

A new genus and species of Calocidae (Trichoptera: Insecta) from south eastern Australia

M.E. SHACKLETON^{1,*} (<http://zoobank.org/urn:lsid:zoobank.org:author:B95D1ABB-6728-4F97-B024-D994D8A9B8D2>),
J.M. WEBB² (<http://zoobank.org/urn:lsid:zoobank.org:author:CD6F532E-3630-4DA6-BFEF-0C91CB9F610C>),
S.H. LAWLER³ (<http://zoobank.org/urn:lsid:zoobank.org:author:EB1CAD81-EE0D-4E5F-AA8B-277C222E413F>) AND
P.J. SUTER⁴ (<http://zoobank.org/urn:lsid:zoobank.org:author:EDDC454C-E7F3-4F91-BE63-EAD237059A82>)

^{1,3,4} La Trobe University, Department of Environmental Management and Ecology, University Drive, WODONGA, Victoria, 3690 (m.shackleton@latrobe.edu.au)

² Rhithron Associates Inc, 33 Fort Missoula Road, Missoula, MT USA 59802

* To whom correspondence and reprint requests should be addressed. Email: m.shackleton@latrobe.edu.au

<http://zoobank.org/urn:lsid:zoobank.org:pub:691C8CCF-5F71-4933-8E20-C1D9B129A8E4>

Abstract

Shackleton, M.E., Webb, J.M., Lawler, S.H. and Suter, P.J. 2014. A new genus and species of Calocidae (Trichoptera: Insecta) from south eastern Australia. *Memoirs of Museum Victoria* 72: 25–30.

Latarima gen. nov. (Trichoptera: Calocidae) is described from southeastern Australia based on the male adult, male pupa, and larva. Two species are included, *L. explicatala* sp. nov. and *L. furcilla* (Neboiss, 1984a) comb. nov. Males of *Latarima* gen. nov. are distinct from other Calocidae genera in that segment X of the genitalia is widely incised, forming two elongate sections on the segment. Larvae are distinguished by a reticulate texture of the head capsule and a frontoclypeus that widens suddenly towards the anterior and possesses many setae in the antero-lateral corners. Larvae were previously placed in the interim genus Cal/Hel Genus G by Jackson (1998). This work increases the number of Calocidae genera to 7.

Keywords

Latarima gen. nov., *explicata* sp. nov., *Tamasia furcilla*, Pupa, Larva.

Introduction

There are currently 6 recognised genera in the family Calocidae Ross, with 5 occurring in Australia and 1 monotypic genus in New Zealand. Mosely (1936) described the first genus *Tamasia* Mosely, 1936, which contained a single species *Tamasia variegata* Mosely, 1936. It was originally placed in the family Sericostomatidae, Stephens. Mosely and Kimmins (1953) later described seven new species from three new genera, also placed in the family Sericostomatidae, that would later be included in the family Calocidae. These were *Caenota plicata* Mosely, in Mosely and Kimmins 1953, *Caenota simulans* Mosely, in Mosely and Kimmins 1953, *Caloca straminea* Mosely, in Mosely and Kimmins 1953, *Caloca tertia* Mosely, in Mosely and Kimmins 1953, *Caloca eba* Mosely, in Mosely and Kimmins 1953, and *Caloca fallia* Mosely, in Mosely and Kimmins 1953. A further species, *Tismana saneva* Mosely, in Mosely and Kimmins 1953, was placed in the Odontoceridae and later synonymised with *Caloca* by Neboiss (1977).

The name Calocidae was established by Ross (1967) presumably to accommodate these seemingly related genera: *Caenota* Mosely, 1953, *Caloca* Mosely, 1953, and *Tamasia*. In his publication, Ross (1967) gave no indication of the genera to

be included in the family but stated that the leg spur formula was 2:2:4 and that Calocidae were similar to ancestor 15 (Neboiss 1977; Jackson 1991; Holzenthal et al. 2007). Johanson and Malm (2010) indicate that the family name is derived from *Caloca* suggesting the inclusion of this genus.

The New Zealand endemic, monotypic genus, *Pycnocentrella* Mosely, 1953, was originally described in Mosely and Kimmins (1953) and placed in the family Baeridae. Ross (1967) established the family Pycnocentrellidae Ross, again without indicating which genera it contained. However, *Pycnocentrella* can be assumed to be included. *Pycnocentrella* was transferred to Calocidae by Neboiss (1977).

