

One new genus and seven new species of Rogadinae (Hymenoptera: Braconidae) from Vietnam

K.D. Long & C. van Achterberg

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One new genus of the tribe Rogadini Foerster, 1862 (Braconidae: Rogadinae) from Vietnam: *Vietorogas* Long & van Achterberg, gen. nov. (type species: *Vietorogas bachma* spec. nov.) is described. In addition, seven new species are described and illustrated: *Vietorogas abditivus* Long & van Achterberg, spec. nov.; *V. bachma* Long, spec. nov.; *Cornutorogas aurantius* van Achterberg, spec. nov., *C. hatinhensis* Long & van Achterberg, spec. nov.; *C. hoabinhicus* Long & van Achterberg, spec. nov.; *C. similis* Long, spec. nov. and *Megarhogas albapiculatus* Long, spec. nov.

Introduction

The subfamily Rogadinae Foerster, 1862 (Hymenoptera: Braconidae) consists of a medium-sized group of koinobiont endoparasitoids living in caterpillars. The subfamily contains about 800 described species and 54 valid genera (Yu et al., 2007). The caterpillars are mummified and serve as protection of the parasitoid cocoon.

Little is known of the Rogadinae from Vietnam, but the revision of the Chinese Rogadinae (Chen & He, 1997) gives an indication that many species are waiting to be recognized. For several years specialists of both IEBR and RMNH have collected Braconidae from all over Vietnam to get a first understanding of the fauna of Vietnam. In this paper part of the discoveries are described.

For identification of the subfamily, see van Achterberg (1993, 1997); for the subdivision of the subfamily see van Achterberg (1991) and Chen & He (1997). For a key to the genera see Chen & He (1997). For the terminology used in this paper, see van Achterberg (1988, 1993).

Descriptions

Vietorogas gen. nov.
(figs 1-10)

Type species: *Vietorogas bachma* Long, spec. nov.

Etymology. — “Viet” (from Vietnam) and “Rogas” (from the generic name *Rogas* Nees, 1818). Gender: masculine.

Diagnosis.— Antenna of female with distinct spine apically (fig. 3); apex of scapus oblique, in lateral view longer dorsally than ventrally; scapus longer than apically wide; occipital carina present but absent dorsally; eyes glabrous and distinctly emarginate; tentorial pits medium-sized, distance between tentorial pits more than distance from pits to eyes; face with two smaller pits above tentorial pits and connected by a faint groove; eyes more than twice as long as wide (in anterior view); frons with a prominent mid-longitudinal carina; area between antennal sockets with transverse rugae; in lateral view eye 4.7 times wider than length of temple; ocelli rather large (fig. 1); antescutal depression distinct; prepectal carina complete; precoxal sulcus rugose; notauli deep in anterior half, but fading medially, fused posteriorly resulting in a large flat rugose area (fig. 5); median carina of metanotum absent; propodeum with long sparse setae and anteriorly with strong median carina, posteriorly with small areola, largely granulate or finely reticulate-rugose; posterior lateral corners of propodeum rather deeply sunken, without granules and rugosities (fig. 8); propodeal spiracle behind middle of propodeum; vein cu-a of fore wing vertical and far postfurcal; second submarginal cell long, distinctly narrowed distally; vein 1-M of fore wing curved basally; vein m-cu of fore wing short and subparallel with anterior half of vein 1-M (fig. 4); vein 1-SR of fore wing vertical or nearly so; hind wing broad; marginal cell of hind wing parallel-sided apically, slightly curved submedially; vein m-cu of hind wing absent; vein M+CU of hind wing more than twice as long as vein 1-M, the latter a little shorter or equal to vein 1r-m; apex of hind tibia without comb of specialized setae at inner side; hind tibial inner and outer spurs equal, straight and with short setae (fig. 7); fifth and following metasomal tergites retracted under fourth tergite (fig. 10); second-fourth tergites with weak lateral crease (fig. 9); first tergite with dorsope, dorsal carinae complete on first and second tergites, strong, largely united; dorsal carina on third tergite present on basal two third of tergite; posterior margin of fourth metasomal tergite protruding (figs 9, 10); in lateral view, posterior margin of fourth metasomal tergite with well-developed sublateral semicircular emargination (fig. 10); hypopygium of female small, in lateral view straight ventrally and medio-ventrally without keel and apically acute; ovipositor sheath short, widened and truncate apically (fig. 9).

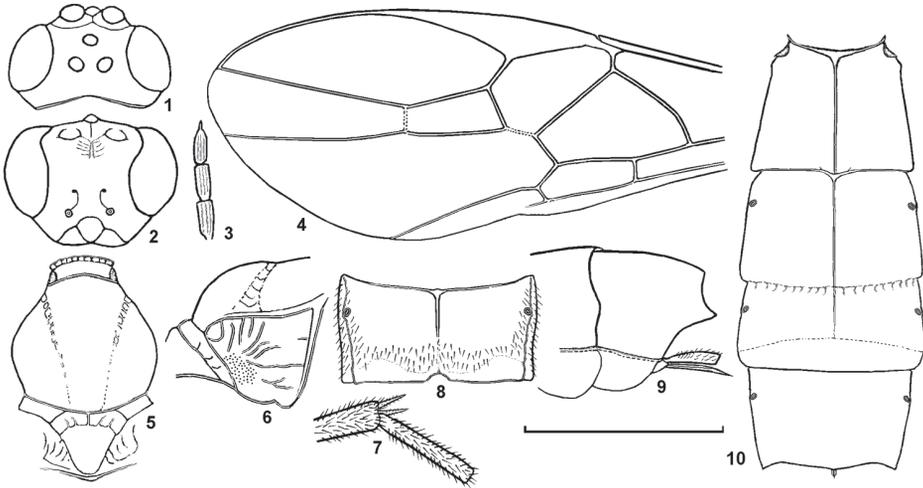
Notes.— The new genus differs from similar genera of the Rogadini by the well-developed sub-lateral semicircular emargination of the fourth metasomal tergite (fig. 10), the retracted apical tergites of the metasoma, the short vein m-cu of the fore wing (subparallel with anterior half of vein 1-M; fig. 4) and the vertical vein 1-SR of the fore wing.

Vietorogas bachma Long, spec. nov.
(figs 1-10)

Material.— Holotype, ♀ (IEBR) "Rog. 512, Vietnam: Thua Thien-Hue, Bach Ma National Park, 600 m, forest, 16.v.2007, K.D. Long". Paratype: 1 ♀ (RMNH), topotypic, but 19.v.2007.

Holotype, ♀, length of body 4.3 mm, length of fore wing 3.5 mm, antenna 4.5 mm.

Head.— Antennae with 40 segments, slightly longer than body; middle segments longer than wide (5:3), penultimate antennal segment equal to apical segment; apical segment with distinct spine (fig. 3); width of face equal to length of face and clypeus



Figs 1-10, *Vektorogas bachma* Long, spec. nov., holotype, ♀. 1, Head, dorsal aspect; 2, head, anterior aspect; 3, apical antennal segments; 4, fore wing; 5, mesoscutum and scutellum, dorsal aspect; 6, pronotum, lateral aspect; 7, inner side of apex of hind tibia and spurs; 8, propodeum, dorsal aspect; 9, fourth metasomal tergite, lateral aspect; 10, first-fourth metasomal tergites, dorsal aspect. Scale-line: 1 mm.

combined (fig. 2); malar space 1.4 times as long as mandible width, mandible width 1.25 times as long as hypoclypeal depression; malar suture absent; distance between tentorial pits 1.25 times distance between pits and eyes (fig. 2); eyes more than 2.1 times as high as wide (19:9; in anterior view); in lateral view width of eye 4.7 times as long as temple; POL:OD:OOL = 3:4:3, distance between front and hind ocelli equal to OOL; frons with a short longitudinal carina; face rugose with long sparse setae (fig. 2); area between antennal sockets with transverse rugosities (fig. 2); vertex and temple rugose.

