

TWO NEW SPECIES OF *CONOESUCUS* MOSELY FROM TASMANIA
(TRICHOPTERA: CONOESUCIDAE)

J. E. JACKSON

Zoology Department, University of Tasmania, GPO Box 252-05, Hobart, Tasmania 7001, Australia
(Jean.Jackson@utas.edu.au)

Abstract

Jackson, J.E., 1998. Two new species of *Conoesucus* Mosely from Tasmania (Trichoptera: Conoesucidae). *Memoirs of the Museum of Victoria* 57(1): 133–142.

Adults, pupae and larvae are described and illustrated for *Conoesucus adiaxolus* sp. nov. and *Conoesucus notialis* sp. nov. from Tasmania. The first diagnoses of the pupae and larvae of Conoesucidae and *Conoesucus* are given.

Introduction

The Conoesucidae, now with 23 described Australian species, is the second most diverse of the case-making Trichoptera families in Australia, after the Leptoceridae. In addition, taxonomic work on larvae (Jackson, 1988) indicates that there are about 16 undescribed species in southeastern Australia (no further undescribed conoesucids are known from Tasmania). Conoesucid larvae are common in many lotic habitats in southeastern Australia. Conoesucidae also occur in New Zealand and the immatures of New Zealand species have been described by Cowley (1975, 1976, 1978).

The descriptions given here of two new Tasmanian species include the first larval and pupal descriptions of Australian Conoesucidae. Chromosome number and information on testis structure obtained during a chromosome study (Jackson, 1991) are included in diagnoses.

Materials and Methods

Collecting. Larvae and pupae were collected by hand picking from various substrates (rocks, wood, plants). Specimens required for rearing were transported in jars of shallow water on ice; others were preserved in 70% ethanol. Adults were collected from riparian vegetation with a sweep net during the day; at night adults were collected from a sheet hung behind a mercury vapour lamp, or in automatic UV light traps. Specimens were preserved immediately in 70% ethanol. All material was collected by the author unless otherwise stated. Type material and material examined is lodged in the Museum of Victoria (NMV). Grid references given with locality data refer to the Tasmap 1:100,000 map series (Lands Dept., Hobart).

Rearing of immatures. Larvae or pupae were reared to adults in small plastic containers with shallow, aerated tap or stream water at 10–15°C. Stones, sand, leaves, wood and/or algae were provided as food, case material and pupation sites. Transparent perforated lids prevented the escape of emerged adults. Association of larva with adult using metamorphotypes collected from the field was also possible, as conoesucids retain larval sclerites within the pupal case.

Electrophoresis. Standard methods of allozyme electrophoresis (Richardson et al., 1986) were used to confirm that *Conoesucus adiaxolus* sp. nov. was distinct from the morphologically similar *C. brontensis* Neboiss. The criterion used to indicate specific status was a minimum of 15% of loci with fixed differences between allopatric populations (Richardson et al., 1986).

Preparation, drawing and description. Descriptions and figures are of late instar larvae. Whole larvae and adult abdomens were prepared for microscopic examination by clearing in hot 5% KOH for about 10 minutes (after puncturing larval abdomens), rinsing in glacial acetic acid, then transferring to glycerol. Specimens were mounted in glycerol; cleared material was subsequently stored in glycerol. To clarify the structure of the genitalia and the larval abdominal cuticle, a few specimens of each series were stained temporarily by adding a few drops of acid fuchsin to the acetic acid rinse. Untreated material was also examined, and larval sclerites from pupal cases often showed setal and scar patterns more clearly than other material.

Drawings of pupae were made from exuviae of reared specimens; whole specimens were also examined. Wings to be drawn were removed from the adult, denuded with a fine paint brush,

and stained in acid fuschin to show venation. They were mounted on a flat microscope slide in glycerol or alcohol. Drawings were made with the aid of camera lucida on a Wild M20 compound microscope and a Wild M5 stereomicroscope. Scale lines on figures are in millimetres. Terminology follows that of Wiggins (1977) (larvac), Wiggins (1984) (pupae) and Neboiss (1981) (adults). Abbreviations: L=larvae; P=pupae.

Conoesucidae Ross

Diagnosis. Adult diagnosis given by Neboiss (1977). Chromosome number: $n=25$.

Pupa: Gills absent. Lateral fringe extending from posterior of segment 6 to midsegment 8. Dorsal hook plates on anterior of segments 3–6 and posterior of segment 5, toothed ridges on segment 2. Mandibles broad basally, distal half tapered and curved, outer margins with 2 large basal setae. Labrum a truncated cone or hemispherical in shape, anterior margin papillate. Midleg setal fringe either dense on both sides, sparse on one side or absent; fore and hind legs lacking fringe. Anal processes elongate, with 2 pale apical bristles arising slightly subapically. Case constructed from larval case by shortening and adding anterior and posterior membranes. Anterior opening a transverse slit, posterior opening a vertical slit or oval.

