Fig. 15

Diagnosis

Trioxys breviflagellaris sp. nov. (Fig. 15A) differs from all congeners by its very short flagellomeres 1 and 2 (Fig. 15B), which are about 2.1 and 2.0 times as long as wide, respectively, and by the dorsal side of the prongs bearing two long setae – one at the middle and one near its tip (Fig. 15F). Ovipositor sheath elongate and gradually narrowing at the apex.

Etymology

The name of the new species is derived from the short first and second flagellomeres.

Type material

Holotype

VIETNAM • ♀; S, Central Highlands, Lam Dong, Bidoup Nui Ba, N.R., nr Da Lat; 1680–1700 m a.s.l.; 12–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise trap[s] 19-23; slide-mounted; RMNH.

Paratype

VIETNAM • 1 ♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

MEASUREMENTS. Length of body 2.0 mm.

COLOURATION (Fig. 15A). Body predominantly brown to light brown. Mouthparts yellow; face light brown, eyes black, remaining parts of head light brown to brown. Scape and pedicel yellow, F1 and F2 yellow to light brown. Mesosoma brown. Legs yellow. First metasomal tergite yellow. Other metasomal segments yellow to light brown. Ovipositor sheath and prongs yellow.

HEAD (Fig. 15C). Eyes oval, slightly converging toward the clypeus. Malar space equal to 0.2 times the longitudinal eye diameter. Face without setae centrally, but with dense setae laterally, clypeus with 7

