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FIJI ARTHROPODS VII

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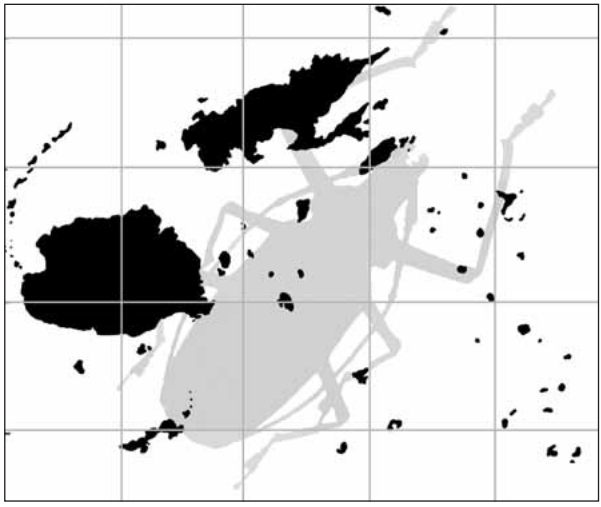

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FIJI ARTHROPODS

Editors' Preface

We are pleased to present the seventh issue of *Fiji Arthropods*, a series offering rapid publication and devoted to studies of terrestrial arthropods of the Fiji Group and nearby Pacific archipelagos. Most papers in this series will be the results of collecting and research on the Fijian fauna deriving from the NSF-funded "Terrestrial Arthropods of Fiji" project. Five co-PIs and 18 specialists (see Fiji Arthropods I, p. 18) form the core team of scientists who have agreed to publish new taxa that result from collecting during this survey. However, as space allows, we welcome papers from any scientist who is currently working on arthropod taxonomy in Fiji.

This issue contains results of discoveries of new species of Platypezidae (Diptera: Sinclair & Chandler), Pompilidae (Hymenoptera: Pitts *et al*.), and Zoraptera (Engel). Additionally, a study of the Godeffroy Sale catalogs that list many Fijian arthropods is given (Evenhuis) and the authorship of *Xithuthrus heros* is clarified (Evenhuis). Manuscripts are currently in press or in preparation on Cerambycidae, Lauxaniidae, Keroplatidae, Mycetophilidae, Mythicomyiidae, Limoniidae, Dolichopodidae, Stratiomyidae, Asilidae, and Sciaridae and will appear in future issues.

The editors thank the Government of Fiji (especially the Ministries of Environment and Forestry), the National Science Foundation (DEB 0425970), and the Schlinger Foundation for their support of this project. Types of new species deriving from this study and voucher specimens will be deposited in the Fiji National Insect Collection, Suva.

All papers in this series are available free of charge as pdf files downloadable from the following url:

http://hbs.bishopmuseum.org/fiji/fiji-arthropods/

We encourage interested authors to contact us before submitting papers.

—Neal L. Evenhuis, Co-editor, neale@bishopmuseum.org
Daniel J. Bickel, Co-editor, danb@austmus.gov.au

Fiji Arthropods VII. Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 91: 3–15 (2007).

The spider wasps of Fiji (Hymenoptera: Pompilidae)[1]

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Abstract. The spider wasps of Fiji (Hymenoptera: Pompilidae) comprise five species: *Anoplius caerulescence* (Dalla Torre), **n. comb**. (= *Dendropompilus vitiensis* Williams, **n. syn**), *Anoplius elatus* (Smith) **n. comb**., *Anoplius vitiensis* (Williams), *Cyphononyx vitiensis* Turner, and *Heterodontonyx guerini* Banks (first record from Fiji).

INTRODUCTION

Of particular interest to studies of biogeography of Fiji are the distributions of strong flying insects, such as spider wasps. Various authors have published on the pompilid fauna of Fiji in the past, but this fauna has never been treated in a coherent fashion. Smith (1865) described many new species of wasps, including several spider wasps, from islands of Sumatra, Gilolo, Salwatty and New Guinea. Later, Smith (1879) described various new species of wasps found in the British Museum from throughout Oceania. His treatment included the spider wasp *Pompilus caerulescens* (as *P. caerulens*), which was collected at sea on the voyage of the "Herald", and, at the time of the publication, it was unknown whether the species was endemic to New Hebrides (= Vanuatu), the Fijian Archipelago, or the Solomon Islands. Williams (1947) surveyed the aculeate wasp fauna of Fiji, but his study was based on a limited number of specimens. He described the new genera *Nesopompilus* and *Dendropompilus* based exclusively on females and these genera are currently known only from Fiji. He also listed *Sphictostethus nitidus* (Fabricius) (as *Chrysocurgus nitidus*) as being present on Fiji and Australia, while Harris (1987) stated that this species is endemic only to New Zealand leaving the true identity of the Fijian wasp in question. The only systematic survey of spider wasps in the region is that of Banks (1941), which covers the Solomon Islands, Prince of Wales Island, and New Caledonia.

The study reviews the Pompilidae or spider wasp fauna of Fiji. Specifically, we determine that *Pompilus caerulescens* and *Sphictostethus nitidus* are present on Fiji and describe the heretofore unknown males, and determine generic affinity for both *Nesopompilus* and *Dendropompilus*. This study should provide a foundation on which future biodiversity studies of surrounding islands can be built. The specimens used in the study are primarily those obtained by the Terrestrial Arthropod Survey of Fiji.

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1. Contribution No. 2007-001 to the NSF-Fiji Arthropod Survey.

MATERIALS AND METHODS

Material was examined from or deposited into the Natural History Museum, London (BMNH); the Bishop Museum, Honolulu, Hawai'i (BPBM); the Department of Biology Insect Collection, Utah State University, Logan, Utah (EMUS), the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZC) and New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand (NZAC). Vouchers deriving from the Fiji Terrestrial Arthropod Survey will be deposited in the Fiji National Insect collection, Suva.

SYSTEMATICS

Anoplius caerulescens (Dalla Torre), **n. comb.**

Pompilus caeruleus Smith, 1879: 151. Female (BMNH Hymenoptera Type no. 19–334). Preoccupied.

Pompilus caerulescens Dalla Torre, 1897: 278. Replacement name for *Pompilus caeruleus* Smith, 1879.

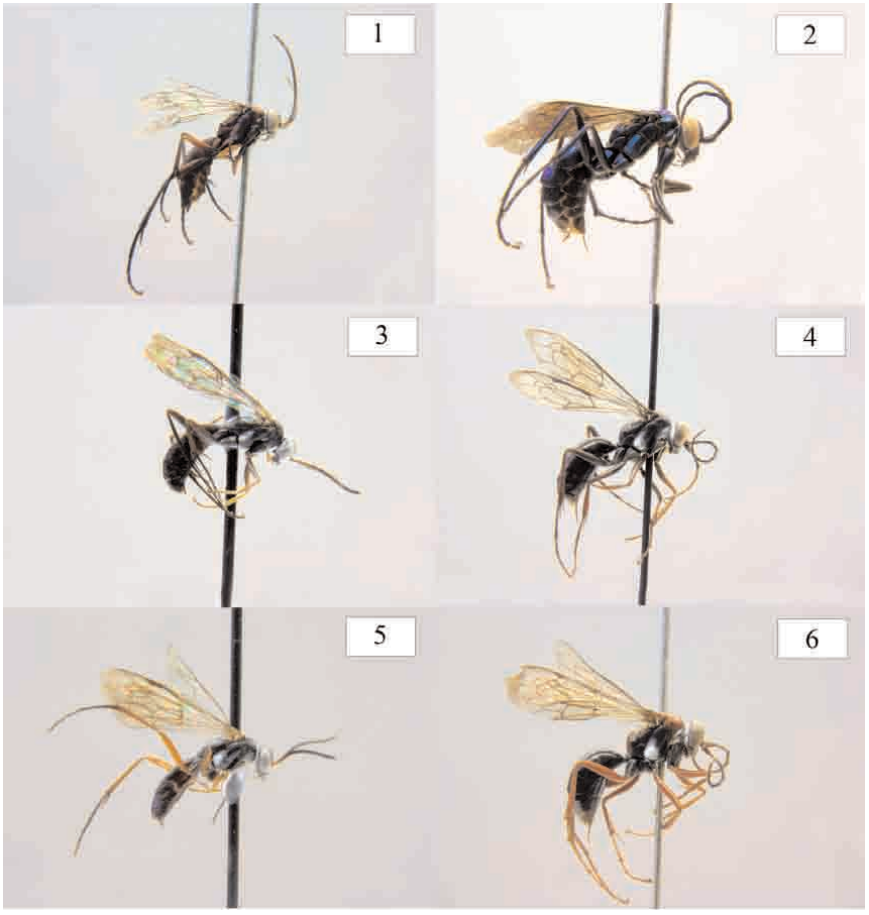
Dendropompilus vitiensis Williams, 1947: 328–329. Female (BPBM). **N. Syn.**

Diagnosis. The male is easily differentiated from other Fijian spider wasps by having ferruginous integument covered with metallic purple setae except for the head (Fig. 1), which has black integument with typically blue metallic setae, and by having a mesopleuron with tubercles projecting laterally over mesocoxa more prominent than in the female. A unique combination of characters is also useful for identifying the female and includes having the claws bifid (Fig. 24), having the apical tarsomere of the hindleg without a median row of spines ventrally, having unique genitalic morphology (Fig. 17), and having an elongate subgenital plate (Fig. 18) with a rounded apex. The female can be diagnosed easily due to the black integument covered with metallic blue setae (Fig. 2) and the mesopleuron tuberculate projecting laterally over mesocoxa. Also, the forewing is infuscated while the hind wing is hyaline (Fig. 11), the claws are dentate, and the apical tarsomere of the hind leg has a median row of spines ventrally. Both males and females have the propodeum tuberculate laterally and the wing venation is unique (Figs. 11 and 12) with the second submarginal cell being acute basally and being 4-sided rather than 5-sided.

Description of male. Length 7.4–10.8 mm. Color of head black, remainder ferruginous usually including clypeus with mesonotum slightly darker (Fig. 2); forewing slightly infuscated; hindwing hyaline (Fig. 12). Pubescence of mesosoma, metasoma, and head dorsal to antennal insertions metallic purple (Fig. 2); tarsi with black setae; dense silvery setae present on head ventral to antennal insertions. Purple setae decumbent, short and scale-like. Integument not obscured by setae.

Clypeus about 2 x as broad as high, its apical margin slightly arcuately concave. Front broad, middle interocular distance about 0.5 x transfacial distance. Inner orbits converging very slighty above. Ocelli close, forming acute triangle; ocellocular distance ~2 x greatest diameter of later ocellus. First four antennal segments in ratio of about 15:7:20:15, flagellomere III from 4–4.5 x as long as its greatest width. Pronotum angulate posteriorly. Propodeum sloping gradually and evenly. Lateral margin of propodeum with large tubercle located midway between anterior and posterior margins. Mesopleuron with ventral tubercle projecting laterally over mesocoxa. Last segment of tarsus slightly produced on inner margin; claws only slightly asymmetrical. Claws deeply bifid; foretarsus with outer claw similar to others while inner claw asymmetrical to others, curved 90° and more deeply bifid (Fig. 24); subapical teeth rounded. Wing venation as in Fig. 12; hindwing with cu-a meeting M+CuA slightly basal to origin of M.

Metasoma subfusiform, first segment slender. S4 without median patch of specialized setae. S6



Figures 1-6. Habitus: *Anoplius caerulescence*, **1**. male and **2**. female; *A. elatus*, **3**. male and **4**. female; *A. vitiensis*, **5**. male and **6**. female.

with deep emargination; emargination tuberculate laterally. Subgenital plate elongate, rounded apically, lacking subapical plumose process, with basal ridge (Fig. 18). Genitalia as in Fig. 17 with basal hooklets present.

Distribution. Australia (Queensland), Indonesia, Papua New Guinea, New Caledonia, Fiji.