Late instar larva: Small to medium sized (length 4–12 mm). Head more or less round in dorsal view and flat on top. Ventral apotome triangular, usually unpigmented posteriorly, genae widely separated at occipital margin. Antennae minute, very close to anterior margin of head, below carina if present. Pronotum strongly sclerotised. Mesonotum weakly sclerotised, metanotum predominantly membranous with one or two small pairs of sclerites. Legs unmodified, increasing in length and slenderness posteriorly. Abdomen cylindrical, lateral fringe of setae absent, lateral row of minute spicules on segment 8. Segment 1 lateral hump with small spiny oval area. Anal claw with single small accessory hook. Case cylindrical, usually curved and tapered; constructed of sand, secretion or concentric plant strips; posterior membrane with central circular or oval opening.

Conoesucus Mosely

Conoesucus Mosely, 1936: 408.—Mosely and Kimmins, 1953: 87.—Neboiss, 1977: 109.

Type species. *Conoesucus fromus* Mosely, 1936.

Diagnosis. Adult diagnosis given by Neboiss (1977).

Pupa: Labrum with anterior pair of median setae, 2 large pairs in midtransverse row and single seta on each lateral margin, 3 large setae in each posterolateral corner. Anterior hook plates roughly oval, hooks scattered or in a row; posterior hook plates rounded-quadrate or about twice as wide as long. Dorsum of segment 9 with transverse row of 3–6 setae on each side, several setae laterally. Midleg with setal fringe on one side only, setae sparse or lacking in some species. Anal processes broad basally, cylindrical distally; setose dorsally. Case anterior membrane domed or flat with curved slit at or below centre; posterior membrane domed or flat.

Late instar larva: Length to about 12 mm. Head dorsally with polygonal reticulate sculpturing. Strong carina extends from anterior margin of head capsule to behind eye. Frontoclypeus with two erect dark setae in each anterolateral corner. Foretrochantin separated from propleuron by suture. Pronotum lateral face entirely pigmented, setose. Mesonotum approximately square. Abdominal gills present on segments 1–3 or absent. Tergum 9 with a pair of irregularly pigmented sclerites. Anal lateral sclerites pigmented, facing dorsally and with setae relatively uniform in length. Gonads: each testis with four round lobes. Case curved, about the same length as larva.

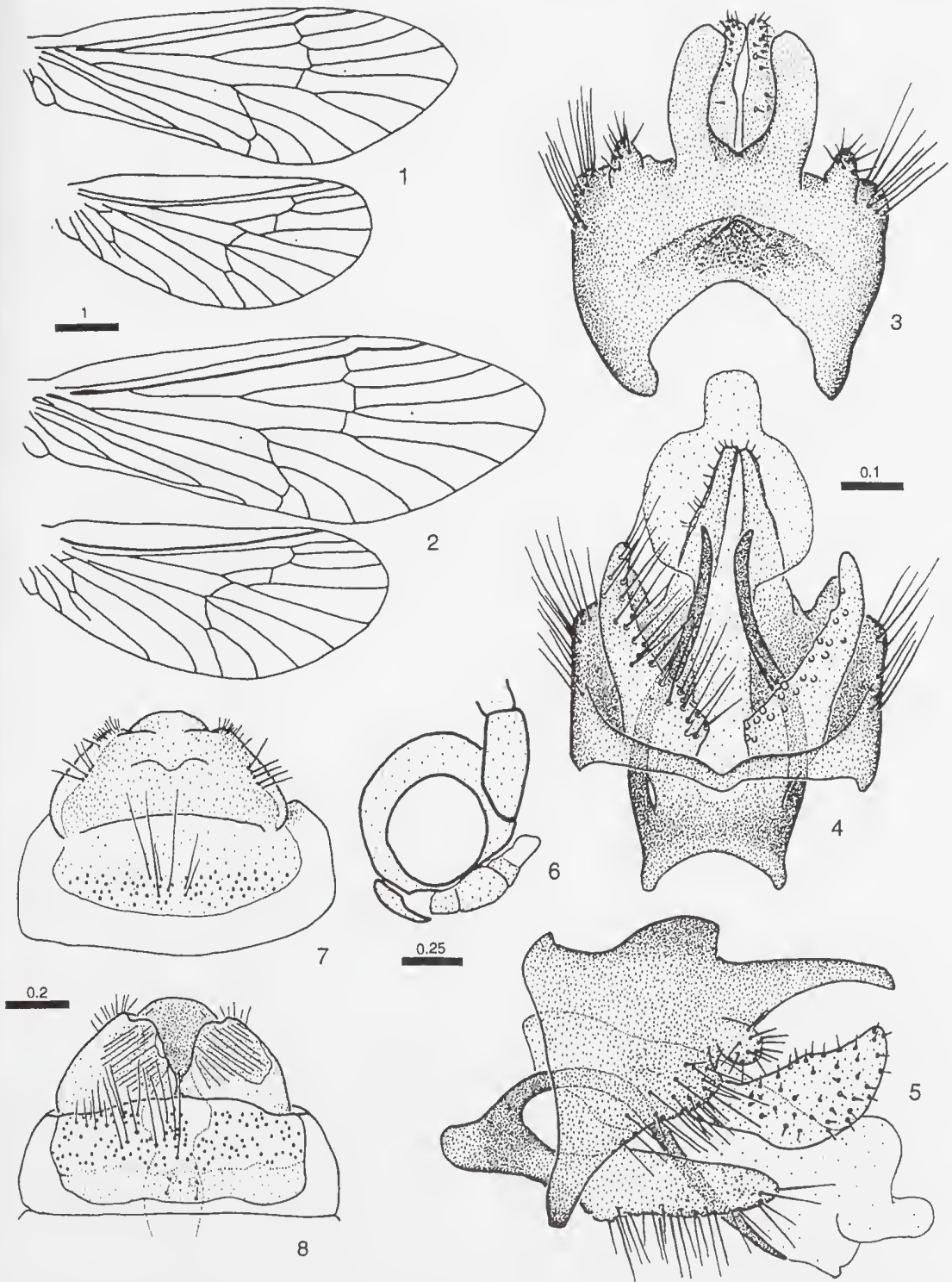
Conoesucus adiaestolus sp. nov.

