

A new species of *Phyllodromia* Zetterstedt, 1837 (Insecta, Diptera, Empididae, Hemerodromiinae) from Vanuatu

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KEY WORDS

Insecta,
Diptera,
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new species.

ABSTRACT

Phyllodromia variabilis n. sp. (Diptera, Empididae, Hemerodromiinae) is described from Espiritu Santo, Vanuatu and provisionally assigned to *Phyllodromia* Zetterstedt, 1837. Systematic relationships with other *Phyllodromia* species and with the closely related genus *Chelipoda* Macquart, 1823 are discussed and it is concluded that the new species is probably more closely related to species of *Phyllodromia* from New Zealand than those of the Northern Hemisphere.

RÉSUMÉ

Une nouvelle espèce de *Phyllodromia* Zetterstedt, 1837 (Insecta, Diptera, Empididae, Hemerodromiinae) du Vanuatu.

MOTS CLÉS
Insecta,
Diptera,
Empididae,
Hemerodromiinae,
Phyllodromia,
Vanuatu,
espèce nouvelle.

Une nouvelle espèce d'Hemerodromiinae (Diptera, Empididae, Hemerodromiinae), provisoirement attribuée au genre *Phyllodromia* Zetterstedt, 1837, *Phyllodromia variabilis* n. sp., est décrite d'Espiritu Santo, Vanuatu. Ses relations phylogénétiques avec les autres espèces du genre ainsi qu'avec le genre *Chelipoda* Macquart, 1823 sont discutées ; la nouvelle espèce est plus étroitement apparentée aux espèces de *Phyllodromia* de Nouvelle-Zélande plutôt qu'à celles de l'hémisphère nord.

INTRODUCTION

Phyllodromia Zetterstedt, 1837 is a genus of small predatory empidid flies in the subfamily Hemerodromiinae Wheeler & Melander, 1901 comprising just eight described species distributed in the Nearctic, Palearctic, Oriental and Australasian realms. The genus is distinguished from *Chelipoda* Macquart, 1823 solely by the absence of crossvein dm-cu (cell dm open), a character usually considered of dubious generic significance (Melander 1947; Collin 1961; MacDonald 1993; Plant 2005). Varied structure of the male genitalia in particular, indicates that *Phyllodromia* s.l. is almost certainly not monophyletic and is perhaps best ascribed in the interim to an informal group of “*Chelipoda*-like” taxa, pending a fuller phylogenetic analysis of *Phyllodromia*, *Chelipoda* and related taxa (Plant 2007). The new species described here from Vanuatu is provisionally assigned to *Phyllodromia* and although undescribed forms are known also from New Caledonia, it is the first record for the islands of the western Pacific Ocean.

MATERIALS AND METHODS

This study is based on material collected from the island of Espiritu Santo, Vanuatu during SANTO 2006, a collaborative international expedition of five months duration organized by the Muséum national d'Histoire naturelle, Paris, the Institut de Recherche pour le Développement and Pro-Natura International. For a narrative of the expedition, see Bouchet *et al.* (2008), and for a review of the geography and natural history of Santo, we refer to Bouchet *et al.* (in press).

The specimens were collected following the IBISCA protocol consisting of Malaise traps set out at pre-determined altitudes (300, 600, 900 and 1200 m).

Morphological terms are essentially those of McAlpine (1981) and Stuckenberg (1999). Interpretation of genitalic homology follows Cumming *et al.* (1995) and Sinclair (2000).

ABBREVIATIONS

MNHN Muséum national d'Histoire naturelle, Paris;
NMWC National Museum of Wales, Cardiff.

SYSTEMATICS

Order DIPTERA Linnaeus, 1758
Family EMPIDIDAE Fallén, 1815
Subfamily HEMERODROMIINAE
Wheeler & Melander, 1901
Genus *Phyllodromia* Zetterstedt, 1837

Phyllodromia variabilis n. sp.
(Figs 1; 2)

TYPE MATERIAL. — Vanuatu. Espiritu Santo, Penaoru, 1200 m, ground, Malaise, montane forest, 8-18.XI.2006, ♂ holotype (MNHN). — Same data as holotype, 25 ♂♂ paratypes, 16 ♀♀ paratypes (MNHN); 15 ♂♂ paratypes, 14 ♀♀ paratypes (NMWC NMW.Z.2008.050).

ETYMOLOGY. — The specific epithet refers to the variable colouration of the thorax and variation in size of the species.

