

A REDESCRIPTION OF THE GENUS *TASMANOCOENIS* LESTAGE (EPHEMEROPTERA: CAENIDAE) FROM AUSTRALIA

by PHILLIP J. SUTER*

Summary

SUTER, P. J. (1984) A redescription of the genus *Tasmanocoenis* Lestage (Ephemeroptera: Caenidae) from Australia. *Trans. R. Soc. S. Aust.* **108**(2), 105-111, 12 June, 1984.

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, Suter¹ reared imagos from nymphs referable 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.

* State Water Laboratories, Engineering and Water Supply Department, Private Mail Bag, Salisbury Post Office, S. Aust. 5108.

¹ Suter, P. J. (1980) The taxonomy and ecology of the Ephemeroptera (Mayflies) of South Australia. Ph.D. thesis, Dept. of Zoology, University of Adelaide. Unpubl.

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.

Lestage, 1930: 53-54; Tillyard, 1936: 56 (Part in *Caenis*); Harker, 1950: 24-26, 29 (referred to as *Caenis*); 1954: 266 (referred to as *Tasmanocoenis* sic, part in *Caenis*); Demoulin, 1955: 1-7; Harker, 1957: 76; van Bruggen, 1957: 32-33; Thew, 1960: 202; Riek, 1970: 238; Puthz, 1975: 412; Soldán, 1978: 124-128; Suter, 1979: 82.

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 *Coenis 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, *Tasmanocoenis 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 *Tasmanocoenis* 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 not 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 *Tasmanocoenis* 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.

Suter¹ questioned the status of *Pseudocaenis* when adults of *Tasmanocoenis tillyardi* 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 *Tasmanocoenis* are erroneous, and that the characterization given for *Pseudocaenis* (Soldán, 1978) is actually that of *Tasmanocoenis*. The genus *Pseudocaenis* thus becomes a synonym of *Tasmanocoenis*. *Tasmanocoenis* 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 pedicel 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; forelegs 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. Venation reduced, almost lacking cross veins, posterior margins lined with very fine setae.

Mature 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, palpi three-segmented. Labium with 3-segmented palpi. 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.

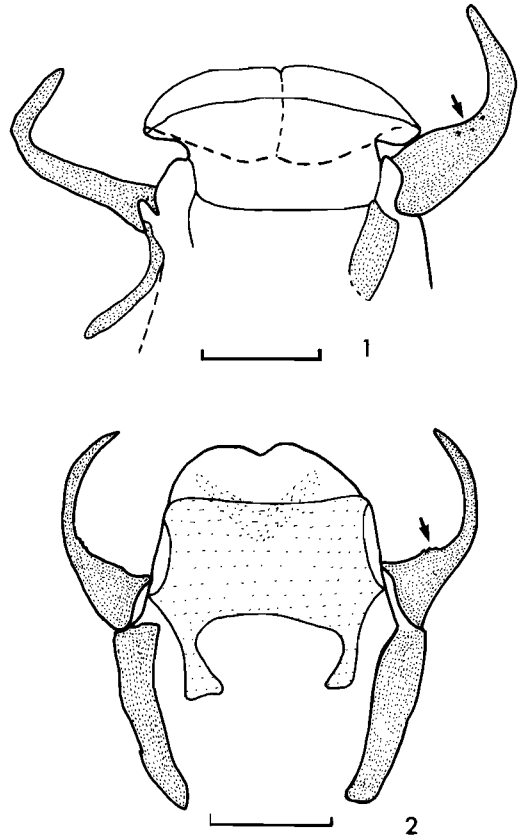
Tasmanocoenis closely resembles *Caenis* in both nymphal and imaginal characters, but the following combination of characters distinguishes *Tasmanocoenis* from all other genera in the Caenidae. In the nymph: (i) pedicel of antenna with setae, (ii) mesal fork of gill cover with bifid setae, (iii) posterior 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

Lestage, 1930: 53-54; Tillyard, 1936: 56; Harker, 1954: 266; Demoulin, 1955: 2-3; Thew, 1960: 202.

