

Revision of the genera of the subfamily Sigalphinae (Hymenoptera: Braconidae), including a revision of the Australian species

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A key to all known genera of the Sigalphinae (Braconidae) is given and all genera are described and fully illustrated. Two new genera from the Australian region and one from the Afrotropical region are described: *Notosigalphus* gen. nov. (type species: *Sphaeropyx conjugator* Turner, 1917), *Aposigalphus* gen. nov. (type species: *Aposigalphus tessi* spec. nov.), and *Malasigalphus* gen. nov. (type species: *Malasigalphus petiolaris* spec. nov.). Keys to the Australian and Palaearctic species of Sigalphinae are given. The new tribe Afrocampsiini is proposed for the Afrotropical genera *Malasigalphus* gen. nov. and *Afrocampsis* van Achterberg & Quicke, 1990. *Sigalphus hunanus* You & Tong, 1991, and *S. anonis* You & Zhou, 1991, are synonymized with *S. irrorator* (Fabricius, 1775).

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Introduction

The subfamily Sigalphinae Blanchard, 1845 (Braconidae Nees, 1812) is uncommonly collected and mainly known from the Holarctic and Afrotropical regions. Recently a new genus was published from West Africa (*Afrocampsis* van Achterberg & Quicke, 1990). Previously known from this continent is the highly aberrant genus *Minanga* Cameron, 1906, and some species of the genus *Sigalphus* Latreille, 1802. In this paper a new genus from Malagasy (*Malasigalphus* gen. nov.) is described, along with two new genera from Australia. One Australian genus, *Notosigalphus* gen. nov., is based on the only described species from that continent, *Sphaeropyx conjugator* Turner, 1917, while the other, *Aposigalphus* gen. nov., is described to accommodate three new species. In addition, three new species of the genus *Acampsis* Wesmael, 1835, are described from the East Palaearctic. The genus *Sigalphus* contains (except for the Afrotropical species) one Palaearctic and one Nearctic species.

For the terminology used, see van Achterberg, 1988b; the lateral pronope is a depression situated lateral to the dorsal pronope (figs 14, 28, 42, 62).

Abbreviations

The following abbreviations are used: AMSA= Australian Museum, Sydney; ANIC= Australian National Insect Collection, Canberra; BMNH= The Natural History Museum (formerly British Museum (Natural History)), London; ELF= Entomological Laboratory, Fukuoka; PAN= Polska Akademia Nauk, Warsaw; RMNH= Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden; WAMP= Western Australian Museum, Perth; WARI= Waite Agricultural Research Institute, University of Adelaide, Adelaide.

Phylogeny

The Sigalphinae share with the subfamilies Cercobarconinae Tobias, 1979, and Trachypetinae Schulz, 1911, a lowly situated vein 2-CU of hind wing. The presence of the vein 2-CU is in itself a plesiomorphous state, but in its sistergroup, the Ichneumonidae Latreille, 1802, it is situated higher similar to its position in e.g. the Agathidinae Nees, 1814, Meteorideinae Capek, 1970, and Pselaphaninae van Achterberg, 1985. Both Cercobarconinae and Trachypetinae are exclusively Australian in distribution. The Sigalphinae are well presented in Australia compared with other continents. In the shortest cladograms of Braconidae known (van Achterberg, unpubl., based on the improved matrix of Quicke & van Achterberg, 1990) the Sigalphinae come out as the sister-group of the Trachypetinae+Cercobarconinae. According to the published phylogenetic analyses by Quicke & van Achterberg (1990) the Sigalphinae belong either to the group of Trachypetinae+Cercobarconinae+Meteorideinae or to the Agathidinae+Pselaphaninae, all these groups having vein 2-CU of hind wing present. An interesting feature of the Sigalphinae is the direction of vein m-cu of fore wing. Normally in Braconidae this vein is parallel with vein 1-M or converging to it. In part of the Sigalphinae (fig. 25), as in the Agathidinae+Pselaphan-

Table 1. Apomorphous character-states used for phylogenetic analysis of the subfamily Sigalphinae. In brackets the plesiomorphous state is given. Outgroup is the group of basal "cyclostome" subfamilies of Braconidae (Quicke & van Achterberg, 1990).

1. Lateral and dorsal pronope present (absent).
2. First metasomal tergite with pair of posterior depressions (depressions absent).
3. Laterope of first metasomal tergite absent (present).
4. Frons with (weak) median carina (no median carina).
5. Discal cell of fore wing transverse (subquadrate).
6. Parastigma enlarged (normal sized).
7. Tarsal claws with lobe (1) or bifurcate (2) (simple). Unordered.
8. Vein M+CU1 of fore wing slightly curved (straight).
9. Posterior propleural flange reduced, narrow (distinctly developed and wide).
10. Occipital flange (rather) wide (narrow).
11. Ovipositor sheath widened (narrow).
12. Vein r of fore wing very short (medium-sized or long).
13. Malar suture present (absent).
14. Third metasomal tergite enlarged (normal).
15. Veins m-cu and 1-M of fore wing distinctly diverging posteriad ((sub)parallel or converging).
16. Ovipositor short (medium-sized).
17. Third tergite distinctly convex in lateral view (slightly convex or flat).
18. Second metasomal suture comparatively wide and deep (comparatively narrow and shallow).
19. Second metasomal tergite with pair of anterior depressions (no depressions).
20. First metasomal tergite comparatively long in lateral view (medium-sized).
21. Clypeus emarginate ventrally (straight ventrally).
22. Propodeal carinae absent (present).
23. Notauli reduced on mesoscutal disc (complete).
24. Second metasomal tergite with medial area parallel (1) or triangular (2) (no area). Unordered.
25. Dorsal carinae of first tergite complete and strong (incomplete and medium-sized).
26. Face with medial area enclosed by sublateral sublongitudinal depressions (no area with sublongitudinal depressions).
27. Third metasomal tergite longer than second tergite, in lateral view and dorsally measured (third tergite about as long as second tergite or shorter).

Table 2. Matrix of character-states of the genera of Sigalphinae; characters listed in table 1; ?= polymorphous character-state.

Ancestor	0000000000	0000000000	0000000
<i>Afrocampsis</i>	0111000000	0110011001	0000100
<i>Malasigalphus</i>	0111002000	1001110001	0100001
<i>Acampsis</i>	1000111111	1000000001	0000100
<i>Sigalphus</i>	1000111111	1101011110	0001111
<i>Minanga</i>	1000111110	1000111010	0002100
<i>Notosigalphus</i>	1000111111	1000111110	1110011
<i>Aposigalphus</i>	1010111110	1000?11110	1110011

inae, this vein diverges from vein 1-M. However, part of the Sigalphinae lack this apomorphous condition and have both veins parallel to each other (fig. 37). In this group another apomorphy, the presence of lateral pronope is known (figs 16, 28, 41). The Sigalphinae differs from the Agathidinae+Pselaphaninae by the presence of the medio-posterior depression of the scutellum (an apomorphy (fig. 14), but several Agathidinae have a differently shaped depression on the scutellum), the retracted fourth and following tergites of metasoma (an apomorphy; figs 4, 28), the sclerotized

vein M+CU1 of fore wing (a plesiomorphy; fig. 13; however, in the Pselaphaninae the vein M+CU1 is frequently completely sclerotized), the strong dorsal carinae of the first metasomal tergite (an apomorphy; figs 7, 46), the acute lateral margin of the second and third tergites (an apomorphy; figs 16, 41), and vein 2-M of hind wing near the level of vein 1A (an apomorphy; figs 13, 25, but comparatively high in *Afrocampsis*, fig. 1), and the short, curved and strongly tapered ovipositor, without teeth or nodus and its sheath comparatively wide (an apomorphy; figs 16, 47, but narrow in *Afrocampsis* (fig. 9).

Within the Sigalphinae four groups can be distinguished (fig. 119): the tribes Afrocampsinini nov., Acampsinini van Achterberg, 1984, Minangini de Saeger, 1948, and Sigalphini Blanchard, 1845. Members of the tribe Afrocampsinini have no lateral or medial pronope (figs 2, 4, 80, 83), the first metasomal tergite has a pair of posterior depressions, the frons has a weak median carina (figs 8, 84), the discal cell of fore wing is comparatively high (figs 1, 78), the tarsal claws are with no lobe (figs 11, 86), the posterior propleural flange is normal (figs 4, 80), and vein r of fore wing is angularly connected with vein 3-SR (figs 1, 78). The tribe Acampsinini (with only the Palaearctic genus *Acampsis* Wesmael, 1835) is the sister-group of the Sigalphini. It lacks the pair of basal depressions of the second metasomal tergite (fig. 21), and has not the other synapomorphies of the Sigalphini (fig. 115). The synapomorphies of the tribe Sigalphini are: second suture of the metasoma comparatively wide and deep, margin of the third tergite with ventral lamella (fig. 47), third tergite distinctly convex (figs 41, 56), second tergite with a pair of anterior depressions (figs 46, 63), ovipositor short (fig. 41), and first tergite comparatively short laterally (figs 28, 41, 68).

The tribe Minangini has many autapomorphies: e.g. the first metasomal tergite is immovably joined to the second tergite (figs 28, 33), a the pair of crests is present between antennal sockets (fig. 26), the head is elongated (fig. 28), the second tergite has converging grooves and carinae (fig. 33), the stemmaticum bears two spines or teeth (figs 26, 29), and the occipital carina is reduced ventrally (fig. 28). However, the third tergite is shorter than the second tergite (a plesiomorphy).

Descriptions and keys

Subfamily Sigalphinae Blanchard, 1845

Sigalphites Blanchard, 1845: 166.

Sigalphini; Shenefelt, 1973: 931-935.

Sigalphinae; van Achterberg, 1984: 52, 1988a: 91 & 1990: 11; van Achterberg & Quicke, 1990: 155; Quicke & van Achterberg, 1990: 44.

Diagnosis.— Antenna long or medium-sized, slender (figs 3, 28, 67); labrum flat (fig. 5); occipital carina present laterally (fig. 4), except in *Aposigalphus* (fig. 68); maxillary and labial palpi with 6 and 4 segments, respectively; antescutellar depression absent; pronotum with lateral and dorsal pronope present (fig. 62), except in Afrocampsinini (fig. 2); middle lobe of mesoscutum similarly convex as lateral lobes; anterior subalar depression crenulate (fig. 41); postpectal carina absent; fore wing with short fringe; vein SR1 of fore wing completely sclerotized; vein CU1b of fore wing present (fig. 13); marginal cell of fore wing comparatively short (figs 1, 25); vein m-cu of fore wing antefurcal (fig. 1); marginal cell of hind wing parallel-sided apically;

vein 2-CU of hind wing present and situated near level of vein 1A (figs 10, 13, 32, 37), but in *Afrocampsis* distinctly above level of vein 1A (fig. 1); plical lobe of hind wing narrow (figs 1, 64) to comparatively large (fig. 37); fore tarsus normal; hind leg rather robust (figs 6, 18, 69), except *Malasigalphus* (fig. 87); hind trochantellus distinct; trochantelli without small pegs; metasoma inserted largely between hind coxae; spiracles of first metasomal tergite in its notum (fig. 56); dorsal carinae of first tergite distinct; second metasomal spiracle near anterior border of tergite and third spiracle in front of notum of third tergite (fig. 80); third tergite with acute lateral margin (figs 4, 56); fourth-seventh tergites retracted below third tergite (figs 4, 41); ovipositor more or less curved, without teeth, nodus or notch; ovipositor sheath usually widened (figs 16, 47, 80), but slender in *Afrocampsis* (fig. 9).

Distribution.— Holarctic, Afrotropical and Australian.

Biology.— Knowledge of the biology of sigalphine braconids is very limited; probably the species are koinobiont endoparasites (e.g., because of their phylogenetic position (van Achterberg, 1984; Quicke & van Achterberg, 1990) of lepidopterous larvae of the families Noctuidae and Geometridae. Because of the carapace-like metasoma, ovo-larval parasitism may occur. *Sigalphus bicolor* (Cresson, 1880) is a gregarious parasite and *S. irrorator* (Fabricius, 1775) is a solitary parasite, both of Noctuidae, especially of the genus *Acronicta* Ochsenheimer, 1816 (Shaw & Huddleston, 1991). *Notosigalphus joshuai* spec. nov. was reared from the Geometrid *Capusa senilis* Walker, the adults of which are long-winged, grey moths, with a body length of about 18 mm. According to Common (1990) its host is distributed from south-eastern Queensland to Victoria and has been collected from *Acacia* (Mimosaceae), *Eucalyptus* (Myrtaceae; new record), garden peas (Fabaceae) and *Pinus radiata* (Pinaceae).

Note.— In the past the generic name *Sphaeropyx* Illiger, 1807 has been used extensively for the genus *Sigalphus*, because before its fixation by designation of a type species, *Sigalphus* Latreille, 1802 was used for the genus *Triaspis* Haliday, 1835 of the subfamily Helconinae. After the selection of the type species by Viereck (1914) *Sigalphus* became a senior synonym of *Sphaeropyx*. For this reason *Sigalphus tripartitus* Szépligeti, 1905 from Australia has been transferred to *Triaspis* by Shenefelt (1970).

Key to genera of the subfamily Sigalphinae

1. First metasomal tergite immovably joined to the second tergite (figs 28, 33); stemmaticum with spines or tubercles (fig. 29); pair of carinae of first and second tergites distinctly converging posteriorly (fig. 33); second tergite similarly convex as third tergite (fig. 28); third tergite closed apically (fig. 28); occipital flange narrow (fig. 28); (tribe Minangini de Saeger; Afrotropical) *Minanga* Cameron
- First tergite movably joined to second tergite (figs 4, 7, 41, 56); stemmaticum without spines or tubercles (fig. 5); pair of carinae of first and second tergites absent, parallel or slightly converging posteriorly (figs 7, 21, 46, 88), but intermediate in *Notosigalphus* (fig. 63); third tergite more convex than second tergite (figs 4, 41, 56, 84); third tergite (figs 4, 16, 41, 68) and occipital flange variable (figs 41, 68) 2
2. Tarsal claws bifurcate (fig. 86); first metasomal tergite elongate, resulting in a petiolate metasoma (fig. 88); occipital flange narrow (fig. 79); third tergite much

- longer than second tergite, and apically open (fig. 80); first tergite with pair of distinct depressions posteriorly (fig. 88); (part of the tribe Afrocampsiini nov.; Afrotropical-Malagasy) *Malasigalphus* gen. nov.
- Tarsal claws simple or with submedial lobe (figs 11, 22, 57, 74); first tergite subsessile, resulting in a subsessile metasoma (figs 7, 63, 76, 104, 107); occipital flange wide (figs 4, 16, 45, 54, 77); length and shape of third tergite variable (figs 4, 16, 41, 56); first tergite without pair of depressions posteriorly (figs 21, 46, 76), except *Afrocampsis* (fig. 7) 3
 - 3. Third metasomal tergite open apically, and medially about (1.1 times or less) as long as second tergite (figs 4, 16); base of second tergite at most with a pair of shallow depressions, which are usually absent (figs 7, 21) 4
 - Third tergite closed apically and longer than second tergite (figs 41, 56, 68); second tergite deeply impressed anteriorly (figs 46, 63, 76); (tribe Sigalphini Blanchard) .. 5
 - 4. Frons with dorsally bifurcated median lamella (figs 5, 8), medially concave and smooth (fig. 8); scapus about as long as pedicellus (fig. 3); ovipositor sheath slender (fig. 9); hind tarsal claws enlarged (longer than fourth tarsal segment; fig. 6), and without lobe (fig. 11); vein r of hind wing absent (fig. 1); malar suture distinct (fig. 5); pronope absent or nearly so (fig. 2); hind tibia enlarged (fig. 6); first discal cell of fore wing sessile anteriorly, comparatively high and less transverse (fig. 1); parastigma of fore wing slender (fig. 1); vein 2-SR of fore wing about as long as vein 3-SR; (part of the tribe Afrocampsiini nov.; Afrotropical)
..... *Afrocampsis* van Achterberg & Quicke
 - Frons without median lamella (figs 15, 19), flat and rugose medially (fig. 17); scapus much longer than pedicellus (fig. 16); ovipositor sheath wide (fig. 16); hind claws about as long as fourth tarsal segment and with acute lobe (figs 18, 22); vein r of hind wing present, but faintly developed (fig. 13); malar suture absent or nearly so (figs 15, 16); pronope distinct (fig. 14); hind tibia normal (fig. 18); first discal cell of fore wing petiolate anteriorly and distinctly transverse (fig. 13); parastigma of fore wing robust (fig. 13); vein 2-SR of fore wing distinctly shorter than vein 3-SR (fig. 13); (tribe Acampsiini van Achterberg; Palaearctic)
..... *Acampsis* Wesmæle
 - 5. Notauli largely absent on disc and area smooth (figs 62, 68, 75), but a medio-posterior depression may be present (fig. 62); third tergite without teeth, instead a wide lamella along its whole length present (figs 56, 61, 68, 72); anterior depression of second metasomal tergite elongate, not well defined (figs 63, 76); propodeal carina absent anteriorly (figs 62, 75); tarsal lobe comparatively small, with apical tooth distinctly surpassing tarsal lobe (figs 57, 74); vein M+CU of hind wing much longer than vein 1-M (figs 51, 64); parastigma more or less widened (figs 51, 64); (Australian) 6
 - Notauli completely impressed on disc and crenulate (fig. 42); third tergite with pair of teeth or lobes and only apico-medially with an apical lamella (figs 41, 47), exceptionally obsolescent; anterior depression of second tergite pit-like, well defined (fig. 46); propodeal carina present anteriorly (fig. 42); tarsal lobe large and apical tooth hardly or not surpassing it (fig. 50); vein M+CU of hind wing about as long as vein 1-M (fig. 37); parastigma medium-sized (fig. 37); (Holarctic; Afrotropical) *Sigalphus* Latreille

6. Prepectal and occipital carinae absent (figs 65, 68), although prepectal carina may be faintly indicated by an impressed line medio-ventrally and the occiput may be abruptly rounded or angled giving impression of a faint carina; occipital flange minute (fig. 68); tarsal lobe with irregular ventral margin (figs 73, 74); scapus subtruncate apically and leaving free a part of pedicellus (figs 67, 68); precoxal sulcus largely smooth *Aposigalphus* gen. nov.
- Prepectal and lateral part of occipital carinae present (figs 56, 58); occipital flange large (figs 54, 56); tarsal lobe with regular ventral margin (fig. 57); outer side of scapus excised apically and covering pedicellus ventrally (figs 55, 56); precoxal sulcus distinctly crenulate (fig. 56) *Notosigalphus* gen. nov.

