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Revision of the Australian genus *Stenopsychodes* Ulmer (Stenopsychidae: Trichoptera)

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Abstract

Wells A. and Cartwright D. 2025. Revision of the Australian genus *Stenopsychodes* Ulmer (Stenopsychidae: Trichoptera). *Memoirs of Museum Victoria* 84: 89–126.

We review the endemic Australian genus *Stenopsychodes*, revise the nine established species, and describe 11 new species: *S. boreas*, *S. crystalinus*, *S. disjunctus*, *S. dispar*, *S. elongatus*, *S. pictus*, *S. quasiredactus*, *S. redactus*, *S. shackletoni*, *S. unguibus*, *S. tropicus*. *Stenopsychodes venustus* Kimmins, 1953 in Mosely and Kimmins (1953), previously synonymised with *S. melanochrysus* Tillyard, 1922 by Schmid (1969) is reinstated as valid, thus raising to 21 the number of recognised species. Images are included of three larvae identified as belonging to the genus *Stenopsychodes*. From the scant information on the eyeless immatures and their habitat, and the morphology and habits of adults, we speculate about the biology of some members of the genus. The genus is restricted to eastern Australia from NE Queensland (latitude about 12.7°S) to NW Tasmania (latitude about 41°S).

Keywords

Stenopsyche, *Pseudostenopsyche*, Stenopsychinae, new species, larval habitat

Introduction

Adults of the endemic Australian genus *Stenopsychodes* Ulmer, 1916 (Stenopsychidae) are some of the most easily recognised Australian Trichoptera, often bearing striking patterns in golden and black or dark brown. Most are quite large sized, with the length of each forewing up to 17mm, and the mouthparts of many species are well produced. The genus is restricted to eastern Australia where it has been collected along the 3500 km long Great Dividing Range from Iron Range (12.7°S) in far North Queensland (Cape York) to the Grampians in Western Victoria, with one species found in north-west Tasmania (41°S). Currently nine valid species are recognised based on features of wings and genitalia. While identification to genus rarely presents problems, species determination is often confounded by variations in wing markings and apparent close similarities in male genitalia. We review the genus, revise the established species and describe 11 new species. *Stenopsychodes venusta* Kimmins, 1953 in Mosely and Kimmins (1953), previously synonymised with *S. melanochrysa* Tillyard, 1922 by Schmid (1969) is reinstated as valid, thus raising to 21 the number of recognised species.

Stenopsychodes, described originally in the family Polycentropodidae, is one of the three genera comprising the family Stenopsychidae. The genus was assigned by Lestage (1925) to its own subfamily Stenopsychodinae, distinct from

the Stenopsychinae, including the genera *Stenopsyche* McLachlan, 1866, and *Pseudostenopsyche* Döhler, 1915. *Stenopsyche* is diverse in the east Palaearctic/Oriental regions (around 100 species) and one species is described from the African tropics (Morse 2024). The three known species of *Pseudostenopsyche* are Neotropical, described from Chile (Morse 2024). Mosely and Kimmins (1953) revised *Stenopsychodes* in Polycentropodidae, but subsequently, Ross (1967) moved the genus into the Stenopsychidae, in which family it was treated by Schmid (1969).

A preliminary analysis of CO1 data from the BOLD database clusters the three stenopsychid genera together, with *Stenopsychodes* and *Pseudostenopsyche* in a clade with *Stenopsyche* the sister-group; Stenopsychidae clusters as the sister-group to Philopotamidae. These two families were grouped as the Philopotamoidea by Kjer et al. (2001) in analyses that include only *Stenopsyche*, and more recently by Thomas et al. (2020) with data on one species each of *Stenopsyche* and *Stenopsychodes*. The Philopotamoidea were determined as sister-group to the Hydropsychoidea by the former authors, and by the latter authors to the less inclusive Psychomyoidea, with a separate Hydropsychoidea sister-group, to a clade including the two other Annulipalpia groups.

Most of the adult specimens of *Stenopsychodes* available for study were collected at light and most of the available museum specimens are preserved in ethanol; many have

faded. Among pinned specimens and others collected recently into ethanol are species in which both male and female have colourfully patterned wings, perhaps indicating mimicry or disruptive colouration, features suggesting that at least some of these species could be day-flying — indeed, images of one species taken by day recently at a south-eastern Queensland stream support this thesis (Fig. 66). The unusually produced mouthparts of many species, forming a ‘rostrum’, suggest that they could feed on nectar. Such behaviour was observed in a Tasmanian plectrotarsid species that also has well-produced mouthparts (Wells personal observation). An internal structure seen in the rostrum of *Stenopsychodes crystalinus* sp. nov. could be an adaptation for sucking up nectar (Fig. 69).

Material and methods

Where accessible, actual type specimens have been examined; if not available, images were obtained from the relevant depositories. We examined the considerable collection of specimens in Museums Victoria (NMV), and further material in the collections of the Australian Museum, Sydney (AM); Queensland Museum, Brisbane (QM); and the Australian National Insect Collection, Canberra (ANIC).

Images only are provided for established species, and the few females illustrated. Images and line drawings of male genitalia are given for new species.

The images were taken on a Leitz stereomicroscope fitted with Leica Application Suite (version 4.2). Genitalia were macerated in 10% KOH and are stored in glycerol in specimen vials. Genitalia preparations were given PT-numbers, MS-numbers or CT-numbers from notebooks of Arturs Neboiss, Michael Shackleton and David Cartwright, respectively, and lodged in NMV. Some specimens collected by J. Mynott and M. Shackleton bear M. Shackleton’s notebook numbers.

The image of the wings and part body of the type of *S. montanus* Tillyard, 1922 were provided by Dr Ben Price, The Natural History Museum, London (NHM); the slide of the genitalia could not be located. The image of the type of *S. melanochrysis*, a female, was provided by Dr Ben Parslow, South Australian Museum (SAMA); and the images of the type of *S. mjobergi* Ulmer, 1916 were supplied by Dr Tobias Malm, Swedish Museum of Natural History (NHRS). Types of *S. tillyardi* Banks, 1939 and *S. venustus* Kimmins, 1953 were accessed in ANIC.

The bodies of some species of *Stenopsychodes* are jet black. When necessary, genitalia preparations of these specimens were prepared for study by maceration in alcoholic potassium hydroxide followed by dehydration and storage in glycerol (see Wells and Cartwright 2021).

Terminology used by workers on *Stenopsychodes* species has been inconsistent. Here we follow Neboiss (1974) with the exception that we use the term ‘phallus’ rather than ‘aedeagus’ for the intromittent organ, and we have followed terms used by Schmid (1969) for the lateral processes on abdominal segment X of males ‘upper’, ‘intermediate’ and ‘lower’. For males of some species in which only one or two of these processes is apparent, we have attempted to interpret the homologies of those processes present.

Taxonomy

Stenopsychodes Ulmer

Stenopsychodes Ulmer, 1916: 5; –Mosely and Kimmins 1953: 363; –Schmid 1969: 197; –Neboiss 1974: 81, 1977: 53, 1986: 110–113. Type species: *Stenopsychodes mjobergi* Ulmer, 1916 by monotypy.

<http://urn:lsid:zoobank.org:act:716BE4D1-F45C-4FAF-AF5B-9AD8F86513FE>

Diagnosis. Adults of *Stenopsychodes* usually can be distinguished from other similarly large Australian Trichoptera by their often colourfully patterned wings and absence of ocelli; they share with Hydropsychidae, Ecnomidae, Psychomyiidae and Polycentropodidae the characteristic terminal segment of the maxillae elongate and flexible and share with Ecnomidae, Polycentropodidae, and Psychomyiidae the feature of paired setal warts on the mesoscutum; however, they are distinguished from all other families by having the setal warts on the mesoscutum separated by the tapered forward extension of the mesoscutellum. Forewing forks 1–5 are present, the length of forks and their foot stalks varying; hindwing forks 1–3 and 5 are present. They share with Polycentropodidae and some Ecnomidae the spur formula of 3:4:4.

A more expanded ‘diagnosis’ of adults of *Stenopsychodes* was given by Neboiss (1977) (more accurately a description): ‘...characterised by having a rather square head bearing one small anterior and 2 larger posterior warts; the compound eyes not occupying the entire side of the head (a pair of minute elevations indicate the possible location of the lateral ocelli); scutellum elongate-triangular, with anterior quarter produced and narrow and with rounded mesoscutal warts on either side; forewing with an oblique costal cross-vein at about the middle of the wing and forks 1–5 all present. Male genitalia are elongate, with long, slender superior appendages (= anal appendages); inferior appendages large, usually robust, single-segmented; tergite X usually divided to form a pair of slender lateral filaments [here designated intermediate processes], and in some species one or 2 other pairs of short processes [here designated lower and upper processes]; phallus stout. In the female the abdomen tapers to a narrow, dorsi-ventrally flattened, bilobed, apical segment (segment X), which bears a pair of minute cerci. In females of some species the posterior angle of tergite VIII extends into divergent, rounded, earlike or angular processes bearing dense marginal setae.’

The larvae of *Stenopsychodes* (Figs 170, 176) resemble those of Polycentropodidae, Dipseudopsidae, Ecnomidae and Psychomyiidae in having only the pronotum sclerotised. They most closely resemble Dipseudopsidae in having anal gills and the anal claws strong, simple and sharp, features that separate both taxa from known larvae of Polycentropodidae, and from Ecnomidae and Psychomyiidae. They can be distinguished from dipseudopsids by the shorter spinneret on the labium (Fig. 179).

Further details of larvae were provided by Dean et al. (1995, unpublished report): ‘[H]ead and prothorax sclerotised, rest of body membranous, eyes absent, abdominal segment X bearing stout gills and sharp anal prolegs with strong simple sharp anal claws. Head in dorsal view rounded, slightly

tapered toward anterior, anterior margin rounded; dorsal ecdysial sutures with short dorsal ecdysial line, anterior tentorial pits at about half length; labrum sclerotised, with short anterior margin setae; ventral head with short wide triangular anterior ventral apotome, postmental sclerite wide, rectangular, undivided. Forelegs with tibia and tarsus short and stout, brush of setae along median part, tibial process pronounced, bearing long stout seta.'

Remarks. The gender of the name *Stenopsychodes* has been interpreted variously. We accept it as masculine, and have changed the endings of species names accordingly. Evaluation of the limits of variability within species of *Stenopsychodes* has proved a challenge. For identification of some species their strikingly patterned wings are useful, especially for pinned specimens, but specimens stored in ethanol for any length of time are often faded such that little evidence of reticulations or other markings remains. The bodies of several species are very dark in colour, making assessment of genitalia exceptionally difficult, as is interpretation of homologies of the processes on tergite X. Several sets of species have almost identical male genitalia, yet distinctive wing markings — Schmid (1969) noted the remarkable resemblance in genitalia of *S. melanochrysus* and *S. aureonigra* Schmid, 1969, yet great difference in wing markings, and to these we add three new species with distinctive wing markings, but almost indistinguishable male genitalia: *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov. For some species, the form of the female genitalia appears to be diagnostic, but too few reliable associations have been made of males and females.

Based on adult morphology, two distinct groups can be recognised easily within the genus *Stenopsychodes* and, although we recognise that these may not be natural groups, they are convenient. Members of one group, we designate the 'montanus-group', are characterised by having the adult mouthparts 'normal', i.e. not produced to form a rostrum (Fig. 16). These species have all three pairs of processes present on abdominal segment X (e.g. Figs 19, 25, 28), some have colourful forewings (e.g. Figs 7, 16, 17) and all are SE Australian in distribution. The group includes *S. montanus*, *S. venustus*, *S. syrdenus*, *S. opsius*, *S. lineatus*, *S. hiemalis* and *S. disjunctus* sp. nov.

Members of the second and larger group, here designated the *melanochrysus*-group, have the mouthparts produced to form a prominent rostrum (Figs 48, 68, 69). All have colourful forewings (e.g. Figs 58, 67, 79), patterned golden and black or dark brown, some with irregular blotchy patterns and others with regular reticulate patterning (e.g. Figs 104, 147); some have only one pair of processes on abdominal segment X, others have three pairs. This group comprises *S. aureonigra*; *S. melanochrysus*; *S. crystalinus* sp. nov.; *S. pictus* sp. nov.; *S. dispar* sp. nov.; *S. boreas* sp. nov.; *S. shackletoni* sp. nov.; *S. redactus* sp. nov.; *S. quasiredactus* sp. nov.; *S. elongatus* sp. nov.; *S. unguibus* sp. nov.; *S. tropicus* sp. nov.; *S. mjobergi*; and *S. tillyardi*. With the exception of *S. aureonigra*, these species are NE Australia in distribution; *S. aureonigra* is common in the southeast.

Among the *melanochrysus*-group are two problematic sets of species: *S. crystalinus* sp. nov.; *S. pictus* sp. nov.; *S. dispar* sp. nov. and *S. boreas* sp. nov. have almost identical male genitalia, but each has distinctively patterned forewings; and *S. mjobergi* and *S. tillyardi* have identical wing patterns and head and body colour, but very slight and, for some, inconsistent differences in male genitalia.

A preliminary analysis of the limited COI data available on the Bold Website (accessed 01/02/2024) failed to resolve these problems (Cartwright unpublished). A comprehensive study of available molecular data on Australian Trichoptera is currently in progress (Shackleton et al. in prep.), so for the present, we include only a broad summary. Well-supported groupings isolate a specimen identified as *S. venustus* with two other unidentified specimens; *S. shackletoni* sp. nov. and *S. redactus* sp. nov. each separated by high bootstrap values; and *S. melanochrysus* and *S. aureonigra* together with, but well separated from, *S. pictus* sp. nov. The preliminary analysis derives a fourth set within which are two well-supported branches, both including specimens identifiable on some morphological features as *S. mjobergi* or *S. tillyardi*. For the present we recognise only the two species, *S. mjobergi* and *S. tillyardi*, although future more-detailed study is likely to recognise hybrids or separate species.

Larval features and habitat. Comparison larval features and reported habitats of *Stenopsychodes* and *Stenopsyche* reveal considerable differences between the two genera. *Stenopsychodes* larvae have the head in dorso-ventral view are rounded to subquadrate (Figs 173, 174, 178), and the labrum lacks hair brushes whereas *Stenopsyche* larvae have the head in narrowly rectangular and the labrum bears well-developed hair brushes on the anterior margin (Ismail et al. 1996; Xu et al. 2015; Nozaki 2016). The presence of hairbrushes suggests that the *Stenopsyche* larvae could be filter feeders, and such a niche seems unlikely for *Stenopsychodes* larvae. In contrast, larvae of *Stenopsychodes* could be predatory: two of the three *Stenopsychodes* larval forms available for this present study have forelegs bearing sharp claws, that could be suitable for grasping prey (Fig. 180), the third has a blunter claw, but has the foretarsus equipped with stout spines (Fig. 175). According to Holzenthal et al. (2015) 'Predation is also found in the families Stenopsychidae ...'.

The absence of eyes or eye spots in *Stenopsychodes* larvae (Figs 173, 178), however, would make a predatory lifestyle unlikely. It suggests that they live in dark places, or at least where light intensity is much reduced. Moreover, the presence of anal gills (Figs 170, 176, 177) could be suggestive of a somewhat inactive life in slow or still waters. This accords with the report of Dean et al. (2004) that larvae had been collected '... from matted roots along the margins of streams ...' and suggested that, like many members of other annulipalpi families, they could live in silken tubes or burrows and could be filter feeders.

In contrast, Suter et al. (2006) reported larvae of an unidentified *Stenopsychodes* species '... (from 5 sites in NE NSW) in riffle habitat samples from medium to high altitude streams between 210–1200 m altitude, close to the stream source at between 4.8–8.3km, with predominantly a substrate of boulders, cobbles, pebbles and bedrock with low detritus cover'.

This riffle habitat is consistent with habitats described by various authors for *Stenopsyche* species: Ismail et al. (1996) described *Stenopsyche* larvae as living in 'wide crevices beneath boulders in stream rapids, typically constructing their retreats and food-catching nets in places where pebbles have become lodged underneath larger stones'; Tanida (2002), described species of East Asian *Stenopsyche* as spinning '...loose nets and retreats at interstices between cobbles, ...'; Morse et al. (2019), as living in 'loosely woven retreats/capture nets in fast-flowing water, with three different parts of the capture-net portion serving as: (1) a cover, (2) a primary feeding mesh, and (3) a pocket for collecting seston (minute living and nonliving FPOM suspended in moving water); the retreat portion is beside the latter'.

Distribution. The distribution of the genus is strictly eastern Australian. Ten species are recorded for tropical NE Queensland, five species for central-eastern Queensland–north-eastern New South Wales, five species for central-eastern New South Wales–Victoria, and one for Tasmania. Thus, the distribution appears to reflect the recognised eastern Australian zones and barriers (see Cartwright et al. 2023).

Both the eastern distribution and the north to south attenuation of number of species support an Oriental origin for Stenopsychidae in Australia, perhaps following an adaptive shift. A similar suggestion was made by Wells (2023) to account for the species diversity and different habitats and feeding habits of larvae of the hydroptilid genus *Orthotrichia* in Australia compared with congeners elsewhere.

Key to adult males of species of *Stenopsychodes* Ulmer

*,** —Two sets of species in which male genitalia are virtually indistinguishable, but wing patterns are distinctive.

- 1 Mouthparts normal, not produced
S. montanus-group 2
- Mouthparts produced to form a rostrum
S. melanochrysus-group 8
- 2(1) Forewing brightly patterned with coarse blotchy markings (Figs 16, 17) *S. disjunctus* sp. nov.
- Forewing with regular reticulate pattern or without pattern (Figs 1, 2, 7, 44) 3
- 3(2) Lateral lobes on segment IX, in lateral view, tapered sharply at about mid length to narrowly rounded apex (Figs 3, 28) 4
- Lateral lobes on segment IX, in lateral view, stout basally, broadly triangular to stout and broadly rounded apically (Figs 11, 35, 38, 43) 5
- 4(3) Golden markings on forewing coarsely reticulate (Figs 1, 2); mainland Australia *S. montanus* Tillyard*
- Forewing golden with scattered dark areas; Tasmania
S. lineatus Neboiss*
- 5(3) Forewing uniformly ochreous to dark brown (Figs 40, 41); pair of paddle-shaped lobes lateral to tergite X (Fig. 43) *S. opsius* Neboiss

- Forewing with reticulate pattern (Fig. 7); without pair of paddle-shaped lobes lateral to tergite X 6
- 6(5) Lateral lobes on segment IX, in lateral view, stout, almost equal width throughout length, broadly rounded apically; inferior appendages in dorsal and ventral views dilated in distal 2/3 (Fig. 11)
S. venustus Kimmins
- Lateral lobes on segment IX tapered towards apex; inferior appendages in dorsal and ventral views almost equal width throughout length (Figs 35, 38) 7
- 7(6) Inferior appendages, in lateral view, narrowest at about 1/3 length, dilated and curving downwards distally, clear but small concavity distally (Fig. 38)
S. syrdenus Neboiss
- Inferior appendages, in lateral view, about equal width throughout length, with very slight downward curvature, apex tightly cleft (Fig. 35)
S. hiemalis Tillyard
- 8(1) Forewing brightly patterned with coarse golden bands and blotchy markings (Figs 56, 58, 65, 67, 79) or reticulate pattern (Fig. 48); hindwing with irregular golden band on costal margin (Figs 56, 58, 67, 79, 87); inferior appendages stout, 'crab claw-like' distally, mesal lobe of 'claw' with one or two sharp hooks apically (Figs 50, 62, 73, 82); superior appendages with length in dorsal view between about 5 to 9X width at broadest part (Figs 51, 59, 70, 81, 89) 9
- Forewing with regular reticulate golden/orange and dark brown/black pattern (Figs 104, 147, 162); hindwing without golden/orange band on costal margin; inferior appendages in ventral view usually slender, if stout, then with or without a sharp hook apically on the mesal lobe (Figs 101, 102, 122, 123, 167, 168); superior appendages usually long and slender with length in dorsal view at least 10X width at broadest part (Figs 125, 134, 155, 165) 13
- 9(8) Forewing with reticulate pattern of golden/orange and dark areas (Fig. 48); lateral lobes of segment IX in lateral view evenly tapered, sharply triangular (Fig. 52)
S. aureonigra Schmid
- Forewing brightly patterned golden/orange and black to brown, with coarse bands and/or blotchy markings (Figs 58, 67, 87); lateral lobes of segment IX digitate in distal half, or tapered gradually to more coarsely rounded apex (Figs 71, 80, 88, 93, 96, 99) 10
- 10(9) Forewing with many irregular small blotchy markings proximally and coarse dark bands distally (Figs 56, 58); lateral lobes of segment IX, in lateral view, digitate in distal half (Fig. 61) *S. melanochrysus* Tillyard**
- Forewing with few small dark blotches proximally, distal irregular golden/orange and dark bands or 3 distal golden/orange blotches; lateral lobes of segment IX, in lateral view, triangular 11

- 11(10) Hindwing with golden/orange marking along costa extending for less than half length of margin (Fig. 87) *S. boreas* sp. nov.**
- Hindwing with golden/orange marking along costa extending for around $\frac{3}{4}$ length margin (Figs 67, 79) 12
- 12(11) Forewing with distal 1/3 dark, interrupted only by 3 large golden/orange areas; ratio of length to width of male forewing 2.5 (Fig. 67) *S. crystalinus* sp. nov.**
- Forewing with distal 1/3 interrupted by coarse, zigzagged golden/orange band (Figs 78, 79); ratio of length to width of male forewing almost 3 (Fig. 79) *S. pictus* sp. nov.**
- 13(8) Head and prothorax pale, bearing golden setae (Figs 104, 147, 162); inferior appendages in ventral view stout, terminating in wide open-gaped 'claw', with sharp hook apically on the mesal lobe (Figs 157, 166, 167) 14
- Head and prothorax dark brown coloured to black; inferior appendages in ventral view usually slender, if stout, then with mesal lobe of apical 'claw' with or without single sharp hook apically (Figs 106, 123, 136, 137, 140) 15
- 14(13) Lateral lobes of segment IX in lateral view truncate apically (Figs 163, 167); lower process on segment X in lateral view with saw-like appearance due to row of bristle-like setae on upper margin (Figs 164, 169) *S. tillyardi* Banks
- Lateral lobes of segment IX in lateral view tapered to rounded or truncate apex (Figs 151, 156); lower process on segment X in lateral view peg-like, bearing short setae apically (Fig. 158) *S. mjobergi* Ulmer
- 15(13) Inferior appendages stout in dorsal and ventral views, swollen distally (Figs 134, 136, 138, 140); single pair of processes on abdominal segment X (Figs 134, 135, 138) 16
- Inferior appendages slender in dorsal and ventral views, not swollen distally (Figs 103, 106, 110, 123, 127); 1–2 pairs of processes on abdominal segment X (Figs 101, 103, 113, 116, 129, 132) 17
- 16(15) Lateral lobes on segment IX in lateral view gradually tapered to rounded apex (Figs 139, 146); inferior appendages in ventral view with open gape apically (Figs 140, 142), in lateral view sharply downturned distally (Figs 139, 146) *S. tropicus* sp. nov.
- Lateral lobes on segment IX in lateral view tapered sharply to narrowly rounded apex (Figs 135, 142); inferior appendages in ventral view with tight rather slit-like gape apically (Figs 136, 143), in lateral view almost straight throughout length (Figs 135, 142) *S. unguibus* sp. nov.
- 17(15) Lateral lobes on segment IX triangular, tapered gradually to narrowly rounded apex, not digitiform apically (Fig. 129) *S. redactus* sp. nov.
- Lateral lobes on segment IX, in lateral view, tapered strongly to narrowly digitiform distally; 1 or 2 processes on segment X, length of intermediate process shorter than or exceeding length of superior appendages, usually a slender spine (Figs 113, 116, 119) 18
- 18(17) Two processes on segment X, intermediate and upper (Fig. 113) *S. dispar* sp. nov.
- Only intermediate process on segment X (Figs 116, 119) 19
- 19(18) Superior appendages about equal length to inferior appendages; tergite X narrowly cleft apically (Figs 105, 115); in ventral view length: intermediate width of inferior appendages ~6–7 (Figs 106, 117) *S. shackletoni* sp. nov.
- Superior appendages shorter than inferior appendages; tergite X smoothly rounded or narrowly cleft apically (Figs 108, 118, 125, 131); in ventral view length: median width of inferior appendages ~8–10 (Figs 110, 120, 127, 133) 20
- 20(19) Intermediate processes on segment X dilated subapically, hooked apically; segment X in dorsal view with small cleft medially (Figs 125, 131); in ventral view length: median width of inferior appendages ~8:1 (Figs 127, 133) *S. quasiredactus* sp. nov.
- Intermediate processes on segment X not dilated subapically and not hooked apically; segment X in dorsal view smoothly rounded apically (Figs 108, 120); in ventral view length: median width of inferior appendages ~10:1 (Figs 110, 120) *S. elongatus* sp. nov.

montanus-group

This group is conveniently recognised as a set of species with 'normal' mouthparts, i.e. not produced into a kind of rostrum (Figs 16, 40); all have three processes on abdominal segment X. Since several other character states, such as wing pattern and shape of lateral lobes on segment IX, cut across groups, separation on the basis of form of mouthparts is probably artificial, but this feature is easily identified. The group includes: *Stenopsychodes montanus*, *S. venustus* stat. rev., *S. hiemalis*, *S. syrdenus*, *S. lineatus*, *S. opsius* and *S. disjunctus* sp. nov., all south-eastern Australian species. Among these species, all but *S. hiemalis* and *S. disjunctus* sp. nov. have sculptured apices on the intermediate processes of abdominal segment X, and all but *S. disjunctus* sp. nov. have rather tight 'mitten-shaped' apices on the inferior appendages; in *S. disjunctus* sp. nov. the apices of the inferior appendages are more open and 'claw shaped'.