Figures 1–28

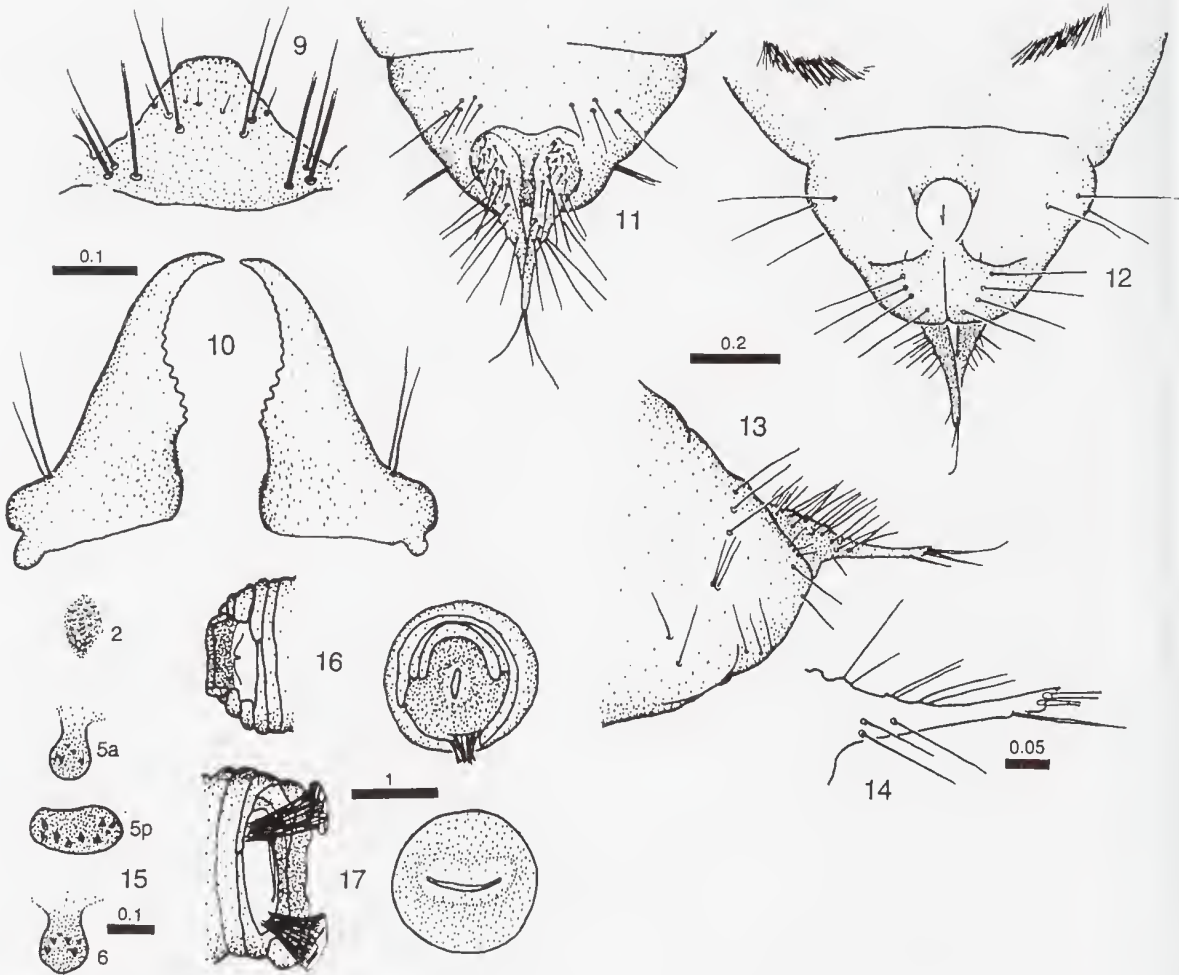
Type material. Holotype ♂ (NMV T-10796), Tasmania, Gordon River 2 km downstream of Serpentine junction, grid ref. 8012: 134 667, 12 Jan 1977, A. Neboiss. Allotype ♀ (NMV T-10797), small creek on Serpentine Dam Road, grid ref. 8012: 168 644, 29 Dec 1988, emerged 2 Jan 1989.

