

SOME NEW AUSTRALIAN EPHEMEROPTERA.

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PART II.

A key to the nymphs of the genus *Atalophlebia* was not given in previous papers, and, although only eight of the nineteen described species are known in this stage, it is possible to separate them by the following key.

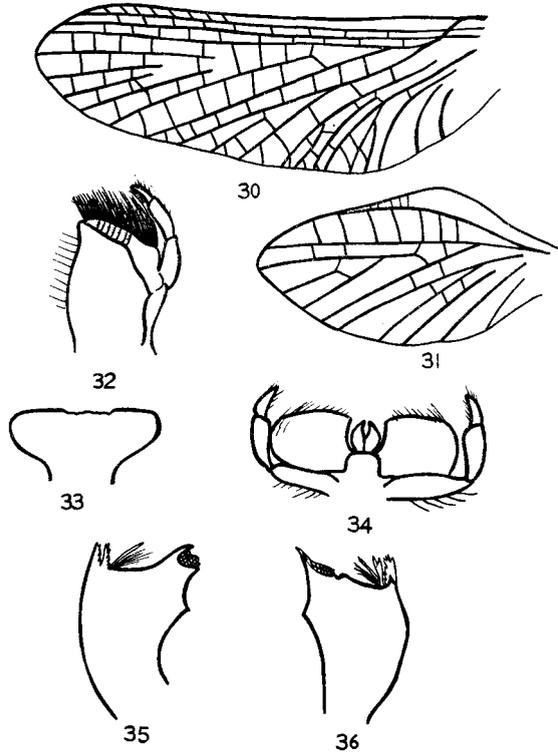
KEY TO NYMPHS OF THE GENUS *ATALOPHLEBIA*.

- 1. Gills double, lamellae undivided 2
- Gills double, lamellae divided into at least three digits 4
- 2. Lamellae of gills not more than twice as long as broad 3
- A. longicaudata** Harker
- Lamellae of gills more than twice as long as broad 3
- 3. Distal end of lamellae drawn out into a short projection with few hairs. The plate of the lamellae ovate **A. yugana** sp. n.
- Distal end of lamellae drawn out into a long projection with many hairs. The plate of the lamellae lanceolate **A. pierda** Harker
- 4. Gill lamellae trifurcate 7
- Gill lamellae multifurcate 5
- 5. Gill feathery in appearance, forming a thick mat along the side of the body **A. australasica** Pictet
- Not so 6
- 6. Outer margin of dorsal lamellae bearing at least three digits 8
- A. albiterminata** Tillyard
- Outer margin of dorsal lamellae without digits **A. darrunga** sp. n.
- 7. Apical filaments very fine, abundant tracheae in the lamellae 8
- A. superba** Tillyard
- Rather stout apical filaments, few tracheae 8
- 8. Glossae very small and raised above paraglossae. Left mandible with an elongated molar area **A. incerta** Harker
- Glossae not raised above paraglossae. Molar area of left mandible very broad **A. maculosa** Harker

Atalonella darkara sp. n.

Female subimago.—*Measurements*: Body length 12 mm. Fore wing 6 mm. Hind wing 1.5 mm. *General colour*: Yellowish with dull brown markings. *Wings*: Uniform grey in colour. Fore wing (fig. 30): costal and subcostal area slightly milky. *Rs* forks close to base of wing, and the long intercalary IR_{3b} arises close to the fork. Fork of *MA* slightly apical to beginning of IR_{3b} . *IMA* short. MP_2 arises at about one-quarter of length from base to apex, and lies half way between MP_1 and *CuA*. *CuP* bends sharply down towards posterior edge of wing at level of MP_2 . Hind wing (fig. 31): Costal space short, five cross-veins present. *Rs* arises in basal half of wing, *MP* forked at about one-third the distance from base to apex. *Legs*: Cream, no markings. Femur slightly shorter than

tibia, and tarsus about half length of femur. Tarsal segments in decreasing order of length : 5, 2, 3, 4, 1 (fused with tibia). Tarsal claws all acute. Appendix dorsalis present, but shorter than caudal filaments. Subanal plate with a very shallow concavity on its posterior margin.



