A REDESCRIPTION OF THE GENUS TASMANOCOENIS LESTAGE
(Ephemeroptera: Caenidae) FROM AUSTRALIA

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Summary

The genus Tasmanocoenis Lestage is redescribed and nymphs directly associated with adults of T. tonnoiri, the type species, are described. Nymphal characterization of Tasmanocoenis is given. The recently established genus Pseudocaenis Soldán is shown to be congeneric with Tasmanocoenis and is suppressed.

KEY WORDS: Tasmanocoenis, Ephemeroptera, Caenidae, Pseudocaenis, nymphal characterization.

Introduction
Prior to 1978 the Caenidae was considered to be represented in Australia by only one genus, Tasmanocoenis Lestage (1930) (Demoulin 1955; Thew 1960; Williams 1968; Riek 1970; Suter 1979; and Williams 1980). However, Soldán (1978) established a new genus, Pseudocaenis based only on nymphal material from one locality in Queensland, and one in New South Wales. The description of this new genus was based on a comparison with descriptions given by Harker (1950, 1957) of nymphs of Tasmanocoenis.

In a recent study of South Australian mayflies, Suter reared imagoes from nymphs referred to Pseudocaenis. The adults were typical Tasmanocoenis. These observations suggested that the genera were synonymous. Examination of material of all described species of Tasmanocoenis (with the exception of T. jillongi Harker) and Pseudocaenis demonstrated that the generic diagnosis given for Pseudocaenis (Soldán, 1978) clearly characterized Tasmanocoenis. Therefore Pseudocaenis is suppressed and becomes a synonym of Tasmanocoenis.

Materials and Methods
Nymphs and adults were associated in the laboratory, and the reared adults were preserved with their individual cast skins. Dissected appendages were mounted in polyvinyl lacto-phenol mounting medium.

All measurements are given in mm. Each segment of the fore, middle and hind legs of the nymph is compared to the length of the femur, as a ratio. The absolute length of the femur is given in parentheses. Comparative measurements of the segments of the labial and maxillary palpi are also expressed as ratios, compared with the proximal segment length, given in parentheses.

In figures of the labium, the method of Peters & Edmunds (1964, 1970, 1972) is followed, with the ventral surface shown on the left.

Material examined was made available from l'institut Royal Des Sciences Naturelles de Belgique (I.R.Sc.N.B.) and the National Museum of Victoria (NMV).

Genus TASMANOCOENIS Lestage
Tasmanocoenis Lestage, 1930, p. 53. Type species Tasmanocoenis tonnoiri Lestage, original designation.


The genus Tasmanocoenis was established by Lestage (1930) when T. tonnoiri was described from a single adult specimen collected at Geeveston, Tasmania by Tonnoir in 1922. The description was not illustrated and no nymphs of this species were recorded. In 1936, Tillyard described a further caenid species from Tasmania (Caenis scotti) but Lestage (1938) noted that the specific name was pre-occupied, and renamed this species Caenis tillyardi (sic).

Harker (1950), apparently unaware of Lestage's paper, maintained Caenis scotti for the species described by Tillyard, and
described a nymph and female imago which she assigned to this species. These nymphs were not directly associated with a male imago, and there remains some doubt about the identification of the nymph described.

Demoulin (1955) reviewed the Australian Brachycercidae (Caenidae) and re-described, with illustrations, *Tasmanocenus tonnoiri*, the type species of the genus. He recognised that *Caenis tillyardi* belonged to the same genus as *T. tonnoiri*. Demoulin also presented a key to the genera of adult and nymphal caenids. He based the generic separation of adults on the length and width of the prosternum, length of the antennal pedicel, and length of leg segments, especially the comparative lengths of the fore tibiae and tarsi. The nymphs of *Tasmanocenus* were distinguished from other genera by having a three or four segmented first gill. This, and the following characters were mentioned by Demoulin as interpreted from Harker's (1950) description and illustrations: gill II not joining at the mid dorsal line of the abdomen, lamellate gills III-VI fringed with tracheal filaments generally simple, rarely bifid; anterior margin of labrum with a median concavity, and denticles on each side of the concavity; second segment of maxillary palp almost as long as third segment; glossae and paraglossae of labium widely separated. The nymphal characteristics were therefore established from actual specimens, but from Harker's illustrations and descriptions of *T. tillyardi*.