Neboiss (1984a) added two new species to the genus *Tamasia*, *T. acuta* Neboiss, 1984a, and *T. furcilla* Neboiss, 1984a. In the same year two further genera were described in the Calocidae in Neboiss (1984b). These were *Calocoides* Neboiss, 1984b, with a single species and *Pliocaloca* Neboiss, 1984b, with three species, all from northern Queensland.

The taxonomy of the family is based on characters of the adult males. Until recently, the larvae of only 5 species from four genera were known: *Caloca saneva*, *Caenota plicata*, *Pycnocentrella eruensis* Mosely, 1953, *T. variegata*, and *T. acuta*. These were

illustrated in Jackson (1998), along with a number of larval types which she considered likely to be distinct genera. Jackson (1998) gave these the temporary generic names Genus Cal/Hel A – H. The genus name Cal/Hel reflected her uncertainty as to whether these taxa belonged to the family Calocidae or Helicophidae. Neboiss (2002) associated the larva of the monotypic Genus Cal/Hel A with a newly described species, *Heloccabus buccinatus* Neboiss, 2002, that he tentatively placed in the family Helicophidae. The taxa Genus Cal/Hel B, C, and D have recently been associated with known and newly described species, each in separate genera (Cal/Hel B and C, Shackleton, in prep; Cal/Hel D, Shackleton and Webb, 2014). All genera described to date can easily be distinguished through examination of larval characters.

The current study provides descriptions of the adult male and pupa of a new species and genus, *Latarima* gen. nov. *explicatala* sp. nov., which is associated with the larva that Jackson (1998) referred to as Genus Cal/Hel G. The presence of male genital characters on a pharate male pupa, along with the sclerites of the larva, which are exuviated and retained in the posterior of the pupal case, enables an association between the life stages of the species (Milne 1938). Similarities in adult male characters between this species and that of *Tamasia furcilla* suggest a close relationship between the two. Here we suggest that these two species belong in the new genus, *Latarima* gen. nov. This work increases the number of Calocidae genera to 7.

Materials and Methods

Adult, larval and pupal specimens were obtained from the Museum of Victoria, Melbourne, and the Environmental Protection Authority, Victoria. All specimens are deposited in the Museum of Victoria, Melbourne.

Larval sclerites were extracted from pupal cases and compared with known larvae. Similarities in the genitalia of pharate male pupae were used to associate the adult with the pupal form.

Material was examined using a Nikon SMZ1500 microscope. Photographs were taken using a Nikon DS-Fil camera mounted on a Nikon SMZ1500 microscope. Helicon Focus 5.3.7 was used to create photographs with a wide depth of field. Photographs were edited using GIMP 2.6.11.

Terminology of the adult characters follows that of Mosely (1936), Neboiss (1991, 1992), and Holzenthal et al. (2007). Terminology of the larval characters follows that of Jackson (1998). Terminology of pupae follows that of Holzenthal et al. (2007). Because the modification of the hind wing venation of this species makes identification of individual veins difficult, the author's interpretation of the wing venation is indicated on the illustrations provided.

Family Calocidae

Latarima Genus nov.

Zoobank LSID. <http://zoobank.org/urn:lsid:zoobank.org:act:955AF7F6-958F-4485-AC37-80DD885EE461>

Type species: *L. furcilla* (Neboiss) comb. nov. (*Tamasia furcilla* Neboiss in Neboiss 1984a).

Generic Diagnosis. Adult and larval characters can be used to distinguish *Latarima* from all other Calocidae genera. This genus is the only Calocidae genus known where segment X, in the adult males, is widely separated at the base of the segment. The dorsal surface of the head capsule, in the adult male, does not possess eversible scent organs, as in *Caloca* and *Pliocaloca*. The segments of the maxillary palps are expanded, similar to *Tamasia*, *Caenota*, and *Pycnocentrella*. However, unlike *Caenota*, segments 3 and 4 are not greatly reduced. As with *Tamasia*, but no other Calocidae genus, there are only 4 maxillary palpal segments.

