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New records of species of the genus *Trypoxylon* Latreille, 1796 (Hymenoptera: Crabronidae) from northern Vietnam

Новые находки видов рода *Trypoxylon* Latreille, 1796 (Hymenoptera: Crabronidae) из северного Вьетнама

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KEY WORDS: new record, species group, taxonomy, *Trypoxylon*, Crabronidae, northern Vietnam.

КЛЮЧЕВЫЕ СЛОВА: новая находка, видовые группы, таксономия, *Trypoxylon*, Crabronidae, северный Вьетнам.

ABSTRACT. In Vietnam, seven species of the genus *Trypoxylon* (Hymenoptera: Crabronidae) have been recorded. In the present work, we study the *Trypoxylon* species from northern Vietnam resulting in records of 14 species, namely *T. bicolor* F. Smith, 1856; *T. cagrum* Tsuneki, 1979; *T. fulviventre* Tsuneki, 1979; *T. interruptum* Tsuneki, 1978; *T. orientale* Cameron, 1904; *T. paeninsulicola* Tsuneki, 1979; *T. petiolatum* F. Smith, 1858; *T. pileatum* F. Smith, 1856; *T. prominens* Tsuneki, 1979; *T. rufigaster* Tsuneki, 1979; *T. thaianum* Tsuneki, 1961; *T. tomi* Tsuneki, 1979; *T. varipilosum* Cameron, 1901; and *T. yumi* Tsuneki, 1979. Of these, except *T. petiolatum* and *T. prominens,* the others are recorded for the first time from the country. Altogether, 19 species of the genus *Trypoxylon* have been recorded from Vietnam. A key to the *Trypoxylon* species from northern Vietnam is presented.

РЕЗЮМЕ. Во Вьетнаме было зарегистрировано семь видов рода *Trypoxylon* (Hymenoptera: Crabronidae). В настоящей работе мы указываем 14 видов *Trypoxylon* из северного Вьетнама, а именно *T. bicolor* F. Smith, 1856; *T. cagrum* Tsuneki, 1979; *T. fulviventre* Tsuneki, 1979; *T. interruptum* Tsuneki, 1978; *T. orientale* Cameron, 1904.; *T. paeninsulicola* Tsuneki, 1979; *T. petiolatum* F. Smith, 1858; *T. pileatum* F. Smith, 1856; *T. prominens* Tsuneki, 1979; *T. rufigaster* Tsuneki, 1979; *T. thianum* Tsuneki, 1961; *T. tomi* Tsuneki, 1979 г.р.; *T. varipilosum* Cameron, 1901; и *T. yumi* Tsuneki, 1979. Кроме *T. petiolatum* и *T. prominens* остальные отмечены впервые для страны. Всего во Вьетнаме зарегистрировано 19 видов рода *Trypoxylon*. Представлен определитель видов *Trypoxylon* из северного Вьетнама.

Introduction

Trypoxylon is a genus of solitary wasps of the family Crabronidae and consists of 633 species distributed worldwide [Pulawski, 2022]. The genus is characterized by the slender body, the mid tibia with an apical spur, inner eye orbits distinctly emarginated, the forewing with one submarginal and discoidal cells each, and the clavate- or flask-shaped gastral petiole [Bohart, Menke, 1976; Tsuneki, 1978a, 1979a]. The latter characteristics differ in the shape of the 1st gastral segment. In the species with clavate-shaped gastral petiole, 1st gastral segment is moderately widened apically, whereupon its lateral sides are subparallel and tergite 1 envelopes laterally sternite 1 almost to basal vertical joining plate. In the species with flask-shaped gastral petiole, 1st abdominal segment is strongly widened apically, with its lateral sides parallel and tergite 1 envelopes laterally sternite 1 only at the apex, after which it continues to the base of the segment in the form of a narrow dorsal band.

Many species of *Trypoxylon,* based on external morphological characters, have been arranged in different species groups, such as the *T. fabricator*, *T. brevipenne*, *T. carpenteri*, *T. mandibulatum*, and *T. nitidum* groups

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[Richards, 1934], the *T. attennuatum* group [Antropov, 1991], the *T. figulus* group [Richards, 1934; Antropov, 2003], and the *T. scutatum* group [Tsuneki, 1978; Antropov, 2003, 2011]. Tsuneki [1981f], based on the structure of male genitalia, divided the *Trypoxylon* species into three major groups with 96 groups. He also arranged species with unknown males in these three major groups.

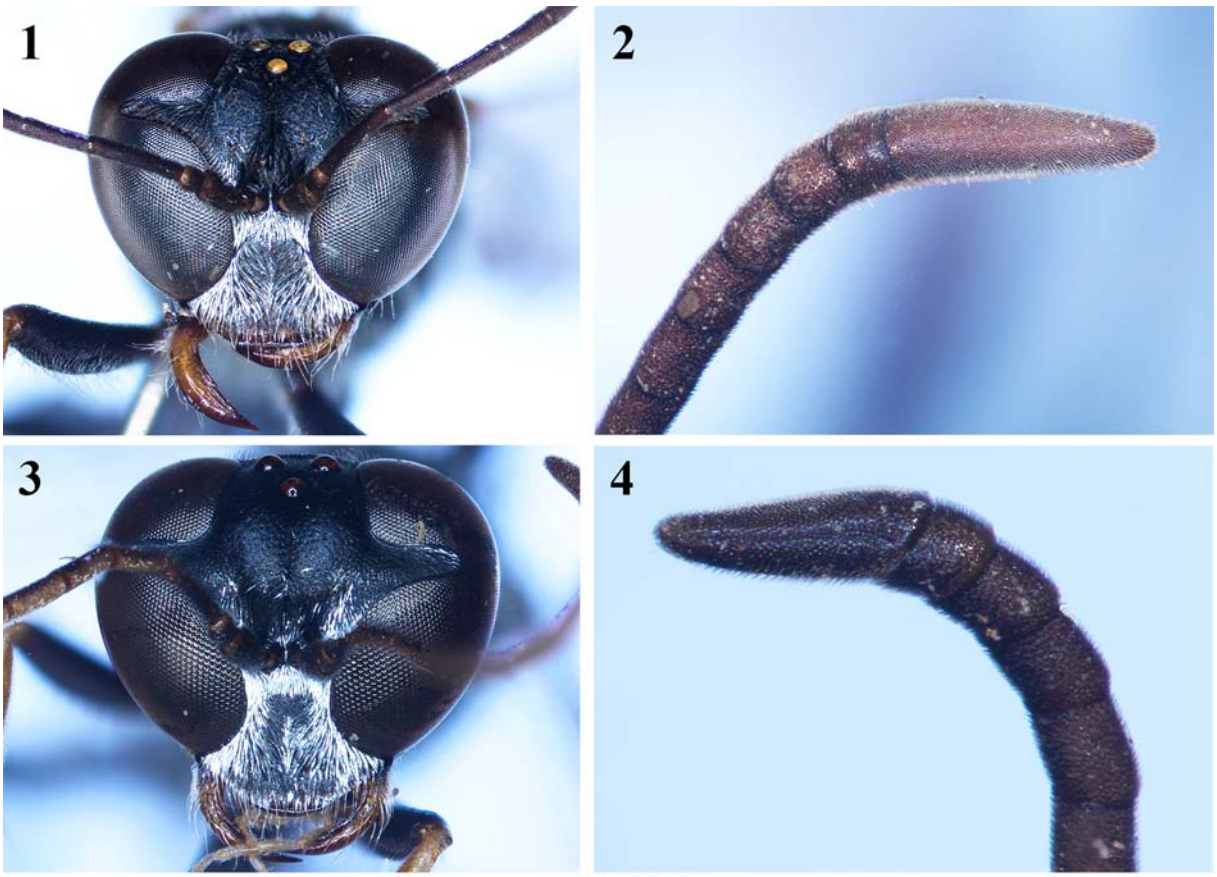
Main contributions on taxonomy study of *Trypoxylon* are by several authors. For example, Richards [1934] revised the New World species, Sandhouse [1940] revised the Nearctic species, Tsuneki [1956, 1966, 1977, 1978a, b, 1979a, b, c, 1980a, b, 1981a, b, c, d, e, f] studied the species from the Oriental and Australian Regions, as well as those from northeastern Asia and presented comments on several European species, and Antropov [1986, 1987, 1989a, b, 1994] studied the species from the Oriental and Palearctic regions.

