A NEW GENUS AND SPECIES OF CRABRONINI (HYMENOPTERA: SPHECIDAE) FROM SRI LANKA

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Abstract.—The new genus ***Krombeinictus*** and its type species, ***Krombeinictus nordenae,*** are described and illustrated. The species was obtained from hollow internodes of the myrmecophyte *Humboldtia laurifolia* collected in Sri Lanka. *Krombeinictus* is similar to *Vechtia* Pate, but apparently most closely related to *Piyumoides* Leclercq.

The key to genera of Crabronini in Bohart and Menke (1976) is modified to include *Krombeinictus.*

Key Words: Crabronini, Sphecidae, Sri Lanka, new species

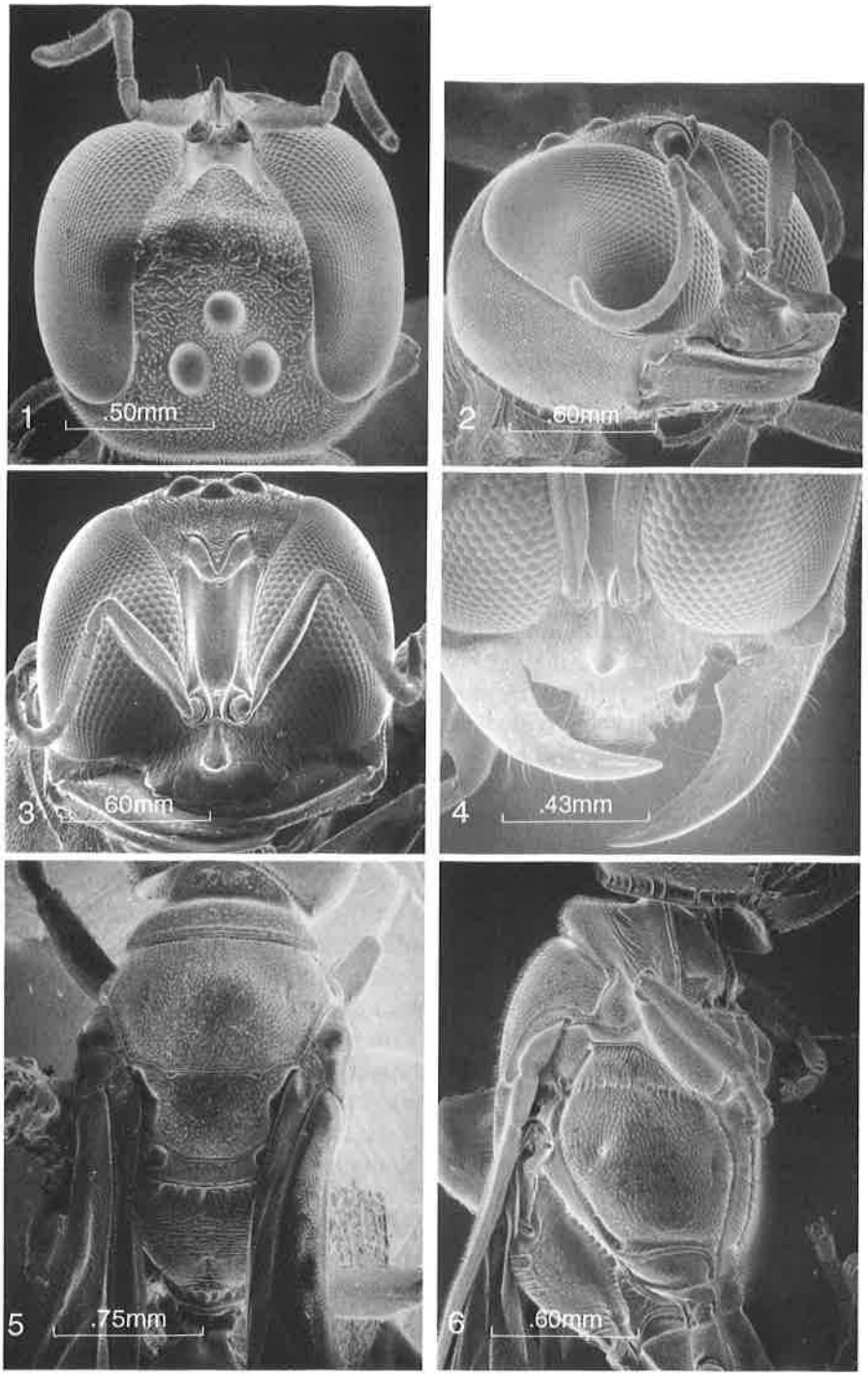
The new genus *Krombeinictus* is described for a remarkable species collected in Sri Lanka by Karl Krombein and his associates. The morphology of this genus includes characteristics found in unrelated genera: *Vechtia,* on one hand, *Piyuma* and *Piyumoides,* on the other. *Krombeinictus* has a simple pronotal collar like the last two genera, but it has a deep scapal basin surmounted by a triangular, median lamella as in *Vechtia.* The purpose of this paper is to describe the new genus and species, and to modify the generic key of Bohart and Menke (1976) to include it and related genera. The relationship of *Krombeinictus* to other genera of Crabronini is also discussed. The terminology used here is from Bohart and Menke (1976).