FIGS. 30-36.—*Atalonella darkara* sp. n. Subimago: (30) Fore wing. (31) Hind wing. Nymph: (32) Maxilla. (33) Labrum. (34) Labium. (35) Left mandible. (36) Right mandible.

Nymph.—*Measurements*: Body length 10 mm. *Mouth parts* (figs. 32-36): Mandibles with small canines much denticulated, molar regions small. Maxillae with 3-segmented palp; the proximal segment very slightly longer than the second, the distal segment small and pointed. Labium with 3-segmented palp, the basal segment longer than the second, the distal shorter and narrow at the tip. Glossae small and narrow at the tip; paraglossae large, broader than long, slightly concave on the inner edge. Labium shallowly concave at the anterior margin, five rounded denticles present. *Legs*: Yellow without markings, but the dorsal side slightly darker. Femur of hind leg equal in length to tibia and tarsus. Tarsal claws short and denticulate. *Gills*: Seven pairs, all double and lanceolate. *Abdomen*: Clear brown pattern, the most noticeable feature being a median yellow circle on each segment. Lateral abdominal angles prolonged backwards in spines, the longest being on the ninth segment.

Male.—Unknown.

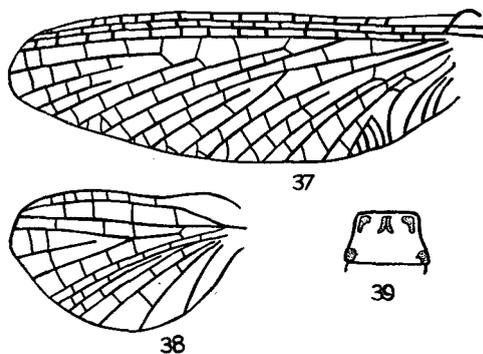
Holotype, TASMANIA : Burnie, 6. xii. 1954 (*B. McMillan*).

This species can be separated from the other known members of the genus by the colour of the subimaginal wings, the venation of the hind wings and the nymphal mouth parts.

Kirrara algona sp. n.

Female imago.—*Measurements* : Body length 6 mm. Fore wing 9 mm. Hind wing 2.3 mm. *General colour* : Light yellowish-brown. *Wings* : Clear without any markings. Veins golden-brown. First intercalary of *CuA* in fore wing (fig. 37) does not arise as close to wing base as in the other two described species of *Kirrara*, and second intercalary not connected to the first at its base. In hind wing (fig. 38) the radial sector arises close to origin of *MA*. Intercalary of *MP* runs nearly full length of fork. Costal area narrow and long, running nearly to apex of wing, and costal angulation very slight. *Legs* : Golden-brown without any markings. Legs very long relative to the body size ; in the hind leg the femur 2.7 mm., tibia 2.1 mm., tarsus 0.7 mm. Tarsal segments in decreasing order of length : 5, 2 = 3, 4, 1 (fused with tibia). Tarsal claws of each pair dissimilar. *Abdomen* : Clear golden-brown with three very distinct dark brown markings, one mid-dorsal, the other two lateral (fig. 39). The three last abdominal segments with chalky white bands on their posterior halves. Subanal plate very large, projecting well beyond last abdominal segment and slightly flattened at the tip. Cerci same colour as legs with very faint brown annulations. Appendix dorsalis well developed.

Male imago, subimago, nymph.—Unknown.



FIGS. 37-39.—*Kirrara algona* sp. n. Imago: (37) Fore wing. (38) Hind wing. (39) Abdominal pattern.

