

Studies of Tiger Beetles. CLXXVII. Notes on the tiger beetle fauna of Fiji (Coleoptera: Cicindelidae)

FABIO CASSOLA

Via F. Tomassucci 12/20, 00144 Roma, Italy. E-mail: fabiocassola@alice.it

Abstract. The data are given of tiger beetle species collected during the long-term Bioinventory of Fijian Arthropods (FBA) Project, funded by the Schlinger Foundation between September 2002 and May 2004, and the subsequent NSF-funded Fiji Terrestrial Arthropods Survey (still continuing). The Fijian tiger beetle fauna presently includes two species only, one of which was early described early in 19th Century by Blanchard, while the other one was described by the author in 1983 from Viti Levu. Both species have obvious Papuan relationships and were collected during the surveys, mostly by primarily using Malaise traps in rainforest. While *Oceanella vitiensis* (Blanchard) was collected on Kadavu, Taveuni, Vanua Levu and Viti Levu, *Parapolyrhanis oceanica* Cassola proved to be new to Taveuni and Vanua Levu, but it was apparently not found on Kadavu.

INTRODUCTION

The tiger beetle fauna of Fiji includes only two species, one of which (*Parapolyrhanis oceanica* Cassola) was described by me several years ago (Cassola, 1983, 1986) and is apparently a Fiji endemic. The other species, *Oceanella vitiensis* (Blanchard, 1853), is better known, is apparently widespread in on several Fiji islands (D. Brzoska, pers. comm.), and was also recorded from the Samoan Islands (Brouerius van Nidek, 1957). Generally, there are few tiger beetle species on Pacific islands and are lacking in several island groups (such as the Hawaiian Islands). The only notable exceptions are New Guinea and the Solomons (both of which harbour a rich and remarkable endemic fauna); New Caledonia [with at least 3 endemic genera at (*Caledonica* Chaudoir, *Vata* Fauvel, and *Manautea* Deuve)]; and New Zealand (with the endemic genus *Neocicindela* Rivalier) (Cassola 1983). One species was recently described from the Palau Islands as well (Cassola & Sató, 2004).

Previous to this study, the existing information on Fijian species was scanty and based primarily on a few old-collected specimens. In 2001, Mike Irwin (University of Illinois, USA) and Evert I. Schlinger (World Spider Endoparasitoid Laboratory, Santa Ynez, California, USA; WSPL) started a long-term bioinventory analysis of the arthropods of Fiji, which was followed by the NSF-funded Fiji Terrestrial Arthropods Survey (the latter still continues). General information about the geography of the Fiji Islands and the surveys cited above is found in Evenhuis & Bickel (2005). Beginning in September 2002, many trips were made to Fiji and numerous Malaise traps were placed in habitats on various islands. Thanks to several Fijian naturalists (especially Moala Tokota'a, and his wife Akanisi Caginitoba, but also S. Lau, W. Naisililili, E. Namatalau, E. Ratu, Timoci, L. & M. Tuimereke and P. Vodo), all traps were monitored regularly and many specimens

were collected. From the tiger beetles kindly sent to me for identification, the present paper presents the many new distributional records obtained. Most of the specimens mentioned below are currently in the collection of the Bishop Museum (BPBM; Honolulu, Hawaii, USA), and some are in my collection (FCC). Vouchers deriving from this material currently in BPBM will be sent to the Fiji National Insect Collection in Suva (FNIC).

Oceanella vitiensis (Blanchard)

Cicindela vitiensis Blanchard, 1853: 7. Fairmaire, 1881: 244. Fleutiaux, 1892: 40. Horn, 1915: 316; 1926: 198; 1936: 9. Brouerius van Nidek, 1957: 140.

Cicindela australasiae Chaudoir, 1865: 22. Fleutiaux 1892: 40. [synonymy by Horn, 1915: 316].
Nomen nudum.

Cicindela ezonata Broun, 1921: 594. [synonymy by Horn, 1936: 9].

Oceanella vitiensis (Blanchard); Rivalier, 1963: 40. Brouerius van Nidek, 1965: 353. Cassola, 1983: 215. Lorenz, 1998: 60.

