

# Revision of the genus *Canalicephalus* Gibson and the recognition of the Acampsohelconinae (Hymenoptera: Braconidae) as extant

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Achterberg, C. van. Revision of the genus *Canalicephalus* Gibson and the recognition of the Acampsohelconinae (Hymenoptera: Braconidae) as extant.

Zool. Med. Leiden 76 (20), 27.xii.2002: 347-370, figs 1-68.— ISSN 0024-0672.

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Key words: Braconidae; Helconoid clade; Acampsohelconinae; Urosigalphini; Afrocampsiini; Helconinae; *Canalicephalus*; *Urosigalphus*; *Acampsohelcon*; *Afrocampsis*; key; distribution; Indo-Australian; Oriental; Indonesia; Java; Sulawesi; Halmahera; Malaysia; Borneo; Sabah.

The species of the genus *Canalicephalus* Gibson, 1977, are revised and eight new species are described (three from East Malaysia (Sabah), and five from Indonesia (three from Sulawesi, one from Java and one from Halmahera). The sistergenera *Canalicephalus* and *Urosigalphus* are united in a new tribe Urosigalphini and keyed, including a key to the recognized subgenera of the genus *Urosigalphus* Ashmead, 1889. Both extant tribes Urosigalphini nov. and Afrocampsiini van Achterberg & Austin, 1992, are included in the subfamily Acampsohelconinae Tobias, 1987, which up to now contains only a fossil species.

## Introduction

During revision of the genera of Braconidae two genera (*Canalicephalus* Gibson, 1977, and *Urosigalphus* Ashmead, 1889), supposedly belonging to the subfamily Blacinae Foerster, 1862 (e.g., Gibson, 1977) or more commonly to the Helconinae Foerster, 1862 (e.g., Sharkey, 1997) were found not to fit well into either of these subfamilies but to be more similar to members of the subfamily Cheloninae Foerster, 1862. As indicated by the presence of the following synapomorphies: the more or less developed postpectal carina, the transverse first discal cell of the fore wing, the development of a carapace and the far postfurcal, oblique vein cu-a of fore wing. The presence and position of vein 2-CU of the hind wing and the modified hind claws prevent inclusion and indicate that the group is monophyletic. The result of subsequent examination of part of the 28S rDNA by Drs R. Belshaw and D.L.J. Quicke also indicate an exclusion from the Helconoid clade (Dr D.L.J. Quicke, in litt.; Quicke et al, 2002). The *Urosigalphus*-group is positioned near the base of the Microgastroid clade, which basally includes the subfamily Cheloninae (Belshaw & Quicke, 2002). Therefore, both genera are included in a new tribe, Urosigalphini nov. The only extant genus with similarly enlarged hind claws and with vein 2-CU of hind wing present (van Achterberg & Austin, 1992) is the genus *Afrocampsis* van Achterberg & Quicke, 1990 (included in the tribe Afrocampsiini van Achterberg & Austin, 1992, of the subfamily Sigalphinae Haliday, 1833). This genus is very similar to the extinct genus *Acampsohelcon* Tobias, 1987, known from Baltic Amber and included in the tribe Acampsohelconini Tobias, 1987. Unfortunately, the hind wing venation and the size of the hind claws for *Acampsohelcon* are not mentioned and neither part is figured. Prof. Dr A. Rasnitsyn (in litt.) kindly informed me after re-examination of the holotype of *Acampsohelcon* ras-

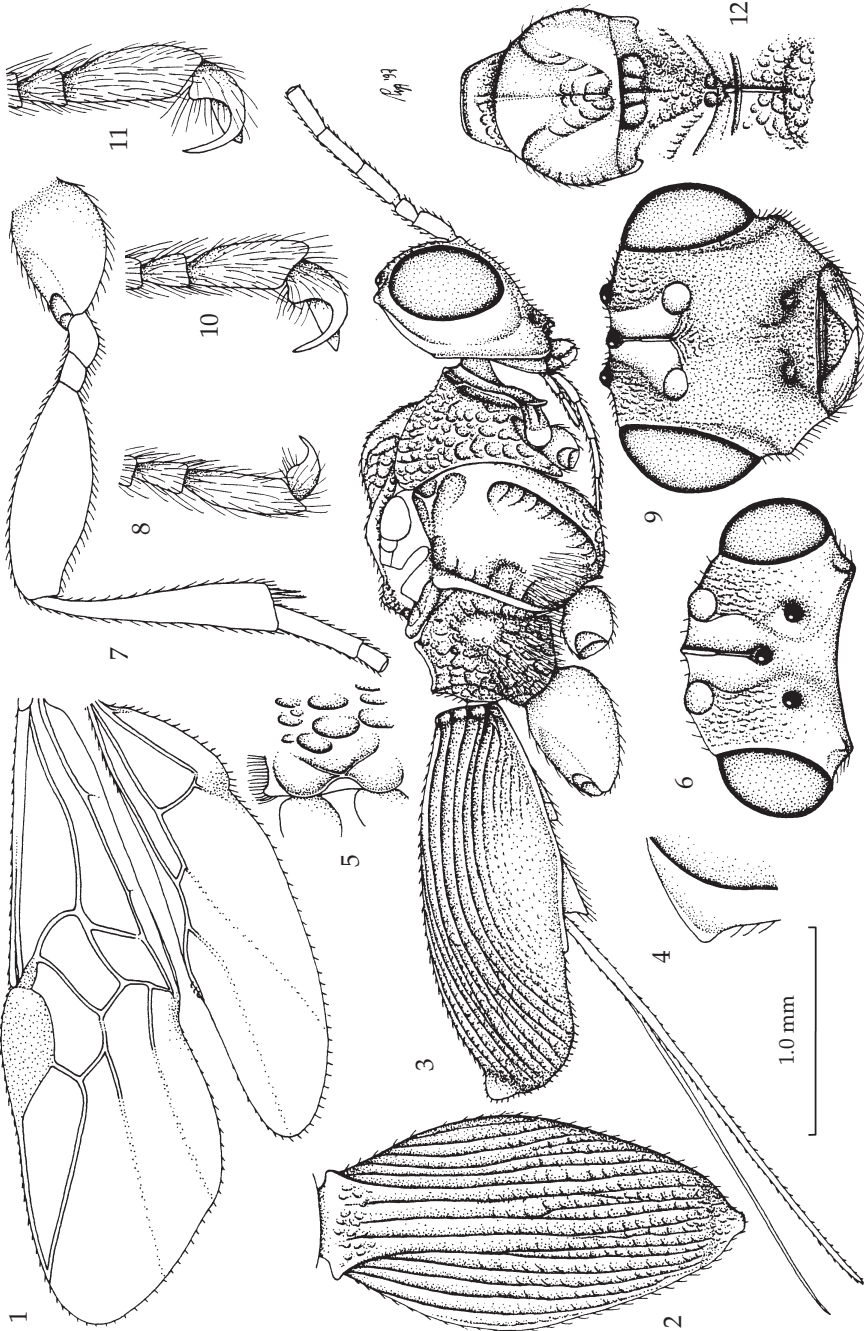
*nitzini* Tobias, 1987, that the hind claws are difficult to measure exactly because of the numerous internal cracks of the amber. Nevertheless, it can be concluded that the tarsal claws are between 1.5-2.0 times as long as of the middle claws, indicating that *Acampsohelcon* indeed is related to the *Urosigalphus* group. For the differences between the tribes and genera, see the key in this paper. In conclusion, the subfamily Acampsohelconinae Tobias is instated and contains three tribes: Acampsohelconini Tobias (fossil), Afrocampsini van Achterberg & Austin, and Urosigalphini trib. nov. The subfamily is defined by the having at least the outer hind claw modified and much larger than the middle claws, vein 2-CU of hind wing present and the metasoma with a carapace, covering fourth and following tergites.

The biology of *Canalicephalus* is unknown, but the members of the sister genus *Urosigalphus* are parasitoids of Bruchidae and Curculionidae (Sharkey, 1997) in seeds. *Canalicephalus* has an Old World distribution with seven described species and eight new species added in this paper. Only two papers are published on *Canalicephalus* with keys included: Gibson (1977) keyed the four species described together with the original description of the genus, and Chou & Hsu (1996) added a key to the three new species from Taiwan.

For the identification of the subfamilies of Braconidae, see van Achterberg (1993, 1997), and for the terminology used in this paper, see van Achterberg (1988, 1993).

### Key to genera of the subfamily Acampsohelconinae Tobias

1. Outer hind claw small (cf. fig. 8); vein 2-CU of hind wing absent; postpectal carina absent; vein cu-a of fore wing (sub)interstitial; occipital carina meeting with hypostomal carina ventrally ..... subfamily **Brachistinae-Triaspidini**
- Outer hind claw very large (figs 11, 21); vein 2-CU of hind wing present (figs 1, 13, 18); postpectal carina present (figs 5, 24) or absent; occipital carina remaining separated from hypostomal carina or meeting with hypostomal carina ventrally ..... 2
2. First metasomal tergite movably connected to second tergite (figs 60, 66, 68); postpectal carina absent (unknown of *Acampsohelcon*); clypeus slightly depressed ventrally (fig. 66); carapace open apico-ventrally, its ventral margin not reflexed (fig. 66); vein cu-a of fore wing shortly postfurcal (figs 55, 67); vein M+CU1 of fore wing straight (figs 55, 67); third metasomal suture present (figs 66, 68); occipital carina meeting with hypostomal carina ventrally (fig. 66; unknown of *Acampsohelcon*); vein 1r-m of hind wing medium-sized (fig. 55; unknown of *Acampsohelcon*); first subdiscal cell of fore wing normal (fig. 55); ovipositor very short (figs 56, 66, 68); malar suture present (figs 63, 68), notauli narrow (figs 58, 68), antenna with more than 30 segments (unknown of *Acampsohelcon*); hind tibia comparatively short (fig. 59; unknown of *Acampsohelcon*) ..... 3
- First tergite immovably joined to second tergite (figs 2, 3, 16, 25); postpectal carina present (figs 5, 24); clypeus distinctly depressed ventrally (fig. 9); carapace closed apico-ventrally (figs 3, 16), its ventral margin reflexed completely around apex; vein cu-a of fore wing far postfurcal (figs 1, 13); vein M+CU1 of fore wing distinctly sinuate (figs 1, 13); carapace without metasomal sutures (figs 2, 3, 16, 25); occipital carina remaining separated from hypostomal carina (fig. 16); vein 1r-m of hind wing short (figs 1, 13); first subdiscal cell of fore wing shortened, subquadrate (figs



