

## New species of *Caloca* Mosely (Trichoptera: Calocidae) from eastern Australia

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### Abstract

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The Australian endemic genus *Caloca* Mosely was established 60 years ago to include five species. Since then only a single species has been added to the genus. Adult males of seven new species are here named and described: *C. ada* sp. nov., *C. sica* sp. nov., *C. gippslanda* sp. nov., *C. lata* sp. nov., *C. kiandra* sp. nov., *C. disparala* sp. nov. and *C. ungula* sp. nov. Each species possesses a distinct triangular receptacle on the dorsum of the head capsule, which occurs only in *Caloca* and *Pliocaloca* Neboiss. A transient discoidal cell in the hindwing of one species blurs the diagnostic lines between *Caloca* and *Pliocaloca*. However, the two genera can be separated on the presence or absence of spine-like setae associated with segment X (present in *Caloca*), and the larvae of the two genera are distinctive. The descriptions here raise the total number of species in the genus from 6 to 13, all from south-eastern Australia. A key to the identification of all 13 species is provided.

### Keywords

Caddisfly, taxonomy, *Caloca*, *ada*, *sica*, *gippslanda*, *lata*, *kiandra*, *disparala*, *ungula*

### Introduction

Among the caddisflies (Trichoptera), Calocidae exhibit some of the most interesting morphological features and habitat choices. The hind-wing venation of all Calocidae species is modified, often lacking veins of the cubitus and media. Some species have highly modified maxillary palpi, which may include spines or large setose areas. Most species possess a small finger-like process that extends from the anterior margin of the antennal scape (fig. 11). Unique to the genera *Caloca* Mosely and *Pliocaloca* Neboiss, is a receptacle on the dorsum of the head, which is closed by a membranous cover that opens along the midline (fig. 12). This large, triangular feature holds a pair of filaments that, when the membrane is opened, protrude from the head capsule (fig. 11).

Very little is known about the larvae of *Caloca*. The one species for which a larva has been associated and described is the only known Australian species of Trichoptera to be fully terrestrial. Neboiss (1979) described the larva of *C. saneva* from specimens he collected from pitfall traps placed about 20–50 m from a river. He noted that the adults could be found crawling under leaf litter on the forest floor. This specialised habitat may be the reason why the larvae of other species of *Caloca* remain to be discovered, as the usual technique for collecting larvae is to search river substrates. However, I have personally observed *Caloca* larvae inhabiting a somewhat aquatic environment in seeps along a road cutting in the alpine regions of the Hartz Mountains National

Park, Tasmania, which suggests that while some species might not be collected in river samples, they may still require some form of flowing water. Adults of *Caloca* have been collected from 400 m to around 1300 m above sea level. They are found in densely forested or alpine areas with undisturbed ground and shrub layers. Neboiss (1977) recorded the Tasmanian species from alpine areas such as Mt Wellington, the Hartz Mountains and Lake St Clair. The most northerly species has been recorded from Ebor, New South Wales (NSW), where the local Guy Fawkes River runs out of the Guy Fawkes National Park. Two species occur in forested areas of the Blue Mountains, NSW.

*Caloca* is the most species-rich genus of the family Calocidae, and many of these species appear to be short-range endemics. This apparent endemism may be a product of sampling effort. However, the present study follows a three-year investigation into the taxonomy of Calocidae, throughout which extensive light trapping and stream sampling around many of the localities of these species were undertaken. Over this period, very few specimens were collected, suggesting that *Caloca* may be rare in the locations in which they occur and have short geographic ranges, they may have very specific emergence and rapid adult life stages, or they may not readily come to light traps. *Caloca* are distributed along the east coast of Australia from Tasmania to northern NSW. The early work of Mosely and Kimmins (1953) and Neboiss (1977) recorded the fauna of NSW, specifically around the Sydney and northern NSW regions,

and the fauna of Tasmania. Many of the new species described here fill the void between these two regions. Six of the new species occur in Victoria, and one of these is also recorded from Mt Gingera in the Australian Capital Territory (ACT). One species occurs in southern NSW, close to the Victorian border near Mt Kosciuszko. Of the previously described species, three are endemic to Tasmania, one is known from Ebor and south of Sydney at Stanwell Park, NSW, one is recorded only from Wentworth Falls, NSW, and one is known to occur across two states, Victoria and NSW.

*Caloca* was originally erected by Mosely and Kimmins (1953) in the family Odontoceridae Wallengren. In the same publication a description of *Tismana saneva* Mosely, sole member of the monotypic genus *Tismana*, was also included and placed in the family Sericostomatidae Stephens. *Tismana* was later to be synonymised with the genus *Caloca* by Neboiss (1977). It was not until Ross (1967) that the family name Calocidae Ross was erected. Ross (1967) did not provide a family diagnosis. Nor did he state which genera were to be included in this family. His only comments were that the leg spur count was 2, 2, 4, and that the family was little changed from what he called, 'ancestor 15'. It has since been assumed that *Caloca*, likely to be the derivation of Calocidae, belongs within this family (Neboiss, 1977; Johanson and Malm, 2010).

Since Mosely and Kimmins (1953), only a single species has been added to the genus. The current paper adds seven new species to the genus *Caloca*, raising the number of known species to a neat baker's dozen. Here I present descriptions and illustrations of the adult males of these new species, and provide a key for the identification of all adult male *Caloca* species. Given that many *Caloca* appear to have relatively small geographic ranges, and that so many new species are being described, it is likely that there are more species of *Caloca* awaiting collection and description.