Material Examined. FIJI: **Taveuni**: Tavuki Village, Mt. Devo, 892 m, 1♂, 14–31.VII.04 (FBA: 099456), 1♀, 31.VII–14.VIII.2004 (FBA 113977), coll. E.I. Schlinger & M. Tokota'a; 5.5 km SE of Tavuki Village,1188 m, 2♂, 30.VI–14.VIII.04 (FBA 070445, 070447), coll. E.I. Schlinger & M. Tokota'a; 5.3 km SE Tavuki Village, Mt. Devo, 1054 m, 5♂, 10–17.X.02 (FBA 134587–134590), 2♂, 24–31.X.02(FBA 105942, 105944), 1♂, 31.X–14.XI.02 (FBA 089333), 1♀, 30.VI–31.VII.2004 (FBA 148344), 8♂, 2–10.X.2002 (FBA 108469–108476), 1♂, 17–24.X.2002 (FBA 126333), 1♂ 1♀, 31.X–14.XI.2002 (FBA 148997, 148996), 22♂,1♀, 3–20.XII.2002 (FBA 154682–154703, 154681), 5♂,

20–27.XII.2002 (FBA 128590, 128592–128595), 8♂, 27.XII.2002–3.I.2003 (FBA 146955–146962), coll. E.I. Schlinger & M. Tokota'a; 5.3 km SE Tavuki Village, Mt. Devo peak, 1054 m, 4♀, 14. XI–21.XI.02 (FBA 054056–054058, 054060), 5♂, 10–17.X.2002 (FBA 053023–053025, 053027, 053028), coll. E.I. Schlinger & M. Tokota'a; 5.6 km SE Tavuki Village, Mt. Devo peak, 1187 m, 2♀, 14.XI–21.XI.02 (FBA 110560, 134423), 3♂, 14.XI–21.XI.02 (FBA 129791, 134424, 134425), 1♂, 3♀, 20–27.XII.2002 (FBA 144892, 144890, 144891, 144893), 7♂, 30.VI–14.VIII.2004 (FBA 151461–151467), 1♀, 21.XI–13.XII.2002 (FBA 150163), coll. E.I. Schlinger & M. Tokota'a; Mt. Devo Peak, 1♀,10–16.I.03 (FBA 039087), coll. M. Irwin, E.I. Schlinger, & M. Tokota'a; Mt. Devo Peak Radio Tower, 1200 m, 1♂, 10–16.I.03 (FBA 050920), 2♀, 3–20.XII.2002 (FBA 020175, 020176), 1♀, 2–10.X.02 (FBA 021741), coll. M. Irwin, E.I. Schlinger, & M. Tokota'a; Mt. Devo Forest Reserve, 800 m, 16♂, 3♀, 3–10.I.03 (FBA m, 012526,012528–012529,012531–012532, 012534, 012536–012541, 012543–012545, 012547, 012549, 012450, 012553), coll. M. Irwin; E.I. Schlinger; & M. Tokota'a; **Vanua Levu:** Batiqere Range, 6 km NW Kilaka Village, 146 m, 2♂, 2♀, 28.VI–21.VII.04 (FBA 105437, 105438, 105439, 105441), 11♂, 3♀, 3–10.VI.2004 (FBA 115579–115580, 115582–115586, 115588–115589, 115591–115592, 115590, 115593–115594), coll. E. Schlinger, & M. Tokota'a; Batiquere Range, 6 km NW Kilaka, 146 m, 1♂, 13–26.IV.04 (FBA 059495), 1♂, 15–28.VI.04 (FBA 072303), coll. E. Schlinger, & M. Tokota'a; Kilaka, 154 m, 3♂, 1♀, 28.VI–2.VII.04 (FBA 048989, 048991, 048995, 048994), coll. M.E. Irwin, E. Schlinger, & M. Tokota'a; **Viti Levu:** 1 km E Abaca Village, Koroyanitu National Park, 800m. Savuione Trail, 1♀, 19–26.X.02 (FBA 088871), 1♀, 7–12.X.02 (FBA 081025), coll. E. Schlinger & Tokota'a; Navai Villiage, Eteni. 700m, 1♀, 15.V–2.VI.03 (FBA 041724), 1♀, 6.VI–15.VII.03 (FBA 013819), 2♀, 24.X–8.XI.03 (FBA 036759–036760, 037316), coll. M. Irwin, E. Schlinger, & Tokota'a; 3.2 km E Navai Village, Veilaselase Track, 1020m, 1♀, 26.I–13.II.2004 (FBA 122305), coll. E. Schlinger & M. Tokoka'a; Koroyanitu Eco Park, 0.5 km N Abaca Village, 800m, 1♂, 1♀, 12–19.XI.2002 (FBA 110089, 110086), coll. E. Schlinger & Tokota'a; PABITRA Wabu Baseline Survey, 1034m, 10♂, 5♀, 17–20.XI.03 (FBA 065048–065050, 065054–065055, 065057, 065059, 065063, 065065–065066, 053204–053205, 065056, 065060), coll. D. Veikovi (BPBM).

Remarks. Study of this species has revealed that it is best placed in the cosmopolitan genus *Anoplius* Dufour. The females of this species have numerous stout bristle-like setae on the pygidium and a strong pulvillar comb. The males have bifid, asymmetrical fore claws. Both sexes have a short malar space, slender antennal segments (3rd segment at least 3 x longer than thick), a pronotum that is shorter than the mesonotum, the forewing with three submarginal cells, the anal vein of the hind wing meeting the media before (males) or at the origin (females) of the cubitus, and a transverse postnotum. This species should be placed in the subgenus *Anoplius* because the females lack a tarsal comb and the males have bifid claws and a gently sloping propodeum, but lack a plumose process at the base of the subgenital plate. As such, *Dendropompilus* is a junior synonym of *Anoplius*.

Anoplius elatus (Smith), **n. comb.**

Pompilus elatus Smith, 1865:82. Female (BMNH).
Pompilus inquirendus Vachal, 1907: 117. Male and female. [synonym by Turner, 1919]

Diagnosis. The male is easily separated from other Fijian spider wasps because of the

Figures 7-10. Habitus: *Cyphononyx vitiensis*, **7**. male and **8**. female; and *Heterodontonyx guerini*, **9.** male and **10**. female.

completely black integument, except the forelegs and underside of the antennae are yellow, and the femora and tibiae of hindlegs are tinged with yellow (Fig. 3). The female also has completely black integument with silvery setae (Fig. 4) and the mesopleuron tuberculate is only slightly projecting laterally over mesocoxa. Both the males and the females have bifid tarsal claws (e.g., Fig. 25), but the claws are not as deeply bifid as in *Anoplius caerulescens* and the subapical tooth is acute rather than rounded. Both sexes also have the second submarginal cell oblique basally and 5-sided (Fig. 13). The female has a median row of ventral spines on the apical tarsal segment of the hind leg; the male lacks this row of spines. Only the females have the propodeum tuberculate laterally. Male genitalic morphology and subgenital plate are similar to *A. vitiensis* (Fig. 19). The subgenital plate also is similar to *A. caerulescens,* but the apex is emarginated (e.g. Fig. 18).

Distribution. Known only from Fiji. A possible distribution that includes the Solomon Islands and Vanuatu (suggested in the original description) has not been demonstrated.

Material Examined. FIJI: **Taveuni:** Mt. Devo Forest Reserve, 800 m, 2♀, 3–10.I.03 (FBA 012527, 012552), coll. M. Irwin, E.I. Schlinger, & M. Tokota'a; 5.3 km SE Tavuki Village, Mt. Devo Peak, 1054 m, 2♀, 10–17.X.02 (FBA 053026, 053030), 1♀, 14–21.XI.2002 (054059), coll. E.I. Schlinger & M. Tokota'a; Mt. Devo Peak, 1♀, 10–16.I.03 (FBA 03984), coll. M. Irwin, E.I. Schlinger, & M. Tokota'a; Mt. Devo Peak Radio Tower, 1200 m, 1♀, 10–16.I.02 (FBA 050918), coll. M. Irwin, E.I. Schlinger, & M. Tokota'a; Tavuki Village, Mt. Devo, 892 m, 1♂,14–31.VII.2004 (FBA 151849), 2♀, 31.VII–14.VIII.2004 (FBA 113978–113979), coll. E.I. Schlinger & M. Tokota'a; 5.3 km

SE Tavuki Village, Mt. Devo, 1054 m, 1♀, 30.VI–31.VII.2004 (FBA 148343), 3♀, 17–24.X.02, 2♀ (FBA 098687–098689), 1♂, 2♀, 24–31.X.02 (FBA 105940, 105941, 105943), 1♀, 31.X–14.XI.02 (FBA 089334), 1♂, 1♀, 20–27.XII.2002 (FBA 128591, 128596), 1♀, 27.XII.2002–3.I.2003 (FBA 145963), coll. E.I. Schlinger & M. Tokota'a; 5.6 km SE Tavuki Village, Mt. Devo peak, 1187 m, 1♀, 31.X–14.XI.02 (FBA 057331), 2♀, 14–21.XI.02 (FBA 110559, 110561), coll. E.I. Schlinger & M. Tokota'a; **Vanua Levu**: Rokosalase, 105 m, 2♂, 26.III–9.IV.04 (FBA 047266, 047268), coll. M. Irwin, E. Schlinger & M. Tokota'a; Kilaka, 154 m, 3♀, 3–10.VI.04 (FBA 034430, 040335–040336), 4♀, 28.VI–21.VII.04 (FBA 028845, 048993, 048997, 048999), coll. M.E. Irwin, E. Schlinger, & M. Tokota'a; Batiquere Range, 6 km NW Kilaka, 113 m, 2♀, 3–15.VI.04 (FBA 069282–069283), 1♂, 13–26.IV.04 (FBA059496), 3♀,3–10.VI.2004 (FBA 11444–114445, 115587), coll. E. Schlinger, & M. Tokota'a; **Viti Levu:** 1 km E Abaca Village, Kordyanitu National Park, 800 m, Savuione Trail, 1♂, 26.X–5.XI.02 (FBA 082617), coll. E. Schlinger & Tokota'a; PABITRA Wabu Baseline Survey, 1034 m, 1♀, 17–20.XI.03 (FBA 065058), coll. D. Veikovi (BPBM).

Remarks. Study of this species has revealed that it is best placed in *Anoplius* in the subgenus *Anoplius*. The reasoning is the same as mentioned above for *A. caerulescens.* Both this species and the following species have a distinct transverse groove on the second sternite, which is a character normally associated with Pepsinae. We were unable to locate Vachal's type, which is possibly in the Muséum National d'Histoire Naturelle, Paris.

Anoplius vitiensis (Williams), **new combination**

Nesopompilus vitiensis Williams, 1947: 327. Female (BPBM).

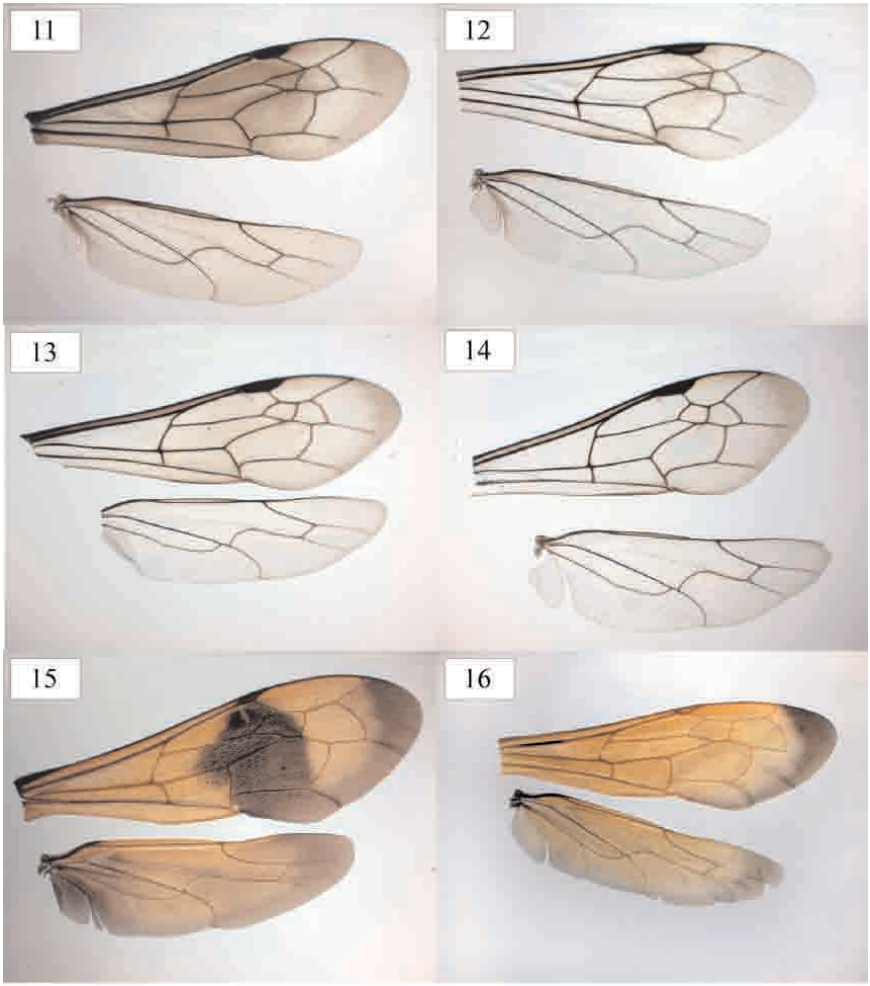
Diagnosis. This species is very similar to *Anoplius elatus*, including wing venation (Fig. 14), and the male subgenital plate and genitalia (Fig. 20), but differs in coloration. The male has black integument except for the pronotum, the anterior half of the mesonotum, sometimes the metapleuron, the antennae ventrally, the forelegs, and the trochanters through the tibiae of the mid and hind legs ferruginous (Fig. 5). The female is similar in coloration to the male (Fig. 6), except that the apical margin of the clypeus is ferruginous.

Description of male. Length 6.0–7.2 mm. Clypeus about 2 x as broad as high, its apical margin rounded. Front broad, middle interocular distance about 0.58 x transfacial distance. Inner orbits converging very slighty above. Ocelli close, forming acute triangle; ocellocular distance ~3 x greatest diameter of later ocellus. First four antennal segments in ratio of about 15:5:13:12, flagellomere III from 2.5–3 x as long as its greatest width. Pronotum angulate posteriorly. Propodeum sloping gradually and evenly. Lateral margin of propodeum without large tubercle located midway between anterior and posterior margins. Mesopleuron without ventral tubercle projecting laterally over mesocoxa. Last segment of tarsus slightly produced on inner margin; claws only slightly asymmetrical. Claws bifid with subapical tooth acute (Fig. 25). Wing venation as in Fig. 14 with second submarginal cell 5-sided; hindwing with cu-a meeting M+CuA distinctly basal to origin of M.

Metasoma subfusiform, first segment slender. S4 without median patch of specialized setae. S6 with deep emargination; emargination tuberculate laterally. Subgenital plate elongate, emarginated apically, lacking subapical plumose process, with basal ridge (e.g., Fig. 18). Genitalia as in Fig. 20 with basal hooklets present.

