

A new genus of Tetratermini (Hymenoptera: Braconidae: Lysiterminae) parasitic on grasshoppers (Gryllacrididae)

C. van Achterberg & H. Steiner

Achterberg, C. van & H. Steiner. A new genus of Tetratermini (Hymenoptera: Braconidae: Lysiterminae) parasitic on grasshoppers (Gryllacrididae).

Zool. Med. Leiden 70 (17), 31.xii.1996: 249-259, figs 1-48.—ISSN 0024-0672.

Key words: Hymenoptera; Braconidae; Lysiterminae; Tetratermini; *Katytermus*; *Platyrmus*; *Tetratermus*; Gryllacrididae; Oriental; Australian; key.

The new genus *Katytermus* from Malaysia (type species: *Katytermus palmicola* spec. nov.) is described and illustrated. The new genus belongs to a new tribe, Tetratermini, of the subfamily Lysiterminae. The type species has been reared as a gregarious endoparasite of a "katydid" longhorn grasshopper (Gryllacrididae).

C. van Achterberg, Nationaal Natuurhistorisch Museum, Postbus 9517, 2300 RA Leiden, The Netherlands.

H. Steiner, AK. Ethoökologie, Zoologisches Institut der J.W. Goethe Universität, Postfach 111932, D-60054 Frankfurt/Main, Germany.

Introduction

Last year the second author reared a series of an unknown cyclostome braconid from a longhorn grasshopper collected in open shrubland with banana and fruittrees near the Field Studies Centre, Ulu Gombak, Malaysia, of the University of Malaya (Kuala Lumpur). The area is bordered by old secondary forest. The host was living in a (most probably selfmade) shelter of a leaflet of a palm (*Calamus manan* Miquel, 1861) native to the area; the inner part of the leaflet was folded over and an oblong hole near the edge of the leaflet had been cut out. About 50 larvae emerged from the grasshopper while it was stored in a glass tube and then spun their white cocoons outside the host. The host had deteriorated when, after 13 days (during \pm 1 day), the adult braconids (both males and females) emerged from their cocoons. The host was probably a nymph of a member of the orthopteran family Gryllacrididae; the remnant does not allow a certain identification, but other specimens collected from rolled palm leaves were also nymphs belonging to several genera of this family (C. Amedegnato, in litt.). The majority of the species of the about 76 genera of Gryllacrididae (mainly occurring in Indo-Malaysian area) make chambers of rolled leaves in which they hide during the day. The reared parasitic specimens proved to belong to a new genus of the subfamily Lysiterminae Tobias, 1968 (Braconidae), *Katytermus* (type species: *Katytermus palmicola* spec. nov.) which is described and illustrated below. The new genus belongs to the new tribe Tetratermini of the subfamily Lysiterminae and it is keyed together with the two other known genera of this tribe. The biology of other Lysiterminae is hardly known; the few host records indicate that they are parasites of lepidopterous larvae.

Only one other case is known of Braconidae selecting grasshoppers as their host: *Perilitus morabinarum* Blackith, 1967 (Euphorinae), from Australia, which is the first known hymenopterous primary parasite of nymphal or adult grasshoppers (Blackith, 1967). The new genus is not related to this species (which belongs to a different

lineage of subfamilies (Quicke & van Achterberg, 1990) and also its host is not related to the host of *P. morabinarum*: the latter is a parasite of wingless morabine grasshoppers. Other *Perilitus* species are parasites of adult Coleoptera (Curculionidae, Chrysomelidae, Melandryidae).

For the recognition of the subfamily Lysiterminae, see van Achterberg (1993, 1995), and for the terminology used in this paper, see van Achterberg (1988). The first author is the author of the taxonomic part of this paper.

Descriptions

Subfamily Lysiterminae Tobias, 1968 (figs 1-48)

Lysitermini Tobias, 1968: 28; van Achterberg, 1991: 8, 15, 1995: 66-95; Belokobylskij, 1993: 150-151, 1994: 61; Quicke, 1994: 159-160.

Lysiterminae; van Achterberg, 1993: 26.

Lysitermina; Belokobylskij, 1993: 151.

Diagnosis.— Antennal segments 14-34; malar suture absent (figs 2, 15, 37, 40); occipital carina connected to hypostomal carina ventrally or carina absent ventrally; first subdiscal cell of fore wing usually slender (figs 381, 402 in van Achterberg, 1975), but sometimes comparatively wide (fig. 421, l.c.); vein CU1a of fore wing near middle of first subdiscal cell (figs 1, 14, 27) or above its middle (fig. 39; figs 357, 393, 402, 409, l.c.); dorsal carinae of first tergite variable (figs 380, 392, 401, 420, l.c.), if connected to each other subbasally, then semicircularly united (fig. 41); second metasomal spiracle in notum of tergite (figs 395, 433, l.c.); third metasomal tergite distinctly sculptured and with complete, sharp, lateral margin (figs 6, 19, 31, 43); third and fourth tergite without transverse striae (figs 8, 21, 38, 43); if fourth tergite is retracted, then third tergite with lamella or thin serrate rim apically (figs 395, 406b, 412, 430, l.c.); ovipositor valve with one valvillus; ovipositor sheath distinctly protruding and slender, but shorter than metasoma (figs 6, 19, 31).