DESCRIPTION

Male

Body length 2.0-2.2 mm.

Head black with greyish dust, rather dorsoventrally compressed. Ocellar tubercle bearing a few minute setulae and a pair of strong black divergent ocellar setae. A pair of minute frontal setulae, widely separated at front of frons. Face whitish, very narrow about as wide as single ommatidium immediately below eye and widening toward mouth. Two pairs of vertical setae, inner vertical contiguous with upper series of postocular setae. Postocular setae black on upper occiput, becoming yellow below and on lower occiput, merging into patch of yellow erect pile on gena.

Antenna black with basal segments yellow; post-pedicle sharply pointed lanceolate, almost twice as long as deep, stylus about 3 times as long; scape with strong dorsal seta extending beyond apex of pedicel which bears circlet of shorter black setulae, longest on outer face. Mouthparts yellow, proboscis darker apically; palpus narrow with a few longish fine setae apically and on outer face.

Thorax. Colour pattern highly variable, usually broad median brown stripe on scutum which is sometimes considerably narrowed or virtually absent and occasionally broader leaving only extreme lateral margins of scutum yellowish. In

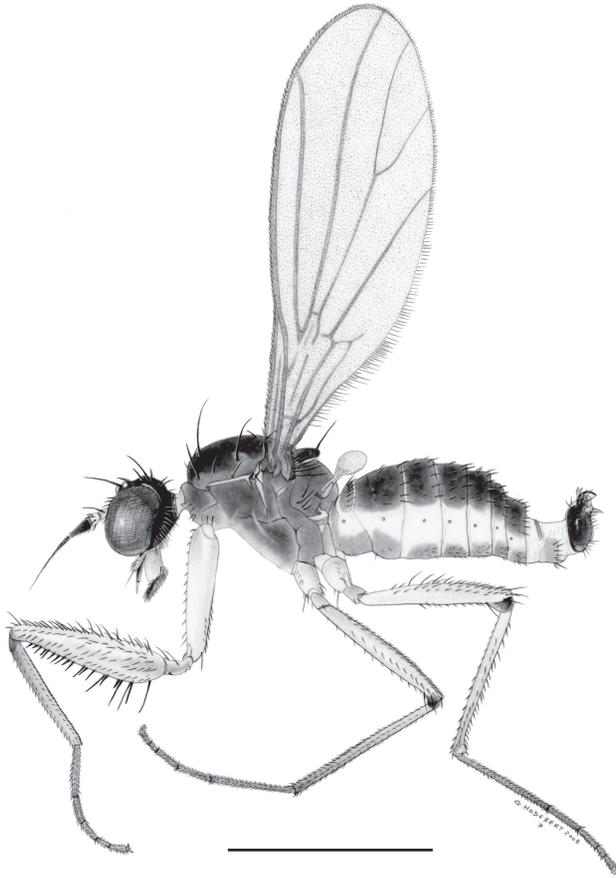


FIG. 1. — *Phyllodromia variabilis* n. sp., male habitus. Scale bar: 1.0 mm.

paler exemplars brownish cloud often present above humerus, weakly continued posteriorly over notopleural depression. Scutellum and postnotum dorsally brownish. Pleura clear yellow, occasionally suffused brownish. All thoracic setae black; anterior dorsocentral minute, positioned close to anterior margin of scutum in dorsal view; second dorsocentral strong, in line with somewhat weaker postpronotal seta; pair of convergent scutellar setae, one supraalar and upper notopleural about as long as postpronotal; posthumeral, lower notopleural and postalar setae smaller. Pair of minute acrostichals and some minute setulae in front of postpronotal seta and on proepisternum and katepisternum above base of front coxa. Laterotergite with 3-6 upswept setae.

Legs yellow with apical tarsal segments darker (especially blackish tarsomeres 4 and 5). Front coxa about 0.95 times as long as thorax, bearing a few decumbent bristly setae anteriorly and posteriorly. Mid and hind coxae short, former with anteroapical fan of dark setae, latter with 2 or 3 stouter yellowish setae anteroapically. Front femur inflated, about 4.5 times as long as wide, widest 0.2 from base, narrowing distally; armed ventrally on distal 0.9 with an anteroventral series of 13-16 (mean = 13.8 ± 1.2 , $n = 11$) rather regularly spaced black spine-like setae, becoming shorter distally but with a few shorter setae interspersed in series proximally; posteroventral series of 9-12 (mean = 10.3 ± 0.8 , $n = 11$) similar rather less regularly spaced setae, longest proximally but with

distal 3 or 4 very small and closely spaced; no rows of peg-like denticles between anteroventral and posteroventral setation; one single strong basal anteroventral seta; anterior surface bare, one or two outstanding dark setae dorsally and apically but otherwise with only short decumbent setulae. Front tibia linear, about 0.8 times as long as front femur and articulating between two rows of spine-like ventral setae on femur. Legs otherwise simple with short setae but posterior femur slightly inflated and curved with a few erect black setulae amongst dorsal ciliation.

