
Two new species of *Deleatidium* (*Deleatidium*) (Ephemeroptera: Leptophlebiidae) from the South Island, New Zealand

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ABSTRACT

Two new species of mayfly, *Deleatidium* (*Deleatidium*) *wardorum* and *D. (D.) kiwa*, both from the South Island of New Zealand are described. The larval stage of each species is included and associated with its respective winged stages. Notes on ecology are given and distribution maps provided. Diagnostic characters are given for larval and winged life stages and a key for similar larvae in the genus is provided.

KEYWORDS

Ephemeroptera; key; mayflies; *Deleatidium*; new species; New Zealand; distribution; taxonomy

INTRODUCTION

The genus *Deleatidium* Eaton, 1899, with 14 described species in two sub genera, *Deleatidium* (*Deleatidium*) and *D. (Penniketellum)*, was revised by Towns and Peters (1978, 1979a, b, 1996) and more recently by Hitchings (2008, 2009). This work adds two new species of *Deleatidium* (*Deleatidium*), provides keys to their identification and includes distribution maps.

METHODS, MATERIALS AND CONVENTIONS

Larvae were associated by proximity or by rearing in aquaria. All specimens are stored in 80% ethanol. Body,

fore- and hindwing lengths of imagos and larvae are given, with means in parentheses. Length ratios of the foreleg segments (femur: tibia: tarsomeres 1-5) are based on the length of the tibia (absolute measurements in mm, in parentheses).

Collecting sites are grouped into regions of New Zealand using the system of Crosby et al. (1976) in which each is allocated a two letter code. Regions referred to in this paper are as follows: BR – Buller, FD – Fiordland, KA – Kaikoura, MB – Marlborough, MC – Mid Canterbury, MK – Mckenzie, NC – North Canterbury, NN – Nelson; OL – Otago Lakes.

Abbreviations in site descriptions: Bn – Burn, Ck – Creek, L – Lake, Mt – Mount, R – River, Stm – Stream, Trib – Tributary.

Map references and altitudes are taken from the map series NZMS 260. The first group of five figures gives the east – west grid coordinate to the nearest 100 metres and the second group the north – south coordinates. The final group of one or more figures gives the height above mean sea level in metres.

Collections: All material is held at Canterbury Museum, Christchurch, New Zealand except for specimens held at the New Zealand Arthropod Collection, Landcare Research, Auckland (NZAC);

National Museum of Natural History, Washington DC, USA, (NMNH) and in the personal collection of IM Henderson, Massey University, Palmerston North, New Zealand (IH).

Collectors: AHS, AH Staniczek; BHP, BH Patrick; H&W, TR Hitchings & JB Ward; IMH, IM Henderson; J&G, JB & GM Ward; JBW, JB Ward; JRJ, JR Jackson; OSF, OS Flint Jr, (NMNH); PJQ, PJ Quinn; PTL, PT Leaf; M&D, I Millar & J Dugdale; P&J, PE Penney & JA Hitchings; SJM, SJ Morris; TRH, TR Hitchings.

SYSTEMATIC SECTION

Order EPHEMEROPTERA Hyatt and Arms, 1891
Family LEPTOPHLEBIIDAE Banks, 1900

Genus *Deleatidium* Eaton, 1899

As described by Towns and Peters 1996, pp. 27–28.

Sub Genus *Deleatidium* (*Deleatidium*) Towns and Peters, 1996

As described by Towns and Peters 1996, p. 30.

Deleatidium (*Deleatidium*) *wardorum* sp. nov. (Figs. 1-10)

Derivation of name

Named for John B and Geraldine M Ward, in recognition of their many years of work collecting mayflies throughout New Zealand and for personal encouragement and practical support.

Description

Dimensions (mm)

Male: length of body 8.4-10.7 (9.6); forewings 8.8-11.1 (9.5). Female: length of body 7.7-9.4 (8.4); forewings 9.7-11.5 (10.5). Mature larva: length of body 8.6-9.7 (9.1).

Male imago

Head dark brown. Antennal scape yellowish brown, pedicel and flagellum yellowish. Eyes in contact medially, with upper portion yellowish and lower portion grey.

Thorax. Pronotum and mesonotum yellowish brown, the latter with dark brown parallel median and sub median marks. Metanotum and scutellum yellowish brown, the former with paired dark brown submedian maculae. Thoracic pleura and sterna yellowish brown, darker at the sutures. Legs yellowish, darker at the

femoro-tibial articulation. Length ratios of the foreleg segments: 0.64-0.78(0.71):1.00(2.8-3.6); 0.05-0.09:0.34-0.36: 0.41-0.42: 0.30-0.38: 0.06-0.10. Foretarsal pad without an apical hook.

Wings (Fig. 1). Forewing width 0.35-0.36(0.36) x length; longitudinal and cross veins uniformly yellowish brown. Vein ICu, usually with 3 or 4 cross veins directly connected to the posterior margin (Fig 1a). Hind wing width 0.49-0.56(0.53) x length and length 0.24-0.30(0.28) x that of forewing; vein Sc 0.94 x wing length; cross veins few and faint in the posterior half of the wing; both longitudinal veins and cross veins brownish. Membranes of both wings with a faint brownish colouration.