Seven species of the genus *Trypoxylon* have been recorded from Vietnam, namely *T. bidenticulatum* Tsuneki, *T. petiolatum* F. Smith, *T. pygmaeum* Cameron, *T. maculipes* Tsuneki, *T. prominens* Tsuneki, *T. schmiedeknechtii* Kohl, and *T. sextum* Tsuneki [Pham et al., 2015; Pham, Antropov, 2021]. In this present study, we provide a study on the *Trypoxylon* species of the *T. bicolor, T. coloratum, T. fulviventre, T. orientale, T. prominens, T. rufigaster,* and *T. scutatum* species groups from northern Vietnam with many new records for the country.

Materials and methods

The sampling was taken using sweeping nets, Malaise traps, and trap nests. The trap nests were made by hollow reed and bamboo stems, about 5–45 cm long and 5–25 mm in diameter. Ten to 20 trap nests were tied up to a bundle and a piece of plastic was used to cover the outside of this bundle. The trap nests were put on branches of various bushes and trees, about 1–2.2 meters from the ground, and regularly checked every 15 days. Trap nests occupied by *Trypoxylon* were collected and reared under laboratory conditions to hold adult wasps that emerged from them. Information on methods of the collection in which specimens taken was mentioned in labels of examined specimens.

Morphological terms used in a key in general follow Bohart, Menke [1976] and Tsuneki [1978a, b]. Information on the distribution of all species was taken from Pulawski [2022]. The external morphological characters were observed from pinned and dried specimens with the aid of a stereoscopic microscope. Tsuneki [1978a, 1979a] were used for the identification of examined species. A key to the species of *Trypoxylon* from northern Vietnam was constructed only from the specimens of the species in the present study. Photographic images were taken using a Nikon SMZ800N microscope camera and a Canon camera SD3500 IS. Provincial distributions were only for records from Vietnam.



Figs 1–4. *Trypoxylon* spp.: 1–2 — *T. bicolor*; 3–4 — *T. petiolatum*; 1, 3 — head in frontal view, female; 2, 4 — flagellum, male.
Рис. 1–4. *Trypoxylon* spp.: 1–2 — *T. bicolor*; 3–4 — *T. petiolatum*; 1, 3 — голова спереди, самка; 2, 4 — жгутик, самец.

The specimens examined in the present study are deposited in the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology, Ha Noi, Vietnam.

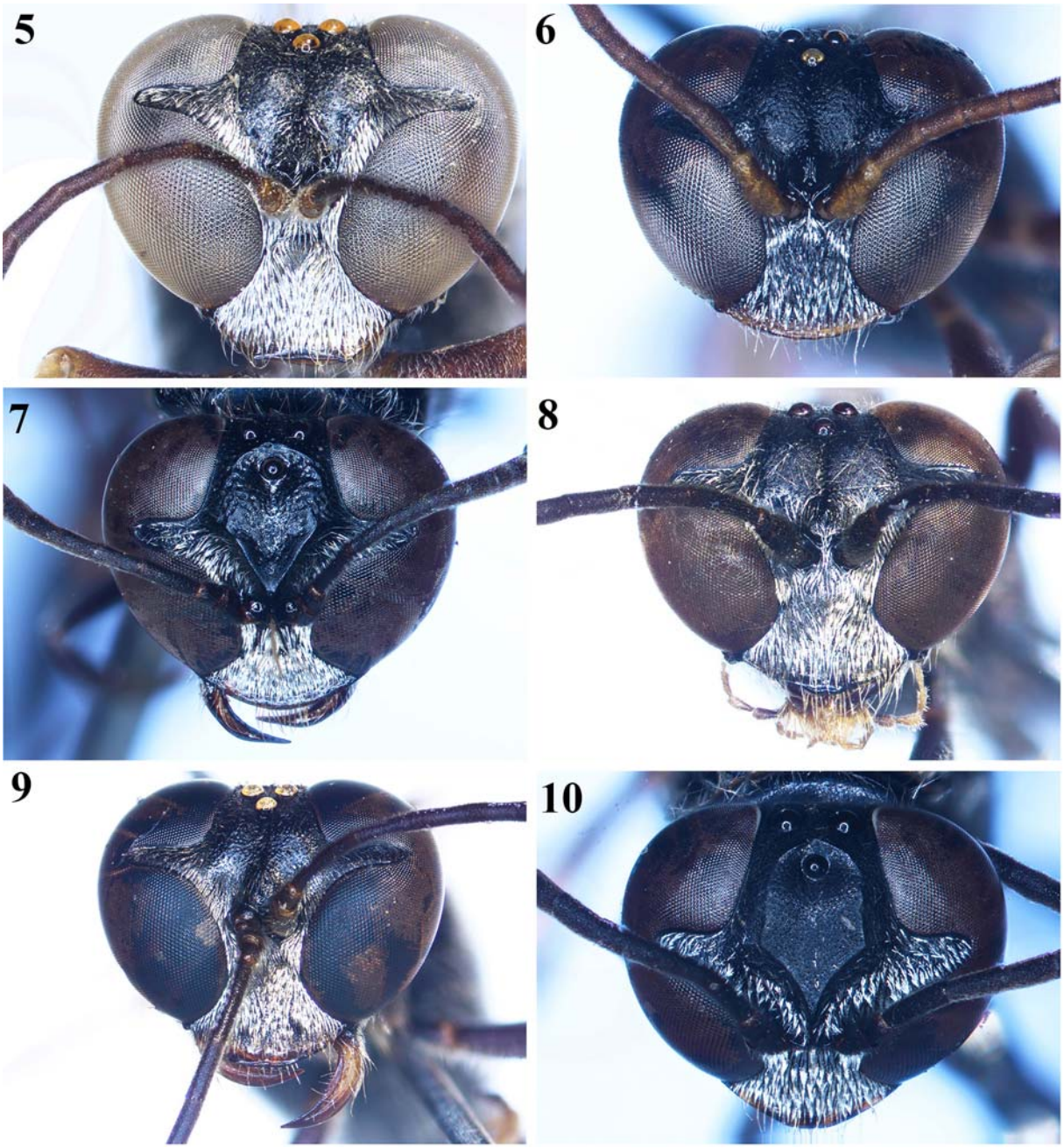
The following abbreviations are used in the text: ASR — antennal socket rim; IOD — interocular distance; IODc — minimum IOD measured at the clypeus; IODv — minimum IOD measured at the vertex; IODs = IODv: IODc; PAF — furrow between ASR and SAT; SAT — supraantennal tubercle.