Mesosoma.— Length of mesosoma 1.5 times its height; pronotum strongly carinate anteriorly (fig. 6); mesoscutum completely rugose; pronotal trough with distinct carinae (fig. 5); precoxal sulcus shallow and faintly rugose; mesopleuron finely punctate medially; mesoscutum rugose; scutellar sulcus wide and deep with strong median carinae; lateral lobes of mesoscutum posteriorly and scutellum finely granulate; propodeum largely granulate (paratype also with fine rugosities); posterior lateral corners deeply sunken without granules and rugosities; propodeal spiracle small (fig. 8).

Wings.— Fore wing: pterostigma 3.2 times as long as wide; vein 1-SR of fore wing short (fig. 4); r:2-SR:3-SR:SR1 = 7:9:16:34; vein r arising submedially from pterostigma; vein cu-a short and vertical, vein 1-CU1 long; 1-CU1:cu-a:2-CU1:3-CU1 = 11:4:13:7; 1-CU1 distinctly longer than m-cu (11:9; fig. 4); second submarginal cell distinctly narrowed distally, its length about 2.3 times as long as its basal width and 3.6 times as long as its apical width (18:8:5; fig. 4). Hind wing: vein M+CU:1-M: 1r-m = 25:12:12.

Legs.— Hind coxa finely granulate and densely setose; length of fore femur:tibia:tarsus:basitarsus = 31:35:33:12; length of hind femur:tibia:tarsus:basitarsus = 40:55:52:20; inner hind tibial spur 0.45 times as long as basitarsus (fig. 7).

Metasoma. — Second-fourth tergites with weak lateral crease (fig. 9); first tergites with dorsope; first tergite 0.7 times as long as apical width; medial length of second tergite slightly less than third (21:20); second suture crenulate; third and second tergites strongly longitudinally striate with rugulosity between striae; fourth tergite areolate-rugose; fifth and following tergites retracted under fourth tergite (fig. 10); hypopygium of female medium-sized with sparse setae; ovipositor sheath short, widened and truncate apically, length of ovipositor sheath 0.6 times as long as hind basitarsus (fig. 9).

Colour. — Yellow; antenna dark brown; palpi whitish yellow; stemmaticum black; pronotum, metanotum, large apical triangle of first tergite and large medio-longitudinal area of second tergite pale yellow; propodeum, ovipositor sheath and stemmaticum dark brown; all coxae whitish yellow; hind tarsus light brown; lateral corners of second tergite, basally large corners of third tergite and large medio-basal area of fourth tergite black or dark brown; wing membrane yellowish with dark brown veins and pterostigma.

Vietorogas abditivus Long & van Achterberg, spec. nov.
(figs 11-17)

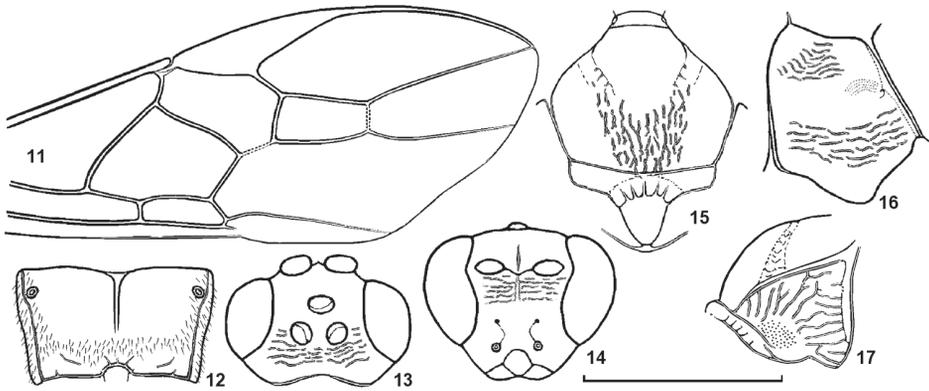
Material. — Holotype, ♀ (IEBR) "Rog. 406, Vietnam: Tay Ninh, Lo Go-Xa Mat National Park, bushes, 4.xi.2003, K.D. Long".

Holotype, ♀, length of body 4.3 mm, length of fore wing 3.7 mm.

Head. — Antenna with 34+ segments, middle segments twice longer than wide; width of face slightly longer than length of face and clypeus combined (fig. 14); malar space 1.4 times as long as mandible width, width of mandible 1.7 times as long as hypoclypeal depression; malar suture absent; distance between tentorial pits 1.2 times distance between pits and eyes (fig. 14); eyes about 1.9 times as high as wide (in anterior view); in lateral view width of eye 2.4 times as long as temple; POL:OD:OOL = 3:4:3, distance between front and hind ocelli equal to OOL (fig. 13); frons with a rather long prominent longitudinal carina; face rugose; area between antennal sockets with transverse rugosities (fig. 14); vertex and temple rugose.

Mesosoma. — Length of mesosoma 1.4 times its height; pronotum strongly carinate anteriorly and posteriorly (fig. 17); mesoscutum rugose anteriorly, with coarse rugosities posteriorly (fig. 15); pronotal trough with distinct carinae anteriorly and posteriorly (fig. 17); scutellar sulcus wide and deep with strong median carinae; precoxal sulcus shallow and completely transversely rugose (fig. 16); lateral lobes of mesoscutum and scutellum finely granulate; metapleuron completely rugose; propodeum reticulate rugose with strong median carina united anteriorly and fading posteriorly; postero-lateral corners deeply sunken, without granules and rugosities (fig. 12); propodeal spiracle medium-sized (fig. 12).

Wings. — Fore wing: pterostigma 3.2 times as long as wide (fig. 11); vein 1-SR of fore wing comparatively long (fig. 11); vein r:2-SR:3-SR:SR1 = 5:10:18:34; vein r arising just before middle of pterostigma; vein cu-a short and vertical; vein 1-CU1 long; 1-CU1:cu-a:2-CU1:3-CU1 = 11:3:14:6; second submarginal cell distinctly narrowed distally, its length more than 2.7 times as long as basal width and 4.5 times as long as its apical width (27:10:6); vein 1-CU1 about as long as vein m-cu (fig. 11). Hind wing: vein M+CU:1-M:1r-m = 26:14:15.



Figs 11-17, *Vietorogas abditivus* Long & van Achterberg, spec. nov., holotype, ♀. 11, Fore wing; 12, propodeum; 13, head, dorsal aspect; 14, head, anterior aspect; 15, mesoscutum and scutellum, dorsal aspect; 16, precoxal sulcus; 17, pronotum, lateral aspect. Scale-line: 1 mm.

Legs. — Hind coxa finely granulate and densely setose; length of fore femur:tibia:tarsus:basitarsus = 31:35:33:37; length of hind femur:tibia:tarsus:basitarsus = 33:43:45:23; inner hind tibial spur 0.3 times as long as basitarsus.