Paratypes (NMV T-10798-10806): 3 ♂ cleared, same data as holotype; 2 ♂ same locality as allotype, emerged 8 Jan 1989, 15 Jan 1989; 1 ♂ 1 ♀ same data as allotype, 2 ♂ Nelson Valley Creek Lyell Hwy, grid ref. 8013: 933 385, emerged 12 Jan 1989, 22 Jan 1989; 5 L (NMV T-10807-10811) same data as holotype; 5 L (NMV T-10812-10816) small creek on Serpentine Dam Road, grid ref. 8012: 168 644, 29 Dec 1988. All lodged in Museum of Victoria.

Other material examined. 2 ♂, pharate ♀, 20 L, 5 P same data as holotype; 20 ♂, 7 ♀ reared, 2 ♂ netted, small creek on Serpentine Dam Road, grid ref. 8012: 168 644, 29 Dec 1988; 2 ♂ 2 ♀ reared, same locality, 11 Nov 1988; 36 L same locality, 1 Sep 1988, 14 Oct 1987; 22 P same locality, 11 Nov 1988, 29 Nov 1988, 29 Dec 1988; 2 ♂, 1 ♀, Nelson Valley Creek Lyell Hwy, grid



Figures 1–8. *Conoesucus adiaastolus* sp. nov.: 1, male wing venation. 2, female wing venation. 3, male genitalia dorsal. 4, ventral. 5, lateral. 6, male head lateral. 7, female genitalia dorsal. 8, ventral.



Figures 9–17. *Conoesucus adiastolus* sp. nov.: 9, pupal labrum. 10, pupal mandibles ventral. 11, male pupal terminalia dorsal. 12, ventral. 13, lateral. 14, anal process. 15, pupal hook plates of segments 2, 5 and 6. 16, pupal case posterior ventral and posterior membrane. 17, pupal case anterior ventral and anterior membrane.

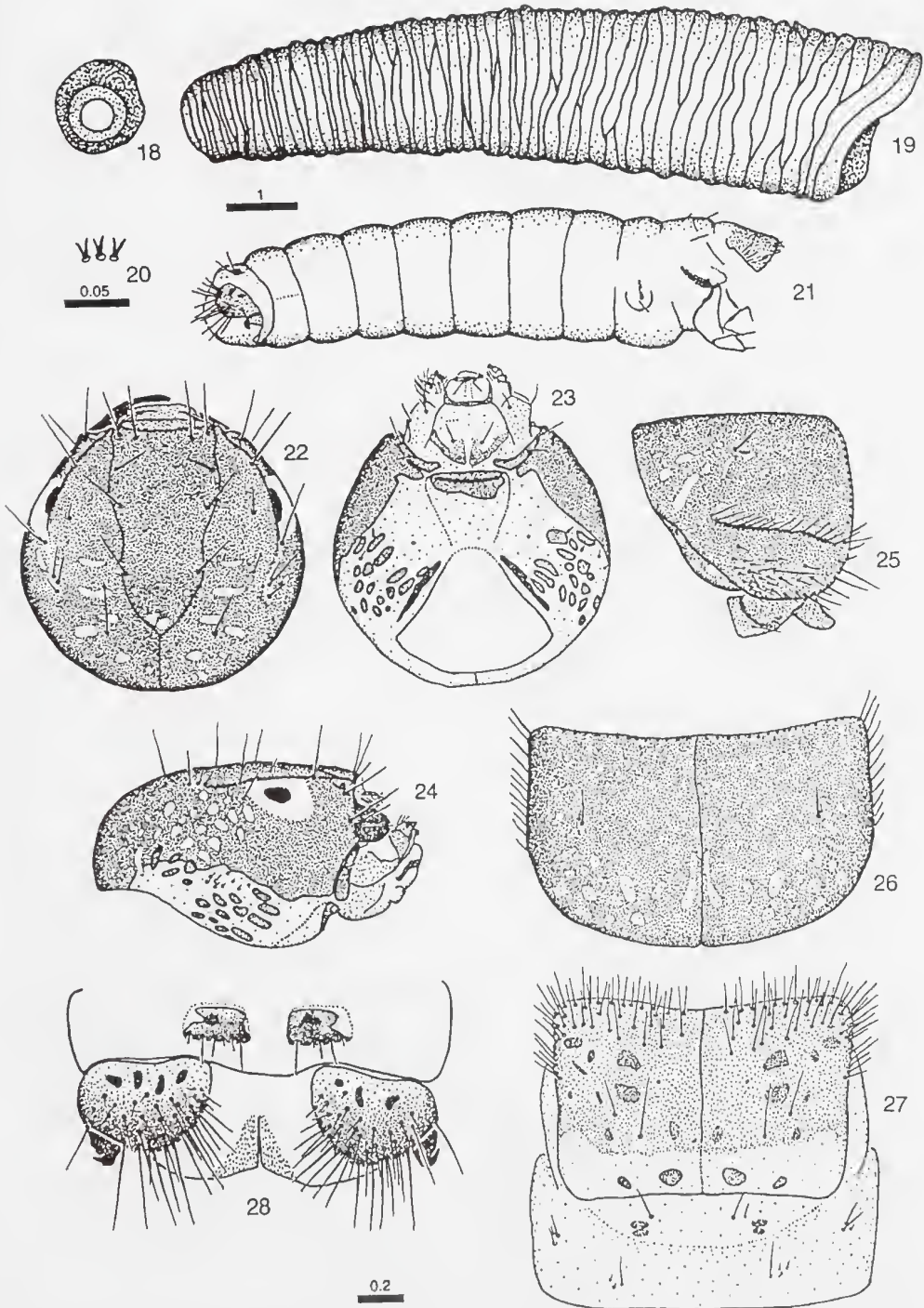
ref. 8013: 933 385, 31 Oct 1988; 2♂ 6♀ same locality, 12 Jan 1989; 40 L same locality, 19 Sep 1988, 12 Jan 1989; 8 P same locality, 12 Jan 1989; 2♂ small creek near Teds Beach Gordon Rd, grid ref. 8112: 231 625, 29 Dec 1988; 3 L same locality, 11 Nov 1988, 29 Dec 1988; 2 P same locality, 29 Dec 1988; 1 L Yolande River Murchison Hwy, grid ref. 8013: 766 472, 20 Sep 1988; 6 L Hogarth Falls Strahan, grid ref. 7913: 641 319, 20 Sep 1988; 1 L Snake Creek Lyell Hwy, grid ref. 8013: 989 368, 19 Sep 1988; 5 L small creek 7 km W of Collingwood River Lyell Hwy, grid ref. 8013: 073 357, 31 Oct 1988; 6 L Double Barrel Creek Lyell Hwy, grid ref. 8013: 138 275, 19 Sep 1988.