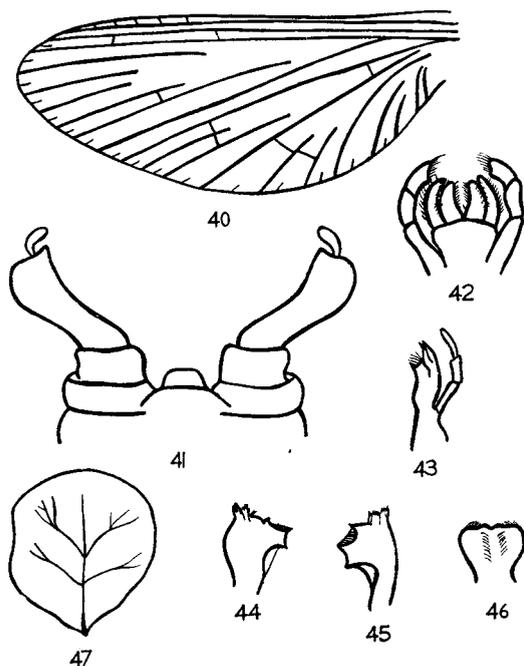
Holotype female imago, NEW SOUTH WALES : Tumut-Talbiggo Road, 900-1200 ft., 24. xii. 1947 (*B. McMillan*). Paratypes, N.S.W.: Willow Tree, near Armidale, 2000 ft., viii. 1955. In alcohol.

This species can be separated from the other two known species by the lack of any colour on the wing membrane, the form of the subanal plate, and the proportions of the tarsal segments. It should be noted that in the original description of one of these species, *K. amenia* Harker, 1954, the tarsal claws are referred to in error as being all alike ; they are in fact dissimilar in each pair.

3. BAETIDAE.

Cloeon nandirum sp. n.

Male subimago.—*Measurements*: Body length 7 mm. Fore wing 4 mm. Hind wing absent. *General colour*: Cream with very pale brown markings. *Head*: Eyes turbinate, the dorsal section orange, the lower black; very close together, so that the upper sections are almost contiguous. *Wings* (fig. 40): Veins cream and not easily seen. Pterostigmal area milky, with five cross-veins. *Rs* branches close to wing base. Very few cross-veins, otherwise typical *Cloeon* venation. *Legs*: Cream without markings. Hind leg femur equal in length to tibia plus tarsus. Tarsal segments in decreasing order of length: 2, 3 = 5, 4, 1 (fused with tibia). *Abdomen*: First two segments dark brown, three and four cream, five and six dark brown, and the rest cream. Appendix dorsalis absent. *Genitalia* (fig. 41): Forceps four-segmented, the basal two segments short and broad, the third long and wider distally, the distal segment very short.



FIGS. 40-47.—*Cloeon nandirum* sp. n. Subimago: (40) Fore wing. (41) Genitalia. Nymph: (42) Labium. (43) Maxilla. (44) Right mandible. (45) Left mandible. (46) Labrum. (47) Gill.

Nymph.—*Measurements*: Body length 6 mm. *General colour*: Yellow with very pale brown markings. *Mouth parts* (figs. 42-46): Mandibles with small molar region, canines with many teeth. Labrum concave on its anterior edge. Maxillae with a well-developed tooth in the galea region, the lacinia square in outline. Maxillary palp 3-segmented with the first and third segments about equal in length, the middle one shorter. Labium with well developed glossae and paraglossae of similar shape. Palp 3-segmented, the basal segment being longer than the other two, which are about equal in length. Distal segment

slightly concave on its free edge. *Legs*: Cream, without markings. Tarsal claw very long, tapering sharply at the tip, and heavily toothed. *Gills* (fig. 47): Seven in number, all double except the most posterior. Nearly circular in outline.

Female.—Unknown.

Holotype male subimago, QUEENSLAND: Townsville, 28.ix.1948 (*B. McMillan*).

The genitalia and colour of the abdomen distinguish this species from *C. tasmaniae* which it otherwise resembles.

Bungona gen. n.

