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# Review of the New Caledonian species of *Acritoptila* Wells, 1982 (Trichoptera, Insecta), with descriptions of 3 new species

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## Abstract

We review the New Caledonian representatives of the Australasian endemic hydroptiline genus *Acritoptila*, based on examination of a considerable collection of material in the Swedish Museum of Natural History and of types of previously established species. A key for identification of males is given and includes 3 species newly described here: *A. parallela* **sp. n.**, *A. forficata* **sp. n.** and *A. macrospina* **sp. n.** For all New Caledonian species, male genitalia are illustrated, and for 5 associated females, distinctive features are illustrated and described.

## Keywords

Spicipalpia, Hydroptilidae, New Caledonia, key

## Introduction

Among the microcaddisfly genera (Trichoptera: Hydroptilidae) found in the southwestern Pacific region, several have restricted distributions whereas others are common also in the Oriental Region or are cosmopolitan. *Acritoptila* Wells, 1982 is one of those

with a narrow distribution, first described for 3 Australian species (Wells 1982). Subsequently, another 2 Australian species were added by Wells (1990) and 7 species were described from New Caledonia by Kelley (1989) and Wells (1995). Two additional New Caledonian species were described by Oláh and Johanson (2010a), but below one of their names is considered a junior synonym, and 3 new species are described. Comparative notes and new records are given for previously established New Caledonian species. All specimens of *Acritoptila* have been collected at lights or in Malaise traps, none by sweep-netting.

The species in the genus *Acritoptila* were distinguished by Wells (1982) from those in the apparently related genera *Hellyethira* Neboiss, 1977, *Austratrichia* Wells, 1982 and *Mulgravia* Wells, 1982 on the basis of small but consistent differences in male inferior appendages. These include abdominal segment IX being sub-quadrate in ventral view, inferior appendages fused, and presence of a pair of spines, termed "parameres" by Wells (1982) when describing them in the south-western Australian species *A. globosa* Wells, 1982, but described by Kelley (1989) as spiny processes "projecting from the lateral margin of abdominal tergum X". In Kelley's illustrations of these "spiny processes" in lateral views of the male genitalia they arise from complex internal apodemes, from which appearance it is likely that they are moveable. But how closely associated they are with tergum X is open to conjecture. Recognition of homologies, and therefore assignment of terms to these and other processes in the often extraordinarily complex male genitalia of microcaddisflies is difficult. In the absence of evidence from developmental studies, putative homologies can be no more than hypotheses. It is difficult to decide, for example, how best to describe the suite of features seen in the male genitalia of *Acritoptila glossocercus* Kelley, 1989 (Figs 11, 12). The stout, dark, tapered setae apico-medially on the fused gonopods of this species may or may not be homologous with the rounded, knob-like setae seen in the Western Australian *A. globosa* and *A. margaretae* Wells, 1982 and in the New Caledonian *A. planichela* Kelley, 1989, *A. ouenghica* Wells, 1995, *A. macrospina* sp. n., and *A. parallela* sp. n. One set of species, with Australian and New Caledonian representatives, lacks the threadlike "parameres", but has sclerotized processes laterally on tergite X. These are assumed homologues of the thread-like parameres.

In the context of congeners, meaningful description of structures in male genitalia of some of these species is difficult. Nevertheless, the New Caledonian species together with the 5 Australian species share the above small suite of genitalic features that suggest they form a monophyletic lineage. In contrast, distinctive female features are recognised for each of the few species that has been associated with males, such as the mesal elongate digitiform process on abdominal sternite VIII in *A. disjuncta* Kelley, 1989 (Fig. 24), pair of dark-tipped lobes on sternite VIII as in *A. crinita* Kelley, 1989 (Fig. 26), darkly pigmented mid ventral spine on abdominal sternite VIII in *A. chiasma* Kelley, 1989 (Fig. 27) and mid ventral glandular structure in *A. amphapsis* Kelley, 1989 (Fig. 28).

For most of the species described by Kelley, new illustrations are given here, drawn from fresh material and corroborated by examination of the holotypes. Final instar larvae have been associated for two Australian species (Wells 1990) and for two New Caledonian species (Figs 31–33) and have abdominal segments III to VIII swollen and segments I and II forming a narrow "waist", superficially giving a appearance somewhat similar to the Hymenoptera petiole, a feature that distinguishes them from known larvae of *Hellyethira* (Wells 1985, 1997), which have the first 3 abdominal segments narrow. Several cases have been associated from pharate pupae and, similar to females, each is distinctive (Figs 30, 32, 34).

## Material and methods

The basis of this study is the collection of New Caledonia material made by K.A. Johanson (abbreviated throughout as KAJ) and associates from the Swedish Museum of Natural History, Stockholm, Sweden where most of the material is deposited; a small number of specimens, including several paratypes are deposited in the Australian National Insect Collection. All holotypes are lodged in the Muséum National d'Histoire Naturelle, Paris, France. Specimens were collected with light traps and Malaise traps. One of the authors (AW) examined holotypes of Kelley's 6 species of *Acritoptila* deposited in the Bishop Museum in Honolulu, where they are stored as macerated specimens in glycerine in microvials.

Recently collected specimens were prepared for close study by maceration in KOH, then cleared in clove oil and mounted in Canada Balsam. Illustrations were prepared by methods described by Wells et al. (2013). A key is provided to adult males of New Caledonian species. Larvae and cases were associated from pharate adults.

Treatments of species are arranged in order such that those with most similar features are placed in close proximity. Terminology follows the recommendations of Oláh and Johanson (2010b), who argued for uniformity of terms across all Trichoptera taxa. Thus we have employed the terms "gonopods" and "subgenital processes" rather than "inferior appendages" and "subgenital plate"; these terms have been used in the two papers already published in this series of papers on New Caledonia Hydroptilidae (Wells and Johanson 2012; Wells et al. 2013).

### List of depository institutions with abbreviations used in the text

**ANIC** Australian National Insect Collection, CSIRO Ecosystem Sciences, Canberra, Australia
**BPBM** B.P. Bishop Museum, Hawaii, USA
**MNHP** Muséum National d'Histoire Naturelle, Paris, France
**NHRS** Swedish Museum of Natural History, Stockholm, Sweden

## Descriptions

### *Acritoptila* Wells

http://species-id.net/wiki/Acritoptila

*Acritoptila* Wells (1982: 262); Kelley (1989: 190); Oláh and Johanson (2010a: 70).

**Type species.** *Acritoptila globosa* Wells, 1982, by original designation.

**Revised diagnosis.** Hydroptilinae with antennae comprising 26–41 flagellomeres in male and 24–26 flagellomeres in female; in male abdominal sternite VII bearing slender subapical spine mesally; abdominal segment VIII shorter than VII, broad; abdominal segment IX deeply excavated mid-ventrally, often produced distally as stout lateral lobes; in male genitalia, gonopods fused at least partially, not forming claspers, with paired, generally slender, elongate spines ("parameres") laterally, arising from complex of internal apodemes, or with lateral margins of tergite X forming sclerotized spiny processes; phallic apparatus without titillator, often with complex spiny apical processes; in female, terminalia forming a short, broad oviscapt; final instar larvae laterally flattened, physogastric, head, thorax and first two abdominal segments slender, then abdominal segments increasing in size to fifth, decreasing distally from sixth, cuticle of head and thorax may have darkened bands or patches; case basically a laterally flattened purse of two equal valves, but shape and materials variable.

### *Acritoptila disjuncta* Kelley

http://species-id.net/wiki/Acritoptila_disjuncta

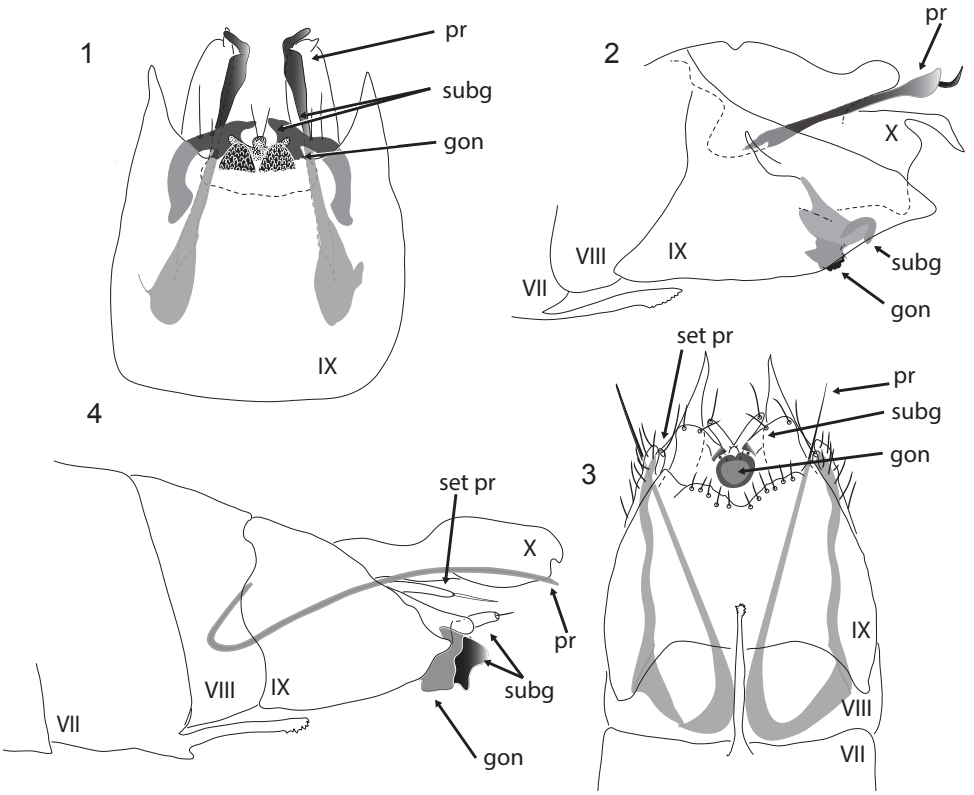
Figs 1, 2, 24, 25, 30, 31, 35

*Acritoptila disjuncta* Kelley (1989: 193, figs 5, 6, 15, 16); Wells (1995: 235, figs 18, 19).

**Revised diagnosis.** Males are recognised by genitalic features (Figs 1, 2): in ventral view by the conical gonopods with rugose surfaces, ventral to the sharply mesally directed darkly sclerotized subgenital processes with a small median papilla bearing a pair of setae and parameres that are dilated subapically proximal to a narrow constriction; females are readily distinguished by the mid ventral elongate digitiform process on abdominal segment VIII (Figs 24, 25). Males resemble most closely those of *A. chiasma* and *A. csavar* Oláh & Johanson, 2010a, all three species in lateral view having a pair of curved spines apically on tergite X. However, *A. chiasma* and *A. csavar* have paired sinuous elongate-slender parameres latero-ventrally, whereas in *A. disjuncta* these processes are constricted subapically and hooked apically; and *A. disjuncta* has well-developed apico-lateral lobes on abdominal segment IX.

Male antennae each with 30–34 flagellomeres; forewing length, 1.9–2.4 mm (n=10).

Female antennae each with 24–26 flagellomeres; forewing length, 2.1–2.5 mm (n=10).




**Figures 1–4.** *Acritoptila* male genitalia. **1–2** *A. disjuncta* Kelley ventral and lateral views **3–4** *A. crinita* Kelley ventral and lateral view. Abbreviations: gon = gonopod(s); pr = parameres; set pr = setose process; subg = subgenital process(es); VII–X = abdominal segments VII–X.

**Remarks.** *Acritoptila disjuncta* is widespread on the island (Fig. 35) and one of the most commonly collected of *Acritoptila* species at sites sampled in this study, although it was never as abundant in any collections as *A. crinita*. The larval cases, described and figured by Wells (1995), are basically rectangular secretion "purses" (Wells 1995: fig. 19). Many cases had a cover of sponge, always neatly shaped around the case, giving a spindle shape in profile (Fig. 30); it appears that the larva (Fig. 31) may crop the proliferating sponge.

**Material examined.** Holotype male: New Caledonia, mountain stream up Boulari River, (BPBM); larvae, pupae, Province Sud, Ouenghi River nr Boulouparis, 20.xii.1983, A Wells, (ANIC); numerous males, females Province Sud, Dumbéa river, Branche sud, 22°08.344'S, 166°30.147'E, 42 m, 3.xi.2003, light trap, loc#006, KAJ (NHRS); numerous males, females, Province Sud, W part of Plaine des lacs, 150 m downstream bridge at La Capture, 22°15.967'S, 166°49.493'E, 261 m, 4–22.xi.2003, Malaise trap, loc#007, KAJ (NHRS); 2 females, Province Sud, Col d'Amieu, 319 m,

small stony river, loc 23, 21°34.720'S, 165°49.620'E, Malaise trap, 30.xi–5.xii.2001, Johanson, Pape, Viklund (NHRS); 1 female, Province Sud, Col d'Amieu, 323 m, small stony river, loc 24, 21°34.844'S, 165°49.677'E, Malaise trap, 30.xi–5.xii.2001, Johanson, Pape, Viklund (NHRS); 1 female, Province Sud, Col d'Amieu, fauna reserve, 415 m, small forest stream, loc 25, 21°33.830'S, 165°45.584'E, Malaise trap, 30.xi–5.xii.2001, Johanson, Pape, Viklund (NHRS); 3 male, 7 females, Province Sud, stream draining to Marais de la Rivière Blanche, 1.35 km S Pont Pérignon, 22°08.496'S, 166°42.152'E, 180 m, 6–16.xi.2003, Malaise trap, loc#009, KAJ (NHRS); numerous males, females, Province Sud, stream draining to Marais de la Rivière Blanche, 2.25 km SW Pont Pérignon, 22.14158°'S, 166.67993 °E, 157 m, 6–16.xi.2003, Malaise trap, loc#010, KAJ (NHRS); 1 male, Province Sud, Monts Kwa Ne Mwa, on road between Noumea and Yaté, Rivière des Pirogues, 22°11.225'S, 166°43.338'E, 100 m, 7.xi.2003, light trap, loc#016, KAJ (NHRS); 1 male, Province Sud, Mt Dzumac, source stream of Ouinne River, downstream crosspoint to mountain track, 22°01.997'S, 166°28.486'E, 795 m, over about 30 m waterfall, 18.xi–4.xii.2003, Malaise trap, loc#031, KAJ (NHRS); numerous males, females, Province Sud, Tamoa River, 700m S road RT1 between Noumea and La Foa, 22°04.518'S, 166°16.592'E, 19.xi.2003, light trap, loc#033, KAJ (NHRS); numerous males, females, Province Sud, Hwa Hace Mtn, Hwa Motu River, at Pont Wamuttu, 1.0 km E Nassirah, about 200 m upstream bridge, 21°48.094'S, 166°04.298'E, 137 m, 20.xi–12.xii.2003, Malaise trap, loc#034, KAJ (NHRS); 1 male, 3 females, Province Sud, W slope Mt Ningua, Kwé Néco Stream, 3.9 km W summit of Mt Ningua, on Boulouparis-Thio Road, about 50 m upstream road, 21°44.359'S, 166°06.009'E, 117 m, 20.xi–12.xii.2003, Malaise trap, loc#035, KAJ (NHRS); 2 males, 18 females, Province Nord, Amoa River, 23 m, loc 20, 12 km W Poindimié, 22°58.092'S, 165°11.804'E, light trap, 26.xi.2001, Johanson, Pape, Viklund (NHRS); numerous males, females, Province Sud, Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt Piditéré, 3.5 km NNE Dumbéa, 22°07.405'S, 166°28.023'E, 27 m, 28.xi.2003, light trap, loc#052, KAJ (NHRS); 6 males, 7 females, Province Sud, Xwé Pemöu Stream, 300 m N bridge over Dathio River at Atè, 6.2 km WNW Thio, 21.58835°S, 166.15117°E, 13 m, 29.xi.2003, light trap, loc#056, KAJ (NHRS); 1 male, Province Sud, lower part of Dumbéa River, 1.0 km SSW bridge over Dumbéa River at Dumbéa, 22°09.750'S, 166°26.700'E, 0.5 m, 30.xi.2003, light trap, loc#058, KAJ (NHRS); 1 male, numerous females, Province Sud, lower part Rivière des Pirogues, 800 m WNW summit of Mont Imbaah, 4.7 km E Lucky Creek in Plum, 22°18.559'S, 166°41.227'E, 1.3 m, 01.xii.2003, light trap, loc#059, KAJ (NHRS); 3 males, 6 females, Province Nord, 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèda, 2.2 km E Tnèdo, 20°43.085'S, 164°49.928'E, 29 m, 7.xii.2003, light trap, loc#071, KAJ (NHRS); numerous males, females, Province Nord, Wé Caot Stream, draining NNE side of Mt Panié, 0.9 km NW Cascade de Tao, 20°33.311'S, 164°48.064'E, 18.xii.2003, light trap, loc#084, KAJ (NHRS); 1 female, Province Nord, Wan Pwé On Stream, draining NNE side of Mt Panié, 3.9 km NW Cascade de Tao, 20°31.820'S, 164°47.016'E, 18.xii.2003, light trap, loc#085, KAJ (NHRS); numerous males, females, Province Nord, Bouérabate Stream,

S Mont Ninndo, along road Barabache-Boulagoma, 20°17.409'S, 164°11.242'E, 60 m, 19.xii.2003–7.i.2004, Malaise trap, loc#089, KAJ (NHRS); numerous males, females, Province Nord, Rivière Néhoué, camp Amenage de Néhoué, 20°25.037'S, 164°13.222'E, 12 m, 19.xii.2003, light trap, loc#090, KAJ (NHRS); numerous males, females, Province Nord, Héémwâ Pwei River, 50 m upstream bridge on Touho-Hienghène road, 1.0 km N Paola, 20.76512°S, 165.10979°E, 22.xii.2003, light trap, loc#095, KAJ (NHRS); numerous males, females, Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS); 1 male, numerous females, Province Sud, W slope Mt Ningua, Kwé Néco Stream, at Camp Jacob, 3.9 km W summit of Mt Ningua, on Boulouparis-Thio Road, about 50 m upstream road, 21°44.083'S, 166°06.298'E, 117 m, 29.xi.2003–12.xii.2003, Malaise trap, loc#053, KAJ (NHRS); 4 males, numerous females, New Caledonia, Province Nord, Plaine des Gaïacs, Rivière Rouge, 14.2 km NW summit of Mt Rouge, 50 m upstream road RT1 Noumea-Koné, 20°31.573'S, 164°46.690'E, 23 m, 2.i.2004, light trap, loc#104, KAJ (NHRS); 1 female, New Caledonia, province Sud, Kuébini River (Kwé Binyi River), 1.4 km N summit of Mt Nokowèito, inland Baie de Tere, 13.5 km SSW Yaté, 22°15.467'S 167°00.238'E, 1 m, 6.i.2004, light trap, loc#111, KAJ (NHRS); numerous males, females, New Caledonia, Province Nord, 2.8 km ENE Bopope, Rivière Oua Mendiou, 100 m S RPN2 Koné-Poindimié, 20°54.455'S, 165°06.300'E, 78 m, 14.i.2004, light trap, loc#119, KAJ (NHRS).

***Acritoptila crinita* Kelley**
http://species-id.net/wiki/Acritoptila_crinita
Figs 3, 4, 26, 32, 33, 35

*Acritoptila crinita* Kelley (1989: 193, figs 4, 13, 14).
*Acritoptila karika* Oláh & Johanson (2010a: 70), **syn. n**.

**Revised diagnosis.** The males of this species are most closely similar to *A. chiasma* and *A. csavar* with which it shares the strongly reduced, fused form of the gonopods, and the slender, elongate ventro-lateral processes or parameres; but they can distinguished because in *A. crinita* the parameres are only slightly curved, not sinuous as in the other two species (Figs 3, 4). In addition, *A. crinita* lacks the sharp apico-lateral spines seen on tergite X of *A. chiasma* and *A. csavar* and *A. crinita* has a pair of lateral digitiform apically setose processes on tergite X. Females are recognised by the very dark apices of the paired lobes of sternite IX. Larval and pupal cases are rectangular purses (Fig. 32), obliquely sloped at each end, constructed of secretion with diatoms accreted smoothly into walls.

Male antennae each with 29–33 flagellomeres; forewing length, 1.5–2.0 mm (n =10).

Female antennae each with 23 flagellomeres; forewing length, 2.8–2.1 mm (n =10).

**Remarks.** Of all species of *Acritoptila*, *A. crinita* was collected most commonly by Johanson and colleagues in New Caledonia, often being taken in large numbers at

sites in both the north and south. The males are readily recognised in ventral view by the fused, darkly sclerotized, rounded to heart-shaped ventral genitalic structure interpreted as the fused gonopods.

The features by which Oláh and Johanson (2010a) distinguished *A. karika* Oláh & Johanson, 2010a from *A. crinita* are "… segment X without sclerotized apical structures; fused ring-shaped gonopods without dorsal projection; basal plate with short digitiform processes; and apex of the phallic organ with a lobe-like complex (not with spine-like structures)"; *A. karika* has "Segment X … slightly sclerotized horizontally…". This is simply another interpretation of the sclerotization displayed in the type of *A. crinita. Acritoptila crinita* also has fused gonopods without a dorsal projection, but has the basal plate (= bilobed processes of Kelley (1989)) with short digitiform processes as in *A. karika*; and the phallic organ has the same apical features that can be interpreted as spiny or lobe-like. Hence we are synonymising *A. karika* with *A. crinita*. In fact, numerous male and female specimens identified as *A. crinita* were collected from the type locality of *A. karika,* and also at a site from which 2 paratypes were designated.

**Material examined.** Holotype male: *Acritoptila crinita* Kelley, New Caledonia, headwaters of Honailu River (BPBM); Holotype male: *Acritoptila karika* Oláh & Johanson, New Caledonia, Province Nord, 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèdo, 2.2 km E Tnèdo, 20°43.085'S 164°49.928'E, loc#071 (MNHN); immatures, Province Nord, Bopope, 18.xii.1983, A Wells, (ANIC); numerous males and females, Province Nord, Amoa River, 23 m, loc 20, 12 km W Poindimié, 22°58.092'S, 165°11.804'E, light trap, 26.xi.2001, Johanson, Pape, Viklund (NHRS); 12 males, Province Sud, Monts Kwa Ne Mwa, on road between Noumea and Yaté, 2.0 km E Pic Mouirange, 22°12.356'S, 166°40.798'E, 220 m, 7–16.xi.2003, Malaise trap, loc#014, KAJ (NHRS); 1 male, Province Sud, Mt Dzumac, source stream of Ouinne River, near crosspoint to mountain track, 22°02.439'S, 166°28.646'E, 805 m, 18.xi–4.xii.2003, Malaise trap, loc#029, KAJ (NHRS); numerous males, females, Province Sud, Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt Piditéré, 3.5 km NNE Dumbéa, 22°07.405'S, 166°28.023'E, 27 m, 28.xi.2003, light trap, loc#052, KAJ (NHRS); numerous males, females, Province Sud, Xwé Pemöu Stream, 300 m N bridge over Dathio River at Atè, 6.2 km WNW Thio, 21.58835°S, 166.15117°E, 13 m, 29.xi.2003, light trap, loc#056, KAJ (NHRS); 3 males, Province Sud, lower part of Dumbéa River, 1.0 km SSW bridge over Dumbéa River at Dumbéa, 22°09.750'S, 166°26.700'E, 0.5 m, 30.xi.2003, light trap, loc#058, KAJ (NHRS); numerous males, females, Province Nord, Wemwâdiu stream, 850 m E summit Kögi Mtn, 5 m upstream road, about 200 m S Tiwaka River, 20°49.020'S, 165°14.165'E, 24 m, 6–27.xii.2003, Malaise trap, loc#067, KAJ (NHRS); numerous males, Province Nord, 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèda, 2.2 km E Tnèdo, 20°43.085'S, 164°49.928'E, 29 m, 7.xii.2003, light trap, loc#071, KAJ (NHRS); numerous males, females, Province Nord, 1 m upstream road, below waterfall on Hienghène-Tnèdo road, 2.2 km SSW summit of Mt Unpac, 4.9 km ESE Tnèdo, 20.73879°S, 164.85508°E, 7.xii.2003, light trap, loc#072, KAJ (NHRS); numerous males, females, Province Nord, 2.8 km ENE Bopope, Riv-

ière Oua Mendiou, 100 m S RPN2 Koné-Poindimié, 20°54.455'S, 165°06.300'E, 78 m, 14.xii.2003, light trap, loc#119, KAJ (NHRS); 3 males (1 dissected by KAJ as B4), Province Nord, Wan Pwé On Stream, draining NNE side of Mt Panié, 3.9 km NW Cascade de Tao, 20°31.820'S, 164°47.016'E, 18.xii.2003, light trap, loc#085, KAJ (NHRS); 3 males, Province Nord, Bouérabate Stream, S Mont Ninndo, along road Barabache-Boulagoma, 20°17.409'S, 164°11.242'E, 60 m, 19.xii.2003–7.i.2004, Malaise trap, loc#089, KAJ (NHRS); numerous males, females, Province Nord, Rivière Néhoué, camp Amenage de Néhoué, 20°25.015'S, 164°13.245'E, 12 m, 19.xii.2003, light trap, loc#091, KAJ (NHRS); numerous males, females, Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS); numerous males, females, Province Nord, Plaine des Gaïacs, Rivière Rouge, 14.2 km NW summit of Mt Rouge, 50 m upstream road RT1 Noumea-Koné, 20°31.573'S, 164°46.690'E, 23 m, 2.i.2004, light trap, loc#104, KAJ (NHRS); 3 males, 2 females, Province Nord, Établissement thermal de la Crouen, along Riv. la Crouen, 30 m upstream road RM3, 21°32.105'S, 165°53.319'E, 15 m, 5.i.2004, Malaise trap, loc#110, KAJ (NHRS); males (1 dissected by KAJ as 'Y'), Province Sud, Col d'Amieu, Xwé Ko River, on road to St. Forestière, 21°35.612'S, 165°48.241'E, 368 m, 8.i.2004, light trap, loc#114, KAJ (NHRS); 4 males, 3 females, Province Sud, Sarraméa, Xwê Wya River, 21°38.318'S, 165°51.582'E, 127 m, 17–18.i.2004, light trap, loc#121, KAJ (NHRS).

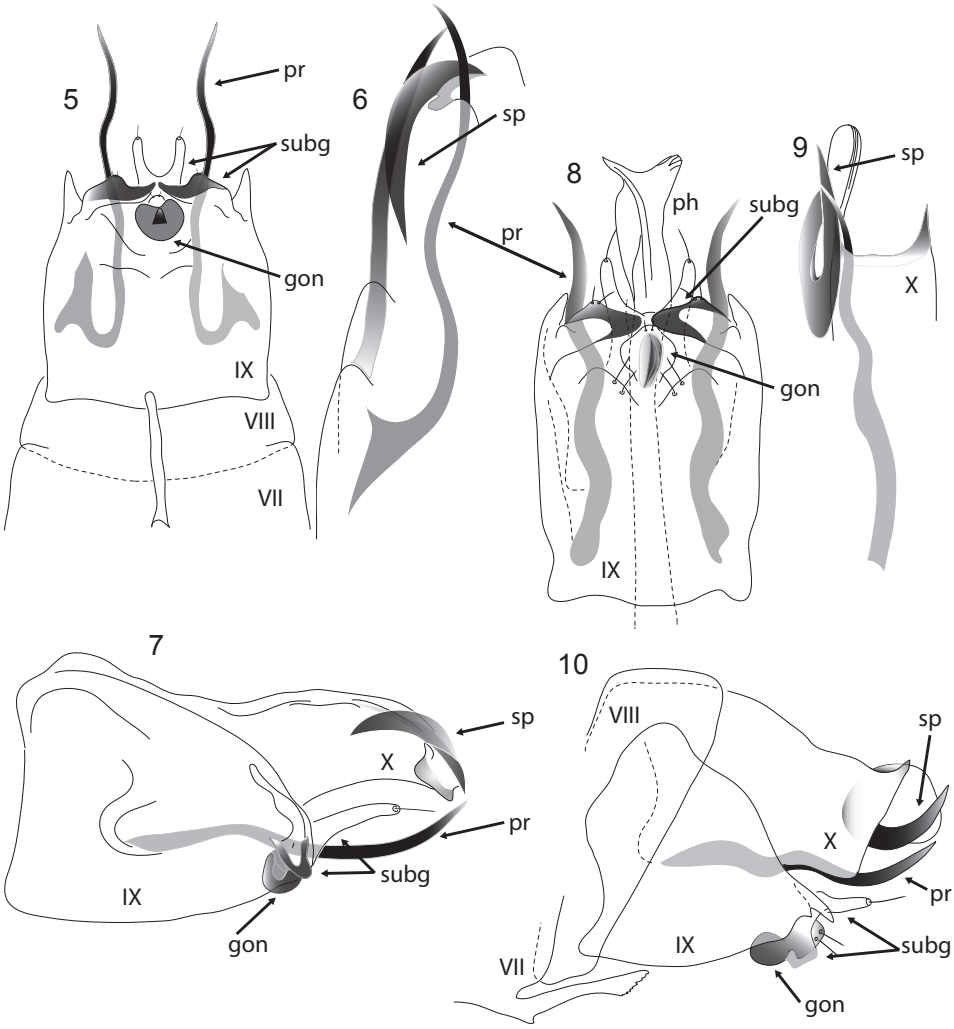
***Acritoptila chiasma* Kelley**
http://species-id.net/wiki/Acritoptila_chiasma
Figs 5–7, 27, 35

*Acritoptila chiasma* Kelley (1989: 192, figs 2, 11, 12).