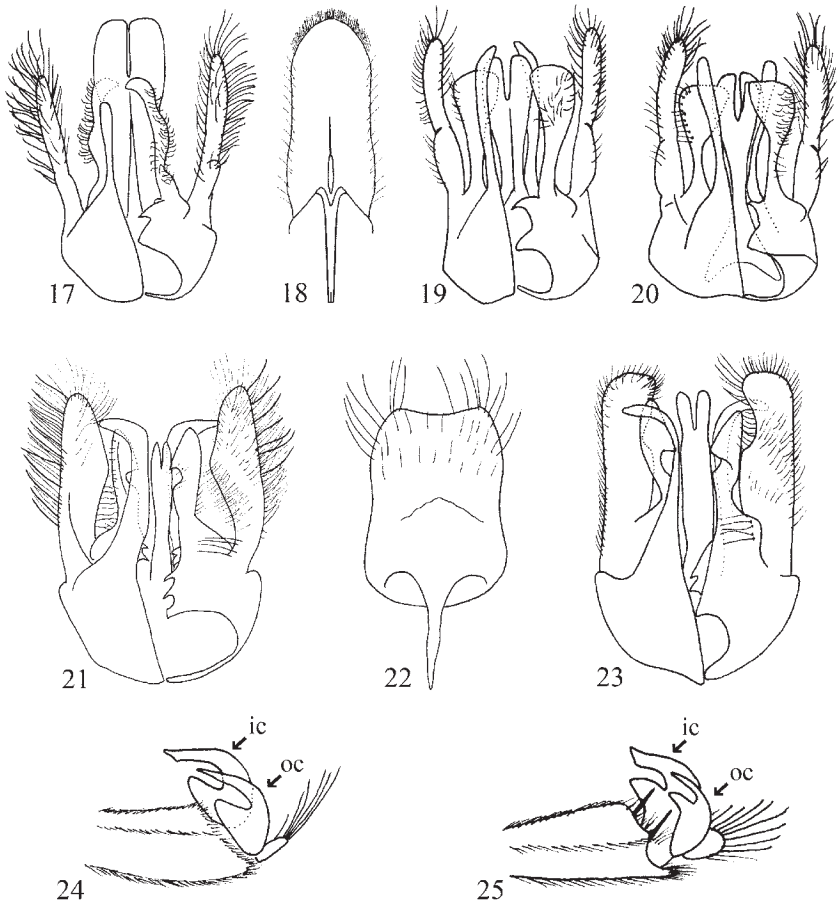
Distribution. Fiji.

Material Examined. FIJI: **Kadavu:** 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary, 60 m, 1♂, 7.III–11.IV.2004 (FBA 112711), coll. E Schlinger & M. Tokota'a; **Taveuni:** Soqulu House in Soqulu Estate, 140 m, 1♂, 4–21.XI.02 (FBA



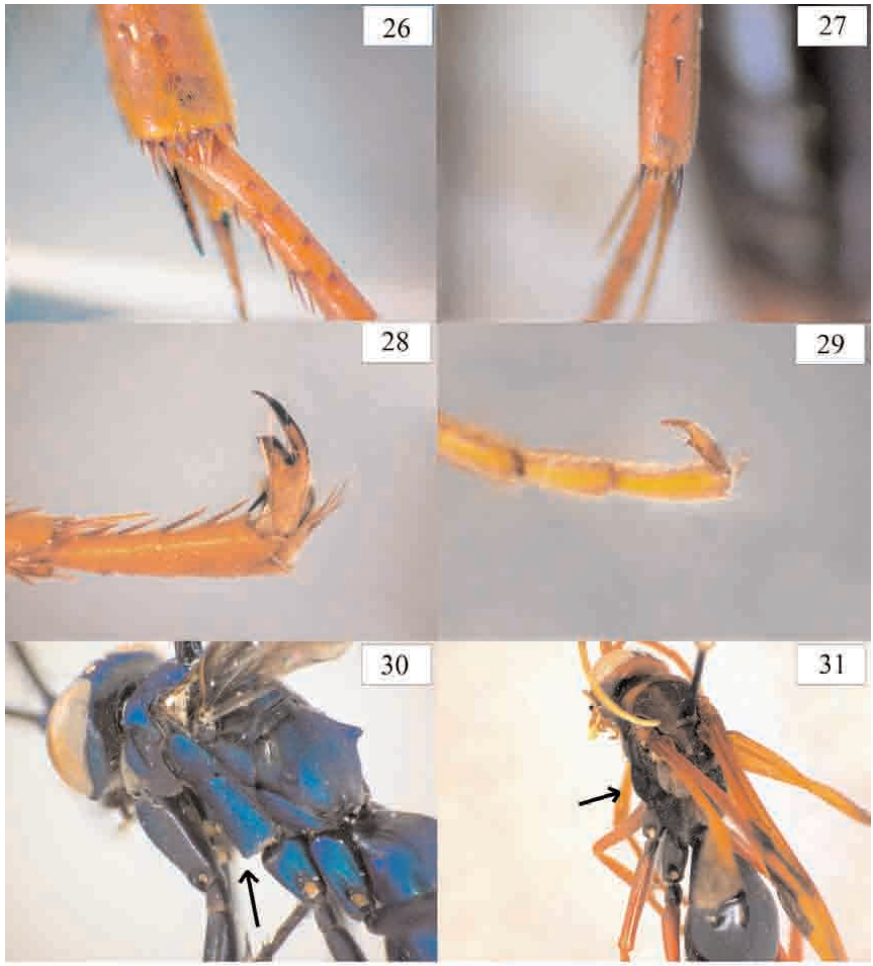
Figures 11-16. Wings. *Anoplius caerulescence*, **11**. female and **12**. male; *A. elatus*, **13**. female; *A. vitiensis*, **14**. female; *Cyphononyx vitiensis*, **15**. male; and *Heterodontonyx guerini*, 16. female.

099895), coll. E Schlinger & M Tokota'a; **Vanua Levu:** Batiquere Range, 6 km NW Kilaka, 146 m, 1♂, 15–28.VI.04 (FBA 072304), 1♂, 13.IV–26.IV.04 (FBA 059494) coll. E Schlinger & M Tokota'a; Batiquere Range, 6 km NW Kilaka Village, 98 m, 5♂, 28.VI–21.VII.2004 (FBA 141563–141567), coll. E Schlinger & M Tokota'a; **Viti Levu:** Koroyanitu, Abaca Village, 1♀, 2.VI.03, coll. D. Yanega; 3.8 km N Veisari. Waivudawa Log Rd., 300 m, 1♀,25.IV–25.V.03 (FBA 055042), coll. E. Schlinger & M. Tokota'a; 2 km SE Nabukavesi Village, Ocean Village Pacific Resort, 40 m, 1♀, 26.IV–5.V.2004 (FBA 118882), coll. E. Schlinger & M. Tokota'a; Sigatoka Sand Dunes National Park, 4 m, 2♀, 24.XI–15.XII.03 (FBA 030048–030049), coll. M, Irwin, E. Schlinger, & M. Tokota'a; 1.8 km E Navai Village, 700 m, old trail to Mt. Tomaniivi, 2♂, 2♀, 7–26.I.2004



Figures 17-25. *Anoplius caerulescence*, **17**. genitalia (dorsal view left and ventral view right) and **18**. subgenital plate; *A. elatus*, **19**. genitalia; *A. vitiensis*, **20**. genitalia; *Cyphononyx vitiensis*, **21**. genitalia and **22**. subgenital plate; *Heterodontonyx guerini*, **23**. genitalia; *A. caerulescence,* **24**. male foreclaw; and *A. vitiensis,* **25**. male foreclaw (in = inner claw; oc = outer claw).

(FBA 120231, 120233, 120232, 120234), coll. E Schlinger & M Tokota'a; 2 km E Navai Village, 700 m, old trail to Mt. Tomaniivi, 1♀, 26.IX–11.X.2003 (FBA 125135), coll. E Schlinger & M Tokota'a; 3.2 km E Navai Village, Veilaselase track, 1020 m, 1♂, 19.IV–14.V.2004 (FBA 155543), coll. E Schlinger & M Tokota'a; Nakobalevu Mt., 340 m, 1♀, 24–29.X.03 (FBA 026377), coll. M. Irwin, E. Schlinger, & M. Tokota'a; Navai Village, Eteni, 700 m, 1♀, 13–18.II.04 (FBA 039657), 19♀, 6.VI–15.VII.03 (FBA 029778–029788, 029790–029792, 029794–029798), 12♀, 24.X–8.XI.03 (FBA 037310, 037317, 037319–037321, 036757, 036761–036765, 036961, 1♀, 9–20.XII.03 (FBA 032392), coll. M, Irwin, E. Schlinger, & M. Tokota'a; Eteni, Navai, 700 m, 7 ♀,



Figures 26-31. 26. Auxiliary spines, *Cyphononyx vitiensis*; **27.** auxiliary spines, *Anoplius caerulenscens*; **28.** bifid claws, *C. vitiensis*; **29.** dentate claws, *Heterodontonyx guerini*; **30.** tuberculate mesopleuron, *A. caerulenscens*; **31.** unmodified mesopleuron, *C. vitiensis*.

5.VI–15.VII.03 (FBA 013810, 013816–013818, 013820, 013822–013823), coll. M, Irwin, E. Schlinger, & M. Tokoka'a; Eteni, Navai, 4 km WSW Colo–1–Suva Village, Mt. Nakobalevu, 372 m, 1♀, 4–14.XI.03 (FBA 096654), 1♀, 25.II–17.III.03 (FBA 103368), 2♂, 17.III–9.IV.03 (FBA 097922–097923), 1♀, 24.IV–12.V.04 (FBA 065490), 2♂, 2♀, 9–30.V.03 (FBA 094340, 094335–094336), coll. E. Schlinger & Tokota'a; Koroyanitu National Park, Abaca Village, 400 m, 3♀, 6–26.V.03 (FBA 022044, 022046, 022046), coll. E. Schlinger, M. Irwin, & M. Tokota'a; 1 km E Abaca Village, Kordyanitu National Park, 800 m Kokabula trail, 5♂, 3♀, 19–26.X.02 (FBA 085222, 085227, 085232–085233, 085237, 085239), 2♂, 7–12.X.02 (FBA 081039, 081043), 2♂, 2♀,

12–19.XI.02 (FBA 086069–086070, 086071–086072), 3♂, 26.XI–3.XII.02 (FBA 076471–076473) coll. E. Schlinger & Tokota'a; Koroyanitu National Park, Savuione Trail, 450 m, 5♀, 21.X–18.XI.03 (FBA 049569–049570, 049576, 049579, 049581) coll. M. Irwin, E. Schlinger, & M. Tokota'a; 1.5 km SW Vaturu Dam, 550 m, 3♂, 1♀, 2–14.VII.2004 (FBA m, 135819–135821, f, 135822), coll. E. Schlinger & M. Tokota'a; Koroyanitu Eco Park, Mt. Evan's Range, 0.5 km N Abaca Village, 800 m, 1♂, 26.X–5.XI.02 (FBA 080329), 3♂, 26.XI–3.XII.02 (FBA 073991–073993), coll. E. Schilinger & Tokota'a; Koroyanitu Park, 1 km E Abaca Village, 800 m, 4♂, 26.X–5.XI.2002 (FBA 133430–133433), 2♀, 22.IV–6.V.03 (FBA 100633–100634) coll. E. Schilinger & Tokota'a; Koroyanitu Park, 1 km E Abaca Village, 800 m, Sivuione Trail, 1♀, 12–19.X.02 (FBA 133395), 10♂, 2♀, 7–12.X.2002 (FBA 081024, 081030–081031, 081037–081038, 081040–081044, 081020, 081023), 4♂, 1♀, 19–26.X.02 (FBA 088870, 088873–088875, 088872), 5♂, 1♀, 26.XI–5.XII.02 (FBA 082619–082623, 082616), coll. E. Schilinger & Tokota'a; Koroyanitu Eco Park, 0.5 km N Abaca Village, 800 m, 1♂, 2♀, 12–19.XI.02 (FBA 110090, 110087–110088), 5♂, 1♀, 7–12.X.02 (FBA 133521, 133838–133839, 133842, 133840), 7♂, 21.IX–7.X.02 (FBA 133520, 133523–133528), coll. E. Schilinger & Tokota'a; Koroyanitu National Park, 0.5 km N Abaca Village, 800 m, 1♀, 7–12.X.02 (FBA 056090), coll. E. Schilinger & Tokota'a (BPBM).

Remarks. Study of this species has revealed that it is best placed *Anoplius* in the subgenus *Anoplius*. The reasoning is the same as mentioned above for *A. caerulescens.* As such, *Nesopompilus* is a junior synonym of *Anoplius*. This species is extremely similar to *A. elatus* and the two species may be synonyms. However, no specimens were collected showing a transition between the two species, and they should be treated as distinct species at this time.

This species seems to be the most common spider wasp in Fiji.

Cyphononyx vitiensis Turner

Cyphononyx vitiensis Turner, 1917: 78–80. Male and Female (BMNH Hymenoptera Type no. 19-2).

Diagnosis. This species is easily identified by its large size and coloration; the integument is black except for head, which is ferruginous except for a transverse band of back across the ocelli, the lateral margins of the pronotum and mesonotum (sometimes completely), the antennae, the legs from femora to tarsi, and mesosoma segments 4–6 which are ferruginous (Fig. 8). In the males, the dorsum of the mesosoma including the propodeum medially is sometimes ferruginous. The wings are orange with apical and medial infuscated bands (Fig. 15). Also for both sexes, the pronotum, mesonotum and scutellum are covered with bronze to orangish decumbent setae differing from surrounding setal coloration, the propodeum is tuberculate laterally and is transversely rugose with the wrinkles stronger in the male, the claws are bifid, and the apical tarsomere of the hind legs has lateral rows of spines beneath. The male genitalia (Fig. 21) and subgenital plate (Fig. 22), which is quadrate without a median carina, differs from the other species on Fiji.