Tribe Afrocampsini nov.

Diagnosis.— Frons with (weak) median carina (figs 8, 85); occipital flange normal or nearly so (figs 4, 80); malar suture absent (fig. 84) or present (fig. 5); posterior propleural flange medium-sized (figs 4, 80); medial and lateral pronope absent (figs 2, 4, 83); parastigma normal (fig. 78); vein M+CU1 of fore wing straight; vein 1-M of fore wing about twice as long as vein m-cu, resulting in a comparatively large discal cell (figs 1, 78); vein 2-CU of hind wing long (fig. 78) or short (fig. 1); vein r of fore wing angularly connected to vein 3-SR and behind middle of pterostigma issued (figs 1, 78); tarsal claws without lobe, at most with a small inner tooth (fig. 86); dorsal aspect of first metasomal tergite with a pair of (narrow) posterior depressions (figs 7, 88) and in lateral view comparatively long (figs 4, 80); second tergite without medial area, and no anterior depressions or distinct carinae (figs 7, 88); second metasomal suture comparatively shallow and narrow (fig. 4); third tergite comparatively flat and longer than second tergite (fig. 80) or distinctly convex and about as long as third tergite (fig. 4); ovipositor sheath short, slender (figs 4, 9) or widened (fig. 80).

Distribution.— Contains two Afrotropical genera: *Afrocampsis* van Achterberg & Quicke, 1990 and *Malasigalphus* gen. nov.

Afrocampsis van Achterberg & Quicke, 1990

(figs 1-12)

Afrocampsis van Achterberg & Quicke, 1990: 156. Type species: *Afrocampsis griseosetosus* van Achterberg & Quicke, 1990 (by original designation).

Diagnosis.— Frons with oblique carinae between antennal sockets and ocelli (fig. 8); stemmaticum triangular and without protuberances (fig. 8); malar suture present (figs 4, 5); occipital carina present ventrally (fig. 4), but interrupted dorsally (fig. 8); prepectal carina present; transverse suture of mesoscutum complete (fig. 2); second submarginal cell of fore wing comparatively short (fig. 1); vein 1-M of fore wing long (fig. 1); veins 1-SR of fore wing and r of hind wing absent (fig. 1); vein 1-M and m-cu of fore wing converging posteriorly (fig. 1); hind leg robust (fig. 6); hind tarsal claws enlarged and simple, without lobe (figs 6, 11); first metasomal tergite elongate in lat-

eral view (fig. 4), movably joined to second tergite; dorsal carinae of first tergite complete and strong (fig. 7); laterope absent (fig. 4); second tergite with only shallow elongate and parallel lateral depressions (fig. 7); third tergite about as long as second tergite and partly open posteriorly (fig. 4); ovipositor sheath slender (figs 4, 9).

Distribution.— Contains only the W. African type species. Its biology is unknown.

Malasigalphus gen. nov.
(figs 78-88)

Type species: *Malasigalphus petiolaris* spec. nov.

Etymology: from "Malagasy" and the generic name "*Sigalphus*", because it is an aberrant member of the subfamily Sigalphinae only known from Malagasy. Gender: masculine.

Diagnosis.— Frons with short median carina, and antennal sockets with short carinae posteriorly (fig. 85); anterior ocellus distinctly smaller than posterior ocellus (fig. 85, about similar or somewhat less in other Sigalphinae: figs 17, 65); stemmaticum triangular, without protuberances (fig. 85); malar suture absent (figs 80, 84); occipital carina complete, but irregular and rather weak dorsally, connected to a rather narrow occipital flange (fig. 79); transverse suture of mesoscutum absent (fig. 83); second submarginal cell of fore wing rather robust (fig. 78); vein r of fore wing angularly connected to vein 3-SR (fig. 78); vein 1-M of fore wing about twice as long as vein m-cu and distinctly diverging posteriorly (fig. 78); vein 1-SR of fore wing and vein r of hind wing present; vein 2-CU of hind wing comparatively long (fig. 82); hind leg moderately slender (fig. 87); tarsal claws medium-sized and bifurcate (fig. 86), inner hind claw similar to outer hind claw; first metasomal tergite long, without hump in lateral view (fig. 80), and movably joined to second tergite; first tergite with pair of semi-elliptical depressions posteriorly (fig. 88); dorsal carinae of first tergite in basal half of tergite present, but weakly developed (fig. 88); laterope absent (fig. 80); second tergite without basal depressions or differentiated median area (fig. 88); no constriction between second and third tergites; medial length of third tergite about 1.5 times medial length of second tergite (figs 80, 88); third tergite with narrow and regularly crenulate lamella posteriorly (figs 80, 81), no teeth and apically open; ovipositor sheath short and rather wide (fig. 80).

Distribution.— Contains only the Malagasian type species. The biology is unknown.

Note.— The new genus has the latero-posterior depressions of the first tergite, the lack of the pronope, the transverse crenulation of the orbits (fig. 80), the elongate first tergite, the carinae of the antennal sockets connected to a carina pointed to the stemmaticum (fig. 85), and the comparatively small parastigma in common with the genus *Afrocampsis* van Achterberg & Quicke, 1990. *Afrocampsis* differs in many respects, e.g. the vein 1-SR of fore wing absent, the dorsal carinae of first tergite incomplete, the tarsal claws enlarged and simple, the first subdiscal cell of fore wing robust, the malar suture present, the third tergite not enlarged, the scapus smaller, and the ovipositor sheath slender. Obviously, the relationships with *Afrocampsis* and *Malasigalphus* is rather distant.

***Malasigalphus petiolaris* spec. nov.**
(figs 78-88)

Material.— Holotype, ♀ (PAN), "Cap d'Ambre, Madagascar, ex coll. F. Schneider".

Holotype, ♀, length of body 8.3 mm, of fore wing 8.4 mm.

Head.— Remaining antennal segments 11, length of third segment 1.3 times fourth segment, length of third and fourth segments 1.5 and 1.2 times their width, respectively (fig. 80); length of maxillary palp 1.3 times height of head; in dorsal view length of eye 1.3 times temple (fig. 58); occipital carina rather weak dorsally; temples rugose and posteriorly subparallel (fig. 85); OOL:diameter of posterior ocellus:POL = 6:4:5; frons largely smooth medially, except for a short carina, glabrous and laterally rugose; vertex rather flattened, coarsely vermiculate rugose; face irregularly convex, largely rugose, except latero-ventrally (fig. 84); clypeus rather convex and largely smooth (fig. 84), its ventral margin convex and thin; epistomal suture distinct (fig. 84); length of malar space equal to basal width of mandible; mandibles strongly twisted apically.

Mesosoma.— Length of mesosoma 1.4 times its height; propleuron convex; side of pronotum largely crenulate, and dorsally punctate (fig. 80); mesosternal sulcus rather deep and crenulate; prepectal carina rather strong ventrally and not reaching anterior margin of mesopleuron (fig. 80); epicnemial area rugose; precoxal sulcus complete and coarsely crenulate (fig. 80); remainder of mesopleuron finely punctulate, but dorsally coarsely punctate; pleural sulcus coarsely crenulate; metapleuron coarsely (densely) reticulate; notauli completely impressed on disc, crenulate; middle lobe of mesoscutum with shallow impression anteriorly (fig. 83); scutellum flat medially and convex posteriorly; side of scutellum (= lateral scutellum) with long setae, largely punctate and contiguous with dorsal sculpture; metanotum not protruding dorsally without median carina; propodeum coarsely reticulate-punctate (fig. 83), without defined medial area or median carina; propodeal spiracle elliptical, medium-sized and close to anterior rim of propodeum (fig. 80).

Wings.— Fore wing: $r:3-SR:SR1 = 8:17:23$; area basad of 2A glabrous; 1-SR+M and SR1 straight (fig. 78); cu-a interstitial, about as inclivous as 3-CU1; 2-SR:3-SR:r-m = 11:17:8; m-cu far postfurcal (fig. 78). Hind wing (fig. 82): wing membrane largely glabrous basally; cu-a vertical and relatively long.

Legs.— Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 5.9, 10.4 and 7 times their width, respectively; length of hind tibial spurs 0.4 and 0.55 times hind basitarsus.

Metasoma.— Petiolate; length of first tergite 2.7 times its apical width, its surface largely rugose, except basally, and basally concave (fig. 88), medially rather flat, dorsal carinae present in basal half; second and third tergites densely reticulate-rugose; second suture narrow and rather shallow (fig. 80); second spiracle near level of apex of first tergite, positioned in incision of second tergite (fig. 80); setae dense and short; hypopygium medium-sized (fig. 80), and apically truncate; length of ovipositor sheath 0.06 times fore wing.

Colour.— Black; fore femora and tarsi of fore and middle legs (but telotarsi dark brown), apex of first tergite, base of vein C+SC+R of fore wing, and palpi (except dark basal segment) yellowish-brown; ptero- and parastigma, and veins dark brown; apex and base of ovipositor sheath and hypopygium basally, brown; wing membrane sub-

hyaline, except for dark brown apical area of fore wing (fig. 78), and surroundings of vein 1-SR of fore wing and area above vein 1-SC+R of hind wing brown.

Tribe **Acampsini** van Achterberg, 1984

Acampsini van Achterberg, 1984: 52.

Diagnosis.— Malar suture absent, but shallow depression may be present (fig. 15); frons without median carina; occipital flange somewhat enlarged (fig. 16); posterior postpleural flange obsolescent (fig. 16); medial and lateral pronope present (figs 14, 16); parastigma enlarged (fig. 13); vein M+CU1 of fore wing slightly curved (fig. 13); vein 1-M of fore wing about 1.5 times vein m-cu, resulting in a transverse first discal cell of fore wing (fig. 13); vein 2-CU of hind wing comparatively short (fig. 13); vein r of fore wing connected almost linearly to vein 3-SR and issued (just) in front of middle of pterostigma (fig. 13); tarsal claws with large lobe (fig. 22); first metasomal tergite without posterior depression and tergite in lateral view comparatively long (fig. 16); second tergite without carinae, anterior depressions or medial area (fig. 21); second metasomal suture narrow but distinct (figs 16, 21); third tergite comparatively flat and about as long as second tergite (fig. 16); ovipositor sheath comparatively long and widened (fig. 16).

Distribution.— Contains only the Palearctic genus *Acampsis* Wesmael, 1835.

Acampsis Wesmael, 1835 (figs 13-24)

Acampsis Wesmael, 1835: 250; Shenefelt, 1973: 932. Type species: *Sigalphus alternipes* Nees, 1816 (by monotypy; type lost).

Diagnosis.— Frons without oblique carina (fig. 17); stemmaticum rather transverse and without protuberances (fig. 17); malar suture absent, except for a shallow depression (fig. 15); occipital carina absent ventrally, and completely absent in *A. brevis* and *A. granulatus*; prepectal carina present, but may be partly reduced (fig. 16); dorsal and lateral pronope present (figs 14, 16); transverse suture of mesoscutum absent medially (fig. 14); second submarginal cell of fore wing elongate (fig. 13); vein 1-SR of fore wing present (fig. 13); vein r of hind wing present (fig. 13); veins 1-M and m-cu of fore wing slightly diverging posteriorly (fig. 13); vein 1-M of fore wing medium-sized (fig. 13); hind leg moderately slender (fig. 18); tarsal claws with large, rather acute lobe (fig. 22); first metasomal tergite movably joined to second tergite; dorsal carinae of first tergite nearly complete (fig. 21); laterope deep and large (fig. 16); second tergite without depressions and carinae (fig. 21); third tergite about as long as second tergite and partly open posteriorly (fig. 16); ovipositor sheath widened (fig. 16).

Distribution.— Palearctic; small genus with four known species.

Biology.— Parasites of Geometridae and Noctuidae.

Key to species of the genus *Acampsis* Wesmael

1. Hind femur (except black apex and slightly darkened base) red; dorsal and lateral pronope small; mesopleuron weakly crenulate anteriorly; antennal segments 35-36; maximum width of clypeus about 0.7 times minimum width of face (fig. 19); length of ovipositor sheath 0.22-0.23 times fore wing; palpi of both sexes dark brown; (West Palaearctic) *A. alternipes* (Nees, 1816)
- Hind femur completely black or blackish-brown; dorsal and lateral pronope deep and comparatively large (fig. 14); mesopleuron coarsely crenulate anteriorly (fig. 16); antennal segments 30-47; maximum width of clypeus 0.7-0.8 times minimum width of face (fig. 15); length of ovipositor sheath 0.13-0.15 or 0.27-0.28 times fore wing; palpi of ♂ may be largely yellowish, of ♀ dark brown; (East Palaearctic) .. 2
2. Antennal segments 30-36; length of ovipositor sheath 0.27-0.28 times fore wing; palpi of both sexes dark brown; length of fore wing 4.0-5.1 mm; hind tibia largely yellowish-brown or completely dark brown; maximal width of clypeus about 0.7 times minimum width of face (cf. fig. 19); clypeus largely depressed (figs 92, 98); length of antenna of ♀ 0.9-1.0 times fore wing (unknown of *A. granulatus*), of ♂ 1.1-1.2 times; submedial antennal segments of ♀ 1.0-1.1 times their width (fig. 90; unknown of *A. granulatus*); occipital carina absent (figs 92, 98); face rugose or coriaceous (figs 93, 103); precoxal sulcus narrowly sculptured or smooth; notauli somewhat wider 3
- Antennal segments 41-47; length of ovipositor sheath 0.13-0.15 times fore wing; palpi of ♂ largely yellowish, of ♀ dark brown; length of fore wing 6.0-7.8 mm; at least apical third of hind tibia dark brown; maximal width of clypeus about 0.8 times minimum width of face (fig. 15); clypeus hardly depressed (fig. 16); length of antenna of both sexes 1.2-1.4 times fore wing; submedial antennal segments of ♀ 1.2-1.3 times their width (fig. 23); occipital carina weakly developed laterally (fig. 17); face punctate (fig. 15); precoxal sulcus widely sculptured (fig. 16); notauli comparatively narrow (fig. 14) *A. nigrifemur* spec. nov.
3. Propodeum densely and finely granulate, dull, with small blunt tubercle lateromedially, and without rugae; hind tibia and fore femur completely dark brown; vertex and temples dorsally densely rugulose-punctate; precoxal sulcus smooth; temple comparatively wide (fig. 98); face coriaceous (fig. 103) *A. granulatus* spec. nov.
- Propodeum rugose and its interspaces smooth and shiny, and without tubercle laterally; hind tibia (except basally and its apical third) and apical half of fore tibia yellowish-brown; vertex and temples dorsally punctulate, largely smooth; precoxal sulcus coarsely punctate; temple less wide (fig. 92); face densely rugose (fig. 93) *A. brevis* spec. nov.