Abdomen brown dorsally, paler ventrally. Tergites 1-7 with distinct short setae sparsely on disc and posterior margins; tergite 2 slightly elongated; tergite 8 very narrow. Male terminalia (Fig. 2) dark brown, reflexed upward at 90°. Epandrium and hypandrium separate, nowhere fused. Hypandrium divided medially by broad pale membranous area with short dark setae along posterior margin of outer more sclerotized lobes (Fig. 2B). Epandrium divided, subrectangular in lateral view (Fig. 2C); a weakly developed apical lobe delineated by white weakly sclerotized area posteriorly; with distinct setae including one rather longer on posterior margin subapically. Subepandrial sclerite strongly sclerotized, long bifid subepandrial process arising dorsally (Fig. 2A); posterior bifurcation narrow, emerging slightly beyond tip of epandrium in lateral view and strongly curved posteriorly; anterior bifurcation broader in lateral view with anteriorly twisted rather beak-like apex; both bifurcations narrower in anterior and posterior view. Pale yellow rod-shaped process (phallic process?) each side of phallus, apically divergent viewed from in front or behind but in lateral view rather abruptly curved posteriorly near apex. Postgonites somewhat beak-shaped apically, broad, almost transparent and very inconspicuous. Phallus pale, broad, curving posteriorly near tip. Cercus very small, free, very inconspicuous but covered with distinctly bent setae and shorter setulae.

Wing with membrane tinged brown, veins yellowish brown. Fork $M_1 + M_2$ narrow. Crossvein dm-cu absent. Cell cup (anal cell) closed and slightly produced posteriorly, vein CuA_2 closing cell linear. Vein A_1 distinct for short distance beyond end of

cell cup. Squamae with dark fringes, halter brownish white.

Female

Very similar to male but larger, body length 2.5-3.2 mm. Front femur with 10-15 (mean = 12.5 ± 1.5 , $n = 11$) spine-like setae in anteroventral series and 10-14 (mean = 11.1 ± 1.3 , $n = 11$) in posteroventral series. Abdomen with tergites brown bearing sparse and inconspicuous short pale setulae, longer and darker on posterior margins; basal sternites whitish but sternites 8 and 10 brown, the former slightly elongated, terminally trapezoid and with distinct fine marginal setae, the latter very small bearing a few fine setulae. Cercus rather slender, brown, with a few longish fine setulae on outer face and apically.

DISCUSSION

Systematic relationships in the tribe Chelipodini are poorly understood, especially in a group of *Chelipoda*-like taxa which includes at least *Chelipoda*, *Phyllodromia*, *Monodromia* Collin, 1928, *Ptilophyllodromia* Bezzi, 1904 and *Achelipoda* Yang, Zhang & Zhang, 2007 (Plant 2007) and at least one undescribed genus (Plant in press).

Phyllodromia is only distinguished from *Chelipoda* by the absence of crossvein dm-cu (cell dm open), a character of doubtful generic importance (Melander 1947; Collin 1961; MacDonald 1993; Plant 2005), especially as wing venation is notoriously plastic in many Hemerodromiinae and occasional individuals occur with asymmetric wing venation. Interpretation of wing vein characters is additionally complicated by a high incidence of sexual dimorphism in the wings of some Southern Hemisphere lineages of *Chelipoda* (Plant 2007) and *Phyllodromia* (Plant 2005).

Tuomikoski (1966) treated *Phyllodromia* as a subgenus of *Chelipoda* while MacDonald (1993) considered the Nearctic *C. americana* (Melander, 1947) and *C. limitaria* MacDonald, 1993 (both of which lack dm-cu) to represent a monophyletic group within *Chelipoda* on the basis of synapomorphic genital characters rather than wing venation.