Krombeinictus Leclercq, NEW GENUS

The name honors Karl V. Krombein, "ami éminent et admiré" (eminent and admired friend).

Description.—Head, thorax and gaster finely sculptured, without ridging and coarse punctation. Head (Figs. 1–4) subcuboidal, eyes asetose, inner orbits converging toward clypeus. Scapal basin smooth, shining, not delimited laterally by carina, but surmounted dorsad by a median, flat, triangular lamella below which there is a transverse, arcuate carina (Fig. 3). Scape finely bicarinate. Flagellomere I slightly shorter than II. Male antenna with 11 unmodified flagellomeres, setation simple. Mandible bidentate apically, external face entire, shining, divided by small, translucent carina; inner margin, at least in female, with small subbasal tooth (Fig. 4). Clypeus broad, with strong median projection, its edge simple, rounded (Figs. 2–4). Orbital fovea tiny (Fig. 1). Ocellar triangle subequilateral (Fig. 1). Gena simple. Occipital carina a complete circle separated from hypostomal carina, crenulate (Fig. 6). Hypostomal carina flattened at apex, thus trapezoidal in shape. Palpal formula 6-4.

Pronotal collar non-carinate, smooth, rounded, unnotched medially (Figs. 5–6). Pronotum anteriorly with pair of dimples. Propleuron produced at posterolateral corner. Scutum with two short admedian lines, notauli absent, parapsidal lines present, short. Prescutellar sulcus very narrow, not



Figs. 1–6. *Krombeinictus nordenae.* 1–2, Male head. 3–4, Female head. 5, Female thorax. 6, Male thorax.

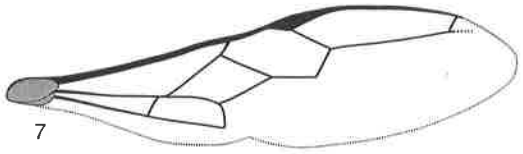


Fig. 7. *Krombeinictus nordenae.* Fore wing.

foveate. Scutellum and axillae flat, on same plane as scutum (Fig. 5). Metanotum flat, micropunctate. Mesopleuron with continuous postspiracular carina and omaulus (Fig. 6), without acetabular carina, verticaulus or sternaulus. Propodeum finely sculptured, dorsal enclosure not defined but dorsum with short, basal carinae (Fig. 5), a ridge extends anterad from lower end of propodeal spiracle.

Legs simple. Femur 1 without ridge basoventrally. Legs 1–2 as in Fig. 6; midtibial spur present in both sexes, tibia 3 moderately spinose, basitarsi 1–3 fairly long. Female basitarsus 1 with very short, very tight comb of spines, basitarsus 2 with longer comb but with fewer spines.

