Fiji Arthropods II. Edited by Neal L. Evenhuis & Daniel J. Bickel. *Bishop Museum Occasional Papers* 84: 17-34 (2005).

A New Genus, *Phasmaphleps,* and New Species of *Cryptophleps* Lichtwardt from the Western Pacific, with Notes on Australasian Diaphorinae (Diptera: Dolichopodidae)[1]

DANIEL J. BICKEL
Australian Museum, 6 College Street, Sydney NSW 2010, Australia;
email: danb@austmus.gov.au

Abstract. *Phasmaphleps* (Diptera: Dolichopodidae) is a monotypic new genus in the subfamily Diaphorinae. The single included species, *P. pacifica* n. sp. occurs in the western Pacific: Fiji, Tonga, Samoa, American Samoa, the Solomon Islands, Tuvalu, and Belau, and is characterized by the absence of vein M just beyond the dm-cu crossvein. As well, seven new *Cryptophleps* species are described from the western Pacific: *C. vitiensis* from Fiji, *C. samoensis, C. vaea,* and *C. bucculenta* from the Samoan Islands, *C. rivularis* from New Caledonia, *C. buala* from the Solomon Islands, and *Cryptophleps karkar* from Papua New Guinea.

Phasmaphleps, *Cryptophleps,* and a third genus, *Asyndetus,* are all members of the subfamily Diaphorinae, and all have vein M either weakened and bent, or totally absent beyond crossvein dm-cu, and in some cases this crossvein is absent as well. A key is provided to all Australasian genera of Diaphorinae and species of *Cryptophleps.*

INTRODUCTION

The family Dolichopodidae has a characteristic venation which is fairly stable through out the family, with distinct patterns in various subfamilies. Usually veins that are weakened or lost (e.g., loss of M_2 in Sciapodinae, or A_1 in various genera) are not major veins. However, in the subfamily Diaphorinae, two genera, *Asyndetus* Loew and *Cryptophleps* Lichtwardt characterized by vein M distinctly weakened or broken, and in the latter genus usually having crossvein dm-cu absent as well. A new diaphorine genus, *Phasmaphleps,* having vein M beyond the dm-cu crossvein reduced to a faint trace has been recognized in collections from western Pacific islands. This genus is described here along with a number of new Australasian *Cryptophleps* species.

MATERIALS AND METHODS

This study is based on material housed in the Australian Museum, Sydney (AMS), Bishop Museum, Honolulu (BPBM), California Academy of Science, San Francisco (CAS), Illinois Natural History Survey, Urbana (INHS), Fiji National Insect Collection, Suva (FNIC), Museum National d'Historie Naturelle, Paris (MNHN), Queensland Museum, Brisbane (QM); United States National Museum of Natural History, Washington, D.C. (USNM), and collections of Richard Hurley, Montana State University, Bozeman. The left lateral view of the hypopygium or male genital capsule is illustrated for all species. In describing the hypopygium, 'dorsal' and 'ventral' refer to morphological position prior to genitalic rotation and flexion. Thus, in figures showing a lateral view of the hypopygium, the top of the page is morphologically ventral, while the bottom is dorsal. The CuAx ratio

1. Contribution No. 2005-008 to the NSF-Fiji Arthropod Survey.
.

is the length of the m-cu crossvein/ distal section CuA. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres should be regarded as representative ratios and not measurements. The ratios for each leg are given in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5. The following abbreviations and terms are used: MSSC, Male secondary sexual character(s), non-genitalic characters found only on the male body; I, II, III: pro- , meso-, metathoracic legs; C, coxa; T, tibia; F, femur; ad, anterodorsal; av, anteroventral; dc, dorsocentral setae; pd, posterodorsal; pv, posteroventral; t, tarsus; t_{1-5}, tarsomeres 1 to 5. On the figures, arrows are used to indicate diagnostic features.

SYSTEMATICS

The Diaphorinae are a complex and rich subfamily of cosmopolitan distribution. Three genera, *Phasmaphleps* (newly described here), *Cryptophleps,* and *Asyndetus,* all have vein M either weakened and bent, or totally absent beyond crossvein dm-cu, and in some cases this crossvein is absent as well. The morphology and possible relationships of these three genera are discussed near the end of this paper. A key to all Australasian genera of Diaphorinae is provided below.

KEY TO TROPICAL AUSTRALASIAN GENERA OF THE SUBFAMILY DIAPHORINAE (DOLICHOPODIDAE), AND TO MALES OF *CRYPTOPHLEPS*

1. Vertex not excavated laterad of ocellar tubercle, vein M unbranched, scape without dorsal setae, femora II and III without distinct anterior preapical setae; posterior mesonotum not flattened; abdomen not dorsoventrally flattened; postorbital setae present in row on lower postcranium; crossvein dm-cu usually shorter than distal section of CuA_1; hypopygium not pedunculate, but encapsulated at apex of abdomen; coxa III with lateral seta positioned in basal quarter ... Diaphorinae .. 2

–. Without this combination of characters ..... other Dolichopodidae

2. Upper part of proepisternum with 2–4 fine setae; male face parallel-sided; female with narrowest part of face subequal in width to widest part of frons; males often with enlarged pulvilli on tarsus I which are fused with claws, i.e., claws apparently absent; male sternum 8 often with four to eight strong projecting setae 3

–. Upper part of proepisternum bare; male face narrowed below or parallel-sided ; female with narrowest part of face narrower than widest part of frons; males rarely with enlarged pulvilli, but if enlarged, claws present; male sternum 8 without strong outstanding setae, or with only 2 projecting setae 4

3. Costa not extending beyond tip of R_{4+5}; distal vein M broken or weakened, with distal section often displaced; vein dm-cu present (near cosmopolitan, often coastal) ..... *Asyndetus* Loew

–. Costa ending at apex of vein M; vein M unbroken; male eyes sometimes dorsally holoptic (cosmopolitan) ..... *Diaphorus* Meigen

4. Vein M of normal thickness and unbroken; ac setae present, biseriate 5
-. Vein M distinctly reduced in thickness to trace, and/or broken, with distal section displaced anteriad; ac setae absent 6

5. Male first flagellomere with slender apical projection bearing apical arista, and lower postocular surface with many flattened pale setae (New World, introduced into Polynesia) ..... *Achradocera* Becker
-. Male first flagellomere with arista subapica1 in notch or to side of tip; lower postocular surface of male with fine unmodified setae (cosmopolitan) .... *Chrysotus* Meigen

6. Cross vein dm-cu well developed; vein M beyond crossvein dm-cu becoming demelanized trace, and continuing as unbroken trace to apex (Fig. 1c); vein R_{4+5} ending almost at wing apex; mesonotum and pleura dark metallic green with little pruinosity; 5 dc present; male FII with row of about 20 short av setae along distal two-thirds; hypopygium with elongate appendages; cercus elongate, extending beyond dorsal lobe of surstylus, and with strong setae (Fig. 1a) (widespread, western Pacific) ..... *Phasmaphleps pacifica* **n. gen., n. sp**.
-. Cross vein dm-cu absent or present as faint trace; vein M beyond crossvein dm-cu weakened but distinct, and with bend or anterior displacement near mid wing (Figs. 2c, 3b); vein R_{4+5} ending along distal anterior wing margin, well before wing apex; mesonotum and pleura brown or black; 4 dc setae present; FII without row of short av setae distally; hypopygium with short digitiform appendages; cercus short and rounded (Old World) (Figs 2, 3) .... *Cryptophleps* Lichtwardt .. 7

7. Male palp enlarged, projecting beyond proboscis, and pale yellow or white 8
-. Palp short and brown, not projecting beyond proboscis 12

