

Received: 13 March 2026 • Accepted: 30 June 2026 • Published: 25 September 2026

Topic editor: Tony Robillard • Section editor: Gavin Broad • Desk editor: Kristiaan Hoedemakers

Monograph

[urn:lsid:zoobank.org:pub:69205CDE-9317-47EB-BA78-98C42945F6E3](https://zoobank.org/pub:69205CDE-9317-47EB-BA78-98C42945F6E3)

First record of the genus *Orthocentrus* Gravenhorst, 1829 (Hymenoptera, Ichneumonidae: Orthocentrinae) from Vietnam, with descriptions of nineteen new species

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Abstract. In this paper the orthocentrine genus *Orthocentrus* Gravenhorst, 1829 is reported from Vietnam for the first time. Twenty two species are recognized, with three Eastern Palaearctic species, *O. brachycerus* Humala & Lee, 2020, *O. leucostomus* Humala & Lee, 2020 and *O. pulchellus* Humala & Lee, 2020, recorded from the Indomalayan region for the first time, and nineteen species are described as new: *O. dalatensis* sp. nov., *O. dissidens* sp. nov., *O. excisus* sp. nov., *O. fossatus* sp. nov., *O. lamdongensis* sp. nov., *O. languidus* sp. nov., *O. lineatus* sp. nov., *O. mandibularis* sp. nov., *O. mystacinus* sp. nov., *O. nitidus* sp. nov., *O. papillosus* sp. nov., *O. pectoralis* sp. nov., *O. pilosus* sp. nov., *O. punctatus* sp. nov., *O. remotus* sp. nov., *O. sulcatus* sp. nov., *O. taeniatus* sp. nov., *O. tonkinensis* sp. nov., and *O. vietnamensis* sp. nov. An identification key to females of Vietnamese *Orthocentrus* is provided.

Keywords. Darwin wasps, biodiversity, new species, key, Indomalayan region.

Varga O. 2026. First record of the genus *Orthocentrus* Gravenhorst, 1829 (Hymenoptera, Ichneumonidae: Orthocentrinae) from Vietnam, with descriptions of nineteen new species. *European Journal of Taxonomy* 1100: 1–72. <https://doi.org/10.5852/ejt.2026.1100.3331>

Introduction

The subfamily Orthocentrinae Förster, 1869 is one of the most poorly studied groups of Darwin wasps in the Indomalayan region comprising only 21 known species (Yu *et al.* 2016; Humala 2021; Ranjith *et al.* 2022; Varga 2025). Most of the recorded species belong to a few genera of the *Helictes* group, while the species of the *Orthocentrus* group remain completely overlooked. So far, only two species of the latter group, *Orthocentrus fulvipes* (Gravenhorst, 1829) and *O. pallidifrons* (Morley, 1913), have been recorded from the Indomalayan region (Morley 1913; Uchida 1932; Chao 1976).

Orthocentrus Gravenhorst, 1829 is among the most studied genera of the *Orthocentrus* group, numbering already more than 150 described species (Veijalainen *et al.* 2014; Yu *et al.* 2016; Humala 2019; Humala *et al.* 2020; Watanabe *et al.* 2024; Varga & Di Giovanni 2025). Nevertheless, the genus is still relatively unevenly studied: most species have been described from the Neotropics (Veijalainen *et al.* 2014;

Zwakhals & Diller 2015), Mexico (Humala 2019) and South Korea (Humala *et al.* 2020), while the other territories remain largely (Europe) to almost completely (Afrotropical, Australasian, Nearctic, and Indomalayan regions) unstudied (Varga & Di Giovanni 2025).

Our knowledge of the biology of *Orthocentrus* remains scarce: most of the reliable host records belong to several species of the fungus gnat genera *Neoempheria* Osten Sacken, 1878 and *Sciophila* Meigen, 1818 of the family Mycetophilidae Newman, 1834 (Kolarov & Bechev 1995; Mukai & Kitajima 2021; Watanabe *et al.* 2024; Varga pers. obs.).

The Vietnamese orthocentrines had not been documented until the genera *Gnathochorisis* Förster, 1869 and *Symplecis* Förster, 1869 were reported from the country by Varga (2025). That was the first paper of a series of revisionary works altogether containing descriptions of more than 100 new species from twelve genera of Vietnamese Orthocentrinae to be published by the author in the next few years.

The main aim of the present paper is to provide the first report of the genus *Orthocentrus* from Vietnam, which will be a background for further studies of the genus in the Indomalayan region.

Material and methods

The specimens used in this study were collected by Malaise traps in different localities of Vietnam from 1999 to 2011. The studied material is deposited in the collection of the Naturalis Biodiversity Center, Leiden, The Netherlands (NBC). The types of the Eastern Palaearctic species deposited in the Department of Science Education, Daegu National University of Education, Daegu, South Korea (DNUE) were studied based on images provided in Humala *et al.* (2020). Images of the specimens were taken with a Leica Z16 APO microscope equipped with Leica FLEXACAM C1 camera and processed by LAS Core software at the Schmalhausen Institute of Zoology, NAS of Ukraine (SIZK). Morphological terminology follows mainly Broad *et al.* (2018), except for the terms ‘width’ and ‘height’ applied to the head in dorsal view, which are proposed by the author in the key and descriptions. The measurement of the ratio of head width to head height is illustrated on Fig. 2D.

Results

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Family Ichneumonidae Latreille, 1802
Subfamily Orthocentrinae Förster, 1869

Genus *Orthocentrus* Gravenhorst, 1829

Orthocentrus Gravenhorst, 1829: 358–359. Type species *Orthocentrus anomalus* (Gravenhorst, 1829), by subsequent designation in Westwood (1840: 59).

Diagnosis

Clypeus fused with face, forming uniformly convex surface; lower edge of clypeus usually rounded (e.g., Fig. 2C), but rarely straight to weakly truncate; labrum usually hidden, but sometimes visible (e.g., Fig. 43C). Scape long and subcylindrical. Mandibles narrowed apically and at least slightly twisted, not overlapping when closed, usually bidentate, lower tooth much shorter than upper tooth, visible in frontoventral view (e.g., Fig. 43C–D) or rarely lower tooth reduced (Fig. 17B). Epicnemial carina present at least laterally (e.g., Fig. 3A). Pleural carina present (e.g., Fig. 14A). Hind wing with nervellus usually intercepted in lower third, inclivous (e.g., Fig. 8C), or rarely not intercepted, vertical (e.g., Fig. 16D). Ovipositor $0.2\text{--}1.1 \times$ the length of the hind tibia, with its sheath uniformly pubescent (e.g., Figs 5E, 31A).

Key to females of Vietnamese species of *Orthocentrus* Gravenhorst, 1829

1. Antenna long, with 46 flagellomeres (Fig. 19A); first flagellomere $4.0 \times$ as long as its maximum width (Fig. 19B) *O. mystacinus* sp. nov.
 – Antenna shorter, at most with 32 flagellomeres 2
2. Mesoscutum ivory laterally and along notaular lines; scutellum ivory (Fig. 16B). Face densely punctate, aciculate in upper half (Fig. 15B). Fore wing with vein 3rs-m (Fig. 16C). Third tergite and anterior 0.4 of fourth tergite sculptured (Fig. 16E) *O. lineatus* sp. nov.
 – If mesoscutum ivory laterally and along notaular lines, then face with different sculpture and vein 3rs-m in the fore wing absent (Fig. 1E–F). Third tergite sculptured at most on anterior 0.8, fourth tergite unsculptured (Figs 6D, 14D, 18E, 22D, 26D, 29D, 35D, 44D) 3
3. Face densely punctate (Figs 16B, 21B, 31C, 36B). Fore wing with areolet closed, sessile (Figs 14C, 22C, 32C, 37C). Antenna stout, with basal flagellomeres at most $1.1 \times$ as long as maximum width (Figs 13E, 21E, 31B, 36E). Head in dorsal view at most $1.5 \times$ as wide as high; vertex dark (Figs 13D, 21D, 31D, 36D) 4
 – Face sculpture different (e.g., Figs 2C, 5C, 23C). If sparsely punctate (e.g., Fig. 11B), then fore wing with areolet open (e.g., Fig. 44C) or basal flagellomeres more elongate (e.g., Fig. 9B) or head at least $1.8 \times$ as wide as high in dorsal view; vertex dark or ivory along inner orbits (e.g., Figs 9E, 11C) .. 7
4. Subocular sulcus absent (Fig. 36C). [Tergites 1–2 with latero-median longitudinal carinae (Fig. 37D)] *O. sulcatus* sp. nov.
 – Subocular sulcus present, weak (Fig. 13C) or strong (Fig. 21C) 5
5. Subocular sulcus weak (Fig. 13C). Antenna with 24 flagellomeres. Hind leg yellow (Fig. 13A) *O. languidus* sp. nov.
 – Subocular sulcus strong (Fig. 21C). Antenna with 30 flagellomeres. Hind leg largely fuscous (Figs 21A, 31A) 6
6. Second tergite with latero-median longitudinal carinae; third tergite sculptured on anterior 0.8 (Fig. 22D). Flagellomeres stouter (Fig. 21E) *O. nitidus* sp. nov.
 – Second tergite with latero-median longitudinal carinae absent; third tergite sculptured on anterior 0.1 (Fig. 32D). Flagellomeres slenderer (Fig. 31B) *O. punctatus* sp. nov.
7. Face sparsely punctate (Figs 1B, 5C, 7C, 9D, 11B, 17D, 25B, 38C, 43C) 8
 – Face papillate, at least in upper half (Figs 1D, 23C, 28B, 34C, 41C) 16
8. Fore wing with areolet closed (Figs 10C, 12C). Hind leg largely fuscous (Figs 9A, 11A) 9
 – Fore wing with areolet open (Figs 6C, 8C, 18C, 26C, 39C, 44C). Hind leg yellow or orange (Figs 5C, 7A, 17A, 25A, 38A, 43A) 10
9. Vertex black (Fig. 9E); ocellar-ocular sulcus present (Fig. 9C) *O. fossatus* sp. nov.
 – Vertex ivory along inner orbits; ocellar-ocular sulcus absent (Fig. 11C) .. *O. lamdongensis* sp. nov.
10. Ovipositor extremely long, its sheath about $1.1 \times$ the length of hind tibia (Fig. 5A, E) *O. dissidens* sp. nov.
 – Ovipositor typical, its sheath at most $0.3 \times$ the length of hind tibia (e.g., Fig. 43A) 11
11. First flagellomere $1.8 \times$ as long as its maximum width. Ocellar-ocular sulcus present (cf. Fig. 2D). Second tergite without distinct latero-median longitudinal carinae (cf. Fig. 27D) *O. brachycerus* Humala & Lee, 2020
 – First flagellomere at least $2.8 \times$ as long as its maximum width (Figs 7B, 17C, 25B, 38B, 43B). Ocellar-ocular sulcus absent (Figs 7D, 17E, 25C, 38D, 43E). Second tergite usually with distinct latero-median longitudinal carinae (Figs 8D–E, 26D, 39D, 44D) 12

12. Third tergite sculptured at most on anterior 0.2. Tergites 3–6 concave posteriorly (Fig. 8E) *O. excisus* sp. nov.
- Third tergite sculptured at least on anterior 0.6. Tergites 3–6 not concave posteriorly (Figs 18E, 26D, 39D, 44D) 13
13. Third tergite with latero-median longitudinal carinae on anterior 0.7 (Fig. 39D). Antenna with 23–24 flagellomeres *O. taeniatus* sp. nov.
- Third tergite with latero-median longitudinal carinae absent (Figs 18E, 26D, 44D). Antenna with 18–23 flagellomeres 14
14. Metasoma robust; tergites 2–3 $0.8\times$ and $0.6\times$ as long as their posterior widths, respectively (Fig. 18E). Mandible with lower tooth reduced (Fig. 17B). Antenna with 23 flagellomeres; first flagellomere $3.4\text{--}3.5\times$ as long as wide (Fig. 17C) *O. mandibularis* sp. nov.
- Metasoma slender; tergites 2–3 $0.9\text{--}1.0\times$ and $0.8\text{--}0.9\times$ as long as their posterior widths, respectively (Figs 26D, 44D). Mandible with lower tooth developed (Fig. 43D). Antenna with 18–22 flagellomeres; first flagellomere $2.8\text{--}3.0\times$ as long as wide (Figs 25B, 43B) 15
15. Mesosoma uniformly orange except propodeum (and sometimes metapleuron) (Figs 25A, 26A–B). Ocellar-ocular distance $1.1\text{--}1.2\times$ maximum diameter of lateral ocellus (Fig. 25C) *O. pectoralis* sp. nov.
- Mesosoma dark, at most with small yellow and orange marks on pronotum, propleuron and sometimes mesoscutum (Figs 43A, 44B–C). Ocellar-ocular distance $0.8\text{--}0.9\times$ maximum diameter of lateral ocellus (Fig. 43E) *O. vietnamensis* sp. nov.
16. Mesoscutum ivory laterally and along notaular lines. [Antenna with 30 flagellomeres. Areolet open (Fig. 1E)] *O. pulchellus* Humala & Lee, 2020
- Mesoscutum sometimes entirely yellow or orange, but never with contrasting ivory lines (Fig. 29A–B) 17
17. Vertex ivory along inner orbits (Figs 1C, 28C, 34D) 18
- Vertex dark, at most with small scattered orange spots (Fig. 2D) 20
18. Hind wing with nervellus intercepted. Hind coxa brown (Fig. 1C). [Antenna with 21 flagellomeres, first flagellomere $2.0\times$ as long as wide] *O. leucostomus* Humala & Lee, 2020
- Hind wing with nervellus not intercepted (Figs 29C, 35C). Hind coxa and femur yellow (Figs 28A, 34A) 19
19. Eye densely setose (Fig. 28B). Head and mesosoma largely yellow/orange (Fig. 29A–B). Fore wing with vein 3rs-m absent (Fig. 29C). Third tergite with posterior transverse furrow (Fig. 29D) *O. pilosus* sp. nov.
- Eye sparsely setose (Fig. 34C). Head orange, mesosoma largely black (Fig. 35A). Fore wing with vein 3rs-m present (Fig. 35C). Third tergite without posterior transverse furrow (Fig. 35D) *O. remotus* sp. nov.
20. Antenna with 32 flagellomeres. Ocellar-ocular sulcus present (Fig. 2D) Second tergite $1.8\times$ as long as its posterior width (Fig. 3D) *O. dalatensis* sp. nov.
- Antenna with at most 27 flagellomeres. Ocellar-ocular sulcus absent (Fig. 23D) Second tergite at most $1.6\times$ as long as its posterior width (Fig. 42D) 21
21. Fore wing with vein 3rs-m absent (Fig. 42C). Eye glabrous (Fig. 41C). Antenna with 27 flagellomeres; flagellomeres slenderer (Fig. 41B) *O. tonkinensis* sp. nov.
- Fore wing with vein 3rs-m present (Fig. 24C). Eye sparsely setose (Fig. 23C). Antenna with at most 25 flagellomeres; flagellomeres stouter (Fig. 23B) *O. papillosus* sp. nov.

Orthocentrus brachycerus Humala & Lee, 2020

Fig. 1A–B

Orthocentrus brachycerus Humala & Lee in Humala *et al.* 2020: 21–25. Holotype in DNUE (images examined).

Diagnosis (based on Vietnamese specimens)

Face smooth, almost impunctate; subocular sulcus strong (Fig. 1B); antenna with 20 flagellomeres, first flagellomere about $1.7\text{--}1.8\times$ as long as wide; head $1.9\text{--}2.0\times$ as wide as high in dorsal view, vertex ivory

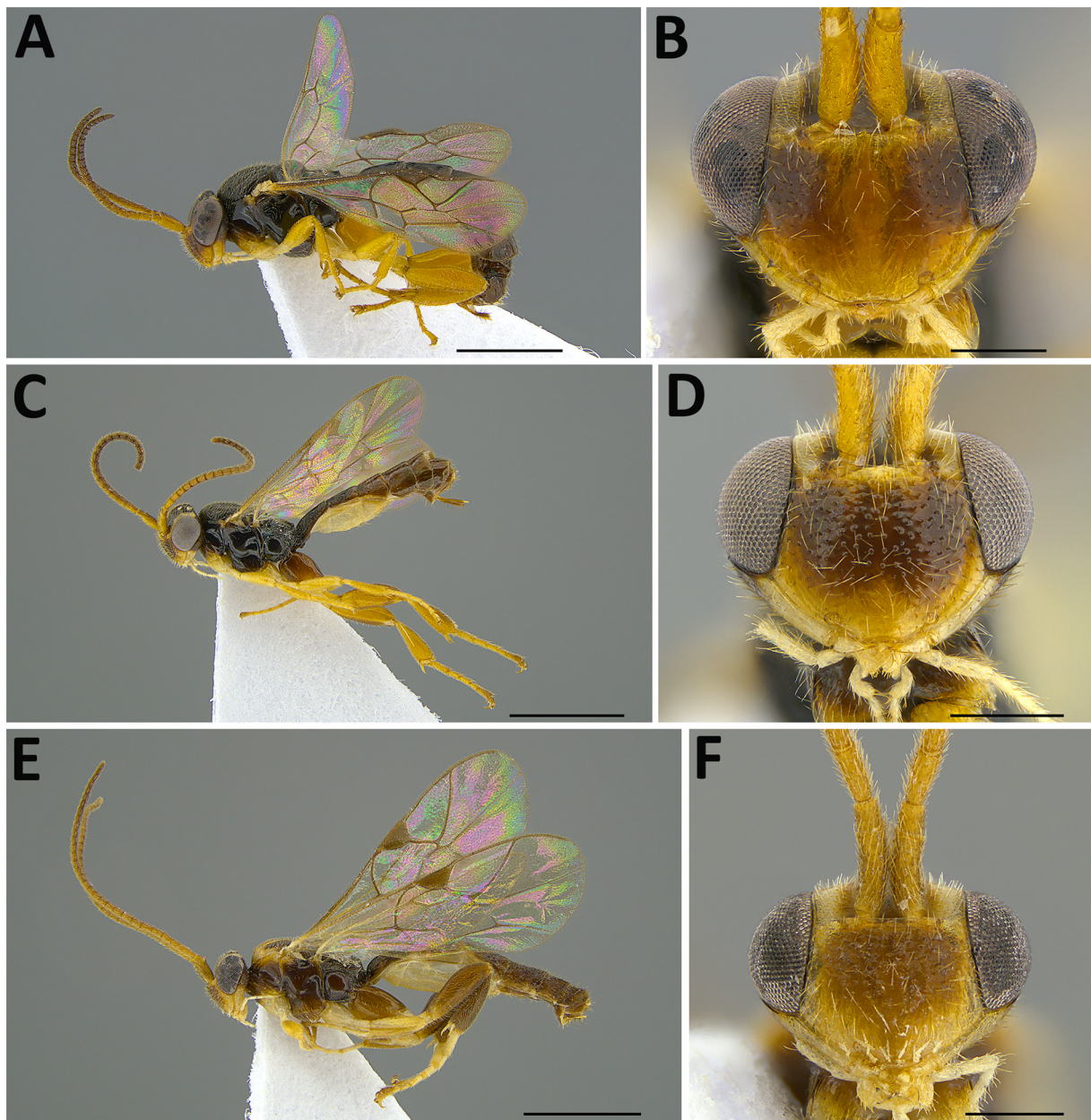


Fig. 1. *Orthocentrus* spp., ♀. **A, C, E.** Lateral views of habitus. **B, D, F.** Frontal views of head. **A–B.** *O. brachycerus* Humala & Lee, 2020 (RMNH.INS.1722385). **C–D.** *O. leucostomus* Humala & Lee, 2020 (RMNH.INS.1722380). **E–F.** *O. pulchellus* Humala & Lee, 2020 (RMNH.INS.1722381). Scale bars: A, C, E=1 mm; B, D, F=0.25 mm.

along inner orbits, ocellar-ocular sulcus present; mesoscutum with notauli; fore wing with vein 3rs-m absent (Fig. 1A); hind wing with nervellus intercepted; first tergite $1.4\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae strong; second tergite $0.9\text{--}1.0\times$ as long as its posterior width, longitudinally wrinkled, with subapical transverse furrow; third tergite longitudinally wrinkled on anterior 0.3.

Material examined

Holotype

Not examined; however, illustrations and description in Humala *et al.* (2020) are good enough.

Other material

VIETNAM • 1 ♀; Dak Lak, Chu Yang Sin N.P.; ca 740 m a.s.l.; 1–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; near river, Malaise traps; RMNH'07; NBC, RMNH.INS.1722385 • 1 ♀; Krong K'mar; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH'07; NBC, RMNH.INS.1722386 • 1 ♀; same data as for preceding; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 13–23; RMNH'05; NBC, RMNH.INS.1722387 • 1 ♀; Lam Dong, Bidoup Nuiba N.P., near Da Lat; 1680–1700 m a.s.l.; 12–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 19–23; RMNH'05; NBC, RMNH.INS.1722388.

Distribution

South Korea (Humala *et al.* 2020); first record from the Indomalayan region (Vietnam).

Remarks

The Vietnamese specimens are generally similar to the Korean specimens from the type series, but have antennae with 20 flagellomeres (19 in Korean specimens), with a slightly longer first flagellomere and slenderer tergites.

Orthocentrus dalatensis sp. nov.

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Figs 2–4

Diagnosis

Face papillate; subocular sulcus strong (Figs 2C, 4B); antenna with 32 flagellomeres (26–27 in male), first flagellomere about $1.5\times$ as long as wide ($2.4\text{--}2.9\times$ in male) (Fig. 2B); head $1.6\times$ as wide as high in dorsal view, vertex dark, ocellar-ocular sulcus present (Figs 2D, 4C); mesoscutum with notauli (Figs 3B, 4C); fore wing with vein 3rs-m (but partly unpigmented), areolet sessile; hind wing with nervellus intercepted (Fig. 3C); first tergite $2.2\times$ as long as its posterior width ($2.3\times$ in male), longitudinally wrinkled, with latero-median longitudinal carinae present, but weak; second tergite $1.8\times$ as long as its posterior width ($1.4\text{--}1.5\times$ in male), longitudinally wrinkled; third tergite wrinkled on anterior 0.3 (Figs 3D, 4D).

Differential diagnosis

Orthocentrus dalatensis sp. nov. differs from all Vietnamese species with a papillate face by the ocular-ocular sulcus present. It is similar to *O. tonkinensis* sp. nov., but has a longer antenna with 32 flagellomeres (27 in *O. tonkinensis*), orange face (dark in *O. tonkinensis*), and slenderer metasoma with second tergite $1.8\times$ as long as its posterior width ($1.4\times$ in *O. tonkinensis*).

Etymology

The species epithet refers to the type locality situated near the city of Da Lat, where the paratypes have been collected. Adjective.

Material examined

Holotype

VIETNAM • ♀; Tonkin, Hoang Lien N.R., 15 km W of Sa Pa; ca 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise traps; RMHN'99; NBC, RMNH.INS.1722375.

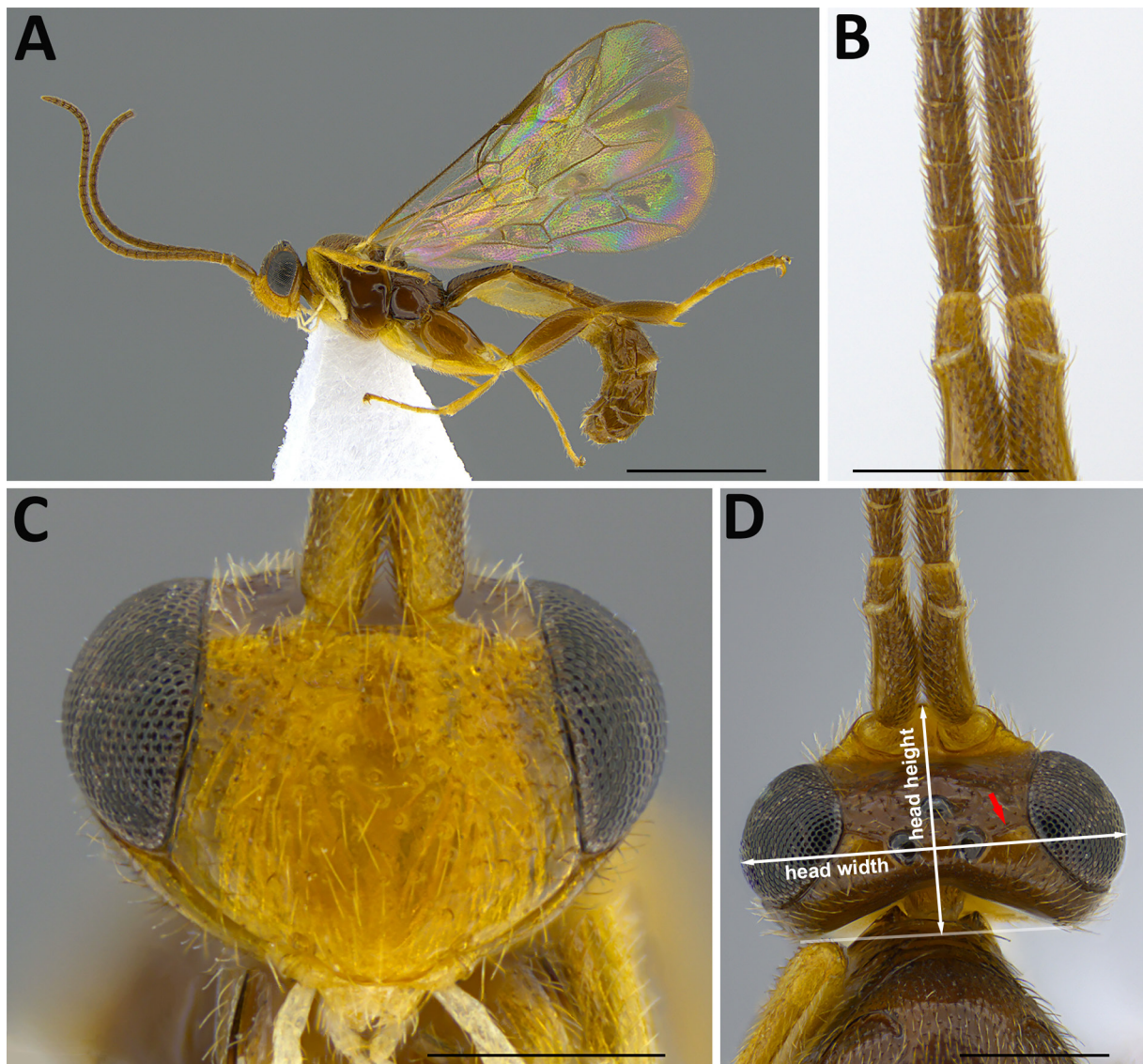


Fig. 2. *Orthocentrus dalatensis* sp. nov., holotype, ♀ (RMNH.INS.1722375). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head; ocellar-ocular sulcus indicated with a red arrow. Scale bars: A=1 mm; B–D=0.25 mm.

Paratypes

VIETNAM • 1 ♂; same collection data as for holotype; NBC, RMNH.INS.1722376 • 2 ♂♂, 1 ♀; Lam Dong, Bidoup Nui N.P., near Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–12; RMHN'05; NBC, RMNH.INS.1722377 to RMNH.INS.1722379.

Description

Female

Body length 3.8–4.6 mm. Fore wing 2.9–3.7 mm.

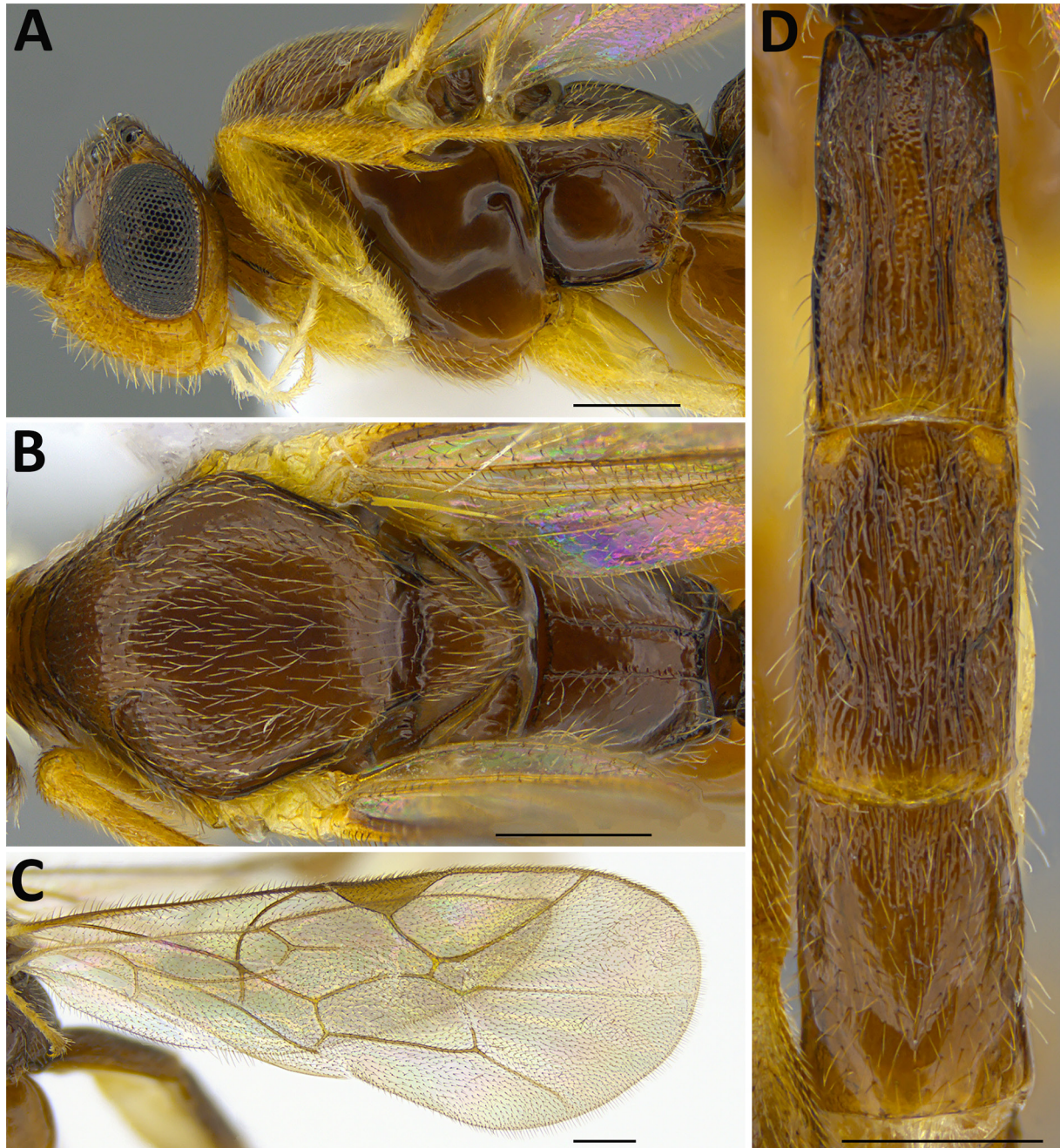


Fig. 3. *Orthocentrus dalatensis* sp. nov., holotype, ♀ (RMNH.INS.1722375). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–3. Scale bars = 0.25 mm.

Antenna with 32 flagellomeres, first flagellomere about $1.5 \times$ as long as wide. Face about $0.5 \times$ as long as wide, papillate; inner orbits slightly divergent. Eye sparsely setose. Malar space $3.6\text{--}3.7 \times$ basal width of mandible; subocular sulcus deep. Mandible apices hidden under clypeus. Head $1.6 \times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; length of ocellar-ocular distance about $1.2 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus present; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina present laterally. Metapleuron smooth; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $3.0\text{--}3.1 \times$ as long as wide, third tarsomere of hind tarsus about $0.8 \times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.4 \times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but largely unpigmented; vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

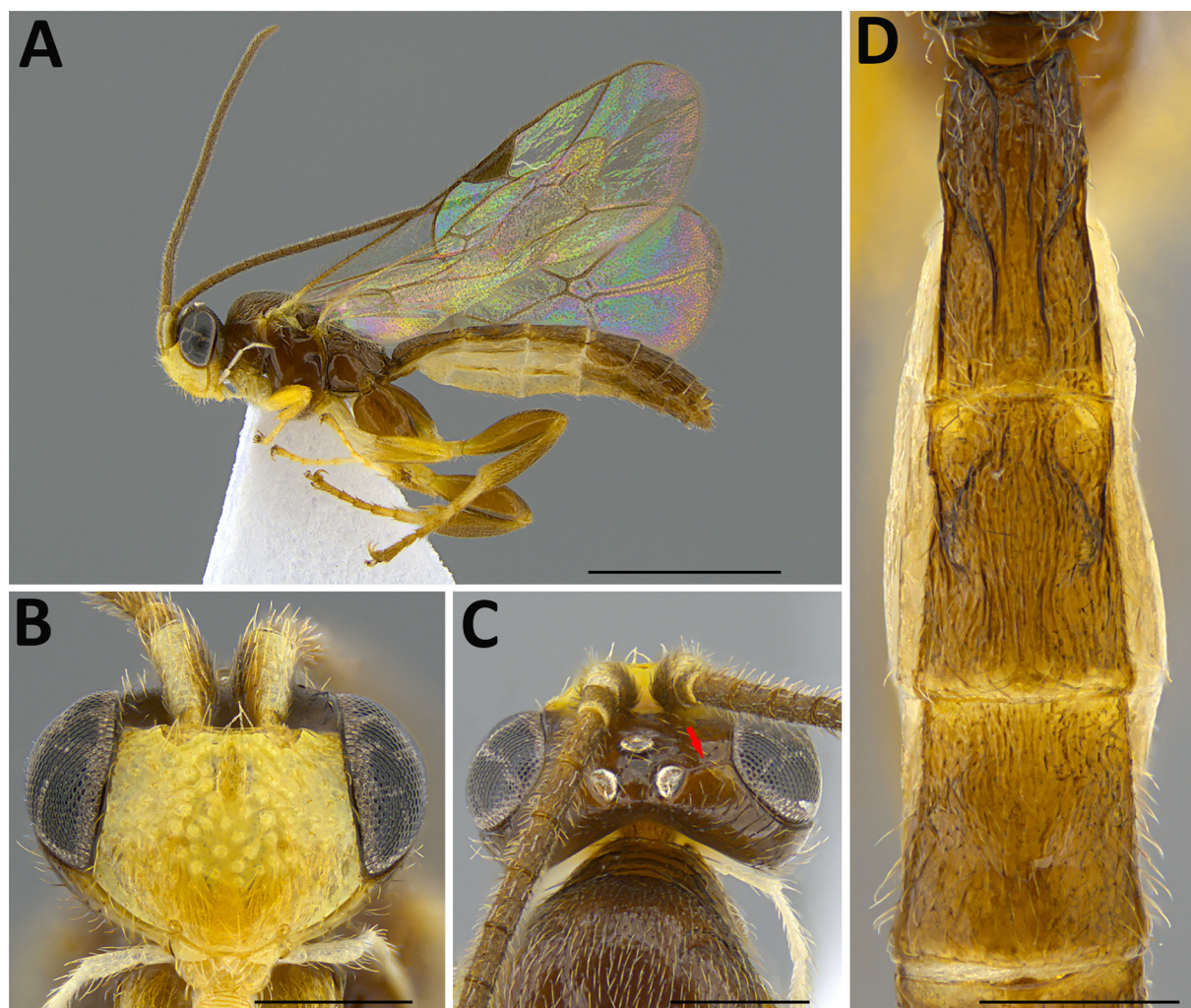


Fig. 4. *Orthocentrus dalatensis* sp. nov., paratype, ♂ (RMNH.INS.1722376). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of head; ocellar-ocular sulcus indicated with a red arrow. **D.** Dorsal view of metasomal tergites 1–3. Scale bars: A=1 mm; B–D=0.25 mm.

