

DESCRIPTIONS OF NEW LEPTOPHLEBIIDAE (INSECTA: EPHEMEROPTERA)
FROM AUSTRALIA. I. *TILLYARDOPHLEBIA* GEN. NOV.

JOHN C. DEAN

Environment Protection Authority, Catchment and Marine Studies,
27 Francis Street, Melbourne, Vic. 3000, Australia

Abstract

Dean, J.C., 1997. Descriptions of new leptophlebiidae (Insecta: Ephemeroptera) from Australia. I. *Tillyardophlebia* gen. nov. *Memoirs of the Museum of Victoria* 56: 83-89.

The genus *Tillyardophlebia* gen. nov. is established to accommodate a group of leptophlebiid mayflies from eastern Australia. Adults and nymphs of *T. rufosa* sp. nov. from Victoria and New South Wales and *T. alpina* sp. nov. from New South Wales are described and figured.

Introduction

The family Leptophlebiidae is the dominant mayfly family in Australia. Despite recent descriptions of new genera (Dean, 1987, 1988; Campbell and Suter, 1988; Campbell, 1993), the family remains poorly known, with many undescribed genera held in various collections (Dean and Suter, 1996). The present paper is the first in a series, and describes a new genus and two new species from south-eastern Australia. Additional taxa will be described as nymphs are associated with adults and sufficient adult material becomes available. Examined material has been preserved in alcohol, with parts of some specimens mounted on microscope slides. All material is lodged in the Museum of Victoria (NMV).

Tillyardophlebia gen. nov.

Diagnosis. Imago. Forewing with membrane hyaline (Fig. 1); costal and subcostal cells either uniformly washed with reddish-brown or hyaline with cells in apical third of wing translucent, whitish. Length-width ratio 2.8-3.0. 4-9 costal crossveins basal to the bulla, 10-19 distal to the bulla. MA forked at 0.38-0.41 wing length. MP_2 attached by crossvein to MP_1 at 0.17-0.18 wing length. ICu_1 not linked to $CuA-CuP$ crossvein; base of ICu_1 linked by crossvein to CuA ; ICu_1 and ICu_2 moderately diverging as wing margin approached. Hindwing 0.24-0.28 length of forewing. Costal margin with shallow concavity just beyond midlength, costal space relatively broad both basal and distal to this (Fig. 2). Vein Sc joining costal margin at about 0.95 wing length. Hindwing with 8-13 costal crossveins and 8-10 subcostal crossveins. All legs with tarsal claws dissimilar, one with an apical hook and opposing ventral flange, the other obtuse, pad-like (Fig. 6). Forelegs of male with ratios of segment

lengths 0.71-0.89:1.00 (3.6-3.9 mm):0.04-0.05:0.37-0.43:0.37-0.45:0.28-0.36:0.10-0.11. Male genitalia with claspers 3-segmented, narrowing abruptly at about midlength (Fig. 4). Penes long, narrow, widely separated for most of length, fused at base only; with pair of stout, curved ventral spines a little basal to where the penes fuse (Figs 21, 22, 24, 25). Female ninth sternum with apical margin either flattened or very shallowly concave (Fig. 5).

Subimago. Wings uniformly yellowish-brown.

Mature nymph. Head prognathous, antennae about twice width of head. Mouthparts as in Figures 14-20. Clypeus with lateral margins slightly diverging to anterior. Labrum 1.1-1.4 times broader than clypeus; width 1.8-2.3 times maximum length; 2 setal fringes close to anterior margin, each fringe extending across more than half width of labrum; anterior margin with central notch, the base of which is concealed by frontal setal fringe, which lies along an overhanging canopy. Mandible with outer margin rounded, dense tuft of long setae at midlength, and series of shorter setae along margin between tuft and outer incisor; incisors slender, with 1 or more subapical denticles; prostheca large. Lingua of hypopharynx with well developed lateral processes, anterior margin with deep incision; superlingua with dense setal fringe along anterior margin. Maxilla somewhat squat, subapical row of about 25 pectinate setae; palp moderately short, terminal segment about same length as middle segment, middle segment bearing simple setae only. Labium with glossae not turned under ventrally, lying in same plane as paraglossae; palp 3-segmented, terminal segment about half length of middle segment. Legs relatively large, apex of hind femur reaching beyond midlength of abdomen (Fig. 7); all