Material Examined. FIJI: **Kadavu:** Namalata, 50 m, 1♂, 15–28.VII.04 (FBA 051727), coll. ME Irwin, E Schlinger, M Tokota'a; **Taveuni:** Devo Forest Reserve, 800 m, 2♂, 3–10.I.03 (FBA 012551, 012554), coll. E. Schlinger, M. Tokota'a, & M. Irwin; Peak Radio Tower, 1200 m, 1♂, 10–16.I.03 (FBA 050919), coll. E. Schlinger, M. Tokota'a, & M. Irwin; Eteni, Navai., 700 m, 1♀, 6.VI–15.VII.03 (FBA 013821), coll. E.

Schlinger M, Irwin, & Tokota'a; **Viti Levu:** Navai Village, Eteni, 700 m, 1♂, 6.VI–15.VII.03 (FBA 029793), coll. E. Schlinger M, Irwin, & Tokota'a; Nakobalevu Mt. area, 350 m, 1♀, 30.V.03, coll. D. Yanega; Koroyanitu National Park, Abaca Village, 1♂, 2.VI.03 (FBA 028256), coll. F.D. Parker; Koroyanitu National Park, Abaca Village, 400 m, 1♂, 6.V–26.V.03 (FBA 022045), coll. E. Schlinger, M. Irwin, & M. Tokoka'a; 1 km E Abaca Village, Kordyanitu National Park, 800 m, Kokabula trail, 1♂, 2♀, 19–26.X.02 (FBA 085226, 085228, 085234), coll. E. Schlinger & Tokota'a; Koroyanitu Eco Park, Mt. Evan's Range, 0.5 km N Abaca Village, 800m, 1♂, 26.X–5.XI.02 (FBA 080328), coll. E. Schilinger & Tokota'a; 6 km NW Kilaka, Batiquere Range, 145 m, 1♂, 15.VI–28.VI.04 (FBA 072305), coll. E. Schlinger & Tokota'a; 0.6 km S of Rokosalase Village, 180 m, 3♂, 2♀, 23.IV–8.V.04 (FBA 054403–054405, 054402, 054406), coll. E. Schlinger & Tokota'a (BPBM).

Distribution. Fiji, the Solomon Islands, and New Caledonia.

Remarks. Turner (1917) described this species based on specimens from Fiji only. Banks (1941) listed this species as present on the Solomon Islands and New Caledonia. This is the largest species on Fiji.

Heterodontonyx guerini Banks

Heterodontonyx guerini Banks, 1941: 234. Female and male (MCZC).

Diagnosis. This species is easily identified by its coloration; the integument is black except for head, which is yellow except for a transverse band of back across the ocelli and the occipital region, the antennae, the legs from apex of femora to tarsi, mesosomal tergite 2 medially and mesosoma terga 3–6 which are yellowish. Mesosomal sterna 4–6 are brownish (Fig. 10). In the males, the front of the head is black medially almost down to antennal insertions and the pronotum is ferruginous (Fig. 9). The wings are orange with an apical infuscated band on the forewing and the hindwing with the apical and posterior margin infuscated (Fig. 16). Also for both sexes, the claws are dentate except for the foreclaws of the male which are bifid, and the apical tarsomere of the hind legs has lateral rows of spines beneath. Also, the pronotum, mesonotum and scutellum are covered with dark brown decumbent setae, and the propodeum lack tubercles laterally, but is transversely rugose. The male genitalia (Fig. 23) and subgenital plate, which is similar to *C. vitiensis* but has a median carina and a spinose apical margin, differs from the other species on Fiji.

Material Examined. FIJI: **Viti Levu**: Nacocokuvu, Res. Station, 1♂, 4.II.1980, coll. P.A. Maddison (NZAC); Sigatoka Province, Sigatoka Sand Dunes National Park, 1♀, 22.XII.02–3.I.03 (FBA 45495), coll. M, Irwin, E. Schlinger & M. Tokota'a (BPBM).

Distribution. Queensland (Australia), Solomon Islands, and Fiji.

Remarks. This species was described by Banks (1941) based on specimens from Cape York, Australia and the Solomon Islands.

This species has been confused with other species in the past. Haupt (1930) and subsequently Williams (1947) stated that *Sphictostethus nitidus* (Fabricius) (as *Chrysocurgus nitidus*) was present in Australia, New Zealand and Fiji. However, *Sphictostethus nitidus*, only occurs in New Zealand (Harris, 1987). It is probable that Haupt was confusing a complex of species in the Pepsinae with similar coloration patterns.

This species is the most rarely collected of the Fijian spider wasps.

KEY TO POMPILIDAE OF FIJI

1. Auxiliary spines at apex of hind tarsus of uniform length, not splayed (Fig. 26); forewing without pocket at posterobasal corner (Figs. 15, 16); wings brightly colored yellow–orange with at least apex infuscated (Figs. 15, 16) ... (Pepsinae) ... 2
–. Auxiliary spines at apex of hind tarsus of unequal length, irregularly spaced and splayed (Fig. 27); forewing with pocket at posterobasal corner (Figs. 11–14); wings not brightly colored, hyaline to infuscated (Figs. 11–14) ... (Pompilinae) 3

2. Mid and hind claws bifid (Fig. 28, e.g. Figs. 24–25); forewing with apex and longitudinal medial region infuscated (Fig. 15)..... **Cyphononyx vitiensis** Turner
–. Mid and hind claws dentate (Fig. 29); forewing with only apex infuscated (Fig. 16) ..... **Heterodontonyx guerini** Banks

3. Second marginal cell with acute angle basally, 4-sided (Figs. 11, 12); mesopleuron distinctly tuberculate laterally overlying mesocoxa (Fig. 30); with metallic blue to purple setae (Figs. 1–2, 30); males with inner tooth of both claws of foreleg rounded (Fig. 24); females with claws dentate (e.g. Fig. 29); females with indistinct transverse concavity on the second sternite ..... **Anoplius caerulescens** (Dalla Torre)
–. Second marginal cell with oblique angle basally, 5-sided (Figs. 13, 14); mesopleuron not distinctly tuberculate laterally overlying mesocoxa (e.g. Fig. 31); lacking metallic blue to purple, predominately black (Figs. 3–6); males with inner tooth of both claws of foreleg acute (Fig. 25); females with claws bifid (e.g., Figs. 25, 28); females with distinct transverse groove on the second sternite 4

4. Integument of mesosoma black (Figs. 3,4) ..... **Anoplius elatus** (Smith)
–. Integument of at least pronotum ferruginous, remainder black (Figs. 5, 6) ..... **Anoplius vitiensis** (Williams)

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The Godeffroy Museum Catalogs in Relation to Fiji Terrestrial Arthropods. Part I: Introduction and Review of Myriapoda, Diptera, Odonata, and Smaller Hexapod Orders[1,2]

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Abstract: Catalogs of the Godeffroy Museum in Hamburg are reviewed in relation to their listings of Fijian terrestrial arthropods. A table of names of Fijian terrestrial arthropods listed in the catalogs available for study is presented with discussion of the nomenclatural and taxonomic implications. The names of arthropods in the Blattodea, Dermaptera, Diptera, Neuroptera, Myriapoda, Odonata, Phasmida, and Trichoptera are tabulated.

INTRODUCTION

The Godeffroy Museum in Hamburg, begun in 1861 by Johann Cesar VI Godeffroy, produced nine catalogs of their holdings from 1864–1884 which, in addition to itemizing the museum's holdings of Pacific natural history (and some cultural artifacts), also included items for sale. These catalogs are extremely rare and do not find mention in three of the historical studies of the Godeffroy Museum (Schmack, 1938; Spoehr, 1963; Hoffmann, 1999). Bauer and Watkins-Colwell (2001) gave a brief account of the catalogs in relation to their study of the lizard *Hypsilurus godeffroyi* Peters. Ethnographer Birgit Scheps in her detailed history of the Godeffroy Company and its Museum discusses them in her section on the publications of the Godeffroy Museum (2005: 180-182), but does not go into much detail, paying more attention to the background of the ethnological collections in her excellent history of the Museum.

The Bishop Museum library possesses five of the nine catalogs (catalogs II–VI) which were discovered during my bibliographic work on Diptera books and discussed further there (Evenhuis, 1997). They were also treated in a catalog of nonmarine Samoan snails and slugs (Cowie, 1998). An additional two catalogs (VII and VIII) were kindly supplied by Dr. Aaron Bauer from his personal collection for this study. These catalogs list natural history specimens obtained from naturalists sent out to Pacific Islands by the Godeffroy trading company to collect and also from sea captains who were told to bring back anything of interest. Specimens collected were sent out to specialists for study and identifications came back and were listed in these catalogs. In some cases, names listed in the catalogs appear before their publication in various journals including the Museum's house journal "Journal des Museum Godeffroy", published from 1873–1910. This study lists the names of Fijian terrestrial arthropods in the seven catalogs available for study and

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2. Contribution No. 2007-002 to the Pacific Biological Survey.

discusses any nomenclatural or taxonomic implications that may result from their appearance in the catalogs. Because of the rarity of the catalogs, it is hoped that bringing notice of them here will precipitate further study on the Godeffroy material.

Because the list of names is so extensive, this study will be dealt with in parts. This first part will give background information on Godeffroy Museum and its catalogs and review the names of the Blattodea, Dermaptera, Diptera, Neuroptera, Myriapoda, Odonata, Phasmatida, and Trichoptera.

BACKGROUND TO THE CATALOGS

The House of Godeffroy and the Godeffroy Trading Company

The Godeffroys were French Huguenots of La Rochelle where the leader of their successful family was mayor of the city. However, in 1737 they were forced to flee France to avoid religious persecution brought about by King Louis XIV's anti-Protestantism. The family sought asylum in Germany and, after a few moves, finally settled in the trading port of Hamburg, which, although predominantly Lutheran, was tolerant of persons of all religions. They lived peacefully in Hamburg for decades to come.

Eight years after the death of Johann Cesar III Godeffroy, his son Johann Cesar IV founded the trading firm that was to bear the family name — and, with the subsequent entry of his son Johann Cesar V into the business, the familiar name of J.C. Godeffroy & Sohn was born.

Trading began simply to Western Europe and the West Indies with linens as an export item and goods returning to Hamburg including wines, copper, figs, coffee, and Cuban sugar. The trading empire grew slowly, through good times and bad, establishing outposts in Havana and in Valparaiso, and building a fleet of trading ships that, at its peak, numbered 27. In 1855, Godeffroy's agent in Valparaiso, August Unshelm, was commissioned to investigate the possibility of expanding trade into the Pacific. He sailed out to the Navigator Islands [= Samoa], The Friendly Islands [= Tonga], Fiji, and finally returned to Tahiti.

The trading business in the Pacific was very successful with new outposts being established in many Pacific Islands; and ships loaded with copra, coconut oil, and pearl shells heading back to Hamburg where the ship captains were rewarded with a percentage of the profits of their cargo. In 1860, a central outpost was established in Apia, Samoa that directed the Pacific operations.

During the hard financial times of the late 1850s, the firm was forced to supplement its revenue by taking on passengers to Australia and California, the latter mainly those wishing to make it rich in the gold rush. The German government soon realized the potential for expanding its influence into the Pacific and utilized the Godeffroy company to help with the colonization of many of the Pacific Islands. For the next twenty years, the Godeffroy ships mixed trading cargo and shipping passengers to faraway islands as its business. The company's presence in the Pacific continued until the early 1880s soon after the company went bankrupt and into dissolution.

The Establishment of the Museum Godeffroy

Following a lifelong dream of establishing collections of natural and cultural curiosities from exotic locales and presenting them to an interested public, Johann Cesar VI Godeffroy employed his sea captains to bring back anything of interest they encountered

during their travels. They were expressly told to collect birds, shells, and other animals as well as cultural objects from all localities they visited. As a result, Godeffroy had soon accumulated a large number of natural history specimens and cultural artifacts from the South Pacific and was storing them in a cluttered warehouse. It was time to find a proper place to house and organize them, thereby better ascertaining their value.

In 1860 Godeffroy wrote to Dr. Eduard Gräffe (1833-1919) in Switzerland to request his services in founding a museum and collecting in the South Seas. The 28-year old Gräffe accepted and in 1861 boarded a train for Hamburg. After a short time helping set up the Museum Godeffroy, Gräffe was sent to the Pacific in October 1861 where he eventually settled in Apia and directed the Godeffroy operations there for the next ten years while also collecting in Australia, Samoa, Tahiti, Fiji, Tonga, and other South Pacific Islands. Gräffe's arrival in Apia was apparently reluctantly well thought of by his employers: "Dr. Graeffe ist ein Genie, aber fürchterlich unordentlich u. schmutzig, er machte aus meinen besten Zimmern bald einen wahren Schweinestall, u. es war ein Glück für ihn, dass meine Frau abwesend war." (letter from J.C. Godeffroy VII to his father J.C. VI *in* Hoffmann, 1999). Other scientific collectors were hired by the company over the years who, working in different areas of the vast Pacific ocean, helped increase the holdings of the Godeffroy Museum with their successful collecting or fishes, birds, shells, insects, and plants (see Table 1 for a list of some of the collectors known to have been employed by the Godeffroy company).