First tergite $2.2\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae present, but weak; lateral oblique grooves deep. Second tergite $1.8\times$ as long as its posterior width, longitudinally wrinkled. Third tergite longitudinally wrinkled on anterior 0.3. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.2\times$ as long as hind tibia.

Body generally brown. Head black except face, the underside of scape and pedicel, mandible, and indistinct small spots near ocular-ocellar lines orange. Mesosoma brown except propleuron and pronotum partly, subtegular ridge orange, and tegula yellow. Fore and mid legs yellow except coxae apically, trochanters and trochantelli ivory; hind leg brown except trochanter, trochantellus, femur basally and tarsus ivory. Pterostigma and veins brown. Metasoma brown except tergites 1–3 narrowly paler posteriorly.

Male

Resembles female, but antenna with 26–27 flagellomeres, first flagellomere about $2.4\text{--}2.9\times$ as long as wide; metasoma with first tergite $2.3\times$ as long as posterior width; second tergite $1.4\text{--}1.5\times$ as long as posterior width. Body colour similar to that of female except face, clypeus, malar space, underside of scape and mandible yellow, and hind tarsus infusate apically.

Distribution

Vietnam.

Orthocentrus dissidens sp. nov.

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Figs 5–6

Diagnosis

Face smooth, almost impunctate; subocular sulcus strong (Fig. 5C); antenna with 20 flagellomeres, first flagellomere about $2.7\times$ as long as wide; head $2.0\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 5D); mesoscutum with notauli (Fig. 6B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 6C); first tergite $1.4\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae strong; second tergite $0.8\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae present on anterior 0.5; third tergite longitudinally wrinkled on anterior 0.7 (Fig. 6D). Ovipositor long, its sheath about $1.1\times$ the length of hind tibia (Fig. 5A, E).

Differential diagnosis

Orthocentrus dissidens sp. nov. differs from the other Vietnamese species of *Orthocentrus* by the extremely long ovipositor. There is only one Eastern Palaearctic species with a relatively long ovipositor, *O. caudalis* Humala & Lee, 2020, which, however, has a different sculpture of the face and metasoma, a shorter first flagellomere and a closed fore wing areolet.

Etymology

The species epithet is from the Latin ‘*dissidens*’ (‘dissenting, the one who differs’) referring to the unusually long ovipositor of the new species, which makes it difficult to fit into the framework of the classical concept of the genus *Orthocentrus*. Adjective.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P., Krong K’mar; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMHN’07; NBC, RMNH.INS.1722384.

Description

Female (holotype)

Body length 2.4 mm. Fore wing 1.8 mm.

Antenna with 20 flagellomeres, first flagellomere $2.7\times$ as long as wide. Face about $0.5\times$ as long as wide, smooth and almost impunctate; inner orbits slightly divergent. Malar space $3.0\times$ basal width of mandible; subocular sulcus strong. Mandible twisted, lower tooth very small. Head $2.0\times$ as wide as high in dorsal view. Frons and vertex smooth; ocellar-ocular distance about $0.9\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth; epicnemial carina complete. Metapleuron smooth, densely pubescent along anterior margin; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

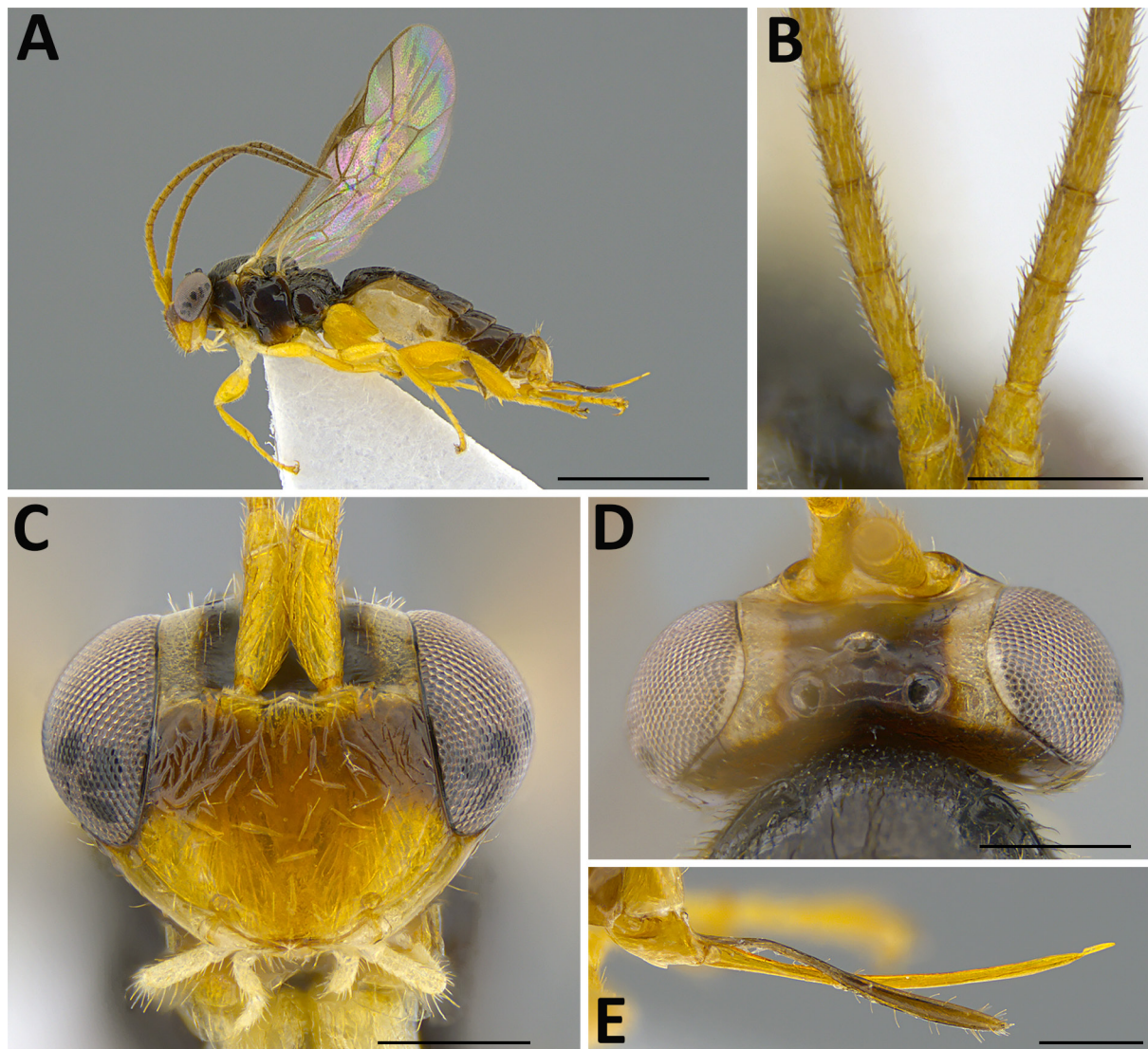


Fig. 5. *Orthocentrus dissidens* sp. nov., holotype, ♀ (RMNH.INS.1722384). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. **E.** Lateral view of ovipositor and sheaths Scale bars: A=1 mm; B–E=0.25 mm.

Hind femur $2.9\times$ as long as wide, third tarsomere of hind tarsus about $0.6\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.2\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a opposite M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.4\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae strong and parallel, diverging centrally; lateral oblique grooves deep. Second tergite $0.8\times$ as long as posterior width, longitudinally wrinkled, with latero-median longitudinal carinae present on anterior 0.5 and transverse subapical furrow. Third tergite longitudinally wrinkled on anterior 0.7. Remaining tergites smooth. Ovipositor upcurved, with a subapical notch; its sheath about $1.1\times$ length of hind tibia.

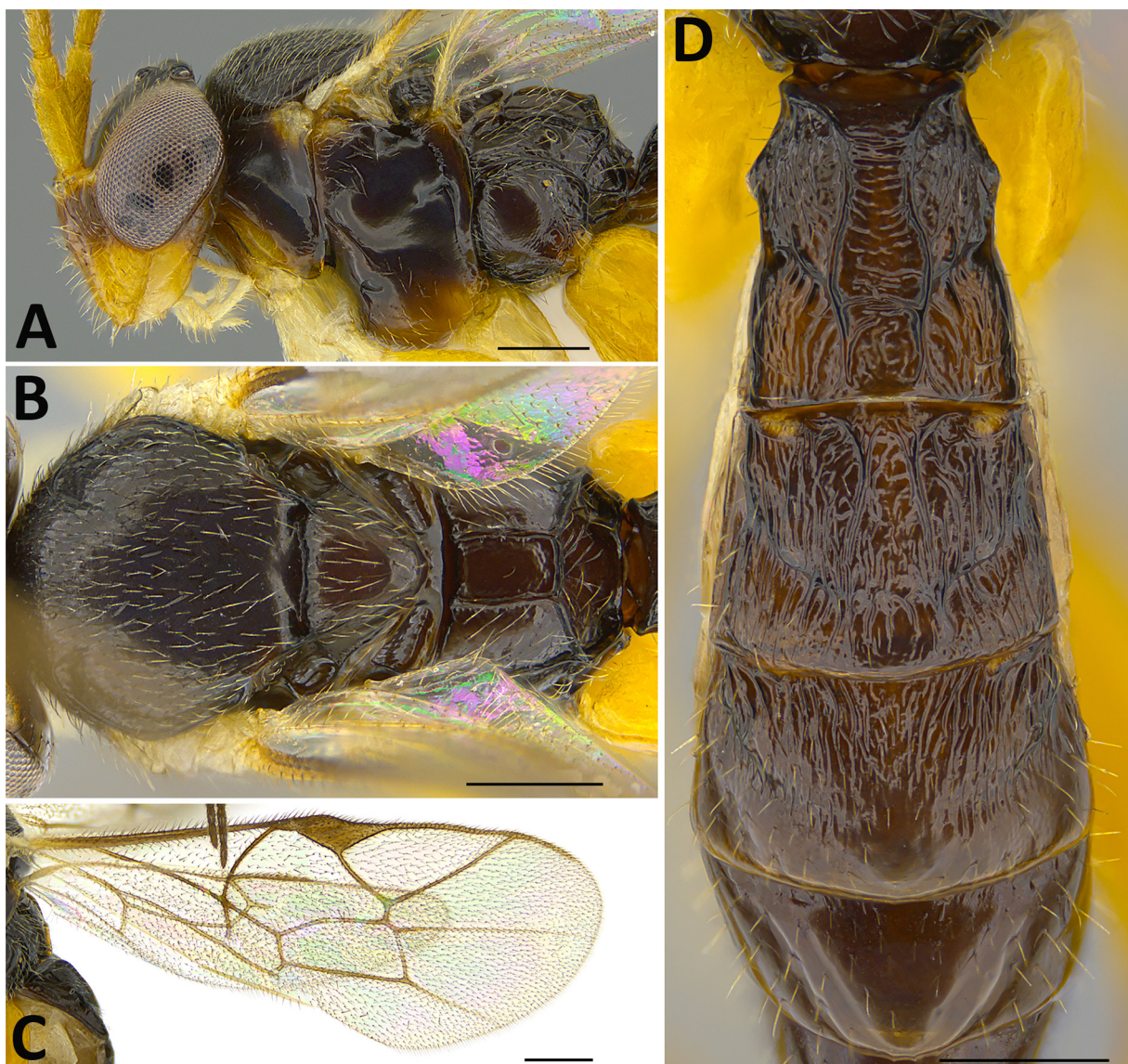


Fig. 6. *Orthocentrus dissidens* sp. nov., holotype, ♀ (RMNH.INS.1722384). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Body generally brownish-black. Head black except inner orbits on frons and vertex, malar space and mandible ivory, antenna, face in lower half orange, and face in upper half brown. Mesosoma black except propleuron brown with ivory, pronotum at upper hind corner and along ventral margin, subtegular ridge and tegula ivory, and mesopleuron ventrally brownish. Fore and mid legs yellow except coxae, trochanters and trochantelli ivory; hind leg orange, except trochanter and trochantellus ivory. Pterostigma and veins brown. Metasoma brownish-black.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus excisus sp. nov.

[urn:lsid:zoobank.org:act:499B7D45-C718-4662-96DA-D2E6A8706433](https://zoobank.org/act:499B7D45-C718-4662-96DA-D2E6A8706433)

Figs 7–8

Diagnosis

Face sparsely punctate; subocular sulcus strong (Fig. 7C); antenna with 22 flagellomeres, first flagellomere about $2.8\text{--}3.0\times$ as long as wide; head $2.0\text{--}2.1\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 7D); mesoscutum with notauli (Fig. 8B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 8C); first tergite $1.6\text{--}1.7\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel, slightly converging centrally; second tergite $1.2\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae and subapical transverse furrow (Fig. 8D); third tergite longitudinally wrinkled on anterior $0.1\text{--}0.2$; tergites 3–6 concave posteriorly (Fig. 8E).

Differential diagnosis

Orthocentrus excisus sp. nov. is similar to *O. vietnamensis* sp. nov., but differs by the posteriorly concave tergites 3–6 (not concave in *O. vietnamensis*) and a less sculptured third tergite, at most on the anterior 0.2 (sculptured at least on the anterior 0.6 in *O. vietnamensis*).

Etymology

The species epithet is from the Latin ‘*excisus*’ (‘cut out’) referring to the concave tergites of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P., Krong K’mar; 760–770 m a.s.l.; 21–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 7–12; RMHN’05; NBC, RMNH.INS.1722394.

Paratypes

VIETNAM • 2 ♀♀; same collection data as for holotype; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMHN’07; NBC, RMNH.INS.1722395 to RMNH.INS.1722396 • 1 ♀; same data as for preceding; 590–840 m a.s.l.; 22–26 Oct. 2005; Malaise traps 13–23; RMHN’05; NBC, RMNH.INS.1722397 • 1 ♀; Đông Nai, Cát Tiên N.P., *Ficus* trail; ca 100 m a.s.l.; 1–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–8; RMHN’05; NBC, RMNH.INS.1722398 • 1 ♀; same data as for preceding; Dong trail; Malaise traps 13–16; NBC, RMNH.INS.1722399 • 1 ♀; Kon Tum, Chu Mon Ray N.P.; 700–900 m a.s.l.; 21 Sep.–5 Oct. 2006; M.P. Quy and N.T. Manh leg.; Malaise traps; RMHN’07; NBC, RMNH.INS.1722400.

Description

Female

Body length 4.0–4.5 mm. Fore wing 3.0–3.4 mm.

Antenna with 22 flagellomeres, first flagellomere $2.8\text{--}3.0\times$ as long as wide. Face about $0.5\times$ as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space $3.0\text{--}3.2\times$ basal width of mandible; subocular sulcus present. Mandible strongly twisted, lower tooth very small. Head $2.0\text{--}2.1\times$ as wide as high in dorsal view. Frons and vertex smooth, densely pubescent; ocellar-ocular distance $0.9\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

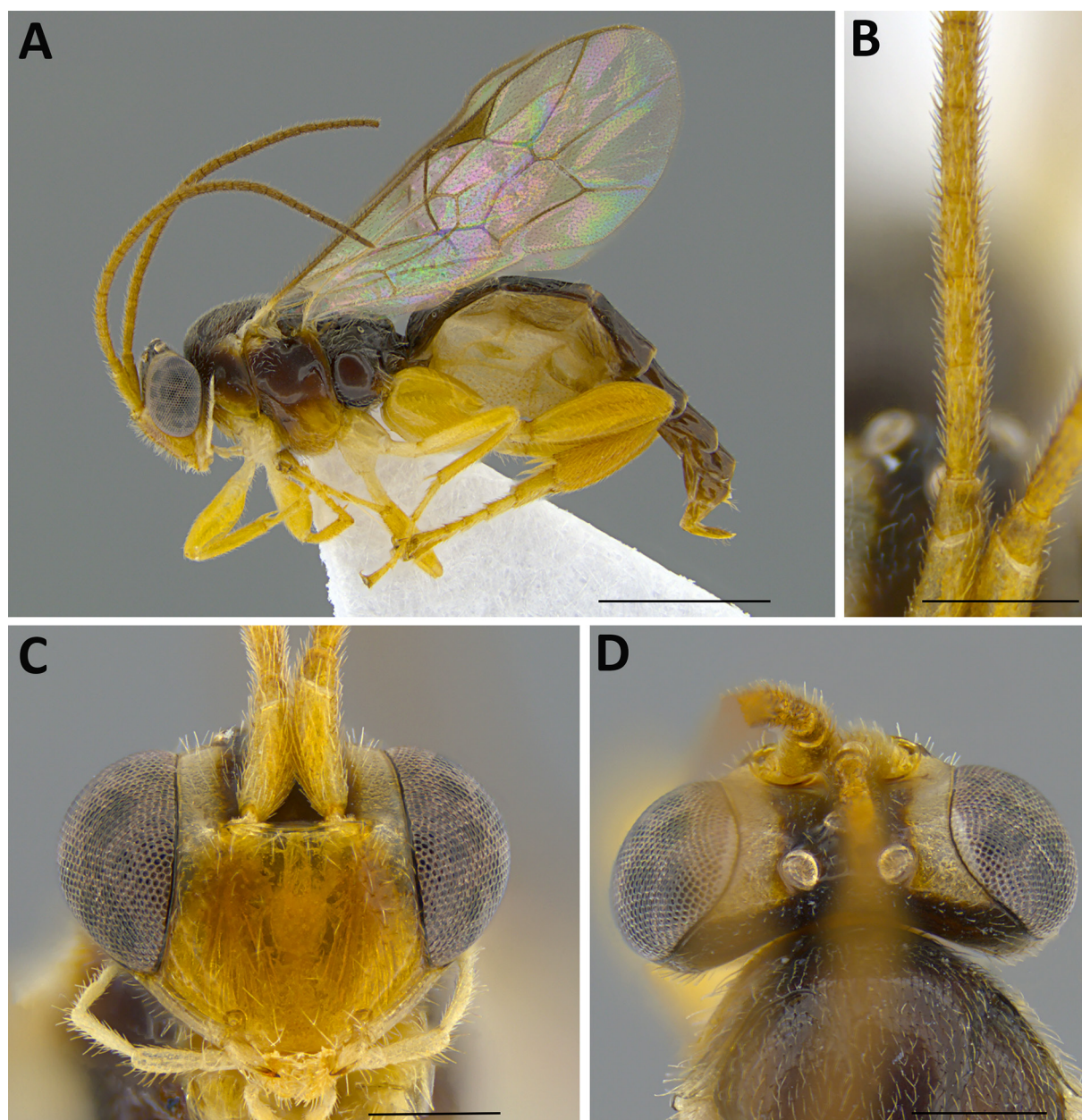


Fig. 7. *Orthocentrus excisus* sp. nov., holotype, ♀ (RMNH.INS.1722394). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

Propleuron densely pubescent. Pronotum smooth; epomia absent. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent anteriorly; epicnemial carina complete. Metapleuron smooth, densely pubescent anteroventrally; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.7\text{--}2.9\times$ as long as wide, third tarsomere of hind tarsus about $0.7\text{--}0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.2\text{--}1.4\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a weakly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

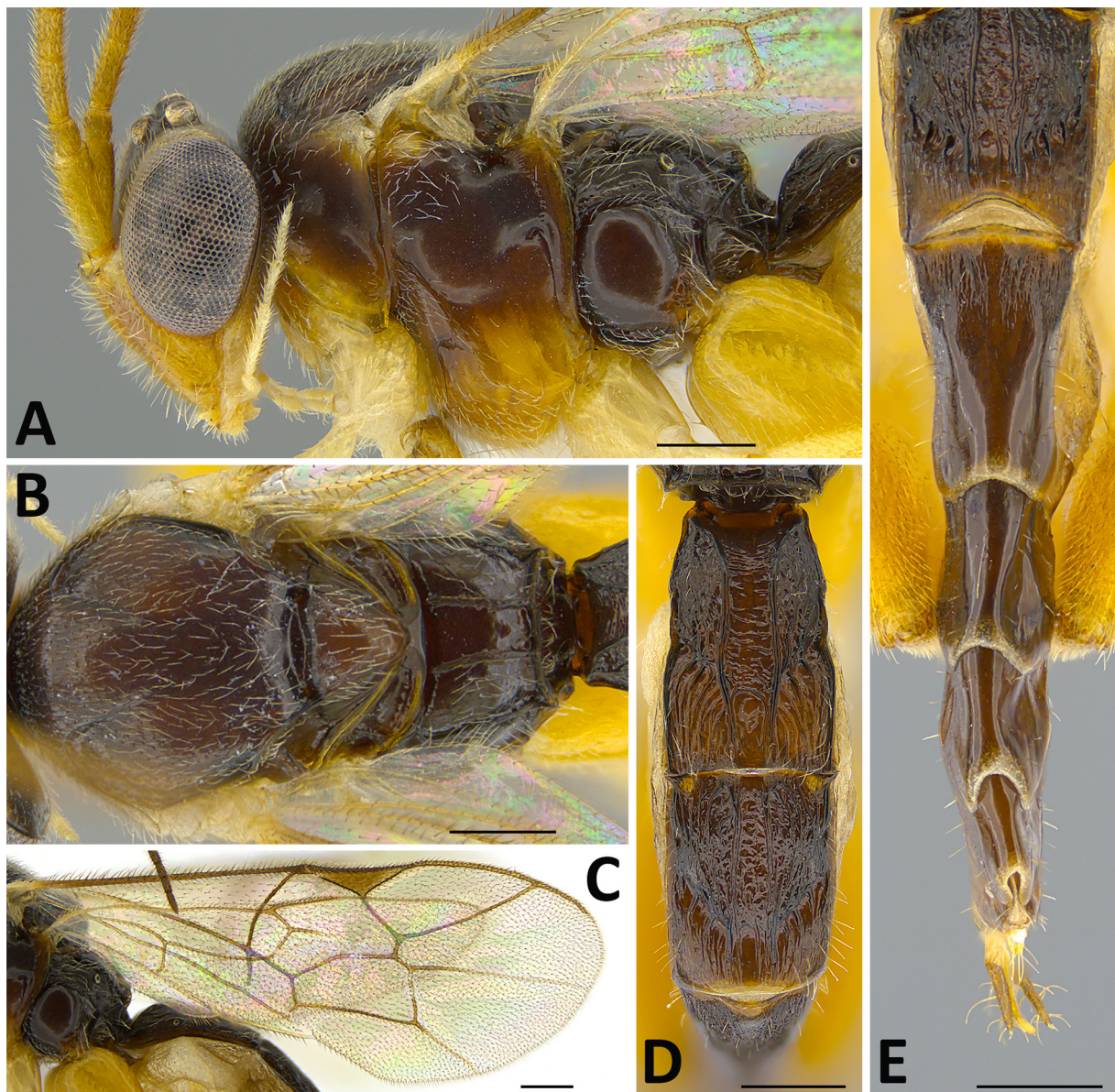


Fig. 8. *Orthocentrus excisus* sp. nov., holotype, ♀ (RMNH.INS.1722394). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–2. **E.** Dorsal view of metasomal tergites 2–7. Scale bars = 0.25 mm.

Metasoma with first tergite $1.6\text{--}1.7\times$ as long as posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel, slightly converging centrally; lateral oblique grooves deep. Second tergite $1.2\text{--}1.5\times$ as long as maximum width, longitudinally wrinkled, with latero-median longitudinal carinae and transverse subapical furrow. Third tergite longitudinally wrinkled on anterior $0.1\text{--}0.2$, concave posteriorly. Remaining tergites smooth, concave posteriorly. Ovipositor thick and upcurved, with a subapical notch, its sheath about $0.2\text{--}0.25\times$ length of hind tibia.

Body generally brownish-black. Head black except inner orbits on frons and vertex, malar space and mandible ivory, antenna and face yellow to orange. Mesosoma brownish-black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge yellow to ivory, tegula ivory, mesopleuron orange ventrally; mesoscutum laterally and along notaular lines, and scutellum entirely orange to brown. Fore and mid legs yellow except coxae, trochanters and trochantelli ivory. Hind leg orange except trochanter and trochantellus ivory. Pterostigma and veins brown. Metasoma brownish-black.

Male

Unknown.

Distribution

Vietnam.

***Orthocentrus fossatus* sp. nov.**

[urn:lsid:zoobank.org:act:7122A805-DFFD-4A04-87E1-0CE5806C2396](https://zoobank.org/urn:lsid:zoobank.org:act:7122A805-DFFD-4A04-87E1-0CE5806C2396)

Figs 9–10

Diagnosis

Face sparsely punctate; subocular sulcus strong (Fig. 9D); antenna with 21 flagellomere, first flagellomere $2.2\times$ as long as wide; head $1.8\times$ as wide as high in dorsal view, vertex dark, ocellar-ocular sulcus present (Fig. 9C, E); mesoscutum with notauli (Fig. 10B); fore wing with vein 3rs-m, areolet slightly sessile; hind wing with nervellus intercepted (Fig. 10C); first tergite $2.1\times$ as long as its posterior width, granulate, with latero-median longitudinal carinae; second tergite $1.1\times$ as long as its posterior width, granulate, with traces of latero-median longitudinal carinae; third tergite weakly granulate on anterior 0.2 (Fig. 10D).

Differential diagnosis

Orthocentrus fossatus sp. nov. is similar to *O. lamdongensis* sp. nov., but differs by the dark vertex, with an ocellar-ocular sulcus present (inner orbits yellow, with ocellar-ocular sulcus absent in *O. lamdongensis*).

Etymology

The species epithet is from the Latin '*fossatus*' ('having fossae') referring to the ocellar-ocular sulcus of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Lam Dong, Bidoup Nuiba N.P., near Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–12; RMHN'05; NBC, RMNH.INS.1722382.

Description

Female (holotype)

Body length 3.2 mm. Fore wing 2.5 mm.

Antenna with 21 flagellomeres, first flagellomere $2.2 \times$ as long as wide. Face about $0.6 \times$ as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space $3.2 \times$ basal width of mandible; subocular sulcus present. Mandible weakly twisted, lower tooth visible. Head $1.8 \times$ as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-ocular distance about $1.2 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus present; occipital carina absent.

Propleuron sparsely pubescent. Pronotum smooth; epomia absent. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina complete. Metapleuron smooth, pubescent along posterior margin; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

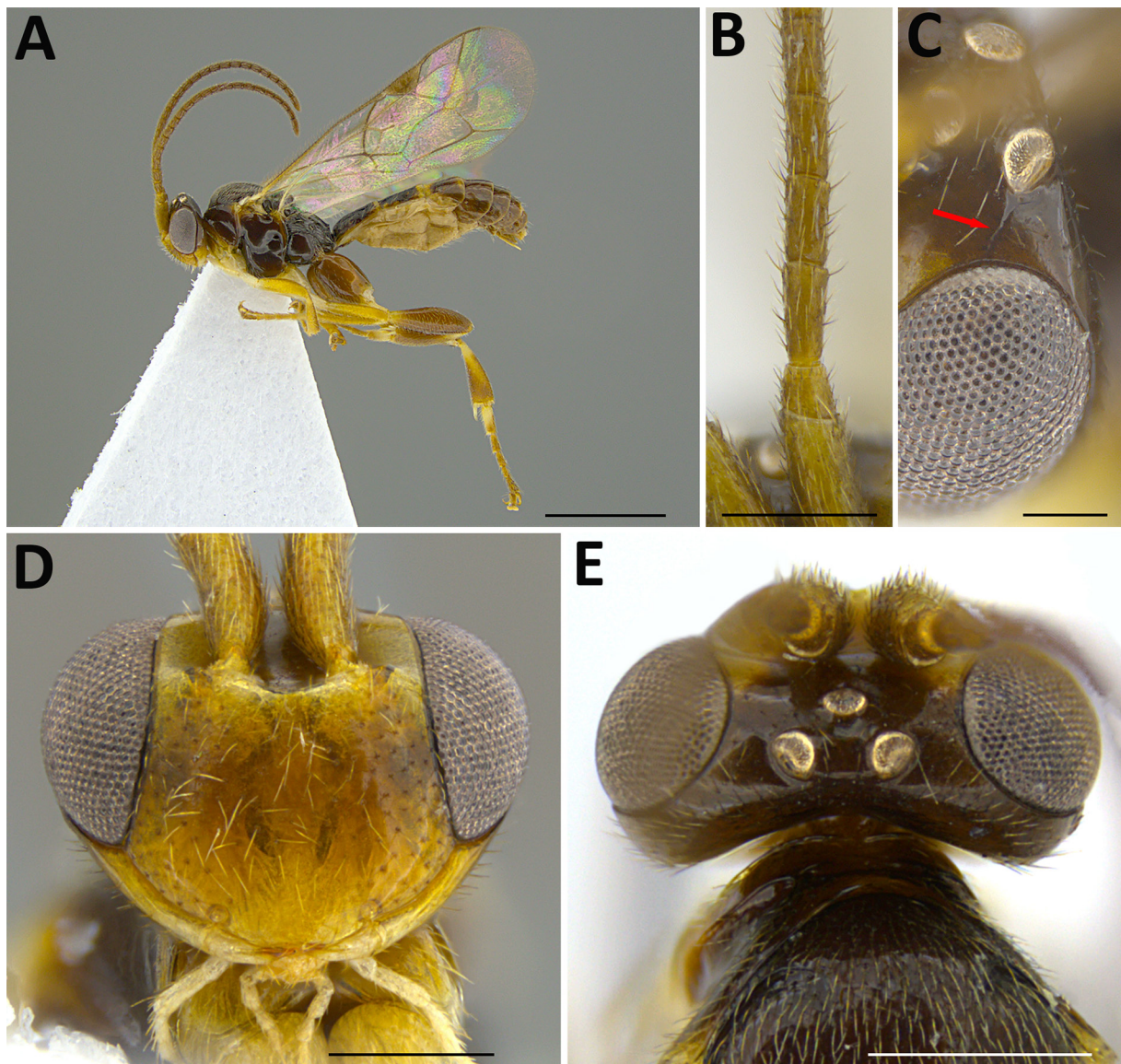


Fig. 9. *Orthocentrus fossatus* sp. nov., holotype, ♀ (RMNH.INS.1722382). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Dorsolateral view of ocellar-ocular sulcus (indicated with a red arrow). **D.** Frontal view of head. **E.** Dorsal view of head. Scale bars: A=1 mm; B, D–E=0.25 mm; C=0.1 mm.

Hind femur $2.7\times$ as long as wide, third tarsomere of hind tarsus about $0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.6\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present; areolet narrowly sessile; vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $2.1\times$ as long as its posterior width, granulate, with latero-median longitudinal carinae present; lateral oblique grooves deep. Second tergite $1.1\times$ as long as its posterior width, granulate, with traces of latero-median longitudinal carinae. Third tergite granulate on anterior 0.2. Remaining tergites smooth. Ovipositor thin and upcurved, lacking subapical notch; its sheath about $0.25\times$ length of hind tibia.

