

Two new species of New Zealand caddisflies (Trichoptera: Hydrobiosidae)

JOHN B. WARD

Canterbury Museum, Christchurch, New Zealand

ABSTRACT

Atrachorema macfarlanei (from Route Burn, Mount Aspiring National Park) and *Tiphobiosis cowiei* (from a tributary of Donald Creek, Hope Saddle, Nelson), 2 new species of the Hydrobiosidae, are described. Keys are included for *Atrachorema* males and for both sexes of the species-group that includes *T. cowiei*.

Keywords: *Atrachorema macfarlanei*, *Tiphobiosis childi*, *Tiphobiosis cowiei*, *Tiphobiosis salmoni*, *Tiphobiosis veniflex*, Hydrobiosidae, taxonomy.

INTRODUCTION

Hydrobiosidae is the dominant family of New Zealand Trichoptera, with 67 described species out of a total known fauna of 160; this paper describes 2 additional species.

Schmid (1989) has recently published a revision of the family in all faunal regions, using a consistent notation for the parts of the genital armature. Changes from earlier usage (McFarlane 1964, 1966; McFarlane & Cowie 1981) in names for the male genital parts that affect this paper are as follows:

cercus	becomes	preanal appendage
paraproctal process	becomes	parapod
segment X	becomes	proctiger
superior appendage	becomes	filipod
phallus	becomes	aedeagus + parameres

Atrachorema McFarlane 1964 contains 3 species including the 1 described here, very well-separated in distribution, each very rarely captured. Of the 2 previously-described species, *Atrachorema mangu* McFarlane 1964 is known by the male holotype only, from Mangamuka Gorge, ND (the abbreviations for the New Zealand faunal regions used in this paper are from Crosby *et al.* 1976). The other, *A. tuarua* McFarlane 1966, has been taken in Arthur's Pass, NC and in 3 locations in Nelson (Henderson 1985). Nothing is known of the immature stages of any of the species.

Tiphobiosis Tillyard 1924 contains 9 species, including the 1 described here; most are alpine, usually taken in small numbers only, often found near waterfalls. The female has a long ovipositor. Larvae of this genus have been captured, but little is known of their biology.

Tiphobiosis males are easily identified to species by the shapes of their prominent external genitalia, but no corresponding method has so far been formulated for the females. The shapes of the female 7th and 8th abdominal sternites are useful characters.

The 8th sternite is normally telescoped inside segment 7; to examine it, the abdomen must be removed and cleared for about 30 min in hot 10-15% aqueous KOH solution. After this treatment, a gentle pull will extend the abdomen, and the 8th sternite can be seen. All the genitalia figures in this paper (except 2d) were drawn from specimens cleared in this way, using a squared eyepiece graticule.

SYSTEMATICS

Atrachorema macfarlanei new species (Figs 1, 2).

Type material: male HOLOTYPE and 6 male PARATYPES, OL, Route Burn near the Lodge, 44° 43' 10" S, 168° 16' 30" E, map reference (NZMS1 series) S122 206070,

460 m asl, UV light trap, night of 8-9 January 1990; collector John B. Ward; all in 70% ethanol, deposited in Canterbury Museum. Two further male PARATYPES, same data except 3 December 1990; deposited in the New Zealand Arthropod Collection, Auckland.

Other material examined: nil.

Etymology: named for Alex G. McFarlane, in recognition of his long and outstanding contribution to our knowledge of the New Zealand Trichoptera.

Diagnosis: a black *Atrachorema*, male wings as in Fig. 1a (typical of the genus), male genitalia as in Fig. 2. Female unknown. The males of the 3 known *Atrachorema* species can be separated by the following key couplets, which refer to Schmid (1989) Plate IV Figs 1 and 4, and Fig. 2 this paper:

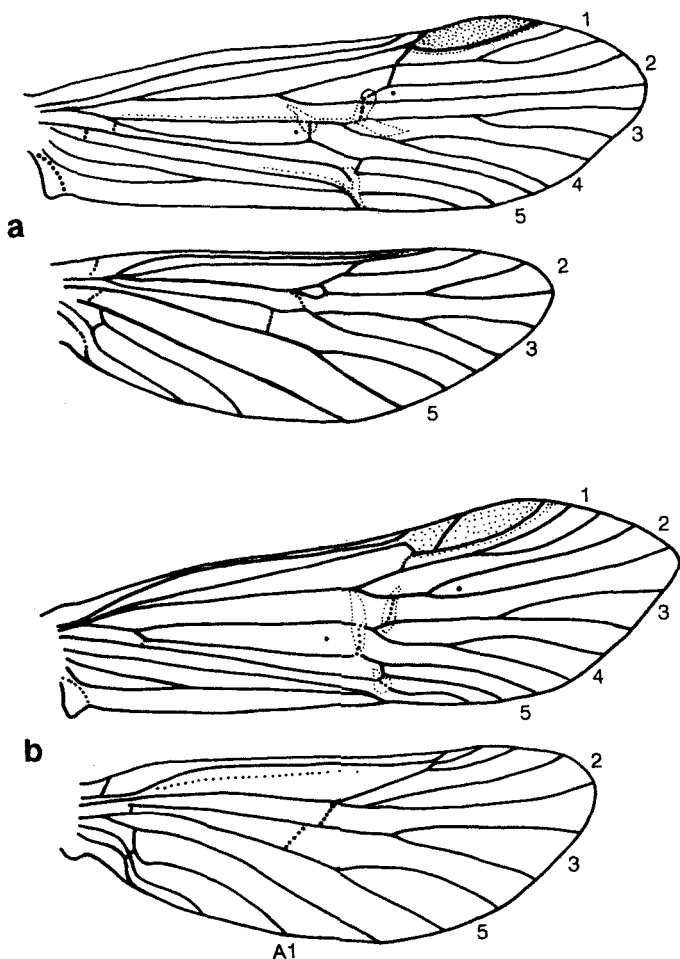


Fig. 1: Male wing venation. a. *Atrachorema macfarlanei* new species, paratype 1; b. *Tiphobiosis cowiei* new species, paratype 2. Heavy dots indicate weak veins; light dots outline transparent areas of the wing membrane, and shade the pterostigma. Numbers 1 to 5, apical wing forks; A1, first anal vein.

- | | | |
|---|--|-----------------------|
| 1 | Inferior appendages deeply bifid, lobster-claw shaped; aedeagus obscure (Fig. 2) | <i>A. macfarlanei</i> |
| * | Inferior appendages shallowly excised, aedeagus prominent | 2 |
| 2 | Parapods 2-pronged (Schmid, Fig. 1) | <i>A. tuarua</i> |
| * | Parapods single-pointed, doubly bent towards tip (Schmid, Fig. 4) | <i>A. mangu</i> |

General description (male specimens in 70% ethanol): Wings: forewing membrane gray-black, except for the clear areas indicated, otherwise unmarked; hindwing slightly paler. Forewing pilosity dark, lying flat, no erect hairs. Head dark red-brown, eyes bronzy-green, iridescent. All sclerites of thorax and abdomen gray-black, intersegmental membranes much paler, almost white. Spurs 244, those on the foretibiae about $\frac{1}{3}$ the length of the others.

Male genitalia (Figs 2a-2d; described by comparison with *A. mangu* and *A. tuarua*): inferior appendages large, deeply bifid, shaped rather like a lobster's claw. Parapods with a conspicuous upper section rimmed with several dark-pigmented, sharp serrations, and with a rapidly-tapering lower arm whose end turns upwards and inwards. Preanal appendages globular; filipods darkly pigmented, hairy. Proctiger with 2 longitudinal pigmented stripes ventrally.

The internal genital armature (Fig. 2d) is similar in plan to that of *A. mangu* and *A. tuarua*, but the beaks of the phallosome are much larger, S-shaped and slightly twisted, projecting rearwards almost to the end of the inferior appendages, where their sharp points touch or slightly cross each other. The aedeagus is small, apparently membranous and eversible (long, sclerotised and conspicuous in *A. mangu* and *A. tuarua*).

Size: length of forewing 7.0 mm (S.D. ± 0.3 mm, $n=7$); antennae about 6 mm, head + thorax + abdomen about 6 mm.

***Tiphobiosis cowiei* new species (Figs 1, 3, 4).**

Type material: male HOLOTYPE: NN, Donald Creek Tributary 1, 41° 35' S, 172° 44' E, 460 m asl, UV light trap, overnight 22-23 February 1982; collector Brent Cowie. 2 male PARATYPES, same data as the holotype except as noted, 1 from Tributary 4 on 23-24 February, the other from Tributary 1 on 28 February-1 March, 1982. All in 70% ethanol, held in the Canterbury Museum collection.