### Materials and methods

Adult specimens, housed in Museum Victoria, Melbourne, were examined under a Nikon SMZ1500 microscope. Genitalia were cleared in KOH prior to illustrating. Photographs were taken using a Nikon DS-Fi1 camera mounted on a Nikon SMZ1500 microscope. Keys used to identify specimens were those of Neboiss (1986, 1992).

Terminology follows Holzenthal *et al.* (2007). However, in Calocidae the hind-wing venation is highly modified from that of the generalised illustration provided by Holzenthal *et al.* (2007). Here I have applied the terminology of Holzenthal *et al.* (2007), but have interpreted the veins of the hindwing to suit a modification from the generalised pattern (figs 5 and 10). Characters of the genitalia and the tenth abdominal segment (segment X) are indicated in figs 2 and 3.

### Family Calocidae

Genus *Caloca* Mosely, 1953

*Type species.* *Caloca straminea* Mosely, by original designation, from NSW.

### Generic diagnosis

*Caloca* differ from most other Calocidae in that the males possess a receptacle on the dorsum of the head which houses a pair of membranous filaments; they also possess at least some strong spine-like setae on the genitalia, and lack a distinct discoidal cell in the hindwing, except in *C. disparala* sp. nov., where a small, indistinct discoidal cell is sometimes present in one or both of the hindwings. *Pliocaloca* may be confused with *Caloca* because it also possesses a receptacle on the head. However, members of this genus lack the strong spines on the genitalia, and possess a distinct discoidal cell in the hindwing.

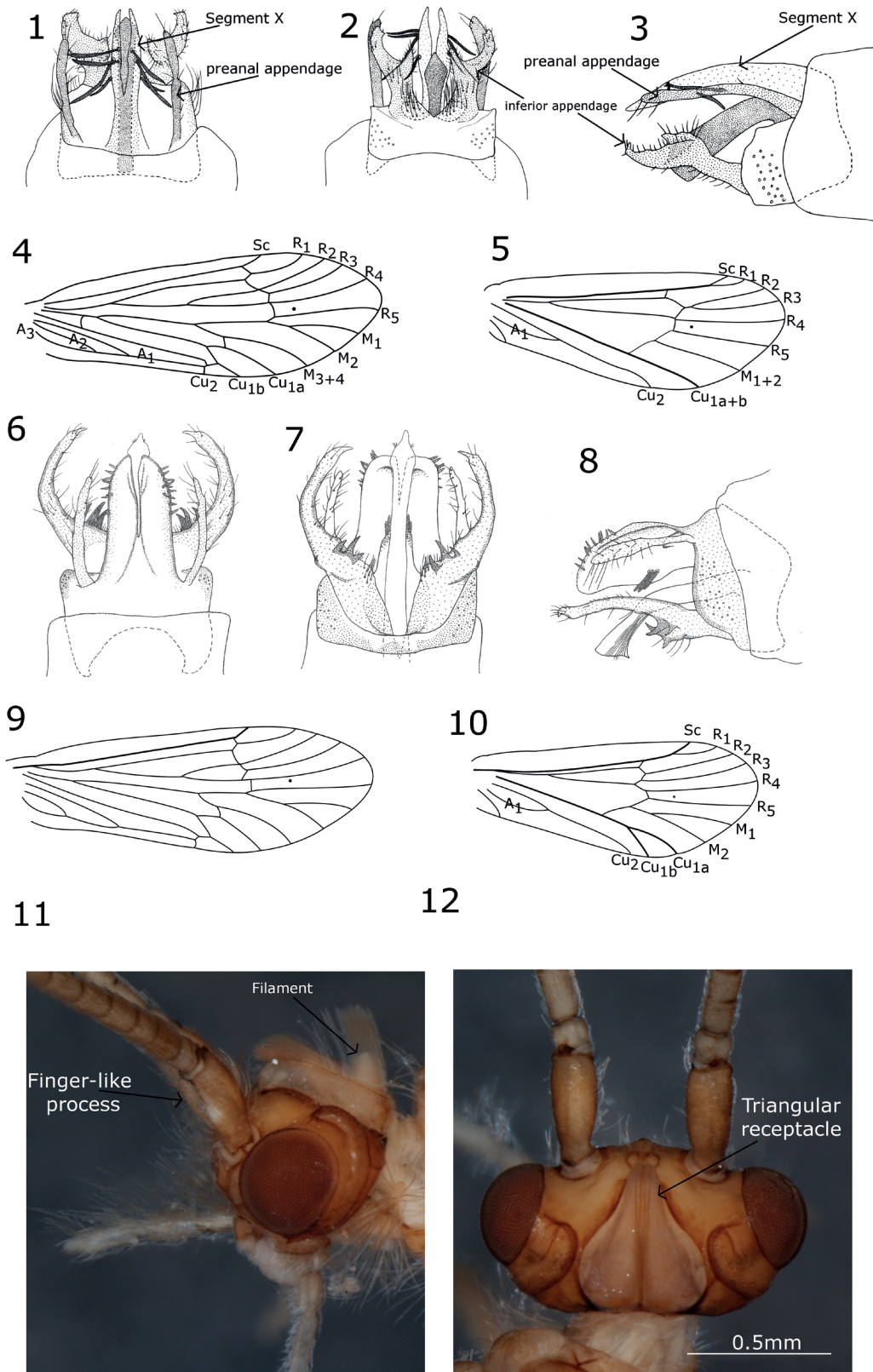
### Revised generic description

*Adult.* Ocelli absent. Male. Head: dorsum with triangular receptacle containing dense, pale setae and a pair of membranous filaments. Antennal scape: with or without projection arising from anterior margin. Maxillary palpi: 5-segmented. Labial palpi: 3-segmented. Forewing: discoidal cell present; forks 1, 2, 3 and 5 present, fork 3 petiolate; nygma between veins  $R_4$  and  $R_5$  and within thyridial cell. Hindwing: discoidal cell present or absent; vein  $R_1$  either fused or parallel to Sc until just beyond midpoint of wing where they fuse for a short distance before separating to approach the wing margin. Legs: spurs 2, 2, 4.

