



First report of the genus *Aprostocetus* Westwood (Hymenoptera: Eulophidae) from Vietnam with descriptions of two new species

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ABSTRACT: The genus *Aprostocetus* Westwood is reported for the first time from Vietnam with descriptions of two new species viz *A. modistrus* Narendran & Nikhil, sp. nov. and *A. petiolatus* Narendran & Minu, sp. nov.

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Key words: Oriental Region, Chalcidoidea, taxonomy, *Aprostocetus* Westwood, two new species

INTRODUCTION

The genus *Aprostocetus* Westwood belongs to the Subfamily Tetrastichinae of the family Eulophidae. Westwood (1833) described the genus with *Aprostocetus caudatus* Westwood as the type species. This is an extremely large genus, cosmopolitan in distribution. So far 758 valid species are known from the world of which 117 species are from Oriental region (Noyes, 2014). This genus has not yet been reported from Vietnam (Noyes, 2014) and the two new species and the unidentified species in this paper are the first report of the genus *Aprostocetus* Westwood from that country.

Genus *Aprostocetus* can be diagnosed by the presence of complete MS, bilobed or bidentate clypeal margin, 3 or 4 antennal funicular segments (anelli 3 or 4, rarely 1-2), 1 row of adnotaular setae on mesoscutum (rarely 2 or 3 rows), 2 pairs of setae on scutellum (rarely 3 pairs in aberrant forms) always near to SMG than to SLG (Narendran, 2007).

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The hosts of the members of this genus mostly include insects inhabiting plant galls, such as Diptera: Cecidomyiidae, sometimes Hymenoptera: Cynipoidea; occasionally Coleoptera or Coccoidea; rarely gall-inhabiting Acari (Graham, 1987).

Since the holotype specimens of the new species described here are on loan from Biodiversity Centre, Leiden (RMNH), they will be returned to RMNH [At present they are in ZSIK].

ABBREVIATIONS USED

AOL= distance between anterior ocellus and posterior ocellus; CC= costal cell; F1 to F4= funicular segments 1 to 4; L= length; ML= median line; MS= malar sulcus; MV= marginal vein; OD= ocellar diameter; OOL= distance between eye and posterior ocellus; OVPS= Ovipositor sheath; PMV= post marginal vein; POL= distance between posterior ocelli; SLG= sublateral groove; SMG= submedian groove; SMV= submarginal vein; STV= stigmal vein; W= width.

Acronyms of depositories: ZSIK= Zoological Survey of India, Kozhikode. RMNH= Biodiversity centre, Leiden, The Netherlands.

Aprostocetus modistrus Narendran & Nikhil, sp.nov.

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(Figs. 1-7)

Description: Holotype : 1 ♀, Length (excluding ovipositor sheath) 1.75mm. Head and mesosoma dark brown with slight metallic greenish blue refringence except the following: scape and legs pale whitish yellow, remaining segments of antenna pale yellowish brown. Metasoma pale yellowish brown with ovipositor sheath brown, wings hyaline with veins hyaline brown, tegula brown.

Head: Width in anterior view 1.35x (42:31) its height; width in dorsal view 2.15x (43:20) its height; eyes separated from each other in anterior view by 0.96x (23:22) eye height; eyes 1.3x (23:18) as long as wide; lower margin of clypeus bilobed; mandibles tridentate; eyes 3.3x (23:7) as long as malar sulcus; POL 2x OOL (9:5); POL 2.3x AOL (9:4); OOL 1.3x OD (5:4); distance between toruli 1.3x (5:4) the diameter of one torulus; distance between a toruli and an eye equal to diameter of one torulus (4:4); antenna inserted above level of lower eye margin, scape not reaching level of vertex; antennal formula 11441; clava unsegmented (Fig. 2); scape 0.9x (20:13) as long as eye; pedicellus plus flagellum 2.2x width of mesosoma (77:35). Relative L: W of antennal segments: scape = 20:4; pedicel = 7:3; F1 = 16:3; F2 = 16:3; F3 = 12:3; F4 = 9:3; clava = 16:4.