8. Male palp with distinct pale setae; tibia II bare of strong ad setae, or ad setae very short; halter yellow or yellowish 9
-. Male palp bare of setae; tibia II with distinct ad seta in basal third; halter various ... 10

9. Male palp with 2 distinct pale setae along dorsal margin; femora I and II yellow to brownish; TI with posterior to pd row of pale slightly curved hairs; $IIIt_{2-4}$ with 7–8 dark curved posterior setae which decrease in size distally; sternum 8 with only short setae (Australia: N.T., Qld.) ..... *C. cyplus* Bickel
-. Male palp with single subapical pale seta; all femora dark brown; TI and IIIt unmodified; sternum 8 with 2 long curved setae (Australia: Qld.) ..... *C. nova* Bickel

10. Coxae and remainder of legs dark brown; palp subrectangular and cream colored with silvery pruinosity, but not entirely covering proboscis laterally (fig. 2b); wing (Fig 2c) with crossvein dm-cu totally absent; sternum 8 with only 2 long curved projecting setae, more than twice length of other setae (Fig. 2a); cercus with 4–5 long curved setae, clearly visible on dried specimens .. (New Caledonia) ..... *C. rivularis* **n. sp**.
–. Coxa I and all femora mostly yellow; palp enlarged as a subrectangular cream colored flap, and completely covering yellow proboscis; crossvein dm-cu present as trace, but not true vein (as in Fig. 3b); sternum 8 with no seta more than twice length of others 11

11. Male palp short, length not more than one quarter head height (Fig. 2e); femora yellow but brown dorsally; CI with pale yellow cuticle; halter stalk yellowish, club dark brown. (Samoa) .... *C. vaea* **n. sp.**
–. Male palp greatly enlarged, almost half head height (Fig. 2f); femora mostly dark brown; CI with some silvery anterior pruinosity; halter yellow (Samoa) .... *C. bucculenta* **n. sp.**

12. Tibia II without major ad setae 13
–. Tibia II with strong ad seta in basal third 15

13. Coxa I entirely yellow; halter yellow; vein M straight; male tarsi unmodified (Australia: Qld., N.T.) ..... *C. inornatus* Bickel
–. All coxae and remainder of legs dark brown; halter dark brown; vein M with distinct bend; at least one male tarsus distinctly modified 14

14. Coxa I with 3 strong thick black anterolateral setae, which are two-thirds length of coxa; IIt modified: IIt_1 with row of short black av setae; $IIt_{2–3}$ each expanded and ventrally concave with outer row of curved av setae; $IIIt_{2–5}$ each slightly flattened and bearing 2–3 outstanding curved setae on dorsal and posterior surfaces (Australia: Qld.) ..... *C. yungaburra* Bickel
-. Coxa I setation unmodified; IIt unmodified; $IIIt_{2–4}$ dorsoventrally flattened and broad, with $IIIt_4$ distinctly wider than $IIIt_5$ (Papua New Guinea, Solomon Is.) .. .. *C. papuanus* Grootaert & Meuffels

15. Sternum 8 with only short subequal setae, none more than twice length of others .. 16
–. Sternum 8 with 2 long projecting setae 17

16. Crossvein dm-cu present as distinct trace (not true vein) (Fig. 3b); halter pale yellow; hypopygium (Fig. 3a), surstylus digitiform with rounded apex (Fiji) .... *C. vitiensis* **n. sp**.
–. Crossvein dm-cu totally absent (as in Fig. 2c); halter dark brown; hypopygium (Fig. 3c); surstylus subtriangular with rounded apex (American Samoa, Samoa) .... *C. samoensis* **n. sp**.

17. Male tarsus I with claws and pulvilli enlarged, but not fused; tibia III from 3/5 to 7/8 with posterior row of long setae; femur III basally with only short setae; male sternum 8 with two long curved setae, distinctly longer than others ... (Micronesia) ..... *C. atollensis* Bickel
–. All claws and pulvilli small and subequal; other features variable 18

18. Male femur II without modified ventral setae; femur III with 3–4 ventral to pv setae along basal half (Solomon Is.) ..... *C. solomonis* Bickel
–. Male femur II with modified ventral setae along basal third; other features variable . 19

19. Male femur II in basal third with 7–8 curved almost crocheted ventral hairlike setae; femur III (Fig. 3e) with long ventral setae between 1/3 and 2/3; tarsomeres $III_{2–4}$ (Fig. 3f) with posterior row of curved setae, subequal to tarsal width; hypopygium (Fig. 3d) (Solomon Is) ..... *C. buala* **n. sp.**
–. Male femur II with 3 ventral setae in basal third, almost as long as femoral thickness; femur III with group of 6–7 ventral setae from 1/ to 2/5, with outstanding av seta, longer than femoral width at 1/3; tarsus III unmodified; hypopygium (Fig. 3g) (Papua New Guinea) ..... *C. karkar* **n. sp**.

Genus ***PHASMAPHLEPS*** Bickel**, new genus**

Etymology. *Phasmaphleps* is from the Greek, a combination of the word *phasma*, meaning ghost or phantom, and *phleps*, meaning tube or vein, referring to the absence of vein M just beyond the dm-cu crossvein. The gender is feminine.

Type species: *Phasmaphleps pacifica* Bickel, new species.

Diagnosis. (based on a single species, and notes characters considered to be of generic importance; however, a complete species description is also provided below.)

Head: pairs of strong postvertical, strong vertical and strong ocellar setae present; male eyes joined across lower face with anteroventral facets enlarged; first flagellomere rounded subtriangular, with apical arista.

Thorax: mesonotum with little pruinosity; setae black; ac absent; 5 dc present, decreasing in size anteriorly, with posterior most pair slightly offset laterally; propleuron with pale seta just above coxa, subtended dorsally by shorter seta; lateral scutellar setae reduced to tiny hairs or absent.

Legs: claws and pulvilli short; legs mostly bare of major setae.

Wing: (Fig. 1c); vein R_{4+5} ending near wing apex; vein M beyond crossvein dm-cu becoming trace, and continuing as faint fold to just behind wing apex; vein R_{4+5} and trace vein M bowed with respect to each other; CuAx ratio very low, less than 0.2.

Abdomen: elongate with short black vestiture; postabdomen (Fig. 1a); tergum and sternum 7 bare, each well developed and separated by membrane; hypopygial foramen left lateral; hypandrium and aedeagus elongate; epandrial lobe with strong apical seta; surstylus with dorsal and ventral arms; cercus elongate with strong distal setae; oviscapt (Fig. 1d) with fused epiproct bearing 4 pairs of long setae, and lobate cercus.

Remarks. *Phasmaphleps* is represented by a single widespread western Pacific species, *P. pacifica.* known from the Samoan Islands, Tonga, Fiji, Solomon Islands, Tuvalu and Belau. Most collection locales are elevations less than 100 m, and the type series was "collected in a salty slough, black mud with rocks and numerous fiddler crabs" (R. Hurley, pers. comm.), and a collection label from Belau indicates a mangrove habitat. This suggests a marine littoral/ mangrove habitat for this species (the specimen cited from 400 m on Savaii, Samoa, might be incorrectly labeled).

This genus is distinctive in having vein M reduced to a faint trace just beyond the crossvein dm-cu (Fig. 1c). This trace lacks tubular structure, and therefore is quite unlike other Diaphorinae with modified venation (*Asyndetus* and *Cryptophleps*), as discussed below. Also, there is no costalization, or anterior displacement of the veins in *Phasmaphleps*, and vein R_{4+5} terminates near the wing apex, as in diaphorine genera with unmodified venation.