### Key to males of *Caloca*

- 1 Antennal scape without a finger-like process on the anterior surface ..... 2
- Antennal scape with a finger-like process on the anterior surface (see figs 101-b and 105-b in Mosely and Kimmins, 1953) ..... 3
- 2 (1) Segment X longer than wide, gently tapering towards posterior, with anterolaterally directed spines on each lateral margin (see fig. 41-b in Mosely and Kimmins, 1953) ..... *C. saneva*
- Segment X about as wide as long, with two pairs of stout spines (see fig. 463 in Neboiss, 1977) ..... *C. ascita*
- 3 (1) Segment X lateral margins produced distally to form a triangular process at about halfway along length of lateral margin, a single pair of spines dorsally on each process (see fig. 102-b in Mosely and Kimmins, 1953) ..... *C. straminea*
- Segment X lateral margins not produced distally, with more than one spine on either the dorsal or lateral surfaces ..... 4
- 4 (3) Inferior appendages with large spine-like, pointed projections arising from inner surface subapically (figs 19, 20, 23, 24) ..... 5

- Inferior appendages either without large, strong spines or with spines not subapical on segment ..... **6**
- 5 (4)** Segment X very narrow in apical two-thirds, with dark spines restricted to basal portion (figs 23–25) ..... *C. gippslanda* sp. nov.
- Segment X broad, blade-like, with dark spines dorsally along lateral margins (figs 18, 19) ..... *C. sica* sp. nov.
- 6 (4)** Inferior appendages each with at least one large spine-like projection medially (figs 7, 14) ..... **7**
- Inferior appendages without any large spine-like projections medially (figs 19, 24, 29) ..... **8**
- 7 (6)** Inferior appendages each with one large medial spine-like projection; segment X lateral margins slightly divergent towards posterior until apical third, then angled in, with about six long setae dorsolaterally along length of segment, and a pair of strong setae on dorsal face at about mid length (figs 13–15) ..... *C. lata* sp. nov.
- Inferior appendages each with one ventral and three large medial spine-like projections; segment X lateral margins slightly converging towards posterior then rounded in apical third, without spines dorsally but with a row of lateral spines in distal half (figs 6–8) ..... *C. kiandra* sp. nov.
- 8 (6)** Segment X elongate and tapered, with medial incision greater than half the length of the segment (figs 1, 33) ..... **9**
- Segment X broad, with medial incision less than half the length of the segment (fig. 28) ..... **12**
- 9 (8)** Segment X with spines restricted to apical one-third (figs 33, 34) ..... **0**
- Segment X with at least some spines around half the length of the segment (figs 1, 2, 28) ..... **11**
- 10 (9)** Segment X with one large, stout ventral spine and two slender lateral spines; inferior appendages broad in ventral view (figs 33, 34) ..... *C. disparala* sp. nov.
- Segment X with three dorsal spines and one ventral spine; inferior appendages, in ventral view, much narrower in apical half (see fig. 105-d and e in Mosely and Kimmins, 1953) ..... *C. eba*
- 11 (9)** Segment X with one very long anterolaterally directed spine on lateral margin at about halfway along length, one very long laterally directed spine on lateral margin at about two-thirds length, one long spine on ventral margin, directed laterally from the segment but bent halfway to face posteriorly, and a small spine on the dorsal margin subapically; inferior appendages without medial projections (see fig. 106-c and d in Mosely and Kimmins, 1953) ..... *C. fallia*
- Segment X with three or four spines laterally about halfway along length of segment; apices of inferior appendages broadly incised, inner process stout, pointed and shorter than outer process (figs 1–3) ..... *C. ungula* sp. nov.
- 12 (8)** Segment X with row of dark spines on lateral margins, a pair of dark spines on dorsal surface at about two-thirds length of the segment, and no spines apically; inferior appendages without medial processes (figs 28, 29) ..... *C. ada* sp. nov.
- Segment X with dark spines apically; inferior appendages each with medial process (see fig. 104-c and e in Mosely and Kimmins, 1953) ..... *C. tertia*
- Caloca ungula* sp. nov.
- urn:lsid:zoobank.org:act:9B04B374-EE5D-442D-BE1C-7F57FD7C7CFE
- Figures 1–5
- Holotype male*: Vic.: Mt Feathertop, 1300 m, 12 Feb 1984, G. Theischinger. **T-21490**.
- Paratypes*: ACT: Mt Gingera, 11 Jan 1967, E.F. Riek. **T-21491**, 1 male. NSW: Perisher Creek, 1500 m, 5 Jan 1984, G. Theischinger. **T-21492**, 2 males (1 illustrated).
- Diagnosis*. This species can be separated from other species of *Caloca* by the 3–4 spines arranged laterally around the midpoint of segment X, and the apices of the inferior appendages being broadly incised.
- Description*. Adult male. Length of anterior wing: 5–5.7 mm ( $n = 4$ ). Head: postocular warts long, relatively wide; anterior warts slightly raised, semicircular, abutting to form a circle; a pair of large warts on frons anterior and medial to antennae. Antennae: as long as anterior wing; scape approximately as long as depth of head capsule, with a process arising from the basal half and extending to the distal margin. Maxillary palpi: covered in setae, dorsal surface of first three segments with long setae; segments 4 and 5 about three-quarters length of other segments. Forewing (fig. 4): thyridial cell present; fork 3 petiolate; cross-vein m-cu between MP and  $Cu_{1a}$  distal to where MA and MP separate and where  $Cu_{1a}$  separates from  $Cu_{1b}$ ;  $Cu_2$  joins  $Cu_{1b}$  via cross-vein;  $A_1$  joins  $Cu_2$  at arculus. Hindwing (fig. 5): vein  $R_1$  parallel to Sc until just beyond midpoint of wing where they fuse for a short distance before separating to approach the wing margin; fork 1 on short pedestal; fork 3 absent; veins  $M_1$  and  $M_2$  fused; basal section of vein M absent; vein Mp absent;  $Cu_{1a}$  and  $Cu_{1b}$  fused;  $Cu_2$  absent. Genitalia (figs 1–3): segment X narrow, incised apically to about half length of segment, each apical projection with two or three long spines dorsally and one long spine ventrally at about the midpoint of segment; preanal appendages almost as long as segment X; inferior appendages, apices broadly incised with inner process stout, pointed and shorter than outer process; phallus in ventral view diamond-shaped apically.
- Female and immature stages unknown.
- Etymology*. From the Latin *ungula* meaning ‘claw’ and pertaining to the claw-like inferior appendage.