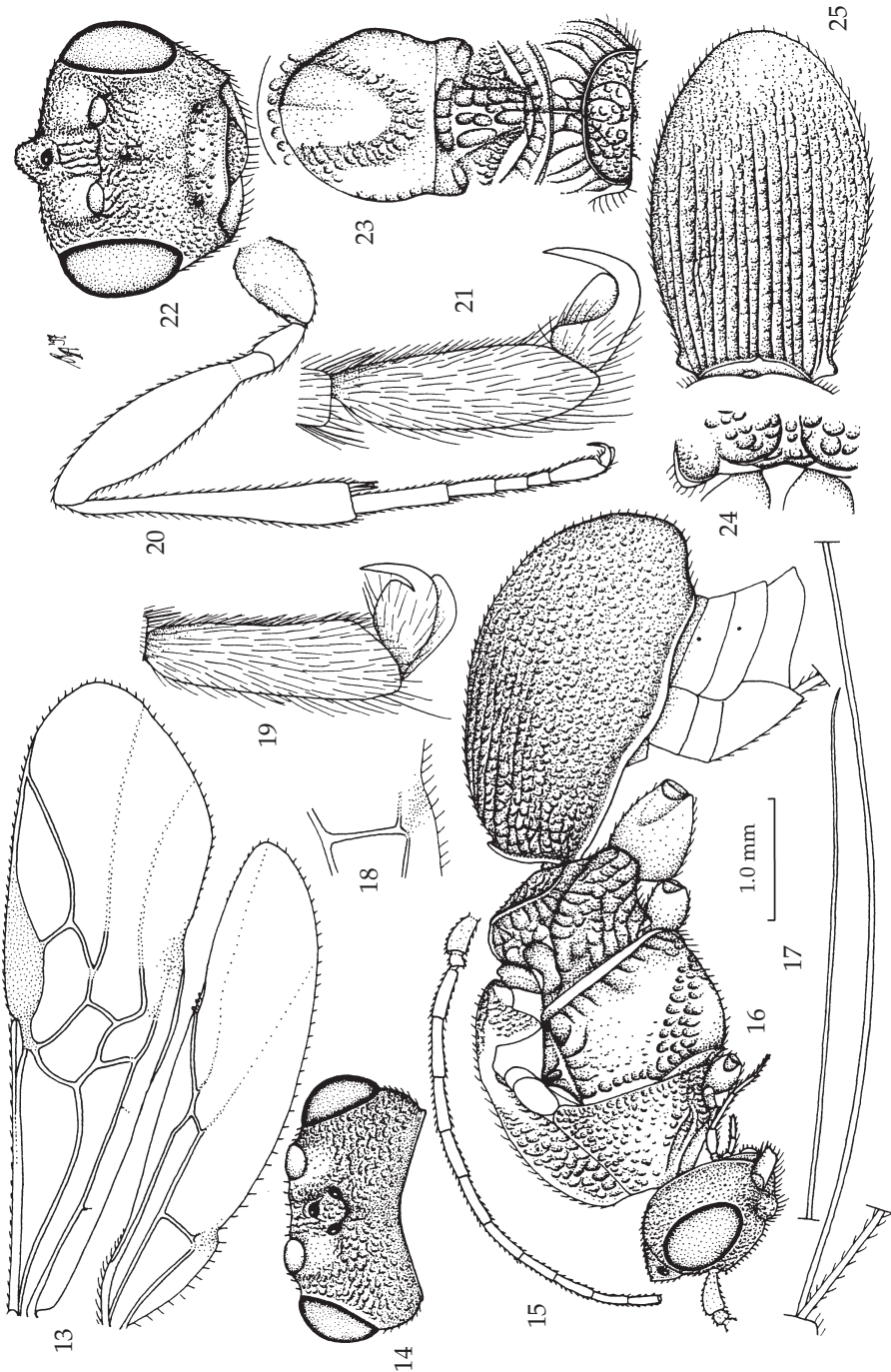
Figs 1-9, 12, *Canalicephalus orientalis* Gibson, ♀, holotype; figs 10, 11, *C. minor* spec. nov., ♀, holotype. 1, habitus, lateral aspect; 2, detail of tubercle of vertex, lateral aspect; 3, metasoma, dorsal aspect; 4, postpectal carina, ventral aspect; 5, detail of tubercle of vertex, lateral aspect; 6, head, dorsal aspect; 7, hind leg, dorsal aspect; 8, inner fore claw; 9, head, frontal aspect; 10, outer hind claw; 11, inner hind claw; 12, mesosoma, dorsal aspect. 1-3, 5-7, 9, 12: 1.0 × scale-line; 4: 2.5 ×; 6, 8, 10, 11: 3.3 ×.

- 1, 13); ovipositor medium-sized to rather long (figs 4, 17); malar suture absent (fig. 9), notauli wide as far as distinctly impressed (figs 12, 23), antenna with 14-19 segments; hind tibia somewhat longer than femur (figs 7, 20); Urosigalphini trib. nov. .... 4
3. Vein 3-SR of the fore wing about as long as vein r (fig. 67); vein r of fore wing medium-sized (fig. 67); metasoma inserted above hind coxae (fig. 68); extinct; tribe Acampsohelconini Tobias, 1987 ..... *Acampsohelcon* Tobias, 1987
- Vein 3-SR of the fore wing much longer than vein r (fig. 55); vein r of fore wing short (fig. 55; metasoma inserted partly between hind coxae (fig. 66); extant; tribe Afrocampisini van Achterberg & Austin, 1992 ..... *Afrocampsis* van Achterberg & Quicke, 1990
4. Outer hind claw larger than inner hind claw, and inner claw with lobe (figs 19, 21); frons hardly or not depressed (fig. 14); propleuron without protuberance (fig. 16); vertex without tubercles (fig. 14); stemmaticum flat or protruding medially (figs 14, 16, 22); vein 2-SC+R of hind wing medium-sized (fig. 13); frons without a carina or at most with a weak median carina (fig. 22); antenna with 14-19 segments; mainly New World ..... *Urosigalphus* Ashmead, 1889
- Outer hind claw about as large as inner hind claw and inner claw without lobe (figs 10, 11); vertex with pair of deep depressions medially (fig. 6); propleuron with transverse protuberance (fig. 3); vertex with tubercles (fig. 6); stemmaticum concave medially (fig. 6); vein 2-SC+R of hind wing comparatively long (fig. 1); frons with a median lamella (fig. 9); antenna with 17 segments; Old World ..... *Canalicephalus* Gibson, 1977

### Tribe Urosigalphini nov.

Diagnosis.— Clypeus distinctly depressed ventrally (fig. 5); occipital carina at least laterally present and remaining separated from hypostomal carina ventrally, but sometimes connected by small side-branch; mandible not (*Urosigalphus*) or distinctly (*Canalicephalus*) twisted apically; prepectal carina up to level of ventral half of side of pronotum; propleuron with subposterior transverse carina, area in front of it concave or flat; lateral carina of mesoscutum absent in front of tegulae and lamelliformly protruding near scutellum; tegulum large compared to small humeral plate (figs 3, 16); postpectal carina present, strongly curved (figs 5, 24); hind claws enlarged, especially outer hind claw (figs 10, 11, 19, 21), and nearly twice as wide as middle claw; vein 2-CU of hind wing shortly developed and close to apex of vein cu-a (figs 1, 13); vein 1r-m of hind wing short (figs 1, 13); first discal cell transverse (fig. 1); vein r-m of fore wing absent (fig. 1); parastigma enlarged (figs 1, 13); vein 1-M distinctly curved; vein cu-a of fore wing far postfurcal and inclivous (figs 1, 13); vein M+CU1 of fore wing distinctly situate (fig. 1); carapace inserted above hind coxa but below dorsal level of propodeum, with distinct reticulate sclerite between hind coxa and base of metasoma; first tergite immovably joined to second tergite; carapace without metasomal sutures and closed apically (figs 2, 3), its ventral margin reflexed completely around apex or nearly so; upper valve of ovipositor ribbon-like, but narrow.

Contains two genera: *Urosigalphus* Ashmead, 1889 and *Canalicephalus* Gibson, 1977.



Figs 13-25, *Urosigalphus armatus* Ashmead, ♀, lectotype. 13, wings; 14, head, dorsal aspect; 15, habitus, lateral aspect; 17, ovipositor; 18, detail of vein cu-a of hind wing; 19, inner hind claw; 20, hind leg; 21, outer hind claw; 22, head, frontal aspect; 23, mesosoma, dorsal aspect; 24, postpectal carina, ventral aspect; 25, metasoma, dorsal aspect. 13-17, 20, 25: 1.0 × scale-line; 18, 24: 2.0 ×; 19, 21: 5.0 ×; 22, 23: 1.2 ×.



***Canalicephalus* Gibson, 1977**  
(figs 1-12, 26-54)

*Canalicephalus* Gibson, 1977: 241; Chou & Hsu, 1996: 438. Type species (by original designation): *Canalicephalus orientalis* Gibson, 1977 [examined].