Phasmaphleps pacifica has a dull shining metallic cuticle with very little thoracic and abdominal pruinosity. The legs are mostly bare of major setae.

Phasmaphleps pacifica Bickel**, new species**

(Figs. 1a–d)

Description. Male: body length 1.3–1.4 mm; wing: 1.5 x 0.6 mm.

Head: (Fig. 1b); frons shining black with grey pruinosity; pairs of strong postvertical, strong vertical and strong ocellar setae present; face/ clypeus present as narrow triangle beneath antennae; eyes joined across lower face with anteroventral facets enlarged; pale black with black apical seta; proboscis yellowish; antenna black; first flagellomere rounded subtriangular, almost reniform with

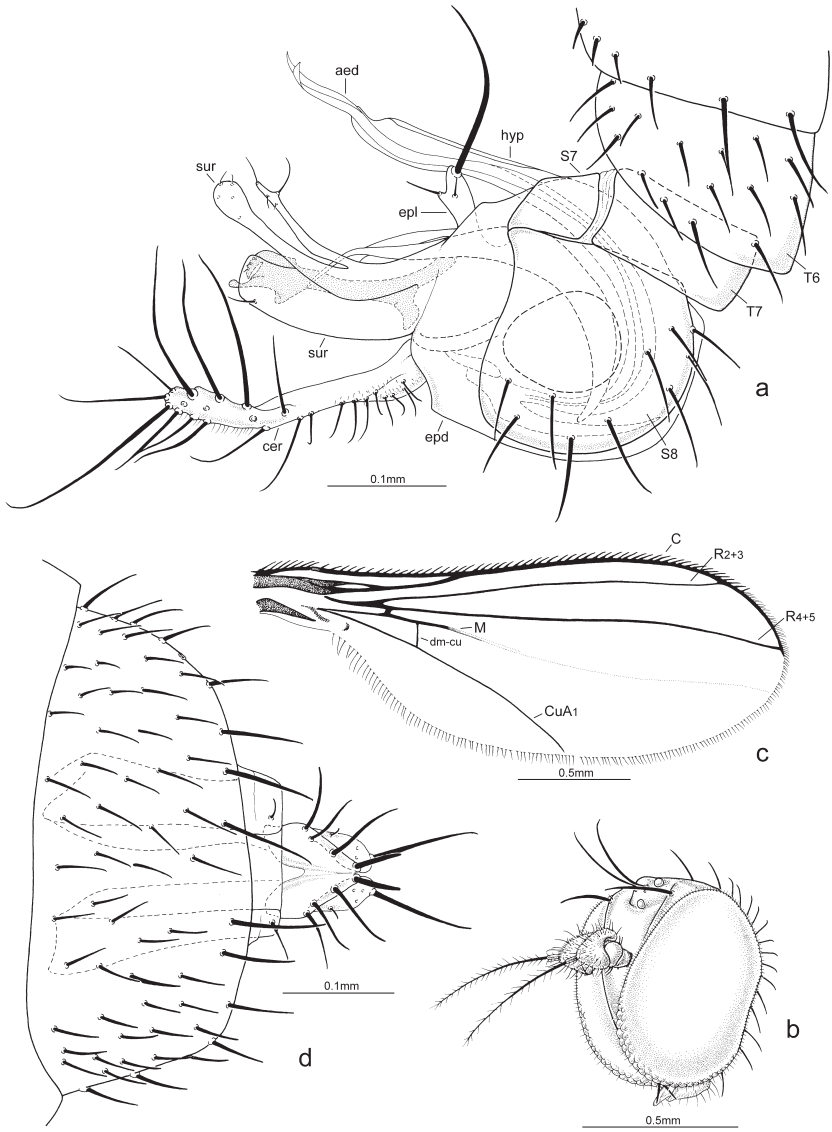

Fig. 1. *Phasmaphleps pacifica* n. sp.: **a**. male postabdomen, left lateral; **b**. male head, left anterior view; **c**. male wing, dorsal; **d**. female abdomen, dorsal. Legend: aed, aedeagus; cer, cercus; epd, epandrium; epl, epandrial lobe; hyp, hypandrium; S7, S8, sternum 7, 8; sur, surstylus; T6, T7, tergum 6, 7. Wing veins: C, R_{2+3}, R_{4+5}, M, CuA_1 and crossvein dm-cu.

apical arista; postcranium almost shining dark metallic blue-green; postorbital setae black dorsally, white along ventral half of head.

Thorax: mesonotum and pleura entirely dark metallic green with little pruinosity; setae black; ac absent; 5 dc present, decreasing in size anteriorly, with posterior most pair slightly offset laterally; 1 postalar, 2 postsutural supra-alar, 1 presutural intra-alar, 2 notopleural, 1 presutural supra-alar, and 1 weak postpronotal setae present; propleuron with pale seta just above coxa, subtended dorsally by shorter seta; median scutellar setae strong, lateral scutellars reduced to tiny hairs or absent.

Legs: all coxae and remainder of legs entirely dull yellow, with only distalmost tarsomeres infuscated; coxae with pale yellow setae; CI with 3–4 distolateral setae; CII with anterior setae; CIII with single lateral seta; claws and pulvilli short; legs mostly bare of major setae except where noted; I: 2.0; 1.7; 1.1/ 0.6/ 0.5/ 0.4/ 0.4; FI with very short av seta on distal sixth; II: 2.5; 2.3; 1.6/ 0.7/ 0.5/ 0.4/ 0.3; FII with row of about 20 very short av setae along distal two-thirds (MSSC); TII with short ad seta at 1/3, and very short apical setae; III: 2.8; 2.9; 0.5/ 1.4/ 0.6/ 0.4/ 0.4; $IIIt_1$ ventrally with slight longer than normal vestiture.

Wing: (Fig. 1c); vein R_{4+5} ending near wing apex; vein M beyond crossvein dm-cu becoming trace, and continuing as faint fold to just behind wing apex; vein R_{4+5} and trace vein M bowed with respect to each other; CuAx ratio: 0.15; lower calypter pale with dark brown rim and pale setae; halter yellow with infuscated club.

Abdomen: elongate; entirely dull metallic violet; with short black vestiture; tergum 1 with posterior row of black setae; other terga and without long marginal setae; postabdomen (Fig. 1a); epandrium dark brown with brown surstylus and cercus; tergum and sternum 7 each well developed and separated by membrane; sternum 8 ovate, and covering left lateral hypopygial foramen, and bearing setae as figured; hypandrium forming hood over aedeagus; aedeagus elongate; epandrial lobe with strong apical seta and two short setae on pedicel; surstylus with broad dorsal arm and narrow curved and deeply forked ventral arm, with setae as figured; cercus elongate, digitiform with strong projecting setae on distal third.

Female: similar to male except as noted: eyes separated by narrow band of cuticle, facets uniform; I: 1.7; 1.5; 0.7/ 0.4/ 0.3/ 0.3/ 0.2; II: 1.9; 1.8; / 1.2/ 0.6/ 0.4/ 0.3/ 0.2; FII without av row of short av; TII also with short ad seta at 1/3; III: 2.1; 2.3; 0.4/ 1.0/ 0.4/ 0.3/ 0.3; oviscapt (Fig. 1d) with fused subtriangular epiproct bearing 4 pairs of long setae, and lobate cercus with pair of strong apical setae.

Types. Holotype ♂ (BPBM 16,583), 1♂, 5♀ paratypes, FIJI: **Vanua Levu:** 31 km E of Savusavu, Buca B Rd & Salt L. Rd., 11.vi.1988, salty slough, R. Hurley (R. Hurley, personal collection, deposited in BPBM).