Figures 1–12. *Caloca unguia*, male (1–5): genitalia, dorsal (1), ventral (2), lateral (3); forewing (4); hindwing (5). *C. kiandra*, male (6–12): genitalia, dorsal (6), ventral (7), lateral (8); forewing (9); hindwing (10); head, lateral (11), dorsal (12).



***Caloca kiandra* sp. nov.**

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Figures 6–10

*Holotype male.* NSW: Diggers Ck, Mt Kosciusko, 9 Dec 1974, E.F. Riek. **TRI-21493**, 1 male.

*Paratypes.* Collected with holotype: **T-21494**, 1 male. **T-21495**, 1 male.

*Other material examined.* NSW: Alpine Ck, Kiandra, 9 Dec 1964, E.F. Riek. **TRI-26656**, 27 males. **TRI-26417**, 6 males. **TRI-26420**, 1 male. NSW: Alpine Ck, Kiandra, 19 Dec 1962, **TRI-26151**, 5 males (1 illustrated).

*Diagnosis.* This species can be separated from other species of *Caloca* by the presence of three large medial spines and one large ventral spine arising medially from each inferior appendage at about mid length.

*Description.* Male. Length of anterior wing: 5.5–6.2 mm ( $n = 42$ ). Head: anterior setal warts, small, separated; a pair of large warts on frons anterior and medial to antennae; frons with apical margin projected forward slightly; antennae about as long as anterior wing length; scape about as long as depth of head capsule, with setose projection arising from basal half and extending to distal margin. Maxillary palpi with setae on dorsal surface longer than ventral. Pronotum: with one large pair of setose warts. Mesoscutellum: with darker pigmentation in anterolateral corners. Forewing (fig. 9): covered in brown setae; fork 3 petiolate; cross-vein m-cu between MP and  $Cu_{1a}$ , placed distally to where MA and MP separate and where  $Cu_{1a}$  separates from  $Cu_{1b}$ ;  $Cu_2$  joins  $Cu_{1b}$  via cross-vein;  $A_1$  meets  $Cu_2$  at arculus. Hindwing (fig. 10): veins R, Rs and M very faint; fork 1 and 2 sessile; fork 3 on pedestal; fork 5 present; veins  $M_{3+4}$  and  $Cu_2$  absent; cross-vein between  $Cu_1$  and  $A_1$  near base of wing; nygma between veins  $R_4$  and  $R_5$ . Genitalia (figs 6–8): segment X broad, narrowly and deeply incised apically, with row of dark spines along lateral margins in distal half of apices, ventral surface broad, concave with about three dark spines projecting posteriorly at about mid length of segment in medial quarter; preanal appendages long, slender, about three-quarters length of segment X, gently curved inwards; inferior appendages curved inwards, apices pointed, with three large medial spines and one large ventral spine arising at about the midpoint of segment.

Female and immature stages unknown.

*Etymology.* Named after the type locality.

***Caloca lata* sp. nov.**

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*Holotype male.* Vic.: Ovens R at Porepunkah, 26 Jan 1960, A. Neboiss. **T-21496**.

*Paratypes.* Collected with holotype: **T-21497**, 1 male. **T-21498**, 1 male.

*Other material examined.* Vic.: Ovens R at Porepunkah, 26 Jan 1960, A. Neboiss. **TRI-26413**, 1 male. **TRI-26415**, 1 male. **TRI-26414**, 2 males. **TRI-6470**, 1 male (illustrated). Vic.: Buffalo R,

Abbeyards, 27 Jan 1960, A. Neboiss. **TRI-26412**, 2 males. Vic.: Lake Mountain, 17 Jan 1961, A. Neboiss. **TRI-26411**, 1 male. **TRI-26416**, 3 males.

Figures 13–17

*Diagnosis.* This species can be separated from other species of *Caloca* by the presence of a large medial spine on the inferior appendage.

