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Species of *Lissothrips* and *Williamsiella* from mosses and lichens in Australia and New Zealand (Thysanoptera, Phlaeothripinae)

LAURENCE A. MOUND¹ & DESLEY J. TREE²

¹Australian National Insect Collection CSIRO, PO Box 1700, Canberra, ACT 2601. E-mail: laurence.mound@csiro.au

²Queensland Primary Industries Insect Collection (QDPC), Department of Agriculture and Fisheries, Queensland, Ecosciences Precinct, GPO Box 267, Brisbane, Qld, 4001

Abstract

Species of *Lissothrips* and *Williamsiella* live in association with mosses and lichens. Their gut contents are commonly blue-green, suggesting that they possibly feed on blue-green algae. Three species of *Lissothrips* are known from New Zealand, of which two are here recorded from Australia together with six new species. *Williamsiella* is recorded from Australia for the first time, with one new species.

Key words: new species, *Lissothrips*, *Williamsiella*, mosses, lichens

Introduction

Species of the Phlaeothripinae genera *Lissothrips* and *Williamsiella* are typically found, in many of the warmer parts of the world, in association with mosses and lichens. Only one species, *Lissothrips gersoni*, is reported as having been reared on a moss (Mound & Walker 1986), and the precise tissues ingested by these thrips remain difficult to determine. The gut of adults in these two genera commonly contains a distinctive blue-green pigment, whereas the gut of typical leaf-feeding Phlaeothripinae never contains any green colour. Moreover, when specimens of these two genera are prepared for taxonomic study, that is macerated in weak hydroxide solution, dehydrated through an alcohol series, and prepared onto slides in Canada balsam, the blue-green colour is often retained. The colour diffuses throughout the body cavity as the body tissues are broken down, but it seems to be remarkably unaffected by the chemical treatment to which it is exposed. It thus differs in its reactions from any chlorophyll pigments of higher plants, in that these are quickly digested when ingested by typical leaf-feeding Phlaeothripinae. One possibility might be that the moss- and lichen-associated thrips considered here are not feeding on the tissues of these plants, but on some other organism such as blue-green algae living at the base of mosses.

The genera *Lissothrips* and *Williamsiella* have been referred to a particular supra-generic taxon, the Williamsiellina (Mound 1989), although this taxon is of doubtful phylogenetic significance. Species of these two genera share the following character states: antennal segment III usually smaller than segment IV, often particularly small and lacking sense cones (Figs 1–7, 30); antennal segment VIII often elongate, although the terminal segments are sometimes fused; pronotum often with notopleural sutures incomplete; tergite IX major setae longer than the tube (Mound 1989). Species of *Lissothrips* have the maxillary stylets long and deeply retracted into the head capsule (Figs 8–13). In contrast, *Williamsiella* species have these stylets exceptionally short, restricted to the mouth cone and not retracted anterior to the posterior margin of the head (Fig 29), comparable to the position of stylets in species of *Sophiothrips*, an unrelated genus of fungus-feeding species (Mound & Tree 2014). The objective here is to provide an identification system to the species known from Australia, including six new species of *Lissothrips*, and the genus *Williamsiella* newly recorded from this continent with one new species. Nomenclatural information on all Thysanoptera is available at ThripsWiki (2015).

Abbreviations, depositaries and acknowledgments

The following abbreviations for setal names are used: po—postocular setae on head; pronotal setae: am—anteromarginal, aa—anteroangular, ml—midlateral, epim—epimeral, pa—posteroangular. Holotypes of the new species are deposited in the Australian National Insect Collection (ANIC), CSIRO, Canberra, with some paratypes in the Queensland Primary Industries Insect Collection (QDPC), Brisbane. This paper was produced as part of a programme studying the diversity of Australian fungus-feeding Thysanoptera that was supported in part by a Bush Blitz Research Grant from Australian Biological Resources Study, Canberra. Studies on the thrips fauna of Norfolk Island were carried out for Department of Agriculture Australia, courtesy of Dr Glynn Maynard. We are grateful to the Curator, New Zealand Arthropod Collection, Auckland, for the loan of paratypes of *Lissothrips gersoni*, and to Katherine Thomson of DAFF Queensland for enthusiastic support in field and laboratory work.

Lissothrips Hood

Lissothrips Hood, 1908: 365. Type species *L. muscorum* Hood.

Relationships of this genus were discussed by Mound (1989) and Mound and Marullo (1996), who also provided notes on the variation in structural details between and within the 17 species that are currently listed worldwide (ThripsWiki 2015). Of these species 12 are known only from the Americas, mainly the Neotropics, one is from Fiji, one from Japan, and three from New Zealand. Detailed descriptions of the three New Zealand species were provided by Mound and Walker (1986), and two of these three are here recorded from Australia together with six new species.