This species was first described by Blanchard (1853), then by Fairmaire (1881). Broun (1921) erroneously reported it from Greymouth, New Zealand. Broun's species, *Cicindela ezonata* was synonymized under *vitiensis* by Horn (1936) and this synonymy was maintained by Brouerius van Nidek (1965). The name *australasiae* Chaudoir is a *nomen nudum* and is treated under *O. vitiensis* (Horn, 1896a; Wiesner, 1992; Lorenz, 1998). *Oceanella vitiensis* is apparently a common species in the Fiji Islands, found in many places and habitats (D.W. Brzoska, pers. comm.). The supposed "subspecies" *imperfecta* Horn (Horn, 1896b) and *pallidesignata* Brouerius van Nidek, both of which exhibit slightly different elytral markings, are herein considered to be junior synonyms because all forms were represented among the examined material. *Oceanella vitiensis* has also been recorded from the Samoa Islands (Brouerius van Nidek, 1957).

Material Examined: Kadavu: 0.25 km SW Solodamu Village, Moanakaka Bird Sanctuary, 60 m, 19°04'S, 178°07'W, 28 May–11 Jun 2003, Malaise 1, E.I. Schlinger & M. Tokota'a, 1 ♀; 23 Oct–19 Dec 2003, Malaise in coastal limestone forest, M. Irwin, E.I. Schlinger, M. Tokota'a, 1 ♂; 9–15 Feb 2004, Malaise 1, E.I. Schlinger & M. Tokota'a, 1 ♂, 2 ♀; 15 Feb–7 Mar 2004, Malaise 4, S. Lau, 6 ♂, 5 ♀; 15 Feb–7 Mar 2004, Malaise 1, E.I. Schlinger & M. Tokota'a, 6 ♂, 7 ♀; 7 Mar–11 Apr 2004, Malaise, E. I. Schlinger & M. Tokota'a, 7 ♂, 1 ♀; 11 Apr–2 May 2004, Malaise, S. Lau, 4 ♂, 1 ♀. *Taveuni:* Taveuni Estate, 16°50'S, 179°59'W, 140 m, 25 Sep–2 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♀; 10–17 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♂ 1 ♀; 31 Oct–21 Nov 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♂, 1 ♀; 5.3 km SE Tavuki Village, Des Voeux (Devo) Peak, 1064 m, 16.84°S, 179.97°W, 2–10 Oct 2002, Malaise, P. Vodo [FBA 108411], 1 ♀; 24–31 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 5 ♂, 2 ♀; 31 Oct–14 Nov 2002, Malaise, E.I. Schlinger & M. Tokota'a, 2 ♀; 14–21 Nov 2002, Malaise, E.I. Schlinger & M. Tokota'a, 2 ♂, 1 ♀. Des Voeux Peak Radio Tower, 16°51'S, 179°58'W, 1195 m, 31 Oct–21 Nov 2002, Malaise, M.E. Irwin, E.I. Schlinger & M. Tokota'a, 2 ♂; 13–20 Dec 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 6 ♂, 4 ♀; 10–16 Jan 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 10 ♂, 8 ♀. Des Voeux Forest Reserve, 16°50'S–179°59'W, 800 m, 3–10 Jan 2003, Malaise, M. Irwin, E.I. Schlinger, M. Tokota'a, 2 ♂, 4 ♀. Soqlu House in Soqlu Estate, 140 m, 16°50'S, -180°W, 17–24 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a [FBA 206419], 1 ♀; 3–10 Jan 2003, Malaise, E. Ratu [FBA 220383], 1 ♀. Lavena, 16°51'S, -179°53'W, 213 m, 4–19 Nov 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♀. 3.2 km NW Lavena Village, Mt Koronibuabua, 16.85°S, 179.89°W, 234 m, 24 Oct 2003–4 Jan 2004, Malaise, E.I. Schlinger & M. Tokota'a, 3 ♂, 1 ♀. Koronibuabua, 16°51'S, 179°53'W, 233 m, 11–26 Mar 2004, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 3 ♀. *Vanua Levu:* Kilaka, 16.89°S, 178.59°W, 146 m, 3–10 Jun 2004,