Imago.—Small mayflies. Eyes of the male large and turbinate, the lateral ocelli large. Posterior margin of female head nearly straight. Fore wing with venation similar to that of *Pseudocloeon*, marginal intercalaries double. Hind wing absent. Fore leg of male with femur and tarsus equal in length and twice as long as tibia. In both sexes tibia and tarsus of hind leg equal in length, being three-quarters length of femur. Tarsal claws of each pair dissimilar. Forceps of male four-segmented; the two basal segments short and stout, third segment longer and bowed, distal segment narrow and short. Penis cover present. Penis broad.

Nymph.—Free swimming form. Maxillary palp 3-segmented, galea region longer than lacinia, the two being fairly clearly defined. Labium with narrow long glossae and paraglossae; labial palp 3-segmented. Legs with long femur, about twice length of tibia and tarsus. Tarsal claws long and tapering. Gills single, seven pairs, all pointed with trachea on one-half of median line only. Appendix dorsalis slightly shorter than the caudal filaments.

Type species: *Bungona narilla* sp. n.

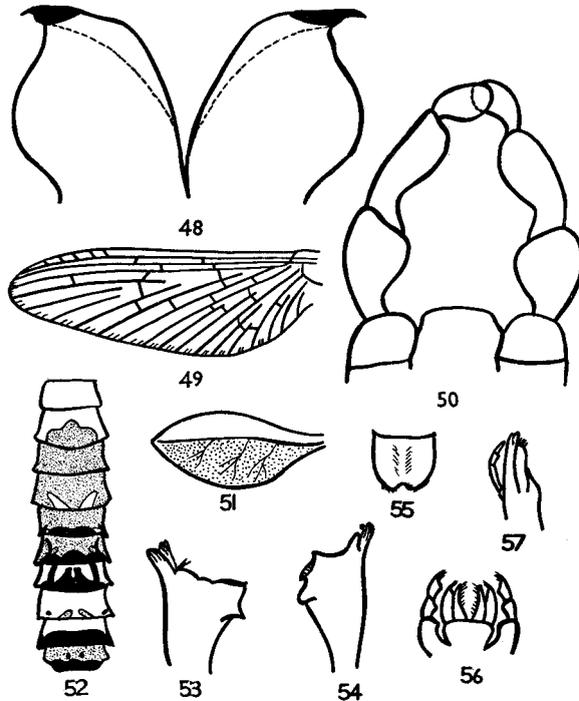
This genus is similar to *Pseudocloeon* in the absence of the hind wing, and the presence of paired marginal intercalaries in the fore wing. It differs from *Pseudocloeon*, however, in a number of characters: the relative lengths of the leg segments of the imago are unlike those of *Pseudocloeon*, and the forceps differ in shape and in the number of segments. In the nymph the maxillary palp is three-segmented, not two-segmented as in *Pseudocloeon*, and the shape of the labial palp is unlike that of the latter genus. The appendix dorsalis is present in *Bungona* and not in *Pseudocloeon*.

Bungona narilla sp. n.

Male imago.—*Measurements*: Body length 5 mm. Fore wing 4 mm. *General colour*: Dark brown head; thorax, and tip of abdomen cream. *Head*: Eyes turbinate with dorsal halves standing up vertically and very close together, reddish-brown in colour; ventral halves of eyes black and placed laterally on the head. Two large black ocelli at anterior base of eyes, the median ocellus black and small. *Wings*: Hyaline with almost colourless veins. Costal brace black. Fore wing (fig. 49): Pterostigma with five cross-veins, *Rs* forking close to its origin, and the long intercalary *IR*₃₀ arising close to the fork. Branches of *MA* and *MP* separated from the main stem, but supported by cross-veins. Marginal veinlets double. Hind wing absent. *Legs*: Femur yellow, tibia and tarsus greyish-brown. Fore leg femur equal in length to tarsi, tibia half length of femur. Hind leg tibia and tarsus equal in length, being about three-quarters length of femur. Tarsal segments of hind leg in decreasing order of length: 2, 3, 5, 4, 1 (fused with tibia). Tarsal claws of each pair

dissimilar, one being acute and the other obtuse. *Abdomen* : First two abdominal segments light brown, segments 3-7 yellow, the posterior segments light brown. Appendix dorsalis absent. *Genitalia* : Forceps (fig. 50) 4-segmented; the second segment broad and short, arched on its inner surface, third segment much longer and also arched, distal segment small. Penis with a sharp spine distally (fig. 48); penis cover present.