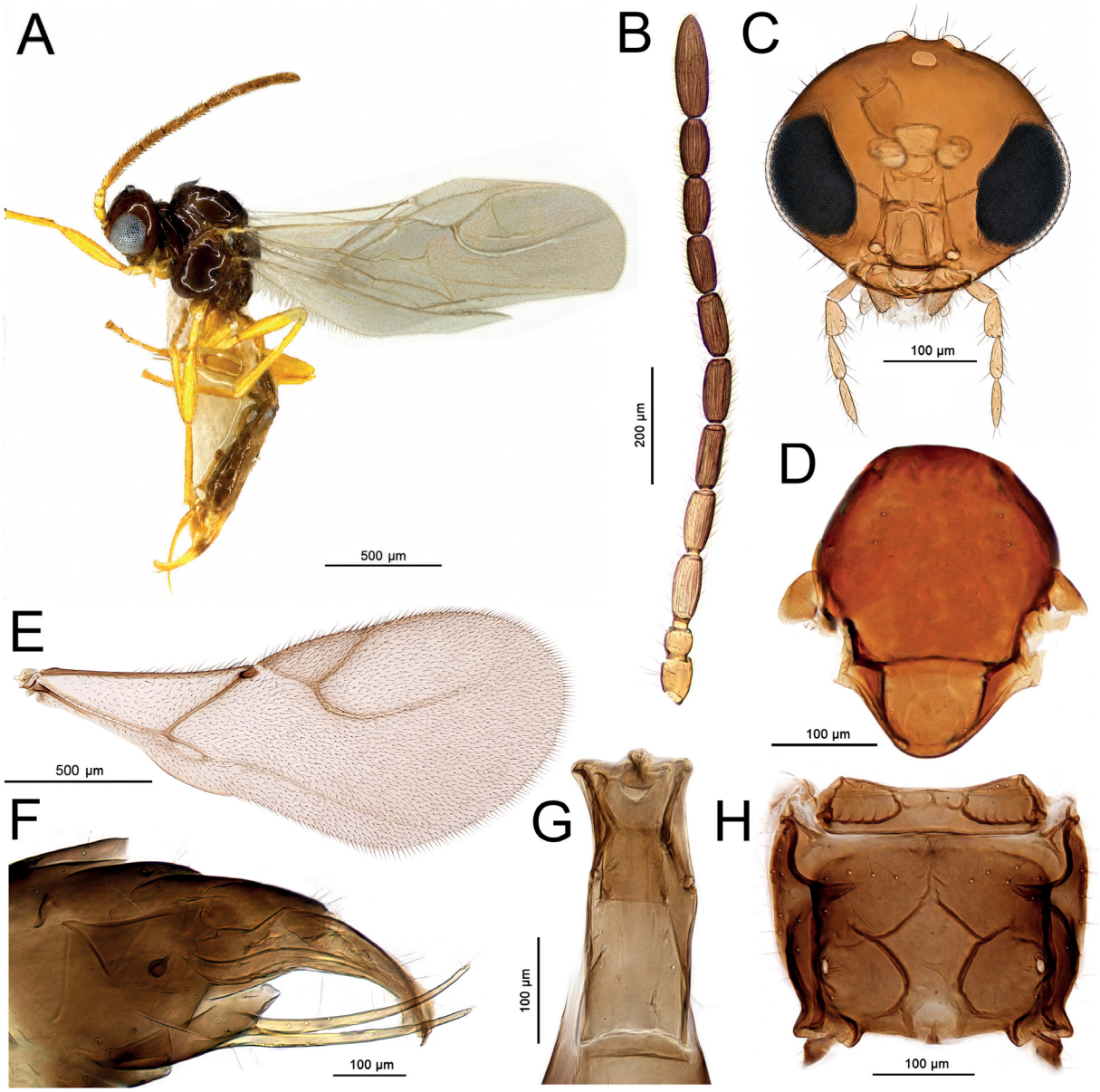


Fig. 15. *Trioxys breviflagellaris* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. Ovipositor sheath, lateral view. **G**. First metasomal tergite, dorsal view. **H**. Propodeum, dorsal view.

long setae. Tentorial index about 0.4. Maxillary palps 4-segmented, labial palps 2-segmented (Fig. 15C). Antennae 11-segmented, moderately thickened at apex, with semierect setae much shorter than half the diameter of the segments (Fig. 15B). Flagellomeres 1 and 2 very short, about 2.1 and 2.0 times as long as median width, respectively (Fig. 15B). F1 with 7 and F2 with 9 longitudinal placodes. F1 subequal to F2 (Fig. 15B).

Mesosoma. Mesonotum with notaulices distinct only in the fore part, effaced on the disc (Fig. 15D), with few setae dorsally. Scutellum with 3–5 setae laterally. Propodeum (Fig. 15H) areolate. Upper part with a set of 6–7 long setae on each side. Lower part with one seta.

Wings. Pterostigma 2.6–2.9 times as long as wide and 1.45–1.85 times as long as R1 metacarpal vein (Fig. 15E). r&RS vein coinciding with end of R1 metacarpal vein. Forewing margin with long setae (Fig. 15E).

Metasoma. First metasomal tergite 2.4–2.6 times as long as wide at level of spiracles (Fig. 15G), with three long setae laterally. Dorsal side smooth, without carina. Distance from spiracles to apex of first metasomal tergite petiole about 0.9 times as long as wide across spiracles. Ovipositor sheath long and curved at tip, with two setae ventrally and five on dorsal margin (Fig. 15F). Prongs clearly upcurved at tip, with two setae on dorsal side and two short setae at apex (Fig. 15F). Length of ovipositor sheath about 3.3 times its maximum width at base and about 13 times its minimum width at tip.

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Trioxys glabrirostris Tomanović & van Achterberg sp. nov.
urn:lsid:zoobank.org:act:954846A4-2F2C-473E-B373-77F58E1C98B1
Fig. 16

Diagnosis

Trioxys glabrirostris sp. nov. (Fig. 16A) differs from all congeners by absence of setae on dorsal side of prongs (Fig. 16F), and by short flagellomeres 1 and 2 (Fig. 16B), which are about 2.75 and 3.00 times as long as wide, respectively, with 7 and 8 longitudinal placodes on F1 and F2, respectively. *Trioxys glabrirostris* is closely related to *T. annae* Davidian, 2005 by having no setae on dorsal side of prongs, but clearly differs by a shorter F1 (2.75 times as long as wide in *T. glabrirostris*, compared to 4.5 in *T. annae*) and a longer first metasomal tergite (about 2.7 times as long as wide at level of spiracles, compared to 2.1 in *T. annae*) (Fig. 16G). Ovipositor sheath elongate, approximately 5.5 times its maximum width at the base and about 10 times its minimum width at the tip.