Stenopsychodes montanus Tillyard

Stenopsychodes montana Tillyard, 1922: 78, pl. xxiva, text-fig. 2; –Mosely and Kimmins, 1953: 373, figs 256a, 257, 258; –Schmid, 1969: 210, pl. 1, figs 5, 9; pl. 2, figs 5, 6.

Figures 1–6

Type. Holotype ♂, NSW, Katoomba (NHM — slide of male genitalia not located (Price, pers. com.)). [<https://data.nhm.ac.uk/object/02771723-d746-4427-bfc6-f488921829f3/1665014400000>]

Material examined. New South Wales: 1 ♂, Kosciuszko NP, 3.2km WSW Thredbo, nr Dead Horse Gap, over narrow stream in flowering grassland, malaise, 11–13 Jan. 2002, CL Lambkin & NT Starick, 1496m, 36°31'15"S 148°16'06"E GPS National Parks and Wildlife Service, Kosciuszko National Park, Jan. 12–13. 2002 (Biodiversity Blitz, ANIC MT 1962); 2 ♂♂, ANIC MT 1962, Biodiversity Blitz, NSW National Parks and Wildlife Service, Jan. 12–13.2002, Kosciuszko NP (ANIC); 1 ♂, Kosciuszko NP, 0.8km NE Thredbo, nr narrow streams, sheltered gully, malaise, 2–11 Jan. 2004, CL Lambkin & NT Starick, 1480m, bulk sample 2224, 36°22'49"S 148°18'56"E GPS (ANIC); 1 ♂, Cataract Creek, off Lawson waterfall track, Lawson, 21.09.2017, Z. Billingham (NMV CT-721). Victoria: 1 ♂, 10 mls NW of

Beaufort, 19 Dec. 1922 (NMV TRI-12148); 1 ♂, Kalymna Falls, Grampians (37°19'S, 142°36'E), 9 Nov. [1972], P. Zwick, (NMV TRI-12247); 1 ♂, Back Track, Trib. Cann R., Noorinbee, MV It., 10 Dec. 2003, D. Cartwright (CT-775).

Diagnosis. The coarse but more regularly reticulate pattern of golden and black or brown areas on the forewing of *S. montanus* (Fig. 1) separates it from the very similar *S. venustus* (Figs 7, 8) which has more irregular golden patches on the forewing but shares the feature of the distal margin of the hindwing dark (Figs 1, 7, 8) whereas *S. disjunctus* has broader areas of golden and brown on the forewing and small golden spots apically on the leading edge of the hindwing (Figs 16, 17). Male genitalia of *S. montanus* resemble closely those of *S. lineatus* but *S. lineatus* has the lateral lobes of segment IX almost digitate in



Figs 1–6, *Stenopsychodes montanus* Tillyard, 1922. 1, Type ♂, wings, fore part of body, and data stored with type (NHM, image Ben Price). 2–6, ♂, ('Vic, Kalymna Falls, Grampians, 9 Nov. P. Zwick'; [GenPrep TRI-12148]): 2, forewing; 3–6, genitalia, lateral, dorsal, ventral, tip of left inferior appendage. Scale bars =2mm, unless otherwise indicated.

distal half (Fig. 28), rather than triangular (also see *Remarks* under *S. lineatus*) as in *S. montanus*, *S. hiemalis* and *S. disjunctus* sp. nov. (Figs 3, 19, 25, 35), in contrast to the short, stout lateral lobes of *S. venustus*, *S. syrdenus* and *S. opsius* (Figs 11, 38, 43); *S. montanus* has the upper processes on segment X stouter than those of *S. venustus*.

Female. No females were identified among the collections.

Description. See Tillyard (1922: 78), Mosely and Kimmins (1953: 373) and Schmid (1969: 210).

Length of each forewing: ♂ 9.8–12mm (n = 4).

Distribution. Known from the Blue Mountains to the west of Sydney, the Australian Alps of NSW and Victoria up to elevations of about 1500m, and from lower elevations in the Pyrenees Range to the northwest of Melbourne and the Grampians in Western Victoria, giving a broad distributional range from 33.7–37.4°S.

Remarks. We remove *S. venustus* from synonymy with *S. montanus*, reinstating it as a valid species based on the broadly rounded shape of the lateral lobes of abdominal segment IX of males of *S. venustus* and the differences in the wing pattern. But see *Remarks* under *S. lineatus* for comment on similarity to that species.

Stenopsychodes venustus Kimmins, stat. rev.

Figures 7–15

Stenopsychodes venusta Kimmins, 1953 in Mosely and Kimmins, 1953: 375, fig. 259; –Schmid, 1969: 210, synonymy with *S. montana*.

Material examined. Holotype male, ♂, Lee's Springs, ACT [–35.35, 148.8], (ANIC). Paratypes: 1♂ 1♀, collected with holotype, (ANIC).

Other material examined. Victoria: 1♀, Hotham Heights [36°59'S, 147°09'E, 1585m], 1 Feb. 1957, Neboiss (NMV TRI-12248); 1♀, G.G.S. Timbertop, nr Merrijig [37°09'S, 146°19'E], 30 Nov. 1957, J. Landy, (NMV TRI-12253); 1♂, White bridge on Mt Buller rd, 02 Feb. 2011, M. Shackleton 110202.1; 2♂♂ 4♀♀, Perisher Ck, [36°22'S, 148°24'E], 1500m, 5–7 Jan. 1984 (NMV TRI-12126); 1♂, Vic, Porepunkah, Mt Buffalo NP, Eurobin Picnic Area, HgV light, 36.7006°S 146.851°E, 325m, 11.1.2024, K.M. Bayless, Yue Liu (ANIC).

Diagnosis. Closely similar to *S. montanus* but differing in having coarser and, in dorsal view, more widely and irregularly scattered golden spots on the forewing and broad sub-distal dark band on forewing or irregularly scattered golden spots interspersed with dark brown bands (Figs 7, 8) and hindwing with the distal border dark (Figs 7, 8). The males of both species have inferior appendages stout in distal three quarters, apically tightly mitten-like in dorsal view (Figs 4, 9) and bearing a small spur on the mesal lobe (Figs 6, 12). However, *S. venustus* is clearly distinguished by having the lateral lobes of segment IX short, stout and broadly rounded apically when seen in lateral view (Fig. 11) rather than triangular as in *S. montanus* (Fig. 3). The female (Fig. 8) resembles that of *S. lineatus*, having abdominal sternite IX seen in ventral view with a short apico-medial cleft (Fig. 14), but parallel sided and becoming a medial groove more proximally, whereas in *S. lineatus* the short cleft divides two broadly rounded apical lobes (Fig. 33); segment X

in dorsal and ventral views forms two closely pressed lobes that are slightly constricted in mid length (Figs 13, 14).

Description. See Mosely and Kimmins (1953: 375).

Length of each forewing: ♂ 10.7–13.3mm (n = 3), ♀ 11.5–12.4mm (n = 2).

Distribution. Known from the ACT and the higher country of Victoria and New South Wales.

Remarks. See *Remarks* under *S. montanus*.

Stenopsychodes disjunctus sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:10962795-8D36-41AD-B227-6C25201699F7>

Figures 16–26

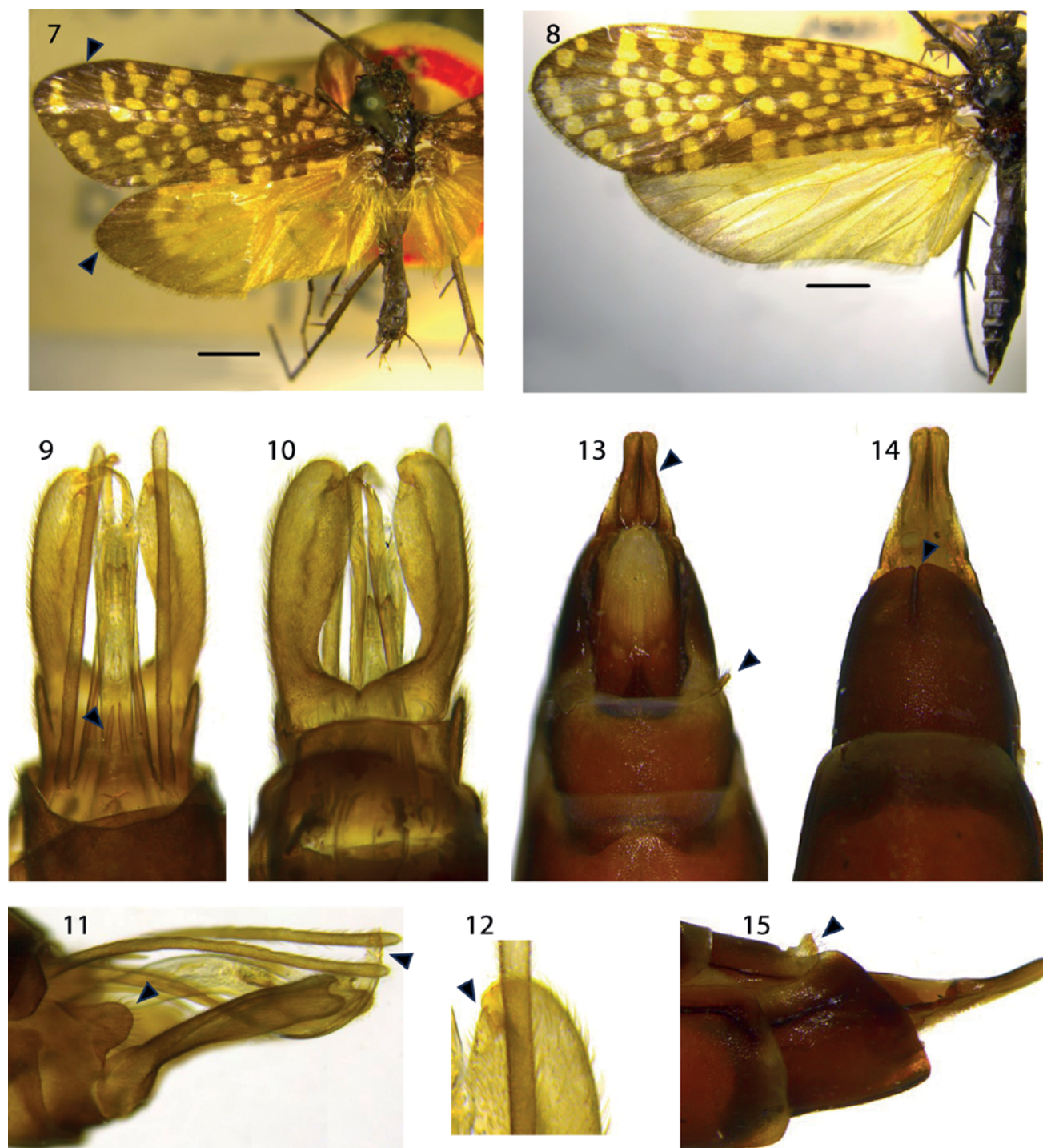
Material examined. Holotype ♂, New South Wales, Wilton, 29.10.1982, V.J. Robinson, (AM K-612213). Paratypes, New South Wales: 1♀, Mt Wilson, 30°30'30"S 153°22'29"E, 980m, Malaise; warm temp r'for, D. Bickel, A. Mitchell, F11: 3–24.IX.2019, AMS, (AM-K393216); 1♀, NSW, Wentworth Falls, Blue Mtns [33°43'S, 150°22'E], 6 Dec. 1986, D.K. McAlpine, K Khoo, R de Keyser, (NMV TRI-12120).

Diagnosis. Unusual among species with short mouthparts, *S. disjunctus* has forewings with a pattern of large irregular bands of dark brown and golden (Figs 16, 17), in that feature resembling four other species — *S. melanochrysus*, *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov. — all with similar patterns on the wings, but having protruding mouthparts, and a golden bar on the costal margin of the hindwing — whereas *S. disjunctus* lacks protruding mouthparts (Fig. 16) and has only a series of small golden spots subapically on the hindwing (Fig. 17). The male genitalia in dorsal view have the pair of upper processes on segment X each tipped apically with a sharp spine (Figs 18, 24), and other processes on abdominal segment X slender and sharply pointed apically, not sculptured (Figs 24, 25). In the female genitalia, sternites VIII and IX taper distally and IX has a distinctive small, rounded cleft apically (Fig. 23), whereas in other females with a cleft, it is V-shaped.

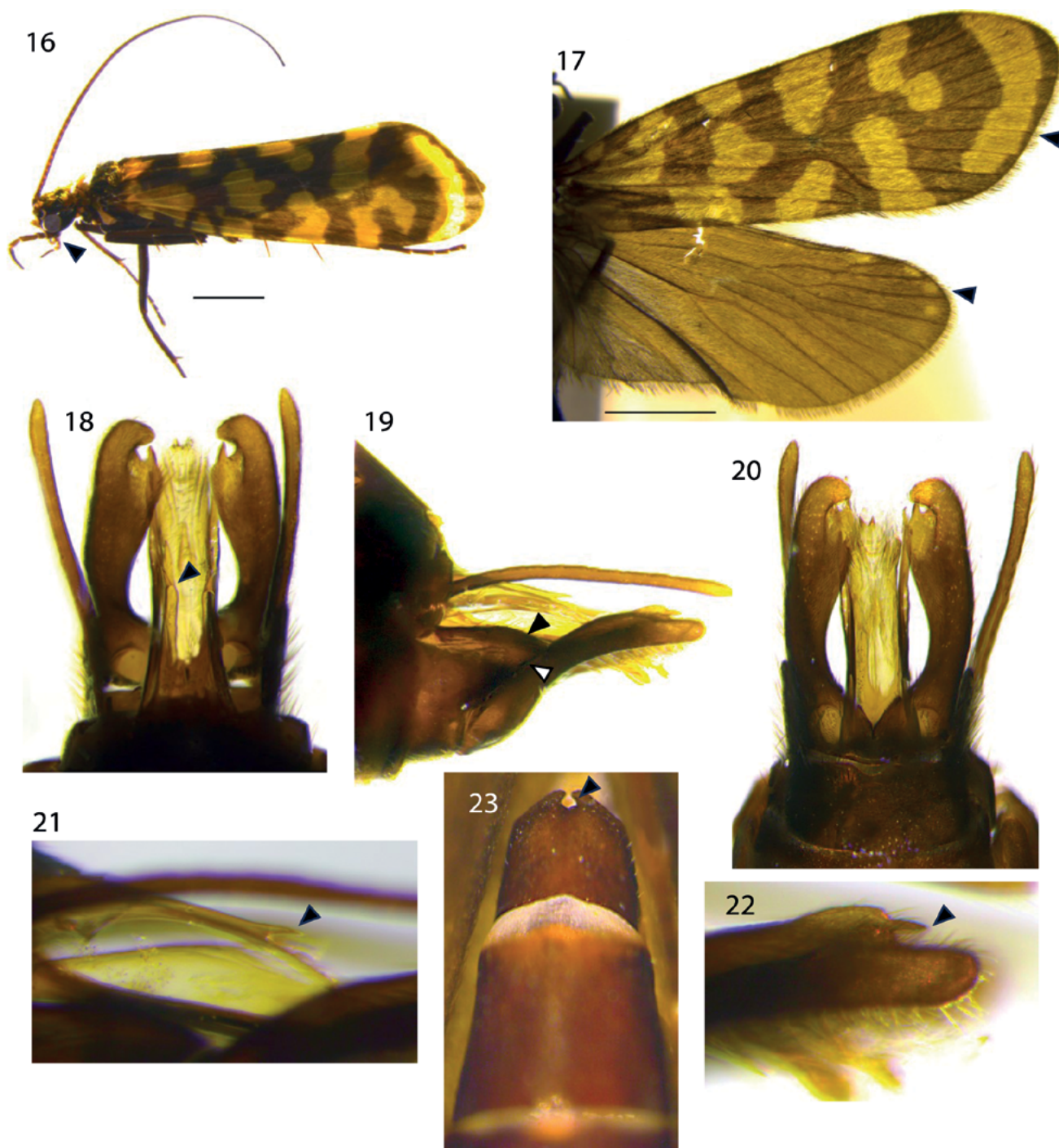
Description. Head, thorax and body entirely jet black. Antennae black, slender, female antennal length about equal to length of forewings; mouthparts not produced (Fig. 16).

Wings (Figs 16, 17). Length of each forewing: ♂ 9.4mm (n = 1); ♀ 10.1–10.2mm (n = 2). Forewing irregularly and vividly patterned golden and dark brown (Figs 16, 17), four pairs of large golden areas from base towards a broader curving distal golden band and narrow dark apical band; hindwing with small golden spots along costal margin (Fig. 17); forewing with very short stalk on fork 3; hindwing with fork 3 sessile.

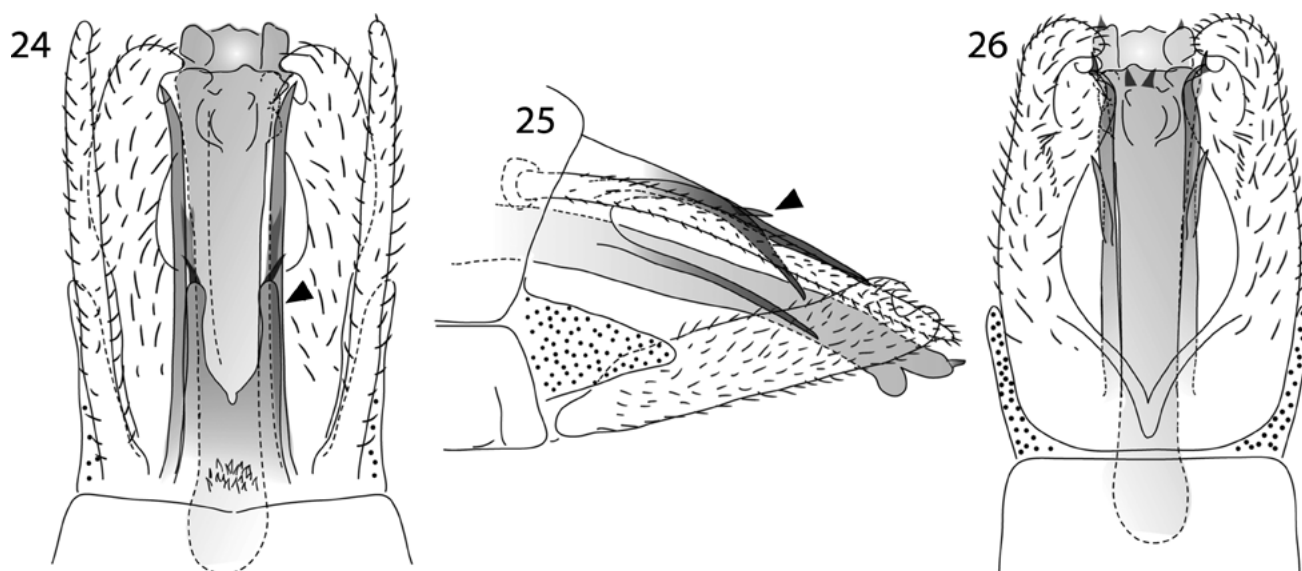
Genitalia. Male (Figs 18–22, 24–26). Lateral lobe of segment IX broadly triangular in lateral view (Figs 19, 25). Superior appendages slender (Figs 18, 19, 24, 25), in length slightly exceeding inferior appendages and intermediate processes of segment X. Inferior appendages in lateral view almost even width throughout length; in ventral view stout basally, narrowing before expanding to form claw-like apices with mesal lobe bearing prominent sharp apical tooth (Figs 18, 22). Abdominal segment X with intermediate and upper



Figs 7–15, *Stenopsychodes venustus* Kimmins, 1953. 7, 8, type ♂ habitus and paratype ♀ (ANIC). 9–12, ♂ (Vic, white bridge on Mt Buller rd, 02 Feb. 2011, M Shackleton 110202.1), genitalia dorsal, ventral, lateral and tip of left inferior appendages. 13–15, ♀ (Vic, G.G.S. Timbertop, nr Merrijig, 30 Nov. 1957, J. Landy, NMV TRI-12253), genitalia dorsal, ventral and lateral. Scale bars =2mm



Figs 16–23, *Stenopsychodes disjunctus* sp. nov. (AM). 16, Paratype ♀ (NSW, Wilson, 30°30'30"S 153°22'29"E, 980m, Malaise; warm temp r'for, D. Bickel, A. Mitchell, F11: 3–24.IX.2019, AMS-K393216), habitus lateral. 17–22, Holotype ♂ (New South Wales, Wilton, 29.10.1982, V.J. Robinson; AMS-K612213): 17, wings, right dorsal; 18–22, genitalia, dorsal, lateral, ventral, upper process on segment X and apex of left inferior appendage; 23, Paratype ♀ (AMS-K393216), sternites VIII and IX, ventral. Scale bars =2mm.



Figs 24–26, *Stenopsychodes disjunctus* sp. nov., Holotype ♂, (AMS-K612213), genitalia, dorsal, lateral and ventral.

processes slightly shorter than inferior appendages, upper processes finger-like, each bearing apical seta, intermediate processes slender, with spine at about half length (Figs 18, 21, 24, 25).

Female genitalia (Fig. 23). Abdominal segments VIII and IX tapered distally, shallowly triangular in distal 1/5, sternite IX with small round cleft apically.

Distribution. Known only from three localities: Mt Wilson and Wentworth Falls in the Blue Mountains, to the west of Sydney, and Wilton slightly further south eastward, thus a latitudinal range of 33.5–34°S.

Etymology. From the Latin *disjunctus*, for the southerly occurrence in comparison with other species with similar very coarsely patterned wings all of which occur further to the north-east.

Remarks. See Remarks for *S. melanochrysus*, *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov.

***Stenopsychodes lineatus* Neboiss**

Stenopsychodes lineata Neboiss, 1977: 53, figs 234–242.

Figures 27–33

Material examined: Holotype ♂ (NMV T-4801), Bluff Hill Creek, 12km S of Marrawah 41°01'S, 144°42'E, TAS, 30 Nov. 1974, A. Neboiss; Paratypes, 'allotype' ♀ (NMV PT-448), (NMV T-4802) from same location as holotype; 8 specimens from same location as the holotype (♂ NMV T-4803, NMV T-4803.1 (=PT-447), ♀ NMV PT-448); ♀, Bluff Hill Creek, 12km S of Marrawah, Tas., 30 Nov. 1974, A. Neboiss (NMV T-4804).