Specimens figured: 1♀ reared Nelson Valley Creek Lyell Hwy, grid ref. 8013: 933 385, emerged 18 Dec 1988; 1♂ reared small creek on Serpentine

Dam Road, grid ref. 8012: 168 644, emerged 8 Jan 1989; 1 P same locality, 29 Dec 1988; 2 L same data as holotype.

Diagnosis. Male: Abdominal sternite 7 without broad spatulate process (although there is a slight distal extension), segment 10 apically turned upwards almost at right angle. Maxillary palp with base of segment 3 sclerotised and segment 3 of about equal length to segment 2.

Late instar larva: pronotum anterior margin without dark setae, pronotum anterolateral corner strongly rounded, mesonotum with dense anterior band of setae 3–4 wide, case of concentric plant strips.



Figures 18–28. *Conoesucus adiaxolus* sp. nov.: 18, larval case posterior membrane. 19, larval case lateral. 20, segment 8 lateral spicules. 21, larval abdomen lateral. 22, larval head dorsal. 23, ventral. 24, lateral. 25, pronotum and foretrochantin lateral. 26, pronotum dorsal. 27, mesonotum and metanotum. 28, tergite 9 and anal prolegs.

Description. Adults (Figs 1–8): Dark coloured. Male fore wings without specialised hairs or fold; hind wing with row of long hairs on Cu and Cu₂. Cu₂ ending at margin in both sexes, connecting to Cu_{1b} by cross vein. Hind wing Sc and R running separately to margin; fl footstalk length variable; 2A not reaching margin in either sex. Length of fore wing ♂ 5.25–7.25 mm. ♀ 7.25–9.0 mm. Male maxillary palps with long golden and brown hairs; segment 1 short, segment 2 about twice length of segment 1, broad; segment 3 short, about length of segment 2, base of segment 3 pigmented. Maxillary palps 5-segmented and normal in female. Male genitalia (Figs 3–5): Tergite 9 with prominent ridge or hump and extended distally into 2 curved processes; laterally produced into rounded setose process. Superior appendages short round lobes bearing pale setae. Inferior appendages tapered and curved slightly, inner (concave) margin setose, setal sockets not produced into finger-like projections; a pair of long slender processes with smooth pointed apices arise basally and protrude ventral to the phallus. Phallus expanded laterally near apex. Segment 10 consists of 2 laterally flattened broad processes, curved evenly upwards so that apices point dorsad, tapered to rounded apex, with slight convexity on upper margin. Distal margin of sternite 7 with broad extension but no free process.

Female abdomen (Figs 7, 8) terminates bluntly, tergite 9 median process prominent, without median concavity, dorsolateral areas setose distally. Ventral plates about as wide as long; ventral incision wider distally, margins approximately straight. Sternite 8 distal two-thirds with dense broad band of dark stout setae, other sternites with sparse dark setae; no process on sternite 7. Tergite 8 with 2 groups of dark setae, other tergites also setose.

Pupa (Figs 9–17): Midleg setae very sparse. Anterior hook plates with 6–8 hooks scattered or in semicircle; posterior hook plates oval, wider than long, with 8–14 small hooks. Additional hookplates occasionally present. Apices of anal processes pointed, dorsal surface smooth apart from setal sockets; apical bristles arise very close to apex. Case anterior opening broad, width about half membrane diameter, central, slightly raised, under small dorsal hood. Posterior membrane slit raised slightly in membrane, under small dorsal hood. Adhesive stalked discs at both ends.