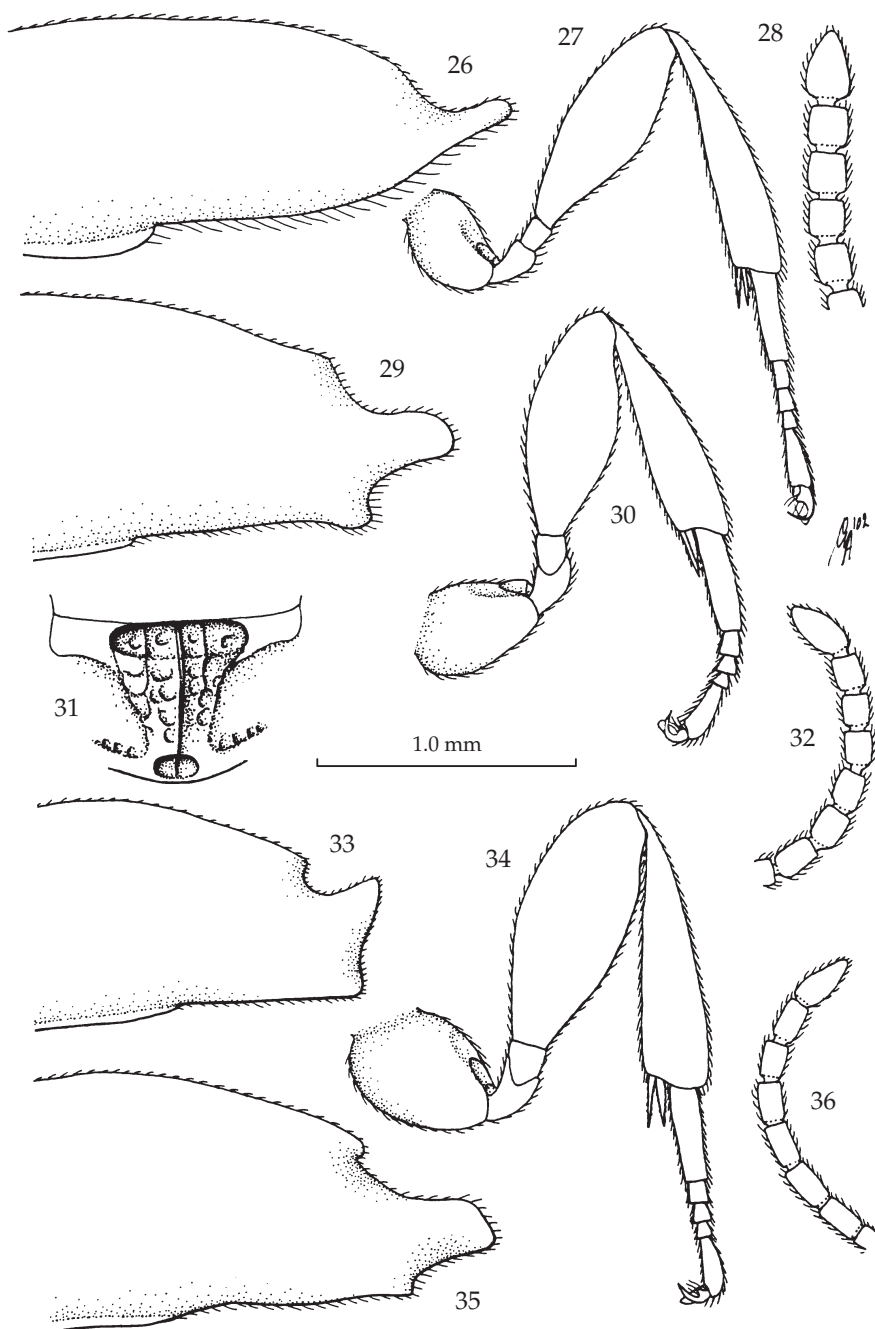
**Diagnosis.**— Antenna of both sexes with 17 segments; outer hind claw about as large as inner hind claw and inner claw without lobe (figs 10, 11); frons with pair of deep depressions medially (fig. 6); propleuron with transverse crest (fig. 3); vertex with pair of tubercles (figs 3, 6); stemmaticum concave medially (fig. 6); vein 2-SC+R of hind wing comparatively long (fig. 1); frons with a median lamella (fig. 9); prepectal carina mainly ventrally developed just behind fore coxa, not above level of lower quarter of side of pronotum; lower posterior corner of mesopleuron and metapleuron conspicuously setose, obscuring underlying sculpture; scutellum coarsely sculptured; carapace truncate anteriorly (figs 3, 16); lateral depressions of face more or less developed (fig. 9).

**Distribution.**— Indo-Australian (15 species)

**Key to species of the genus *Canalicephalus* Gibson**

1. Ovipositor sheath longer than carapace, about 0.7 times length of fore wing (fig. 3); carapace rather widely elliptical in dorsal view (fig. 2); apex of carapace evenly convex ventro-apically (fig. 3), and with distinct dorsal knob apically (figs 2, 3); precoxal sulcus comparatively finely crenulate (fig. 3); hind tibia less widened (fig. 7); Borneo (Sabah) ..... *C. orientalis* Gibson, 1977
- Ovipositor sheath shorter than carapace, 0.2-0.6 times length of fore wing; carapace narrowly elliptical in dorsal view; apex of carapace at least partly flat ventro-apically (figs 26, 29, 33, 35, 42, 45, 52, 59), and with apical protuberances usually directed posteriad (figs 29, 35, 45, 52), if convex ventrally (figs 42, 46) then precoxal sulcus coarsely crenulate and hind tibia comparatively wide (fig. 47) ..... 2
2. Carapace with slender (and slightly upcurved) tooth apically (fig. 26); tegulum dark brown ..... 3
- Carapace with comparatively robust protuberance apically (figs 29, 33, 35, 45, 43, 52); colour of tegulum variable ..... 4
3. Wing membrane infusate; scapus brown; femora orange yellow; Papua New Guinea ..... *C. novus* Gibson, 1977
- Wing membrane subhyaline; scapus yellow; femora dark brown; Sulawesi ..... *C. luteoscapus* spec. nov.
4. Apex of carapace of ♀ with a large central protuberance and a pair of medium-sized to small protuberances below it (figs 29, 35); males have only a central protuberance (fig. 33), but have side of pronotum rather densely finely punctate and setose dorso-apically ..... 5
- Apex of carapace of ♀ with a central protuberance only or without protuberances and evenly rounded (figs 42, 45, 46, 49, 52); side of pronotum coarsely and less densely punctate and less setose ..... 7
5. Central apical protuberance of carapace of ♀ rounded in lateral view and apically

- comparatively robust (figs 29, 35); scutellum distinctly costate anteriorly (fig. 31); hind tibia (except basal ivory band) and tarsus largely dark brown; metasoma black, similarly coloured to mesosoma; precoxal sulcus of ♀ more or less sculptured medially; Sunda area ..... 6
- Central apical protuberance of carapace of ♀ acute in lateral view and apically slender (fig. 7 in Gibson, 1977); scutellum punctate anteriorly, and rugose-punctate laterally; hind tibia and tarsus largely reddish; metasoma chestnut-brown, paler than mesosoma; precoxal sulcus of ♀ smooth medially; Philippines (Mindanao) ..... *C. bakeri* Gibson, 1977
6. Occipital carina complete medio-dorsally or nearly so; subapical antennal segments of ♀ robust (fig. 32); face partly rugose; transverse crest of propleuron inconspicuous and rather obtusely protruding in lateral view; vein 1-M of fore wing hardly darker brown than vein 1-M; Borneo (Sabah) ..... *C. quickei* spec. nov.
- Occipital carina widely absent medio-dorsally; subapical antennal segments of ♀ rather slender (fig. 36); face without rugae (except near lateral depression); transverse crest of propleuron conspicuously and acutely protruding in lateral view; vein 1-M of fore wing distinctly darker brown than vein 1-M; Java ..... *C. rhinoides* spec. nov.
7. Carapace truncate or evenly rounded apically **and** tegulum dark brown; vertex without protuberance and no carina connected to it; scutellum punctulate or punctate; Taiwan ..... 8
- Carapace with protuberance apically (figs 45, 46, 49, 52), if absent (fig. 42) then tegulum yellowish and vertex with protuberance and a carina connected to it; scutellum more or less reticulate ..... 10
8. Apex of carapace truncate in lateral view (fig. 189 in Chou & Hsu, 1996); carapace of ♀ with distinct groove apico-ventrally; frons rugose-reticulate; occipital carina present medio-dorsally (fig. 35 l.c.) ..... *C. fugou* Chou & Hsu, 1996
- Apex of carapace evenly rounded in lateral view (figs 190, 191 l.c.); carapace of ♀ without distinct groove apico-ventrally; frons densely punctate or punctate-reticulate; occipital carina absent medio-dorsally (figs 36, 37 l.c.) ..... 8
9. Apex of carapace smooth (fig. 190 l.c.); length of ovipositor sheath about 0.4 times fore wing; frons punctate-reticulate; temple flattened below eye (fig. 60 l.c.) ..... *C. longus* Chou & Hsu, 1996
- Apex of carapace sculptured (fig. 191 l.c.); length of ovipositor sheath about 0.2 times fore wing; frons densely punctate; ventrally temple convex near eye (fig. 61 l.c.) ..... *C. taiwanensis* Chou & Hsu, 1996
10. Carapace without distinct apical protuberance and apically narrowly smooth (fig. 42); scutellum mainly smooth except for some fine punctures; Sulawesi ..... *C. semiglaber* spec. nov.
- Carapace with apical protuberance and usually sculptured apically (figs 45, 46, 49, 52); scutellum distinctly punctate and usually partly reticulate-rugose (figs 40, 44) ..... 11
11. Apex of carapace narrowly truncate apically (fig. 45); penultimate segments of antenna of ♀ comparatively robust (fig. 43); dorso-lateral carina of vertex indistinct; median carina of scutellum strong (fig. 40); occipital carina complete or nearly so; Borneo (Sabah) ..... *C. minor* spec. nov.



Figs 26-28, *Urosigalphus luteoscapus* spec. nov., ♀, holotype; figs 29-32, *C. quickei* spec. nov., ♀, holotype; figs 33-36, *C. rhinoides* spec. nov., ♀, holotype but 33 of ♂ paratype. 26, 29, 33, 35, apical half of carapace, lateral aspect; 27, 30, 34, hind leg; 28, 32, 36, apex of antenna; 31, scutellum, dorsal aspect. 26, 28: 2.2 ×; 27, 29, 31-33, 35, 36: 1.4 ×; 30, 34: 1.0 × scale-line.



- Apex of carapace roundly protruding apicad (figs 46, 49, 52); penultimate segments of antenna of ♀ more slender (figs 51, 54); dorso-lateral carina of vertex distinct; median carina of scutellum absent or indistinct (fig. 44); occipital carina distinctly interrupted medio-dorsally, except in *C. robustus* ..... 12
- 12. Carapace ventrally convex subapically in lateral view (fig. 46); hind tarsus robust (fig. 47); hind tibia strongly swollen (fig. 47); hind femur dark brown; crenulae of precoxal sulcus long; Ceram ..... *C. devriesi* spec. nov.
- Carapace ventrally straight subapically in lateral view (figs 49, 52); hind tarsus less robust (figs 50, 53); hind tibia moderately swollen (figs 50, 53); hind femur pale brownish-yellow; crenulae of precoxal sulcus medium-sized ..... 13
- 13. Apical protuberance of carapace comparatively robust and short (figs 49, 52); length of ovipositor sheath 0.6-0.7 times as long as carapace; area of precoxal sulcus distinctly crenulate medially ..... 14
- Apical protuberance of carapace comparatively slender and medium-sized (fig. 8 in Gibson, 1977); length of ovipositor sheath 0.5 times as long as carapace; area of precoxal sulcus smooth; Philippines (Mindanao) ..... *C. mindanao* Gibson, 1977
- 14. Apical protuberance of carapace somewhat up curved and slender (fig. 49); vein 1-CU1 of fore wing yellowish; frons punctate-rugose laterally; face finely punctate and with distinct smooth interspaces; scutellum without lateral and central carinae; carapace antero-laterally largely sculptured; Sulawesi ..... *C. rugifrons* spec. nov.
- Apical protuberance of carapace straight and robust (fig. 52); vein 1-CU1 of fore wing brown; frons punctate laterally; face coarsely punctate, without distinct smooth interspaces; scutellum with lateral and central carinae more or less developed; carapace antero-laterally largely smooth; Borneo (Sabah) ..... *C. robustus* spec. nov.