Other material examined: 8 females from the type locality, collected with the males on the dates given above; all in 70% ethanol; Canterbury Museum. 1 male, 1 female, KA, Blue Duck Creek Scientific Reserve, map reference (NZMS 1 series) S42&43 063113, 400 m asl; light trap, 26 December 1989; Raphael K. Didham. Female pinned, male in 70% alcohol; Zoology Department, University of Canterbury. 1 female, WD, Arthur's Pass National Park, Wesley Creek, map reference (NZMS 1 series) S59 051375, 610 m asl; UV light trap 4 February 1990; John B. Ward; Canterbury Museum.

Etymology: named for the collector of the type material.

Diagnosis: a yellow-brown to red-brown *Tiphobiosis*, large (for the genus), wing venation as shown in Fig. 1b (typical for the genus, sexes similar), male genitalia as in Fig. 3, female genitalia as in Figs 4a, d and e.

T. cowiei belongs in the group of species *T. childi*, *T. salmoni* (both McFarlane in McFarlane & Cowie 1981) and *T. veniflex* McFarlane 1960, characterised by: the absence of a spine on the rear margin of abdominal sternite 7; the presence of a marked S-shaped flexure in hind wing vein A1 basally; the absence of knobs on abdominal segment II; and forewing fork 2 arising noticeably distal to the R-M crossvein. It can be separated from its near congeners by the following key couplets:

- | | |
|---|--------------------------------------|
| 1. Female | 2 |
| * Male | 4 |
| 2. Sternite 8 rear margin convex (Fig. 4a) | <i>T. cowiei</i> ; <i>T. salmoni</i> |
| * Sternite 8 rear margin concave (Figs 4b, 4c) | 3 |
| 3. Anterior arms of sternite 8 wide, tapering only gradually; projection on rear margin of sternite 7 of width (measured half way along it) about equal to its length (Fig. 4b) | <i>T. childi</i> |
| * Anterior arms of sternite 8 narrow, tapering rapidly; projection on sternite 7 of width about half its length (Fig. 4c) | <i>T. veniflex</i> |