In 1863, after interaction on his behalf by the well-known Hamburg naturalist broth-

Table 1. Preliminary List of Known Godeffroy Collectors

Name	Known Dates Collected	Where Collected
Dämel, Eduard (1821-1900)	1867-1874	Australia (NSW, Queensl.)
Decker*	?	?
Dietrich, Amalie (1821-1891)	1863-1873	Australia (Queensl.)
Garrett, Andrew (1823-1878)	1866-1870	Hawaii, Samoa, Fiji, Cook Is, Society Is, Tuamotus, Marquesas
Gräffe, Eduard (1833-1919)	1862–1872	Australia, Samoa, Fiji, Tonga, Tuamotus, Tahiti, numerous smaller Polynesian and Micronesian islands
Hennings*	1863	Fiji
Holsten*	?	"Südseeinseln"
Hübner, Franz (1846-1877)	1875-1877	Samoa, Tonga, New Britain
Kleinschmidt, Johann Theodor (1834-1881)	1875-1881	Fiji, Solomons Is, Vanuatu
Kubary, Jan Stanislaus (1846-1896)	1869-1879	Micronesia
Rachau, C*	1861+	"Südseeinseln"
Tetens, Alfred (1835-1909)*	1862-1866	Palau, Caroline Is, islands off shore of northern Papua New Guinea
Wendt, H W*	1873	Marshall Is

* Ship captains named by Gräffe in Scheps (2005: 268) as helping collect specimens for the Godeffroy Museum. Further information on them obtained from Hoffman (1999).

ers George, Karl, and Otto Semper, Hamburg-born Johannes Dietrich Eduard Schmeltz (1839-1909) was hired as custodian of the collection. Schmeltz was a self-trained biologist, who maintained many biological contacts in the Hamburg area in his efforts to increase his knowledge of natural history of the region. Schmeltz remained in the employ of the Godeffroy company for almost twenty years until a few years after the company's bankruptcy and dissolution in 1879, whereupon he left to become the director of the Rijks Ethnographisch Museums in Leiden.

Table 2. List of the Godeffroy catalogs available for study

No.	Author	Year	Title/Publisher	Pages
II	Schmeltz, J.D.E.	1865	Catalog II der zum Verkauf stehenden Doubletten aus dem naturhistorischen Expeditionen der Herren Joh. Ces. Godeffroy & Sohn in Hamburg. [no publisher given], Hamburg	iv + 33 pp.
III	Schmeltz, J.D.E.	1866	Catalog III der zum Verkauf stehenden Doubletten aus dem naturhistorischen Expeditionen der Herren Joh. Ces. Godeffroy & Sohn in Hamburg. [no publisher given], Hamburg	[iii] + xii + 52 pp.
IV	Schmeltz, J.D.E.	1869	Museum Godeffroy. Catalog IV, nebst einer Beiläge, enthaltend: topographische Notizen; Beschreibung neuer Bryozoen von Senator Dr. Kirchenpauer zu Hamburg und einer neuen Asteriden-Gattung von Dr. Chr. Lütken zu Kopenhagen. Wilhelm Mauke Söhne, vormals Perthes-Besser & Mauke, Hamburg	xxxix + [iii] + 139 + [2] pp.
V	Schmeltz, J.D.E.	1874	Museum Godeffroy. Catalog V. Nebst einer Beiläge enthaltend topographische und zoologische Notizen. L. Friedrichsen & Co., Hamburg	xxxvi + [ii] + 215 pp.
VI	Schmeltz, J.D.E.	1877	Museum Godeffroy. Catalog VI. Nachträge zu Catalog V. L. Friedrichsen & Co., Hamburg	v + 108 pp.
VII	Schmeltz, J.D.E.	1879	Museum Godeffroy. Catalog VII. Wirbeltheire (Animalia vertebrata) und Nachträge zu Catalog V & VI aus den übrigen Thierklassen. L. Friedrichsen & Co., Hamburg	viii + 99 pp.
VIII	Schmeltz, J.D.E.	1881	Museum Godeffroy, Hamburg. Catalog VIII. *Zoologischer Anzeiger* 4(91) (Beilage)	18 pp.

The Godeffroy Museum sale catalogs

Schmeltz's immediate tasks after being hired by Godeffroy were to put the collections into order; invite specialists to Hamburg to identify specimens and possibly borrow material for further study; and make catalogs of duplicate specimens to be offered for sale. From 1864 to 1881, eight such sale catalogs were compiled by Schmeltz (Figs. 1-2); a ninth catalog in 1884 was compiled by C.W. Pöhl (see Table 2 for a list of catalogs available for this study). In addition to the catalogs, the Godeffroy business also subsidized publication of their house journal, the *Journal des Museum Godeffroy* (1873-1910). Both publications were used to publicize the specimens in the museum and to disseminate information on the scientific research being conducted on those specimens collected by the Godeffroy explorers and sea-captains.

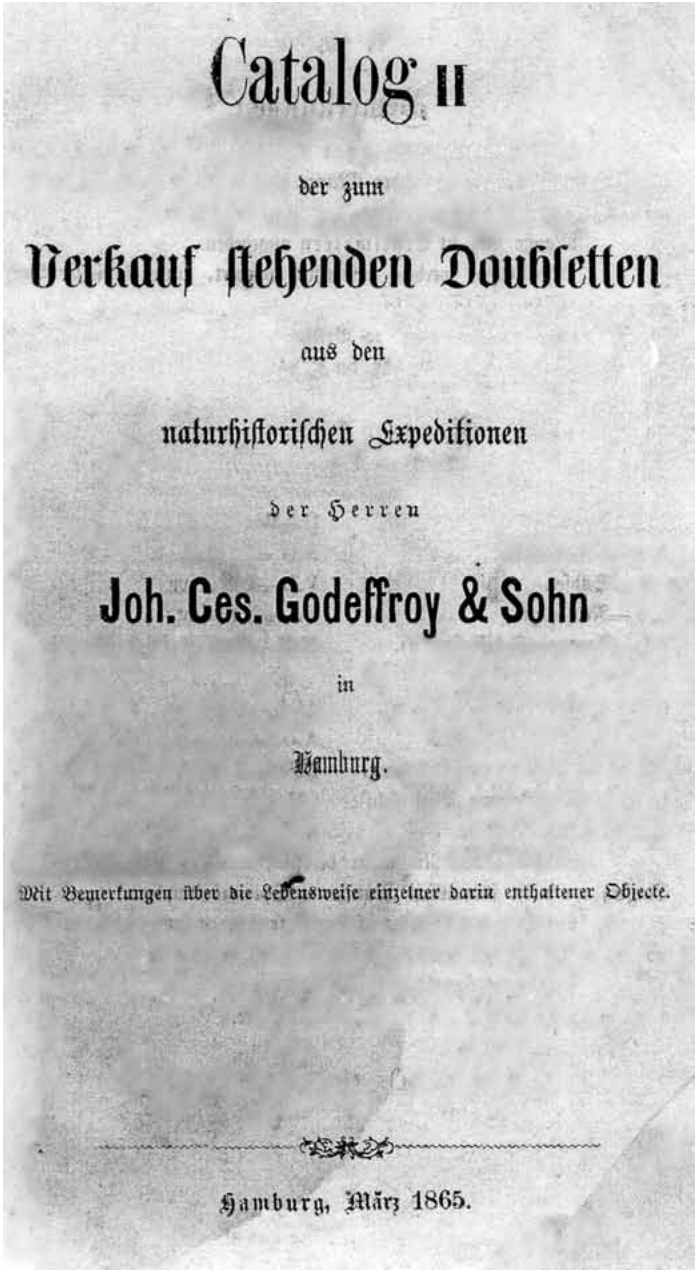
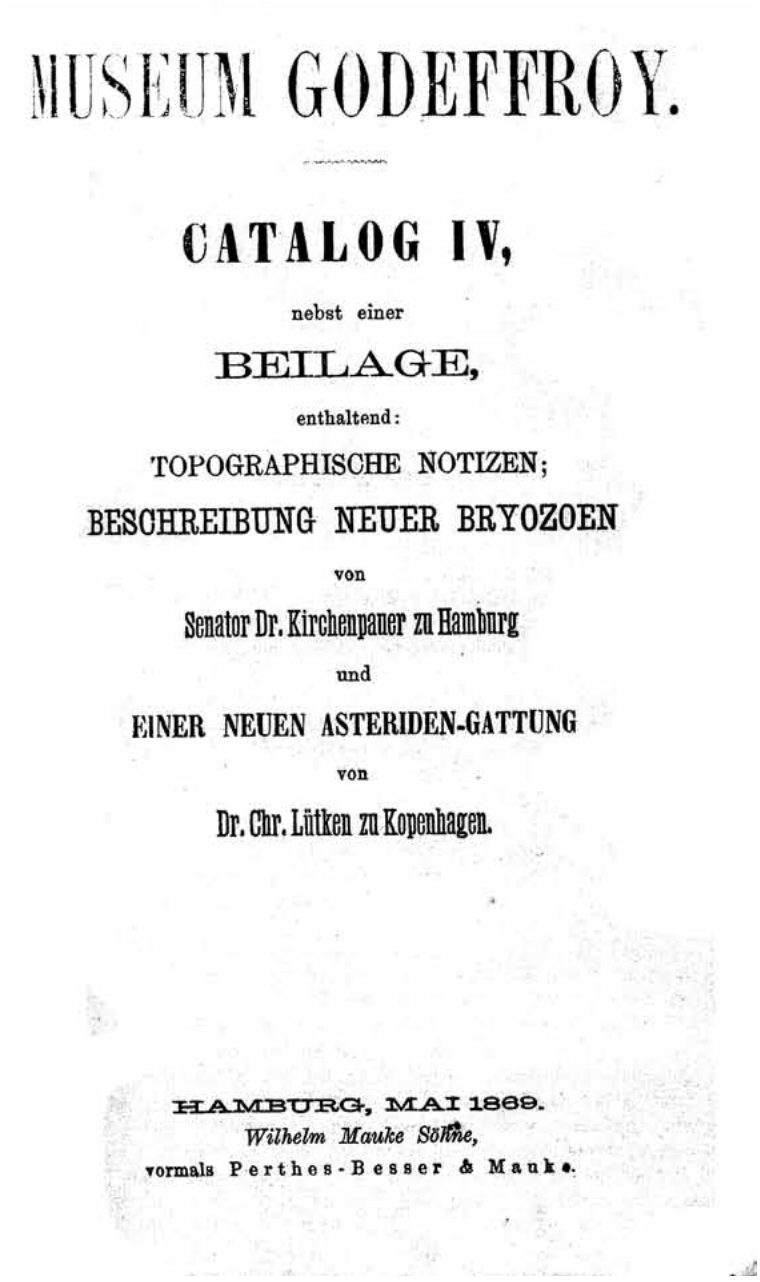


Figure 1. Cover of the second sale catalog of the Godeffroy Museum. From copy held in the Bishop Museum Library.



MUSEUM GODEFFROY.

CATALOG IV,

nebst einer

BEILAGE,

enthaltend:

TOPOGRAPHISCHE NOTIZEN;

BESCHREIBUNG NEUER BRYOZOEN

von

Senator Dr. Kirchenpauer zu Hamburg

und

EINER NEUEN ASTERIDEN-GATTUNG

von

Dr. Chr. Lütken zu Kopenhagen.

HAMBURG, MAI 1869.

Wilhelm Mauke Söhne,

vormals Perthes-Besser & Mauke.

Figure 2. Cover of the fourth sale catalog of the Godeffroy Museum. From copy held in the Bishop Museum Library.

No.		*Patria.*	*M.* ℳ
4628	Podoscirtus vittatus Br.	Rockhampton	2,40
8031	Trygonidium dilutum Br.	Tonga-Inseln	0,40
4611	Cyrtoxiphe fulva Br.	,,	0,50
8046	Mogoplistes sp. nov.	,,	0,40
4510	Tropidoderus Childreni Gray	Queensland	30,00
2706	Phaneroptera linearis Br.	,,	1,20
8021	,, decorata Br.	,,	2,40
10139	Phaneroptera sp. nov.	Sidney	1,50
4597	Phylloptera incerta Br.	Samoa-Inseln	0,80
4603 †	,, parvicaudae Br.	Rockhampton	1,00
10142	,, sp. nov. vic. parvicaudae Br.	Sidney	1,20
10113	,, mutica Br.	,,	1,20
2703	Ephippithyta trigintiduo-guttata Serv.	Queensland	2,00
10087 S.	Conocephalus differens Serv.	Palau-Inseln	1,00,
10092 S.	Xiphidium longicorne Br.	Yap	1,00
10136	,, sp. nov.	Sidney	1,80
8026	,, sp. nov.	Bowen, Rarotonga	1,00
4613 †	Physis pectinata Serv.	Samoa, Tahiti	0,60
3764 †	Agroecia rugosifrons Br.	Viti-Levu	2,50
10095 S.	,, truncata Br.	Palau-Inseln	1,50
10133	,, marmorata Br.	Sidney	3,00
4607	Hexacentrus horridus Burm.	Queensland	1,20—2,40
8054	Tettix sp?	Tongatabu	0,50
10116	,, subulata L.	Sidney	0,60
7995	Oedipoda caliginosa de Haan.	Bowen	1,50
2714	Stetophyma signatum Br.	Queensland	1,00
2718	Stenobothrus laetus Br.	N. S. Wales, Samoa	1,00
10135	Epacromia sp. nov. vic. tricoloripes Hagb.	Sidney	2,00
10121	Epacromia sp. nov.	Bowen	1,00
10144	Pachytylus musicus F.	Sidney	1,00—2,00
2709a	Pachytylus cinerascens F.	N. S. Wales, Queensland	1,00

Figure 3. Typical page of the listing of specimens in the Godeffroy sale catalogs showing specimen number, scientific name, locality, and price.

Each sale catalog consisted of a listing of identified species, places collected, and prices (cf. Fig. 3). A few catalogs were prefaced with narratives of collecting expeditions or other information regarding the collections listed therein. In one of these narratives (Catalog III—Schmeltz, 1866) collecting localities are itemized with latitude and longitude, and collectors. It is in these narratives that mention of some of the species listed in the catalogs themselves may include characters validating the name (except for a few cases of measurements in the lists of specimens, most of the names in the catalogs proper are not validated there). These catalogs have potential nomenclatural value as many of the names were published in these catalogs before their first formal descriptions elsewhere.