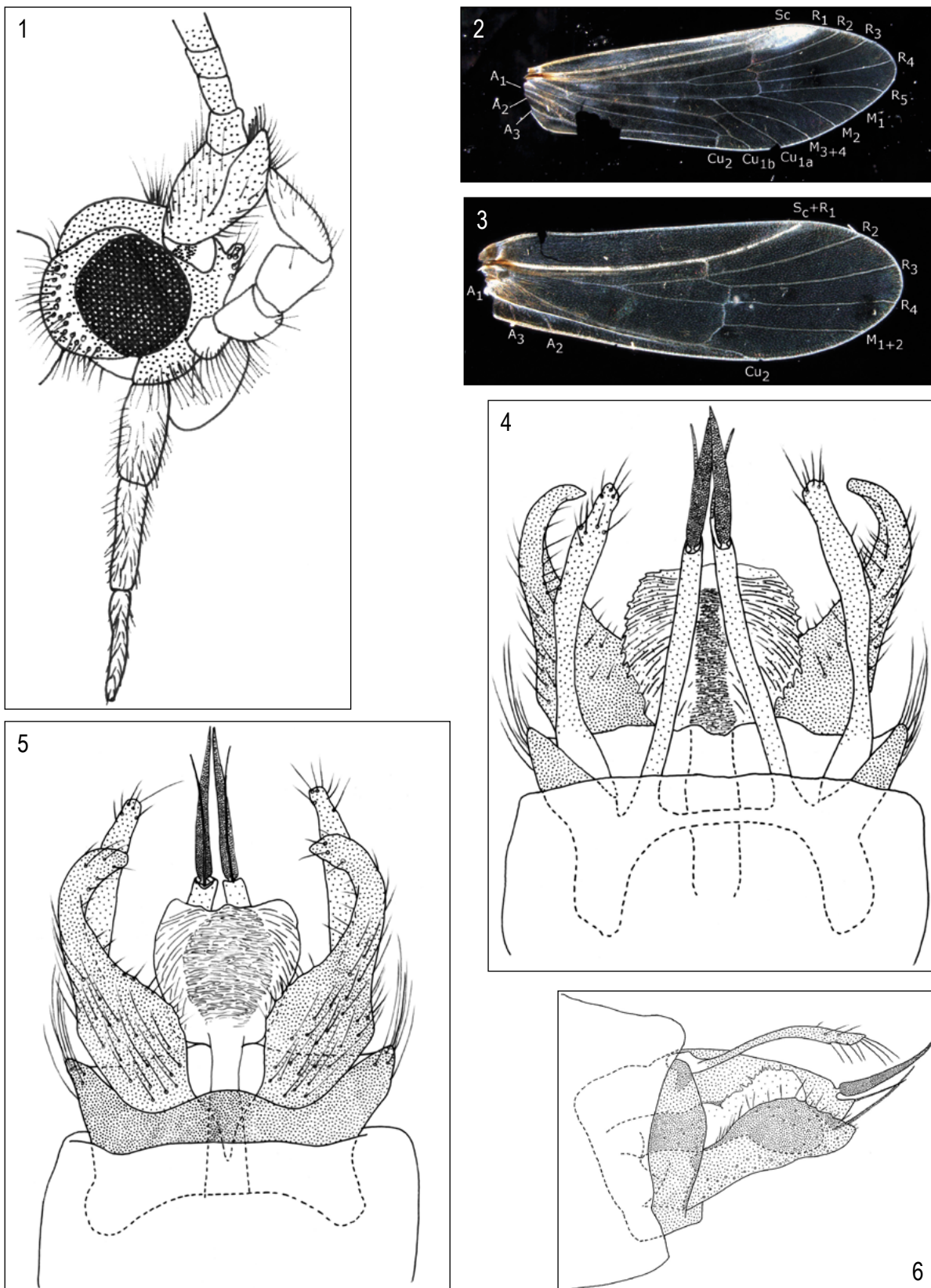
In the larva, the frontoclypeus widens suddenly towards the anterior margin, unlike those of *Caloca*, *Tamasia*, and *Calocoides*. The posterior and anterior portions of the frontoclypeus are separated by a constriction and the lateral margins of the anterior portion are somewhat rounded. This is dissimilar to *Pycnocentrella eruensis* where the anterior portion diverges out from the posterior portion in a straight line without any constriction between the two. The head and pronotum is reticulate in texture and does not possess the dense, short, papillate setae present in *Tamasia* or *Pliocaloca*. The metanotum does not possess a small, sclerotised ridge on the anterior margin, as in *Caenota* and *Calocoides*. The foretrochantin is fused to the propleuron, unlike that of *Pliocaloca*.