Other material: AMERICAN SAMOA: **Manua,** 1♂, Tau I, Fitiuta, Faleasso Trail, 12.vi.1954, C.P. Hoyt (BPBM). **Tutuila:** 5♂, 1♀, Fagatogo, 14.ix.1964, N.R. Spencer (BPBM); 2♂, 1♀, Tapitimu Farm, 7.xii.1963, 13.x.1964, 24.iv.1964, N.R. Spencer (BPBM); 2♂, 1♀, Pago Pago, 0–100 m, iii.1971, i.1980, N.L.H. Krauss (BPBM). BELAU: 1♂, 1♀, **Babelthaup**: Ngerathalong, 6.v.1957, C.W. Sabrosky (USNM); 2♂, **Oreor** (= Koror): 24.iv.1957, mangroves, C.W. Sabrosky (USNM). SAMOA: **Savaii:**: 1♂, Asau, 400 m, iii.1977, N.L. H. Krauss (BPBM). SOLOMON ISLANDS: 1♂, **Ontong Java:** Peku, 0–10 m, 17.xii.1972, N.L. H. Krauss (BPBM). TONGA: 1♂, **Vavau,** Neiafu, 0–100 m, i.1980, N.L.H. Krauss (BPBM, Acc.1980.55). TUVALU: 1♂, **Funafuti,** 0–5 m, ii.1970, N.L.H. Krauss (BPBM).

Remarks. See Remarks under generic diagnosis.

Etymology. The specific epithet *pacifica* refers to the species' wide distribution on islands in the Pacific Ocean.

Genus CRYPTOPHLEPS Lichtwardt

Diagnosis. Small Dolichopodidae, body length less than 1.8 mm.

Head: setae black; strong vertical and ocellar setae present; postvertical setae short; lower eyes only narrowly separated by band of cuticle, sometimes joined, and anteroventral facets distinctly enlarged; female eyes distinctly separated, and female face and clypeus narrower than greatest width of frons; palp usually brown, but sometimes pale yellow or silvery, and elongate, projecting beyond proboscis (MSSC); first flagellomere subtriangular to subrectangular with dorsal to dorsoapical arista.

Thorax: usually dark brown to black with metallic blue-green reflections, and with light dusting of grey pruinosity; ac absent; 4 strong dc present; 1 postalar, 2 postsutural supra-alar, 1 presutural intra-alar, 2 notopleural, 1 presutural supra-alar, and 1 weak postpronotal setae present; lateral scutellar setae reduced to weak hairs or absent; proepisternum with short seta just above base of CI.

Legs: CI with 3–4 anterolateral setae; CII with anterior setae; CIII with lateral seta positoned in basal quarter; pulvilli and claws usually small; leg setation generally sparse; MSSC on legs include: flattened or deformed IIIt, modified setation on femora II and III, tibia III and tarsus III.

Wings. costa ends at R_{4+5}, well before wing apex (Figs. 2c, 3b); vein M with distinct bend or weakening in distal half, and vein M either unbroken or with distal section displaced anteriad; crossvein dm-cu usually absent, but sometimes evident as faint trace; anal angle and alula reduced,

Abdomen: preabdomen of male with short sparse vestiture; tergum 7 well developed, sternum 7 sometimes reduced in size; male sternum 8 sometimes with 2 long curved setae which project posteriad; epandrium circular with aedeagus following curvature of epandrium; epandrial lobe usually with 2 apical setae; surstylus digitiform; cercus short rounded; female oviscapt divided into two acanthophorites, each bearing 4 strong setae or dornen.

Remarks. *Cryptophleps* is an Old World genus comprising one species from central Europe, one from West Africa, two from the Seychelles, four from Australia, and ten from western Pacific island groups: New Guinea, Solomon Islands, Fiji, the Samoan Group, New Caledonia and Micronesia. The genus occurs in a variety of habitats, including tropical coastal mudflats, mangroves, rainforests, and temperate woodlands. Although 14 of the 18 described species are from tropical Australasia, more species undoubtedly await description from the Eastern Hemisphere. Their small size (less than 2.0 mm) probably accounts for them being overlooked by collectors, but specimens are readily collected in malaise and water traps. Nothing is known of the life history of the *Cryptophleps*. Grootaert & Meuffels (1987) and Bickel (1996) provide further information on the genus.

Morphological notes

1. Five of the Australasian species, *C. inornatus, C. cyplus, C. nova, C. yungaburra* (all Australian) and *C. papuanus* (New Guinea and Solomon Islands) all lack a strong ad seta along the length of tibia II, while the other the nine species all have a strong ad seta along the basal third of tibia II.

2. Among *Cryptophleps* species, *C. vitiensis* from Fiji, *C. vaea,* and *C. bucculenta* from the Samoan Islands, *C. rothii* Couterier from Ivory Coast, and *C. ochrihalteratus* Lamb from the Seychelles all have crossvein dm-cu present as a distinct trace (as in Fig. 3b), whereas the remaining twelve described species totally lack dm-cu (as in Fig. 2c). This suggests that the venation of *Cryptophleps* is not strongly fixed, and although the loss of crossvein dm-cu is a putitive apomorphy for the genus, the apomorphy itself may have variable phenotypic expression as a trace.

3. Males of five Australasian species, *Cryptophleps cyplus* and *C. nova*, both from Australia, *C. vaea* and *C. bucculenta* from Samoa, and *C. rivularis* from New Caledonia all have enlarged white or cream colored palps (MSSC), which possibly serve in mate recognition. This is an apomorphy, probably of variable expression, and not necessarily a synapomorphy for these five species. Here it should be noted that another diaphorine dolichopodid, *Chrysotus longipalpis* Aldrich, an accidental introduction to the tropical Pacific from the Neotropics, and now found in Hawaii, Guam, and French Polynesia, also has enlarged silvery palps in the male.

Biogeographical and faunistic notes

What are the phylogenetic relationships among the Australasian *Cryptophleps*? Pairs of morphologically close and putative sister taxa include *C. vitiensis* from Fiji and *C. samoensis* (Samoan Islands), *C. vaea* and *C. bucculenta* (sympatric on Upolu, Samoa), and *C. nova* and *C. cyplus* from tropical Australia.

However, a complete species-level phylogenetic analysis of the Australasian fauna is premature. I suspect additional species of *Cryptophleps* await collection from Fiji, New Caledonia, Vanuatu (where the genus is unrecorded), and of course the high and complex islands comprising New Guinea and the Solomon Islands. For example, in addition to the newly described *Cryptophleps rivularis,* female specimens representing a second New Caledonian species were isolated: 3♀, NEW CALEDONIA: **Grande Terre:** Prov. Nord, Presque Isle de Pindai, 2.5 km WSW Népoui, 21°22.968'S 164°58.421'E, 45 m, Malaise trap, 17–22.xi.1998, M.E. Irwin & D.W. Webb (CAS). These specimens appear close to *C. papuanus*, but without males, their identity cannot be confirmed. Crossvein dm-cu is absent, and vein M is unbroken, almost in straight line to the apex.

Cryptophleps vitiensis Bickel**, new species**

(Figs. 3a, b)

Description. Male: length 1.3–1.4 mm; wing: 1.6 x 0.6 mm.

Head: vertex and frons dark metallic green with brownish pruinosity; palp dark brown with black apical seta; proboscis brown; antenna black; postorbitals black dorsally, but yellowish in ventral half.

Thorax: dark brown with metallic blue-green reflections, and with dusting of grey pruinosity; setae brown with yellowish reflections; lateral scutellar setae absent.