**Revised diagnosis.** Males of *A. chiasma* are similar to *A. crinita* and *A. csavar*, with which they share, in ventral view, the rather similar tongue-shaped form of the mid ventral genitalic structures interpreted as subgenital processes (Fig. 5). The males are distinguished from *A. crinita* by having spiny apical processes apico-laterally on tergite X (Fig. 6), which are hooked in *A. csavar* (Fig. 9), and simply curved in *A. chiasma* (Figs 6, 7). Neither *A. chiasma* nor *A. csavar* has the lateral setose processes seen on tergite X of *A. crinita*.

Male antennae each with 37–40 flagellomeres; forewing length, 2.0–2.1 mm (n=3).

**Material examined.** Holotype male: New Caledonia, mountain stream up Boulari River, (BPBM); 3 males (2 on slides), 4 females (1 on slide), Province Sud, lower part Rivière des Pirogues, 800 m WNW summit of Mont Imbaah, 4.7 km E Lucky Creek in Plum, 22°18.559'S, 166°41.227'E, 1.3 m, 1.xii.2003, light trap, loc#059, KAJ (NHRS); 1 male, Province Sud, Mt Dzumac, source stream of Ouinne River, at crosspoint to mountain track, 22°02.218'S, 166°28.566'E, 797 m, 18.xi.2003, light trap, loc#032, KAJ (NHRS).




**Figures 5–10.** *Acritoptila* male genitalia. **5–7** *A. chiasma* Kelley ventral view, dorsal view of paramere and spines, and lateral view **8–10** *A. csavar* Oláh & Johanson ventral view, dorsal view of paramere and spines, and lateral view. Abbreviations: gon = gonopod(s); ph = phallic apparatus; pr = parameres; sp = spine on tergite X; subg = subgenital process(es); VII–X = abdominal segments VII–X.

**Remarks.** The features separating *A. chiasma* from *A. csavar* are weak, but appear to be definitive. In the diagnosis of *A. chiasma*, Kelley (1989) states that species "is most closely related to *A. crinita*", but has the tenth tergum "quite distinctive". However, *A. chiasma* more closely resembles *A. csavar*, both having gonopods of similar shape and stout spiny processes laterally on tergite X, whereas *A. crinita* has the gonopods forming a tight sphere and on tergite X has slightly sclerotized, weakly curved, lateral processes. *A. chiasma* differs from *A. csavar* in having in ventral the structure

representing the fused gonopods more rounded, and in dorsal view the apical angles of tergite X acute and in lateral view the spine on tergite X curved ventrad, rather than dorsad. This species has been collected only in the far south of the island.

### *Acritoptila csavar* Oláh & Johanson

http://species-id.net/wiki/Acritoptila_csavar
Figs 8–10

*Acritoptila csava*r Oláh & Johanson (2010a: 70, figs 1–3).

**Revised diagnosis.** Males of *A. csavar* most closely resemble those of *A. chiasma*, from which it they are distinguished by the presence of hooked (Fig. 9) rather than gently curving (Fig. 6) apico-lateral spines on tergite X (also see diagnoses for *A. crinita* and *A. chiasma*), and in ventral view by the paler and more ovoid shape of the fused gonopods.

Male antennae each with 39–40 flagellomeres; forewing length, 2.0–2.3 mm (n=6).

**Material examined.** Paratype male, Province Sud, Tamoa River, 700 m S road RT1 between Noumea and La Foa, 22°04.518'S, 166°16.592'E, 19.xi.2003, light trap, loc#033, KAJ (NHRS); 5 males (2 on slides), Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS); 3 males (KAJ sp 'G'), New Caledonia, Province Nord, Forêt Plate, Ouendé River, at 2.5 km WNW summit of Katépouenda, 23.3 km E Pouembout, 21°07.490'S, 165°06.723'E, 470 m, 8–15.i.2004, Malaise trap, loc#112, KAJ (NHRS).

**Remarks.** Few specimens of this species have been collected, several from the north and several from the south (Fig. 35). See also Remarks under *A. chiasma*.

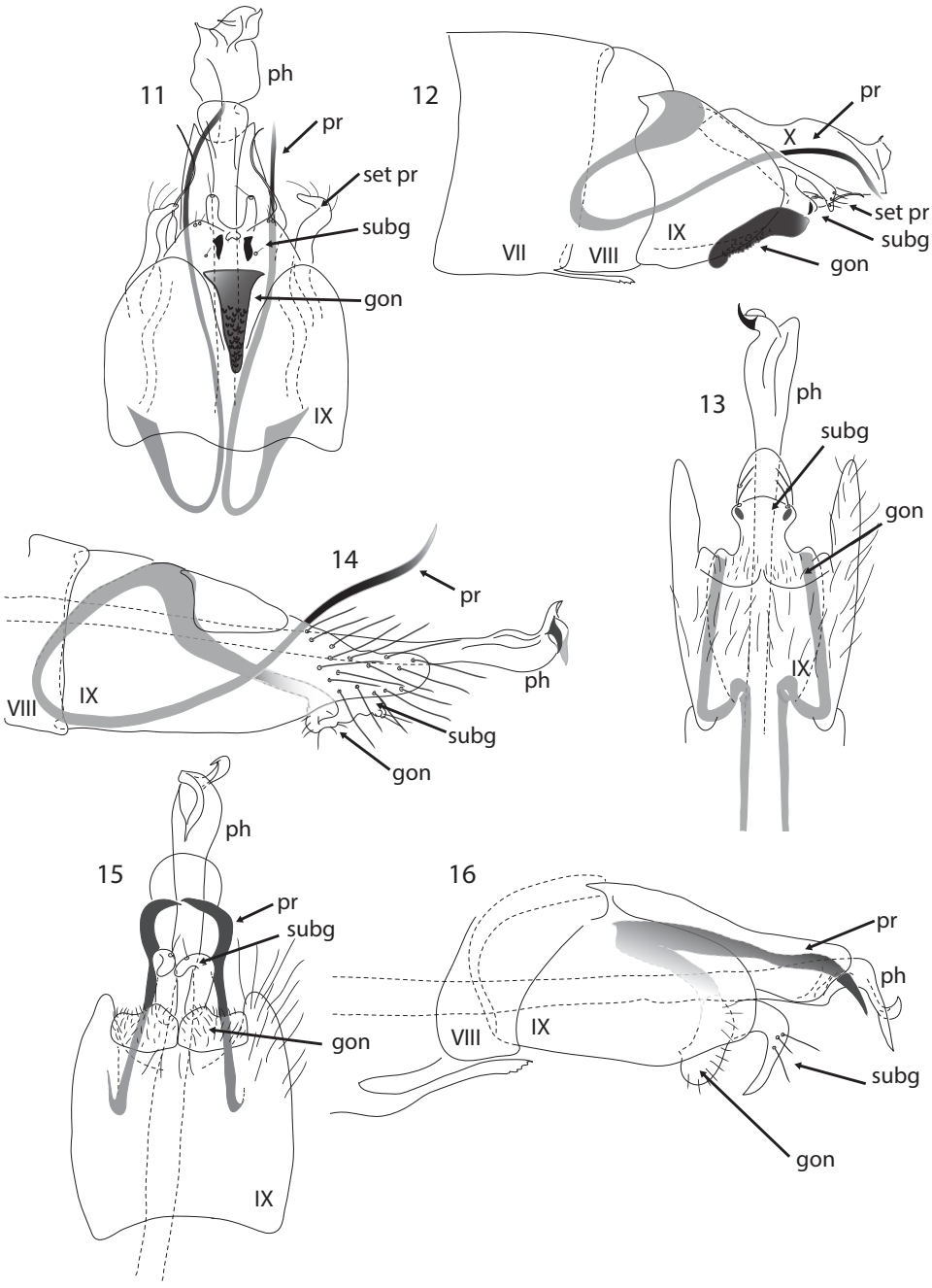
### *Acritoptila glossocercus* Kelley

http://species-id.net/wiki/Acritoptila_glossocercus
Figs 11, 12

*Acritoptila glossocercus* Kelley (1989: 193, figs 7, 17, 18).

**Diagnosis.** This species is distinctive in the genus in having a single mid-ventral very darkly sclerotized tongue-like process, interpreted as the fused gonopods. It groups with *A. crinita*, *A. chiasma* and *A. csavar* in having filamentous parameres, but particularly with *A. crinita* in having paired setose processes laterally on tergite X (Figs 11, 12).

**Revised description.** Male antennae each with 29–32 flagellomeres, with large sensilla placodea on surfaces; forewing length, 1.9–2.3 mm (n=7). Male genitalia (Figs 11, 12). Abdominal segment VII bearing a slender elongate process mid-ventrally. Abdominal segment VIII much shorter than IX, which is excavated mid-ventrally, accommodating darkly sclerotized, rugose tongue-like process interpreted as fused gonopods.




**Figures 11–16.** *Acritoptila* male genitalia. **11–12** *A. glossocercus* Kelley ventral and lateral views **13–14** *A. parallela* sp. n. ventral and lateral views **15–16** *A. amphapsis* Kelley ventral and lateral views. Abbreviations: gon = gonopod (s); ph = phallic apparatus; pr = parameres; set pr = setose process; subg = subgenital process(es); VII-X = abdominal segment VII–X.

Abdominal segment X broad based, concave apically, with two small spines medially, and laterally an elongate apically setose process. Subgenital processes, in ventral view, in form of small conical lobes, each bearing a robust seta meso-ventrally; dorsally a pair of membranous setose lobes. Paired thread-like straight parameres extend distally from robust apodemes arising from base of segment IX. Phallic apparatus stout, constricted sub-apically, a strap-like band at apex. Female unknown.

**Remarks.** Upon examination, the holotype male was found to be identical in all respects with a group of specimens collected from the sites listed below, save in the form of the mid-ventral structure illustrated and described by Kelley (1989: 193) as "tongue-shaped in caudal view", yet shown as a small rounded structure in his figure of ventral view (Fig. 17, Fig. 11). In fact, in the type this structure has been broken off (from Kelley's fig. 7, it appears it may have been intact when he drew his lateral view). The few known specimens of *A. glossocercus* were all collected in northern New Caledonia (Fig. 35).

**Material examined.** Holotype male: New Caledonia, mountain stream up Boulari River, (BPBM); 1 male, Province Sud, Monts Kwa Ne Mwa, on road between Noumea and Yaté, Rivière des Pirogues, 22°11.225'S, 166°43.338'E, 100 m, 7.xi.2003, light trap, loc#016, KAJ (NHRS); 9 males (3 on slides), Province Nord, 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèda, 2.2 km E Tnèdo, 20°43.085'S, 164°49.928'E, 29 m, 7.xii.2003, light trap, loc#071, KAJ (NHRS); 3 males, New Caledonia, Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS); 1 male (on slide), Province Nord, Bouérabate Stream, S Mont Ninndo, along road Barabache-Boulagoma, 20°17.409'S, 164°11.242'E, 60 m, 19.xii.2003–7.i.2004, Malaise trap, loc#089, KAJ (NHRS).

***Acritoptila parallela* sp. n.**
http://zoobank.org/F31DAC91-2622-4DB5-AE43-C429A7D49EA6
http://species-id.net/wiki/Acritoptila_parallela
Figs 13, 14, 29, 35

**Diagnosis.** This species resembles *A. glossocercus, A. chiasma*, *A. csavar* and *A. crinita* in having elongate ventro-lateral spiny parameres, but differs in that apico-laterally abdominal segment VIII is produced to form pronounced lateral lobes that extend distally beyond the apices of gonopods, and gonopods and subgenital processes appear in ventral view to form a single broad-base, medially constricted plate. The females have a small elongate anchor-shaped marking ventrally on abdominal segment IX.

**Description, male.** Male antennae each with 27–29 flagellomeres, bicoloured, apical 4 segments pale, more proximally 11 dark, rest pale; forewing length 2.0–2.2 mm (n=6). Female antennae each with 24 flagellomeres; forewing length 2.1–2.2 mm (n=2). Male genitalia (Figs 13, 14). Abdominal segment VII bearing slender elongate

spine midventrally. Abdominal segment IX produced posteriorly, forming parallel-sided lobes, in lateral view segment narrows abruptly towards rounded apices. Gonopods and subgenital processes in ventral view appear to be fused to form a plate, broad at base, constricted medially, bearing a pair of dark knob-like setae at apico-lateral angles. Paired thread-like almost straight parameres extend distally from robust apodemes arising at base of segment IX. Phallic apparatus narrow, dilated towards apex, a sharp, sclerotized spur at right angles apically. Female genitalia (Fig. 29). Abdominal segment IX in ventral view with a pair of lobes laterally and median anchor-shaped gland.

**Material examined. Holotype:** male, New Caledonia, Province Nord, Mt Panié, stream at camp, 20.58139°S, 164.76444°E, 1310 m, 9.xii.2003–2.i.2004, Malaise trap, loc#074, KAJ, (MNHP); **paratypes**: 12 males (2 on slides), 12 females (2 on slides), same data as for holotype (NHRS).

**Etymology.** *parallela*, named for the nearly parallel arrangement of several structures in the male genitalia.

**Remarks.** *A. parallela* is known only from the type locality in the northeast of the island.

### ***Acritoptila amphapsis*** **Kelley**

http://species-id.net/wiki/Acritoptila_amphapsis
Figs 15, 16, 28, 34, 35

*Acritoptila amphapsis* Kelley (1989: 191, figs 1, 9, 10); Wells (1995: 238, fig. 17).

**Revised diagnosis.** Males of *A. amphapsis* are distinctive, being distinguished from males of other *Acritoptila* species by their genitalia in ventral view with parameres in form of pair of mesally directed, horn-like spines postero-lateral to gonopods (Fig. 15) and, in lateral view, coarsely hooked apices of the "ventral processes" (as termed by Kelley 1989), here interpreted as subgenital processes (Figs 15, 16). Females are distinguished by the apico-mesal concavity and sclerotised plate-like gland on sternite VIII (Fig. 28). Male antennae each with 31–35 flagellomeres, bicoloured with distal dark band of 9 flagellomeres followed by 9 pale flagellomeres apically; forewing length, 1.9–2.0 mm (n=4). Female antennae each with 24–26 flagellomeres, bicoloured with distal dark band of 6 segments followed by 6 pale apically; forewing length 1.8–2.0 mm (n =5).

**Remarks.** This species was not commonly collected, but was taken in both the northern and southern provinces (Fig. 35). It was identified only in samples taken in the wet season, from late November, with the largest sample dated 8–15 January. This could indicate a restricted period of emergence, or possibly a later time of emergence than for other congeners. A pupal case attributed to this species by Wells (1995: fig. 17) and pictured here in Fig. 34 is a subrectangular purse case constructed of fine sand grains.

**Material examined.** Holotype male: New Caledonia, Honailu River, (BPBM); cases, cased pupa, Province Sud, creek between Negropa and Koh on La Foa-Canala Road, 19 Dec. 1983, A Wells (ANIC); 1 male (on slide), Province Sud, W slope Mt Ningua, Kwé

Néco, Stream, at Camp Jacob, 3.7 km WNW summit of Mt Ningua, on Boulouparis-Thio Road, about 50 m upstream road, 21°43.613'S, 166°06.567'E, 150 m, 29.xi–12.xii.2003, Malaise trap, loc#054, KAJ (NHRS); 1 male, Province Nord, 50 m upstream bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèda, 2.2 km E Tnèdo, 20°43.085'S, 164°49.928'E, 29 m, 7.xii.2003, light trap, loc#071, KAJ (NHRS); 23 males, 54 females (2 males, 2 females on slides), Province Nord, Bouérabate Stream, S Mont Ninndo, along road Barabache-Boulagoma, 20°17.409'S, 164°11.242'E, 60 m, 19.xii.2003–7.i.2004, Malaise trap, loc#089, KAJ (NHRS); 1 male Province Nord, Forêt Plate, Ouendé River, at 2.5 km WNW summit of Katépouenda, 23.3 km E Pouembout, 21°07.490'S, 165°06.723'E, 470 m, 8–15.i.2004, Malaise trap, loc#112, KAJ (NHRS).

***Acritoptila planichela* Kelley**
http://species-id.net/wiki/Acritoptila_planichela
Fig. 17

*Acritoptila planichela* Kelley (1989: 194).

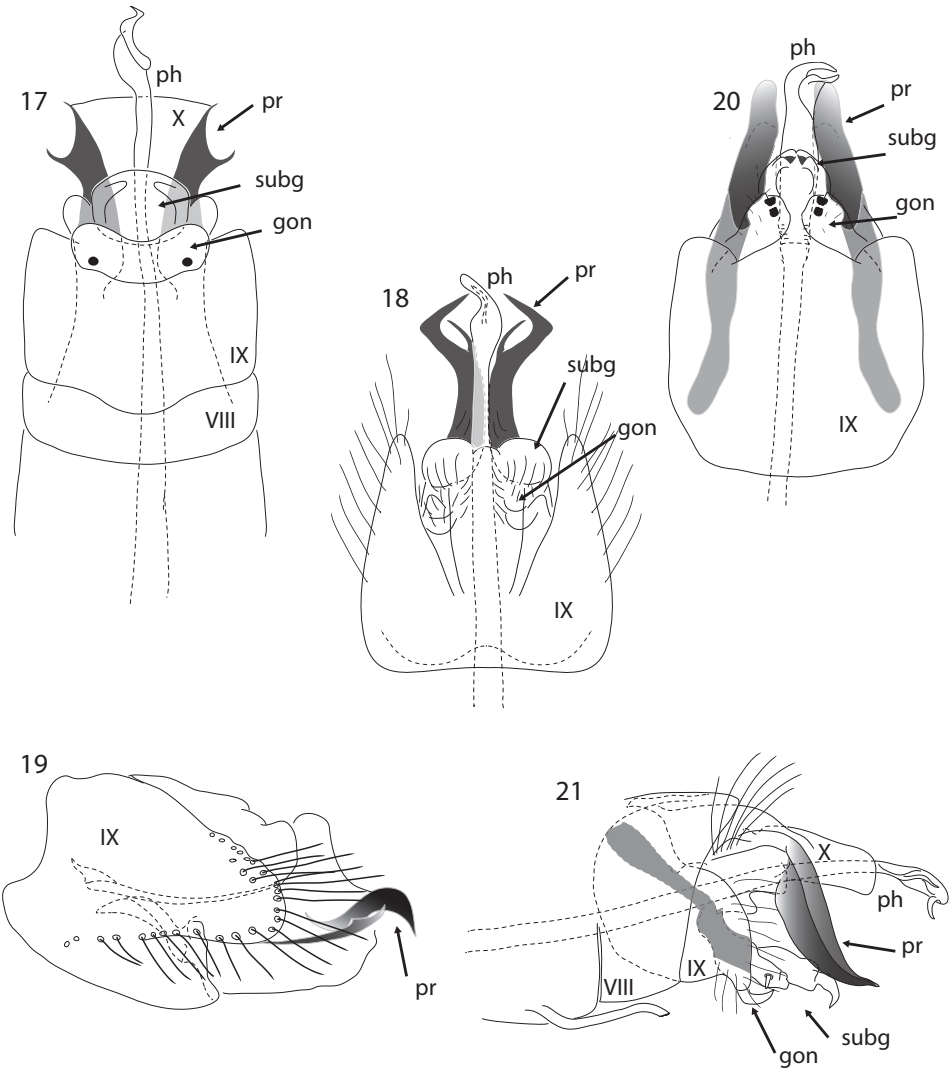
**Revised diagnosis.** In having the parameres branched, *A. planichela* resembles *A. forficata*, sp. n. however in *A. forficata* the parameres are more slender and the mesal branch is the shorter, finer branch and closely associated with the lateral branch whereas in *A. planichela* the lateral branch is shorter and finer than the lateral branch, and *A. planichela* lacks the pronounced lateral lobes on abdominal segment IX seen in *A. forficata* sp. n. *A. planichela* shares with *A. ouenghica* and *A. macrospina* sp. n. the feature of curiously modified knob-like setae on the fused, non-sclerotized gonopods, but neither of those species has branched parameres. Male antennae damaged in only specimens at hand; forewing length, 2.1 mm (n=1).

**Remarks.** Only a single specimen was collected despite the extensive field work. Thus, with the 3 identified by Kelley (1989), 4 specimens are now known, all from the southern province.

**Material examined.** Holotype male: New Caledonia, mountain stream up Boulari River, (BPBM); 1 male (on slide), Province Sud, Monts Kwa Ne Mwa, on road between Noumea and Yaté, 1.5 km E Pic Mouirange, 22°12.545'S, 166°40.246'E, 143 m, 9.xi.2003, light trap, loc#018, KAJ (NHRS).

***Acritoptila forficata* sp. n.**
http://zoobank.org/606C0AF2-B93C-4B6B-8988-E659480FD608
http://species-id.net/wiki/Acritoptila_forficata
Figs 18, 19, 35

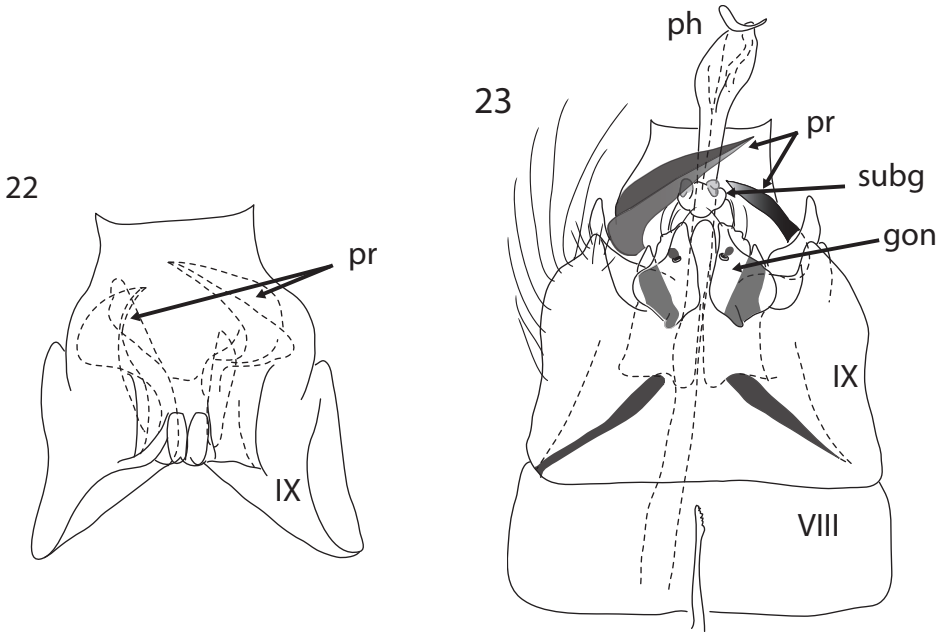
**Diagnosis.** Superficially, males of *A. forficata* resemble those of *A. parallela* sp. n. , having similar elongate lateral lobes on abdominal segment IX. However, *A. forficata* has




**Figures 17–21.** *Acritoptila* male genitalia. **17** *A. planichela* Kelley ventral view **18–19** *A. forficata* sp. n. ventral and lateral views **20** *A. ouenghica* Wells ventral view **21** *A. macrospina* sp. n. lateral view. Abbreviations: gon = gonopod (s); ph = phallic apparatus; pr = parameres; subg = subgenital process(es); VIII-X = abdominal segments VIII-X.

prominent forked parameres, rather than the fine filaments that characterize *A. parallela* and in that feature resemble *A. planichela*, although the parameres are more slender, and their forks more pronounced; *A. planichela* lacks lateral lobes on abdominal segment IX.

**Description.** Male antennae each with 29–31 flagellomeres, with large *sensilla placodea* on surfaces; forewing length 2.1–2.3 mm (n=3). Male genitalia (Figs 18, 19). Abdominal segment VII bearing a slender elongate process mid-ventrally. Abdominal segment IX in ventral view laterally produced posteriorly to form prominent lateral lobes. Gonopods




**Figures 22–23.** *A. macrospina* sp. n. lateral and dorsal ventral views. Abbreviations: gon = gonopod(s); ph = phallic apparatus; pr = parameres; subg = subgenital process(es); VIII–IX = abdominal segments VIII–IX.

and subgenital processes appear to be fused to form a rounded structure, apico-laterally rounded. Paired forked spiny parameres arise from stout apodemes. Phallic apparatus slender medially, dilated towards apex, a strap-like twist apically. Female unknown.

**Material examined.** Holotype male (on slide): New Caledonia, Province Sud, Monts des Koghis, ca 800 m S Koghi Restaurant, 22.18406°S, 166.50383°E, 420 m, 11–26.xi.2003, Malaise trap, loc#022, KAJ (MNHP); **Paratypes**: 2 males, Province Nord, Mt Panié, stream at camp, 20.58139°S, 164.76444°E, 1310 m, 9.xii.2003–2.i.2004, Malaise trap, loc#074, KAJ (NHRS).

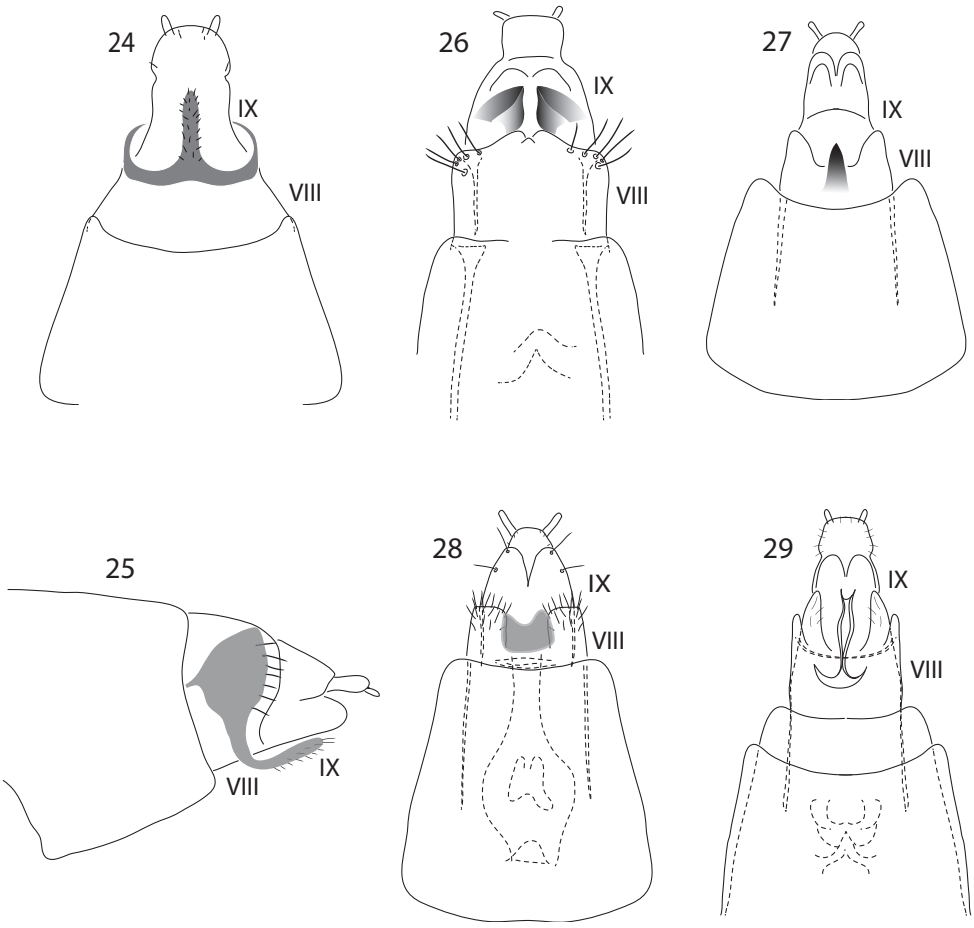
**Etymology.** Named for the forked appearance of the parameres.

**Remarks.** Only 3 specimens of this species are known, from two widely separated localities, one in the south, the other in the north.

***Acritoptila ouenghica* Wells**
http://species-id.net/wiki/Acritoptila_ouenghica
Fig. 20

*Acritoptila ouenghica* Wells (1995: 235).

**Revised diagnosis.** *Acritoptila ouenghica* groups with *A. planichela* and *A. macrospina* sp. n. in having, in the male genitalia, curiously modified setae on the fused gonopods,

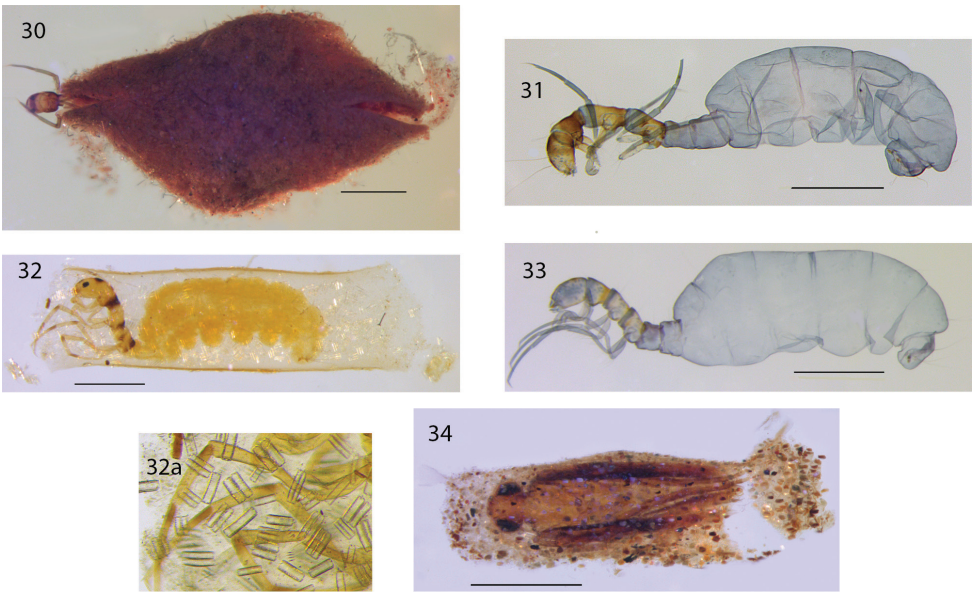



**Figures 24–29.** *Acritoptila* female terminalia. **24–25** *A. disjuncta* Kelley ventral and lateral views **26** *A. crinita* ventral view **27** *A. chiasma* Kelley ventral view **28** *A. amphapsis* Kelley ventral view **29** *A. parallela* sp. n. ventral view. Abbreviations: VIII–IX = abdominal segments VIII–IX.

described as "tab-like" by Wells (1995) but in the two other species more knob-like. Unlike other New Caledonian congeners, *A. ouenghica* lacks the free parameres, the parameres instead appear to be fused laterally as broad sclerotized margins on tergite X, although in cleared specimens these clearly arise from stout apodemes. Male antennae each with 30–33 flagellomeres; forewing length 1.9–2.2 mm (n =8).