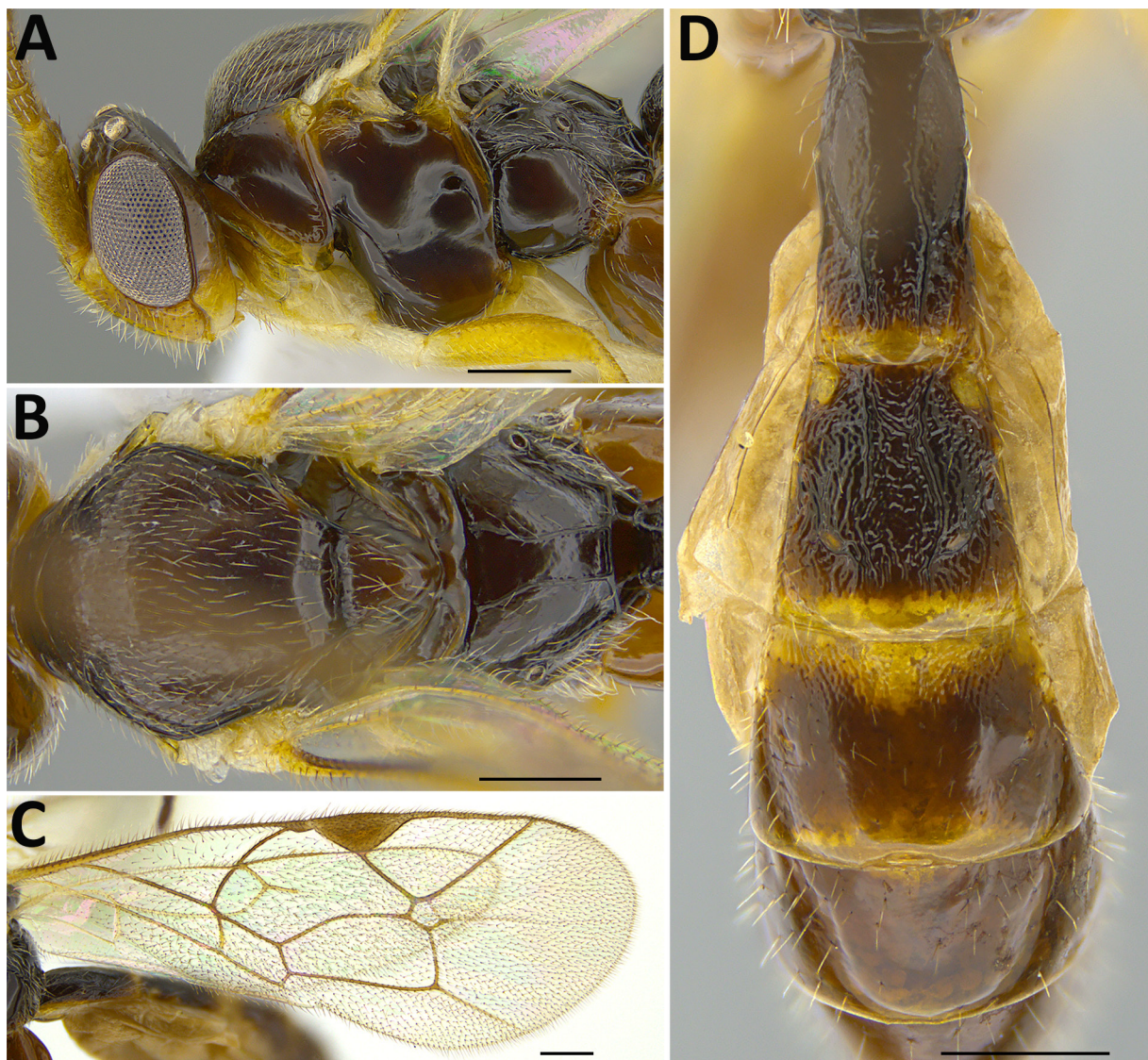


Fig. 10. *Orthocentrus fossatus* sp. nov., holotype, ♀ (RMNH.INS.1722382). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Body generally brownish-black. Head brownish except antenna, face and malar space largely orange and yellow, inner orbits on frons and mandible (except apices) ivory. Mesosoma brownish-black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, and subtegular ridge yellow, and tegula ivory. Fore and mid coxa, trochanter and trochantellus ivory, femur, tibia and tarsus yellow. Hind leg brown except trochanter, trochantellus, femur, tibia and first tarsomere basally ivory. Pterostigma and veins brown. Metasoma black anteriorly and brown posteriorly except tergites 1–3 narrowly banded with yellow posteriorly.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus lamdongensis sp. nov.

[urn:lsid:zoobank.org:act:6FD38C72-1F0E-475E-8708-134F31ADAE21](https://zoobank.org/act:6FD38C72-1F0E-475E-8708-134F31ADAE21)

Figs 11–12

Diagnosis

Face punctate; subocular sulcus strong; antenna with 23 flagellomeres, first flagellomere about $2.2 \times$ as long as wide (Fig. 11B); head $1.8 \times$ as wide as high in dorsal view, vertex ivory on inner orbits (Fig. 11C); mesoscutum with notauli (Fig. 12B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 12C); first tergite $2.3 \times$ as long as its posterior width, granulate, with latero-median longitudinal carinae; second tergite $1.3 \times$ as long as its posterior width, granulate, with traces of latero-median longitudinal carinae; third tergite weakly granulate on anterior 0.2 (Fig. 12D).

Differential diagnosis

Orthocentrus lamdongensis sp. nov. is similar to *O. fossatus* sp. nov., but differs by the inner orbits yellow on the vertex, with an ocellar-ocular sulcus absent (vertex dark, with ocellar-ocular sulcus present in *O. fossatus*).

Etymology

The species epithet refers to the type locality in the Lam Dong Province in Vietnam. Adjective.

Material examined

Holotype

VIETNAM • ♀; Lam Dong, Bidoup Nui Ba N.P., near Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–12; RMHN'05; NBC, RMNH.INS.1722383.

Description

Female (holotype)

Body length 3.3 mm. Fore wing 2.7 mm.

Antenna with 23 flagellomeres, first flagellomere $2.2 \times$ as long as wide. Face about $0.6 \times$ as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space $3.3 \times$ basal width of mandible; subocular sulcus present. Mandible twisted, lower tooth small. Head $1.8 \times$ as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-ocular distance $0.9 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron sparsely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina complete. Metapleuron smooth; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.9\times$ as long as wide, third tarsomere of hind tarsus about $0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.8\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present; areolet sessile; vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $2.3\times$ as long as its posterior width, granulate, with latero-median longitudinal carinae; lateral oblique grooves deep. Second tergite $1.3\times$ as long as its posterior width, granulate, with traces of latero-median longitudinal carinae. Third tergite granulate on anterior 0.2. Remaining tergites smooth. Ovipositor not visible; its sheath about $0.25\times$ length of hind tibia.

Body generally brownish and extensively marked with orange. Head orange-brownish except malar space, inner orbits and mandible (except apices) ivory. Mesosoma brownish except propleuron, pronotum, mesopleuron and mesoscutum largely marked with orange, subtegular ridge and tegula ivory. Fore and mid coxa, trochanter and trochantellus ivory, femur, tibia and tarsus orange. Hind leg brown except coxa

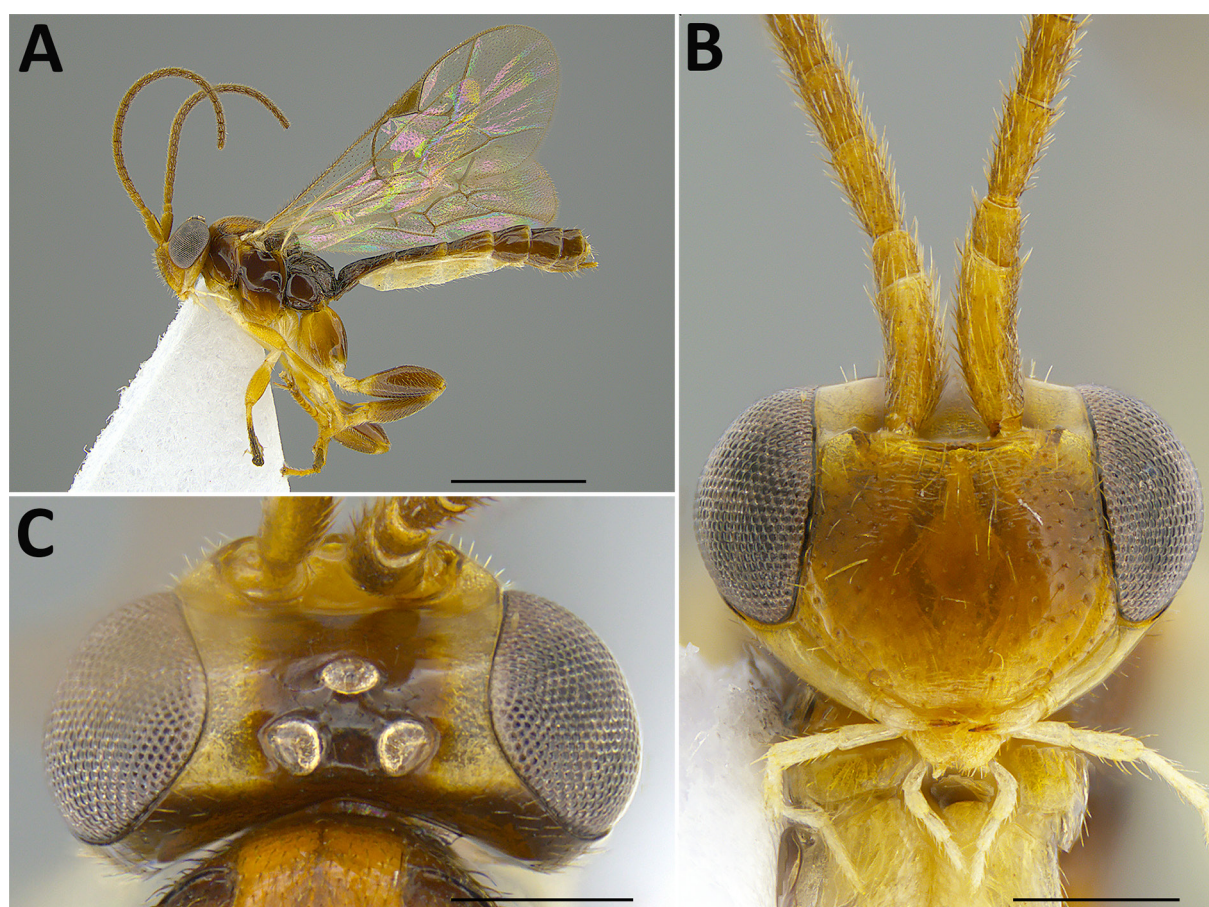


Fig. 11. *Orthocentrus lamdongensis* sp. nov., holotype, ♀ (RMNH.INS.1722383). **A.** Lateral view of habitus. **B.** Frontal view of head and basal antennal segments. **C.** Dorsal view of head. Scale bars: A = 1 mm; B–C = 0.25 mm.

basally orange, trochanter, trochantellus, femur, tibia and tarsomeres basally ivory. Pterostigma and veins brown. Metasoma brownish except tergites 2–4 narrowly banded with yellow posteriorly.

Male

Unknown.

Distribution

Vietnam.

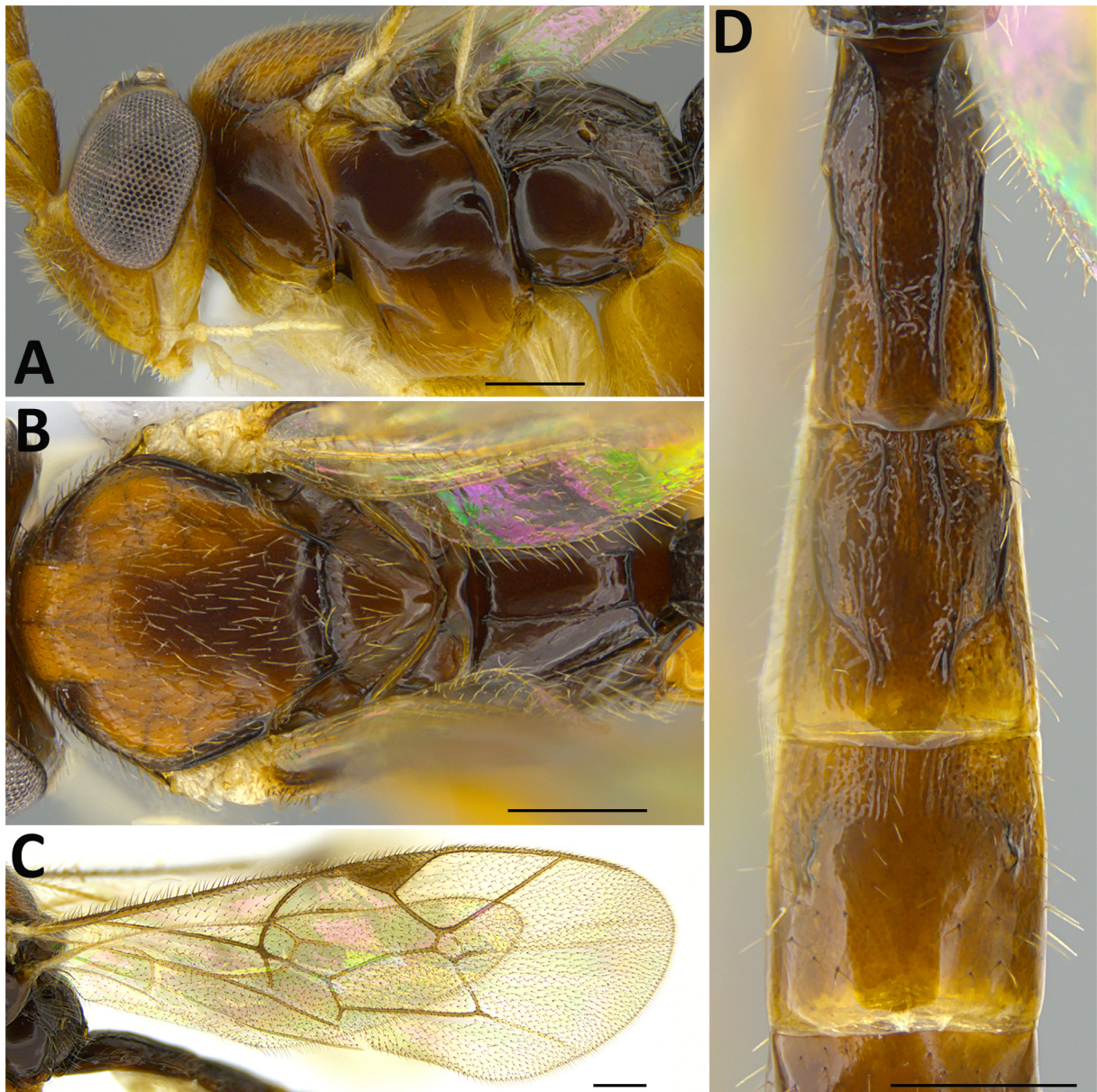


Fig. 12. *Orthocentrus lamdongensis* sp. nov., holotype, ♀ (RMNH.INS.1722383). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–3. Scale bars=0.25 mm.

Orthocentrus languidus sp. nov.

[urn:lsid:zoobank.org:act:EBE24614-4BB7-40DB-9063-6DB52BA08B22](https://doi.org/10.21203/rs.3.rs-11000000/v1)

Figs 13–14

Diagnosis

Face densely punctate; subocular sulcus weak (Fig. 13B–C); antenna with 24 flagellomeres, first flagellomere $1.15\times$ as long as wide (Fig. 13E); head $1.5\times$ as wide as high in dorsal view, vertex dark (Fig. 13D); mesoscutum with notauli (Fig. 14B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 14C); first tergite $1.3\times$ as long as its posterior width, indistinctly sculptured, with latero-median longitudinal carinae strong and parallel; second tergite $0.8\times$ as long as its posterior width, weakly longitudinally wrinkled, with latero-median longitudinal carinae; third tergite smooth, with median transverse furrow (Fig. 14D).

Differential diagnosis

Orthocentrus languidus sp. nov. is similar to *O. punctatus* sp. nov. and *O. nitidus* sp. nov., but has shorter antennae with 24 flagellomeres (30 in *O. punctatus* and *O. nitidus*), a weakly developed subocular

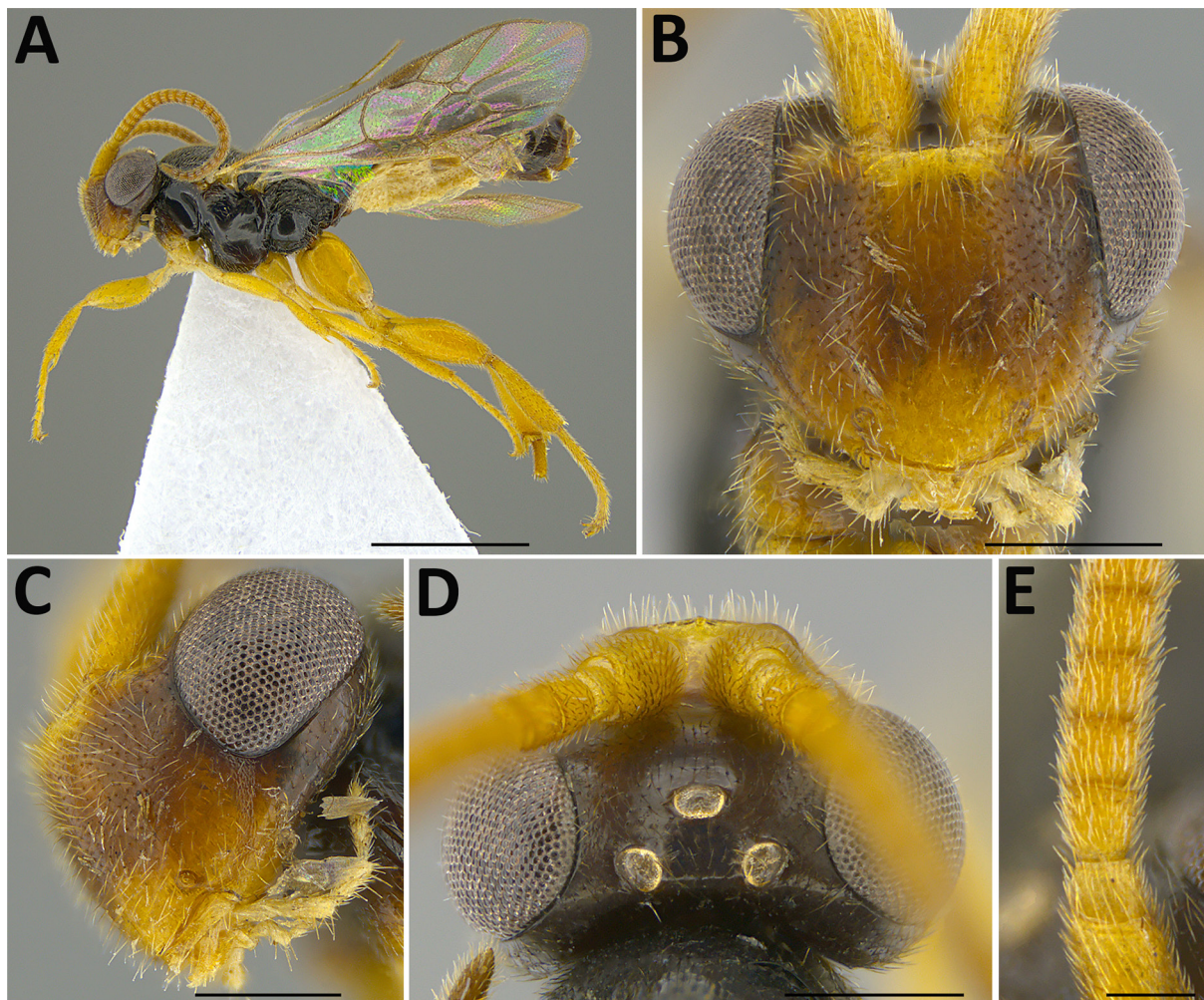


Fig. 13. *Orthocentrus languidus* sp. nov., holotype, ♀ (RMNH.INS.1722358). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Lateral view of head. **D.** Dorsal view of head. **E.** Frontal view of basal antennal segments. Scale bars: A=1 mm; B–D=0.25 mm; E=0.1 mm.

sulcus (strong in *O. punctatus* and *O. nitidus*), a strongly projecting posterior transverse carina of the propodeum (not projecting in *O. punctatus* and weakly projecting in *O. nitidus*), and a yellow hind leg (largely fuscous in *O. punctatus* and *O. nitidus*).

Etymology

The species epithet is from the Latin '*languidus*' ('indistinct, weak') referring to the weak subocular sulcus of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P., Krong K'mar; 760–770 m a.s.l.; 21–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 7–12; RMHN'05; NBC, RMNH.INS.1722358.

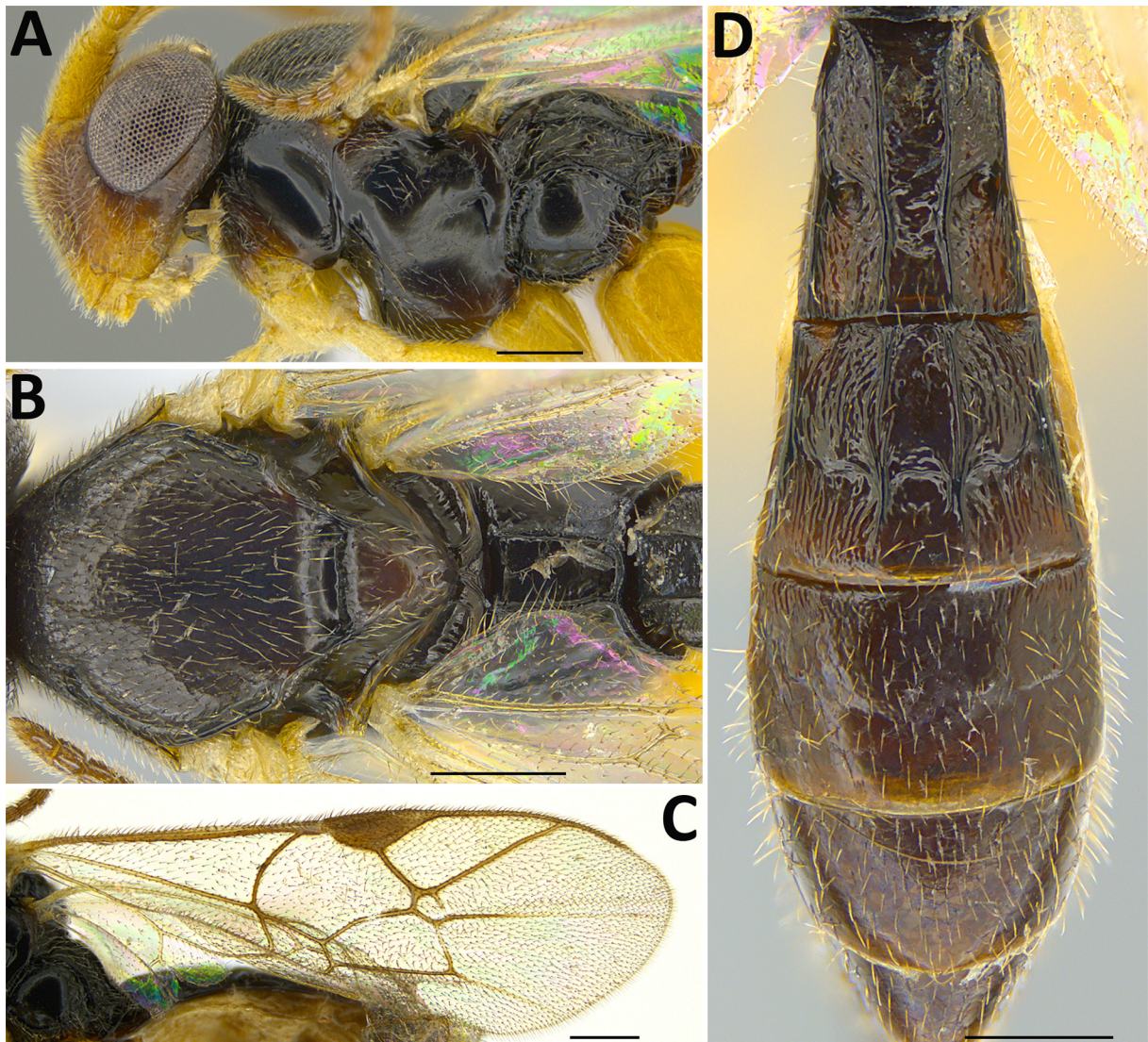


Fig. 14. *Orthocentrus languidus* sp. nov., holotype, ♀ (RMNH.INS.1722358). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–5. Scale bars=0.25 mm.

Description

Female (holotype)

Body length 3.2 mm. Fore wing 2.5 mm.

Antenna with 24 flagellomeres, first flagellomere about $1.15\times$ as long as wide. Face about $0.6\times$ as long as wide, densely punctate; inner orbits slightly divergent. Malar space $4.0\times$ basal width of mandible; subocular sulcus present, but weak. Mandible closed, apices hidden under clypeus. Head $1.5\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance about $0.9\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina not visible dorsally due to head position, present laterally.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth; epicnemial carina complete. Metapleuron smooth, densely pubescent along margins; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae, posterior transverse carina strongly projecting.

Hind femur $2.6\times$ as long as wide, third tarsomere of hind tarsus about $0.9\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.6\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, areolet sessile; vein 1cu-a distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.3\times$ as long as its posterior width, indistinctly sculptured, shiny, with latero-median longitudinal carinae strong and parallel; lateral oblique grooves distinct and deep. Second tergite $0.8\times$ as long as its posterior width, weakly longitudinally wrinkled, shiny, with latero-median longitudinal carinae. Third tergite smooth, with median transverse furrow. Remaining tergites smooth. Ovipositor not visible; its sheath about $0.2\times$ as long as hind tibia.

Body generally brownish-black. Head brownish-black except antenna and mandible yellow, face marked with yellow and orange. Mesosoma black except propleuron ventrally and upper hind corner of pronotum yellow, and tegula ivory. Fore and mid leg, hind trochanter and trochantellus ivory, remaining part of hind leg yellow. Pterostigma and wing veins brown. Metasoma black anteriorly, brownish posteriorly.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus leucostomus Humala & Lee, 2020

Fig. 1C–D

Orthocentrus leucostomus Humala & Lee in Humala *et al.*, 2020: 39–41. Holotype in DNUE (images examined).

Diagnosis (based on Vietnamese specimen)

Face papillate; subocular sulcus present (Fig. 1D); antenna with 21 flagellomeres, first flagellomere $2.0\times$ as long as wide; head $1.8\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 1D); mesoscutum with notauli; fore wing with vein 3rs-m, areolet narrowly sessile; hind wing with nervellus

intercepted (Fig. 1C); first tergite $1.7\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled, with latero-median longitudinal carinae; second tergite as long as its posterior width, granulate and weakly longitudinally wrinkled, with posterior transverse furrow; third tergite granulate on anterior 0.2.

Material examined

Holotype

Not examined; however, illustrations and description in Humala *et al.* (2020) are good enough.

Other material

VIETNAM • 1 ♀; Ninh Binh, Cuc Phuong N.R.; ca 225 m a.s.l.; 15 Apr.–1 May 2000; M.P. Quy leg.; near entrance; Malaise trap II; RMNH'00; NBC, RMNH.INS.1722380.

Distribution

South Korea (Humala *et al.* 2020); first record from the Indomalayan region (Vietnam).

Orthocentrus lineatus sp. nov.

[urn:lsid:zoobank.org:act:B682B959-B2EB-4D79-BE0C-44D5F08F2F83](https://zoobank.org/urn:lsid:zoobank.org:act:B682B959-B2EB-4D79-BE0C-44D5F08F2F83)

Figs 15–16

Diagnosis

Face densely punctate, aciculate in upper half; subocular sulcus strong (Fig. 15B); antenna with 31 flagellomeres, first flagellomere about $3.8\times$ as long as wide (Fig. 15C); head $2.1\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 15D); mesoscutum with notauli (Fig. 16B); fore wing with vein 3rs-m, areolet petiolate (Fig. 16C); hind wing with nervellus not intercepted (Fig. 16D); first tergite $1.7\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae parallel; second tergite $1.6\times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow; third tergite longitudinally wrinkled and with subapical transverse furrow (Fig. 16E).

Differential diagnosis

Orthocentrus lineatus sp. nov. is similar to *O. mystacinus* sp. nov. in the sculpture of the metasoma, colouration of mesoscutum and scutellum, and the strongly elongate flagellomeres, but has a shorter antenna with 31 flagellomeres (46 in *O. mystacinus*), slenderer metasoma with tergites 1–3 elongate (tergites 2–3 transverse in *O. mystacinus*), and different wing venation.

Etymology

The species epithet is from the Latin '*lineatus*' ('having lines') referring to the colouration of the mesoscutum of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Đông Nai, Cát Tiên N.P., *Lagerstroemia* trail; ca 100 m a.s.l.; 2–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 17–23; RMNH'05; NBC, RMNH.INS.1722410.

Description

Female (holotype)

Body length 4.8 mm. Fore wing 3.3 mm.

Antenna with 31 flagellomeres, first flagellomere about $3.8\times$ as long as wide. Face about $0.6\times$ as long as wide, densely punctate, weakly aciculate in upper half; inner orbits divergent. Malar space $3.2\times$ basal width of mandible; subocular sulcus present. Mandible twisted, lower tooth not visible. Head $2.1\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance about $0.9\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent dorsally and ventrally; epicnemial carina complete. Metapleuron smooth, densely pubescent anteroventrally; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.8\times$ as long as wide, third tarsomere of hind tarsus about $0.9\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.0\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, areolet petiolate; vein 1cu-a weakly distad M&Rs; hind wing nervellus not intercepted, vertical.

First tergite $1.7\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae parallel; lateral oblique grooves deep. Second tergite $1.6\times$ as long as its posterior width,

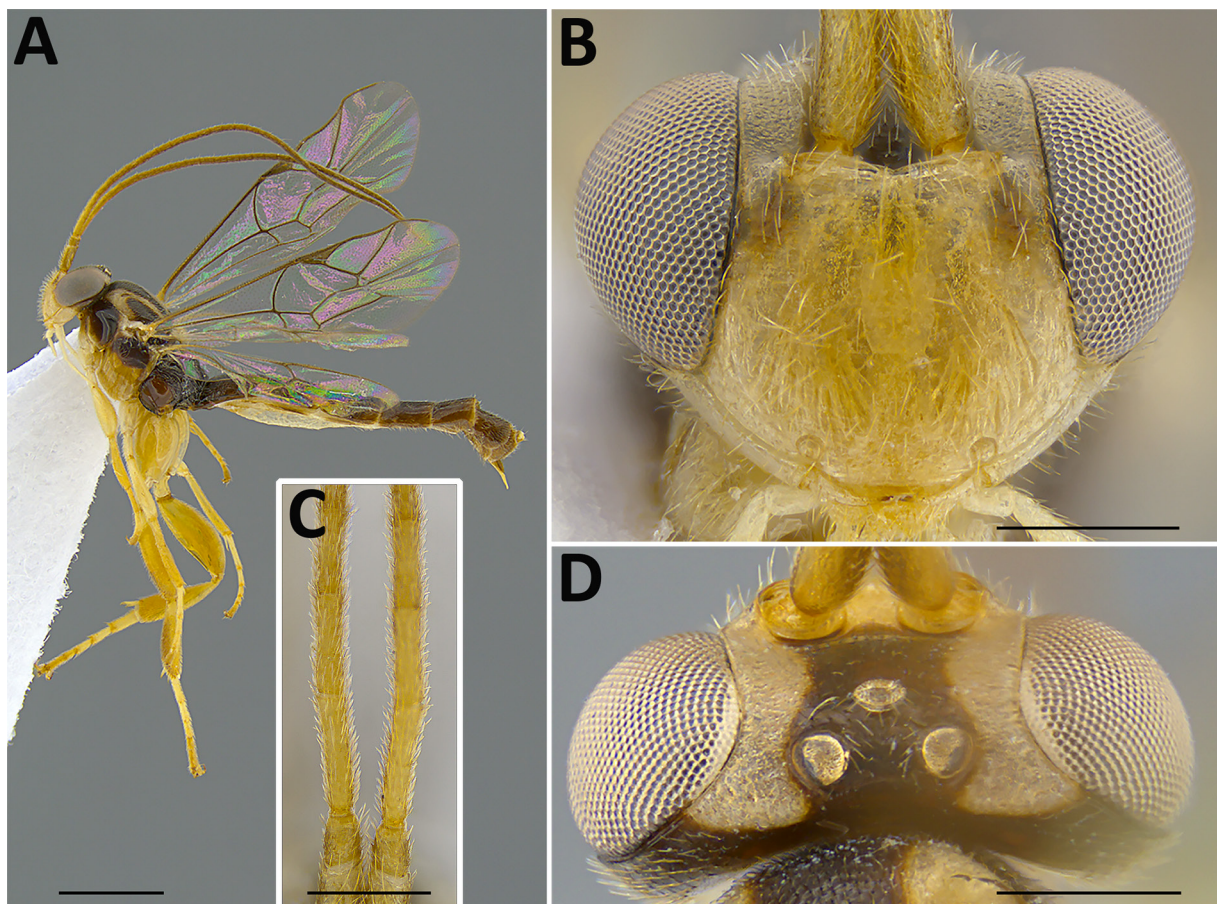


Fig. 15. *Orthocentrus lineatus* sp. nov., holotype, ♀ (RMNH.INS.1722410). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Frontal view of basal antennal segments. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

longitudinally wrinkled and with subapical transverse furrow. Third tergite with same structure and sculpture as previous tergite. Fourth tergite longitudinally wrinkled on anterior 0.3. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.25 \times$ as long as hind tibia.

Body generally brownish-black with abundant ivory marks. Head ivory except frons and vertex centrally, occiput brownish-black and antenna largely orange (except basal flagellomeres). Mesosoma brownish-black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, tegula, subtegular ridge, mesoscutum laterally and along notaular lines, and scutellum ivory, mesopleuron in

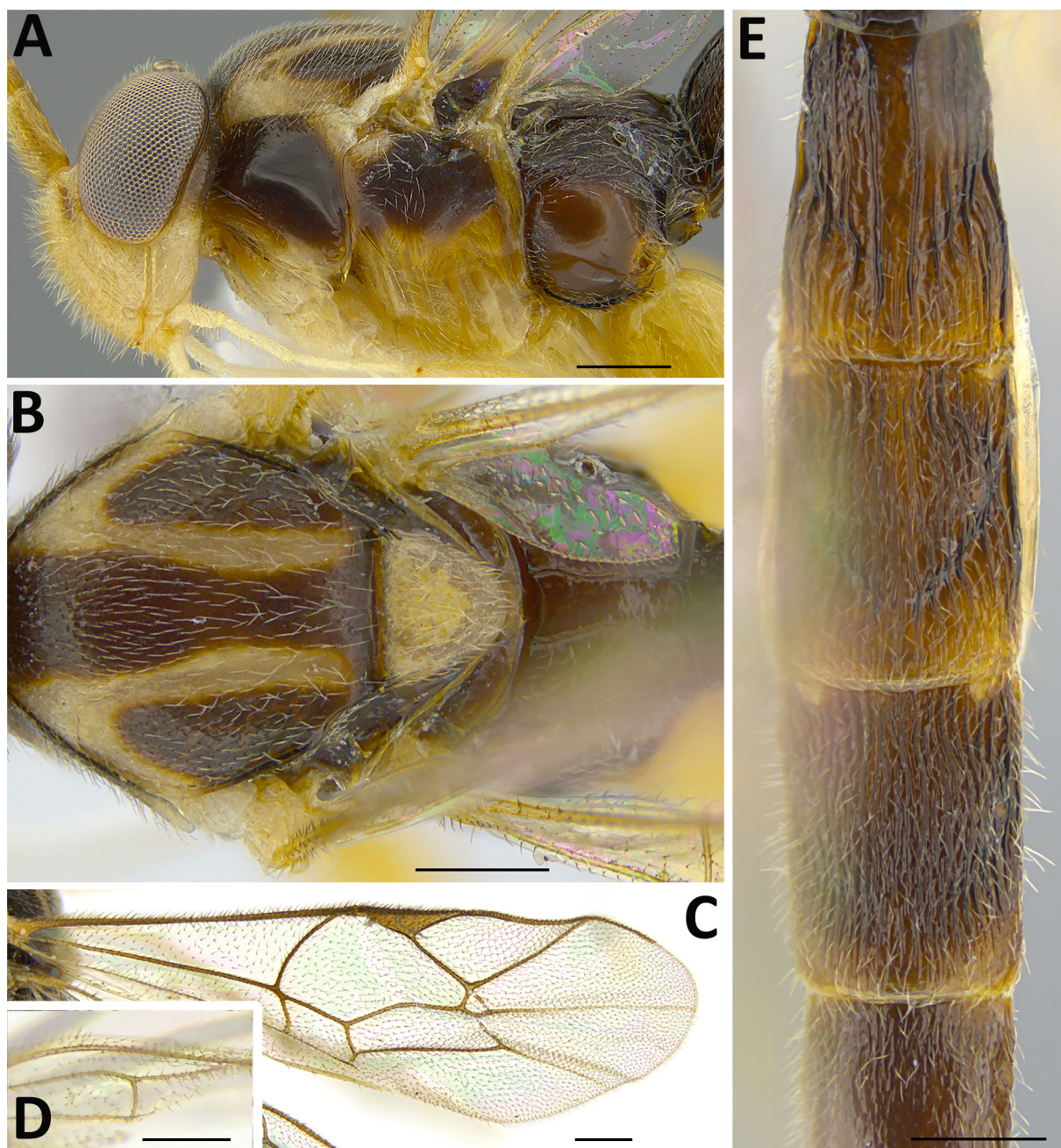


Fig. 16. *Orthocentrus lineatus* sp. nov., holotype, ♀ (RMNH.INS.1722410). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Fore wings. **D.** Nervellus. **E.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

ventral half partly ivory and yellow, and metapleuron brown. Fore and mid legs ivory except tibiae and tarsi yellow; hind leg orange except coxa partly, trochanter and trochantellus, and tarsomeres (except apices) ivory, femur and tibia slightly infuscate (except base). Pterostigma and wing veins brown. Metasoma brown except tergites 1–3 narrowly banded with yellow posteriorly.