Key to *Lissothrips* species from Australia and New Zealand

1. Antennal segments VII and VIII broadly joined (Fig. 3), segment III with one sense cone; fore tarsus with a tooth, although this is sometimes small and directed ventrally. 2
- Antennal segment VIII slender and narrowed to base (Figs 1–2, 4–7), segment III with no sense cone; fore tarsus usually without a tooth in both sexes 3
2. Pelta broadly D-shaped (Fig. 17); pronotal am setae less than 0.5 as long as aa setae; New Zealand and Australia. . . . *dentatus*
- Pelta reduced to irregular sub-circular sclerite; pronotal am and aa setae equally long and slender; New Zealand *dugdalei*
3. Head with po setae capitate (Figs 8–10); both sexes micropterous with wing lobe more than 25 microns long (Fig. 18); male [where known] with no pore plate on sternite VIII. 4
- Head with po setae finely acute (Figs 11–13); apterous, or micropterous with wing lobe no more than 15 microns (Fig. 21) [one macroptera known]; male sternite VIII pore plate present or absent 6
4. Antennal segment III wider than long, almost disc-shaped (Fig. 2). *discus* sp.n.
- Antennal segment III longer than wide, laterally convex (Figs 1, 4) 5
5. Antennal segment IV with 2 stout sense cones; maxillary stylets about 1/3 of head width apart; wing lobe 25–30 microns long; pelta transverse (Fig. 16), extending across 0.7 of width of tergite II; female fore tarsus with no tooth *corticoides* sp.n.
- Antennal segment IV with 3 slender sense cones; maxillary stylets about 1/4 of head width apart; wing lobe 40–60 microns long; pelta D-shaped (Fig. 19), extending across 0.5 of width of tergite II; female fore tarsus with minute tooth *hypni* sp.n.
6. Mesopresternum transverse and entire (Fig. 26); antennal segment III scarcely 1.3 times as long as wide (Fig. 6); male with no pore plate on sternite VIII; both sexes with minute fore wing lobe 10–15 microns long bearing one major seta *taverneri* sp.n.
- Mesopresternum absent or reduced to two lateral sclerites (Fig. 25); antennal segment III more than 1.5 times as long as wide (Figs 5, 7); male sternite VIII with or without pore plate medially; both sexes fully apterous 7
7. Male sternite VIII without pore plate; female with pronotal am scarcely 3 times as long as pronotal posterior discal setae (Fig. 11), male am setae about 20 microns long *gersoni*
- Male sternite VIII with small oval or broadly transverse pore plate; both sexes with pronotal am setae about 5 times as long as posterior discal setae (Figs 13, 15) 8
8. Male sternite VIII with small oval pore plate medially (Fig. 27); mesonotum of both sexes usually with pair of long setae laterally (Fig. 20) *tallagandai* sp.n.
- Male sternite VIII with narrow elongate pore plate medially (Fig. 28); mesonotum never with lateral setae elongate. *thomsonae* sp.n.

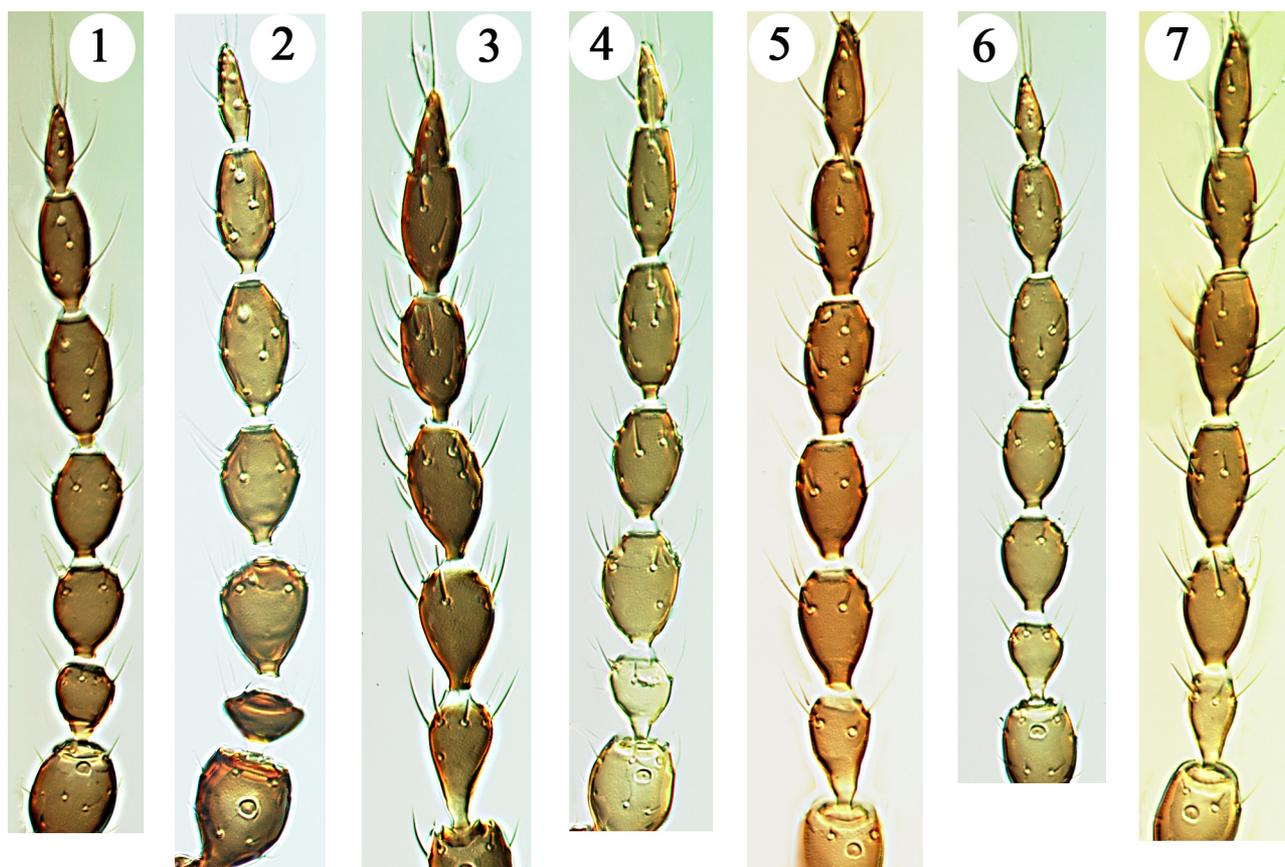
***Lissothrips corticosus* sp.n.**

(Figs 1, 8, 16, 24)