Metasoma. — First tergite with dorsope, areolate-rugose, about 0.7 times as long as its apical width (23:34); medially second tergite somewhat longer than third tergite (25:23); second suture crenulate; second-fourth tergites with a more developed lateral crease than in *V. bachma*; third and second tergites strongly longitudinally striate with rugulae between striae; fourth tergite areolate-rugose; fifth and following tergites retracted under fourth tergite; hypopygium medium-sized with sparse setae; ovipositor sheath short, widened and apically truncate; ovipositor sheath 0.4 times as long as hind basitarsus (10:23).

Colour. — Reddish yellow; antenna pale yellow basally and brown apically; palpi whitish yellow; stemmaticum black; pronotum, metanotum, propodeum reddish yellow; large apical triangle of first tergite, basal half of third and fourth tergites, ovipositor sheath and stemmaticum dark brown; lateral area of second tergite pale brown; all coxae and apical half of third and fourth tergites yellow; hind tarsus light brown; wing membrane yellowish with dark brown veins; pterostigma brown, but basal third pale yellow.

Key to species of genus *Vietorogas* nov.

1. Vein 1-CU1 of fore wing about as long as vein m-cu and first discal cell weakly narrowed distally (fig. 11); vein 1-M of hind wing slightly shorter than 1r-m; mesoscutum irregularly rugose posteriorly (fig. 15); precoxal sulcus largely transversely rugose (fig. 16); propodeum reddish yellow and largely rugose with a strong median carina anteriorly; propodeal spiracle close to anterior border of propodeum (fig. 12); vein 1-SR of fore wing comparatively long (fig. 11); propodeal spiracle medium-sized (fig. 12) *V. abditivus* Long & van Achterberg, spec. nov.

- Vein 1-CU1 of fore wing distinctly longer than vein m-cu and first discal cell distinctly narrowed distally (fig. 4); vein 1-M of hind wing as long as 1r-m; mesoscutum finely rugose posteriorly; precoxal sulcus finely and sparsely rugose; propodeum dark brown, but pale yellow medially and completely rugose-granulate with a less strong median carina anteriorly; propodeal spiracle comparatively far from anterior border of propodeum (fig. 8); vein 1-SR of fore wing short (fig. 4); propodeal spiracle small (fig. 8) *V. bachma* Long, spec. nov.

Cornutorogas aurantius van Achterberg, spec. nov.
(figs 49-53, 56)

Material.— Holotype, ♀ (RMNH), "S. Vietnam: Đông Nai, Cát Tiên N.P., Mal. traps, c. 100 m, 9.iv-13.v.2007, Mai Phu Quy & Nguyen Thanh Manh, RMNH'07". Paratype: 1 ♂ (IEBR), "S. Vietnam: Dak Lak, Chu Yang Sin N.P., n[ea]r dam, 740-940 m, 1-10.vi.2007, Mal. traps, C. v. Achterberg & R. de Vries, RMNH'07".

Holotype, ♀, length of body 5.7 mm, length of fore wing 4.0 mm.

Head.— Antenna with 60+ segments and 2.5 times as long as fore wing, third segment 1.2 times as long as fourth segment, length of third, fourth and penultimate segments 5.2, 4.2 and 1.8 times their width, respectively; scapus longer dorsally than ventrally in lateral view; scapus 1.6 times longer than apically wide; occipital carina strongly developed (fig. 50); eye large and emarginate, resulting in a subtriangular head in anterior view (fig. 49); in anterior view height of eye 1.7 times its width; eye 1.3 times longer than width of face; tentorial pits large, distance between tentorial pits 1.5 times distance from pit to eye (fig. 49); face 1.2 times wider than height of face and clypeus combined; in lateral view width of eye 5.4 times central width of temple (fig. 50), in dorsal view 4.8 times temple; POL:Od:OOL = 5:6:8; face largely smooth, sparsely punctulate and setose; vertex and temple sparsely finely punctate; length of malar space 1.2 times basal width of mandible.

Mesosoma.— Length of mesosoma (without propodeal horn) 1.5 times its height; pronotum comparatively robust and with large pronope (fig. 52) and in dorsal-lateral view hardly convex medio-posteriorly (fig. 53); side of pronotum rather slender (fig. 51); prepectal carina lamelliform; precoxal sulcus rather deep and strongly carinate, absent near middle coxa; dorsally mesopleuron coarsely crenulate and below it and ventrally spaced punctate; mesoscutum setose and punctulate; notauli rather narrow, deep and coarsely carinate; median lobe of mesoscutum with rather short and largely shallow (except posterior pit) groove posteriorly; axillar lobe rather wide and obtuse (fig. 56); scutellum sparsely punctulate; propodeum coarsely vermiculate-rugose; lateral horn of propodeum 0.8 times as long as first metasomal tergite.

Wings.— Fore wing: pterostigma 4 times as long as wide; vein r from middle of pterostigma; length of vein r:2-SR:3-SR:SR1 = 10:17:19:60; length of vein 1-CU1:cu-a:2-CU1:3-CU1 = 5:10:43:7; second submarginal cell rather short, parallel-sided, 1.1 times longer than vein r-m. Hind wing: M+CU:1-M: 1r-m = 40:53:16.

Legs.— Hind coxa rather densely punctate; length of fore femur:tibia:tarsus:basitarsus = 50:57:62:25; length of femur, tibia and basitarsus of hind leg 5.6, 9.0 and 10.4 times their width, respectively; both hind tibial spurs 0.2 times as long as basitarsus.

Metasoma. — First tergite 1.2 times as long as wide apically, basally hardly widened beside dorsope, its surface coarsely longitudinally costate; dorsal carinae remain separated; second tergite with small but distinct semicircular medio-basal area and complete median carina continuing up to 0.9 of third tergite; second tergite 1.4 times as long as third tergite; second tergite sublongitudinally costate, third and fourth tergites coarsely longitudinally rugose-striate and between striae punctate; fifth tergite densely coarsely discretely punctate but laterally rugose; length of ovipositor sheath 0.5 times basitarsus and 0.13 times fore wing, its apical half somewhat widened.

Colour. — Head black; mandible, palpi, pronotum (except posteriorly), scapus and pedicellus (except dark outer streak), fore and middle coxae, trochanters and trochantelli, humeral plate, propodeal horn, apex of fore and middle femora, base and apex of all femora, base and apex of hind basitarsus and second-fifth tarsal segments, ivory; 3rd-8th antennal segments brownish-yellow, 9th-28th and apical segments blackish and 29th-53rd segments white; mesoscutum dark orange red but laterally narrowly darkened; tegulum, pronotum posteriorly and mesopleuron anteriorly blackish; hind trochantellus, apex of hind femur, remainder of hind tibia and of all basitarsi dark brown; remainder of mesopleuron and mesosternum orange brown; remainder of mesosoma (including axillae and scutellum) and remainder of legs brownish-yellow; metasoma pale yellowish ventrally, largely orange brown dorsally, but all tergites (except second) partly more or less darkened; ovipositor sheath, most veins and pterostigma (except narrowly pale base) dark brown; base of pterostigma and parastigma largely pale yellowish; wing membrane slightly infuscate, parastigma yellow.

Male. — Similar to female but head normal, not subtriangular, antenna with 56 segments and 29th-34th antennal segments white and 35th segment greyish; length of body 5.6 mm and length of fore wing 4.5 mm; apex of hind coxa partly blackish; hind tibial spurs of ♂ slender and acute apically; third-fifth tergites largely blackish.