Malaise, M.E. Irwin, E.I. Schlinger & M. Tokota'a, 1♂, 1♀; 98 m, 28 Jun–21 Jul 2004, Malaise, M.E. Irwin, E.I. Schlinger & M. Tokota'a, 1♀; 154 m, 28 Jun–2 Jul 2004, Malaise, M.E. Irwin, E.I. Schlinger & M. Tokota'a, 1♀; Batiqere Range, 6 km NW Kilaka Village, 16.81°S, -178.99°E, 98 m, 28 Jun–21 Jul 2004, Malaise, E.I. Schlinger & M. Tokota'a, 7♂, 10♀; Rokosalase, 28 Mar 2004, hand netted, E.I. Schlinger, 1♂, 1♀; 0.6 km S Rokosalase Village, 16°53'S, -179°02'W, 180 m, 22 May–8 Jun 2004, Malaise, E.I. Schlinger & M. Tokota'a, 1♀; 22 May–8 Jun 2004, Malaise, E.I. Schlinger & M. Tokota'a, 2♂, 2♀; 0.5 km S Rokosalase Village, 16°53'S, -179°02'W, 97 m, 26 Mar–9 Jun 2004, Malaise, E.I. Schlinger & M. Tokota'a, 1♀. **Viti Levu:** 3.3 km N Veisari, logging rd to Waivudawa, 18°07'S, -178°37'W, 300 m, 12 Dec 2002–3 Jan 2003, Malaise, E.I. Schlinger & M. Tokota'a, 30♂, 28♀; 14 Feb–8 Mar 2003, Malaise, E.I. Schlinger & M. Tokota'a, 5♂, 10♀; 8–31 Mar 2003, Malaise, M. Tokota'a, 7♂, 17♀; Sovi Basin, Wainivalau, 17°54'S, -178°14'E, 300 m, 8–16 May 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 10♂, 2♀; Nakobalevu Peak, 372 m, 14 Nov–24 Dec 2003, Malaise, E.I. Schlinger & Timoci, 1♀; 325 m, 12–24 Apr 2004, Malaise trap, Timoci, 2♀; Nakobalevu logging rd, 17 Mar–9 Apr 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1♂, 1♀; Nakobalevu Peak radio towers nr. Suva, 19°03'S, -178°25'E, 460 m, 22 Sep–9 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1♂; Nakobalevu Peak, logging rd behind Suva, 18°03'S, -178°25'E, 340 m, 22 Sep–9 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1♂; 4 km WSW Colo-i-Suva Village, 18°05'S, -178°42'E, 372 m, 17 Mar–9 Apr 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1♀; Sovi Basin, Wainivalau, 17°54'S, -178°14'E, 300 m, 8–16 May 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 5♂, 7♀; Navai Village, Eteni, 17°37'S, -177°59'E, 700 m, 15 May–2 Jun 03, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1♂; 13–18 Dec 2004, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1♀; 2 km SE Nabukavesi Village, Ocean Pacific Resort, 40 m, 18°01'S, -178°25'W, 21 Apr–4 May 2003, Malaise, W. Naisilisili, 1♂, 1♀; 24 Nov–11 Dec 2003, Malaise, W. Naisilisili, 1♂, 1♀; Wainadoi, Ocean Pacific, 18°10'S, -178°15'E, 40 m, 5–24 Nov 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1♂, 2♀; 3.8 km N Veisari, Waivudawa logging rd, 19°08'S, -178°36'W, 300 m, 25 Apr–25 May 2003, Malaise, E.I. Schlinger & M. Tokota'a, 27♂, 42♀; Koroyanitu Ecopark, Mt. Evans Range, Abaca Village, 17°40'S, 177°33'E, 400 m, 21 Sep–7 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 1♂; 0.5 km N Abaca Village, 17.67°S, -177.55°W, 800 m, 7–12 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 8♂, 16♀; 28 Jan–4 Feb 2003, Malaise, L. & M. Tuimereke, 2♂, 2♀; Koroyanitu Ecopark, Mt. Evans Range, 1 km E Abaca Village, Savuione Trail, 17°40'S, -177°33'E, 450 m, 7–12 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 12♂, 10♀; 12–19 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 4♂, 2♀; 19–26 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 9♂, 6♀; 26 Oct–5 Nov 02, Malaise, E.I. Schlinger & M. Tokota'a, 18♂, 19♀; 11–19 Mar 2003, E.I. Schlinger & M. Tokota'a, 24♂, 36♀; 800 m, 22 Apr–6 May 2003, Malaise, L. & M. Tuimereke, 4♂, 1♀; 21 Oct–18 Nov 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 22♂, 26♀; Savuione Trail, 800 m, 6–11 Mar 2003, Malaise, E.I. Schlinger & L. & M. Tuimereke, 5♂, 6♀; 26 Nov–3 Dec 2002, Malaise, E.I. Schlinger & L. & M. Tuimereke, 2♂ 5♀. Koroyanitu Ecopark, Mt. Evans Range, 1 km E Abaca Village, Kokabula Trail, 17°40'S, -177°33'E, 400 m, 12–19 Nov 2002, Malaise, E.I. Schlinger & M. Tokota'a, 3♂, 13♀; 19–26 Oct 02, Malaise, E.I. Schlinger & M. Tokota'a, 7♂, 13♀; 26 Oct–5 Nov 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 9♂, 6♀; 800 m, 19–26 Nov 2002, Malaise, L. & M. Tuimereke, 4♂ 2♀; 10–17 Dec 2002, Malaise, M. Tokota'a, 1♂, 3♀; 1 km SW Vaturu Dam, 17.75°S, -177.66°W, 620 m, 2–14 Jul 2004, Malaise, E.I. Schlinger & M. Tokota'a, 1♀.