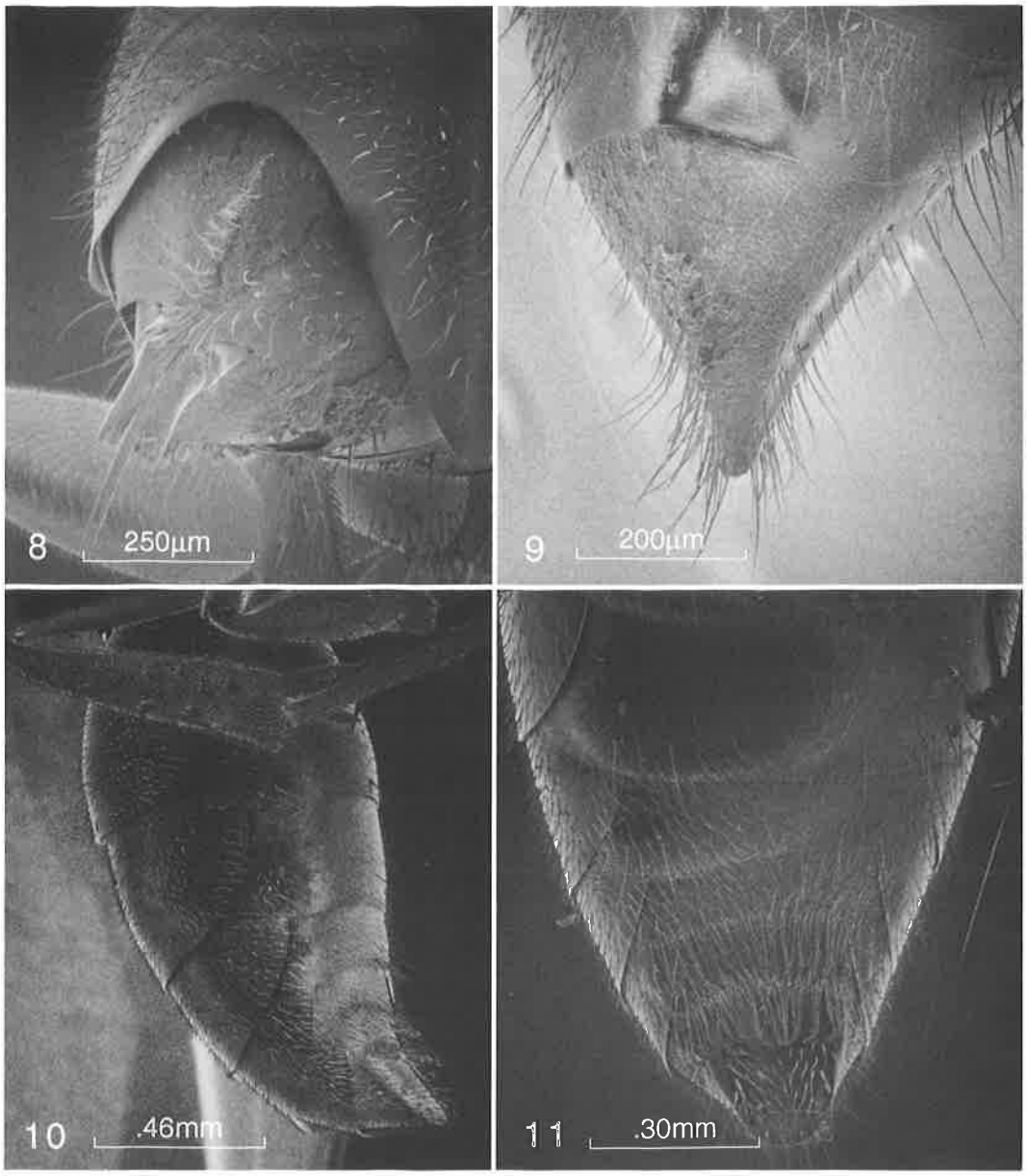
Forewing with recurrent vein meeting submarginal cell a little beyond middle, marginal cell truncate apically (Fig. 7). Hindwing jugal lobe as long as submedian cell.

Gaster sessile, oblong, terga fairly flat. Tergum I with lateral carina, tergum II depressed basally. Female tergum VI convex, without pygidial plate, surface with microsculpture and median, longitudinal array of erect setae (Figs. 8–9). Male tergum VII trapezoidal, fairly flat, without bordering carina.