**Remarks.** Very few specimens of *A. ouenghica* were taken in all the recent collecting – one specimen from the south and several from the north (Fig. 35) – and no females have been associated.

**Material examined.** Holotype male: New Caledonia, Ouenghi River, nr Boulouparis (ANIC); 1 male, Province Sud, Couvelée River at Haute Couvelée, 2.8 km SV summit of Mt Piditéré, 3.5 km NNE Dumbéa, 22°07.405'S, 166°28.023'E, 27 m, 28.xi.2003, light trap, loc#052, KAJ (NHRS); 5 males Province Nord, 50 m upstream




**Figures 30–34.** *Acritoptila* larvae and cases. **30–31** *A. disjuncta* Kelley larva in sponge-covered case and larva removed from case, lateral view **32–33** *A. crinita* Kelley larva in case of secretion and (32a) embedded diatoms and larva removed from case, lateral view **34** *A. amphapsis* Kelley pupa in damaged sand grain case. Scale bars: **30, 32** = 0.5 mm; **31, 33, 34** = 1.0 mm.

bridge on Hienghène-Tnèdo road, 3.9 km S summit of Mt Tnèda, 2.2 km E Tnèdo, 20°43.085'S, 164°49.928'E, 29 m, 7.xii.2003, light trap, loc#071, KAJ (NHRS); 4 males. Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS).

***Acritoptila macrospina* sp. n.**
http://zoobank.org/FD1907D2-8250-4909-A886-027FEFA5F496
http://species-id.net/wiki/Acritoptila_macrospina
Figs 21–23, 35

**Diagnosis.** The males of this species differ from all other New Caledonian species in having among genitalic structures stout, sclerotized asymmetrical parameres, in ventral view sharply angled mesally.

**Description, male.** Antennae each with 26–31 flagellomeres, with large *sensilla placodea* on surfaces; forewing length 1.9–2.0 mm (n=5).

Male genitalia (Figs 21–23). Abdominal segment VII bearing a slender elongate process mid-ventrally. Abdominal segment VIII shorter than IX. Abdominal segment IX in lateral view broader than long, in ventral view widely excavated apico-mesally. Gonopods in ventral view in form of discrete triangular lobes, each with a small

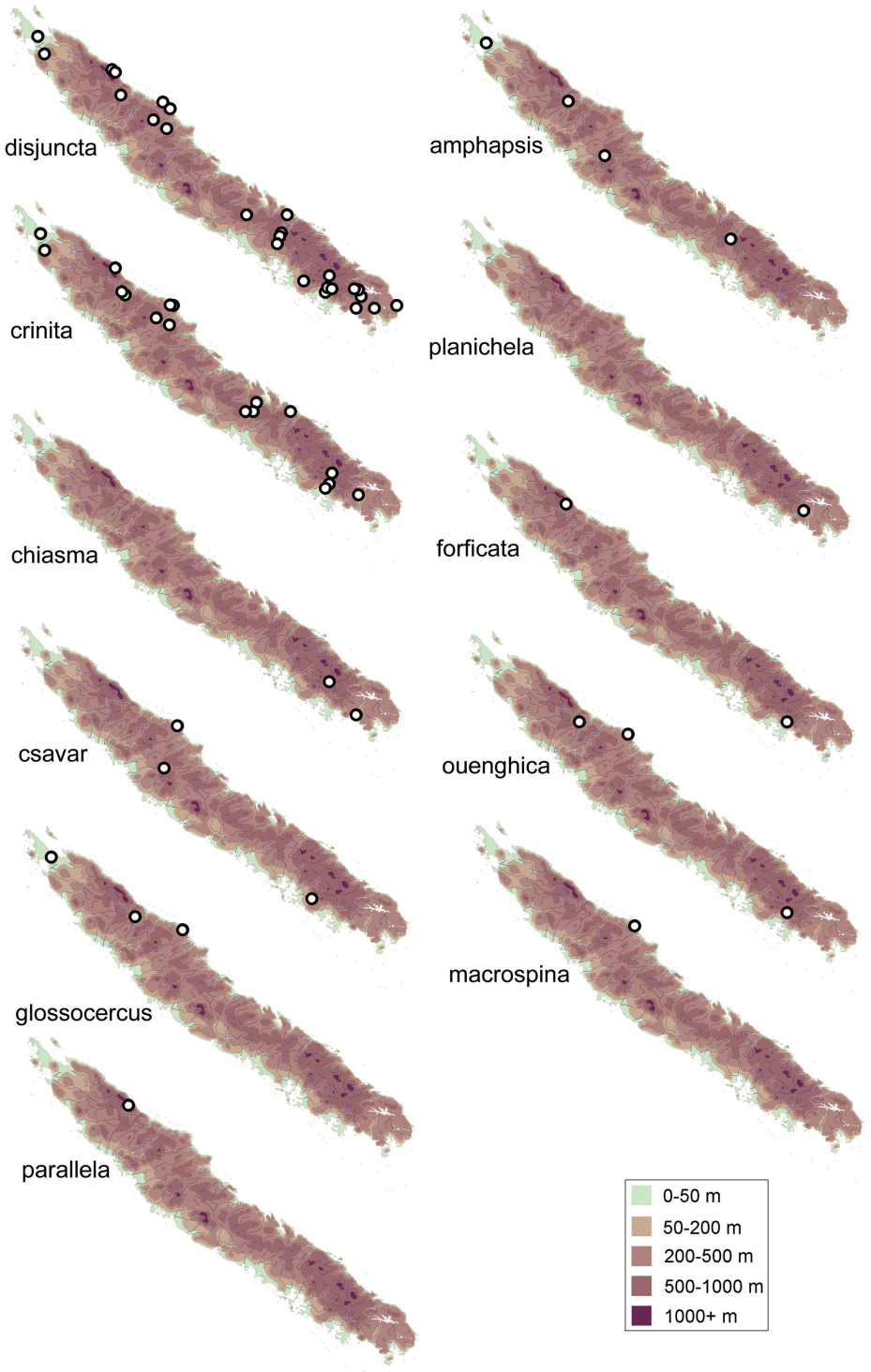



**Figure 35.** Maps of New Caledonia showing the collection sites for different species of *Acritoptila*.

rounded knob-like seta at about 2/3 length. Subgenital processes irregular in shape, in ventral view forming rounded lobe medially and pair of apically acute lobes laterally. Parameres leaf-shaped, left longer than right, in lateral view sharply down-turned, in ventral view directed mesad. Phallic apparatus elongate, dilated subapically with a slender re-curved apical spine. Female: unknown.

**Material examined.** Holotype male: New Caledonia, 1 male (on slide), Province Nord, Wemwâdiu stream, 850 m E summit Kögi Mtn, 5 m upstream road, about 200 m S Tiwaka River, 20°49.020'S, 165°14.165'E, 24 m, 6–27.xii.2003, Malaise trap, loc#067, KAJ (MNHP). **Paratypes:** 33 males (3 on slides), Province Nord, Ponandou Tiôgé River at Kögi, 3.9 km SSW Touho, 20°49.043'S, 165°13.551'E, 25 m, 26.xii.2003, light trap, loc#100, KAJ (NHRS); 1 male, Province Nord, Plaine des Gaïacs, Rivière Rouge, 14.2 km NW summit of Mt Rouge, 50 m upstream road RT1 Noumea-Koné, 20°31.573'S, 164°46.690'E, 23 m, 2.i.2004, light trap, loc#104, KAJ (NHRS).

**Etymology.** Named for the stout spines in the male genitalia.

**Remarks.** Collected from only 3 northern localities (Fig. 35).

## Checklist of New Caledonian *Acritoptila* species

*A. amphapsis* Kelley, 1989
*A. chiasma* Kelley, 1989
*A. crinita* Kelley, 1989
*A. karika* Oláh & Johanson, 2010a, syn. n.
*A. csavar* Oláh & Johanson, 2010a
*A. disjuncta* Kelley, 1989
*A. forficata* sp. n.
*A. glossocercus* Kelley, 1989
*A. macrospina* sp. n.
*A. ouenghica* Wells, 1995
*A. parallela* sp. n.
*A. planichela* Kelley, 1989

## Key to males of New Caledonian species of *Acritoptila* Wells

1 Genitalia lacking discrete parameres; margins of abdominal segment X sclerotized (Fig. 20) ..... ***A. ouenghica* Wells**

– Genitalia including a pair of spiny parameres; parameres simple and unbranched (Figs 3, 4) or forked (Figs 17, 18) ..... **2**

2 Gonopods fused, in form of an elongate, anteriorly directed heavily sclerotized tongue-like process (Fig. 11) ..... ***A. glossocercus* Kelley**

– Gonopods not in form of tongue-like process, may be discrete or fused and lobe- or plate-like, membranous or sclerotized ..... **3**

3 Gonopods fully or partially sclerotized, in ventral view usually appearing as a spherical, berry-like structure (Figs 3, 5, 8) or conical lobes (Fig. 1); parameres not forked ..... **4**

– Gonopods not sclerotized (Figs 17, 18), may bear paired small knob-like setae (Fig. 17); in ventral view parameres forked (Figs 17, 18) or forceps-like (Fig. 15) or stoutly leaf-like and asymmetrical (Fig. 23) ..... **7**

4 Parameres dilated subapically, then abruptly constricted (Figs 1, 2) ..... ***A. disjuncta*** **Kelley**

– Parameres forming simple, straight to smoothly curved spines (Figs 3, 5, 8).... **5**

5 Gonopods fused, in ventral view in form of sclerotized spherical structure; subgenital processes broadly triangular; parameres whip-like, straight or gently bowed; setose lobes lateral to tergite X (Figs 3, 4) ..... ***A. crinita*** **Kelley**

– Gonopods fused, forming rounded or ovoid fully or partially sclerotized structure; subgenital processes tongue-like, angled mesad; parameres slender and sinuous; without setose process lateral to tergite X ..... **6**

6 Apico-lateral spines on tergite X strongly curved dorsad in lateral view (Figs 9, 10) ..... ***A. csavar*** **Oláh & Johanson**

– Apico-lateral spines on tergite X gently curved ventrad in lateral view (Figs 6, 7) ..... ***A. chiasma*** **Kelley**

7 Parameres forked ..... **8**

– Parameres simple, not forked ..... **9**

8 Lateral branch of fork on parameres (Fig. 18) more slender than mesal branch; gonopods lacking small sclerotized knobs (rounded setae) ..... ***A. forficata*** **sp. n.**

– Lateral branch of parameres (Fig. 17) more slender than mesal branch; gonopods each bearing small sclerotized knob ..... ***A. planichela*** **Kelley**

9 Parameres in ventral view sinuous, thread- or whip-like (Figs 14) ..... ***A. parallela*** **sp. n.**

– Parameres in ventral view not thread- or whip-like, angled mesad (Figs 15, 23), down-turned in lateral view (Figs 16, 21) ..... **10**

10 Parameres asymmetrical, stout, leaf-like; gonopods triangular, each with two knob-like setae subapically (Figs 21–23) ..... ***A. macrospina*** **sp. n.**

– Parameres symmetrical, in ventral view angled mesad, forceps-like; gonopods broadly rounded to subrectangular (Figs 15, 16)..... ***A. amphapsis*** **Kelley**

## Acknowledgements

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RESEARCH ARTICLE

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# First record of the genus *Wilkinsonellus* (Hymenoptera, Braconidae, Microgastrinae) from Fiji with description of three new species

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## Abstract

*Wilkinsonellus* Mason is a relatively small Pantropical genus of braconid parasitoid wasps within the subfamily Microgastrinae. Most of the currently described species are from the Palaeotropics; however, previous records were absent from Fiji. Here, the first three *Wilkinsonellus* species from Fiji are described: *Wilkinsonellus corpustriacolor* **sp. n.**, *Wilkinsonellus fijienis* **sp. n.** and *Wilkinsonellus nescalpura* **sp. n.** The material was collected by Malaise traps set up in a quite variety of ecosystems (wet zone, dry zone and coastal forests) throughout the archipelago. With these records, Fiji represents the easternmost known distribution of the genus in the Indo-Pacific Region. A key to all of the currently known *Wilkinsonellus* species is included to facilitate species identification.

## Resumen

*Wilkinsonellus* Mason es un pequeño género Pantropical de avispas parasitoideas en la subfamilia Microgastrinae (Hymenoptera). La mayoría de las especies descritas son Paleotropicales, aunque hasta ahora el género no había sido previamente registrado en Fiji. En esta publicación, tres nuevas especies son descritas para Fiji: *Wilkinsonellus corpustriacolor* **sp. n.**, *Wilkinsonellus fijienis* **sp. n.** y *Wilkinsonellus nescalpura* **sp. n.** Las muestras fueron colectadas mediante trampas Malaise colocadas en un gran variedad de ecosistemas (zonas húmedas, zonas secas y bosques costeros) en el archipiélago. Fiji es el registro más oriental conocido del género en la región Indo-Pacifica. Una clave que incluye todas las especies descritas de *Wilkinsonellus* es provista para facilitar la identificación de las especies.

**Keywords**
Braconidae, diversity, inventory, parasitoid wasps

**Palabras clave**
Braconidae, diversidad, inventario, avispas parasitoideas

## Introduction

*Wilkinsonellus* Mason, 1981 are parasitoid wasps within Microgastrinae (Braconidae: Hymenoptera) of Pantropical distribution. The genus currently contains 19 species (Table 1), of which three species were recently reported in the Neotropics (Arias-Penna et al. 2013). The identity of hosts parasitized by those wasps remains essentially undocumented. As all the subfamily genera, *Wilkinsonellus* possibly are koinobiont endoparasitoids of Lepidoptera that exclusively attack the larval (caterpillar) stage. The only lepidopteran host reported up to date is *Microthyris prolongalis* (Crambidae) in the Neotropical species *W. alexsmithi* (Arias-Penna et al. 2013). The genus is easy to recognize from other Microgastrinae genera mainly by its characteristic propleuron (with a posterior rounded flange), the shape of the vein 1-1A on the fore wing (strongly curved, and almost touching the margin of the wing), and the shape of the petiole on tergite I (petiole 4–5 times as long as its apical width, constricted medially and deeply grooved almost to its apex) (Whitfield 1997, Long and van Achterberg 2003, Zeng et al. 2011).

There are no available records of *Wilkinsonellus* from Fiji, except those newly reported here. In the Palaeotropics the genus has been previously reported in Africa, South and Southeast Asia, Indonesia, Australia and Papua New Guinea (Nixon 1965, Austin and Dangerfield 1992, Long and van Achterberg 2003, 2011, Ahmad et al. 2005, Long 2007). Most, if not all, microgastrine species currently reported from Fiji (e.g. Evenhuis 2007, Prasad 2010) come from checklists published in the first two thirds of the twentieth century (Turner 1919, Fullaway 1957). As so far reported, the Fijian Microgastrinae fauna includes a total of 18 species that belong to four genera as follows: *Apanteles* [*A. aganoxenae* Fullaway, 1941; *A. carpatus* (Say, 1836); A. *expulsus* Turner, 1919; *A. heterusiae* Wilkinson, 1928; *A. hyblaeae* Wilkinson, 1928; *A. hymeniae* Wilkinson, 1935; *A. platyedrae* Wilkinson, 1928; *A. samoanus* Fullaway, 1940; *A. stantoni* (Ashmead, 1904), *A. tirathabae* Wilkinson, 1928]; *Cotesia* [*C. glomerata* (Linnaeus, 1758); *C. marginiventris* (Cresson, 1865); *C. plutellae* (Kurdjumov, 1912); *C. ruficrus* (Haliday, 1834)]; *Glyptapanteles* [*G. artonae* (Rohwer, 1926), *G. phytometrae* (Wilkinson, 1928), *G. taylori* (Wilkinson, 1928)] and *Sathon* [*S. belippae* (Rohwer, 1918)] (Turner 1919, Fullaway 1957, Evenhuis 2007, Prasad 2010). Inventory samples make clear that this is only a fraction of the total species found there.

This paper provides descriptions of the three new *Wilkinsonellus* species, representing the first records of this genus in Fiji and establishing this island country as the easternmost distribution of the genus in the Indo-Pacific Region so far. This revision elevates the current total of *Wilkinsonellus* species known worldwide to 22.

**Table 1.** Checklist of the *Wilkinsonellus* species currently described

| ***Wilkinsonellus* species** | **Descriptor** | **Distribution** | **Reference** |
|---|---|---|---|
| *W. alexsmithi* | Arias-Penna & Whitfield, 2013 | Costa Rica | Arias-Penna et al. 2013 |
| *W. amplus* | Austin & Dangerfield, 1992 | Australia | Austin and Dangerfield 1992 |
| *W. daira* | (Nixon, 1965) | Papua New Guinea | Nixon 1965 |
| *W. flavicrus* | Long & van Achterberg, 2011 | Taiwan | Long and van Achterberg 2011 |
| *W. granulatus* | Ahmad, Pandey, Haider & Shuja-Uddin 2005 | India | Ahmad et al. 2005 |
| *W. henicopus* | (de Saeger, 1944) | Kenya and Rwanda | Nixon 1965 |
| *W. iphitus* | (Nixon, 1965) | Philippines, Taiwan | Nixon 1965, Chou 1999 |
| *W. kogui* | Arias-Penna & Whitfield, 2013 | Colombia | Arias-Penna et al. 2013 |
| *W. longicentrus* | Long & van Achterberg, 2003 | Vietnam | Long and van Achterberg 2003, 2011 |
| *W. masoni* | Long & van Achterberg, 2011 | Vietnam | Long and van Achterberg 2011 |
| *W. narangahus* | Rousse & Gupta, 2013 | Reunion Island | Rousse and Gupta 2013 |
| *W. nigratus* | Long & van Achterberg, 2011 | Vietnam | Long and van Achterberg 2011 |
| *W. nigrocentrus* | Long & van Achterberg, 2011 | Vietnam | Long and van Achterberg 2011 |
| *W. panamaensis* | Arias-Penna & Whitfield, 2013 | Panama | Arias-Penna et al. 2013 |
| *W. paramplus* | Long & van Achterberg, 2003 | Vietnam and China | Long and van Achterberg 2003, 2011; Zeng et al. 2011 |
| *W. striatus* | Austin & Dangerfield, 1992 | Australia and Papua New Guinea | Austin and Dangerfield 1992 |
| *W. thyone* | (Nixon, 1965) | Philippines | Nixon 1965 |
| *W. tobiasi* | Long, 2007 | Vietnam | Long 2007, Long and van Achterberg 2011 |
| *W. tomi* | Austin & Dangerfield, 1992 | Australia and Papua New Guinea | Austin and Dangerfield 1992 |

## Methods

The Fijian Archipelago is one of the most unique island groups within the Indo-West Pacific region, characterized by an exceptionally high species richness documented mainly in marine ecosystems (Bromfield and Pandolfi 2012). Fiji consists of over 300 + named islands of which Viti Levu and Vanua Levu are the largest islands, followed by the mid-sized Taveuni, Kadavu, Ovalau, Gau and Koro, the remainder being small islands (Evenhuis and Bickel 2005). Biogeographically the archipelago is very interesting due to the proximity to other major Pacific island groups such as the Samoan Archipelago to the northeast, Tonga to the east, Vanuatu to the west and New Caledonia to the southwest. Fiji has a warm, humid tropical maritime climate, with moisture brought by the south-east winds. The wet zones are found on the windward side of the islands, while the dry zones are on the leeward (Bickel 2008). The endemic fauna from Fiji is concentrated almost exclusively in terrestrial ecosystems; however many of the tropical forests have been cleared by loggers and converted to plantations [e.g. copra, ginger, tropical fruits, cocoa and rice] (Department of Environment 2010).

The material reviewed for this revision comprises specimens collected under the three-years project "The Fiji Terrestrial Arthropod Survey" (http://hbs.bishopmuseum.org/fiji/) funded by the National Science Foundation (DEB- 0425790) and the Schlinger Foundation. The project was conducted by Dr. Neal L. Evenhuis (Bernice Pauahi Bishop Museum, Hawaii), and Dr. Daniel J. Bickel (Australian Museum, Australia). Between 2005 to 2008, the survey of terrestrial arthropods in the Fijian islands collected about 700,000 specimens covering the wet zone (lowland rain forest, montane rain forest and cloud forest), dry zone, and coastal forests (limestone forest and lowland moist forest) in twelve islands of the archipelago (i.e. Gau, Koro, Kadavu, Lakeba, Macuata, Moala, Ovalau, Taveuni, Vanua Levu, Viti Levu, Yadua Taba and Yasawa).

Two to five Malaise traps were set up at each site; all traps were monitored regularly and samples were collected each 12 days. Specimens were preserved in 95% ethanol. A team of parataxonomist sorted and processed all the material at the Ministry of Forestry laboratory facility, Colo-i-Suva, Fiji. Afterwards, all samples were first sent to Bernice Pauahi Bishop Museum, Hawaii, and after sorting were subsequently shipped to different specialists around the world. Part of the Ichneumonoidea samples were sent to the University of Illinois Urbana-Champaign, UIUC, USA (James B. Whitfield Lab).

## Morphology and taxonomic characters

At UIUC, Microgastrinae were sorted from the other Ichneumonoidea. Later on, *Wilkinsonellus* specimens were separated from the rest of Microgastrinae following a key to the genera (Whitfield 1997). A previous key to species (Long and van Achterberg 2011) and the original species descriptions (Nixon 1965, Austin and Dangerfield 1992, Long and van Achterberg 2003, Ahmad et al. 2005, Long 2007, Long and van Achterberg 2011, Arias-Penna et al. 2013) were used in order to confirm if the specimens matched with species previously described.

For easy manipulation and to avoid specimen fragmentation during handling, samples were soaked with Hexamethyldisilazane HMDS, $[(CH_3)_3Si]_2NH$ for 1 hour at room temperature and afterwards pinned (point mounted). Specimens treated with this chemical can be subsequently processed for DNA extraction and amplification (Heraty and Hawks 1998).

The cuticular sculpturing terminology follows Harris (1979), and morphological terms for body structures as well as venation follow Sharkey and Wharton (1997). Species descriptions are based on the holotype female, and infraspecific variation for the three species is reported when possible. Photos were taken with a Leica DFC425 digital microscope camera attached to a Leica M205 stereomicroscope (Wetzlar, Germany). The LAS (Leica Application Suite) multifocus module integrated within the Leica microscope was used for taking the pictures. The stack of images at different focus positions was processed with Zerene Stacker version 1.04 (http://zerenesystems.com/cms/stacker) and post-processed with Adobe Photoshop CS5.

Holotypes are deposited in the Fiji National insect Collection in Suva, Fiji and paratypes in Bernice Pauahi Bishop Museum, Honolulu, Hawaii, USA and California Academy of Sciences, San Francisco, California, USA.

The following are the abbreviations used in the text:

ATM = axillary trough of metanotum; ATS = axillary trough of scutellum; BM = medioposterior band of metanotum; BS = medioanterior band of scutellum; L = lunule of scutellum; MPM = medioposterior pit of metanotum; OOL = ocular ocellar line: the shortest distance between posterior ocellus and adjacent compound eye margin; POL = posterior ocellar line: the shortest distance between the posterior ocelli; PRM = posterior rim of metanotum.

## Results

***Wilkinsonellus* Mason, 1981**
http://species-id.net/wiki/Wilkinsonellus

**Type species.** *Apanteles iphitus*, Nixon 1965

**Diagnosis.** *Wilkinsonellus* is distinguishable from other Microgastrinae genera by the following combination of traits: body coloration largely yellowish or brown-yellow (Figs 1A–F); propleuron with a posterior flange (Figs 1A–F, 2D, 3G, 4G, 5G); scutellum sculptured medio-posteriorly and often with subapical carina (Figs 3F, 4F, 5F); lunules of scutellum narrow (Figs 3F, 4F, 5F); fore wing with vein r-m absent and vein 1-1A strongly curved (Figs 3I, 4I, 5I), lying very close to posterior margin of the wing (Long and Achterberg 2003); propodeum with a median carina (Figs 3F, 4F, 5F), spiracles completely or partially surrounded by carinae; tergite I (Figs 3K, 4K, 5K) with petiole 4–5 times as long as its apical width, more or less constricted medially and deeply grooved almost to apex (Zeng et al. 2011); median longitudinal area of metasomal tergite II slightly raised, usually poorly delimited (Figs 3K, 4K, 5K), tergite II as long as tergite III, both smooth (Whitfield 1997); hind coxa enlarged (Figs 1A–F, 3A, 4A, 5A), rarely short except in *W. flavicrus* (Long and Achterberg 2011); ovipositor sheaths short (Figs 3H, 4H, 5H) (Whitfield 1997).