Diagnosis. With short mouth parts, *Stenopsychodes lineatus* is a member of the *montanus*-group within which it is

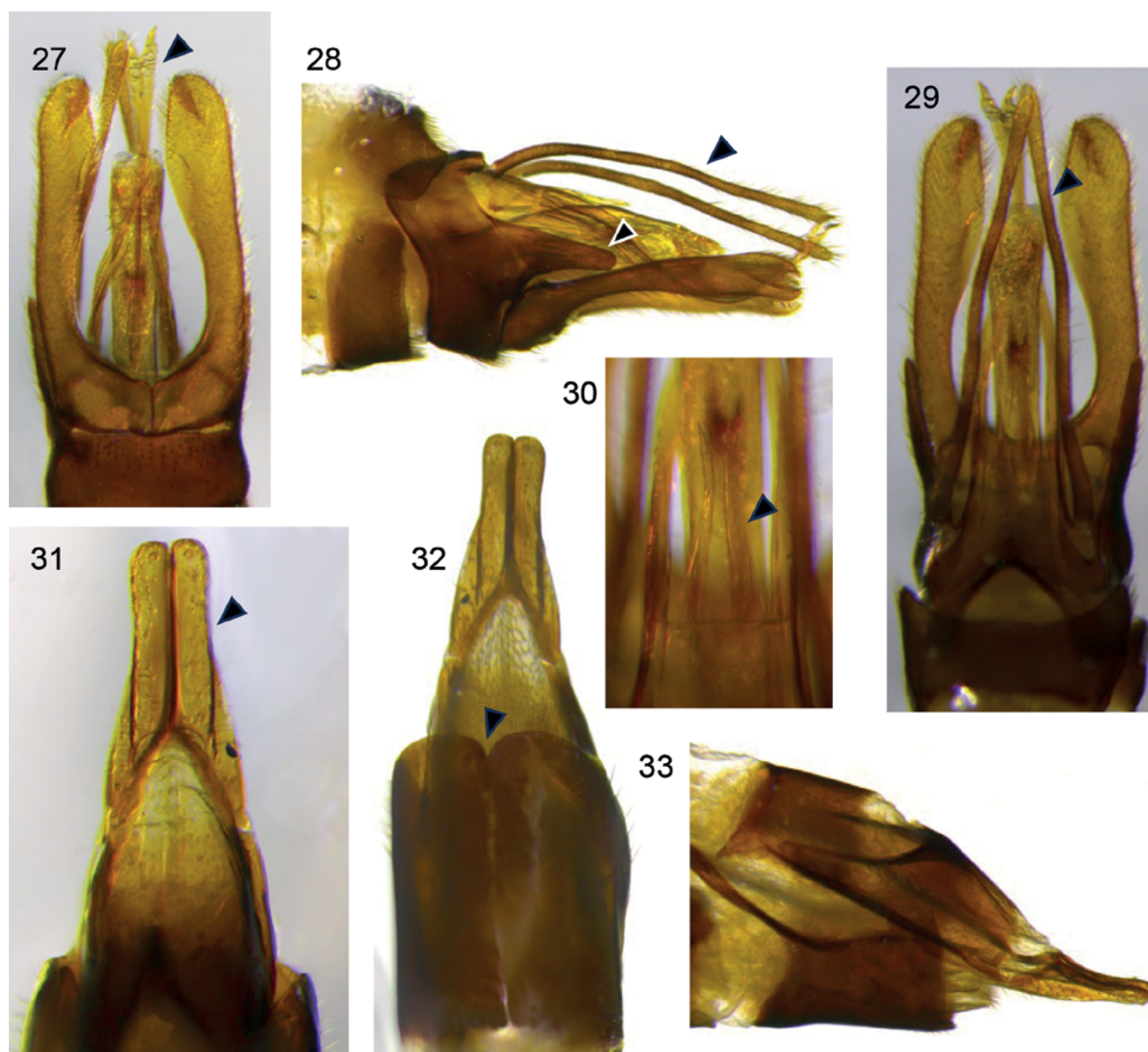
distinguished from other species by having the lateral lobes of segment IX digitate in distal half, rather than triangular (Fig. 28). The forewing is broadly rounded, and mottled rather than having discrete reticulations or large golden areas on a dark background. Females (Figs 31–33) are distinctive in having segment IX in ventral view with the apico-medial cleft separating two broadly rounded lobes, segment X elongate with sides subparallel, and length 3x greater than width; in other species the apical margin of sternite IX is not divided into two broadly rounded lobes, and segment X usually with length less than twice width.

Description. See Neboiss (1977: 53).

Length of each forewing: '♂ 9–10mm, ♀ 10–11mm' (data from Neboiss 1977, presumably wing lengths of holotype and paratypes).

Distribution. Known only from NW Tasmania, from the from type locality in northwest Tasmania (latitude 41°S).

Remarks. *Stenopsychodes lineatus* is on the list of Tasmanian Threatened Species (Tasmanian Government Threatened Species List, accessed 2024). Despite extensive collecting in Tasmania by both E.F. Riek and A. Neboiss, and others in more recent years, only the specimens from a single locality in the north-west of Tasmania were available for study. The close similarity of the male genitalia to those of specimens we have identified as *S. montanus* suggests that the two could be synonyms, but the forewings of *S. lineatus* are more finely patterned. The slide of type genitalia of *S. montanus* is missing so cannot be checked. However, since the two species are separated by a known dispersal barrier (Bass Strait) and the habitat of *S. lineatus* is lowland rather than montane we have maintained the separate species for the present.



Figs 27–33, *Stenopsychodes lineatus* Neboiss, 1977. 27–30, ♂ (NMV TRI-04803.1 – PT 447), genitalia ventral, lateral and dorsal and upper processes of segment X; 31–33, ♀ (NMV TRI-04803.1 – PT 448): genitalia, dorsal, ventral and lateral.

Stenopsychodes hiemalis Tillyard

Stenopsychodes hiemalis Tillyard, 1922: 79, text fig. 3; –Mosely and Kimmins 1953: figs 250, 251; –Neboiss 1986: 111 (figures).

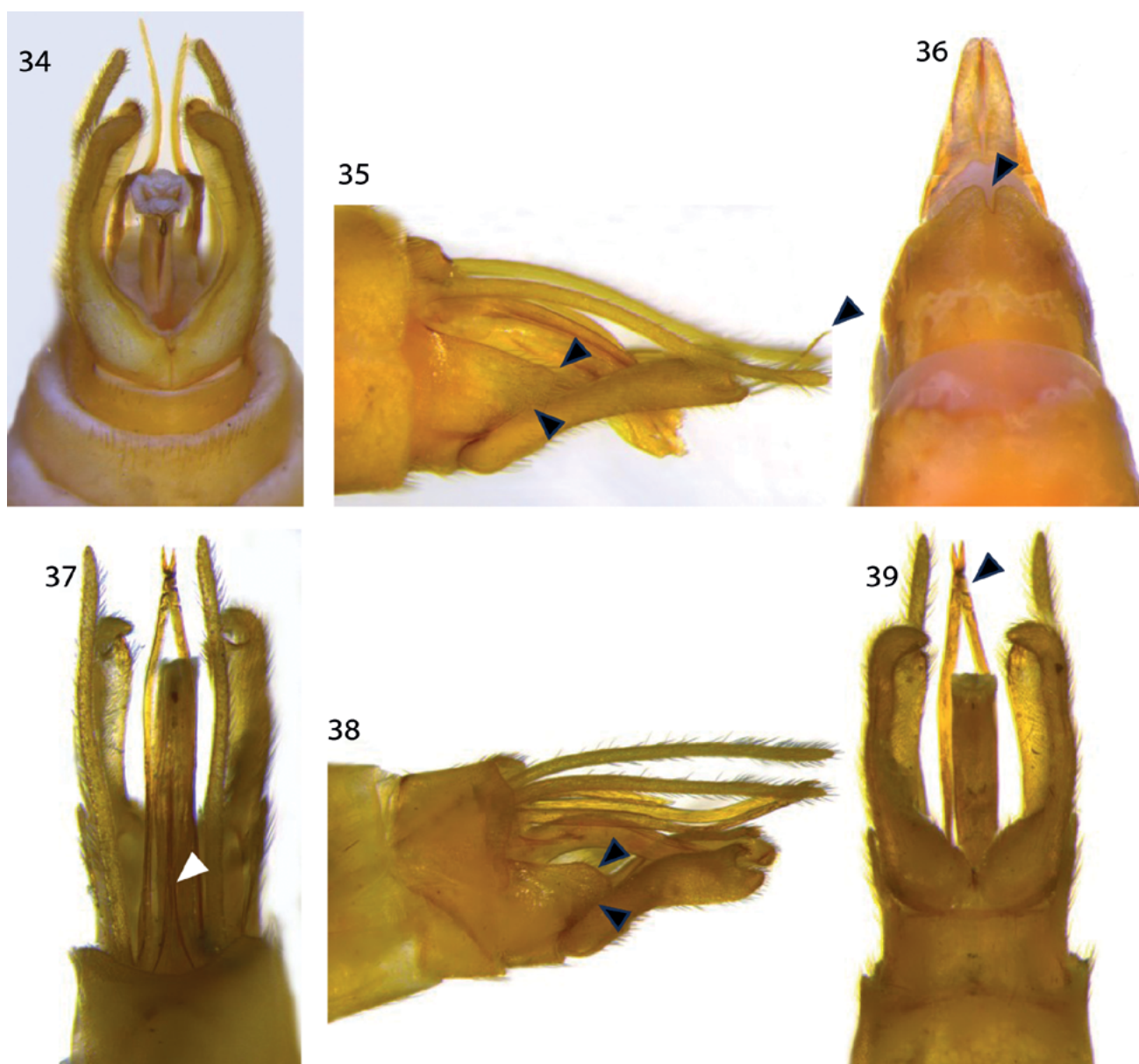
Figures 34–36

Type material. Holotype, ♂ (ex Tillyard coll.), Hornsby, NSW, (BMNH(E)251775); Paratype, ♀ (as allotype, BMNH(E)251776).

Material examined. New South Wales: 1♂, Mt Colah nr Sydney (33°39'S, 151°07'E) 10 Sept. 1974, at mv light, A.B. Rose (NMV TRI-12245); 1♂, Mt Colah (33°39'S, 151°07'E), 11 Aug. 1975, at light, A.B. Rose (NMV TRI-12243; Figs 34–36); 1♂, Waterfall, Royal National Park (34°08'S, 151°00'E), 2 Oct. 1985, A. Neboiss (NMV TRI-12244);

1♀, Heathcote Brook, Royal National Park (34°05'S, 151°01'E), 22 Oct. 1985, G. Theischinger (NMV TRI-12242); 1♂, Heathcote Brook, Royal National Park (34°05'S, 151°01'E), 21 Oct. 1986, G. Theischinger (NMV TRI-12118).

Diagnosis. The males of this species are distinctive in having the pattern on the forewing very finely reticulate. They share male genitalic features with *S. venustus* and *S. syrdenus*, the inferior appendages having only a small apico-lateral excision, but they differ in having the lateral lobes of segment IX broadly triangular (Fig. 35), not short and stout with the apex broadly rounded. The female figured (NMV TRI-12245, Fig. 36, identified by Neboiss as *S. hiemalis*) is distinctive in having



Figs 34-39, *Stenopsychodes* species. 34-36, *Stenopsychodes hiemalis* Tillyard, 1922 (NSW, Mt Coloh, 11 Aug. 1975, at light, A.B. Rose; NMV TRI-12243): 34, 35, ♂: genitalia, ventral and lateral; 36, ♀ genitalia: ventral. 37-39, *Stenopsychodes syrdenus* Neboiss, 1974, ♂ (NSW, Fernbrook, 15km W of Dorrigo, 17 Dec. 1975, A.B. Rose; NMV TRI-12147), genitalia, dorsal, lateral and ventral.

abdominal segment IX tapered towards the apex and with the mid apical cleft dividing a pair of sub-triangular lobes.

Description. See Tillyard 1922: 79, figs 1, 3, 4; Mosely and Kimmins 1953: 361, figs 250, 251; Neboiss 1986: 111.

Length of each forewing: ♂ 13.5–17.0mm (n =4); ♀ 14.5–16.5mm (n =2).

Distribution. Known only from central eastern New South Wales, from northern Sydney south to the Royal National Park (latitudinal range 33.7–34°S).

Remarks. Tillyard (1922) states: Types, holotype male and Allotype female (Hornsby, Aug. 25th, 1917, R.J.T.) in Tillyard Collection, Cawthron Institute, Nelson, N.Z. Also a set of slides prepared from a third specimen (♂) taken on same date.' A specimen of *S. hiemalis* in the BMNH e-dataset is listed as 'type' and male, and another 'type' female. No database number, collection site, collector or sex are given for two other specimens.

Tillyard's (1922) figures are difficult to interpret, and could have been drawn from dry, undissected specimens. Mosely and Kimmins (1953) simply duplicated Tillyard's figures and quoted his description. Neboiss (1986) provided

new figures of dorsal, ventral and lateral views of male genitalia, but gave no identification number for the specimen from which these were drafted. The images here are of NMV specimen TRI-12243, one of a very few specimens identified by Neboiss as *S. hiemalis*: a specimen from Lawson in the Blue Mountains west of Sydney conforms in the arrangement and relative lengths of the structures of the male genitalia and accords with Tillyard's (1922) description of forewings 'with very close and delicate reticulations'.

Stenopsychodes syrdenus Neboiss

Stenopsychodes syrdena Neboiss, 1974: 84, figs 6–9.

Stenopsychodes syrdenus Neboiss, 1974; –ABRS, 2024.

Figures 37–39

Type material. *Holotype* ♂ New South Wales, Dorrigo National Park, (30°22'S, 152°44'E) Alt. 800m, coll. M.S. Moulds, 19 Nov., 1973 (NMV T-4534). *Paratypes*: 1♀ (as 'allotype', NMV T-4535 & T-4535.1 (=PT-444)), 2♂♂, data as for holotype, (NMV T-4536–4537 & T-4537.1 (=PT-436)).

Material examined. New South Wales: 1♂, Fernbrook, 15km W of Dorrigo, (30°19'S, 152°35'E) 17 Dec. 1975, A.B. Rose (NMV TRI-12147).

Diagnosis. This species is a member of the *montanus*-group within which it groups with *S. venustus* and *S. opsius*, all three of which have the lateral lobes of segment IX in lateral view short, stout and broadly triangular, apically broadly rounded (stocky). Of these three species, only *S. syrdenus* has the forewing with a regular pattern of reticulations: *S. venustus* has coarse, somewhat irregular golden spots and available specimens of *S. opsius* have little or no pattern at all; the hindwing of *S. venustus* and *S. opsius* are pale with a dark area on the distal margin; and in *S. syrdenus* the hindwing is uniform in colour; the inferior appendages in lateral view are arched downward (Fig. 38). The female was described by Neboiss (1974) as 'similar to that of *opsia*. But differs in the shape of sternite VIII and much smaller apodemes on sternite IX ...'.

Description. See Neboiss (1974: 84).

Length of each forewing: ♂ 11.5–13mm, ♀ 15mm (in part after Neboiss 1974).

Distribution. Collected only in the Dorrigo region of north-eastern New South Wales, latitudinal range 30.3–30.4°S.

Remarks. As for *S. lineatus* and *S. hiemalis*, very few specimens of *S. syrdenus* have been collected and identified. The images in Figures 37–39 are of a rather faded specimen identified by Neboiss (NMV TRI-12147).

Stenopsychodes opsius Neboiss

Stenopsychodes opsia Neboiss, 1974: 82, figs 1–5.

Stenopsychodes opsius Neboiss, 1974; –ABRS, 2024.

Figures 40–47

Type material. *Holotype* ♂, New South Wales, Boonoo River, 25km NE of Tenterfield, 7km SE Carrolls Creek, (28°51'S, 152°09'E) (NMV T-4529). *Paratypes*, New South Wales: 1♀ (NMV T-4530, as

'allotype'), 3♀♀ (NMV T-4531, T-4532 & T-4532.1 (=PT-430), T-4533), data as for holotype.

Material examined. New South Wales: 1♂, N.E. Nat. Pk near entrance, 13 Nov. 1960, C.W. Frazier (ANIC); 1♂, N.E. Nat. Pk, near Wright's Lookout, 20 Dec. 1960, C.W. Frazier, mv 1(ANIC); 1♀, Gibraltar Range, 30 Nov. 1962, C.W. Frazier at light (ANIC); 4♀♀ (pinned, 1 dissected), State Forest, Gibraltar Range, 30 Nov. 1962, C.W. Frazier, at light, (ANIC); 1♀, Barrington R., Dec. 1962, N.E.U. Expl. Soc., M. Spencer (ANIC); 1♀, Gibraltar Range, 8 Dec. 1964, C.W. Frazier at light (ANIC); 1♀, Dawsons Springs, Mt Kaputar, 5000feet, 18 Nov. 1968, C.W. Frazier (ANIC); 5♂♂ 16♀♀, Gibraltar Ra. N.P., Waratah track, 10.xi.1984, MV light, D.K. Yeates (QM); 1♀, Gibraltar Ra. N.P., 11.xi.1984, MV light, D.K. Yeates (QM); 1♂ 2♀♀, New England NP, Cunnamurra Rd, Georges Ck, MT over muddy affluent, 11–15.xi.2020, 30.5159°S 152.3687°E, 1323m, K.M. Bayless & D. Bickel (dry pinned, ANIC); 1♂ 1♀, New England NP Cunnamurra Rd, Georges Ck, MT over muddy affluent, 11–15.xi.2020, (30.5159°S 152.3687°E), 1323m, K.M. Bayless & D. Bickel, (ANIC). Queensland: 2♂♂ 1♀, Mt Marlay, near Stanthorpe, 6–9.xi.1984, D.K. Yeates (QM).

Diagnosis. Distinguished from other members of the *montanus*-group by males with a paddle-shaped process on each side of tergite X (Fig. 43), a structure not seen in any other species. Like *S. hiemalis*, *S. opsius* has the lateral lobes on segment IX broadly triangular (Fig. 43), but the inferior appendages are narrow medially in ventral view, dilated in the distal 2/3, and tightly claw-shaped apically (Fig. 44). The female (Figs 45–47) has sternite IX more roundly and evenly tapered toward the apex than in the somewhat similar *S. hiemalis* and with a more strongly pronounced apical cleft (Fig. 47); segment X is less narrowly tapered than in *S. hiemalis*.

Description. See Neboiss (1974: 82).

Length of each forewing: ♂ 9.8–13.2mm (n = 4), ♀ 12.6–14.5mm (10).

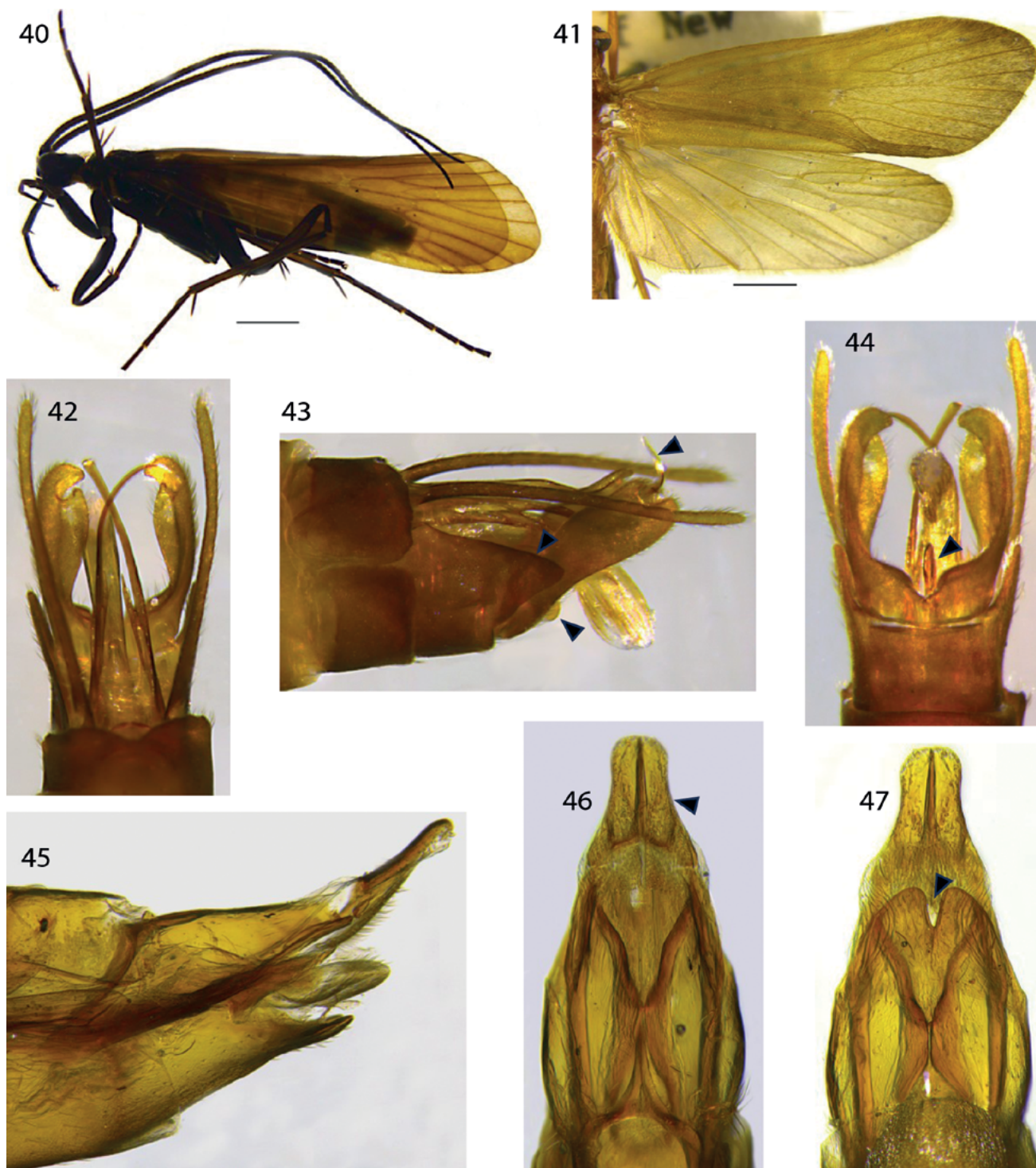
Distribution. Known from the New England area of north-eastern New South Wales, inland on Mt Kaputar and the Gibraltar Range, and from near and across the Queensland border in southeastern Queensland, a latitudinal range of 30.3–30.4°S.

Remarks. Neboiss (1974) described the forewings of this species as 'bright ochraceous coloured ... with the apices smoky brown', the hindwings as 'slightly paler throughout, but apices darker, smoky brown', as seen in Figure 41, the wings of a pinned female.

melanochrysus-group

The prominent feature of produced mouthparts separates the group here designated the '*melanochrysus*-group' from the *montanus*-group of species. This larger group can be further divided into two sub-groups based on wing patterns and male genitalic features.

The first sub-group comprises *S. aureonigra*, *S. melanochrysus*, *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov. all of which have an irregular golden (in pinned or spirit specimens) or orange (in live animals) area on the costal margin of the hindwing, and in the male genitalia have two pairs of processes on abdominal segment X, the intermediate and upper processes, and have the apices of the inferior appendages wide and claw like.



Figs 40–47, *Stenopsychodes opsius* Neboiss, 1974 (NSW, New England NP Cunnawarra Rd, Georges Ck, 11–15.xi.2020, 30.5159°S 152.3687°E, 1323m, Col K.M. Bayliss & D. Bickel; ANIC). 40–44, ♂, 40, habitus, lateral; 41 right fore- and hindwings; 42–44, genitalia, dorsal, lateral and ventral. 45–47, ♀ genitalia, lateral, dorsal and ventral. Scale bars =2mm.

Species in the second sub-group have a regular reticulate pattern on the forewing, lack the golden/orange marking on the hindwing, and have 1–3 processes on segment X; the apices of the inferior appendages vary considerably: some are ‘mitten-shaped’, some have a wide gape apically, some are narrow, others stout and some have an apical ‘claw’. These species are *S. dispar* sp. nov., *S. shackletoni* sp. nov., *S. redactus* sp. nov., *S. quasiredactus* sp. nov., *S. elongatus* sp. nov., *S. unguibus* sp. nov., *S. tropicus* sp. nov., *S. tillyardi* and *S. mjobergi*.

Stenopsychodes aureonigra Schmid

Stenopsychodes aureonigra Schmid, 1969: 208.

Figures 48–55

Type material. Holotype ♂, Victoria, Noorinbee, (37°31'S, 149°10'E), 22-XI-1965, (NMV T-3829).

Paratypes. Victoria: same locality as holotype, 20-XI-1965 (NMV T-3831, 1♂; NMV T-3834, 1♂), 30-XI-1965 (NMV T-3830, 1♀, as allotype; NMV T-3832, 1♂; NMV T-3833, 1♂; NMV T-3835, 1♂; NMV T-3836, 1♂); Licola (37°38'S, 146°37'E) 15-XI-1965 (NMV T-3837, 1♂; NMV T-3838, 1♂; NMV T-3839, 1♂; NMV T-3840, 1♂; NMV T-3841, 1♂; NMV T-3842, 1♀).