Thew (1960) revised the genera of the Caenidae and listed the following nymphal characteristics as distinguishing *Tasmanocenus* from other genera: mandibles lacking marginal fringes on both sides; maxillae with only a few hairs, no thick spines; labrum lacking marginal fringe of hair; gill covers without triangular ridge and without marginal fringe of hair; first gill three or four segmented and lamellate gills with fringe of single or bifid tracheal filaments. Soldán (1978) also noted these characters, all of which are consistent with Harker's (1950) illustrations.

Suter questioned the status of *Pseudocaenis* when adults of *Tasmanocenis tillyarai* were reared from nymphs which displayed characteristics used by Soldán (1978) to define *Pseudocaenis*. To establish the status of *Pseudocaenis* it was necessary to examine the type species of each genus in either adult or nymphal stage. Nymphs were collected and reared from the type locality of *T. tonnoiri* (Geeveston, Tas.) but all were *T. tillyardi*. However, material from the La Trobe River and the Tyers River, Vic., enabled association of nymphs and adults of *T. tonnoiri*. Examination of this material, the holotype of *T. tonnoiri*, and paratypes of *P. queenslandica* and *P. rieki* Soldán, show that the generic criteria of Demoulin (1955), Thew (1960), and Soldán (1978) for *Tasmanocenus* are erroneous, and that the characterization given for *Pseudocaenis* (Soldán, 1978) is actually that of *Tasmanocenus*. The genus *Pseudocaenis* thus becomes a synonym of *Tasmanocenus*. *Tasmanocenus* is redefined based on examination of the holotype, and nymphs associated with male imagos of the type species, and of associated adult and nymphal material of *T. tillyardi*.

Imago Characteristics

**Male**: body length 3.1–4.2 mm, forewing length 2.9–4.0 mm.

**Female**: body length 5.0–6.5 mm, forewing length 4.5–5.2 mm. Head: eyes separate, lateral. Dorso-lateral ocelli raised, black; median ocellus small, black. Antennal pedicle twice length of scape. Thorax: robust, dark black/brown. Pronotum narrower than head. Prosternum triangular, apex truncate, lateral margins separated, slightly longer than broad. Mesonotum strongly humped, slightly broader than head, median notal suture divided just anterior to wings to form pale area. Legs: pale grey, slender and delicate; fore legs longer than middle and hind legs. Fore, middle and hind legs of male with five tarsal segments; female with all tarsi four segmented. Tarsal claws of male imago similar in foreleg, both blunt and club shaped, dissimilar in middle and hind legs, one blunt, club shaped, one slender, curved and sharp. Female with each pair of tarsal claws dissimilar: one blunt, one curved and sharp.

Wings: forewing length 1.7–2.0 × width; hyaline with milky-opaque pterostigma. Vena
tion reduced, almost lacking cross veins, posterior margins lined with very fine setae.

**Matuare Nymph Characteristics**

Head smooth, lacking protuberances. Pedicel of antenna 2–3 × length of scape, covered with long setae. Tentorial body rectangular, length 0.75 × width. Gills, six pairs on abdominal segments 1–6: first abdominal gill filamentous, two-segmented with long setae;
second gill operculate with triangular dorsal ridge, mesal fork with bifid setae, posterior ridge not extending to posterior margin of gill cover, margin lined with setae; gills 3–6 triangular, pigmented between trachea (pigment may be lost after long preservation), tracheal filaments single to multifid, and with longitudinal band of short bifid bristles on dorsal surface. Second abdominal segment with a small blunt dorsal median spine. Abdominal segments 3–9 with postero-lateral projections.