Late instar larva (Figs 18–28): General colour of sclerites dark brown. Head with several erect

dark setae on dorsum. Pronotum anterolateral corner round, anterior margin with minute pale setae, no long dark setae. Lateral face between carina and margin broad. Mesonotum with dense anterior band of setae, 3–4 setae wide; mesonotum anterior two-thirds pigmented. Metanotum: each setal area with 1–2 easily visible setae and 1–3 minute setae; setal area 1 sometimes pigmented. Abdominal gills absent. Case of concentric plant strips, may include some sand grains.

Distribution. Western Tasmania; locally abundant.

Larval habitat. Rocky streams with moss or algae. Pupates singly, case attached at both ends under rocks.

Etymology. From *adiastolos* (Greek), not separated, confused; refers to the similarity of adults of this species to *Conoesucus nepotulus* Neboiss and *C. brontensis* Neboiss, and of larvae (except for the case) to *C. brontensis*.

Remarks. This species was confirmed as specifically distinct from *C. brontensis*, with electrophoretic fixed differences at three of the eleven allozyme loci scored (27% fixed differences) (Jackson, 1991).

Male maxillary palp characters distinguish the three similar species *Conoesucus adiaastolus* sp. nov., *C. brontensis* and *C. nepotulus*. In *C. nepotulus* segment 3 is unsclerotised. The base of segment 3 is sclerotised in *C. brontensis* and *C. adiaastolus* sp. nov., which are distinguished by the long segment 3 in *C. brontensis* compared to segment 3 of about equal length to segment 2 in *C. adiaastolus* sp. nov.

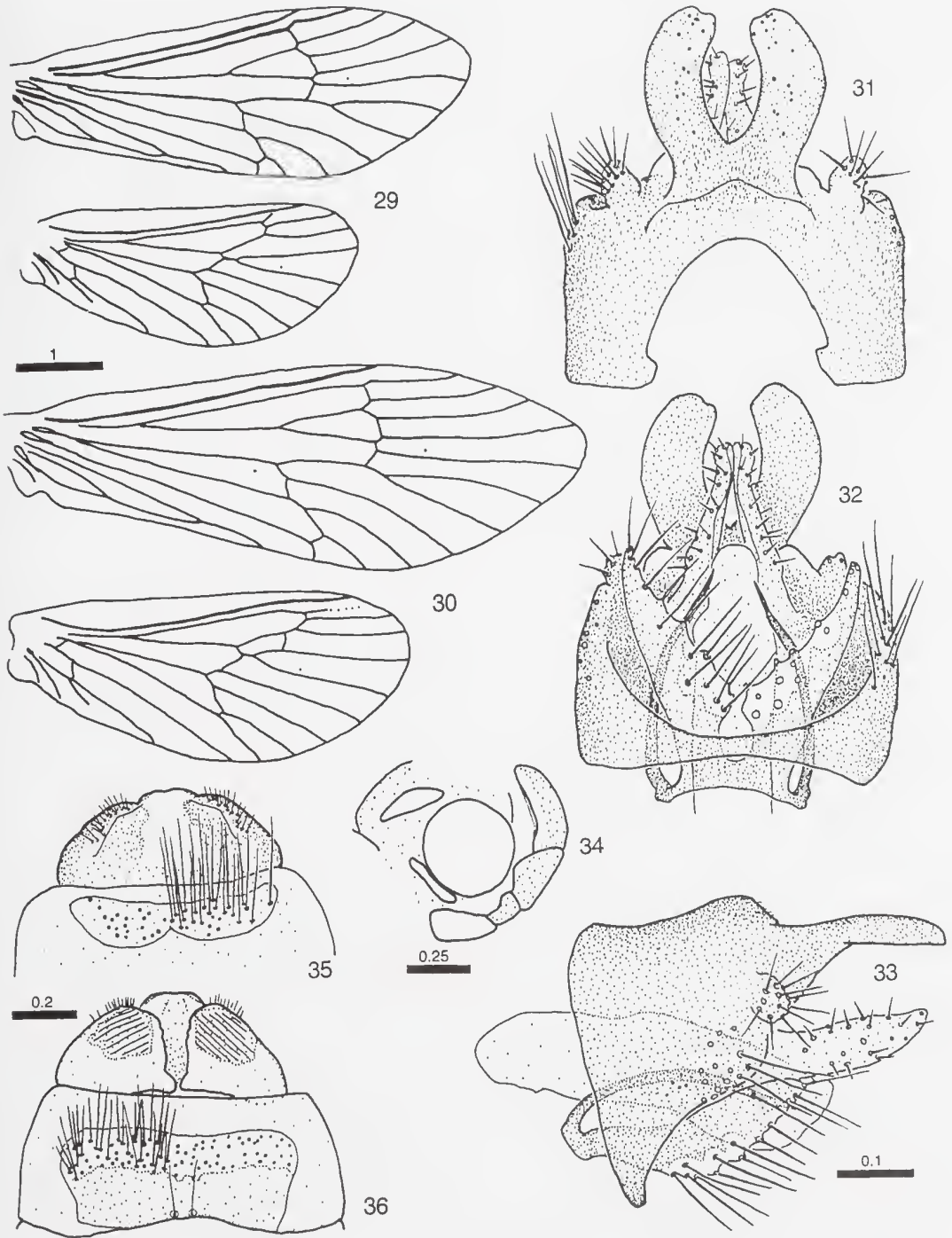
None of the following wing characters enable diagnosis of *C. adiaastolus* males or females from *C. brontensis* or *C. nepotulus*: fore wing length, hind wing length, hind wing fork 1 footstalk length (f), hind wing fork 1 discoidal cell anterior margin length (dc), or the ratio f:dc (Jackson, 1991).