Etymology

The name of the new species is derived from the glabrous dorsal side of its prongs.

Type material

Holotype

VIETNAM • ♀; NW, Tonkin, Hoàng Liên N.R., 10 km SW of Sa Pa; 1550 m a.s.l.; 22–29 Oct.1999; C. van Achterberg leg.; Malaise trap; slide-mounted; RMNH.

Description

Female

Measurements. Length of body 2.0 mm.

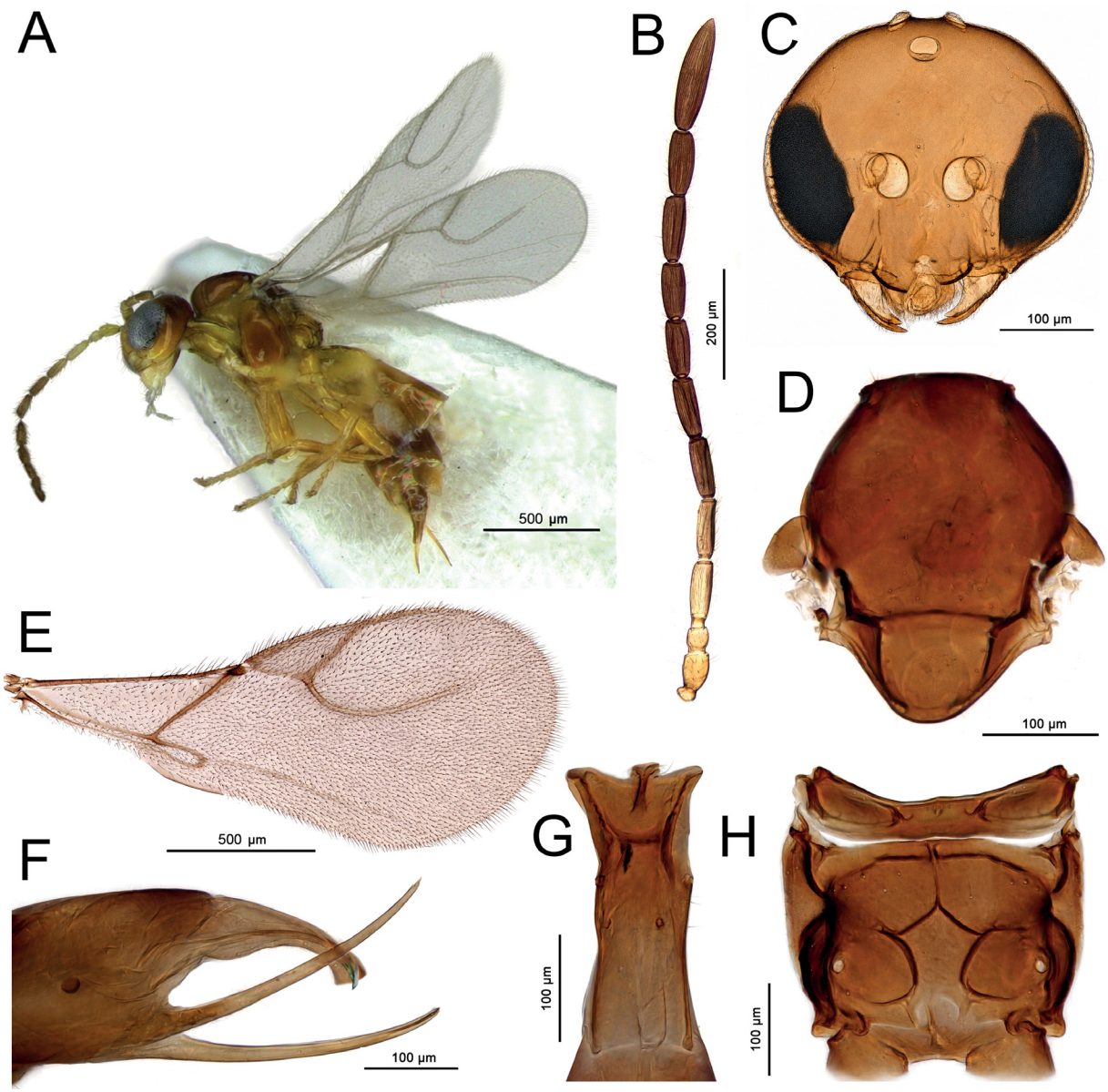


Fig. 16. *Trioxys glabrirostris* Tomanović & van Achterberg sp. nov., holotype, ♀ (RMNH). **A**. Female habitus, lateral view. **B**. Antenna. **C**. Head, frontal view. **D**. Mesoscutum, dorsal view. **E**. Fore wing. **F**. Ovipositor sheath, lateral view. **G**. First metasomal tergite, dorsal view. **H**. Propodeum, dorsal view.

Colouration (Fig. 16A). Body predominantly yellow to light brown. Mouthparts and face yellow, eyes black, genae and temple brown. Scape, pedicel, and F1 yellow, F2 light brown. Dorsal part of mesosoma and mesopleuron light brown to brown, remaining parts yellow. Legs yellow. First metasomal tergite yellow. Propodeum yellow. Other metasomal segments yellow to light brown. Ovipositor sheath and prongs yellow.

Head (Fig. 16C). Eyes oval. Malar space about 0.2 times the longitudinal eye diameter. Face sparsely setose (Fig. 16C), clypeus with 8 long setae. Tentorial index about 0.28. Maxillary palps 4-segmented, labial palps 2-segmented. Antennae 11-segmented, filiform, moderately thickened, with semierect setae shorter than half segment diameter (Fig. 16B). Flagellomeres 1 (F1) and 2 (F2) about 2.75 and 3.0 times as long as median width, respectively. F1 with 7 and F2 with 8 longitudinal placodes. F1 subequal to F2 (Fig. 16B).