*C. bakeri* Gibson, 1977

*Canalicephalus bakeri* Gibson, 1977: 244-245, fig. 7.

Distribution.— Known only from the holotype from Mindanao, Philippines.

*C. devriesi* spec. nov.  
(figs 44, 46-48)

Material.— Holotype, ♂ (RMNH), “Indonesia: N Ceram, 9 km E Wahai, n[ea]r PHPA-Q[arters], (nr rainforest), 15.iii.1997, C. v. Achterberg & R. de Vries, RMNH’97”.

Holotype, ♀, length of body 4.2 mm, of fore wing 3.1 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments slender, subapically not moniliform (fig. 48), third segment nearly as long as fourth segment, and 3.6 times as long as wide; length of maxillary palp equal to height of head; occipital carina widely interrupted medio-dorsally; length of eye in dorsal view 2.6 times temple; OOL:diameter of ocellus: POL = 9:6:14; tubercle of vertex distinct and transverse crest and dorso-lateral carina distinctly developed; distance between tubercles of vertex and ocelli about 1.5 times diameter of ocellus; frons coarsely vermiculate-rugose laterally; vertex coarsely reticulate-punctate laterally, largely smooth near ocelli; face densely

and rather coarsely and regularly punctate, rather shiny, laterally with a few rugae, with a distinct lateral depression, inner side of depression bordered by irregular rugae; clypeus densely punctate-rugose dorsally, punctate medially, and with a distinct sub-ventral transverse carina; length of malar space 1.6 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum nearly completely coarsely punctate-vermiculate; transverse crest of propleuron distinct, but hardly protruding ventrally; epicnemial area smooth; precoxal sulcus posteriorly absent, wide, oblique and with coarse and long crenulae (about as long as width of episternal scrobe); metapleuron very coarsely punctate-vermiculate; notauli completely distinctly crenulate, moderately wide; mesoscutum laterally sparsely and rather finely punctate, flattened and setose, medially finely and densely punctate; scutellum without median crest, mainly smooth except for some coarse punctures laterally, and weakly convex, without distinct lateral carina (fig. 44); side of scutellum coarsely crenulate and with some punctures; surface of propodeum mainly coarsely reticulate.

Wings.— Fore wing:  $r:3\text{-SR}+\text{SR}1:2\text{-SR} = 6:41:11$ ;  $3\text{-SR}+\text{SR}1$  basally straight or nearly so;  $1\text{-CU}1:2\text{-CU}1 = 3:10$ ;  $1\text{-CU}1$  distinctly widened;  $\text{CU}1\text{b}$  mainly obsolescent, only basally sclerotized. Hind wing:  $\text{M}+\text{CU}:1\text{-M} = 13:7$ ;  $\text{cu-a}$  weakly curved, vertical.

Legs.— Hind femur and tibia strongly swollen (fig. 47); length of femur, tibia and basitarsus of hind leg 2.6, 4.0 and 2.8 times their width, respectively (fig. 47); length of hind tibial spurs 0.45 and 0.50 times basitarsus.

Metasoma.— Carapace strongly costate up to apex, coarsely punctate between costae, but medio-laterally more weakly sculptured, subapically only densely coarsely punctate and smooth in front of very strong basal carinae, carinae remaining distinctly separated; carapace 2.1 times longer than its maximum width in dorsal view, slenderly elliptical especially posteriorly; carapace convex ventro-apically (fig. 46); apex of carapace with wide protuberance, rounded and smooth apically (fig. 46), apical 0.4 of carapace closed ventrally (fig. 46).

Colour.— Black(ish); basal quarter of hind tibia pale yellowish; antenna (except scapus and pedicellus), parastigma, pterostigma, remainder of hind tibia and hind tarsus dark brown; scapus and pedicellus, palpi, tegulae, fore and middle legs, hind trochanter and trochantellus brownish-yellow; hind coxa largely, hind femur, and most veins brown, but veins of basal third of wings yellowish; wing membrane subhyaline.

Distribution.— Indonesia (Ceram).

Note.— It is a pleasure to name this species after one of its collectors, Mr Robbert de Vries, who has been an excellent companion during our fieldwork.

*C. fugou* Chou & Hsu, 1996

*Canalicephalus fugou* Chou & Hsu, 1996: 438-439, figs 11, 35, 59, 85, 113, 137, 163, 189, 215, 241.

Distribution.— Known only from the holotype from Taiwan, China (1200 m).

*C. longus* Chou & Hsu, 1996

*Canalicephalus longus* Chou & Hsu, 1996: 439-440, figs 12, 36, 60, 86, 114, 138, 164, 190, 216, 242.

Distribution.— Known only from the holotype from Taiwan, China (1200 m).

*C. luteoscapus* spec. nov.  
(figs 26-28)

Material.— Holotype, ♀ (RMNH), "Indonesia: C Sulawesi, n[ea]r Luwuk, Salodik, c 400 m, 21-31.x.1989, Mal. trap 14, C. van Achterberg, RMNH'89".

Holotype, ♀, length of body 2.6 mm, of fore wing 2.0 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments robust, moniliform (fig. 28), third segment 0.9 times as long as fourth segment, and 2.8 times as long as wide; length of maxillary palp equal to height of head; occipital carina narrowly interrupted medio-dorsally; length of eye in dorsal view 4.0 times temple; OOL:diameter of ocellus: POL = 5.3:10; distance between tubercles of vertex and ocelli about equal to diameter of ocellus; frons finely punctate laterally; vertex largely smooth except for some punctures; face moderately densely punctate, shiny, without lateral depressions ventrally, except at malar space; clypeus coarsely punctate, with a distinct subventral transverse carina; length of malar space 2.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum largely coarsely punctate; epicnemial area smooth; precoxal sulcus oblique and narrowly crenulate; metapleuron very coarsely reticulate; notauli completely crenulate, moderately wide; mesoscutum laterally flattened and largely setose; scutellum smooth and weakly convex, with lateral carina; side of scutellum punctate; surface of propodeum coarsely reticulate.

Wings.— Fore wing:  $r:3-SR+SR1:2-SR = 6:36:8$ ;  $3-SR+SR1$  basally hardly curved;  $1-CU1:2-CU1 = 3:11$ ;  $1-CU1$  widened;  $CU1b$  obsolescent. Hind wing:  $M+CU:1-M = 13:6$ .

Legs.— Hind femur rather swollen ventrally (fig. 27); length of femur, tibia and basitarsus of hind leg 2.9, 4.9 and 4.5 times their width, respectively (fig. 27); length of hind tibial spurs 0.45 and 0.50 times basitarsus.

Metasoma.— Carapace mainly strongly costate, but smooth in front of nearly complete hemicircular basal carina and apical fifth of carapace smooth, subapically and laterally largely punctate, 2.5 times longer than its maximum width, slenderly elliptical; carapace apically straight ventrally and with a slender slightly upcurved apical tooth (fig. 26); apical half of carapace closed ventrally (fig. 26); length of ovipositor sheath 0.33 times fore wing, about half as long as carapace, rather densely setose, setae rather long.

Colour.— Black(ish); scapus and pedicellus, palpi, humeral plate, trochanters, trochantelli and fore and middle tarsi (except telotarsi) brownish-yellow; third and fourth antennal segments, tegulum, and remainder of legs (except for ivory bases of tibiae), parastigma, pterostigma,  $1-CU1$ , apex of  $C+SC+R$  and  $1-R1$  dark brown; veins  $M+CU1$ ,  $1A$  and mainly vein  $1-M$  yellowish; remainder of veins brown; wing membrane subhyaline.

Distribution.— Indonesia (Sulawesi).

*C. mindanao* Gibson, 1977

*Canalicephalus mindanao* Gibson, 1977: 245, fig. 8.

Distribution.— Known only from the holotype from Mindanao, Philippines.

*C. minor* spec. nov.  
(figs 10, 11, 40, 41, 43, 45)

Material.— Holotype, ♀ (RMNH), "Malaysia: SE Sabah, n[ea]r Danum Valley Field C., c 150 m, 15-19.iii.1987, Mal. trap 10, C. v. Achterberg, RMNH'87".

Holotype, ♀, length of body 3.2 mm, of fore wing 2.4 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments robust, subapically moniliform (fig. 43), third segment as long as fourth segment, and 2.8 times as long as wide; length of maxillary palp equal to height of head; occipital carina complete but rather weakly developed medio-dorsally; length of eye in dorsal view 4.2 times temple; OOL:diameter of ocellus: POL = 9:5:15; tubercle of vertex rather weak because of weakly developed dorso-lateral carina; distance between tubercles of vertex and ocelli about twice diameter of ocellus; frons coarsely vermiculate-rugose laterally; vertex coarsely reticulate-punctate; face densely and regularly punctate, rather shiny, laterally rugose, with shallow lateral depression, inner side of depression bordered by irregular rugae; clypeus densely punctate, and with a rather weak subventral transverse carina; length of malar space 2.0 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum nearly completely coarsely punctate; transverse crest of propleuron strong, distinctly and obtusely protruding ventrally; epicnemial area smooth; precoxal sulcus present only medially, moderately wide, oblique and coarsely crenulate; metapleuron very coarsely punctate-reticulate; notauli completely distinctly crenulate, moderately wide; mesoscutum laterally sparsely and rather finely punctate, flattened and setose, medially coarsely punctate; scutellum with complete median crest, mainly smooth except for some coarse punctures laterally and flat, with irregular lateral carina (fig. 40); side of scutellum coarsely punctate; surface of propodeum mainly coarsely reticulate.

Wings.— Fore wing:  $r:3\text{-SR}+SR1:2\text{-SR} = 6:36:9$ ;  $3\text{-SR}+SR1$  basally slightly curved;  $1\text{-CU}1:2\text{-CU}1 = 3:15$ ;  $1\text{-CU}1$  distinctly widened;  $CU1b$  narrow, completely sclerotized. Hind wing:  $M+CU:1\text{-M} = 13:6$ ;  $cu\text{-a}$  weakly inclivous.