*Description.* Adult male. Length of anterior wing: 5.3–6.2 mm ( $n = 14$ ). Head: postocular setal warts long, narrow; row of setae above eye; strong, pale and darker setae posterior to eye; a pair of large warts on frons anterior and medial to antennae. Maxillary palpi, setose, setae on dorsum relatively long. Antennae: shorter than anterior wing length; antennal scape relatively long, with slender projection arising anteriorly at about mid length, extending almost to anterior margin of scape. Forewing (fig. 16): discoidal and thyridial cells present; cross-vein between Sc and  $R_1$ ; vein  $A_1$  joins  $Cu_2$  at arculus. Hindwing (fig. 17): vein  $R_1$  parallel to Sc until just beyond midpoint of wing where they fuse for a short distance before separating to approach the wing margin; forks 1 and 2 sessile; fork 5 present; veins  $Cu_2$  and MP absent; basal half of vein MA weak, giving the appearance of a large vein-free area in mid basal half of wing. Genitalia (figs 13–15): segment X broad, lateral margins slightly divergent until apical third where they converge at approximately a 45° angle, apical third incised medially, pair of lobes basally on lateral margin, dorsal sublateral margins with a row of about seven spines projecting distally, extending from lobe to apical quarter, and one spine situated more medially at about the midpoint of segment, directed posteriorly; preanal appendages slender, extending almost length of segment X, basal third weakly curved outwards; inferior appendages with two broad, spine-like projections, lateral projection weakly curved inward, abruptly tapering to a point, darkly sclerotised apically, and medial projection shorter, blade-like, angled medially (one specimen possesses a third projection between these two that is about half the length of the medial projection).

Female and immature stages unknown.

*Etymology.* From the Latin *lata* meaning ‘wide’ and pertaining to the broad segment X.

***Caloca sica* sp. nov.**

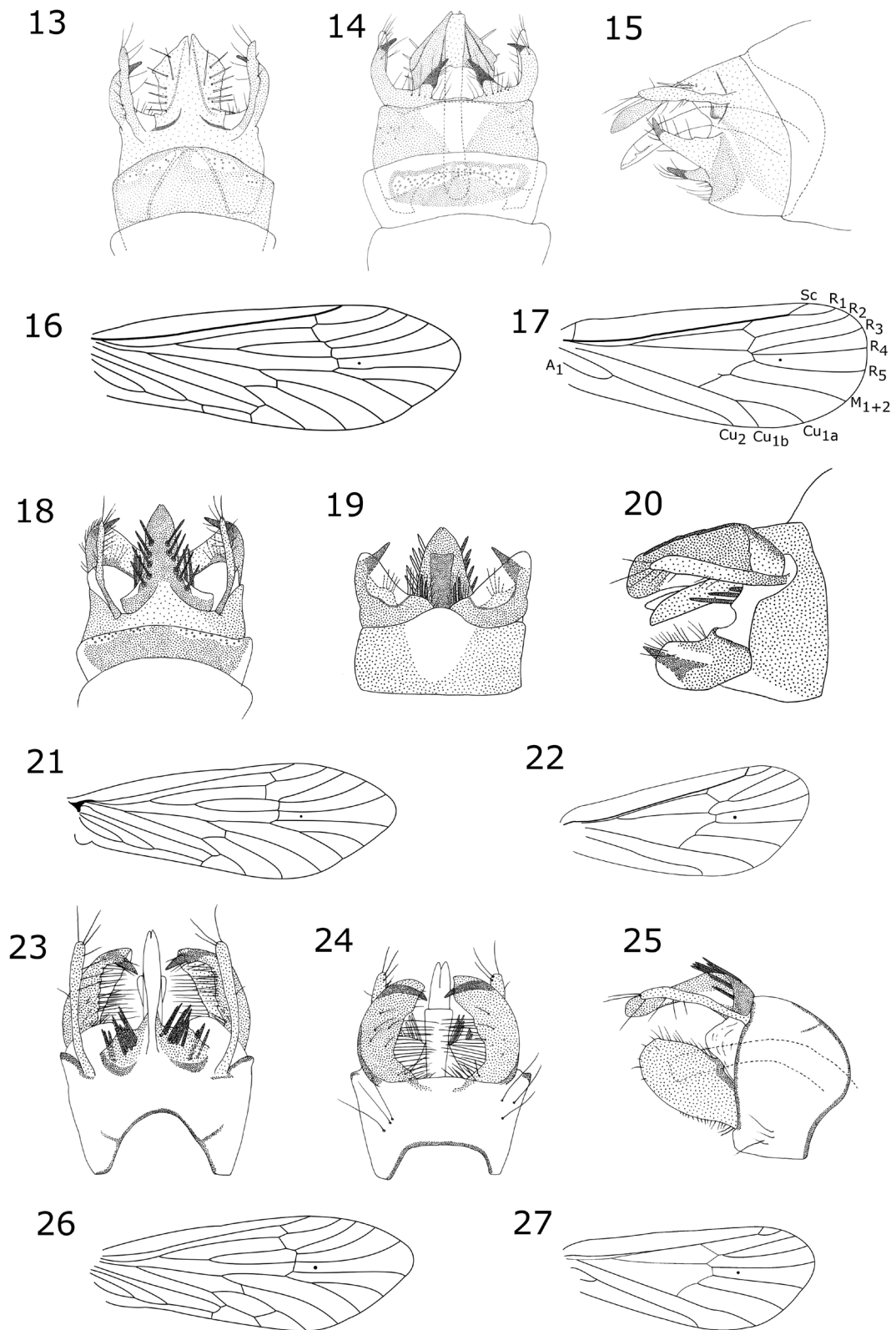
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Figures 18–22

*Holotype male.* Vic.: Thomson R, 7 km NNW Walhalla (Narrows Gauging Stn), 4 Mar 1980, NMV Survey Dept TRS Site T16. **T-21499**.