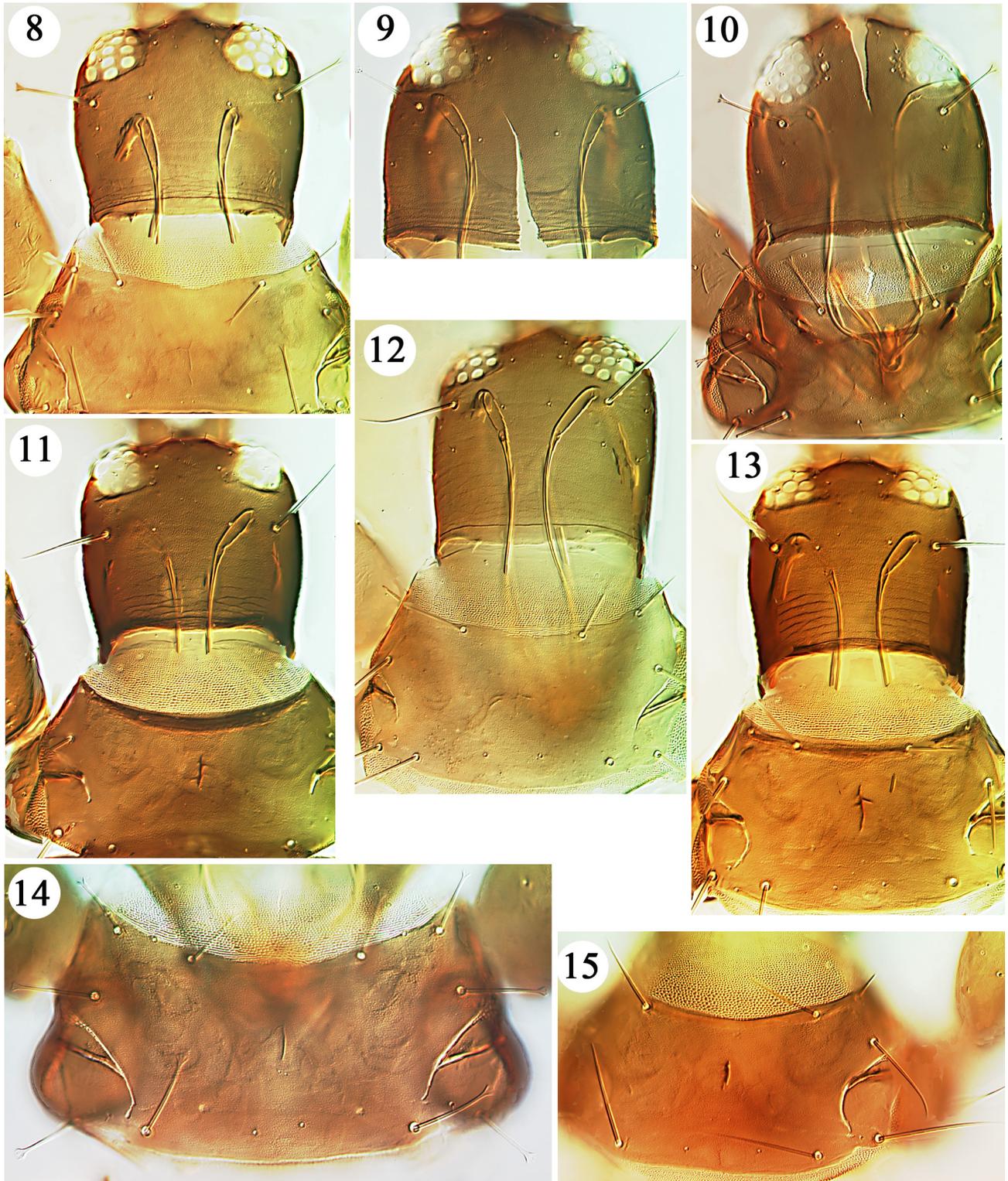
Female microptera. Body, legs and antennae brown, tarsi paler, pedicel of antennal segment III yellow, tube dark brown, major setae pale. Head slightly wider than long, weakly reticulate near posterior margin (Fig. 8); compound eyes small, with about 12 large facets dorsally, also about 10 ventrally narrowing to a single facet at posterior; po setae long and capitate; maxillary stylets retracted to level of po setae, about one third of head width apart medially. Antennae 8-segmented, III unusually small and sub-spherical with no sense cones (Fig. 1), IV with 2 stout sense cones, VIII slender and narrowed to basal pedicel. Pronotum transverse, without sculpture; notopleural sutures variable, incomplete to fully complete; major setae all long and capitate. Fore tarsus with no tooth. Mesonotum transversely reticulate on anterior half, lateral setae minute; fore wing lobe with 2 capitate setae; metanotum almost without sculpture, median setae wide apart small and fine (Fig. 16). Prosternal ferna weakly developed, usually hidden beneath mouth cone; basantra bluntly pointed medially; mesopresternum transverse, slender, sometimes reduced to slender lateral triangles (Fig. 24); anterior margin of mesoeusternum transverse; metathoracic sternopleural sutures not developed. Abdomen with pelta broadly flattened, campaniform sensilla present (Fig. 16); tergites with median setae minute, III–IV with 2 pairs of long capitate setae laterally, V–VIII with external pair acute; tergite IX setae finely acute and longer than tube; anal setae about as long as tube. Sternites with 8 to 10 small discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1170. Head, length 125; width 135; po setae 45. Pronotum, length 100; width 175; setae—am 40, aa 38, ml 40, epim 40, pa 45. Fore wing lobe 35. Tergite IX setae S1 100. Tube length 75. Antennal segments III–VIII length, 27, 30, 35, 43, 40, 27.

Male microptera. Very similar to female, but smaller; prosternal ferna well developed; tergite IX setae S2 short and stout; sternite VIII with no pore plate.