### Key to species of the genus *Wilkinsonellus* Mason, 1981

Modified from Long and Achterberg 2011

1 Mesosoma flattened, scutellum at same level as propodeum; scutellum almost smooth and without a transverse posterior carina; hind coxa more or less shortened, not surpassing apex of tergite I..... **2**

– Mesosoma normal (Figs 1A–F), scutellum protruding far above level of propodeum; scutellum rugose or punctate-rugose or finely punctate, often with an apical spine; hind coxa long, distinctly surpassing apex of tergite I..... **3**

2 Propodeum with a very coarse median carina combined with various strong secondary rugae; body large (about 5.5 mm), completely brownish yellow. [Distribution. Papua New Guinea: East New Britain (Kerevat)] ... ***W. daira*** **(Nixon, 1965)**

– Propodeum with a coarse median carina dividing propodeum into two smooth lateral parts, without rugae; body rather small (2.4 mm), black, metasoma yellowish brown, tergite I ivory colored laterally. [Distribution. North of Vietnam (Ha Tay)] ..... ***W. flavicrus*** **Long & van Achterberg, 2011**

3 Ocelli small or medium-sized (Figs 3B, 4B, 5B), OOL more than diameter of posterior ocellus or subequal, inner margins of eyes at antennal sockets hardly or not emarginate ..... **4**

– Ocelli large to very large (Fig. 2E), OOL less than diameter of posterior ocellus or equal; inner margins of eyes at antennal sockets deeply emarginate . 16

4 Mesopleuron obliquely striate above precoxal sulcus; OOL 1.0–1.5 times diameter of posterior ocellus. [Distribution. Australia: Queensland (Atherton, Little Mulgrave Natl Pk, Mt Webb Natl Pk). Papua New Guinea: Western Highlands (Baiyer river Sanctuary), Morobe (Mt Keinde [Kaindi], Sattelberg)] ..... ***W. striatus*** **Austin & Dangerfield, 1992**

– Mesopleuron smooth or sparsely punctate above precoxal sulcus; OOL 1.6–2.0 times diameter of posterior ocellus..... **5**

5 Body completely brownish yellow (Figs 1E–F, 4A, 5A) ..... **6**

– Body partly dark brown or blackish, at least propodeum and mesopleuron (Figs 1D, 3A)..... **10**

6 Face coarsely reticulate-rugose ..... **7**

– Face finely and densely punctate..... **8**

7 Body entire fulvous, except hind femur and hind tibia slightly darkened at extreme apex; OOL less than twice diameter of posterior ocellus. [Distribution. Philippines: Mindanao (Davao). Taiwan: Pingtung (Kenting Ntl. Pak., Shantimen [Sandimen?])] ..... ***W. iphitus*** **(Nixon, 1965)**

– Body yellowish orange except tergites III –IV (medially) and following tergites dark brown, and hind tarsi infuscate; OOL 1.27 times diameter of posterior ocellus. [Distribution. Reunion Island: Bras-Panon (La Caroline), Saint Pierre (Bassin Martin)] ..... ***W. narangahus*** **(Rousse & Gupta, 2013)**

8 Hind wing with vannal lobe of typical microgastrine dimensions (Figs 3J, 5J). [Distribution. Fiji: Kavadu, Taveuni and Viti Levu] ..... ..... ***W. nescalptura*** **Arias-Penna, Zhang & Whitfield**, **sp. n**

– Hind wing with vannal lobe reduced (Fig. 4J) ..... **9**

9 Outer dorsal surface of hind coxa with distinct longitudinal carina, inner dorsal surface coarsely reticulate; hypopygium smooth and hairless. [Distribution. Papua New Guinea: Jiwaka (Jimmi Valley), Madang, Morobe (Bulolo, Busu River in Lae, Lae-Zenag Road, Saruwaged Range), East New Britain (Kerevat). Australia: Queensland (MtTozer)] ..... ***W. tomi*** **Austin & Dangerfield, 1992**

– Outer dorsal surface of hind coxa with coarse and heterogeneous aerolate-rugose sculpture throughout without carina, ventral surface with dense and fine

punctate those two areas separated by a flat, smooth and shiny stripe (Fig. 1B); hypopygium setose (Fig. 4H). [Distribution. Fiji: Gau, Kadavu, Taveuni, Vanua Levu, Viti Levu].....W. ***fijiensis*** **Arias-Penna, Zhang & Whitfield**, **sp. n.**

10 Scutellum with a small spine apically (Fig. 1F) .....**11**

– Scutellum without spine apically.....**15**

11 Head yellow-orange or reddish-brown (Fig. 1D, 3A).....**12**

– Head black or blackish brown.....**14**

12 Frons with two distinct parallel carinae between antennal sockets. [Distribution: Central highlands of Vietnam (Kon Tum)] ..... ..... ***W. nigrocentrus*** **Long & van Achterberg, 2011**

– Frons with rippled sculptures between antennal sockets (Fig. 3B).....**13**

13 Hind coxa reddish-brown; surface of hind coxa reticulate with fine granulate background sculpture. Head and mesosoma reddish-brown. [Distribution. India: Maharashtra (Solapur)]..... ..... ***W. granulatus*** **Ahmad, Pandey, Haider & Shuja-Uddin, 2005**

– Hind coxa completely black, but yellow-brown ventrally; outer dorsal surface of hind coxa with coarse aerolate-rugose sculpture, but finely sculptured in the remaining area (Fig. 1A); head yellow-orange and mesosoma brown-black. [Distribution. Fiji: Kadavu, Taveuni, Vanua Levu, Viti Levu]..... ..... ***W. corpustriacolor*** **Arias-Penna, Zhang & Whitfield**, **sp. n.**

14 Vein 1CUa of fore wing 0.50 times as long as vein 1CUb; pterostigma distinctly shorter vein R1 (23 : 60); frons smooth; propodeum largely rugose; vein cu-a of hind wing more or less sinuate. [Distribution. Vietnam: NE (Ha Giang), Central highlands (Lam Dong)]..... ..... ***W. nigratus*** **Long & van Achterberg, 2011**

– Vein 1CUa of fore wing 0.85 times as long as vein 1CUb; pterostigma as long as vein R1; frons rugose/punctate; propodeum sparsely rugose apically, smooth basally; vein cu-a of hind wing curved. [Distribution. Northeast of Vietnam (Thai Nguyen)] ..... ***W. masoni*** **Long & van Achterberg 2011**

15 Head entirely, mesoscutum and scutellum black; frons, vertex and temple dull, coarsely rugose-punctate; scutellum medially dull and densely rugose; second metasomal tergite with an elongate parallel-sided area. Distribution. Belgian Congo (Nyasheke [Now Rwanda: Nyamasheke?]. Kenya (Embu)]... ..... ***W. henicopus*** **(de Saeger, 1944)**

– Head brownish yellow, mesoscutum and scutellum reddish brown; frons, vertex and temple shiny and almost smooth; scutellum medially shiny and superficially rugose-punctate; second tergite without such area. [Distribution. Philippines: Luzon (Mt Makiling)]..... ***W. thyone*** **(Nixon, 1965)**

16 Lateral lobes of mesoscutum and mesopleuron ventrally yellow or brownish yellow; ocelli strongly protuberant, in frontal view completely above dorsal level of eyes.....**17**

– Lateral lobes of mesoscutum and mesosternum dark brown or blackish; ocelli less protuberant, in frontal view partly below dorsal level of eyes .....**21**

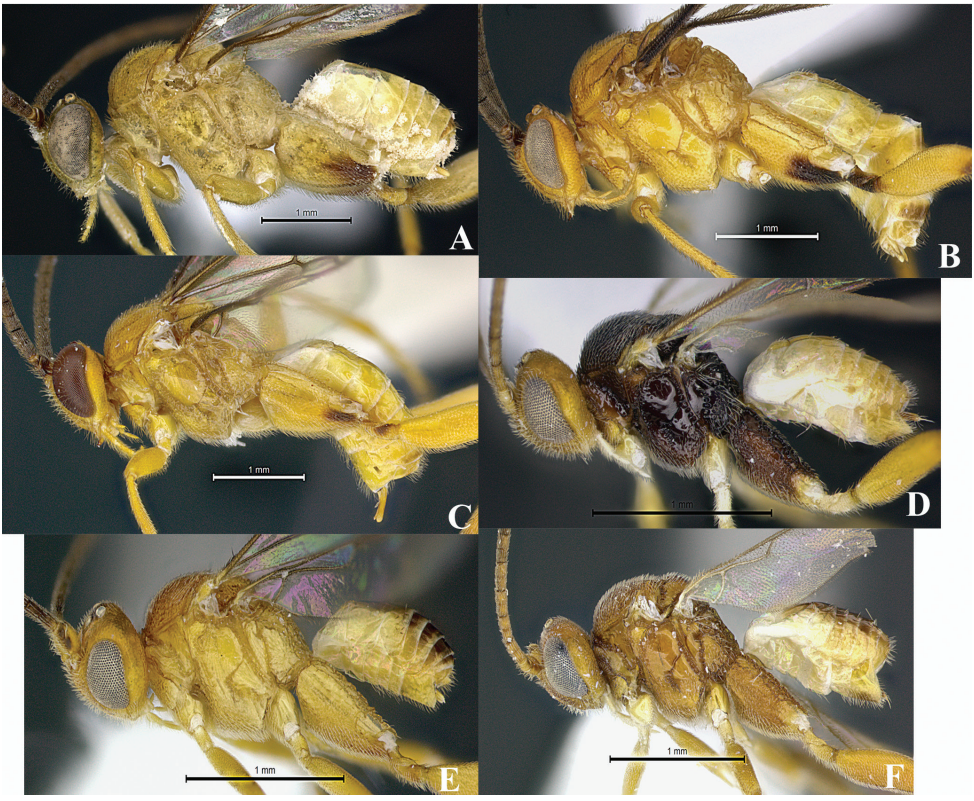


**Figure 1.** Habitus *Wilkinsonellus* species. **A** Female, *W. alexsmithii* Arias-Penna & Whitfield, 2013 **B** Male, *W. kogui* Arias-Penna & Whitfield, 2013 **C** Female, *W. panamaensis* Arias-Penna & Whitfield, 2013 **D** Female, *W. corpustriacolor* Arias-Penna, Zhang & Whitfield, sp. n. **E** Female, *W. fijiensis* Arias-Penna, Zhang & Whitfield, sp. n. **F** Female, *W. nescalptura* Arias-Penna, Zhang & Whitfield, sp. n.

17 Hind coxa yellow/orange without dark brown patch. [Distribution. Australia: Queensland (Herbert River in Ingham, Hope Vale Mission, Mt Spec, Mt Baird), Northern Territory (Mudginbarry H.S.)] ..... ***W. amplus* Austin & Dangerfield, 1992**

– Hind coxa yellow with apex light brown or with a dark brown ventral patch (Figs 1A–C) ..... **18**

18 Notauli absent. [Distribution. Vietnam: North Central Coast (Ha Tinh, Nghe An), Northeast (Thai Nguyen), Central highlands (Dak Lak), Southeast (Dông Nai)] ..... ***W. longicentrus* Long & van Achterberg, 2003**

– Notauli present but incomplete ..... **19**

19 Scutellar sulcus with seven carinate foveae. Axillary trough of metanotum with complete parallel carinae. Eyes and ocelli appearing reddish in preserved

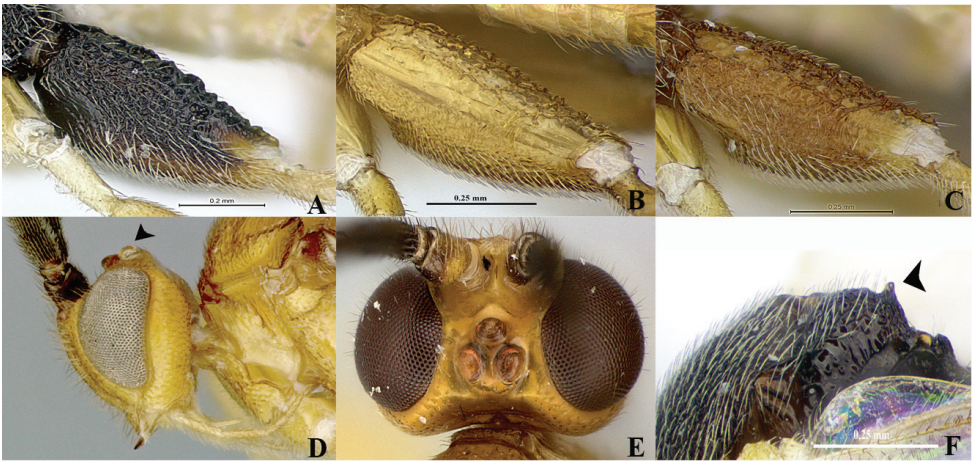


**Figure 2.** Body structures *Wilkinsonellus* species**. A–C** Female, hind coxa **A** *W. corpustriacolor* Arias-Penna, Zhang & Whitfield, sp. n. **B** *W. fijiensis* Arias-Penna, Zhang & Whitfield, sp. n. **C** W. *nescalptura* Arias-Penna, Zhang & Whitfield, sp. n. **D–E** Head **D** *W. kogui* Arias-Penna & Whitfield, 2013, lateral view. **E** *W. panamaensis* Arias-Penna & Whitfield, 2013, dorsal view **F** Scutellum with apical spine, *W. corpustriacolor* Arias-Penna, Zhang & Whitfield, sp. n.

specimens (Figs 1C, 2E) [habitus Fig. 1C]. [Distribution. Panamá: Panamá (Las Cruces)] ..... ***W. panamaensis* Arias-Penna & Whitfield, 2013**

– Scutellar sulcus with five carinate foveae. Axillary trough of metanotum with some incomplete parallel carinae. Eyes and ocelli silver in preserved specimens ..... **20**

20 Fore and hind wings infuscate [habitus Fig. 1B]. [Distribution. Colombia: Magdalena (Tayrona Natl Pk), Chocó (Utría Natl Pk)] ..... ..... ***W. kogui* Arias-Penna & Whitfield, 2013**

– Fore wing and hind wing not infuscate [habitus Fig. 1A]. [Distribution. Costa Rica: Alajuela (Area de Conservación Guanacaste)] ..... ..... ***W. alexsmithi* Arias-Penna & Whitfield, 2013**

21 Temple narrow, in lateral view its width near middle of eye 0.3–0.35 times transverse diameter of eye; OOL of female 0.2–0.3 times diameter of posterior ocellus; vertex without transverse rugosities. [Distribution. Vietnam: Northwest (Hoa Binh), Southeast (Dông Nai), Central highlands (Dak Lak), South central coast (Ninh Thuân)] ... ***W. paramplus* Long & van Achterberg, 2003**

– Temple wider, in lateral view its width near middle of eye 0.4–0.5 times transverse diameter of eye; OOL of female 0.5 times diameter of posterior ocellus; vertex with distinct transverse rugosities. [Distribution. Vietnam: Northeast (Thai Nguyen), North Central Coast (Thua Thien-Hue)]..... ..... ***W. tobiasi* Long, 2007**

## Descriptions of new species

***Wilkinsonellus corpustriacolor* Arias-Penna, Zhang & Whitfield, sp. n.**
http://zoobank.org/45035C2E-F223-463F-BB64-2CA0DD2091E1
http://species-id.net/wiki/Wilkinsonellus_corpustriacolor
Figs 3A–K

**Female.** Body length 2.2 mm, antennae length 2.73 mm.

**Material examined. Type material.** Holotype, 1 female, FIJI: KADAVU ISLAND, Takuvi, 0.25 km SW Solodamu village, Moanakaka bird sanctuary, lat -19.078, long 178.121, 60 m, Malaise, coastal limestone forest, 07.iii–11.iv.2004, S. Lau, [FJKV41a].

Paratypes, 1 female, FIJI: VITI LEVU ISLAND, Nabukavesi village, Ocean Pacific Resort, lat -18.171, long 178.258, 40 m, Malaise, coastal lowland moist forest, 26.iv–05.v.2004, W. Naisilisili, [FJVL18a_01_25] in CAS. 1 male, 2 km E Navai village, old trail to mount Tomaniivi (Victoria), lat -17.621, long 178, 700 m, Malaise, gymnosperm dominated rainforest, 13–18.ii.2004, E. Namatalau, [FJVL11b_03_35] in California Academy of Sciences. 1 male & 1 female, FIJI: VITI LEVU ISLAND, 0.75 km E. Navai Village, old trail to mount Tomaniivi (Victoria), lat -17.621, long 177.989, 700 m, Malaise, gymnosperm dominated rainforest, 03.ii–16.iii.2005, E. Namatalau, [FJVL11d_05_26] in Bishop Museum.

**Other material.** TAVEUNI ISLAND: 1 male, 3.2 km NW Lavena village, Mt. Koronibuabua, lat -19.851, long -179.891, 235 m, Malaise, lowland rainforest, 07.iii-11.iv.2004, B. Soroalau, [FJTA52d].

VANUA LEVU ISLAND: 1 male, Lomaloma village, lat -16.63, long -179.208, 587 m, Malaise, 26.i–07.ii.2006, N. Qarau, [FJVN97_03_01]; 1 male, same data except for: 630 m, 07–18.ii.2006, [FJVN95_01_02].

VITI LEVU ISLAND: 1 male, 2 km E Navai village, old trail to mount Tomaniivi (Victoria), lat -17.621, long 178, 700 m, Malaise, gymnosperm dominated rainforest, 13–18.ii.2004, E. Namatalau, [FJVL11b_03_35]; and 2 males, same data except for: Navai Village, 07–26.i.2004, [FJVL11e_01_02]. 1 male, 1.1 km SSW Volivoli village, Sigatoka sand dunes, lat -17.621, long 177.989, 55 m, Malaise, mixed littoral forest on sand, 06–17.iv.2004, S. Niusoria, [FJVL6b_02_19]; 1 female same data except for: 24.xi–15.xii.2003, T. Ratawa, [FJVL6b_02_16] and 1 female same data except 0.8 km SSW Volivoli village, 25 m, 24.xi–15.xii.2003, T. Ratawa, [FJVL6a_01_11].

**Diagnosis.** Head yellow-orange, metasoma light yellow, mesosoma brown-black (Fig. 3A). Hind coxa brown-black, but yellow-brown ventrally and differing in coloration from fore and middle coxae; hind coxa with aerolate-rugose sculpture which varies in size and shape: outer dorsal edge coarse and heterogeneous, but fine and homogeneous in the remaining area (Fig. 2A). Proximal five antennal flagellomeres lighter than following flagellomeres. Ovipositor sheaths brown (Fig. 3K). Fore wing with vein r slightly curved (Fig. 3I). Hind wing with vannal lobe not reduced (Fig. 3J). Petiole of tergite I smooth, bottle-shaped, widest part with more or less straight edges (Fig. 3K).

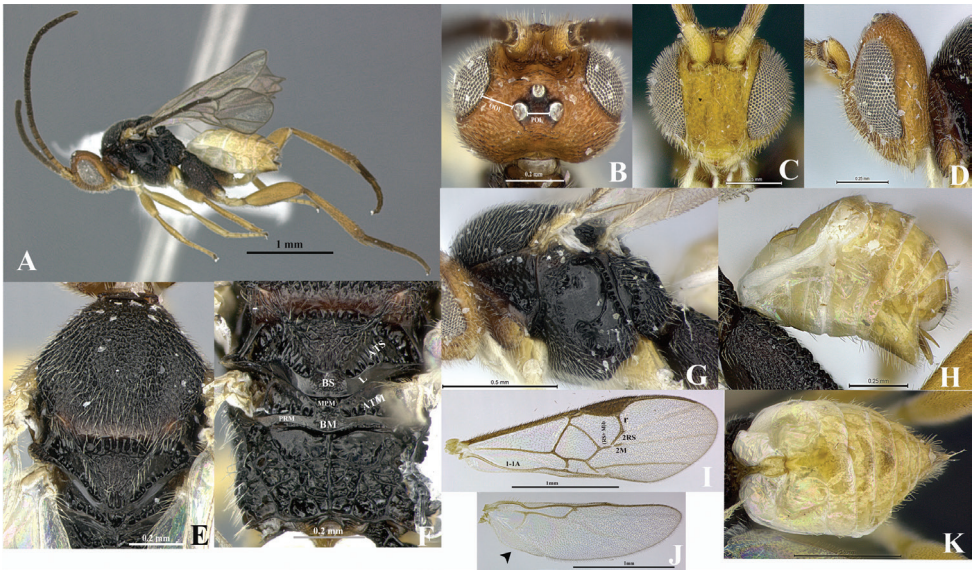


**Figure 3.** Female, *Wilkinsonellus corpustriacolor* Arias-Penna, Zhang & Whitfield, sp. n. **A** Habitus **B–D** Head **B** Dorsal view **C** Frontal view **D** Lateral view **E** Mesoscutum, dorsal view **F** Metanotum & Propodeum, dorsal view **G** Mesosoma, lateral view **H** Metasoma, lateral view **I–J** Wings **I** Fore **J** Hind **K** Metasoma, dorsal view.

**Description.** Coloration (Figs 3A–K). Head yellow-orange, metasoma light yellow and mesosoma brown-black (Fig. 3A) except propleuron (Fig. 3G), dorsal epicnemial ridge and mesosternum yellow-brown. Legs: fore and middle coxa, and trochanter and trochantellus of all legs light yellow (Fig. 3A); hind coxa brown-black except ventrally yellow-brown (Fig. 2A), half basal of hind tibia and whole hind tarsus light brown. Proximal five antennal flagellomeres lighter than remaining brown flagellomeres; scape and pedicel light yellow, both with a thin brown strip laterally (Fig. 3D). Eyes and ocelli silver in preserved specimens, ocellar triangle area with a thin semicircular black ring in each ocellus (Fig. 3B). Edges of mandibular teeth brown. Membrane and microtrichiae of both fore and hind wings light brown (Figs 3I–J). Ovipositor sheaths brown (Fig. 3K).

Head (Figs 3B–D). Inner margin of scape curved, scape longer than wide (0.15:0.10 mm); pedicel as long as wide (0.06:0.07 mm), first three antennal flagellomeres equal in length (0.17:0.17:0.17 mm); last antennal flagellomerus with apex acute and 1.6× longer than penultimate (0.19:0.12 mm) flagellomere. Antennal scrobes deep, not encircled by carina and located far above middle level of eyes and close to inner compound eye margin; frons rippled sculptures throughout; in frontal view, medial area between antennal sockets without projection. Face with finely, dense and homogeneous punctures, interspaces wavy; face with a short median longitudinal carina running from antennal scrobes to half of the length of the face, but it continues as a ridge extending close to the clypeus; fronto-clypeal suture absent. Distance between anterior

tentorial pit and closest inner compound eye margin 1.7× longer than diameter of tentorial pit (0.05:0.03 mm); anterior tentorial pits (Fig. 3C) far away from each other (0.14 mm). Mandible with two teeth, inferior tooth longer than superior. Maxillary palps longer than labial palps. OOL (Fig. 3B) 1.8× longer than diameter of lateral ocellus (0.11:0.06 mm), POL (Fig. 3B) subequal as diameter of lateral ocellus (0.07:0.06 mm). Vertex pointed, laterally sloped, but medially high (Fig. 3D), medially vertex with a semicircular, smooth and slightly concave area. Vertex and gena with fine, dense and homogeneous punctures, interspaces forming faint wavy patterns (Fig. 3B).

Mesosoma (Figs 3E–G). Mesosoma dorsoventrally convex (Fig. 3G). Pronotum shiny, smooth; curvature of pronotum with a deep groove of deeply carinate foveae throughout. Mesopleuron (Fig. 3G) smooth, convex, except precoxal groove with elongated foveae; margins lateral and ventro-lateral of mesopleuron forming an L-shaped area, ventro-lateral part with distinctive diagonal costate and lateral margin with a noticeable curved carina; dorsal epicnemial ridge convex. Mesosternum slightly flat with characteristic curved costate sculptures, medially with a groove of deep, carinate foveae. Metepisternum and metepimeron (Fig. 3G) separated by a chain of deep foveae, the deepest fovea at the dorsal end; metepisternum narrower than metepimeron, anteriorly metepisternum with a curvilinear carina running parallel to the groove of foveae that sorted it from the mesopleuron; metepisternum smooth but setose on dorsal edge; metepimeron just above submetapleural carina with finely areolate-rugose and hairs extended over most of the area. Mesoscutum (Fig. 3E) with dense areolate-rugose sculptures. Notauli (Fig. 3E) incomplete, not reaching the scutellar sulcus, barely visible by a slight difference in the level of the surface of the mesoscutum. Area of mesoscutum close to scutellar sulcus smooth and sloped. Scutellar sulcus (Fig. 3F) with at least six-seven deep, carinate foveae of heterogeneous size. Scutellum (Figs 3E–F) with sculptures of the same kind as mesoscutum and contours carinate; in lateral view scutellum with a spine apically (Fig. 2F). ATS (Fig. 3F) with several carinae; ATM (Fig. 3F) smooth with some short stubs only at posterior edge; L (Fig. 3F) smooth and shiny; BS (Fig. 3F) with tiny sculptures, dorsal edge upward; MPM (Fig. 3F) triangular, which apex strongly upward forming a carinate projection; BM (Fig. 3F) convex; PRM (Fig. 3F) thin, wavy and smooth. Propodeum (Fig. 3F) with a complete median longitudinal carina dividing it in two halves, plus one additional divergent carina at each half of propodeum; all three carinae crossed by several transverse, wavy carinae; edge of first third anterior of propodeum with less transverse carinae. Propodeal spiracle enclosed partially by carinae, but anteriorly without evident transverse carina; propodeal spiracle located at the intersection between pleural and a posterior transverse carina; inner spiracle far away from divergent carina (Fig. 3F).

Wings (Figs 3I–J). Fore wing with vein r slightly curve (0.15 mm) arising just beyond the half of the length of pterostigma (Fig. 3I); vein 2RS as same length as r (0.15:0.15 mm), but 2.1× longer than 2M and (RS+M)b veins (0.15:0.07:0.07 mm). Hind wing (Fig. 3J) with vannal lobe of normal size but with subapical outline flattened; edge with setae throughout, basal ones longer than apical.

Legs. Hind coxa extended beyond apex of tergite III (Fig. 3A) with aerolate-rugose sculptures, but differing in size and shape: outer dorsal edge coarse and heterogene-

ous, but fine and homogeneous in the remaining area (Fig. 2A); hind tibia with inner spur 1.3× longer than outer spur (0.22:0.17 mm); hind basitarsus 1.8× longer than inner spur (0.40:0.22 mm), telotarsus subequal in length to penultimate tarsomere (0.11:0.10 mm); outer surface of hind tibia with orderly spines throughout.

Metasoma (Figs 3H, K). Petiole of tergite I (Fig. 3K) smooth, bottle-shaped widest part with mildly straight edges, length 0.35 mm, distinctly constricted at anterior half (minimum width 0.04 mm), but subapically wider (maximum width 0.09 mm), petiole with a deep groove which reaches the half of the length of swollen area; hypopygium not protruding beyond at apex of metasoma (Fig. 3H); wall of hypopygium with long and numerous hairs; ovipositor length = 0.10 mm, apex rounded and bearing few long hairs, in lateral view ovipositor sheaths not protruding beyond the apex of metasoma.

Comments. In some females from Viti Levu and Kavadu, at least the first five antennal flagellomeres are lighter than the remaining ones. Some females have the ocellar triangle black, hiding the semicircular ring in each ocellus. Tergite III and beyond with some brown tinge. Body length range from 2.22 to 2.93 mm.

Males. Males from all localities exhibit tergites II and beyond brown in comparison with females. In some specimens, basal antennal flagellomeres look similar in coloration to apical flagellomeres, and ocellar triangle with extended black area, so black ring around each ocelli is not outlined. Body length range from 2.2 to 2.52 mm.

**Etymology.** From *corpus* (Latin, noun) = body; *tres, tria* (Latin, number) = three and *color*, *colos* (Latin, noun)= color, tint, hue. The name refers to different coloration on the body: head, mesosoma and metasoma.

**Distribution.** Fiji: Kadavu, Taveuni, Vanua Levu and Viti Levu. *W. corpustriacolor* sp. n was collected in coastal limestone forest, coastal lowland moist forest, lowland rainforest, and gymnosperm dominated rainforest and elevation ranges from 25 m to 700 m.

**Host.** unknown.

***Wilkinsonellus fijiensis* Arias-Penna, Zhang & Whitfield, sp. n.**
http://zoobank.org/2DA0845E-CFCD-40D8-B5E8-3B2D814DC31B
http://species-id.net/wiki/Wilkinsonellus_fijiensis
Figs 4A–K

**Female.** Body length 2.63 mm, antennae length 3.33 mm

**Material examined. Type material.** Holotype, 1 female, FIJI: VITI LEVU ISLAND, 2 km E Navai village, old trail to mount Tomaniivi (Victoria), lat -17.612, long 178, 700 m, Malaise, gymnosperm dominated rainforest, 13–18.ii.2004, [FJVL11b_03_35]. Paratypes, 1 female, same data as holotype in California Academy of Sciences. 1 male in California Academy of Sciences and 1 female & 1 male in Bishop Museum, same data as holotype except for: 0.75 km E. Navai village, old trail to mount Tomaniivi (Victoria), lat -17.62, long 177.989, 03.ii–16.iii.2005, [FJVL11d_05_26].

**Other material.** GAU ISLAND: 1 female, 4 km SE Navukailagi village, mount Delaco, lat -17.98, long 179.275, 496 m, Malaise, 28.xii.2005–10.i.2006, U. Racule,

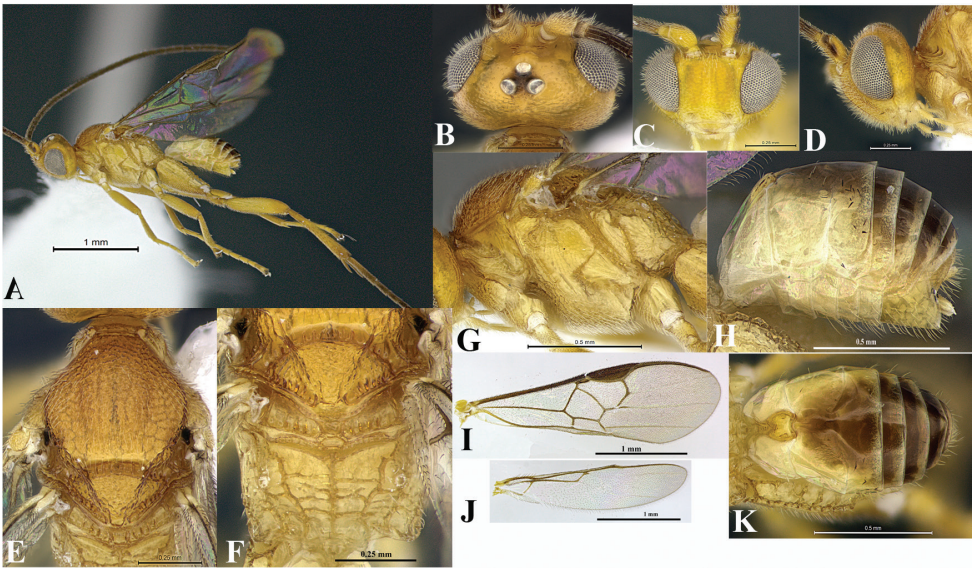


**Figure 4.** Female, *Wilkinsonellus fijiensis* Arias-Penna, Zhang & Whitfield, sp. n. **A** Habitus **B–D** Head **B** Dorsal view **C** Frontal view **D** Lateral view **E** Mesoscutum, dorsal view **F** Metanotum & Propodeum, dorsal view **G** Mesosoma, lateral view **H** Metasoma, lateral view **I–J** Wings **I** Fore **J** Hind **K** Metasoma, dorsal view.

[FJGA65_02_22]; 1 female, same data except for: 10.i–11.ii.2006, [FJGA65_02_23]; 1 female, same data except for: 3.3 km SE Navukailagi village, mount Delaco, 564 m, 20.x–02.xi.2005, [FJGA66_03_19].

KADAVU ISLAND: 1 male, Takuvi, 0.25 km SW Solodamu village, Moanakaka bird sanctuary, lat -19.078, long 178.121, 60 m, Malaise, coastal limestone forest, 23.x–19.xii.2003, S. Lau, [FJKV41a_02_06]; 3 males, same data except for: 128 m, 11.vi–06.vii.2003, [FJKV41b_01_02]; 1 male, same data except for: 128 m, 23.x–19.xii.2003, [FJKV41c_01_01].

TAUVENI ISLAND: 3 females, 5.6 km SE Tavuki village, Devo peak, lat -16.8432, long -179.965, 1187 m, Malaise, cloud forest, 03-10.i.2003, E. Ratu, [FJTA8a_01_12]; 1 female, Tavuki village, mount Devo, lat -16.837, long -179.973, 892 m, Malaise, montane wet forest, 31.vii-14.viii.2004, P. Vodo, [FJTA9b_04_02] in FNCI. 2 males & 4 females, Tavuki village, Devo peak, Malaise, M. Irwin, E. Schlinger & M. Tokotaa, 10-16.i.2003 [FJTA7-9]. 1 male, 3.2 km NW Lavena village, mount Koronibuabua, lat -16.855, long -179.889, 219 m, Malaise, lowland rainforest, 04–19.xi.2003, [FJTA52b_04_26].