Generic description. Adult male: Dark brown to blackish, white markings on wings. Head: dorsum with single setal wart along midline; small receptacle on posterior margin dorsally extending mid-dorsal setal wart, not membranous, without eversible scent organs; posterior setal warts absent; postocular setal warts long, narrow. Maxillary palps four segmented, segments irregular, bulbous, apical segment reflexed posteriorly; labial palps three segmented; antenna slightly shorter than fore wing; scape long, with highly setose anterior projection. Pronotum: one pair lateral setose warts. Mesoscutellum smooth. Scutellum with one pair, elongate, setal warts. Legs: tibial spines 2:2:4. Wings: Forewing: discoidal cell present; thyridial cell present; fork 1 and 2 sessile; fork 3 petiolate; fork 4 absent; fork 5 sessile or slightly petiolate. Hind wing: venation reduced, with or without posterior fold; discoidal cell present; thyridial cell absent; base of M absent; large vein-free area in basal posterior section if no fold present; Sc and R1 fused; cell formed by Sc and C relatively large; fork 1 sessile, no other forks present. Genitalia: Segment X divided into two elongated, widely separated segments.

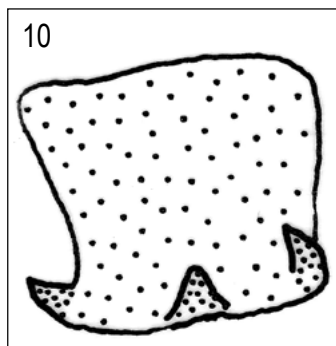
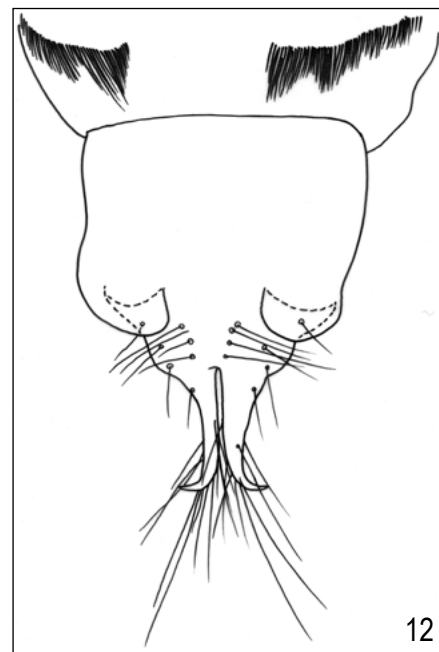
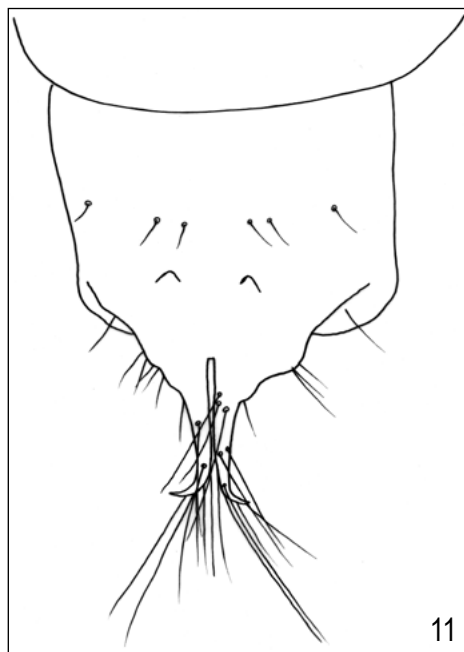
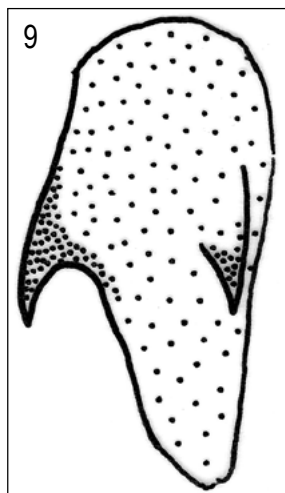
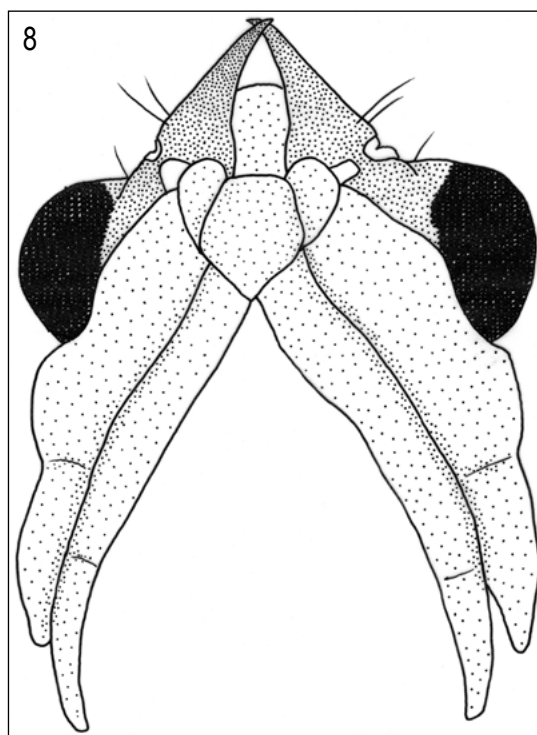
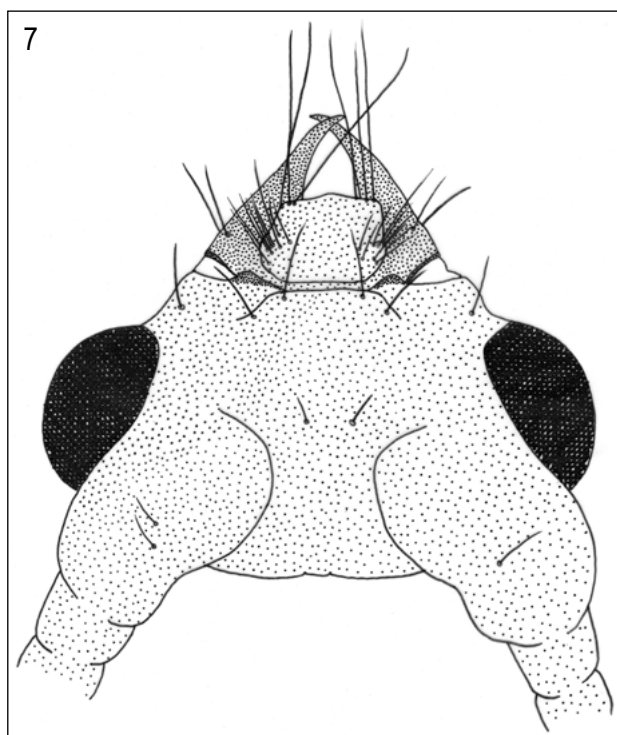
Larva: Head: reticulate in texture; frontoclypeus widens suddenly anteriorly; antennae close to eye. Pronotum: with weak lateral carina; foretrochantin fused to propleuron. Metanotum: single sclerite in anterior half. Abdomen: segment 1 lateral hump with large spiny patch, without sclerites; gills absent.

Etymology. From the Latin *lata* meaning wide and *rima* meaning gap, and pertaining to the widely incised segment X and is feminine in gender.