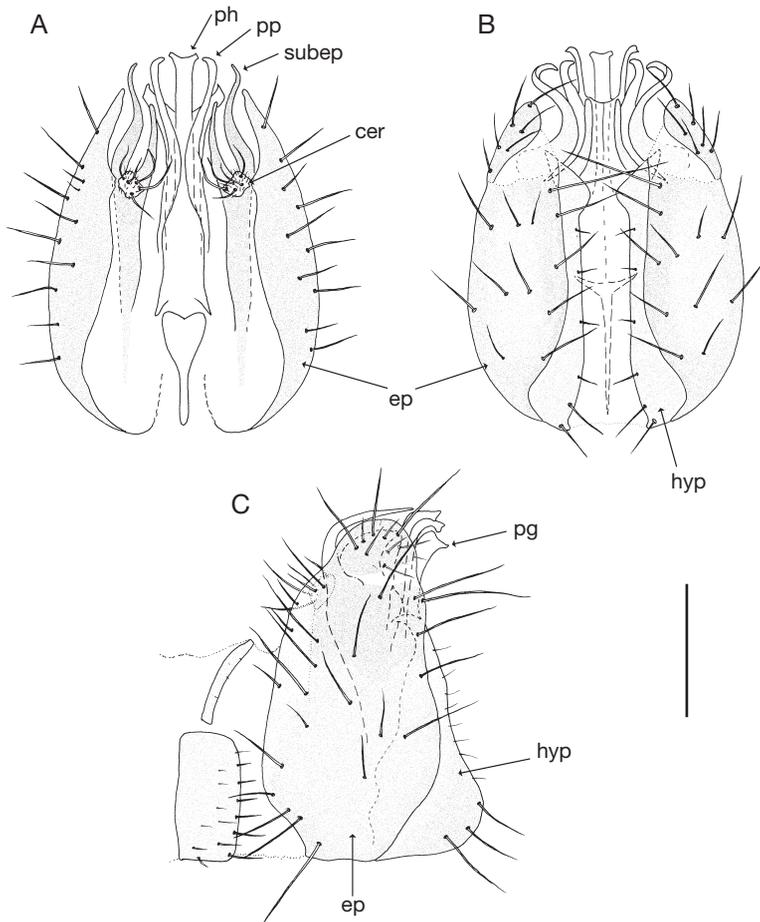


FIG. 2. — *Phyllodromia variabilis* n. sp. male terminalia: **A**, anterior aspect; **B**, posterior aspect; **C**, lateral aspect. Abbreviations: **cer**, cercus; **ep**, epandrium; **hyp**, hypandrium; **pg**, postgonite; **ph**, phallus; **pp**, phallic process; **subep**, subepandrial process. Scale bar: 0.1 mm.

Occasional loss of crossvein dm-cu has occurred in both of the two major lineages of *Chelipoda* present in New Zealand and was interpreted as a homoplasy of no generic significance (Plant 2007). Although taxon sampling in the cladistic analysis of Plant (2007) was strongly biased in favour of New Zealand taxa, the analysis placed the Palaearctic *P. melanocephala* (Fabricius, 1794) and *C. vocatoria* (Fallén, 1816) (the type species of *Phyllodromia* and *Chelipoda* respectively) in a monophyletic terminal clade based on a single apomorphy – the fusion of the epandrium and hypandrium into a keel-like

structure. Furthermore, in the New Zealand fauna there are two sets of “species pairs”, each containing one taxon nominally ascribed to *Phyllodromia* and another placed in *Chelipoda* (on the basis of wing venation) but which exhibit other characters so similar as to suggest that they are either sister species or a remarkable example of convergence (Plant 2007). While it seems clear that *P. melanocephala* would more properly be assigned to *Chelipoda*, we consider it unwise to do so without proper elucidation of the relationships with other forms currently placed in *Phyllodromia*.

Phyllodromia variabilis n. sp. is here included in *Phyllodromia* merely on the basis of cell dm being open pending more thorough analysis of *Chelipoda*-like genera world-wide. However, in *P. variabilis* n. sp. the shape of cell cup, reduction of the male cercus, separated condition of the hypandrium and epandrium, tendency towards membranous division of the hypandrium, vertical rather than forwardly reflexed position of the male genitalia and the reduction of ventral chaetotaxy on the front femora may indicate greater similarities with the New Zealand *Phyllodromia* than with Northern Hemisphere *P. melanocephala*, *C. americana* or *C. limitaria*.

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