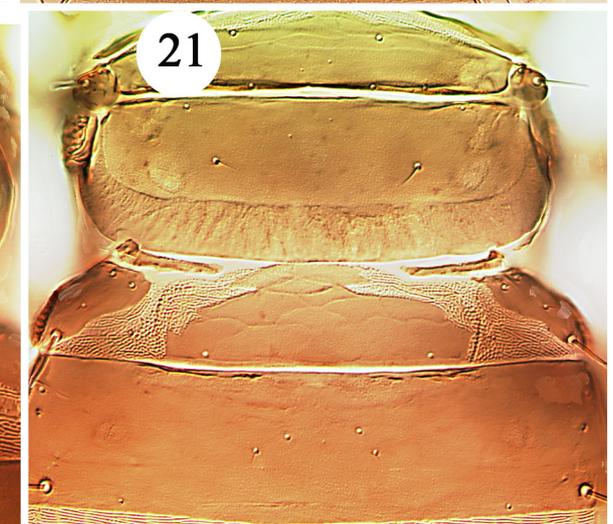
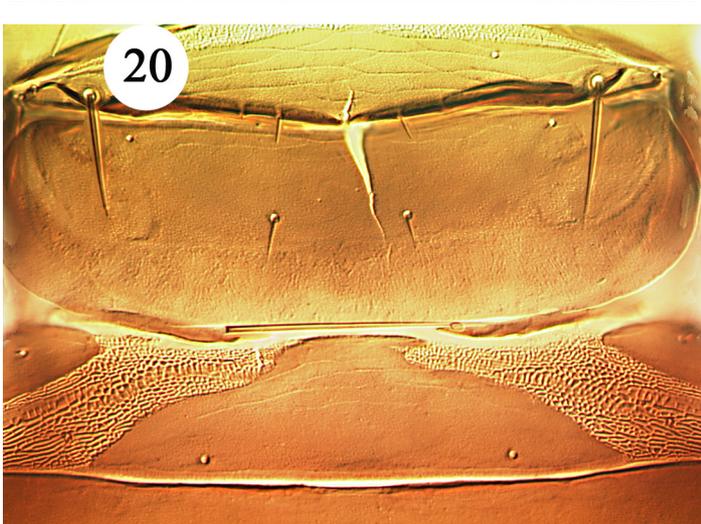
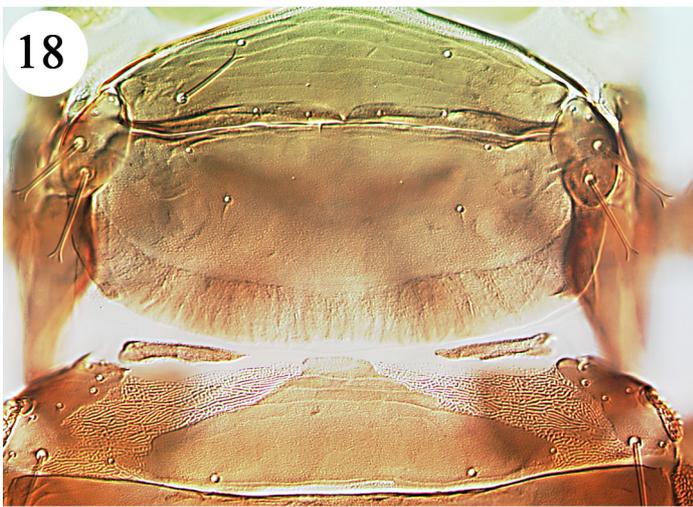
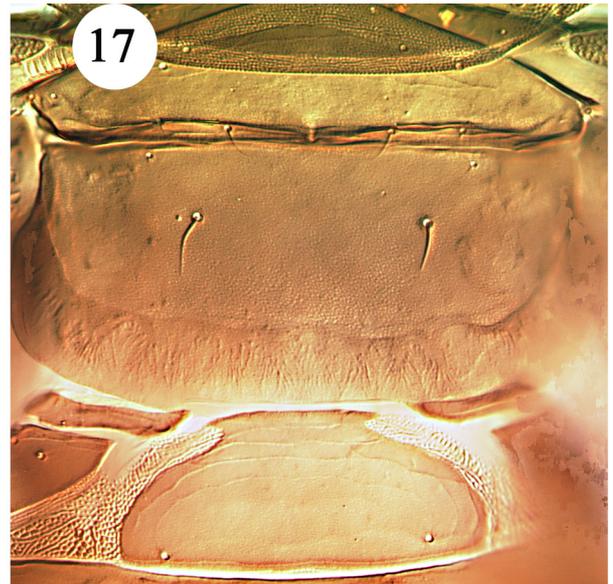
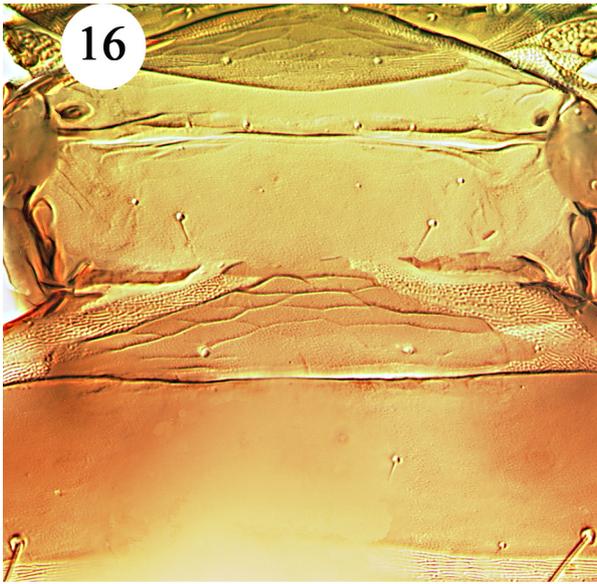
FIGURES 1–7. *Lissothrips* species from Australia—antennae. (1) *corticosus*; (2) *discus*; (3) *dentatus*; (4) *hypni*; (5) *tallagandai*; (6) *taverneri*; (7) *thomsonae*.