*Paratypes.* Vic.: Britannia Ck, 6 km S of Warburton, 27 Feb 1976, Neboiss. **T-21500**, 1 male. **T-21501**, 1 male (illustrated).

*Diagnosis.* This species can be separated from other species of *Caloca* by the transparent ventral half of the inferior appendages, which gives them a concave appearance in ventral view.



Figures 13–27. *Caloca lata*, male (13–17): genitalia, dorsal (13), ventral (14), lateral (15); forewing (16); hindwing (17). *C. sica*, male (18–22): genitalia, dorsal (18), ventral (19), lateral (20); forewing (21); hindwing (22). *C. gippslanda*, male (23–27): genitalia, dorsal (23), ventral (24), lateral (25); forewing (26); hindwing (27).

**Description.** Adult male. Length of anterior wing: 5.5–5.6 mm ( $n = 3$ ). Head: postocular setal warts long, narrow; a pair of large warts on frons anterior and medial to antennae. Maxillary palpi, with long setae dorsally. Antennae: shorter than anterior wing length; antennal scape about as long as first three antennal segments, with slender projection arising anteriorly at about mid length, extending to one-seventh scape length from anterior margin of scape. Pronotum: with one small pair of medial setal warts and one larger pair of distal setal warts. Forewing (fig. 21): discoidal and thyridial cells present; cross-vein between Sc and  $R_1$ ; fork 1 sessile; fork 3 petiolate; vein  $Cu_2$  weak; vein  $A_1$  joins  $Cu_2$  at arculus. Hindwing (fig. 22): vein  $R_1$  and Sc fused along length until separating just before wing margin; fork 1 on small pedestal; fork 2 sessile. Abdomen: segment 9 ventrally with distinct light patch, broadly along midline for length of segment. Genitalia (figs 18–20): segment X in dorsal view broad basally, posterior three-quarters somewhat elongate and triangular, tapering distally; dorsolateral margins with row of six strong setae directed posterodistally; segment X ventrally with three pairs of strong setae in line with phallus, directed posteriorly; preanal appendages long, slender, extending almost length of segment X; inferior appendages somewhat short; in ventral view widely separated, medially with slightly projecting setose lobe, posterior half, from setose lobe to distal margin, transparent, giving medial margin of appendages a concave appearance; inner surface concave, with large posteromedially directed spine extending beyond posterior margin of each inferior appendage.

Female and immature stages unknown.

**Etymology.** From the Latin *sica* meaning ‘dagger’ and pertaining to the dagger-like segment X.

#### ***Caloca gippslanda* sp. nov.**

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Figures 23–27

**Holotype male.** Vic.: Goonmark Rocks scenic reserve, E. Gippsland, 16 Jan 1991, G. Theischinger. **T-21509.**

**Paratype.** Collected with holotype: **T-21510**, 1 male (illustrated).

**Diagnosis.** This species can be separated from other species of *Caloca* by the very narrow posterior half of segment X, which bears no spine-like setae, and the broad anterior half, which bears several dark spine-like setae on the dorsum.

**Description.** Adult male. Length of anterior wing: 6.5–7 mm ( $n = 2$ ). Head: postocular warts long, narrow, slightly broader dorsally; anterior setal warts rounded, raised, separated anteriorly, abutting posteriorly; a small, distinct, white puncture medially and anterior to anterior setal warts; a pair of large warts on frons anterior and medial to antennae. Antennae: slightly shorter than anterior wing length; scape about as long as pedicel and first two antennal segments combined, with relatively small projection on anterior surface arising from mid length and terminating just before distal margin of scape. Maxillary palpi: with long setae on dorsal

surface of first three segments, last two segments with short setae. Pronotum: with one pair of large, distal setal warts and one pair of small medial setal warts. Forewing (fig. 26): forks 1 and 2 sessile, fork 3 petiolate, fork 4 absent; cross-veins s and  $r_4-r_5$  forming relatively straight line; cross-vein r-m angled medially from  $r_4$  to  $r_5$  at about 45°; cross-vein m absent, medial cell open; cross-vein m-cu distal from separation of  $Cu_{1a}$  and  $Cu_{1b}$ ; cross-vein present between  $Cu_{1a}$  and  $Cu_{1b}$ ;  $Cu_2$  terminates at cross-vein between  $Cu_{1b}$  and  $A_1$ ; vein  $A_1$  terminates at wing margin slightly basad of  $Cu_2$  termination point; small cross-vein present between  $A_1$  and wing margin just distal to confluence of  $A_1$  with  $A_2$ ; nygma present in fork 2, absent in thyridial cell. Hindwing (fig. 27): Sc and  $R_1$  fused almost along entire length until separating just before wing margin; fork 1 present on very short pedestal; fork 2 sessile, with nygma;  $M_1$  and  $M_3$  fused, basal section of M absent;  $Cu_{1a}$  and  $Cu_{1b}$  fused;  $Cu_2$  absent;  $A_2$  joins  $A_1$  close to base of wing. Abdomen: segment 9 ventrally with distinct light patch, broad posteriorly and converging anteriorly before reaching anterior margin. Genitalia (figs 23–26): segment X anterior half broad, with several (8–10) strong, dark, posteriorly projecting spines on posterior half of dorsal surface and 3–4 strong, dark, posteriorly projecting spines on anterior half of ventral surface; posterior half slender, with two ridges slightly diverging posteriorly; preanal appendages slender, about as long as segment X; inferior appendages in lateral view broad, ventral surface rounded, dorsal surface somewhat straight; in ventral view apices directed medially, inner surface concave with large tapered spine subapically, ventral and dorsal margins with strong medially directed setae. Phallus: simple, slightly sclerotised on ventral and lateral surfaces, phallotremal sclerite present laterally at about three-quarters length.