Mesosoma. Mesonotum with notaulices distinct only in anterior part, effaced on disc (Fig. 16D), with very few setae dorsally. Scutellum with 4–5 setae laterally. Propodeum (Fig. 16H) areolate. Upper part with a set of 4–5 long setae on each side. Lower part with one seta.

Wings. Pterostigma about 2.6 times as long as its width and about 1.8 times as long as R1 metacarpal vein (Fig. 16E). Vein r&RS coinciding with end of R1 metacarpal vein. Forewing margin with long setae.

Metasoma. First metasomal tergite about 2.7 times as long as wide at level of spiracles (Fig. 16G), with 2–3 long setae laterally. Dorsal side of first metasomal tergite smooth, without carina (Fig. 16G). Distance from spiracles to apex of first metasomal tergite about 0.9 times as long as wide across spiracles. Ovipositor sheath elongate and curved at the top, with 1–2 long setae ventrally and dorsally, respectively (Fig. 16F). Prongs long and slightly curved at the tip, without setae on dorsal side and with two short setae at apex (Fig. 16F). Length of ovipositor sheath about 5.5 times its maximum width at base, about 10 times its minimum width at tip.

Male

Unknown.

Host

Unknown.

Distribution

Vietnam.

Trioxys sp.

Material examined

VIETNAM • 3 ♀♀; NW, Tonkin, Hoàng Liên N.R., 15 km W of Sa Pa; 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise trap; RMNH.

Discussion

By examining 154 specimens collected in Vietnam from 1999 to 2009, we recorded 27 Aphidiinae species, including 12 species new to science and 12 species recorded for the first time for the territory of Vietnam. As previously mentioned, in general, aphid parasitoids are very poorly studied in Vietnam, and our research confirmed the existence of a highly diverse and rich fauna of aphid parasitoids in the country. The recorded species can be classified into several groups, such as widely distributed Palaearctic species