Mouthparts: labrum rectangular, 2–3 × broader than long, anterior margin with shallow median concavity, lateral and anterior margins with spine setae. Mandibles stout, with marginal setae, outer incisors with 3–4 teeth, inner with 2–3. Glossae of hypopharynx not produced, anterior margin concave, paragnaths lined with setae. Maxillae slender, with group of teeth at apices, palp three-segmented. Labium with 3-segmented palp. Leg margins lined with spine setae, femur of fore leg with transverse row of setae on outer lateral edge, tarsal claws short, curved with blunt teeth near base, and smaller distal teeth. Male and female nymphs similar, but females more robust.

_Tasmanocoenis_ closely resembles _Caenis_ in both nymphal and imaginal characters, but the following combination of characters distinguishes _Tasmanocoenis_ from all other genera in the Caenidae. In the nymph: (i) pedicel of antenna with setae, (ii) mesal fork of gill cover with bifid setae, (iii) posterior ridge not extending to posterior margin of gill cover, (iv) tarsal claws with blunt teeth near base and smaller distal denticles, (v) submarginal row of scales on gill cover. Male imago: (i) forceps strongly bowed (ii) lobes of penes fused, with apical indentation.

_Tasmanocoenis tonnoiri_ Lestage

FIGS. 1–13


This species was described by Lestage (1930), from a dry specimen glued to a card; no illustrations were given. Demoulin (1955) redescribed the holotype, and mounted the genitalia, legs and wings onto slides, and placed the body in spirits. In the present study the holotype was examined, and although Demoulin’s description (with the exception of the genitalia) is adequate, fresh material has been used to add to this description. Thorax: legs slender, fore femur equal in length to middle femur, but shorter than hind femur. Ratios of leg segments: fore leg 1.00 : 1.85 : 0.13 : 0.61 : 0.28 : 0.32 : 0.19 (0.54 mm); middle leg 1.00 : 0.68 : 0.11 : 0.09 : 0.08 : 0.04 : 0.23 (0.53 mm); hind leg 1.00 : 0.72 : 0.12 : 0.09 : 0.07 : 0.05 : 0.21 (0.58 mm). Genitalia: the genitalia of the holotype, now on a slide, are badly distorted, in parts torn, with the penes folded back within themselves, giving a broad curved posterior margin as illustrated by Demoulin, and in Fig. 1. Genitalia from specimens from the La Trobe River, Victoria, were dissected, and the actual shape of the penes is shown in Fig. 2.

The forceps of the holotype are also twisted and the resultant structures cannot be viewed.
Figs. 3–7. *Tasmanocoenis tonnoiri* mature nymph: 3, Basal part of antenna, scape, pedicel, and basal segment of flagellum; 4, Fore leg; 5, First abdominal gill; 6, Second abdominal gill; 6a, Enlargement of the bifid setae of mesal fork of the dorsal triangular ridge; 6b, Enlargement of the sub-marginal scales; 7, Third abdominal gill. Scale lines; Figs 3, 4, 5 and 7 = 0.1 mm, Figs 6, 6a and 6b = 0.05 mm.
Figs 8–13. *Tasmanocoenis tonnoiri* mature nymph: 8, Dorsal view of labrum with the enlarged anteromedian emargination; 9, Left mandible, ventral view; 9a, Left incisors and prostheca enlarged; 10, Right mandible, ventral view; 10a, Right incisors and prostheca, enlarged; 11, Hypopharynx; 12, Right maxilla, ventral view; 13, Labrum, dorsal (left) and ventral (right) view. Scale lines = 0.1 mm.
in ventral orientation. However, along the mesal margin of the forceps are 3 small tubercles. These are also present on the forceps of the holotype, but appear as ventral tubercles (Fig. 1).