Mesosoma: Mesosoma with weak reticulations (Fig. 5), 1.6x as long as broad (56:35); pronotum 2.3x as broad as long (30:13); mesoscutum with one pair of adnotaular setae on each side, ML weak; mid lobe of mesoscutum 1.3x as long as broad (29:22); scutellum 1.05x as wide as long

(18:17); SMG with two pairs of stout setae; enclosed space between SMG 3x as long as broad (17:6), distance between SMG equal to distance between SMG and SLG; dorsellum clearly visible in dorsal view, 3x as wide as long (12:4), as long as median length of propodeum (4:4); propodeum with a distinct median carina, 8x as broad as its median length (32:4); callus with two setae on each side; rim of spiracle separated from posterior margin of metanotum by its own diameter; spur of midtibia 0.4x (5:13) as long as length of metatarsus. Relative L: W of hind leg: coxa = 24:11, trochanter = 6:5, femur = 35:7, tibia = 45:5, tibial spur = 8, tarsals 1 to 4 = 13, 9: 9, 9. Forewing 2.31x as long as broad (153:66); SMV with two dorsal setae (Fig. 7); relative L of, CC = 22, SMV = 23, MV = 58, STV = 13.

Metasoma: Gaster sessile, 4x as long as broad (96:25); 1.7x as long as mesosoma (96:56) and 1.3x (96:74) as long as combined length of head and mesosoma in side view; 5x as long as dorsal visible part of ovipositor sheath (96:20); 4 cercal setae, one black and longer than others, remaining 3 yellow and shorter; T1 longer than other tergites (Fig. 6), relative L:W of gaster tergites: T1 = 21:24; T2 = 10:25; T3 = 12:25, T4 = 12:21; T5 = 11:17; T6 = 9:13; T7 = 9:25.

Male: Unknown

Host: Unknown

Material examined: Holotype: 1 ♀, NORTH VIETNAM: Hoa Binh. Pa Co Kang Kia N. R., 1051m N 20°44'28" E 104°55'45", 11. 23.x.2009, Mal. Trap. 25, RMNH 09. Coll. C.V. Achterberg & R. de. Vries.

Paratypes: 2 ♀♀, NORTH VIETNAM: Hoa Binh. Pa Co Kang Kia N. R., 1323m N 20°44'36" E 104°53'45", 11. 23.x.2009, Mal. Trap. 13, RMNH 09. Coll. C.V. Achterberg & R. de. Vries.

Etymology: The species name is derived from an arbitrary combination of letters.

Remarks: This species comes near *Aprostocetus harithus* Narendran in the key to species by Narendran (2007). It resembles *A. harithus* in general body colour, tridentate mandible, SMG with two pairs of stout setae, dorsellum almost as long as median length of propodeum, callus with two setae and SMV with two dorsal setae but differs from it in having: 1) MS slightly bent (slope 70°) (in *A. harithus*, MS straight), 2) Antennal formula 11443 (in *A. harithus*, antennal formula 11433), 3) space between SMG 3x as long as broad (in *A. harithus*, space between SMG 1.8x as long as broad), 4) propodeum 8x as broad as its median length (in *A. harithus*, propodeum 11x as broad as its median length), 5) forewing 2.31x as long as broad (in *A. harithus*, forewing 2.77x as long as broad), 6) gaster 1.7x as long as mesosoma (in *A. harithus*, gaster 2.08x as long as mesosoma) and 7) gaster 5x as long as dorsal visible part of ovipositor sheath (in *A. harithus*, gaster 7.5x as long as dorsal visible part of ovipositor sheath).