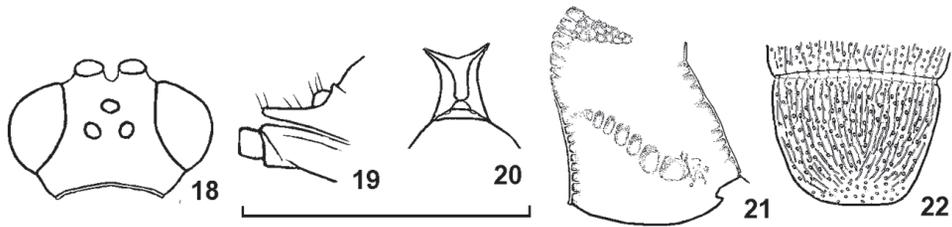
Notes. — This species is closely related to *Cornutorogas orientalis* Chen & Belokobylskij, but the new species differs by the larger eyes and subtriangular head of the female, the larger anterior tentorial pits (fig. 49), the absence of a distinct convexity of the pronotum medio-posteriorly (figs 51, 53), the about 25 white segments of the antenna of the female and the largely orange-red mesoscutum.

Cornutorogas hatinhensis Long & van Achterberg, spec. nov.
(figs 18-22)

Material. — Holotype, ♂ (IEBR), "Dory. 367, Vietnam: Ha Tinh (Huong Son), 1250 m, forest, 14.v.1998, K. D. Long". Paratype: 1 ♂ (RMNH), "S. Vietnam: Dak Lak, Chu Yang Sin N.P., n[ea]r dam, 740-940 m, 1-10.vi.2007, Mal. traps, C. v. Achterberg & R. de Vries, RMNH'07".

Holotype, ♂, length of body 3.2 mm, length of fore wing 3.3 mm.

Head. — Antenna with 49 segments, third segment 1.3 times as long as fourth segment, penultimate segment 0.6 times as long as apical segment; in lateral view scapus longer dorsally than ventrally (7:4); scapus 1.75 times longer than apically high; occipital carina strongly developed (fig. 18); eyes glabrous, emarginate; width of face equal to height of face and clypeus combined; distance between antennal sockets 0.75 times diameter of antennal socket; eye 1.9 times as long as wide; in lateral view eye 3 times as



Figs 18-22, *Cornutorogas hatinhensis* Long & van Achterberg, spec. nov., holotype, ♂. 18, Head, dorsal aspect; 19, pronotum, lateral aspect; 20, pronotum, dorsal aspect; 21, precoxal sulcus; 22, fifth metasomal tergite, dorsal aspect. Scale-line: 1 mm.

long as width of temple; POL:Od:OOL = 3:2:3 (fig. 18); face, vertex, temple and occiput shiny and smooth.

Mesosoma. — Length of mesosoma 1.45 times (without propodeal horn) its height; pronope shallow; pronotum small in dorsal view and in dorsal-lateral view hardly convex medio-posteriorly (figs 19, 20); precoxal sulcus rather deep with carinae (fig. 21); mesopleuron with dense fine punctures dorsally, and highly polished ventrally; metapleuron with sparse fine punctures; mesoscutum shiny and with sparse setae; notauli wide, deep and strongly carinate; median lobe of mesoscutum with apical carinate groove; scutellum smooth as apical part of mesoscutum; propodeum irregularly rugose-areolate with a very short carina basally; lateral horn of propodeum 0.7 times as long as long as first metasomal tergite.

Wings. — Fore wing: pterostigma 5.4 times as long as wide; length of veins r:2-SR:3-SR:SR1 = 5:11:10:34; vein r arising just before middle of pterostigma; second submarginal cell 1.4 times as long as its basal width and 1.75 times as long as its apical width; length of veins 1-CU1:cu-a:2-CU1:3-CU1 = 4:5:19:4. Hind wing: M+CU:1-M:1r-m = 20:22:7.

Legs. — Hind coxa more or less punctate; length of fore femur:tibia:tarsus:basitarsus = 30:34:34:13; length of hind femur:tibia:tarsus:basitarsus = 47:55:54:24; inner hind tibial spur about 0.3 times as long as basitarsus (7:24).

Metasoma. — Length of first tergite 1.1 times as long as its apical width, its surface very coarsely longitudinally rugose-striate; dorsal carina complete; medio-basal triangular area rather large, dorsal carina complete and ending at apex; medially second tergite 1.5 times as long as third tergite; third and fourth tergites coarsely longitudinally rugose-striate, between apical striae punctate; fifth tergite rugose-striate and mixed with punctures (fig. 22).

Colour. — Brown; head, mesoscutum dorsally, propodeum and all tergites dark brown; pronotum, fore and middle legs, mesopleuron, propodeal horns, hind coxa, trochanters and basal half of femur yellow; apical half of hind femur brown; hind tibia brown but whitish yellow basally; hind basitarsus basally, tarsus 2-4 whitish yellow; telotarsus infuscate; ovipositor sheath brown.

Notes. — This species is closely related to *Cornutorogas maetoi* van Achterberg, 2004, but the new species differs by the following features: pronotum slender in dorsal view, mesoscutum and scutellum smooth and fifth tergite coarsely striate, inter-mingled with

discrete punctures. It differs from *C. similis* spec. nov. as follows: antenna of ♂ without white segments, entirely brown; mesopleuron polished and smooth ventrally, rugose-areolate dorsally, finely punctate medially; precoxal sulcus rather deep and strongly carinate (fig. 21) and propodeum irregularly rugose.

Cornutorogas hoabinhicus Long & van Achterberg, spec. nov.
(figs 23-29)

Material.— Holotype, ♀ (IEBR), "Dory. 283, Vietnam: Hoa Binh (Yen Thuy), forest, 1.iii.2004, K.D. Long".

Holotype, ♀, length of body 6.0 mm, length of fore wing 4.8 mm.

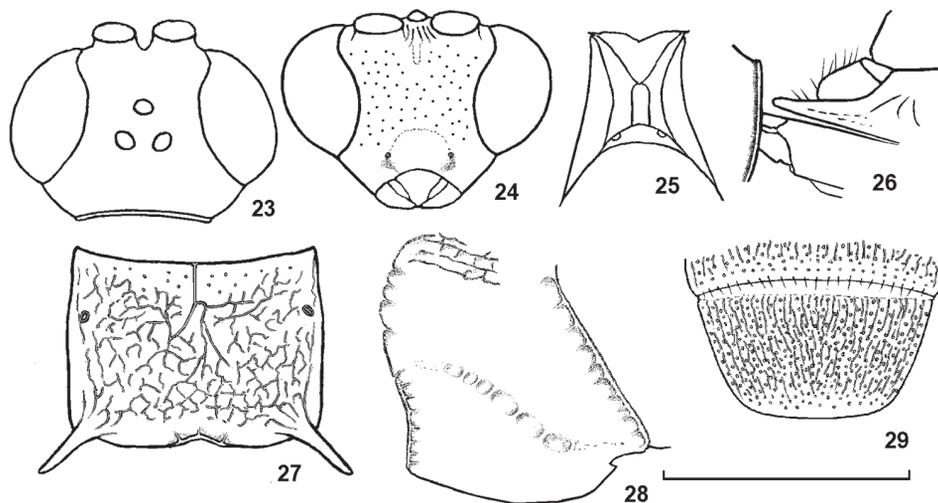
Head.— Antenna with 63 segments; penultimate segment shorter than apical segment (5:12); scapus longer dorsally than ventrally in lateral view (12:7); scapus 1.7 times longer than apical width; occipital carina strongly developed (fig. 23); face with rather distinct keel medially (fig. 16); eye largely glabrous, emarginate; in anterior view width of face equal to height of face and clypeus combined; distance between antennal sockets 0.5 times diameter of antennal socket; tentorial pits small, distance between tentorial pits twice as long as distance from pit to eye; height of eye twice as long as wide; in lateral view eye about 3 times longer than temple; POL:OD:OOL = 2:3:6 (fig. 23); face smooth with sparse fine punctures and setae; frons and area between antennal sockets with some sublongitudinal rugae (fig. 24); vertex, temple and occiput smooth and shiny.