Material examined. Victoria: 1♀, G.G.S. Timbertop, nr Merrijig, (37°09'S, 146°19'E), 30 Nov. 1957, J. Landy, (NMV TRI-12253); 1♂ 1♀, Howqua River, Stockyard Flat (37°12'S, 146°28'E), 11 Jan. 1969, G.E.C. (NMV TRI-12254); 2♂ 1♀, Brodribb River, Sardine Creek Track, 39km N of Orbost (37°23'S, 148°28'E) 16 Dec. 1976, Neboiss (NMV TRI-12246); 1♀, Wellington-Carey Riv. Junc., (37°30'S, 146°38'E) 15 Feb. 1977, A.A. Calder (NMV TRI-12250); 1♂, Thomson River, Bells Clearing (37°41'S, 146°13'E), 2 Dec. 1977, NMV Survey Dept, G.R.E.S. T13 A (NMV TRI-12252); 1♀, Macalister-Barkly River junction Lyndon Flat, (37°33'S, 146°35'E), 6 Dec. 1977, N.M.V. Survey Dept, G.R.E.S. Mc 14 (NMV TRI-12251); 1♀, Big River at Big River Track, 20km SE of Goongerah (37°30'S, 148°52'E), 3 Oct. 1985, B. Chessman, (NMV TRI-12255). New South Wales: 1♀, Genoa River, Rockton (37°07'S, 149°19'E), 20 Nov. 1965, Neboiss (NMV TRI-12249); 4♂♂, (35.56S 149.35E), Little Snowball Ck, 960m, 10 Dec. 1989, E.D. Edwards (ANIC); 4♀♀, SE Genoa River, 1.5km along Imlay Rd, (37.14°S 149.32°E), alt 421m, 22 Nov. 2014, D. Cartwright (NMV TRI-54417).

Diagnosis. *Stenopsychodes aureonigra* shares with *S. melanochrystus*, *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov. an irregular golden/orange marking on the costal edge of the hindwing (as in Figs 56, 58 of *S. melanochrystus*) but *S. aureonigra* differs from those species in having the forewing bearing small, regularly distributed golden/orange reticulations on a dark background (Fig. 48), a feature shared with the remaining members of the *melanochrystus*-group. Males of *S. aureonigra* are also distinguished from *S. melanochrystus*, *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov., by the lateral lobe on segment IX sharply triangular in lateral view (Fig. 52), the intermediate processes on tergite X short, scarcely exceeding the length of the superior appendages, and the gape on the apical claw of the inferior appendages tight (Fig. 50). The female genitalia are similar to those of *S. melanochrystus*, *S. montanus* and *S. mjobergi*, all four species having the sternite of abdominal segment IX broad apically and, in lateral view,

abdominal tergite VIII expanded into ‘earlike flaps’ bearing dense long setae apically (Figs 53–55); *S. aureonigra* is distinguished from *S. melanochrystus* in ventral view by having the distal margin of sternite IX smoothly rounded (Fig. 55), not apically cleft as in *S. melanochrystus*, or truncate as in *S. mjobergi*; the flaps on tergite VIII are deeper in lateral view as in *S. melanochrystus*, but less so.

Description. See Schmid (1969: 208).

Length of each forewing: ♂ 11.5–14mm (n = 10); ♀ 13.5–16mm (n = 10)

Distribution. One of the more commonly collected *Stenopsychodes* species, ranging from eastern Victoria to south-eastern New South Wales, a latitudinal range of 35.9–37.5°S.

Remarks. Schmid’s (1969) comment in describing this species, that ‘[t]his species is very pretty with its black colouring and the strong flecks on the forewings of a warm golden colour, which allow it to be immediately distinguished from *S. melanochrystus*, its very close relative’ [authors’ translation from French].

Stenopsychodes melanochrystus Tillyard

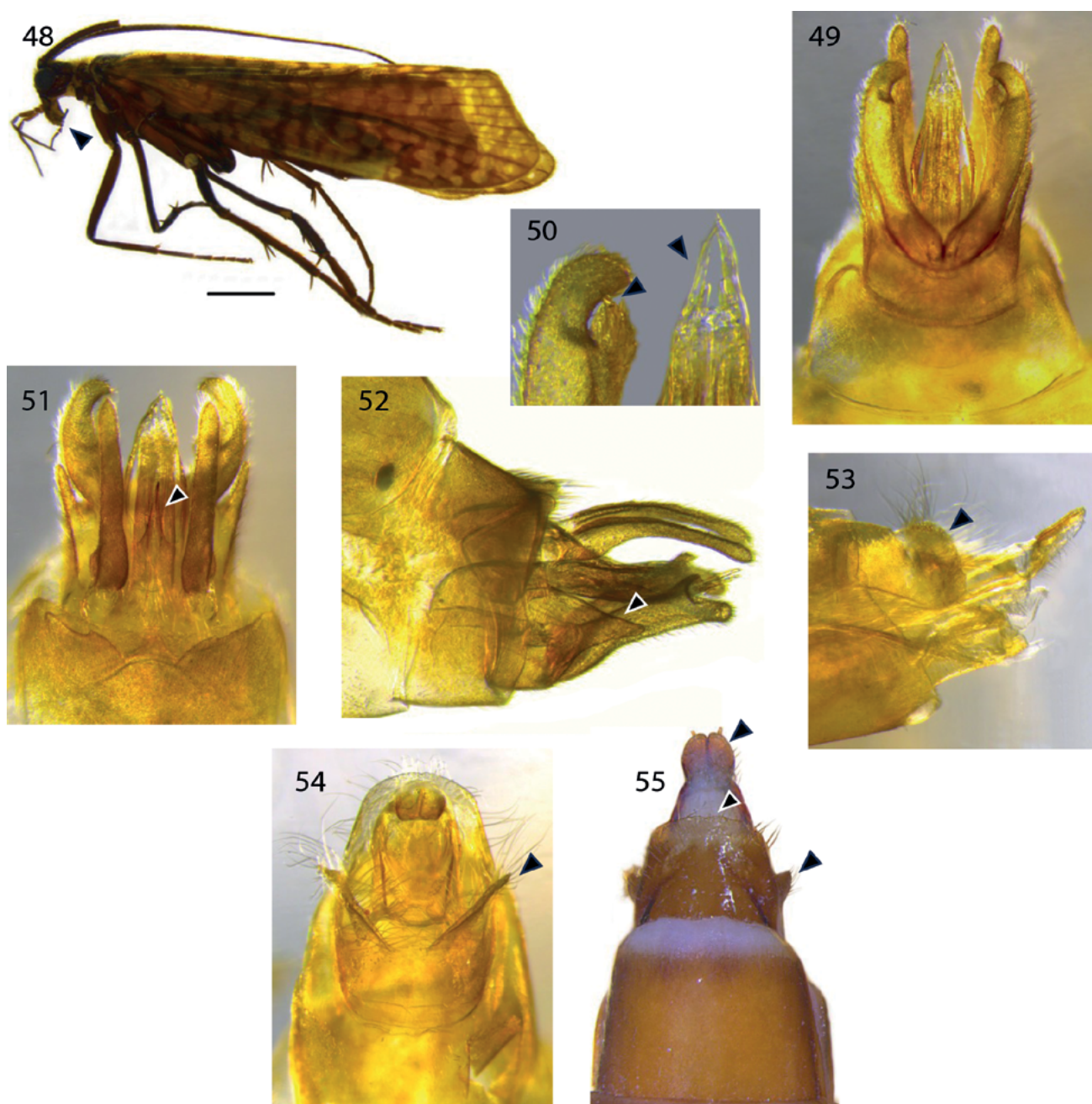
Stenopsychodes melanochrysta Tillyard, 1922: 81–82; –ABRS, 2024.

Figures 56–65

Material examined. Holotype ♀, New South Wales, Dorrigo, (undated), (SAM: image supplied by SAM). [Estimated as latitude 30°20'24.72"S longitude 152°42'44.47"E or -30.340199 152.712352]

Other material examined. New South Wales: ♂♂ ♀♀ Upper Allyn River, 1000 feet, 8 Nov. 1960, IFB Common & MS Upton, (NMV TRI-27402–27414); 2♀♀, Gibraltar Range Nat. Pk, 11 Nov. 1961, C.W. Frazier (ANIC); 2♂♂ 4♀, Forbes River, nr Yarras, (31°25'S 152°19'E), 12 Oct. 1979, G. Theischinger (NMV TRI-12119); 2♂♂ 3♀♀, Allyn River, Chichester SF, 10–11 Nov. 1981, T. Weir, (ANIC); 2♂, Wilson River Reserve, 15km NW Bellangry, 7-xii-1986, 244m, G. Theischinger, (NMV TRI-12124); 1♀, Wilson River Reserve nr Bellangry, 5.xii.1988, sub trop. rainforest, G. Theischinger, (NMV TRI-12121, part); 9♂♂ 9♀♀, Styx River, Hyatts Flat, 8.12.1998, G. Theischinger, (ANIC); 2♂♂, Never Never River at Whitney’s Rr, (030.3300166 152.8622166), 10 Nov. 2010, J Webb & M Shackleton 101110-5 (QM); 1♂ 1♀, Wilson River at Wilson rd, -(31.207050 152.49950), 12 Nov. 2010, J. Mynott & M. Shackleton 101112-3 (QM).

Diagnosis. *Stenopsychodes melanochrystus* shares with *S. aureonigra*, *S. pictus* sp. nov., and *S. crystalinus* sp. nov. the irregular-shaped golden strip along about ¾ of the length of the costal margin of the hindwing (Figs 56, 58); on *S. boreas* sp. nov. the strip is much shorter. Pinned specimens of *S. melanochrystus*, *S. pictus* sp. nov., *S. crystalinus* sp. nov. and *S. boreas* sp. nov. or those freshly preserved in ethanol have an irregular pattern on the forewing that is quite distinct from the very regular reticulate pattern of *S. aureonigra*. Both *S. melanochrystus* and *S. pictus* sp. nov. have a sub-distal golden band in between brown/black areas (Figs 56, 58); whereas *S. crystalinus* sp. nov. and *S. boreas* sp. nov. have isolated golden spots sub-distally; in *S. melanochrystus* the proximal 2/3 of the forewing is more greatly divided into golden and dark areas



Figs 48–55, *Stenopsychoidea aureonigra* Schmid, 1969, (Vic, Noorimbee, 23 Nov. 1965, A. Neboiss; NMV TRI-12094). 48–52, ♂, 48, habitus; 49–52, genitalia ventral, apex of left inferior appendage, dorsal and lateral. 53–55, ♀ genitalia: lateral, dorsal and ventral. Scale bar = 2mm.

than in *S. crystalinus* sp. nov., *S. pictus* sp. nov. or *S. boreas* sp. nov. (Figs 66, 67, 78, 79, 87). The male genitalic structures resemble those of *S. crystalinus* sp. nov. in lateral view the lateral lobes on segment IX are sharply triangular, whereas in *S. melanochrysus* they taper more abruptly at about half length to become almost digitiform in distal half (Fig. 61). The female has abdominal segment IX with a short, more widely V-shaped

apical cleft (Fig. 65) than in *S. crystalinus* sp. nov. and in lateral view deeper and more prominent apically rounded lateral 'flaps' on tergite VIII (Figs 63–65) than in *S. aureonigra*, *S. crystalinus* sp. nov. and *S. pictus* sp. nov.

Description. (See Tillyard 1922: 81; Schmid 1969: 208).

Length of each forewing: ♂ 12.0–15.2mm (n =4); ♀ 13–16.3mm (n =3).



Figs 56–65, *Stenopsychodes melanochrysa* Tillyard, 1922. 56, 57, Holotype specimen, pinned ♀ (SAMA) part of body and wings, and locality and identification labels, abdomen attached to latter. 58–65, New South Wales, Styx River (ANIC), 58, ♂ fore- and hindwings; 59–62, ♂ genitalia: dorsal, ventral, lateral and tip of inferior appendage; 63–65, ♀ genitalia, lateral, dorsal and ventral. Scale bars =1mm (Fig. 56), 2mm (Fig. 58).

Distribution. *Stenopsychodes melanochrysus* is known from north-eastern New South Wales, from the foot of the New England tablelands and toward the east coast, with a latitudinal range of 29.5–32°S.

Remarks. Tillyard (1922) based this species on two ‘badly damaged’ female specimens. The image here (Fig 56) of the female type in the SAMA shows the patterned wings and lateral view of the genitalia consistent with those illustrated by Tillyard (1922). Subsequently, Schmid (1969: Pl. II, fig. 9) illustrated in far more accurate detail, a lateral view of the genitalia of a female identified as *S. melanochrysus*, and Neboiss (1986: 112) included a lateral view of the male genitalia, a copy Schmid’s figure (pl. II fig. 9) of the lateral view of female genitalia and a patterned forewing that appears to be copied from Tillyard (1922: 82, fig. 6). Neboiss (1986) does not give any identifier for the specimen he illustrates; the genitalia bear close resemblance to the three new species we are describing here as *S. crystalinus* sp. nov., *S. pictus* sp. nov. and *S. boreas* sp. nov. However, although the forewings of these new species show some slight variation between specimens (e.g., Fig. 78), the basic patterns of all three are consistently different from the forewing illustrated by Tillyard (1922) for *S. melanochrysus*; and the female genitalia of *S. melanochrysus* and *S. pictus* sp. nov. in lateral view have more angular postero-lateral ‘flaps’ on abdominal tergite VIII rather than the rounded or earlike ‘flaps’ seen in *S. crystalinus* sp. nov.

Schmid (1969), in describing the male of his new species, *S. aureonigra*, commented on the difference in wing pattern, but noted that ‘[c]uriously, the genitalia correspond perfectly to those of *S. melanochrysa* and that even in the smallest details’ [authors’ translation from French]. Thus, we have the conundrum of a group of what we postulate are separate species, but which appear to have virtually identical male genitalia, yet distinct and constant differences in wing pattern. The problem could possibly be solved by molecular studies, or even, were it possible, by behavioural studies that might throw light on the significance of the wing patterns.

Stenopsychodes crystalinus sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:8FE81351-B52D-40D5-9FBD-CABF69B27993>

Figures 66–77, 92–94

Material examined. *Types:* Holotype, ♂, New South Wales, Crystal Creek Rainforest Resort, Upper Crystal Creek, (28°15'S 153°18'E), 24–25 Dec. 2016, UV It, A. Wells, (ANIC). *Paratypes:* New South Wales: 1♂, Crystal Creek Rainforest Resort, Upper Crystal Creek, 20 Dec. 2016, UV It, A. Wells, (ANIC); 1♂, Crystal Creek Rainforest Resort, Upper Crystal Creek, (28°15'S 153°18'E), 24 Dec. 2016, UV It, A. Wells, (ANIC); 6♂♂, New South Wales, Crystal Creek Rainforest Resort, Upper Crystal Creek, 24–25 Dec. 2016, UV It, A. Wells, (NMV TRI-56799); 10♂♂ 1♀, Crystal Creek Rainforest Resort, Upper Crystal Creek, 26–27 Dec. 2016, UV It, A. Wells, (ANIC); 1♂ 3♀♀, Crystal Creek Rainforest Resort, Upper Crystal Creek, 26–27 Dec. 2016, UV It, A. Wells, (ANIC).

Other material examined. Queensland: 2♂♂ 1♀, 20 unsexed (all pinned), National Park, Dec. 1953, H. Hooker (QM); 2♀♀, Cedar Creek, Oct., (no further data) (QM); 3♂♂ 1v, Nothofagus Mtn, 12km N of Woodenbong, 26 Nov. 1982, 400m, G.B. Monteith & D. Yeates, Light trap (QM); 1♀, Wilson River Reserve nr Bellangry, 5.xii.1988,

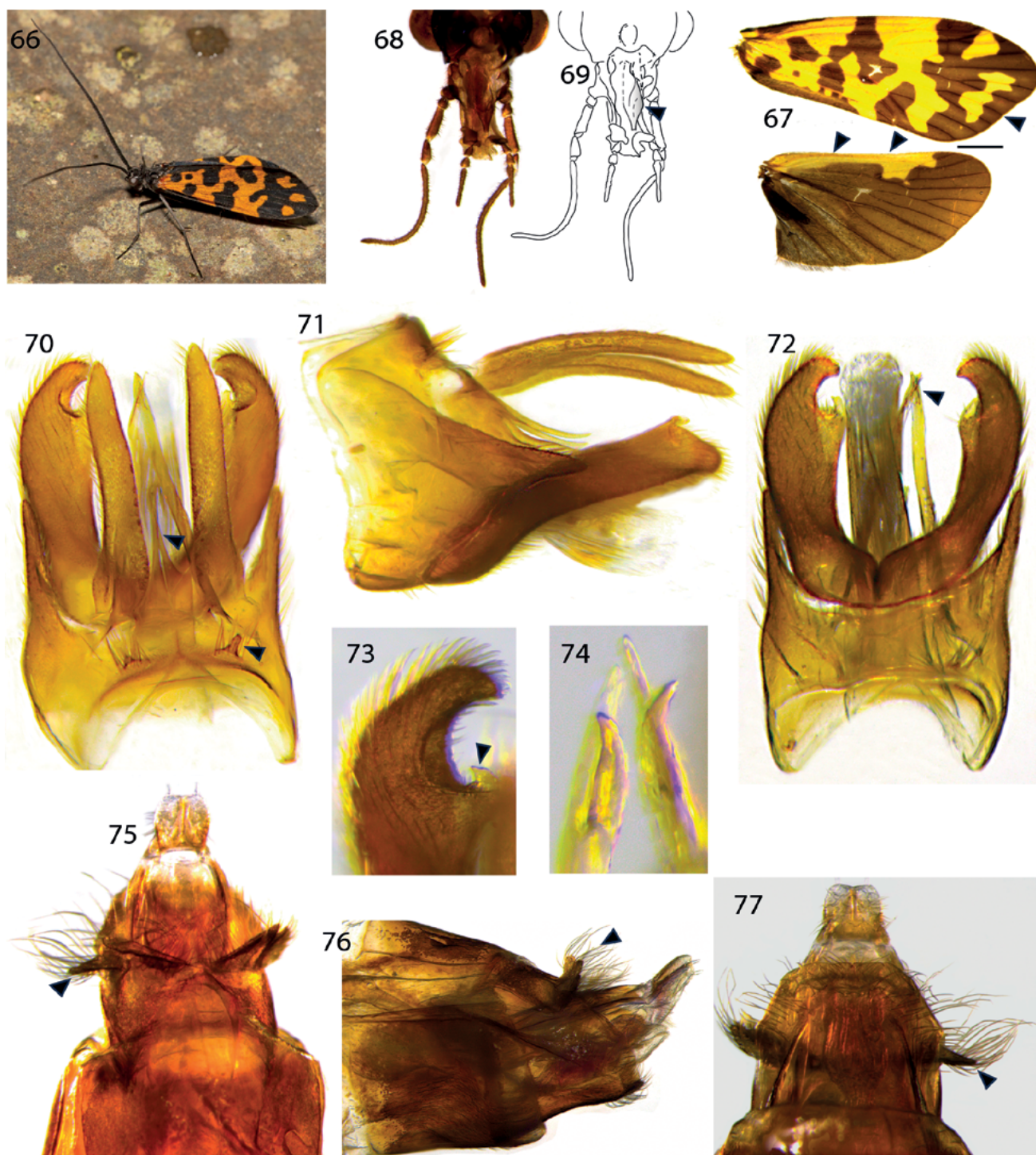
subtrop. rainforest, G. Theischinger, (TRI-12121, part); 1♀, Lamington National Park, Albert River (Right Branch), (28°16'09.9"S 153°07'57"E), 12 Dec. 2021, C.J. Burwell, 440m (QM); 1♀, 28.267°S x 153.124°E, Lamington N.P. Albert R. (Right branch), 380m, 12 Dec. 2021, D. Pagotto. New South Wales: 1♀, Gibraltar Range Nat Pk, S.T.R.F., 8 Jan. 1964, C.W. Frazier (ANIC); 1♂ (pinned), (28.24S 153.17E), 1km E of Mt Warning, 500m, 22 Nov. 1976, I.F.B. Common, E.D. Edwards (NMV TRI-56800); 1♂, Upper Tweed River, Dec. 1978, LG M (ANIC); 1♀, Gibraltar Ra. N.P., 15.xii.1984, MV light, D.K. Yeates (QM); 5♂♂ 1♀, Goomburra State Forest, NE of Warwick, (28°03'S 152°07'E), 20 Jan. 1986, G. Theischinger, (NMV TRI-12384); 1♀, Goomburra State Forest, NE of Warwick, (28°03'S 152°07'E), 20 Jan. 1986, G. Theischinger, (NMV TRI-12381 & TRI-12381.1 (=PT-1656)); 3♂♂ 4♀♀, Goomburra State Forest, NE of Warwick, (28°03'S 152°07'E), 20 Jan. 1986, G. Theischinger, (NMV TRI-12377).

Diagnosis. *Stenopsychodes crystalinus* resembles *S. melanochrysus*, *S. aureonigra* and *S. pictus* sp. nov. in having a golden/orange bar along about $\frac{3}{4}$ of the costal margin of the hindwing (Fig. 67) and shares a similar bold pattern on the forewings with *S. melanochrysus*, *S. pictus* sp. nov. and *S. boreas* sp. nov., but most closely resembles *S. pictus* sp. nov. with which it shares more similar coarse bold patterns of golden/orange and black to brown areas on the forewing. It can be distinguished by the two or three discrete golden areas on the distal end of the forewing, and sparse dark areas in the proximal section and by the shape of the tooth in the claw-like gape of the inferior appendages; see also the diagnostic features under *S. melanochrysus*. The female genitalia of *S. crystalinus* differ from those of *S. pictus* sp. nov. in having the distal margin of sternite IX truncate with a median very small v-shaped cleft (Fig. 77), not rounded with a shallow median concavity as in *S. pictus* sp. nov. (Fig. 85).

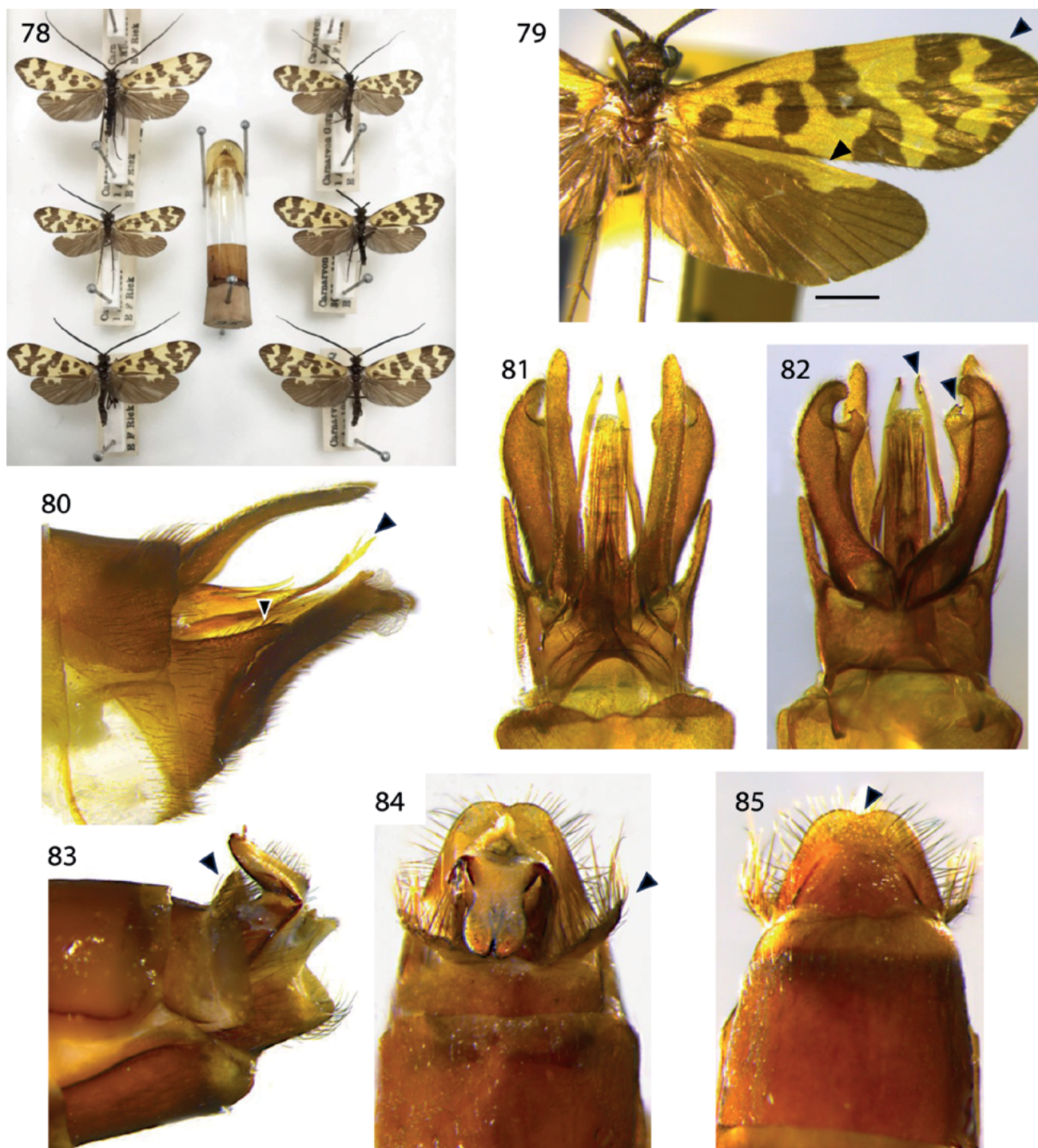
Description. Body entirely jet black, including head and thorax (Fig. 66). Antennae black, slightly longer than forewings. Mouthparts elongate, forming a rostrum (Figs 68, 69).