This species comes near *Aprostocetus collega* Ratzeburg of Graham's key to European species

of *Aprostocetus* (1987). It resembles *A. collega* in having gaster 1.3x as long as head plus thorax but differs from it in having: 1) gaster 4x as long as broad (in *A. collega*, gaster 1.9-2.5x as long as broad) and 2) last tergite 3x as long as broad (in *A. collega*, last tergite 1.3x as long as broad).

Aprostocetus petiolatus Narendran & Minu, sp.nov.

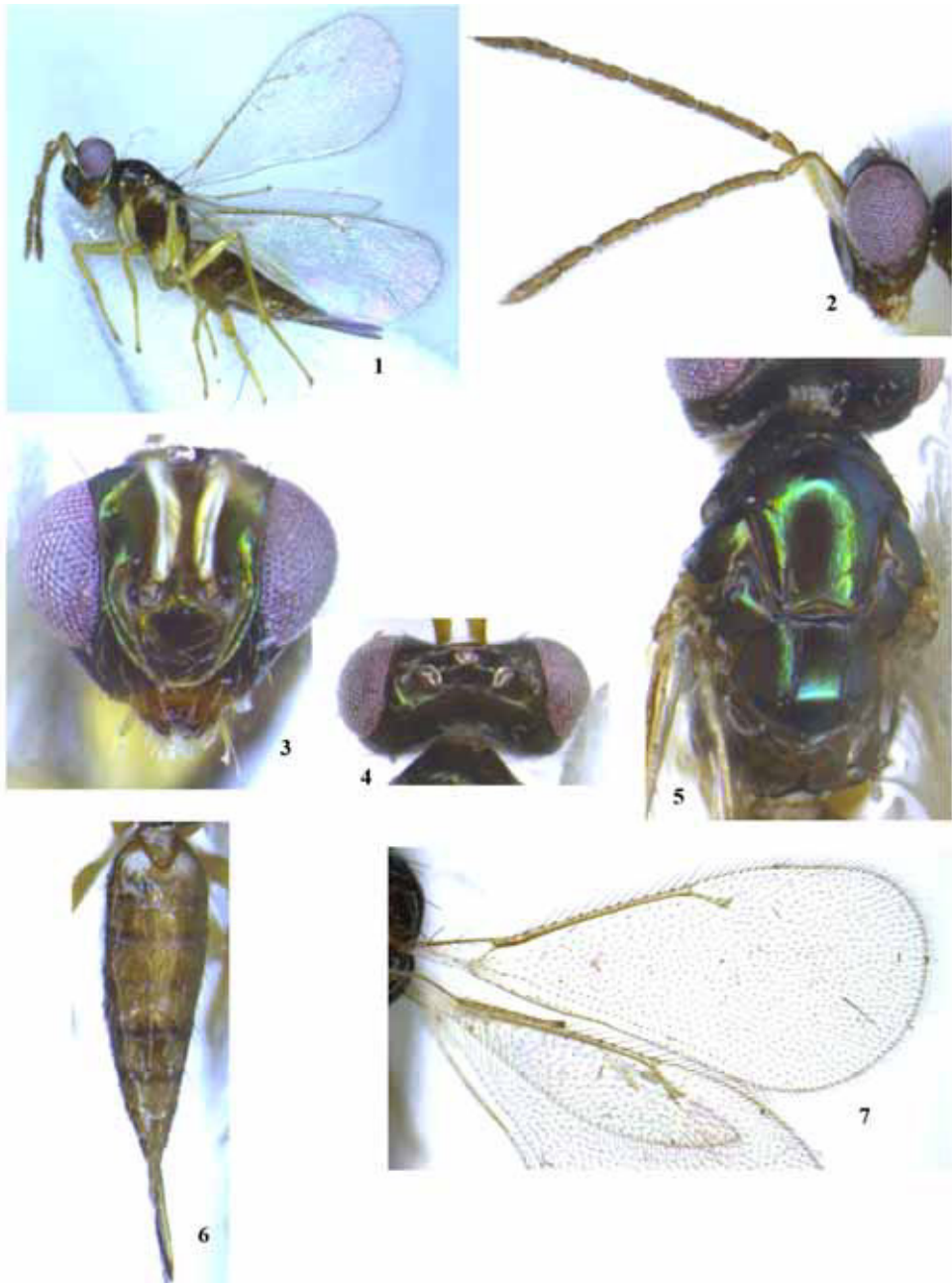
urn:lsid:zoobank.org:act:B9A67AAA-1F23-41C6-B26B-0943515432EF