Mesosoma.— Length of mesosoma (without propodeal horn) 1.5 times its height; pronotum long and robust in dorso-lateral view and medio-posterior area rather long and large, 0.6 times as long as pronotum (figs 25, 26); mesoscutum punctate, median lobe of mesoscutum with a smooth, wide and deep median groove posteriorly; notauli complete and strongly carinate; precoxal sulcus shallow with 5 faint carinae (fig. 28), rugose dorsally; mesopleuron smooth; scutellar sulcus wide; scutellum smooth except sparse fine punctures; propodeum coarsely longitudinal-rugose with short carina basally; propodeal spiracles round (fig. 27); in lateral view, length of propodeal horn 0.7 times as long as first tergite.

Wings.— Fore wing: pterostigma 4.7 times as long as wide; vein 1-M of fore wing distinctly curved basally; length of vein r:2-SR:3-SR:SR1 = 18:16:17:48; vein r arising from middle of pterostigma; length of veins 1-CU1:cu-a:2-CU1:3-CU1 = 5:6:35:7; second submarginal cell long, distinctly narrowed distally, its length 1.8 times as long as its basal width and 2.3 times as long as its apical width. Hind wing: M+CU:1-M:1r-m = 31:38:14.

Legs.— Hind coxa with sparse fine punctures; length of fore femur:tibia:tarsus:basitarsus = 53:62:68:28; length of hind femur:tibia:tarsus:basitarsus = 86:100:105:48; inner hind tibial spur 0.2 times as long as hind basitarsus (11:48); claw with obtuse lobe.

Metasoma.— First tergite as long as its apical width, its surface very coarsely longitudinally rugose-striate; second tergite 1.2 times as long as third tergite; second and third tergites with complete carina; median length of second tergite about 1.2 times as long as third tergite (25:21); second-fourth tergites coarsely longitudinally rugose-striate, basal half of fourth tergite smooth; between striate at apex of third and fourth



Figs 23-29, *Cornutorogas hoabinhicus* Long & van Achterberg, spec. nov., holotype, ♀. 23, Head, dorsal aspect; 24, head, anterior aspect; 25, pronotum, dorsal aspect; 26, pronotum, lateral aspect; 27, propodeum; 28, precoxal sulcus; 29, fifth tergite, dorsal aspect. Scale-line: 1 mm.

tergites punctulate; fifth tergite striate-punctulate (fig. 29); ovipositor sheath 0.3 times as long as hind basitarsus.

Colour.— Head, mesoscutum and mesopleuron, third-fifth tergites medio-dorsally black; basal eight segments of antenna yellow, 9th-25th segments dark brown, 28th-38th segments white and apical remainder dark brown; palpi whitish yellow; pronotum, propodeal horns, fore leg yellow (but third and fourth tarsal segments white) yellow; propodeum, first-second tergites medio-dorsally, third-fifth tergites laterally and hind coxa reddish yellow; first-second tergites laterally dark brown; fore basitarsus, second tarsal segment and telotarsus brown; middle leg yellow, but telotarsus brown; hind femur and trochantellus dark brown, basal half of hind femur reddish yellow and its apical half dark brown; basal one third of hind tibia whitish yellow, remainder dark brown; hind tarsus white, but basitarsus medially and telotarsus apically dark brown; ovipositor sheath brown.

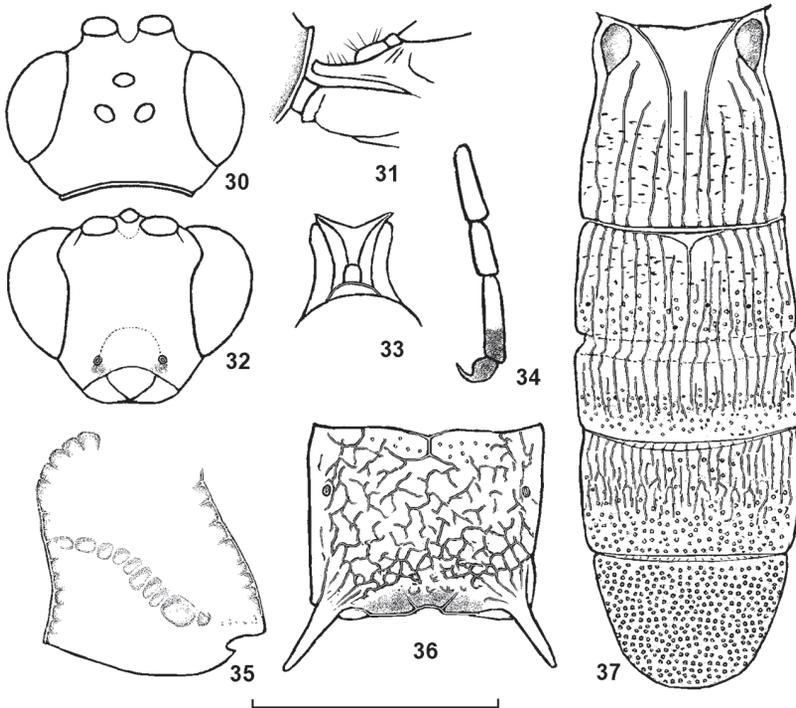
Notes.— This species is closely related to *Cornutorogas orientalis* Chen & Belokobylskij, 2004, but differs by the shape of the pronotum and the shallow and sparsely carinate precoxal sulcus.

Cornutorogas similis Long, spec. nov.
(figs 30-37)

Material.— Holotype, ♀ (IEBR), "Rog. 507, **Vietnam**: Thua Thien-Hue, Bach Ma National Park, bushes, 18.v.2007, K.D. Long". Paratype: 1 ♂ (RMNH), same data as holotype, Rog. 508".

Holotype, ♀, length of body 5.8 mm, length of fore wing 4.6 mm.

Head.— Antenna with 63 segments; middle segments longer than wide (6:3), penul-



Figs 30-37, *Cornutorogas similis* Long, spec. nov., holotype, ♀. 30, Head, dorsal aspect; 31, pronotum, lateral aspect; 32, head, anterior aspect; 33, pronotum, dorsal aspect; 34, apical half of hind tarsus; 35, precoxal sulcus; 36, propodeum, dorsal aspect; 37, first-five metasomal tergites, dorsal aspect. Scale-line: 1 mm.

timate antennal segment shorter than apical segment (3:4); scapus longer dorsally than ventrally in lateral view (11:7); scapus distinctly longer than apically wide (11:7); occipital carina strongly developed (fig. 32); eye largely glabrous, emarginate; in anterior view eye more than 1.6 times as high as wide (21:13); distance between antennal sockets 1.75 times diameter of antennal socket; tentorial pits rather large, distance between tentorial pits 1.25 times as long as distance from pit to eye (fig. 24); face slightly wider than height of face and clypeus combined; basal width of mandible less than length of malar space (6:8); in lateral view width of eye 2.4 times width of temple; POL:OD:OOL = 3:3:5 (fig. 30); face coriaceous and with sparse long setae; vertex, temple and occiput smooth and shiny.