segments of leg with fringe of setae along outer margin (Fig. 9); tarsal claws with ventral teeth, progressively larger apically (Fig. 10). Abdominal segments without setae on lateral margins, strongly developed posterolateral spines on segments 2–9 (Fig. 8); posterior margins of abdominal terga with series of stout spines, longer spines interspersed with shorter (Fig. 11). Gills present on abdominal segments 1–7, each gill lanceolate, with upper and lower lamellae equally developed (Fig. 12). Caudal filaments with apical whorl of stout spines on each segment, fine setae sparse (Fig. 13).

Type species. Tillyardophlebia rufosa sp. nov.

Etymology. The genus is named for R.J. Tillyard, in recognition of his pioneering work on Australian mayflies.

Remarks. Brief descriptions of *Tillyardophlebia* have previously been provided by Dean and Suter (1996) under the designation 'Genus D'. More species than those described below are known from Tasmania, Victoria and Queensland, but a shortage of material precludes their description in the present work.

The genus *Tillyardophlebia* can be distin-

guished from all other leptophlebiid genera by the following combination of characters.

Imago: 1, forewing with ICu_1 not attached to $CuA-CuP$ crossvein; 2, forewing approximately 4 times length of hindwing; 3, hindwing with Sc joining wing margin at about 0.95 wing length; 4, tarsal claws dissimilar; 5, male genitalia with penes long, narrow, fused near base only, with a pair of stout ventral spines near base; 6, ninth sternum of female with apex either flattened or with very shallow concavity.

Nymph. 1, labrum slightly broader than clypeus and with notch in anterior margin; 2, width of labrum 1.8–2.3 times maximum length; 3, tarsal claws with ventral teeth; 4, abdominal segments without lateral fringe of setae; 5, posterolateral spines present on abdominal segments 2–9.

Tillyardophlebia is a member of the *Meridialis* lineage as defined by Pescador and Peters (1980), which also includes the Australian genus *Austrophlebioides*. While the two Australian genera are closely related, *Tillyardophlebia* is clearly distinguished by the form of the male genitalia and, in the nymph, by the form of the labrum and the absence of setae on the lateral margins of the abdominal segments.

Keys to described species of *Tillyardophlebia*

Imagos

1. Legs with all segments yellow, brown pigmentation restricted to small area around apices of femora; male genitalia with ventral, triangular flange at about mid length of each penis lobe (Figs 21–22) *Tillyardophlebia rufosa*
- Legs with femora dark brown, all other segments pale brown; male genitalia without ventral flange at mid length of each penis lobe (Figs 24–25) *Tillyardophlebia alpina*

Nymphs

1. Gills with membranes heavily pigmented, purple; femora of all legs dark reddish-brown *Tillyardophlebia alpina*
- Gills with membranes pale, yellow-white; femora of all legs light brown with several contrasting pale patches *Tillyardophlebia rufosa*

Tillyardophlebia rufosa sp. nov.

Figures 1–23

Type material. Holotype: Victoria. Badger Creek, d/s weir, 23 Feb 1984, J. Dean, NMV T-16709, male imago reared from nymph.

Paratypes: same location, 31 Jan 1985, J. Dean, NMV T-16710, male imago reared from nymph; same location, 21 Feb 1980, J. Dean, NMV T-16711, male imago reared from nymph (wings, genitalia, legs, assorted nymphal parts mounted on slides); same location, 20 Mar 1980, J. Dean, NMV T-16712, female imago reared from nymph; same location, 21 Feb 1980, J. Dean, NMV T-16713, female imago

reared from nymph (wings, ninth sternum, legs, assorted nymphal parts mounted on slides).