LIST OF FIJI TERRESTRIAL ARTHROPODS IN GODEFFROY SALE CATALOGS

The tables below list the names of the Myriapoda, Diptera, Odonata, and smaller hexapod orders in the sale catalogs of the Godeffroy Museum (those available for study) as occurring in Fiji. Future papers in this series will tabulate the other orders present in these catalogs. The tabular listing includes family, genus and species, page numbers of each catalog in which the name is listed, and notes on the current name of the species or other information regarding that name. There are many misspellings of generic and specific epithets in the catalogs and these are corrected in the lists below. Since these listings are some of the first for Fijian arthropods, there are bound to be misidentifications due to insufficient knowledge of the Fijian and surrounding fauna. There are many entries of names of species as occurring in both Queensland, Australia and Fiji, when it is now known that these species do not occur in both area. Not all the names listed in the catalogs could be traced in this study and I hope that these lists will promote further research into the specimens and their true identifications.

NOTES ON THE SPECIES

1. The genus *Philodicus* does not occur in Fiji and no doubt, the identification was a preliminary one of a specimen that appeared similar to that genus. It is not certain what species this misidentification is associated with but it may be either *Promachus* or *Maira*.
2. There is only one species of *Promachus* in the Fiji Archipelago. The name in the Schmeltz catalogs (*Promachus graeffei*) was validated in catalog III (Schmeltz, 1866: v) and attributed to Schiner as "i.l." [= in litt.] but was not described by Schiner (the name is available nomenclaturally and attributable to Schmeltz). Bezzi (1928) was the first to formally describe the species (as *Promachus triumphans*). The Schmeltz name has priority and is the senior synonym of *Promachus triumphans* Bezzi, **n. syn**. The Schmeltz name was first noted in Evenhuis (1991) but since the *Promachus* fauna of Viti Levu was not well known at that time, no synonymization could be done with certainty. Malaise trapping conducted by the NSF and Schlinger-funded Fiji Arthropod Survey from numerous islands since 2002 shows the same species to be widely distributed throughout the archipelago.

MYRIAPODA

CHILOPODA

Family	Species*	Catalog Page II	III	IV	V	VI	VII	VIII	Remarks
Geophilidae	*Geophilus bifasciatus* L. Koch			134					*nomen nudum*
Scolopendridae	*Scolopendra perfida* L. Koch			134					*nomen nudum*

DIPLOPODA

Family	Species*	Catalog Page II	III	IV	V	VI	VII	VIII	Remarks
Polydesmidae	Fontaria gracilis C. Koch		20	54	67				[= Asiomorpha coarctata (Saussure, 1860)]
Siphonophoridae	Siphonophora hirsuta L. Koch			134	66				
Spirobolidae	Spirobolus colubrinus L. Koch	12	20	54		77			[= Salpidobolus colubrinus (Koch, 1865)]
Spirobolidae	Spirobolus costatus L. Koch	13	20	54	66				[= Dinematocricus costatus (Koch, 1865)]
Spirobolidae	*Spirobolus decoratus* L. Koch			54					[*nomen nudum*] [=Dinematocricus decoratus (Koch, 1881)]
Spirobolidae	*Spirobolus detornatus* L. Koch			134					[*nomen nudum*] [=Dinematocricus detornatus (Koch, 1881)]
Spirobolidae	Spirobolus pictus L. Koch			54					
Spirobolidae	Spirobolus semicinctus L. Koch			134					
Spirobolidae	*Spirobolus signifer* L. Koch			54	66				[*nomen nudum*] [=Dinematocricus signifer (Koch, 1881)]

* *nomina nuda* are listed in italics

HEXAPODA

BLATTODEA		Catalog Page							
Family	**Species**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Blaberidae	Panchlora surinamensis Fabricius			29	42		66		[= Pycnoscelus surinamensis (Linnaeus, 1758)]
Blattidae	Polyzosteria nitida Brunner von Wattenwyl				42				[= Platyzosteria nitida (Brunner von Wattenwyl, 1865)]

DERMAPTERA		Catalog Page							
Family	**Species**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Chelisochidae	Lobophora morio Fabricius			32	43				[= Chelisoches morio (Fabricius), 1775]

DIPTERA		Catalog Page							
Family	**Species**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Asilidae	Philodicus fuscus Macquart					74			[error, not Fijian] [See note 1]
Asilidae	Promachus graeffei Schiner		20	50	62				[= Promachus triumphans Bezzi, 1928] [See note 2]
Calliphoridae	Calliphora sp.			50	62		80		
Hippoboscidae	Ornithomyia sp.			50	63				
Stratiomyidae	Sargus sp.			50	62				
Syrphidae	Platycheirus sp.			50	62				[error, not Fijian]
Syrphidae	Syrphus sp.					74			
Syrphidae	Syrphus salviae Fabricius						80		[= Asarkina salviae (Fabricius, 1794)]
Tephritidae	Trypeta sp.						80		

NEUROPTERA		Catalog Page							
Family	**Species**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Chrysopidae	Chrysopa sp.			32					

HEXAPODA (continued)

ODONATA		Catalog Page							
Family	**Species***	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Coenagrionidae	Agrion aurora Brauer		18		43				[= Ischnura aurora (Brauer, 1865)]
Coenagrionidae	Agrion sp.				43				
Libellulidae	Orthemis pectoralis Kaup			32					[= Lathrecista pectoralis (Kaup in Brauer, 1867)]
Libellulidae	Diplax bipunctata Brauer		18	32	44				[= Diplacodes bipunctata (Brauer), 1865]
Libellulidae	Diplax trivialis Rambur			32	43				[= Diplacodes trivialis (Rambur), 1842]
Libellulidae	Libellula sabina Drury			32	43	23			[= Orthetrum sabina (Drury, 1770)]
Libellulidae	Pantala flavescens Fabricius			32	43				
Libellulidae	Rhyothemis dispar Brauer						70		[= Rhyothemis dispar Brauer, 1867]
Unplaced	*Mesocera annulipes* L. Koch				54				[n. gen. n. sp.] [*nomen nudum*]

PHASMIDA		Catalog Page							
Family	**Species***	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Phasmatidae	Anopholepis fulvescens Saussure						66		[= Lopaphus cocophagea (Newport, 1844)]
Phasmatidae	Bacteria sp.		12						
Phasmatidae	Graeffea purpuripennis Brunner von Wattenwyl			30	42				[= Lopaphus cocophagea (Newport, 1844)]
Phyllidae	Phibalosoma novae-britanniae Wood-Mason						66		(as "Phybalosoma") [= Chitoniscus feedjeanus (Westwood, 1864)]
Phyllidae	Phibalosoma pythonius Westwood		17	30		20	30		(as "Phybalosoma") [= Hermarchus appolonius (Westwood, 1859)]
Phyllidae	Phyllium geryon Gray			30			67		larva
Phyllidae	Phyllium lobiventre Blanchard			30			67		[= Chitoniscus lobiventris (Blanchard, 1853)]
Phasmatidae	*Xeroderus insignis* Brunner von Wattenwyl					20	66		*nomen nudum*

TRICHOPTERA		Catalog Page							
Family	**Species**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**Remarks**
Hydropsychidae	Hydromanicus ruficeps Brauer			32					[= Abacaria ruficeps (Brauer, 1867)]

* *nomina nuda* are listed in italics

ACKNOWLEDGMENTS

I thank Dr. Aaron Bauer (Villanova University) for kindly supplying photocopies of catalogs in his care. Thomas Buckley (Landcare New Zealand) helped verify the *nomen nudum* status of *Xeroderus insignis*. Review of the manuscript by Aaron Bauer and Dick Petit improved it in many ways and they are thanked for their efforts.

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Fiji Arthropods VII Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 91: 29-32 (2007).

A new species of *Microsania* Zetterstedt from Fiji (Diptera: Platypezidae)[1]

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Abstract. *Microsania fijiensis*, **n. sp**. (Diptera: Platypezidae) is described and illustrated. This represents the first record of the genus and family from Fiji. The key to Oriental and Australasian *Microsania* is updated.

INTRODUCTION

This paper describes a species of Fijian *Microsania* Zetterstedt collected by the Terrestrial Arthropod Survey of Fiji. The Platypezidae from the Australasian Region were revised by Chandler (1994), and species of *Microsania* were recorded from Australia, New Zealand, Papua New Guinea, Philippines, Sri Lanka and Vanuatu. This marks the firs record of the family from Fiji.

Microsania is practically cosmopolitan in distribution, with 21 described species (Thompson 2006). They occur in a variety of habitats, including boreal forests, dry sclerophyll and tropical forests. Species of this genus are known as "smoke flies", because of their attraction to smoke of wood fires (Chandler & Shatalkin 1998; Chandler 2001). All investigated species are attracted to smoke and are rarely found elsewhere. In the wet tropics where non-anthropogenic smoke would be extremely rare, there are presumably other swarm attractants, but this remains unknown. Chandler (2001) reported rare observations in Europe of swarming without presence of smoke, including a case where the topmost branches of a tree were used as a marker. Other Platypezidae develop in fungi but the development of *Microsania* has not been recorded, so whether the attraction to smoke has any bearing on this is also unknown.

MATERIALS AND METHODS

This study is based on material from the Fiji athropod Survey funded by NSF and the Schlinger Founbdation, types and vouchers of which will be deposited in the National Insect Collection (FNIC), Suva. Terms used for adult structures primarily follow McAlpine (1981), except male terminalia where terms of Sinclair (2000) are used.

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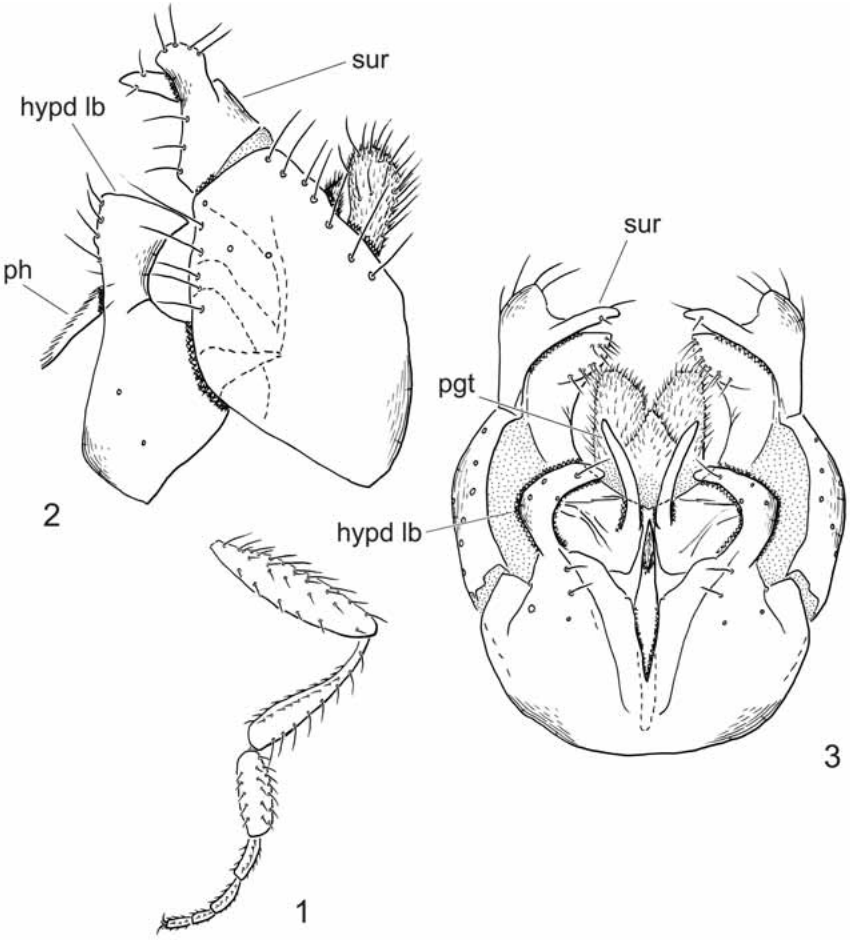

Figures 1–3. *Microsania fijiensis*. **1**. Male hind leg; **2**. male terminalia, lateral view; **3**. male terminalia, ventral view. Abbreviations: hypd lb – hypandrial lobe; pgt – postgonite; ph – phallus; sur – surstylus.

SYSTEMATICS

Microsania Zetterstedt

Microsania Zetterstedt, 1837: 30. Type-species, *M. stigmaticalis* Zetterstedt (= *Cyrtoma pectipennis* Meigen, 1830) (monotypy).

Diagnosis. This genus is distinguished from other platypezids except the Nearctic genus *Melanderomyia* Kessel by the absence of crossvein dm-cu and from all except *Melanderomyia*, *Platypezina* Wahlgren and *Grossoseta* Kessel & Kirby by the presence of a stigma extending beyond vein R_1 on the costa. It differs from these three genera in the stigma extending only narrowly beyond vein R_1 and from *Melanderomyia* it also dif-

fers in having M_{1+2} forked but the anterior branch incomplete basally (Chandler 1994, 2001).

Microsania fijiensis Sinclair & Chandler**, new species**
(Figs. 1–3)

Diagnosis. This species is characterized by the trilobed surstylus with its slender pointed central lobe. It is distinguished from *M. unicornuta* Chandler by the medially arched hypandrial lobes when viewed ventrally.

Description. **Male**. *Head*. Postorbitals and occipitals pale.