Female subimago.—Similar to male in most features. Eyes smaller than in the male and widely separated. Posterior margin of the head nearly straight. Hind leg of female of similar proportions to that of male. Subanal plate quite straight on its free margin.



FIGS. 48-57.—*Bungona narilla* sp. n. Imago: (48) Penis. (49) Fore wing. (50) Forceps. Nymph: (51) Gill. (52) Abdomen. (53) Right mandible. (54) Left mandible. (55) Labrum. (56) Labium. (57) Maxilla.

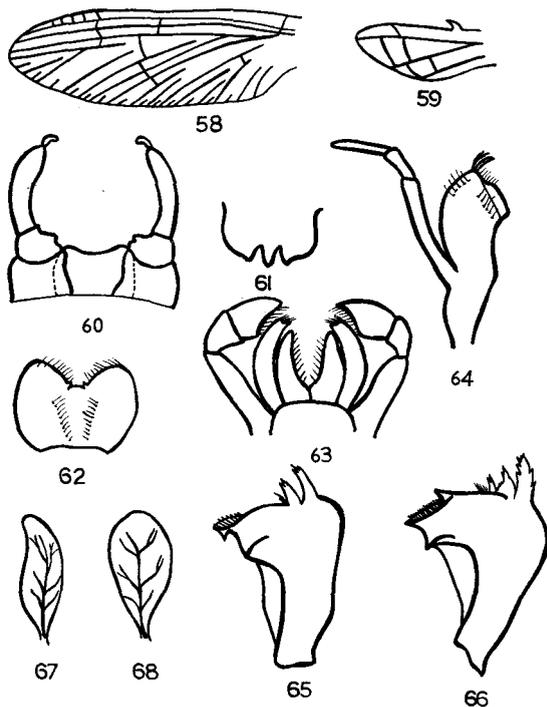
Nymph.—*Measurements* : Body length 5 mm. *General colour* : Yellow with clearly defined brown markings (fig. 52). *Head* : Antennae very short. *Mouth parts* (figs. 53-57) : Mandibles with blunt canines and small molar regions. Maxilla with 3-segmented palp, rather shorter than the galea-lacinia, the first segment being the longest. Galea region longer than the lacinia and toothed; the lacinia blunt and slightly rounded at its tip. Labium with large glossae and paraglossae, the glossae slightly the longer. Palp 3-segmented, the basal segment stout, the middle segment produced inwards at its tip, and the distal segment truncate. Labium sharply concave on its anterior margin. *Legs* : Femur twice as long as tibia and tarsus, which are equal in length. Tarsal claws long and tapering acutely at tip. *Gills* : Seven pairs, all single and slightly pointed at tip (fig. 51).

Abdomen : With a clearly defined dark brown pattern (fig. 52). Appendix dorsalis slightly shorter than the caudal filaments. Hairs only on inner sides of caudal filaments.

Holotype male imago, NEW SOUTH WALES : Coal and Candle Cr., Sydney, 15.viii.1955. Morphotype female subimago and nymph same locality.

Centroptilum collendum sp. n.