Other material examined. Vic. Badger Creek, d/s weir, various dates, J. Dean, 14 nymphs; same location, various dates, J. Dean, 5 female subimagos reared from nymphs; Watts River, Fernshaw, 4 Mar 1976, J. Dean, female imago reared from nymph; same location, 24 Feb 1977, J. Dean, 1 nymph; O'Shannassy River, u/s reservoir, 17 Feb 1977, J. Dean, 1 nymph; Thomson River, u/s Easton Portal, 22 Jan 1975, J. Dean, 1 nymph. NSW. Thredbo River, 1.5 km u/s Deadhorse Gap, 21 Jan 1984, J. Dean, 2 nymphs; Leather Barrel Creek, Alpine Way, 6 Feb 1985, J. Dean, 3 nymphs.

Description. Imago. Length of male: body 10.6–11.6 mm, forewing 10.0–10.3 mm; Length of female: body 11.7 mm, forewing 11.7 mm. Upper lobes of male eyes orange-brown, in contact dorsally. Thorax golden. Legs with all segments yellowish, apex of femur brown. Forewings with costal and subcostal cells washed with reddish-brown (Fig. 1). Male abdomen predominantly paler brown, with pair of thin, dark brown, longitudinal stripes along midline, an adjacent paler macula on each side of midline close to anterior margin, and further lateral to this an area of dark brown pigmentation (Fig. 23). Female abdomen similar, although with pale maculae less obvious and darker anterolateral region less contrasting with the rest of the segment. Penes lobes with ventral, triangular flange at about midlength, and triangular ventral process immediately distal to the fused basal section (Figs 21–22).

Subimago. Wings yellowish-brown, forewing costal and subcostal cells with brown pigmentation of imago showing through. Female abdomen reddish-brown.

Nymph. Labrum width 2.0–2.1 times maximum length; width of frontal setal fringe 0.5–0.6 times width of labrum, narrower than secondary fringe; anterior notch broad (Fig. 14). Femora with upper surface contrasting pale brown and yellow (Fig. 9). Gills with membrane pale, yellow-white. Abdominal terga contrasting brown and yellow colour pattern (Fig. 7).

Comments. Association of adult and nymph by rearing. Nymphs occur in small to medium sized forest streams, where they have been collected from the surface of large cobbles and small boulders in moderate currents.

Tillyardophlebia alpina sp. nov.

Figures 24–26

Type material: Holotype: New South Wales. Ramshead Creek, the Cascades, Merritt's Track, 27 Jan 1984, J. Dean, NMV T-16714, male imago. Paratype: same location and date, NMV T-16715, female subimago.

Other material examined: NSW. Ramshead creek, The Cascades, Merritt's track, 27 Jan 1984, J. Dean, 2 nymphs; Ramshead creek, u/s Mt Kosciusko summit track, 27 Jan 1984, J. Dean, 6 nymphs; Lake Cootapatamba, 24 Jan 1984, J. Dean, 1 nymph; Lake Albina inflowing stream, 9 Feb 1985, J. Dean, 24 nymphs; creek near top of Crackenback chair lift, 15 Dec 1978, J. Dean, 6 nymphs.

Description. Imago. Length of male, body 12 mm, forewing 11 mm. Upper lobes of male eyes

pinkish-tan, in contact on meson of head. Thorax golden. All legs with femur dark brown, other segments pale brown. Forewings with costal and subcostal cells washed with pale brown. Abdomen predominantly darker brown, somewhat blotchy, each segment paler in posterior half; terga with thin, dark brown, longitudinal stripes along the midline, ill defined pair of paler maculae near anterior margin, 1 on either side of the midline (Fig. 26). Penes lobes without ventral flange at midlength; inner margin of each lobe with ventral process immediately distal to fused basal section (Figs 24, 25). Lobes in ventral view relatively long and narrow.

Subimago. Wings yellowish-brown.