Results

Genus *Trypoxylon* Latreille, 1796

KEY TO THE SPECIES OF *TRYPOXYLON* FROM NORTHERN VIETNAM

1. Frons with shield (Figs 7, 10, 13); gaster wholly black (Figs 19, 26, 28) 2
— Frons without shield (Figs 1, 3, 5–6, 8–9, 11–12, 14–16); gaster wholly or partly ferruginous (Figs 17–18, 20–25, 27, 29–30) 4



Figs 5–10. *Trypoxylon* spp, head in frontal view: 5 — *T. cagrum*; 6 — *T. fulviventre*; 7 — *T. interruptum*; 8 — *T. orientale*; 9 — *T. paeninsulicola*; 10 — *T. pileatum*; 5, 7–10 — females; 6 — male.

Рис. 5–10. *Trypoxylon* spp, голова спереди: 5 — *T. cagrum*; 6 — *T. fulviventre*; 7 — *T. interruptum*; 8 — *T. orientale*; 9 — *T. paeninsulicola*; 10 — *T. pileatum*; 5, 7–10 — самки; 6 — самец.

2. Frontal shield with upper lateral carinae broadly interrupted, dorsal carina distinctly present, lower carina straight (Fig. 7); pronotum undiscoloured posteriorly; body length 12–13 mm (female) ..... *T. interruptum* Tsuneki, 1978
— Frontal shield with upper lateral carinae uninterrupted, lower carina curved or lightly zigzag (Figs 10, 13); pronotum discoloured or undiscoloured posteriorly; body length 8–12 mm 3
3. Frontal shield with lower area nearly flat, upper area deeply depressed around fore ocellus (Fig. 10); interantennal transverse carina without hole above (Fig. 10); mesoscutum weakly microcoriaceous; body length 8 mm (female) ..... *T. pileatum* F. Smith, 1856
— Frontal shield with lower area conspicuously inclined (Fig. 13); interantennal transverse carina with deep hole above (Fig. 13); mesoscutum fairly and sparsely punctate; body length 11–12 mm (female) .... *T. thaianum* Tsuneki, 1961
4. Gaster black with median area (from apex of petiole to gastral segment 3 or from apex of petiole to base of gastral segment 4) ferruginous (Figs 17, 20, 22–23) 5
— Gaster wholly or from apex of petiole to last gastral segment ferruginous (Figs 18, 21, 24, 25, 27, 29–30) 8
5. Clypeus conspicuously protruded mediapically (Fig. 8); gaster from apex of petiole to gastral segment 3 ferruginous lateraldorsally, darkly marked dorsally and ventrally (Fig. 20); legs black (Fig. 20); IODs = 1:1 (Fig. 8); body length 11–14 mm (both female and male) .... *T. orientale* Cameron, 1904
— Clypeus round mediapically (Figs 1, 3, 11); gaster from apex of petiole to base of gastral segment 4 ferruginous (Figs 17, 22–23); legs black, with ferruginous spots (Figs 17, 22–23); IODs varied (Figs 1, 3, 11) 6
6. SAT with apical margin roundly curved and acutely edged, produced over PAFs; head lightly convergent at lower part (nearly round); IODs = 3:2 (Fig. 11); flagellum black (Figs 11, 23); body length 12–13 mm (female) ... . *T. prominens* Tsuneki, 1979
— SAT without apical margin roundly curved and acutely edged; head conspicuously convergent at lower part; IODs = 5:4 or 4:3 (Figs 1, 3); flagellum brown beneath (Figs 17, 22); body length 10–19 mm 7
7. Vertex conspicuously depressed (Fig. 1); anterior margin of clypeus moderately curved (Fig. 1); IODs = 5:4 (Fig. 1); in males, flagellomere 11 in lateral view distinctly tapering (Fig. 2); body length 14–19 mm (both female and male) ..... *T. bicolor* F. Smith, 1856
— Vertex undepressed (Fig. 3); anterior margin of clypeus conspicuously curved (Fig. 3); IODs = 4:3 (Fig. 1); in males, flagellomere 11 in lateral view not tapering, lightly curved medially; body length 9–14 mm (both female and male) ..... *T. petiolatum* F. Smith, 1858
8. Gaster wholly ferruginous (Fig. 27); scape, pedicel and base of flagellomere 1 yellowish brown (Fig. 12); body length 11–12 mm (female) . *T. rufigaster* Tsuneki, 1979
— Gaster from apex of petiole to last gastral segment ferruginous (Figs 18, 21, 24–25, 29–30); scape, pedicel and base of flagellomere 1 black or ferruginous (Figs 5–6, 9, 14–16) 9
9. PAF shallow (Fig. 9); IODs = 10:9 (Fig. 9); legs mostly black (Fig. 21); body length 17 mm (female) .... *T. paeninsulicola* Tsuneki, 1979
— PAF deep (Figs 5–6, 14–16); IODs varied; legs mostly ferruginous or pale brown (Figs 18, 24–25, 29–30) .. 10
10. IODs = 3:1 (Fig. 14); clypeus distinctly pointed mediapically (Fig. 14); scape and pedicel pale brownish (Fig. 14); body length 9 mm (female) ..... *T. tomi* Tsuneki, 1979
— IODs varied; clypeus nearly round or largely truncated mediapically; scape and pedicel ferruginous or black 11
11. Anterior oblique flattened area of SAT with distinct hole (Fig. 16); gastral segment 5 and 6 darkly red (Fig. 30); IODs = 5:4 (Fig. 16); body length 10 mm (male) .... *T. yumi* Tsuneki, 1979
— Anterior oblique flattened area of SAT without hole; gastral segment 5 and 6 ferruginous (Figs 18, 24–25); IODs = 3:2 or 10:9 (Figs 5–6, 15) 12
12. Antennae wholly and legs mostly ferruginous (Fig. 24); ASR roundly inclined to PAF; hairs whitish brassy; body length 13 mm (female) .... *T. varipilosum* Tsuneki, 1979
— Antennae except scape and pedicel black (Figs 5–6); legs mostly pale brown or ferruginous (Figs 18, 25); ASR steeply inclined to PAF; hairs silvery 13
13. Clypeus largely truncated mediapically (Fig. 5); scape and pedicel brownish black; legs largely ferruginous (Fig. 18); IODs = 3:2 (Fig. 5); body length 16 mm (female) . ..... *T. cagrum* Tsuneki, 1979
— Clypeus round mediapically (Fig. 5); scape and pedicel ferruginous; legs pale brown to black (Fig. 25); IODs = 5:4 (Fig. 6); body length 9 mm (male) .... *T. fulviventre* Tsuneki, 1979