Wings. Length of each forewing: ♂, 11.0–12.9mm (n =10), ♀ 12.8–14.8mm (n =5). Forewings boldly and vividly patterned, orange/golden and black (Figs 66, 67), fading to bright yellow and brown in spirits with distal area dark except for 2 or discrete irregularly shaped subapical golden patches; hindwing (Fig. 67) with coloured band extending along proximal $\frac{3}{4}$ costal margin and irregularly wider in distal part; and small, coloured area at base of median cell, marking cross-vein M3+4–Cu1. Forewing footstalk of f3 about $\frac{1}{5}$ length of f3.

Genitalia. Male (Figs 70–74, 92–94). Lateral lobe of segment IX produced to about half length of inferior appendages, broad-based, sharply tapered in distal half to acute apex (Figs 71, 93). Superior appendages rod shaped, in length equal to inferior appendages and intermediate processes of segment X. Abdominal segment X dorsally bearing pair of short, sharp upper processes (Figs 70, 92), laterally pair of slender tapered intermediate processes, apically bifid, with bristle-like setae on lower $\frac{2}{3}$ (Figs 72, 74, 92–94). Inferior appendages in ventral view stout basally, narrowing before expanding to form open clawlike apices with mesal lobe bearing small tooth distally, outer lobe curving inwards to rounded apex (Figs 70, 72, 73); in lateral view almost even width throughout length, obliquely truncate distally (Fig. 71)



Figs 66–77, *Stenopsychodes crystalinus* sp. nov. 66, live specimen, Queensland, Lamington National Park, Albert River (Right Branch), 28°16'09.9"S 153°07"E. 67–77, specimens from New South Wales, Upper Crystal creek (ANIC): 67–74, ♂: 67, fore- and hindwings; 68, 69, mouth parts in form of rostrum, dorsal and ventral views; 70–74, genitalia, dorsal, lateral and ventral views, apex of left inferior appendage and tips of intermediate processes; 75–77, ♀ genitalia dorsal, lateral and ventral. Scale bar = 2mm. [Fig. 66 Courtesy C. Burrell, QM]



Figs 78–85, *Stenopsychoidea pictus* sp. nov. 78, 79, pinned specimens, (Queensland, Carnarvon Gorge; NMV): 78 sample illustrating slight variations in wing pattern; 79 Holotype ♂, (Queensland, Carnarvon Gorge; (NMV TRI-27378), right fore- and hindwings and part body); 80–82, ♂ genitalia lateral, dorsal and ventral. 83–85, ♀, (Qld, Carnarvon Gorge National Park, 25°15'S 148°24'E; NMV Tri-12143), genitalia, lateral, dorsal and ventral. Scale bar =2mm.

Female genitalia (Figs 75–77). Abdominal segment IX produced dorso-laterally to form rather angular ‘flaps’; apico-ventral margin almost truncate in ventral view, a tiny v-shaped cleft medially (Fig. 77); segment X divided lengthwise to form ovoid lobes (but apparent shape dependent on angle of viewing).

Distribution. Known from NE New South Wales from the type locality and further southwest, and from Lamington National Park in SE Queensland, having a latitudinal range of 28–29.6°S.

Etymology. *crystalinus*—derived from the name Crystal Creek, the type locality.

***Stenopsychodes pictus* sp. nov.**

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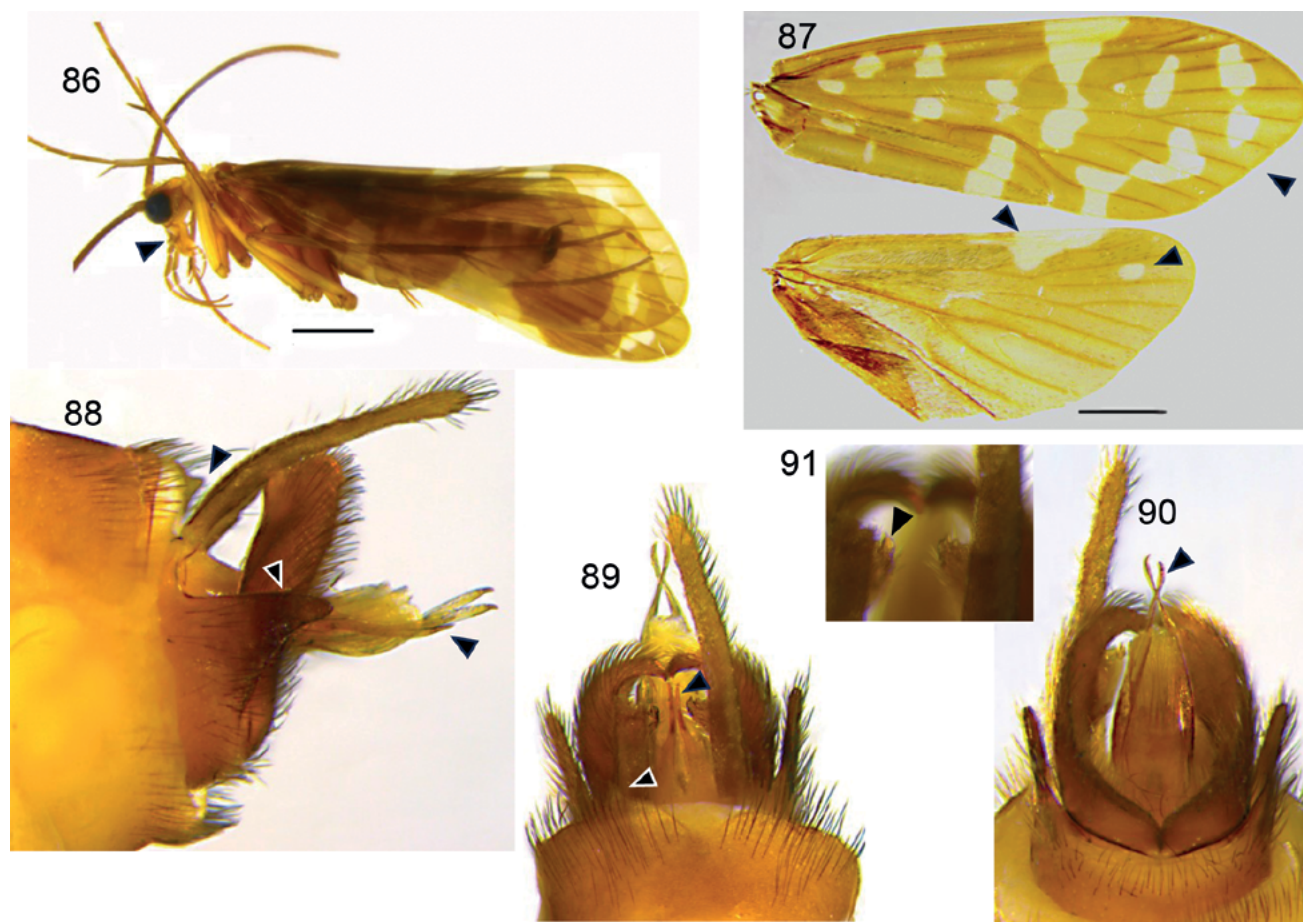
Figures 78–85, 95–97

Material examined. *Holotype* ♂, Queensland: Carnarvon Gorge (25°04'S, 148°15'E), E.F. Riek, 1 Apr. 1957 (NMV TRI-27378, TRI-27378.1, gen. prep.). *Paratypes*: Queensland: 2♀♀ (pinned), Carnarvon Gorge, 1 April 1957, E.F. Riek, (ANIC); 1♀, Carnarvon Gorge N.P., 11–13-3-1997, G. Theischinger & L. Mueller, (ANIC).

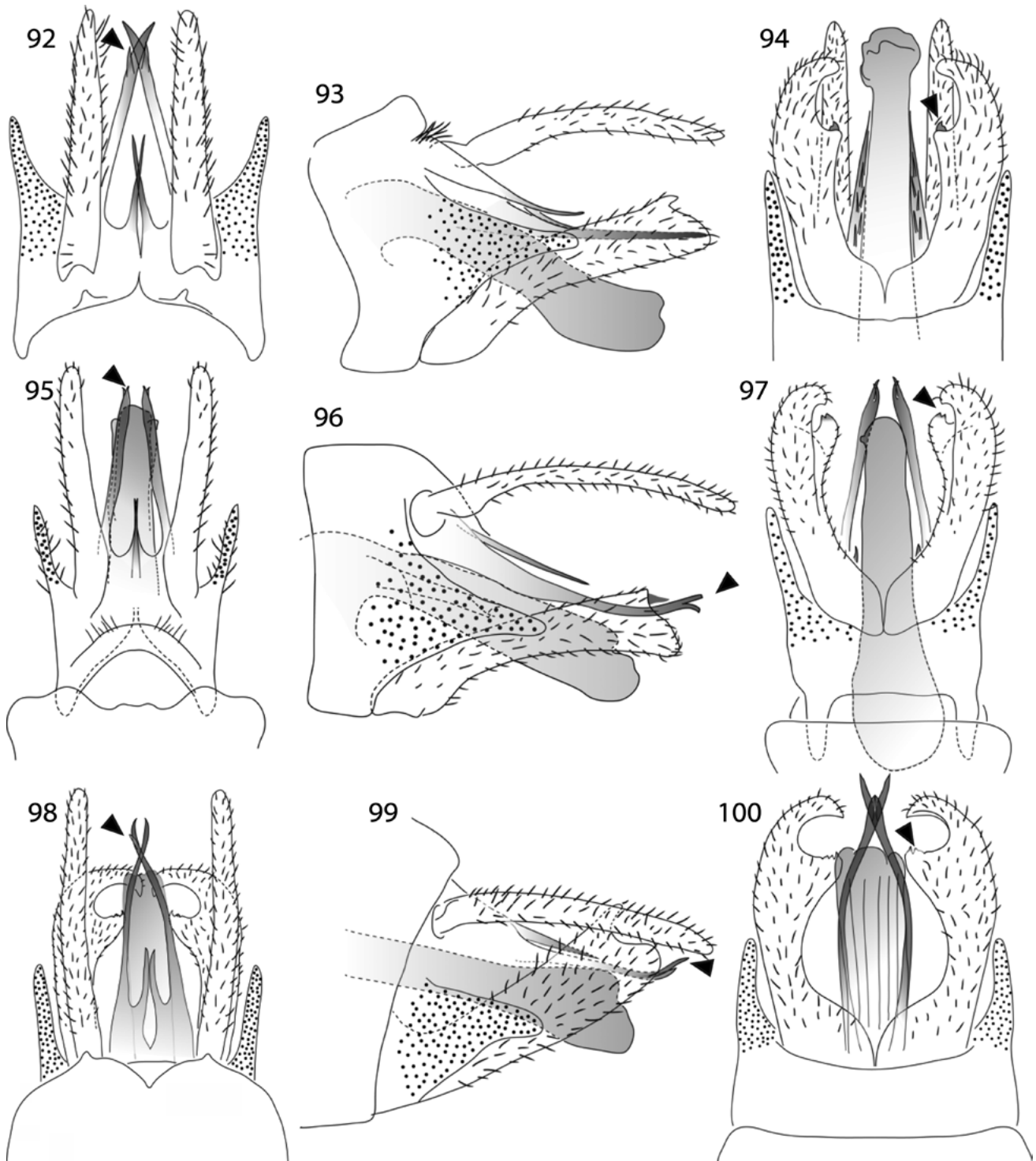
Other material examined. 1♀, SE Qld, Cedar Creek, Mt Tambourine (27°57'36"S, 153°11'24"E), 20 Dec. 1954, [no collector given], (NMV TRI-12144).

Diagnosis. *Stenopsychodes pictus* and *S. crystalinus* have the head and thorax black, whereas *S. melanochrysus* has golden setae on the head and thorax. The male genitalia of *S. pictus* closely resemble those of *S. crystalinus* and *S. melanochrysus* but the intermediate appendages are only weakly bifid (Fig. 95) and the female abdominal sternite IX of *S. pictus* has the apical margin rounded, with more of a concavity apically (Fig. 85), rather than a small ‘cleft’ as seen in *S. crystalinus* and *S. melanochrysus*, and the latero-apical flaps angular, not rounded as in those two species.

Description. Length of each forewing: ♂ 12.1–13mm (n=4); ♀ 12.8–16.0mm (n=7). Forewing boldly patterned, golden and dark brown (Figs 78, 79), two irregular-shaped golden bands in distal half and more than half proximal area golden; f1 footstalk short, footstalk on f3 very short; hindwing with irregular golden bar along $\frac{3}{4}$ costal edge (Fig. 79). Mouthparts elongate. Body, including head and thorax, entirely jet black (Fig. 78). Antennae black, almost length of forewings.



Figs 86–91, *Stenopsychodes boreas*, sp. nov., (Queensland, Finch Hatton Gorge, ♂; NMV TRI-12145): 86, Paratype habitus (NMV TRI-56801); 87, Holotype, fore- and hindwings; 88–91, Holotype, genitalia, lateral, dorsal, ventral, tip of right inferior appendage. Scale bars =2mm.



Figs 92–100, *Stenopsychodes* species, ♂ genitalia, dorsal, lateral and ventral: 92–94, *S. crystalinus* sp. nov.; 95–97, *S. pictus* sp. nov.; 98–100, *S. boreas* sp. nov.

Genitalia. Male (Figs 80–82, 95–97). Lateral lobes of segment IX in lateral view wide at base and tapered, narrow in distal half, apex narrowly rounded (Figs 80, 96); superior and inferior appendages almost equal in length; tergite X produced medially into two sharp short spines of upper processes, intermediate processes elongate, in lateral view, tapering distally to weakly bifid apices (Fig. 96); superior appendages robust in dorsal view, length about nine times broadest width (Figs 81, 95); inferior appendages in ventral view stout basally, narrowing before expanding distally, apex in form of ‘claw’ with gape rounded, mesal lobe bearing pair of small teeth distally, outer lobe curving inwards to rounded apex (Figs 82, 97); in lateral view almost even width throughout length, obliquely truncate distally (Figs 80, 96).

Female (Figs 83–85). Abdominal tergite VIII produced dorso-laterally into setate ‘flaps’, sharply triangular apically in lateral view; sternite IX with apical margin rounded, shallow excavation mid-apically in ventral view (Fig. 85); segment X short, apically truncate.

Distribution. Known from the type locality in the central highlands of S Queensland, to the north-east of Brisbane, a latitudinal range of 25–31.4°S.

Etymology. *pictus* — Latin word for coloured; ‘picta’ was the unpublished name on the pinned specimens in NMV, chosen by the late Arturs Neboiss.

Remarks. *Stenopsychodes pictus* closely resembles *S. crystalinus* and has male and female genitalic features almost indistinguishable from those of *S. aureonigra*, *S. crystalinus* sp. nov., *S. melanochrysus* and *S. boreas* sp. nov. However, since wing features of each are so distinctive, we follow Schmid (1969) who separated *S. melanochrysus* and *S. aureonigra* on the basis of wing pattern differences. Future molecular studies might determine otherwise.

Stenopsychodes boreas sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:8696D66D-71CE-44C2-88FD-577540017C5F>

Figures 86–91, 98–100

Material examined. Holotype ♂, N Qld, Finch Hatton Gorge, (21°07'S 148°38'E), 14 Nov. 1982, T. Hinger, (NMV TRI-12145, TRI-14145.1).

Paratype: 1♂ collected with holotype (NMV TRI-56801).

Diagnosis. This species differs from *S. melanochrysus*, *S. crystalinus*, and *S. pictus*, having far more sparse pale areas (probably golden in fresh specimens) on the very coarsely patterned forewing, and in the hindwing the costal pale band reduced to about 1/3 length of the costal margin, compared with about 3/4 length in other colourfully patterned species; the male genitalia closely resemble those of *S. crystalinus* and *S. pictus*; but the intermediate processes on tergite X are sculpted apically, not smooth or bifid.

Description. Male. Head yellow, body dark coloured. Length of each forewing: 6.2–6.3mm (n = 2). Forewing coarsely but sparsely patterned dark and pale (?golden), with two small pale (?golden) blotches distally; hindwing with pale (golden) costal

area only about 1/3 length of costal margin band, a single pale spot distally in fork 2. Stalks on f1 and f3 short, about 1/6 and 1/8 length of forks respectively.

Genitalia (Figs 88–90, 98–100). Abdominal tergite IX in dorsal view excavated apico-medially, produced distally into small pointed peak on each side; lateral lobes sub-triangular, tapered to narrowly rounded apex; superior appendages longer than inferior appendages and intermediate processes; inferior appendages in dorsal and ventral views, broad-based, constricted before broad distal section, claw-like distally, inner lobe of claw bearing small spurs apically, in lateral view robust, sub-rectangular; segment X divided dorso-medially to form pair of short sharp upper processes, intermediate processes elongate, sculptured apically (Figs 88, 98, 100).

Female unknown.

Distribution. Known only from Finch Hatton Gorge, NE Qld, latitude 21.1°S.

Etymology. The Latin *boreas*, the north (for its northern locality).

Remarks. Only two specimens were available and both had damaged or slightly deformed male genitalia. Since the wing patterns are so very different from the other species with coarse patterns, and the type locality is so far north of the other localities, we are establishing a separate species. The holotype is missing one of the superior appendages.

Stenopsychodes dispar sp. nov.

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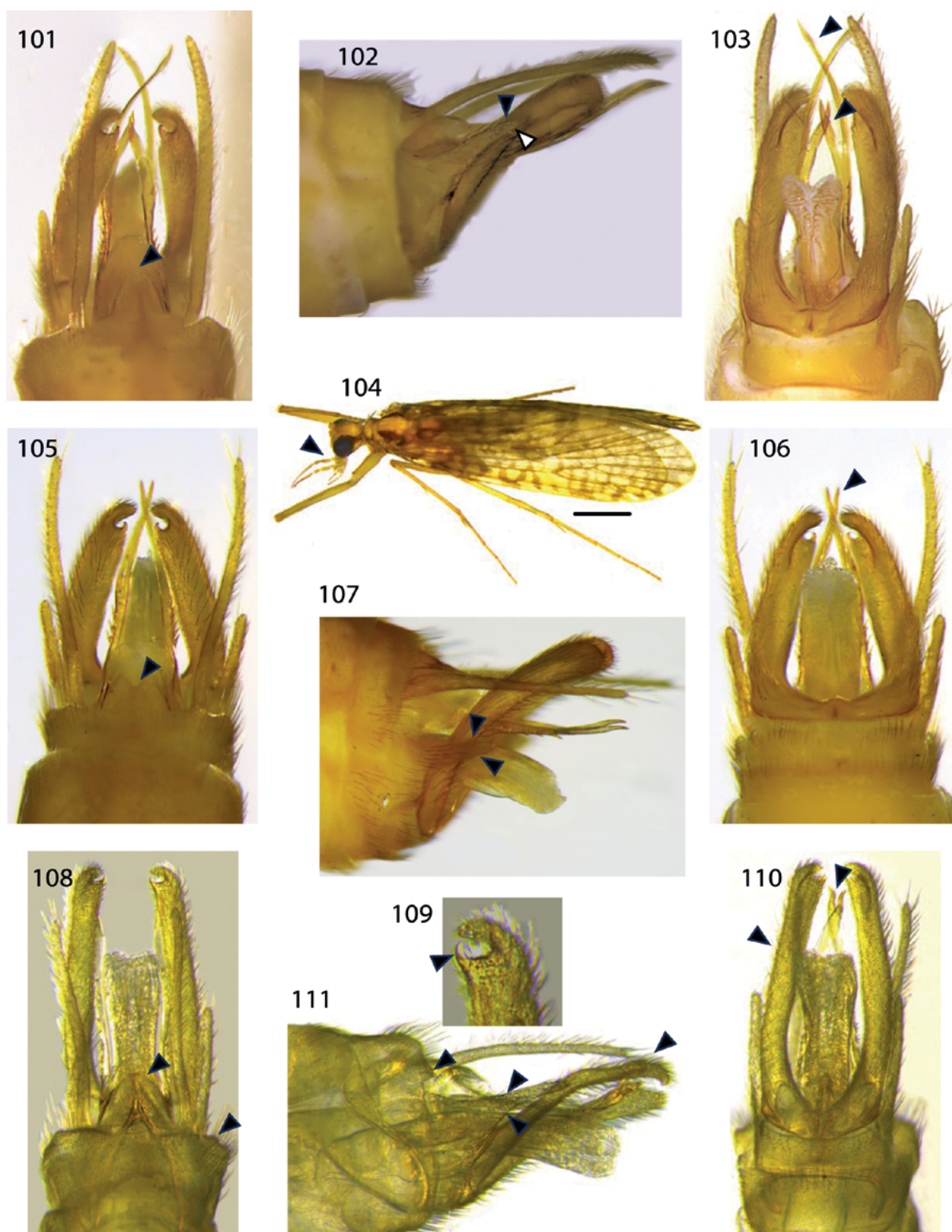
Figures 101–103, 112–114

Material examined. Holotype ♂, North Queensland, Bellenden Ker Range, Cable Tower 3 (17°12' S, 145°51' E), 1054m, Oct. 25–31-1981 Earthwatch /Qld Museum (NMV TRI-56802).

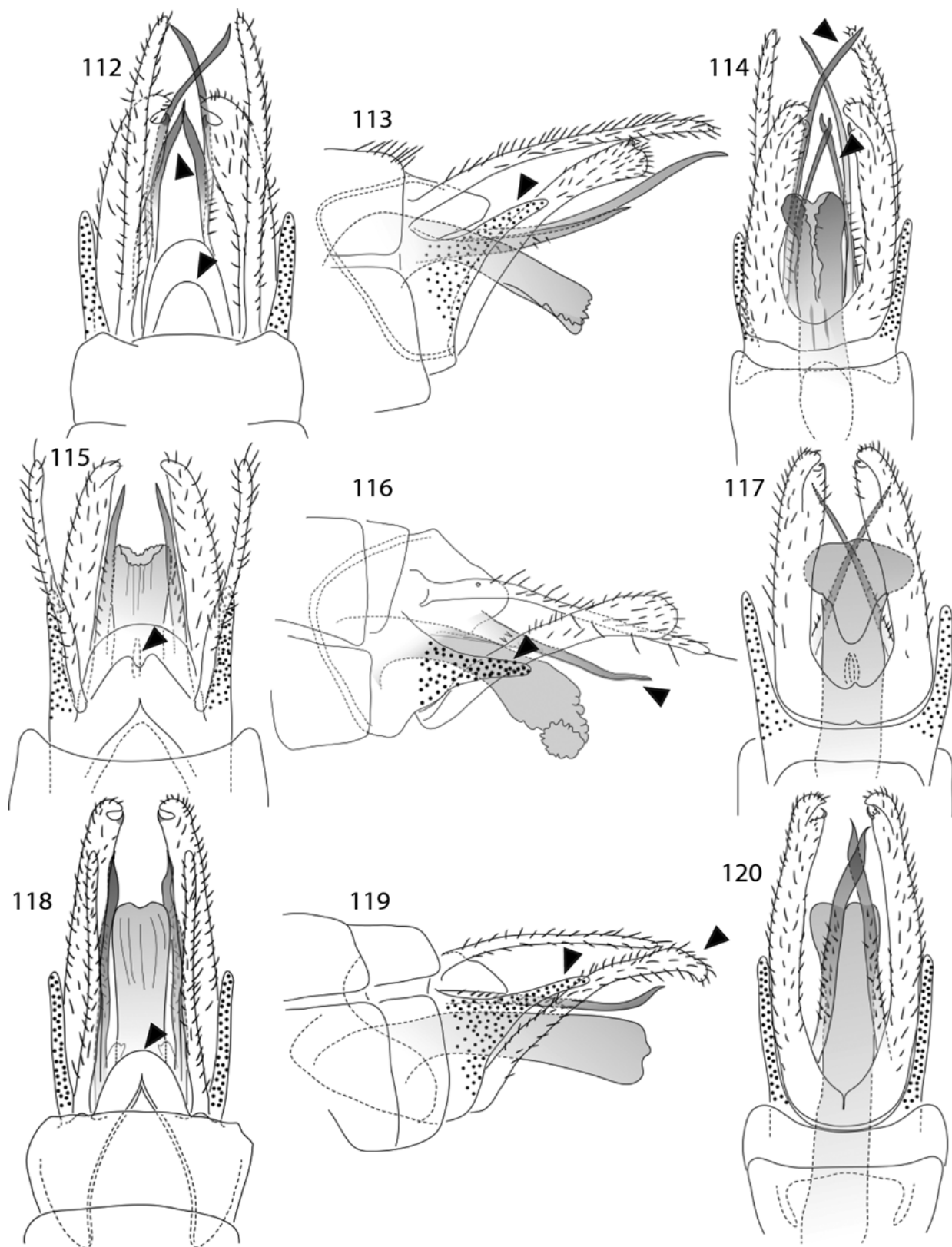
Paratypes: North Queensland: 2♂♂, collected with holotype (NMV TRI-56803); 2♂♂, same collection data as holotype (NMV TRI-56804).