Legs.— Hind femur and tibia strongly swollen (fig. 41); length of femur, tibia and basitarsus of hind leg 2.5, 4.2 and 3.2 times their width, respectively (fig. 41); length of both hind tibial spurs 0.50 times basitarsus.

Metasoma.— Carapace strongly costate up to apex, coarsely punctate between costae, but medio-laterally partly smooth and smooth in front of very strong basal carinae, carinae remaining distinctly separated; carapace twice as long as its maximum width in dorsal view, rather widely elliptical; carapace mainly flat ventro-apically (fig. 45); apex of carapace with a wide and short protuberance, truncate and reticulate-rugose apically (fig. 45), apical 0.4 of carapace closed ventrally (fig. 45); length of ovipositor sheath 0.38 times fore wing, almost 0.6 times as long as carapace.

Colour.— Black(ish); basal third of hind tibia pale yellowish; four basal segments of antenna, palpi, fore and middle legs, hind leg (except for tibia and tarsus, and coxa ventro-basally darkened) and metasoma ventrally brownish-yellow; remainder of antenna, tegulae, remainder of hind tibia and hind tarsus, parastigma, pterostigma

(but basally narrowly pale brownish), veins r, SR1+3-SR, apex of C+SC+R and 1-R1 of fore wing dark brown; remainder of veins yellowish; wing membrane subhyaline.

Distribution.— East Malaysia (Borneo: Sabah).

*C. novus* Gibson, 1977

*Canalicephalus novus* Gibson, 1977: 244, fig. 6.

Distribution.— Known only from the holotype from Wau (1250 m), Papua New Guinea.

*C. orientalis* Gibson, 1977  
(figs 1-9, 12)

*Canalicephalus orientalis* Gibson, 1977: 242-244, figs 3-5.

Material.— Holotype, ♀ (USNM), "[Malaysia], Borneo, Sandakan, Baker", "Holotype", "*orientalis*", "USNM 72776", "*Canalicephalus orientalis* Gibson", "genotype".

Holotype, ♀, length of body 3.8 mm, of fore wing 2.9 mm.

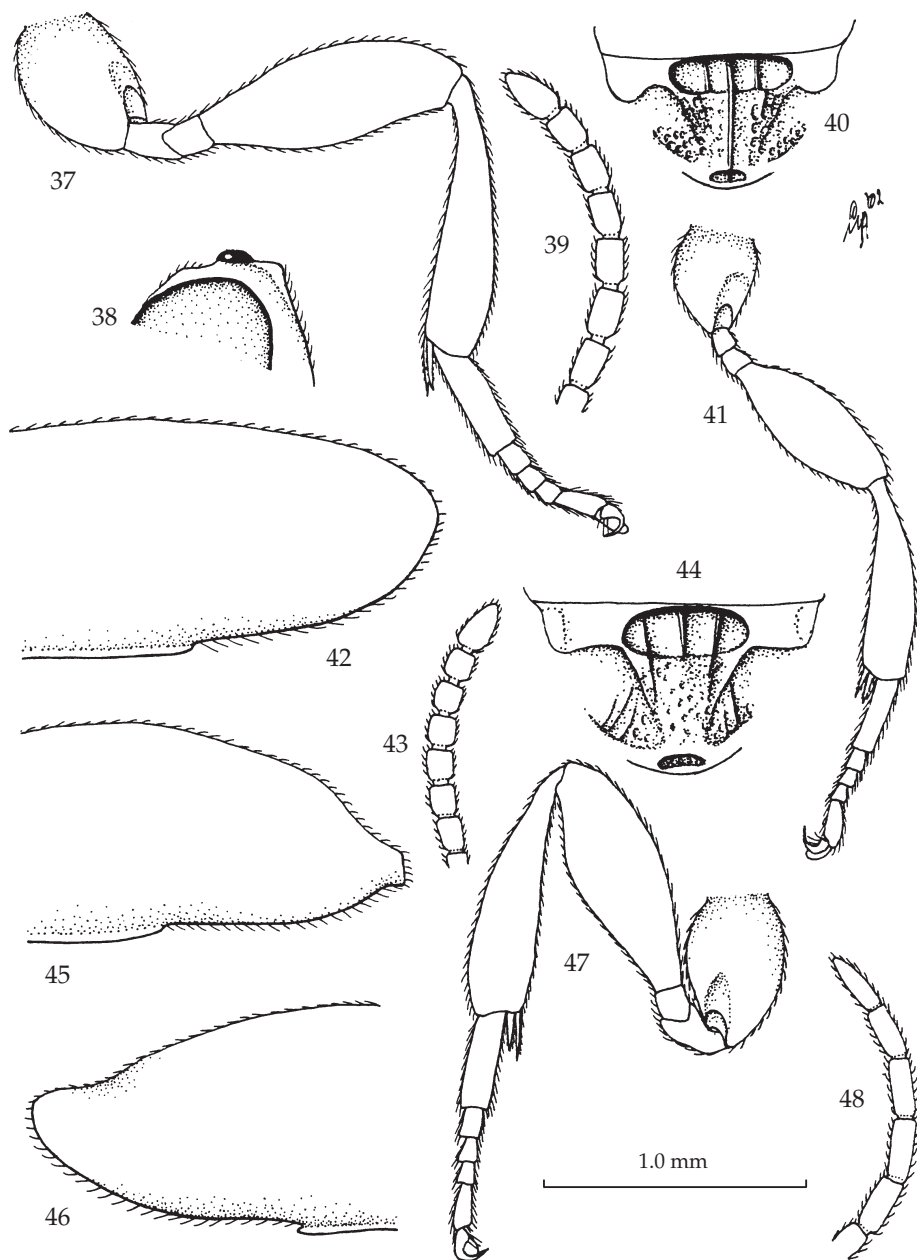
Head.— Antenna incomplete, third segment as long as fourth segment, and 3.6 times as long as wide (fig. 3); length of maxillary palp equal to height of head; occipital carina widely interrupted medio-dorsally; length of eye in dorsal view 4.2 times temple (fig. 6); OOL:diameter of ocellus: POL = 9:4:15; distance between tubercles of vertex and ocelli about 3 times diameter of ocellus (fig. 6); frons reticulate-punctate laterally; vertex largely smooth except for some punctures; face with dense whitish setosity and densely punctate, with a few rugae medio-dorsally and near eyes (fig. 9); clypeus densely punctate, with subventral transverse carina and area below it smooth and depressed (fig. 9); length of malar space 2.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum largely coarsely punctate, with some rugae (fig. 3); prepectal carina only present behind fore coxa; epicnemial area largely smooth; precoxal sulcus distinctly but rather finely crenulate (fig. 3); metapleuron anteriorly smooth and remainder coarsely reticulate and rather long whitish setose (as mesopleuron postero-ventrally: fig. 3); notauli complete, wide, anteriorly smooth and coarsely crenulate posteriorly (fig. 12); mesoscutum laterally flattened and largely glabrous, anteriorly with weak median crest (fig. 12); scutellum with coarse punctures and distinctly convex (figs 3, 12), medio-posteriorly with large depression; side of scutellum narrowly crenulate; surface of propodeum scobriculate dorsally, punctate-reticulate posteriorly, its median carina very strong but only on dorsal face of propodeum, its posterior face vertical, reticulate and without areola (fig. 12).

Wings.— Fore wing: r:3-SR+SR1:2-SR = 6:42:7; 3-SR+SR1 basally curved (fig. 1); 1-CU1:2-CU1 = 1:4; 1-CU1 widened (fig. 1); CU1b distinctly sclerotized; basal half of fore wing only sparsely setose. Hind wing: M+CU:1-M = 13:6; cu-a slightly curved.

Legs.— Hind femur smooth ventrally, without carina; hind tibia moderately widened (fig. 7); length of femur, tibia and basitarsus of hind leg 2.6, 5.2 and 4.8 times their width, respectively (fig. 7); tarsal claws missing except of fore leg; length of hind





Figs 37-39, 42, *Urosigalphus semiglaber* spec. nov., ♀, holotype; figs 40, 41, 43, 45, *C. minor* spec. nov., ♀, holotype; figs 44, 46-48, *C. devriesi* spec. nov., ♂, holotype. 37, 41, 47, hind leg; 38, detail of tubercle of vertex, lateral aspect; 39, 43, 48, apex of antenna; 40, 44, scutellum, dorsal aspect; 42, 45, 46, apical half of carapace, lateral aspect. 37, 41, 47: 1.0 × scale-line; 38-40, 42-46, 48: 1.4 ×.

tibial spurs 0.4 times basitarsus.

Metasoma.— First tergite not differentiated from remainder of carapace, carapace mainly strongly costate, except basally and apical knob (fig. 2), 1.9 times longer than its maximum width, rather widely elliptical; apically carapace convex ventrally and knob dorsally situated (fig. 3); apical third of carapace closed ventrally (fig. 3), ventral opening bordered by a distinct carina, which is narrowly incised medio-apically; length of ovipositor sheath 0.71 times fore wing, densely setose, setae short.

Colour.— Black(ish); tegulae, three basal antennal segments (remainder dark brown), palpi, and legs (but hind tibia (except basal third) and hind tarsus dark brown) brownish-yellow; veins M+CU1, 1A (up to level of vein cu-a) and posterior half of vein 1-M yellowish; veins C+SC+R (except basally), parastigma, pterostigma (but basally pale brown) and 1-R1 dark brown; remainder of veins brown; wing membrane subhyaline.

Distribution.— Known only from a small series from Sandakan, Sabah, Borneo, East Malaysia.

*C. quickei* spec. nov.  
(figs 29-32)

Material.— Holotype, ♀ (RMNH), "E. Malaysia: Sabah, N.P. Mt. Kinabalu, Poring, 22.viii-4.ix. 1999, D.L.J. Quicke, RMNH'00", "DNA, 14.ix.[19]99".