Discussion.—*Krombeinictus* is readily distinguished from other crabronines by the following combination of characters: scapal basin surmounted by a triangular lamella (Figs. 1–3); pronotal collar simple, rounded; mesothorax finely punctate, without ridging; prescutellar sulcus very narrow; no precoxal carina; gaster oblong and fairly flat; female tergum VI without pygidial plate.

Krombeinictus shares one apomorphy with the Oriental genus *Vechtia,* namely the triangular lamella that projects over the top of the scapal basin, somewhat shielding the apices of the scapes. In both genera, the basin is very deep. In *Vechtia* it is delimited laterally by a carina that is continuous dorsally with the edge of the lamella; its surface is microsculptured and dull. The scapal basin of *Krombeinictus* lacks defining lateral carinae, its surface is polished and shining, and there is a transverse, rounded carina (Fig. 3, not easily seen) below the triangular lamella. These two genera also share a complete occipital carina that is separated from the hypostomal carina.

Other features readily separate the two genera and also suggest that they are not closely related. The pronotal collar of *Krombeinictus* is non-carinate and rounded. That of *Vechtia* is transversely carinate anteriorly, the carina extending onto the pronotal lobe; moreover, the midline of the collar is indicated by a short carina dividing a broad median notch. The absence of a pygidial plate in the female of *Krombeinictus* contrasts with the narrow, gutterlike plate in *Vechtia* that is margined by a carina. *Krombeinictus* lacks the acetabular carina, sternaulus, verticaulus, and dorsal and lateral propodeal carinae, all of which occur in *Vechtia.* There are also other differences: the ocellar triangle is low in *Vechtia* (high in *Krombeinictus*), the orbital fovea is shallow and elongate in females (absent in males) (small and impressed in both sexes of *Krombeinictus*); the frontal line is a carina in *Vechtia,* a superficial sulcus in *Krombeinictus*; the gena in *Vechtia* has a postocular sulcus that becomes quite large near the mandible (very narrow, not widening below in *Krombeinictus*); the antennal sockets are contiguous in *Vechtia* (separated in *Krombeinictus*); the scape has a single, somewhat lamellaform carina (*Krombeinictus* has two); the clypeus is short and the edge is thickened in *Vechtia* (broad and thin-edged in *Krombeinictus*); the female mandible is tridentate apically in *Vechtia* (bidentate in *Krombeinictus*); the



Figs. 8–11. *Krombeinictus nordenae.* 8–9, Female gaster, last segment. 10–11, Male gaster.

apex of the hypostomal carina is arcuate in *Vechtia* (trapezoidal in *Krombeinictus*); the prescutellar sulcus is broad and deep in *Vechtia* (very narrow in *Krombeinictus*); the gaster is oval in *Vechtia* (oblong in *Krombeinictus*).

The rounded off collar of *Krombeinictus* which is smooth, broadly yellow and without a median mark or notch, is a feature shared with only a few genera of Crabronini: *Piyuma, Piyumoides* (revised by Leclercq, 1994), *Leclercqia, Towada,* and the subgenus *Thao* of *Crossocerus* (see Tsuneki, 1982, Leclercq, 1986). In the other genera, the pronotal collar is more or less uneven and flattened, with a median notch or

another mark (spot, line or sulcus). That median notch or mark may be obsolete or even absent in a few species of *Entomognathus, Quexua, Pseudoturneria* and *Rhopalum,* but these genera are easily distinguished from *Krombeinictus* by other characters in the key of Bohart & Menke (1976). In a few species of *Crossocerus* (*Blepharipus*), some specimens have no trace of a median mark, but the collar is obviously different, being black and having convex humeral angles. In *Krombeinictus,* and the other genera with a rounded pronotal collar (except subgenus *Thao*), the female mandible is bidentate and tergum VI has fine microsculpture and is not shining. In *Crossocerus* (*Thao*) and (*Blepharipus*), the female mandible is tridentate and tergum VI has a gutterlike and polished pygidial plate.