Diagnosis. One of the sub-second subset of species with prominent mouthparts, forewing with a regularly reticulate pattern of golden and dark brown or black and the hindwing uniform in colour. *Stenopsychodes dispar* resembles *S. shackletoni* sp. nov., *S. redactus* sp. nov., *S. quasiredactus* sp. nov. and *S. elongatus* sp. nov. in having the inferior appendages slender throughout their length, often appearing ‘mitten-shaped’ terminally in ventral and/or dorsal views, usually with a terminal concavity or gape, its meso-dorsal angle bearing a short hook. But *S. dispar* is characterised by having both intermediate and lower processes present laterally on tergite X, having the intermediate processes and the superior appendages of approximately equal length, and both well exceeding length of the lower processes and inferior appendages (Figs 101, 103, 112, 114); the lower processes bear short bristle-like setae on the basal half (Fig. 113).

Description. Male. Length of each forewing: ♂ 10.0–12.2mm (n = 6). Forewing with coarsely reticulate patterning (faded brown and cream coloured in spirit specimens); f1 almost



Figs 101–111, *Stenopsychodes* species. 101–103, *Stenopsychodes dispar* sp. nov., ♂, (North Queensland, Bellenden Ker Range, Cable Tower 3, 1054m; NMV TRI-56803): genitalia, dorsal, lateral and ventral. 104–107, *Stenopsychodes shackletoni* sp. nov., Holotype ♂, (Queensland, waterfall on Tully Gorge rd near Frank Roberts Lookout; NMV TRI-56802.1): 104, habitus; 105–107, genitalia, dorsal, ventral and lateral. Scale bar = 2mm. 108–111, *Stenopsychodes elongatus* sp. nov., Holotype ♂, (North Queensland, Goddard [sic] Ck, Kirrama State Forest, 18°06'S 145°41'E) (NMV TRI-56808.1), genitalia, dorsal, tip of left inferior appendage, ventral and lateral.



Figs 112–120, *Stenopsychodes* species, ♂ genitalia, dorsal, lateral and ventral: 112–114, *S. dispar* sp. nov.; 115–117, *S. shackletoni* sp. nov.; 118–120, *S. elongatus* sp. nov.

length of discoidal cell, sessile; f3 with footstalk 1/3 length of leading edge of fork; hindwing f1 with short footstalk, f3 with footstalk almost half length of leading edge of fork.

Genitalia (101–103, 112–114). Abdominal segment IX lateral lobes in lateral view tapered sharply in basal half, digitiform distally, rounded apically (Figs 102, 113); tergite X without upper processes but cleft apically forming pair of rounded lobes, bearing both intermediate and lower processes (Figs 101, 112), intermediate slightly twisted apically, about equal in length to superior appendages, both exceeding length of inferior appendages, lower processes almost length of inferior appendages, bearing bristle-like setae on basal half (Fig. 113); inferior appendages very slightly expanded in distal half, terminating in small dorsal claw-like gape (Figs 101, 112), with sharp hook on meso-dorsal angle of concavity (Fig. 101). Phallus with chitinated endotheca (Fig. 103).

Female: unknown.

Distribution. Known only from the type locality on the Bellenden Ker Range of north-eastern Queensland at over 1000m altitude, latitude 17.2°S.

Etymology. Latin *dispar* — unequal, for the lengths of the male genitalic structures.

Remarks. The diversity of species of *Stenopsychodes* collected from the Bellenden Ker Range during the EarthWatch expedition of 1981 is remarkable (a total of six species); all are rather similar. Although a single distinctive female was collected with and sorted into the same vial as the holotype and four paratypes of *S. dispar*, association of any females from the Bellenden Ker Range is dubious.

***Stenopsychodes shackletoni* sp. nov.**

<http://zoobank.org/urn:lsid:zoobank.org:act:0AD9D51D-FB85-42C1-83B8-D6A525134044>

Figures 104–107, 115–117

Material examined. *Holotype* ♂, North Queensland, waterfall on Tully Gorge rd near Frank Roberts Lookout, (–17.77823 145.65074), 18 May 2010, J Webb & M Shackleton, (NMV TRI-56805, NMV TRI-56805.1 (gen. prep.) *Paratypes:* North Queensland: 1♂, 25km along Mt Lewis Rd, SW of Mossman, 8 Jan. 1977, MS & BJ Moulds (NMV TRI-56806); 2♂♂, data as for holotype, (NMV TRI-56807).

Diagnosis. Although closely resembling *S. dispar*, *S. redactus* sp. nov. and *S. elongatus* sp. nov. in general form of produced mouth parts and male genitalia, this species is distinguished by having only the lower processes on tergite X, the intermediate and dorsal processes both absent, and having the lower processes about the length of the inferior appendages and undivided apically (Figs 105–107).

Description. Male. Head and thorax pale in spirit specimens (Fig. 104), forewing with coarse reticulations, brown and pale yellow; hindwing uniformly fuscous.

Length of each forewing: ♂ 10.2–11.3mm (n = 5). Forewing with f1 footstalk about half length of fork, footstalk on f3 about half length of fork, footstalk on f3 about 1/3 length; hindwing f1 sessile, f3 slightly exceeding 1/2 length of footstalk.

Genitalia (Figs 105–107, 115–117). Lateral lobes of abdominal segment IX in lateral view, elongate sub-triangular, tapered to narrowly rounded apices (Figs 107, 116); tergite X without upper processes but cleft apically forming pair of rounded lobes (Figs 105, 115); intermediate processes absent; lower processes elongate, in length almost equal to inferior appendages, basal half bearing stout bristle-like setae, apices undivided and smoothly sharp; superior appendages very slender (Fig. 107), in dorsal and ventral views longer than inferior appendages and lower processes (Figs 105, 106); inferior appendages in lateral view slightly expanded toward rounded apex, in ventral and dorsal views stout, even in width throughout length, apices claw shaped, with small curved hook at mesal angle; phallus membranous (Figs 105, 106).

Female: unknown.

Distribution. This species is known from two quite widely separated localities, from the top of Bellenden Ker Range and at the eastern base of the Range, and one from almost 250km further north on the eastern side of the Great Dividing Range, latitudinal range 16.6–17.8°S. A single female collected with the males at the Tully Gorge road waterfall could be the female of this species.

Etymology. Named for Dr Michael Shackleton who collected one of the specimens and also collected specimens of several of the other new species of *Stenopsychodes*.

***Stenopsychodes elongatus* sp. nov.**

<http://zoobank.org/urn:lsid:zoobank.org:act:80F2200F-D98A-450C-B99C-EADB240EFCDD>

Figures 108–111, 118–120

Material examined. *Holotype* ♂, North Queensland, Goodard Ck, Kirrama State Forest, (18°06'S 145°41'E), Apr. 1993, G. Theischinger, (NMV TRI-56808, TRI-56808.1).

Diagnosis. Distinguished from other similar species by slender inferior appendages terminating in mitten-like claws by the narrower and relatively far longer length of the inferior appendages (Figs 108, 111, 110, 118–120) and the long footstalk on f3 of the forewing that exceeds the length of the fork.

Description. Male. Length of each forewing: 8.9mm (n = 1).

Genitalia. Abdominal tergite IX in lateral view with apical margin with a very small upper lobe (Figs 108, 111, 118); tergite IX in lateral view with lateral lobes elongate sub-triangular, sharply tapered distally (Figs 111, 119); superior appendages slender, length about 13x maximum width (Figs 108, 118), inferior appendages exceeding length of other genitalic structures, curved downwards distally (Figs 111, 119), small claw apically (Figs 109, 118); tergite X lower processes elongate, about length of superior appendages (Figs 110, 118, 119).

Female: unknown.

Distribution. Kirrama area of NE Queensland, latitude 18.1°S.

Etymology. The Latin, *elongatus* — descriptive of the elongate inferior appendages.

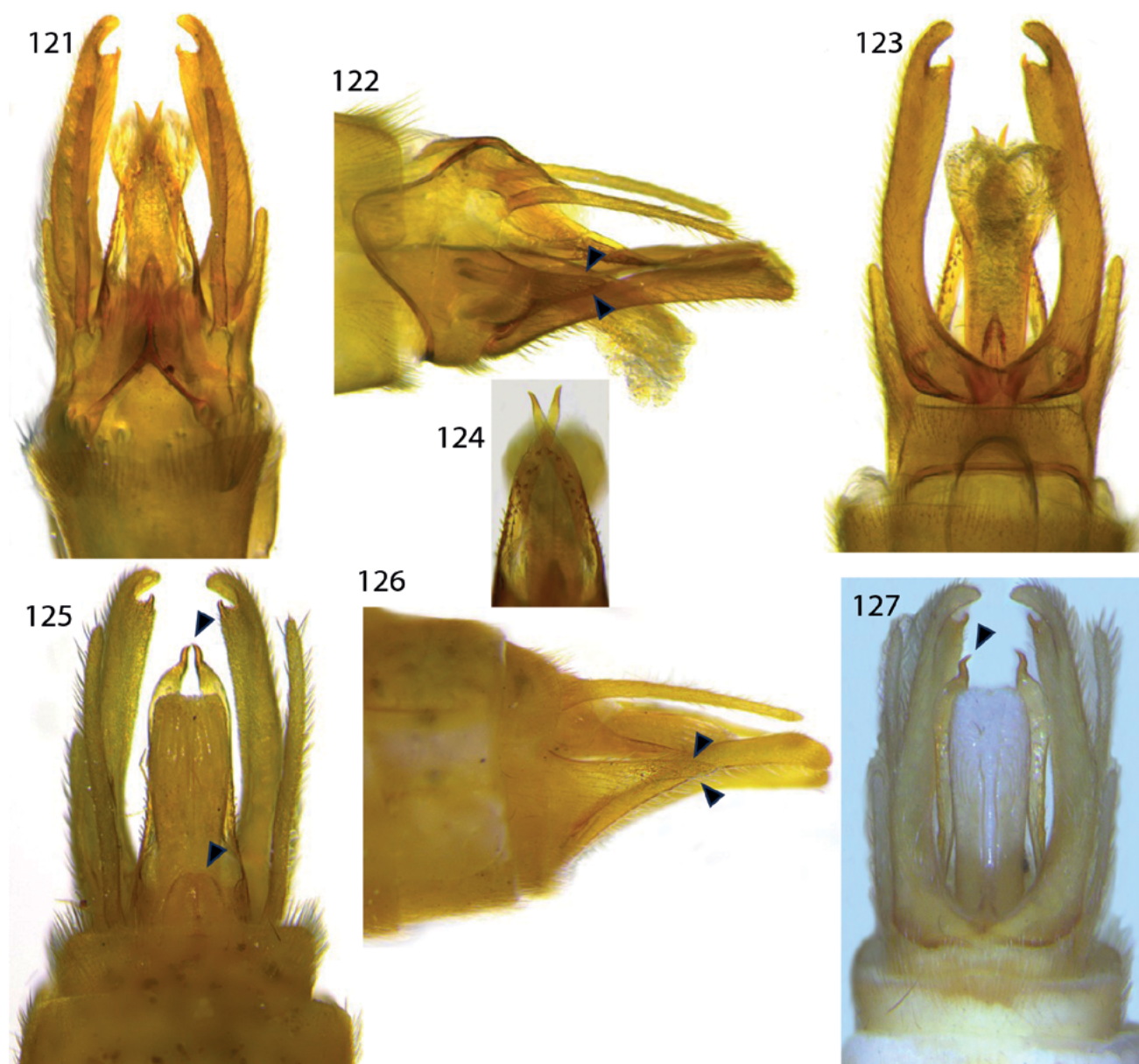
Remarks. This very distinctive species with its slender, elongate inferior appendages is known only from the type male, collected well south of the other similar species with slender inferior appendages.

***Stenopsychodes redactus* sp. nov.**

<http://zoobank.org/urn:lsid:zoobank.org:act:9553FD43-2CFB-40ED-8AE3-7DA031D6FCFB>

Figures 121–124, 128–130

Material examined. *Holotype* ♂, North Queensland, E flowing creek, 14 km from NP sign, Mt Lewis Rd, (16.5944S 145.2792E), 28/10/2017, D. Cartwright and R. St Clair (NMV TRI-56823, TRI 56823.1 [gen. prep]). *Paratypes*: North Queensland: 4♂♂, Upper Freshwater Creek, Whitfield Range, Cairns, (16.93°S 145.70°E), 24 Aug. 1974, M. Moulds MV-light (NMV TRI-56809; NMV TRI-56810; NMV TRI-56811); 2♂♂, Lock-Davies Ck Rd, Lamb Range, Mareeba district (16°59'S, 145°33'E), 10 Nov. 1974, MS Moulds (NMV TRI-56812); 1♂, Rocky Creek, Tully (17°55'S, 145°53'E), 1 May 1979, A. Wells (NMV TRI-56813); 1♂, Mt Fisher, 8km SW of Millaa Millaa, (17°33'S, 145°33'E)



Figs 121–127, *Stenopsychodes* species. 121–124, *Stenopsychodes redactus* sp. nov., Holotype ♂, (North Queensland, E flowing creek, 14km from NP sign, Mt Lewis Rd, 16.5944S 145.2792E; NMV TRI-56823.1), genitalia, dorsal, lateral, ventral, tip of lower processes of segment X. 125–127, *Stenopsychodes quasiredactus* sp. nov., ♂, (North Queensland, Bellenden Ker Range Site 5 S Cable Tower 7, 500m; NMV TRI-56827.1), genitalia, dorsal, lateral, ventral.

21 Nov. 1979, MS & BJ Moulds (NMV TRI-56814); 1♂, 25km along Mt Lewis Rd, SW of Mossman (16°42'S, 145°10' E), 25 Dec. 1980, MS & BJ Moulds (NMV TRI-56815); 2♂♂, Bellenden Ker Range Cable Tower 3, (17°12'S, 145°51'E) 105.4m, Oct. 25–31, 1981, EarthWatch/Qld Museum (NMV TRI-56816, NMV TRI-56817); 4♂, Ck, 13km from NP sign, Mt Lewis Rd, (16.5696S 145.2693E), 27/10/2017, D. Cartwright and R. St Clair (NMV TRI-56822).

Other material examined: North Queensland: 2♂♂ (dry), The Crater, nr Herberton, 3 Jan. 1967, mv lamp, D.K. McAlpine & G. Holloway (AM K.612211, K.612212); 2♂♂, Bellenden Ker Range Site 5 S Cable Tower 7, 500m Oct. 25–31 1981, EarthWatch Qld Mus. (NMV TRI-56819); 1♂, (17.05S 145.35E), Mt Haig, 22 km NEbyN Atherton, 16 Mar 1988, D.C. Rentz, Stop A-35, (ANIC); 3♂, Douglas Creek, Kirrama nr Tully, 9 May 1988, J.E. Brittain (NMV TRI-56820); 1♂, trickle, ~16 km from NP sign, Mt Lewis Rd, (16.557S 145.2767E), 27.10.2017, D. Cartwright & R. St Clair, (QM); 1♂, swamp on creek ~22km from NP sign, Mt Lewis Rd, (16.5278S 145.2868E), 27.10.2017, D. Cartwright & R. St Clair, (QM).

Diagnosis. This species resembles *S. shackletoni* and *S. quasiredactus* sp. nov. in having only lower processes on segment X, but in this species the lower processes are about 2/3 length of inferior appendages (Figs 121, 128) compared with those of *S. shackletoni* that are longer than the inferior appendages (Figs 105, 106), and in *S. quasiredactus* they are expanded and subapically and narrowly sinuous apically (Figs 127, 133); the superior appendages are shorter than the inferior appendages, and in lateral view their apices are somewhat foot-shaped, obliquely truncate (Figs 122, 129), not rounded as in *S. shackletoni* (Figs 126, 132).

Description. Male. Length of each forewing: ♂ 9.5–13.2mm (n=24).

Head and thorax brown in spirit specimens. Forewing coarsely reticulate with large pale areas delineated by dark brown bands. Forewing with f1 sessile, f3 footstalk about ½ length of f3; hindwing f1 sessile, f3 footstalk 1.3 times length of f3.

Genitalia (Figs 121–124, 128–130). Lateral lobes on segment IX in lateral view triangular, narrowly rounded apically (Figs 122, 129); tergite X membranous, lower processes in ventral view about 7/10 length of inferior appendages, bearing bristle-like setae throughout length, apices not sinuous or bifid (Figs 121, 124, 128); superior appendages slender, shorter than inferior appendages, about equal in length to lower processes of segment X; inferior appendages slender, almost same width throughout length, apically with short, open claw-like gape with small hook on inner proximal angle (Figs 121, 123, 128); phallus stout, with small internal sclerite (Fig. 123).

Female: Unknown.

Distribution. A common species in the Wet Tropics area of north Queensland from the Tully area northward to Mossman, latitudinal range 16.6–17.9°S.

Etymology. The Latin name, *redactus*, is descriptive of the reduced processes on tergite X.

Stenopsychodes quasiredactus sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:D3D45B3D-9502-46CC-BB24-B6CE58AC7211>

Figures 125–127, 131–133

Material examined. Holotype ♂, North Queensland, Bellenden Ker Range 1/2km S Cable Tower 7, 500m Oct. 25–31 1981, EarthWatch/Qld Mus. (NMV TRI-56824). *Paratypes:* North Queensland: 1♂, Station Creek, 15km S of Mt Carbine, 9 Dec. 1975, Walford-Huggins, (NMV TRI-56825); 3♂♂, collected with holotype (NMV TRI-56826); 2♂♂, Bellenden Ker Range Site 5 S Cable Tower 7, 500m Oct. 25–31 1981, EarthWatch/Qld Mus. (NMV TRI-56827).

Diagnosis. Closely resembling *S. redactus*, but distinguished from that species by the narrower, more slender inferior appendages that in lateral view are close to 12x longer than wide and the lower processes on abdominal segment X that are expanded in distal third and abruptly narrowed and sinuous distally (Figs 125, 127, 131, 133).

Description. Male. Length of each forewing: 9.5–10.5mm (n=7). On forewing footstalk on f3 almost same length as fork.

Genitalia (Figs 125–127, 131–133). Lateral lobes on segment IX in lateral view, elongate sub triangular, tapered sharply to narrowly rounded apex (Figs 126, 132); tergite X membranous, with pair of short blunt basal structures (possibly vestigial upper processes) and lower processes in ventral view shorter than inferior appendages, bearing bristle-like setae on lower 2/3, expanded distally and narrowly sinuous apically (Figs 125, 127, 131, 133); superior appendages slender, shorter than inferior appendages; inferior appendages slender, elongate, length about 12 times width, almost same width throughout length, in lateral view slightly down-turned towards rounded apex (Figs 126, 132), in dorsal and ventral views with short rounded claw-like gape apically, small hook on inner proximal angle (Figs 125, 127, 131, 133); phallus stout, with small internal sclerite (Figs 127, 133).

Female: Unknown.

Distribution. Recorded from three sites at Bellenden Ker Range and west of Mossman, NE Queensland, latitudinal range 16.5–17.2°S.

Etymology. *Quasiredactus* — *quasi*- Latin 'as if', just as or as it were, and the Latin, *redactus*.

Remarks. These small samples of males that are so similar to those of *S. redactus*, are tentatively referred to a separate species, *S. quasiredactus*, since the characteristic shape of the lower processes of segment X appears to be constant.

Stenopsychodes unguibus sp. nov.

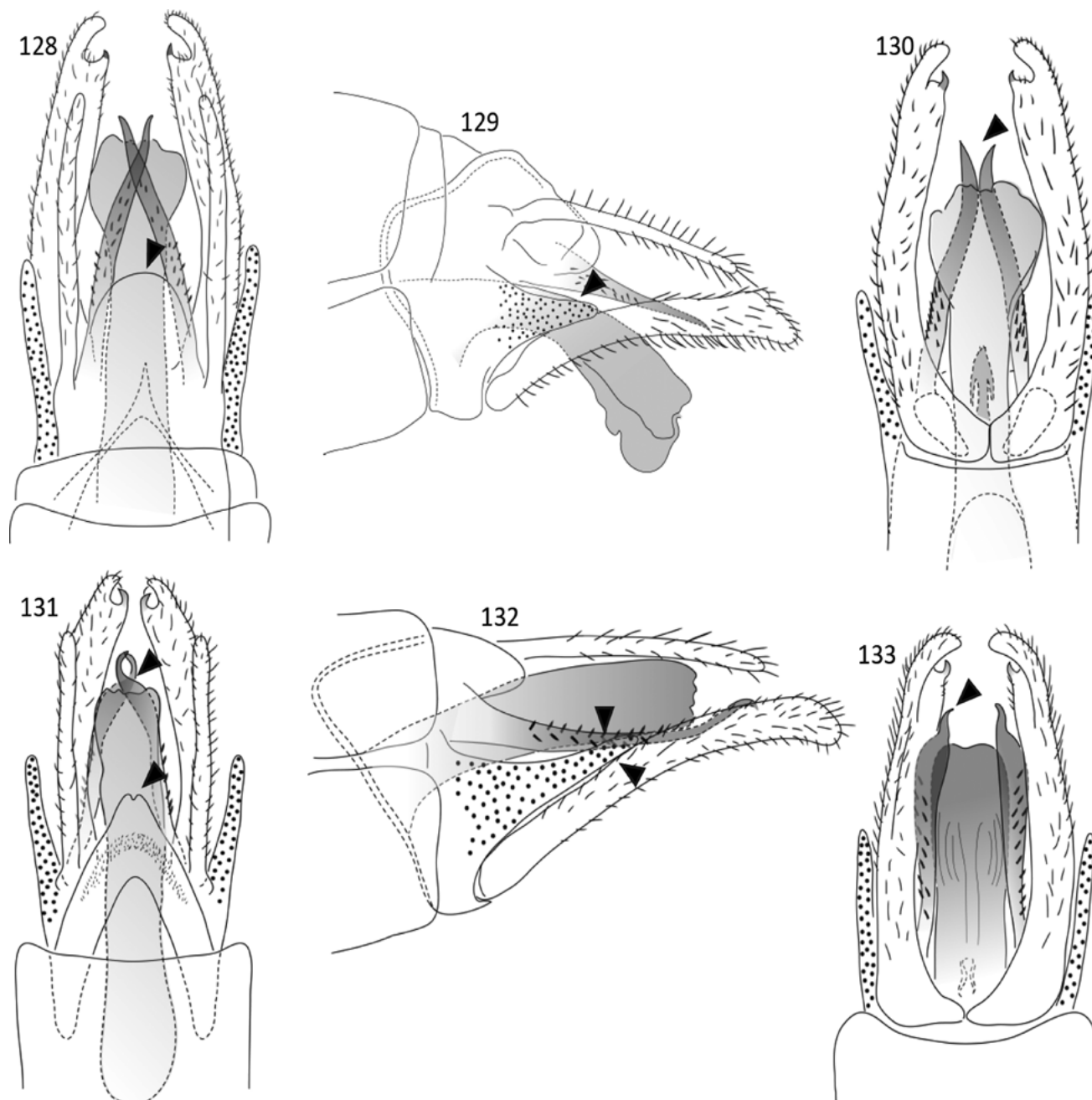
<http://zoobank.org/urn:lsid:zoobank.org:act:A7004731-A3E6-4C67-A5E4-13607DBD322E>

Figures 134–137, 141–143

Material examined. Holotype ♂, North Queensland, 25km along Mt Lewis Rd, SW of Mossman, (16°42'S, 145°10'E), 16 Jan. 1977, MS & BJ Moulds (NMV TRI-56828, TRI-56828.1). *Paratypes:* North Queensland: 2♂♂, Lock-Davies Creek Rd, Lamb Range, Mareeba District (17°02'S, 145°40'E) 10 Nov. 1974, MS Moulds (NMV TRI-56829); 1♂, Spurgeon Ck, Mt Spurgeon W of Mossman (16°26'S, 145°12'E) 1200m, 21 Dec. 1974, MS Moulds (NMV TRI-56830); 2♂♂, N Qld, 25km along Mt Lewis Rd, SW of Mossman (16°42'S, 145°10'E) 25 Dec. 1980, MS & BJ Moulds (NMV TRI-56831); 1♂, collected with

holotype (NMV TRI-56832); 1♂, Bellenden Ker Range, Cableway Base Stn 100m, Nov. 1-7, 1981, EarthWatch/Qld Museum (NMV TRI-57693); 1♂, Bellenden Ker Range, Cableway Base Station, 100m, Oct. 17-24 1981, Earthwatch/Queensland Museum, (NMV TRI-56833); 3♂♂, same data, (NMV TRI-56834); 4♂♂, same data, (NMV TRI-56835); 9♂♂, same data, (NMV TRI-56836); 1♂, same locality, Nov. 1-7 1981, (NMV TRI-56837); 2♂, Bellenden Ker Range 1/2km S Cable Tower No. 7, 500m Oct. 25-31 1981, Earthwatch Qld Mus., (NMV TRI-56838); 3♂, same data, (NMV TRI-56839).