Conoesucus notialis sp. nov.

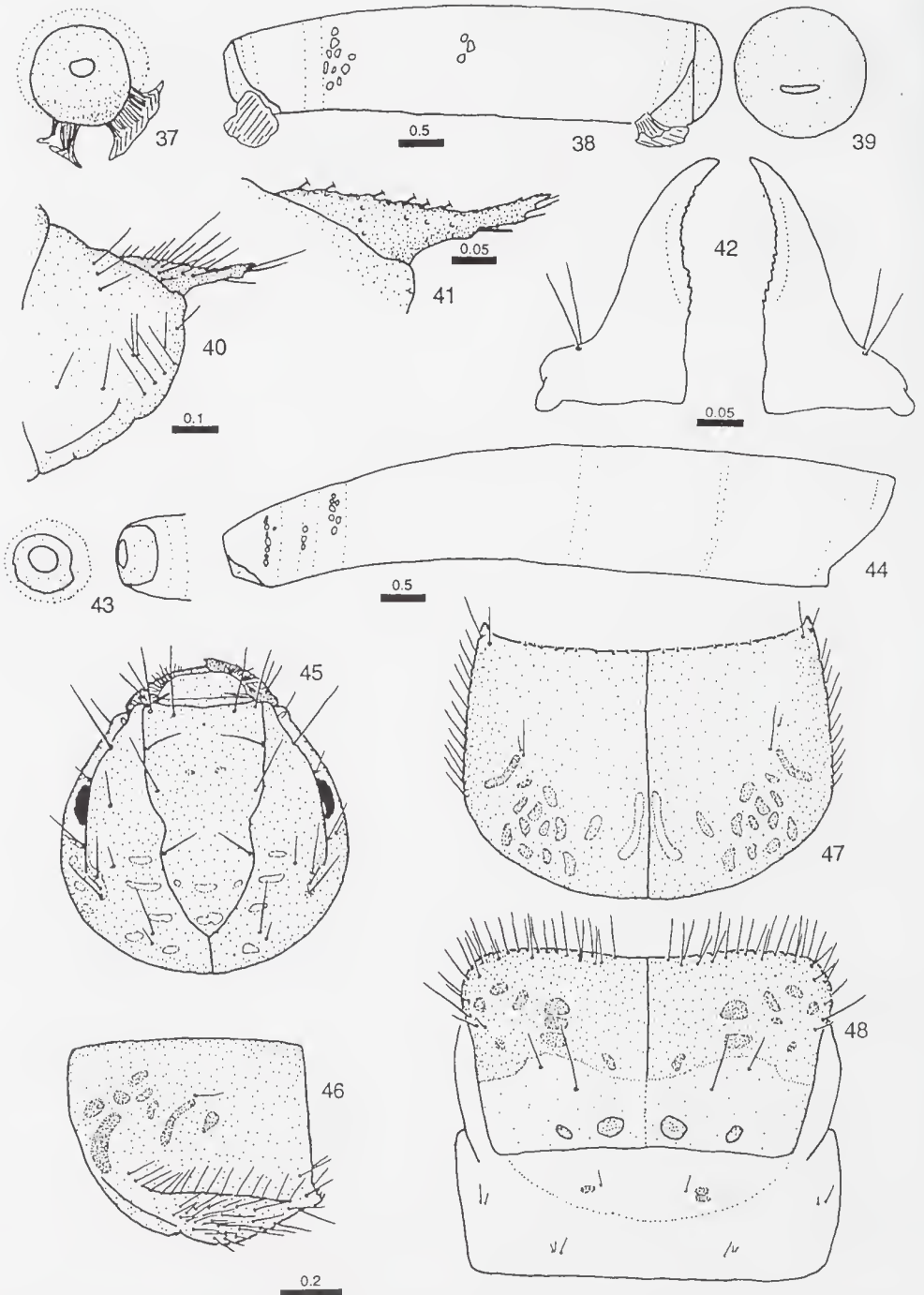
Figures 29–48

Type material. Holotype ♂ (NMV T-10817), allotype ♀ (NMV T-10818), Tasmania, Twin Creeks, Scotts Peak Dam Rd, grid ref. 8112: 483 413, 25 Aug 1988, emerged 9 Oct 1988.

Paratypes (NMV T-10819–10825): 3♂ 2♀ same locality, emerged 20 Nov 1988; 1♂ 1♀ Condominium Creek, Scotts Peak Dam Rd, grid ref. 8112: 479 434, 25 Aug 1988, emerged 12 Oct 1988; 5L (NMV T-10826–10830) same locality as holotype, 25 Aug 1988. All lodged in Museum of Victoria.