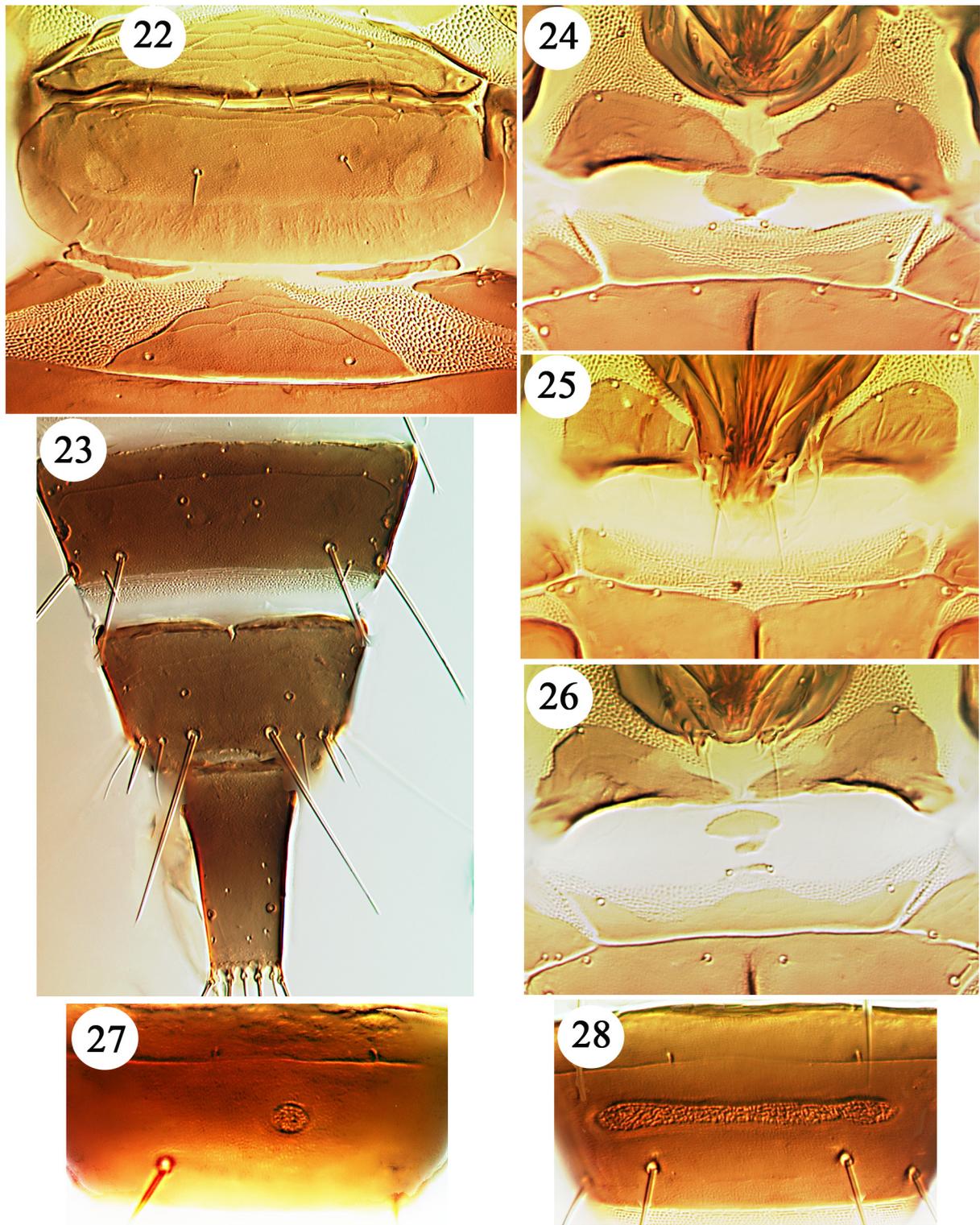
FIGURES 8–15. *Lissothrips* species from Australia—head and pronotum. (8) *corticosus*; (9) *discus*; (10) *hypni*; (11) *gersoni*; (12) *taverneri*; (13) *tallagandai*; (14) *discus*; (15) *thomsonae*.

Measurements (paratype male in microns). Body length 1050. Pronotum, length 85; width 175; setae—am 30, aa 25, ml 30, epim 35, pa 40. Fore wing lobe 30. Tergite IX setae S1 95; S2 20. Tube length 70.

Material studied. Holotype female microptera, **Australia, Queensland**, Brisbane Forest Park, from dead branch with moss and lichen, 16.i.2006 (LAM 4818).



FIGURES 16–21. *Lissothrips* species from Australia—meso & metanotum and pelta. (16) *corticosus*; (17) *dentatus*; (18) *discus*; (19) *hypni*; (20) *tallagandai*; (21) *taverneri*.



FIGURES 22–28. *Lissothrips* species from Australia. (22) *thomsonae* meso & metanotum and pelta. (23) *hypni* male tergites VIII–X. Thoracic sternites 24–26: (24) *corticosus*, (25) *tallagandai*, (26) *taverneri*. Male sternite VIII 27–28: (27) *tallagandai*, (28) *thomsonae*.

Paratypes: **Queensland**, 4 females, 3 males taken with holotype; same site, 4 females, 3 males from dead branch with moss, 22.iii.2007; Lamington, O'Reilly's, 1 male from dead twigs, 9.x.2006; Mt Fisher, 2 females, ix.1995; Lamington National Park, 1 female from yellow pan trap, vii.2007. **New South Wales**, Dorrigo National Park, Darkwood, 1 female from *Ripogonum*, iii.2010; Chichester Forest, 2 females from dead *Nothofagus moorei*

branch, 24.xii.2000; Nelligen, 1 female from dead *Acacia* twig, 5.x.1997; Monga Forest, 1 male from dead branch, 24.i.2013.

Comments. Although similar in structure to the two species, *discus* and *hypni*, this species is distinguished from the other members of the genus known from Australia by the following character states: capitate setae on head and pronotum, maxillary stylets widely separated, third antennal segment short, prosternal ferna distinct, mesopresternum often complete, fore wing lobe relatively large with two long setae, pelta broad, males with no sternal pore plate.