(Figs 8-15)

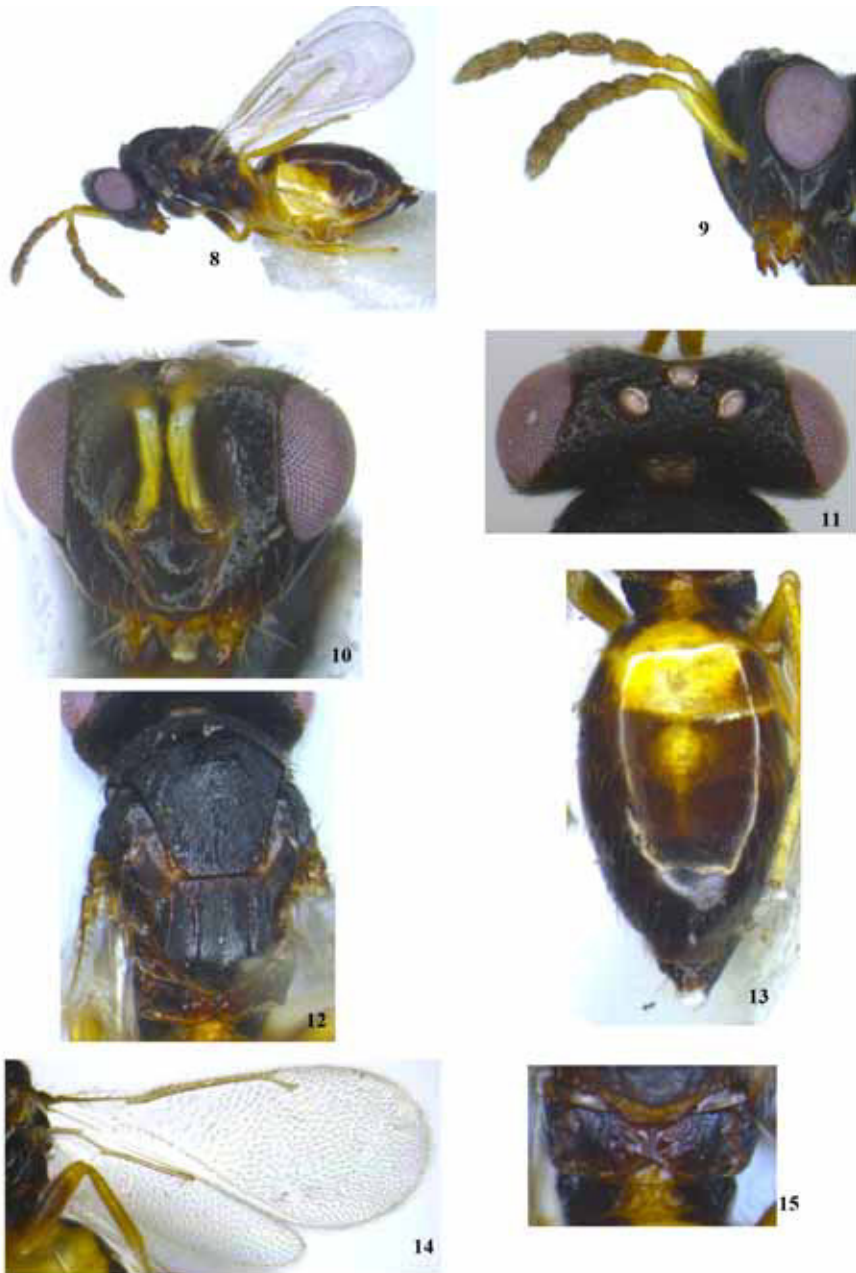
Description: Holotype : 1 ♀ Length 2.143mm. black with following parts as follows: scape, pedicel and anelli pale yellow; funicles and clava brownish yellow; mandibles pale golden yellow with brownish tinge at the tips; eyes grey; area adjacent to the longitudinal grooves of mesoscutum brown on either sides; dorsellum brownish yellow; propodeum brownish black; coxae concolorous with mesosoma except basal portion yellow; trochanters yellow; femur yellowish brown; remaining segments of legs yellow; wings hyaline with veins pale yellow; petiole golden yellow; T1 and T2 pale yellow with brownish patches on either sides; T3 brown with a pale yellow region in middle; T4 brown with black apex, remaining segments black.