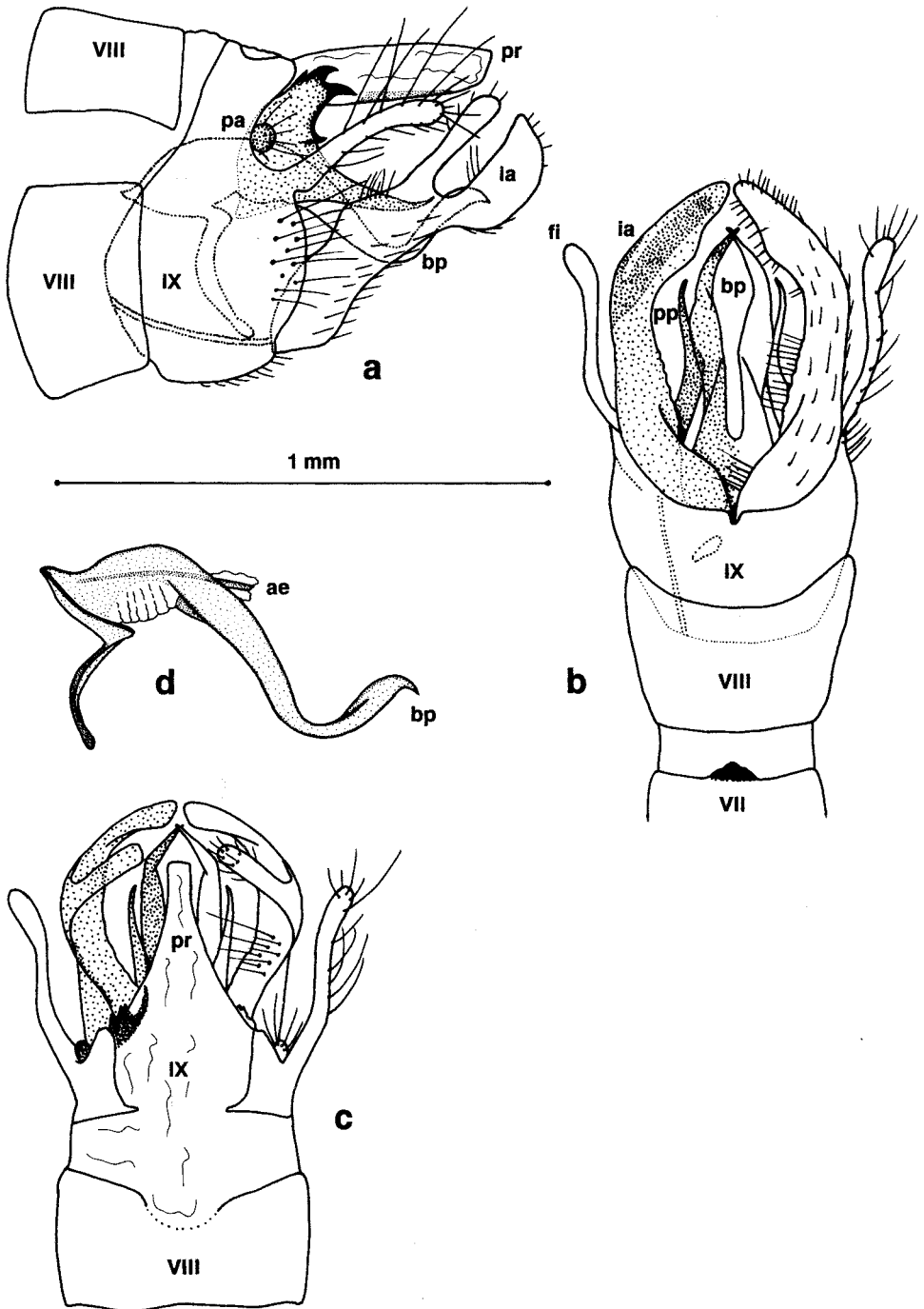


Fig. 2: *Atrachorema macfarlanei* new species, male genitalia. a. lateral, parapod and preanal appendage shaded; b. ventral (proctiger not shown); c. dorsal; all paratype 1; d. genital armature, paratype 2. ae, aedeagus; bp, beaks of the phallosome; fi, filipod; ia, inferior appendage; pa, preanal appendage; pp, parapod; pr, proctiger; VI-VIII, 6th-8th sternite and tergite; IX, 9th segment.

4. The 2 distal arms of the inferior appendages both blade-like (flattened cross-section) 5
 * Upper arm blade-like, lower arm rod-like (round cross-section) 6
 5. Lower arm in lateral profile tapering uniformly towards tip (Fig. 56, McFarlane & Cowie 1981) *T. childi*
 * Lower arm in lateral profile abruptly narrowed half-way towards tip (Fig. 3a) *T. cowiei*
 6. Upper arm concave; lower lacking spines (Figs 60-62, McFarlane & Cowie 1981) *T. salmoni*
 * Upper arm flat; lower with inwardly-directed spines on tip (Figs 40-42, McFarlane 1960) *T. veniflex*

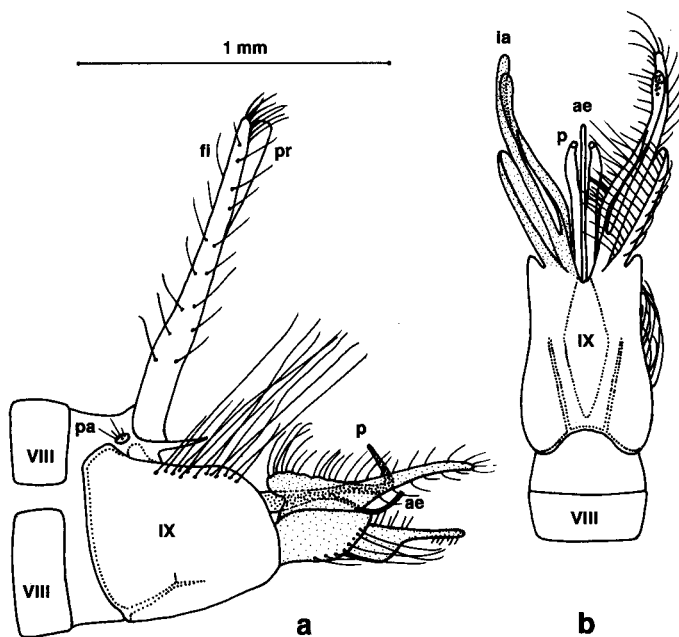


Fig. 3: *Tiphobiosis cowiei* new species, male genitalia, paratype 2: a. lateral; b. ventral. p, parameres; other notation as in Fig. 2.