Male

Unknown.

Distribution

Vietnam.

***Orthocentrus mandibularis* sp. nov.**

[urn:lsid:zoobank.org:act:944F9460-11E9-4A1F-8E6F-F36ED4154A27](https://zoobank.org/urn:lsid:zoobank.org:act:944F9460-11E9-4A1F-8E6F-F36ED4154A27)

Figs 17–18

Diagnosis

Face sparsely punctate; subocular sulcus strong (Fig. 17D); antenna with 23 flagellomeres, first flagellomere about $3.4\text{--}3.5\times$ as long as wide (Fig. 17C); head $2.1\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 17E); mesoscutum with notauli (Fig. 18B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 18C); first tergite $1.1\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel (Fig. 18D); second tergite $0.8\times$ as long as its posterior width, longitudinally wrinkled and subapical transverse furrow; third tergite longitudinally wrinkled and with subapical transverse furrow (Fig. 18E).

Differential diagnosis

Orthocentrus mandibularis sp. nov. is similar to *O. vietnamensis* sp. nov. and *O. pectoralis* sp. nov., but differs by the longer first flagellomere, which is $3.4\text{--}3.5\times$ as long as wide (at most $3.0\times$ in *O. vietnamensis* and *O. pectoralis*), a reduced lower tooth of the mandible (developed in *O. vietnamensis* and *O. pectoralis*), and a stouter metasoma, with latero-median longitudinal carinae of the second tergite not developed (developed in *O. vietnamensis* and *O. pectoralis*).

Etymology

The species epithet is from the Latin ‘*mandibularis*’ referring to the reduced lower tooth of the mandible of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P.; ca 750 m a.s.l.; 1–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; near river, Malaise traps 3–5; RMNH’07; NBC, RMNH.INS.1722401.

Paratype

VIETNAM • 1 ♀; same collection data as for holotype; NBC, RMNH.INS.1722402.

Description

Female

Body length 2.9–3.0 mm. Fore wing 2.7–2.8 mm.

Antenna with 23 flagellomeres, first flagellomere $3.4\text{--}3.5\times$ as long as wide. Face about $0.5\times$ as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space $3.8\text{--}3.9\times$ basal width of mandible;

subocular sulcus present. Mandible strongly twisted, lower tooth absent. Head $2.1 \times$ as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-ocular distance about $1.1 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina complete. Metapleuron smooth; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.8 \times$ as long as wide, third tarsomere of hind tarsus about $0.8 \times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.2\text{--}1.3 \times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

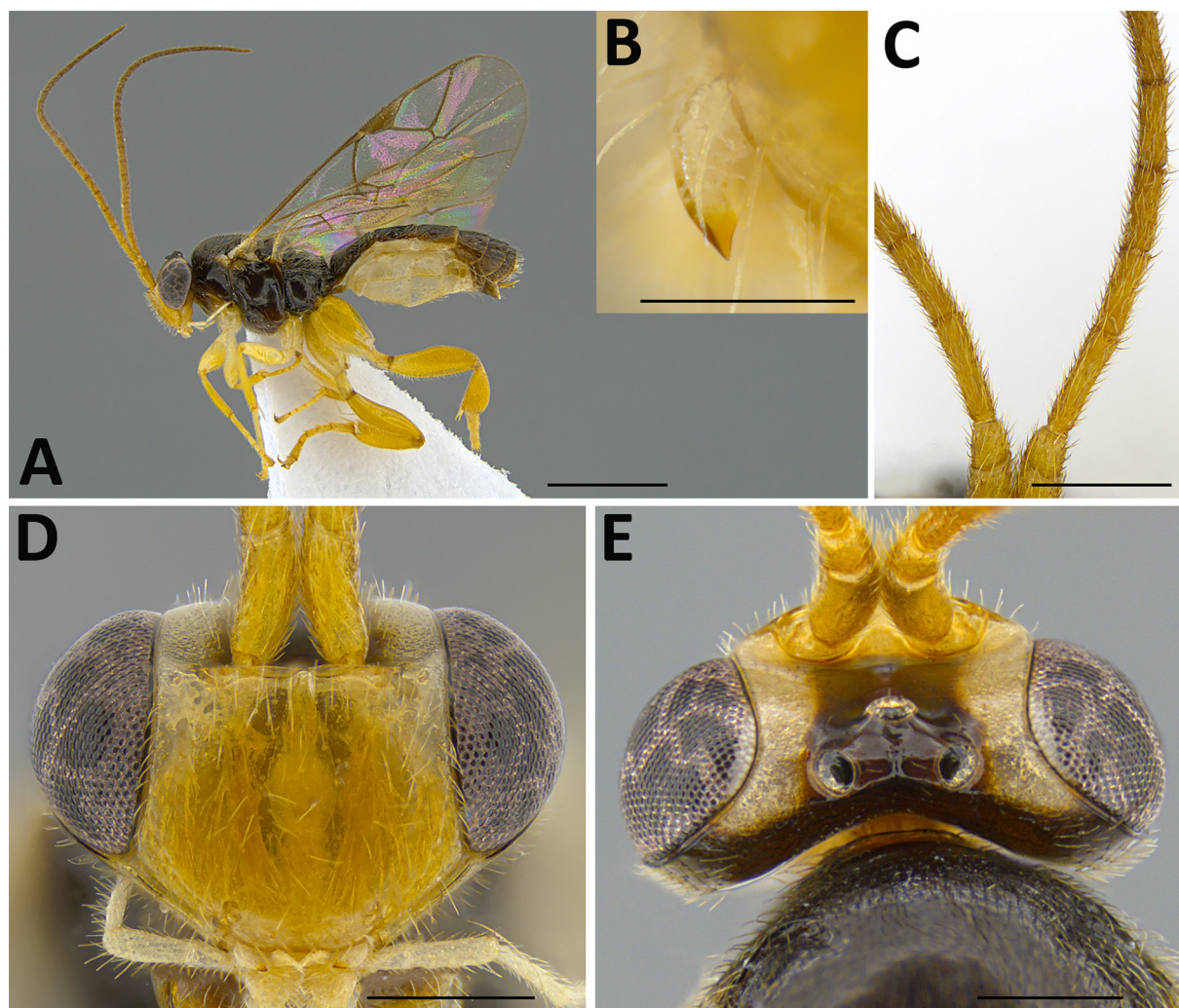


Fig. 17. *Orthocentrus mandibularis* sp. nov., holotype, ♀ (RMNH.INS.1722401). **A.** Lateral view of habitus. **B.** Dorsal view of mandibula. **C.** Frontal view of basal antennal segments. **D.** Frontal view of head. **E.** Dorsal view of head. Scale bars: A=1 mm; B=0.1 mm; C–E=0.25 mm.

First tergite $1.1 \times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel; lateral oblique grooves deep. Second tergite $0.8 \times$ as long as its posterior width, longitudinally wrinkled, with subapical transverse furrow. Third tergite with same structure and sculpture as previous tergite. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.25 \times$ length of hind tibia.

Body generally brownish-black. Head yellow to orange except frons and vertex medially and occiput brownish black, inner orbits, malar space and mandible ivory. Mesosoma brownish-black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge, and

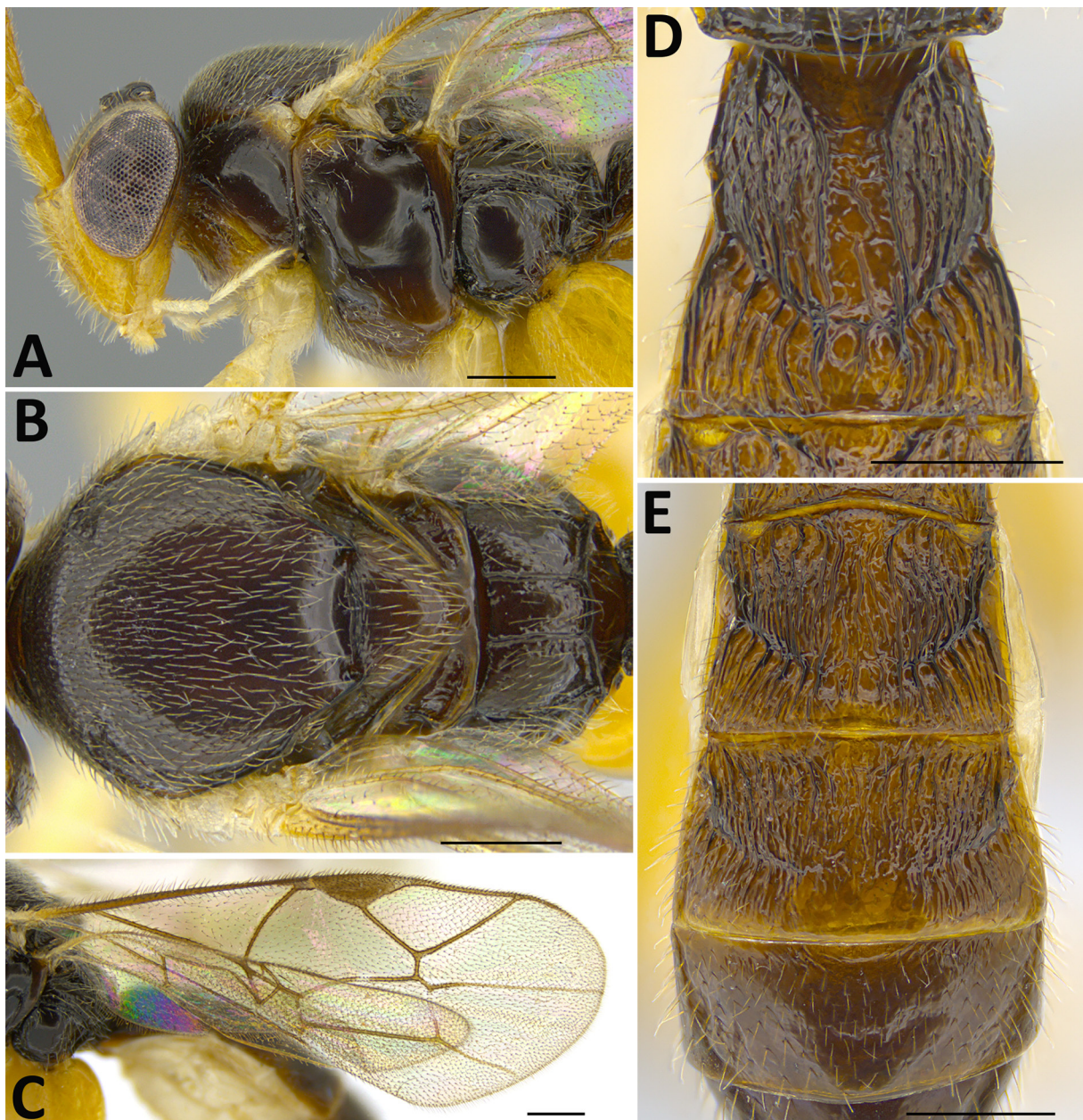


Fig. 18. *Orthocentrus mandibularis* sp. nov., holotype, ♀ (RMNH.INS.1722401). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of first tergite. **E.** Dorsal view of metasomal tergites 2–4. Scale bars = 0.25 mm.

tegula ivory. Fore and mid legs ivory except tibiae largely orange. Hind leg orange except trochanter and trochantellus ivory. Pterostigma and wing veins brown. Metasoma brownish-black.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus mystacinus sp. nov.

[urn:lsid:zoobank.org:act:194FA9D5-0178-41B1-B2C1-1FB93F2B9A97](https://zoobank.org/urn:lsid:zoobank.org:act:194FA9D5-0178-41B1-B2C1-1FB93F2B9A97)

Figs 19–20

Diagnosis

Face densely punctate and aciculate; subocular sulcus strong (Fig. 19C); antenna with 46 flagellomeres, first flagellomere about $4.0\times$ as long as wide (Fig. 19B); head $1.6\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 19D); mesoscutum with notauli absent (Fig. 20B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 20C); first tergite $1.3\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae slightly converging; second tergite $0.8\times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow; third tergite longitudinally wrinkled and with subapical transverse furrow (Fig. 20D).

Differential diagnosis

Orthocentrus mystacinus sp. nov. is similar to *O. lineatus* sp. nov. in the sculpture of the metasoma, the colouration of the mesoscutum and scutellum, and the strongly elongate flagellomeres, but has a longer antenna with 46 flagellomeres (31 in *O. lineatus*) and a stouter metasoma with tergites 2–3 quadrate to transverse (tergites 1–3 elongate in *O. lineatus*).

Etymology

The species epithet is from the Latin ‘*mystacinus*’ (‘mustachioed’) referring to the long antenna of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P., Krong K’mar; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH’07; NBC, RMNH.INS.1722411.

Description

Female (holotype)

Body length 4.0 mm. Fore wing 3.2 mm.

Antenna with 46 flagellomeres, first flagellomere about $4.0\times$ as long as wide. Face about $0.6\times$ as long as wide, densely punctate and aciculate; inner orbits divergent. Eye densely setose. Malar space $3.8\times$ basal width of mandible; subocular sulcus present. Mandible twisted, lower tooth very small. Head $1.6\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance about $1.1\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli absent. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent dorsally and ventrally; epicnemial carina complete. Metapleuron smooth, densely pubescent along margins; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $3.2 \times$ as long as wide, third tarsomere of hind tarsus about $1.0 \times$ length of fifth tarsomere; tarsal claws simple.

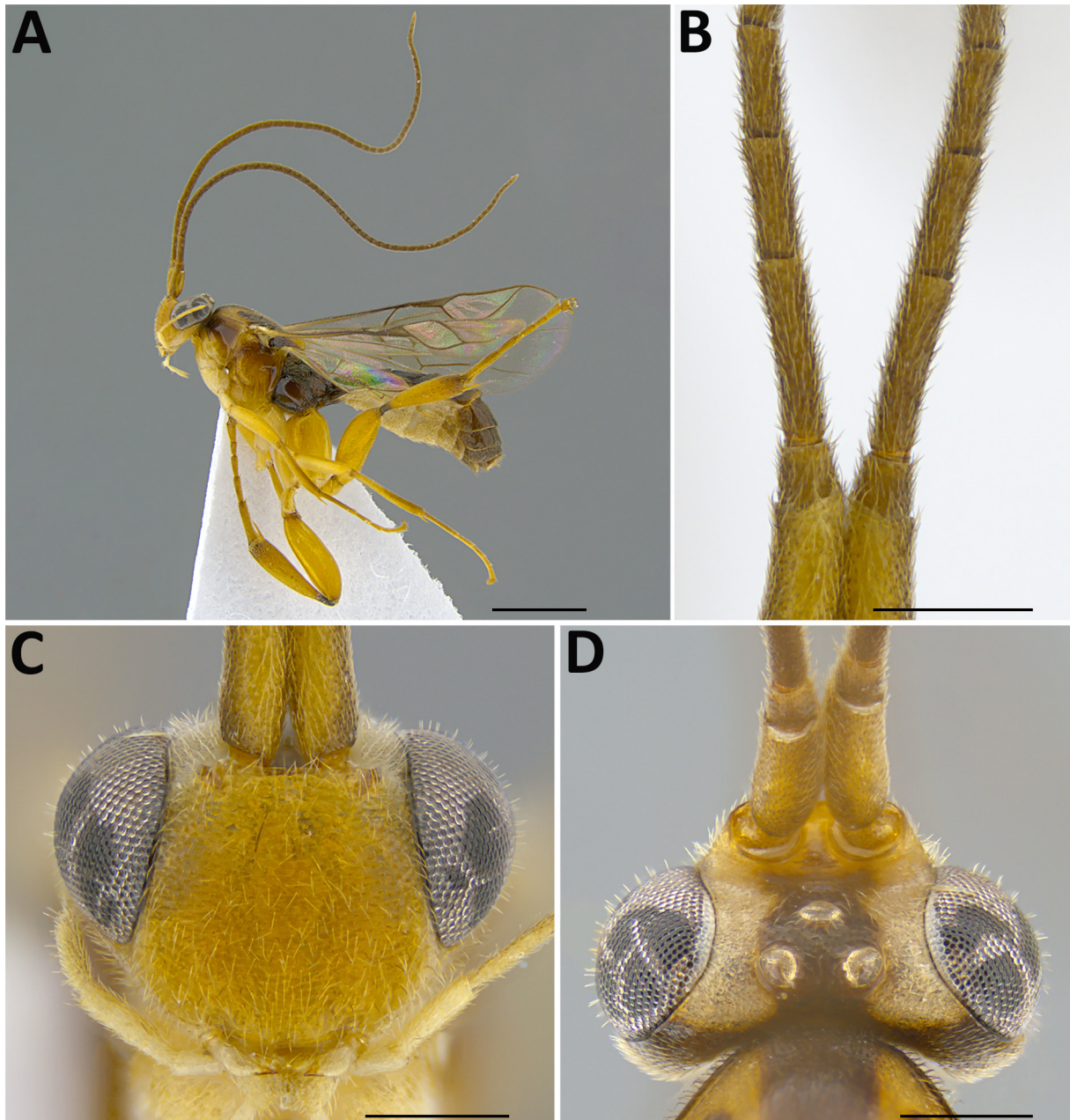


Fig. 19. *Orthocentrus mystacinus* sp. nov., holotype, ♀ (RMNH.INS.1722411). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

Fore wing with vein 2rs-m about $0.7 \times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but largely unpigmented, areolet sessile; vein 1cu-a weakly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.3 \times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae slightly diverging; lateral oblique grooves deep. Second tergite $0.8 \times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow. Third tergite with same structure and sculpture as previous tergite. Fourth tergite granulate on anterior 0.5. Remaining tergites smooth. Ovipositor not projecting beyond apex of metasoma.

Body generally brownish-black with abundant yellow marks. Head orange except malar space, mandible (except apices) and inner orbits on frons and vertex ivory, frons and vertex centrally, and occiput brownish-black, and antenna brown except scape largely orange. Mesosoma brownish-black except propleuron, pronotum and mesopleuron orange with ivory marks, mesoscutum laterally and along

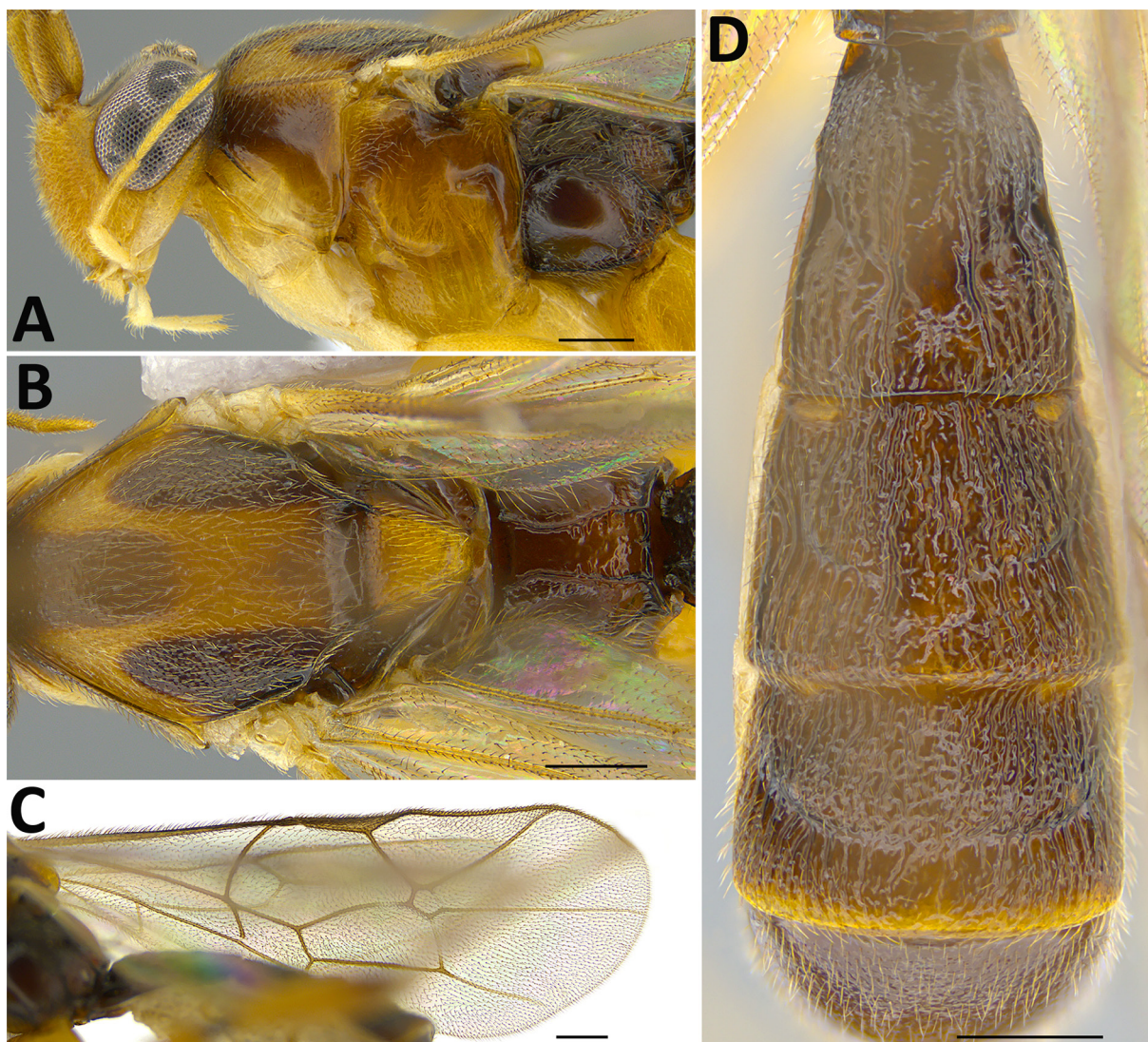


Fig. 20. *Orthocentrus mystacinus* sp. nov., holotype, ♀ (RMNH.INS.1722411). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

notaular lines, and scutellum yellow. Fore and mid legs yellow except coxae, trochanters and trochantelli ivory; hind leg orange except trochanter and trochantellus partly ivory, and tibia infusate basally and apically. Pterostigma translucent and wing veins brown. Metasoma brownish-black except third tergite slightly paler posteriorly.

Male

Unknown.

Distribution

Southern Vietnam.

Orthocentrus nitidus sp. nov.

[urn:lsid:zoobank.org:act:AE77326A-DCBB-424B-89C5-4248F770EF70](https://zoobank.org/act:AE77326A-DCBB-424B-89C5-4248F770EF70)

Figs 21–22

Diagnosis

Face densely punctate; subocular sulcus strong (Fig. 21B–C); antenna with 30 flagellomeres, first flagellomere about $1.15 \times$ as long as wide (Fig. 21E); head $1.3 \times$ as wide as high in dorsal view, vertex dark (Fig. 21D); mesoscutum with notauli (Fig. 22B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 22C); first tergite $1.8 \times$ as long as its posterior width, indistinctly sculptured, with latero-median longitudinal carinae strong; second tergite $1.1 \times$ as long as its posterior width, weakly rugulose and longitudinally wrinkled, with latero-median longitudinal carinae; third tergite sculptured on anterior 0.8, with posterior transverse furrow (Fig. 22D).

Differential diagnosis

Orthocentrus nitidus sp. nov. is similar to *O. punctatus* sp. nov., but has slightly stouter flagellomeres, the second tergite with latero-median longitudinal carinae (absent in *O. punctatus*), and the third tergite sculptured on the anterior 0.8, with a posterior transverse furrow (sculptured on the anterior 0.1, with a posterior transverse furrow absent in *O. punctatus*).

Etymology

The species epithet is from the Latin ‘*nitidus*’ (‘shiny’) referring to the smooth and shiny tergites of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Lam Dong, Bidoup Nuiba N.P., near Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–12; RMHN’05; NBC, RMNH.INS.1722359.

Paratype

VIETNAM • 1 ♀; same locality as for the holotype; NBC, RMNH.INS.1722360.

Description

Female

Body length 4.1 mm. Fore wing 3.5 mm.

Antenna with 30 flagellomeres, first flagellomere $1.15 \times$ as long as wide. Face about $0.8 \times$ as long as wide, densely punctate; inner orbits divergent. Malar space $4.1 \times$ basal width of mandible; subocular sulcus present. Mandible slightly twisted, lower tooth small, visible. Head $1.3 \times$ as wide as high in dorsal

view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance $0.9 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina present, narrowly interrupted dorsally.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent anteriorly and ventrally; epicnemial carina complete. Metapleuron smooth, densely pubescent along margins; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae, posterior transverse carinae weakly projecting.

Hind femur $2.6 \times$ as long as wide, third tarsomere of hind tarsus about $0.9 \times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.7 \times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but partly unpigmented, areolet sessile; vein 1cu-a distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.8 \times$ as long as its posterior width, indistinctly sculptured, with latero-median longitudinal carinae strong; lateral oblique grooves distinct and deep. Second tergite $1.1 \times$ as long as its posterior

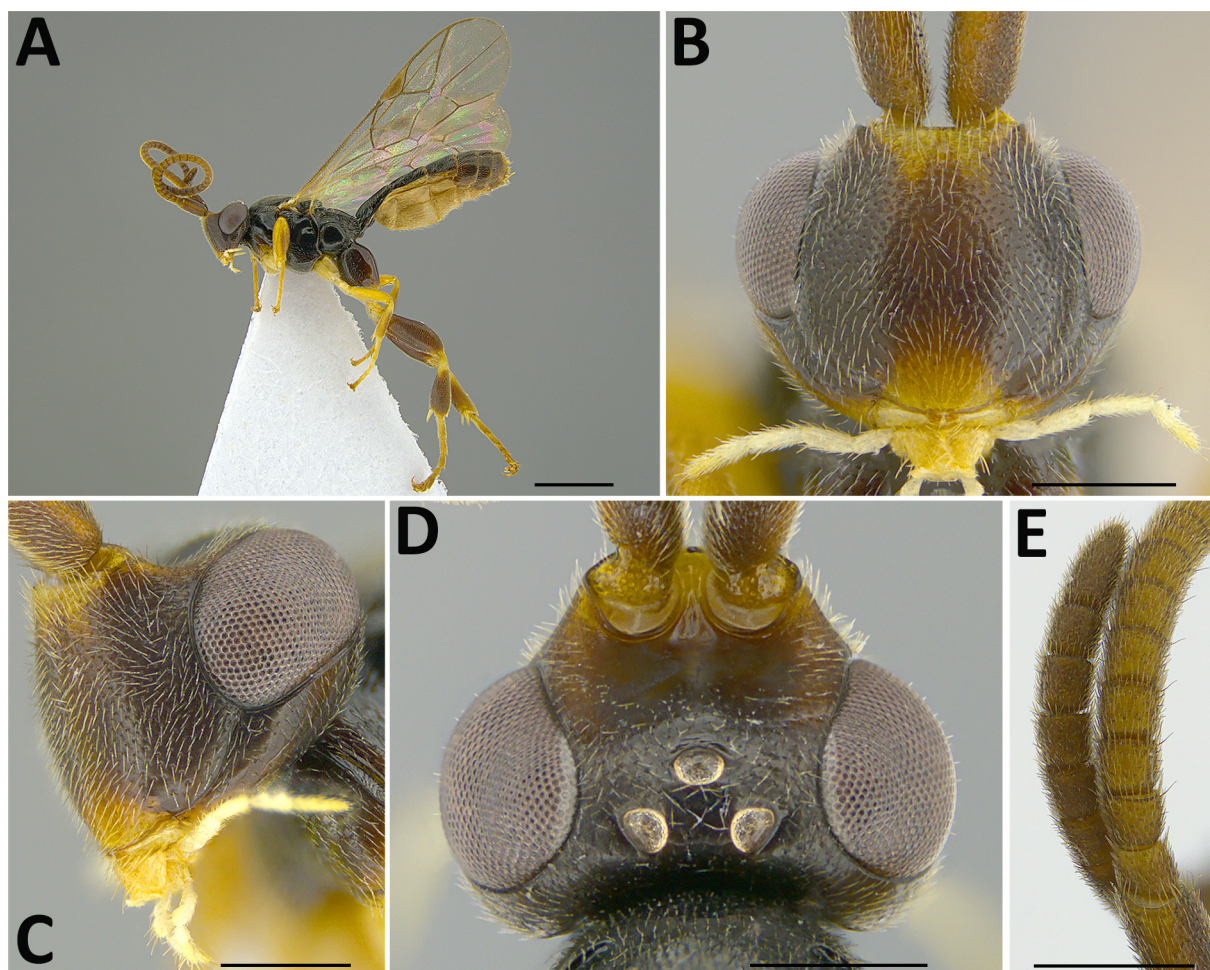


Fig. 21. *Orthocentrus nitidus* sp. nov., holotype, ♀ (RMNH.INS.1722359). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Lateral view of head. **D.** Dorsal view of head. **E.** Frontal view of basal antennal segments. Scale bars: A=1 mm; B–E=0.25 mm.

width, weakly rugulose and longitudinally wrinkled, with latero-median longitudinal carinae. Third tergite sculptured on anterior 0.8, with posterior transverse furrow. Remaining tergites smooth. Ovipositor thin and straight; its sheath about $0.3 \times$ as long as hind tibia.

Body generally brownish-black. Head brownish-black except face below antennal sockets and clypeus orange and mandible yellow. Mesosoma black except propleuron narrowly ventrally, upper hind corner of pronotum and tegula yellow. Fore and mid coxa, trochanter and trochantellus ivory, femur, tibia and tarsus yellow; hind leg brown except coxa apically, trochanter and trochantellus, femur basally, tibia basally, and first tarsomere basally yellow. Pterostigma and wing veins brown. Metasoma black except second and third tergites narrowly yellow posteriorly, and tergites starting from fourth brownish.

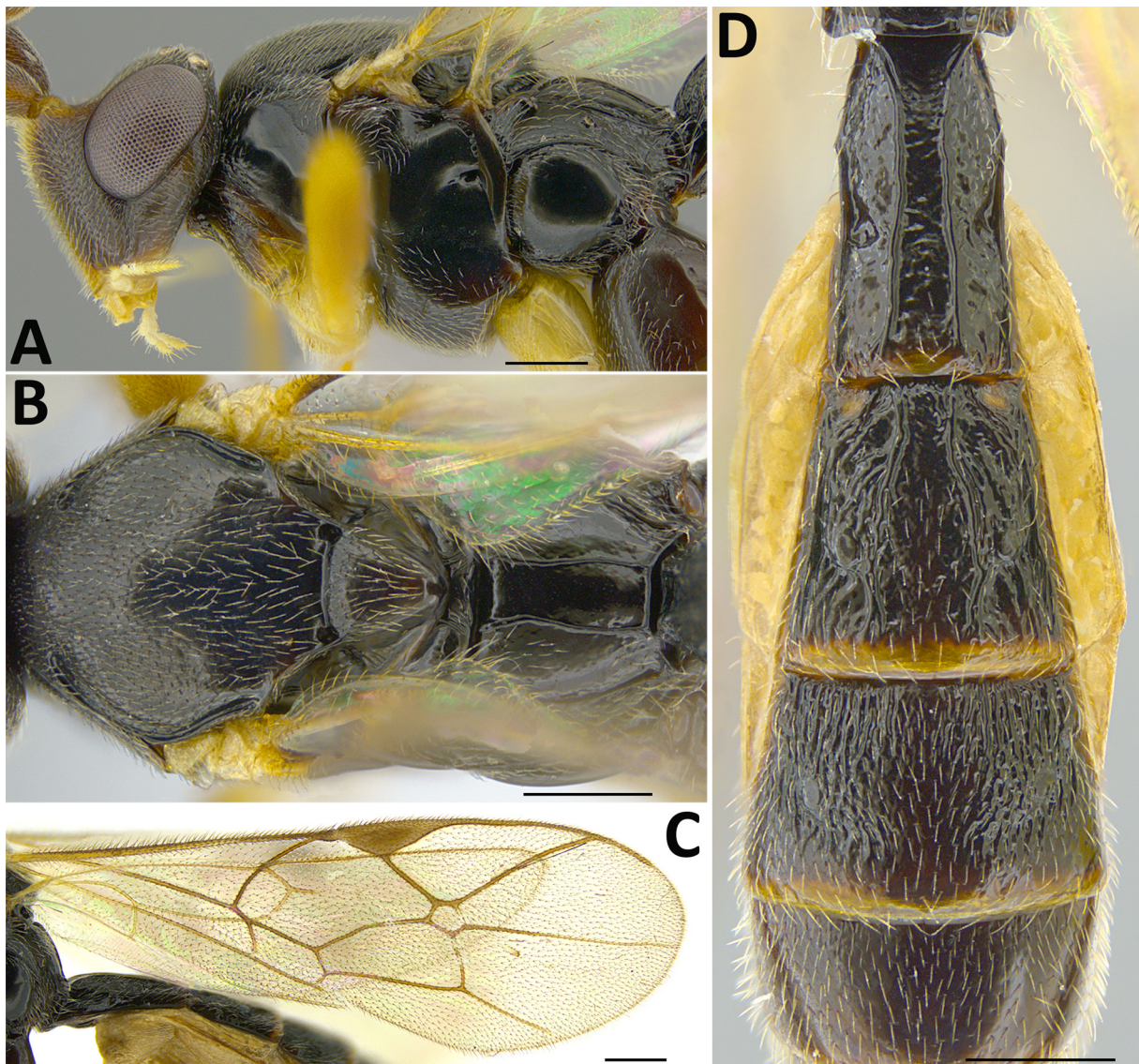


Fig. 22. *Orthocentrus nitidus* sp. nov., holotype, ♀ (RMNH.INS.1722359). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Male

Unknown. One male with similar leg colour and structure of the metasoma was examined, but it was collected in the northwestern part of Vietnam (females from the southern part), thus the taxonomic status of this specimen remains uncertain.