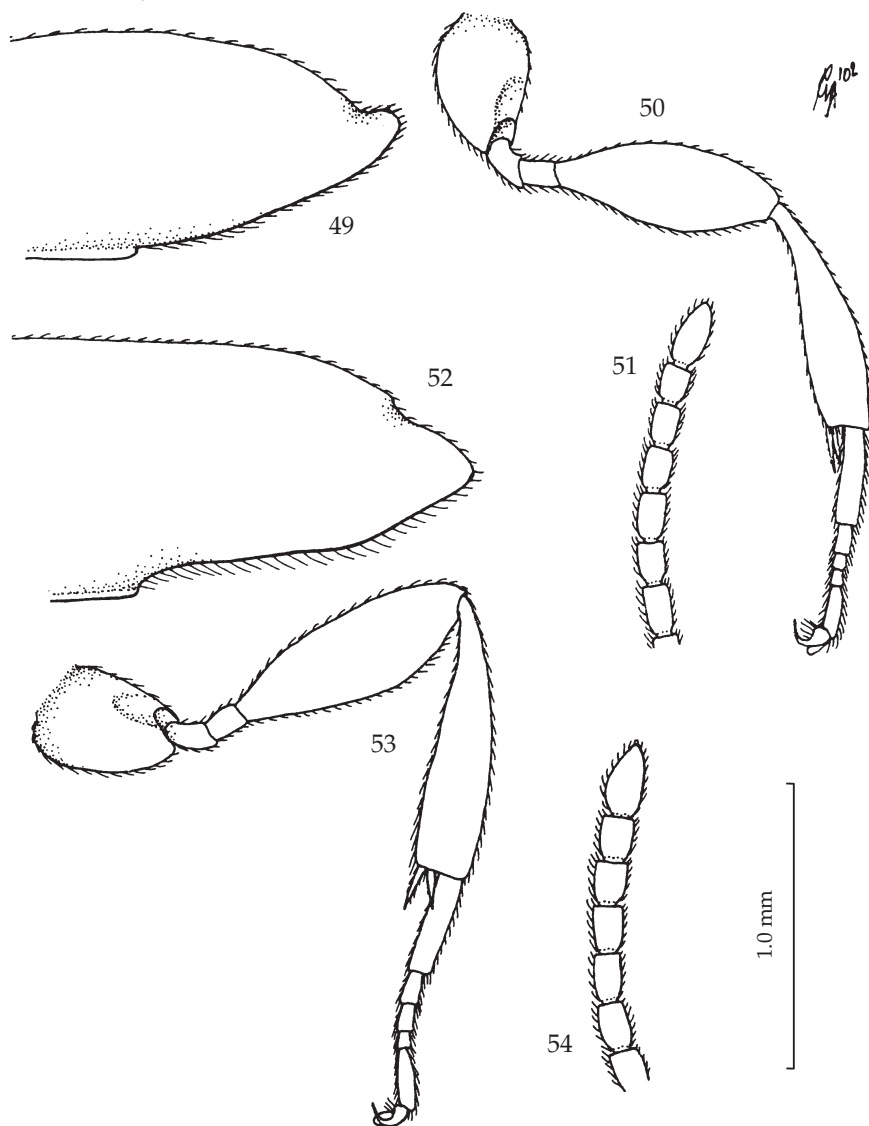
Holotype, ♀, length of body 4.0 mm, of fore wing 2.8 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments rather robust, submoniliform (fig. 32), third segment 0.9 times as long as fourth segment, and 2.8 times as long as wide; length of maxillary palp equal to height of head; occipital carina complete medio-dorsally or nearly so; length of eye in dorsal view 3.4 times temple; OOL:diameter of ocellus: POL = 6:3:9; distance between tubercles of vertex and ocelli about equal to twice diameter of ocellus; frons coarsely reticulate laterally; vertex largely smooth except for some punctures; face distinctly and irregularly rugose-punctate, rather shiny, with distinct lateral depression laterally, inner side of depression bordered by a ruga; clypeus densely punctate, with rather weak subventral transverse carina; length of malar space 1.8 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum largely coarsely punctate, but densely rather finely punctate and setose dorso-apically; transverse crest of propleuron weakly protruding, obtuse; epicnemial area smooth; precoxal sulcus wide, oblique and widely crenulate; metapleuron very coarsely reticulate; notauli completely crenulate, moderately wide; mesoscutum laterally flattened and largely setose; scutellum coarsely reticulate-punctate and convex, with median and lateral carina (fig. 31); side of scutellum coarsely punctate; surface of propodeum coarsely reticulate.

Wings.— Fore wing: r:3-SR+SR1:2-SR = 6:35:8; 3-SR+SR1 basally hardly curved; 1-CU1:2-CU1 = 3:11; 1-CU1 distinctly widened; CU1b narrow but completely sclerotized. Hind wing: M+CU:1-M = 26:11; cu-a weakly inclivous.

Legs.— Hind femur strongly swollen (fig. 30); length of femur, tibia and basitarsus of hind leg 2.7, 4.3 and 3.8 times their width, respectively (fig. 30); length of hind tibial



Figs 49-51, *Urosigalphus rugifrons* spec. nov., ♀, holotype; figs 52-54, *C. robustus* spec. nov., ♀, holotype. 49, 52, apical half of carapace, lateral aspect; 50, 53, hind leg; 51, 54, apex of antenna. 49, 52:  $1.4 \times 50$ , 51, 53, 54:  $1.0 \times$  scale-line.

spurs 0.45 and 0.50 times basitarsus.

**Metasoma.**— Carapace strongly costate up to apex, but mainly punctate laterally and in front of nearly complete and strong hemicircular basal carina, 2.35 times longer than its maximum width, slenderly elliptical; carapace flat ventro-apically (fig. 29); apex of carapace of ♀ with a large and robust central protuberance and a pair of medium-sized protuberances below it (fig. 29), apical half of carapace

(including protuberances) closed ventrally (fig. 29), length of ovipositor sheath 0.34 times fore wing, about half as long as carapace.

Colour.— Black(ish); bases of tibiae ivory; scapus and pedicellus, palpi, fore and middle legs, hind leg (except for tibia and tarsus) brownish-yellow; third and fourth antennal segments, tegulum, humeral plate, remainder of hind tibia and hind tarsus, parastigma, pterostigma, veins r, SR1+2-SR, C+SC+R and 1-R1 of fore wing dark brown; remainder of veins and metasoma ventrally brownish but veins M+CU1, and 1A yellowish; wing membrane subhyaline.

Distribution.— Malaysia (Borneo: Sabah).

Note.— It is a pleasure to dedicate this species to its collector, Dr D.L.J. Quicke (London) because of his excellent contributions to the knowledge of the family Braconidae.

*C. rhinoides* spec. nov.  
(figs 33-36)

Material.— Holotype, ♀ (RMNH), "[Indonesia], Java, Res. Semarang, Gedangan, 40 m, 17.vi. 1930", "Walikoekoen, No. W. 131-131C, Fr. A.Th.H. Verbeek". Paratypes (RMNH): 1 ♀ + 1 ♂, "Java, Semarang, teak-forest, 24.iv.1928, , no. W 33b, L.G.E. Kalshoven"; 1 ♀ (damaged), id., but 1.v.1928, no. W 34b.

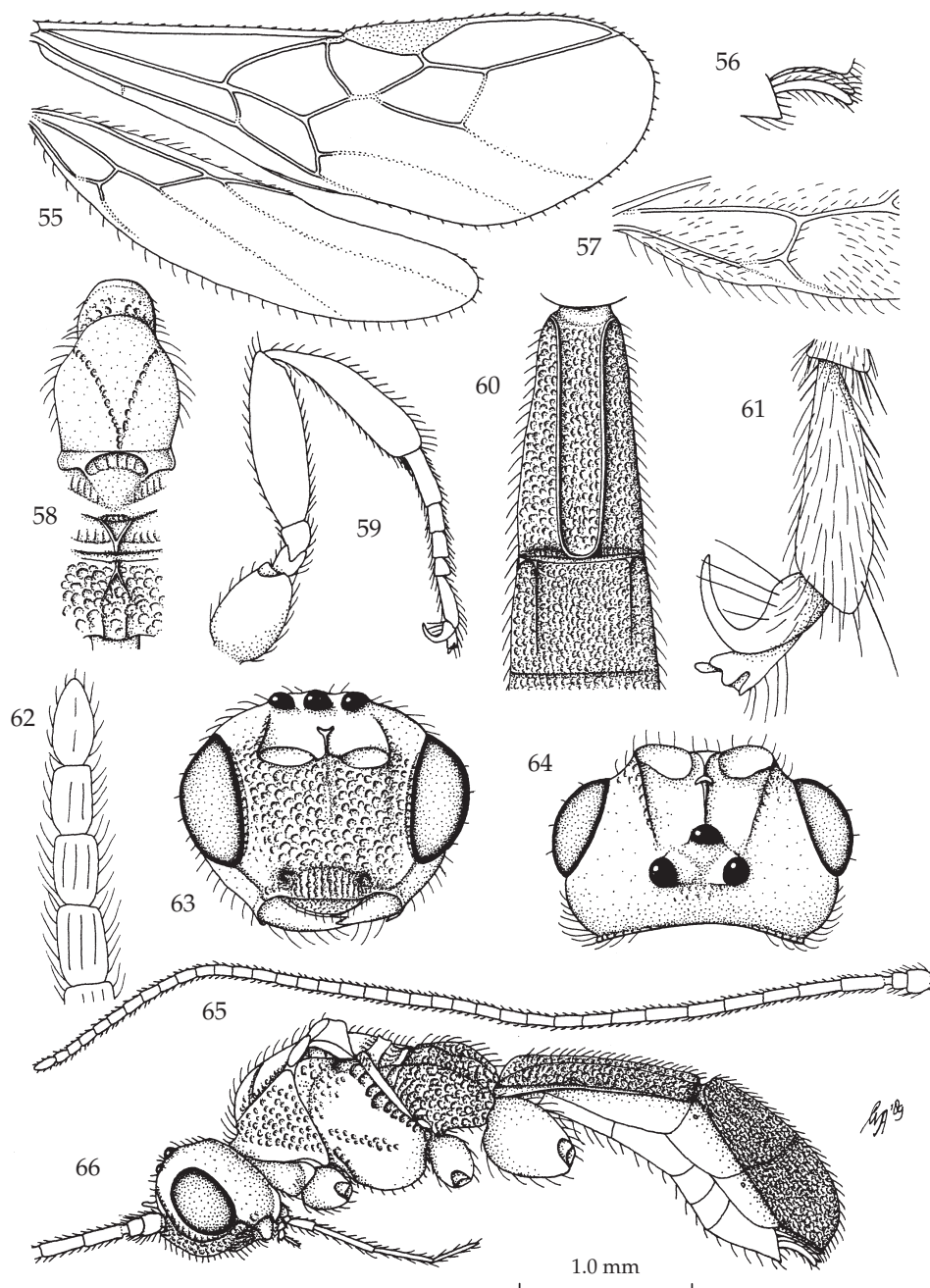
Holotype, ♀, length of body 4.4 mm, of fore wing 3.1 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments rather slender, not moniliform (fig. 36), third segment as long as fourth segment, and 3.3 times as long as wide; length of maxillary palp 0.7 times height of head; occipital carina widely interrupted medio-dorsally, at most vaguely indicated; length of eye in dorsal view 2.8 times temple; OOL:diameter of ocellus: POL = 7:3:9; distance between tubercles of vertex and ocelli about equal to twice diameter of ocellus; frons coarsely reticulate laterally; vertex partly smooth and laterally coarsely punctate; face densely and regularly punctate, rather mat, with distinct lateral depression laterally, inner side of depression bordered by a ruga; clypeus invisible, covered by glue, but in paratypes densely punctate, with some transverse striae and a rather weak subventral transverse carina; length of malar space 2.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum medially coarsely punctate, but densely and finely punctate and densely setose dorsally; transverse crest of propleuron strong, and acutely protruding ventrally; epicnemial area smooth; precoxal sulcus moderately wide, oblique and coarsely punctate; metapleuron very coarsely reticulate; notauli anteriorly smooth and shallow, remainder distinctly crenulate, moderately wide; mesoscutum laterally finely punctate, somewhat depressed and setose; scutellum coarsely costate and rather convex, with irregular lateral carina; side of scutellum coarsely punctate; surface of propodeum coarsely reticulate.