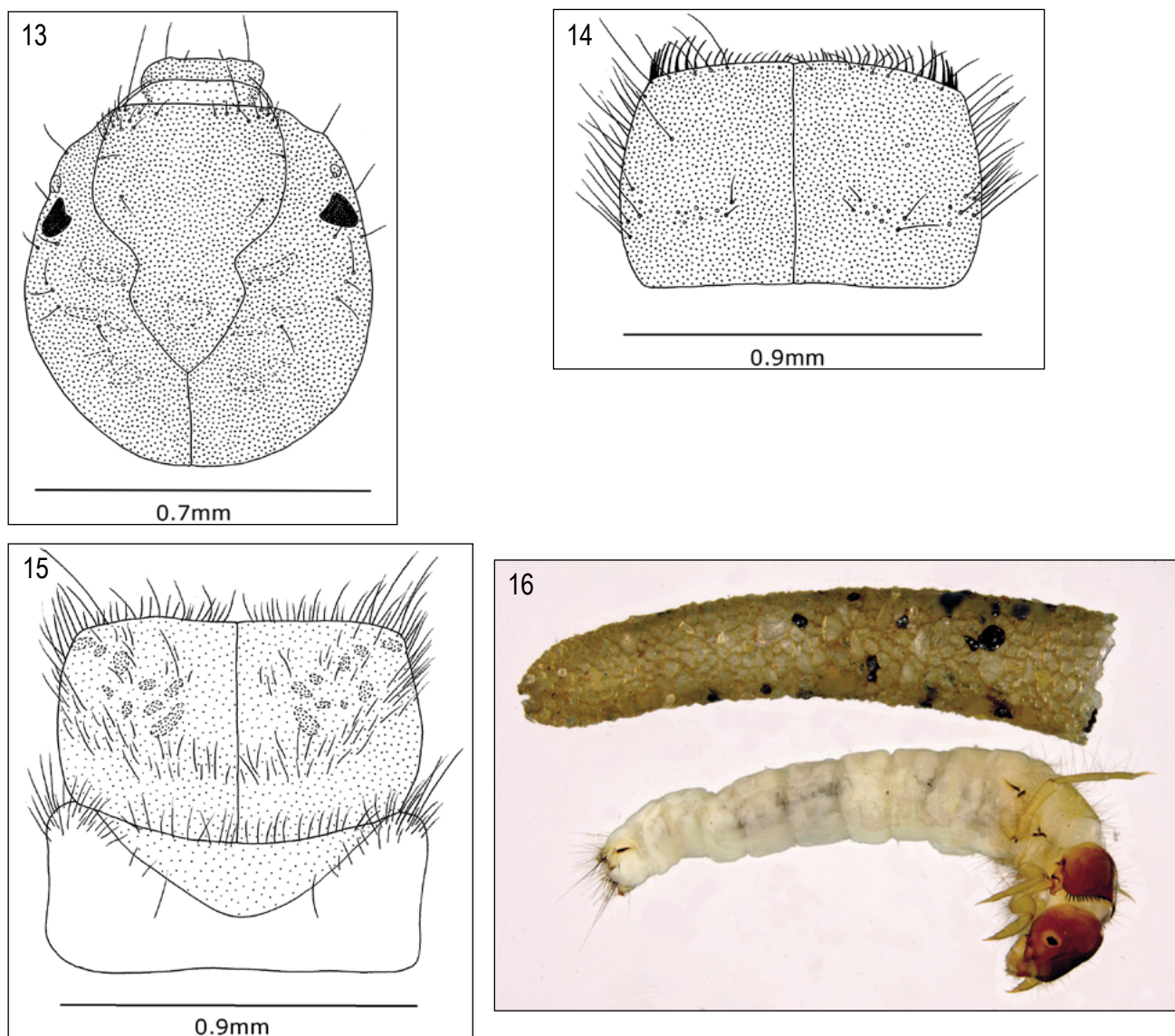
Material examined. Species included: *Latarima explicatala* sp. nov. and *Latarima furcilla* (Neboiss, 1984a) comb. nov.



Figures 1–6. *Latarima explicatala*, Male: head, lateral (1); forewing (2); hind wing (3); genitalia (4–6), dorsal (4), ventral (5), lateral (6).



Figures 7–12. *Latarima explicatala*, Pupa: head, dorsal (7), ventral (8); anterior hook plate (9); posterior hook plate (10); terminal segment, dorsal (11), ventral (12).



Figures 13–16. *Latarima explicatala*, Larva: head, dorsal (13); pronotum, dorsal (14) mesonotum and metanotum, dorsal (15); larva and case, lateral (16).