Figures 29–36. *Conoesucus notialis* sp. nov.: 29, male wing venation. 30, female wing venation. 31, male genitalia dorsal. 32, ventral. 33, lateral. 34, male head lateral. 35, female genitalia dorsal. 36, ventral.



Figures 37–48. *Conoesucus notialis* sp. nov.: 37, pupal ease posterior membrane. 38, pupal case lateral. 39, anterior membrane. 40, pupal terminalia lateral. 41, anal process lateral. 42, pupal mandibles ventral. 43, larval ease posterior membrane and ventral. 44, larval case lateral. 45, larval head dorsal. 46, pronotum lateral. 47, dorsal. 48, mesonotum and metanotum.

Other material examined. 14♂ 2♀ reared, Condominium Creek, Scotts Peak Dam Rd. grid ref. 8112: 479 434, 6 Oct 1987; 7♂ 1♀ reared, same locality, 25 Aug 1988; 15 L same locality, 26 Mar 1987, 25 Aug 1988; 7♂ 4♀ reared Twin Creeks, Scotts Peak Dam Rd, grid ref. 8112: 483 413, 25 Aug 1988; 10♂ 10♀ same locality, 12 Nov 1988; 42 L same locality, 9 Feb 1988, 3 Jul 1987, 25 Aug 1988. Specimens figured: holotype ♂; allotype ♀, 2 L, 1P Twin Creeks, Scotts Peak Dam Rd, grid ref. 8112: 483 413, 25 Aug 1988.

Diagnosis. Male abdominal sternite 7 without broad spatulate process. Male segment 10 processes with margins not parallel, processes almost straight, apices very slightly upturned; tergite 9 dorsal processes stout.

Late instar larva: pronotum anterolateral corner pointed, no long dark setae on anterior margin. Abdominal gills small and difficult to see, not branched. Case almost entirely of golden secretion.

Description. Adults (Figs 29–36): Dark coloured, abdominal sclerites charcoal black, flesh greenish when fresh. Length of fore wing ♂ 5.0–5.5 mm; ♀ 7 mm; Cu_2 ending at margin, connected by cross vein to Cu_{1b} in both sexes; in hind wing Sc may join R_1 ; male fore wings without folds, small scale-like hairs below R from base, not extending to margin. Male hind wing discoidal cell sometimes open. Male maxillary palps 3-segmented, segment 1 short, segment 2 about twice length of segment 1, segment 3 about as long as segments 1+2, all segments covered with flattened black setae; maxillary palps 5-segmented and normal in female. Male genitalia (Figs 31–33): Segment 9 dark brown, dorsally extended distally into 2 broad curved processes, laterally produced slightly into rounded setose process. Superior appendages short round lobes, bearing pale setae. Inferior appendages brown, tapered distally, only slightly curved, inner margin setal sockets produced into finger-like processes; a pair of long slender processes with smooth pointed apices arise basally and protrude on both sides of the phallus. Phallus broad, apex truncate. Segment 10 consists of 2 laterally flattened processes covered with short clear setae, processes widen slightly before tapering to apices, apices only slightly upturned.

Female abdomen (Figs 35, 36) terminates bluntly, tergite 9 concave, median process with slight concavity in distal margin; distal lateral areas with short clear setae. Ventral plates about as wide as long, ventral incision with parallel sides or slightly narrower distally. Sternite 8 distal half densely setose with dark setae, other

sternites with sparse dark setae; no process on sternite 7. Tergite 8 with single broad band of dark setae.

Pupa (Figs 37–42): Midlegs without setal fringe. Anterior hook plates with 3–4 hooks, posterior hook plates slightly wider than long, with about 6 larger hooks irregularly arranged and several smaller teeth. Additional small irregular sclerites sometimes present in a row on anterior of segments 2–8. Sclerites present on thorax just behind wing bases. Anal processes with spiny apices and short projection beyond bases of apical bristles. Case with undercut anterior margin filled in with secretion. Anterior membrane domed, opening slit very slightly curved, just below centre; posterior membrane domed, opening a dorsoventrally flattened oval. Adhesive discs ventrally at both ends, arising from old (larval) case margin.

Late instar larva (Figs 43–48): General colour of sclerites mid-dark brown. Head tapered anteriorly in dorsal view. Pronotum anterolateral corner pointed, slightly projected forward of anterior margin, no long dark setae on anterior margin. Mesonotum anterior margin with irregular row, 1–2 wide, of medium-length setae; mesonotum pigmented in anterior two-thirds. Metanotum: each setal area with 1–2 easily visible setae and 0–2 minute setae; setal area 1 sometimes pigmented. Abdominal gills small and indistinct: dorsal gills on posterior of segment 1, segment 2 with anterior dorsal and ventral gills. Case entirely of golden secretion, sometimes with a few sand grains; slight dorsal overhang anteriorly, posterior opening dorsad of centre, posterior membrane fills in undercut ventral margin.

Distribution. Southwestern Tasmania; locally abundant.

Larval habitat. Rock surfaces in streams, rocks with film of algae. Pupates attached to the underside of rocks.

Etymology. From *notialis* (Latin), southern; for the southern distribution of the species.

Acknowledgements

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