Thorax. Chaetotaxy dark; 3 notopleural bristles.

Legs. Pale in contrast to thorax. Fore femur and tibia with short setae; posteroventral bristle on mid tibia less than half first tarsomere length. Hind leg (Fig. 1): femur with dorsal setae slightly shorter than femoral depth; tibia somewhat arched on basal half, progressively broadened apically, with approximately 8 stronger dorsal setae in series (at most only subequal to apical width of tibia); first tarsomere (basitarsus) slightly broader than tibia.

Wing (length 1.9 mm). Whitish, stigma yellowish. Halter light brown.

Abdomen. Setae of tergites dark. *Terminalia* (Figs. 2, 3): Surstylus trilobed, with broad flattened pair of outer lobes and central, slender pointed lobe directed perpendicular to outer lobes. Hypandrial lobe arched medially and tapered to rounded apex in ventral view; apex shallowly forked or bilobed in lateral view. Postgonite slender, arched gradually with narrow apex.

Female. Unknown.

Type. Holotype male (FBA 139604): FIJI: **Kadavu**: 0.25 km SW Solodamu Vlg., Moanakaka Bird Sanctuary, 60 m, 9–15.Feb.2003, Malaise 1, Schlinger, Tokota'a, 19.078°S, 178.121°E. Holotype to be deposited in FNIC.

Etymology. The specific name is in reference to the type locality.

Key to Males of *Microsania*

The key to Oriental and Australasian species of *Microsania* presented in Chandler (1994) is modified as follows to include *M. fijiensis*.

5. Hind tibia with 4 longer bristles in series; its first tarsomere (basitarsus) broadest near base. Surstyli with outer and middle lobes curved and pointed .... **albani** Chandler

-. Hind tibia with 6–8 longer bristles in series; its first tarsomere more evenly broadened at mid length. Surstyli with slender straight pointed lobe, lateral lobes broadly rounded 5a

5a. Hypandrial lobes gradually arched medially in ventral view .... **fijiensis** Sinclair & Chandler, **n.sp.**

-. Hypandrial lobes strongly arched medially and with outer lateral projection .... **unicornuta** Chandler

DISCUSSION

Little can be said of the habits of this species because it is based on a single male specimen. Further collection efforts are required, especially using wood smoke to attract additional specimens. The specimen was collected during the middle of the wetter season on

Kadavu, a mid-sized island (408 km^2), which lies some 80 km to the south of the largest island, Viti Levu. The local habitat where this species was collected is a coastal limestone forest, with periods of moderate moisture to almost dry. The few running streams are mostly intermittent, flowing when there is wet weather (Evenhuis pers. comm. 2006).

This species is most closely related to *M. unicornuta* from Papua New Guinea. This sister group pairing is supported on the basis of the uniquely shaped surstylus, which bears a long slender pointed lobe medially. In fact, there is very little difference between these two species. Evenhuis & Bickel (2005) stated that this western Pacific affinity is the dominant pattern for the Fijian flora and very common among arthropod groups. The species from Vanuatu, *M. hebridensis* Chandler, is related to *M. arthuri* Chandler (Australia, Papua New Guinea) and *M. tonnoiri* (New Zealand) (Chandler 1994).

ACKNOWLEDGMENTS

The above material was provided by the Terrestrial Arthropod Survey of Fiji project, funded in part by The National Science Foundation (DEB-0425790) and the Schlinger Foundation. The government of Fiji (Ministries of Environment and Forestry) and the Wildlife Conservation Society, Suva Office, are thanked for their support of the project. BJS would like to thank E. Schlinger and N. Evenhuis for inviting him to analyze the Empididae collected from the Survey, among which this platypezid was discovered. Neal Evenhuis also kindly arranged for the loan of the holotype of *M. unicornuta*.

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Fiji Arthropods VII Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 91: 33–38 (2007).

The Zorotypidae of Fiji (Zoraptera)

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Abstract. The zorapteran fauna of Fiji is reviewed based on newly collected material from the "Terrestrial Arthropod Survey of Fiji". A single, endemic species, *Zorotypus zimmermani* Gurney, is recognized from Fiji, with new records from Vanua Levu and Taveuni. The alate has hitherto not been characterized and a description of the wing venation is accordingly provided for the species.

INTRODUCTION

The insect order Zoraptera is one of the least understood and species poor lineages of the Insecta. Presently there are 34 described living and six fossil species (Rafael & Engel 2006), although new species are already known from Asia and South America and likely from tropical Africa as well (Engel pers. obs.). Nonetheless, the order has remained an enigma since its initial discovery less than a century ago with more controversy surrounding its phylogenetic affinities than any other group of hexapods, perhaps second in this regard only to the Strepsiptera (Engel & Grimaldi 2000, Grimaldi & Engel 2005).

Zorapterans are elusive creatures, living in small aggregations under the bark of rotting logs. Aggregations are known to consist of anywhere up to about 120 individuals and, while not truly social, they are apparently dependent on their gregarious associations, as individuals kept in isolation do not survive for long. Individuals do groom each other and this may serve an "antibiotic" function necessary for survival in their subcortical environment. The degree of relatedness of individuals in such aggregations has never been investigated but is likely to be high, perhaps representing extended families. A similar kind of gregarious behavior is well studied in the webspinners (Embiodea) (*e.g.*, Edgerly 1987, 1988, Ross 2000), close relatives of Zoraptera, and this may provide insights into zorapteran behavior. Species feed on fungal hyphae but apparently will also at times prey upon minute arthropods such as mites.

Species occur in two different forms – a blind, apterous morph and an alate morph, fully winged with well-developed compound eyes and ocelli. These different forms have at times in the past been referred to as "castes" but are not true castes in the sense of social insects as zorapterans are merely gregarious and these are more accurately considered merely different morphs. During the life of an aggregation apterous individuals predominate until such time as resources become limiting or the log deteriorates to a state that it can no longer provide harbor for the zorapterans. At this stage a developmental shift occurs

1. Contribution No. 2006-004 to the NSF-Fiji Arthropod Survey.

and females lay eggs that hatch into alates that then disperse to form new aggregations.

Through the courtesy of Dr. Evert I. Schlinger I have recently been able to examine a series of nine zorapterans collected from a variety of localities across Fiji, thereby more fully documenting the range of the species. All of the individuals are of the endemic *Zorotypus zimmermani* Gurney (1939) and most fascinatingly are all alates or dealates, a form that is less commonly encountered for most species. The recovery of alates, however, is not surprising given that all of the specimens were captured in Malaise traps and this is the dispersive morph. Furthermore, all are females, the sex that is most common during episodes of dispersal. *Zorotypus zimmermani* was hitherto known only from the type locality near Colo-i-Suva on Viti Levu (listed under the former spelling Tholo-i-Suva by Gurney) and from seven apterous males, eight apterous females, two dealate females (meaning the wings were hitherto unknown), and 17 nymphs. All of the specimens reported here are deposited in the Bishop Museum, Honolulu, Hawaii and in the Fiji National Insect Collection, Suva, Fiji. Morphological terminology and vein identities follow that of Engel & Grimaldi (2000, 2002) and Rafael & Engel (2006).

SYSTEMATICS

Zorotypus zimmermani Gurney
(Figs. 1–2)

Zorotypus zimmermani Gurney, 1939: 161.

Diagnosis. The species can be recognized by the shallow medioapical emargination of the female subgenital plate, sternum distinctly more heavily sclerotized in emargination; male subgenital plate with apical margin broadly, gently, and weakly concave, nearly straight in some individuals (Gurney describes it as emarginate which is a bit misleading); subgenital plates of both sexes relatively narrow and transverse; terminal terga of male with paramedian pectens of three stout setae; and the male genitalic sclerites as depicted by Gurney (1939). Ventral surface of metafemur with inner marginal spination as follows: apical third with series of 5–6 subequal short spines; three prominent, stout, larger spines, one near midpoint and just before terminal series of short spines, other two large spines in basal third, more distal spine slightly larger; outer marginal spination with series of 5–6 subequal short spines.

Description. Gurney (1939) provided a thorough and accurate characterization of the species and that material is not repeated herein. However, Gurney did not have available to him complete alates and so the wings remain hitherto undocumented. As such, the following description focuses on this missing data. Habitus of the alate female in figure 1. **Wing venation:** Wings of typical paddle-shape, membrane and margins distinctly setose, membrane lightly fuscous; venation nebulous throughout both wings, degree of fuscous pigmentation varies. Forewing with pterostigma present as faint infuscation along anterior, apical wing margin between anterior point of termination of R and apical termination of Rs; R disappearing in pterostigmal base; Rs nearly extending to wing apex, terminating on anterior wing margin at pterostigmal apex; Rs fusing with M shortly after separation from stem of R; rs-m crossvein absent; Rs+M present and slightly longer than basal abscissa of Rs; Rs separating from M nearly opposite from pterostigmal base; M extending to posterior wing margin and terminating before wing apex; CuA_1 present and extending to just before two-thirds wing length before terminating on posterior wing margin; CuA_2 present as a diffuse stub in basal third of wing, terminating on posterior wing margin well proximal to fusion of Rs and M and slightly distal of point

Figure 1. Photomicrograph of alate female of *Zorotypus zimmermani* Gurney from Fiji; dorsal habitus.

of separation of M and Cu from stem of M+Cu (Fig. 2). Hind wing with stem of M exceedingly faint at base of wing, joining slightly more distinct stem of R near wing base; R+M more strongly pigmented, positioned in anterior third of wing and extending to near two-thirds wing length; apical abscissa of R terminating on anterior wing margin well prior to wing apex and slightly more apical than point of termination of M on posterior margin (Fig. 2).

Comments. The wide distribution of *Z. zimmermani* across Fiji and at elevations ranging from near sea level to nearly 1200 m is indicative of the dispersal abilities and broad habitat range of this and other zorapterans. The notion of extreme endemism for most species is likely the result of poor sampling as noted by Engel (2001, 2004) and demonstrated by the already known wide distribution for certain species (*e.g*., *Z. hubbardi* Caudell throughout the eastern United States), increasingly larger ranges being documented for additional species (*e.g*., Engel, 2001), and ecological models of zorapteran distribution (Hinojosa-Díaz *et al*. 2006). Certainly more locally endemic species do exist but the concept of zorapterans as being poor flies with almost no ability to disperse or all species being restricted in distribution is assuredly false.

It is interesting to note that there are few records of zorapterans from Oceania. Aside from the Melanesian *Z. zimmermani*, and three species in Indonesia, only two additional species are documented from Australasia (*Z. lawrencei* New on Christmas Island) and Polynesia (*Z. buxtoni* Karny on Samoa) (there is also a species, *Z. swezeyi* Caudell, from Hawaii). None are presently known in Micronesia. Suitable zorapteran habitat occurs widely throughout the region and, given the presence of the aforementioned species, there is great reason to suspect that *Zorotypus* occurs on other oceanic islands. In particular, species should be sought in Papua New Guinea, the Solomon Islands, Vanuatu, New Caledonia, and Tonga. It is a challenge to ascertain the affinities of the few species from

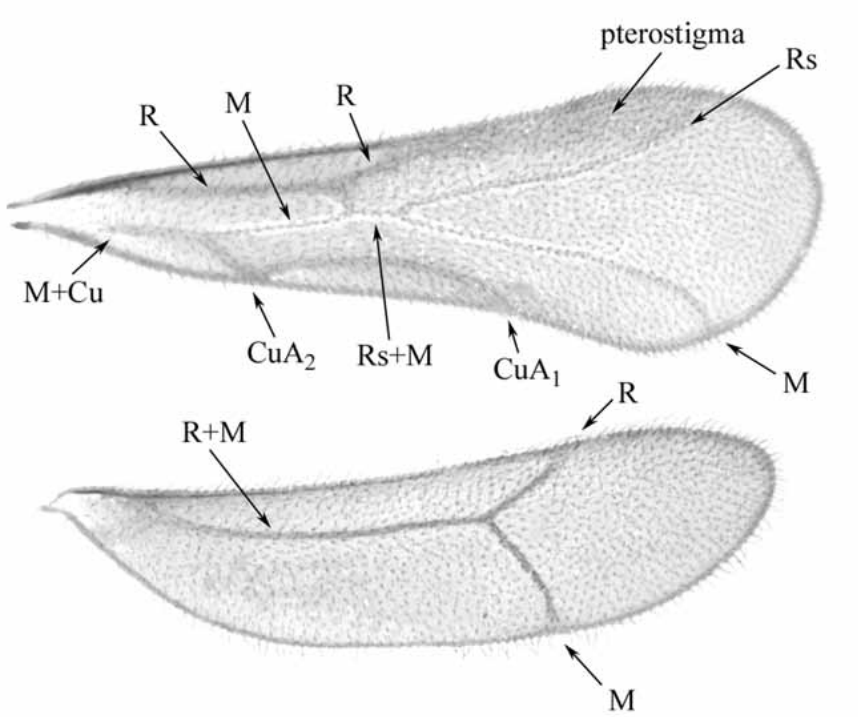

Figure 2. Wing venation of *Zorotypus zimmermani* Gurney from Fiji; forewing above, hind wing below.

Oceania given the paucity of available material and that only *Z. zimmermani* and *Z. lawrencei* have been adequately characterized and figured in the literature. It is tempting to hypothesize a relationship between *Z. zimmermani* in Fiji with *Z. buxtoni* from Upolu, Samoa (holotype and only known specimen captured at 2000 m near Malololelei), but too little information is available on the latter species to permit a positive association. Karny (1932) provided a brief account of the species but the sole specimen available to him was a badly damaged, apterous individual. So poor was the specimen that he could not ascertain whether it was an adult or a nymph. From the scant information on the species, the structure the cercus suggests more of an affinity with *Z. javanicus* Silvestri rather than *Z. zimmermani*. In *Z. buxtoni* and *Z. javanicus* the cercus is strongly conical, with an elongate, stout, terminal seta or spine, while in the Fijian species the cercus is more oval, with scattered, elongate, more flexible setae both apically, subapically, and laterally. Extensive new collections need to be made in Samoa before anything more about the identity and affinities of *Z. buxtoni* can be ascertained.