***Acampsis brevis* spec. nov.**
(figs 89-96)

Material.— Holotype, ♀ (RMNH), "Korea, Chonggyesan, Kyonggido, 25.vi.1984, coll. J.W. Lee". Paratypes (coll. Park; RMNH): 12 ♂♂, topotypic, 22.iv.1984 (6 ♂♂), 23.iv.1984 (2 ♂♂), 25.vi.1984 (3 ♂♂), 1.v.1984 (1 ♂).

Holotype, ♀, length of body 4.8 mm, of fore wing 4.4 mm; body with long, whitish setosity.

Head.— Antennal segments 32, length of antenna equal to length of fore wing, length of third segment 1.7 times fourth segment, length of third, fourth and penultimate segments 3.2, 1.8 and 1.0 times their width, respectively (figs 90, 91); submedial antennal segments as wide as long (fig. 90); length of maxillary palp 0.7 times height of head; occipital carina absent; in dorsal view length of eye equal to temple; OOL:diameter of ocellus:POL = 8:5:6; vertex and temple largely smooth, with some punctures near stemmaticum and eyes; frons coarsely rugose laterally and largely smooth medially; face densely rugose (fig. 93); maximum width of clypeus 0.7 times minimum width of face (fig. 93); clypeus depressed (fig. 92), largely punctate dorsally and rugose laterally (fig. 93); occipital flange rather large (fig. 92); malar space rugose, its length equal to basal width of mandible; mandible not distinctly twisted apically.

Mesosoma.— Length of mesosoma 1.4 times its height; dorsal and lateral pronope comparatively small; lateral carina of mesoscutum absent medially and anteriorly (but weakly developed in some paratypes); side of pronotum crenulate posteriorly; epicnemial area punctate-rugose; precoxal sulcus completely, narrowly and coarsely punctate; mesopleuron rugose antero-ventrally, remaining part sparsely punctate; pleural sulcus moderately crenulate; metapleuron coarsely reticulate; notauli complete, deep and crenulate, moderately wide (narrower in some paratypes); anterior half of mesoscutum punctate, remaining part smooth; scutellar sulcus with 5 carinae; axillar "wings" (= lateral carina of mesoscutum posteriorly) medium-sized; scutellum rather flat and sparsely punctate; metanotum with median carina anteriorly; propodeum convex, rather short, reticulate and shiny.

Wings.— Fore wing: r:3-SR:SR1 = 7:23:31; 1-SR+M nearly straight (fig. 89); 1-CU1:2-CU1 = 2:27; 2-SR:3-SR:r-m = 13:23:8; subbasal cell and area near 1-M sparsely setose (fig. 96).

Legs.— Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 3.7, 7.0 and 4.8 times their width, respectively; length of hind tibial spurs 0.5 and 0.6 times hind basitarsus.

Metasoma.— Length of first tergite 0.9 times its apical width, its surface rather coarsely reticulate-rugose, its dorsal carinae distinct in basal 0.7 of tergite; laterope very large and deep; second and third tergites completely and densely longitudinally rugose; third tergite somewhat compressed apically, medio-apically slightly concave and with narrow smooth rim; length of ovipositor sheath 0.27 times fore wing, rather widened and apically rounded (fig. 95).

Colour.— Black; basal half of fore and middle femora, and complete hind femur blackish-brown, remainder of femora yellowish-brown; fore, middle (except basal infuscation) and hind tibiae (except blackish apical fifth) yellowish-brown; tarsi infuscated; ovipositor sheath, palpi, apex of antenna, tegulae, pterostigma (except paler base), parastigma, veins, and metasoma ventrally dark brown; wing membrane indistinctly infuscated.

Variation.— Length of antenna of ♂ about 1.1 times fore wing; number of antennal segments of ♂ 30(1), 31(1), 33(3), 34(1), 35(3), or 36 (1); length of fore wing 4.0-5.1 mm; only apical third of hind tibia (partly) dark brown, exceptionally hind tibia completely yellowish-brown.

***Acampsis granulatus* spec. nov.**
(figs 97-103)

Material.— Holotype, ♂ (RMNH), "Korea, Gyeonggi-do [= Kyonggido], Gwangcheon-ri, 23.vi.1984, coll. J.W. Lee".

Holotype, ♂, length of body 6.3 mm, of fore wing 5.3 mm; body with long, whitish setosity.

Head.— Antennal segments 32, length of antenna 1.2 times length of fore wing, length of third segment 1.6 times fourth segment, length of third, fourth and penultimate segments 3.8, 2.4 and 1.8 times their width, respectively (figs 100, 101); submedial antennal segments 1.4 times longer than wide (fig. 100); length of maxillary palp 0.7 times height of head; occipital carina absent; in dorsal view length of eye 0.9 times temple; OOL:diameter of ocellus:POL = 10:5:12; frons coriaceous laterally, rugose medially with scattered smooth patches (fig. 103); vertex and temple densely rugulose-punctate dorsally; face coriaceous-granulate (fig. 103); maximum width of clypeus 0.7 times minimum width of face (fig. 93); clypeus somewhat depressed (fig. 98), largely finely granulate dorsally, some punctures ventrally (fig. 103); occipital flange rather large (fig. 98); malar space superficially coriaceous, its length 0.9 times basal width of mandible; mandible not distinctly twisted apically.

Mesosoma.— Length of mesosoma 1.4 times its height; dorsal and lateral pronope comparatively large and deep; side of pronotum densely punctate posteriorly; prepectal carina complete, but weak; epicnemial area, precoxal sulcus, and remainder of mesopleuron largely smooth, only some rugulosity present anteriorly; pleural sulcus finely crenulate; metapleuron coarsely reticulate; notauli complete, deep and distinctly crenulate; mesoscutum finely granulate superficially and shiny; scutellar sulcus with one weak carina; axillar "wings" medium-sized; scutellum rather flat and superficially coriaceous; metanotum with median carina anteriorly; propodeum less convex, and longer than of *A. brevis*, its surface finely granulate and dull, medio-laterally with blunt tubercle.

Wings.— Fore wing: r:3-SR:SR1 = 7:26:31; 1-SR+M straight (fig. 97); 1-CU1:2-CU1 = 1:13; 2-SR:3-SR:r-m = 12:26:8; subbasal cell and area near 1-M sparsely setose (fig. 99).

Legs.— Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 3.8, 7.4 and 6 times their width, respectively; length of hind tibial spurs 0.4 and 0.5 times hind basitarsus.

Metasoma.— Length of first tergite equal to its apical width, its surface (as of second and third tergites) densely longitudinally rugose, and rather flat, its dorsal carinae distinct in basal half of tergite; laterope medium-sized and rather deep; third tergite somewhat compressed apically and medio-apically truncate, with narrow smooth rim.

Colour.— Black; pterostigma completely dark brown; all femora completely black; all tibiae and tarsi completely dark brown; further coloured as *A. brevis*.

***Acampsis nigrifemur* spec. nov.**
(figs 13-18, 20-24)

Material.— Holotype, ♀ (ELF), "[Japan], Futagoyama, Anamizu-machi, Ishikawa Pref., 27.v.1979, I. Togashi", "Host: *Orthosia carnipennis* Butler, (fed on chestnut)". Paratypes (9 ♀♀ + 17 ♂♂): 3 ♀♀ + 11 ♂♂ (coll. Park; RMNH), "Korea, Chonggyesan, Kyonggido, 25.vi.1984, coll. J.W. Lee"; 1 ♂ (coll. Togashi),

"[Japan], Mitsutami, Komatsu City, Ishikawa Pref., 8.v.1977, I. Togashi"; 1 ♀ (RMNH), "[Japan], Mt. Shiritaka, Tsurugi-machi, Ishikawa Pref., 17.v.1970, I. Togashi"; 1 ♂ (RMNH), "[Japan], Mt. Koshu, Wajima-shi, Ishikawa Pref., 28.iv.1963, I. Togashi"; 2 ♂♂ (RMNH), "[Japan], Fukaze, Okuchi-mura, Ishikawa Pref., v.6, 1979, I. Togashi"; 2 ♂♂ + 1 ♀ (National Institute of Agro-Environmental Sciences, Tsukuba; RMNH), "[Japan], Shikishima Is., Izushichitō Isle, em. vi.1988, T. Nobuchi leg.", "Host: *Descoreba simplex* Butler (pupa)"; 1 ♀ (ELF), "[Japan], Mt. Shinbo-dake Asahi-mura, Niigata Pref., 5.vi.1980, K. Maetō leg."; 1 ♀ (ELF), "Hokkaido Univ. Exp. Forest, Tomakomai City, Hokkaido, 18-20.vi.1980, H. Takemoto leg.", "Japan"; 1 ♀ (ELF), "Mt. Kurodake, Mts. Kuju, Oita Pref., 27.iv.1985, N. Abe leg.", "Japan"; 1 ♀ (RMNH), "Mt. Daisen Tottori Pref., 29.v.1983, (L.T.), K. Konishi leg.", "Japan".

Holotype, ♀, length of body 10.0 mm, of fore wing 7.8 mm.

Head.— Antennal segments 44, densely short, and whitish setose, length of antenna 1.2 times length of fore wing, length of third segment 1.7 times fourth segment, length of third, fourth and penultimate segments 3.5, 2.1 and 1.2 times their width, respectively (figs 23, 24); submedial antennal segments 1.2 times longer than wide (fig. 23); length of maxillary palp 0.9 times height of head; occipital carina weak, low, just reaching upper level of eyes and reduced ventrally; in dorsal view length of eye 0.9 times temple; OOL:diameter of ocellus:POL = 8:4:6; frons largely coarsely reticulate, except for smooth area in front of anterior ocellus, and laterally largely smooth (fig. 17); vertex punctulate, convex; face rather flat and densely finely punctate (fig. 15); maximum width of clypeus 0.8 times minimum width of face (fig. 15); clypeus rather flat (fig. 16), coarsely punctate, except for area near its ventral margin (fig. 15); occipital flange large (fig. 16); malar suture absent, except for a wide weak depression; length of malar space 1.3 times basal width of mandible; mandible not distinctly twisted apically, with long setae, both teeth robust and wide, upper tooth longer than lower tooth.

Mesosoma.— Length of mesosoma 1.5 times its height; dorsal and lateral pronope rather large and deep (fig. 15); side of pronotum medially and posteriorly largely punctate-rugose, coarse, remainder largely smooth or finely punctate (fig. 16); prepectal carina complete, but weakly developed below level of precoxal sulcus; epicnemial area coarsely crenulate; precoxal sulcus complete, widely and coarsely crenulate and partly punctate (fig. 16); remainder of mesopleuron finely punctate; pleural sulcus coarsely crenulate (fig. 16); metapleuron coarsely reticulate; notauli complete, deep and distinctly crenulate, but shallow and not meeting posteriorly; mesoscutum finely punctulate and shiny; scutellar sulcus with three weak carinae; axillar "wings" wide; scutellum rather flat and sparsely punctulate; metanotum without median carina anteriorly; propodeum coarsely reticulate, with a long V-shaped areola posteriorly (fig. 14), medio-laterally only angularly protruding.

Wings.— Fore wing: r:3-SR:SR1 = 7:37:44; 1-SR+M slightly bent, with short protuberance (fig. 13); 1-CU1:2-CU1 = 2:19; 2-SR:3-SR:r-m = 18:37:12; subbasal cell and area near 1-M largely glabrous (fig. 20).

Legs.— Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 4.2, 7.6 and 5 times their width, respectively; length of hind tibial spurs 0.4 and 0.5 times hind basitarsus.

Metasoma.— Length of first tergite 1.2 times its apical width, its surface densely and coarsely reticulate (fig. 21), concave basally and rather flat medially, its dorsal carinae distinct nearly to apex of tergite; laterope large and deep; second and third tergites longitudinally cellulate-rugose and medially only longitudinally rugulose; second tergite somewhat depressed anteriorly and crenulate (fig. 21); third tergite slightly excavated and with narrow smooth rim (fig. 16).

Colour.— Black; apical half of fore femur, fore tibia, all tarsal segments more or less apically, basal 0.6 of middle lobe, subbasal third of hind tibia (with its base blackish), reddish-brown; pterostigma, parastigma, and veins largely, dark brown; wing membrane infuscated, especially apico-anteriorly.

Biology.— Parasite of *Orthosia carnipennis* Butler (Noctuidae) on chestnut trees and of *Descoreta simplex* Butler (Geometridae).

Distribution.— Japan, S Korea.

Variation.— Length of antenna 1.2-1.4 times fore wing; antennal segments of ♀ 42(1), 43(3), or 44(4), of ♂ 41(1), 42(3), 43(6), 44(2), 45(1), or 47(1); length of fore wing of ♀ 6.9-7.8 mm, of ♂ 6.0-7.2 mm; clypeus 0.75-0.8 times minimal width of face; vein 1-SR+M of fore wing of paratypes without protuberances, only slightly sinuate; third tergite of ♂ truncate posteriorly; fore tibia, fore and middle tarsi, and palpi of ♂ (except for dark brown base) yellowish; palpi of ♀ black(ish); complete hind tibia may be brownish; propodeal areola may be parallel-sided; length of ovipositor sheath 0.10-0.13 times fore wing.

Tribe Sigalphini Blanchard, 1845

Sigalphites Blanchard, 1845: 166.

Diagnosis.— Malar suture absent (fig. 59); frons without median carina; occipital flange enlarged (figs 41, 56) or narrow (fig. 68); face with medial areola enclosed by sublongitudinal depressions (figs 39, 59, 65); posterior propleural flange absent or minute (figs 41, 56, 68); medial and lateral pronope present (figs 42, 62); parastigma enlarged (figs 51, 64); vein M+CU1 of fore wing slightly curved (fig. 51); vein 1-M of fore wing 0.8-1.6 times vein m-cu, resulting in a transverse first discal cell (figs 37, 51, 64); vein 2-CU of hind wing long (figs 37, 51); vein r of fore wing connected linearly to vein 3-SR (figs 37, 51), but less in *Aposigalphus* (figs 115, 116) and issued submedially from pterostigma (figs 37, 115) or issued more basad (fig. 64); hind basitarsus compressed; tarsal claws with large lobe (figs 57, 74); first metasomal tergite without distinct depression posteriorly, tergite in lateral view comparatively short (figs 41, 56), movably joined to second tergite; second tergite with strong or weak carinae and medial areola (fig. 46) or carinae and areola absent (figs 63, 76), and with pair of anterior depressions; second metasomal suture rather deep and wide (figs 41, 56); third tergite strongly convex (figs 41, 56, 68); ovipositor sheath short and widened (figs 47, 61, 68).

Distribution.— Contains three genera: the Holarctic and Afrotropical *Sigalphus* Latreille, 1802, and two new genera from Australia: *Notosigalphus* and *Aposigalphus*.

Aposigalphus gen. nov. (figs 64-77, 107-113)

Type species: *Aposigalphus tessi* spec. nov.

Etymology: from “apo” (Greek for “separate, off”) and the generic name “*Sigalphus*”, because it is the most derived genus closest to the genus *Sigalphus*. Gender: masculine.

Diagnosis.— Frons with pair of lateral carinae connected dorsally to antennal sockets (fig. 65); stemmaticum triangular and without protuberances (fig. 65); malar suture absent (figs 66, 67); occipital carina completely absent, but occiput may be abruptly rounded or angled giving impression of a faint carina; occipital flange rather narrow (fig. 68), compared to *Notosigalphus*; dorsal and lateral pronope present, round (fig. 68); transverse suture of mesoscutum absent (fig. 75); notauli absent or only faintly indicated and unsculptured (figs 75, 113); prepectal carina completely absent (fig. 68), but sometimes indicated by faintly impressed line medio-ventrally; propodeal spiracle elliptical and situated in front of middle of propodeum; second submarginal cell of fore wing wide (fig. 64); length of vein 1-M of fore wing 1.2-1.3 times vein m-cu, and veins subparallel (fig. 64); vein 1-SR of fore wing short; vein r of hind wing present (fig. 64); vein 2-CU of hind wing comparatively long; hind leg rather robust (fig. 69); tarsal claws medium-sized and with small and acute lobe (fig. 74); first tergite medium-sized and distinctly convex in lateral view (but without distinct hump; fig. 68), and movably joined to second tergite; first tergite without depressions posteriorly; laterope absent (fig. 68); dorsal carinae of first tergite only present in basal 0.8 of tergite and carinae converging; second tergite with pair of elongate basal depressions and without differentiated median area or carinae (fig. 76); constriction between second and third tergites absent (fig. 76) or present (fig. 107); medial length of third tergite about 1.3 times medial length of second tergite (figs 68, 110); third tergite with wide subtruncate (partly crenulate) lamella ventro-posteriorly, no teeth, and partly closed apically (figs 68, 72); ovipositor sheath about as long as hind basitarsus.