Male subimago.—*Measurements* : Body length 10 mm. Fore wing 5 mm. *General colour* : Cream with dark brown markings. *Head* : Eyes turbinate, the upper region orange and the lower black, oval in shape. *Legs* : In hind leg the femur the longest segment (1.28 mm.), the tibia and tarsus being equal in length (1.0 mm.). Tarsus with four free segments, the first being fused with the tibia. Tarsal segments in decreasing order of length :



FIGS. 58-68.—*Centroptilum collendum* sp. n. Subimago: (58) Fore wing. (59) Hind wing. (60) Male genitalia. (61) Female subanal plate. Nymph: (62) Labrum. (63) Labium. (64) Maxilla. (65) Right mandible. (66) Left mandible. (67) Second gill. (68) Third gill.

2, 5, 3, 4, 1. Fore leg as long as body. Tarsal claws unlike, one of each pair being acute and the other obtuse. *Wings* : Veins nearly transparent. Fore wing (fig. 58) : Pterostigmal area milky and with five cross-veins. Marginal intercalaries single. Hind wing (fig. 59) with acute curved costal projection and three longitudinal veins. Cross-veins present. *Abdomen* : Appendix dorsalis absent. *Genitalia* (fig. 60) : Forceps 4-segmented. Basal two segments

short and stout, the second with a projection on its inner surface, third segment long and curved, fourth very small and slightly broader at its dorsal tip. Penis cover present, slightly concave on the anterior border

Female subimago.—Similar to the male in most features. Posterior margin of head concave. Subanal plate with a median projection (fig. 61).

Nymph.—*Measurements*: Body length 9 mm. *General colour*: Cream with dark brown markings. *Mouth parts* (figs. 62–66): Mandibles with slender canines and relatively small molar regions. Maxillary palps 3-segmented, the proximal segment being nearly as long as the galea-lacinia, the distal two much shorter, but the whole palp extending well beyond the tip of the maxillae. Labium with narrow glossae and paraglossae, the latter being the longer and concave distally. Palp 3-segmented, the proximal segment narrow and the next two broad and slightly shorter on the inner side. Labium V-shaped, with a deep concavity on its anterior edge. *Legs*: In hind leg femur slightly longer than tibia, which is itself longer than the tarsus without the claw. Tarsal claw slender and very long, being about equal in length to the tarsus itself, so that the tarsus and claw together are longer than the femur. *Gills*: Seven pairs, all single plates, the anterior two pairs (figs. 67) lying flat against the body, and pairs 3–7 (fig. 68) standing out vertically above the abdomen.

Holotype male subimago, NEW SOUTH WALES: Kuringae Chase, 25.viii. 1955. Morphotype female subimago and nymph, same locality.

This is the first time that *Centroptilum* has been recorded from Australia.

4. CAENIDAE.

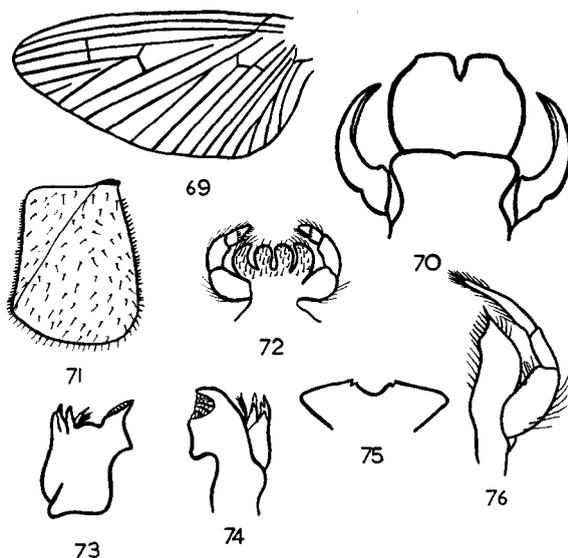
Tasmanocoenis jillongi sp. n.