Comments. Adults of *Latarima furcilla* have only been collected from a single stream on the road to Mt Buller, Victoria. Preliminary investigations suggest that a larva from the same site is a likely candidate for being associated with the adults of this species. However, this association has not yet been confirmed. The range of *L. explicatala* is much wider than that of *L. furcilla*. *Latarima explicatala* has been collected from the Yarra Ranges, Mount Baw Baw, Taggerty, Mount Buller, and at the Victorian-New South Wales border near Mt. Kosciuszko. These sites are all well forested and associated with mountains. Interestingly, one site where this *L. explicatala* has been collected from is less than 1km from the site at which *L. furcilla* is found, on Mt Buller.

***Latarima explicatala* sp nov.**

Zoobank LSID. <http://zoobank.org/urn:lsid:zoobank.org:act:2717E1DE-373A-45DD-8CCF-646CACB66499>

Diagnosis. The adult males of *L. explicatala* sp nov. are distinguished from *L. furcilla* in that the hind wing does not possess a fold, abdominal segment X has more than one pair of spines apically, and the lateral projections on the phallus are more rounded and with crenulated dorsal margins.

Description. *Adult male.* Head (fig. 1): dark brown; one pair setal warts anterior to antennae, raised; antennae as long as body; antennal scape anterior apex extended, with anterior projection extending half way through pedicel, bulbous, densely setose on

posterior half. Pronotum: Fore coxa with pale “Y” shape on anterior margin, mid coxa with setal wart, “Y” shaped on ventral surface; hind coxa with long setal wart dorso-ventrally on lateral margin; hind femur with pale patch 1/3 length from apex. Wings: Forewing (fig. 2): gold/brown, white areas on apical half; veins M_{3+4} and Cu_{1a} join at distal margin of thyridial cell. Hind wing (fig. 3): A_3 and A_2 terminate before basal quarter of wing; A_1 and Cu_2 almost fused, almost forming a fold. Genitalia (figs 4–6): Segment X divided into two elongate projections each with a large spine sub-apically on dorsal surface, a slender spine apically, and a slender spine sub-apically on ventral surface; preanal appendages about as long as segment X, slender, expanded shortly before rounded apex; inferior appendage in ventral view basally expanded, apices curved inward, broad in lateral view; phallus enlarged apically with a rounded flange on either side extending dorsally to near dorsal margin of segment X, flange with dorsal margin crenulated.

Pupa. Body: pale. Head: both mandibles similar in length, smooth, 2 setae on basal lateral margin; a seta near lateral margin anterior to each eye; two pairs of setae on anterior margin of frons; a pair of setae between antennae. Labrum apex with 3 dark setae either side on anterolateral margin; many setae on lateral margin near base. Antennal scape with 2 setae dorsally. Abdomen: lateral fringe present, thin; abdominal segments 3–6 each with 1 pair of anterior hookplates, hookplates bearing 2 hooks; 1 pair of posterior hookplates on segment 5, left hookplate with 2 hooks, right hookplate with 2–3 hooks. Terminal segment: with a row of 6 short setae transversely at around mid-length; ventrally with a pair of large lobes, around 9 setae between lobes and base of terminal process; terminal process fairly setose, distal overhang projecting radially.

Larva (fig. 10). Head (fig. 7): frontoclypeus lateral margins of anterior half curved outward, anterolateral margins with 7 erect setae; ridge along lateral margin of frontoclypeus extending to dorsal edge of eye; eye circled by un-pigmented area; antennae close to eyes. Pronotum (fig. 8): anterior margin with 2 distinct rows of setae, anterior row thicker, projecting medio-ventrally, short along medial margin but become longer towards lateral corner, posterior row hair like projecting upwards. Mesonotum (fig. 9): anterior margin with many hair like setae, with a band of setae from anterolateral corners to median approximately 1/3 from posterior margin. Metanotum (fig. 9): sclerite triangular; setae along anterior margin of sclerite. Abdomen: segment 1 with a pair of setae ventrally; abdominal prolegs with one accessory tooth, anal lateral sclerites densely setose. Case (fig. 10): composed of sand grains arranged into a curved cylinder, narrow membranous panels present laterally at posterior end.

Holotype. Male, Cement Ck nr Warburton, Victoria, 9 Jan 1957, A. Neboiss (TRI-22774).

Paratypes. 1 male collected with Holotype (TRI-25846).