New records. FIJI: **Viti Levu:** 4 alate ♀♀, 1 dealate ♂, Naitasiri Province, 3.3 km N Veisari Settlement, log road to Waivudawa, 300 m, 14.ii–8.iii.03 [14 February–8 March 2003], Malaise 4, E.I. Schlinger & M. Tokota'a, 18.069°S 178.367°E [FBA 134766–

134770]. 1 alate ♀, Naitasiri Province, 4 km WSW Colo-i-Suva Village, Mt. Nakobalevu, 372 m, 24–28.x.2003 [24–28 October 2003], Malaise 3, E.I. Schlinger & M. Tokota'a, 18.055° 178.424°E [FBA 134760]. **Vanua Levu:** 1 dealate ♀, Bua Province, Batiqere Range, 6 km NW Kilaka Village, 61 m, 3–10.vi.2004 [3–10 June 2004], Malaise 4, E.I. Schlinger & M. Tokota'a, 16.811°S 178.988°E [FBA 134763]. **Taveuni:** 1 dealate ♀, Cakaudrove Province, 5.6 km SE Tavuki Village, Devo Peak, 1187 m, 3–10 Jan 2003 [3–10 January 2003], Malaise 1, E.I. Schlinger & M. Tokota'a, 16.843°S 179.966°E [FBA 134761]. 1 alate ♀, Cakaudrove Province, 3.2 km NW Lavena Village, Mt. Koronibuabua, 217 m, 1–24.ii.2004 [1–24 February 2004], Malaise 3, E.I. Schlinger & M. Tokota'a, 16.855°S 179.89°E [FBA 134765].

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Note: Clarification of the Authorship of *Xixuthrus heros* (Coleoptera: Cerambycidae)

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INTRODUCTION

The authorship of the Fiji cerambycid beetle *Xixuthrus heros* (originally *Macrotoma heros*) described in 1868 (Gräffe, 1868; fig. 1) has long been attributed to Oswald Heer. The description, on p. 47 is labeled "Macrotoma heros Hr." (Fig. 2) but there is no explanation of what surname the abbreviation "Hr." stands for nor is there any explanation in the text of the article by Gräffe regarding who was responsible for the description. Since there is nothing in the work itself that explicitly indicates that Heer "published it in a way that satisfies the criteria of availability" (I.C.Z.N. *Code* Article 50.1 [I.C.Z.N., 1999]), the name should therefore be attributed to the author of the article in which it appeared, Eduard Gräffe. Additionally, Article 50.1.1 of the *Code* stipulates that in the case of a person other than the author of a work being responsible for validating the name, "If the identity of that other person is not explicit in the work itself, then the author is deemed to be the person who publishes the work." In this case, there is nothing that explains what the abbreviation "Hr." stands for, so again, Gräffe becomes the author.

THE INSECTS IN GRÄFFE'S "REISE"

The story behind the actual circumstances leading to the publication of this beetle is worth recanting. Dohrn (1868) in a detailed treatise on the beetle a short while after the publication of the beetle by Gräffe, outlines the events that lead to the beetle being so labeled.

Carl August Dohrn (1806–1892) was a coleopterist, president of the Entomological Society in Stettin from 1843–1887 and, by 1868 had published over 60 scientific articles. In Dohrn (1868) he mentions that in late 1866 his son Heinrich Dohrn (malacologist and dermapterist) visited the Godeffroy Museum (for background on this Museum and its expeditions to the South Pacific, see Evenhuis, in press) and its curator, J.D.E. Schmeltz to discuss exotic beetles being sent to C.A. Dohrn for description, including the giant cerambycid from Fiji. By the Spring of 1867, C.A. Dohrn had received 3 male specimens of the giant beetle plus a immature in a cocoon [the last to be determined later as from another species of beetle]. He arranged for drawings to be made by a Mr. G. Schultz. In early 1868 Dohrn sent the completed drawings to Godeffroy for approval and they crossed in the mail with Gräffe's booklet sent from Godeffroy to Dohrn. Dohrn was surprised to see the lithograph and description of *Macrotoma heros* and wrote to Schmeltz for an explanation.

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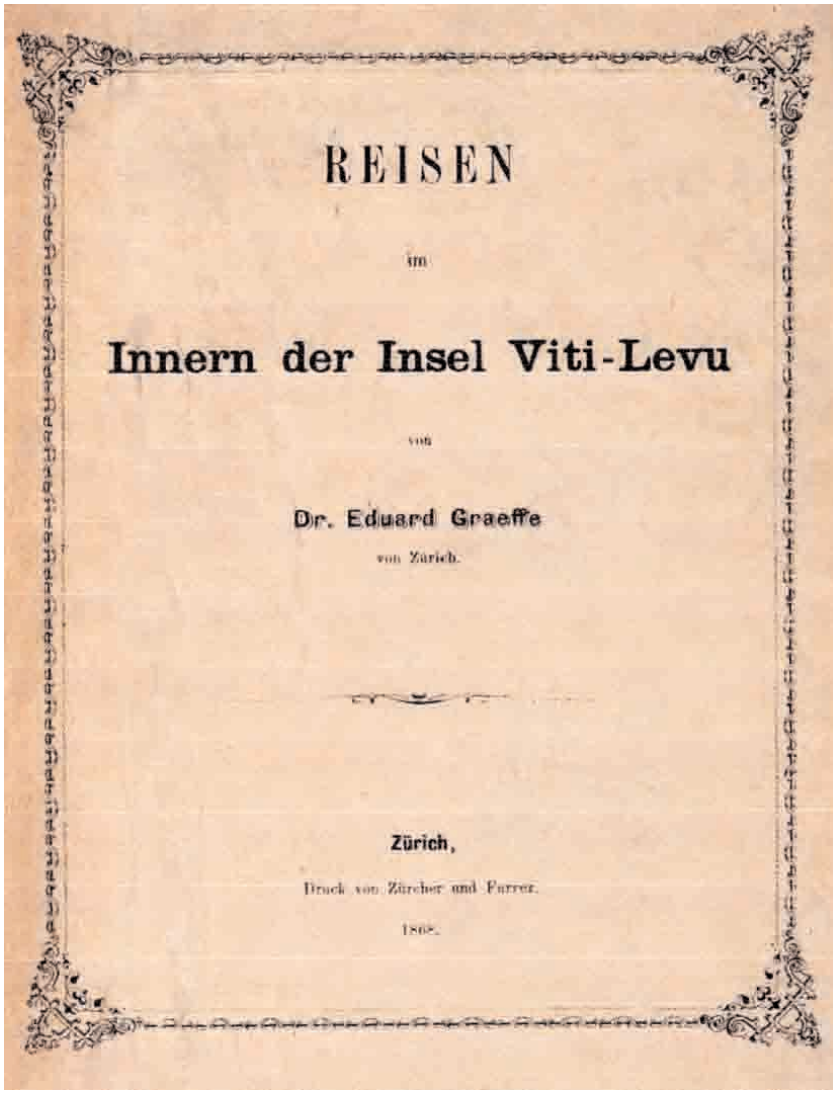
2. Contribution No. 2007-0xx to the Pacific Biological Survey.


REISEN

im

Innern der Insel Viti-Levu

von

Dr. Eduard Graeffe

von Zürich.

Zürich,

Druck von Zürcher und Furrer.

1868.

Figure 1. Title page of Gräffe's 1868 *Reise* booklet.

Schmeltz explained that it was the custom in Zürich that at the turn of the year, scientific societies published small works for general enlightenment and entertainment. The chairman of the publications committee, malacologist Albert Mousson, chose Gräffe's voyage into the interior of Viti Levu, Fiji for 1868. The insect plates were intended to give an idea of the fauna without any scientific intention. Since the plates needed textual explanation, Oswald Heer was given charge of the task.

— 47 —

Longitudo.	maris.	feminae.
corporis	68—70 Mm.	105—116 Mm.
pronoti	4,5	6—6,5
mesonoti	13,5	20—21,5
alarum	18—20	10—12
femorum antic.	24	31—33
„ post.	18	23—25

Der Charakter der Species besteht in den angeführten Grössen-Verhältnissen und der derben Gestalt des Weibchens. Besonders hervorzuheben ist die zarte smaragdgrüne Färbung, welche beim Männchen ins Bräunlich-gelbe variirt. Während das lederartige Vorderfeld des Unterflügels die lichte smaragdgrüne Färbung des ganzen Thieres theilt, ist das zarte Hinterfeld in dem reinsten, intensiven Purpur gefärbt, mit jenem matten Sammet-Hauche, wie er nur auf den zarten Membranen der Hinterflügel einer Reihe von Phasmodeen Asiens und Australiens vorkommt.

Die Füsse sind nicht besonders scharfkantig und glatt, mit Ausnahme der Mittel- und Hinterschenkel, welche gegen die Spitze der äusseren Unterkante 3 bis 5 ganz kleine Sägezähne tragen.

Die Form der Genitalien ist bei der Charakteristik des Genus angegeben. Die relative Länge und Form jener Platten, aus welchen die Legescheide zusammengesetzt ist, bildet einen wesentlichen Charakter für die Eintheilung der Phasmodeen und ist daher für die Diagnose des Genus wichtig.

Die Eier gehören zu den tonnenförmigen, nicht gerippten, mit eingesetztem Deckel: ebenfalls ein Merkmal für grössere Gruppen-Eintheilung.

Von den Viti-Inseln stammt eine zweite Species, welche ich **Gr. minor** nenne und die durch die bedeutend kleineren Dimensionen, die schwächere Granulation des Mesonotum und die durchgehends gelblich-braune Färbung sich auszeichnet.

Fig. 3. **Macrotoma heros Hr.**
Von den Viti-Inseln.

Dieser riesenhafte Bockkäfer gehört in die Familie der Prioniden, welche in Indien mehrere sehr grosse Arten, so den Enoplocerus armillatus L. sp., besitzt. Er stimmt in den meisten Merkmalen mit Macrotoma Serv. überein, weicht aber in dem an den Seiten gerundeten, fast halbmondförmigen Vorderrücken von den bekannten Arten ab und bildet so durch die abweichende Form der Brust eine besondere Gruppe unter den Macrotomen. Er hat eine Länge von 144 Millimeter; der Kopf ist 27 Mill. lang (die Oberkiefern 11 Mill.); der Vorderrücken 21 Mill. lang und 37 Mill. breit; beide Flügeldecken haben eine Breite von 45 Mill., ihre Länge beträgt 94 Mill. Die Oberkiefer sind auf der Innenseite stark gezahnt. Die Fühler von der Länge des Körpers, das erste Glied auswärts keulenförmig verdickt, das zweite sehr kurz, das dritte so lang als die zwei folgenden, das 3—8te Glied sind mit einer Reihe von Dornen besetzt. Der Vorderrücken ist am Grund fast grade abgeschnitten, an den Seiten der Art gerundet und nach vorn verschmälert, dass er fast halbmondförmig wird; die Seiten sind mit zahlreichen sehr genäherten Dornen besetzt. Die Beine haben starke Schenkel, die wie die

Figure 2. Page 47 of Gräffe's *Reise* with the original description of *Macrotoma heros*.

When informed about the booklet, Gräffe's father, a mathematician in Zürich, wrote to Schmeltz about the insects. Schmeltz naïvely sent him a touched-up photograph of the cerambycid and other relevant things and said to make sure he contacted the people contracted by Godeffroy to do the descriptions, namely Brunner von Wattenvyl, Dohrn, Herrich-Schaeffer, and Schiner. Upon receiving the photograph from which to make the descriptions, Gräffe passed it on to Heer and failed to contact any of the listed authors

except fellow Swiss Brunner von Wattenwyl. So it became an all-Swiss endeavor.

The fact that Heer turns out to be the one who was given the task of preparing the explanation to the plate of insects explains why Brunner von Wattenwyl was mentioned as being responsible for the walking sticks that were described and Heer was not mentioned as responsible for anything. it also explains why the brief "Hr." was used rather than the full surname. All the other new taxa were described by Heer himself so he figured it would be redundant to explain in his narrative that he was writing the remainder of the descriptions and no need to print out his name in full. With this evidence of the circumstances that took place in the publication of the Gräffe booklet, it is now apparent that even Heer got duped in this fiasco. To further the insult to Dohrn, Professor Mousson, in a rather cavalier response to an inquiry by Dohrn responded that he thought this all "eine wahre Lächerlichkeit erscheint" ["a truly laughable matter"].

It is a pity that Mousson as editor of the publication, did not see to it that proper credit was given to Heer for his contribution. This could easily have been done when checking the page proofs or even the manuscript itself. Heer probably thought a title with his name attached would appear somewhere in the work, but it did not. The unfortunate result is an innocent Eduard Gräffe became author of this beetle — as well as the author of the remainder of the new species (other than the phasmids) described in that explanation to the plate.

NB: An interesting side note is that since Heer did the description from a photograph (Dohrn had the only 3 known specimens at the time), the plate must now be considered an iconotype—a rare instance in zoology.

ACKNOWLEDGMENTS

Many thanks to Dr. Adrian C. Pont for his assistance with the translation of the relevant pages in Dohrn (1868) that helped clarify the circumstances surrounding publication of the insect descriptions in the Gräffe booklet.

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FIJI ARTHROPODS VII

(edited by N.L. Evenhuis & D.J. Bickel)

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