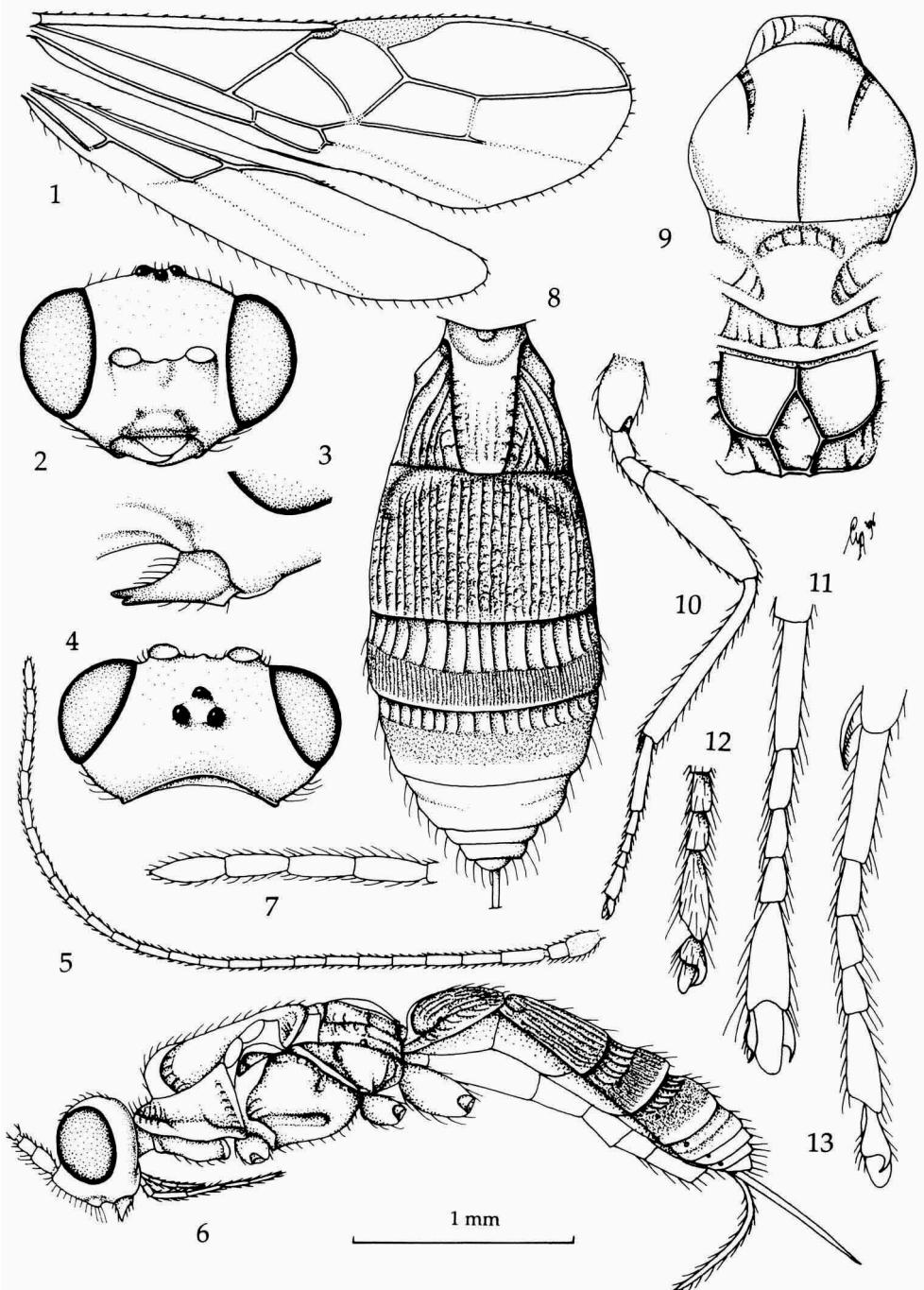
Distribution.— Cosmopolitan (two tribes).

Tetratermini van Achterberg, trib. nov. (figs 1-38)

Diagnosis.— Antennal segments 23-27; parastigma distinctly differentiated (figs 1, 14, 27); metanotum not protruding dorsally; vein 2-SR of fore wing complete; first metasomal tergite movably joined to second tergite (figs 6, 19, 31), its dorsal carinae free subbasally (fig. 8) and with small dorsope; second metasomal tergite distinctly depressed antero-laterally (figs 8, 21, 38); second metasomal suture wide (figs 8, 21, 38); metasoma consists of at least four strongly sclerotized segments (figs 6, 19, 31); third tergite truncate, simple posteriorly (figs 8, 21, 38); fourth tergite convex, with basal groove and with lateral crease (figs 6, 19, 31); ovipositor sheath distinctly longer than second tergite (figs 6, 19, 31).

Biology.— One species reared as gregarious endoparasite of nymph of Gryllacrididae (Orthoptera).

Distribution.— Indo-Australian (three genera).



Figs 1-13, *Katytermus palmicola* gen. nov. & spec. nov., ♀, holotype. 1, wings; 2, head, frontal aspect; 3, mandible, lateral aspect; 4, head, dorsal aspect; 5, antenna; 6, habitus, lateral aspect; 7, apex of antenna; 8, metasoma, dorsal aspect; 9, mesosoma, dorsal aspect; 10, hind leg; 11, fore tarsus, dorsal aspect; 12, outer hind claw; 13, fore tarsus, lateral aspect. 1, 5, 6, 8, 10: 1 × scale-line; 2, 4, 9: 1.6 ×; 3, 11, 13: 3.1 ×; 7, 12: 2.5 ×.