Krombeinictus thus appears related to the genera which have a rounded, yellow pronotal collar, and these taxa constitute what I call "the *Piyuma* complex." *Piyumoides* is obviously the most closely related: it shares with *Krombeinictus* the convex, finely microsculptured female tergum VI which lacks a pygidial plate. Moreover comparison of the few known species of *Piyumoides* shows transitions of three characters found in *Krombeinictus:* the frons varies from simply rounded above scapal basin, to having a broad, arcuate, carinate swelling; the prescutellar sulcus varies from quite broad to unusually very narrow; the scutellum and axillae vary from slightly convex to flat and on the same plane as the scutum. However *Piyumoides* differs in having the swelling of the frons interrupted medially, the occipital carina incomplete or reaching the hypostomal carina, the verticaulus present and the oval gaster.

Krombeinictus nordenae Leclercq, New Species

The specific name honors Beth B. Norden of the Smithsonian Institution, who helped collect the material and also contributed to this manuscript.

Female.—Length: 5.5 mm. Black except following pale yellow: scape, pedicel; flagellomeres I–II, remaining flagellomeres dorsally (red ventrally); mandible (apex reddish brown); disk of clypeus including tubercle (border narrowly black); palpi; pronotal lobe, collar and transverse spot at anterior margin; tegula and humeral plate (latter with central brown spot); scutellum and metanotum (and their lateral sutures posteriorly); basal third of costal vein; precoxal lobes; front leg, midleg from apex of coxa, hindleg except base of coxa (here tibia and tarsus are more strongly yellow); spur of tibia 2. Spurs of tibia 3 reddish brown. Gaster yellowish brown but, terga I–II and V with basal, transverse brown spots and terga I–II with transverse brown spot distally; middle of terga III–IV largely black. Sterna slightly paler yellow brown.

Vestiture very short, uniform, dense on mesopleuron and propodeum. Terga I–V with recumbent setae. Erect setae sparse, not very long on inferior border of mandible, on gena ventrally, on external face of tibiae 1–2, and on distal margin of sterna. Venter of trochanter 1 with slightly longer, erect setae. Tergum VI with long, erect setae along midline (Figs. 8–9).

Frons, vertex and gena fairly shiny, with very fine, dense punctation. Frons with week frontal line between midocellus and scapal basin. Orbital fovea very small, oval, concave. Antennal sockets not contiguous but touching inner orbit. Clypeus with broad median lobe whose free margin is broadly arcuate (Figs. 3, 4), corner of lobe slightly more than a right angle. Yellow discal area of clypeus devoid of silver setae, with strong rounded projection (Figs. 3, 4). Mesothorax dull, with uniform, fine, dense punctation. Episternal sulcus represented by a series of large pits. Metapleuron shiny, micropunctate. Propodeum shiny, with short basal ridges dorsally beyond which the surface is finely, transversely microridged and punctate; lateral surface striatopunctate dorsad, becoming smooth, impunctate ventrad. Terga I–II shallowly

punctate; following terga with superficial microsculpture that disappears laterally. Sterna smooth.

Male.—Length: 5.2 mm. Similar to female except all flagellomeres brown dorsally; mandible narrowly black at base; clypeus black, brown below median carina (with a small yellow spot in holotype, not in paratype); precoxal lobes black; coxae yellow only at apex; femur 3 reddish brown beneath.

Mesopleuron, propodeum and venter of trochanter 1 less setose than female. Orbital fovea smaller. Clypeus with median lobe semicircular; median projection narrower, carinate from between the antennal sockets (Fig. 2). Episternal sulcus more distinctly crenulate (Fig. 6).

Discussion.—The pale yellow color is remarkably constant in all specimens seen, thus it is likely that it would make the species easy to identify if other species were found in the same genus. The clypeus, scutellum, punctation and fine propodeal sculpture are also likely to be good specific characters.