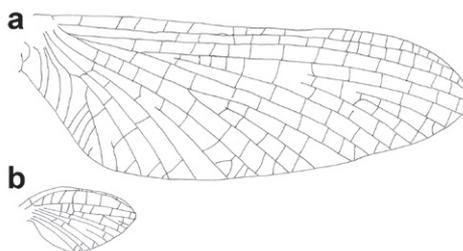


Figure 1. *Deleatidium* (*D.*) *wardorum* sp. nov. a - forewing and b - hind wing of male imago



Figure 2. *Deleatidium* (*D.*) *wardorum* sp. nov. Dorsal abdomen of male imago

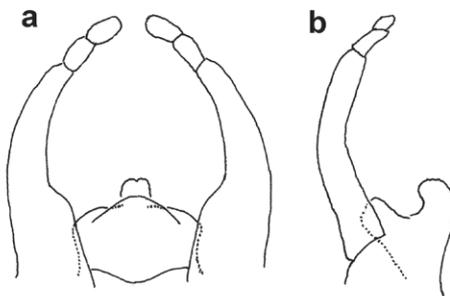


Figure 3. *Deleatidium* (*D.*) *wardorum* sp. nov. Genitalia of male imago a - ventral view and b - lateral view

Abdomen (Fig. 2). Most segments with pale median dorsal line. Terga brownish; segments 1-3 with paired submedian yellowish maculae; segments 4-5 with similar marks opening mesially; sometimes segments 5 and 6 almost without crescent shaped marks; tergum 7 with similar maculae opening posteriorly; terga 8 and 9 with blackish transverse anterior marks. Sternum 7 with strongly marked blackish ganglion, that of sternum 6 less dark; ganglia of sterna 2-5 sometimes faintly visible. Genitalia (Fig. 3) yellowish with penes darker laterally and fused almost to their apices, rolled ventrally; a ventral appendage, shaped as an apically semi-circular lamina, is expanded laterally and extends to almost the distance between the forceps. Caudal filaments grayish yellow, darker at the articulation of the annulations.

Female imago

As in the male, except as follows. Eyes blackish and separated by three times the width of the eye. Femora paler and without markings. Forewing width 0.27-0.33(0.31) x length and length 0.42-0.55(0.49) x that of forewing.

Abdomen: terga 1-3 dark brown with paired pale grayish yellow sub-median maculae; terga 4-5 with dark brown crescent shaped marks opening mesially; terga 6-8 with dark brown posterolateral marks (Fig. 4a). Sternum 9 having a deeply emarginated V shaped cleft with a small indentation medially (Fig. 4b).

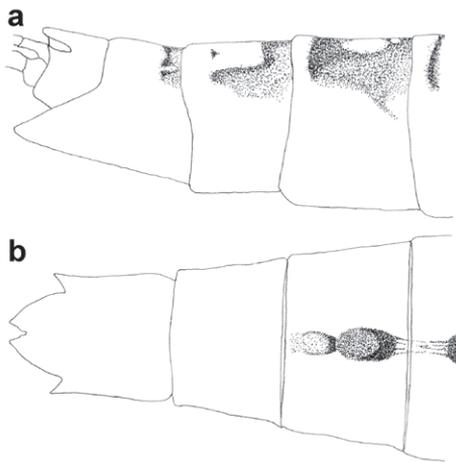


Figure 4. *Deleatidium (D.) wardorum* sp. nov. Female imago, abdominal segments 7-9 **a** - lateral and **b** - ventral.

Male subimago

As in male imago except eyes slightly separated; pro-, meso- and metanotum whitish fawn; pronotum with a blackish transverse lateral mark, mesonotum darker brown with paired lateral blackish longitudinal marks. Margins of scutellum dark brown. Pleura brownish. Wings, both membrane and veins, uniformly brownish grey, without clouding at the cross veins. Terga dark brown with paired submedian pale fawn maculae most prominent on segments 4-6. Caudal filaments pale whitish fawn with darker annulations at the articulations.

Female subimago

As in male subimago except that the pale paired submedian maculae of the dorsal abdomen are larger, resembling the imaginal body pattern more closely.

Late instar larva (Fig. 5)

Head: yellowish, darker at the margins; clypeus mesially flecked with black as are portions of the scape, pedicel and mandibles anterior to the antennae. Eyes of the female black, male greyish with the lower portion black. Antennae 1.8-1.9 x as long as head.

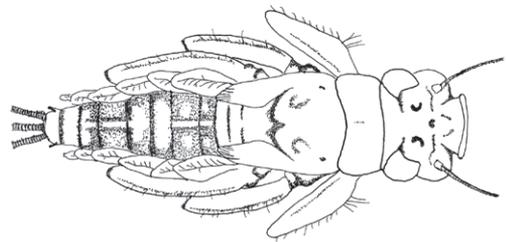


Figure 5. *Deleatidium (D.) wardorum* sp. nov. Mature larva (dorsal view with antennae and caudal filaments truncated).

Mouthparts. Clypeus and labrum (Fig. 6a): labrum length 0.40-0.45(0.43) x that of clypeus, width 1.19-1.22 (1.20) x that of clypeus. Clypeus smoothly curved with elliptical lateral margins. Anterior margin of labrum with V-shaped median cleft with irregular anteromedian emargination. Mandibles (Fig. 6b): two tufts of hairs in centre of outer margin; more distal tuft thicker. Outer incisors usually with five serrations on distal surface. Maxillae (Fig. 6c): galea-lacinia with a subapical row of 18-21 spines; palp segment 2 0.93-1.00(0.97) x as long

as segment 1, segment 3 0.77-0.85(0.81) x as long as segment 2. Labium (Fig. 6d): shoulders of submentum without spines near base. Palp segment 3 0.82-0.83(0.83) x as long as segment 1, palp segment 3 0.40-0.43(0.42) x as long as segment 2. Segment 2 without long spines. Hypopharynx (Fig. 6e): lingua between lobes with wide shallow emargination and median cleavage mark.

Sclerotised crest of small hairs borne apically on each lobe.