Nymph. Labrum width about 2.2 times maximum length; width of frontal setal fringe 0.5–0.6 times width of labrum, narrower than secondary fringe; anterior notch narrow. Femora with upper surface strongly pigmented, reddish-brown. Gills with membrane darkly pigmented, purplish. Abdominal terga uniformly dark reddish-brown.

Comment. Association of adult and nymph is based on dissection of the male genitalia from a ripe nymph. The species is known only from the Kosciusko region, and nymphs have been collected from stony substrates of small streams, both above and just below the treeline.

Acknowledgments

Dr Ken Walker, Curator of Entomology, Museum of Victoria, is thanked for making available material held in the collections of the museum. Part of the work on the immatures has been funded by the Land and Water Resources Research and Development Corporation as an MRHI R and D project.

References

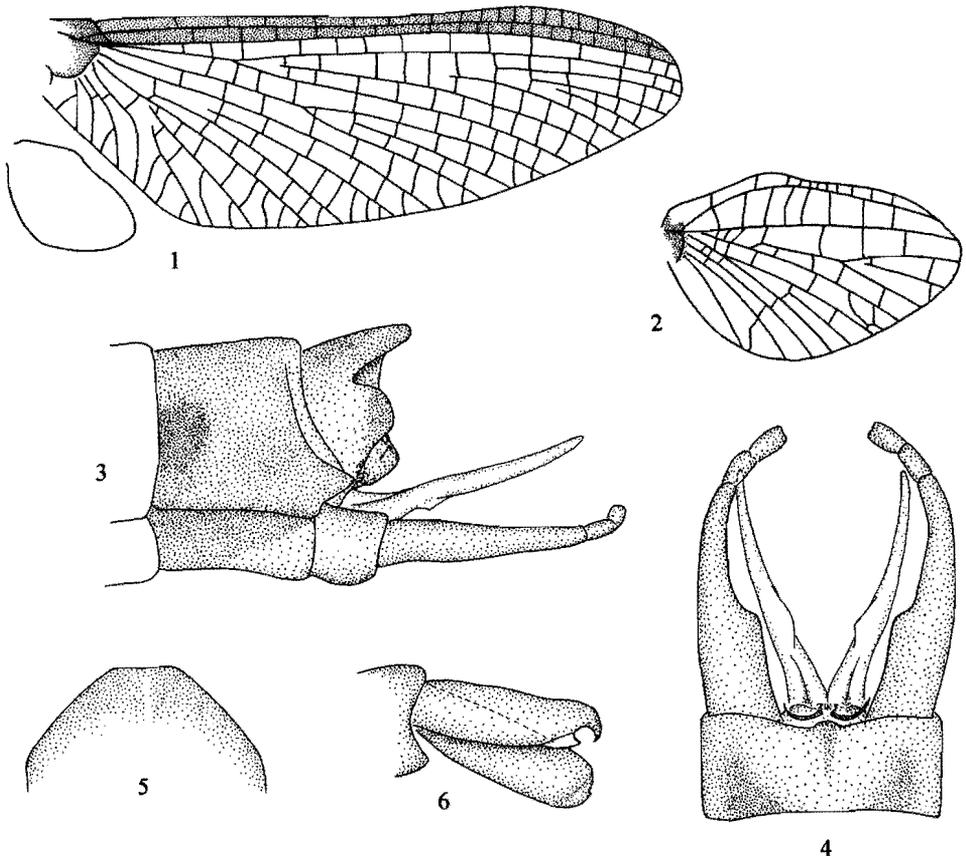
- Campbell, I.C., 1993. A new genus and species of lepto-phlebiid mayfly (Ephemeroptera: Lepto-phlebiidae: Atalophlebiinae) from tropical Australia. *Aquatic Insects* 15: 159–167.
- Campbell, I.C. and Suter, P.J., 1988. Three new genera, a new subgenus and a new species of Lepto-phlebiidae (Ephemeroptera) from Australia. *Journal of the Australian Entomological Society* 27: 259–273.
- Dean, J.C., 1987. Two new genera of Lepto-phlebiidae (Insecta: Ephemeroptera) from south-western Australia. *Memoirs of the Museum of Victoria* 48: 91–100.