Types.—Holotype female: SRI LANKA, Ratnapura District: Induruwa Jungle, Gilimale, 06°46′N, 80°26′E, ex internodes of *Humboldtia laurifolia,* 18–20.VII.1993, K. V. Krombein, P. B. Karunaratne, A. W. Norden, B. B. Norden (USNM). Allotype male: SRI LANKA: same data as holotype (USNM). Paratypes (1 male, 3 females). SRI LANKA, same data as holotype, ♀ (USNM), ♀ (National Museum of Sri Lanka), ♀ (GEMBLOUX), 2 ♀♀ 2–3.VIII.1993 (USNM); 4.5 km S of Kudawe, Sinharaja Rainforest, uncut 20 ha plot of N & S Gunatilleke, 06°25′ N 80°26′ E, ex internodes of *Humboldtia laurifolia,* ♂ 28.IV.1992, F. R. Rickson (GEMBLOUX).

Modification to Generic Key of Bohart and Menke

I have modified the key to genera of Crabronini in Bohart & Menke (1976) to include *Krombeinictus.* This has resulted in considerable reorganization of part of their key. As a result, their couplets 23–27 can now be eliminated. For completeness, the new couplets below include the recent modifications to the key by Pulawski and Court (1992), and an improved version of couplets 13–15 based on new information in Leclercq (1991) and from a revision in progress of Australian species of *Rhopalum.* Most of the figures cited in the key are found in Bohart and Menke (1976), the only exceptions being those in couplet 7b.

7. Pronotal collar evenly rounded anteriorly and laterally, as high as anterior part of scutum, smooth and broadly yellow, without a median notch or mark. Gaster sessile or subsessile 7a

– Pronotal collar usually with a median notch or mark (small spot, line or sulcus); if notch is indistinct, then collar is entirely black, often flattened or raised laterally and finely punctate, sometimes transversely carinate or sloping below the level of scutum 7f

7a. Tergum II with large, rounded basal hollow. Female pygidial plate gutterlike and polished. Female mandible tridentate apically. Oriental Region . . . . . .*Crossocerus* (*Thao* Tsuneki)

– Tergum II flat basally or with only a weak transverse depression. Female tergum VI with or without a pygidial plate, surface rather dull due to very fine microsculpture. Mandible bidentate apically in both sexes 7b

7b. Scapal basin surmounted dorsad by a flat, triangular lamella (Fig. 3). Occipital carina forming a complete circle separated from hypostomal carina. Clypeus broad, surface with median projection (Figs. 1–3). Verticaulus absent. Female tergum VI convex, without pygidial plate, but with a longitudinal array of erect setae (Fig. 8). Sri Lanka . . . . . .*Krombeinictus* Leclercq

– Frons without lamella overhanging scapal basin. Occipital carina an incomplete circle or joining hypostomal carina 7c

7c. Clypeus broad, trapezoidal, its free margin rounded or subtruncate. Frons rounded, sometimes slightly swollen laterally above scapal basin. Ocelly usually in a low triangle. Verticaulus usually present. Female pygidial plate triangular, flat and with median longitudinal carina. Oriental and Australasian Region . . . . .*Piyuma* Pate

– Clypeus subtriangular. Frons swollen laterally above scapal basin, swelling usually

with a transverse carina that is interrupted medially. Ocelli in an equilateral or subequilateral triangle 7d

7d. Verticaulus present. Female tergum VI convex, without pygidial plate. Female scutum posteriorly with a median papilla. Scape more or less distinctly carinate, sometimes bicarinate. Oriental Region . . . . . *Piyumoides* Leclercq

– Verticaulus absent. Female pygidial plate present. Female scutum posteriorly without a median papilla. Scape ecarinate. . . 7e

7e. Female pygidial plate with a median longitudinal carina. Propodeal enclosure punctate, defined by a foveate sulcus. Male flagellum and legs 1–2 with modifications. Taiwan, S. China. . . . . *Leclercqia* Tsuneki

– Female pygidial plate ecarinate medially. Propodeal enclosure smooth, shining, not defined. Male flagellum and legs simple. Japan . . . . . *Towada* Tsuneki

7f. Scapal basin with lateral carinae which may be continuous dorsally (Figs. 121A, 127B) 8