Key to genera of the tribe Tetratermini

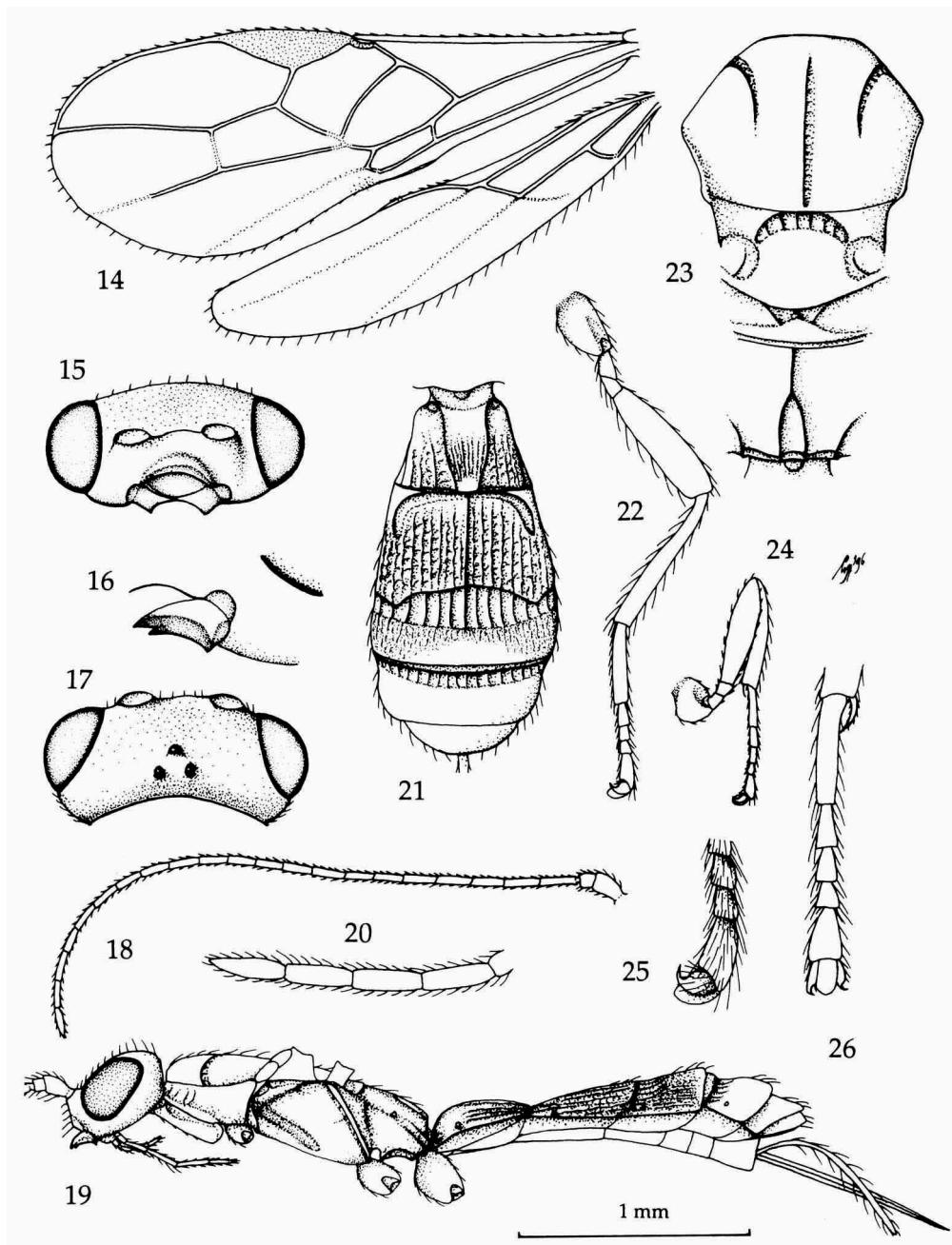
1. Mesoscutum with long medio-longitudinal groove (figs 9, 23); notaui absent posteriorly (fig. 9); fore tarsal segments more robust (figs 11, 13, 26); vein 3-SR of fore wing distinctly longer than vein r (figs 1, 14); vein m-cu of fore wing interstitial or slightly postfurcal (figs 1, 14); occipital carina reduced ventrally, not connected to hypostomal carina (fig. 6); mandible with angulate protuberance (figs 3, 16); precoxal sulcus absent posteriorly (figs 6, 19); scutellum at about same level as metanotum (figs 6, 19); vein M+CU of hind wing slightly shorter than, or about equal to vein 1-M (figs 1, 14); Oriental 2
- Mesoscutum without medio-longitudinal groove (fig. 34); notaui present posteriorly (fig. 34); fore tarsal segments slender (fig. 35); vein 3-SR of fore wing about as long as vein r (fig. 27); vein m-cu of fore wing antefurcal (fig. 27); occipital carina complete ventrally, just connected to hypostomal carina (fig. 31); mandible without angulate protuberance (fig. 31); precoxal sulcus present posteriorly (fig. 31); scutellum distinctly elevated above metanotum (fig. 31); vein M+CU of hind wing much shorter than vein 1-M (fig. 27); Australian *Tetratermus* Wharton
2. Face about six times wider than high, and about as high as clypeus (fig. 15); mandible depressed ventrally and basally, without lamella (fig. 16); mesosoma strongly flattened (fig. 19); costulae of propodeum absent (fig. 23); mesosternal sulcus smooth *Platyrmus* Belokobylskij
- Face about three times wider than high, and much higher than clypeus (fig. 2); mandible not depressed ventrally and basally, with subbasal lamella (fig. 3); mesosoma normal (fig. 6); costulae of propodeum present (fig. 9); mesosternal sulcus finely crenulate *Katytermus* gen. nov.