Trypoxylon bicolor F. Smith, 1856
Figs 1–2, 17.

SPECIMENS EXAMINED. Vietnam: Son La: 1 ♀, Son La city, 20–30.viii.2017, Malaise trap, Coll. Khuat Dang Long; 1 ♀, Kho Hong, Chieng Xuan, Van Ho, 13–18.vi.2018, Malaise trap, Coll. Phong Huy Pham. Hoa Binh: 2 ♀♀, My Tan, Tan Thanh, Luong Son, 27.v–27.vi.2019, 27.vi. 2019, Malaise trap, trap nest, Coll. Phong Huy Pham; 1 ♀, Thanh Lap, Luong Son, 25.ix–5.x.2018, Malaise trap, Coll. Phong Huy Pham; 6 ♀♀ + 5 ♂♂, Kim Boi, 25.iv–5.v.2012, 5–15.vi.2012, 25.vi–5.vii.2012, 15–25.vii.2012, 5–15.viii.2012, 15–25.viii.2012, 15–25.ix.2012, 5–15.xi.2012, 5–15.vii.2018, Malaise trap, Colls. Khuat Dang Long and Hoa Thi Dang. Vinh Phuc: 4 ♀♀, Me Linh Station for Biodiversity, Ngoc Thach, Me Linh, 6–12.vi.2018, 12–25.vii.2018, trap nest, Coll. Phong Huy Pham. Thai Nguyen: 1 ♀, An Lac, Phu Luong, 22.vii–9.viii.2018, Malaise trap, Coll. Hoa Thi Dang. Tuyen Quang: 1 ♀, Na Hang, 30.x–10.xi.2017, Malaise trap, Coll. Khuat Dang Long. Ha Giang: 1 ♀, Cao Bo, Vi Xuyen, 5–15.x.2001, Malaise trap.

DISTRIBUTION. Vietnam: Cao Bang, Ha Giang, Hoa Binh, Son La, Thai Nguyen, Vinh Phuc. China, Hawaii, India, Indonesia, Japan, Malaysia, Philippines, Singapore, Sri Lanka, Thailand [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon bicolor* is a member of the *T. bicolor* species group [Tsuneki, 1981f]. Males of *T. bicolor* are very similar to those of *T. petiolatum*. Tsuneki [1979a] separated males of these two species only by measurement parameters of antennal segments, the colour of mid tibiae, shape of the pronotal lamina, and the body length. These external morphological characters are difficult to convince us of the identification of the males of the two in the Vietnamese specimens because of distinct variations of the characters. We, based on the Vietnamese specimens of the males of these two species, produce two morphological characters that are easy to distinguish between them as follows: in *T. bicolor*, the vertex conspicuously depressed and its surface lower than the vertical margin at the upper margin of eyes (in *T. petiolatum*, the vertex undepressed and its surface level to the vertical margin at the upper margin of eyes) and in *T. bicolor*, flagellomere 11 in lateral view lightly distinctly tapering (Fig. 2) (in *T. petiolatum*, flagellomere 11 in lateral view not tapering, lightly curved medially) (Fig. 4).

Both *T. bicolor* and *T. petiolatum,* based on collected specimens, are widely distributed in northern Vietnam. Whereas *T. bicolor* was collected only in highland areas, *T. petiolatum* was widely collected in both lowland and highland areas, but mainly in the lowland area.

Trypoxylon cagrum Tsuneki 1979
Figs 5, 18.

SPECIMENS EXAMINED. Vietnam: Vinh Phuc: 1 ♀, Tam Dao National Park, Tam Dao, 1–10.viii.2012, Malaise trap, Coll. Khuat Dang Long.