Distribution

Vietnam.

Remarks

The Indomalayan records of *O. fulvipes* (Uchida 1932; Chao 1976) probably belong to this or a similar undescribed species.

Orthocentrus papillosus sp. nov.

[urn:lsid:zoobank.org:act:9D11EFC2-26C2-405B-A7F1-A10EE555BDE0](https://zoobank.org/act:9D11EFC2-26C2-405B-A7F1-A10EE555BDE0)

Figs 23–24

Diagnosis

Face papillate; subocular sulcus strong (Fig. 23C); antenna with 25 flagellomeres, first flagellomere about $0.9\times$ as long as wide (Fig. 23B); head $1.4\times$ as wide as high in dorsal view, vertex dark (Fig. 23D); mesoscutum with notauli (Fig. 24B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 24C); first tergite $1.6\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled, with latero-median longitudinal carinae present posteriorly; second tergite $1.1\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled; third tergite smooth (Fig. 24D).

Differential diagnosis

Orthocentrus papillosus sp. nov. is similar to the Palaearctic *O. protervus* Holmgren, 1858 in having stout flagellomeres in combination with a papillate face and smooth third tergite, but differs by the shorter antenna with 25 flagellomeres (29–31 in *O. protervus*), more weakly developed carinae of the first tergite (strong in *O. protervus*), and an elongate face (transverse in *O. protervus*).

Etymology

The species epithet is from the Latin ‘*papillosus*’ referring to the papillate sculpture of the face of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Tonkin, Hoang Lien N.R., 15 km W of Sa Pa; ca 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise traps; RMHN’99; NBC, RMNH.INS.1722373.

Other material

VIETNAM • 1 ♀; same locality and date as for holotype; NBC, RMNH.INS.1722374.

Description

Female

Body length 3.6 mm. Fore wing 3.0 mm.

Antenna with 25 flagellomeres, first flagellomere about $0.9\times$ as long as wide. Face about $0.7\times$ as long as wide, papillate; inner orbits slightly divergent. Eye densely setose. Malar space $3.5\times$ basal width of

mandible; subocular sulcus present. Mandible apices hidden under clypeus. Head $1.4\times$ as wide as high in dorsal view. Frons and vertex sparsely papillate and densely pubescent; ocellar-ocular distance about $1.1\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina present laterally. Metapleuron smooth, densely pubescent along anterior margin; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

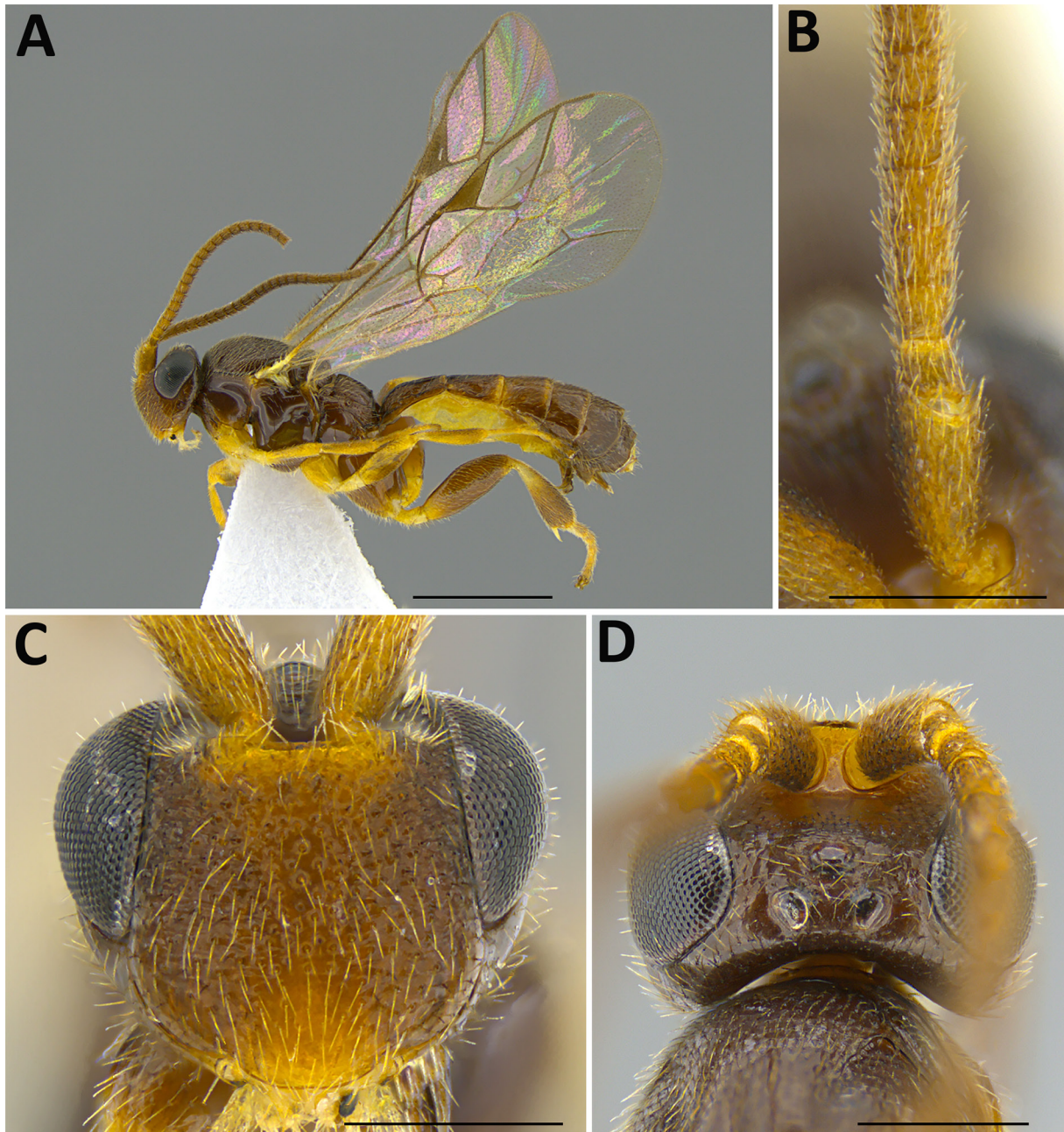


Fig. 23. *Orthocentrus papillosus* sp. nov., holotype, ♀ (RMNH.INS.1722373). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

Hind femur $2.6\times$ as long as wide, third tarsomere of hind tarsus about $0.7\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.5\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, areolet sessile; vein 1cu-a opposite M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.6\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled, with latero-median longitudinal carinae present posteriorly; lateral oblique grooves deep. Second tergite $1.1\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled. Remaining tergites smooth. Ovipositor thin and slightly upcurved, lacking subapical notch; its sheath about $0.25\times$ as long as hind tibia.

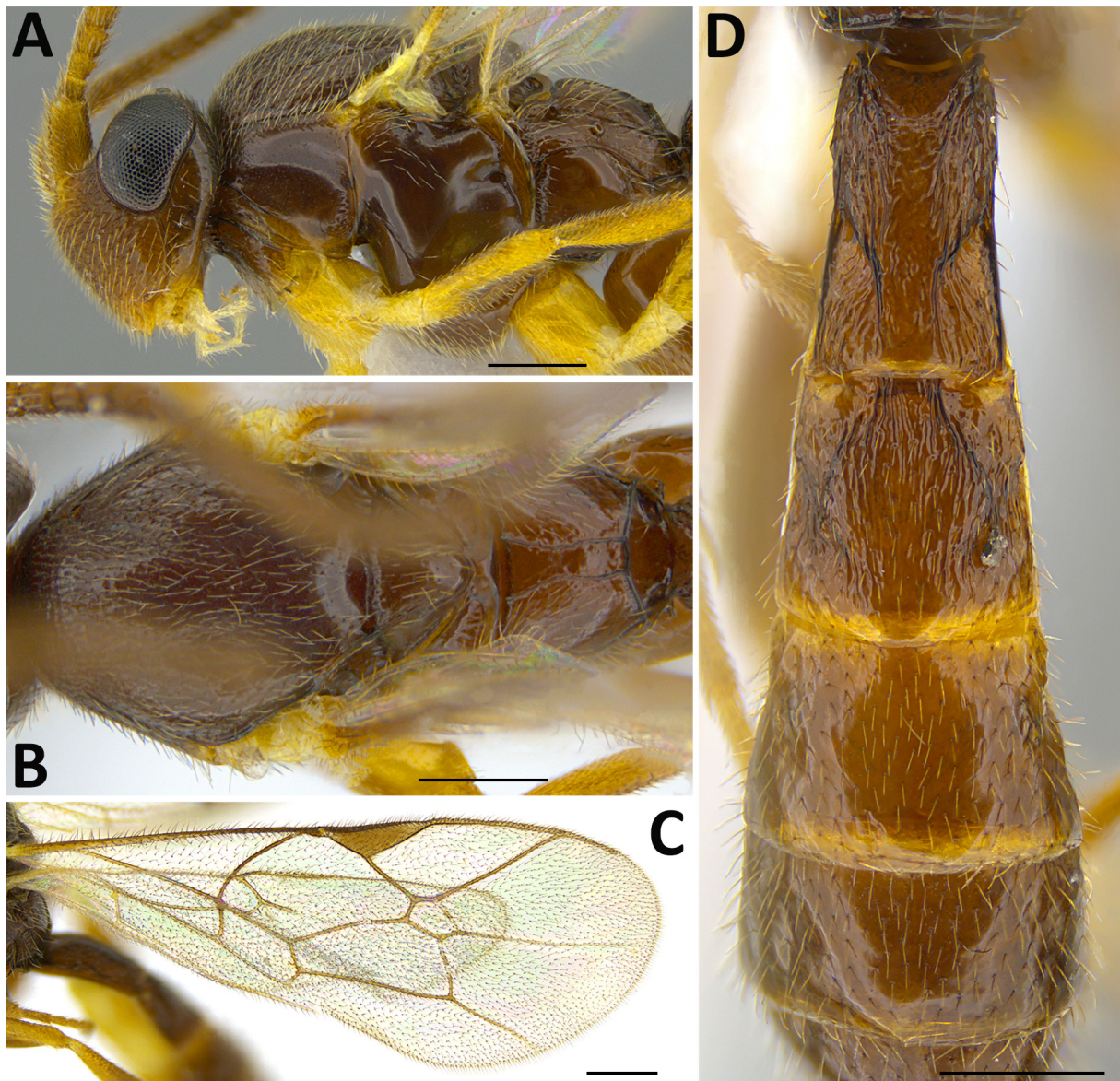


Fig. 24. *Orthocentrus papillosus* sp. nov., holotype, ♀ (RMNH.INS.1722373). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Body generally brown. Head brown except clypeus orange and mandible yellow. Mesosoma brown except upper hind corner of pronotum narrowly yellow and tegula ivory. Fore and mid legs yellow except trochanters and trochantelli ivory; hind leg brown except trochanter, trochantellus, and tibia basally ivory. Pterostigma and wing veins brown. Metasoma brown except tergites 2–3 narrowly yellowish posteriorly.

Male

Unknown.

Distribution

Vietnam.

Remarks

There is one female with the same collection data as the holotype. This specimen is smaller, has a shorter antenna with 21 flagellomeres, but with the first flagellomere slightly elongate, about $1.2\times$ as long as wide. It could belong to a different species and thus is not included in the type series.

Orthocentrus pectoralis sp. nov.

[urn:lsid:zoobank.org:act:817E3BB9-F471-496E-B758-E76E3EA39647](https://zoobank.org/urn:lsid:zoobank.org:act:817E3BB9-F471-496E-B758-E76E3EA39647)

Figs 25–27

Diagnosis

Face sparsely punctate; subocular sulcus strong; antenna with 18–20 flagellomeres, first flagellomere about $2.5\text{--}3.0\times$ as long as wide ($2.5\text{--}3.0\times$ in male) (Fig. 25B); head $1.9\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 25C); mesoscutum with notauli (Fig. 26B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 26C); first tergite $1.4\text{--}1.5\times$ as long as its posterior width ($1.6\text{--}1.7\times$ in male), longitudinally wrinkled and rugulose, with latero-median longitudinal carinae strong; second tergite $0.9\text{--}1.0\times$ as long as its posterior width ($1.0\text{--}1.1\times$ in male), longitudinally wrinkled, with latero-median longitudinal carinae and posterior transverse furrow; third tergite longitudinally wrinkled on anterior 0.7 and with posterior transverse furrow (Figs 26D, 27C).

Differential diagnosis

Orthocentrus pectoralis sp. nov. is similar to *O. vietnamensis* sp. nov., but differs by the largely orange mesosoma (at most partly orange in males, but mesoscutum and scutellum always dark in both sexes in *O. vietnamensis*) and a longer ocellar-ocular distance, which is about $1.1\text{--}1.2\times$ the maximum diameter of the lateral ocellus ($0.8\text{--}0.9\times$ in *O. vietnamensis*).

Etymology

The species epithet is from the Latin '*pectoralis*' ('of the chest') referring to the colour of the anterior part of the mesosoma of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Ha Tinh, Vu Quang N.P.; 106 m a.s.l.; $18^{\circ}17'41''$ N, $105^{\circ}25'42''$ E; 5 Mar.–15 Apr. 2011; Malaise trap 14; C. van Achterberg leg.; RMNH'11; NBC, RMNH.INS.1722403.

Paratypes

VIETNAM • 1 ♀; same collection data as for holotype; NBC, RMNH.INS.1722404 • 1 ♂; same data as for holotype; 100 m a.s.l.; $18^{\circ}17'46''$ N, $105^{\circ}25'29''$ E; Malaise trap 11; NBC,

RMNH.INS.1722405 • 1 ♀; same data as for holotype; 123 m a.s.l.; 18°17'42" N, 105°25'34" E; Malaise trap 15; NBC, RMNH.INS.1722406 • 1 ♂; Dak Lak, Chu Yang Sin N.P.; ca 750 m a.s.l.; 1–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps near dam and edge of forest; RMNH'07; NBC, RMNH.INS.1722407 • 1 ♀; Krong K'mar; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 13–23; RMNH'05; NBC, RMNH.INS.1722408 • 1 ♀; Viet Try, near Thanh Son, Thuong Cuu; 350–400 m a.s.l.; 20°59' N, 105°8' N; 11–16 Oct. 1999; R. de Vries leg.; Malaise traps; RMNH'99; NBC, RMNH.INS.1722409.

Description

Female

Body length 2.9–4.0 mm. Fore wing 2.0–2.9 mm.

Antenna with 18–20 flagellomeres, first flagellomere 2.5–3.0 × as long as wide. Face about 0.6 × as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space 3.3–3.5 × basal width of mandible; subocular sulcus present. Mandible not strongly twisted, lower tooth small and visible in anteroventral view. Head 1.9 × as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-

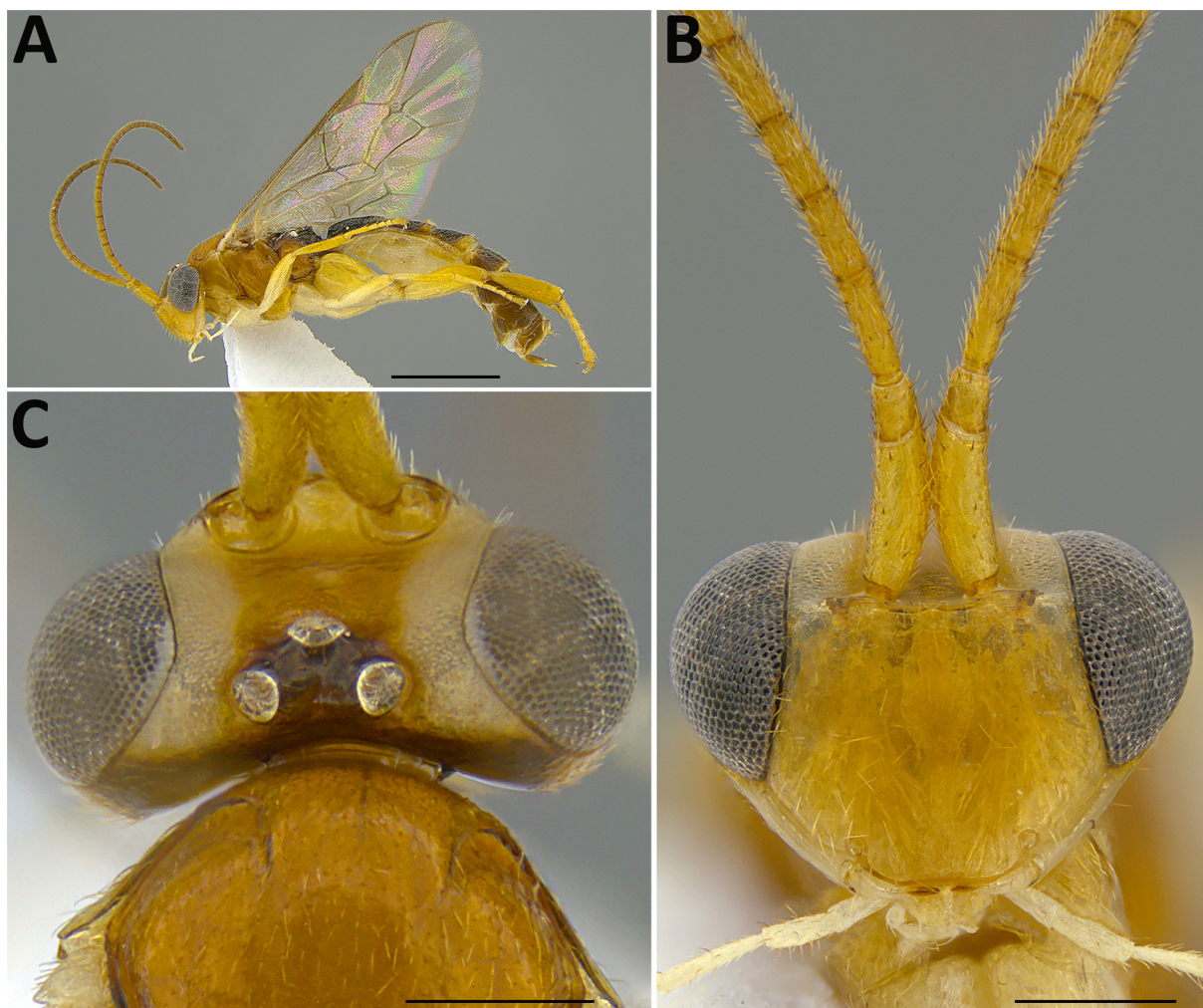


Fig. 25. *Orthocentrus pectoralis* sp. nov., holotype, ♀ (RMNH.INS.1722403). **A.** Lateral view of habitus. **B.** Frontal view of head and basal antennal segments. **C.** Dorsal view of head. Scale bars: A=1 mm; B–C=0.25 mm.

ocular distance about $1.1\text{--}1.2 \times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron sparsely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina complete. Metapleuron smooth, pubescent along margins; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae; posterior transverse carina projecting.

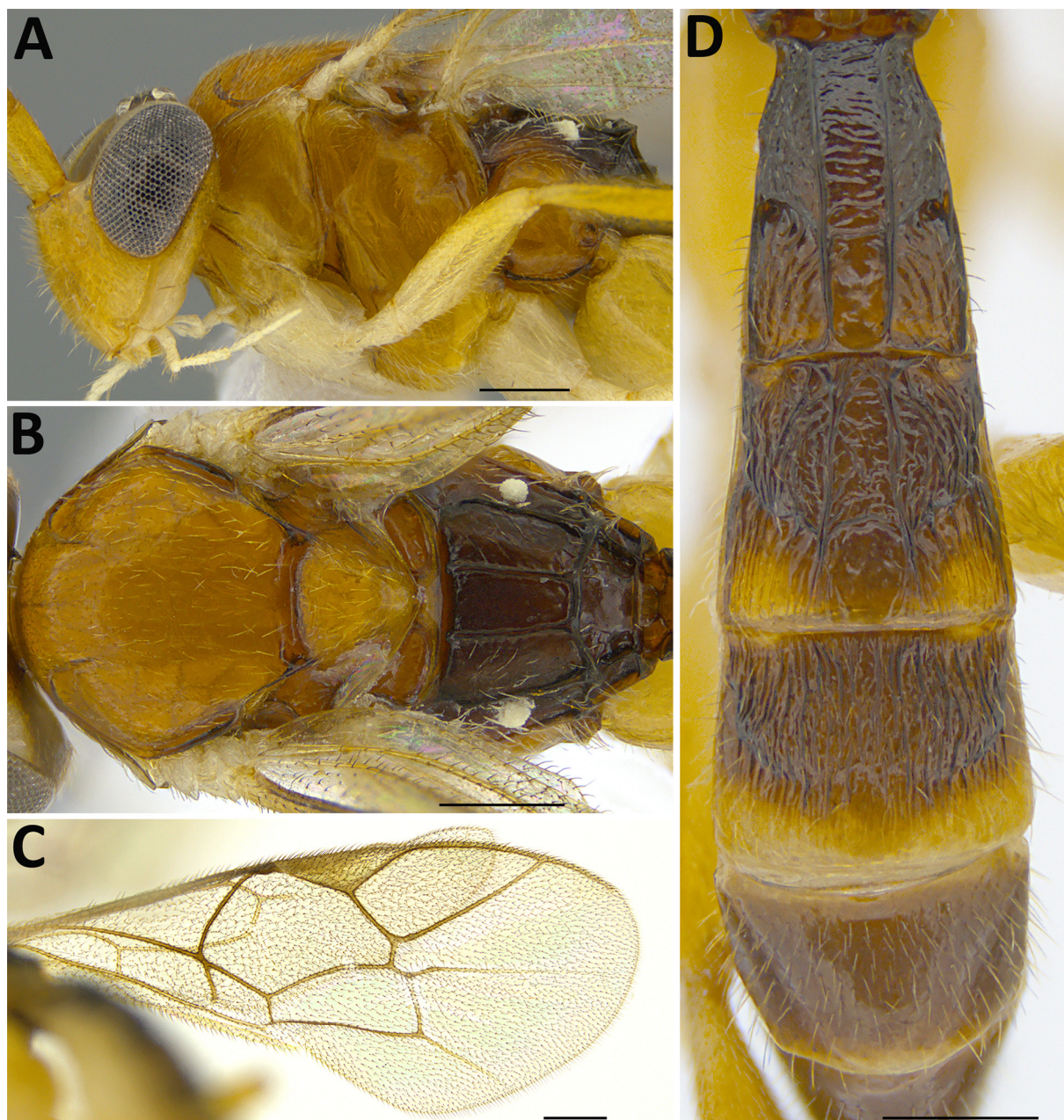


Fig. 26. *Orthocentrus pectoralis* sp. nov., holotype, ♀ (RMNH.INS.1722403). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Hind femur $2.9\text{--}3.0\times$ as long as wide, third tarsomere of hind tarsus about $0.7\text{--}0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.0\text{--}1.1\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent (present on one wing in holotype); vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.4\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae strong; lateral oblique grooves deep. Second tergite $0.9\text{--}1.0\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae and posterior transverse furrow. Third tergite longitudinally wrinkled on anterior 0.7 and with posterior transverse furrow. Remaining tergites smooth. Ovipositor thick and upcurved, with a subapical notch; its sheath about $0.25\text{--}0.3\times$ length of hind tibia.

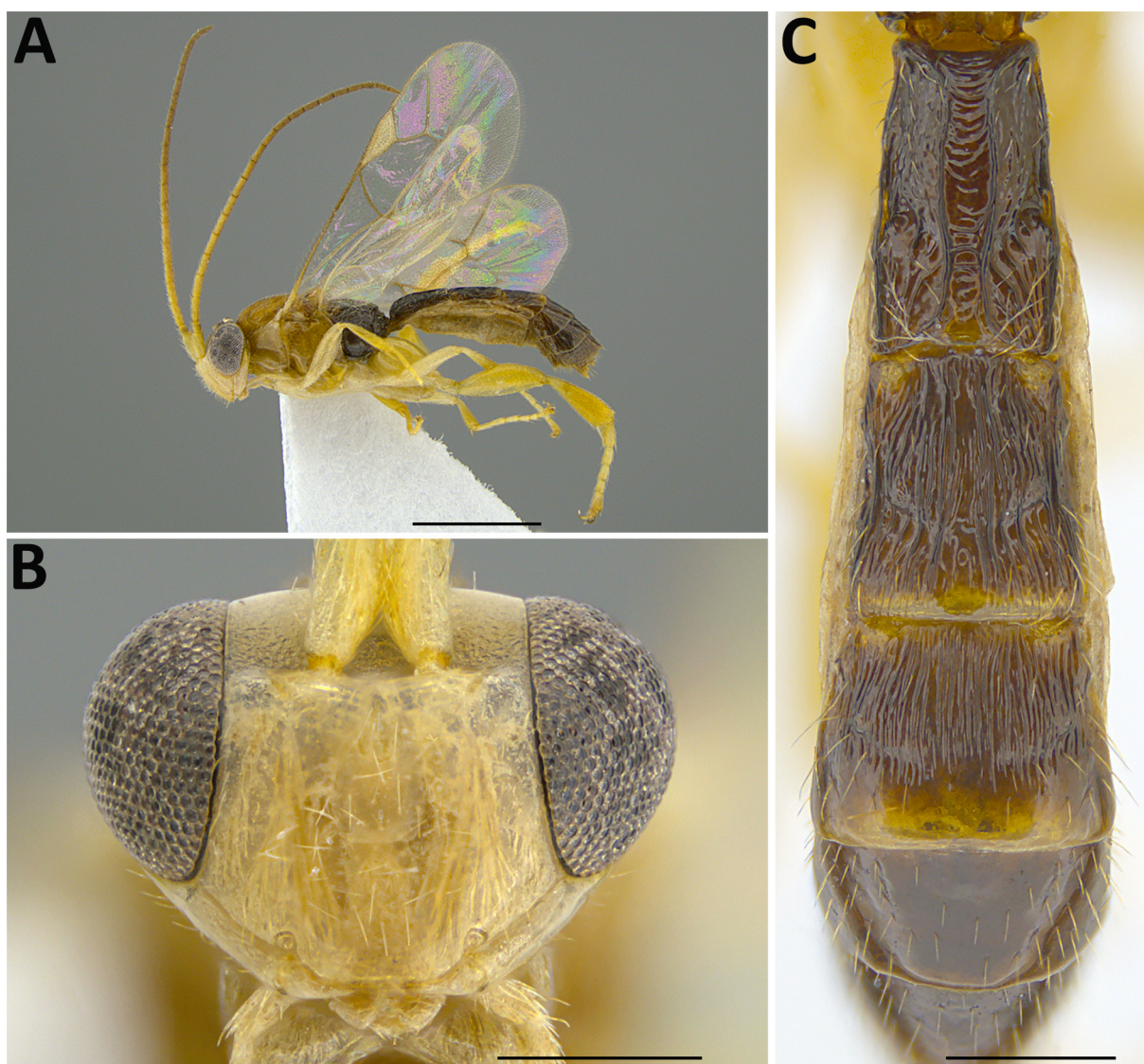


Fig. 27. *Orthocentrus pectoralis* sp. nov., paratype, ♂ (RMNH.INS.1722405). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of metasomal tergites 1–4. Scale bars: A=1 mm; B–C=0.25 mm.

Body largely orange. Head orange inner orbits, malar space and mandible (except apices) ivory to yellow and interocellar area brown. Mesosoma orange except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge and tegula ivory, and propodeum brownish-black. Fore and mid leg ivory except femur and tibia partly yellow. Hind leg yellow except coxa ventrally, trochanter and trochantellus, and femur basally ivory. Pterostigma translucent and wing veins brown. Metasoma brownish-black except tergites 2–3 (4) banded with yellow posteriorly.

Male

Resembles female, but has antenna with 18–19 flagellomeres, first flagellomere about $2.8\text{--}3.4\times$ as long as wide; metasoma with first tergite $1.6\text{--}1.7\times$ as long as its posterior width; second tergite $1.0\text{--}1.1\times$ as long as its posterior width. Colour pattern similar to that of female except head largely ivory.

Distribution

Vietnam.

Remarks

Smaller specimens have a dark metapleuron, somewhat stouter flagellomeres and a more weakly developed posterior transverse furrow on the third tergite.

Orthocentrus pilosus sp. nov.

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Figs 28–30

Diagnosis

Face papillate; subocular sulcus strong; antenna with 27–29 flagellomeres (24–26 in male), first flagellomere about $2.0\text{--}2.2\times$ as long as wide ($2.0\text{--}2.6\times$ in male) (Fig. 28B); head $1.6\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 28C); mesoscutum with notauli absent (Fig. 29B); fore wing with vein 3rs-m absent; hind wing with nervellus not intercepted (Fig. 29C); first tergite $1.4\text{--}1.6\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae absent; second tergite $1.0\text{--}1.2\times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow; third tergite the same sculpture and structure as previous tergite (Figs 29D, 30C).

Differential diagnosis

Orthocentrus pilosus sp. nov. is similar to *O. remotus* sp. nov. in having a papillate face, a hind wing with the nervellus not intercepted, and yellow inner orbits, but differs by the densely setose eyes (glabrous in *O. remotus*), a largely yellow mesosoma (black in *O. remotus*), the fore wing with vein 3rs-m absent (present in *O. remotus*), and the third tergite with a deep transverse furrow (absent in *O. remotus*).

Etymology

The species epithet is from the Latin ‘*pilosus*’ (‘hairy’) referring to the densely setose eyes of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Ha Tinh, Vu Quang N.P.; 106 m a.s.l.; $18^{\circ}17'41''$ N, $105^{\circ}25'42''$ E; 5 Mar.–15 Apr. 2011; Malaise trap 14; C. van Achterberg leg.; RMNH’11; NBC, RMNH.INS.1722364.

Paratypes

VIETNAM • 1 ♂; Viet Try, near Thanh Son, Thuong Cuu; 350–400 m a.s.l.; $20^{\circ}59'$ N, $105^{\circ}8'$ E; 11–16 Oct. 1999; R. de Vries leg.; Malaise traps; RMNH’99; NBC, RMNH.INS.1722365 • 1 ♀; Dong Nai,

Cát Tiên N.P., Crocodile trail; ca 100 m a.s.l.; 13–19 May 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH'07; NBC, RMNH.INS.1722366 • 1 ♀; same data as for preceding; Dong trail; ca 100 m a.s.l.; 13–19 May 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH'07; NBC, RMNH.INS.1722367 • 1 ♀; same data as for preceding; *Ficus* trail; ca 100 m a.s.l.; 1–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–8; RMNH'05; NBC, RMNH.INS.1722368 • 1 ♀; Dak Lak, Chu Yang Sin N.P., Krong K'mar; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH'07; NBC, RMNH.INS.1722369 • 1 ♀; same data as for preceding; 550–610 m a.s.l.; 21–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–6; RMNH'05; NBC, RMNH.INS.1722370 • 1 ♂; same data as for preceding; 590–840 m a.s.l.; 22–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 13–23; RMNH'05; NBC, RMNH.INS.1722371.

Description

Female

Body length 2.4–2.7 mm. Fore wing 1.8–2.1 mm.

Antenna with 27–29 flagellomeres, first flagellomere about $2.0\text{--}2.2\times$ as long as wide. Face about $0.7\times$ as long as wide, papillate; inner orbits slightly divergent. Eye densely setose. Malar space $3.8\text{--}3.9\times$ basal width of mandible; subocular sulcus present. Mandible twisted, lower tooth very small. Head $1.6\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance about $1.3\text{--}1.4\times$ maximum diameter of lateral ocellus, ocellar-ocular groove absent; occipital carina absent.