VANUA LEVU ISLAND: 1 female, 6 km NW Kilaka, village Batiqere range, lat -16.8103, long 178.988, 61 m, Malaise, lowland wet forest, 03-10.vi.2004, P. Manueli, [FJVN58a_03_06]; 1 female, same data except for: lat -16.806, long 178.991, 98 m, 15-24.vi.2004, [FJVN58b_05_07]; 1 female, same data except for: alt -16.806, long 178.988, 154 m, [FJVN58e_04_06]; 3 males, same data except for: -16.806,

long 178.988, 154 m, 28.vi-02.vii.2004, [FJVN58e_04_08]. 1 female, Lomaloma village, 630 m, Malaise, 07–18.ii.2006, N. Qarau, [FJVN95_01_02]; 1 female, same data except for: 219 m, 26.i–07.ii.2006, [FJVN96_02_01]; 1 male & 2 females, same data except for: 587 m, 26.i–07.ii.2006, [FJVN97_03_01]; 2 females, same data except for: 587 m, 07-18.ii.2006, [FJVN97_03_02].

VITI LEVU ISLAND: 1 male, 1 km E Abaca village, mount Evan's range, Koroyanitu Eco park, Kokabula trail, lat -17.667, long 177.55, 800 m, Malaise, disturbed mid-elevation moist forest, 26.xi–03.xii.2002, L. Tuimereke, [FJVL02_01_09]; 3 males, same data except: 0.5 km E Abaca village, [FJVL03_01_09]; 2 males, same information except: 0.5 km E Abaca village, 12–19.xi.2002 [FJVL03_01_54]. 1 male, 4 km WSW Colo-i-Suva village, mount Nakobalevu, lat -18.055, long 178.423, 372 m, Malaise, lowland wet forest, 12–24.vi.2004, Timoci, [FJVL4b_03_33]. 1 female, 0.8 km SSW Volivoli village, Sigatoka sand dunes, lat -18.166, long 177.485, 4 m, Malaise, mixed littoral forest on sand, 24.xi–15.xii.2003, T. Ratawa, [FJVL6a_01_11]; 1 male & 4 females, same data except for: 1.1 km SSW Volivoli village, lat -18.171, long 177.484, 700 m, 09–20.xii.2003 [FJVL6c_04_11]. 1 female, 1.8 km E Navai village, old trail to mount Tomaniivi (Victoria), lat -17.621, long 177.998, 700 m, Malaise, gymnosperm dominated rainforest, 24.x-08.xi.2003, E. Namatalau, [FJVL11c_04_08]; 2 males, same data except for: Navai village, old trail to mount Tomaniivi (Victoria), lat -17.616, long 177.983, 07–26.i.2004, [FJVL11e_01_02]. 1 female, 3.3 km N Veisari settlement, logging road to Waivudawa, lat -18.069, long 178.3666, 300 m, Malaise, lowland wet forest, 08–31.iii.2003, M. Tokotaa [FJVL10d_04_02]. 2 males & 1 female, 3.2 km E Navai village, Veilaselase Track, lat -17.624, long 178.009, 700 m, Malaise, gymnosperm dominated rainforest, 06.vi–15.vii.2003, E. Namatalau, [FJVL11a_02_02]. 1 male, Nabukavesi Village, Ocean Pacific Resort, lat -18.171, long 178.258, 40 m, Malaise, coastal lowland moist forest, 26.iv–05.v.2004, W. Naisilisili, [FJVL18a_01_25].

**Diagnosis.** Propodeal spiracles touching the pleural carina and enclosed by an incomplete carinate area (Fig. 4F). Hind coxa (Fig. 2B) with three distinctive regions: outer dorsal surface with big and heterogeneous aerolate-rugose throughout; ventral surface with dense, fine punctate; those two kind of sculptures separated by a flat, smooth and shiny stripe. Petiole (Fig. 4K) bottle-shaped, widest part with edge not strongly curved. Axillary trough of scutellum (Fig. 4F) with fine, dense and homogeneous punctures, interspaces wavy, forming undulating patterns. Fore wing (Fig. 4I) with vein r slightly curve. Hind wing (Fig. 4J) with vannal lobe reduced.

**Description.** Coloration (Figs 4A–K). General body yellow (Fig. 4A). All antennal flagellomeres brown; scape (Fig. 4D) yellow with a brown strip in lateral outer surface; pedicel brown. Eyes and ocelli silver in preserved specimens, ocellar triangle (Fig. 4B) with semicircular black rings around each ocellus. Edge of mandibular teeth brown. Hind leg with both outer and inner spurs and all tarsomeres yellow-brown to brown. Tergites II and III (Fig. 4K) medially dark yellow-brown but lighter in periphery; tergite IV and so forth (Fig. 4K) brown, but subapically with a transversal thin yellow-brown band. Membrane and microtrichiae of both fore and hind wings light brown (Figs 4I–J).

Head (Figs 4B–D). Inner margin of scape curved, scape longer than wide (0.18:0.11 mm); pedicel as wide as long (0.05:0.06 mm), first three antennal flagellomeres subequal in length (0.20:0.21:0.21 mm). Antennal scrobes (Fig. 4B) deep, not surrounded by carina, located far above middle level of eyes (Fig. 4C); frons smooth but with some semicircles close to antennal sockets; in frontal view, medial area between antennal sockets without projection, antennal scrobes close to inner eye margin. Face (Fig. 4C) with fine, dense and homogeneous punctures, interspaces forming dorsally distinctive semicircular patterns which are less pronounced ventrally -close to the clypeus; face with a short noticeable median longitudinal carina running from antennal scrobes to half of the length of the face, but continuing as ridge extending close to clypeus; fronto-clypeal suture absent. Distance between each anterior tentorial pit and closest inner compound eye margin equal to diameter of a tentorial pit (0.05:0.04 mm); anterior tentorial pits far away from each other (0.15 mm). Mandible with two teeth, inferior tooth longer than superior. Maxillary palps longer than labial palps. OOL (Fig. 4B) 2× longer than diameter of lateral ocellus (0.15:0.07 mm), POL (Fig. 4B) shorter than diameter of lateral ocellus (0.04:0.07 mm). Vertex convex, laterally sloped and medially high, with fine, dense and homogeneous punctures, interspaces forming distinctive semicircular patterns close to the ocellar triangle and occiput, but less evident laterally; medially vertex with a smooth, shiny and slightly concave area. Gena with fine homogeneous punctures, interspaces forming wavy patterns close to occipital foramen.

Mesosoma (Figs 4E–G). Mesosoma dorsoventrally convex (Fig. 4G). Pronotum shiny, smooth; curvature of pronotum with elongated, semicircular and carinate foveae throughout the groove. Mesopleuron (Fig. 4G) convex, except precoxal groove which bears fine foveae; lateral and ventro-lateral margins forming a L-shaped area that possesses fine, homogeneous punctuations; lateral margin delimited by a carina; dorsal epicnemial ridge convex. Mesosternum slightly flat with dense, fine and homogeneous punctuations, medially with distinctive groove of deep, homogeneous foveae. Metepisternum and metepimeron (Fig. 4G) separated by a chain of deep foveae throughout, the largest at the dorsal end; metepisternum smooth and narrower than metepimeron; metepimeron just above submetapleural carina with very coarse areolate-rugose sculpture, remaining area without sculpturing. Mesoscutum (Fig. 4E) with fine, dense and homogeneous punctures, interspaces wavy forming transversal undulant patterns; mesoscutum slightly narrow than head. Notauli (Fig. 4E) incomplete, barely visible only in a small portion of the mesoscutum, faintly indicated by a change in sculpturing. Area of mesoscutum close to scutellar sulcus smooth and sloped. Scutellar sulcus (Figs 4E–F) with six deep, carinate foveae of heterogeneous size. Scutellum with the same kind of sculptures as mesoscutum and edges defined by a strong carina. ATS (Fig. 4F) with the same sort of sculpture as scutellum, without complete parallel carinae, and posterior edge with visible, but short stubs; ATM (Fig. 4F) with a few, incomplete parallel carinae, only present basally; L and BS (Fig. 4F) smooth and shiny; MPM (Fig. 4F) trapezoidal, and posteriorly delimited by a strong upward carina forming a

projection; BM convex and PRM (Fig. 4F) thin and smooth. Propodeum (Fig. 4F) with a complete median longitudinal carina dividing it in two halves, plus one additional carina at each half of propodeum, all three carinae crossed by several transverse and wavy carinae. Propodeal spiracles touching the pleural carina and enclosed by an incomplete carinate area.

Wings (Figs 4I–J). Fore wing (Fig. 4I) with vein r slightly curved (0.15 mm) arising just beyond the half of the length of pterostigma; vein 2RS slightly longer than r (0.17:0.15 mm), but 1.8× longer than 2M and 1.5× longer than r(RS+M)b veins (0.17:0.09:0.11 mm). Hind wing (Fig. 4J) with vannal lobe reduced.

Legs. Hind coxa extending beyond apex of tergite III (Fig. 4A), hind coxa (Fig. 2B) with three distinctive regions: outer dorsal surface with coarse heterogeneous aerolate-rugose sculpturing throughout; ventral surface with dense, fine punctuates; those two kind of sculptures separated by a flat, smooth and shiny stripe; hind tibia with inner spur 1.6× longer than outer spur (0.36:0.23 mm); hind basitarsus 1.25× longer than inner spur (0.45:0.36 mm); outer surface of hind tibia with orderly spines throughout; hind tarsal claw with a short comb.

Metasoma (Figs 4H, K). Petiole of tergite I (Fig. 4K) smooth, bottle-shaped, widest part with more or less straight edges, length 0.35 mm, distinctly constricted at anterior half (minimum width 0.04 mm), but subapically wide (maximum width 0.10 mm), petiole with a deep groove extending ¾ the length of tergite I, just reaching the top of petiole widest part; hypopygium (Fig. 4H) not protruding at apex of metasoma; wall of hypopygium with long numerous hairs; ovipositor sheath length 0.06 mm, apex rounded and bearing tiny, few visible hairs, in lateral view ovipositor sheaths slightly protruding apex of metasoma.

Comments. In lateral view the mesosoma in some females (e.g. Viti Levu) exhibit two different shades of yellow, dorsally darker than ventrally. In specimens from Gau the coloration on tergite II and so forth is dark brown, in comparison with specimens from other sites that is light brown. Some females exhibit a black ocellar triangle area without/faint delimitation of semicircular black ring in each ocelli (e.g. Vanua Levu). Body length in females ranges from 2.02 mm to 2.83 mm.

Males. Similar to females. Some males exhibit a black ocellar triangle area without semicircular rings patterns in each ocellus (e.g. Kadavu). In specimens from Tauveni, Vanua Levu last laterotergites and sternites are brownish. Body length ranges from 2.22 mm to 2.93 mm.

**Etymology.** The name is based on the country Fiji, where the holotype was collected; the species is recorded in several localities in the archipelago.

**Distribution.** Gau, Kadavu, Taveuni, Vanua Levu and Viti Levu islands. *W. fijiensis* sp. n was collected in different ecosystem as coastal limestone forest, coastal lowland moist forest, mixed littoral forest on sand, lowland rainforest, lowland wet forest, cloud forest, montane wet forest, gymnosperm dominated rainforest, disturbed mid-elevation moist forest. Elevation in localities ranges from 4 m to 1200 m.

**Host.** unknown.

***Wilkinsonellus nescalptura* Arias-Penna, Zhang & Whitfield, sp. n.**
http://zoobank.org/6CC317A2-CB95-4F47-B901-96E1AC74AB16
http://species-id.net/wiki/Wilkinsonellus_nescalptura
Figs 5A–K

**Female.** Body length 2.63 mm, antennae length 2.93 mm

**Material. Type material.** Holotype, 1 female, FIJI: KADAVU ISLAND, Takuvi, 0.25 km southwest Solodamu village, Moanakaka bird sanctuary, lat- 19.077, long 178.121, 60 m, Malaise, coastal limestone forest, 07.iii–11.iv.2004, S. Lau, [FJKV41a]. Paratypes, 1 female & 1 male in California Academy of Sciences and 1 female & 1male in Bishop Museum, same data as holotype except for: 23.x–19.xii.2003, [FJKV41a_02_06].

**Other material.** KADAVU ISLAND: 5 males & 1 female, same data as holotype except for: 23.x–19.xii.2003, [FJKV41a_02_06]; 2 males & 2 females, same data as holotype except for: 09–15.ii.2004, [FJKV41a_04_08].

TAUVENI ISLAND: 1 male & 1 female, 3.2 km NW Lavena village, mount Koronibuabua, lat -16.855, long -179.888, 219 m, Malaise, lowland rainforest 04–19.xi.2003, [FJTA52b_04_26]; 1 female, same data except for: lat -16.854, long -179.891, 235 m, 24.x–19.xi.2004, [FJTA52d]; 1 female, same data except for: lat -16.854, long -179.891, 235 m, 24.x-04.xi.2003, [FJTA52d_01_03]; 1 male, same data except for: lat -16.855, long -179.888, 229 m, 19.xi-19.xii.2003, [FJTA52f_05_28].

VITI LEVU ISLAND: 1 male, 1 km E Abaca village, mount Evan's range, Koroyanitu Eco Park, Kokabula trail, lat -17.66, long 177.55, 800 m, Malaise, disturbed mid-elevation moist forest, 02–10.vi.2002, L. Tuimereke, [FJVL02_01_26]. 1 female, 2 Km SE Nabukavesi village, ocean Pacific resort, lat -18.170, long 178.258, 40 m, Malaise, coastal lowland moist forest, 26.iv–05.v.2004, W. Naisilisili, [FJVL18a_01_25].

**Diagnosis.** First five antennal flagellomeres lighter in color than following flagellomeres. ATS and ATM smooth (Fig. 5F). Mesosternum with characteristic curved costate sculptures. Hind coxa (Fig. 2C) aerolate-rugose, sculptures on the outer dorsal edge big and heterogeneous, but fine and homogeneous in the remaining area. Fore wing (Fig. 5I) with vein r straight; hind wing (Fig. 5J) with vannal lobe normal, of typical microgastrine dimensions. Petiole of tergite I (Fig. 5K) bottle-shaped, widest part with rounded edges. Ovipositor sheaths brown (Fig. 5H).

**Description.** Coloration (Figs 5A–K). General body (Fig. 5A) yellow-brown, except first five antennal flagellomeres yellow-brown, but remaining brown; lateral surface of both scape (Fig. 5D) and pedicel with a thin brown strip. Eyes and ocelli silver in preserved specimens; ocellar triangle with a slim semicircular black ring in each ocellus (Fig. 5B). Edges of mandibular teeth brown. Coxae of both front and middle legs, trochanter and trochantellus of all legs yellow (Fig. 5A). Petiole on tergite I (Fig. 5K) completely dark yellow, but the tergite I light yellow; median area in tergite II dark yellow with contours dark brown, coloration decreases in intensity as it gets far away from median area; tergites III and beyond brown; laterotergites and sternites yellow

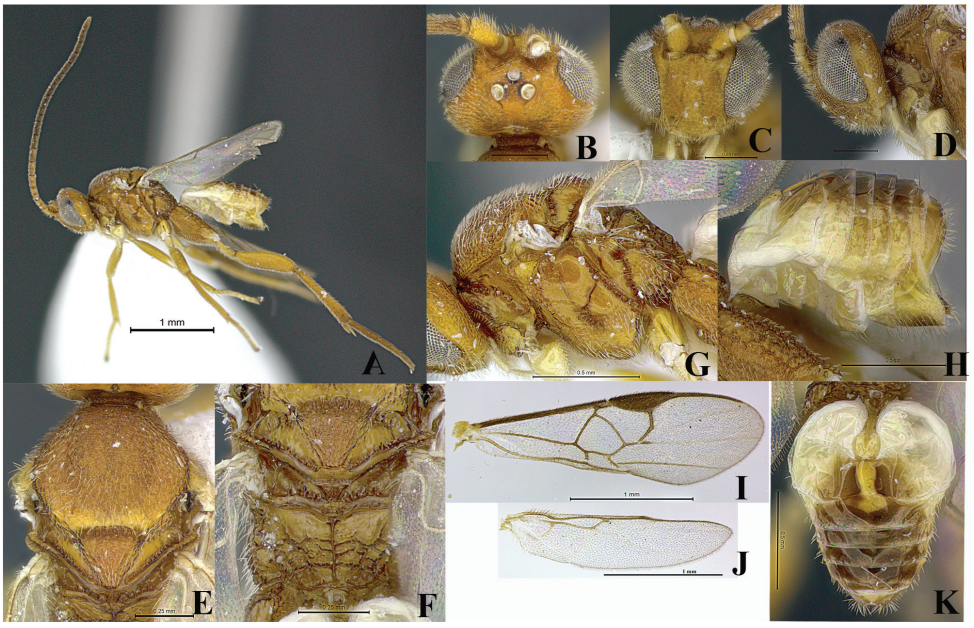


**Figure 5.** Female, *Wilkinsonellus nescalptura* Arias-Penna, Zhang & Whitfield, sp. n. **A** Habitus **B–D** Head **B** Dorsal view **C** Frontal view **D** Lateral view **E** Mesoscutum, dorsal view **F** Metanotum & Propodeum, dorsal view **G** Mesosoma, lateral view **H** Metasoma, lateral view **I–J** Wings **I** Fore **J** Hind **K** Metasoma, dorsal view.

(Fig. 5H). Membrane and microtrichiae of both fore and hind wings light brown (Figs 5I–J). Ovipositor sheaths brown (Fig. 5H).

Head (Figs 5A–D). Inner margin of scape curved, scape longer than wide (0.15:0.10 mm); pedicel longer than wide (0.08:0.05 mm); first three antennal flagellomeres subequal in length (0.21:0.20:0.19 mm); last antennal flagellomerus longer than penultimate (0.20:0.14 mm) and with acute apex. Antennal scrobes (Figs 5B–C) shallow, not surrounded by carina located far above middle level of eyes and close to inner compound eye margin; frons with ripples sculptures throughout; in frontal view, medial area between antennal sockets without projection (Fig. 5C). Face with fine, dense and homogeneous punctures, interspaces forming dorsally distinctive semicircular patterns; face with a short median longitudinal carina running from antennal scrobes to half of the length of the face, but continuing as a ridge extending close to the clypeus; frontoclypeal suture absent. Distance between anterior tentorial pit and closest inner compound eye margin 1.7× longer than diameter of tentorial pit (0.05:0.03 mm); anterior tentorial pits far away from each other (0.18 mm). Mandible with two teeth, inferior tooth longer than superior. Maxillary palps longer than labial palps. OOL (Fig. 5B) 1.7× longer than the diameter of lateral ocellus (0.12:0.07 mm), POL (Fig. 5B) as equal as diameter of lateral ocellus (0.07:0.07 mm). Vertex convex, laterally sloped and medi-

ally high, with fine, dense and homogeneous punctures, interspaces forming distinctive semicircular patterns; medially vertex with a smooth and slightly concave area. Gena (Fig. 5D) with fine homogeneous punctures, interspaces forming wavy patterns.

Mesosoma (Figs 5E–G). Mesosoma dorsoventrally convex (Fig. 5G). Pronotum shiny, smooth; curvature of pronotum (Fig. 5G) with a deep groove of deep foveae throughout. Mesopleuron (Fig. 5G) smooth, convex, except precoxal groove which bears a group of foveae; margins lateral and ventro-lateral of mesopleuron forming an L-shaped area; ventro-lateral part with distinctive diagonal costate sculpturing and lateral margin with an evident curved carina; dorsal epicnemial ridge convex. Mesosternum slightly flat with characteristic curved costate sculptures; medially with a groove of deep, homogeneous foveae. Metepisternum and metepimeron (Fig. 5G) separated by a chain of deep foveae, the deepest fovea at the dorsal end; metepisternum narrower than metepimeron; metepisternum with an additional curved carina running parallel to the groove of foveae that separates it from the mesopleuron; dorsal edge of metepisternum with a convex and setose area; metepimeron just above submetapleural carina with coarse areolate-rugose sculpturing, remaining area with scattered, finely sculpture, hairs extending over most of the area (Fig. 5G). Mesoscutum (Fig. 5E) with fine, dense and homogeneous punctures, interspaces wavy, mesoscutum slightly narrow than head. Notauli (Fig. 5E) incomplete, not reaching the scutelar sulcus, visible in most of the anterior part of the mesoscutum and indicated by a faint change in sculpturing. Area of mesoscutum close to scutellar sulcus smooth and sloped. Scutellar sulcus (Figs 5E–F) with at least six visible deep, carinate foveae of heterogeneous size. Scutellum with edges carinate, sharing the same kind of sculptures as mesoscutum. ATS and ATM (Fig. 5F) smooth, both with some short stubs at posterior edge; L and BS (Fig. 5F) smooth and shiny; MPM (Fig. 5F) trapezoidal, posteriorly with a strong upward carina forming a projection; BM convex and PRM (Fig. 5F) thin, wavy and smooth. Propodeum (Fig. 5F) with a complete median longitudinal carina, plus one additional divergent carina at each half of propodeum, all three carinae crossed by several transverse, wavy carinae; first third anterior of propodeum without transverse carinae. Propodeal spiracles in the junction of transverse carina and pleural carina; innerly spiracles far away from divergent carina; anteriorly lacking of any evident carinae. Propodeal spiracle partially enclosed by carinae.

Wings (Figs 5I–J). Fore wing (Fig. 5I) with vein r straight (0.16 mm) arising just beyond the half of the length of pterostigma; vein 2RS longer than r (0.20:0.16 mm), but 2× longer than 2M and r(RS+M)b veins (0.20:0.10:0.10 mm). Hind wing (Fig. 5J) with vannal lobe not reduced, but with subapical outline flattened; edge with setae throughout, basal ones longer than apical.

Legs. Hind coxa extended beyond apex of tergite III (Fig. 5A) with aerolate-rugose sculpturing, sculpture on the outer dorsal edge coarse and heterogeneous, but fine and homogeneous in the remaining area (Fig. 2C); hind tibia with inner spur 1.3× longer than outer spur half (0.26:0.20 mm); hind basitarsus 1.5× longer than inner spur (0.40:0.26 mm), telotarsus as same length as penultimate tarsomere (0.10:0.10 mm); outer surface of hind tibia with orderly spines throughout.

Metasoma (Figs 5H, 5K). Petiole of tergite I (Fig. 5K) smooth, bottle-shaped, widest part with rounded edges, length 0.40 mm, distinctly constricted over anterior half (minimum width 0.05 mm), but subapically wider (maximum width 0.12 mm), petiole with a deep groove extending across great part of the petiole swollen area; hypopygium (Fig. 5H) not protruding beyond apex of metasoma; wall of hypopygium with long and numerous hairs; ovipositor sheath length 0.15 mm, apex acute, tapering at the ending, bearing long and visible hairs, in lateral view ovipositor sheaths not protruding the apex of metasoma.

Comments. In some females from Kavadu, the coloration on tergites III and beyond is completely yellow; other specimens exhibit on those tergites a striping pattern that can alternate light yellow followed by dark brown and vice versa. In contrast, specimens from Taveuni, the brown coloration includes tergite II and following. Body length ranges from 2.12 mm to 2.83 mm.

Males. Similar to females. Some dry specimens (e.g. from Kavadu) with striping pattern on tergites III and beyond, those specimens exposing the arthrodial membrane which is light yellow in contrast with dark brown coloration on the tergites. In other males, the first third anterior of propodeum lacks the transverse carinae. Body length ranges from 2.32 to 2.52 mm.

**Etymology.** From *ne* (Latin)= particle of negation and *scalptura* (Latin, noun, femine)= engraving. The name refers at the absence of sculptures in both the axillary trough of the scutellum and axillary trough of the metanotum.

**Distribution.** Kavadu, Taveuni and Viti Levu. *W. nescalptura* sp. n was collected in coastal lowland moist forest, coastal limestone forest, lowland rainforest and disturbed mid-elevation moist forest, ecosystems range from 40 m to 800 m.

**Host.** unknown

## Acknowledgments

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RESEARCH ARTICLE

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# A new species of *Paratanais* Dana, 1852 (Crustacea, Peracarida, Tanaidacea, Paratanaidae) from Puerto Rico, northwestern Atlantic

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## Abstract

*Paratanais rosadi* **sp. n.** described from Puerto Rican coastal waters represents the first species of the genus from the northwestern Atlantic. It is distinguished from the other *Paratanais* species by a combination of characters, including article-2 of the maxilliped palp with a geniculate, finely-serrulate seta on inner margin; chela with stiff, geniculate, seta arising from propodus between fixed finger and dactylus and with short, stout, finely serrulate, seta on inner distal face of propodus adjacent to base of dactylus; carpus of pereopods 4–6 having three, instead of four stout modified spiniform setae distally, uropodal exopod distinctly shorter than endopodal article-1; and uropodal endopod with articles of about of equal in length. A key for the separation of *Paratanais* species from the Atlantic Ocean is presented.

## Keywords

Tanaidomorpha, *Paratanais*, new species, Caribbean, Puerto Rico

## Introduction

Morales-Núñez (2011) have summarized the information on the crustacean order Tanaidacea presently known from Puerto Rico. They recorded a species belonging to the genus *Paratanais* Dana, 1852 from the waters off Culebra Island. Subsequently, additional specimens of this species were collected from La Parguera on the southwestern coast of Puerto Rico. After further examination it was determined that it represented and undescribed species. The description of this species is the subject of this paper.

The status of genus *Paratanais* was recently partially reviewed by Bird and Bamber (2013). Based on differences in the setation of the maxilliped, chela, and pereopods, they transferred five species, (i.e. *Paratanais denticulatus* Gutu & Ramos, 1995; *P. intermedius* Dojiri & Sieg, 1997; *P. malignus* Larsen, 2001; *P. spinanotandus* Sieg, 1981; and *P. vicentetis* Larsen, Nagaoka & Froufe, 2012) to the new genus, *Aparatanais* Bird & Bamber, 2013. Further they described four new species of *Paratanais* (i.e. *P. caterae* Bird & Bamber, 2013; *P. hamulus* Bird & Bamber, 2013; *P. incomptus* Bird & Bamber, 2013; and *P. puia* Bird & Bamber, 2013) from New Zealand waters. *Paratanais coelhoi* Araújo-Silva & Larsen, 2012 described was not treated by Bird and Bamber (2013).

Twenty-seven nominal species are currently attributed to the genus *Paratanais* (Anderson 2013; WoRMS). At present, seven species have been reported from the Atlantic Ocean. Three of these species *P. hessleri* Kudinova-Pasternak, 1985; *P. martinsi* Bamber & Costa, 2009; and *P. pseudomartinsi* Larsen, 2012, are known from their respective type localities in the NE Atlantic, and a single species, *P. elongatus* (Dana, 1849) is reported from the NW Atlantic (Bamber and Costa 2009, Larsen 2012, Kudinova-Pasternak 1985; Makkaveeva 1968). Three of these species are reported from the South Atlantic, *P. euelpis* Barnard, 1920 from the SE Atlantic and two, *P. coelhoi* Araújo-Silva & Larsen, 2012 and *Paratanais oculatus* Vanhöffen, 1914, from the SW Atlantic (Araújo-Silva and Larsen 2012, Barnard 1920, Silva-Brum 1973).

Of the three NE Atlantic species, *Paratanais hessleri* is the most poorly known. Its type material is based on single incompletely described and illustrated female specimen collected on the slope of the Great Meteor Seamount. The other SE Atlantic species, *P. martinsi* and *P. pseudomartinsi*, which were both described from the Azores, are quite similar morphologically (Larsen 2012).

Makkaveeva (1968) reported *P. elongatus* as "*Leptochelia [=Paratanais] elongatus* (Dana, 1849)" from Cuban waters; however, Bamber (1998) suggested that her "poorly figured" specimens might have more affinities with the South African *P. euelpis*. Additionally, Heard et al. (2004) reported "*Paratanais* sp. A" from Florida waters including Port Everglades, Florida Keys (Long Key), and Florida West Coast (Tampa Bay) and they suggested that the Cuban specimens reported by Makkaveeva might be conspecific with the one found by them in South Florida material.

From the equatorial Southwest Atlantic, Silva-Brum (1973) reported *Paratanais oculatus* (Vanhöffen, 1914) from Brazilian coastal waters; this species was previously known from Sub-Antarctic waters (Vanhöffen 1914; Shiino 1978). Silva-Brum's identification, however, was questioned by Araújo-Silva and Larsen (2012), who de-

scribed *P. coelhoi* from the same general locality. The remaining South Atlantic species, *P. euelpis,* was briefly described from the Southwest coast of South Africa (Barnard 1920) and later redescribed in detail by Lang (1973).

## Materials and methods

Part of the material was diver-collected during 2002 using PVC corers at a depth of 28 m off Culebra Island (eastern Puerto Rico). During 2008 larger series of specimens, including the type material was collected with a benthic grab at a depth of 14.9 m near Margarita Key in the southwestern region of La Parguera Natural Reserve (Fig. 1). Samples were processed using the methods described by Morales-Núñez and Kornicker (2007) and Morales-Núñez et al. (2010).

Type material has been deposited in the National Museum of Natural History, Smithsonian Institution, Washington DC, (USNM), and the Gulf Coast Research Laboratory Museum, Ocean Springs, Mississippi MS, (GCRL). All measurements are in millimetres (mm). Total body length (TL) is measured from the tip of the rostrum to the end or tip of the telson. The terminology used in this paper, unless otherwise stated, follows that of Larsen (2003). Abbreviations: TL = total length; millimetres = mm.