Male imago.—*Measurements*: Body length 4.2 mm. Fore wings 4.0 mm. Caudal filaments 12 mm. *General colour*: Cream with dark brown markings. *Head*: Twice as wide as long. Eyes very large, laterally placed, black. Ocelli white and prominent. Antennae equal in length to width of head; pedicel double length of scape. *Wings*: Fore wing (fig. 69) hyaline with chocolate-brown veins, milky in the pterostigma area. Venation close to that of *T. tillyardi*. Hind wing absent. *Legs*: Fore leg equal in length to width of wing; coxae practically contiguous. Femur short, about half length of tibia, tarsus slightly longer than tibia. Tarsal segments in decreasing order of length: 2, 3, 5, 4, 1. Tarsal claws alike, both obtuse. Hind leg femur longer than tibia or tarsus. Tarsal segments in decreasing order of length: 5, 4, 3 = 2, 1. Tarsal claws unlike, one obtuse, one acute in each pair. *Abdomen*: Cream with very pale brown markings except for segments 8–10, which are dark brown. All lateral angles of abdominal segments produced backwards to form spines. *Genitalia* (fig. 70): Forceps with only one segment, very curved and pointed. Penis longer than forceps (unlike that of *T. tillyardi*) and partially divided in the mid-line; the anterior margin not rounded as in *T. tillyardi*. Appendix dorsalis well developed, as long as the caudal filaments.

Nymph.—*Measurements*: Body length 5 mm. *General colour*: Cream with dull brown markings. *Mouth parts* (figs. 72–74): Mandibles with well developed canines and molar area. Left mandible unusual in having the canines completely separated from the molar region. Maxillary palp 3-segmented, and longer than the galea-lacinia. First segment broad and about twice as long as the second, the distal segment longer than the first segment and considerably narrower. Galea-lacinia completely fused and ending in a sharp point. Labial palp 3-segmented, the first and second segments being about equal in length, the distal one about half as long. Paraglossae slightly longer than glossae, but narrower and pointed; the glossae oval in shape. Labrum with a concave region on its anterior margin, bordered on either side with two denticles. *Legs*: Coxae of fore legs not contiguous. Coxal

segment of all legs very long. Femur slightly longer than tibia, which is about twice the length of the tarsus. Tarsal claws long, narrow and denticulate. *Gills*: Six pairs: the first pair rod-like and 2-segmented, equal in length to the gills on segments 3-6. Second gill acts as a gill cover and is almost rectangular in shape (fig. 71), completely covering gills 3-6 when pressed down against the body. Second pair of gills do not touch or overlap in the median line. Gills 3-6 filamentous and roughly triangular in shape, brownish in colour with a distinct clear region around the main plate of the gill. Each filament divided several times. *Abdomen*: Lateral angles of abdominal segments all produced into spines. Appendix dorsalis well developed. The whole nymph covered with hairs.

Female.—Unknown.



FIGS. 69-76.—*Tasmanocoenis jillongi* sp. n. Imago: (69) Fore wing. (70) Genitalia. Nymph: (71) Second gill. (72) Labium. (73) Right mandible. (74) Left mandible. (75) Labrum. (76) Maxilla.

Holotype male imago, NEW SOUTH WALES: Kuringae Chase, 25.viii.1955. Morphotype nymph, same locality.

This species appears to belong to the genus *Tasmanocoenis* Lestage by virtue of its imaginal characters. The nymphs, however, are unlike those of *T. tillyardi*, the only known nymph of this genus. Neither are they typical *Caenis* nymphs, differing from that genus by the separation of the coxae of the fore legs and the form of the maxillae and the labium. For the present, therefore, the species is placed in the genus *Tasmanocoenis*.

5. SUMMARY.

Nine new species, and one new genus of Ephemeroptera from Australia are described.

6. REFERENCES.

- HARKER, J. E., 1950, Australian Ephemeroptera. Part I. Taxonomy of New South Wales species, and evaluation of taxonomic characters. *Proc. Linn. Soc. N.S.W.* **75** : 1-34.
- , 1954, The Ephemeroptera of Eastern Australia. *Trans. R. ent. Soc. Lond.* **105** : 241-268.