Thorax yellowish, darker at the margins; sterna whitish. Prominent black maculae on anterior surfaces of episterni (Fig. 7). Legs (Fig. 8) yellowish white with proximal paler macula on anterior surface of each femur. Foretarsal claw (Fig. 9).

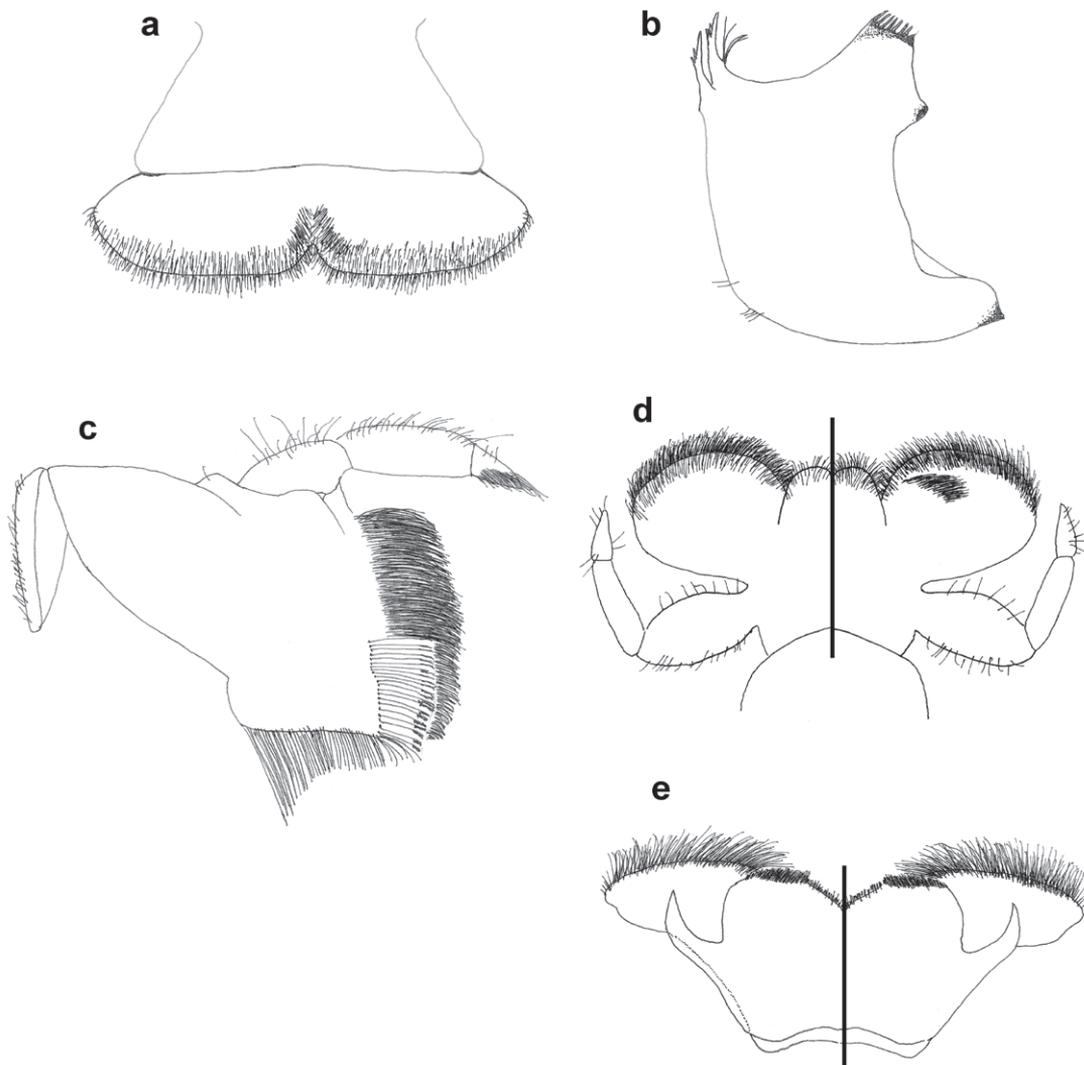


Figure 6. *Deleatidium (D.) wardorum* sp. nov. Mouth parts of larva: **a** – clypeus and labrum; **b** – left mandible; **c** – right maxilla; **d** – labium, in dorsal (left) and ventral (right) views; **e** – hypopharynx in dorsal (left) and ventral (right) views .

Abdomen. Terga 2-7 each with blackish lateral posterior band; terga 2-4 yellowish with submedian paired dark brown irregular maculae with paler centres; terga 5-6 yellowish and darker brown laterally; terga 7-9 with whitish median marks. Sterna yellowish white with blackish ganglia strongly marked on sternum 7 and less strongly on 6. Sometimes ganglia on other sterna faintly visible. Short hairs present on all sterna increasing successively in density to segment 9. Gills (Fig. 10): single, plate-like and rounded apically. Sometimes larvae from the Canterbury region show very small, hair-like apical points on otherwise rounded gills 3-6. Gill 1 1.6 x as wide as the length of lamella; gill 7 usually folded ventrally. Lamellae translucent with numerous tracheae, black in the dorsal half. Posterolateral projections small on segment 8 and well developed on segment 9. Caudal filaments 1.0-1.1 x as long as body, yellowish with darker annulations, the latter with a small whorl of denticles at midlength.