***Katytermus* van Achterberg, gen. nov.**
(figs 1-13)

Type species: *Katytermus palmicola* spec. nov.

Etymology.— From "katydid" (a familiar American-English name for longhorn grasshoppers) and the generic name *Tetratermus* Wharton, 19934, because it has been reared from a katydid grasshopper and it is similar to the genus *Tetratermus*. Gender: masculine.

Diagnosis.— Antennal segments of both sexes 23-27; scapus truncate apically (fig. 5); antennal sockets not protruding (fig. 4); head directly narrowed ventrally (fig. 2); face about three times wider than high, and much higher than clypeus (fig. 2); occipital carina reduced ventrally, not connected to hypostomal carina (fig. 6); mandible with angulate protuberance, not depressed ventrally and basally, with subbasal lamella (fig. 3); mesosoma normal (fig. 6); mesoscutum largely long setose; notaui absent posteriorly (fig. 9); precoxal sulcus absent posteriorly (figs 6, 19); scutellum at about same level as metanotum (figs 6, 19); mesosternal sulcus finely crenulate; mesoscutum with long medio-longitudinal groove (fig. 9); costulae of propodeum present (fig. 9); fore tarsal segments more robust (figs 11, 13); vein 3-SR of fore wing distinctly longer than vein r (figs 1, 14); vein m-cu of fore wing interstitial or slightly postfurcal (fig. 1); first subdiscal cell of fore wing moderately



Figs 14-26, *Platyrmus maichaui* Belokobylskij ♀, holotype. 14, wings; 15, head, frontal aspect; 16, mandible, lateral aspect; 17, head, dorsal aspect; 18, antenna; 19, habitus, lateral aspect; 20, apex of antenna; 21, metasoma, dorsal aspect; 22, hind leg; 23, mesosoma, dorsal aspect; 24, fore leg; 25, outer hind claw; 26, fore tarsus, dorsal aspect. 14, 18, 19, 21, 22, 24: 1 × scale-line; 15, 17, 23: 1.5 ×; 16, 20, 25, 26: 2.5 ×.

narrow and with vein CU1b sclerotized, shorter than 3-CU1 (fig. 1); vein M+CU of hind wing equal to vein 1-M (fig. 1); first metasomal tergite flattened postero-laterally (fig. 8); length of second tergite about 3.5 times length of third tergite behind second metasomal suture (fig. 8); fifth tergite smooth, with incomplete transverse groove, moderately sclerotized, and hardly retracted (figs 6, 8).

Biology.— Gregarious endoparasites of nymphs of Gryllacrididae (Orthoptera).

Distribution.— Oriental (only the type species from Malaysia is known).

Katytermus palmicola van Achterberg, spec. nov.
(figs 1-13)

Material.— Holotype, ♀ (RMNH), "Malaysia: Selangor, Ulu Gombak, Kg Orang Asli, coll. 3.iv.1995, em. 4.iv.1995, H. Steiner, RMNH'95", "gregarious endoparasite of Katydid (longhorn grasshopper) on *Calamus manan* (Palmae) in open shrubland near old secondary forest". Paratypes: 37 ♀ ♀ + 5 ♂ ♂ (RMNH; BMNH; Quicke Collection; ZISP; Forest Research Institute Malaysia, Kepong; NMS); topotypic, same date and host.

Holotype, ♀, length of body 3.2 mm, of fore wing 2.7 mm.

Head.— Antennal segments 26, length of third segment 1.2 times fourth segment, length of third, fourth and penultimate segments 4.0, 3.3 and 2.6 times their width, respectively (figs 5, 6); length of maxillary palp 1.4 times height of head; OOL:diameter of posterior ocellus:POL = 10:4:4; frons nearly flat, sparsely setose and punctulate; length of eye in dorsal view 2.8 times temple (fig. 4); face smooth; length of malar space equal to basal width of mandible; mandible without depressions (fig. 3).