General description (from specimens in 70% ethanol): forewing membrane pale yellow-brown, unmarked except for the clear areas outlined with small dots in Fig. 1b; hindwing paler. Pilosity on most specimens pale, lying flat, no erect hairs; however, the Wesley Creek female has a few darker, erect hairs on forewing Sc. Females with a blister-like organ on each side of abdominal sternite 5. Spurs 244, those on the foretibiae being about $\frac{1}{3}$ the length of those on the others.

Male genitalia (Fig. 3): similar to *T. childi* but with the lower distal branch of the inferior appendages in lateral profile broad basally, abruptly narrowed at a point half-way towards the tip; a group of downwards-pointing spine-like hairs at the tip. Upper branch in lateral profile tapered gradually. Aedeagus in the form of a tube, curving downwards then upwards distally; parameres bent downwards near their tips, then sharply upwards and forwards; pointed. Proctiger entirely membranous; filipods basally each with a hook and a longitudinal sclerotised ridge (which grasp the female segment 9 in copulation). Preanal appendages very small, ovoid.

Female genitalia (Figs 4a, d, e): sternite 7 rear margin smoothly curved with a small concavity medially. Sternite 8 saddle-shaped, rear margin convex.

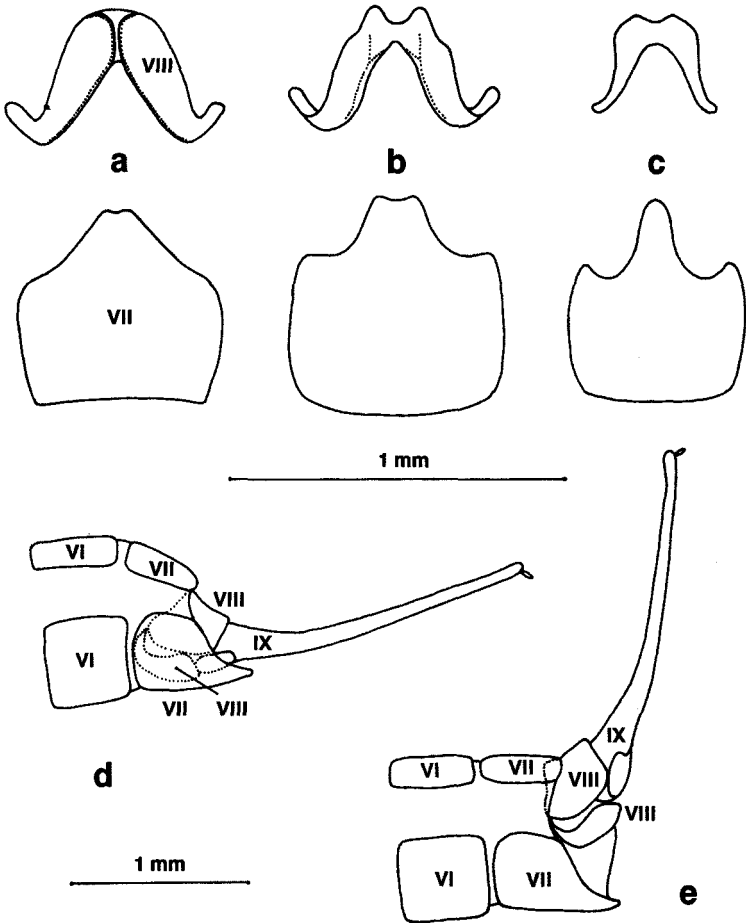


Fig. 4: *Tiphobiosis* species, female abdominal sternites 7 and 8, ventral view (rearwards direction is up the page): a. *Tiphobiosis cowiei* new species (Donald Creek); b. *Tiphobiosis childi* (paratype); c. *Tiphobiosis veniflex* (Rastus Burn); *Tiphobiosis cowiei* new species, rear end of female abdomen, lateral view: d. normal position; e. expanded position.