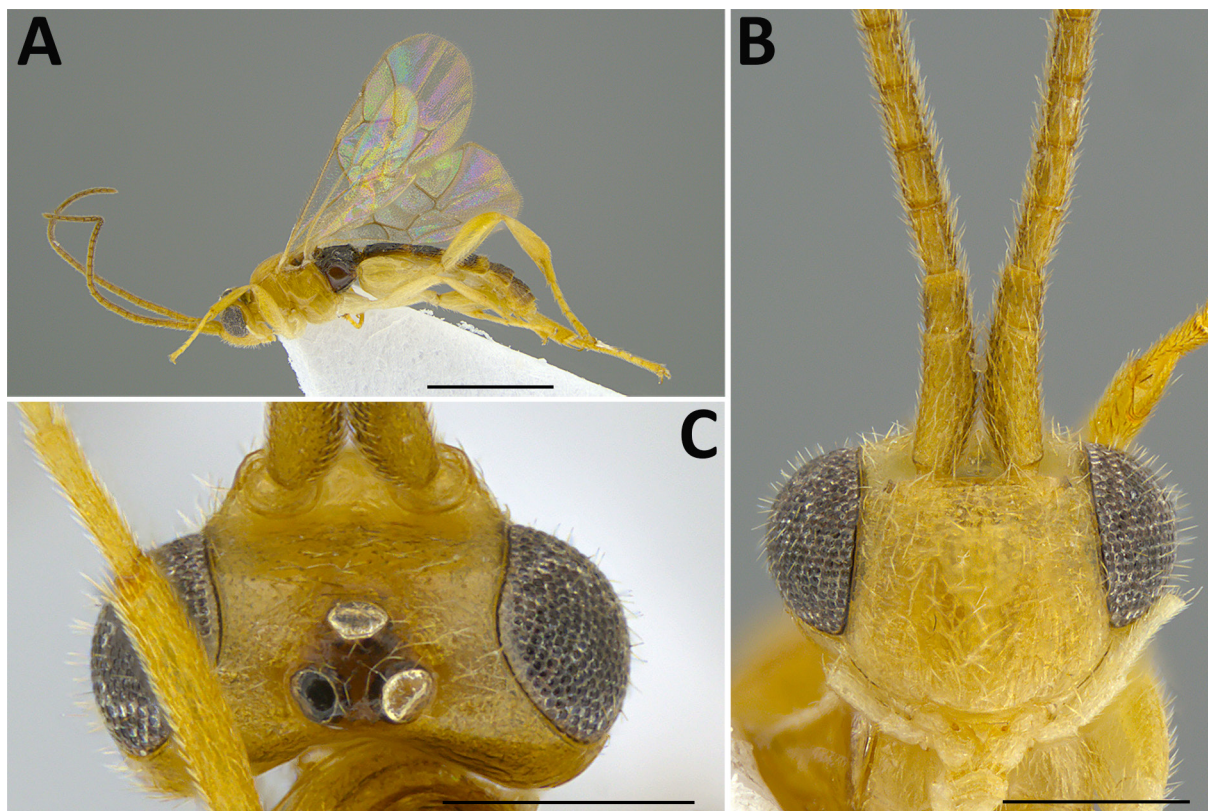


Fig. 28. *Orthocentrus pilosus* sp. nov., holotype, ♀ (RMNH.INS.1722364). **A.** Lateral view of habitus. **B.** Frontal view of head and basal antennal segments. **C.** Dorsal view of head. Scale bars: A=1 mm; B–C=0.25 mm.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli absent. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina present laterally. Metapleuron smooth; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.6\text{--}2.7\times$ as long as wide, third tarsomere of hind tarsus about $0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.6\text{--}0.8\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a strongly distad M&Rs; hind wing nervellus not intercepted, vertical.

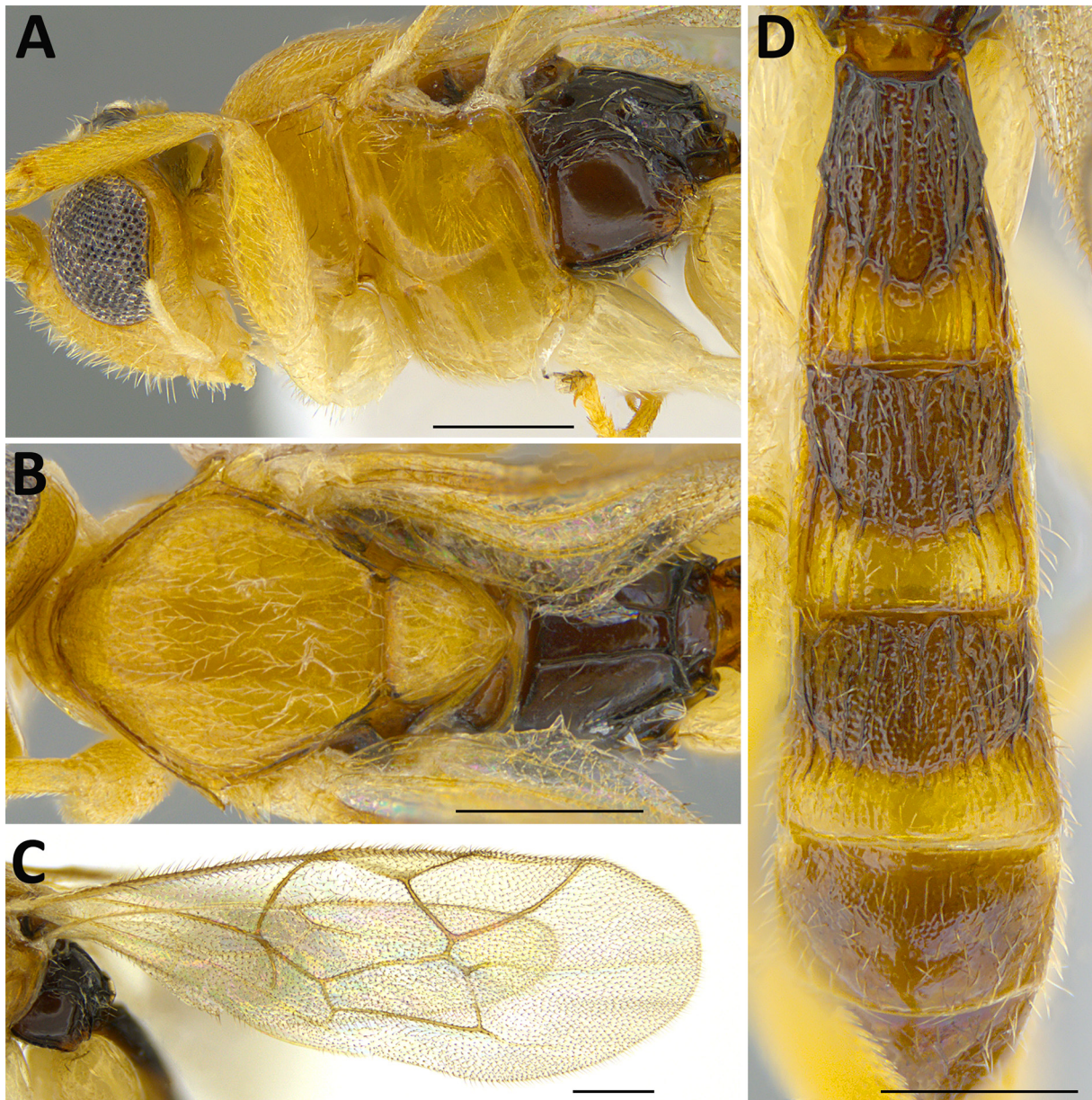


Fig. 29. *Orthocentrus pilosus* sp. nov., holotype, ♀ (RMNH.INS.1722364). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

First tergite $1.4\text{--}1.6\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae absent (instead with 3–5 strong parallel longitudinal wrinkles); lateral oblique grooves deep. Second tergite $1.0\text{--}1.2\times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow. Third tergite with same structure and sculpture as previous tergite. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.2\times$ as long as hind tibia.

Body generally largely yellow to orange. Head and mesosoma yellow to orange except spots on inner orbits opposite ocelli ivory, interocellar area brownish-black, and propodeum dark orange to brown.

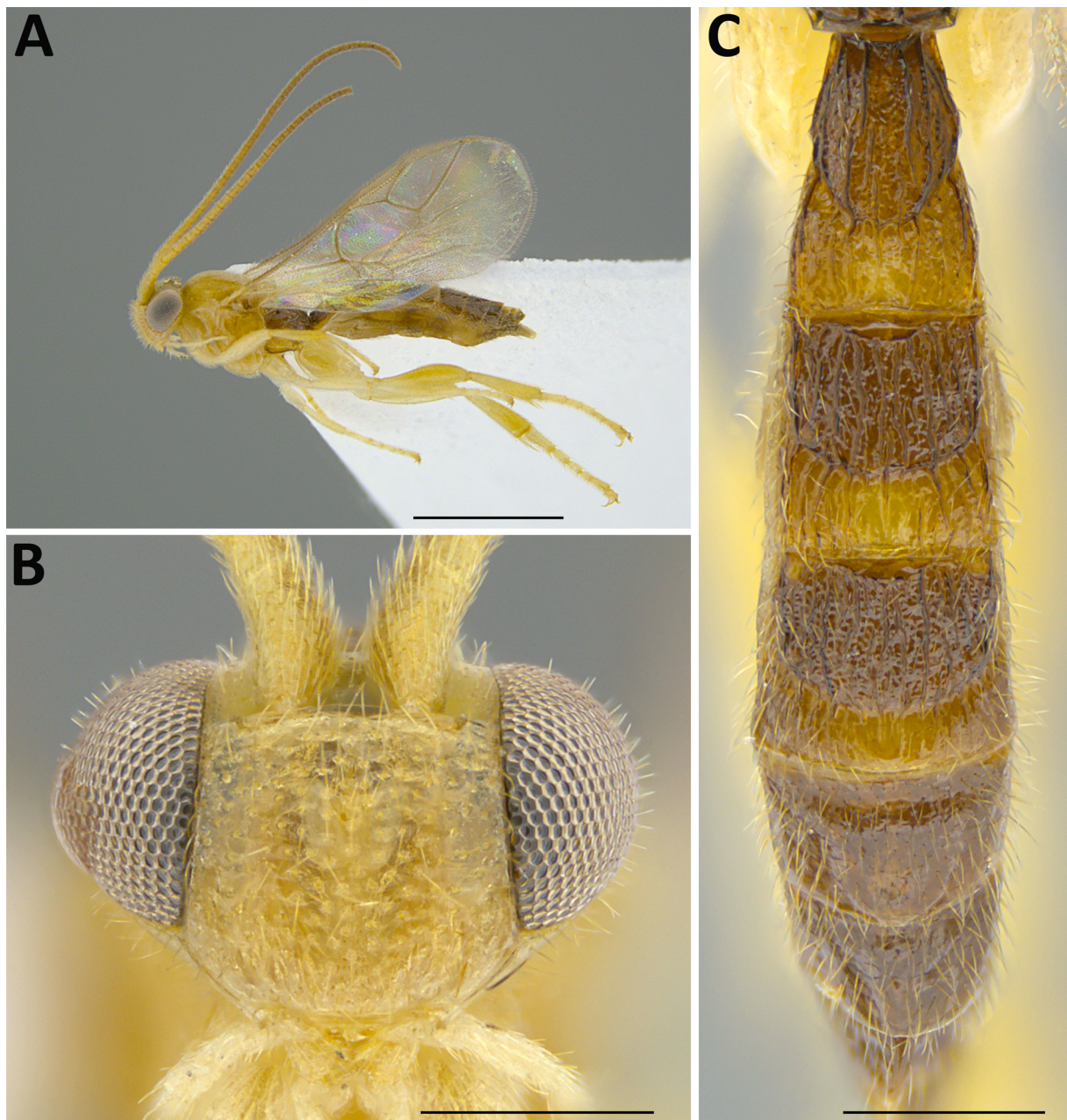


Fig. 30. *Orthocentrus pilosus* sp. nov., paratype, ♂ (RMNH.INS.1722365). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of metasomal tergites 1–5. Scale bars: A=1 mm; B–C=0.25 mm.

Fore and mid legs ivory except tibiae partly yellow; hind leg yellow except coxa sometimes largely, trochanter, trochantellus and tarsus ivory. Pterostigma translucent and wing veins brown. Metasoma orange to brownish except tergites 1–3 before transverse furrows brown to black, and posterior tergites yellow.

Male

Resembles female but has antenna with 24–26 flagellomeres, first flagellomere about $2.0\text{--}2.6\times$ as long as wide.

Distribution

Vietnam.

Remarks

There is another very similar species, which is relatively abundant in samples from Southern Vietnam (same locations from where the paratypes of *Orthocentrus pilosus* sp. nov. were collected), but with glabrous eyes. Unfortunately, only males were examined and thus this species is not described until females are found.

Orthocentrus pulchellus Humala & Lee, 2020

Fig. 1E–F

Orthocentrus pulchellus Humala & Lee in Humala *et al.* 2020: 49–51. Holotype in DNUE (images examined).

Diagnosis (based on Vietnamese specimen)

Face papillate; subocular sulcus strong; antenna with 30 flagellomeres, first flagellomere about $2.8\times$ as long as wide (Fig. 1F); head $1.8\times$ as wide as high in dorsal view, vertex ivory along inner orbits; mesoscutum with notauli, yellow laterally and along notaular lines; fore wing with vein 3rs-m absent, pterostigma wide; hind wing with nervellus intercepted (Fig. 1E); first tergite $1.8\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled, with latero-median longitudinal carinae; second tergite $1.4\times$ as long as its posterior width, granulate and weakly longitudinally wrinkled, with posterior transverse furrow; third tergite sculptured on anterior 0.3.

Material examined

Holotype

Not examined, however illustrations and description in Humala *et al.* (2020) are good enough.

Other material

VIETNAM • 1 ♀; Hoa Binh, Hang Kia Pà Cò N.R.; 1329 m a.s.l.; $20^{\circ}44'36''$ N, $104^{\circ}53'45''$ E; 2 Mar.–15 Apr. 2011; C. van Achterberg leg.; Malaise trap 5; RMNH'11; NBC, RMNH.INS.1722381.

Distribution

South Korea (Humala *et al.* 2020); first record from the Indomalayan region (Vietnam).

Orthocentrus punctatus sp. nov.

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Figs 31–33

Diagnosis

Face densely punctate; subocular sulcus strong (Fig. 31C); antenna with 30 flagellomeres (26–28 in male), first flagellomere about $1.15\times$ as long as wide ($3.4\times$ in male) (Fig. 31B); head $1.5\times$ as wide as high in dorsal view, vertex dark (Fig. 31D); mesoscutum with notauli (Fig. 32B); fore wing with vein

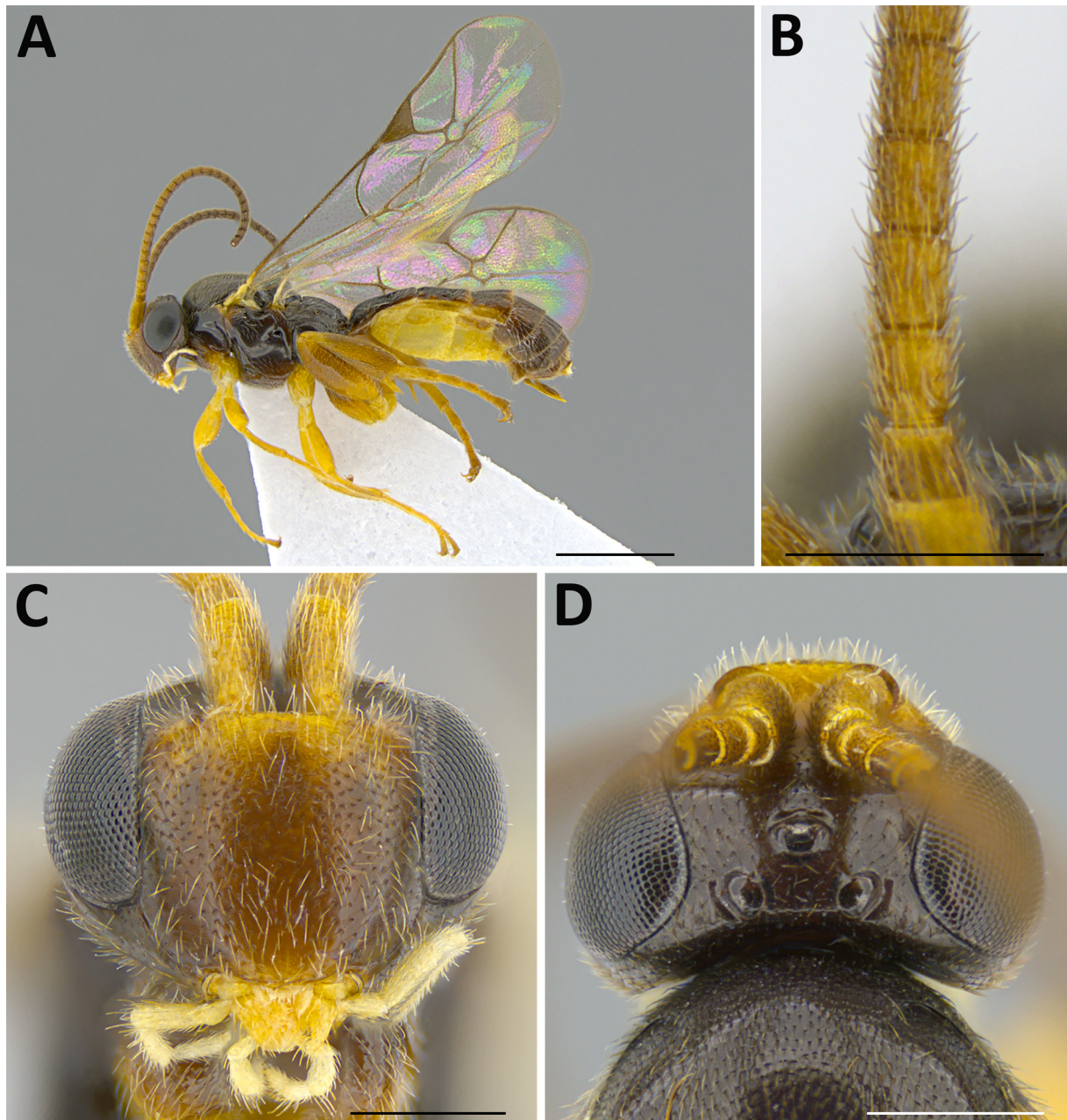


Fig. 31. *Orthocentrus punctatus* sp. nov., holotype, ♀ (RMNH.INS.1722355). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 32C); first tergite $1.7\times$ as long as its posterior width ($2.0\times$ in male), weakly longitudinally wrinkled, with latero-median longitudinal carinae; second tergite $0.9\times$ as long its posterior width, longitudinally wrinkled on weakly granulate background; third tergite smooth, sculptured on anterior 0.1 (sculptured on anterior 0.5–0.8 in male) (Figs 32D, 33C).

Differential diagnosis

Orthocentrus punctatus sp. nov. is similar to *O. nitidus* sp. nov., but has slightly slenderer flagellomeres, the second tergite without latero-median longitudinal carinae (present in *O. nitidus*), and the third tergite sculptured on the anterior 0.1, with the posterior transverse furrow absent (sculptured on the anterior 0.8, with a posterior transverse furrow present in *O. nitidus*).

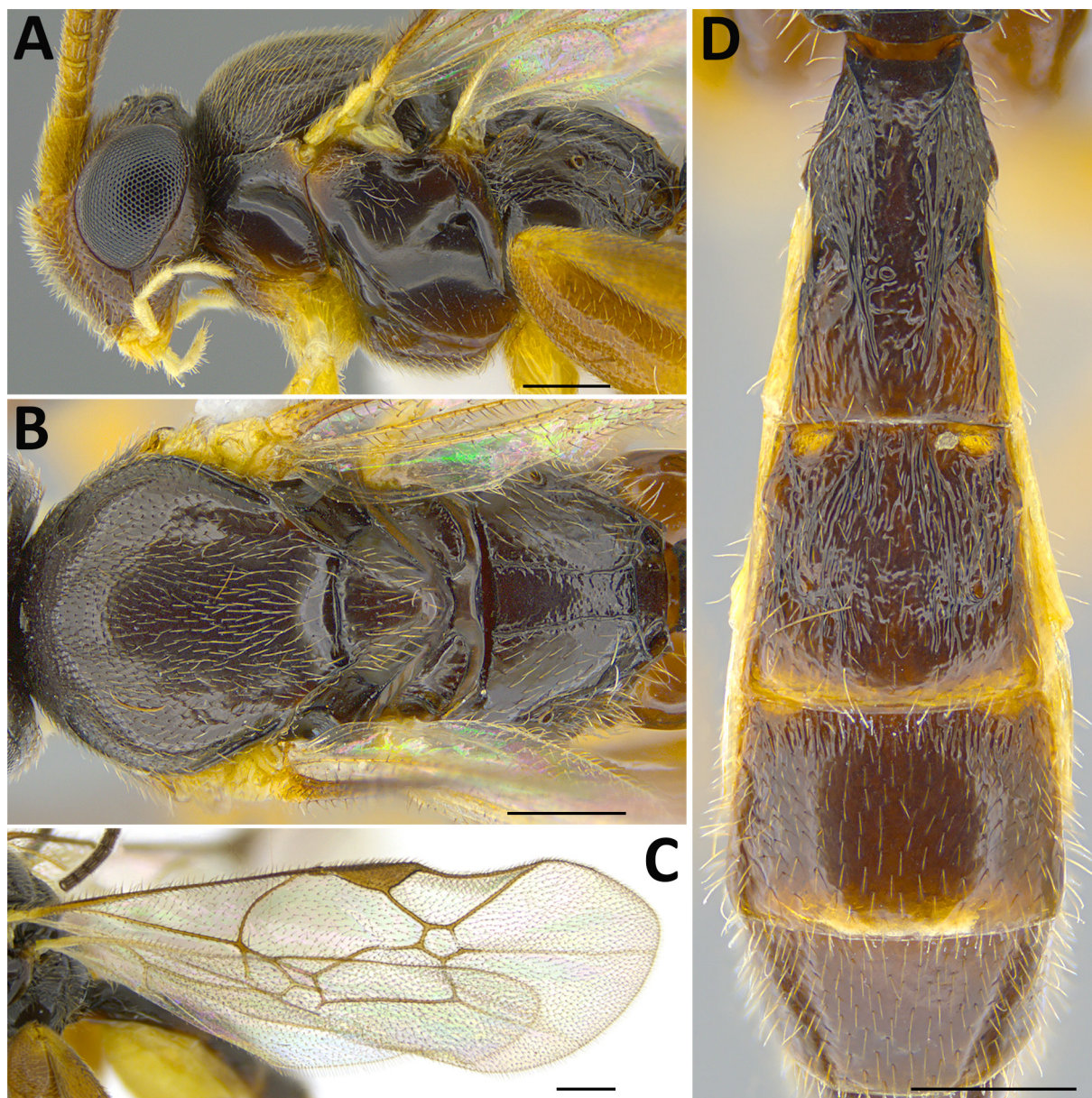


Fig. 32. *Orthocentrus punctatus* sp. nov., holotype, ♀ (RMNH.INS.1722355). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

Etymology

The species epithet is from the Latin '*punctatus*' ('spotted, having dots') referring to the densely punctate face of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Tonkin, Hoang Lien N.R., 15 km W of Sa Pa; ca 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise traps; RMNH'99; NBC, RMNH.INS.1722355.

Paratypes

VIETNAM • 2 ♂♂; same collection data as for holotype; NBC, RMNH.INS.1722356 to RMNH.INS.1722357.

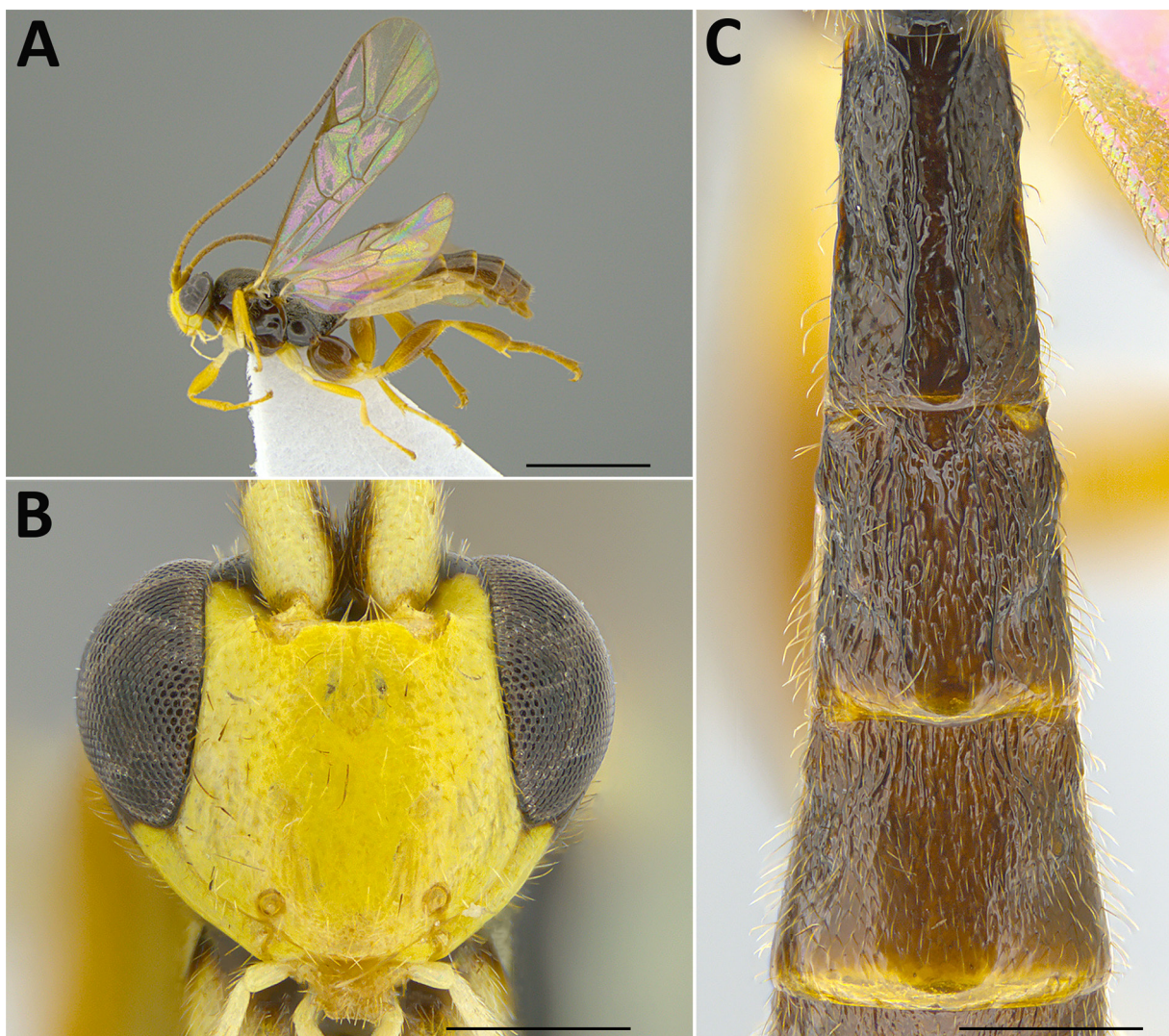


Fig. 33. *Orthocentrus punctatus* sp. nov., paratype, ♂ (RMNH.INS.1722357). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of metasomal tergites 1–3. Scale bars: A=1 mm; B–C=0.25 mm.

Description

Female (holotype)

Body length 3.8 mm. Fore wing 3.1 mm.

Antenna with 30 flagellomeres, first flagellomere $1.15\times$ as long as wide. Face about $0.7\times$ as long as wide, densely punctate; inner orbits parallel. Malar space $3.6\times$ basal width of mandible; subocular sulcus present. Holotype mandibles closed, apices hidden under clypeus. Head $1.5\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance $1.0\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina not visible due to head position.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth; epicnemial carina complete. Metapleuron smooth, densely pubescent along anterior and posterior margins; pleural and submetapleural carinae present. Propodeum weakly granulate, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.7\times$ as long as wide, third tarsomere of hind tarsus about $0.9\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.7\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but partly unpigmented; areolet sessile; vein 1cu-a weakly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.7\times$ as long as its posterior width, weakly longitudinally wrinkled on smooth background, with latero-median longitudinal carinae weakly narrowed posteriorly; lateral oblique grooves distinct and deep. Second tergite $1.2\times$ as long as its posterior width, longitudinally wrinkled on weakly granulate background. Third tergite wrinkled on anterior 0.1. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.3\times$ as long as hind tibia.

Body generally brownish-black. Head brownish-black except antenna, face narrowly below antennal sockets, mandible yellow. Mesosoma black except propleuron ventrally, upper hind corner of pronotum and subtegular ridge orange, tegula yellow, and mesopleuron ventrally brown. Fore and mid legs yellow; hind leg orange except trochanter and trochantellus yellow, hind coxa and femur largely brown, tibia except base and tarsus entirely brown. Pterostigma and wing veins brown. Metasoma black anteriorly and brownish posteriorly except second and third tergites narrowly yellow posteriorly.

Male

Resembles female but has antenna with 26–28 flagellomeres, first flagellomere about $3.4\times$ as long as wide; first tergite $2.0\times$ as long as its posterior width; second tergite $0.9\times$ as long as its posterior width; third tergite sculptured on anterior 0.5–0.8. Colour pattern similar to that of female except inner orbits opposite antennal sockets, face, clypeus, and malar space yellow.

Distribution

Vietnam.

Orthocentrus remotus sp. nov.

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Figs 34–35

Diagnosis

Face papillate; subocular sulcus strong (Fig. 34C); antenna with 24–31 flagellomeres, first flagellomere about $1.4\text{--}1.6\times$ as long as wide (Fig. 34B); head $1.7\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 34D); mesoscutum with notauli (Fig. 35B); fore wing with vein 3rs-m, areolet narrowly sessile; hind wing with nervellus not intercepted (Fig. 35C); first tergite $1.3\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae strong; second tergite $0.9\text{--}1.0\times$

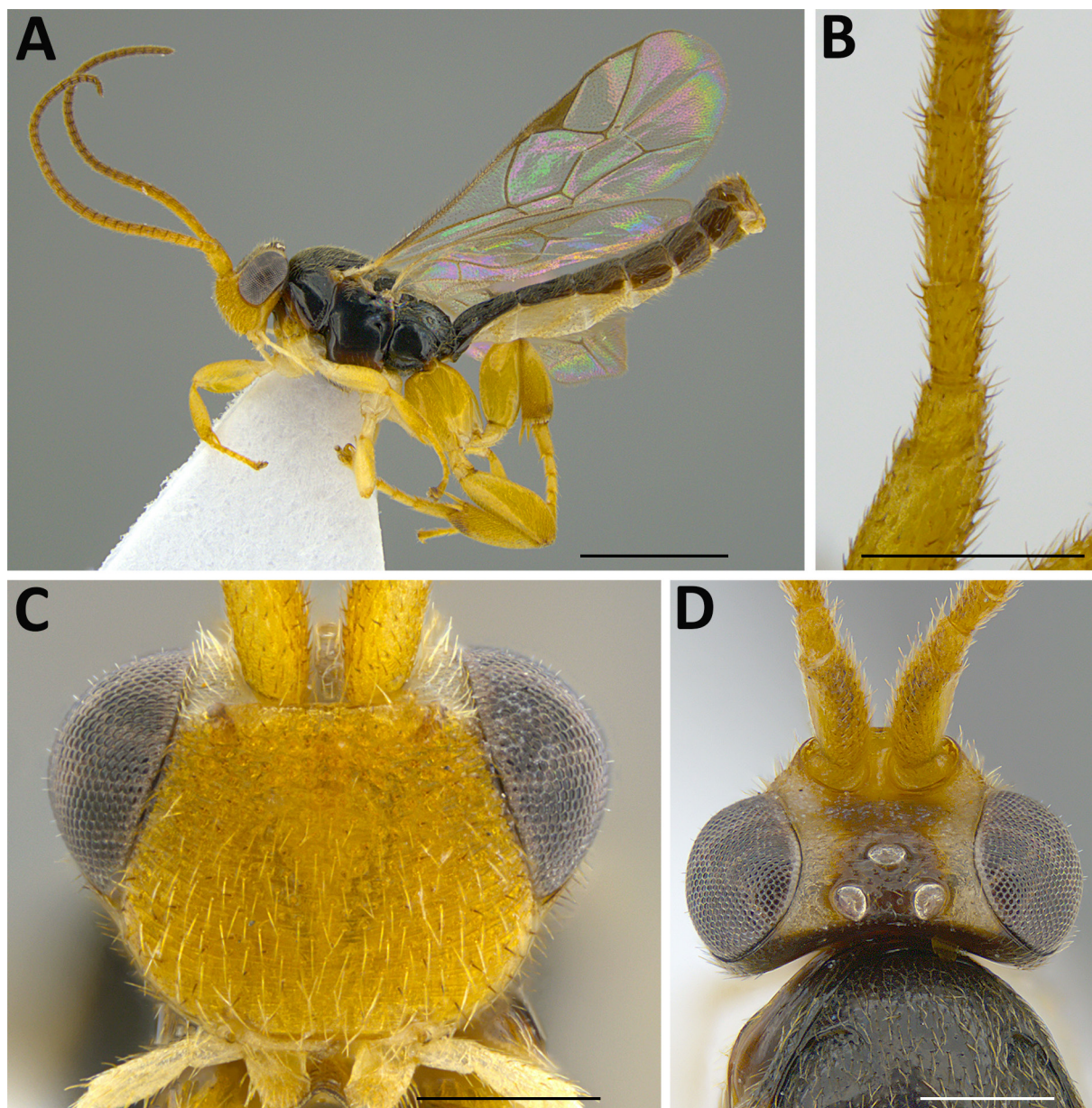


Fig. 34. *Orthocentrus remotus* sp. nov., holotype, ♀ (RMNH.INS.1722361). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A = 1 mm; B–D = 0.25 mm.

as long as its posterior width, longitudinally wrinkled and with posterior transverse furrow; third tergite granulate on anterior 0.7 (Fig. 35D).

Differential diagnosis

Orthocentrus remotus sp. nov. is similar to *O. pilosus* sp. nov. in the papillate face, the hind wing with nervellus not intercepted, and yellow inner orbits, but differs by the glabrous eyes (densely setose in *O. pilosus*), the black mesosoma (largely yellow in *O. pilosus*), the fore wing with vein 3rs-m present (absent in *O. pilosus*), and the third tergite lacking the transverse furrow (present and deep in *O. pilosus*).