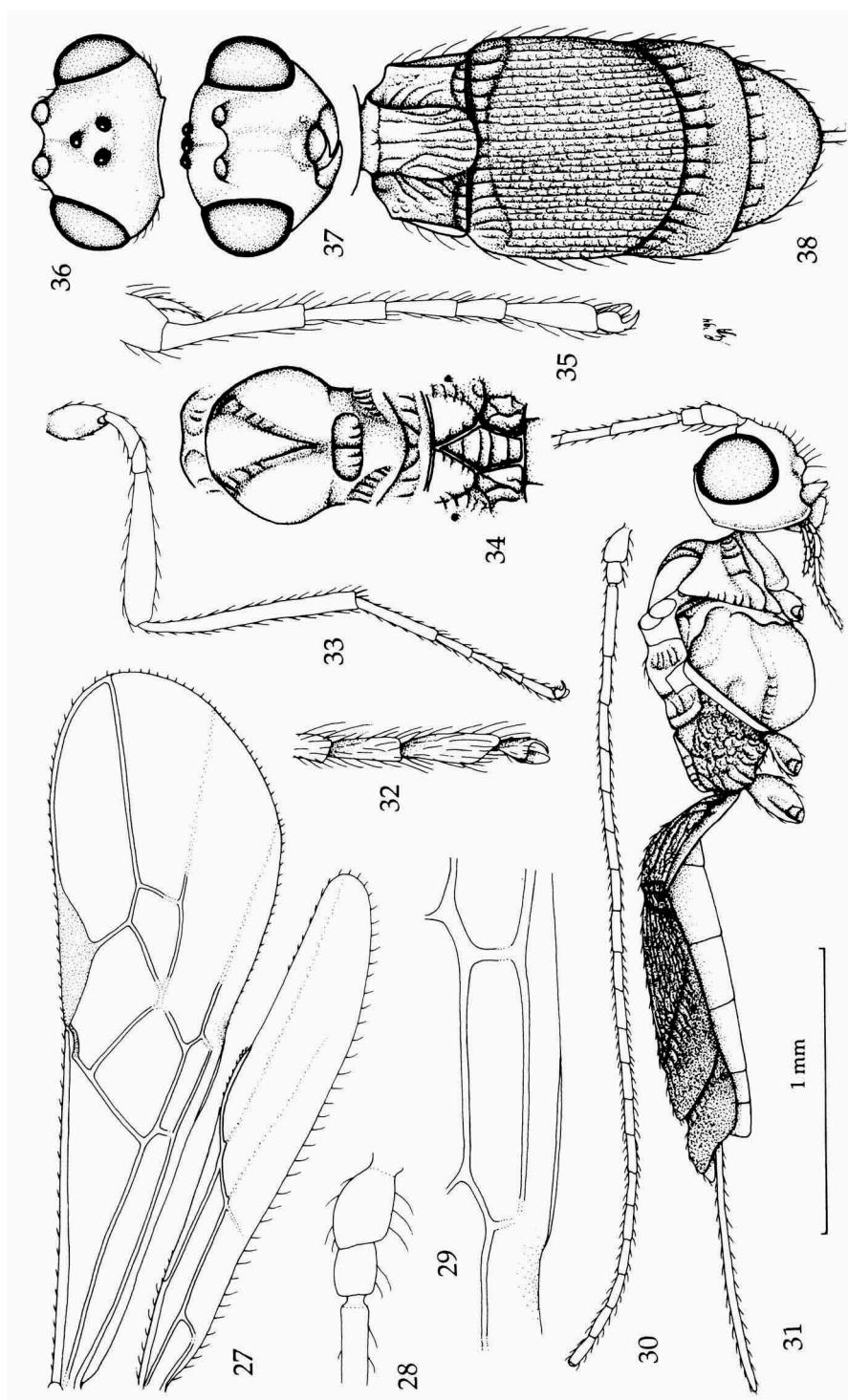
Mesosoma.— Length of mesosoma 1.9 times its height; side of pronotum smooth, except some rugulosity anteriorly and crenulation posteriorly (fig. 6); precoxal sulcus smooth, absent posteriorly and deepest part medially (fig. 6); notaulari only anteriorly, rather deep, crenulate (fig. 9); medio-posterior groove of mesoscutum long and narrow, smooth, remaining far removed from anterior border of mesoscutum (fig. 9); surface of propodeum largely smooth, except some indistinct microsculpture, its median carina short and its areola large (fig. 9).

Wings.— Fore wing: r:3-SR:SR1 = 7:15:31; 1-CU1:2-CU1 = 5:13; SR1 straight; 2-SR:3-SR:r-m = 13:15:8. Hind wing: M+CU equal to 1-M; m-cu long and reclivous (fig. 1); 3 hamuli and no basal bristles.

Legs.— Hind coxa smooth; tarsi shortened, fore and middle telotarsi enlarged (figs 10, 11, 13); length of femur, tibia and basitarsus of hind leg 3.5, 8.6, and 5.5 times their width, respectively; outer spur robust; length of hind tibial spurs 0.2 and 0.4 times hind basitarsus.

Metasoma.— Length of first tergite 0.7 times its apical width, its surface rugose laterally, and largely smooth medially, its dorsal carinae complete (fig. 8); dorsope indistinct; second tergite densely and finely longitudinally rugose; second metasomal suture very wide and crenulate (fig. 8); third tergite short, finely longitudinally rugose; fourth tergite indistinctly rugulose-coriaceous; fifth tergite only basally indistinctly sculptured; fourth tergite joined to third tergite but some movement seems to be possible; fifth-seventh tergites distinctly exposed (fig. 6); length of ovipositor sheath 0.29 times fore wing.