Head: Width in anterior view 1.3x (64:49) its height; width in dorsal view 2.4x (68:28) its height; eyes 1.2x (30:25) long as broad and separated from each other in anterior view by 1.3x (39:30) eye height; area below torulus setose; lower margin of clypeus bilobed; mandibles bidentate; length of malar sulcus 0.43x (13:30) eye height; pedicel 0.3x (9:30) as long as eye height; pedicellus plus flagellum 0.75x (45:60) as long as width of mesosoma; distance between toruli 1.2x (7:6) diameter of one torulus; distance between a torulus and eye 1.8x (11:6) diameter of a torulus; POL 2.6x (13:5) AOL; POL 1.6x (13:8) OOL; OOL 1.3x (8:6) OD; antennae inserted above level of lower eye margin (fig. 10); Antennal formula 11434; scape not reaching level of vertex, 0.77x as long as eye (23:30); Relative L:W of antennal segments: scape= 23:6, pedicel= 9:5, F1=12:7, F2=12:7, F3=2:7, clava=23:8. Funicles with sensillae and setae. Vertex sparsely setose (Fig. 11).

Mesosoma: Mesosoma 1.32x (79:60) as long as wide; pronotum width 2.8x (50:18) its length; ML distinct; pronotum reticulate, sparsely setose (more than 20 setae) (fig. 12); Mesoscutum (excluding scapulae) 1.08x (40:37) as wide as its length, slightly less reticulate than pronotum; distal half of mesoscutum with notaular groove 0.62x (23:37) as long as mesoscutum; mesoscutum with 7 adnotaular setae, 5 near outer margin and 2 in the inner side; scutellum as wide as long (25:25); SMG 0.46x (6:13) nearer to SLG than to each other, space between SMG 1.85x (24:13) as long as broad; scutellum with a pair of proximal setae in middle region and a pair of distal setae near posterior margin; dorsellum 7x (21:3) as broad as long; propodeum 2.5x (45:18) as wide as long, 4x (45:12) as broad as its median length, with a strong median carina having a pair of setae arranged in a longitudinal row near lateral margin of spiracular grooves; callus with 3 setae; rim of spiracle fully exposed. Forewing 2.3x (149:65) as long as wide; SMV with 4 setae, MV with 14 setae on outer margin; speculum present; Relative length of CC= 35,



Figs. 1-7: *Aprostocetus modistrus* Narendran & Nikhil, sp.nov. (Female) 1. Profile, 2. Antenna, 3. Head anterior view, 4. Head dorsal view, 5. Mesosoma, 6. Gaster, 7. Wing



Figs. 8-15: *Aprostocetus petiolatus* Narendran & Minu, sp. nov. (Female)
8. Profile, 9. Antenna, 10. Head anterior view, 11. Head dorsal, 12. Mesosoma,
13. Gaster, 14. Wing, 15. Propodeum

SMV= 28, MV= 59, STV= 14; Relative L: W of hind leg: coxa= 29:10, trochanter= 8:6, femur= 46:11, tibia= 48:6, tibial spur= 9, tarsals 1 to 4= 9, 8, 8, 11.