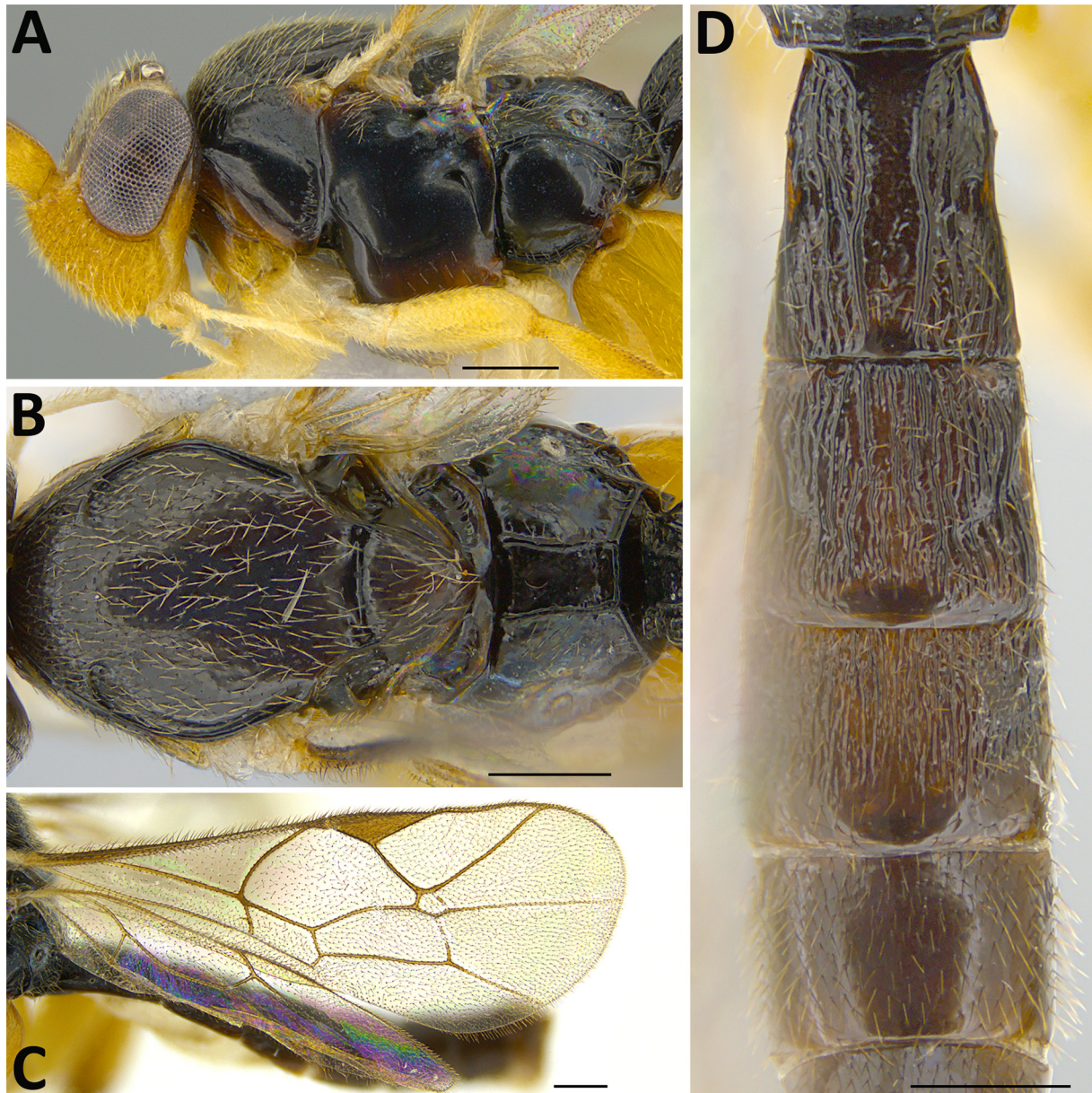


Fig. 35. *Orthocentrus remotus* sp. nov., holotype, ♀ (RMNH.INS.1722361). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars=0.25 mm.

Etymology

The species epithet is from the Latin '*remotus*' ('distant') referring to the strongly divergent eyes of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Ha Tinh, Vu Quang N.P.; 69 m a.s.l.; 18°19'48" N, 105°26'30" E; 4 Mar.–15 Apr. 2011; C. van Achterberg leg.; Malaise trap 10; RMNH'11; NBC, RMNH.INS.1722361.

Paratypes

VIETNAM • 1 ♀; Ha Tinh, Vu Quang N.P.; 106 m a.s.l.; 18°17'41" N, 105°25'42" E; 5 Mar.–15 Apr. 2011; C. van Achterberg leg.; Malaise trap 14; RMNH'11; NBC, RMNH.INS.1722362 • 1 ♀; Vinh Phuc, Tam Dao; 14–17 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMNH'07; NBC, RMNH.INS.1722363.

Description

Female

Body length 2.9–3.8 mm. Fore wing 2.0–3.0 mm.

Antenna with 24–31 flagellomeres, first flagellomere about $1.4\text{--}1.6\times$ as long as wide. Face about $0.6\times$ as long as wide, papillate; inner orbits strongly divergent. Eye sparsely setose. Malar space $3.9\text{--}4.0\times$ basal width of mandible; subocular sulcus present. Mandible twisted, lower tooth small. Head $1.7\times$ as wide as high in dorsal view. Frons and vertex papillate and densely pubescent; ocellar-ocular distance about $1.0\text{--}1.2\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli present anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina present laterally. Metapleuron smooth, densely pubescent along anterior or posterior margin; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.8\text{--}3.0\times$ as long as wide, third tarsomere of hind tarsus about $0.7\text{--}0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.7\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but partly unpigmented, areolet narrowly sessile; vein 1cu-a distad M&Rs; hind wing nervellus not intercepted, slightly inclivous.

First tergite $1.3\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae strong; lateral oblique grooves deep. Second tergite $0.9\text{--}1.0\times$ as long as its posterior width, longitudinally wrinkled and with posterior transverse furrow. Third tergite granulate on anterior 0.7. Remaining tergites smooth. Ovipositor not visible; its sheath about $0.25\times$ as long as hind tibia.

Body generally brownish-black. Head orange except malar space, mandible (except apices) and inner orbits on frons and vertex ivory, occiput and interocellar area brownish-black. Mesosoma black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge orange, and tegula ivory. Fore and mid leg ivory except tibia partly yellow; hind leg orange except trochanter, trochantellus and tarsus partly ivory, and tibia narrowly basally and apically black. Pterostigma and wing veins brown. Metasoma black anteriorly, brown posteriorly.

Male

Unknown.

Distribution

Vietnam.

Remarks

The paratype female collected in Vu Quang National Park has an antenna with 26 somewhat stouter flagellomeres (31 in the holotype), a dark dorsal fleck on the hind coxa, and a somewhat darker hind tibia, but is otherwise similar to the holotype. The other paratype female, collected in another part of the country, is smaller, with only 24 flagellomeres and a generally more weakly sculptured metasoma. However, both females show no significant morphological differences except the number of flagellomeres, thus are included in the type series.

Orthocentrus sulcatus sp. nov.

[urn:lsid:zoobank.org:act:D5A9B5F0-4D15-48A8-BE4A-A4EF3091C9AB](https://zoobank.org/act:D5A9B5F0-4D15-48A8-BE4A-A4EF3091C9AB)

Figs 36–37

Diagnosis

Face densely punctate; subocular sulcus absent (Fig. 36B–C); antenna with 26–28 flagellomeres, first flagellomere about $0.85\text{--}0.95\times$ as long as wide; head $1.4\text{--}1.5\times$ as wide as high in dorsal view, vertex dark (Fig. 36D); mesoscutum with notauli (Fig. 37B); fore wing with vein 3rs-m, areolet sessile; hind wing with nervellus intercepted (Fig. 37C); first tergite $1.4\text{--}1.5\times$ as long as its posterior width, granulate to weakly rugulose, with latero-median longitudinal carinae; second tergite $0.8\times$ as long as its posterior width, granulate, with latero-median longitudinal carinae and deep posterior transverse furrow; third tergite smooth (Fig. 37D).

Differential diagnosis

Orthocentrus sulcatus sp. nov. differs from the other known Vietnamese species with the antennal sockets on a high protruding shelf by the lack of a subocular sulcus.

Etymology

The species epithet is from the Latin ‘*sulcatus*’ referring to the lack of the subocular sulcus of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Đông Nai, Cát Tiên N.P., Crocodile trail; ca 100 m a.s.l.; 13–19 May 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; NBC, RMNH.INS.1722338.

Paratypes

VIETNAM • 4 ♀♀; same collection data as for holotype; NBC, RMNH.INS.1722339 to RMNH.INS.1722341, RMNH.INS.1722348 • 3 ♀♀; same data as for preceding; Dong trail; 13–19 May 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; NBC, RMNH.INS.1722349 to RMNH.INS.1722351 • 3 ♀♀; same data as for preceding; eco-trail; ca 100 m a.s.l.; 13–20 May 2007; C. van Achterberg and de Vries leg.; Malaise traps 25–29; RMNH’07; NBC, RMNH.INS.1722352 to RMNH.INS.1722354 • 1 ♀; Dak Lak, Chu Yang Sin N.P.; ca 750 m a.s.l.; 1–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; near river; Malaise traps 3–5; NBC, RMNH.INS.1722342 •

2 ♀♀; same data as for preceding; 740 m a.s.l.; Malaise traps; NBC, RMNH.INS.1722343 to RMNH.INS.1722344 • 3 ♀♀; Krong K'mar; 740–900 m a.s.l.; 2–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; NBC, RMNH.INS.1722345 to RMNH.INS.1722347.

Description

Female

Body length 2.4–3.5 mm. Fore wing 2.4–3.1 mm.

Antenna with 26–28 flagellomeres, first flagellomere $0.85\text{--}0.95\times$ as long as wide. Face about $0.7\times$ as long as wide, densely punctate; inner orbits slightly divergent. Malar space $3.9\text{--}4.2\times$ basal width of mandible; subocular sulcus absent. Mandible twisted, lower tooth very small. Head $1.4\text{--}1.5\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance $0.7\text{--}0.8\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

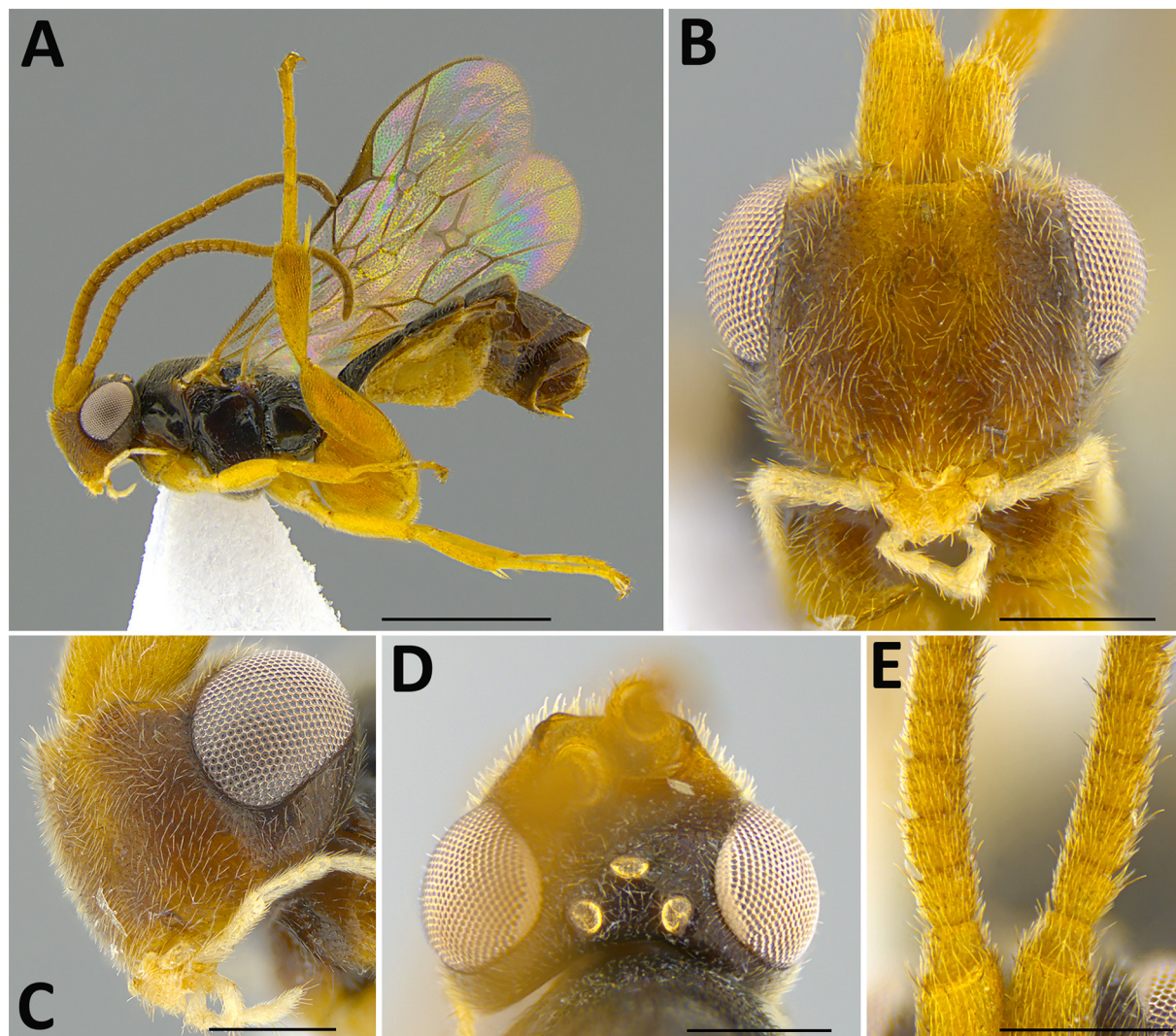


Fig. 36. *Orthocentrus sulcatus* sp. nov., holotype, ♀ (RMNH.INS.1722338). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Lateral view of head. **D.** Dorsal view of head. **E.** Frontal view of basal antennal segments. Scale bars: A=1 mm; B–E=0.25 mm.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina present laterally. Metapleuron smooth, densely pubescent along anterior and posterior margins; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.5\text{--}2.7\times$ as long as wide, third tarsomere of hind tarsus about $1.0\text{--}1.1\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.9\text{--}1.0\times$ distance between 2rs-m and 2m-cu; vein 3rs-m present, but sometimes partly unpigmented; areolet sessile; vein 1cu-a strongly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

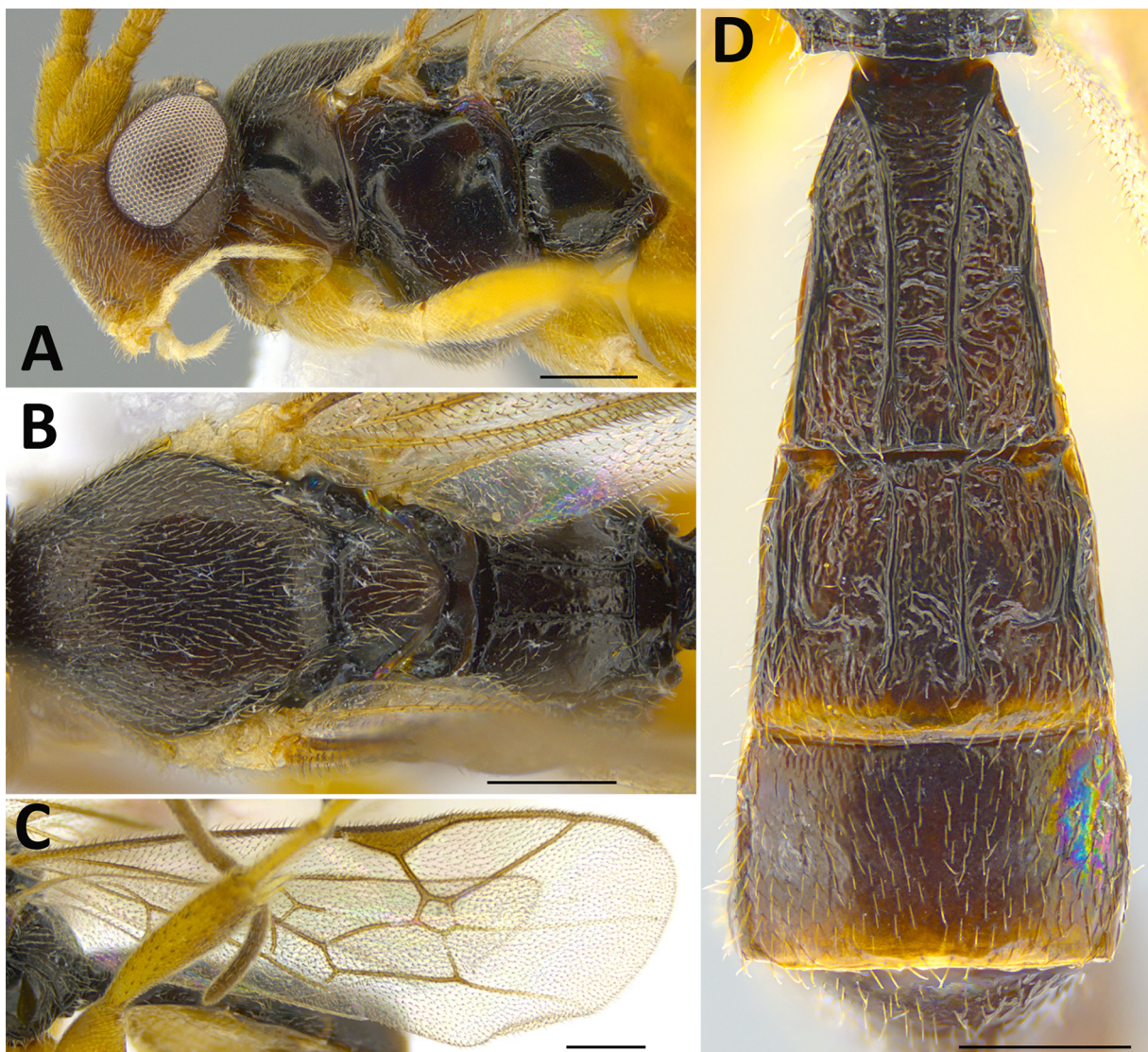


Fig. 37. *Orthocentrus sulcatus* sp. nov., holotype, ♀ (RMNH.INS.1722338). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–3. Scale bars = 0.25 mm.

First tergite $1.4\text{--}1.5\times$ as long as its posterior width, granulate to weakly rugulose, with latero-median longitudinal carinae strong; lateral oblique grooves deep. Second tergite $0.8\times$ as long as its posterior width, granulate to weakly rugulose, with latero-median longitudinal carinae and posterior transverse furrow. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.2\times$ as long as hind tibia.

Body generally brownish-black. Head brownish-black except antenna yellow to orange, face brown to largely orange, and mandible yellow. Mesosoma brownish-black to largely dark orange except propleuron ventrally, upper hind corner of pronotum and subtegular ridge orange, tegula yellow. Fore and mid legs yellow except trochanters and trochantelli often ivory; hind leg orange, always slightly darker than fore and mid legs. Pterostigma and wing veins brown. Metasoma brownish to black, but first and second tergites always darker and second tergite narrowly yellow posteriorly.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus taeniatatus sp. nov.

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Figs 38–40

Diagnosis

Face sparsely punctate; subocular sulcus strong (Figs 38C, 40B); antenna with 23–24 flagellomeres, first flagellomere about $2.8\text{--}3.0\times$ as long as wide ($3.9\times$ in male) (Fig. 38B); head $1.9\times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 38D); mesoscutum with notauli (Fig. 39B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 39C); first tergite $1.3\text{--}1.4\times$ as long as its posterior width ($1.8\times$ in male), indistinctly longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel; second tergite $1.0\times$ as long as its posterior width, indistinctly longitudinally wrinkled, with latero-median longitudinal carinae and subapical transverse furrow; third tergite indistinctly sculptured, with latero-median longitudinal carinae on anterior 0.7 and weak subapical transverse furrow (Figs 39D, 40C).

Differential diagnosis

Orthocentrus taeniatatus sp. nov. is similar to *O. vietnamensis* sp. nov., but differs by the developed latero-median longitudinal carinae on the anterior 0.7 of the third tergite (not developed in *O. vietnamensis*) and the more weakly sculptured tergites 1–3, which are indistinctly wrinkled and rugulose (strongly longitudinally wrinkled in *O. vietnamensis*).

Etymology

The species epithet is from the Latin ‘*taeniatatus*’ (‘striped’) referring to the latero-median longitudinal carinae on the third tergite of the new species. Adjective.

Material examined

Holotype

VIETNAM • ♀; Đông Nai, Cát Tiên N.P., *Ficus* trail; ca 100 m a.s.l.; 1–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–8; RMNH’05; NBC, RMNH.INS.1722389.

Paratypes

VIETNAM • 1 ♀; same collection data as for holotype; Bird trail; Malaise traps 9–12; NBC, RMNH.INS.1722390 • 1 ♀; 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 traps 13–23; RMNH'05; NBC, RMNH.INS.1722391 • 1 ♀; same data as for preceding; 550–610 m a.s.l.; 21–26 Oct. 2005; Malaise traps 1–6; RMNH'05; NBC, RMNH.INS.1722392 • 1 ♂; Ha Tinh, Vu Quang N.P.; 100 m a.s.l.; 18°17'46" N, 105°25'29" E; 5 Mar.–15 Apr. 2011; Malaise trap 11; C. van Achterberg leg.; RMNH'11; NBC, RMNH.INS.1722393.

Description

Female

Body length 3.8–3.9 mm. Fore wing 2.9–3.1 mm.

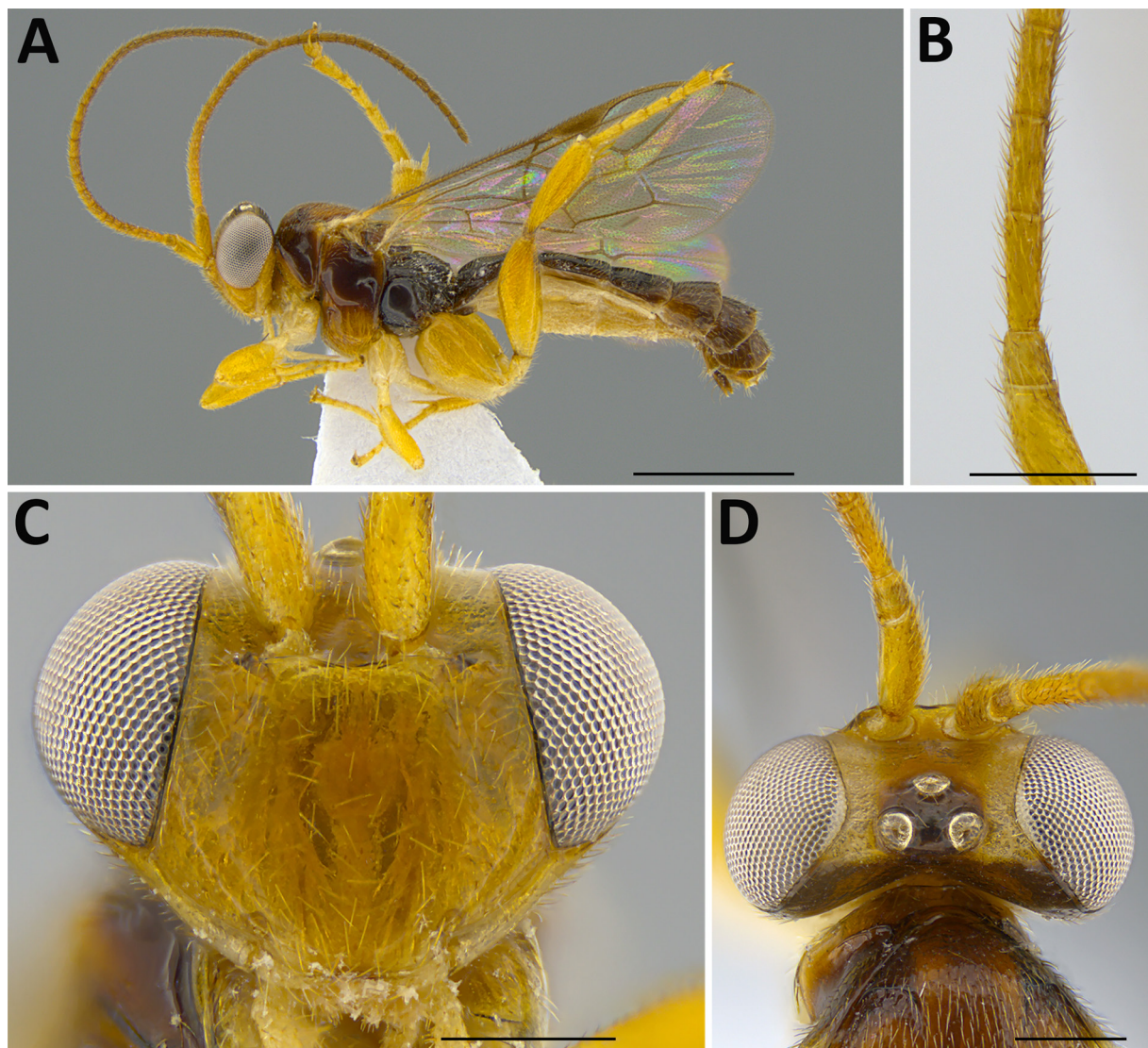


Fig. 38. *Orthocentrus taeniatum* sp. nov., ♀, holotype (RMNH.INS.1722389). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A = 1 mm; B–D = 0.25 mm.

Antenna with 23–24 flagellomeres, first flagellomere $2.8\text{--}3.0\times$ as long as wide. Face about $0.5\times$ as long as wide, sparsely punctate; inner orbits divergent. Malar space $3.4\text{--}3.5\times$ basal width of mandible; subocular sulcus present. Mandible strongly twisted, lower tooth very small. Head $1.9\times$ as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-ocular distance about $0.8\text{--}0.9\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent dorsally

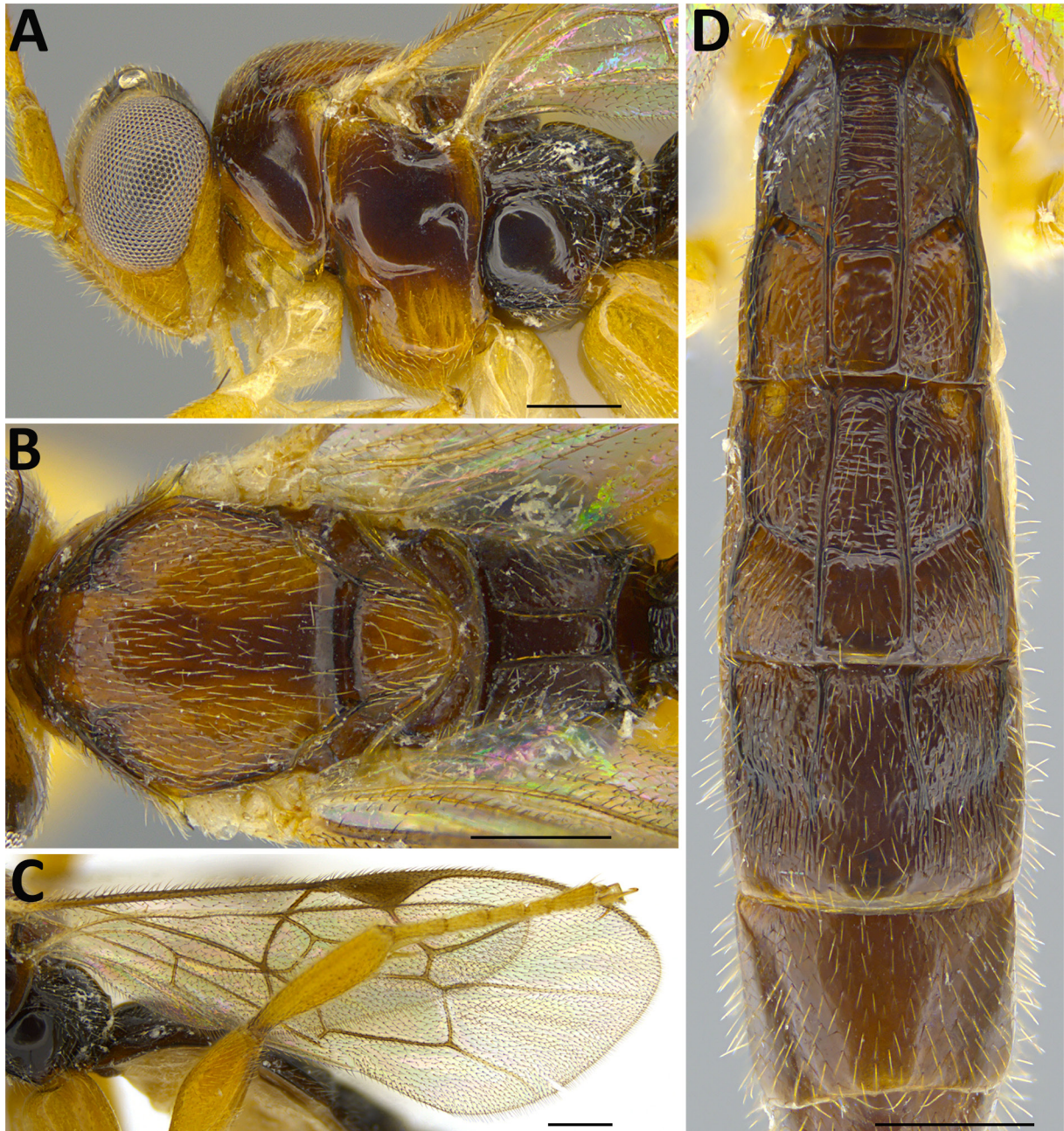


Fig. 39. *Orthocentrus taeniatus* sp. nov., holotype, ♀ (RMNH.INS.1722389). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–4. Scale bars = 0.25 mm.

and ventrally; epicnemial carina complete. Metapleuron smooth, densely pubescent ventrally; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $3.0\times$ as long as wide, third tarsomere of hind tarsus about $0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.0\text{--}1.2\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a opposite to weakly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.3\text{--}1.4\times$ as long as its posterior width, indistinctly longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel; lateral oblique grooves deep. Second tergite $1.0\times$ as long as its posterior width, indistinctly longitudinally wrinkled, with latero-median longitudinal carinae

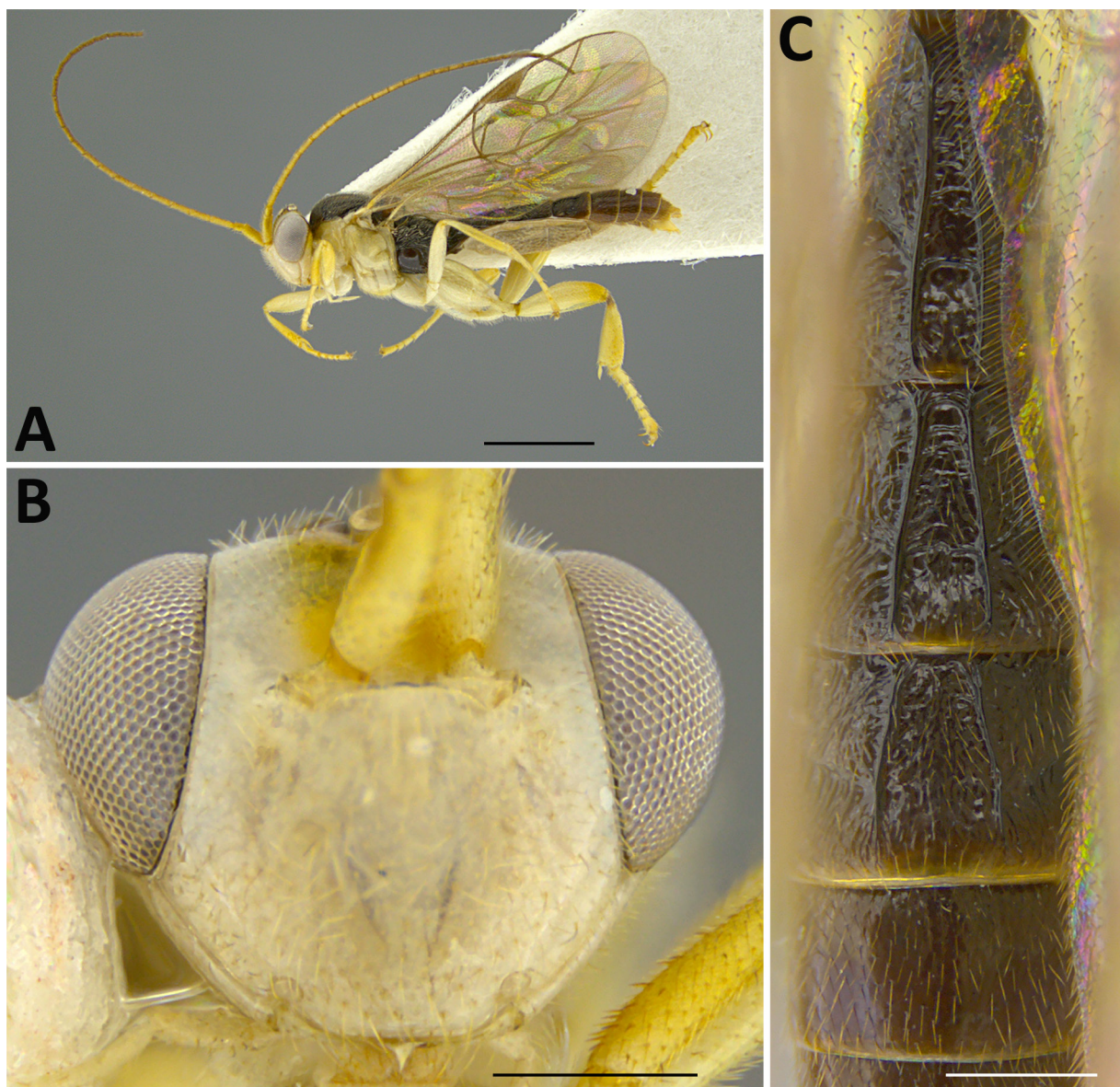


Fig. 40. *Orthocentrus taeniatatus* sp. nov., paratype, ♂ (RMNH.INS.1722393). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of metasomal tergites 1–4. Scale bars: A=1 mm; B–C=0.25 mm.

and transverse subapical furrow. Third tergite indistinctly sculptured, with latero-median longitudinal carinae on anterior 0.7 and weak transverse subapical furrow. Remaining tergites smooth. Ovipositor thick and upcurved, with a subapical notch; its sheath about $0.25 \times$ length of hind tibia.

Body generally brownish-black. Head yellow to orange except occiput and interocellar area brownish black, malar space and mandible ivory. Mesosoma largely marked with rufous and orange except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge yellow, tegula ivory, metapleuron and propodeum black. Fore and mid legs yellow except coxae, trochanters and trochantelli ivory. Hind leg orange except trochanter and trochantellus ivory. Pterostigma and wing veins brown. Metasoma brownish-black.