Colour.— Pale brownish-yellow; palpi, tegulae, and ventral side of metasoma ivory; apical quarter of antenna and ovipositor sheath dark brown; wing membrane



Figs 27-38, *Tetratermus hiddlestoni* Wharton, ♀, holotype. 27, wings; 28, detail of scapus and pedicellus, lateral aspect; 29, detail of first subdiscal cell of fore wing; 30, antenna; 31, habitus, lateral aspect; 32, outer hind claw; 33, hind leg; 34, mesosoma, dorsal aspect; 35, fore tarsus, lateral aspect; 36, head, dorsal aspect; 37, head, frontal aspect; 38, metasoma, dorsal aspect. 27, 30, 31, 33: 1 × scale-line; 28, 29: 2.5 ×; 32, 35: 2.7 ×; 34, 36-38: 1.2 ×.

subhyaline; pterostigma brownish-yellow; veins brown.

Variation.— Length of fore wing 2.1-2.7 mm, and of body 2.4-3.2 mm; antenna of ♀ with 23(1), 25(1), 26(28) or 27(5) segments, of ♂ with 23(1), 24(2), 25(1) segments; length of first tergite of ♀ 0.7-0.9 times its apical width, of ♂ 0.8-1.0 times; median area of first tergite smooth or distinctly sculptured; length of ovipositor sheath 0.24-0.31 times fore wing. Males are very similar to female, possessing also the shortened tarsi.

Platyrmus Belokobylskij, 1994
(figs 14-26)

Platyrmus Belokobylskij, 1994: 169-170, figs 116-128; van Achterberg, 1995: 94. Type species (by original designation): *Platyrmus maichauai* Belokobylskij, 1994 [examined].

Diagnosis.— Antennal segments of ♀ 23; scapus truncate apically (fig. 18); antennal sockets not protruding (fig. 17); head very strongly narrowed ventrally (fig. 15); occipital carina reduced ventrally, not connected to hypostomal carina; face about six times wider than high, and about as high as clypeus (fig. 15); mandible depressed ventrally and basally, without lamella, but with angulate protuberance (fig. 16); mesosoma strongly flattened (fig. 19); mesoscutum largely long setose, and with long medio-longitudinal groove (fig. 23); mesosternal sulcus smooth; notauli absent posteriorly (fig. 23); precoxal sulcus absent posteriorly (fig. 19); scutellum at about same level as metanotum (fig. 19); costulae of propodeum absent (fig. 23); first subdiscal cell of fore wing moderately narrow and with vein CU1b sclerotized, shorter than 3-CU1 (fig. 14); vein M+CU of hind wing slightly shorter than vein 1-M (fig. 14); vein 3-SR of fore wing distinctly longer than vein r (fig. 14); vein m-cu of fore wing slightly postfurcal (fig. 14); fore tarsal segments rather robust (figs 24, 26); first metasomal tergite flattened postero-laterally (fig. 21); length of second tergite about 3 times length of third tergite behind second metasomal suture (fig. 21); fifth tergite smooth, without transverse groove, moderately sclerotized, and partly retracted (figs 19, 21).

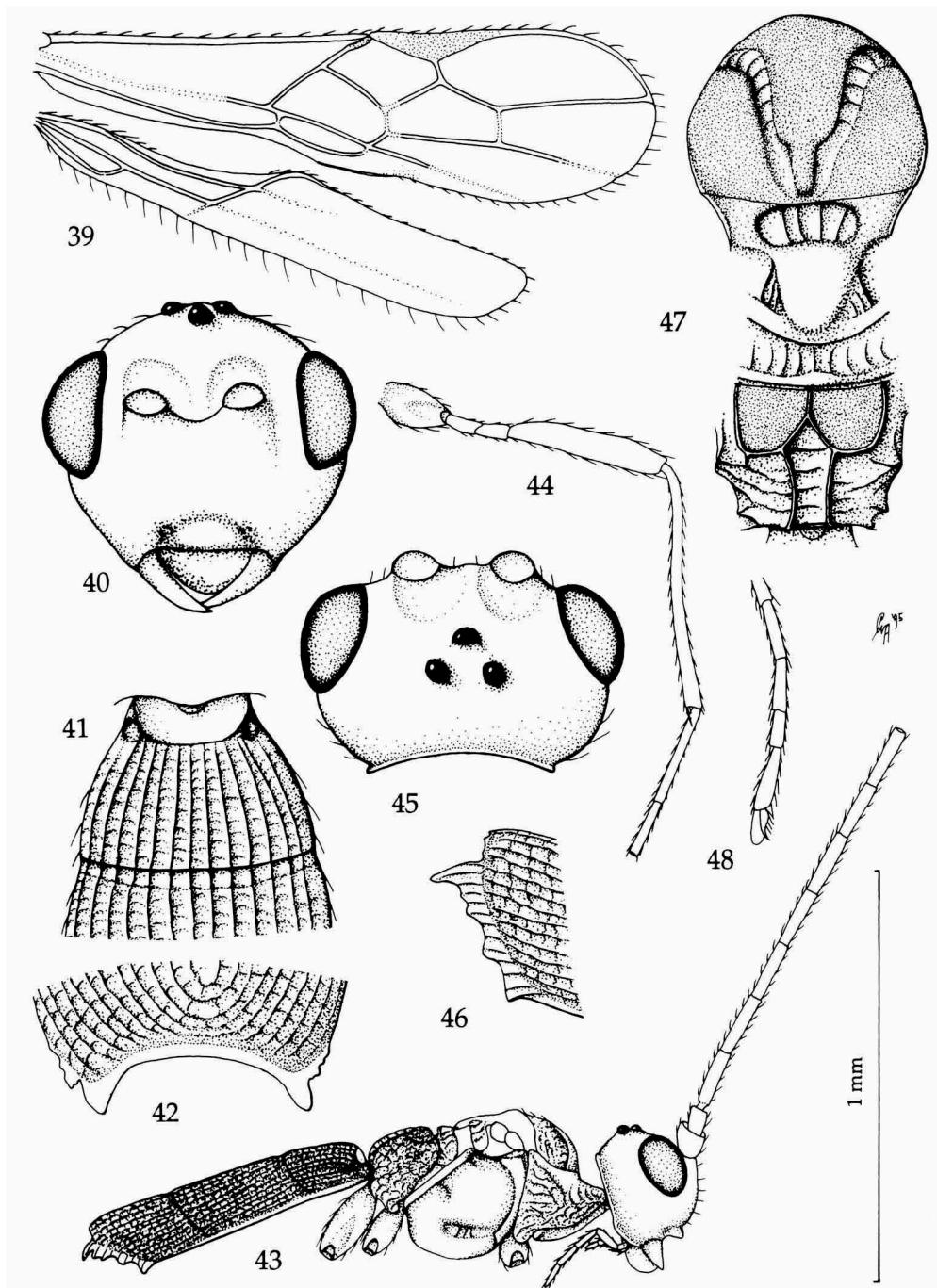
Biology.— Unknown.