Dean, J.C., 1988. Description of a new genus of leptophlebiid mayfly from Australia (Ephemeroptera: Leptophlebiidae: Atalophlebiinae). *Proceedings of the Royal Society of Victoria* 100: 39-45.

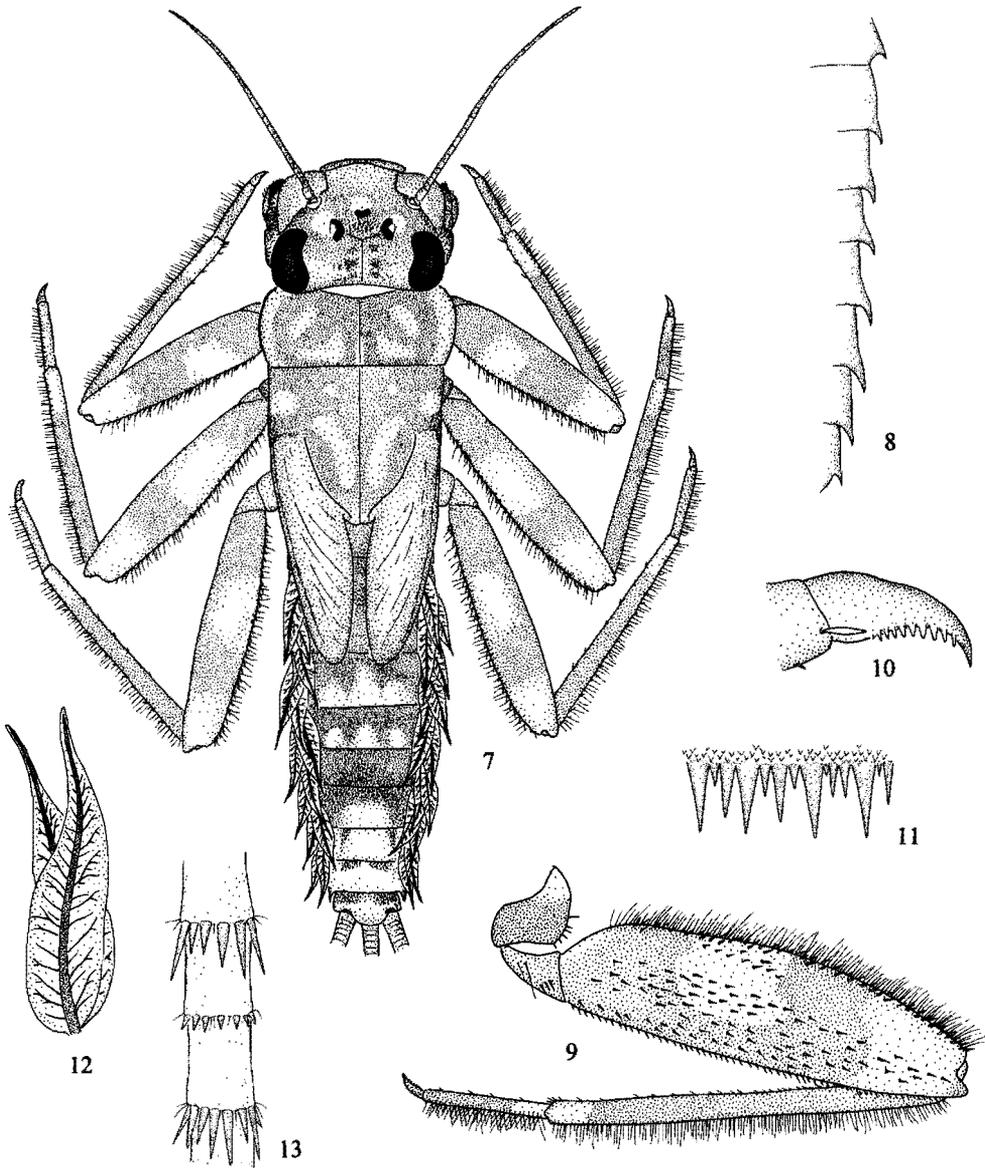
Dean, J.C. and Suter, P.J., 1996. Mayfly nymphs of Australia. A guide to genera. *Identification Guide No. 7, Co-operative research Centre for Freshwater*

Ecology. Murray-Darling Freshwater Research Centre: Albury, New South Wales.