Diagnosis. The protruding mouthparts place this species with most other northern species among which, in the general form of the male genitalia, *S. unguibus* closely resembles *S. tropicus* sp. nov., both having the inferior appendages in dorsal and ventral views greatly swollen distally. In *S. unguibus*, however, the lateral lobes of segment IX are narrower, the inferior appendages in lateral view are straight throughout their length, not down turned distally, and in ventral view the apical gape is



Figs 128–133, *Stenopsychodes* species, ♂ genitalia, dorsal, lateral and ventral: 128–130, *S. redactus* sp. nov.; 131–133, *S. quasiredactus* sp. nov.

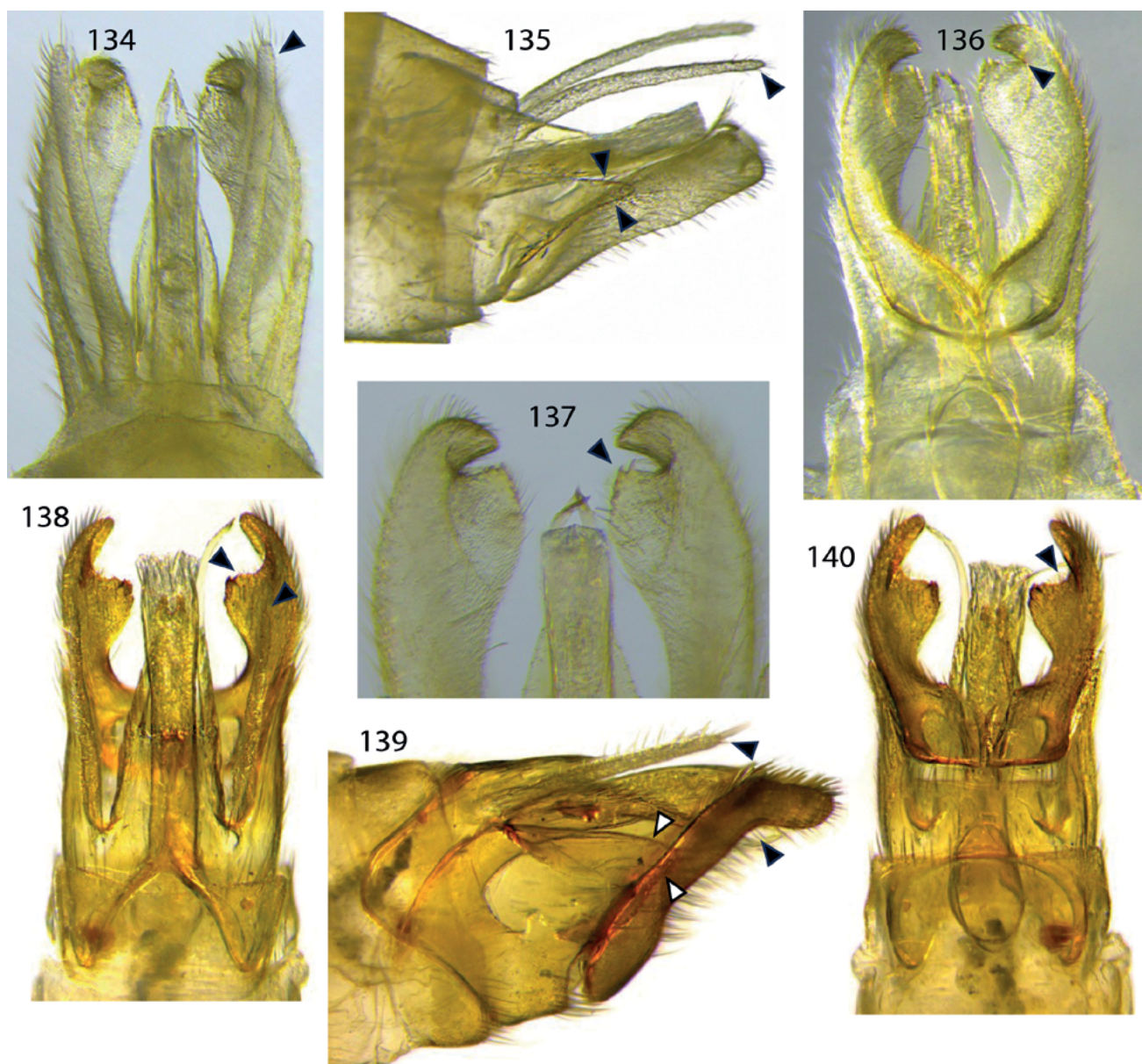
tight, not broadly open, and has the outer lobe short and stout, and a pair of very small spurs on the apex of the mesal lobe (Figs 136, 143).

Description. Male. Length of each forewing: ♂ 7.3–9.6mm (n=9). Forewings of spirit specimens mottled, f1 footstalk very short, footstalk on f3 about 1/6 length of fork.

Genitalia (Figs 134–137, 141–143). Lateral lobes of segment IX in lateral view triangular, wide at base and tapered to narrowly rounded apex (Figs 135, 142); superior and inferior appendages and processes of tergite X about

equal in length; tergite X truncate apically, bearing only lower processes, processes bifid apically (Fig. 142); superior appendages slightly more robust than in *S. tropicus* sp. nov.; inferior appendages in dorsal and ventral views, swollen in distal half, tightly cleft apically, mesal lobe bearing 2 tiny spurs apically, outer lobe sharply curved (Fig. 137, 141, 143); in lateral view inferior appendages straight, slightly dilated and truncate apically (Figs 135, 142); phallus almost parallel sided, internal sclerite present (Fig. 134).

Female: unknown.



Figs 134–140, *Stenopsychodes* species. 134–137, *Stenopsychodes unguibus* sp. nov., Holotype ♂, (North Queensland, 25km along Mt Lewis Rd, SW of Mossman; NMV TRI-56828), genitalia dorsal, lateral, ventral, tips of inferior appendages. 138–140, *Stenopsychodes tropicus* sp. nov., Holotype ♂, (North Queensland, Bellenden Ker Range 1/2km S Cable Tower 7, 500m; NMV TRI-56840), genitalia dorsal, lateral and ventral.

Distribution. Found in northern Queensland from the Atherton Tableland to further north in the Mossman district, latitudinal range 16.6–17°S.

Etymology. *unguibus*, based on the Latin *unguis*, nail or claw for the spurs on the inferior appendages.

***Stenopsychodes tropicus* sp. nov.**

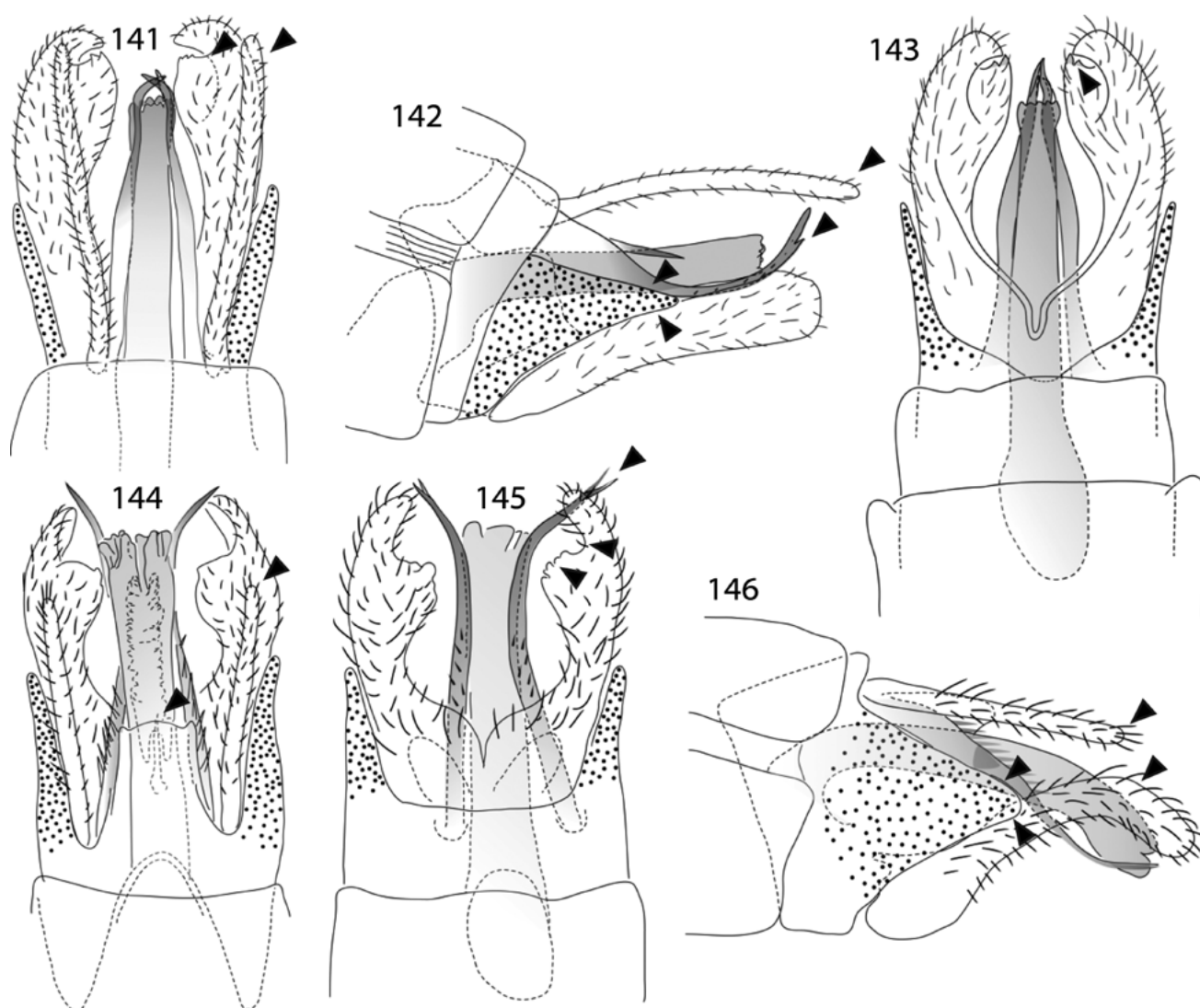
<http://zoobank.org/urn:lsid:zoobank.org:act:9E3E5889-F408-42F4-AD75-5B0C83700B38>

Figures 138–140, 144–146

Material examined. *Holotype* ♂, North Queensland, Bellenden Ker Range, 100m, Oct. 17–24 1981, Earthwatch/Qld Museum, (NMV TRI-56840, TRI-56840.1). *Paratypes*: North Queensland: 2♂♂, collected with holotype, (NMV TRI-56847); 16♂♂, Bellenden Ker Range Cable

Tower 3 (17°12'S, 145°51'E), 1054m Oct. 25–31 1981, Earthwatch Qld Mus., (NMV TRI-56841); 13♂♂, Bellenden Ker Range Cable Tower 3, 1054m Oct. 25–31 1981, (17°12'S, 145°51'E) Earthwatch/Qld Mus., (NMV TRI-56842); 1♂ Goldborough Valley nr Kearney's Falls (S Gordonvale), 20–21.10.2002, G. Theischinger, (ANIC).

Other material examined. Queensland: 1♂, Lock-Davies Ck. Rd., Lamb Ra., Mareeba dist. 10 Nov. 1974, M.S. Moulds, (NMV TRI-56843); 2♂♂, Bellenden Ker Range Cableway Base Stn 100m, Oct. 17–24 1981, Earthwatch/Qld Museum, (NMV TRI-56844); 7♂♂, Bellenden Ker Range 1/2km S Cable Tower 7, 500m, Oct. 25–31 1981, Earthwatch Qld Mus., (NMV TRI-56845); 1♂, Bellenden Ker Range Cable Tower 3, 1054m, Oct. 25–31 1981, Earthwatch Qld Mus., (NMV TRI-56846); 1♂, Bellenden Ker Range Cable Tower 3, 1054m, Nov. 1–7 1981, Earthwatch/Qld Mus., (NMV TRI-56848); 16♂♂, Bellenden Ker Range Summit TV Stn, 1560m Nov. 1–7 1981, Earthwatch/Qld Mus., (NMV TRI-56849); 2♂♂, Bellenden Ker Range Summit TV Stn, 1560m, Nov. 1–7 1981, Earthwatch/Qld Mus., (NMV TRI-56850);



Figs 141–146, *Stenopsychodes* species, ♂ genitalia. 141–143, *S. unguibus* sp. nov., dorsal, lateral and ventral; 144–146, *S. tropicus* sp. nov. dorsal, ventral and lateral.

1♂ NMV TRI-56850.1 (gen. prep.); 6♂♂, 1 F, Mt Bartle Frere, 0.5km N of South peak, 6–8 Nov. 1981, 1500m, Earthwatch/Qld Mus., (NMV TRI-56851); 2♂♂, Mt Bartle Frere, 0.5km N of South peak, 6–8 Nov. 1981, 1500m, Earthwatch/Qld Mus., (NMV TRI-56852); 1♂, Goddard [sic] Ck, Kirrama State Forest, 18°06'S 145°41'E, Apr. 1993, G. Theischinger (NMV TRI-56853).

Diagnosis. Closely resembling *S. unguibus* in general appearance of regularly reticulate forewings and male genitalia with distally stout inferior appendages, but *S. tropicus* is readily distinguished by having, in lateral view, the tip of the inferior appendages sharply downturned (Figs 139, 146), the apex of the lateral lobes of segment IX more broadly rounded, and the mesal lobe of the inferior appendages lacking an apical spur.

Description. Male. Length of each forewing: ♂ 9.8–10mm (n = 6). Forewings of spirit specimens mottled, fl sessile, footstalk on f3 very short.

Genitalia. Lateral lobes of segment IX in lateral view stoutly triangular, tapered to broadly rounded apices (Figs 139, 146); tergite X subquadrate, lateral angles produced in short rounded lobes (Fig. 144), only intermediate processes present, bearing stout bristle-like setae, bifid apically (Fig. 145); inferior appendages in dorsal and ventral view stout basally, narrower medially, robust distally, forming rounded outer lobe subtended by stout mesal lobe (Figs 140, 145), in lateral view inverted L-shaped, with short distal down-turned section (Figs 139, 146).

Female: Unknown.

Distribution. Collected from Bellenden Ker Ranges and also from Kirrama State Forest further to the south on the Great Dividing Range, over a latitudinal range 17.2–18.1°S.

Etymology. Named for the tropical climatic zone in which it was collected.

Stenopsychodes mjobergi Ulmer

Stenopsychodes mjobergi Ulmer, 1916: 8; –Neboiss 1986: 111.

Pseudostenopsyches mjobergi Ulmer (incorrectly labelled type specimen, NHRS).

Stenopsychodes mjobergi Ulmer, 1916; –Morse 2024; incorrect subsequent spelling — Dr. Mjöberg was Swedish (see ICZN Chapt. 7 32.5.2.1).

Figures 147–161

Material examined. *Syntype*, ♂, Bellenden Ker, Queensland, Mjöberg leg. (photograph: NHRS).

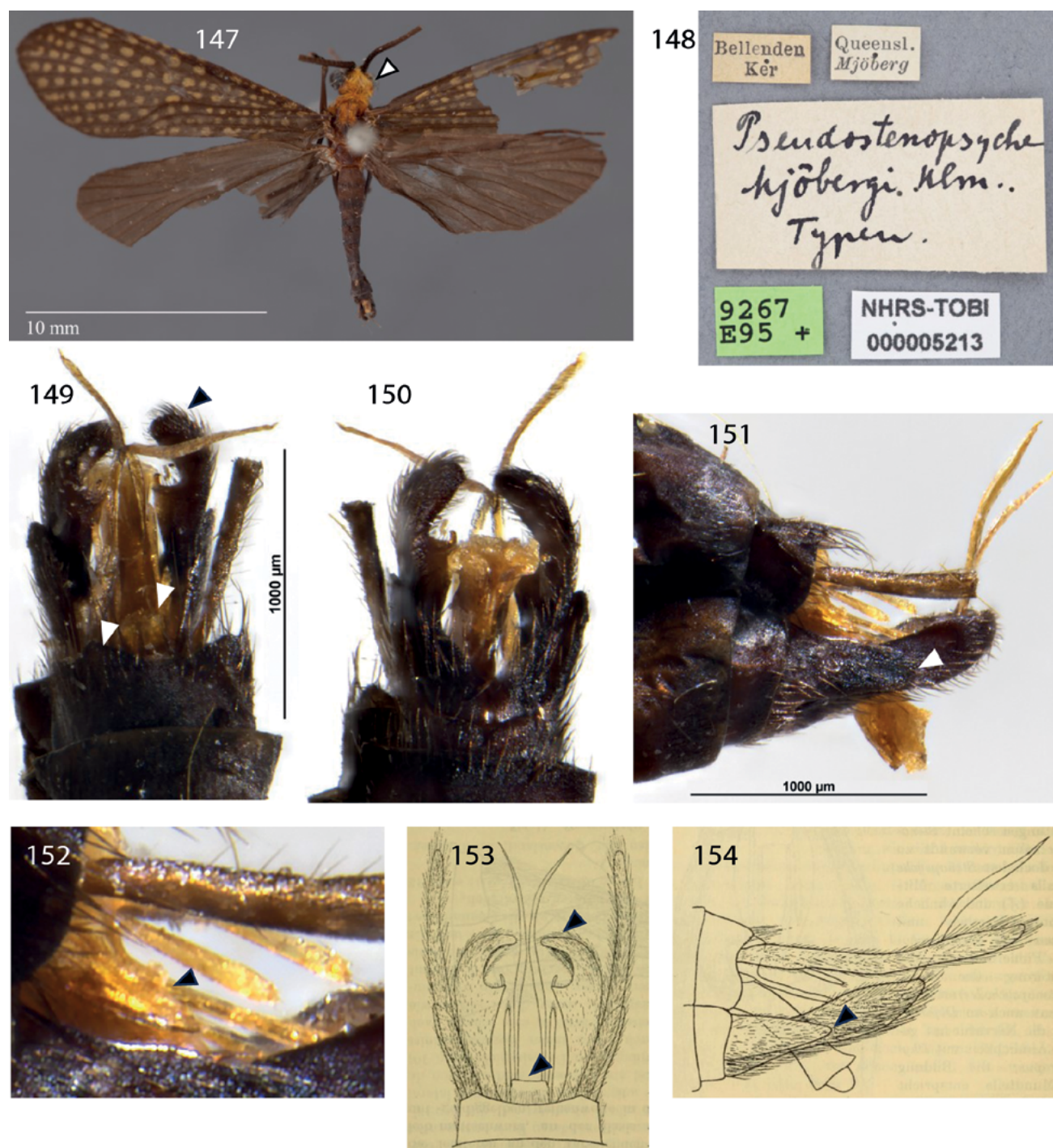
Other material examined. Queensland: 1♂, Kirrama State Forest, nth Cardwell 16 Dec. 1966, B. Cantrell, (NMV TRI-56854); 2♂♂ 1♀, Station Creek, nr Mt Carbine, 24.2–1971, A. Walford-Jones, (pinned, ANIC); 2♂♂ 1♀, Kuranda, 360m, 30 Mar. 1976, W.N.B. Quick, (NMV TRI-56855); 1♂ 1♀, Upper Little Mossman Riv. nr Mt Lewis, 10 Dec. 1974, M.S. Moulds, (NMV TRI-56856); 2♂♂, Upper Little Mossman Riv. nr Mt Lewis, 10 Dec. 1974, M.S. Moulds, (NMV TRI-56857); 1♂, Lock-Davies Ck Rd, Lamb Rs. Mareeba dist., 10 Nov. 1974, M.S. Moulds, (NMV TRI-56858); 11♂♂, Upper Little Mossman Riv. nr Mt Lewis, 10 Dec. 1974, M.S. Moulds, (NMV TRI-56859–56863); 1♂, The Crater, nr Herberton, 18 Dec. 1974, M.S. Moulds, (NMV TRI-56864); 2♂♂, Zanda Creek nr Mt Misery, W of Mossman, 1200m, 23 December 1974, M.S. Moulds, (NMV TRI-56865); 2♂♂, Zanda Creek nr Mt Misery, W of Mossman, 1200m, 23 December 1974, M.S. Moulds,

(NMV TRI-56866); 2♂♂, Zanda Creek nr Mt Misery, W of Mossman, 1200m, 23 December 1974, M.S. Moulds, (NMV TRI-56867); 2♂♂, Zanda Creek nr Mt Misery, W of Mossman, 1200m, 23 December 1974, M.S. Moulds, (NMV TRI-56868); 2♂♂, Zanda Creek nr Mt Misery, W of Mossman, 1200m, 23 December 1974, M.S. Moulds, (NMV TRI-56869); 1♂, Upper Freshwater Creek, Whitfield Range nr Cairns, 3 Apr. 1975, M.S. Moulds, (NMV TRI-56870); 1♀, Station Creek, 15km S of Mt Carbine, 9 Dec. 1975, Walford-Huggins, (NMV TRI-56871); 5♂♂ 1♀, Julatten, Mt Lewis Road, 1128m, 25 Jan. 1976, A. Walford-Huggins, (NMV TRI-56872); 6♂♂, Julatten, Mt Lewis Road, 1128m, 25 Jan. 1976, A. Walford-Huggins, (NMV TRI-56873); 2♂♂, Mt Windsor Tableland, NW of Mossman, 27 Dec. 1976, M.S. & B.J. Moulds, (NMV TRI-56874); 1♂, Mt Spurgeon, NW of Mossman, nr summit, in eucalypt sheoak, 28 Dec. 1976, M.S. & B.J. Moulds, (NMV TRI-56875); 3♂♂ 2♀♀, Mt Baldy, approx. 8km W of Atherton, 13 Jan. 1977, MS & BJ Moulds, (NMV TRI-56876–56877); 6♂♂ 2♀♀, 25km along Mt Lewis Road, SW of Mossman, 16 Jan. 1977, M.S. & B.J. Moulds, (NMV TRI-56878); 1♂, 25km along Mt Lewis Road, SW of Mossman, 8 Jan. 1977, M.S. & B.J. Moulds, (NMV TRI-56879); 8♂♂, 25km along Mt Lewis Road, SW of Mossman, 16 Jan. 1977, M.S. & B.J. Moulds, (NMV TRI-56880); 11♂♂ 2♀♀, 25km along Mt Lewis Road, SW of Mossman, 16 Jan. 1977, M.S. & B.J. Moulds, (NMV TRI-56881); 1♂, Lock Creek, Davies Creek Rd, Lamb Rge, Mareeba District, 25 Dec. 1978, M.S. & B.J. Moulds, (NMV TRI-56882); 3♂♂, 1♀, Rocky Creek, Tully, 1 May 1979, A Wells, (NMV TRI-56883); 2♂♂, 25km along Mt Lewis Road, SW of Mossman, 25 Dec. 1980, M.S. & B.J. Moulds, (NMV TRI-56884); 9♂♂, Bluewater State Forest, S end Paluma Rge, WNW of Townsville, 31 Jan. 1981, M.S. & B.J. Moulds, (NMV TRI-56885); 1♂, Bellenden Ker Range, Cableway Base Station, 100m, Oct. 17–24 1981, Earthwatch - Qld Museum, (NMV TRI-56886); 1♂, Bellenden Ker Range, Cableway Base Station, 100m, Oct. 17–24 1981, Earthwatch - Qld Museum, (NMV TRI-56887); 1♂, Gap Creek, 10 Feb. 1982, Moulds, (NMV TRI-56888); 7♂♂ 1♀, Windsor Tableland, 20 Feb. 1982, Moulds, (NMV TRI-56889); 7 specimens, Annan River, 14 May 1984, A.N. Gilleson (pinned, ANIC); 4♂♂, (17.02S 145.37E), Davies Creek, E by S Mareeba, 24 March 1988, DC Rentz, Stop A-28b, at light (ANIC); 1♂, Birthday Ck, 3.5km WNN Paluma, (18°59'S 146°10'E), at light, 26 Feb. 1989, R. St Clair, (NMV TRI-56890); 20♂♂ 4♀♀, (-13.44S 143.20E), 11km WbyN Bald Hill, McIlwraith Ra., 26 June–13 July 1989, 520m, I.D. Naumann, at light, search party campsite, (ANIC); 13♂♂ 5♀♀, (-13.45S 153.22E), 8km WbyW Bald Hill, McIlwraith Range, 500m, 27 June–12 July 1989, I.D. Naumann, at Lt, Upper Leo Creek Site, (ANIC); 1♂, (-11.41S 142.42E), 14km ENE Heathlands, 26 Feb. 1993, by hand, rainforest, P. Zborowski, (ANIC); 2♂♂, (15°49'S 145°17'E), Mt Finnigan summit, 1100m 20–21 Nov. 1998, C.J. Burwell rainforest, mv lamp 50007 (QM); 1♂, ck at end of Santacaterina rd, (-16.44917 145.34668), 15 May 2010, J. Webb & M. Shackleton, (NMV TRI-56891); 1♂, Dunn? creek at Bridge 1, Kirrama Range Rd 0.5km from NP sign, (-18.2029 145.8859), 24/10/2017, D. Cartwright & R. St Clair, (NMV TRI-56892, NMV TRI-56892.1); 1♂ 1♀, Ck at Bridge 11, Kirrama Range Rd 14km from NP sign, (-18.2138 145.7982), 24/10/2017, D. Cartwright & R. St Clair (QM); 1 specimen, The Boulders nr Babinda, picnic area, 52m, 3 April 2018, D.C.F. Rentz, Stop 10 (pinned, ANIC); 155 specimens, most in ethanol, 28 pinned), (16°48'S 145°38'E), Kuranda, (Top of the Range), 19 Butler Drive, 2004–2019, D.C.F. Rentz (ANIC).