## Systematics

**Order Tanaidacea Dana, 1849**
**Suborder Tanaidomorpha Sieg, 1980**
**Superfamily Paratanaoidea Lang, 1949**
**Family Paratanaidae Lang, 1949**
**Subfamily Paratanainae Lang 1949**

**Genus *Paratanais* Dana, 1852**
http://species-id.net/wiki/Paratanais

**Type species.** *Paratanais elongatus* Dana, 1849 (see Bamber 1998).

**Generic diagnosis.** See Bird and Bamber (2013).

***Paratanais rosadi* sp. n.**
http://zoobank.org/D0D83D3C-8FA3-4378-9A91-5FE2D8B1E77B
http://species-id.net/wiki/Paratanais_rosadi
Figs 2–9; 10C, G, J, M and P

**Material examined.** *Holotype*: adult female (USNM 1231351), 17°55'57.70"N, 67°06'53.36"W, Margarita Southwest of La Parguera, Puerto Rico, depth 14.9 m, col-

lected on August 1 of 2008. *Paratypes:* one male (USNM 1231352), two females (USNM 1231353); two females, (GCRL 6529), the same collection data as for holotype.

Additional specimens from the type locality are in the collection of the authors.

**Diagnosis. Female.** Pleon shorter than pereonites 5–6 combined. Antennule with cap-like terminal article. Antenna article-2 with length twice depth in lateral aspect, ventral marginal sub-linear, lacking shallow apophysis, small simple seta subdistally. Maxilliped palp article-2 with inner margin bearing geniculate, finely-serrulate, seta. Chela with propodus having geniculate, narrow, stiff, seta arising at inner base of fixed finger adjacent articulation with dactylus and extending distally: inner face with small, short, stout, finely serrulate seta on inner distal face of propodus adjacent to base of dactylus. Pereopods 4–6 having carpus distally with three modified, stout spiniform setae and small simple seta. Uropodal exopod uni-articulate, length about twice width, and shorter than endopodal article-1; endopod with both articles about same length. **Male.** Small, length about 1.2 mm. Carapace length about equal to that of first three pereonites combined; eyes large with diameter about half length of carapace. Pereonites 4–5 slightly longer than pereonites 1–3, and 6. Pleonites as long as pereonites 2–5 combined length. Antennule peduncle article about 1.3 times as long as wide; antennular flagellum with four-articles, without detectable terminal cap-like article; flagellum article-2 shorter than articles 3–4 combined. Uropod endopod bi-articulated.

**Etymology.** This species is named in honour of Marcos Rosado Ruiz who has instrumental in assisting the senior author in collection of the specimens used in this study.

**Description - adult female.** *Body* (Fig. 2A). Length about 2.8 mm, about 12.5 times width.

*Carapace* (Fig. 2A). About 15% TL and about twice length of pereonite-1. Ocular lobes with eyes, visual elements present, with demarked lines on carapace indicating possible union of lateral plates.

*Pereon* (Fig. 2A). About 65% of TL, pereonite-1 shorter than other pereonites; pereonites 2–6 subequal in length; all pereonites subrectangular; all pereonites wider than long.

*Pleon* (Figs 2A–C). About 15% TL, shorter than pereonites 5–6 combined; pleonites-1 and -5 of nearly equal lengths, distinctly wider than long, slightly larger than others pleonites; pleonites 2–4 subequal; pleonites 1–4 each with pair of swollen lateral, setulose setae (Fig. 2C); pleonite-5 with lateral pair of short simple setae (Fig. 2B).

*Pleotelson* (Figs 2A, 4F). About 5% TL, longer than pleonite-5, with four simple setae distally.

*Antennule* (Fig. 3A). Slightly shorter than carapace. Article-1 length about 2.4 times width, two broom-setae laterally on mid-dorsal margin and simple seta distally on mid-dorsal margin. Article-2 length about third that of article-1, one simple seta on dorso-distal margin, and one simple and one broom-seta disto-ventrally. Article-3 with length about 1.5 times width, dorsal and ventral seta on distal margin. Article-4 elongate, equal length of article 2–3 combined, distally with broom-seta and long simple seta. Small, terminal, cap-article with aesthetasc and four simple setae of varying length.

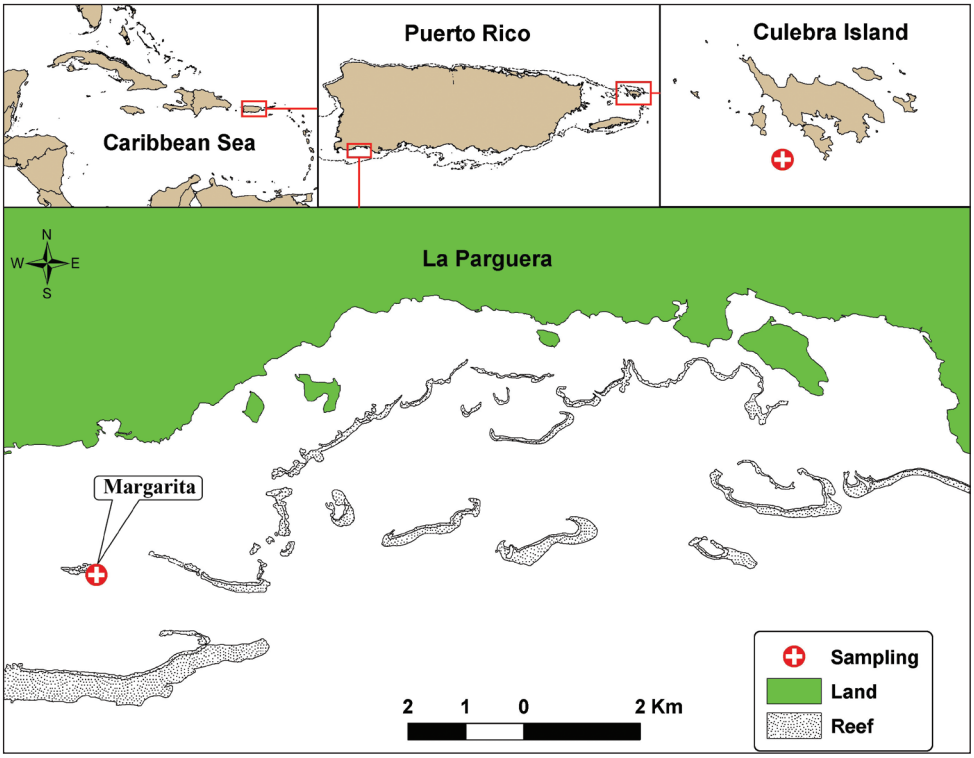


**Figure 1.** Geographic location of La Parguera, Southwest Puerto Rico, and Culebra Island, Eastern Puerto Rico, indicating the sampling stations where *Paratanais rosadi* sp. n., were found.

*Antenna* (Figs 3B–C). Article-1 greatly reduced (not illustrated). Article-2 length about 1.4 times depth, ventral margin sub-linear with small simple seta subdistally; dorsal margin with long simple seta distally. Article-3 slightly wider than long, with strongly developed, stout disto-dorsal spiniform seta. Article-4 about three times width, with two short simple setae on middle-distal margin and two broom-seta on distoventral margin. Article-5 with disto-dorsal simple seta. Article-6 minute, with one articulated cluster of one small curved seta and three long setae, and single articulated seta (Fig. 3C).

*Mouthparts*. *Labrum* (Fig. 3D). Hood-shaped, distal edge finely setose. *Mandibles* (Figs 3E–G): *molar process* well developed; left mandible with smooth, strong incisor without crenulate upper margin, *lacinia mobilis* sub-triangular with four to five shallow subdistal denticles (Figs 3E–F); right mandible (Fig. 3G) with strong crenulate incisor and weakly bifid tip. *Labium* (Fig. 3H): with two lobes, inner lobe finely setose distally, with minute spiniform seta on outer distal margin. *Maxillule* (Figs 4A–B): endite with nine distal spiniform setae, outer margin with short simple setae; palp with two long terminal setae of unequal length (Fig. 4B). *Maxilla* (Fig. 4B): subovally elongate.

*Maxilliped* (Figs 4C–D). Basis fused, long seta near articulation with palp extending distally to or near distal margin of endites; endites fused medially in proximal

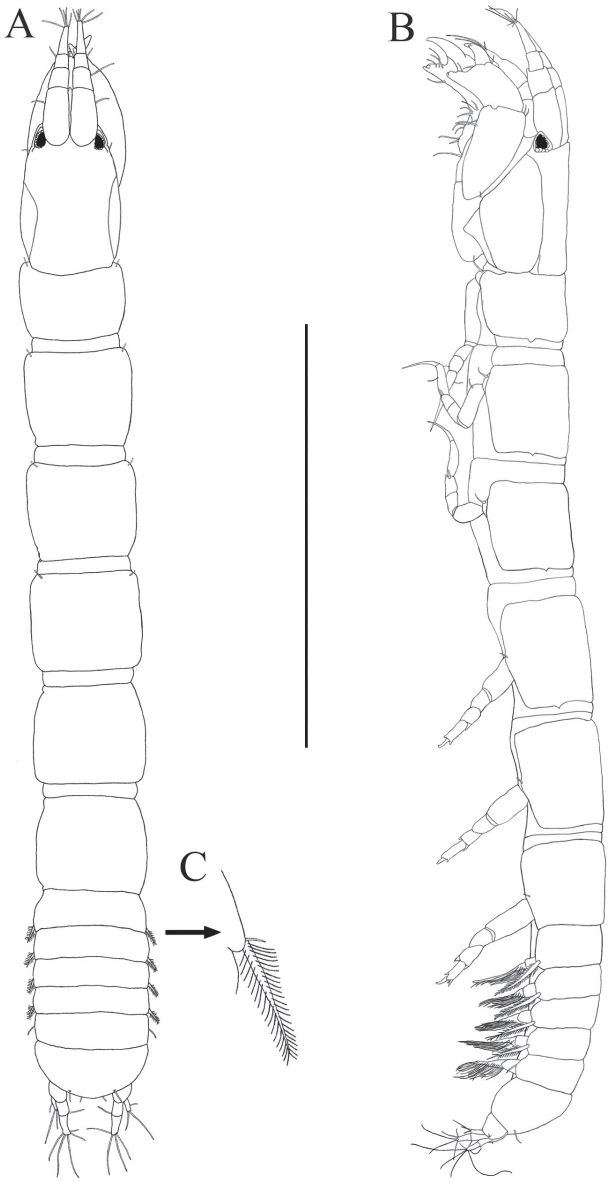


**Figure 2.** *Paratanais rosadi* sp. n., holotype female: **A** dorsal view **B** lateral view **C** enlargement of articulated setulate seta on pleonite-1. Scale bar **A**–**B** 1.0 mm.

third, inner lobes with distal margin bearing seta and two medial flat tubercles, inner lobes serrate on outer-distal margin. *Palp*: article-1 naked; article-2 triangular with simple seta on outer proximal margin, inner margin with two simple setae and geniculate, finely-pectinate (visible at magnification 100×), spiniform seta (Fig. 4D); article-3 with three setulose setae on inner margin; article-4 with four (three setulose and one

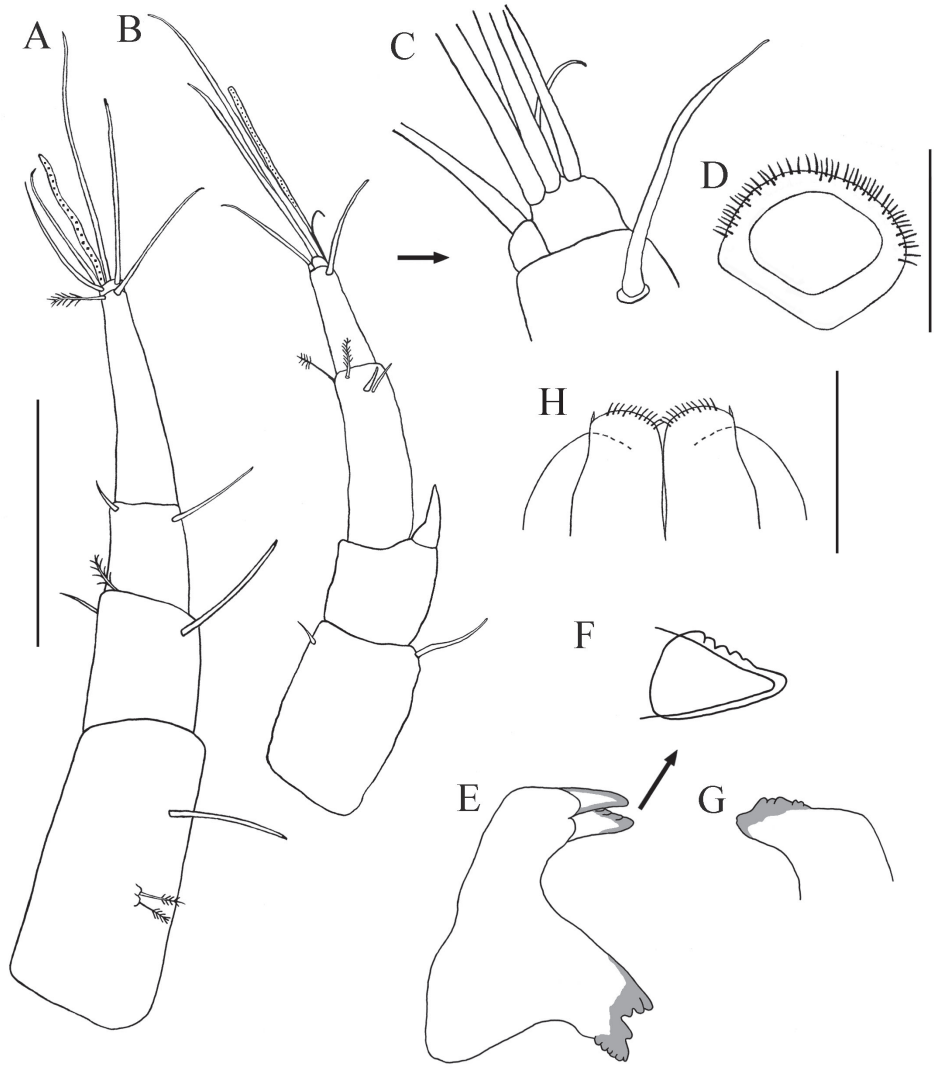


**Figure 3.** *Paratanais rosadi* sp. n., holotype female: **A** antennule, lateral view **B** antenna, lateral view **C** enlargement of tip of the antenna **D** labrum **E** left mandible **F** lacinia mobilis **G** right mandible **H** labium. Scale bar **A**–**G** 0.1 mm.

simple) setae on distal margin, simple seta on outer margin, and two or three simple setae on inner margin. *Epignath*: not recovered.

*Cheliped lateral aspect* (Figs 5A–C). Sclerite sub-triangular, dorsally inserted, naked. Basis length about 2.1 times width, simple seta on disto-dorsal margin. Merus triangular, with simple seta on mid-ventral margin. Carpus length 1.8 times width, with two (one proximal and one distal) short simple setae on dorsal margin, and two ventral simple setae on subdistal, ventral margin. Chela (*lateral aspect*)

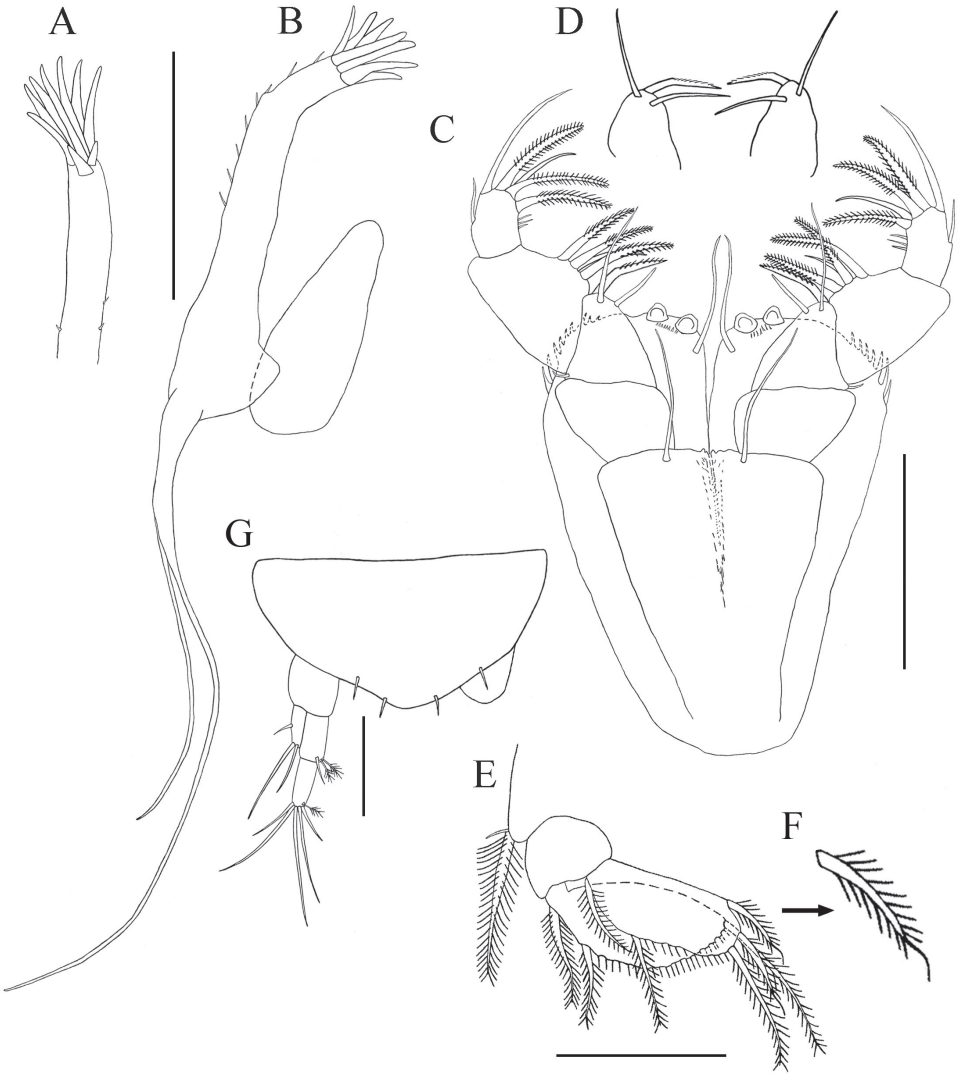


**Figure 4.** *Paratanais rosadi* sp. n., holotype female: **A** maxillule **B** maxillule and maxilla **C** maxilliped **D** enlargement of palp article-2 **E** pleopod **F** enlargement of plumose seta, with whip-like tip **G** uropod. Scale bar **A**–**F** 0.1 mm.

(Figs 5A–C): propodus length 1.4 times width; fixed finger with two ventral seta and three simple setae on incisive margin adjacent; stiff, geniculate, seta arising from propodus between fixed finger and dactylus, extending distally between fixed finger and dactylus. Dactylus slightly longer than fixed finger, curved distally, unguis not fused. Chela (*Inner aspect*) (Fig. 5D): Propodus with short setulate seta distally near articulation of dactylus. Dactylus with short setulate seta proximally on inner sub-dorsal margin.

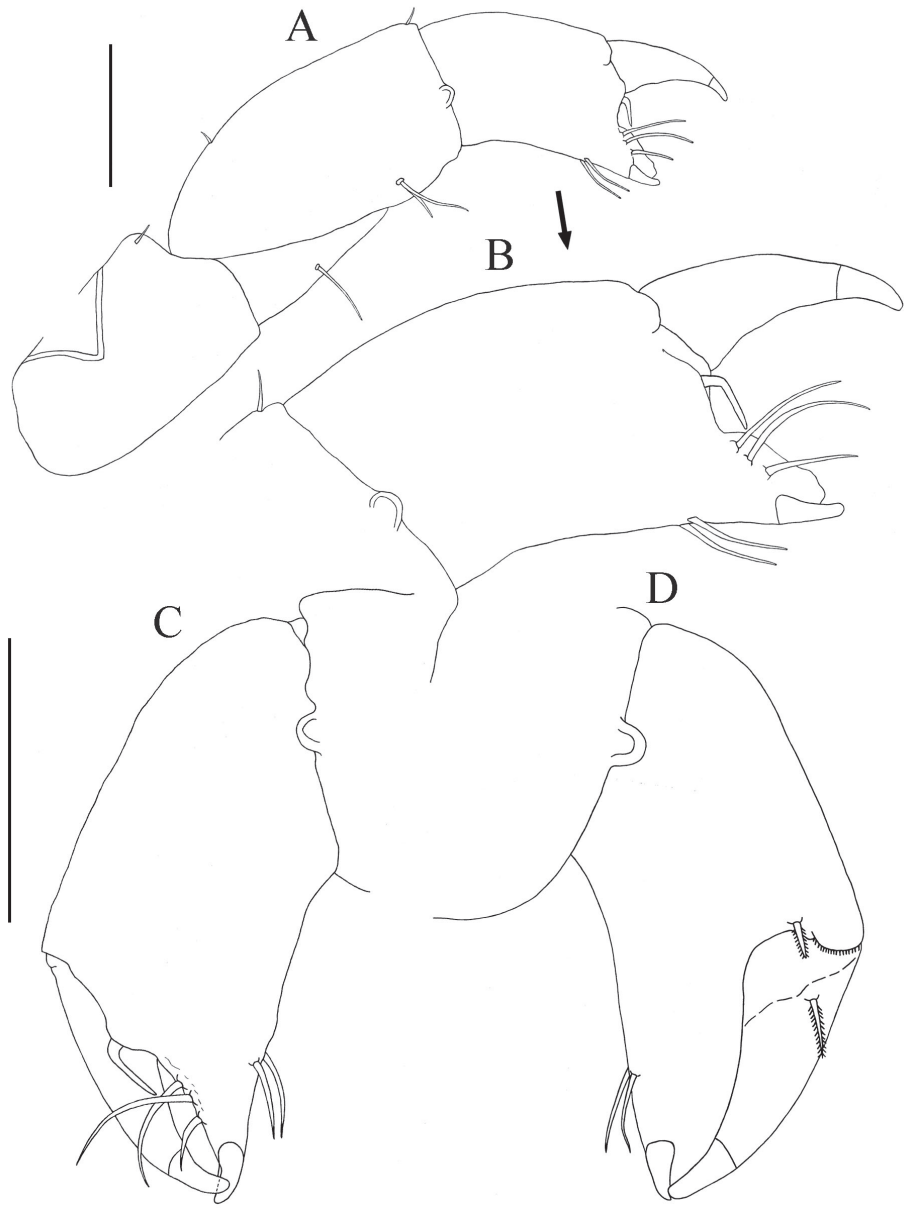


**Figure 5.** *Paratanais rosadi* sp. n., holotype female: **A** right cheliped, lateral view **B** enlargement of propodus and dactylus of right cheliped, lateral view **C** propodus and dactylus of left cheliped, lateral view **D** propodus and dactylus of left cheliped, inner view. Scale bar **A**, **C** and **D** 0.1mm.

*Pereopod-1* (Figs 2B, 6A). Longer than other five pereopods. Coxa with simple seta (Fig. 2B). Basis slender, length about 3.8 times width, with dorso-proximal simple seta. Ischium about three times width with single simple ventral seta. Merus length about

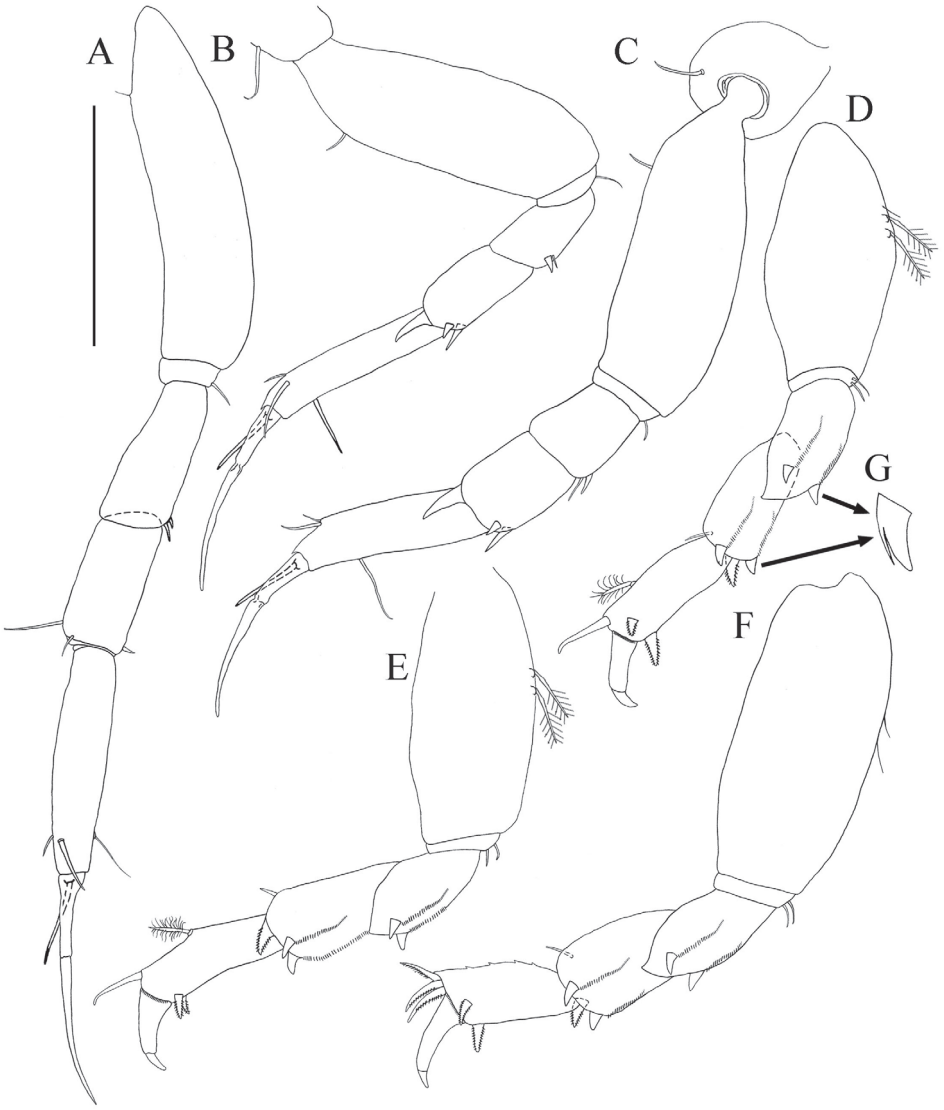


**Figure 6.** *Paratanais rosadi* sp. n., holotype female: **A** pereopod 1 **B** pereopod 2 **C** pereopod 3 **D** pereopod 4 **E** pereopod 5 **F** pereopod 6 **G** enlargement of bifurcate spiniform setae. Scale bar **A**–**F** 0.1 mm.

2.1 times width, with two ventro-distal small simple setae. Carpus with length about 2.1 times width, one short and one long disto-dorsal simple setae and one ventro-distal simple seta. Propodus with length about 4.5 times width, with two sub-distal simple setae on dorsal margin and one sub-distal seta ventrally. Dactylus and unguis combined about as long as propodus, with simple proximal seta, unguis longer than dactylus.

*Pereopod-2* (Figs 2B, 6B). Coxa with simple seta (Fig. 2B). Basis length about 2.7 times width, with supraproximal seta. Ischium length about 3.0 times width, with

simple ventral seta. Merus length about 1.5 times width, with simple seta and one spiniform seta, disto-ventrally. Carpus length about 1.8 times width, with one longer disto-dorsal spiniform seta and two disto-ventral spiniform setae. Propodus length about 5.1 times width, with two sub-distal simple setae on dorsal margin and one sub-distal simple seta ventrally. Dactylus and unguis together longer than propodus and not fused, with simple proximal seta, unguis longer than dactylus.

*Pereopod-3* (Fig. 6C). Similar to pereopod 2, except basis longer. Merus, carpus and propodus wider.

*Pereopod-4* (Figs 6D, G). Basis stout, length about twice width, with simple seta and two broom setae on mid-ventral margin. Ischium length about 6.5 times width, with two ventral simple setae. Merus length about 1.9 times width, with two short asymmetrical bifurcate spiniform setae on disto-ventral margin (Fig. 6G), and row of setules on distal half of ventral margin. Carpus length about 1.5 times width, distally with simple disto-ventral seta, and three stout modified spiniform setae (two asymmetrical bifurcate and one bipinnate spiniform seta), with row of setules on distal half of ventral margin. Propodus length about 2.6 times width, with mid-dorsal broom seta and disto-dorsal spiniform seta, with two bipinnate spiniform setae on distoventral margin, with distal row of setules. Dactylus and unguis claw-like, together almost half length of propodus, dactylus longer than unguis, curved and not fused.

*Pereopod-5* (Fig. 6E): Similar to pereopod-4, except basis without simple setae on mid-ventral margin.

*Pereopod-*6 (Fig. 6F): Similar to pereopod-5, except basis length about 2.3 times width with two simple setae on mid-ventral margin. Propodus with four short spines on dorsal margin and without mid-dorsal broom seta, with three pectinate distal spiniform setae. Dactylus and unguis together about 1/3 length of propodus.

*Pleopod* (Figs 4E–F). Five similar, well-developed, biramous pairs. Basal article broad, naked. Rami lengths slightly more than twice width; proximal plumose seta on distal inner margin adjacent to articulation with basis. Endopod with inner and distal margins bearing ten long plumose setae, distal most seta modified with whip-like tip (Fig. 4F); sub-distal lateral margin with seta modified with whip-like tip. Exopod with inner and distal margins bearing about 15 long plumose setae, outer margin naked.

*Uropod* (Fig. 4G). Biramous, basis naked. Exopod uniarticulate, shorter than endopod article-1, with simple seta on mid-outer margin, and two simple setae (outer longest) on distal margin. Endopod biarticulated, article-1 as long as peduncle, with one simple and two broom setae on inner distal margin; article-2 length about subequal to length of article-1, with five simple and one broom setae on distal margin.

**Description - adult male.** *Body* (Figs 7A–B). Length about 1.20 mm, about 4.8 times as long as wide, smaller than female.