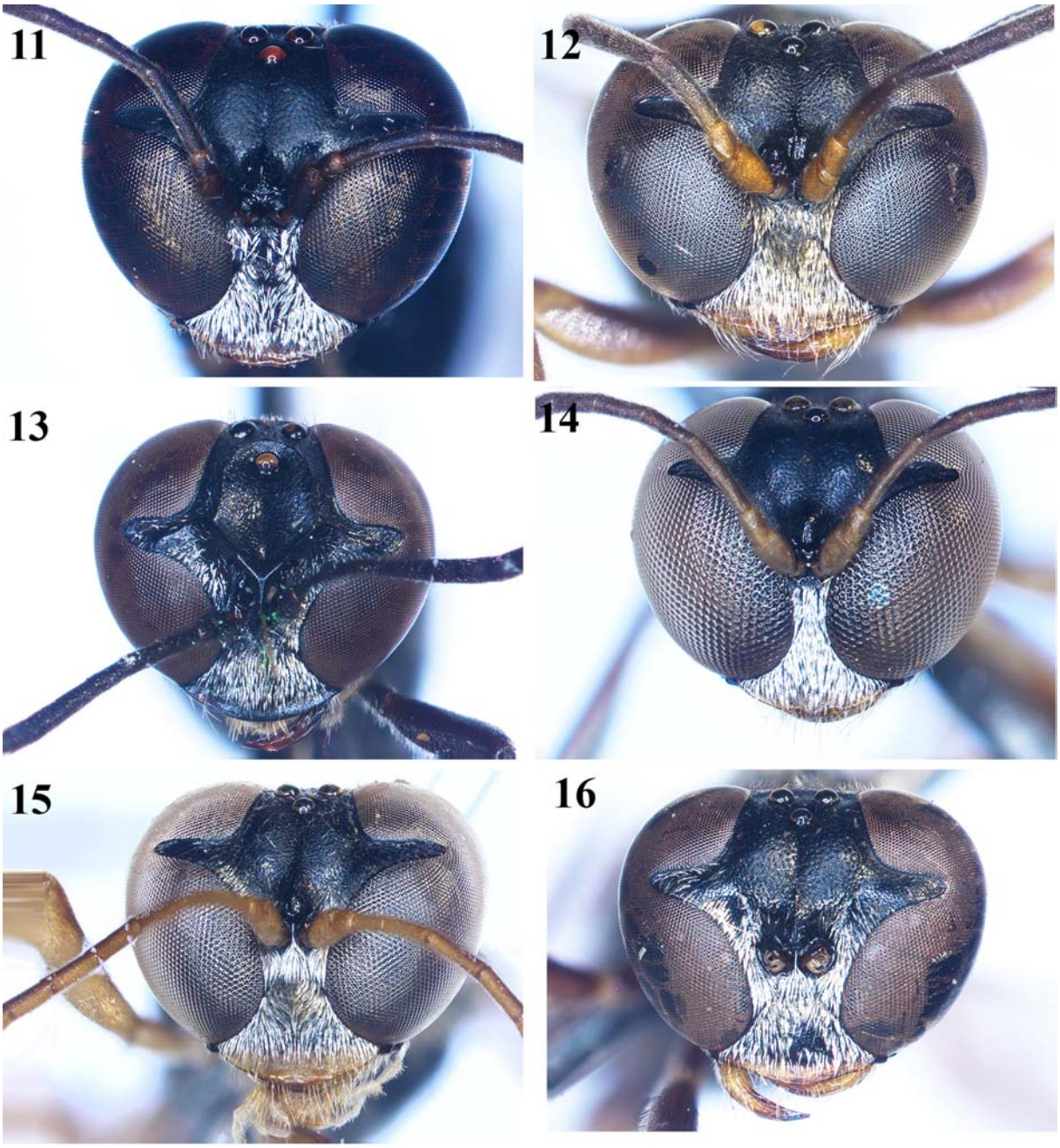
DISTRIBUTION. Vietnam: Vinh Phuc. Thailand [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon cagrum* is a member of the *T. coloratum* species group [Tsuneki, 1981f].

Trypoxylon fulviventre Tsuneki, 1979
Figs 6, 25.

SPECIMENS EXAMINED. Vietnam: Hoa Binh: 1 ♂, Thuong Tien, Kim Boi, 5.viii.2012, Malaise trap, Coll. Khuat Dang Long.

DISTRIBUTION. Vietnam: Hoa Binh. Laos, Singapore [Pulawski, 2022]. New record from Vietnam.



Figs 11–16. *Trypoxylon* spp, head in frontal view: 11 — *T. prominens*; 12 — *T. rufigaster*; 13 — *T. thaianum*; 14 — *T. tomi*; 15 — *T. varipilosum*; 16 — *T. yumi*; 11–15 — females; 16 — male.

Рис. 11–16. *Trypoxylon* spp, голова спереди: 11 — *T. prominens*; 12 — *T. rufigaster*; 13 — *T. thaianum*; 14 — *T. tomi*; 15 — *T. varipilosum*; 16 — *T. yumi*; 11–15 — самки; 16 — самец.

REMARKS. *Trypoxylon fulviventre* is a member of the *T. fulviventre* species group [Tsuneki, 1981f].

Trypoxylon interruptum Tsuneki, 1978
Figs 7, 19.

SPECIMENS EXAMINED. Vietnam: Tuyen Quang: 2 ♀♀, Na Hang, 20–30.v.2017, 20–30.ix.2017, Malaise trap, Coll. Khuat Dang Long. Vinh Phuc: 2 ♀♀, Me Linh Station for Biodiversity, 15–30.v.2008, 6–12.vi.2018, Malaise trap, Coll. Phong Huy Pham.

DISTRIBUTION. Vietnam: Tuyen Quang, Vinh Phuc. China, Laos, Sri Lanka [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon interruptum* is a member of the *T. scutatum* species group [Tsuneki, 1981f].

Trypoxylon orientale Cameron 1904
Figs 8, 20.

SPECIMENS EXAMINED. Vietnam: Son La: 2 ♀♀, Copia Natural Reserve, Thuan Chau, 15.v.2017, > 1000 m, Coll. Phong Huy Pham. Vinh Phuc: 5 ♀♀, 12 ♂♂, Tam Dao National Park, Tam Dao, 24.viii.2011, 20.x.2011, 30.x.2011, 20.xi.2011, 20–30.vi.2012, 1–10.vii.2012, 1–10.viii.2012, 10–20.viii.2012, 10–20.x.2012, 1–10.xi.2012, Malaise trap, Coll. Khuat Dang Long.

DISTRIBUTION. Vietnam: Son La, Vinh Phuc. China, India, Indonesia, Malaysia, Myanmar, Nepal [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon orientale* is a member of the *T. orientale* species group [Tsuneki, 1981f].

Trypoxylon paeninsulicola Tsuneki, 1979
Figs 9, 21.