Diagnosis. *Stenopsychodes mjobergi* shares with *S. tillyardi* the character states of mouthparts extended in a pronounced rostrum, the head and prothorax bearing golden setae, on the forewing a reticulate pattern of golden spots on a black background (faded to brown in spirits), and the hindwing uniformly black/dark brown. But *S. mjobergi* can be distinguished by the shape in lateral view of the lobes of

abdominal segment IX that are rounded apically (Figs 151, 156), rather than stoutly truncate as in *S. tillyardi* (Figs 163, 168); and the lower process of segment X which, in lateral view, gradually

tapers distally to a blunt apex bearing bristle-like setae (Fig. 158), whereas in *S. tillyardi* the lower process is saw-shaped, with bristle-like setae along the upper surface (Figs 163, 169);



Figs 147–152, *Stenopsychodes mjobergi* Ulmer, ♂. 147–152, Syntype: 147, habitus; 148, label details; 149–152, genitalia, dorsal, ventral, lateral and detail of processes on segment X. 153, 154, copies of Ulmer's 1916 figures. Scale bars as indicated. (Images of Syntype courtesy T. Malm, NHNM). Scale bars as indicated.

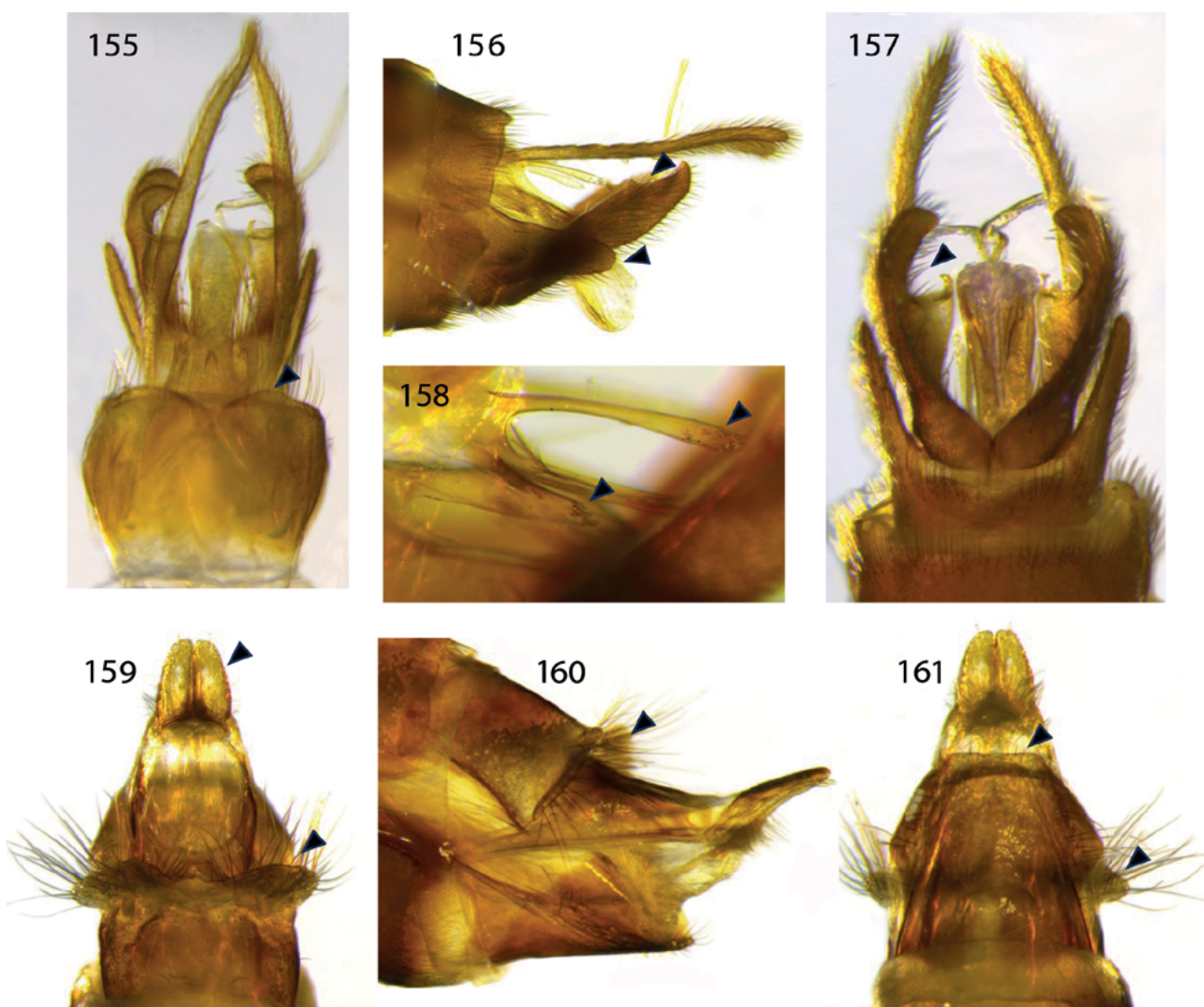
the lateral lobes of segment IX in *S. mjobergi* reach half to 2/3 length of inferior appendages whereas in *S. tillyardi* they reach to about half (Figs 163, 167); the superior appendages tend to be evenly curved, in *S. tillyardi* in lateral view they are kinked subapically, and the distal concavity in the inferior appendages when viewed laterally, is relatively shorter in *S. mjobergi* (Fig. 156) than in *S. tillyardi* (Fig. 167).

Description. (See Ulmer 1916). Length of each forewing: ♂ 11.7–14.0mm (n=10), ♀ 12.6–14.3 (n=10); ♂ f1 sessile, f3 length ~ 8–9X length of footstalk.

Distribution. This species has been collected widely in NE Queensland from the Paluma Range north of Townsville, to as far north as Iron Range on Cape York Peninsula, latitudinal range 12.7–19°S, but see comments in *Remarks* below.

Remarks. Ulmer (1916) figured *S. mjobergi* with only two processes on tergite X and with the lateral lobes of segment IX rounded apically. Tillyard (1922), unable to examine the types of *S. mjobergi*, cited Ulmer's description of the presence of two processes on X as a difference between *S. mjobergi* and *S. tillyardi*. However, all specimens that we have examined have a third, lower, process on segment X, and this can be seen, although not clearly, on the NHRS image of the syntype in lateral view. In images of other specimens that we determine as *S. mjobergi*, the lower process can be seen as a short stump bearing an apical tuft of bristle-like setae (Fig. 158). The slenderer upper process, similarly, has a concentration of setae towards the apex as illustrated by Ulmer (1916) (Figs 152, 158).

When sorting samples that appear superficially to be identifiable as either *S. mjobergi* or *S. tillyardi*, it is difficult to clearly see the distinguishing features without very close and



Figs 155–161, *Stenopsychodes mjobergi* Ulmer, (North Queensland, Top of the Range, Kuranda; ANIC): 155–158, ♂ genitalia, dorsal, lateral, ventral, processes on segment X; 159–161, ♀ genitalia, dorsal, lateral and ventral.

sometimes damaging probing. Even then, although specimens in some samples are easily identified as *S. mjobergi* and many fewer as *S. tillyardi*, others can be assigned only tentatively either *S. tillyardi* or to *S. mjobergi*. The shape of the apex of the lateral lobes of segment IX, in lateral view, appears to vary in specimens here considered tentatively to be *mjobergi*, with some rather irregularly truncate, and others clearly rounded. The females we collected with males that are clearly identified as *S. mjobergi* have rounded lateral flaps on tergite VIII and the apical margin of the sternite broadly truncate (Figs 159–161).

In the analysis of available CO1 data, one clade includes a specimen (DC-345) that shares the morphological features of

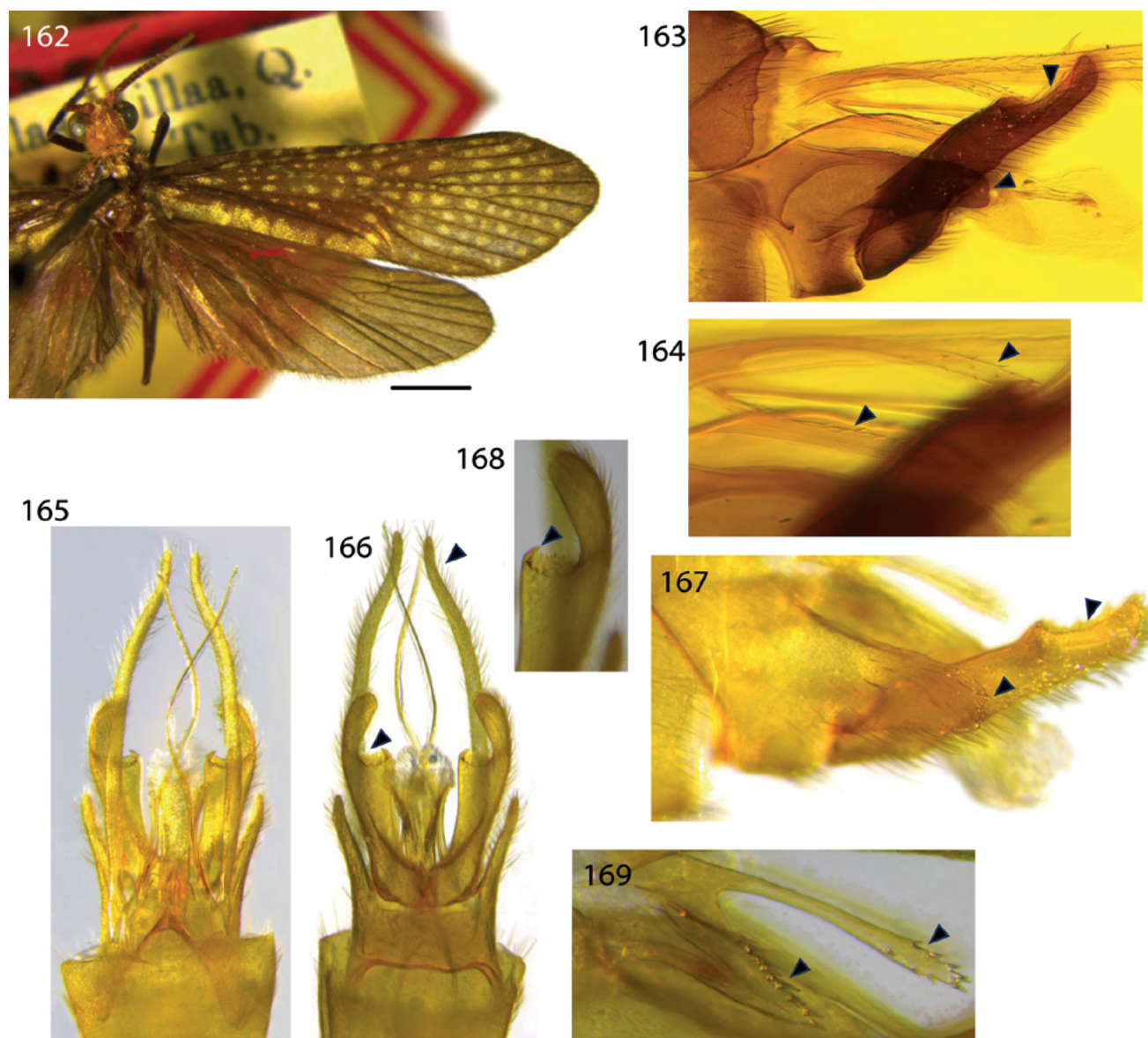
S. mjobergi, and another specimen (MS-506) that seems to be intermediate between the type of *S. mjobergi* and that of *S. tillyardi*, albeit in a separate subclade.

Stenopsychodes tillyardi Banks

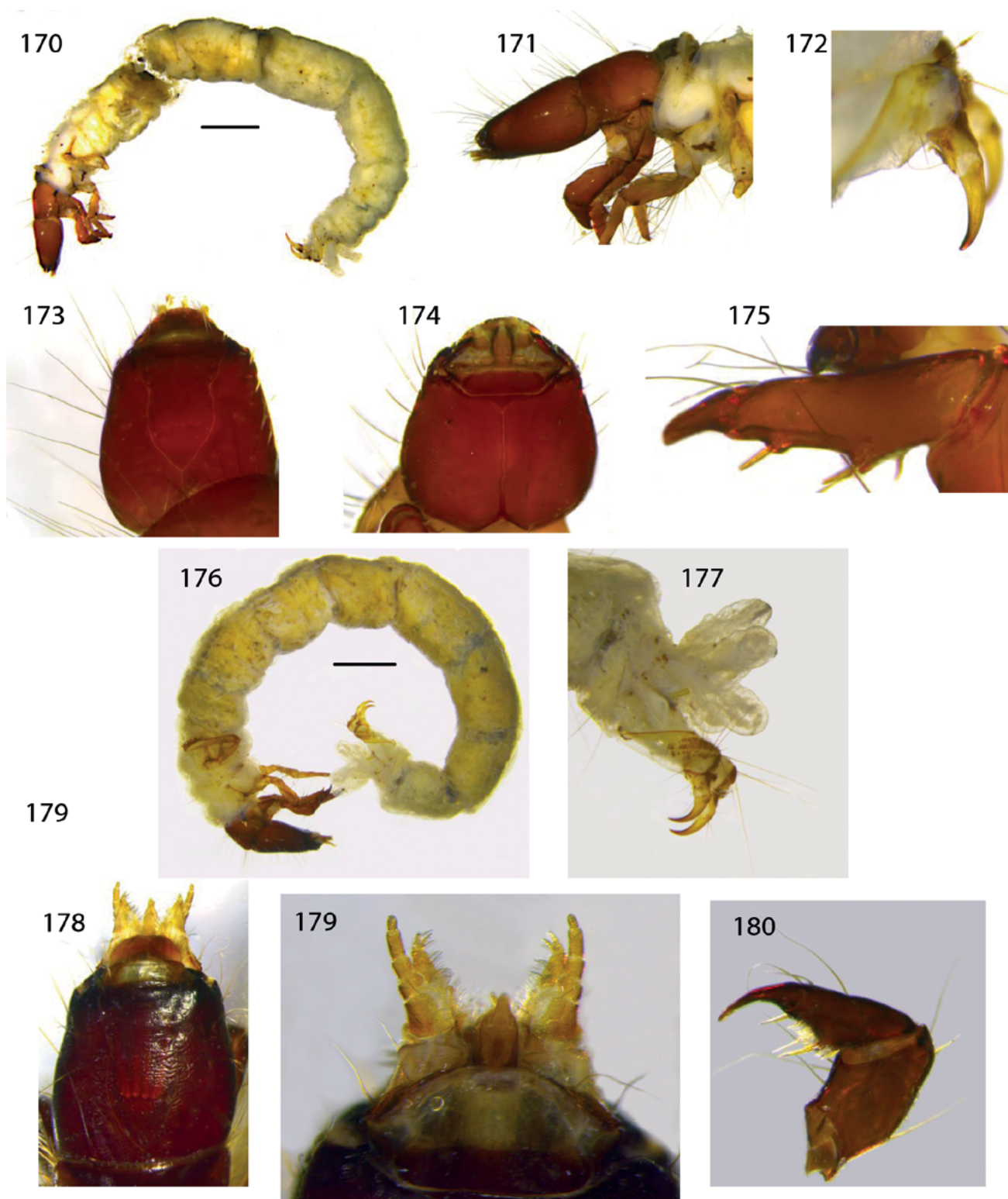
Stenopsychodes tillyardi Banks, 1939: 497; –Schmid 1969: 210.

Figures 162–169

Material examined. Holotype ♂, N Queensland, Atherton Tableland, Millaa Millaa, 2,500 ft, April 1032, Darlington (MCZ No. 22804, now ANIC).



Figs 162–169, *Stenopsychodes tillyardi* Banks. 162–164, Holotype ♂, habitus, ♂ genitalia lateral and upper and lower processes of segment X. 165–169, ♀, (North Queensland, ~16km from NP sign, Mt Lewis Rd, 16.557S 145.2767E, (NMV TRI-57695.1, DC-344 GenPrep CT-680), genitalia, dorsal, ventral, lateral, tip of left inferior appendage, lower process lateral. Scale bar =2mm.



Figs 170–180, *Stenopsychodes* larvae. 170–175, *S. aureonigra* Schmid, 170, habitus; 171, head and thorax; 172, anal claws; 173, 174, head dorsal and ventral; 175, foretarsus. 176, 177, *Stenopsychodes* sp., from Victoria, Snowy Region, Yalmy Creek at Yalmy Rd, (NMV Tri-55883): 176, habitus; 177, distal segments showing gills, and anal claws. 178–180, *Stenopsychodes* sp., from NSW, New England NP, 21 Feb. 1966, E.F. Riek, (ANIC): 178, dorsal head; 179, ventral region of head showing small spinneret, and wide rectangular ventral apotome; 180, sharp foretarsal claw. Scale bars =2mm.

Other material examined. Queensland: 5♂♂ 1♀, Julatten, Mt Lewis Road, 1128m, 25 Jan. 1976, A. Walford-Huggins (NMV TRI-56893); 1♂, Huntsbrook ck on Gordonvale-Atherton Hwy, (17.17739 145.69189), 19 May 2010, J Webb & M Shackleton 100519-3 (MS 369); 1♂, same data (MS 1136); ♂, small creek beside Josephine Falls, 11 May 2011, M. Shackleton, J. Mynott 110511 (MS-1312); 1♂, ~13km from NP sign, Mt Lewis Rd, (16.5696S 145.2693E), 27.10.2017, D. Cartwright and R. St Clair (NMV TRI-57694); 1♂, ~16km from NP sign, Mt Lewis Rd (16.557S 145.2767E), 27.10.2017, D. Cartwright and R. St Clair (NMV TRI-57695, TRI-57695.1, DC 344, GenPrep CT-680); 2♂♂, Qld, E flowing creek, ~14km from NP sign, Mt Lewis Rd, 28.10.2017, (16.5944S 145.2792E), D. Cartwright and R. St Clair (QM); 1♂ 1♀, ~19km from NP sign, Mt Lewis Rd, 27.10.2017, (16.5416S 145.2868E), D. Cartwright and R. St Clair, (QM).

Diagnosis. *Stenopsychodes tillyardi* closely resembles *S. mjobergi*, but the two species are distinguished by the shape in lateral view of the lateral lobes of abdominal segment IX that are stoutly truncate apically in *S. tillyardi*, and reach to about half the length of the inferior appendages (Figs 163, 168), in contrast to *S. mjobergi* in which they are narrower and rounded, and reach to about 2/3 length of the inferior appendages (Figs 151, 156); in *S. tillyardi* the inferior appendages are parallel sided in contrast to slightly swollen in distal half in *S. mjobergi*; in *S. tillyardi* the lower process on segment X is longer, than in *S. mjobergi* and saw shaped with setae situated on the upper side (Figs 163, 169) in contrast to *S. mjobergi* in which this process of segment X in lateral view resembles a short stump tipped apically by a tuft of bristles (Figs 152, 158).

Description. See Schmid (1969).

Length of each forewing: ♂10.6–13.9mm (n =7); ♀13.8–14.6mm (n =2).

Distribution. *Stenopsychodes tillyardi* has been collected from the Atherton area, latitudinal range 16.6–17.5°S, but appears to be uncommon compared with *S. mjobergi*.

Remarks. Banks (1939) distinguished *S. tillyardi* from *S. mjobergi* as follows: ‘... the lateral appendages are more rounded at tip, the ventral appendages, from side to side, have the apical part more slender, and from above, also more slender and longer, the inner hook very large and nearer base than in *S. mjobergi*.’ However, just what Banks meant by ‘lateral appendages’ is unclear. The holotype of *S. tillyardi*, as illustrated in Figure 163, clearly has the apex of the lateral lobe of segment IX truncate, although in Banks figure it is shown as rounded apically. Schmid (1969) illustrated the lateral view of *S. tillyardi*, and his figure conforms closely with the type, which, presumably he had at hand. Schmid’s (1969) figure shows clearly the three processes on segment X, the lower of which also distinguishes the two species (Schmid 1969: fig. 3). Only one further specimen has been found with the long slender saw-like lower process seen in the type of *S. tillyardi*; others have a shorter, stouter saw-like structure (Fig. 169). For the present, these are considered to represent *S. tillyardi*. A female collected with a male of *S. tillyardi* closely resembles females of *S. mjobergi*.

Among specimens in the NMV no clear geographical separation is apparent between specimens identified as *S. tillyardi* and *S. mjobergi*.

Acknowledgments

Preliminary sorting of the NMV spirit collection assisted greatly in handling the considerable volume of material in that collection. Curatorial staff and collection managers of the Museum Victoria (Dr Claire Keely, Simon Hinkley and Dr Genefor Walker-Smith) are thanked for facilitating access to the NMV collection, Genefor is thanked for patiently checking the text and adding MV numbers; and Drs Christine Lambkin, Susan Wright, Karyn Koch and Greg Daniels all helped with access to the Queensland Museum collection; Derek Smith assisted with access to specimens in the Australian Museum. Images of types were provided by Dr Ben Price, Natural History Museum, London; Dr Tobias Malm, Swedish Museum of Natural History; and Dr Ben Parslow, South Australian Museum. We are extremely grateful to a meticulous reviewer for advice and corrections to the manuscript.

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