Legs: coxae, trochanters and femora to knees brown, although FI and FII ; femoral knees, tibiae and basal tarsomeres yellow, with distal tarsomeres becoming brown; leg setae black; I: 2.3; 2.0; 0.8/ 0.4/ 0.3/ 0.2/ 0.2; II: 2.2; 2.3; 1.0; 0.7/ 0.4/0.3/ 0.3; TII with ad setae at 1/5 and 1/2, and short pd setae at 1/5 and near 1/2; IIt unmodified; III: 2.6; 2.8; 0.7/ 0.7/ 0.4/ 0.3/ 0.3; TIII without distinct ad seta, but with 3 short spaced dorsal setae; IIIt unmodified.

Wing: (Fig. 3b); vein M pale, with distal half weak and displaced anteriad, not broken but connected to basal M, and continuing to apex; crossvein dm-cu present only as distinct trace, not true vein; CuAx ratio: 0.2; lower calypter pale yellow with fan of black setae; anal angle and alula reduced; halter pale yellow.

Abdomen: dark brown; sternum 8 with only short setae, none more than twice length of others; hypopygium (Fig. 3a) dark brown; epandrial lobe rounded subtriangular with 2 short apical setae and long internal seta; surstylus rounded digitiform; cercus short with long setae.

Female: similar to male except face wider, facets uniform.

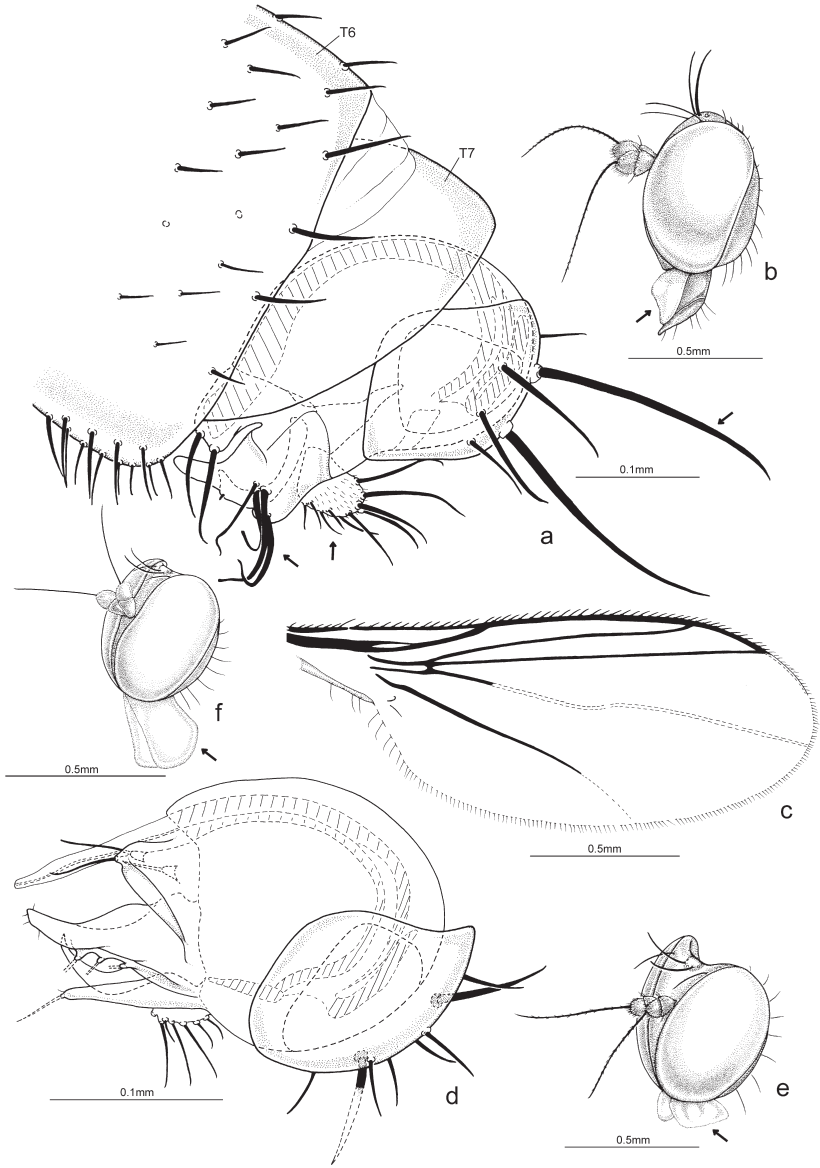

Fig. 2. *Cryptophleps rivularis* n. sp.: **a**. male postabdomen, left lateral; **b**. male head left lateral. **c**. male wing dorsal. *C. vaea* n. sp., **d**. hypopygium, left lateral; **e**. male head, left anterior. *C. buccu-lenta* n. sp., **f**. male head, left lateral.

Types. Holotype ♂ (FBA 049527), paratypes 10♂, 1♀, FIJI: **Viti Levu:** Vuda Prov., Koroyanitu N.H.P., Savuione Trail, Koroyanitu Village, 17°40'S, 177°33'E, 800 m, disturbed mid-elevation moist forest, Malaise trap, 21.x.–18.xi.2003, M. Irwin, M. Tokotaai & E. Schlinger (FJVL-01-M01-33, BPBM; 4♂ to FNIC); paratypes 4♂, same but 12.–19.x.2002, M. Irwin, E. Schlinger, & M. Tokotaai (FJVL-01-M01-03, BPBM). Holotype to be deposited in the Fiji National Insect Collection (FNIC).

Other material: FIJI: **Ovalau,** 1♀, Levuka, 0–200 m, xii.1978, N.L.H. Krauss (BPBM). **Viti Levu**: 1♂, Naitasiri Prov., old trail to Mt. Tomaniivi, 0.75 km E Navai Village, 17°37'16"S, 177°59'21"E, 700m, gymnosperm dominated rainforest, 6.xi–13.xii.2004, E. Namatalau (FJVL-11-M05-22); 3♂, same but 9–20.xii.2003 (FJVL-11-M05-06) (FNIC); 1♀, Naitasiri, Waivudawa logging Rd. 230m, 18º04'46.8'S, 178º 21'52.5E, 23–28.i.2005; sticky trap on tree trunk, rainforest, D. Bickel (FJVL-151-S01-01), FNIC).

Remarks. *Cryptophelps vitiensis* is known from several localities on Viti Levu (up to 800 m in rainforest) as well as Ovalau. This species is distinctive among Pacific *Cryptophleps* in having a faint trace of the dm-cu crossvein (see discussion under Morphology). Also, sternum 8 has short projecting setae, none more than twice as long as any others on the sternum.

Etymology. The specific epithet is based on "Viti", the indigenous Fijian name for the Fiji islands.

Cryptophleps samoensis Bickel**, new species**
(Fig. 3c)

Description. Male: length 1.1 mm; wing: 1.3 x 0.4 mm.

Head: vertex and frons dark metallic green with brownish pruinosity; palp dark brown with black apical seta; proboscis brown; antenna black; postorbitals black dorsally, but yellowish in ventral half.

Thorax: dark brown with metallic blue-green reflections, and with dusting of grey pruinosity; setae brown with yellowish reflections; lateral scutellar setae absent.

Legs: coxae, trochanters and femora to knees brown; femoral knees, tibiae and basal tarsomeres yellow, with distal tarsomeres becoming brown; leg setae black; I: 2.3; 2.0; 0.8/ 0.4/ 0.3/ 0.2/ 0.2; II: 2.2; 2.3; 1.0; 0.7/ 0.4/0.3/ 0.3; TII with ad setae at 1/5 and 1/2, and short pd setae at 1/5 and near 1/2; IIt unmodified; III: 2.6; 2.8; 0.7/ 0.7/ 0.4/ 0.3/ 0.3; TIII without distinct ad seta, but with 3 short spaced dorsal setae; IIIt unmodified.