Metasoma: Gaster 1.4x (110:79) longer than mesosoma, 1.13x (110:97) as long as combined length of head and mesosoma in side view; 1.9x as long as its width (110:57); Petiole 0.36x (5:14) as long as wide; T1, T2 and T3 smooth, remaining tergites faintly reticulate; Metasoma sparsely setose; 4 cercal setae, one black and longer than others, remaining 3 yellow and shorter; Relative L:W of gasteral tergites: T1= 17:41, T2= 16:55, T3= 20:59, T4= 20:53, T5= 19:45, T6= 6:25, OPSL= 8.

Male: Unknown

Host: Unknown

Material examined: Holotype: 1 ♀, NORTH VIETNAM: Hoa Tinh. Vu Quang N. P., 104m N 18°17'45" E 105°25'51", 24.ix - 5.x.2009, Mal. Trap. 19, RMNH 09. Coll. C.V. Achterberg & R. de Vries.

Etymology: The species is named after its characteristic petiole.

Remarks: This species comes near *Aprostocetus malcis* Narendran in Narendran's key to species (2007) and resembles *A. malcis* in having similar head width in anterior view, median length of mesosoma and SMV with 4 dorsal setae, but it differs from *A. malcis* in having, 1) head width in dorsal view 2.4x as broad as long (in *A. malcis*, head width in dorsal view 3.3x as broad as long), 2) MS straight (in *A. malcis*, MS slightly bent), 3) scape not reaching level of vertex (in *A. malcis*, scape exceeding level of vertex), 4) dorsellum 0.2x as long as length of propodeum (in *A. malcis*, dorsellum 0.5x as long as length of propodeum), 5) propodeum 4x as broad as median length (in *A. malcis*, propodeum 5x as broad as median length) and 6) gaster petiolate (in *A. malcis*, gaster sessile).

This species also resembles *A. nadicus* Narendran in having straight MS, mesosoma 1.3x as long as broad, scutellum as long as broad and forewing 2.3x as long as broad but differs from *A. nadicus* in having, 1) space between SMG 1.85x as long as broad (in *A. nadicus*, space between SMG 2.75x as long as broad), 2) dorsellum 0.2x as long as median length of propodeum (in *A. nadicus*, dorsellum as long as length of propodeum), 3) propodeum 4x as broad as median length (in *A. nadicus*, propodeum 9x as broad as its median length) and 4) SMV with 4 dorsal setae (in *A. nadicus*, SMV with 6 dorsal setae).

A. petiolatus sp. nov. comes near *A. clavicornis* (Zetterstedt) of Graham's key to European species of *Aprostocetus* (1987). This species resembles *A. clavicornis* in general colour of scape and pedicellus, pedicellus about twice as long as broad, POL 1.5- 1.6x OOL, callus with 2-4 setae, forewing 2.30- 2.35x as long as broad and SMV with 3- 5 dorsal setae but differs from it in having: 1) head twice as broad as mesoscutum (in *A. clavicornis*, head as broad as or

hardly broader than mesoscutum), 2) pronotum 0.5x as long as mesoscutum (in *A. clavicornis*, pronotum at most 0.25x as long as mesoscutum), 3) ML distinct (in *A. clavicornis*, ML usually absent) and 4) funicular segments equal in length (in *A. clavicornis*, funicular segments decreasing very slightly in length).

This species also resembles to *A. asperulus* (Graham) in having a straight malar sulcus, clava somewhat broader than funicle, callus with 3- 4 setae and forewing 2.3x as long as broad but differs from it in having, 1) thorax 1.3x as long as broad (in *A. asperulus*, thorax 1.5- 1.6x as long as broad), 2) pronotum 0.5x as long as mesoscutum (in *A. asperulus*, pronotum 0.2x as long as mesoscutum), 3) scutellum as long as broad (in *A. asperulus*, scutellum 1.2- 1.3x as long as broad), 4) dorsellum 7x as broad as long (in *A. asperulus*, dorsellum 4x as long as broad) and 5) gaster 1.9x as long as broad (in *A. asperulus*, gaster 3.5x as long as broad).