***Lissothrips dentatus* Mound & Walker, 1986: 66**

(Figs 3, 17)

This is one of the few members of the genus in which antennal segment III is almost as large as segment IV (Fig. 3), and for which fully winged adults are known. The original description of the female apterae refers to “curved wing-retaining setae” on tergites II–VII, but examination of six specimens from the same series as the holotype suggests that this statement was probably a copying error. Some of the tergites have a small, weakly curved seta in the position that a wing-retaining seta would be expected, but this condition is variable amongst the available specimens. The male paratypes have a small transverse pore plate on the eighth sternite. The female from Queensland listed below cannot be distinguished from the New Zealand paratypes, but the two females from ACT have the median setae on tergites II–III longer, almost half as long as the median length of their tergite.

Material studied. **New Zealand**, Whatipu, west of Auckland, 4 females, 2 males from yellow lichen, 26.ii.1979. **Australia, Queensland**, Tully Falls, 1 female from dead branch, 4.vii.1995. **Australian Capital Territory**, Casuarina Sands, 2 females from lichen on *Leptospermum* branch, 3.xii.1994.

***Lissothrips discus* sp.n.**

(Figs 2, 9, 14, 18)

Female microptera. Body, legs and antennae brown, tube and antennal segments I–III darkest; major setae pale. Head slightly wider than long, weakly reticulate near posterior margin (Fig. 9); compound eyes small, with about 12 large facets dorsally, also about 8 ventrally narrowing to a single facet at posterior; po setae long and capitate; maxillary stylets retracted to level of po setae, about one third of head width apart medially. Antennae 8-segmented, III short and disc-shaped with no sense cones (Fig. 2), IV with 3 stout sense cones, VIII slender and narrowed to base. Pronotum transverse, without sculpture (Fig. 14); notopleural sutures incomplete; major setae all long and capitate. Fore tarsus with no tooth. Mesonotum with faint transverse sculpture (chaetotaxy of holotype aberrant, Fig. 18); fore wing lobe with 2 capitate setae; metanotum without sculpture, median setae wide apart small and fine. Prosternal ferna not developed; basantra bluntly pointed medially; mesopresternum reduced to slender lateral triangles; anterior margin of mesoeusternum transverse; metathoracic sternopleural sutures not developed. Abdomen with pelta broadly flattened, almost without sculpture, campaniform sensilla present (Fig. 18); tergites with median setae minute, III–VI with 2 pairs of long capitate setae laterally, VII–VIII with external pair acute; tergite IX setae finely acute and longer than tube; anal setae longer than tube. Sternites with 8 to 10 small discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1600. Head, length 150; width 170; po setae 45. Pronotum, length 100; width 220; setae—am 35, aa 35, ml 45, epim 35, pa 45. Fore wing lobe 45. Tergite IX setae S1 125. Tube length 55. Antennal segments III–VIII length, 20, 40, 40, 45, 43, 30.

Material studied. Holotype female microptera, **Australia, Queensland**, Carnarvon Station [approx. 190km NNW of Roma], from dead wood, 8.x.2014 (DJT 1861).

Comments. This species is distinguished from all other members of the genus by the remarkable disc-like shape of the third antennal segment. Apart from that, it shares with the two new species, *corticossus* and *hypni*, the presence of capitate po setae and a well-developed wing lobe. The head of the only known specimen is slightly crushed (Fig. 9), and the natural head width is probably little more than the head length.

***Lissothrips dugdalei* Mound & Walker, 1986: 67**

This species remains known only from the type series of 16 females and two males, taken from moss and litter at two sites on the west coast of South Island, New Zealand. It is distinguished by the reduction of the pelta to a small sub-circular sclerite, and the male lacks a sternal pore plate.

***Lissothrips gersoni* Mound & Walker, 1986: 68**

(Fig. 11)

Described from both North and South Islands, New Zealand, this species was reared on a species of moss in the genus *Thuidium* (Mound & Walker 1986). It was subsequently recorded from Australia, New South Wales (Mound & Houston 1987), but the specimens on which that record was based are here identified as *tallagandai* **sp.n.** However, as indicated below, one male here identified as *gersoni* was collected recently in southern Queensland, and this is currently the only specimen known from Australia that is identifiable as this species. These two species are similar in many details of their structure, but *tallagandai* has the mesonotal lateral setae elongate, in contrast to the other species considered here, and the male has a small circular pore plate on the eighth sternite. Males of *gersoni* lack a pore plate on sternite VIII, and in both sexes the pronotal am setae are shorter than those of related species. Females of *gersoni* have these setae about 30 to 35 microns long (Fig. 11), but the males only 20 microns long, whereas in both sexes of *tallagandai* and *thomsonae* these setae are 40 microns or more in length. All three of these species have the anterior margin of the mesoeusternum eroded medially and concave.

Material studied. **New Zealand**, various sites, 2 female, 3 male paratypes (including one female with same data as holotype). **Australia, Queensland**, Lamington, O'Reilly's, 1 male from dead twigs, 9.x.2006.

***Lissothrips hypni* sp.n.**

(Figs 4, 10, 19, 23)

Female microptera. Body, all femora and antennal segments IV–VIII brown; tibiae brownish yellow, tarsi and antennal segment III yellow, tube dark brown, major setae weakly shaded. Head slightly wider than long, weakly reticulate near posterior margin (Fig. 10); 3 ocelli present but scarcely 5 microns in diameter; compound eyes well-developed, with at least 16 facets both dorsally and ventrally, ventral posterior margin broadly rounded; po setae long and capitate; maxillary stylets retracted to level of compound eyes, less than one third of head width apart medially. Antennae 8-segmented, III unusually small and sub-spherical with no sense cones (Fig. 4), IV with 3 slender sense cones, VIII slender and narrowed to base. Pronotum transverse, without sculpture; notopleural sutures almost complete; major setae all long and capitate. Fore tarsal inner apical margin with minute tooth. Mesonotum transversely reticulate on anterior half, lateral setae long and capitate; fore wing lobe with 2 capitate setae (Fig. 19); metanotum almost without sculpture, median setae wide apart small and fine. Prosternal ferna weakly developed, usually hidden beneath mouth cone; basantra bluntly pointed medially; mesopresternum transverse but weakly developed medially; anterior margin of mesoeusternum transverse; metathoracic sternopleural sutures weakly indicated. Abdomen with pelta small, irregularly D-shaped, campaniform sensilla present; tergites with median setae minute, III–VI with 2 pairs of long capitate setae laterally, VII with external pair long and acute; tergite IX setae acute but scarcely longer than tube; anal setae about as long as tube. Sternites with 6 to 8 small discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1350. Head, length 135; po setae 45. Pronotum, length 85; width 200; setae—am 40, aa 40, ml 40, epim 55, pa 45. Mesonotal lateral setae 30. Fore wing lobe 75. Tergite IX setae S1 100. Tube length 85. Antennal segments III–VIII length, 27, 35, 35, 45, 43, 25.