Mesosoma.— Length of mesosoma (without propodeal horn) about 1.3 times its height; pronotum short and large in dorsal view (fig. 33) and in dorsal-lateral view hardly convex medio-posteriorly (fig. 31); side of pronotum slender (fig. 31); precoxal sulcus rather deep and strongly carinate; upper part of mesopleuron with dense fine punctures, and lower part of mesopleuron highly polished and with sparse fine punctures; mesoscutum with sparse fine punctures; notauli wide, deep and strongly carinate; median lobe of mesoscutum with a carinate long and deep groove posteriorly; scutellum with sparse fine punctures; propodeum irregularly rugose-areolate; lateral horn of propodeum 0.9 times as long as first metasomal tergite (fig. 36).

Wings. — Fore wing: pterostigma 4 times as long as wide; vein r from middle of pterostigma; length of vein r:2-SR:3-SR:SR1=7:13:12:45; length of vein 1-CU1:cu-a:2-CU1:3-CU1= 4:6:31:6; second submarginal cell long, distinctly narrowed distally, its length 1.8 times as long as apical width. Hind wing: M+CU:1-M: 1r-m = 24:29:11.

Legs. — Hind coxa with sparse fine punctures; length of fore femur:tibia:tarsus:basitarsus = 53:63:58:24; length of hind femur:tibia:tarsus:basitarsus = 80:90:106:40; inner hind tibial spur 0.3 times as long as basitarsus (12:40).

Metasoma. — First tergite as long as wide apically, its surface very coarsely longitudinally rugose-striate; dorsal carinae remain separated medially (fig. 37); second tergite with very small medio-basal area and complete median carina continuing up to 0.7 of third tergite; second tergite 1.1 times as long as third tergite; second to fourth tergites coarsely longitudinally rugose-striate, and between striae punctate and punctate apically; fifth tergite with discrete punctures; length of ovipositor sheath 0.9 times hind basitarsus.

Colour. — Head, mesoscutum and mesopleuron blackish brown; pronotum white; basal ten antennal segments yellow; 11th-25th and 40th-63rd antennal segments blackish brown; 26th-39th antennal segments white; scutellum and propodeum dirty reddish brown; propodeal horns whitish yellow; sternites white, all tergites dark brown but laterally reddish yellow; fore leg white, but basitarsus and telotarsus brown; middle coxa, trochanter, tibia and second-fourth tarsal segments white; middle femur reddish yellow but dark brown apically; middle basitarsus and telotarsus dark brown; hind coxa reddish yellow but dark brown apically; hind trochantellus dark brown; apical two thirds of hind femur black and reddish yellow basally; hind tibia and basitarsus black, but basal third white; second-fourth hind tarsal segments and basal half of telotarsus white (fig. 34); wing veins and pterostigma brown; parastigma yellow.

Male. — Similar to female but antenna with 65 segments and 28th-38th antennal segments white; length of body 6.7 mm and length of fore wing 5.9 mm.

Notes. — This species is closely related to *Cornutorogas orientalis* Chen & Belokobylskij, but it differs from the latter by the yellow basal antennal segments, the more slender pronotum, the distinctly punctate fourth tergite, the largely smooth metapleuron and the irregularly rugose (and apically rugose-areolate) propodeum.

Cornutorogas orientalis Chen & Belokobylskij, 2004
(figs 47, 48, 54, 55)

This species has been found in North Vietnam (IEBR, RMNH: Ha Giang, Hoa Binh, Ninh Binh and Ha Tinh provinces).

Key to Vietnamese species of the genus *Cornutorogas*

1. Mesoscutum black; antenna of ♀ with 11-17 white segments; eye medium-sized (fig. 55); head less widened dorsally in anterior view (fig. 54); colour of scutellum variable, if yellowish-brown then usually metasoma completely yellowish-brown 2
- Mesoscutum orange-red; antenna of ♀ with about 25 white segments; eye large (fig. 50); head more widened dorsally in anterior view, subtriangular (fig. 49); colour of