Figure 7. *Deleatidium (D.) wardorum* sp. nov. Larval thorax, lateral view

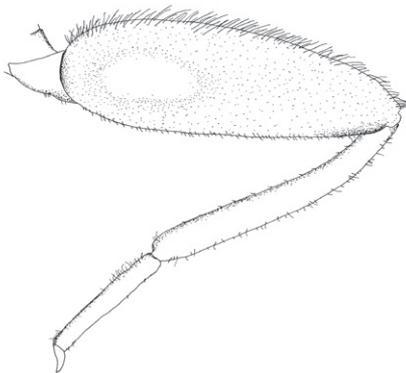


Figure 8. *Deleatidium (D.) wardorum* sp. nov. Foreleg of larva



Figure 9. *Deleatidium (D.) wardorum* sp. nov. Foretarsal claw of larva

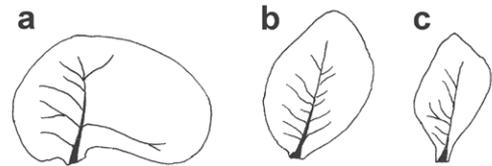


Figure 10. *Deleatidium (D.) wardorum* sp. nov. Abdominal gills a-1; b-4; c-7

Type data

Holotype: ♂ imago NC, Waterfall Creek, Ashley, New Zealand, 24484 57755, 320 m, 22 October 2002, TR Hitchings (CM).

Allotype: ♀ imago same data as holotype (CM).

Paratypes: MB larvae, Edwards R, 24847 58658, 730 m, 21 April 2001, H&W; larvae, St Ronans Stm, Wairau R, 25016 59184, 690 m, 12 December 2003, TRH; NC 3 ♂ imagos, 2 ♀ imagos, 2 ♀ subimagos, Waterfall Ck, Ashley, 24484 57755, 320 m, 22 October 2002, TRH; NZAC- ♂ imago, ♀ imago, ♂ subimago, ♀ subimago, larvae.

Other material examined

BR ♂ ♀ imagos and subimagos, Maruia R Ada Pass, 24649 58779, 980 m, 1 February 1999, SJM; ♂ imago, Durville R, 24773 59065, 660 m, 4 January 1999, IMH, (IMH).

KA ♂ imago, Picnic Stm, Puhipuhi R, 25727 58877, 400 m, 7 January 2006, AHS; ♂ ♀ imago and subimago, Wairere Stm, Kaikoura, 25567 58616, 3 m, 1 January

1991, JBW; larvae, Wandle R, 25222 58583, 740 m, 13 April 2002, TRH.

MB ♂♀ imagos, Leathem R. Trib, 25242 59416, 430 m, 29 December 1995, J&G; ♂ imago, Edwards R, 24883 58670, 800 m, 29 January 2002, TRH; larvae, St Ronans Stm, Wairau R, 25016 59184, 690 m, 12 December 2003, TRH.

MC ♂ imago, L. Pearson, Ritchies Bay, 24104 57888, 610 m, 2 Feb 1997, J&G; ♀ imago, Acheron R, 24022 57627, 770 m, 3 November 2002, TRH; ♂ imago and subimago, Glenfalloch Stm, 23661 57651, 607 m, 8 February 2005, SJM; larvae, Acheron R, 24021 57623, 820 m, 19 October 2002, PJQ; ♂ imago, Tims Stm, Mt Cockayne, 24009 57823, 1625 m, 31 December 1994, SJM; ♀ subimago, Bealey R. Trib, 23927 58066, 760 m, 3 January 1975, PTL; ♀ imago, Cave Stm, 24068 57833, 800 m, 22 January 2001, OSE, (NMNH).

MK larvae, Jollie R. Mt Cook, 22865 57060, 670 m, 22 April 2007, P&J.

NC ♂ imago, Greyneys Ck 1 km N, 23952 58019, 680 m, 6 March 1993, JBW; ♂ imago, Arthurs Pass summit, 23925 58101, 920 m, 12 May 2002, BHP; ♂ subimago, ♀ imago, Glentui R. Mt Thomas, 24498 57789, 400 m, 14 February 2001, OJF, (NMNH); ♂♀ subimagos and imagos, Edwards R, 23996 58063, 970 m, 4 March 1961, JRJ; ♂ imagos, Greyneys Ck, 23951 58018, 680m 22 January 2002, J&G; ♀ subimago & imago, Ashley gorge Trib, 24470 57754, 270 m, 9 February 2001, J&G; ♂♀ subimagos Avalanche Ck., 23924 58064, 840 m, 12 January 2008, IMH (IH); ♀ subimago & imago, Karetu R Trib, 24659 57847, 250 m, 2 February 2004, JBW.

NN ♂♀ imagos, ♀ subimagos, Golden Downs Lodge, 25001 59627, 300 m, 20 December 2001, J&G; ♀ imago and subimago, Flora Stm, 24874 60025, 920 m, 16 January 2002, M&D; ♀ imago, Whisky Ck, 24887 60018, 1085 m, 24 Jan 2002, M&D.

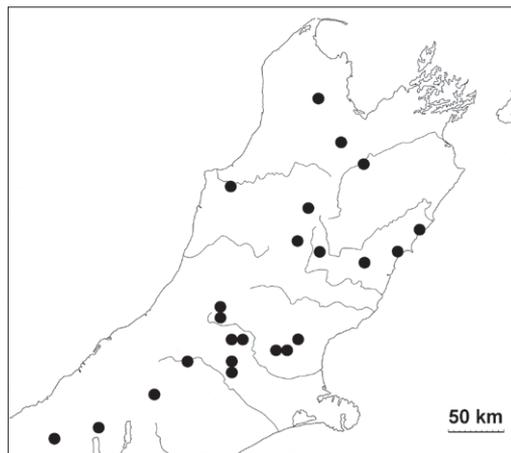
SC larvae, Black Mountain Stm, 23342 57360, 1000 m, 2010, PEP; larvae, Brabazon Stm Trib, 23376 57315, 700 m, 15 April 2010, PEP.