Other Material Examined. Victoria: 1 male, Chalet Ck, east branch, Mount Buller, 20 December 1972 (TRI 26647) (illustrated). 1 male, Charlie Ck EPA site ABV, 20 Oct 2016, MS704. 1 larva, Talbot Ck, Thompson Valley Rd, 17 April 1985, D. Cartwright. 2 males, Cement Ck nr Warburton, 9 Jan 1957, A. Neboiss (TRI-25850). 1 male pupa, Cameron Ck site 3

surber 3, 13 Dec 1995, J. Barton. 1 male pupa, Whitehouse Ck, 13 Dec 1995, site 6 surber 4.

Etymology. From the Latin *explicatus* meaning unfolded and *ala* meaning wing, and pertaining to the hind wing which does not possess a fold.

Acknowledgements

The Museum of Victoria provided access to specimens. This study was conducted as part of the Taxonomic Research and Information Network (TRIN) and was funded by the Commonwealth Environment Research Facilities (CERF) program.

References

- Holzenthal, R.W., Blahnik, R.J., Prather, A.L., and Kjer, K.M. 2007. Order Trichoptera Kirby, 1813 (Insecta), Caddisflies. *Zootaxa* 1668: 639–698.
- Jackson, J. 1991. *Systematics of Conoesucidae, Helicophidae, Calocidae and Antipodoeciidae (Insecta: Trichoptera), with emphasis on the immature stages.* . Hobart, University of Tasmania. Doctor of Philosophy.
- Jackson, J. 1998. *Preliminary guide to the identification of late instar larvae of Australian Calocidae, Helicophidae and Conoesucidae (Insecta: Trichoptera): Identification guide number 16.* Cooperative Research Center for Freshwater Ecology, Thrucoona, NSW
- Johanson, K.A. and Malm, T. 2010. Testing the monophyly of Calocidae (Insecta: Trichoptera) based on multiple molecular data. *Molecular Phylogenetics and Evolution* 54(2): 535–541.
- Milne, M.J. 1938. The “metamorphotype method” in Trichoptera. *Journal of the New York Entomological Society* 46: 435–436.
- Mosely, M.E. 1936. Tasmanian Trichoptera or Caddis-Flies. *Proceedings of the Zoological Society.* 1936: 395–423.
- Mosely, M.E., and Kimmins, D.E. 1953. *The Trichoptera (Caddis-flies) of Australia and New Zealand.* British Museum of Natural History: London.
- Neboiss, A. 1977. A taxonomic and zoogeographic study of Tasmanian caddis-flies (Insecta: Trichoptera). *Memoirs of the National Museum of Victoria* 38: 1–208.
- Neboiss, A. 1984a. Four new caddis-fly species from Victoria (Trichoptera: Insecta). *Victorian naturalist*, 2: 86–91.
- Neboiss, A. 1984b. Calocidae of Northern Queensland (Calocidae: Trichoptera). *Proceedings of the 4th International Symposium on Trichoptera.* J. C. Morse. The Hague, Dr W. Junk: 9.
- Neboiss, A. 1991. Trichoptera (Caddis-flies, caddises). In: Naumann, I.D., Carne, P.B., Lawrence, J.F., Nielson, E.S., Spradbery, J.P., Taylor, R.W. *et al.* (eds). *The Insects of Australia, 2nd edn, vol. 2*, pp. 787 – 816, Melbourne University Press, Carlton, Victoria, Australia.
- Neboiss, A. 1992. *Illustrated keys to the families and genera of Australian Tichoptera 1. adults*, The Australian Society for Limnology.
- Neboiss, A. 2002. A family problem with the placement of *Helocubus buccinatus* gen. & sp. n., an Australian caddisfly (Insecta: Trichoptera). *Proceedings of the 10th International Symposium on Trichoptera - Nova Supplementa Entomologica.* M. Wolfram. Keltern, Geoke and Evers: 9.
- Ross, H.H. 1967. The evolution and past dispersal of the Trichoptera. *Annual Review of Entomology* 12: 169–206.
- Shackleton, M.E., and Webb, J.M. (2014). Two new species of *Calocoides* Neboiss 1984 (Trichoptera: Calocidae) from eastern Australia, with descriptions of the immature stages. *Austral Entomology*. DOI: 10.1111/aen.12091