Parapolyrhanis oceanica Cassola

Parapolyrhanis oceanica Cassola, 1983: 216; 1986: 117. Lorenz, 1998: 60.

This endemic species was described on a single male specimen from Lami, Viti Levu, Fiji (Cassola, 1983), but three years later (Cassola, 1986) two more specimens, both also from Viti Levu (one male from Nadala and one female from Suva), were found. No additional specimens have been reported in the entomological literature, thus the recently collected

specimens, listed below, are the first subsequent records. This species, which is smaller and narrower than *Oceanella* and has yellowish legs (instead of metallic), appears to be new to Taveuni and Vanua Levu while, surprisingly, it was not found on Kadavu.

Material Examined: **Taveuni:** 5.3 km SE Tavuki Village, Des Voeux (Devo) Peak, 1064 m, 16°50'S, -180°W, 2–10 Oct 2002, Malaise, P. Vodo, 2 ♀; 10–17 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 2 ♂; 31 Oct–14 Nov 2002, Malaise, E.I. Schlinger & M. Tokota'a, 2 ♂; 21 Nov–13 Dec 2002, Malaise, E.I. Schlinger & M. Tokota'a, 1 ♀; 5.6 km SE Tavuki Village, Des Voeux Peak, 1187 m, 16.84°W, -179.96°W, 24–31 Oct 2002, Malaise, E.I. Schlinger & M. Tokota'a, 2 ♂, 1 ♀; 3–10 Jan 2003, Malaise, E.I. Schlinger & M. Tokota'a, 16 ♂, 3 ♀; 10–16 Jan 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 13 ♂, 3 ♀. Des Vœux Forest Reserve, 16°50'S, -179°59'W, 800 m, 10–17 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♂; 3–10 Jan 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 10 ♂, 5 ♀; Des Voeux Peak Radio Tower, 1200 m, 16°51'S, -179°58'E, 2–10 Oct 2002, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 1 ♂, 1 ♀; 10–16 Jan 2003, Malaise, M. Irwin, E.I. Schlinger & M. Tokota'a, 2 ♂; Soqulu House in Soqulu Estate, 140 m, 17–24 Oct 2002, Malaise: M01, E.I. Schlinger & M. Tokota'a [-16.833°, 180°], [FBA 206420–206422], 3 ♂. **Vanua Levu:** 0.5 km S Rokosalase Vlg., 16.532°S, -179.019°E, 97 m, 26 Mar–9 Jun 2004, Malaise 3, E.I. Schlinger & M. Tokota'a, 8 ♂. **Viti Levu:** 3.5 km N Veisari, logging rd to Waivudawa, 18°07'S, -178°37'W, 300 m, 12 Dec 2002–3 Jan 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1 ♂, 1 ♀; 14 Feb–8 Mar 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1 ♀; 8–31 Mar 2003, Malaise, M. Tokota'a, 1 ♂; 2 km E Navai Village, old trail to Mt. Tomaniivi, 17.62°S, -178°E, 700 m, 9–20 Dec 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1 ♂; 24 Nov–9 Dec 2003, Malaise, E.I. Schlinger & M. Tokota'a, 1 ♂; 3.2 km E Navai Village, Veilaselase Trail, 1020 m, 17°35'S, -178°01'W, 20 Dec 2003–7 Jan 2004, Malaise, E. Namatalau, 1 ♂.

CONCLUSIONS

As far as it is presently known, the Fijian tiger beetle fauna includes only two species, both of which were collected in the various Malaise traps placed during the surveys in several localities. While *Oceanella vitiensis* (Blanchard) was collected on Kadavu, Taveuni, Vanua Levu, and Viti Levu, the second species, *Parapolyrhaxis oceanica* Cassola, occurs on Viti Levu and is new to Taveuni and Vanua Levu, but it is apparently absent on Kadavu Island. Both species clearly show Papuan relationships.