Size: length of forewing: males 7.2 mm (S.D. ± 0.3 mm, $n=3$); females 7.4 mm (S.D. ± 0.3 mm, $n=7$); head + thorax + abdomen: males about 7 mm, females about 8 mm; antennae about 6 mm.

Remarks: the type material, together with 29 other species of caddis adults, was caught during a study of the impact of forestry practices on stream fauna (Cowie 1984).

My evidence that the males and females described above as *T. cowiei* are conspecific is: (i) their close resemblance in non-genital characters (colour, size, venation); and (ii) their being captured (at Donald Creek and Blue Duck Scientific Reserve) in the absence of other *Tiphobiosis* species. However, I cannot find any character to separate the females described above as *T. cowiei* from the specimen of *Tiphobiosis* from Lake Sylvester, NN, that was assigned by McFarlane & Cowie (1981) as the sole female *T. salmoni* paratype. Males of *T. salmoni* have been captured only at Homer Tunnel, FD (type locality) and at Moa Park, NN (Henderson 1985).

In these circumstances, lacking hard evidence of conspecificity (such as the capture of a pair of insects *in copula*) there remains the possibility that the females described above as *T. cowiei*, and/or the female paratype of *T. salmoni*, have been wrongly assigned to species.

Regarding the other *Tiphobiosis* females in Fig. 4: the *T. childi* association is confirmed by pairs taken *in copula* (McFarlane & Cowie 1981). The sole *T. veniflex* female paratype was repudiated by McFarlane (*ibid.*, p. 373 "The female is not yet known."), and in any case is missing from the Canterbury Museum collection. However, I have been able to examine the January 1 to March 31 1988 Trichoptera catch from a light-trap run continuously at Rastus Burn, Remarkables Range, OL/CO. It contains 18 males and 30 females of *T. childi* plus 16 males of *T. veniflex* and 3 females that closely resemble the *T. veniflex* males. Since no other *Tiphobiosis* species was taken, the identification of the 3 females as *T. veniflex* is reasonably certain.

ACKNOWLEDGEMENTS

I thank R. Kennet and P. Chapman (Mount Aspiring N.P.) and P. Simpson (Arthur's Park N.P.) for granting permission to light-trap; R. Ordish and R. Palma, National Museum, for the loan of type material of *Tiphobiosis*; B. H. Patrick, B. Lyford and R. K. Didham for giving the opportunity to work on their light-trapped material; and to Ann McCaw for art work. I acknowledge much helpful advice from, and collaboration with Ian M. Henderson and greatly appreciate the facilities provided by the Canterbury Museum Trust Board.

REFERENCES

- Cowie, B., 1984: An evaluation of the impacts of different logging techniques upon the invertebrate faunas of four small catchments in the Donald Creek Experimental Catchment Area, Big Bush State Forest. Internal Report to the New Zealand Forest Service.
- Crosby, T. K.; Dugdale, J. S.; Watt, J. C., 1976: Recording specimen localities in New Zealand: an arbitrary system of areas and codes defined. *New Zealand journal of zoology* 3: 69+map.
- Henderson, I. M., 1985: Systematic studies of New Zealand Trichoptera and critical analysis of systematic methods. Unpublished PhD thesis, Victoria University of Wellington, New Zealand.
- McFarlane, A. G., 1960: Additions to the New Zealand Trichoptera (part 4). *Records of the Canterbury Museum* 7: 203-218.
- , 1964: A new endemic subfamily, and other additions and emendations to the Trichoptera of New Zealand (part 5). *Records of the Canterbury Museum* 8: 55-79.
- , 1966: New Zealand Trichoptera (part 6). *Records of the Canterbury Museum* 8: 137-161.
- ; Cowie, B., 1981: Descriptions of new species and notes on some genera of New Zealand Trichoptera. *Records of the Canterbury Museum* 9: 353-385.
- Schmid, F., 1989: Les Hydrobiosides (Trichoptera, Annulipalpia). *Bulletin de l'Institut des Sciences Naturelle de Belgique. Entomologie* 59 (supplement): 1-154.
- Tillyard, R. J., 1924: Studies of New Zealand Trichoptera, or caddis-flies: No 2, descriptions of new genera and species. *Transactions and Proceedings of the New Zealand Institute* 55: 285-314.