*Carapace* (Fig. 7A). About 20% TL, nearly as longer as wide; quadrate; naked; as long as pereonites 1 to 3 combined; ocular lobes bearing large darkly pigmented, multifaceted eyes, diameter about half length of carapace and about eight times that of female eye.

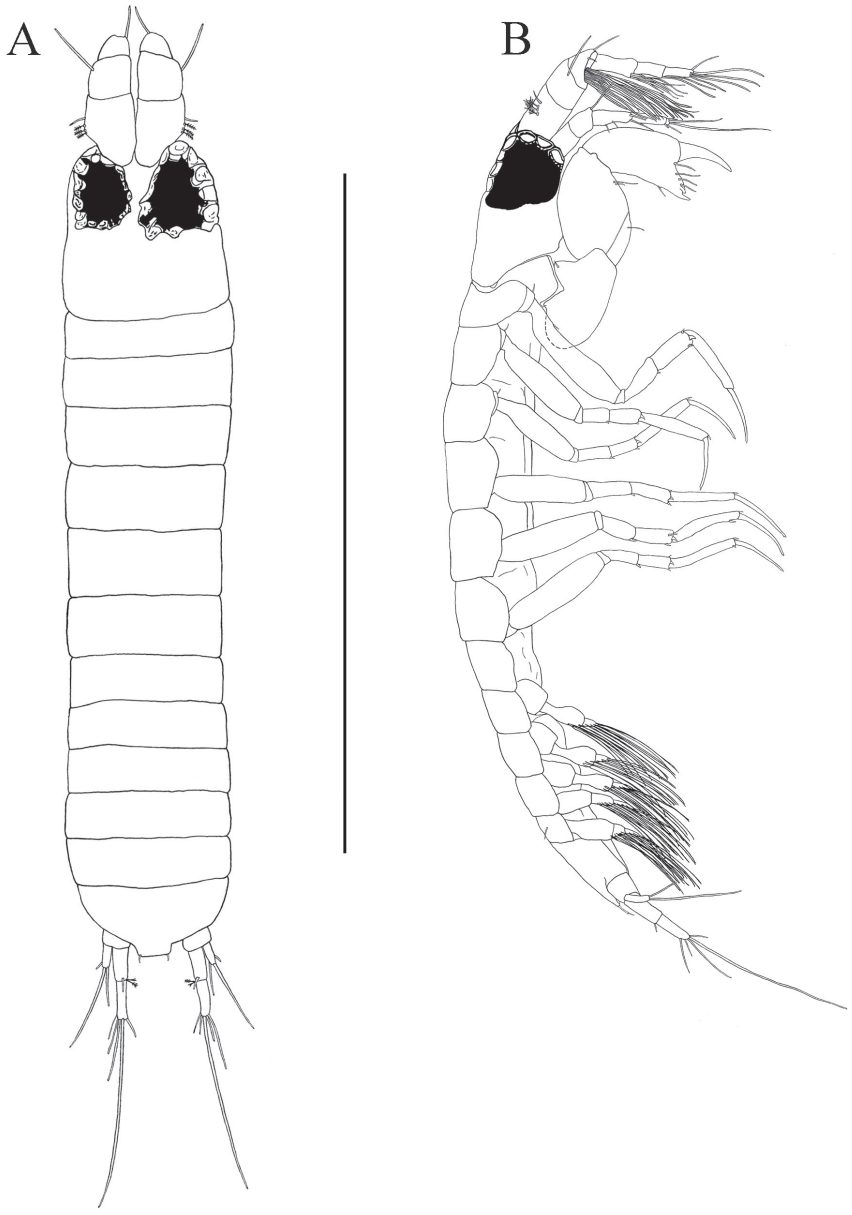


**Figure 7.** *Paratanais rosadi* sp. n., paratype male: **A** dorsal view **B** lateral view. Scale bar **A**–**B** 1.0 mm.

*Pereon* (Fig. 7A). Slightly over 40% TL, pereonites sub-rectangular, and wider than long; pereonites 1 to 4 progressively longer; pereonite-5 about equal in length to pereonite-4; pereonite-6 shorter.

*Pleon* (Fig. 7A). About 30 % TL, as long as pereonite 2–5 combined; all pleonites subequal.

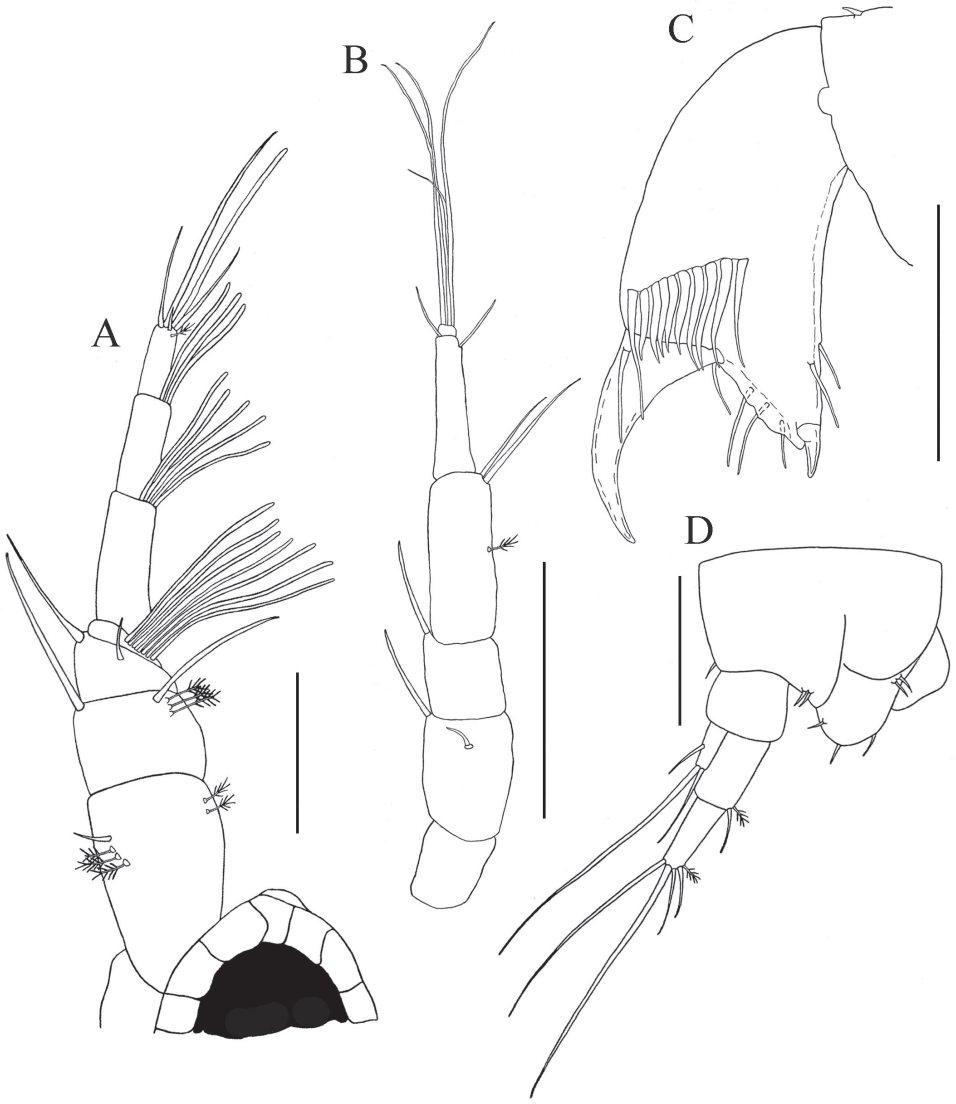


**Figure 8.** *Paratanais rosadi* sp. n., paratype male: **A** antennule, lateral view **B** antenna, lateral view **C** propodus and dactylus of right cheliped, inner view **D** uropod. Scale bar **A**–**D** 0.1 mm.

*Pleotelson* (Fig. 7A). Little less than 10% TL, length about 2.1 times width; subequal length to pleonite-5, with two small apical simple setae on each side;

*Antennule* (Fig. 8A). With seven articles. Article-1 length about 1.3 times width, with four setae (1 simple and 3 broom) close to the middle of dorso-lateral margin, and with two broom setae on ventro-lateral subdistal margin. Article-2 length about 1.5 times width, with long disto-dorsal simple seta, and one simple and three broom on ventro-lateral distal margin. Article-3 with long disto-dorsal simple seta and small

simple lateral seta. Article-4 with dense proximal group of aesthetasc ventrally. Article-5 length about 2.5 times width and with disto-ventral row of aesthetasc. Article-6 length about 2.7 times width, with disto-ventral row of aesthetascs. Article-7 length about 2.8 times width, with one long, one small, one broom setae and one aesthetasc, distally.

*Antenna* (Fig. 8B). Article-1 length about 1.1 times width. Article-2 length about 1.4 times width, with large disto-dorsal simple seta and simple seta on sub-distal lateral margin. Article-3 little wider than long, with large disto-dorsal simple seta. Article-4 length about 2.6 times width, with broom seta on mid-ventral margin and two long simple setae on disto-ventral margin. Article-5 elongate about 5.0 times as long as wide, with dorso-distal simple seta and simple seta on sub-distal ventral margin; article-6 tiny and with four (three long and one short) simple setae.

*Cheliped lateral aspect* (Figs 7B, 8C). Slightly longer than that of the female. Basis length about twice width. Carpus length 1.5 times without short simple setae on dorsal margin. Propodus with length 1.6 times width. *Inner face* (Fig. 8C). Propodus 1.6 times as long as wide; with inner face having "comb row" of ten stout setae just proximal to articulation with dactylus (movable finger); fixed finger with strong spine distally, two simple setae ventrally, three simple setae on outer incisive margin, and single simple seta near articulation of dactylus. Dactylus longer than fixed finger, distally curved and unfused; single dorso-proximal simple seta on inner margin.

*Pereopod-1* (Fig. 9A). Longer than other pereopods. Similar to that of female, except for basis, carpus, and propodus longer. Ischium naked. Propodus with dorsal and ventral margin crenulate. Dactylus and unguis combined shorter than propodus; unguis slightly longer than dactylus.

*Pereopod-2* (Fig. 9B). Similar to pereopod-1, except for merus, carpus, propodus, and dactylus shorter.

*Pereopod-3* (not figured). Similar to pereopod-2

*Pereopod-4* (Fig. 9C). Basis a little wider than in pereopods 2–3, appearing naked, length about 3.2 width. Ischium length about 3.0 times width, with two ventral simple setae. Merus length about 1.9 times width, with two short spiniform setae, disto-ventrally. Carpus length about 2.3 times width, with simple disto-dorsal seta and three spiniform setae. Propodus length 3.3 times width, with one spiniform seta on dorsal and ventral distal margin, with dorsal and ventral margin crenulate. Dactylus and unguis combined shorter than propodus; dactylus much longer than unguis, not fused.

*Pereopod-5* (not figured). Similar to pereopod–4.

*Pereopod-6* (Figs 9D–E). Similar to pereopod-4, except for propodus with three pectinate distal spiniform setae. Dactylus and unguis together longer than propodus, dactylus longer than unguis, tip of unguis bifid (Fig. 9E).

*Pleopod* (not figured). Five similar, but more strongly developed than in female with longer natatory setae. Endopod with inner and distal margins bearing eleven long plumose setae, distal most seta modified with whip-like tip; sub-distal lateral margin with seta modified with whip-like tip. Exopod with inner and distal margins bearing about 12 long plumose setae, outer margin naked.

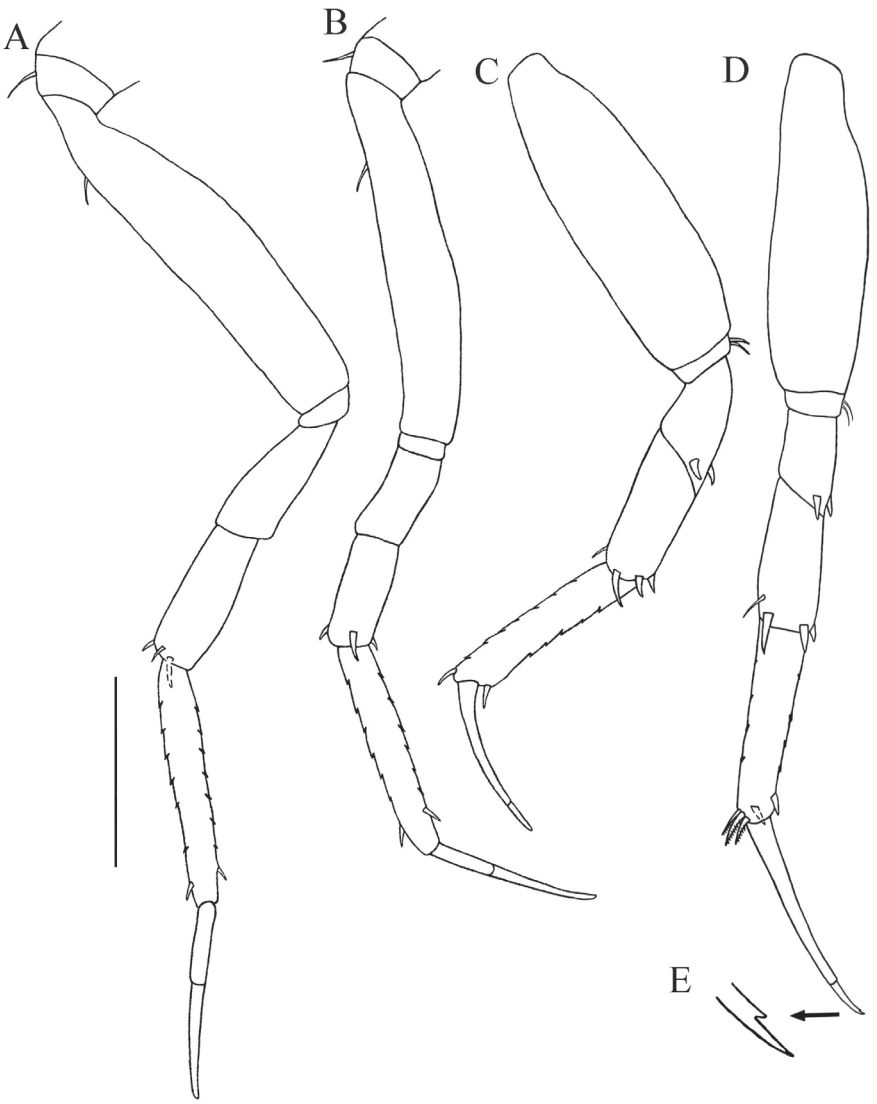


**Figure 9.** *Paratanais rosadi* sp. n., paratype male: **A** pereopod 1 **B** pereopod 2 **C** pereopod 4 **D** pereopod 6 **E** enlargement of tip of the unguis. Scale bar **A**–**D** 0.1 mm.

*Uropod* (Fig. 8D). Similar to female, with minor qualitative differences in setation and all simple setae are longer than female.

**Distribution.** Currently know only from the type locality, at the depths from 15 to 28 m, on sandy substrata.

**Remarks.** *Paratanais rosadi* sp. n., can be distinguished from the other previously described species by having carpus with only three distinct, modified, stout seta on pereopods 4–6; all others species have four distinct carpal spines. The female

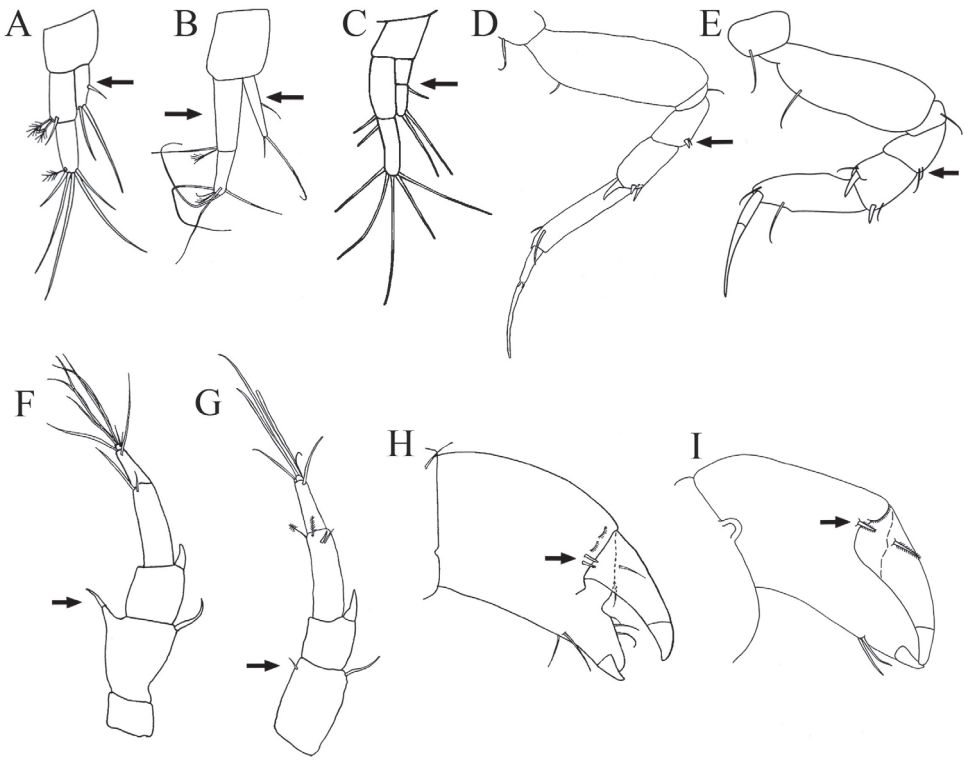


**Figure 10.** Uropods: **A** *Paratanais rosadi* sp. n. **B** *P. euelpis* **C** *P. hessleri*. Pereopod-2: **D** *P. rosadi* sp. n. **E** *P. coelhoi*. Antenna: **F** *P. martinsi* **G** *P. rosadi* sp. n. Chela: **H** *P. euelpis* **I** *P. rosadi* sp. n. [Figures modified from: this study (**A**, **D**, **G**, and **I**); Lang 1973 (**B** and **H**); Kudinova-Pasternak 1985 (**C**); Araújo-Silva & Larsen 2012 (**E**); Bamber & Costa 2009 (**F**)].

of *P. rosadi,* appears most similar to the northeastern Atlantic species, *P. martinsi* from the Azores and *P. euelpis* from South African; *Paratanais rosadi* can be distinguished from *P. martinsi* by (1) lacking a distinctly buttressed seta on antenna article-2; (2) having antennal article-2 with small simple seta on subdistal-ventral margin, not arising from apophysis or process; and (3) having uropodal endopod article-1 about same length as article-2. Owing to difficult in reliably distinguishing them, *P. martinsi* and *P. pseudomartinsi* are not separated in the Key to the Atlantic presented herein.

Based on Lang's detailed redescription of *P. euelpis*, *P. rosadi* differs from that species by the presence of a single small, short, setulate seta on the inner face of chela at the articulation with the dactylus, by having the endopodal articles about the same length; and by the stout exopod about twice as long as wide and being shorter than endopodal article-1.

The new Puerto Rican species differs from the Brazilian species, *P. coelhoi* by having (1) antennule article-1 being more elongate; (2) article-2 of the maxillipedal palp

having inner margin with finely serrulate geniculate seta medially and two simple setae; and (3) merus of pereopod-2 with distinct spiniform seta on ventral margin.

Bamber and Costa (2009) considered *P. hessleri* from the mid-North Atlantic as a species *incertae sedis.* Based on the Kudinova-Pasternak's (1985) illustrations, the presence of a biarticulate exopod distinguishes that deep-water species from *P. rosadi* and so from the other Atlantic species of *Paratanais.* Although the description by Kudinova-Pasternak does not give details for the setation on pleonites 1 to 4, her illustration indicates the presence of only a simple seta on their pleura. Since all other known members of the genus *Paratanais*, with the possible exception of *P. oculatus sensu* Shiino (1978), have swollen setulate setae present, her illustration is most likely incorrect. Notwithstanding, re-examination of Kudinova-Pasternak's holotype and Shiino's specimens is needed to clarify their status.

Vanhoffen's (1914) original description for *P. oculatus* is brief and incomplete and his few illustrations lack detail. For the present we tentatively refer both *P. hessleri* and *P. oculatus* to the *Paratanais*. Based on Shiino's (1978) description of *P. oculatus* from Sub- Antarctic waters, the female of *P. rosadi* can be distinguished from it by having (1) article-2 of the maxillipedal palp with finely serrulate and geniculate stiff seta and two simple setae (instead of four apparently simple setae) medially and (2) uropodal exopod composed of single article.

In our opinion, no meaningful comparisons can be made using the descriptions provided for *P. oculatus sensu* Silva-Brum (1973) from Brazil and *P.* (=*Leptochelia*) *elongatus sensu* Makkaveeva (1968) from Cuba. Until the original material for these records can be re-examined or additional material from the localities in question made available for study, their occurrence in the Atlantic Ocean will remain highly suspect.

**Key to the currently recognized species of *Paratanais* known or reported from the Atlantic**

1 Uropod exopod uniarticulate (Figs 10A– B) ..... **2**

– Uropod exopod appearing biarticulate (Fig.10C) ..... ***P. hessleri*** **Kudinova-Pasternak, 1985 [Northeast Atlantic: Great Meteor Seamount]**

2 Pereopod-2 merus having spiniform seta on posterodistal margin (Fig. 10D) ... **3**

– Pereopod-2 merus lacking spiniform seta on posterodistal margin (Fig. 10E) ... ..... ***P. coelhoi*** **Araújo-Silva & Larsen, 2012 [Southwest Atlantic: Brazil]**

3 Antennal article-2 with simple spiniform seta on distoventral margin arising from apophysis (Fig. 10F) ..... ***P. martinsi*** **Bamber & Costa, 2009 /** ***P. pseudomartinsi*** **Larsen, 2012 [Northeast Atlantic: Azores]**

– Antennal article-2 with small simple, unbuttressed seta on subdistal-ventral margin, not arising from apophysis (Fig. 10 G) ..... **4**

4 Inner face of chela adjacent to articulation with dactylus with two short setulate setae (Fig. 10H). Uropodal endopod with article-2 about 2/3 length of article-1 (Fig. 10B) ..... ***P. euelpis* Barnard, 1920 *sensu* Lang (1973) [Southeast Atlantic: South Africa]**

– Inner face of chela adjacent to articulation with dactylus with single, short setulate seta (Fig. 10I). Uropodal endopod with articles about equal in length (Fig. 10A) ..... ***P. rosadi* sp. n. [Southwest Atlantic: Puerto Rico]**

Males are known only for 11 species of *Paratanais* (see Table 1). The male of *P. rosadi* appears to be most similar to that of *P. clarkae* Bird & Bamber, 2000 by having (1) large eyes occupying almost half the length of carapace and (2) antennule with seven articles. The male of *P. rosadi* differs from *P. clarkae* by having (1) a cheliped

**Table 1.** Alphabetical listing of the 23 currently recognized species for the genus *Paratanais* Dana, 1852, including information on distribution and depth range based on studies by Bird and Bamber (2000, 2013), Araújo-Silva and Larsen (2012), Anderson (2013), and a present study.

| Species | Geographical area | Depth range (m) |
|---|---|---|
| *caterae* Bird & Bamber, 2013* | New Zealand | Intertidal |
| *clarkae* Bird & Bamber, 2000* | Indo-Pacific (South China Sea) | 3.5–16 |
| *coelhoi* Araújo-Silva & Larsen, 2012 | Southwest Atlantic (Brazil) | 40 |
| *elongatus* (Dana, 1849) [**type species**]** | Indo-Pacific (Philippines), | 60 |
| *euelpis* Barnard, 1920* | South Atlantic (South Africa) | littoral–231 |
| *gaspodei* Bamber, 2005 | W. Australia (Esperance) | 39-40 |
| *hamulus* Bird & Bamber, 2013* | New Zealand | 55–141 |
| *hessleri* Kudinova-Pasternak, 1985 | NE Atlantic (Great Meteor Seamount) | 325–470 |
| *impressus* Kussakin & Tzareva, 1972* | North Pacific (Kurile Island) | 3–50 |
| *incomptus* Bird & Bamber, 2013 | New Zealand | 128–437 |
| *maleficus* Larsen, 2001* | Australia (Botany Bay) | 4–4.5 |
| *martinsi* Bamber & Costa, 2009 | NE Atlantic (Azores) | 37.8–312 |
| *monodi* Makkaveeva, 1971 | Red Sea | 21–80 |
| *oculatus* (Vanhöffen, 1914) | South Atlantic (Magellanic); Indian Ocean (Kerguelen Island); and (?) Brazil | littoral–903 |
| *paraoa* Bird, 2011* | New Zealand | shore–15.5 |
| *perturbatius* Larsen, 2001 | Australia (Botany Bay) | 4–4.5 |
| *pseudomartinsi* Larsen, 2012 | NE Atlantic (Azores) | 312 |
| *puia* Bird & Bamber, 2013* | New Zealand | 25 |
| *rosadi* sp. n. | NW Atlantic (Puerto Rico) | 14.9–28 |
| *tanyherpes* Błażewicz-Paszkowycz & Bamber, 2012 | Australia (Bass Strait) | 0–81 |
| *tara* Bird, 2011* | New Zealand | shore–12 |
| *vetinari* Bamber, 2005* | Western Australia (Esperance) | 20–30 |
| *wanga* Bamber, 2008* | Australia (Queensland) | 4–29 |

* Indicates male known.

** See Bamber 1998

inner face having a "comb row" of ten small stout setae instead of 12; and (2) a cheliped dactylus without setae on the inner edge. The basis on the male antennule of *P. rosadi* it is very similar to that of *P. puia*, which also has an antennule with seven articles, but differs by (1) the proportions of the carapace; (2) the length of bases of the pereopods; and (3) having a shorter uropodal exopod.

Based on the questionable taxonomic status for five nominal species (i.e. *Paratanais atlanticus* Dollfus, 1897; *Paratanais limicola* Harger, 1878; *Paratanais rigidus* Bate & Westwood, 1868; *Paratanais linearis* Haswell, 1885; and *Paratanais tenuis* Thomson, 1880), we follow Sieg (1983) in considering them as species *incertae sedis*. Due to their inadequate descriptions and dubious taxonomic status, these five species are excluded from Table 1, which presents distribution and depth ranges for the 23 species of *Paratanais* sensu Bird and Bamber (2013) recognized or tentatively recognized herein.

## Acknowledgments

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# The genus *Micatagla* Argaman, 1994 in Egypt, with three new species and a new record (Hymenoptera, Bradynobaenidae, Apterogyninae)

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## Abstract

The genus *Micatagla* Argaman (Bradynobaenidae: Apterogyninae) is reviewed from Egypt, based on specimens collected from Wadi Allaqi (Aswan, Southern Egypt) and Kom Osheim (Fayoum) and those deposited in Egyptian insect collections as well as recorded data from the literature. A single species, *Micatagla klugi* (André), was previously recorded from Egypt. *Micatagla allaqiensis* **sp. n.**, *Micatagla ezzati* **sp. n.** and *Micatagla pseudorainerii* **sp. n.** are described here. *Micatagla antropovi* Pagliano is also newly recorded from the Egyptian fauna. An illustrated key and a faunistic list comprising all *Micatagla* species recorded from Egypt are given.

## Keywords

Apterogyninae, *Micatagla*, new species, new record, faunistic list

## Introduction

The genus *Micatagla* Argaman, 1994 is a relatively large genus in the subfamily Apterogyninae, with 47 recorded species (Pagliano 2002). It was first erected by Argaman (1994) with only a single species (female), *M. schulzei* (André, 1909) from Namibia.

Members of the genus are widely distributed in Africa; only two species were recorded from Asia (Pagliano 2002). Their biology is still unknown.

Members of the genus *Micatagla* are characterized by their small to medium size, 4–18 mm long; third metasomal tergite (T3) of female without basal tegumental yellow spot; eyes (female) small, distant from occipital carina at least by their own diameter; hind trochanter (male) with ventral lamella; forewing (male) with closed brachial cell (except open in *M. noorti*). Both sexes are normally quite colourful as they consist of red mixed with ferruginous to black, only few species have individuals all black.

In Egypt, the genus *Micatagla* is represented by a single species, *M. klugi* (André, 1899) (Pagliano 2002). In the present study, three new species: *M. allaqiensis, M. ezzati* and *M. pseudorainerii* are described and illustrated, and a new record, *M. antropovi* Pagliano, 2002, is also added to the Egyptian fauna thus increasing the total number to five species. An illustrated key for identifying all the Egyptian species is also given.

## Material and methods

The present study is based on specimens collected from Wadi Allaqi (Aswan, Southern Egypt) and Kom Osheim (Fayoum) and those deposited in the Egyptian insect collections as well as previous records from Egypt. Sampling was done by means of pitfall traps. Morphological terms are based on Pagliano (2002). Body-sculpture terminology is based on Harris (1979). Photos were taken by Canon camera (G12), attached to Optech trinocular zoom stereomicroscope (LFZT). The distribution of *Micatagla* species in the different Egyptian localities is plotted (Fig. 31) using DIVA-GIS (Ver.7.1.7). The type specimens of the new species are deposited in the Efflatoun Bey collection, Entomology Department, Faculty of Science, Cairo University, Giza (Egypt) (CUE).

**Collection sites.** Aswan: 24°05'26"N, 32°54'00"E; Bir Um Reiga: 29°32'28"N, 32°21'45"E; Kafr Hakim: 30°04'54"N, 31°07'00"E; Kom Osheim: 29°33'46"N, 30°54'36"E; Massara: 30°04'15"N, 31°14'43"E; Mokattam: 30°01'00"N, 31°17'16"E; Wadi Allaqi: 22°50'20"N, 33°11'54"E; Wadi Assiouti: 27°12'30"N, 31°18'50"E; Wadi Digla: 29°57'30"N, 31°20'06"E; Wadi el-Tih: 29°09'00"N, 33°32'00"E; Wadi Garawi: 29°48'02"N, 31°27'39"E.Wadi Hoff: 29°53'22"N, 31°20'25"E.