WD ♂ imago Creswicke Flat, Landsborough R, 22466 56933, 380 m, 30 January 1996, SJM.

Distribution and habitat

Widely distributed in the northern and central South Island from Nelson to the Mackenzie Country and from the eastern to the western coasts (Map 1). Larvae occupy fast flowing streams dominated by cobbles and boulders,

both in forest and above the upper tree line. The altitudinal range is from sea level to more than 1000 m. Adults have been collected between October and March.



Map 1. Collection localities of *Deleatidium (Deleatidium) wardorum* sp. nov. in the South Island.

Discussion

In lateral view the axes of the penes of the male imago are sometimes inclined at right angles to the base of the forceps (Fig. 3b). Consequently, a ventral view of the penes, between the forceps, is obscured by the expanded ventral projection (Fig. 3a). In the male subimago, in ventral view, the partially developed penes extend further than the ventral projection. The ventral projection may show slight bifurcation apically.

Deleatidium (D.) wardorum sp. nov. resembles *D. (D.) atricolor*, *D. (D.) kiwa* sp. nov., described below, and *D. (D.) fumosum* (Townsend and Peters 1996 pp. 38-9). *Deleatidium (D.) wardorum* sp. nov. may be distinguished from *D. (D.) fumosum* by the following combination of characters: in the imago by (1) tarsal pad without apical hook; (2) in the male genitalia, the ventral appendage expanded laterally into a semicircular lamina and (3) in the female, sternum 9 deeply cleft. In the subimago, wings uniformly brownish grey. In the larva (1) posterolateral projections well developed on segment 9 only; (2) presence of short hairs on all sterna, increasing to sternum 9 and (3) two tufts of hairs present near centre of outer margin of each mandible.

D. (D.) wardorum sp. nov. also resembles *D. (D.) atricolor* (Hitchings, 2008), from which it may

be distinguished as follows: in the male imago, penes with single ventral appendage expanded laterally; in the female imago sternum 9 deeply cleft; in the subimago, fore- and hind wings without darker clouds at cross veins; in the larva, (1) each leg with proximal pale macula on anterior surface of each femur, (2) prominent blackish marks on episterni, (3) in the mandible two distinct tufts of hairs in centre of outer margin.

Deleatidium (Deleatidium) kiwa sp. nov. (Figs 11-20)

Derivation of name

Māori, a. “*kiwa*” – “dark coloured”, with reference to the dorsal abdomen of the imago.

Description

Dimensions (mm)

Male: length of body 8.7-10.8 (9.6); forewings 10.6-13.6 (12.2). Female: length of body 7.4-9.3 (8.5); forewings 11.0-12.2 (11.5). Mature larva: length of body 8.0-9.7 (8.8).

Male imago

Head blackish. Antennal scape, pedicel and flagellum yellowish brown, eyes almost in contact in midline with upper portion pale brown and lower portion greyish.

Thorax. Pronotum and mesonotum pale brown, darker at lateral margins. Metanotum and scutellum with parallel dark brown lateral marks. Thoracic pleura and sterna yellowish brown. Legs pale yellowish brown, darker at femoro-tibial articulations. Length ratio of foreleg segments: 0.61-0.71(0.66):1.00(4.2-5.3): 0.07-0.11: 0.41-0.44:0.42-0.48: 0.36-0.42: 0.11-0.14. Pretarsal pad with apical hook.

Wings (Fig. 11). Forewing width 0.32-0.34(0.33) x length; costal brace dark brown; longitudinal and cross veins uniformly yellowish brown. In cubital region 3-6 pectinate veins from CuA2 to margin. Hind wing width 0.56-0.61(0.59) x length and length 0.27-0.31(0.29) x that of forewing; vein Sc 0.96 x wing length; cross veins faint in posterior third of wing. Membranes of both wings faintly brownish.

Abdomen (Fig. 12) brownish yellow. Terga dark blackish with pale yellowish mid dorsal line. Segments 2-4 with paired submedian pale brownish maculae; terga 5 and 6 pale brownish with dark brown paired crescent shaped marks opening mesad; segment 7 dark

brown with small pale, paired submedian anterior maculae; segments 8 and 9 pale brown, darker mesially and anteriorly. Sterna pale brownish; terminal ganglia strongly marked, sternum 6 ganglion less so. Genitalia (Fig. 13) Penes pale yellowish brown, fused almost to apices; ventral appendage, semicircular apically, largely obscures ventral view of penes, which are more easily seen in dorsal view (Fig. 20b). Styliiger plate strongly emarginated. Caudal filaments yellowish, dark brown at annulations.

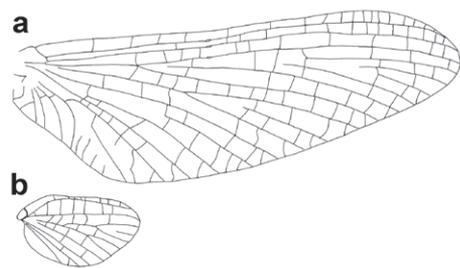


Figure 11. *Deleatidium (D.) kiwa* sp. nov. a - Forewing and b - hind wing of male imago