ACKNOWLEDGMENTS

I thank Neal Evenhuis (BPBM) and Evert I. Schlinger (WSPL) for kindly including me in the beetle team of the Fiji Arthropod projects. Thanks are also to be given to Leah Brorstrom (WSPL), Chris Grinter (WSPL) and Terry Lopez (BPBM), for preparing and sending several parcels to me, as well as to M. Irwin, M. Tokota'a and the other Fijian collectors, and again to Evert I. Schlinger, for their expert field work in the Fijian Islands.

LITERATURE CITED

- Blanchard, É.** 1853. Description des insectes. Ordre des coléoptères. Famille des carabides (Carabidae). Tribu I. Cicindelinae, pp. 1–8. *In: Voyage au Pole Sud et dans l'Océanie sur les corvettes l'Astrolabe et la Zelée*. Tome 4. Zoologie (Hombron et Jacquinet, eds.). Gide & J. Baudry, Paris. 422 pp.

- Brouerius van Nidek, C.M.C.** 1957. Something about *Cicindela vitiensis* Blanch. *Entomologische Berichten* **17**: 140.
- . 1965. Cicindelidae of New Zealand with descriptions of a new species and sub-species. *New Zealand Journal of Science* **8**(3): 352–358.
- Broun, Th.** 1921. Descriptions of new genera and species of Coleoptera. *Bulletin of the New Zealand Institute* **1**(7): 591–595.
- Cassola, F.** 1983. Studies on cicindelids, XXXVI. A new tiger beetle from the Fiji Islands (Insecta: Coleoptera: Cicindelidae). *Senckenbergiana Biologie* **64**(1/3): 215–219.
- . 1986. Studies on cicindelids, XLVI. The female of *Parapolyrhanis oceanica* Cassola (Coleoptera, Cicindelidae). *Fragmenta Entomologica* **19**(1): 117–118.
- . & **M. Satô**, 2004. A new *Cylindera* species from the Palau Islands, Micronesia (Coleoptera, Cicindelidae). *Japanese Journal of Systematic Entomology* **10**(2): 187–191.
- Chaudoir, M. de** 1865. *Catalogue de la Collection collection de cicindélètes de M. le Baron de Chaudoir*. Bruxelles. 64 pp.
- Evenhuis, N.L. & Bickel, D.J.** 2005. The NSF-Fiji Terrestrial Arthropod Survey: Overview. In: Evenhuis, N.L. & D.J. Bickel (eds.), *Fiji Arthropods I. Bishop Museum Occasional Papers* **82**: 3–25.
- Fairmaire, L.** 1881. Essai sur les coléoptères des îles Viti (Fidgi) *Annales de la Société Entomologique de France* (6) **1**: 243–318.
- Fleutiaux, E.** 1892. *Catalogue systématique des Cicindelidae décrits depuis Linné*. Liège, chez Vaillant-Carmanne. 186 pp.
- Horn, W.** 1896a. Beitrag zur Synonymie der Cicindeliden. *Deutsche Entomologische Zeitschrift*, **2**: 353–357.
- . 1896b. Die Cicindeliden der Dohrn'schen Sammlung. *Stettiner Entomologischer Zeitung*, **57**: 164–177.
- . 1915. Coleoptera Adephaga, Fam. Carabidae, Subfam. Cicindelinae. *Genera Insectorum* 82C: 209–486.
- . 1926. Carabidae: Cicindelinae. *Coleopterorum Catalogus* 86. 345 pp.
- . 1936. Check list of the Cicindelidae of Oceania. *Bernice P. Bishop Museum Occasional Papers*, **12**(6): 3–11.
- Lorenz, W.** 1998. *Systematic list of extant ground beetles of the world (Insecta Coleoptera "Geoadephaga": Trachypachidae and Carabidae incl. Paussinae, Cicindelinae, Rhysodinae)*. Tutzing. 60 pp.
- Rivalier, É.** 1963. Démembrement du genre *Cicindela* L. (fin). V. Faune Australienne (et liste récapitulative des genres et sous-genres proposés pour la faune mondiale). *Revue Française d'Entomologie* **30**(1): 30–48.
- Wiesner, J.** 1992. *Verzeichnis der Sandsaufkäfer der Welt. Checklist of the tiger Beetles beetles of the world*. E. Bauer, Keltern. 364 pp.