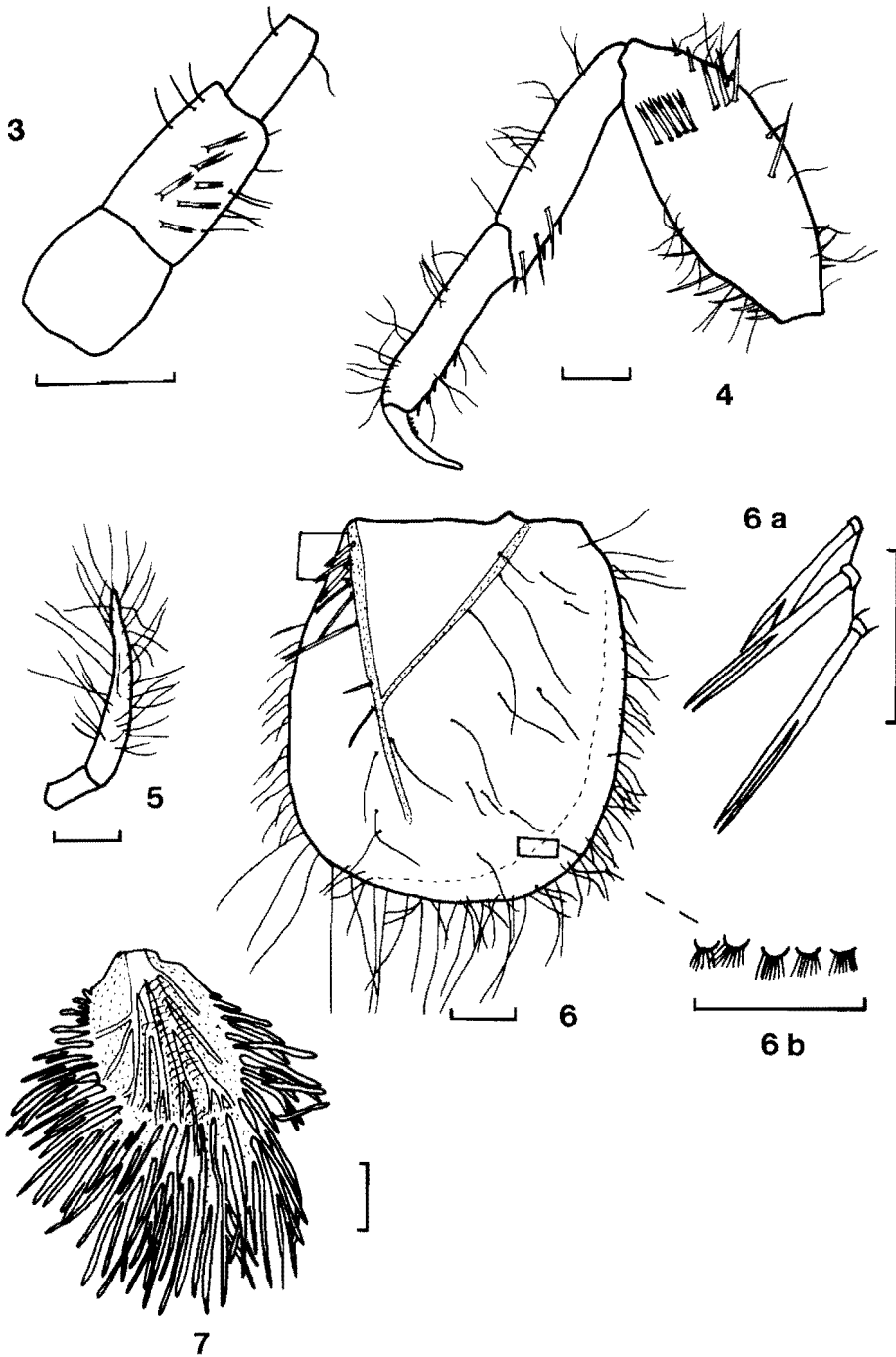
This species was described by Lestage (1930), from a dry specimen glued to a card; no illustrations were given. Demoulin (1955) redescribed the holotype, and mounted the genitalia, legs and wings onto slides, and placed the body in spirits. In the present study the holotype was examined, and although Demoulin's description (with the exception of the genitalia) is adequate, fresh material has