The narrow, strongly bowed forceps with 3 mesal tubercles and the shape of the penes are diagnostic characteristics of *T. tonnoiri*.

**Mature Male Nymph**

The following description is based on one individual, but the range of variation observed in the examined material is given in parentheses.

Head width 0.70 mm (0.70–0.94 mm); body length 2.62 mm (2.62–4.15 mm); cerci length 1.99 mm (1.99–2.35 mm); terminal filament 2.64 mm (2.64–2.88 mm).

General body colour brown.

Head: brown with darker regions between eyes, lateral margins smoothly convex. Eyes black, ocelli brown. Antennae yellow-brown, pedicel 2.60 × length of scape (Fig. 3), flagellum 1 mm long.

Thorax: pronotum brown, antero-lateral margins with few spine setae, width equals head width. Mesonotum dark brown, width 1.5 × head width. Legs light brown; femora without dark markings (Fig. 4). Ratios of leg segments: fore leg 1.00 : 0.72 : 0.56 (0.57 mm); middle leg 1.00 : 0.71 : 0.50 (0.56 mm); hind leg 1.00 : 0.78 : 0.49 (0.62 mm). Femur length to width ratios: fore leg 2.41 (2.30–2.63), middle leg 2.48 (2.33–2.63), hind leg 2.63 (2.52–2.75).

Abdomen: brown. Operculate gills extending over segments 3–7. Cerci and terminal filament dark brown. Gills; first gill (Fig. 5) apical segment length 3.7 × basal segment length, lined with setae. Second gill operculate, length 1.16 × width (Fig. 6), mesal fork of triangular ridge with 8 bifid setae (range 7–10) (Fig. 6a); submarginal row of scales each with 8–10 bristles present (Fig. 6b). Gills 3–6 triangular with multifid tracheal branches (Fig. 7).

Mouthparts: labrum (Fig. 8) 2.03 × broader than long. Left mandible (Fig. 9) outer incisors with 4 teeth with short setae on ventral tooth (Fig. 9a), inner incisors with 3 apical teeth with short setae on ventral tooth, prostheca robust, bifid with bifid or trifid setae apically. Right mandible (Fig. 10), outer incisors with 3 apical teeth, inner incisors with 2 teeth (Fig. 10a), prostheca simple apically with bifid and trifid setae; margin between prostheca and molar region with large tubercle. Hypopharynx (Fig. 11). Maxillae (Fig. 12), galeo-lacinia with 4 apical teeth, palpi longer than galeo-lacinia, segment ratios 1.00 : 0.70 : 1.00 (0.14 mm).

Labium (Fig. 13) proximal segment of palpi 1.64 × longer than broad; second segment convex; distal segment short, triangular; segment ratios 1.00 : 0.84 : 0.49 (0.13 mm); glossae rectangular, rounded apically, paraglossae curved.


La Trobe River, Rosedale, Vic. 10.ix.1980, R. H. Norris and P. Mitchell (nymphs and adults) in NMV; 27.ii.1974, J. Blyth (nymphs) in NMV; Tyers River, west of Tyers, Vic., 24.ii.1974, J. Blyth (nymphs) in NMV.

**Discussion**

With this redefinition of the genus *Tasmanocoesis* the following species are now recognised in Australia; *T. tonnoiri* Lestage, *T. ill Yardi* (Lestage), *T. illlongi* Harker, *T. queenslandica* (Soldán), and *T. rieki* (Soldán). The latter two species were described in the nymphal form only, but on examination of paratype material presented to the National Museum of Victoria, the two nymphal paratypes are indistinguishable. The characters listed by Soldán (1978) to distinguish the two species do not separate the paratypes. However, on the limited material available, and in the absence of reared adults, a synonymy of *T. queenslandica* and *T. rieki* would be premature, but some doubt must remain as to the validity of these species.

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REDESCRIPTION OF *TASMANOCOENIS*

References