Figure 12. *Deleatidium (D.) kiwa* sp. nov. Dorsal abdomen of male imago

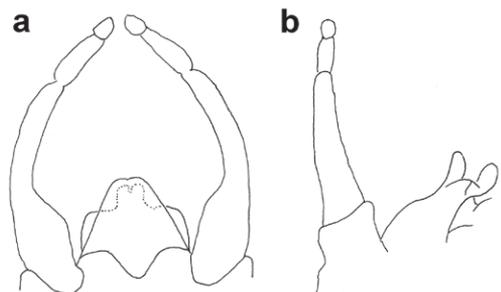


Figure 13. *Deleatidium (D.) kiwa* sp. nov. Genitalia of male imago a - ventral view and b - lateral view

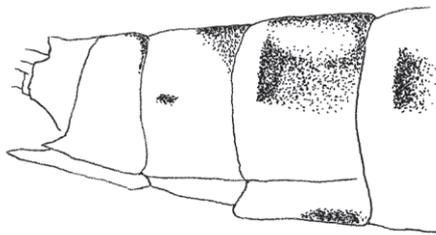


Figure 14. *Deleatidium (D.) kiwa* sp. nov. Female imago abdominal segments 7-9 Lateral view

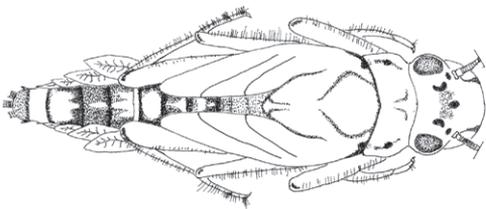


Figure 15. *Deleatidium (D.) kiwa* sp. nov. Mature larva dorsal view with antennae and caudal filaments truncated

Female imago

As in male, except as follows: eyes blackish and separated by three times the width of the eye. Femora pale yellowish and without markings. Forewing width 0.33-0.34 (0.34) x length and length of hind wing 0.33-0.34(0.34) x length that of forewing. Sometimes with dark maculae faintly visible on sterna 2-5, more strongly on sternum 6 and strongest on 7. Egg guide reduced to small thickening of posterior margin of sternum 7. Sternum 9 with deep U- or V-shaped emargination.

Male subimago

As in male imago except eyes with upper portion yellowish. Notum whitish with paired, brown parallel sub median marks; dark brown lateral margins. Fore and hind wings pale brownish, forewing slightly clouded brownish at cross veins. Thoracic pleura and sterna whitish.

Female subimago

As in female imago and male subimago except that head whitish; ocelli with mesial black markings, pronotum pale yellowish brown with small paired submedian maculae.

Late instar larva (Fig. 15)

Head yellowish, darker paired submedian marks near bases of antennae; ocelli grayish, lateral ocelli blackish mesially; median ocellus blackish posteriorly. Eyes of female black and of male yellowish brown with lower portion black. Antennae 1.41 x as long as head.

Mouth parts. Labrum (Fig. 16a): length 0.58-0.78(0.67) x that of clypeus and width 1.10-1.15(1.12) x that of clypeus; labrum interior margin almost straight; anteromedian cleft with six flat-topped irregular denticles (Fig. 16b); lateral margins elliptical. Mandibles (Fig. 16c); single tuft of 6-8 hairs at centre of outer margin; outer incisors with 5 serrations on distal surface. Maxillae (Fig. 16d): galea-lacinia with subapical row of 21-22 spines; palp segment 2 1.14-1.21(1.17) x as long as segment 1 and segment 3 0.67-0.75(0.71) x as long as segment 2. Labium (Fig. 16e): submentum with few scattered spines near base; palp segment 2 0.75-0.84(0.81) x that of segment 1 and segment 3 0.44-0.53(0.49) x as long as segment 2; hypopharynx (Fig. 16f): lobes of lingua separated by shallow V-shaped emargination; sclerotised crest of small hairs borne on a swelling on each lobe.

Thorax yellowish; pronotum sometimes with two dark brown lateral marks, mesonotum pale brown with darker marks at margins, metanotum pale grayish brown. Pleura yellowish brown, sterna whitish. Legs pale yellowish brown, darker at articulations, femora with whitish apical maculae (Fig. 17). Foretarsal claw (Fig. 18).

Abdomen blackish brown; terga 1-6 with dark transverse posterior bands; segments 2 and 3 with small pale submedian anterior maculae; segment 4 whitish, darker at lateral margins; segment 5 dark brown with paired submedian anterior whitish maculae; segment 6 brownish with white median longitudinal mark. Sterna yellowish white and almost without abdominal hairs; each segment with posterior transverse dark brown band. Ganglia usually visible on sterna 2-7, most strongly on 7; connectives sometimes visible. Gills (Fig. 19) single and plate-like; lamellae translucent with few blackish tracheae; gill 1 apically rounded, 1.1-1.4(1.3) x wider than long, gills 2 and 3 apically rounded; gills 4-7 pointed, usually with small, short, sharp-pointed apices. Posterolateral projections well developed only on segment 9. Caudal filaments 1.15-1.17(1.16) x as long as the body; pale yellowish with darker annulations of small denticles.

Type data

Holotype: ♂ imago, FD, Borland Burn, South Branch Tributary, Fiordland National Park, New Zealand, 20766 54817, 690m, 13 November 2004, JB & GM Ward (CM).

Allotype: ♀ imago, same data as holotype (CM).

Paratypes: FD larvae, Borland Burn, South Branch, 20751 54822, 750m, 5 January 1997, JB & GM Ward.

NZAC- ♂ imago, ♀ imago, ♂ subimago, ♀ subimago, larvae.