Distribution.— Oriental (only the type species from Vietnam is known).

Tetratermus Wharton, 1993
(figs 27-38)

Tetratermus Wharton, 1993: 160-163, figs 56, 69-74, 91; van Achterberg, 1995: 94, figs 381-392. Type species (by original designation): *Tetratermus huddlestonei* Wharton, 1993 [examined].

Diagnosis.— Antennal segments of ♀ more than 23; scapus slightly oblique apically, somewhat shorter ventrally than dorsally (fig. 28); antennal sockets somewhat protruding (fig. 36); head directly narrowed ventrally (fig. 37); occipital carina complete ventrally, just connected to hypostomal carina (fig. 31); mandible without angulate protuberance (fig. 31); precoxal sulcus present posteriorly (fig. 31); mesoscutum largely glabrous, without medio-longitudinal groove (fig. 34); notauli present posteriorly (fig. 34); scutellum distinctly elevated above metanotum (fig. 31); metanotum not protruding dorsally; vein 2-SR of fore wing complete; first subdiscal



Figs 39-48, *Afrotitermus capensis* (Hedqvist), ♂, holotype. 39, wings; 40, head, frontal aspect; 41, first metasomal tergite, dorsal aspect; 42, apex of third metasomal tergite, dorsal aspect; 43, habitus, lateral aspect; 44, hind leg; 45, head, dorsal aspect; 46, apex of third metasomal tergite, lateral aspect; 47, mesosoma, dorsal aspect; 48, inner middle claw. 39, 43, 44: 1 × scale-line; 40-42, 45-48: 1.9 ×.

cell of fore wing narrow and with vein CU1b only pigmented, shorter than 3-CU1 (figs 27, 29); vein 3-SR of fore wing about as long as vein r (fig. 27); vein m-cu of fore wing antefurcal (fig. 27); vein M+CU of hind wing much shorter than vein 1-M (fig. 27); fore tarsal segments slender (fig. 35); first metasomal tergite depressed postero-laterally (fig. 38); length of second tergite about 4 times length of third tergite behind second metasomal suture; fifth tergite smooth, weakly sclerotized, and retracted.

Biology.—Unknown.

Distribution.—Australian (only the type species from Australia is known).

Tribe Lysitermini Tobias, 1968

Lysitermini Tobias, 1968: 28; van Achterberg, 1991: 8, 15; Belokobylskij, 1993: 150-151, 1994: 61; Quicke, 1994: 159-160.

Lysiterminae; van Achterberg, 1993: 26, 1995: 66-95 (except *Tetratermus*).

Lysitermina; Belokobylskij, 1993: 151.

Acanthormiina Belokobylskij, 1993: 151; van Achterberg, 1995: 66 (synonymy).

Tritermina Belokobylskij, 1993: 152; van Achterberg, 1995: 66 (synonymy).

Diagnosis.—Antennal segments 14-34; parastigma variable, frequently virtually absent (fig. 39); first metasomal tergite movably or immovably (fig. 43) joined to second tergite, its dorsal carinae free subbasally or united (fig. 41) and with dorsope; second metasomal tergite without depression antero-laterally (fig. 41); second metasomal suture narrow (figs 420, 424 in van Achterberg, 1995) or medium-sized (fig. 41); metasoma consisting of three strongly sclerotized visible segments (figs 43; 412, 433, 443, l.c.); length of ovipositor sheath usually about equal to length of second tergite (figs 433, 443, l.c.).

Biology.—(?Ecto-)parasites of larvae of Psychidae and Xyloryctidae (Lepidoptera). The biology is hardly known, but several species are gregarious.

Distribution.—Cosmopolitan (six genera, of which only one in the New World).