(*Aphidius ervi*, *A. urticae*, *Binodoxys centaureae*, *Diaeretiella rapae*, *Ephedrus nacheri*, and *E. plagiator*) and Oriental/tropical species (*Aphidius autriquei*, *Binodoxys basicurvus*, *B. communis*, *B. greenideae*, *B. rubicola*, *B. shillongensis*, *Ephedrus trichosiphoniellae*, *Lipolexis oregmae*, and *Lysiphlebia mirzai*). Additionally, the 12 newly described species belong to the specific tropical fauna. *Aphidius brevis* sp. nov. and *A. tonkinensis* sp. nov. belong to *Aphidius* species with a costulate anterolateral area of the first metasomal tergite and four maxillary and two labial palpomeres. *Aphidius tonkinensis*, with an elongate pterostigma and R1 metacarpal vein, according to Mitrovski-Bogdanović *et al.* (2021), belongs to their group 1 (e.g., *A. urticae*, *A. matricariae* Haliday, 1834). *Aphidius brevis*, with short, thickened antennae and a shorter R1 metacarpal vein, is morphologically close to *Aphidius* species belonging to group 3 (e.g., *A. eadyi* Starý, González & Hall, 1980, *A. ericaphidis* Pike & Starý, 2011) (Mitrovski-Bogdanović *et al.* 2021). There is also possible cryptic speciation within the tropical species *A. autriquei*, described from Burundi (Starý *et al.* 1985) and recorded from Thailand (Starý *et al.* 2010a) and Madagascar (Starý 2005). Our specimens from Vietnam showed some variation in wing venation and colour pattern. The genus *Binodoxys* is diverse and common in the Oriental and Eastern Palaearctic regions (Takada 1968; Dey & Akhtar 2007). We recorded seven species in Vietnam, of which four are restricted to the Oriental region – *B. shillongensis*, *B. basicurvus*, *B. rubicola*, and *B. greenideae* (Starý & Ghosh 1983; Bodlah *et al.* 2012; Yu *et al.* 2016), and two have a broad distribution in the Palaearctic region (*B. centaureae* – Yu *et al.* 2016; Lazarević *et al.* 2024) and Eastern Palaearctic (*B. communis* – Calilung 2008; Yu *et al.* 2016). *Binodoxys longipetiolatus* sp. nov. possesses a very elongate first metasomal tergite as a clear apomorphic character and bicoloured antennae (first and second flagellomeres yellow to light brown, and seventh and eighth flagellomeres yellow). A multicoloured antenna is uncommon within Aphidiinae. It appears in the tropical *A. autriquei*, but also in some *Pauesia* species (e.g., *P. infulata* Haliday, 1834, see Starý 1960).

The genus *Trioxys* is one of the most diverse within Aphidiinae, with many records from the East Palaearctic (Takada 1966; Davidian 2005; Dey & Akhtar 2007). *Trioxys breviflagellaris* sp. nov. and *T. glabrirostris* sp. nov. possess unique characters within the genus *Trioxys*, such as very short flagellomeres 1 and 2, and the absence of setae on the dorsal side of the prongs in females, respectively. The genus *Cristicaudus* is a small tropical genus described from Mexico (Starý & Remaudière 1982), characterised by widened basal parts of the prongs. All three remaining species (*C. indicus*, *C. nepalensis*, and *C. garhwalensis*) are distributed in the Oriental region (Yu *et al.* 2016). *Cristicaudus ninhbinhensis* sp. nov. is an additional species from Vietnam, supporting the assumption of a tropical origin for this genus.

Gärdenfors (1986) defined three species groups within the genus *Ephedrus* Haliday, 1833: '*persicae*', '*plagiator*', and '*lacertosus*'. Kocić *et al.* (2019), in revisionary studies of European *Ephedrus*, recognised three subgenera: *Fovephedrus* Chen, 1986, *Breviephedrus* Gärdenfors, 1986, and *Ephedrus* Haliday, 1833, which include the '*lacertosus*' and '*plagiator*' species groups. The '*lacertosus*' species group is characterised by an elongate first flagellomere, long antennae, and an elongate pterostigma (Gärdenfors 1986). We recorded three *Ephedrus* species from the '*plagiator*' species group: *E. plagiator* with a Holarctic distribution, *E. nacheri*, a Palaearctic species (Gärdenfors 1986; Yu *et al.* 2016), and *E. brevistigmus* sp. nov., which is diagnosed based on forewing venation pattern, especially its long r vein and the smaller ratio between pterostigma width and r vein length. It appears that these characters could be very useful in *Ephedrus* taxonomy, though they have not been commonly used in taxonomic work until now. Except for the nominative *E. lacertosus* and *E. longistigmus* with Holarctic distribution, other known species from the '*lacertosus*' species group have Oriental or Eastern Palaearctic distributions (*E. himalayensis* Gärdenfors, 1986 and *E. trichosiphoniellae*) (Gärdenfors 1986). We recorded *E. trichosiphoniellae* in Vietnam for the first time and described an additional species in the '*lacertosus*' group, *E. vietnamensis* sp. nov.