– Scapal basin ecarinate laterally (Figs. 121D, 127A) 13

8. Scapal basin not enclosed on three sides by a continuous carina (Fig. 121A) 9

– Scapal basin enclosed laterally and dorsally by a strong continuous carina (Fig. 127B) 10

9. Scapal basin bisected by longitudinal carina bearing one or two processes; weakly carinate laterally (Fig. 121 A). Hypersternaulus present. Gaster pedunculate. Occipital carina interrupted below or forming a complete circle. Female pygidial plate shallowly concave, dull. Ethiopian Region . . . . . *Arnoldita* Pate

– Scapal basin not bisected by longitudinal carina, more or less strongly carinate laterally. Hypersternaulus absent. Gaster sessile. Occipital carina not a complete circle. Neotropical Region 9a

9a. Occipital carina flange-like and foveate, joining hypostomal carina. Postocular sulcus well-developed. Ocelli in a low triangle. Female tergum VI convex, without pygidial plate, but with a strong median carina and stiff setae . . *Parataruma* Kimsey

– Occipital carina not flange-like, directed to, but evanescent before reaching hypostomal carina. Postocular sulcus absent. Ocelli in a subequilateral triangle. Female pygidial plate gutterlike and polished . . . . . *Taruma* Pate

10. Scutum with transverse anterolateral carinae (Fig. 121H). Mandible apex simple. Female pygidial plate broad, flat, coarsely punctate. New World . . . . . *Enoplolindenius* Rohwer

– Scutum without transverse anterolateral carinae. Mandible apex tridentate in female, bidentate in male. Female pygidial plate gutterlike and polished 11

11. Dorsal carina of scapal basin expanded medially into a downcurved, triangular lamella (Fig. 122I). Sternaulus present. Oriental Region . . . . . *Vechtia* Pate

– Dorsal carina of scapal basin nonlamellate medially. Sternaulus absent 12

12. Head and thorax with coarse, reticulate sculpture. Occipital carina not a complete circle, joining hypostomal carina or ending just short of it (hypostomal carina U-shaped). Median clypeal lobe double-edged, area between edges concave and delimited laterally by longitudinal carina on each side. Male flagellum with anterior fringe of fimbriae. Male foretarsus conspicuously expanded. Oriental Region . . . . . *Hingstoniola* Turner & Waterston

– Head and thorax without reticulate sculpture. Occipital carina a complete circle (evanescent medioventrally in some females), well separated from hypostomal carina (if latter U-shaped) or subtangent to it (if V-shaped). Median clypeal lobe single-edged. Male flagellum without anterior fringe of fimbriae. Male foretarsus simple. Neotropical Region . . . . *Foxita* Pate

13. Inner orbits nearly parallel to moderately converging below; antennal socket separated from eye by at least half its diameter, much more in most species (Fig. 121D). Foretrochanter unusually slender and elongate (Fig. 129). Palpal formula 6-3 or 5-3. Mandible bidentate apically. Postspiracular carina and omaulus present. Gaster sessile or subsessile. Holarctic and Neotropical Region . . . . . *Tracheliodes* A. Morawitz

– Without this combination of characters . . 14

14. Palpal formula 6-3. Small (length at most 5 mm). Ocelli in a low triangle. Gaster sessile. Postspiracular carina and omaulus present. Asia, North Africa . . . . . *Odontocrabro* Tsuneki

– Palpal formula 5-3 or 6-4. If size small (at most 5 mm), either ocelli in an equilateral or subequilateral triangle (Fig. 121B), or gaster pedunculate and postspiracular carina and omaulus absent 15

15. Palpal formula 5-3. Gaster often pedunculate (Fig. 128), slender elongate, some-

times subpedunculate, rarely subsessile. Omaulus present or absent 16

– Palpal formula 6-4. Gaster usually sessile or subsessile rarely pedunculate. Omaulus present (only one exception) 28

16–22. In Bohart and Menke: The Australian genus *Pseudoturneria* Leclercq will run to couplet 21, but it can be identified by the presence of an omaulus, a subsessile gaster and a coarsely areolate propodeal dorsum.

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