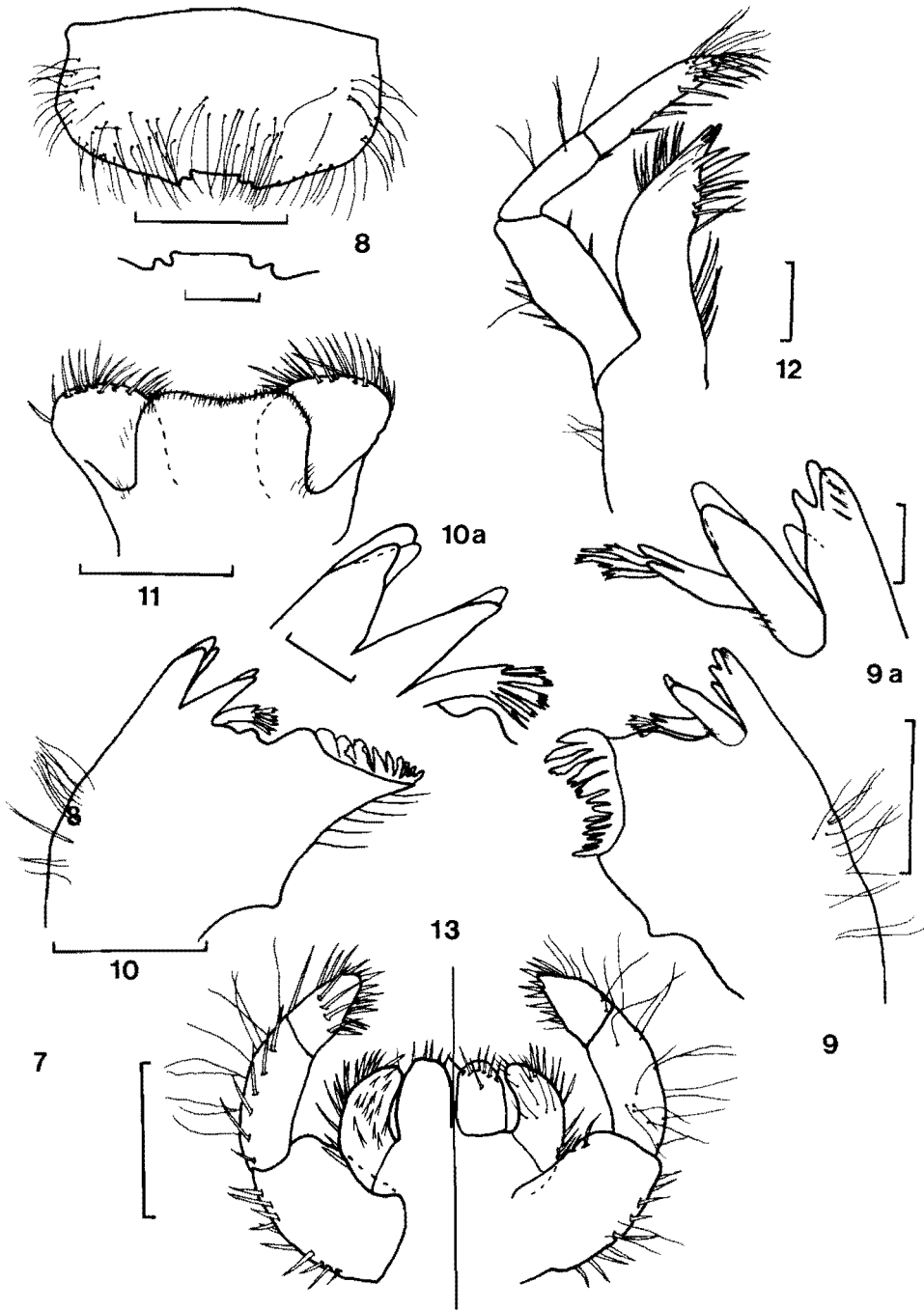
Figs 1-2. *Tasmanocoenis tonnoiri*: 1, Genitalia of holotype male, showing the distorted penes and forceps; 2, Genitalia of a male imago from the La Trobe River, Vic. The small basal tubercles are indicated by the arrows. Scale lines = 0.1 mm.

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 submarginal 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 prosthema enlarged; 10, Right mandible, ventral view; 10a, Right incisors and prosthema, 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 $2.60 \times$ 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 $1.5 \times$ 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 $3.7 \times$ basal segment length, lined with setae. Second gill operculate, length $1.16 \times$ 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) $2.03 \times$ 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, prosthema 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), prosthema simple apically with bifid and trifid setae; margin

between prosthema 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 $1.64 \times$ 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.

Material examined: holotype male, Geeveston, Tas., 7 Dec. 1922, A. L. Tonnoir, in I.R.Sc.N.B.