Male microptera. Very similar to female, but smaller, tarsal tooth not visible; tergite IX setae S2 stout but very short (Fig. 23); sternites with few discal setae, VIII with no pore plate.

Measurements (paratype male in microns). Body length 1050. Pronotum, length 75; width 175; setae—am 35, aa 32, ml 35, epim 38, pa 35. Fore wing lobe 50. Tergite IX setae S1 85; S2 20. Tube length 80.

Material studied. Holotype female microptera, **Australia, Queensland**, Cape Tribulation, Carbeen Road, from barkspray of buttress roots, 7.x.2012 (DJT 1483).

Paratype: 1 male taken with holotype.

Comments. This species shares two characters with *corticus*: the capitate postocular setae, and the short and rounded third antennal segment. However, in *hypni* this segment is yellow whereas it is dark brown in *corticus*. Both species are unusual in having the fore wing lobe well developed. Some of the character states on the *hypni* specimens are probably correlated with wing length, but the presence of three sense cones on the fourth antennal segment is found only in the related species, *discus*, amongst the *Lissothrips* species from Australia.

***Lissothrips tallagandai* sp.n.**

(Figs 5, 13, 20, 25, 27)

Female aptera. Body and legs brown, tarsi and antennal segment III sometimes paler, III with pedicel yellow, major setae not dark. Head about as long as wide, weakly reticulate posterolaterally (Fig. 13); compound eyes small, about 12 facets dorsally and narrowed ventrally to a single facet; po setae long and finely acute; maxillary stylets retracted to eyes, almost touching medially. Antennae 8-segmented, III smaller than IV (Fig. 5), III with no sense cones, IV with 2 large sense cones, VIII slender and narrowed to basal pedicel. Pronotum transverse, with very faint sculpture, notopleural sutures incomplete; aa setae short, epim setae long and finely acute. Fore tarsus with no tooth. Mesonotum transversely reticulate, lateral setae long (Fig. 20), rarely short; metanotum almost without sculpture, median setae small and fine. Prosternal ferna weakly indicated, basantra pointed medially, mesopresternum reduced to pair of weak lateral sclerites, anterior margin of mesoeusternum concave medially (Fig. 25); metathoracic sternopleural sutures not developed. Abdomen with pelta small, flattened D-shape, campaniform sensilla present (Fig. 20); tergites with median setae minute, each with 2 pairs of long pointed setae laterally; tergite IX setae longer than tube; anal setae shorter than tube. Sternites with 0 to 4 minute discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1500. Head, length 135; width 150; po setae 75. Pronotum, length 100; width 210; setae—am 38, aa 15, ml 50, epim 90, pa 70. Mesonotum lateral setae length 40. Tergite IX setae S1 135. Tube length 110. Antennal segments III–VIII length, 35, 38, 40, 45, 45, 40.

Male aptera. Slightly smaller than female but very similar in structure; tergite IX setae S2 short and stout; sternite VIII with small circular or oval pore plate (Fig. 27).

Measurements (paratype male in microns). Body length 1300. Pronotum, length 90; width 180; setae—am 42, aa 15, ml 45, epim 75, pa 60. Sternite VIII pore plate width 13. Tergite IX setae S1 100; S2 30. Tube length 105.

Material studied. Holotype female aptera, **Australia, New South Wales**, Tallaganda Forest, from extensive moss growth on large rock, 9.vi.2003 (LAM 4336).

Paratypes: **New South Wales**, 14 females, 7 males taken with holotype; same locality, 3 males, 27.ii.2011; **Australian Capital Territory**, Australian National Botanic Gardens, 1 female from fern in gully, 17.iv.2003; Tidbinbilla, 2 females, 2 males from moss on rock, 18.iv.2014. **Queensland**, Cooloolo NP, Freshwater Road, 1 female from barkspray in open forest, 16.vii.2013.

Comments. This species is very similar in structure to both *gersoni* and *thomsonae*, and one male treated here as a non-paratype of *thomsonae* was collected together with males of *tallagandai* near the type locality of the latter species. Moreover, one paratype female of *tallagandai* was collected at a site in Queensland close to the type locality of *thomsonae*. No other species of *Lissothrips* known from Australia or New Zealand has the lateral pair of setae on the mesonotum so elongate (Fig. 20). However, similar long mesonotal setae have been seen in various species from other parts of the world, including the type species *muscorum* from North America, *uniformis* from Argentina and *okajimai* from Japan.