Distribution.— Contains three Australian species.

Biology.— Unknown.

Key to species of the genus *Aposigalphus* nov.

1. Fore wing vein 1-SR+M straight, and vein 1-CU1 absent (fig. 64); first metasomal tergite with dorsal carinae widely spaced (fig. 76), in lateral view anterior and posterior surface angled but not abruptly humped (fig. 68); lateral margins of metasoma (viewed dorsally) straight at suture between second and third tergites (fig. 76); second and third tergites without medial crest-like carina; third tergite slightly longer than second (measured in lateral view), smooth laterally, faintly costate-rugose medially (figs. 68, 73) *A. tessi* spec. nov.
- Fore wing vein 1-SR+M faintly sinuate, and vein 1-CU1 present, about 0.2 times length of 2-CU1 (figs 111, 112); first tergite with dorsal carinae much closer together than to margins of tergite in posterior part, forming margins to narrow, more abrupt medial hump (figs 107, 110); lateral margins of metasoma (viewed dorsally) distinctly constricted at suture between second and third tergites (fig. 107); second (and sometimes third) tergite with medial crest-like carina (fig. 107); third tergite slightly shorter than second (measured in lateral view) (fig. 110), costate antero-medially, becoming costate-rugose and coarsely rugose posteriorly 2
2. Notauli absent, indicated by faint indentations on latero-anterior margins of mesoscutum and shallow depression on posterior part, medial and lateral lobes not defined (fig. 108); propodeum smooth and glabrous in anterior two-thirds,

with two short, indistinct carinae postero-medially and a few scattered punctures in posterior one-third (fig. 108); body length less than 7.2 mm

- *A. kiestyni* spec. nov.
- Notauli indicated by smooth, shallow, percurrent grooves and deeper depression posteriorly, medial and lateral lobes clearly delineated but not markedly convex (fig. 113); propodeum completely smooth and polished, with a few small crenulae along posterior margin (fig. 113); body length more than 7.5 mm
- *A. brycei* spec. nov.

***Aposigalphus brycei* spec. nov.**

(figs 112, 113)

Material. — Holotype, ♀ (ANIC), "10 km SW Paynes Find, W.A., 29 viii.1981, G.A. Holloway". Paratype: 1 ♀ (WARI), "10 km N Mamd Loch [?= Marvel Loch], W.A., 18.ix.1981, H. & A. Howden".

Holotype, ♀, length of body 9.5 mm, of fore wing 8.7 mm.

Head.— Antennae intraspecifically variable, with 46-48 segments, length of third segment 1.5 times fourth, length of third, fourth, and penultimate segments 2.8, 2.0, and 0.8 times their width, respectively; length of maxillary palp 0.8 times height of head; in dorsal view length of eye 1.2 times temple (fig. 113); temple virtually completely smooth, except for sparse punctulation; OOL: diameter of posterior ocellus: POL = 38:15:28; frons smooth, largely glabrous; vertex rather flattened, sparsely setose; face convex medially, punctulate, with pair of submedial, pitted grooves dorsally, not ending in a pit; clypeus faintly depressed medially, punctulate, its ventral margin virtually straight and thin; occiput moderately concave (fig. 113); occiput broadly rounded in dorsal and dorso-lateral parts, angled in lateral and ventro-laterally (adjacent to lower margin of eye) but without a carinate margin; length of malar space 1.3 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; sides of pronotum with percurrent carina dorso-medially separating dorsal pronotum from sides, remainder smooth; mesosternal sulcus smooth and medium-sized; epicnemial area smooth; precoxal sulcus smooth; remainder of mesopleuron smooth and glabrous antero-medially, remainder sparsely punctulate; pleural sulcus finely crenulate; metapleuron with some rugosity in posterior one-third, remainder sparsely punctulate; notauli indicated by percurrent smooth depressions joining medio-posteriorly with a large, wide and shallow depression, medial and lateral lobes clearly delineated (fig. 113); scutellum rather flat and sparsely punctulate; side of scutellum with 3-4 crenulae; medio-posterior scutellar depression narrow and crenulate; metanotum with indistinct median carina not protruding dorsally, laterally with 2-3 carinae, remainder smooth; propodeum smooth, glabrous medially, sparsely punctulate laterally, with a few minute striae along posterior margin (fig. 113).

Wings.— Fore wing: r:3-SR:SR1 = 10:46:45; basal cell sparsely setose, subbasal cell glabrous in basal three-quarters, sparsely setose apically; 1-SR+M faintly sinuate; SR1 distinctly sinuate (fig. 112); 1-CU1:2-CU1 = 6:55; 2-SR:3-SR:r-m = 20:46:21. Hind wing: basal and subbasal cells sparsely setose, each virtually glabrous in posterior half of cell.

Legs.— Length of femur, tibia and basitarsus of hind leg 3.8, 7.2 and 5.3 times their width, respectively; length of hind tibial spurs 0.4 and 0.5 times hind basitarsus.

Metasoma.— Length of first tergite 0.7 times its apical width, 1.1 times its basal width (measured posterior to petiolar constriction), its surface areolate-rugose in postero-laterally, faintly rugose antero-laterally, costate-rugose postero-medially, basally flat and smooth, its dorsal carinae distinguishable in basal 0.6-0.7, near parallel in posterior part, here much closer to each other than lateral margins of tergite, in lateral view surface of tergite abruptly humped; lateral margins of metasoma (viewed dorsally) strongly constricted at suture between second and third tergites; second tergite costate-rugose, without median crest-like carina; third tergite slightly shorter than second (best seen in lateral view), subequal in length when viewed dorsally, costate-rugose in about anterior one-third, remainder coarsely rugose, posterior metasoma with wide, crenulate lamella with faintly convex margin posteriorly; ovipositor sheath not visible; hypopygium small, broadly pointed apically.

Colour.— Antennae, mesosoma, coxae, hind leg and third metasomal tergite black; head yellow-orange, with black patch covering medial face and frons, vertex and occiput; fore leg yellowish-orange, mid leg black in basal part from middle of femur, remainder of leg yellowish-orange; first and second metasomal tergites yellow, with small black patch postero-medially on first tergite, and larger triangular patch postero-medially on second tergite black; wings dark brown in distal half, lighter proximally, veins dark brown to black, becoming lighter distally.

Variation.— The paratype female is very similar to the holotype, except that the tarsal segments of the fore and mid legs are brown, and the constriction at the margin between the second and third tergites is slightly more prominent; body length and fore wing length 7.7 mm and 7.4 mm, respectively.

***Aposigalphus kiestyni* spec. nov.**

(figs 107-111)

Material.— Holotype, ♀ (ANIC), "W. Australia, Lake Violet, 6 mi. S Wiluna, 23-27 ix.1969", "Coll. H. Evans, R.W. Matthews". Paratypes (2 ♂♂): 1 ♂ (WARI), topotypic, "23-27 ix.1969", "Coll. H. Evans, R.W. Matthews"; 1 ♂ (ANIC), "31 22S 118 47E, 9 km E by S, Carrabin WA, 9 x.1981, I.D. Naumann, J.C. Cardale.

Holotype, ♀, length of body 6.7 mm, of fore wing 6.0 mm.

Head.— Antennae of holotype broken, one with 34 remaining segments (43 segments in ♂), length of third segment 1.5 times fourth, length of third and fourth segments 2.7 and 1.8 times their width, respectively; penultimate segment missing in holotype; length of maxillary palp 0.6 times height of head; in dorsal view length of eye 1.1 times temple (fig. 109); temple virtually completely smooth, except for sparse micro-punctures; OOL:diameter of posterior ocellus:POL = 35:15:21; frons smooth, largely glabrous; vertex rather flattened, sparsely setose; face convex medially, sparsely punctulate, with pair of submedial grooves, dorsally not ending in a pit; clypeus depressed medially, punctulate, its ventral margin slightly concave and thin; occiput moderately concave in dorsal view (fig. 109), and broadly rounded in dorsal and dorso-lateral parts, sharply rounded ventro-laterally (adjacent to lower margin of eye) giving impression of faint occipital carina ventrally; length of malar space 1.2 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; sides of pronotum with a

few crenulae dorso-medially, remainder smooth; mesosternal sulcus smooth and medium-sized; epicnemial area with some faint crenulae dorsally; precoxal sulcus smooth except for 1-2 faint crenulae anteriorly; remainder of mesopleuron smooth and glabrous; pleural sulcus finely crenulate; metapleuron with anterior and posterior parts divided by crenulate band, ventral margin crenulate with a few large punctures above, remainder of metapleuron punctulate; notauli indicated only by smooth impressions at anterior margin of mesoscutum, medio-posteriorly with large, wide and shallow depression, medial and lateral lobes not delineated (fig. 108); scutellum rather flat and sparsely punctulate; side of scutellum with 2-3 crenulae in apical one-third, smooth toward wing base; medio-posterior scutellar depression narrow, with 4-5 faint crenulae; metanotum with indistinct median carina not protruding dorsally, laterally with 2 carinae, the 2 carinae closest to the mid line incomplete; propodeum smooth and glabrous in anterior two-thirds, with 2 short, indistinct carinae postero-medially and a few scattered punctures in posterior one-third (fig. 108).

Wings.— Fore wing: $r:3\text{-SR:SR1} = 7:28:29$; basal and subbasal cells sparsely setose; 1-SR+M faintly sinuate; SR1 slightly curved outwards (fig. 111); $1\text{-CU1:2-CU1} = 7:33$; $2\text{-SR:3-SR:r-m} = 15:27:12$. Hind wing: basal cell sparsely setose; subbasal almost glabrous.

Legs.— Length of femur, tibia and basitarsus of hind leg 3.8, 5.7 and 3.3 times their width, respectively; length of hind tibial spurs 0.4 and 0.5 times hind basitarsus.

Metasoma.— Length of first tergite 0.8 times its apical width, and equal to its basal width (measured posterior to petiolar constriction), its surface areolate-rugose in posterior part, smooth antero-laterally, finely costate-rugose postero-medially (fig. 107), basally flat and smooth; dorsal carinae of first tergite distinguishable in basal 0.5-0.6, parallel in posterior part, here much closer to each other than lateral margins of tergite, in lateral view surface of tergite abruptly humped (fig. 110); lateral margins of metasoma (viewed dorsally) strongly constricted at suture between second and third tergites (fig. 107); second tergite costate-rugose, with prominent medial crest-like carina; third tergite slightly shorter than second (best seen in lateral view; fig. 110), costate antero-medially, becoming costate-rugose and coarsely rugose posteriorly (figs 107, 110), posterior margin with wide, crenulate lamella, margin faintly convex posteriorly; ovipositor sheath (total length) about 0.8 times length of hind basitarsus; hypopygium small, broadly pointed apically.

Colour.— Antennae, mesosoma, coxae, hind femur and third metasomal tergite black; head yellow-orange, with medial black patch covering medial frons, vertex and occiput; fore leg, mid femur and tibia yellowish-orange, mid tarsal segments brown; hind tibia and tarsi dark brown; first and second metasomal tergites yellow, with small black patch postero-medially on first tergite, medial area of second tergite extensively black; wings dark brown in distal two-thirds, lighter proximally, veins dark brown, becoming lighter distally; hypopygium of male small, truncate posteriorly.

Variation.— The two male paratypes vary substantially in colour: one is similar to the holotype but has the black area on the second metasomal tergite smaller and positioned more posteriorly, the other has the dorsal half of the face, the frons and occiput extending to the eye margin, the hind legs and probably the mid legs (broken) all black; this specimen also has slightly longer postero-medial carinae on the propodeum; both males have a prominent medial crest-like carina on the third metasomal tergite; body length and fore wing length 6.1-7.1 mm and 5.8-6.3 mm, respectively.

Aposigalphus tessi spec. nov.
(figs 64-77)

Material.— Holotype, ♀ (ANIC), "28 km W. Yalgoo, W.A., 1 ix.1981, G.A. Holloway". Paratypes (8 ♀♀, 1 ♂): 3 ♀♀ (AMSA, RMNH, WARI), topotypic, "1 ix.1981, G.A. Holloway"; 3 ♀♀ (2 ♀♀ AMSA, 1 ♀ ANIC), "2 ix.1981, G.A. Holloway"; 1 ♀ (WARI), "10 km SW Paynes Find, W.A., 29 viii.1981, G.A. Holloway"; 1 ♀ (ANIC), "31 21S 118 57E, 2 km SW by W Noongar, W.A., 9 x.1981, I.D. Naumann, J.C. Cardale"; 1 ♂ (WAMP), "W. Aust. 7 km N of Boollogooro HS, (24 39S 113 42E), 27-29 viii.1980, C.A. Howard & T.F. Houston, 336-6", "on flower of *Grevillea eriostachya*".

Holotype, ♀, length of body 8.2 mm, of fore wing 8.5 mm.

Head.— Antenna with 44 segments, (42-43 in male), length of third segment 1.4 times fourth, length of third, fourth, and penultimate segments 2.5, 1.8, and 1.1 times their width, respectively (fig. 70); length of maxillary palp 0.7 times height of head; in dorsal view length of eye 1.1 times temple (fig. 65); temple virtually completely smooth, except for sparse micro-punctures; OOL: diameter of posterior ocellus:POL = 9:3:5; frons smooth (except few crenulae sublaterally), largely glabrous; vertex rather flattened, sparsely setose; face convex medially, sparsely punctulate, with pair of submedial grooves, dorsally not ending in a pit (fig. 66); clypeus depressed medio-ventrally, densely punctate laterally, sparsely medially (fig. 66), its ventral margin slightly concave and thin; occiput not particularly concave in dorsal view (fig. 65), rounded both in dorsal and lateral parts; length of malar space equal to basal width of mandible.

Mesosoma.— Length of mesosoma 1.4 times its height; sides of pronotum with a few crenulae medially, remainder smooth (fig. 68); mesosternal sulcus smooth and medium-sized; epicnemial area largely smooth, with some crenulae dorsally; precoxal sulcus impressed only (except anteriorly), smooth except for 1-2 faint crenulae posteriorly; remainder of mesopleuron smooth and glabrous; pleural sulcus finely crenulate; metapleuron punctulate; notauli indicated only by smooth impressions at anterior margin of mesoscutum, medio-posteriorly with large, wide and shallow depression, medial and lateral lobes not delineated (fig. 75); scutellum rather flat and largely smooth sparsely punctulate; side of scutellum with 4-5 coarse crenulae; medio-posterior scutellar depression narrow and crenulate; metanotum without median carina and not protruding dorsally; surface of propodeum smooth and glabrous medially, punctulate laterally, with a few short, indistinct rugulae postero-medially (fig. 75).

Wings.— Fore wing: r:3-SR:SR1 = 7:42:42; basal and subbasal cells sparsely setose; 1-SR+M straight; SR1 slightly sinuate (fig. 64); 1-CU1 absent, cu-a subinterstitial, inclivous (fig. 64); 2-SR:3-SR:r-m = 19:42:19. Hind wing: basal cell evenly setose; subbasal cell almost glabrous.

Legs.— Length of femur, tibia and basitarsus of hind leg 3.5, 6.0 and 3.4 times their width, respectively; length of hind tibial spurs 0.5 and 0.6 times hind basitarsus.

Metasoma.— Length of first tergite 0.9 times its apical width, and 1.2 times its basal width (measured posterior to petiolar constriction), its surface longitudinally costate-rugose (figs 68, 76), basally flat, its dorsal carinae distinguishable in basal 0.5-0.6, broadly separated, in lateral view surface evenly convex, not abruptly humped; lateral margins of metasoma (viewed dorsally) straight at suture between second and third tergites (fig. 76); second tergite mostly costate-rugose except for finer rugosity in medial longitudinal line, without medial crest-like carina or medially

raised area; third tergite slightly longer than second (best seen in lateral view), smooth laterally, finely costate-rugose medially (fig. 76) posterior margin with wide, crenulate, broadly concave lamella (figs. 68, 72); ovipositor sheath (total length) about equal to length of hind basitarsus, and 0.08 times fore wing; hypopygium small, broadly pointed apically.

Colour.— Antennae, palpi, pronotum, mesosternum, metanotum, coxae, basal two-thirds of fore and mid legs, and hind legs black; head yellow-orange, with medial black patch covering vertex and medial frons; remainder of fore and mid legs yellowish-orange; scutum and anterior half of scutellum, propodeum and most of mesopleuron red-brown, posterior half of scutellum and epicnemial area of mesopleuron black; first and second metasomal tergites yellow, each with a postero-medial black patch; third metasomal tergite black, marginal lamella yellow; wings dark brown in apical half, lighter brown basally; veins in wings black, except for more distal veins in hind wing which are dark brown.