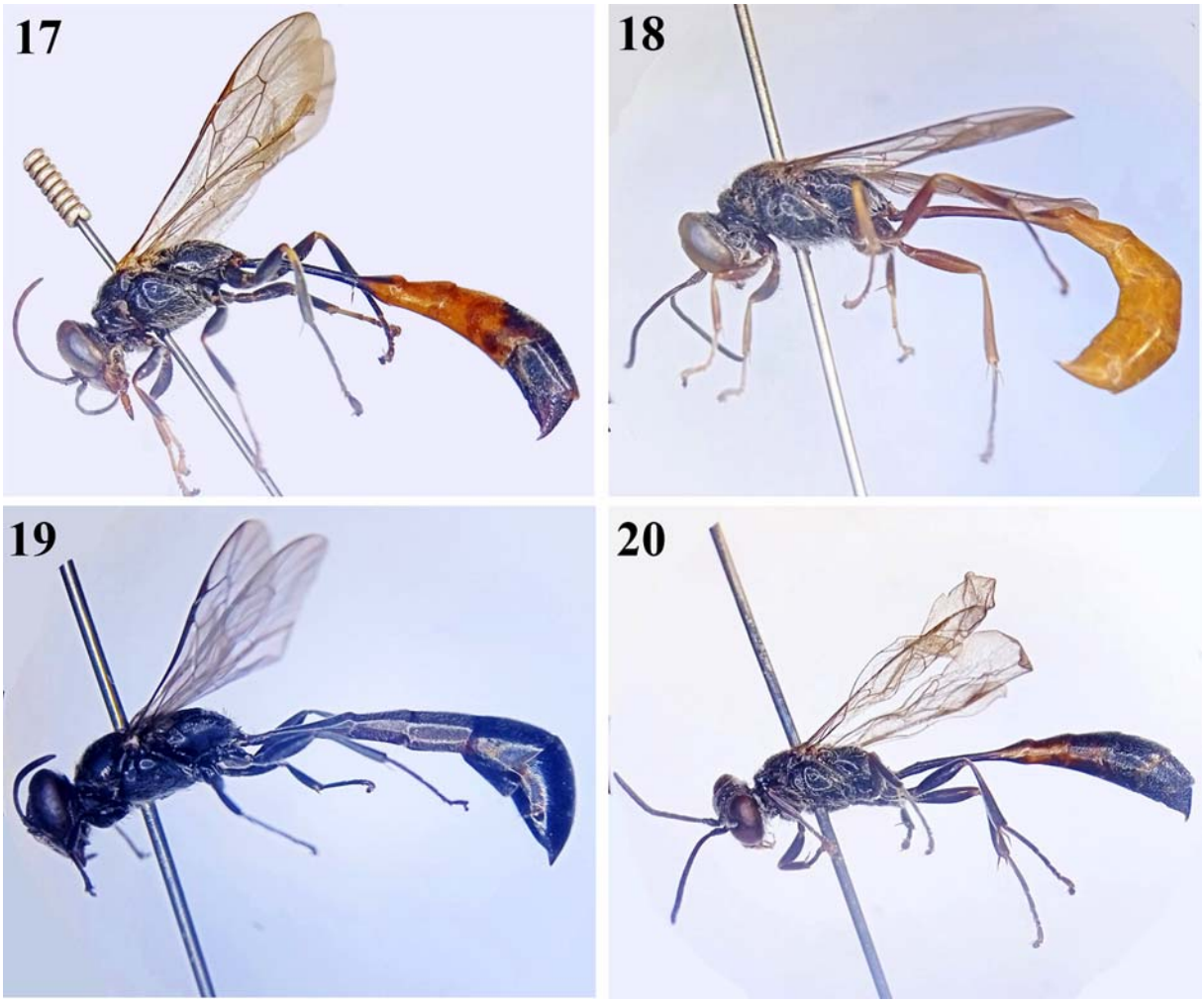
SPECIMENS EXAMINED. Vietnam: Tuyen Quang: 1 ♀, Na Hang, 5–15.iii.2018, Malaise trap, Coll. Khuat Dang Long.

DISTRIBUTION. Vietnam: Tuyen Quang. Malaysia [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon paeninsulicola* is a member of the *T. coloratum* species group [Tsuneki, 1981f].

Trypoxylon petiolatum F. Smith, 1858
Figs 3–4, 22.

SPECIMENS EXAMINED. Vietnam: Hanoi: 3 ♀♀, 2 ♂♂, Co Nhue 2, Bac Tu Liem, 3.iv.2017, 29.viii.2020, trap nest, Coll. Phong Huy Pham; 1 ♀, 2 ♂♂, Bai Giua Song Hong, Long Bien, 9.viii.2016, Coll. Dang Thi Hoa; 2 ♀♀, Da Ton, Gia Lam, 4–14.v.2001, 5–15.ix.2002, Malaise trap, Coll. Khuat Dang Long; 1 ♀, Xuan Mai, 15.viii.2010, Coll. Phong Huy Pham; 1 ♂, Dien, Bac Tu Liem, 28.iv.2017, Coll. Phong Huy Pham; 1 , 2 ♂♂, Bai Giua Song Hong, Long Bien, 19.ix.2012, Coll. Dang Thi Hoa; 1 ♂, Hoa Lac, Thach That, 5–15.vii.2002, Malaise trap, Coll. Khuat Dang Long; 1 ♀, Thuy Xuan Tien, Chuong My, 1–14.ix.2017, Malaise trap, Coll. Phong Huy Pham. Ninh Binh: 3 ♀♀, Bai Dinh Temple, Gia Sinh, Gia Vien, 25.vi.2017, Coll. Phong Huy Pham; 2 ♀♀, Thung Den Tran,



Figs 17–20. *Trypoxylon* spp, female habitus, lateral view: 17 — *T. bicolor*; 18 — *T. cagrum*; 19 — *T. interruptum*; 20 — *T. orientale*.
Рис. 17–20. *Trypoxylon* spp, внешний вид самки сбоку: 17 — *T. bicolor*; 18 — *T. cagrum*; 19 — *T. interruptum*; 20 — *T. orientale*.

Trang An, 23.vi.2017, Coll. Phong Huy Pham. Hoa Binh: 1 ♀, My Tan, Tan Thanh, Luong Son, 27.v.2019, Coll. Phong Huy Pham; 5 ♀♀, 7 ♂♂, Kim Boi, x–xi.2009, 25.iv–5.v.2012; 25.v–5.vi.2012, 5–15.vii.2012, 15–25.vii.2012, 5–15.viii.2012, 5–15.ix.2012, 15–25.ix.2012, 25.x–5.xi.2012, Malasise trap, Coll. Khuat Dang Long; 4 ♀♀, 6 ♂♂, Da Phuc, Yen Thuy, 10–20.iv.2003, 1–10.ix.2002, 20–30.ix.2002, 20–30.x.2002, Malasise trap, Coll. Khuat Dang Long; 2 ♀♀, 1 ♂, Thanh Lap, Luong Son, 25.ix–5.xi.2018, Malaise trap, Coll. Dang Thi Hoa; 1 ♂, Bao Hieu, Yen Thuy, 10–20.vi.2003, Malaise trap, Coll. Khuat Dang Long; 1 ♀, 2 ♂♂, Da Phuc, Yen Thuy, 15–30.viii.2002, 1–10.v.2003, Malaise trap, Coll. Khuat Dang Long; 2 ♀♀, 4 ♂♂, Kim Boi, 5–15.vi.2012, 5–15.vii.2012, 25.viii–5.ix.2012, Malaise trap, Coll. Khuat Dang Long. Cao Bang: 3 ♂♂, Ban Hau, Trung Khanh, unknown time of collection, Coll. Nguyen Quang Truong. Thai Nguyen: 2 ♂♂, An Lac, Phu Luong, 1–15.ix.2017, 22.vii–9.viii.2018, Malaise trap, Coll. Dang Thi Hoa. Son La: 1 ♂, Muong Thai, Ham Yen, 11.viii.2017, Coll. Phong Huy Pham. Vinh Phuc: 4 ♀♀, Me Linh Station for Biodiversity, Ngoc Thach, Me Linh, 5–15.iv.2008, 18.vi.2013, 17.vii.2013, Malaise trap, Colls. Khuat Dang Long and Dang Thi Hoa. Thai Binh: 4 ♀♀, Dong Hung, 18.vi.2014, Coll. Dang Thi Hoa. Hai Phong: 3 ♀♀, 3 ♂♂, Cat Ba National Park, Cat Hai, 2–17.viii.2022, trap nests, Coll. Phong Huy Pham.