Other material examined

FD larvae, Borland Bn, South Branch, 20757 54822, 750m, 5 January 1997, J&G; ♂, ♀, subimagos and imagos, Grebe R, 20707 54966, 220m, 2

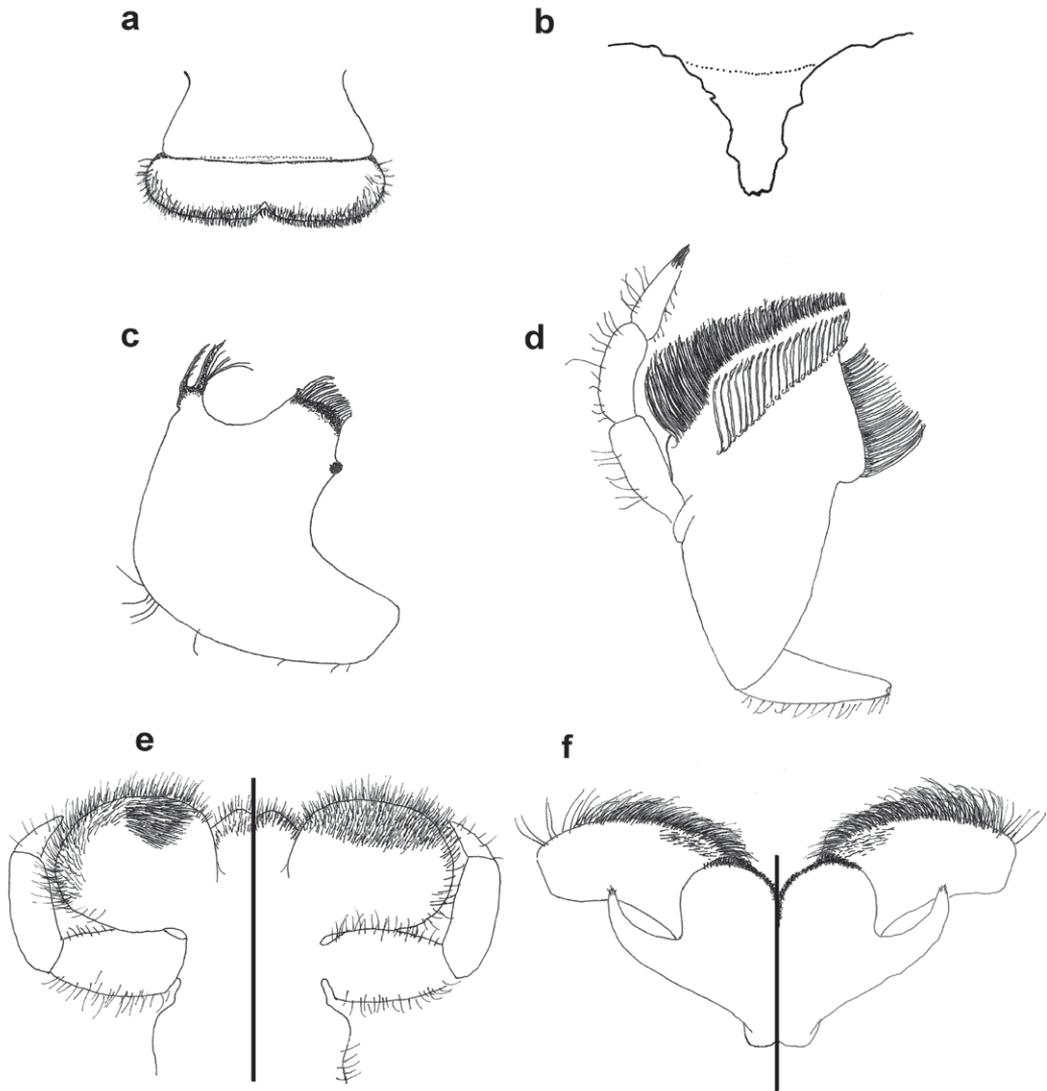


Figure 16. *Deleatidium (D.) kiwa* sp. nov. Mouth parts of larva: **a-** clypeus and labrum; **b-** anteromedian cleft; **c-** left mandible; **d-** right maxilla; **e-** labium in dorsal (left) and ventral (right) views; **f-** hypopharynx in dorsal (left) and ventral (right) views.

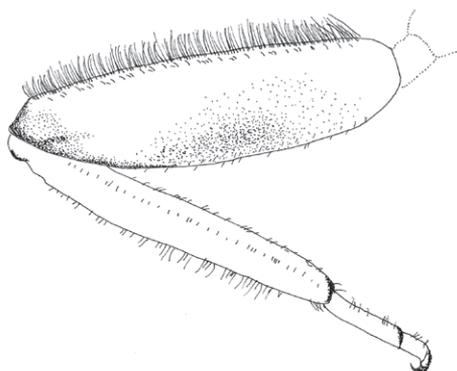


Figure 17. *Deleatidium (D.) kiwa* sp. nov. Foreleg of larva

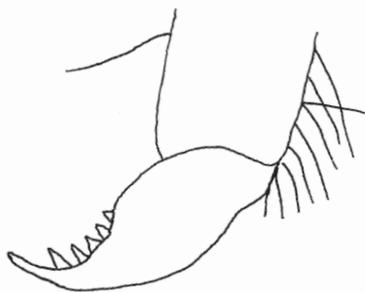
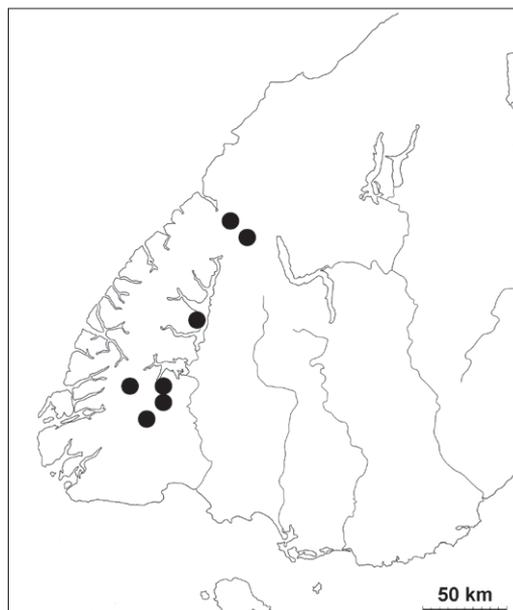