Note.—A key to the genera is given by van Achterberg (1995); the recently described genus *Afrotritermus* Belokobylskij, 1995, may be added as follows (l.c., p. 25):

- 36. First metasomal tergite immovably joined to second tergite (figs. 41, 43) 36a
- First tergite movably joined to second tergite (figs 373, 395 in van Achterberg, 1995) 37
- 36a. Vein CU1b of fore wing present, resulting in a closed first subdiscal cell (fig. 39); vein 1-SR+M of fore wing complete; notauli deep anteriorly (fig. 47); third tergite with serrate lamella apically (figs 43, 46), and medio-apically concave (fig. 42); vein M+CU1 of fore wing largely unsclerotized (fig. 39); vein 3-SR of fore wing comparatively short, angled with vein r (fig. 39); Afrotropical (southern Africa)
..... *Afrotritermus* Belokobylskij

- Note. Two very similar species are known, which are keyed by Belokobylskij (1995: 39).
- Vein CU1b of fore wing absent, resulting in an open first subdiscal cell (fig. 357 in van Achterberg, 1995); vein 1-SR+M of fore wing largely absent (fig. 357, l.c.); notauli shallow anteriorly (figs 363, 367, l.c.); third tergite without serrate lamella apically (figs 366, 367, l.c.), and medio-apically straight (fig. 366, l.c.); vein M+CU1 of fore wing sclerotized (fig. 357, l.c.); vein 3-SR of fore wing comparatively long, not angled with vein r (fig. 357, l.c.); Palaearctic (Central Asia) *Tritermus* van Achterberg

Acknowledgements and abbreviations

We wish to express our gratitude to Drs S.A. Belokobylskij (St. Petersburg) and R. Danielsson (Lund) for the loan of type specimens, Dr C. Amedegnato (Muséum National d'Histoire naturelle, Paris) for the identification of the grasshopper, and Dr M.R. Shaw (Edinburgh) for his comments on the first draft. The second author wishes to express his gratitude to the Gesellschaft für technische Zusammenarbeit GTZ (German Agency for Technical Cooperation; Project Nr 90.2136.1-03.100 : Flanking Programm for Tropical Ecology) for the funding of the fieldwork in Malaysia.

BMNH stands for the Natural History Museum, London; NMS for National Museums of Scotland, Edinburgh; RMNH for Nationaal Natuurhistorisch Museum, Leiden; ZIL for Zoological Institute, Lund, and ZISP for Zoological Institute, Akademia NAUK, St. Petersburg.

References

- Achterberg, C. van, 1988. Revision of the subfamily Blacinae Foerster (Hymenoptera, Braconidae).— *Zool. Verh.* Leiden 249: 1-324, figs 1-1250.
- Achterberg, C. van, 1990. Illustrated key to the subfamilies of the Holarctic Braconidae (Hymenoptera: Ichneumonoidea).— *Zool. Med.* Leiden 64: 1-20, figs 1-26.
- Achterberg, C. van, 1991. Revision of the genera of the Afrotropical and W. Palaearctic Rogadinae Foerster (Hymenoptera: Braconidae).— *Zool. Verh.* Leiden 273: 1-102, figs. 1-390.
- Achterberg, C. van, 1993. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea).— *Zool. Verh.* 283: 1-189, figs 1-66, photos 1-140, plates 1-102.
- Achterberg, C. van, 1995. Generic revision of the subfamily Betylobraconinae (Hymenoptera: Braconidae) and other groups with modified fore tarsus.— *Zool. Verh.* Leiden 298: 1-242, figs 1-857.
- Belokobylskij, S.A., 1993. O klassifikatsii i filogenii naezdnikov-brakonid podsemejstva Doryctinae i Exothecinae (Hymenoptera, Braconidae). Tsast 1. O klassifikatsii. 2.— *Ent. Obozr.* 72: 143-164, figs 1-178.
- Belokobylskij, S.A., 1994. K fauna indomalajskich naezdnikov-brakonid trib Exothecini, Pambolini i Pentatermini (Hymenoptera, Braconidae).— *Trudy zool. inst. RAN* 2455[1992]: 125-1734, figs 1-128.
- Belokobylskij, S.A., 1995. Two new genera and two new subgenera of the subfamilies Exothecinae and Dorcytinae from the Old World (Hymenoptera: Braconidae).— *Zool. Med.* Leiden 69: 37-52, figs 1-74.
- Blackith, R.E., 1967. A hymenopterous primary parasite of morabine grasshoppers.— *Austr. J. Zool.* 15: 93-102, figs 1-5.
- Quicke, D.L.J. & C. van Achterberg, 1990. Phylogeny of the subfamilies of the family Braconidae (Hymenoptera: Ichneumonoidea).— *Zool. Verh.* Leiden 258: 1-95, figs 1-180.
- Quicke, D.L.J., 1994. Phylogenetic and biological transitions in the Braconidae (Hymenoptera: Ichneumonoidea).— *Norw. J. Agric. Sc.*, Suppl. 16: 155-162, fig. 1, table 1.
- Tobias, V.I., 1968. Voprosy klassifikatsii i filogenii sem. Braconidae (Hymenoptera).— *Chteniya Pamjati N.A. Kholodkovskogo* (Moscow-Leningrad)[1967]: 3-43.
- Wharton, R.A., 1993. Review of the Hormiini (Hymenoptera: Braconidae) with description of new taxa.— *J. Nat. Hist.* 27: 107-171.

Received: 12.ix.1996

Accepted: 17.ix.1996

Edited: M.J.P. van Oijen