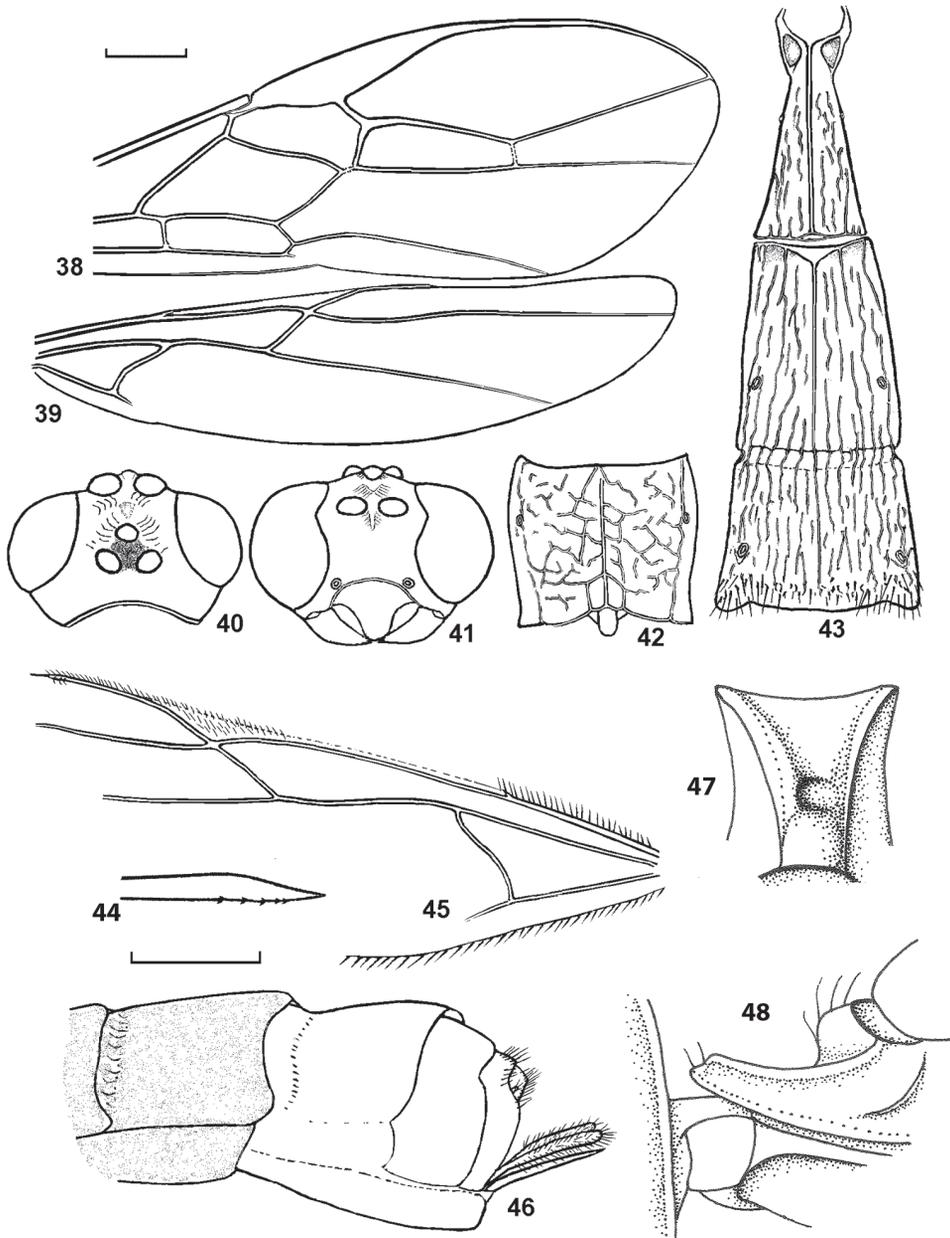
- scutellum yellowish-brown; metasoma partly infusate; [antenna of ♂ with about 5 white segments; hind tibial spurs of ♂ acute apically]; S. Vietnam *C. aurantius* van Achterberg, spec. nov.
2. Length of fore wing about 3.3 mm, of body 3.2-3.7 mm; convexity of pronotum small in lateral view (fig. 19); fifth metasomal tergite coarsely punctate-striate; [antenna of ♂ entirely brown, without white segments; mesopleuron largely smooth ventrally, punctate-crenulate dorsally, punctulate or finely punctate medially; medially precoxal sulcus rather deep and strongly carinate (fig. 21) and propodeum irregularly rugose]; C. & S. Vietnam *C. hatinhensis* Long & van Achterberg, spec. nov.
- Length of fore wing 3.8-4.8 mm, of body 4.8-6.0 mm; convexity of pronotum medium-sized to long in lateral view (figs 26, 31); fifth tergite coarsely striate or discretely punctate 3
3. Mesopleuron reddish yellow or darkened posteriorly; pronotum wider in lateral view (fig. 47) and slightly more slender in dorsal view (fig. 48); fifth metasomal tergite coarsely punctate rugose; [antenna of ♂ with 6-9 white segments; hind tibial spurs of ♂ rather acute apically]; China, N. Vietnam *C. orientalis* Chen & Belokobylskij, 2004
- Mesopleuron entirely black; pronotum narrower in lateral view (figs 26, 31) and slightly less slender in dorsal view (figs 25, 33); fifth tergite discretely punctate or striate rugose 4
4. Fifth metasomal tergite with discrete punctures; pronotum short and robust laterally (fig. 26); precoxal sulcus rather deep and with strong carinae; first and second metasomal tergites dark brown laterally; [precoxal sulcus sparsely carinate and shallow]; N. Vietnam *C. hoabinhicus* Long & van Achterberg, spec. nov.
- Fifth tergite striate rugose mixed with shallow punctures; pronotum long and less robust laterally (fig. 31); precoxal sulcus flat with sparse and short carinae; first and second tergites reddish yellow laterally; [first tergite rather widened beside dorsope; fourth tergite distinctly punctate; metapleuron largely smooth; propodeum irregularly rugose (and apically rugose-areolate); antenna of ♂ with about 11 white segments; hind tibial spurs of ♂ truncate apically]; C. Vietnam *C. similis* Long, spec. nov.

Megarhogas albapiculatus Long, spec. nov.
(figs 38-46)

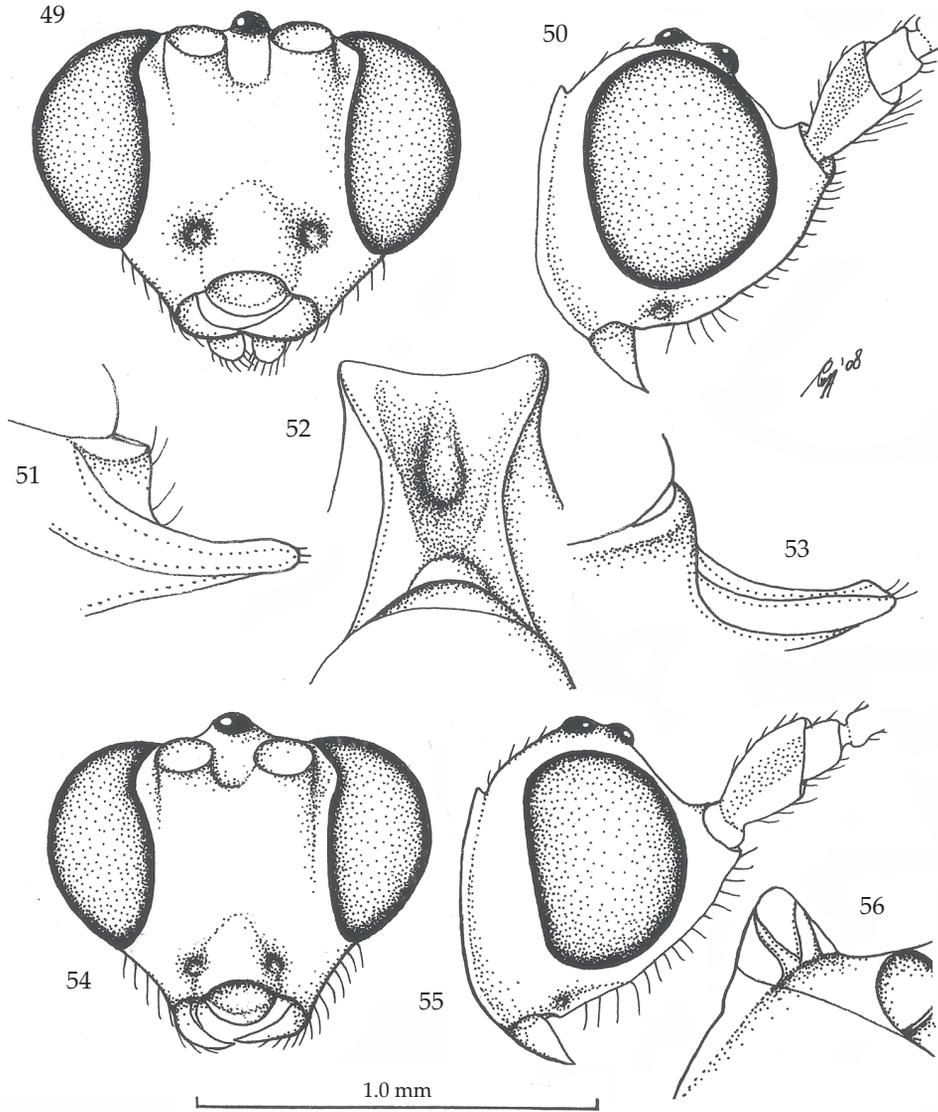
Material.— Holotype, ♀ (IEBR), "Rog. 506, Vietnam: Thua Thien-Hue, Bach Ma National Park, bushes, 17.v.2007, K.D. Long".

Holotype, length of body 11.8 mm, length of fore wing 10.7 mm.