Wing: (Fig. 3b); vein M pale, with distal half weak and displaced anteriad, not broken but connected to basal M, and continuing to apex; crossvein dm-cu totally absent; lower calypter pale yellow with fan of black setae; halter with dark brown/ black stalk and club.

Abdomen: dark brown; sternum 8 with two setae at least twice as long as others; hypopygium (Fig. 3c) dark brown; epandrial lobe rounded subrectangular, with 2 long apical setae and short internal seta; surstylus rounded subtriangular; cercus short with long setae.

Female: similar to male except face wider, facets uniform; halter also black.

Types. Holotype ♂ (BPBM 16,584), AMERICAN SAMOA: **Tutuila:** Mt. Alava, E. Ridge, 470–500 m 23.ii.1965, *Meterosideros* beating, G.A. Samuelson (BPBM).

Other material: SAMOA: **Savaii:**: 1♂, 2♀, 6 mi. S of Patamea, 290–430 m, 2.x.1969, N.L. H. Krauss (BPBM); **Upolu:** 1♂, Afiamalu, 660 m, at light, 7.vi.1940 (BPBM).

Remarks. *Cryptophleps samoensis* is known mid-elevations on Tutuila, Savaii, and Upolu in the Samoan Islands. The Upolu specimen was mistakenly identified as *C. solomonis* in Bickel (1996). *Cryptophleps samoensis* has black halters in both sexes, otherwise it is close to the yellow halter *C. vitiensis,* and with minor hypopygial differences.

Etymology. The epithet *samoensis* refers to this species' occurrence in the Samoan Islands.

Cryptophleps vaea Bickel**, new species**
(Figs. 2d, e)

Description. Male: length 1.3 mm; wing: 1.5 x 0.6 mm.

Head: (Fig. 2e): vertex and frons dark metallic green with brownish pruinosity; eyes with only anteriormost ventral facets larger than other facets; palp greatly enlarged as a subrectangular cream colored flap, and as paired structure completely covering yellow proboscis (MSSC); antenna brown; postorbitals black dorsally, but yellowish in ventral half.

Thorax: brown with metallic blue-green reflections, and with dusting of grey pruinosity; setae brown with yellowish reflections; lateral scutellar setae absent.

Legs: CI and all trochanters yellow; CII and CIII dark brown; all femora yellow but brownish dorsally; tibiae and basal tarsomeres yellow, with distal tarsomeres brownish; CI with pale yellow anterolateral setae; CII with dark brown anterior setae; CIII with dark brown lateral seta; TII with ad setae at 1/5 and possibly at 1/2, and short pd setae at 1/5 and near 1/2; IIt unmodified; TIII with short ad seta at 1/5, and with 3 short spaced dorsal setae; IIIt unmodified.

Wing: vein M pale and with distal half weak and displaced anteriad, not broken but connected to basal M, and continuing to apex; crossvein dm-cu present as distinct trace, not true vein; CuAx ratio: 0.1; lower calypter yellow with fan of black setae; halter stalk yellowish, club dark brown.

Abdomen: dark brown; sternum 8 with two setae almost twice as long as others; hypopygium (Fig. 2d) dark brown; epandrial lobe rounded subrectangular, with long apical setae and 2 internal setae arising on medial surface; ventral surstylus elongated subtriangular, with 3 dorsal pedunculate setae [these are broken off the single male specimen, and have been extrapolated in Fig 2d]; cercus short with long setae.

Female: unknown.

Types. Holotype ♂ (BPBM 16,585), SAMOA: **Upolu**, Mt. Vaea, 183–427 m, ix.1969, N.L.H. Krauss (BPBM).

Remarks. *Cryptophleps vaea* is known only from the single male holotype taken on Mt. Vaea, Upolu, Samoa. Males have modified rectangular silvery palps, which extend over both sides of the proboscis. It is apparently sympatric, with the same label data, with its sister species, *C. bucculenta* (q.v.).

Etymology. The specific epithet *vaea* is an indigenous place name and is treated here as a noun in apposition.

Cryptophleps bucculenta Bickel**, new species**
(Figs. 2f)

Description. Male: length 1.3 mm; wing: 1.4 x 0.5 mm; similar to *C. vaea* except as noted:

Head: (Fig. 2f): eyes also distinctly separated by face/clypeus, and only anteriormost ventral facets larger than other eye facets; palp greatly enlarged and prolonged ventrally as subrectangular

cream colored flap, almost half head height (MSSC); proboscis yellow (MSSC); scape and pedicel brown, first flagellomere distinctly yellowish.

Legs: CI and all trochanters yellow; CII and CIII dark brown; all femora dark brown with yellow knees; tibiae and basal tarsomeres yellow, with distal tarsomeres brownish; CI with some silvery pruinosity, and pale yellow anterolateral setae; CII with pale yellow anterior setae; CIII with dark brown lateral seta.

Wing: crossvein dm-cu also present as distinct trace; CuAx ratio: 0.1; lower calypter yellow with fan of black setae; halter yellow.

Abdomen: dark brown; sternum 8 also with two setae almost twice as long as others; hypopygium (not figured) dark brown.

Female: unknown.

Types. Holotype ♂ (BPBM 16,586), SAMOA: **Upolu**, Mt. Vaea, 183–427 m, ix.1969, N.L.H. Krauss (BPBM).

Remarks. *Cryptophleps bucculenta* is known only from the single male holotype taken on Mt. Vaea, Upolu, Samoa. Males have modified rectangular silvery palps, which extend over both sides of the proboscis. It is sympatric, with the same label data, with its sister species, *C. vaea.* Both species have greatly enlarged cream colored palps, which are much longer in *C. bucculenta* (Fig 2f) than in *C. vaea* (Fig. 2e).

Etymology. The specific epithet *bucculenta* is from the Latin meaning "with full cheeks", referring to the large palps on males of this species.

Cryptophleps rivularis Bickel**, new species**
(Figs. 2a–c)

Description. Male: length 1.4–1.5 mm; wing: 1.5 x 0.5 mm.

Head: (Fig. 2b) vertex and frons dark metallic blue with brownish pruinosity; eyes distinctly separated by narrow face-clypeus, palp enlarged, subrectangular, and cream colored with silvery pruinosity (MSSC); proboscis brown basally, becoming yellowish distally; antenna black; postorbitals black dorsally, but whitish in ventral half.

Thorax: dark brown with metallic blue-green reflections, and with dusting of grey pruinosity; setae black; lateral scutellar setae absent.

Legs: coxae, and remainder of legs entirely dark brown, although trochanters brownish; leg setae black, I: 2.2; 1.6; 0.8/ 0.4/ 0.3/ 0.2/ 0.3; FI ventrally bare; TI with short apical setae; pulvilli on leg I slightly larger than on legs II and III (MSSC); II: 2.4; 2.3; 0.8; 0.4/ 0.3/0.2/ 0.3; FII with 6–7 short pv setae along distal two thirds; TII with ad setae at 1/4 and strong apical ventral seta; III: 2.6; 2.5; 0.6/ 0.5/ 0.3/ 0.2/ 0.3; FIII with 7–8 short black seta av setae along distal three-quarters; TIII without distinct ad seta, but with 3 short spaced dorsal setae; IIIt unmodified.

Wing: (Fig. 2c); vein M pale and with distal three-quarters weak, slightly displaced anteriad but attached to basal M and continuing to apex; crossvein dm-cu totally absent; lower calypter brownish with fan of rather short black setae; halter yellow with infuscated club.