Aprostocetus sp.

One female, apparently of a new species, is left unnamed as the specimen is not in good condition. However, the same is treated as unidentified species and a description is given below.

Length (including OVPS) 3.87 mm.

Head: Width in anterior view 1.35x its height (54:40); width in dorsal view 2.07x its height (54:26); vertex with 4 stout spines on either side near eye margin; POL with 3 spines, one nearer to ocelli and one nearer to middle; one spine in front of posterior ocelli, nearer to AOL on either side; length of median spine 0.83x OD (5:6); eyes separated from each other in anterior view by 0.96x eye height (30:31); eyes 1.24x as long as wide (31:25); lower margin of clypeus bilobed; mandibles tridentate; eye 4.42x as long as malar sulcus (31:9); POL 1.6x OOL (11:7); POL 2.2x AOL (11:5); OOL 1.16x OD (7:6); distance between toruli 0.42x diameter of one torulus (6:7); distance between a torulus and eye 0.9x diameter of a torulus (6:7); antenna inserted 0.11 mm above from lower margin of eye; Antennal formula 11442; scape 0.96x as long as eye (30:31); scape reaching above level of vertex; pedicellus plus flagellum 3.16x width of mesosoma (152:48); relative L:W of antennal segments: scape = 30:4; pedicel = 10:5; F1 = 45:4; F2 = 30:4; F3 = 27:4; F4 = 18:4; clava = 21:5.

Mesosoma: Mesosoma smooth, shiny with weak reticulations on pronotum and axillae, 2x as long as broad (91:48); pronotum weakly cross reticulated, flattened, 1.4x as broad as long (36:26); pronotum with 3 rows of setae, first row with 4 dorsal setae, second row with three pairs of setae and last row with 5 pairs of setae near ad margin; mid lobe of mesoscutum 1.06x as long as wide (33:31); 3 adnotaular setae on either side; ML absent; mesoscutum with posterior margin inverted 'V' shape medially; scutellum 1.13x as long as wide (27:24) with a pair of stout setae, one reaching middle and one near posterior margin; enclosed space between SMG 3.3x as long as wide (33:10); SMG slightly nearer to SLG than to each other;

dorsellum clearly visible in dorsal view, 0.5x as long as broad (9:19); 1.3x median length of propodeum (9:7); propodeum smooth, weakly reticulate than thorax with strong median carina; posterior margin developed as flaps on either side; propodeum 5.3x as broad as its median length (37:7); rim of spiracle exposed; callus with 3 setae; spur of mid tibia 0.3x as long as metatarsus (7:26); Relative L:W of hind leg, coxa = 39:18, trochanter = 13:6, femur = 65:12, tibia = 81:6, tarsals 1 to 4 = 31, 22: 15,12. Forewing 3x as long as broad (255:92); MV 6x STV; Relative L of, CC = 43, SMV = 45, MV = 107, STV = 17,

Metasoma: Sessile; 5.5x as long as broad (219:40); 2.4x as long as mesosoma (219:91) and 2x as long as combined length of head and mesosoma (219:129); 6.4x dorsal visible part of OVPS (219:34); all tergites smooth; Relative length of gasteral tergites, T1 = 38, T2 = 24, T3 = 25, T4 = 23, T5 = 28, T6 = 22, T7 = 65, OVPS (side view) = 103.

Material examined: 1 ♀, NORTH VIETNAM: Hoa Binh. Pa Co Kang Kia N. R., 1051m N 20°44'28" E 104°55'45", 11. 23.x.2009, Mal. Trap. 25, RMNH 09. Coll. C.V. Achterberg & R. de Vries.

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