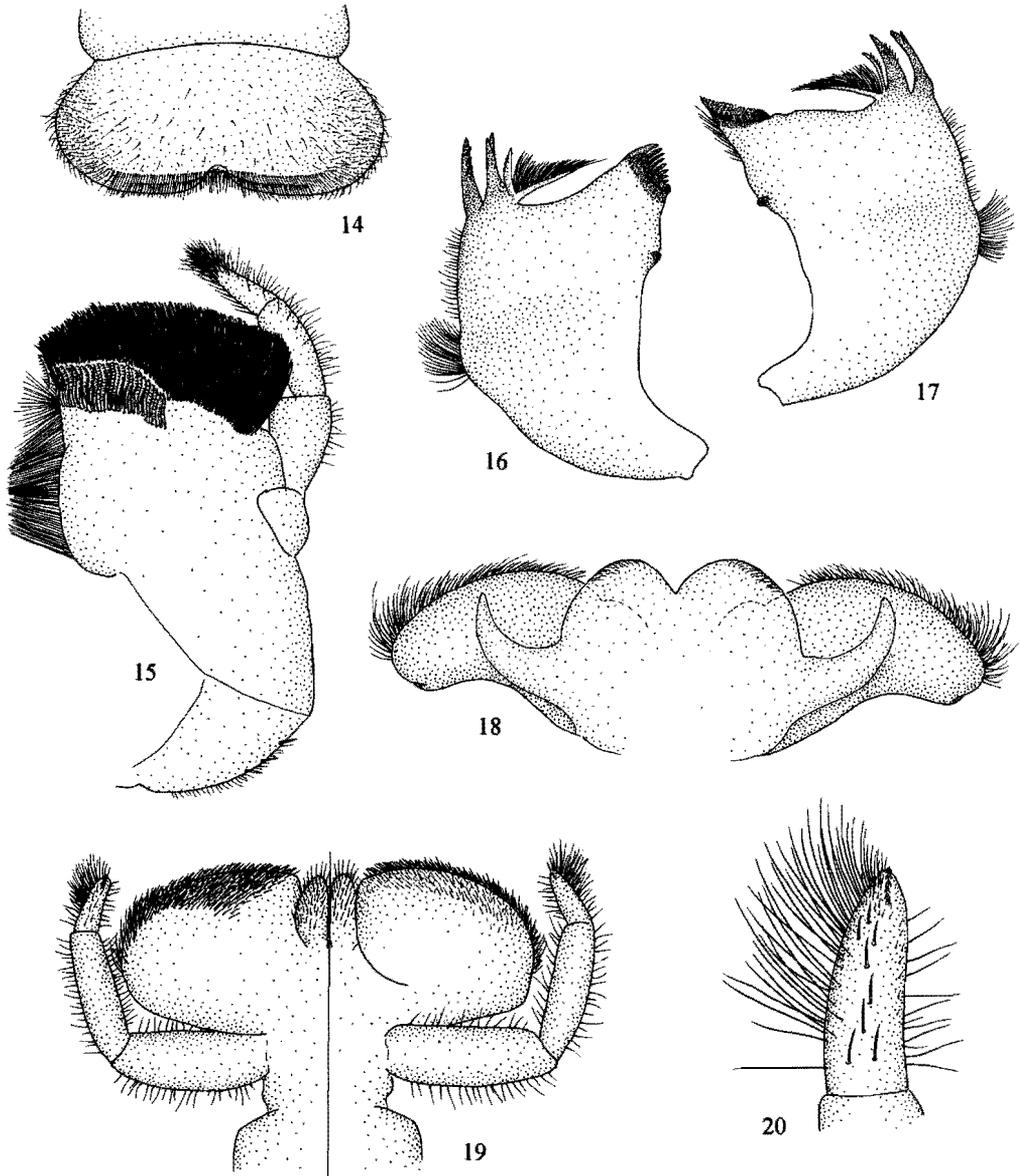
Pescador, M.L. and Peters, W.L., 1980. Phylogenetic relationships and zoogeography of cool-adapted Leptophlebiidae (Ephemeroptera) in southern South America. Pp 43-56 in: Flannagan, J.F. and Marshall, K.E. (eds), *Advances in Ephemeroptera Biology*. Plenum Press: New York