Abdomen: dark brown; sternum 8 with only 2 long curved projecting setae, more than twice length of other setae; hypopygium (Fig. 2a) dark brown; surstylus with distal digitiform projections and strong curved lateral setae; Cercus with 4–5 long curved setae, clearly visible on dried specimens.

Female: similar to male except face wider, facets uniform; palp short, brown; proboscis brown; pulvilli on leg I not enlarged; FII with distinct pv setae; FIII with 4–5 short av setae on distal third.

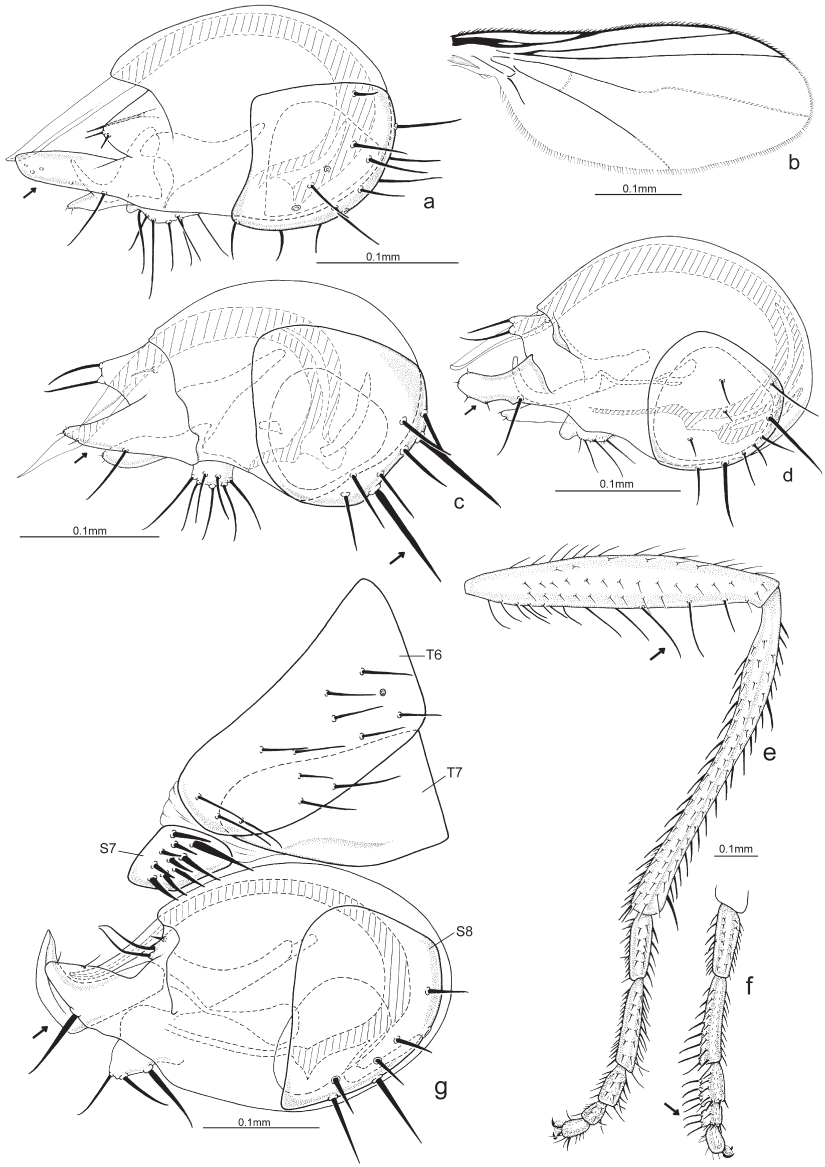

Fig. 3. *Cryptophleps vitiensis* n. sp.: **a**. hypopygium, left lateral; **b**. male wing, dorsal. *C. samoensis* n. sp., **c**. hypopygium, left lateral. *C. buala* n. sp.: **d**. hypopygium, left lateral; **e**. male leg III, anterior; **f**. male tarsus III, ventral. *C. karkar* n. sp.: **g**. male postabdomen, left lateral.

Types. Holotype ♂, paratypes 1♂, 1♀, NEW CALEDONIA: **Grande Terre:** Prov. Sud, Parc territorial Rivière Bleue, 23.5 km NNW Plum, 22°12.967'S, 166°39.267'E, 213 m, Malaise trap, 17–22.xi.1998, M.E. Irwin & D.W. Webb (MNHN); paratypes 3♂, same but 27.x–15.xi.2000 (2♂ CAS, 1♂ AMS).

Other material. NEW CALEDONIA: **Grande Terre:** Prov. Sud: 7♂, 3♀, Pic du Grand Kaori, Site 1, 22°17'S, 166°53'E, 250 m, yellow pans, rainforest, , 22–23.xi.2004, C. Burwell & S. Wright (QM, 11760); 1♂, Chute Madeleine, 22°14'S, 166°52'E, 230 m, pyrethrum on *Dacrydium*, 26.xi.2000, G.B. Monteith (QM, 9916).

Remarks. *Cryptophleps rivularis* is known from several rather low lying rainforest sites in Province Sud, New Caledonia. This species has enlarged cream colored male palps, and long setae on the surstylus and cercus, readily seen in dried specimens.

Etymology. The specific epithet *rivularis* refers to Rivière Bleue of the type locality.

Cryptophleps buala Bickel**, new species**
(Figs. 3d–f)

Description. Male: length 1.3 mm; wing: 1.3 x 0.4 mm.

Head: vertex and frons dark metallic black with brownish pruinosity; palp dark brown with black apical seta; proboscis brown; antenna black; postorbitals entirely black.

Thorax: black with some brown pruinosity on pleura; setae black; lateral scutellar setae present as weak short setae.

Legs: coxae, trochanters and femora dark brown; tibiae and tarsi brown; leg setae black; I: 1.6; 1.7; 0.7/ 0.4/ 0.3/ 0.2/ 0.2; FI with a few weak ventral setae; II: 2.1; 2.2; 1.2; 0.6/ 0.5/0.3/ 0.2; FII from base to 1/3 with 7–8 curved almost crocheted ventral hairlike setae (MSSC); TII with ad seta at 1/3; IIt unmodified; III (Fig. 3e): 2.5; 2.2; 0.4/ 0.6/ 0.3/ 0.2/ 0.2; FIII with ventral setae, some of which longer than femoral width between 1/3 and 2/3; TIII curved, without strong ad seta but with distinct subapical dorsal seta; $IIIt_{2-4}$ (Fig. 3f) with posterior row of curved setae, subequal to tarsal width (MSSC).

Wing: vein M with distal half weak and broken from base and displaced anteriad and continuing to apex; crossvein dm-cu absent; lower calypter black with fan of black setae; halter black; anal angle and alula reduced.

Abdomen: black; sternum 8 with short setae and 2 projecting setae that are more than twice length of others; hypopygium (Fig. 3d) dark brown; epandrial lobe subrectangular with 2 apical setae and a short internal median seta; surstylus blunt, digitiform, with short setae as figured and strong dorsal seta; cercus short with long setae.

Female: unknown.

Types. Holotype ♂ (BPBM 16,587). SOLOMON ISLANDS: **Santa Isabel:** Buala, 20–30 m, 29–31.x.1980, J.L. Gressitt (BPBM, Acc. 1980.484).

Other material: SOLOMON ISLANDS: 1♂, **Guadalcanal:** Honiara, 0–100 m, xii.1976, N.L.H. Krauss (BPBM).

Remarks. *Cryptophelps buala* is a dark colored species known from the lowland locales on Santa Isabel and Guadalcanal. Males have distinctive setation on legs II and III (MSSC).

Etymology. The specific epithet "*buala*" is an indigenous place name and is treated here as a noun in apposition.