**Collection repositories** (abbreviations based on Evenhuis 2012). BMNH = The Natural History Museum, London, United Kingdom; CUE = Efflatoun Bey collection, Entomology Department, Faculty of Science, Cairo University, Giza, Egypt; ESEC = Egyptian Entomological Society collection, Cairo, Egypt; MNHN= Muséum National d'Histoire Naturelle, Paris, France; MSNG = Museo Civico di Storia Naturale 'G. Doria', Genoa, Italy; PPDD = Ministry of Agriculture collection, Giza, Egypt.

**Abbreviations.** F1, F2, F3, etc. = first, second, third, etc., antennal flagellomeres; S1, S2, S3, etc. = first, second, third, etc., metasomal sternites; T1, T2, T3, etc. = first, second, third, etc., metasomal tergites.

## Results and discussion

### Key to the females of the Egyptian species of the genus *Micatagla* Argaman

1 Both first and second metasomal segments red (Figs 7, 13, 19) ..... **2**
– First metasomal segment red, the second black (Figs 1, 25) ..... **4**
2 Mesosomal dorsum, T2 & T3 closely regularly longitudinally striate (Figs 9, 11) .. ..... ***klugi* (André)**
- Mesosomal dorsum punctate, T2 foveolate, T3 closely longitudinally striate .. **3**
3. Body length 5.5 mm; malar space slightly longer than longitudinal eye diameter; mid and hind coxae entirely red; T1 superficially punctate, T2 with ellipsoid foveae separated by longitudinal ridges (Fig. 17), T3 finely and closely striate longitudinally; T6 reddish, with darker interrupted carinae (Fig. 18) ... ..... ***pseudorainerii* sp. n.**
– Body length 8 mm; malar space slightly shorter than longitudinal eye diameter; mid and hind coxae red, with yellow apices; T1 deeply foveate, T2 and T3 with ellipsoid foveae separated by longitudinal ridges (Fig. 23); T6 dark brown with black interrupted carinae (Fig. 24) ..... ***allaqiensis* sp. n.**
4 Body length 8 mm; red of the body dark; mandible bidentate sub-apically; T2 and T3 black with interrupted ridges forming deep widely spaced ellipsoid punctures (Fig. 5); T6 black, bordered with well developed sharp teeth (Fig. 6); S2 and S3 deeply punctate-reticulate..... ***antropovi* Pagliano**
– Body length 6 mm; red of the body light; mandible edentate; T2 and T3 blackish red (Fig. 29); T2 with ellipsoid punctures and longitudinal shiny ridges in between (Fig. 29); T3 with fine longitudinal regular ridges (Fig. 29); T6 brownish red, bordered with less developed blunt teeth (Fig. 30); S2 and S3 with widely spaced punctures..... ***ezzati* sp. n.**

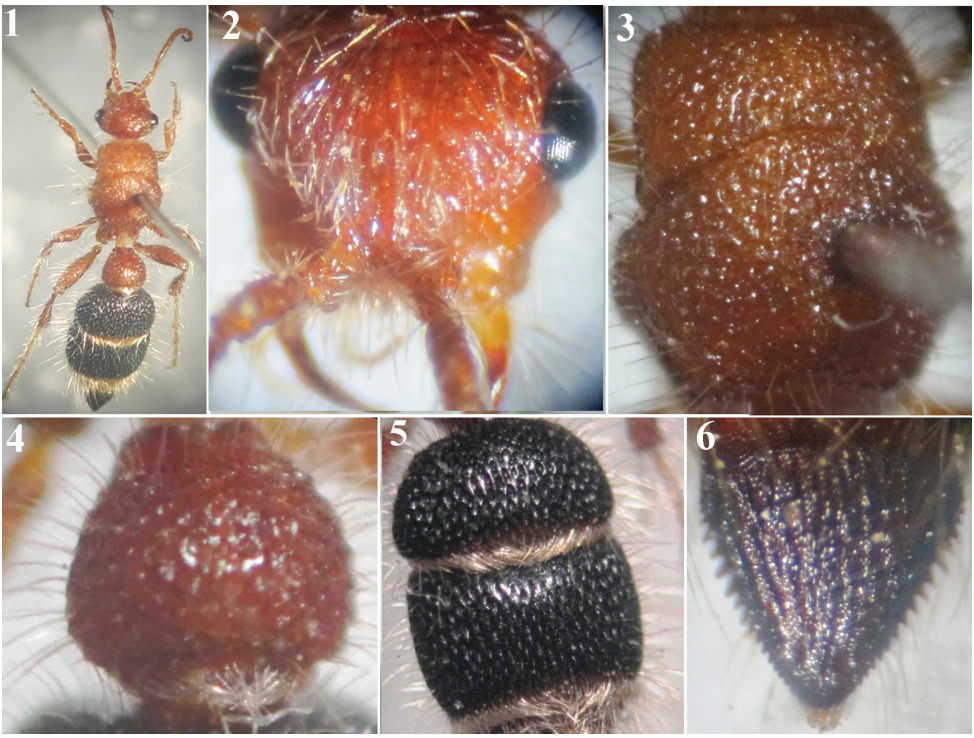
### Egyptian species of the genus *Micatagla* Argaman

***Micatagla antropovi* Pagliano, 2002**
http://species-id.net/wiki/Micatagla_antropovi
Figs1–6

*Micatagla antropovi* Pagliano, 2002: 222, holotype ♀: Abu Arish (Saudi Arabia) (BMNH).

**Material examined.** Egypt, 1 ♀, Kom Osheim (Fayoum), 30.v.2013 (leg. Ahmad M. Soliman) [CUE].

**Distribution.** Saudi Arabia, Yemen (Pagliano 2002); Egypt (new record).




**Figures 1–6.** *Micatagla antropovi* Pagliano, female: **1** Habitus, dorsal view **2** Head, frontal view **3** Mesosoma, dorsal view **4** T1 **5** T2 & T3 **6** T6.

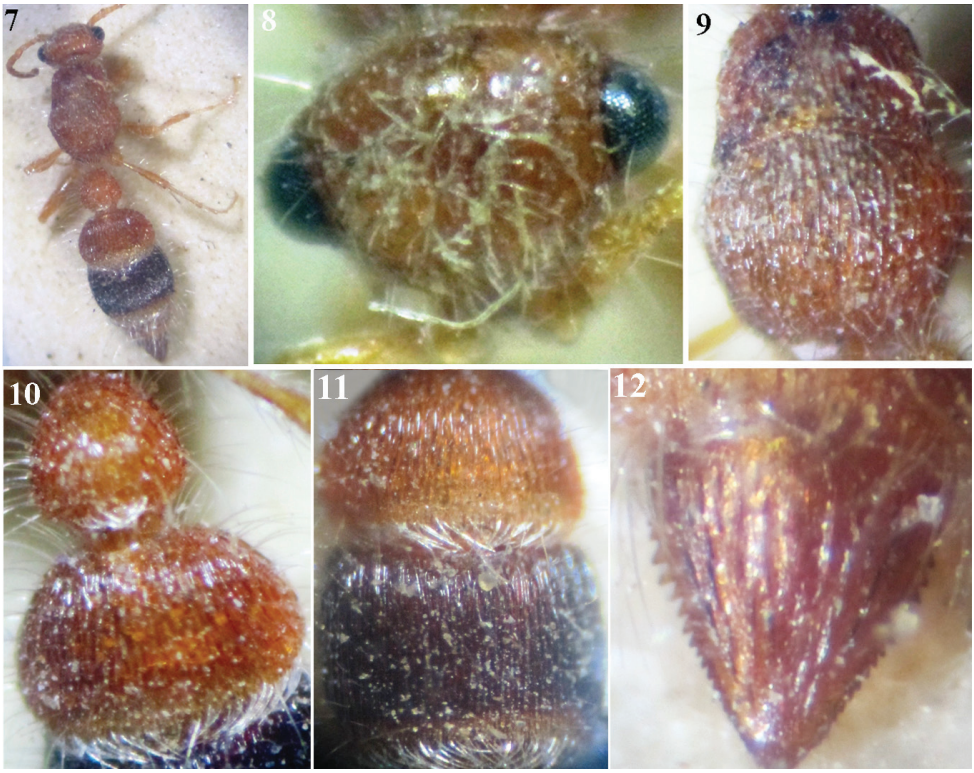
***Micatagla klugi* (André, 1899)**
http://species-id.net/wiki/Micatagla_klugi
Figs 7–12

*Apterogyna klugi* André, 1899: 69, holotype ♀: Aswan (Egypt), (probably in MNHN).
*Apterogyna klugi*: André 1910: 16, ♀; Bischoff 1920: 48, ♀; Invrea 1951: 167, ♀; Invrea 1963: 14, ♀; Invrea 1965: 55, ♀ (? ♀ of *mocsaryi*).
*Apterogyna gridellii* Invrea, 1959: 117, holotype ♀: Egypt; synonymized with *Micatagla klugi* by Pagliano 2002: 269.
*Utapitoca klugi*: Argaman 1994: 48, ♀ & ♂ (♂ not described)

**Material examined.** Egypt, 8 ♀, Wadi Assiouti (Assiout), 1–2.iv.1917 (leg. André) [PPDD]; 1♀, Cairo, with no date (leg. Adair) [PPDD]; 1♀, Mokattam (Cairo), April (leg. Innes Bey) [ESEC]; 1♀, without locality or date (leg. Ferrant) [ESEC].

**Previous records from Egypt.** Wadi Hoff (Helwan), Bir Um Reiga (Red Sea), Massara (Cairo), Wadi Digla (Cairo), Wadi Garawi (Helwan), Wadi el-Tih (Sinai) (Pagliano 2002).

**Distribution.** Egypt; Saudi Arabia (Pagliano 2002).




**Figures 7–12.** *M. klugi* (André), female: **7** Habitus, dorsal view **8** Head, frontal view **9** Mesosoma, dorsal view **10** T1 & T2 **11** T2 & T3 **12** T6.

***Micatagla pseudorainerii* Gadallah & Soliman, sp. n.**
http://zoobank.org/EACEA2EE-E24B-49DB-8F48-64465128B1D5
http://species-id.net/wiki/Micatagla_pseudorainerii
Figs 13–18

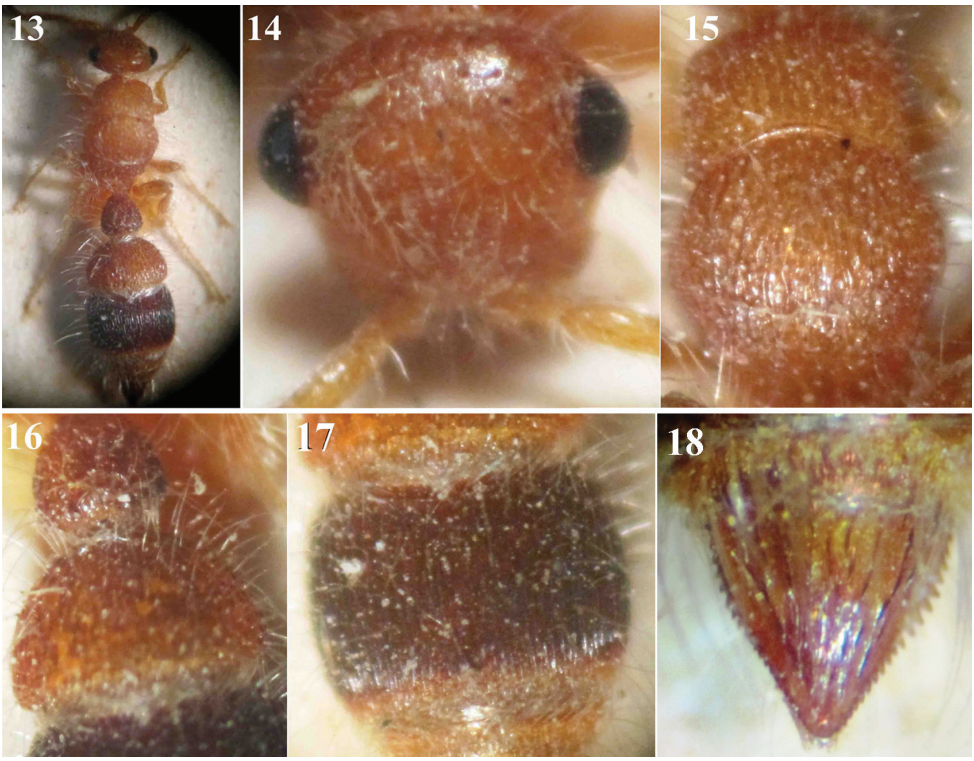
**Material examined.** Holotype ♀: Egypt, Wadi Assiouti, Assiout [27°12'30"N, 31°18'50"E], 13.iv.1934 (leg. ?) [CUE].

**Description. Female (Holotype).** Body length 5.5 mm.

**Colour**. Red, except T3 dark ferruginous to black with red posterior margin, T1 slightly darker than the rest of tergites, S1 and S3 dark ferruginous, S2 slightly dark red, T6 with dark red interrupted longitudinal ridges.

**Pubescence**. Body and legs densely clothed with fine whitish hairs; head with some hairs, along face, that are erect and longer around eyes; mesosomal tergites with few hairs along their dorsal surfaces, posterior margin of all tergites with fringes of dense, inwardly directed silvery hairs that are crossing centrally.

**Head** (Fig. 14). In dorsal view, slightly wider than pronotum, with some scattered superficial punctures, far apart by about 2–4 times their diameter; vertex slightly semi-




**Figures 13–18.** *M. pseudorainerii* Gadallah & Soliman, sp. n., holotype female: **13** Habitus, dorsal view **14** Head, frontal view **15** Mesosoma, dorsal view **16** T1 & T2 **17** T3 **18** T6.

circular to flattened; eye small, prominent, located above midline between clypeus and vertex when seen from frontal view; distance between antennal tubercles slightly longer than tubercle length; malar space relatively long, slightly longer than longitudinal eye diameter. Scape of antenna 2.5× as long as F1, gently convex from above, flagellomeres polished, F1 about as long as F2.

**Mesosoma** (Fig. 15). Pronotum quadrate, about as long as maximum width, with gently declivous anterior face, rounded humeral angle and slightly concave to straight posterior margin; densely foveate-reticulate dorsally; remainder of mesosomal dorsum superficially punctuate, punctures are somewhat spaced by a distance equal to their own diameter. Propodeal posterior face gently declivous, smooth and impunctate. Propleuron faintly punctured, with some incomplete longitudinal separated ridges posteriorly; mesopleuron foveate-reticulate; metapleuron smooth. Hind tibial spurs about equal in length.

**Metasoma**. T1 widened posteriorly (pear-shaped), as long as its maximal width (Fig. 16), with some dispersed punctures hidden behind hairs; T2 with ellipsoid foveae separated by longitudinal ridges (Fig. 17); T3 finely and closely striated longitudinally; T6 (pygidium) subtriangular, with longitudinal interrupted widely spaced carinae, bordered laterally with small sharp teeth that progressively reduce in size and become

blunt distally, apical ones rounded (Figs 24, 25). Metasomal sternites smooth, with some scattered, erect fine hairs in the middle longitudinally.

**Remarks.** *M. pseudorainerii* is nearest to *M. rainerii* Pagliano, 2002 which is found in Namibia, and the two species are distinguished by the following characters:

1 Body length 5.5 mm; metasomal tergites with distinct dense fasciae of silvery bristle-like hairs at posterior margin, inwardly directed and crossed centrally; S2 without sub-lateral blackish spots; mandibles entirely red ..... ***M. pseudorainerii* sp. n.**

– Body length 3.5 mm; metasomal tergites with few silvery hairs at posterior margins; S2 with sub-lateral blackish spots; mandibles brownish at distal half ..... ***M. rainerii* Pagliano**

**Etymology.** The name *pseudorainerii* refers to the similarity of this species to *Micatagla rainerii*.

***Micatagla allaqiensis* Gadallah & Soliman, sp. n.**
http://zoobank.org/A20109F5-2355-42D5-A6B7-7F11F2B00598
http://species-id.net/wiki/Micatagla_allaqiensis
Figs 19–24

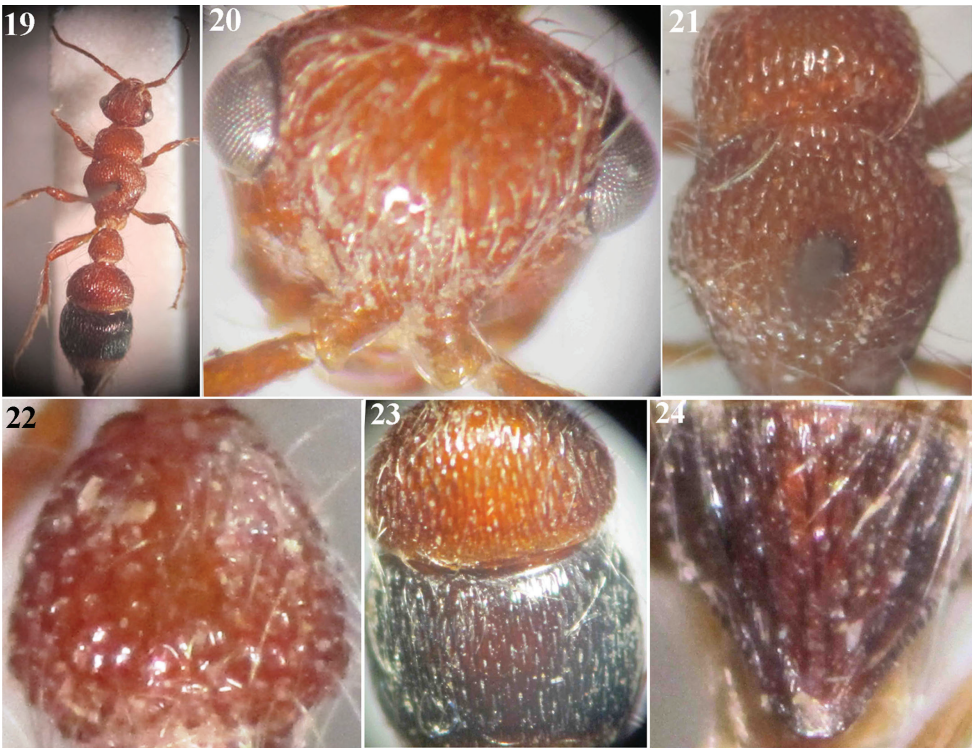
**Material examined.** Holotype ♀: Southern Egypt, Wadi Allaqi, Aswan [22°50'20"N, 33°11'54"E], 20.xii.2012 (leg. Ahmed M. Soliman) [CUE].

**Description. Female (Holotype).** Body length 8 mm.

**Colour**. Medium yellowish brown, except antennal flagellum brown, mandible reddish brown distally; fore tibial spur light red, mid and hind tibial spurs waxy white; mid and hind coxae with yellow apices; T2 with apical yellow band widened medially, T3 black with apical yellowish band, S3 black on basal two-thirds, pygidial area dark brown with black carinae.

**Pubescence**. Body as well as legs rather densely clothed with erect to suberect white hairs (recumbent on face, denser on clypeus and metasomal segments 4–5 than elsewhere). T1–3 with apical fringe of compact inward directed white hairs, that is weak on T1; S2 and S5 with apical fringe of obviously scattered white hairs.

**Head**. (Fig. 20): In dorsal view a little wider than pronotum and abruptly converging behind eyes; vertex gently sloping posteriorly; occiput feebly convex; vertex, face and gena shallowly sparsely punctate, punctures on gena more dispersed; ocular orbit deeply punctate; eye small, subspherical and prominent, located above midline between upper margin of clypeus and vertex; malar space and antennal scrobe polished; distance between antennal tubercles noticeably shorter than tubercle length; clypeus strongly bent downward, polished apically, punctate basally; gena with obsolescent obtuse tubercle behind eye immediately below lower ocular margin; malar space markedly long (slightly shorter than longitudinal eye diameter); mandible slender, sickle-




**Figures 19–24.** *M. allaqiensis* Gadallah & Soliman, sp. n., holotype female: **19** Habitus, dorsal view **20** Head, frontal view **21** Mesosoma, dorsal view **22** T1 **23** T2 & T3 **24** T6.

shaped, edentate; palpi with long and slender segments. Scape of antenna 2.35× as long as F1, gently and evenly convex from above; flagellomeres polished, F1 scarcely longer than F2, F2 as long as F3, F2–7 flattened beneath.

**Mesosoma** (Fig. 21). Pronotum 0.4× as long as its maximal width, with anterior face abruptly declivous, humeral angle gently rounded and posterior margin broadly concave; dorsally deeply foveate-reticulate; horizontally carinate laterally; remainder of mesosomal dorsum foveate-striate. Propodeal posterior face gently declivous and impunctate. Mesopleuron deeply foveate-reticulate; metapleuron faintly horizontally carinate. Mesosternum strongly bidentate in front of hind coxae. Inner hind tibial spur long (0.85× as long as basal tarsomere).

**Metasoma**. T1 (Fig. 22) widened posteriorly (pear-shaped), as long as its maximal width, densely foveate, abruptly declivous along posterior rim; T2 semicircular, 0.6× as long as wide, strongly petiolate anteriorly; T3 narrowed anteriorly forming a constriction with T2; T2 and T3 with ellipsoid foveae separated by longitudinal ridges (Fig. 23), foveae on T3 slimmer than those on T2, ridges on apical fourth of T3 fine and closer to each other than elsewhere; T6 (pygidium) subtriangular, with longitudinal interrupted widely spaced carinae, bordered laterally with small sharp teeth that progressively reduce in size and become blunt distally, apical ones rounded (Fig. 24).

S1 smooth, transversely carinate basally; S2 deeply punctate-reticulate (impunctate on anterior declivity and posteromedially); S3 densely punctate laterally, impunctate medially; S4 and S5 with few scattered punctures; S2–5 with a row of punctures along their apical margins.

**Etymology.** The specific name originates from Wadi Allaqi (Aswan, southern Egypt), the type locality.

***Micatagla ezzati* Gadallah & Soliman, sp. n.**
http://zoobank.org/F10F2B49-17A0-4EBA-B90B-548C19DB6DA3
http://species-id.net/wiki/Micatagla_ezzati
Figs 25–30

**Material examined.** Holotype ♀: Egypt, Kafr Hakim, Giza [30°04'54"N, 31°07'00"E], 8.v.1932 (leg.?)[CUE].

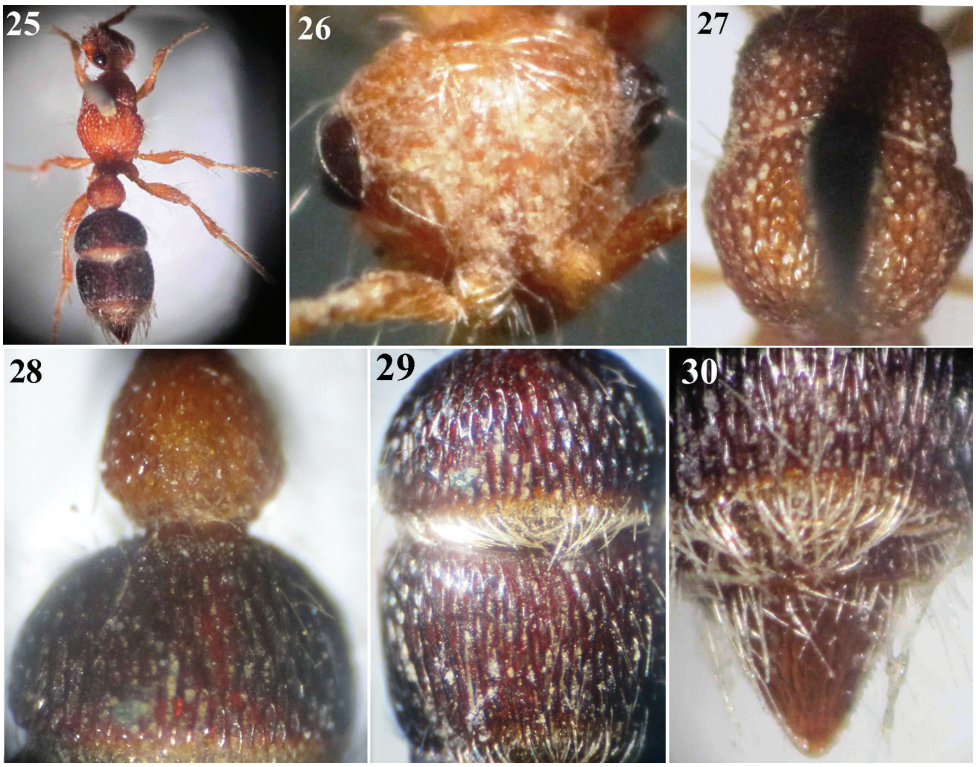
**Description. Female (Holotype).** Body length 6 mm.

**Colour.** Red, except mandible reddish brown distally, maxillary and labial palpi pale; mid and hind tibial spurs waxy white; 2nd & 3rd metasomal segments blackish red (posterior margin of T2 & T3 whitish, slightly widened medially), T4 & T5 pale red, T6 reddish brown.

**Pubescence.** Body including legs clothed with fine erect to recumbent whitish hairs, relatively longer on mesopleuron and distinctly denser on face and vertex of head, T4 and T5 than elsewhere. Posterior margin of T1 with fringe of irregular and inwardly directed whitish hairs; T2 and T3 with apical fascia of silvery inwardly directed hairs that are much denser than that of T1.

**Head** (Fig. 26). In dorsal view slightly wider than pronotum and strongly convergent behind eyes; face and vertex clothed with recumbent whitish hairs masking the sculpturing beneath; vertex gently sloping posteriorly; eye small, subspherical and strongly prominent, located above midline between clypeal free margin and vertex; antennal scrobe polished; distance between antennal tubercles equal to tubercle length; clypeus bent downward, polished apically, with straight free margin, punctate basally; gena very sparsely punctate, with noticeable obtuse tubercle behind eye immediately below lower ocular margin; malar space relatively long, as long as longitudinal eye diameter; mandible slender, edentate; palpi with long and slender segments. Scape of antenna 2.5× as long as F1, gently and evenly convex from above; flagellomeres polished, F1 scarcely longer than F2, F2 as long as F3, F2–7 flattened beneath.

**Mesosoma** (Fig. 27). Pronotum about 0.4× as long as its maximum width, with gently declivous anterior face, rounded humeral angle and broadly concave posterior margin; foveate-reticulate dorsally, faintly striated laterally; remainder of mesosomal dorsum foveate-striate. Propodeal posterior face gently declivous and impunctate. Mesopleuron shallowly foveate-reticulate; metapleuron smooth. Inner hind tibial spur long (0.75× as long as basal tarsomere).




**Figures 25–30.** *M. ezzati* Gadallah & Soliman, sp. n., holotype female: **25** Habitus, dorsal view **26** Head, frontal view **27** Mesosoma, dorsal view **28** T1 & T2 **29** T2 & T3 **30** T6.

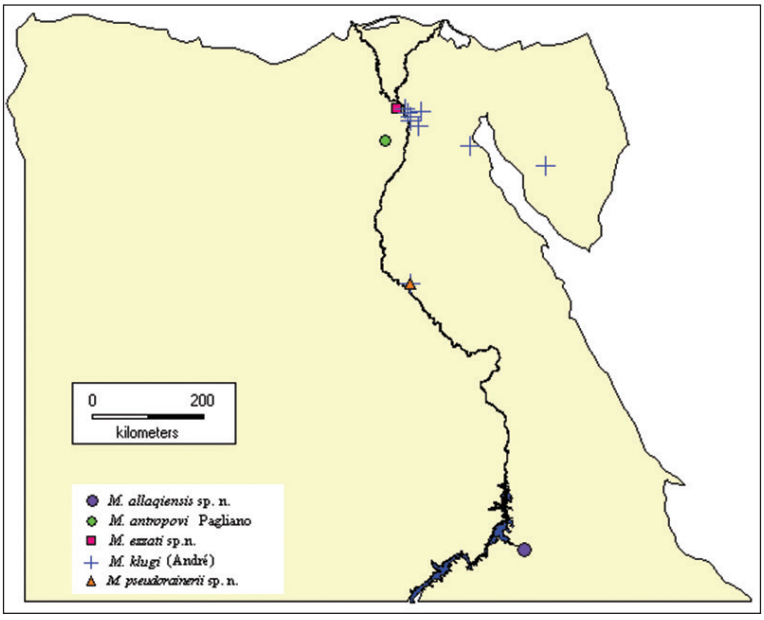



**Figure 31.** Distributional map of *Micatagla* species in Egypt.

**Metasoma.** T1 (Fig. 28) gradually widened posteriorly (pear-shaped), as long as its maximal width, shallowly and coarsely areolate, abruptly declivous posteriorly; T2 semicircular, 0.6× as long as wide, petiolate anteriorly, with ellipsoid punctures separated by longitudinal shiny ridges (Fig. 29); T3 with fine longitudinal regular ridges (Fig. 29); T6 (pygidium) subtriangular, with dark interrupted, widely separated, longitudinal carinae, bordered with small sharp teeth spaced in the middle, becoming smaller, blunter and closer distally (Fig. 30). S1 bare, moderately punctured; S2 and S3 shallowly punctate-subreticulate, punctures dispersed on the disc of both sternites, S3 impunctate subapically; S2–5 punctate along apical margins.

**Etymology.** This species is named in honour of the late Prof. Yahia Ezzat (the professor of the first author).

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