Female and immature stages unknown.

**Etymology.** Named after the region of the type locality.

#### ***Caloca ada* sp. nov.**

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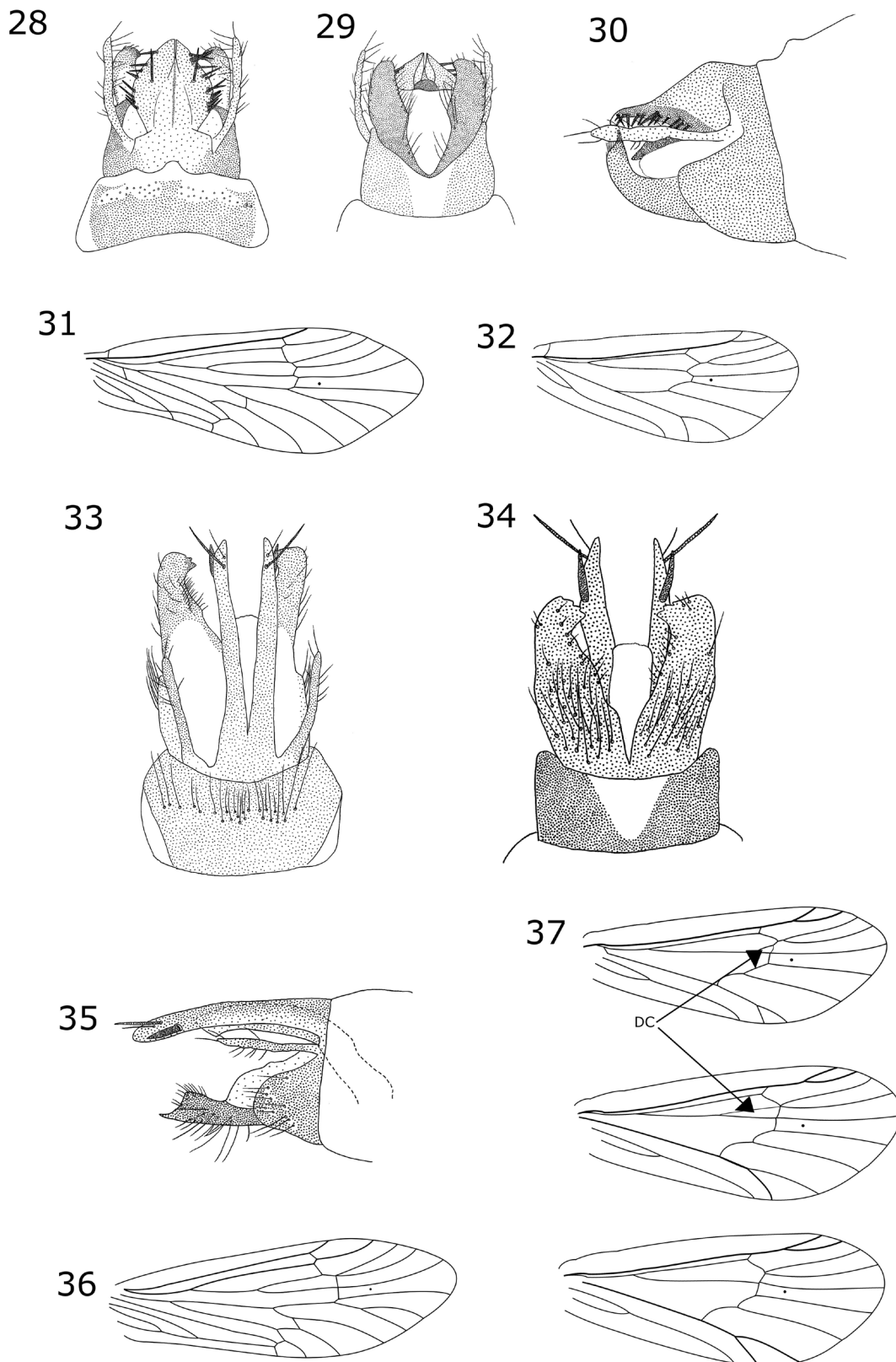
Figures 28–32

**Holotype male.** Vic.: Ada R on Ada R Rd, S4, La Trobe C Survey 37°50.8'S 145°52'E, 19 Jan 1979. **T-21502.**

**Paratype.** Vic.: Dandenong Mts, Sassafras Ck, 18 Nov 1972, P. Zwick. **T-21503**, 1 male (illustrated).

**Diagnosis.** This species can be separated from other species of *Caloca* by the shape of segment X, which in dorsal view is broad at the anterior margin, expanding out laterally towards the posterior until the midpoint, where the lateral margins are rounded and gradually converge to a posterior point.