Cryptophleps karkar Bickel**, new species**
(Figs. 3g)

Description. Male: length 1.4 mm; wing: 1.5 x 0.6 mm.

Head: vertex and frons dark metallic green with brownish pruinosity; eyes joined ventrally and lower facets greatly enlarged; palp dark brown with black apical seta; proboscis brown; antenna black; postorbitals black dorsally, but yellowish in ventral half.

Thorax: dark brown with metallic blue-green reflections, and with dusting of grey pruinosity; setae brown with yellowish reflections; lateral scutellar setae as tiny hairs.

Legs: coxae, trochanters and femora brown; tibiae and basal tarsomeres I and II yellow: tarsus III and distal tarsomeres I and II becoming brown; leg setae black; I: 1.8; 1.7; 0.7/ 0.3/ 0.2/ 0.2/ 0.2; II: 2.2; 2.2; 1.0; 0.5/ 0.3/0.2/ 0.2; FII with 3 ventral setae in basal third, almost as long as femoral thickness (MSSC); TII with ad seta at 1/5 and weaker at 1/2, and with short pd setae at 1/5 and near 1/2; IIt unmodified; III: 2.5; 2.6; 0.6/ 0.4/ 0.3/ 0.2/ 0.2; FIII with group of 6–7 ventral setae from 1/ to 2/5, with outstanding av seta, longer than femoral width at 1/3 (MSSC); TIII without distinct ad seta, but with 3 short spaced dorsal setae; IIIt unmodified.

Wing: vein M melanised and with distal half weak and displaced anteriad and with slight break at midlength and continuing as strong to apex; crossvein dm-cu absent; lower calypter brown with fan of black setae; halter stalk brown with black club.

Abdomen: dark brown; sternum 7 with some strong peg-like setae; sternum 8 with two setae distinctly longer than others; hypopygium (Fig. 3g) dark brown; epandrial lobe very short with 2 strong setae and short seta basad; surstylus subtriangular and wide and bearing strong dorsal seta, and subtended medially by strong curved arm; cercus with 3 strong setae.

Female: similar to male except face wider, facets uniform; FII and FIII ventrally bare.

Types. Holotype ♂ (BPBM 16,588), paratypes, 2♀. PAPUA NEW GUINEA: **Karkar:** Kurum, 100 m, viii.1968, N.L.H. Krauss; paratypes, 2♂, 2♀, same, but Kaul: 180–240 m, ii–viii.1968, N.L.H. Krauss (BPBM).

Remarks. *Cryptophelps karkar* is known only from Karkar Island, near the northern coast of Papua New Guinea. This species has some spine-like setae on sternum 7 and rather stout hypopygial appendages.

Etymology. The specific epithet "*karkar*" is an indigenous place name and treated here as a noun in apposition.

Additional Notes on the Australasian *Cryptophleps* Fauna

Cryptophleps solomonis Bickel

Cryptophleps solomonis Bickel 1996: 1166

Remarks. *Cryptophleps solomonis* is known from coastal localities in the Solomon Islands and Bougainville. It is widely sympatric with *C. papuanus* in the Solomon Islands. Bickel (1996) incorrectly recorded this species as occurring in montane Samoa. The specimen is a different species, *Cryptophleps samoensis*, newly described in this paper.

Additional records: PAPUA NEW GUINEA: **Bougainville**, 4♂, 3♀, Boku, 3.vi.1957, J.L. Gressitt; 1♂, Ruisei, N of Tokinoitu. 2.vi.1956, J.L. Gressitt (BPBM). SOLOMON ISLANDS: **Guadalcanal:** 1♂, 7♀, Honiara, 23–30.iv.1964, Ford (BPBM); **Savo: 1**♂, West coast, 0–100 m, 19.x.1970 (BPBM).

Cryptophleps atollensis Bickel

Cryptophleps atollensis Bickel 1996: 1166.

Remarks. *Cryptophleps atollensis* was previously known from the Marshall Islands, Kirabati, and Federated States of Micronesia: Caroline Atolls.

New Record: Federated States of Micronesia: 1♂, **Truk (Chuk)**: Moen, 600 ft, 31.vii.1946, H.K. Townes (USNM).

Genera of Diaphorinae with Modified Venation

The subfamily Diaphorinae comprises more than 700 species in 15 genera. The major taxonomic problem of the subfamily concerns the limits of *Diaphorus* Meigen and *Chrysotus* Meigen, two large cosmopolitan genera, each with more than 200 described species, and many more awaiting description. Neither genus is strongly defined, especially with respect to each other, and in isolation, females of the two genera often are not reliably separated. Couplet 2 in the key presented above provisionally separates them and closely related genera.

Previously (Bickel, 1996) I presented notes on characters associated with two genera with modified venation, *Asyndetus* and *Cryptophleps*, and then considered they might be closely related on the basis of the following shared modified venational characters:

a) R_{4+5} ends in the costa in the distal sixth of the anterior margin, well before the wing apex. This is a type of costalization, where major longitudinal veins are shifted towards the anterior wing margin. In most other Diaphorinae, R_{4+5} joins the wing margin almost at the wing apex

b) Vein M with bent or weakened in the distal third of wing, with distal section of M either weakly joined to its base, or distinctly displaced anteriad. However, *Phasmaphleps* also shows weakening of vein M, but for the entire distal two thirds of the wing and unbroken (Fig. 1c). In all other Diaphorinae vein M are strong and unbroken.

However, with the discovery of *Phasmaphleps,* it is apparent that the Diaphorinae have the potential for the modification and weakening of vein M within the subfamily. Indeed, based on the major division of the Diaphorinae (*c.f.* couplet 2 in the Key above), the venational similarities of *Asyndetus* and *Cryptophleps* are considered to be the results of homoplasy or underlying synapomorphy.

Modified venation within the Diaphorinae often shows some instability. The *Cryptophleps* species which have crossvein dm-cu as a trace was discussed above (see morphological note 2). Interestingly, two neotropical *Asyndetus* species, *A. singularis* Van Duzee from Mexico and *A. geminus* Becker from Paraguay, are both described as totally lacking crossvein dm-cu (a characteristic apomorphy of most *Cryptophleps).*

Asyndetus appears to be more closely related to *Diaphorus,* and both *Cryptophleps* and *Phasmaphleps* are closer to *Chrysotus,* but not necessarily sister taxa. The only clear apomorphy shared by both *Cryptophleps* and *Phasmaphleps* is the absence of ac setae, but ac setae have been lost many times throughout the Dolichopodidae. Further studies on the definition and limits of *Diaphorus* and *Chrysotus* are needed before the relationships of these genera can be resolved.

ACKNOWLEDGMENTS

N. Evenhuis & A. Ramsdale (BPBM), M. Irwin (INHS), C.Burwell (QM) and N. Woodley (USNM) facilitated the loan of specimens. Richard Hurley, Bozeman, Montana, gener-

ously made his Fijian collections available for study. This research was supported by the National Science Foundation project "Terrestrial Arthropod Survey of Fiji" (DEB-0425790) and the Schlinger Foundation. Hannah Finlay drew the figures. The Government of Fiji is thanked for their support of the project.

LITERATURE CITED

Bickel, D.J. 1996. Australian *Asyndetus* Loew and *Cryptophleps* Lichtwardt (Diptera: Dolichopodidae) with notes on the Oriental and western Pacific faunas. *Invertebrate Taxonomy* **10:** 1151–1170.

Grootaert, P. and Meuffels, H.G.J. 1987. Dolichopodidae (Diptera) from Papua New Guinea V. A new species of *Cryptophleps* Lichtwardt, 1898 with notes on other species. *Indo-Malayan Zoology* **4**: 145–152.