Male

Resembles female, but antenna with 23 flagellomeres, first flagellomere about $3.9 \times$ as long as wide; metasoma with first tergite $1.8 \times$ as long as its posterior width; second tergite as long as its posterior width. Body colour similar to that of female except face, mesosoma and legs largely ivory.

Distribution

Vietnam.

Orthocentrus tonkinensis sp. nov.

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Figs 41–42

Diagnosis

Face papillate; subocular sulcus strong (Fig. 41C); antenna with 27 flagellomeres, first flagellomere about $1.6 \times$ as long as wide (Fig. 41B); head $1.7 \times$ as wide as high in dorsal view, vertex dark (Fig. 41D); mesoscutum with notauli (Fig. 42B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 42C); first tergite $2.2 \times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae weak; second tergite $1.4 \times$ as long as its posterior width, longitudinally wrinkled and with subapical transverse furrow; third tergite weakly wrinkled on anterior 0.3 (Fig. 42D).

Differential diagnosis

Orthocentrus tonkinensis sp. nov. differs from all Vietnamese species with a papillate face and dark vertex by the absence of vein 3rs-m. It is reminiscent of *O. dalatensis* sp. nov., but has a shorter antenna with 27 flagellomeres (32 in *O. dalatensis*), a dark face (orange in *O. dalatensis*), and a stouter metasoma with the second tergite $1.4 \times$ as long as its posterior width ($1.8 \times$ in *O. dalatensis*).

Etymology

The species epithet refers to the type locality in the Tonkin Province of Vietnam. Adjective.

Material examined

Holotype

VIETNAM • ♀; Tonkin, Hoang Lien N.R., 15 km W of Sa Pa; ca 1900 m a.s.l.; 15–21 Oct. 1999; C. van Achterberg leg.; Malaise traps; RMNH'99; NBC, RMNH.INS.1722372.

Description

Female (holotype)

Body length 4.2 mm. Fore wing 3.1 mm.

Antenna with 27 flagellomeres, first flagellomere about $1.6\times$ as long as wide. Face about $0.6\times$ as long as wide, papillate; inner orbits slightly divergent. Eye glabrous. Malar space $4.2\times$ basal width of mandible; subocular sulcus present. Mandible twisted, holotype with mandibles closed and apices hidden under clypeus. Head $1.7\times$ as wide as high in dorsal view. Frons and vertex smooth and densely pubescent; ocellar-ocular distance $1.3\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent dorsally and ventrally; epicnemial carina present laterally. Metapleuron smooth, densely pubescent along anterior

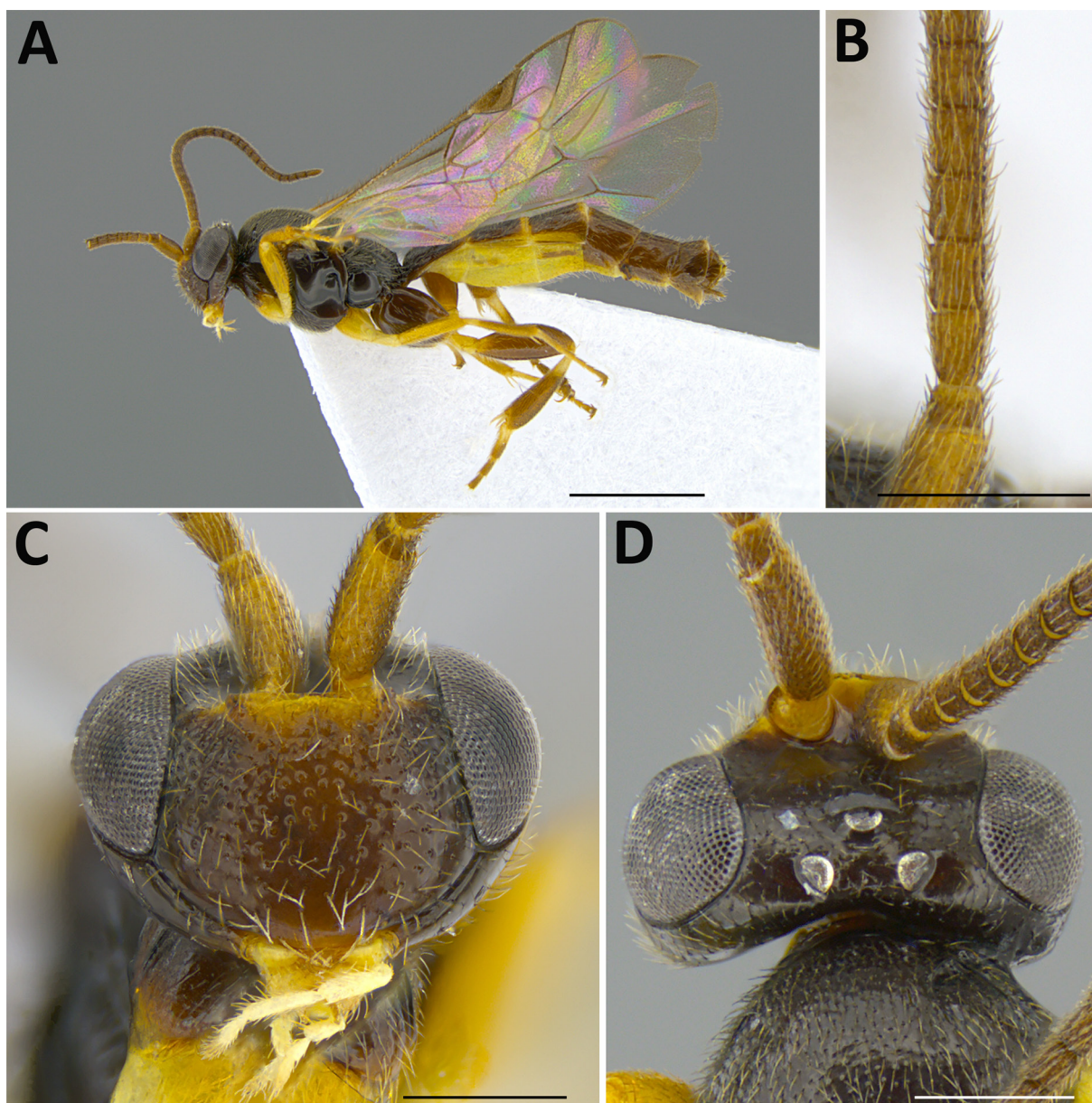


Fig. 41. *Orthocentrus tonkinensis* sp. nov., holotype, ♀ (RMNH.INS.1722372). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of head. Scale bars: A=1 mm; B–D=0.25 mm.

margin; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.9\times$ as long as wide, third tarsomere of hind tarsus about $0.9\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $0.4\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $2.2\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae weak; lateral oblique grooves deep. Second tergite $1.4\times$ as long as its posterior width,

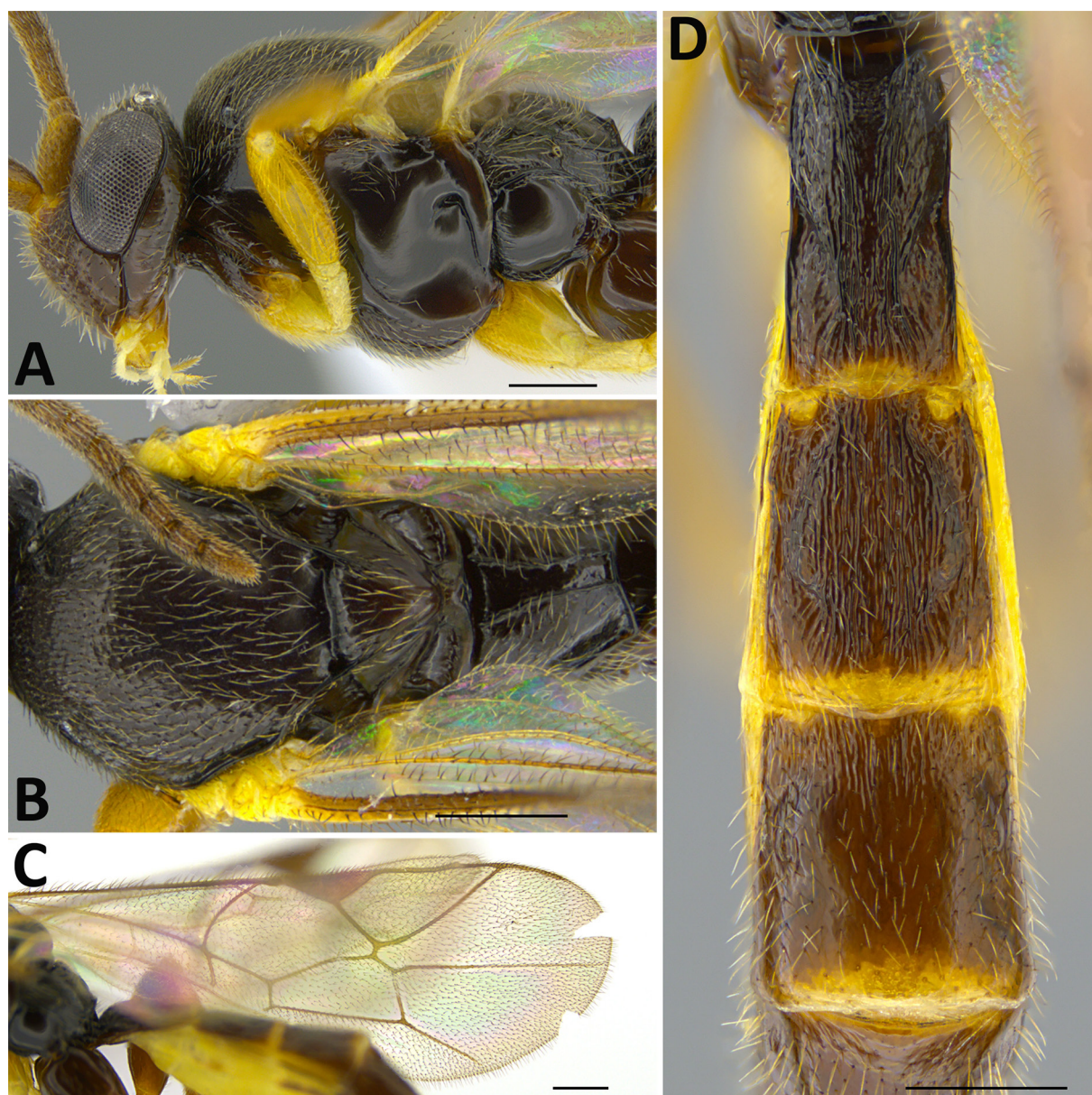


Fig. 42. *Orthocentrus tonkinensis* sp. nov., holotype, ♀ (RMNH.INS.1722372). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–3. Scale bars = 0.25 mm.

longitudinally wrinkled. Third tergite wrinkled on anterior 0.3. Remaining tergites smooth. Ovipositor thin and straight, lacking subapical notch; its sheath about $0.25 \times$ as long as hind tibia.

Body generally brownish-black. Head black except face brownish and narrowly yellow below antennal sockets, mandible yellow, and antenna partly orange on underside. Mesosoma black except propleuron narrowly ventrally, upper hind corner of pronotum orange, and tegula yellow. Fore and mid legs orange except coxae apically, trochanters and trochantelli ivory; hind leg brown except trochanter, trochantellus, tibia and first tarsomere basally ivory. Pterostigma and wing veins brown. Metasoma brownish-black except tergites 1–3 narrowly yellow posteriorly.

Male

Unknown.

Distribution

Vietnam.

Orthocentrus vietnamensis sp. nov.

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Figs 43–45

Diagnosis

Face sparsely punctate; subocular sulcus strong (Figs 43C, 45B); antenna with 20–22 flagellomeres, first flagellomere about $2.8\text{--}3.0 \times$ as long as wide ($3.9 \times$ in male) (Fig. 43B); head $1.8\text{--}1.9 \times$ as wide as high in dorsal view, vertex ivory along inner orbits (Fig. 43E); mesoscutum with notauli (Fig. 44B); fore wing with vein 3rs-m absent; hind wing with nervellus intercepted (Fig. 44C); first tergite $1.3\text{--}1.5 \times$ as long as its posterior width ($1.7\text{--}1.8 \times$ in male), longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel; second tergite $0.9\text{--}1.0 \times$ as long as its posterior width ($1.1\text{--}1.2 \times$ in male), longitudinally wrinkled, with latero-median longitudinal carinae and subapical transverse furrow; third tergite longitudinally wrinkled and with subapical transverse furrow (Figs 44D, 45D).

Differential diagnosis

Orthocentrus vietnamensis sp. nov. is similar to *O. mandibularis* sp. nov., but differs by the shorter first flagellomere, which is $2.8\text{--}3.0 \times$ as long as wide ($3.4\text{--}3.5 \times$ in *O. mandibularis*), the lower tooth of the mandible more developed (reduced in *O. mandibularis*), and a slenderer metasoma, with strong latero-median longitudinal carinae of the second tergite (not developed in *O. mandibularis*). *Orthocentrus vietnamensis* is also similar to *O. taeniatus* sp. nov., but differs by the absence of the latero-median longitudinal carinae on the anterior 0.7 of the third tergite (developed in *O. taeniatus*) and the more strongly sculptured tergites 1–3, which are strongly wrinkled and rugulose (indistinctly longitudinally wrinkled in *O. taeniatus*). *Orthocentrus vietnamensis* differs from *O. pectoralis* sp. nov. by the dark mesosoma (largely orange in *O. pectoralis*) and the shorter ocellar-ocular distance.

Etymology

The new species is the most common one in samples from different localities in Vietnam.

Material examined

Holotype

VIETNAM • ♀; Dak Lak, Chu Yang Sin N.P., near river; ca 740 m a.s.l.; 1–10 Jun. 2007; C. van Achterberg and R. de Vries leg.; Malaise traps; RMHN'07; NBC, RMNH.INS.1722412.

Paratypes

VIETNAM • 1 ♀; same collection data as for holotype; NBC, RMNH.INS.1722413 • 1 ♀; same collection data as for holotype; NBC, RMNH.INS.1722414 • 1 ♀; Krong K'mar; 550–610 m a.s.l.; 21–26 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–6; RMNH'05; NBC, RMNH.INS.1722415 • 1 ♂, 3 ♀♀; same data as for preceding; 740–900 m a.s.l.; 2–10 Jun. 2007; Malaise traps; RMHN'07; NBC, RMNH.INS.1722416 to RMNH.INS.1722419 • 1 ♂, 1 ♀; Lam Dong, Bidoup Nuiba N.P., near Da Lat; 1650–1700 m a.s.l.; 11–19 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–12; RMHN'05; NBC, RMNH.INS.1722420 to RMNH.INS.1722421 • 1 ♀; Đông Nai, Cát Tiên N.P., *Lagerstroemia* trail; ca 100 m a.s.l.; 2–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 17–23; RMHN'05; NBC, RMNH.INS.1722422 • 2 ♀♀; same data as for preceding; *Ficus* trail; ca 100 m a.s.l.; 1–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 1–8; RMHN'05; NBC, RMNH.INS.1722423 to RMNH.INS.1722424 • 1 ♀; same data as for preceding; Bird trail;

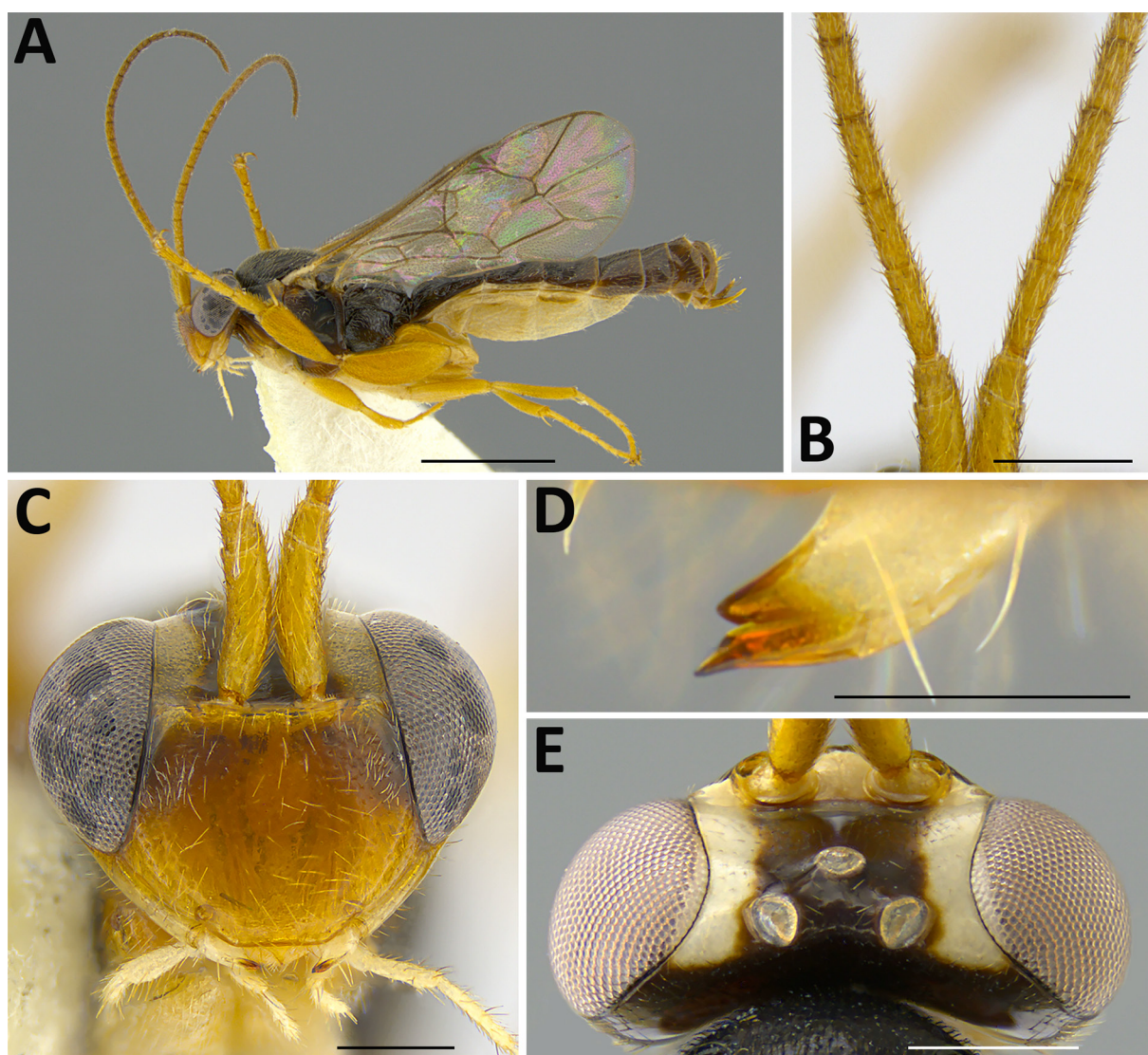


Fig. 43. *Orthocentrus vietnamensis* sp. nov., ♀. **A–D.** Holotype (RMNH.INS.1722412). **E.** Paratype (RMNH.INS.1722423). **A.** Lateral view of habitus. **B.** Frontal view of basal antennal segments. **C.** Frontal view of head. **D.** Dorsal view of mandibula. **E.** Dorsal view of head. Scale bars: A=1 mm; B–C, E=0.25 mm; D=0.1 mm.

ca 100 m a.s.l.; 1–9 Oct. 2005; C. van Achterberg and R. de Vries leg.; Malaise traps 9–12; RMHN'05; NBC, RMNH.INS.1722325 • 4 ♀♀; Ha Tinh, Vu Quang N.P.; 123 m a.s.l.; 18°17'42" N, 105°25'34" E; 5 Mar.–15 Apr. 2011; Malaise trap 15; C. van Achterberg leg.; RMNH'11; NBC, RMNH.INS.1722426 to RMNH.INS.1722429 • 1 ♀; Viet Try, near Thanh Son, Thuong Cuu; 350–400 m a.s.l.; 20°59' N, 105°8' E; 11–16 Oct. 1999; R. de Vries leg.; Malaise traps; RMHN'99; NBC, RMNH.INS.1722430 • 1 ♀; Thua Thien-Hue, near entrance Bach Ma N.P.; 1155 m a.s.l.; 16°11'27" N, 107°50'56" E; 28 Mar.–12 Apr. 2011; Malaise trap 26; RMNH'11; NBC, RMNH.INS.1722431 • 1 ♀; same data as for preceding; 480 m a.s.l.; 16°33'43" N, 107°51'15" E; Malaise trap 29; RMNH'11; NBC, RMNH.INS.1722432.

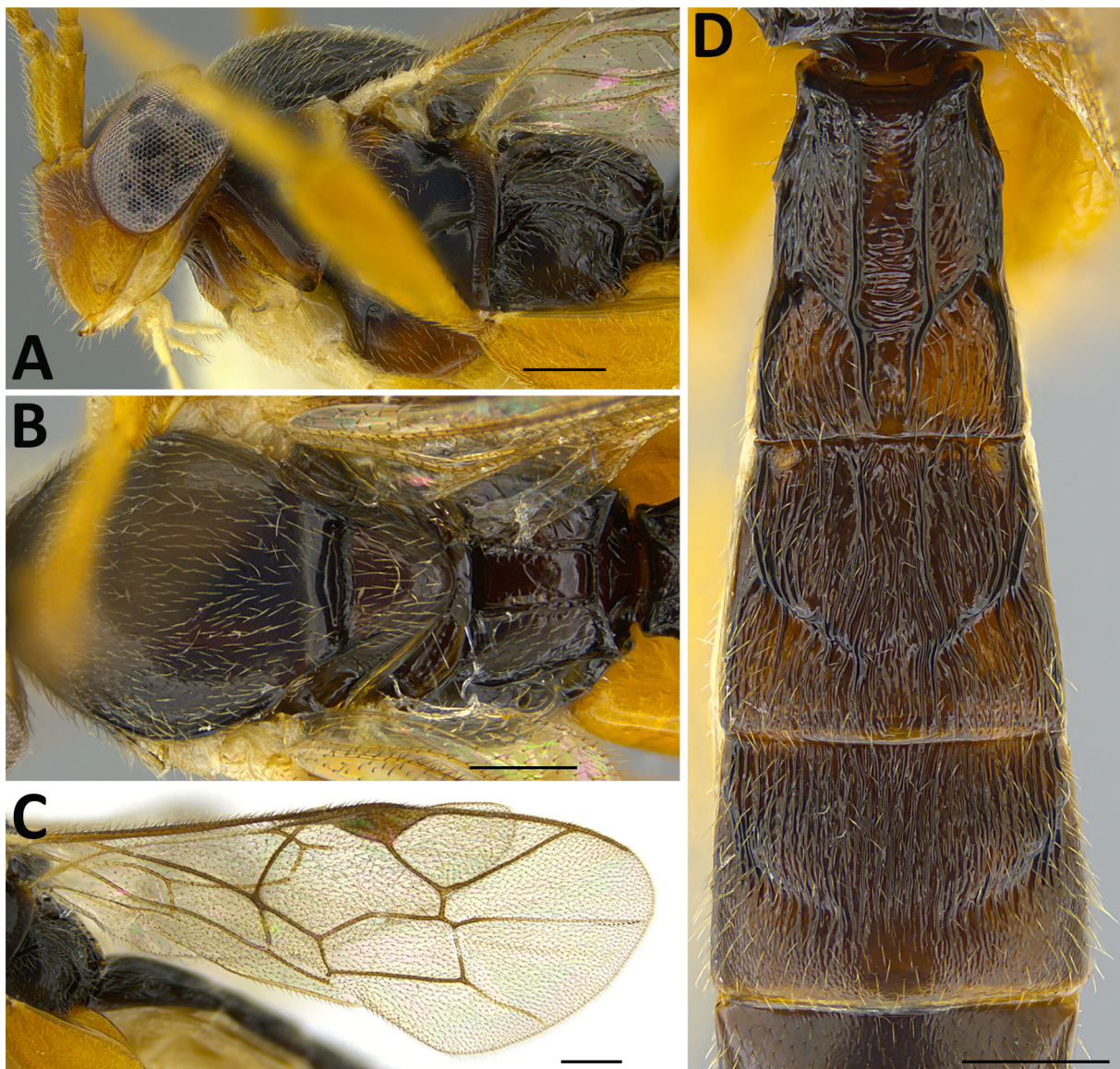


Fig. 44. *Orthocentrus vietnamensis* sp. nov., holotype, ♀ (RMNH.INS.1722412). **A.** Lateral view of head and mesosoma. **B.** Dorsal view of mesosoma. **C.** Wings. **D.** Dorsal view of metasomal tergites 1–3. Scale bars=0.25 mm.

Description

Female

Body length 3.8–4.8 mm. Fore wing 2.9–3.7 mm.

Antenna with 20–22 flagellomeres, first flagellomere $2.8\text{--}3.0\times$ as long as wide. Face about $0.6\times$ as long as wide, sparsely punctate; inner orbits slightly divergent. Malar space $3.1\text{--}3.2\times$ basal width of mandible;

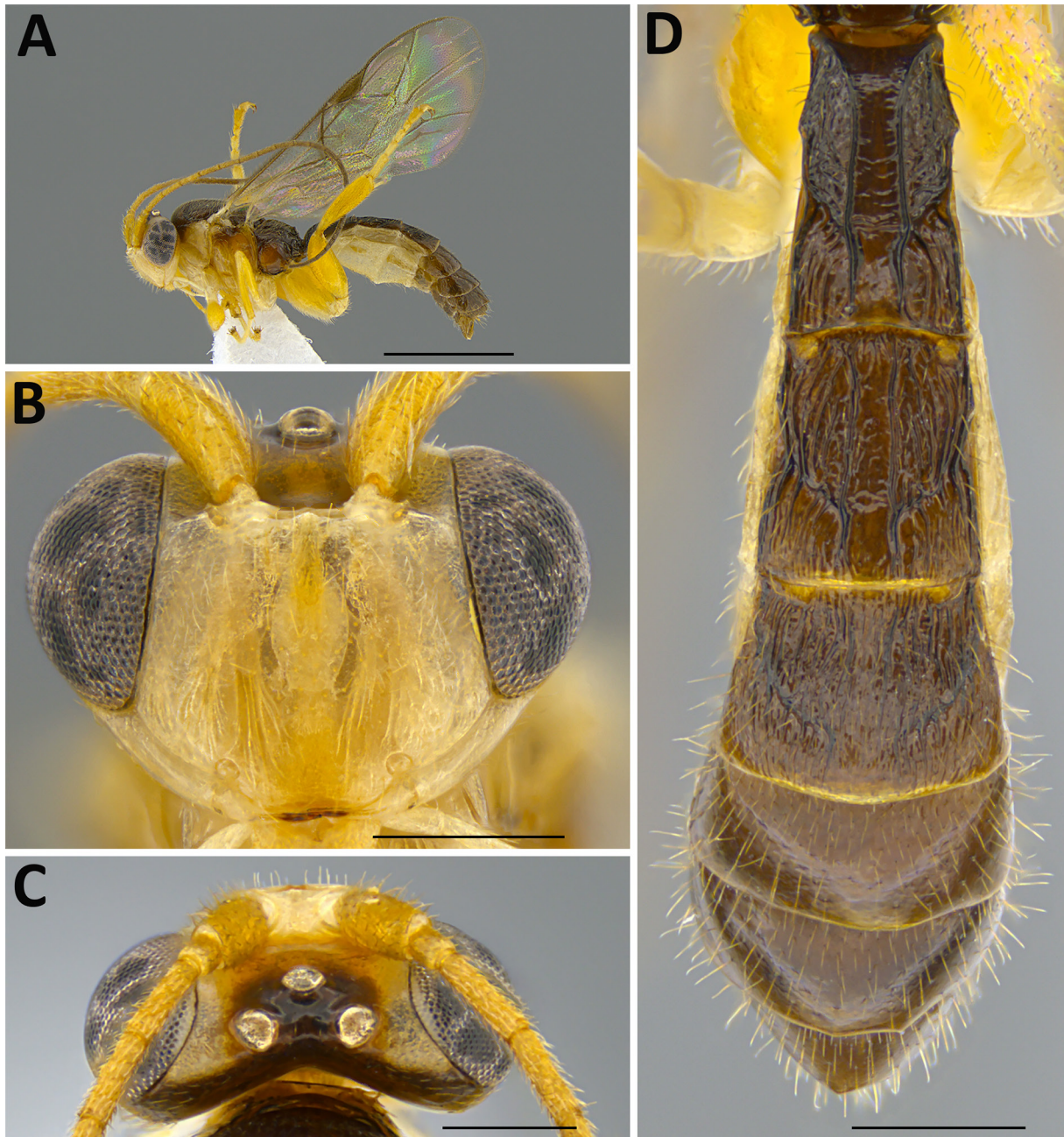


Fig. 45. *Orthocentrus vietnamensis* sp. nov., paratype, ♂ (RMNH.INS.1722419). **A.** Lateral view of habitus. **B.** Frontal view of head. **C.** Dorsal view of head. **D.** Dorsal view of metasomal tergites 1–6. Scale bars: A=1 mm; B–D=0.25 mm.

subocular sulcus present. Mandible not strongly twisted, lower tooth visible in anteroventral view. Head $1.8\text{--}1.9\times$ as wide as high in dorsal view. Frons and vertex smooth, sparsely pubescent; ocellar-ocular distance about $0.9\text{--}1.0\times$ maximum diameter of lateral ocellus, ocellar-ocular sulcus absent; occipital carina absent.

Propleuron densely pubescent. Pronotum smooth; epomia present. Mesoscutum densely pubescent; notauli deep anteriorly. Scutellum densely pubescent. Mesopleuron smooth, densely pubescent ventrally; epicnemial carina complete. Metapleuron smooth; pleural and submetapleural carinae present. Propodeum smooth, with lateral longitudinal and posterior transverse carinae.

Hind femur $2.6\text{--}2.7\times$ as long as wide, third tarsomere of hind tarsus about $0.7\text{--}0.8\times$ length of fifth tarsomere; tarsal claws simple.

Fore wing with vein 2rs-m about $1.2\text{--}1.3\times$ distance between 2rs-m and 2m-cu; vein 3rs-m absent; vein 1cu-a slightly distad M&Rs; hind wing nervellus intercepted in lower third, inclivous.

First tergite $1.3\text{--}1.5\times$ as long as its posterior width, longitudinally wrinkled and rugulose, with latero-median longitudinal carinae parallel; lateral oblique grooves deep. Second tergite $0.9\text{--}1.0\times$ as long as its posterior width, longitudinally wrinkled, with latero-median longitudinal carinae and subapical transverse furrow. Third tergite with same structure and sculpture as previous tergite. Remaining tergites smooth. Ovipositor thick and upcurved, with a subapical notch; its sheath about $0.25\text{--}0.3\times$ length of hind tibia.

Body generally brownish-black. Head brownish-black except face and antenna yellow to orange, inner orbits, malar space and mandible ivory. Mesosoma brownish-black except propleuron ventrally, pronotum at upper hind corner and along ventral margin, subtegular ridge yellow to ivory, mesopleuron partly brownish to orange or yellow, mesoscutum sometimes with two lines yellow to brown, scutellum sometimes brownish, and tegula ivory. Fore and mid legs orange except coxae, trochanters, trochantelli, and partly femora ivory. Hind leg orange except trochanter and trochantellus ivory. Pterostigma and wing veins brown. Metasoma brownish-black except tergites 2–3 sometimes narrowly banded with yellow to orange posteriorly.

Male

Resembles female, but antenna with 21–22 flagellomeres, first flagellomere about $3.9\times$ as long as wide; first tergite $1.7\text{--}1.8\times$ as long as its posterior width; second tergite $1.1\text{--}1.2\times$ as long as its posterior width. Colour pattern similar to that of female except face ivory and frons orange, mesosoma largely yellow and ivory, and metapleuron orange.

Distribution

Vietnam.

Remarks

Several females are not included in the type series due to variability which, however, is difficult to interpret as intraspecific without molecular markers: one female has clavate antennae; two females have a more strongly sculptured third tergite of the metasoma in combination with a translucent pterostigma or unnotched thin ovipositor; and two females have a more weakly sculptured metasoma with the third tergite wrinkled on the anterior half, with the subapical transverse furrow indistinct and a stouter antenna with the first flagellomere $2.3\text{--}2.5\times$ as long as wide. The taxonomic status of these specimens remains uncertain.

Discussion

The present paper is a first attempt to assess the diversity of the genus *Orthocentrus* in the Indomalayan region using the example of Vietnam. Despite the relatively limited number of samples, twenty-two species were recognized in the studied region, nineteen of them (almost 90%) have been described as new in this study, and three other species have previously been known only from the Eastern Palaearctic (Humala *et al.* 2020).

The Vietnamese representatives of *Orthocentrus* show a species grouping similar to those from the other regions (Veijalainen *et al.* 2014; Humala 2019). The most species poor are the *insularis* and *shieldsi* species groups containing two and three species, respectively, while most of the other species are placed in the *maculae* and *wahlbergi* species groups.

The majority of the examined species have been collected with Malaise traps placed in several closely situated locations of Southern Vietnam in Cát Tiên, Chu Yang Sin and Bidoup Nui Ba National Parks, as well as in Hoang Lien National Park in the northwestern part of the country. More than half of the species (12) have been collected at four localities of the Chu Yang Sin National Park; moreover, samples from two of these locations contained seven species of *Orthocentrus* each. In addition, up to ten more species were examined from Bidoup Nui Ba and Hoang Lien National Parks, but being males or partly damaged females, they have not been described in this study. Thus, the potential diversity of Vietnamese members of the genus *Orthocentrus* already exceeds 30 species, which is probably only a little part of their true diversity if the limited number of the studied localities is taken into account.

Acknowledgments

The author is deeply grateful to Gavin Broad (Natural History Museum, London) and Augustijn De Ketelaere (Beernem, Belgium) for the preliminary selection and sorting of orthocentrines from the unsorted material in the collection of NBC, and Frederique Bakker (NBC) who graciously made the specimens available for study, to reviewers for providing useful criticism on the early version of the manuscript, and to the armed forces of Ukraine for providing security to perform this work during the war. The study was supported by the National Research Foundation of Ukraine (project registration number 2025.07/0110).

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