Variation.— Some paratype females have the mesosoma and second metasomal tergite more extensively blackened, i.e. the scutum, and margins of the propodeum and mesopleuron, and from half to all but narrow lateral margins of second tergite are black; the male paratype has the scutum mostly black with the position of the notauli indicated by two red-brown bands; females are variable in body length and wing length, 7.7-8.9 mm and 7.7-8.5 mm, respectively; antennal segments numbering 43-45 (females), the male paratype has the number of segments variable (42-43); hypopygium of male small, truncate posteriorly.

Notosigalphus gen. nov.
(figs 51-63, 104-106)

Type species: *Sphaeropyx conjugator* Turner, 1917.

Etymology: from "notos" (Greek for "south") and the generic name "*Sigalphus*", because it concerns a genus of Sigalphini comparatively close to the genus *Sigalphus*, but occurring far more southerly than *Sigalphus*. Gender: masculine.

Diagnosis.— Frons with some curved carinae and with pair of lateral crests connected to antennal sockets dorsally (fig. 58); stemmaticum transverse and without protuberances (fig. 58); malar suture absent (fig. 59); occipital carina present laterally, connected to the large and concave occipital flange (fig. 54), absent dorsally; dorsal pronope present (fig. 62); lateral pronope medium-sized, round (figs 56, 62); transverse suture of mesoscutum absent (fig. 62); notauli reduced or percurrent, without sculpturing; prepectal carina present, reaching precoxal sulcus in males (fig. 56), but not in females; propodeal spiracle elliptical and situated in front of middle of propodeum; second submarginal cell of fore wing rather robust (fig. 51); vein 1-M of fore wing about 1.5 times vein m-cu, and posteriorly slightly diverging (fig. 51); vein 1-SR of fore wing and vein r of hind wing present (fig. 51); vein 2-CU of hind wing comparatively long; hind leg rather robust (fig. 52); tarsal claws medium-sized and with rather large obtuse lobe (fig. 57); first tergite medium-sized, in lateral view with sub-medial hump distinct (fig. 56), and movably joined to second tergite; first tergite without depressions posteriorly; laterope deep (fig. 56); dorsal carinae of first tergite only present in basal 0.6 of tergite and carinae converging; second tergite with pair of

elongate basal depressions and without differentiated median area or carinae (fig. 63); constriction between second and third tergites present (fig. 63) or absent (fig. 104); medial length of third tergite about 1.2 times medial length of second tergite (figs 56, 63); third tergite with wide crenulate lamella ventro-posteriorly, without teeth, and closed apically (fig. 56); ovipositor sheath about as long as hind basitarsus, and about 0.1 times fore wing.

Distribution.— Contains two Australian species.

Biology.— One species recorded as a parasite of *Capusa senilis* Walker (Geometridae).

Key to species of the genus *Notosigalphus* nov.

1. Notauli percurrent, smooth, dividing mesoscutum into distinct medial and lateral lobes (fig. 104); fore wing of ♀ evenly infusate throughout, of ♂ hyaline in basal half, SR1 slightly curved outwards; propodeum and dorsal metasoma covered with dense, long, fine white setae which partly hide underlying sculpturing (figs 104, 105); first metasomal tergite of ♀ 1.5 times as long as basal width (measured posterior to petiolar constriction) (fig. 104), of ♂ 1.4 times as long as basal width; second tergite without median crest-like carina, but faintly raised in mid longitudinal line (fig. 104); head orange, mesosoma and third metasomal tergite black, first and second metasomal tergites reddish-orange *N. joshuai* spec. nov.
- Notauli indicated only by smooth impressions at anterior margin of mesoscutum and in posterior part so that medial and lateral lobes are not clearly delineated (fig. 62); fore wing of both sexes infusate in apical half, SR1 slightly sinuate (fig. 51); propodeum and dorsal metasoma sparsely covered with fine, long setae; first metasomal tergite of both sexes 1.2 times as long as basal width (measured posterior to petiolar constriction) (fig. 63); second tergite with median crest-like carina (fig. 63); head and mesosoma orange, metasomal tergites orange, sometimes third tergite slightly darker *N. conjugator* (Turner)

Notosigalphus conjugator (Turner, 1917) comb. nov. (figs 51-63)

Sphaeropyx conjugator Turner, 1917: 245.

Sigalphus conjugator; Parrott, 1953: 204; Shenefelt, 1973: 934.

Material.— Holotype (BMNH), ♂, "Type H.T.", "B.M. Type Hym. 3.c.862"; "*Sphaeropyx conjugator* Turn., Type", "S.W. Australia, Yallingup, 23. Dec. [19]13-23.Jan. [19]14, R.E. Turner, 1914-60"; 2 ♂♂, paratypes (BMNH), "Co-Type" [yellow label], topotypic, "Nov. 1913, R.E. Turner, 1914-190", "*Sphaeropyx conjugator* Turn., Cotype"; 1 ♀ (ANIC), "W. Australia, Tim's Thickets 12 mi. S. Mandurah, 17 Oct. 1969", Coll. H. Evans, R.W. Matthews".

Holotype, ♂, length of body 8.4 mm, of fore wing 7.3 mm.

Head.— Remaining antennal segments 39 (of other ♀ 46, of ♂ 48), length of third segment 1.5 times fourth segment, length of third and fourth segments 3.0 and 2.0 times their width, respectively; penultimate antennal segment of ♀ from Tim's Thickets 0.8 times its width (fig. 53); length of maxillary palp 0.7 times height of head; in dorsal view length of eye as long as temple (fig. 58); occipital carina strong;

temples punctulate and posteriorly subparallel; OOL:diameter of posterior ocellus: POL = 35:15:23; frons largely smooth, except for a shallow median groove, largely glabrous; vertex rather flattened, setose, largely smooth; face convex, laterally punctate, with interspaces larger than diameter of punctures, with pair of submedial grooves dorsally ending in a pit (fig. 59); clypeus depressed medially and with some coarse punctures (fig. 59), its ventral margin slightly concave and thin; occipital flange concave (fig. 54); length of malar space 1.3 times basal width of mandible.

Mesosoma.— Length of mesosoma 1.3 times its height; side of pronotum medio-anteriorly and posteriorly crenulate, remainder largely smooth (fig. 56); mesosternal sulcus smooth and medium-sized; prepectal carina strong ventrally and not reaching anterior margin of mesopleuron (fig. 56); epicnemial area with some crenulae dorsally; precoxal sulcus complete and coarsely crenulate; remainder of mesopleuron largely punctulate; pleural sulcus coarsely crenulate; metapleuron finely punctate and ventrally coarsely rugose; notauli not distinctly impressed on disc, smooth; mesoscutum rather flat, smooth, with long setae, medio-posteriorly with large, wide and shallow depression (fig. 62); scutellum rather flat and finely punctate, with long setae; side of scutellum coarsely crenulate; metanotum not protruding dorsally, without median carina; propodeum with rugosity radiating from posterior margin (fig. 62), laterally with some rugosity and antero-laterally with some crenulation, its remainder smooth, without defined medial area or median carina.

Wings.— Fore wing: r:3-SR:SR1 = 9:35:35; subbasal cell sparsely setose; 1-SR+M slightly sinuate; SR1 sinuate (fig. 51); 1-CU1:2-CU1 = 5:40; 2-SR:3-SR:r-m = 18:35:16. Hind wing: wing membrane glabrous basally.

Legs.— Hind coxa punctulate; length of femur, tibia and basitarsus of hind leg 3.6, 8.0 and 4.6 times their width, respectively; length of hind tibial spurs 0.4 and 0.5 times hind basitarsus.

Metasoma.— Tergites sparsely covered with fine setae; length of first tergite 0.9 times its apical width, and 1.2 times its basal width (measured posterior to petiolar constriction), its surface costate-rugose (fig. 63), basally flat, its dorsal carinae present in basal 0.6 and well separated apically; second tergite costate-rugose, rather reticulate, with median crest-like carina; third tergite smooth antero-laterally, costate-rugose medially, remaining part coarsely rugose (fig. 63), with faint median carina in anterior half, posterior and lateral margins with wide, crenulate lamella, no teeth (fig. 61); hypopygium of ♂ small, of ♀ short and truncate apically.

Colour.— Black; fore femur and tibia, and metasoma yellowish-brown; palpi, remainder of fore leg, propleuron, tegulae, veins, pterostigma, and parastigma dark brown; basal third of fore wing and basal half of hind wing largely subhyaline, and remainder dark brown.

Variation.— The female has the palpi and middle leg yellowish-brown; the antenna with 46 segments; the middle tarsus, hind tibia and tarsus (dark) brown, the length of the fore wing 6.5 mm, and of the body 8.0 mm, the length of the ovipositor sheath about 1.1 times length of hind basitarsus and 0.08 times fore wing, and the ovipositor sheath dark brown.

Notosigalphus joshuai spec. nov.
(figs 104-106)

Material.— Holotype, ♀ (ANIC), "BULLS HD [= Bulls Head Creek, New South Wales], E. DALRYMP [= *Eucalyptus dalrympleana*], [coll.] KD & HM, 19.xii.[19]72". Paratype (1 ♀): 1 ♀ (WARI), "35 37S 148 11E, Pilot Hill, NSW, C.P. Omart Coll", "*Eucalyptus delegatensis* foliage", "ex *Capusa senilis* (Geometridae)".

Holotype, ♀, length of body 9.1 mm, of fore wing 7.8 mm.

Head.— Antenna with 51 segments, length of third segment 1.5 times fourth, length of third and fourth segments 3.2 and 2.1 times their width, respectively; penultimate segment 1.2 times its width; length of maxillary palp 0.7 times height of head; in dorsal view length of eye 0.9 times temple (fig. 104); temple punctulate; OOL:diameter of posterior ocellus:POL = 40:12:20; frons smooth, largely glabrous; vertex rather flattened, setose, largely smooth; face convex, punctulate, with pair of submedial grooves, dorsally ending in a pit; clypeus depressed medially, punctulate, its ventral margin slightly concave and thin; occipital flange concave; occipital carina very fine; length of malar space 1.5 times basal width of mandible; mandible strongly twisted apically.

Mesosoma.— Length of mesosoma 1.5 times its height; sides of pronotum medio-anteriorly and posteriorly faintly crenulate, remainder largely smooth (fig. 105); mesosternum densely covered with long fine setae; mesosternal sulcus smooth and medium-sized; prepectal carina strong ventrally, not reaching to precoxal sulcus, area between with several coarse punctures (figs 105, 106); epicnemial area with some crenulae dorsally; precoxal sulcus largely smooth except for few faint crenulae anteriorly; remainder of mesopleuron largely punctulate; pleural sulcus coarsely crenulate; metapleuron finely punctate in dorsal part, coarsely rugose ventrally; notauli percurrent though not distinctly impressed, medial and lateral lobes clearly delineated; mesoscutum rather flat, smooth, with sparse long fine setae, with large, wide, shallow depression medio-posteriorly (fig. 104); scutellum rather flat and punctulate; side of scutellum mostly smooth except for 1-2 coarse crenulae; medio-posterior scutellar depression narrow, divided by medial carina, crenulae faint; metanotum with indistinct median carina and not protruding dorsally; surface of propodeum densely and finely punctate, with 2-3 indistinct carinae postero-medially, densely covered with long fine setae (fig. 104), with some rugosity laterally.

Wings.— Fore wing: r:3-SR:SR1 = 9:45:37; subbasal cell evenly and densely setose; 1-SR+M slightly sinuate; SR1 sinuate; 1-CU1:2-CU1 = 5:44; 2-SR:3-SR:r-m = 21:45:18. Hind wing: basal cell evenly setose; subbasal cell sparsely setose in distal one-third, glabrous proximally.

Legs.— Ventral and lateral surfaces of coxae and trochanters and ventral hind femur densely covered with long fine setae, remainder of legs more normally setose; length of femur, tibia and basitarsus of hind leg 4.2, 8.3 and 4.0 times their width, respectively; length of hind tibial spurs 0.4 and 4.7 times hind basitarsus.

Metasoma.— Tergites densely covered with long, fine setae; length of first tergite equal to its apical width, and 1.5 times its basal width (measured posterior to petiolar constriction), its surface densely punctulate (fig. 104), basally flat, its dorsal carinae virtually percurrent and meeting in apical one-third; second tergite costate, without medial crest-like carina distinguishable from surrounding costae, faintly raised in mid longitudinal line; third tergite smooth antero-laterally, costate antero-medial-

ly, becoming costate-rugose and coarsely rugose posteriorly (fig. 104), posterior and lateral margins with wide, crenulate lamella, no teeth; ovipositor sheath not visible in holotype; hypopygium small, broadly pointed apically.

Colour.— Antennae, mesosoma, coxae, mid and hind legs and third metasomal tergite black; head yellow-orange, with medial black patch covering frons, vertex and occiput; fore femur and tibia yellowish-orange, fore tarsal segments brown; first and second metasomal tergites orange; wings dark brown, veins in proximal half of wings black, more distal veins dark brown.

Variation.— The paratype female has the propodeum with more prominent postero-medial longitudinal carinae which are longer (about one-third length of propodeum); the mid leg is generally lighter in colour with the apical half of the femur, tibia and tarsi being brown (not black); the second metasomal tergite is orange with a black patch antero-medially; body length and fore wing length both 7.8 mm.

Host.— Reared from *Capusa senilis* Walker (Geometridae) on *Eucalyptus* trees.

Sigalphus Latreille, 1802 (figs 37-50)

Sigalphus Latreille, 1802: 327; Shenefelt, 1973: 933-935. Type species: *Ichneumon irrorator* Fabricius, 1775 (examined; designated by Viereck, 1914).

Sphaeropyx Illiger, 1807: 192; Shenefelt, 1973: 933. Type species: *Ichneumon irrorator* Fabricius, 1775 (examined; by monotypy).

Rhytigaster Wesmael, 1835: 206; Shenefelt, 1973: 933. Type species: *Ichneumon irrorator* Fabricius, 1775 (examined; designated by Haliday, 1840 in Westwood).

Rhitigaster Wesmael, 1835: 247 (misspelling).

Rhytidogaster Agassiz, 1846: 321 (unjustified emendation).

Diagnosis.— Frons with oblique rugae (fig. 38); stemmaticum transverse and without protuberances (fig. 38); malar suture absent (fig. 39); occipital carina present laterally and connected to wide occipital flange (fig. 45); dorsal pronope distinct (fig. 42); lateral pronope deep and elongate (fig. 41); transverse suture of mesoscutum absent (fig. 42); propodeal spiracle elliptical and far in front of propodeum (fig. 41); second submarginal cell of fore wing rather robust (fig. 37); vein 1-M of fore wing about 1.5 times vein m-cu and subparallel (fig. 37); vein 1-SR of fore wing and vein r of hind wing present; vein 2-CU of hind wing comparatively long; hind leg moderately slender (fig. 44); tarsal claws medium-sized and with large and rather obtuse lobe (fig. 50); first tergite medium-sized in lateral view and movably joined to second tergite (fig. 41), without distinct depressions posteriorly; dorsal carinae of first tergite complete, strong and converging posteriorly (fig. 46); laterope present (fig. 41); second tergite with pair of round basal depressions and carinae irregular, enclosing a subparallel median area (fig. 46); no constriction between second and third tergites; third tergite much longer than second tergite, ventrally with pair of teeth (fig. 47) or with lamella, and closed apically (fig. 41); ovipositor sheath shorter than hind basitarsus (figs 41, 44).

Distribution.— Holarctic and Afrotropical. In the Palaearctic region (from W Europe to S Korea) occurs only *S. irrorator* (Fabricius, 1775), in the Nearctic region *S. bicolor* (Cresson, 1880), in southern Africa *S. fulvus* Brues, 1926 and *S. neavei* (Turner, 1917), and on Malagasy *S. testaceus* Granger, 1949.

Biology.— Parasites of Noctuidae.