DISTRIBUTION. Vietnam: Cao Bang, Hai Phong, Hanoi, Hoa Binh, Ninh Binh, Son La, Thai Binh, Thai Nguyen, Vinh Phuc (present study), Dak Lak [Tsuneki, 1979a; Pham, Antropov, 2021]. China, Hawaii, Korea, India, Indonesia, Japan, Malaysia, Laos, Maldives Islands, Myanmar, New Guinea, Nepal, Philippines, Singapore, South Pacific islands, Taiwan, Thailand [Pulawski, 2022].

REMARKS. *Trypoxylon petiolatum* is a member of the *T. bicolor* species group [Tsuneki, 1981f].

Trypoxylon pileatum F. Smith, 1856
Figs 10, 26.

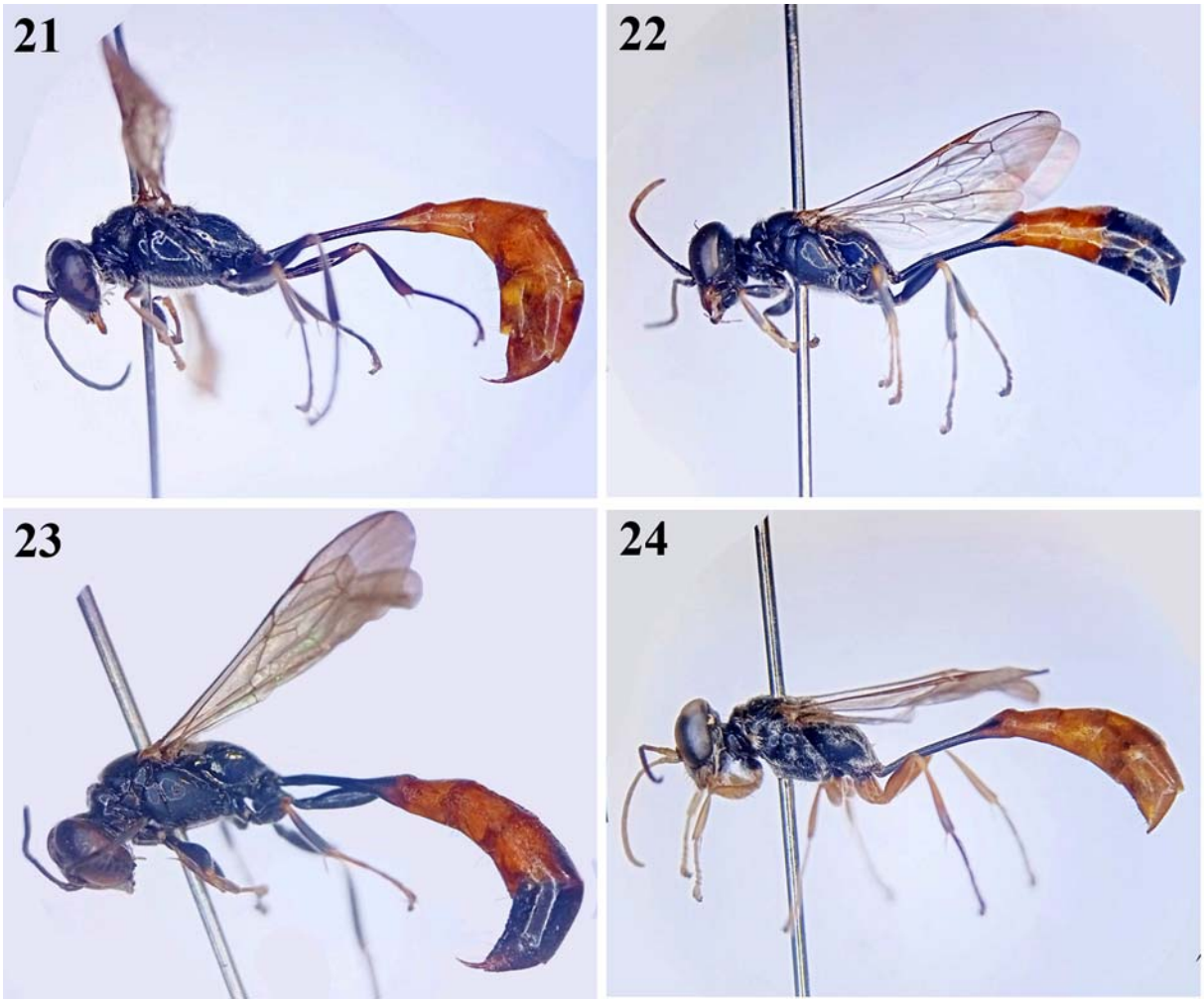
SPECIMENS EXAMINED. Vietnam: Son La: 1 ♀, Son La city, 10–20.vi.2017, Malaise trap, Coll. Khuat Dang Long.

DISTRIBUTION. Vietnam: Son La. Bangladesh, China, India, Sri Lanka [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon pileatum* is a member of the *T. scutatum* species group [Tsuneki, 1981f].

Trypoxylon prominens Tsuneki, 1979
Figs 11, 23.

SPECIMENS EXAMINED. Vietnam: Vinh Phuc: 1 ♀, Me Linh Station for Biodiversity, Ngoc Thach, Me Linh, 6–12.vi.2018, Malaise trap, Coll. Phong Huy Pham.



Figs 21–24. *Trypoxylon* spp, female habitus, lateral view: 21 — *T. paeninsulicola*; 22 — *T. petiolatum*; 23 — *T. prominens*; 24 — *T. varipilosum*.

Рис. 21–24. *Trypoxylon* spp, внешний вид самки сбоку: 21 — *T. paeninsulicola*; 22 — *T. petiolatum*; 23 — *T. prominens*; 24 — *T. varipilosum*.

DISTRIBUTION. Vietnam: Vinh Phuc. Indonesia, Laos [Pulawski, 2022].

REMARKS. *Trypoxylon prominens* is a member of the *T. prominens* species group [Tsuneki, 1981f].

Trypoxylon rufigaster Tsuneki, 1979
Figs 12, 27.

SPECIMENS EXAMINED. Vietnam: Tuyen Quang: 1 ♀, Na Hang, 30.v–10.vi.2017, Malaise trap, Coll. Khuat Dang Long. Vinh Phuc: 1 ♀, Tam Dao National Park, Tam Dao, 20–30.vi.2002, Malaise trap, Coll. Khuat Dang Long.