Wings.— Fore wing: r:3-SR+SR1:2-SR = 6:35:8; 3-SR+SR1 basally straight; 1-CU1:2-CU1 = 3:13; 1-CU1 distinctly widened; CU1b narrow, incompletely sclerotized. Hind wing: M+CU:1-M = 26:11; cu-a weakly inclivous.

Legs.— Hind femur strongly swollen (fig. 34); length of femur, tibia and basitarsus of hind leg 2.6, 4.4 and 3.0 times their width, respectively (fig. 34); length of both hind tibial spurs 0.40 times basitarsus.



Figs 55-66, *Afrocampsis griseosetosus* van Achterberg & Quicke, ♀, holotype. 55, wings; 56, detail of ovipositor sheath, lateral aspect; 57, detail of veins cu-a and 2-CU of hind wing; 58, mesosoma, dorsal aspect; 59, hind leg; 60, first and second metasomal tergites, dorsal aspect; 61, inner hind claw; 62, apex of antenna; 63, head, frontal aspect; 64, head, dorsal aspect; 65, antenna; 66, habitus, lateral aspect. 55, 59, 65, 66: 1.0 × scale-line; 56, 57, 63, 64: 2.0 ×; 58, 60: 1.3 ×; 61, 62: 5.0 ×.



Metasoma.— Carapace strongly costate up to apex, coarsely punctate between costae, but largely smooth medio-laterally and in front of a nearly complete and strong hemicircular basal carina, 2.2 times longer than its maximum width, slenderly elliptical; carapace flat ventro-apically (fig. 35); apex of carapace of ♀ with a large and robust central protuberance and a pair of medium-sized protuberances below it (fig. 35), apical 0.4 of carapace (including protuberances) closed ventrally (fig. 35), length of ovipositor sheath 0.37 times fore wing, slightly more than half as long as carapace.

Colour.— Black(ish); basal third of hind tibia pale yellowish; scapus and pedicellus, palpi, fore and middle legs, hind leg (except for tibia and tarsus) brownish-yellow; third-sixth antennal segments, tegulum, humeral plate, remainder of hind tibia and hind tarsus, parastigma, pterostigma, veins r, SR1+2-SR, apex of C+SC+R, 1-CU1 and 1-R1 of fore wing dark brown; remainder of veins and metasoma ventrally brownish but veins M+CU1, 1-M and 1A yellowish; wing membrane subhyaline.

Distribution.— Indonesia (Java).

Variation.— Paratypes are very similar to holotype; length of ovipositor sheath 0.37-0.41 times fore wing; males have only a truncate central protuberance (fig. 33).

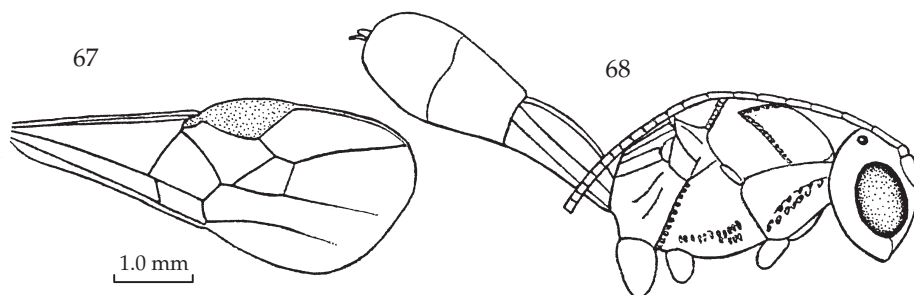
*C. robustus* spec. nov.  
(figs 52-54)

Material.— Holotype, ♀ (RMNH), "Malaysia: SE Sabah, n[ea]r Danum Valley Field C., c 150 m, W0N0, 26.v.-20.vi.1987, Mal. trap 5, C. v. Achterberg & D. Kennedy, RMNH'87".

Holotype, ♀, length of body 4.1 mm, of fore wing 2.8 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments rather slender, subapically not moniliform (fig. 54), third segment as long as fourth segment, and 3.6 times as long as wide; length of maxillary palp 1.1 times height of head; occipital carina widely interrupted medio-dorsally; length of eye in dorsal view 5.2 times temple; OOL:diameter of ocellus: POL = 10:6:16; tubercle of vertex medium-sized with dorso-lateral carina distinct; distance between tubercles of vertex and ocelli about 1.5 times diameter of ocellus; frons coarsely punctate laterally; vertex sparsely and finely punctate, also near tubercle, largely smooth; face coarsely and irregularly punctate and dorsally with rugae, without distinct smooth interspaces, rather shiny, lateral crest present, with distinct lateral depression; clypeus densely punctate, and with a distinct subventral transverse carina; length of malar space 1.6 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; side of pronotum nearly completely coarsely punctate; transverse crest of propleuron strong, distinctly and obtusely protruding ventrally; epicnemial area smooth; precoxal sulcus only medially present, moderately widely, oblique and coarsely crenulate; metapleuron very coarsely punctate-reticulate; notauli complete, distinctly crenulate and moderately wide posteriorly, largely smooth anteriorly; mesoscutum laterally sparsely and rather finely punctate, flattened and setose, postero-medially coarsely punctate and anteriorly finely and sparsely punctate; scutellum with incomplete median crest, sparsely punctate medially, coarsely punctate laterally and rather convex, with lateral carina; side of scutellum coarsely punctate; surface of propodeum mainly coarsely reticulate, mostly without distinct punctuation.



Figs 67-68, *Acampsohelcon rasnitszini* Tobias, ♀, holotype. 67, fore wing; 68, habitus, lateral aspect. After Tobias (1987).

Wings.— Fore wing:  $r:3\text{-SR}+\text{SR}1:2\text{-SR} = 6:40:9$ ;  $3\text{-SR}+\text{SR}1$  basally slightly curved;  $1\text{-CU}1:2\text{-CU}1 = 3:13$ ;  $1\text{-CU}1$  distinctly widened;  $\text{CU}1\text{b}$  obsolescent, unsclerotized. Hind wing:  $\text{M}+\text{CU}:1\text{-M} = 26:11$ ;  $\text{cu-a}$  vertical.

Legs.— Hind femur distinctly and tibia moderately swollen (fig. 53); length of femur, tibia and basitarsus of hind leg 2.6, 4.8 and 4.0 times their width, respectively (fig. 53); length of hind tibial spurs 0.45 and 0.55 times basitarsus.

Metasoma.— Carapace strongly costate up to apex, basal half of carapace mainly smooth between costae, posterior half between costae coarsely punctate, but medio-laterally largely smooth and in front of very strong basal carinae and apico-laterally mainly punctate; basal carinae remain distinctly separated from each other; carapace 2.1 times longer than its maximum width in dorsal view, rather widely elliptical; carapace mainly flat ventro-apically (fig. 52); apex of carapace with a robust, wide, apically narrowly smooth and straight protuberance (fig. 52), apical 0.45 of carapace closed ventrally (fig. 52), length of ovipositor sheath 0.43 times fore wing, (0.6 times as long as carapace).

Colour.— Black(ish); basal third of hind tibia, scapus, pedicellus, palpi, fore and middle legs (but inner side of fore femur and both sides of middle femur brown), hind leg (but inner side of femur, remainder of tibia and tarsus dark brown) pale yellowish; tegulae brownish-yellow; third antennal segment, and metasoma ventrally mainly brown; remainder of antenna, parastigma, pterostigma (but basally narrowly pale brownish), apex of vein  $\text{C}+\text{SC}+\text{R}$  and veins  $r$ ,  $1\text{-R}1$ ,  $2\text{-SR}$ ,  $\text{SR}1+3\text{-SR}$  of fore wing dark brown; remainder of veins brown but veins  $\text{M}+\text{CU}1$  and  $1\text{A}$  yellowish; wing membrane subhyaline.

Distribution.— East Malaysia (Borneo: Sabah).

*C. rugifrons* spec. nov.  
(figs 49-51)

Material.— Holotype, ♀ (RMNH), "Indonesia: C Sulawesi, n[ea]r Luwuk, Salodik, c 400 m, 1-14.xi.1989, Mal. tr. 14, C. v. Achterberg, RMNH'89". Paratype: 1 ♀ (ZMB), "Indonesia: C Sulawesi, n[ea]r Luwuk, Salodik-Lenyek, c 500 m, 22.x.1989, C. v. Achterberg & J. Warouw, RMNH'89".

Holotype, ♀, length of body 3.5 mm, of fore wing 2.7 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments rather slender, subapically rather moniliform (fig. 51), third segment as long as fourth segment, and 3.1 times as long as wide; length of maxillary palp 1.1 times height of head; occipital carina complete but rather weakly developed medio-dorsally; length of eye in dorsal view 4.5 times temple; OOL:diameter of ocellus: POL = 8:5:15; tubercle of vertex medium-sized with dorso-lateral carina distinct; distance between tubercles of vertex and ocelli about equal to diameter of ocellus; frons coarsely punctate-rugose laterally; vertex coarsely punctate near tubercle and remainder largely smooth; face densely and regularly punctate but with distinct smooth interspaces, rather shiny, lateral rugae partly absent, with shallow lateral depression; clypeus densely punctate, and with a rather weak subventral transverse carina; length of malar space 1.8 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum nearly completely coarsely punctate; transverse crest of propleuron strong, distinctly and obtusely protruding ventrally; epicnemial area smooth; precoxal sulcus only medially present, moderately wide, oblique and coarsely crenulate; metapleuron very coarsely punctate-reticulate, but anteriorly partly smooth; notauli completely distinctly crenulate, moderately wide; mesoscutum laterally sparsely and rather finely punctate, flattened and setose, medially coarsely punctate and anteriorly finely and densely punctate; scutellum without median crest, mainly smooth except for some coarse punctures laterally and fine punctures medially and rather convex, without lateral carina; side of scutellum coarsely punctate; surface of propodeum mainly coarsely reticulate, near carinae punctate.