Head.— Antenna with 71 segments; third antennal segment 1.3 times as long as fourth segment; penultimate segment equal to previous segment and shorter than apical segment (4:6); in lateral view scapus dorsally longer than ventrally (20:11); scapus 1.8 times longer than apically wide; frons with tubercle; face 0.9 times wider than height of face and clypeus combined (fig. 41); eyes very large, glabrous and emarginate; antennal sockets twice as long as distance between antennal sockets and 1.4 times as long as distance from socket to eye margin (fig. 41); malar space 0.5 times



Figs 38-46, *Megarhogas albapiculatus* Long, spec. nov., holotype, ♀; figs 47, 48, *Cornutorogas orientalis* Chen & Belokobylskij, paratype, ♂. 38, Fore wing; 39, hind wing; 40, head, dorsal aspect; 41, head, anterior aspect; 42, propodeum; 43, first-third metasomal tergites, dorsal aspect; 44, apex of ovipositor; 45, basal part of hind wing; 46, fifth-ninth tergites and ovipositor sheath, lateral aspect; 47, pronotum, dorsal aspect; 48, pronotum, lateral aspect. Scale-line: 1 mm, but of 47 and 48 5.0 x.



Figs 49-53, 56, *Cornutorogas aurantius* van Achterberg & Long, spec. nov., holotype, ♀; figs 54, 55, *C. orientalis* Chen & Belokobylskij, N. Vietnam, Ha Giang, Tay Con Linh, ♀. 49, 54, Head, anterior aspect; 50, 55, head, lateral aspect; 51, pronotum, lateral aspect; 52, pronotum, dorsal aspect; 53, pronotum, dorso-lateral aspect; 56, detail of axillar anterolateral lobe (= axillar "wings"), dorso-lateral aspect. 49, 50, 54, 55: scale-line (= 1.0 ×); 51-53, 56: 1.5 ×.

width of mandible base; tentorial pits large, distance from pit to eye equal to diameter of pit, distance between tentorial pits 5.7 times as long as distance from pit to eye; hypoclypeal depression large, nearly equal to width of face; in lateral view eye 2.6 times wider than temple; POL:OD:OOL = 3:8:7 (fig. 40); face roughly rugose; vertex

with rugae; temple and occiput smooth; basal half of mandible with long setae.

Mesosoma.— Mesosoma 1.4 times as long as high; sides of pronotum dorsally coarsely crenulate, ventrally smooth; prepectal carina complete; precoxal sulcus wide and deep with distinct carinae; mesopleuron, mesoscutum and scutellum largely smooth, with sparse punctures and setae; metapleuron irregularly rugose-punctate; basal half of notauli deep; scutellar sulcus wide, deep with median longitudinal carina; length of propodeum 0.7 times as long as its middle width; propodeum with strong medio-longitudinal carina, irregularly rugose; propodeal spiracles oval, longer than wide (4:2); lateral carina present (fig. 42).

Wings.— Fore wing: pterostigma 0.9 times as long as vein SR1; parastigma 1.45 times as long as vein 1-SR; vein r arising before middle of pterostigma; vein r 0.65 times as long as vein 2-SR; vein 3-SR 0.7 times as long as vein SR1; length of vein 1-CU1:cu-a:2-CU1:3-CU1 = 12:13:56:14 (fig. 38). Hind wing: vein cu-a strongly reclinous and sinuate (figs 39, 45), M+CU:1-M:1r-m = 14:12:10; marginal cell of hind wing parallel-sided and slightly narrowed submedially (fig. 39); vein SC+R1 with 3 hamuli (fig. 35).

Legs.— Hind coxa largely smooth with sparse fine punctures and setae; ratios of length of hind femur:tibia:tarsus:basitarsus = 6:8:5:4; hind tibial inner spur curved and its apical half glabrous, basal half short setose; hind tarsal claw with obtuse lobe.

Metasoma.— Dorsope of first tergite very large, its diameter 0.4 times minimum width of tergite (fig. 43); surface of first tergite longitudinally rugose, median carina complete; dorsal median carina on second tergite complete and continuing on third tergite; medio-basal smooth triangular area of second tergite large (fig. 43); apico-lateral corners of third tergite distinctly protruding (fig. 43); second-fifth tergites longitudinally rugose, between striate punctate; second suture wide and carinate; sixth-seventh tergites smooth with sparse fine punctures and setae; hypopygium long but narrow in lateral view (fig. 46), ovipositor sheath about 0.3 times as long as hind basitarsus; apex of ovipositor smooth dorsally and with 5 distinct subapical serrations ventrally (fig. 44).

Colour.— Body pale yellow; antenna dark brown to black; scapus yellow but darkened apically; stemmaticum black; wings yellow with darker veins, pterostigma yellow with large basal black spot; first-fifth tergites yellow, sixth-ninth tergites white; ovipositor sheath dark brown; membrane of fore wing with faint dark patches below base and apex of pterostigma and below base of vein CU1a.

Notes.— This species is closely related to *M. minor* Szépligeti, 1904, from Indonesia (Sulawesi) because of the coarse median carina of the propodeum, the protruding apico-lateral corners of the third tergite and the nearly parallel-sided marginal cell of the hind wing. *M. minor* differs by having the hypopygium of the female in lateral view about as wide as the apical height of the sixth tergite, vein cu-a of the hind wing strongly reclinous and the apex of metasoma yellowish-brown.

Megarhogas perinae Watanabe, 1932

This conspicuous species has been found in Central and North Vietnam (IEBR, RMNH: Ha Tinh, Thua Thien Hué, Vinh Phu and Quang Tri provinces).

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References

- Achterberg, C. van, 1983. Revisionary notes on the Palaearctic genera and species of the tribe Exothecini Foerster (Hymenoptera, Braconidae).— Zoologische Mededelingen Leiden 57: 339-355, figs 1-34.
- Achterberg, C. van, 1988. Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae).— Zoologische Verhandelingen Leiden 249: 1-324, figs 1-1250.
- Achterberg, C. van, 1989. Four new genera of Braconinae and Rogadinae from Oriental region (Hymenoptera: Braconidae).— Zoologische Mededelingen Leiden 63(9): 79-95, figs 1-49.
- Achterberg, C. van, 1991. Revision of the genera of the Afrotropical and W. Palaearctic Rogadinae Foerster (Hymenoptera: Braconidae).— Zoologische Verhandelingen Leiden 273: 1-102, figs 1-390.
- Achterberg, C. van, 1993. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea).— Zoologische Verhandelingen Leiden 283: 1-189, figs 1-66, photos 1-140, plates 1-102.
- Achterberg, C. van, 1997. Braconidae. An illustrated key to all subfamilies.— ETI World Biodiversity Database CD-ROM Series.
- Achterberg, C. van, 2007. Revision of the genus *Spinaria* Brullé (Hymenoptera: Braconidae: Rogadinae), with keys to genera and species of the subtribe Spinariina van Achterberg.— Zoologische Mededelingen Leiden 81(2): 11-83, figs 1-212.
- Chen, X.-X. & He, J.-H., 1997. Revision of the subfamily Rogadinae (Hymenoptera: Braconidae) from China.— Zoologische Verhandelingen Leiden 308: 1-187, figs 1-411.
- Chen, X.-X. & Belokobylskij, S.A., van Achterberg, C. & Whitfield, J.B., 2004. *Cornutorogas*, a new genus with four new species of the subfamily Rogadinae (Hymenoptera: Braconidae) from the Oriental region.— Journal of Natural History 38: 2211-2223, figs 1-31.
- Quicke, D.L.J., 1987. The Old World genera of braconine wasps (Hymenoptera: Braconidae).— Journal of Natural History 21: 43-157.
- Yu, D.S., Achterberg, K. van & Horstmann, K., 2007. Biological and taxonomical information: Ichneumonoidea 2006.— Taxapad Interactive Catalogue, Vancouver.

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