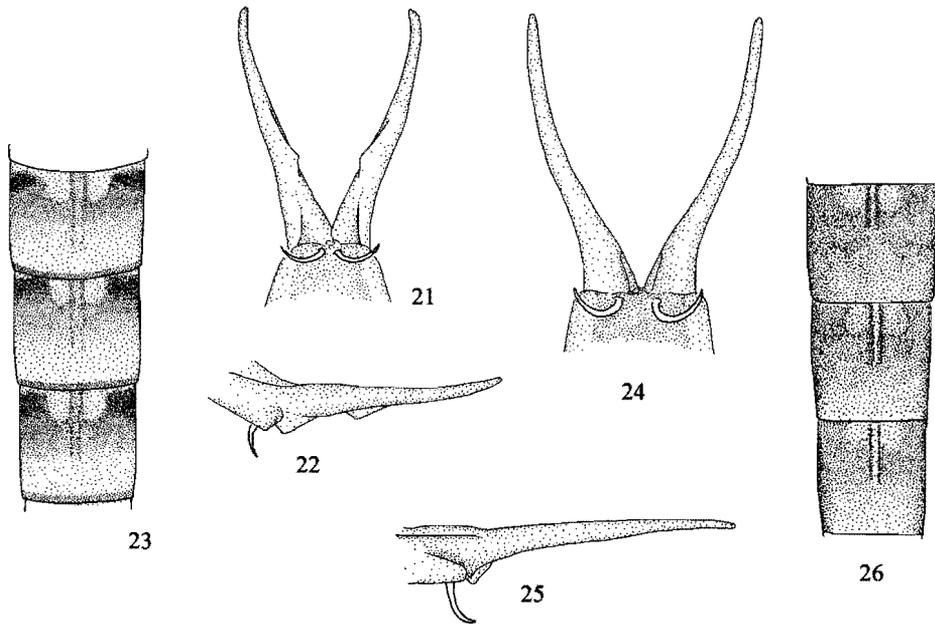
Figures 1-6. *Tillyardophlebia rufosa*. Imago. 1, wings, male; 2, hind wing, male; 3, male genitalia, lateral; 4, male genitalia, ventral; 5, female ninth sternum, ventral; 6, tarsal claws, male.



Figures 7-13. *Tillyardophlebia rufosa*. Nymph. 7, whole nymph, dorsal; 8, postero lateral spines of abdomen; 9, fore-leg; 10, tarsal claw; 11, spines on posterior margin of abdominal tergite 6; 12, gill from abdominal segment 4; 13, terminal filament, midlength.



Figures 14–20. *Tillyardophlebia rufosa*. Nymphal mouth parts. 14, labrum; 15, left maxilla, ventral; 16, left mandible, dorsal; 17, right mandible, dorsal; 18, hypopharynx; 19, labium, dorsal (left of midline) and ventral (right of midline); 20, terminal segment of labial palp, dorsal.



Figures 21–26. Male imagos. *Tillyardophlebia rufosa*. 21, penes, ventral; 22, penes, lateral; 23, abdominal terga 4–6, dorsal; *T. alpina* 24, penes, ventral; 25, penes, lateral; 26, abdominal terga 4–6, dorsal.