Wings.— Fore wing:  $r:3-SR+SR1:2-SR = 6:39:9$ ;  $3-SR+SR1$  basally slightly curved;  $1-CU1:2-CU1 = 3:12$ ;  $1-CU1$  distinctly widened;  $CU1b$  obsolescent, unsclerotized. Hind wing:  $M+CU:1-M = 13:7$ ;  $cu-a$  vertical, slightly curved ventrally.

Legs.— Hind femur distinctly and tibia moderately swollen (fig. 50); length of femur, tibia and basitarsus of hind leg 2.7, 4.4 and 3.4 times their width, respectively (fig. 50); length of hind tibial spurs 0.50 and 0.55 times basitarsus.

Metasoma.— Carapace strongly costate up to apex, basal half of carapace mainly smooth between costae, posterior half coarsely punctate between costae, but medio-laterally and in front of very strong basal carinae mainly punctate, subapically mainly reticulate-punctate; basal carinae almost touching each other; carapace 2.1 times longer than its maximum width in dorsal view, rather widely elliptical; carapace mainly flattened and oblique ventro-apically (fig. 49); apex of carapace with a wide, smooth and short upcurved knob (fig. 49), apical 0.35 of carapace closed ventrally (fig. 49), length of ovipositor sheath 0.58 times fore wing, 0.7 times as long as carapace.

Colour.— Black(ish); basal third of hind tibia pale yellowish; scapus, pedicellus, palpi, tegulae, fore and middle legs, hind leg (except for tibia and tarsus) brownish-yellow; metasoma ventrally mainly brown; remainder of antenna, remainder of hind tibia and hind tarsus, parastigma, pterostigma (but basally narrowly pale brownish), apex of vein  $C+SC+R$  and vein  $1-R1$  of fore wing dark brown; veins  $r$ ,  $2-SR$ ,  $SR1+3-SR$  brown; remainder of veins yellowish; wing membrane subhyaline.

Distribution.— Indonesia (Sulawesi).

Note.— The paratype does not differ from the holotype, except for having the length of the ovipositor sheath 0.49 times fore wing.

*C. semiglaber* spec. nov.  
(figs 37-39, 42)

Material.— Holotype, ♀ (RMNH), "Indonesia: C Sulawesi, n[ea]r Luwuk, Salodik, c 400 m, 21-31.x.1989, Mal. tr. 14, C. v. Achterberg, RMNH'89".

Holotype, ♀, length of body 4.3 mm, of fore wing 3.1 mm. If characters not mentioned then similar to *C. orientalis*.

Head.— Antenna with 17 segments and subapical segments rather slender, hardly moniliform (fig. 39), third segment 0.9 times as long as fourth segment, and 2.8 times as long as wide; length of maxillary palp equal to height of head; occipital carina rather widely interrupted medio-dorsally, at most vaguely indicated; length of eye in dorsal view 3.5 times temple; OOL:diameter of ocellus: POL = 10:6:17; distance between tubercles of vertex and ocelli about equal to 1.5 times diameter of ocellus; tubercle of vertex rather robust (fig. 38); frons coarsely vermiculate-rugose laterally; vertex mainly sparsely punctate; face densely and regularly punctate, shiny, with a distinct lateral depression, inner side of depression bordered by a ruga; clypeus densely punctate, and with a rather weak subventral transverse carina; length of malar space 1.7 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.5 times its height; side of pronotum nearly completely coarsely punctate; transverse crest of propleuron strong, and rather weakly and obtusely protruding ventrally; epicnemial area smooth; precoxal sulcus absent posteriorly, moderately wide, oblique and coarsely crenulate; metapleuron very coarsely punctate-reticulate; notauli largely distinctly crenulate, moderately wide; mesoscutum laterally sparsely and rather finely punctate, flattened and setose; scutellum mainly smooth except for some fine punctures and rather convex, with irregular lateral carina; side of scutellum coarsely punctate-rugose; surface of propodeum mainly coarsely reticulate.

Wings.— Fore wing:  $r:3\text{-SR}+\text{SR}1:2\text{-SR} = 6:34:9$ ;  $3\text{-SR}+\text{SR}1$  basally nearly straight;  $1\text{-CU}1:2\text{-CU}1 = 3:12$ ;  $1\text{-CU}1$  distinctly widened;  $\text{CU}1b$  narrow, completely sclerotized but weakly pigmented. Hind wing:  $M+\text{CU}:1\text{-M} = 13:6$ ;  $cu\text{-a}$  vertical.

Legs.— Hind femur and tibia strongly swollen (fig. 37); length of femur, tibia and basitarsus of hind leg 2.6, 4.4 and 3.5 times their width, respectively (fig. 37); length of hind tibial spurs 0.50 and 0.55 times basitarsus.

Metasoma.— Carapace strongly costate up to apex, between costae coarsely punctate, especially medio-laterally and rugose in front of rather strong basal carinae, carinae remain distinctly separated; carapace twice longer than its maximum width in dorsal view, rather widely elliptical; carapace flat ventro-subapically (fig. 42); apex of carapace without a protuberance, rounded and narrowly smooth apically (fig. 42), apical 0.4 of carapace closed ventrally (fig. 42), length of ovipositor sheath 0.48 times fore wing, slightly more than 0.7 times as long as carapace.

Colour.— Black(ish); basal third of hind tibia pale yellowish; scapus and pedicellus, palpi, tegulum, humeral plate, fore and middle legs, hind leg (except for tibia and tarsus) brownish-yellow; remainder of antenna dark brown; remainder of hind tibia and hind tarsus, parastigma, pterostigma, veins  $r$ ,  $\text{SR}1+2\text{-SR}$ , apex of  $C+\text{SC}+\text{R}$ ,  $1\text{-CU}1$  and  $1\text{-R}1$  of fore wing dark brown; remainder of veins and metasoma ven-

trally brownish but veins M+CU1, 1-M and 1A yellowish; wing membrane subhyaline.

Distribution.— Indonesia (Sulawesi).

*C. taiwanensis* Chou & Hsu, 1996

*Canalicephalus taiwanensis* Chou & Hsu, 1996: 440-441, figs 13, 37, 61, 87, 115, 139, 165, 191, 217, 243.

Distribution.— Known only from a small series from Taiwan, China (650-1200 m).

***Urosigalphus* Ashmead, 1889**

(figs 13-25)

*Urosigalphus* Ashmead, 1889: 637; Shenefelt, 1969: 302; Gibson, 1972a: 85, 101; 1972b: 137; 1974: 203; 1982a: 97; 1982b: 167; Sharkey, 1997: 265; Belokobylskij, 1998: 489. Type species (by original designation): *Urosigalphus armatus* Ashmead, 1889 [examined].

*Rhyssosigalphus* Cameron, 1904: 260; Shenefelt, 1969: 302; Gibson, 1972a: 85; 1972b: 137. Type species (by monotypy): *Rhyssosigalphus rugosus* Cameron, 1904.

*Microurosigalphus* Gibson, 1972a: 87; 1972b: 137; 1974: 203 (proposed as subgenus of *Urosigalphus* Ashmead, 1889). Type species (by original designation): *Urosigalphus femoratus* Crawford, 1914.

*Neourosigalphus* Gibson, 1972a: 87, 122; 1972b: 137; 1974: 203 (proposed as subgenus of *Urosigalphus* Ashmead, 1889). Type species (by original designation): *Urosigalphus robustus* Ashmead, 1889.

*Bruchiurosigalphus* Gibson, 1972a: 87, 94; 1972b: 137; 1974: 203 (proposed as subgenus of *Urosigalphus* Ashmead, 1889). Type species (by original designation): *Urosigalphus bruchi* Crawford, 1907.

*Paraurosigalphus* Gibson, 1972a: 87, 128; 1972b: 137 (proposed as subgenus of *Urosigalphus* Ashmead, 1889). Type species (by original designation): *Urosigalphus dakotaensis* Gibson, 1972.

**Key to subgenera of the genus *Urosigalphus* Ashmead**

1. Stemmaticum raised into a pyramidal projection in frontal and lateral view (figs 16, 22) ..... subgenus ***Urosigalphus*** Ashmead, 1889
- Stemmaticum hardly or not protruding dorsally ..... 2
2. Scutellum strongly protruding dorsally ..... subgenus ***Bruchiurosigalphus*** Gibson, 1972
- Scutellum flattened, hardly or not protruding dorsally ..... subgenus ***Neourosigalphus*** Gibson, 1972

Distribution.— New World, especially in Central and South America, but one species (*U. bruchi* Crawford, 1907) occurs in Japan (Shenefelt, 1969; Belokobylskij, 1998). According to Sharkey (1997) contains about 100 species, with many of the Neotropical species undescribed.

Notes.— The subgenera *Microurosigalphus* Gibson, 1972 (having vein SR1 of the fore wing reduced apically) and *Paraurosigalphus* Gibson, 1972 (characterized by the longer palpi) are considered to be synonyms of the subgenus *Neourosigalphus* Gibson, 1972. The differences are too gradual and unsuitable for separation of subgenera. *Urosigalphus* species can be identified with a series of papers by Gibson (Gibson, 1972a: 87 (subgenera), 87-88, 95, 101-102, 123, 129 (N. America); 1972b: 137 (subgenera); 1974: 203, 208, 213 (S. America); 1982a: 97 (Mexico); 1982b: 167 (South America)).



### Acknowledgements and abbreviations

I wish to thank Drs P.M. Marsh and D.R. Smith (Smithsonian Institution (USNM), Washington, D.C.) for making type specimens available, Dr D.L.J. Quicke (Silwood Park/London) for the gift of specimens and for sharing so much interesting information on Braconidae, Prof. Dr A.P. Rasnitsyn (Moscow) for information on *Acamptsohelcon* and Dr M.R. Shaw (Edinburgh) for his critical remarks. RMNH stands for the Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden and MZB for Zoological Museum, Cibinong (formerly in Bogor).

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Received: 9.x.2002

Accepted: 15.x.2002

Edited: M.J.P. van Oijen