Key to species of the genus *Sigalphus* Latreille

1. Head and mesosoma black 2
- Head and mesosoma reddish-brown 4
2. Third metasomal tergite about as long as second tergite; first tergite somewhat longer than its apical width; third tergite without teeth ventro-apically; southern Africa *S. neavei* (Turner)
- Third metasomal tergite longer than second tergite (fig. 41); length of first tergite variable, if somewhat longer than its apical width then third tergite with teeth ventro-apically (figs 41, 47); northern hemisphere 3
3. Posterior transverse crest of propleuron present (fig. 48); vein M+CU of hind wing much longer than vein 1-M; metasoma with rather small lamella posteriorly, without teeth ventro-apically; parastigma comparatively narrow; third metasomal tergite orange-brown, with short yellowish setae; first and second tergites without median carinae; Nearctic *S. bicolor* (Cresson)
- Posterior transverse crest of propleuron absent; vein M+CU of hind wing about as long as vein 1-M (fig. 37); metasoma with large lamella posteriorly, with teeth ventro-apically (figs 41, 47); parastigma wider (fig. 37); third metasomal tergite black, with dense golden setosity; first and second tergites with median carinae (fig. 46); Palaearctic *S. irrorator* (Fabricius)
4. Head medio-dorsally and apex of hind tibia black; vein r of fore wing about one-third as long as vein 3-SR; southern Africa *S. fulvus* Brues
- Head and tibia completely reddish-brown; vein r of fore wing is about one-seventh as long as vein 3-SR; Malagasy *S. testaceus* Granger

Note.— Recently, in a paper by You, Zhou & Tong (1991) two new species from Hunan province, central China, were described: *S. hunanus* You & Tong, 1991 and *S. anomis* You & Zhou, 1991 (reared from *Anomis flava* Fabricius). Both are new junior synonyms of *S. irrorator* because most of the differences given are incorrect or even contradictory to the included figures, e.g. the length of vein r-m of the fore wing is 3 times vein r according to the description, but 6 times in the included fig. 12.

Tribe Minangini de Saeger, 1948, stat. nov.

Minangina de Saeger, 1948: 71, 72.

Diagnosis.— Malar suture absent (fig. 28); stemmaticum triangular and with pair of teeth (figs 26, 28); frons without median carina; occipital flange narrow (fig. 28); posterior propleural flange minute (fig. 28); medial and lateral pronope present; parastigma enlarged (fig. 25); vein M+CU1 of fore wing slightly curved (fig. 25); vein 1-M of fore wing about 0.8 times vein m-cu, resulting in a very transverse first discal cell (fig. 25); vein 2-CU of hind wing comparatively long (fig. 25); vein r of fore wing angularly connected to vein 3-SR and submedially issued from pterostigma (fig. 28); hind basitarsus compressed; tarsal claws with large lobe (fig. 34); first metasomal tergite without distinct depression posteriorly and tergite in lateral view comparatively short (fig. 28); first tergite short in lateral view and immovably joined to second tergite (figs 28, 33); second tergite with strong converging carinae and medial area trian-

gular (figs 28, 33), and with pair of anterior depressions; second metasomal suture shallow and narrow (fig. 28); third tergite strongly convex and shorter than second tergite (measured in lateral view; fig. 28); ovipositor sheath short and widened.

Distribution.— Contains only the highly aberrant Afrotropical genus *Minanga* Cameron, 1906.

Minanga Cameron, 1906 (figs 25-36)

Minanga Cameron, 1906: 30; Shenefelt, 1973: 907-908. Type species: *Minanga serrata* Cameron, 1906 (by monotypy; examined).

Acanthochelonus Brues, 1926: 271; Shenefelt, 1973: 907. Type species: *Acanthochelonus taurus* Brues, 1926 (by monotypy).

Diagnosis.— Frons without oblique carinae (fig. 26)); occipital carina absent ventrally (fig. 28); prepectal carina complete (fig. 28); lateral pronope deep and large (fig. 28); dorsal pronope absent; transverse suture of mesoscutum absent medially (fig. 30); second submarginal cell of fore wing elongate (fig. 25); vein 1-M of fore wing shorter than vein m-cu (fig. 25); veins 1-M and m-cu of fore wing distinctly diverging posteriorly (fig. 25); vein 1-SR of fore wing and vein r of hind wing present (fig. 25); hind leg moderately slender (fig. 35); tarsal claws medium-sized (fig. 34); dorsal carinae of first tergite complete, strong and converging posteriorly (fig. 33); laterope present, below protuberance of first tergite (fig. 28); second tergite with pair of converging depressions and with regular carinae (fig. 33); third tergite slightly shorter than second tergite, apically serrate and somewhat depressed (fig. 36) and closed apically (fig. 28).

Distribution.— Small genus known from central, southern and eastern Africa, including Malagasy. A key to the species is given by de Saeger (1948).

Biology.— Unknown.

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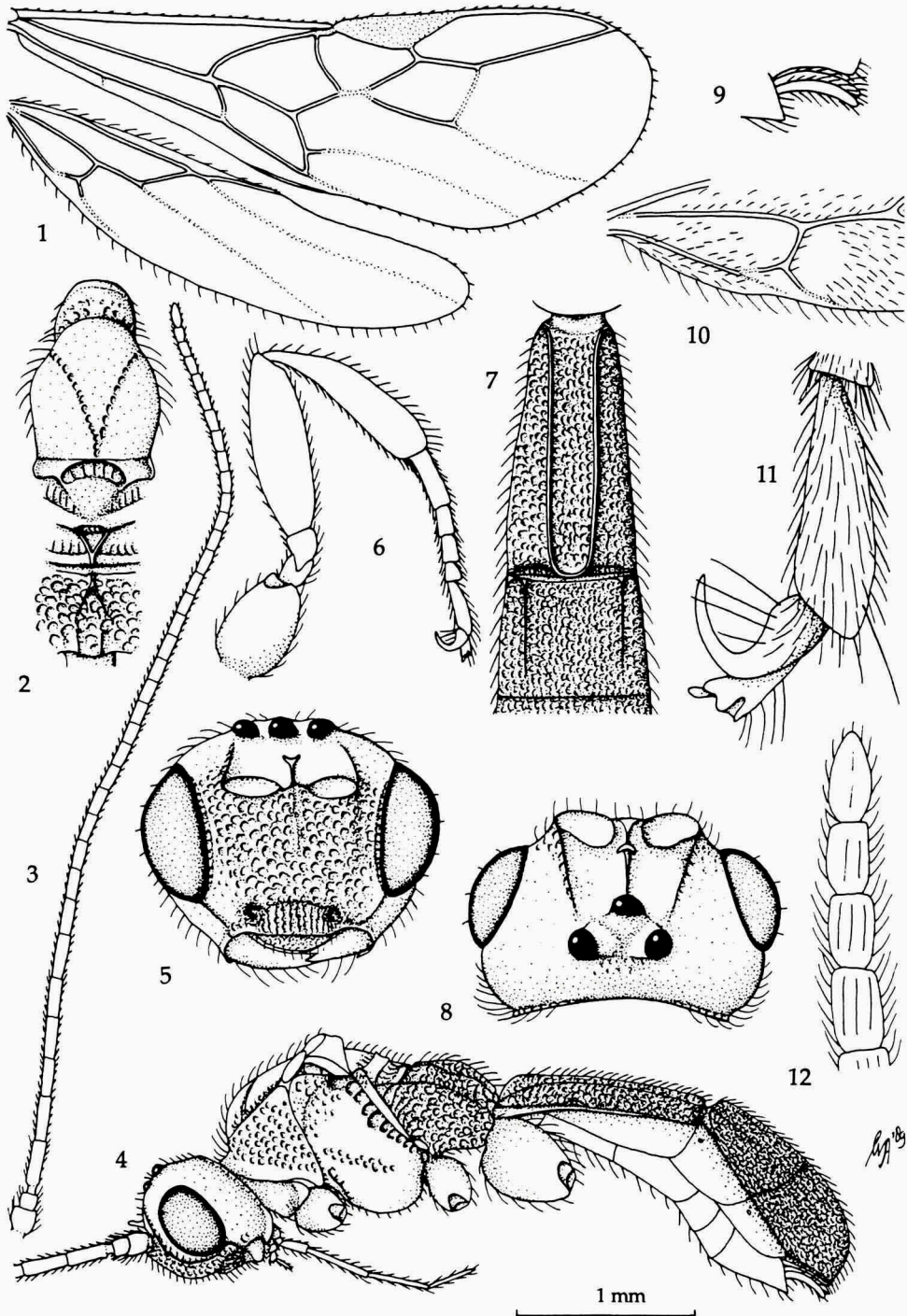
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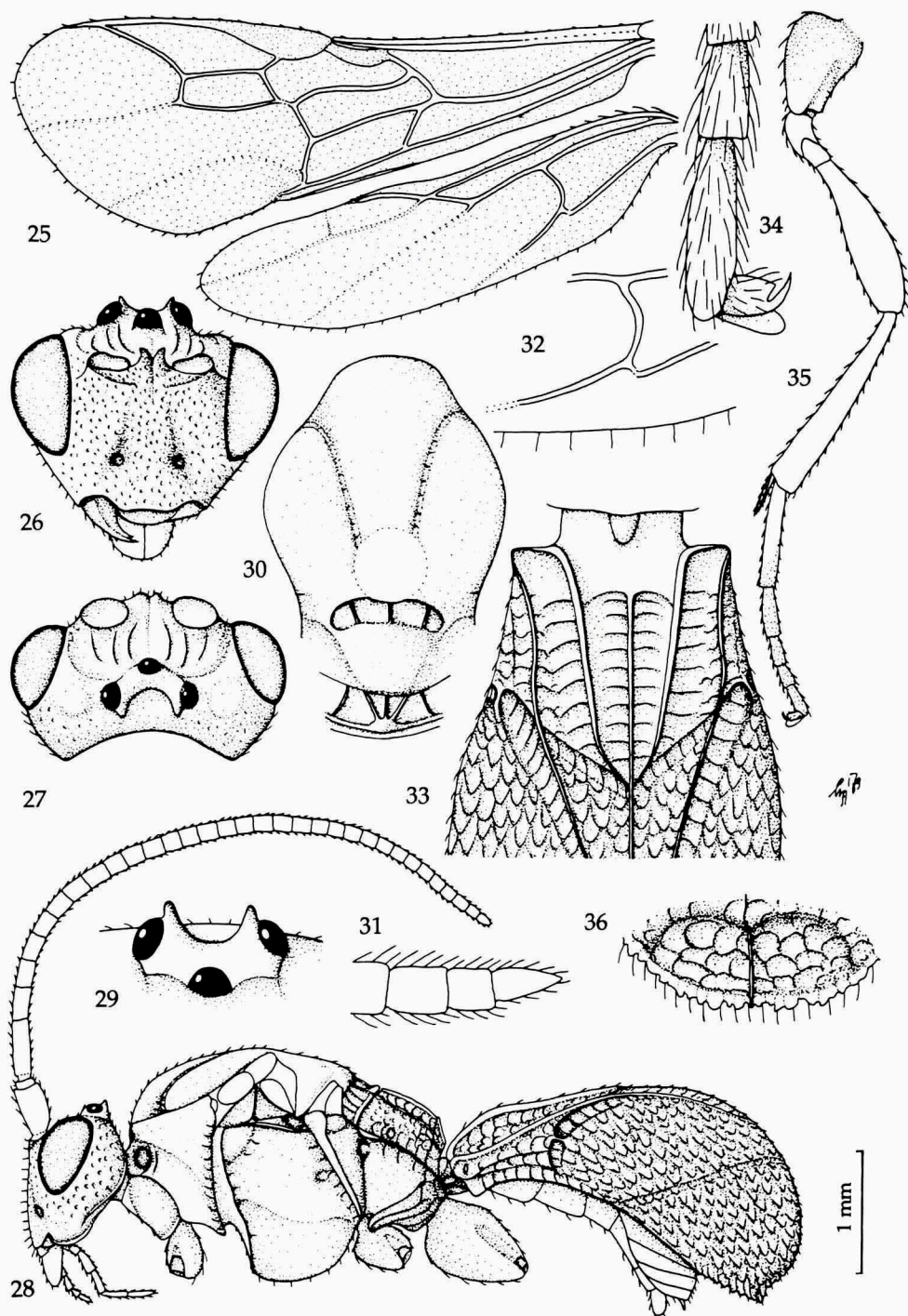
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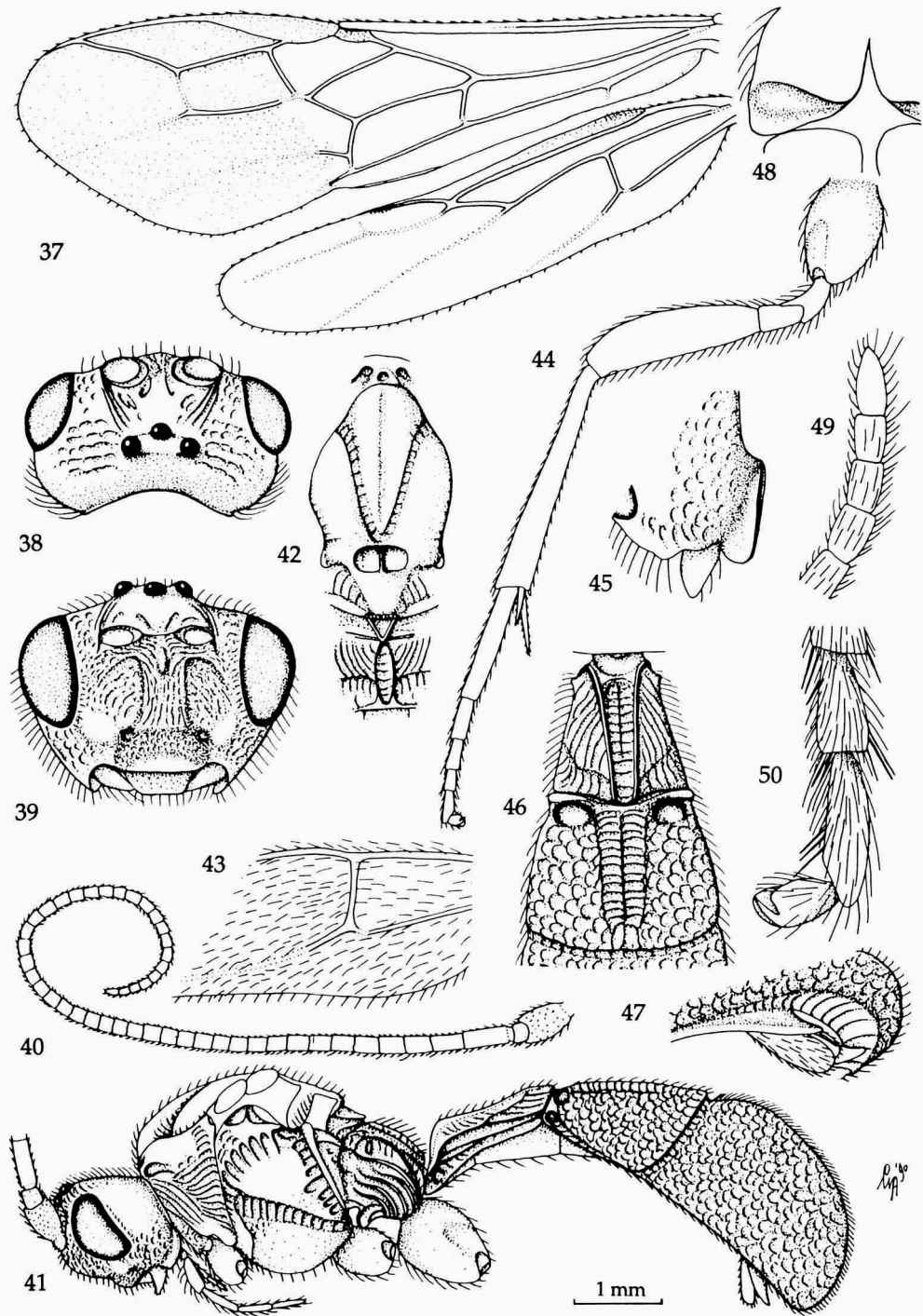
Figs 1-12, *Afrocampsis griseosetosus* van Achterberg & Quicke, ♀, holotype. 1, wings; 2, mesosoma, dorsal aspect; 3, antenna; 4, habitus, lateral aspect; 5, head, frontal aspect; 6, hind leg; 7, first and second metasomal tergites, dorsal aspect; 8, head, dorsal aspect; 9, detail of ovipositor sheath, lateral aspect; 10, detail of veins cu-a and 2-CU of hind wing; 11, inner hind claw; 12, apex of antenna. 1, 3, 4, 6: 1 × scale-line; 2, 7: 1.3 ×; 5, 8-10: 2 ×; 11, 12: 5 ×.