Figure 18. *Deleatidium (D.) kiwa* sp. nov. Foretarsal claw

February 2002, BHP; larvae, Grebe R Trib, 20706 54836, 714m, 2 February 2007, TRH; ♀ imago, Hollyford R Trib, 21146 55927, 800m, 15 February 2003, BHP; ♀ imago, Monowai R, 20897 54784, 165m, 17 January 2004, J&G; ♂ imago, Spey R, 20548 54982, 430m, 9 March 2003, SJM; ♀ imago, The Divide, Milford Road, 21240 55886, 530m, 27 April 2002, BHP; ♀ imago, Tunnel Bn, Te Ana-au Cave, 20965 55327, 250m, 1 December 1996, BHP.

Distribution and Habitat

Present known distribution is restricted to Fiordland National Park (Map 2). *Deleatidium (D.) kiwa* sp. nov. is usually found in smaller streams, at altitudes from near sea level to 800 m., with both open and forested canopies and from substrate dominated by pebbles and cobbles. The gills do not form an adhesion disc. Adult emergence times range from November to April



Map 2. Collection localities of *Deleatidium (Deleatidium) kiwa* sp. nov. in the South Island.

Discussion

Not all species of the genus *Deleatidium* are common and abundant. *Deleatidium (D.) kiwa* sp. nov. is one such, with a distribution apparently restricted to a single region, FD.

Deleatidium (D.) kiwa sp. nov. appears to be most closely related to *D. (D.) wardorum* sp. nov.. Characters useful for distinguishing the former are: in the male imago, (1) fore-claw pretarsal pad with an apical hook; (2) styliger plate with a pronounced U-shaped emargination; (3) penes extended laterally at midlength by a lateral ridge rather than as a lateral extension of the ventral projection (Fig. 18); in the subimago, brownish wings clouded slightly at the cross veins; in the larva, (1) gill 1 less than 1.5 x as wide as long, (2) gills 5-7 pointed, not rounded, (3) gill 7 not tucked ventrally, (4) abdominal sternum 9 almost without hairs, and (5) in the labium the submentum with scattered spines near the base.

PARTIAL KEY TO LARVAE

The preparation of keys for the identification of adults of the genus is usually not difficult but it is the relatively

long lived juvenile life stages, usually collected by field workers, for which keys are most needed but difficult to construct. If rearing larvae to the adult stage or DNA determination is not feasible, then comparing larvae with known adults may be the best alternative.

This key includes only *Deleatidium* spp. known from the South Island, with gill 1 wider than long and which may be confused with the two species described herein. Keys to other described species of the genus may be found in Towns and Peters (1996 p.30) and Hitchings (2009 p.49).

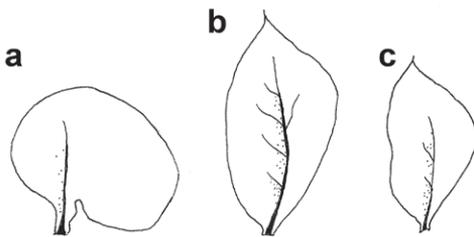


Figure 19. *Deleatidium* (*D.*) *kiwa* sp. nov. Abdominal gills a- 1, b- 4, c- 7

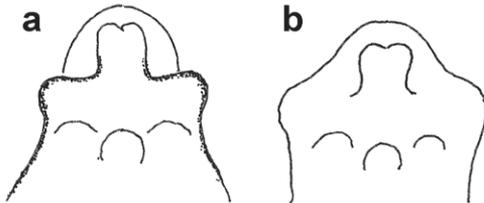


Figure 20. Genitalia of male imagos, dorsal view with caudal filaments removed. a- (*Deleatidium*) (*D.*) *wardorum* sp. nov. and b - (*D.*) (*D.*) *kiwa* sp. nov.

Gill 1 wider than long

1. Abdominal gills rounded on all lamellae, or with only fine hair-like points on otherwise rounded gills 3-6 2
- Abdominal gills pointed apically on at least 1 of gills 2-7 6
2. Abdominal gills strongly developed as an adhesion disc; gill 7 usually folded and tucked beneath abdomen 3

- Abdominal gills not strongly developed as an adhesion disc; gill 7 not folded and tucked beneath abdomen 5
3. Abdominal ganglia strongly pigmented on sternum 7 only; scattered fine hairs confined almost entirely to sternum 9 *myzobranchia*
- All abdominal ganglia pigmented; fine hairs present on sterna 6-9, densest on the latter 4
4. Fore femur with two blackish longitudinal marks; without prominent blackish marks on episterni *atricolor*
- Fore femur with basal whitish macula; with prominent blackish marks on episterni .. *wardorum*
5. Fine hairs present on sterna 6-9, densest on the latter *cornutum*
- Sternal abdomen with fine hairs almost entirely confined to segment 9 *patricki*
6. Abdominal ganglia well pigmented on sternum 7 only *fumosum*
- Abdominal ganglia well pigmented on all segments 7
7. Posterolateral projections present on segments 3 or 4 to 9 *autumnale*
- Abdominal posterolateral projections present on segment 9 only *kiwa*

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