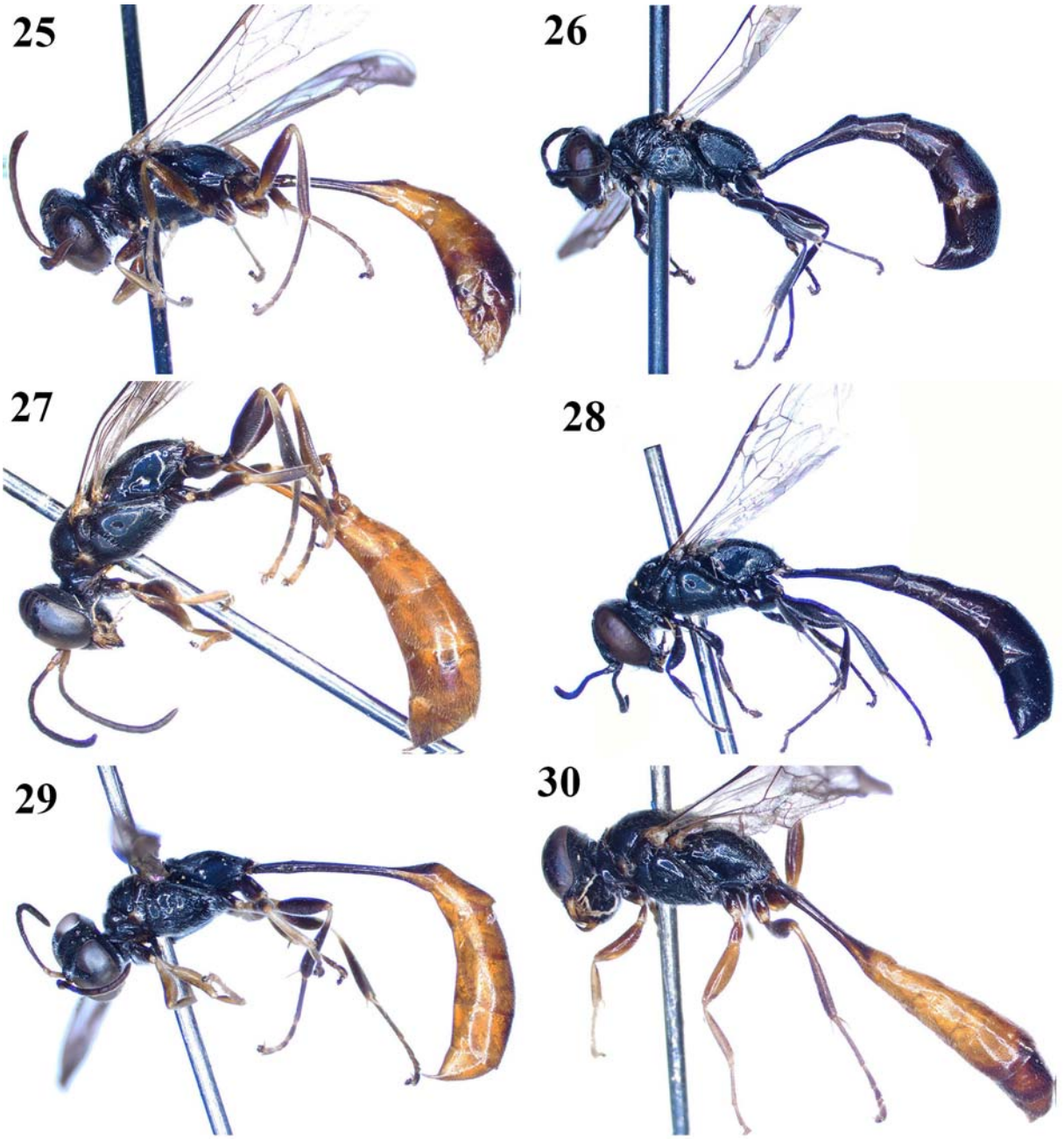
DISTRIBUTION. Vietnam: Tuyen Quang, Vinh Phuc. Laos [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon rufigaster* is a member of the *T. rufigaster* species group [Tsuneki, 1981f].

Trypoxylon thaianum Tsuneki, 1961
Figs 13, 28.

SPECIMENS EXAMINED. Vietnam: Thai Nguyen: 1 ♀, An Lac, Phu Luong, 1–19.x.2017, Malaise trap, Coll. Dang Thi Hoa.

DISTRIBUTION. Vietnam: Thai Nguyen. China, Indonesia, Japan, Malaysia, Philippines, Sri Lanka, Taiwan, Thai-



Figs 25–30. *Trypoxylon* spp, female habitus, lateral view: 25 — *T. fulviventre*, male; 26 — *T. pileatum*, female; 27 — *T. rufigaster,* female; 28 — *T. thaianum*, female; 29 — *T. tomi*, female; 30 — *T. yumi*, male.

Рис. 25–30. *Trypoxylon* spp, внешний вид самки сбоку: 25 — *T. fulviventre*, самец; 26 — *T. pileatum*, самка; 27 — *T. rufigaster,* самка; 28 — *T. thaianum*, самка; 29 — *T. tomi*, самка; 30 — *T. yumi*, самец.

land [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon thaianum* is a member of the *T. scutatum* species group [Tsuneki, 1981f].

Trypoxylon tomi Tsuneki, 1979
Figs 14, 29.

SPECIMENS EXAMINED. Vietnam: Vinh Phuc: 1 ♀, Tam Dao National Park, Tam Dao, 1–10.ix.2012, Malaise trap, Coll. Khuat Dang Long.

DISTRIBUTION. Vietnam: Vinh Phuc. Singapore [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon tomi* is a member of the *T. coloratum* species group [Tsuneki, 1981f].

Trypoxylon varipilosum Cameron, 1901
Figs 15, 24.

SPECIMENS EXAMINED. Vietnam: Ninh Binh: 1 ♀, Thung Den Tran, Trang An, 23.vi.2017, Coll. Phong Huy Pham.

DISTRIBUTION. Vietnam: Ninh Binh. Singapore, Philippines, Indonesia [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon varipilosum* is a member of the *T. coloratum* species group [Tsuneki, 1981f].

Trypoxylon yumi Tsuneki, 1979
Figs 16, 30.

SPECIMENS EXAMINED. Vietnam: Cao Bang: 1 ♂, Ban Hau, Cao Thang, Trung Khanh, time of collection unknown, Coll. Nguyen Quang Truong.

DISTRIBUTION. Vietnam: Cao Bang. Laos [Pulawski, 2022]. New record from Vietnam.

REMARKS. *Trypoxylon yumi* is a member of the *T. coloratum* species group [Tsuneki, 1981f].

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