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 *Tasmanocoenis* the following species are now recognised in Australia; *T. tonnoiri* Lestage, *T. tilliardii* (Lestage), *T. jillongi* 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.

Acknowledgments

I would like to thank Dr G. Demoulin of l'institut Royal Des Sciences Naturelles de Belgique for making available the holotype of *Tasmanocoenis tonnoiri*, and Dr T. Soldán for depositing paratype material of *Pseudocoenis queenslandica* and *P. rieki* in the National Museum of Victoria. I would also like to thank Dr R. Norris and Messrs J. Blyth, P. Mitchell and L. Metzeling for collecting the material from the La Trobe River and for assistance in rearing the adults of *T. tonnoiri*. I am also grateful to Dr A. Neboiss, Dr A. Calder and Dr D. Towns for their critical discussions and suggestions in the preparation of this manuscript.

References

- DEMOULIN, G. (1955) Les Brachyceridae Australiens. Le genre *Tasmanocoenis* Lestage. *Bull. Mus. R. Hist. Nat. Belg.* **31**, 1-7.
- HARKER, J. E. (1950) Australian Ephemeroptera. Part I. Taxonomy of New South Wales species and evaluation of taxonomic features. *Proc. Linn. Soc. N.S.W.* **75**, 1-34.
- (1954) The Ephemeroptera of Australia. *Trans. R. Entomol. Soc. London.* **105**, 241-268.
- (1957) Some new Australian Ephemeroptera. *Proc. R. Entomol. Soc. London. Ser. B.* **26**, 63-78.
- LESTAGE, J. A. (1930) Notes sur le premier Brachyceridien decouvert dans la faune australienne *Tasmanocoenis tonnoiri* sp. nov. (Ephemeroptera) et remarques sur la famille des Brachyceridae Lest. *Mem. Soc. R. Belge Entomol.* **23**, 49-60.
- (1938) Contribution a l'étude des Éphéméroptères XX. Notes synonymique: *Coenis scotti* Till. (1935) nec Ulmer (1930) = *Coenis tillyardi* nom. nov. *Bull. Ann. Soc. R. Belge Entomol.* **78**, 320.
- PETERS, W. L. & EDMUNDS, G. F. Jr. (1964) A revision of the generic classification of the Ethiopian Leptophlebiidae (Ephemeroptera). *Trans. R. Entomol. Soc. London.* **116**, 225-253.
- & — (1970) Revision of the generic classification of the eastern hemisphere Leptophlebiidae (Ephemeroptera). *Pac. Insects* **12**, 157-240.
- & — (1972) A revision of the generic classification of certain Leptophlebiidae from South America (Ephemeroptera). *Ann. Entomol. Soc. Am.* **65**, 1398-1414.
- PUTHZ, V. (1975) Eine neue Caenidengattung aus dem Amazonasgebiet (Insecta: Ephemeroptera: Caenidae). *Amazoniana* **3**, 411-415.
- RIEK, E. F. (1970) Ephemeroptera (Mayflies). In *The Insects of Australia*, sponsor C.S.I.R.O. (University of Melbourne Press: Melbourne).
- SOLDÁN, T. (1978) New genera and species of Caenidae (Ephemeroptera) from Iran, India and Australia. *Acta Entomol. Bohemoslov.* **75**, 119-129.
- SUTER, P. J. (1979) A revised key to the Australian genera of mature mayfly (Ephemeroptera) nymphs. *Trans. R. Soc. S. Aust.* **103**, 79-83.
- THEW, T. B. (1960) Revision of the genera of the Family Caenidae. (Ephemeroptera). *Trans. Am. Entomol. Soc. (Philadelphia)* **86**, 187-205.
- TILLYARD, R. J. (1936) The trout food insects of Tasmania. Part II. A monograph of the mayflies of Tasmania. *Pap. Proc. R. Soc. Tasmania* **1935**, 23-59.
- VAN BRUGGEN, A. C. (1957) On two new species of mayflies from the Wissel Lakes Central New Guinea (Ephemeroptera). *Nova Guinea n.s.* **8**, 31-39.
- WILLIAMS, W. D. (1968) Australian Freshwater Life: The Invertebrates of Australian Inland Waters. (Sun Books: Melbourne).
- (1980) Australian Freshwater Life: The Invertebrates of Australian Inland Waters. 2nd Edition. (The Macmillan Co. of Australia Pty. Ltd.: Melbourne).