**Description.** Adult male. Length of anterior wing: 6.5–6.8 mm ( $n = 2$ ). Head: postocular setal warts long, narrow; anterior setal warts abutting; a pair of large warts on frons anterior and medial to antennae. Maxillary palpi (broken in both specimens), first three segments with dense, long setae dorsally. Antennae: broken in both specimens; antennal scape



Figures 28–39. *Caloca ada*, male (28–32): genitalia, dorsal (28), ventral (29), lateral (30); forewing (31); hindwing (32). *C. disparala*, male (33–39): genitalia, dorsal (33), ventral (34), lateral (35); forewing (36); variations of the hindwing (37–39).



about as long as first three antennal segments, with slender projection arising anteriorly at about mid length, extending to anterior margin of scape. Pronotum: with one small pair of medial setal warts and one larger pair of distal setal warts. Forewing (fig. 31): discoidal and thyridial cells present; cross-vein between Sc and R<sub>1</sub>; fork 1 sessile; fork 3 petiolate; vein A<sub>1</sub> joins Cu<sub>2</sub> at arculus; cross-vein between A and wing margin present at confluence of A<sub>1</sub> and A<sub>2+3</sub>. Hindwing (fig. 32): vein R<sub>1</sub> parallel to Sc until just beyond midpoint of wing where they fuse for a short distance before separating to approach the wing margin; fork 1 on small pedestal; fork 2 sessile; cross-vein present between M and Cu<sub>1</sub>. Abdomen: segment 9 ventrally with distinct light patch, broadly along midline for length of segment. Genitalia (figs 28–30): segment X in dorsal view basally broad, rapidly expanding laterally towards posterior until the midpoint, then gradually tapering to point, with a distinct ridge along midline and lesser ridges to either side, lateral margins rounded with row of strong posterolaterally and laterally directed spines, with a pair of posteriorly directed spines on dorsum at about the midpoint, posterior one-sixth narrowly incised; preanal appendages long, slender, extending just beyond length of segment X; inferior appendages about as long as segment X; in lateral view apical quarter sharply upturned, terminating in a dorsally directed point.

Female and immature stages unknown.

*Etymology.* Named after the type locality.

#### *Caloca disparala* sp. nov.

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Figures 33–39

*Holotype male.* Vic.: Cumberland Falls, Marysville, 1067 m, 37°30'S 145°50'E, 18 Jan 1952, A. Neboiss. **T-21504**.

*Paratypes.* Vic.: Cumberland Falls, Marysville, 1067 m, 37°30'S 145°50'E, 8 Jan 1952, A. Neboiss. **T-21505**, 1 male (illustrated). Vic.: Mt Baw Baw, 1555 m, 13 Jan 1966, B. Cantrell. **T-21506**, 1 male. **T-21507**, 1 male. **T-21508**, 1 male.

*Diagnosis.* This species can be separated from other species of *Caloca* by the presence of a very broad, spine-like setule subapically on the ventral surfaces of each process of segment X.

*Description.* Adult male. Length of anterior wing: 5.8–7.2 mm ( $n = 5$ ). Head: postocular setal warts long, narrow; anterior setal warts, raised and abutting; a pair of large warts on frons, anterior and medial to antennae. Maxillary palpi with medium length setae on dorsal surface. Antennae: about as long as forewing length; antennal scape about as long as first three antennal segments, with slender projection arising anteriorly in basal third, extending to anterior margin of scape, with dense tuft of setae between scape and projection. Pronotum: with one small pair of medial setal warts and one larger pair of distal setal warts. Forewing (fig. 36): discoidal and thyridial cells present; discoidal cell long; cross-vein between Sc and R<sub>1</sub>; fork 1 sessile; fork 3 petiolate; vein A<sub>1</sub> joins Cu<sub>2</sub> at arculus. Hindwing (figs 37–39): discoidal cell, either small (fig. 37) or long (fig. 38), present in one or both of the hindwings, or absent

(fig. 39); vein R<sub>1</sub> parallel to Sc until R<sub>1</sub>-R<sub>2</sub> cross-vein where they fuse for a short distance before separating to approach the wing margin; fork 1 either on small pedestal or sessile; fork 2 sessile; cross-vein present between M and Cu<sub>1</sub>; base of M absent. Abdomen: segment 9 ventrally with distinct, triangular light patch; in lateral view rounded posteriorly and extended to reach around half length of segment X. Genitalia (figs 33–35): segment X in dorsal view long and slender, deeply incised almost to base of segment; a large, broad spine-like seta subapically on lateral surface; a long, pale slender seta subapically on dorsal surface; a darker long, slender seta anterior to pale seta on dorsal surface; preanal appendages long, slender, extending to just beyond mid length of segment X; inferior appendages terminating just before length of segment X; in lateral view ventral margin relatively straight, dorsal margin with distinct, rounded rise above mid two-thirds, apically pointed; in ventral view broad, slightly converging towards posterior, apex rounded, inner apical margin with two small pointed teeth.

Female and immature stages unknown.

*Etymology.* From the Latin *dispar* meaning 'imperfectly matched' and *ala* meaning 'wing' and pertaining to the variation of the hindwings between and sometimes within specimens.

#### Remarks

In the original generic description, given by Mosely and Kimmins (1953), the adult males are said to be lacking a discoidal cell in the hindwing. However, a discoidal cell is, variably, present in *C. disparala*. The presence of a discoidal cell was the main diagnostic feature used to distinguish the genus *Pliocaloca* Neboiss, from other genera of Calocidae. This character can no longer be said to be a diagnostic feature for *Pliocaloca*. However, many of the larval characters of *Pliocaloca*, as described in Shackleton (2010), are diagnostic for this genus.

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