The genus *Lipolexis* is a small Aphidiinae genus, and until recently, only two species were known with broad distributions: *L. gracilis* Förster, 1863 with a Palaearctic distribution and *L. oregmae*, mainly

a tropical species, although three additional species were known from the Oriental region but with doubtful descriptions (Kocić *et al.* 2020). Kocić *et al.* (2020) described six new species from the Oriental/Eastern Palaearctic regions and Europe. Kim *et al.* (2025) described three new *Lipolexis* species from South Korea. Kerkig *et al.* (2025) described *L. khaoyaiensis* Kerkig, Quicke & Butcher, 2025 as an additional member of the '*gracilis*' species group from Thailand and, based on molecular analysis, found 19 unknown independent *Lipolexis* genetic lineages. This clearly illustrates the underestimated number of *Lipolexis* species and likely tropical origin of this genus. Here, we describe *L. hirsutus* sp. nov. as an additional member of the '*oregmae*' species group. The genus *Toxares* is a small Aphidiinae genus with six known species, five of which are distributed in the Eastern Palaearctic and Oriental regions, suggesting an Asian origin for this genus (Tomanović *et al.* 2024). Interestingly, in our material from Vietnam, we found two additional species: *T. brevistigmus* sp. nov. and *T. flavus* sp. nov., indicating that this genus is much more diverse in the Oriental region. *Toxares brevistigmus* possesses developed notaulices and a complex of foveal pits on the mesoscutum, previously known only in *T. fovealis* within the genus *Toxares* (Tomanović *et al.* 2024), as well as a short pterostigma. We suggest that both characters are plesiomorphic. *T. flavus* has yellow antennae except for light brown F5–F7, which is unusual within the genus *Toxares* and the subfamily Aphidiinae. Also, the very elongate first metasomal tergite and pterostigma are clear apomorphic characters. The genus *Praon* is very diverse within the subfamily Aphidiinae, but interestingly, only 12 species are known in the Oriental region (Yu *et al.* 2016), with *P. tonkinensis* sp. nov. as an additional species.

Although based on only 154 examined specimens, the discovery of 12 species new to science highlights how poorly investigated the Aphidiinae fauna of the Oriental region remains. Additional research is necessary to improve knowledge about aphid parasitoids, especially their host associations, because of their potential importance in biocontrol programs. We believe that some newly described species are potential resources for biocontrol in Vietnam and Southeast Asia, as species of the genera *Aphidius*, *Binodoxys*, *Ephedrus*, and *Praon* are commonly associated with aphid pests in crops (Ferrer-Suay *et al.* 2025). However, it is necessary to rear parasitoids to discover aphid-plant host associations in the region to obtain reliable information about aphid host relationships. Several recorded parasitoid species (*Aphidius ervi*, *A. urticae*, *Binodoxys communis*, *Lipolexis oregmae*) are known biocontrol agents of pest aphids (e.g., *Aphis craccivora* (Koch, 1854), *A. gossypii* Glover, 1877) in Southeast Asia (Waterhouse 1998). Some of these are mass-produced for the market (*Aphidius ervi* Haliday, 1834; *A. rapae* (McIntosh, 1855); *Ephedrus plagiator* (Nees, 1811)) (Hågvar & Hofsvang 1991; Boivin *et al.* 2012). Our research is preliminary, based on a small number of specimens collected with Malaise traps and sweep netting. Future research should increase sampling efforts in the region and integrate records of aphid host associations.

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Author contribution

Writing original draft: ŽT. Conceptualisation: ŽT, CvA. Resources: CvA, KDL. Formal Analysis: ŽT, CvA. Investigation & Validation: CvA, ŽT. Methodology: ML, VŽ. Writing – review & editing: all authors.

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