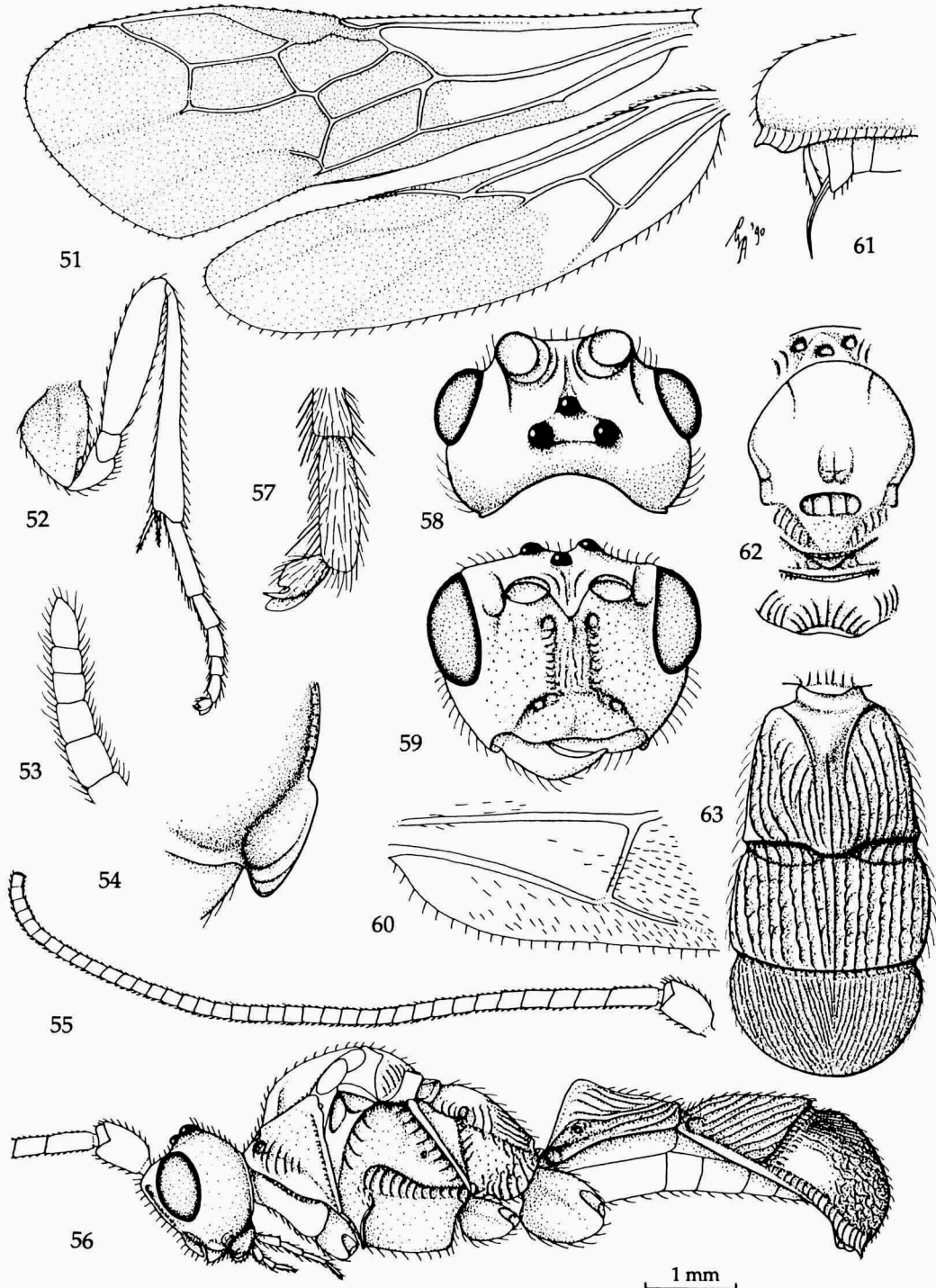
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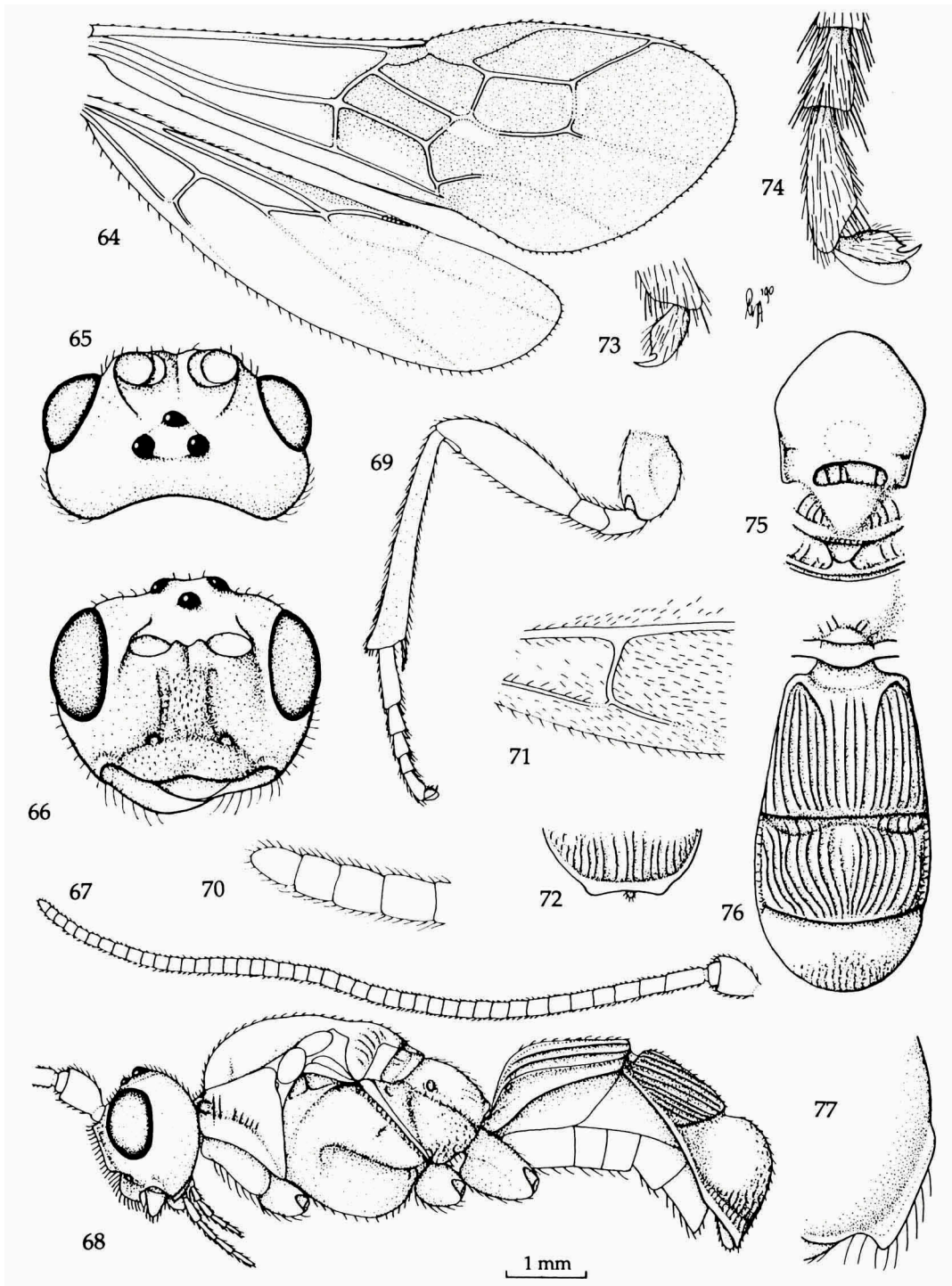
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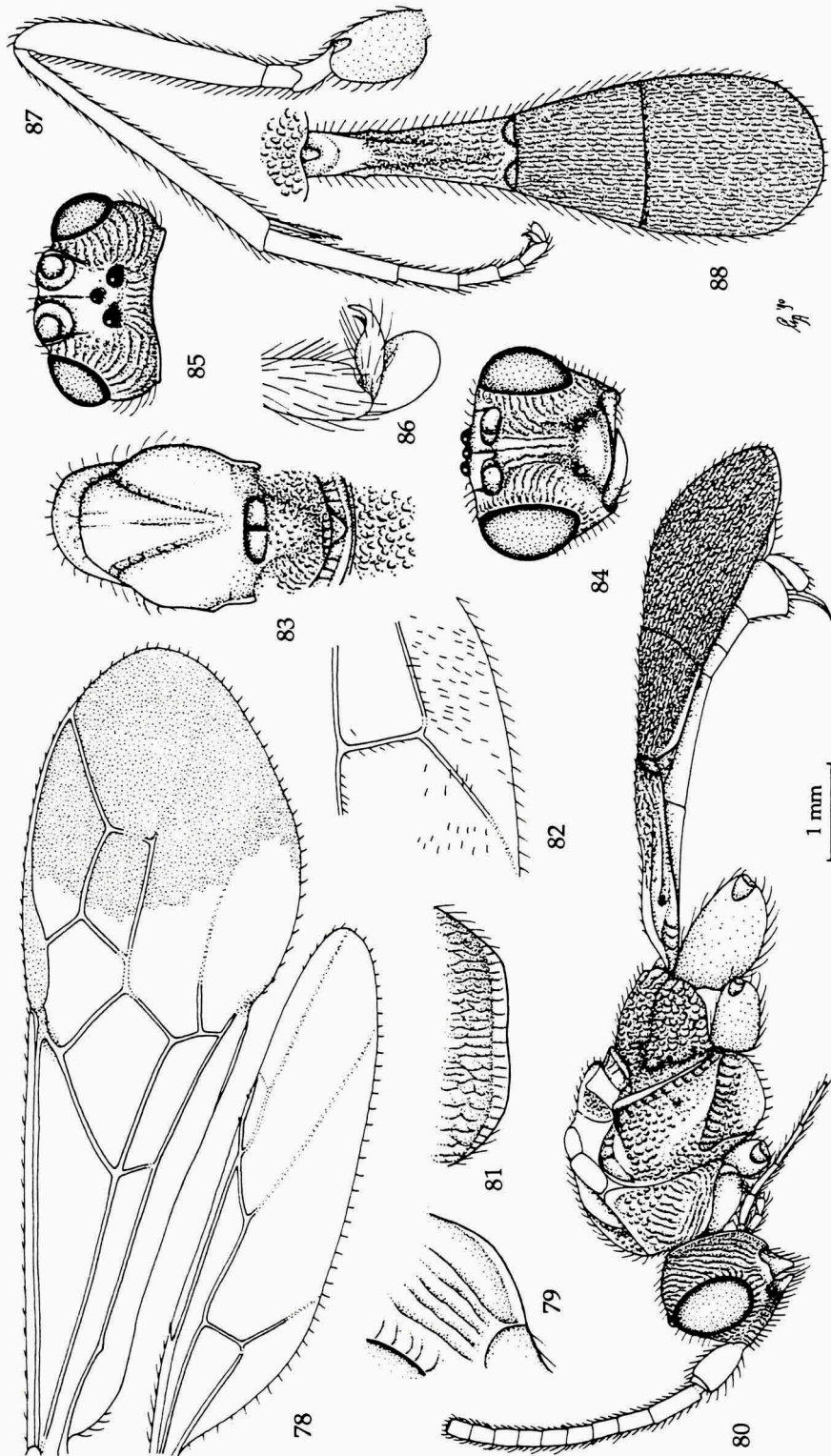
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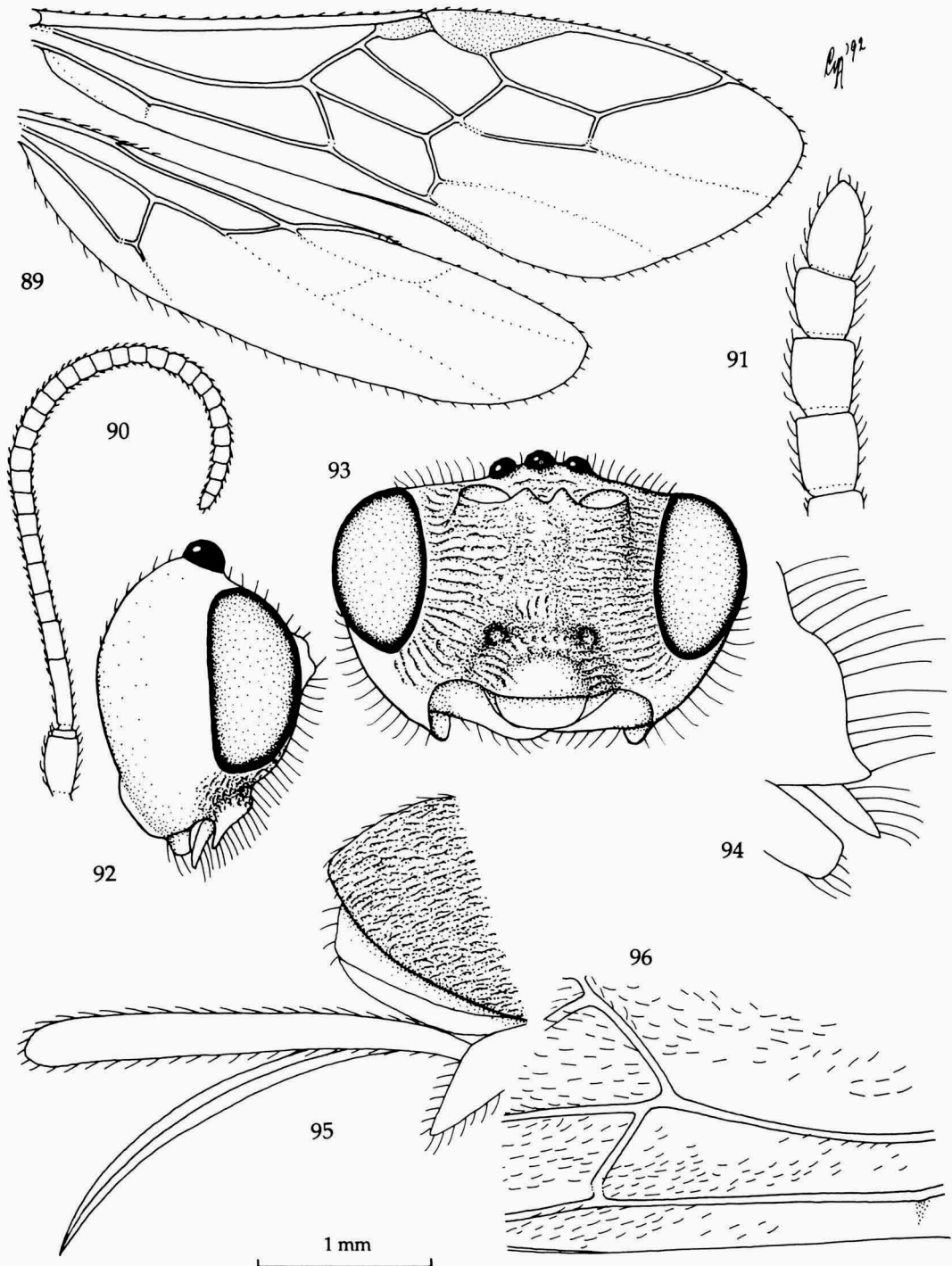
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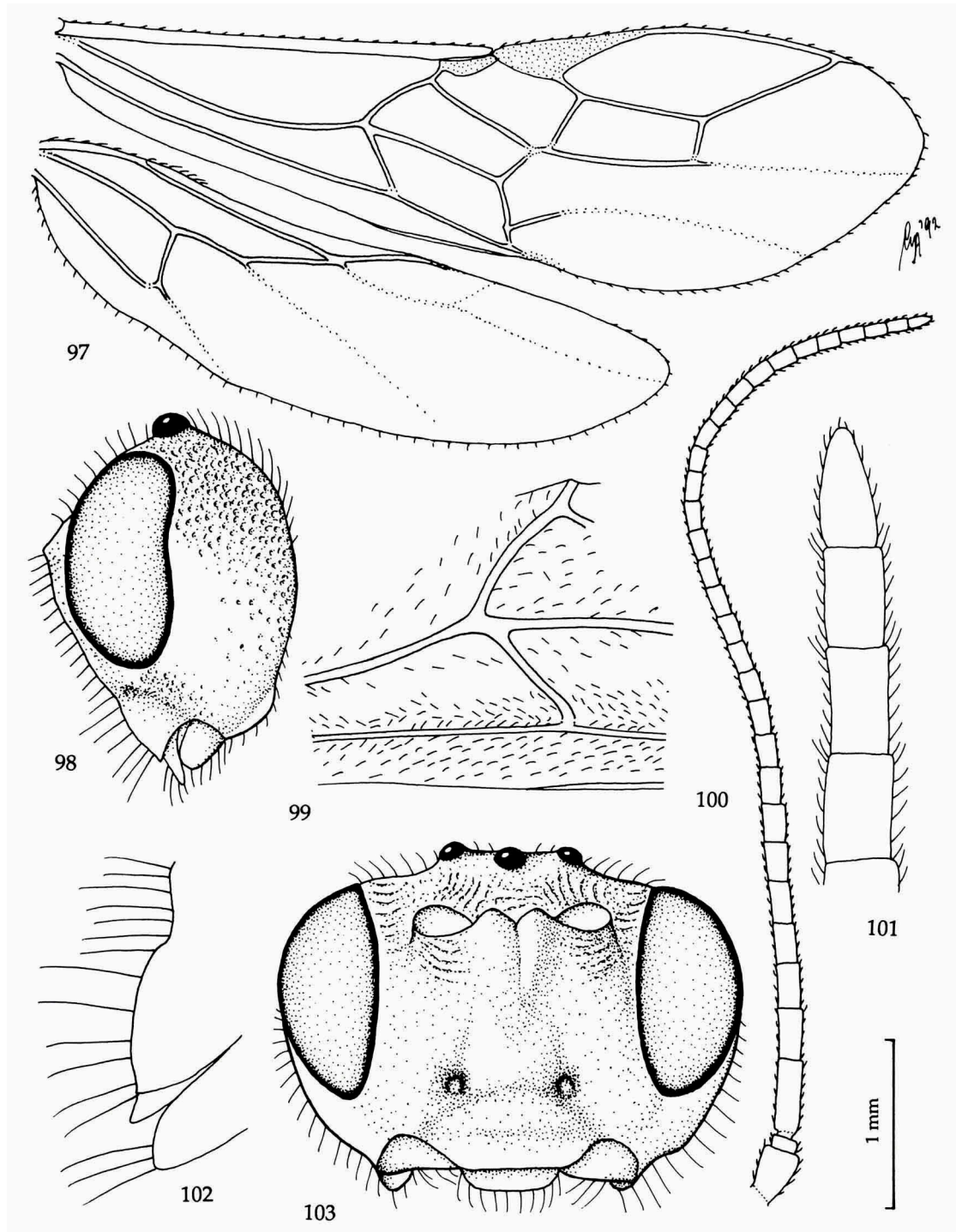
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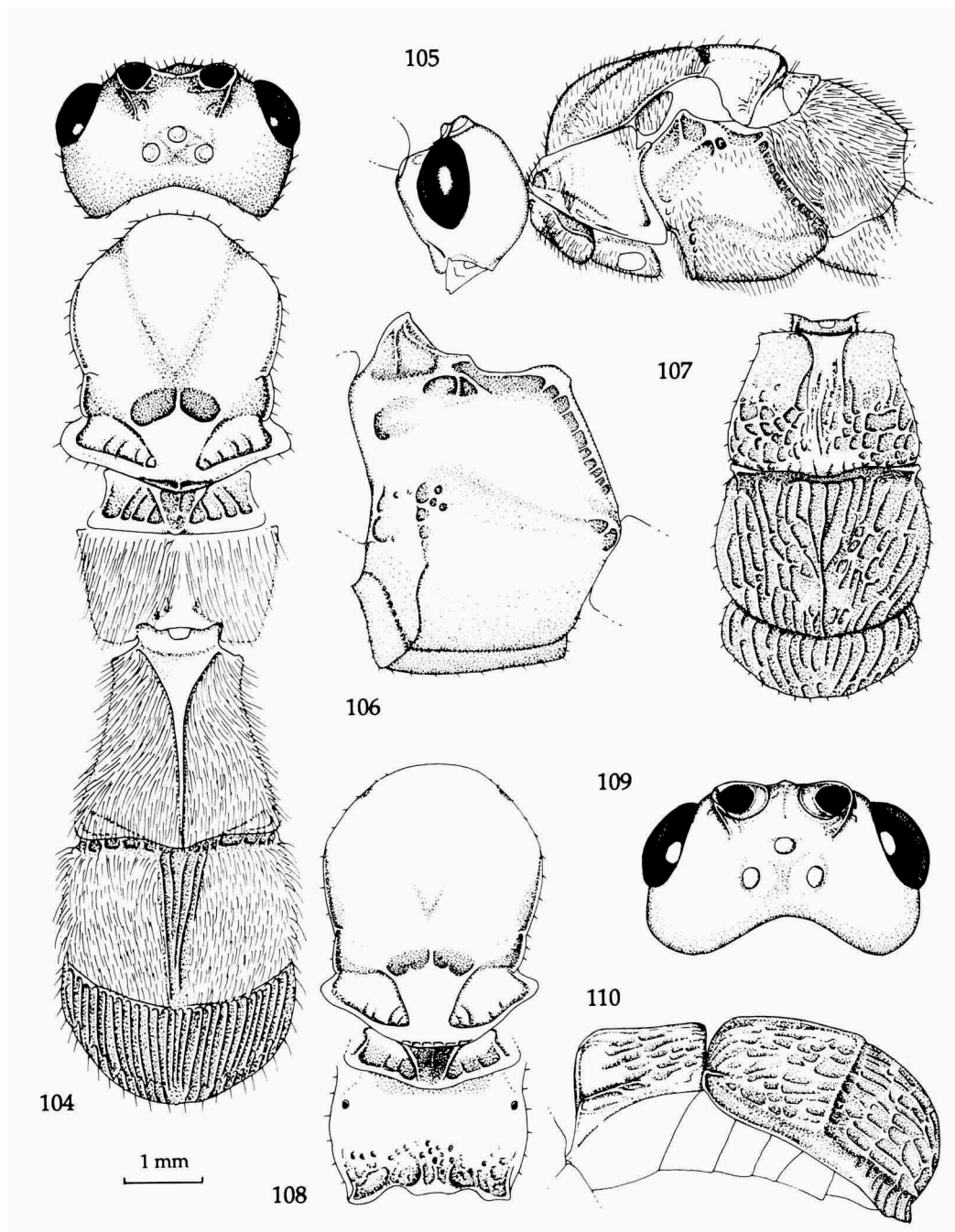
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Figs 89-96, *Acampsis brevis* spec. nov., ♀, holotype. 89, wings; 90, antenna; 91, apex of antenna; 92, head, lateral aspect; 93, head, frontal aspect; 94, clypeus, lateral aspect; 95, ovipositor and its sheath, lateral aspect; 96, detail of distal part of subbasal cell of fore wing. 89, 90: 1 × scale-line; 91, 94: 5 ×; 92, 93, 95, 96: 2 ×.



Figs 97-103, *Acampsis granulatus* spec. nov., ♂, holotype. 97, wings; 98, head, lateral aspect; 99, distal part of subbasal cell of fore wing; 100, antenna; 101, apex of antenna; 102, clypeus, lateral aspect; 103, head, frontal aspect. 97, 100: 1 × scale-line; 98, 99, 103: 2 ×; 101, 102: 5 ×.



Figs 104-106, *Notosigalphus joshuai* gen. nov. & spec. nov., ♀, holotype; figs 107-110, *Aposigalphus kiestyni* gen. nov. & spec. nov. 104, habitus, dorsal aspect; 105, head and mesosoma, lateral aspect; 106, mesosternum and mesopleuron, ventro-lateral aspect; 107, metasoma, dorsal aspect; 108, mesosoma, dorsal aspect; 109, head, dorsal aspect; 110, metasoma, lateral aspect. 104, 107: 1.5 × scale-line; 105: 1.25 ×; 106, 108-110: 2 ×.

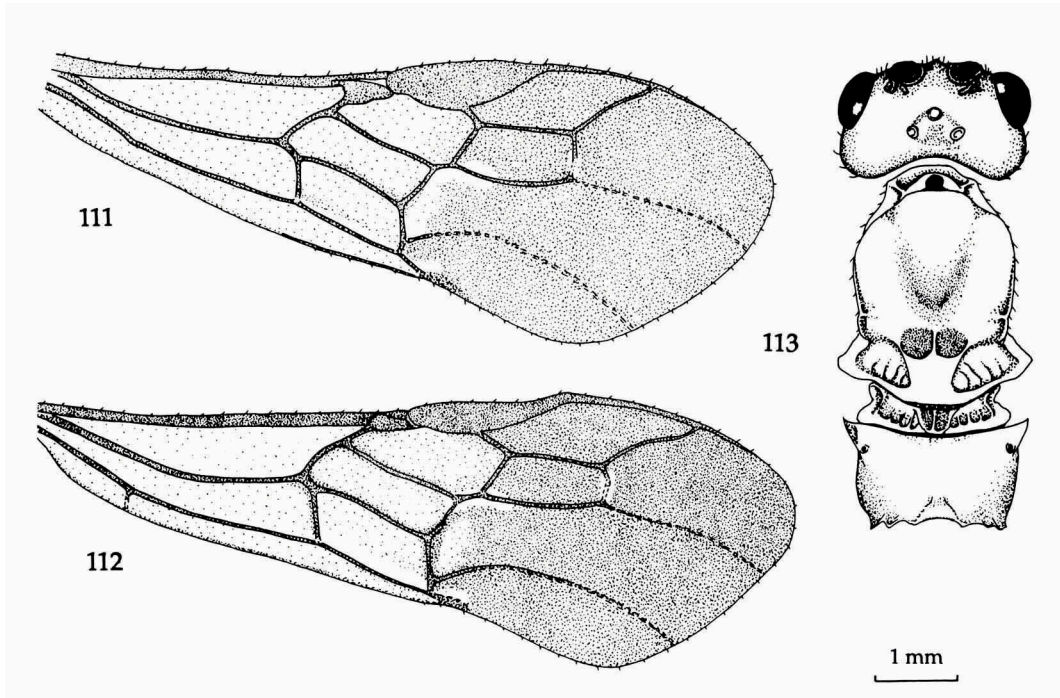
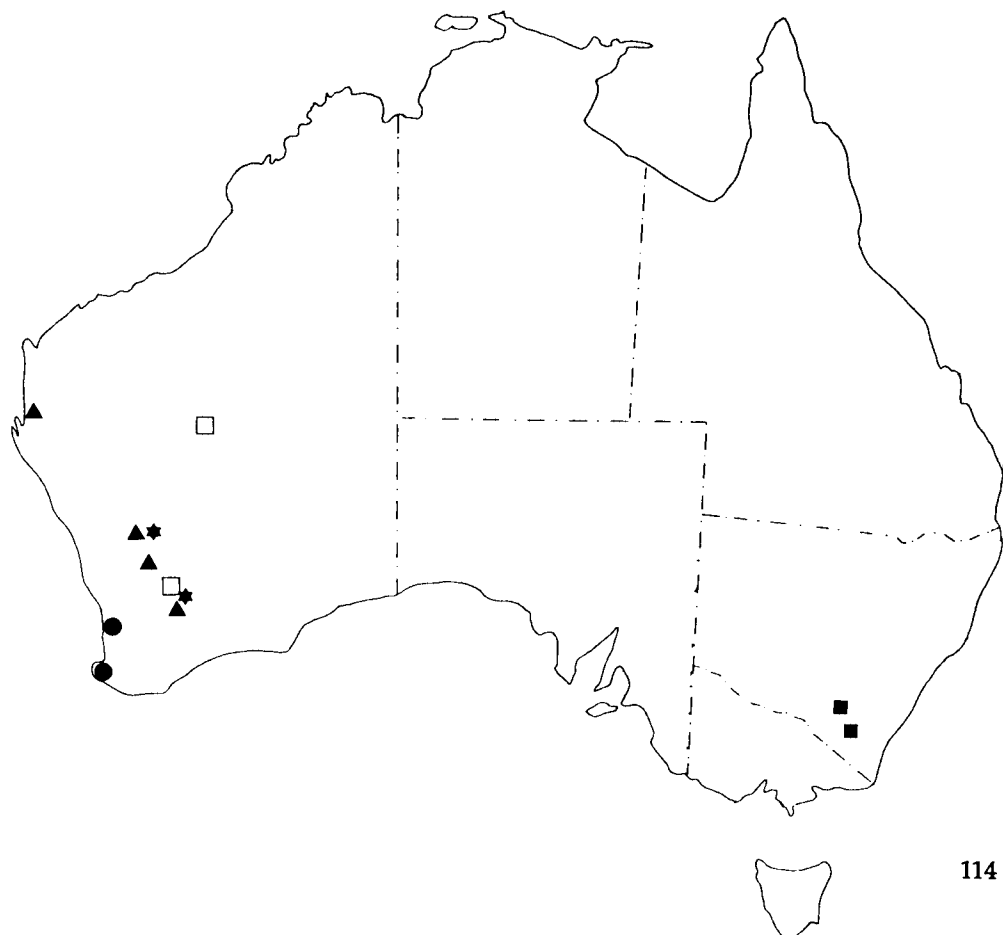


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Fig. 114. Distribution map of Australian species of Sigalphinae. ● = *Notosigalphus conjugator* (Turner); ■ = *N. joshuai* spec. nov.; ▲ = *Aposigalphus tessi* spec. nov.; □ = *A. kiestyni* spec. nov.; ★ = *A. brycei* spec. nov.

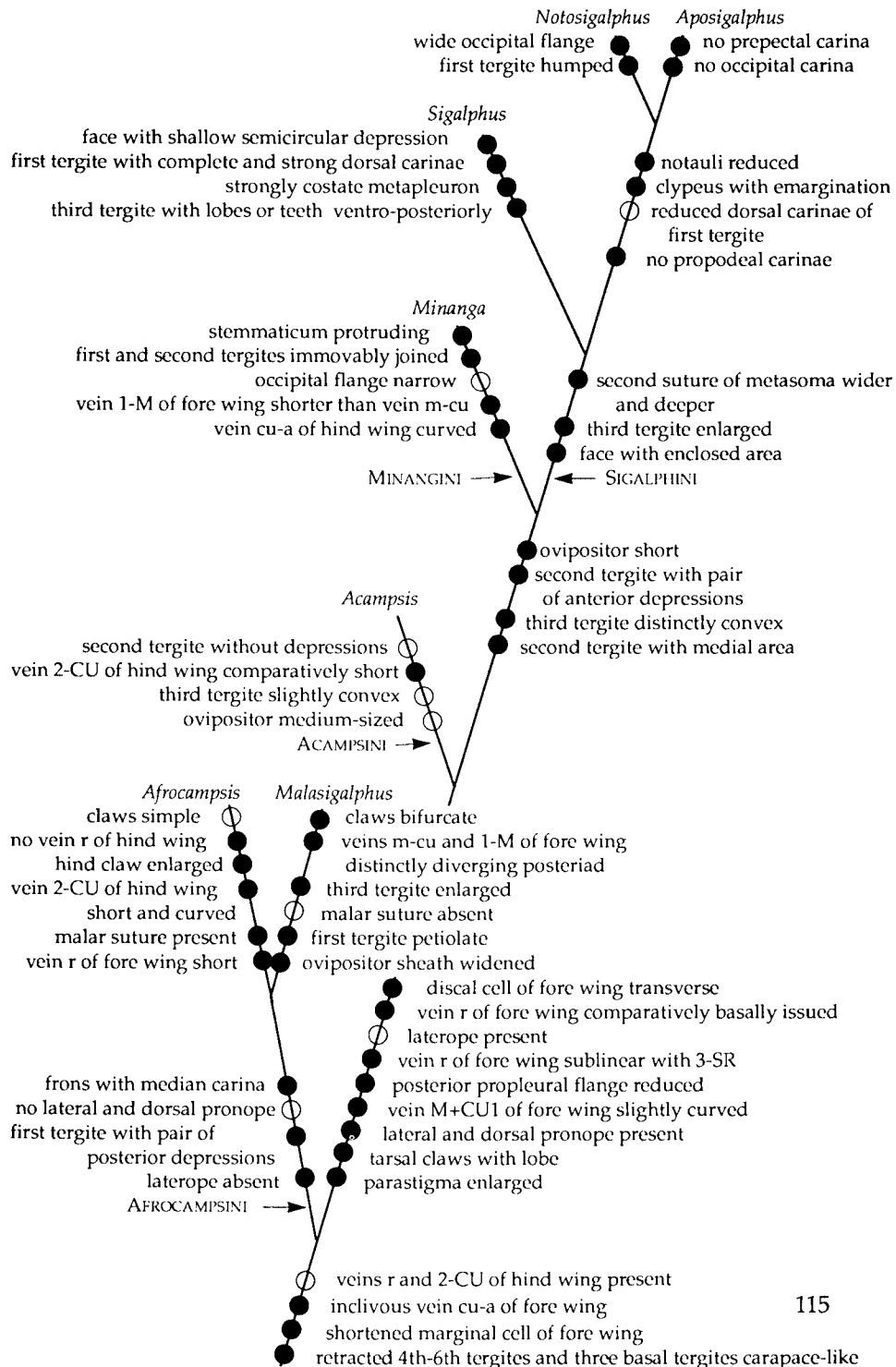


Fig. 115. Cladogram of the genera of the subfamily Sigalphinae; ● = apomorphic character-state; ○ = plesiomorphic character-state. Only one (shortest) tree found with "ie" and "bb" options in Hennig86 and using character matrix of table 2; length of tree 45 and consistency index 0.64.

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