***Lissothrips taverneri* sp.n.**

(Figs 6, 12, 21, 26)

Female microptera: Body, legs and antennae light brown, tarsi paler, tibiae variously yellowish brown, pedicel of antennal segment III yellow, tube darker brown, major setae pale. Head as wide as long, faintly reticulate posterolaterally (Fig. 12); compound eyes small, with about 12 large facets dorsally, narrowed ventrally to a single

facet; po setae long and bluntly pointed; maxillary stylets retracted almost to compound eyes, about one fifth of head width apart medially. Antennae 8-segmented, III small with no sense cones (Fig. 6), IV with 2 large sense cones, VIII slender and narrowed to basal pedicel. Pronotum transverse, without sculpture, notopleural sutures usually incomplete; major setae all long, am and aa bluntly pointed, ml, epim and pa all finely pointed. Fore tarsus with no tooth. Mesonotum weakly reticulate on anterior half, lateral setae minute; fore wing lobe very small with 1 blunt seta (Fig. 21); metanotum almost without sculpture, median setae wide apart small and fine. Prosternal ferna weakly developed, hidden beneath mouth cone; basantra bluntly pointed and meeting medially; mesopresternum transverse, complete (Fig. 26); anterior margin of mesoeusternum transverse; metathoracic sternopleural sutures not developed. Abdomen with pelta irregularly D-shaped with posterior margin eroded, campaniform sensilla present (Fig. 21); tergites with median setae minute, with 2 pairs of long finely pointed setae laterally; tergite IX setae finely acute and longer than tube; tube unusually short, anal setae longer than tube. Sternites with about 8 small discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1330. Head, length 125; width 130; po setae 65. Pronotum, length 90; width 175; setae—am 43, aa 35, ml 60, epim 65, pa 75. Fore wing lobe 15. Tergite IX setae S1 130. Tube length 65. Antennal segments III–VIII length, 25, 30, 35, 40, 35, 30.

Male microptera. Very similar to female, but smaller; tergite IX setae S2 short and stout; sternite VIII with no pore plate.

Measurements (paratype male in microns). Body length 850. Pronotum, length 80; width 150; setae—am 30, aa 20, ml 45, epim 50, pa 45. Fore wing lobe 10. Tergite IX setae S1 115; S2 15. Tube length 60.

Material studied. Holotype female microptera, **Australia, Norfolk Island**, Red Road in National Park, from dead *Elaeodendron curtispiculum* with lichen, 24.xii.2013 (LAM 5890).

Paratypes: 9 females, 5 males taken with holotype; same site, 1 female from dead *Araucaria heterophylla*, 20.xii.2013; Prince Philip Drive, 2 females, 4 males from dead *Lagunaria patersonia* branches, 26.xi.2014, same site, 2 females, 29.xi.2014; Mt Bate, 1 female from dead branch, 24.xii.2013, same site, 2 males from mossy dead branch, 30.xi.2014; Palm Grove Track, 1 female from old dead branch, 23.xii.2012.

Comments. This species is distinguished from the others that are similar to *gersoni* by the presence of a small fore wing rudiment, the rather shorter third antennal segment, the complete mesopresternum, the large pelta, and the relatively short tube. The specific epithet recognises the extensive contributions by Neil Taverner to the Norfolk Island Quarantine Survey between 2012 and 2015.

***Lissothrips thomsonae* sp.n.**

(Figs 7, 15, 22, 28)

Female aptera. Body, legs and antennae brown, antennal segment III paler and with pedicel yellow, tube dark brown, major setae light brown.

Head slightly wider than long, weakly reticulate near posterior margin; compound eyes small, with about 12 large facets dorsally and 10 ventrally that narrow to a single posterior facet; po setae very long and finely acute; maxillary stylets retracted almost to level of eyes, less than one fifth of head width apart medially. Antennae 8-segmented, III slender with no sense cones (Fig. 7), IV with 2 long sense cones, VIII slender and narrowed to basal pedicel.

Pronotum transverse, without sculpture (Fig. 15); notopleural sutures incomplete; major setae long and acute, aa setae much shorter than am setae. Fore tarsus with no tooth. Mesonotum transversely reticulate, lateral setae minute; fore wing lobe absent (Fig. 22); metanotum almost without sculpture, median setae wide apart small and fine. Prosternal ferna weakly developed, usually hidden beneath mouth cone; basantra pointed medially; mesopresternum reduced to slender lateral sclerites; anterior margin of mesoeusternum concave medially; metathoracic sternopleural sutures not developed. Abdomen with pelta broad, campaniform sensilla present (Fig. 22); tergites with median setae minute, III–VII with 2 pairs of long pointed setae laterally; tergite IX setae finely acute and longer than tube; anal setae shorter than tube. Sternites with 2 to 4 minute discal setae, median marginal setae longer than lateral pair.

Measurements (holotype female in microns). Body length 1450. Head, length 125; width 150; po setae 85. Pronotum, length 100; width 210; setae—am 50, aa 20, ml 60, epim 85, pa 70. Tergite IX setae S1 130. Tube length 110. Antennal segments III–VIII length, 30, 32, 40, 48, 40, 40.

Male aptera. Very similar to female, but smaller; tergite IX setae S2 short and stout; sternite VIII with transverse pore plate (Fig. 28).

Measurements (paratype male in microns). Body length 1180. Pronotum, length 85; width 175; setae—am 45, aa 25, ml 50, epim 85, pa 65. Sternite VIII pore plate width 110. Tergite IX setae S1 110; S2 35. Tube length 100.

Female macroptera. Similar to aptera in colour; ocelli well developed; prosternal ferna well developed, mesopresternum complete transverse; anterior margin of mesoeusternum not concave medially; metathoracic sternopleural sutures not developed. Mesonotal lateral setae well developed; metanotum without sculpture. Fore wing parallel sided, no duplicated cilia, with three long sub-basal setae. Pelta broadly D-shaped; tergites III–VI with one pair of straight wing-retaining setae directed mesad.

Material studied. Holotype female aptera, **Australia, Queensland**, Cooloola National Park, Bymien Picnic Area, from barkspray of rainforest tree trunk, 17.vii.2003 (K.Thomson).

Paratypes: 1 female, 2 males taken with holotype. **Queensland:** Atherton, Baldy Mtn Road, 1 male from barkspray in rainforest, 6.xii.2010; Bunya Mtns, Pitta Cottage, 1 female aptera, 1 female macroptera, from barkspray of rainforest tree trunks, 22.xii.2010; Queen Mary Falls NP, 1 female from dead branches, 6.iv.2007. **New South Wales:** Crystal Creek, 10km north of Murwillumbah, 1 male from dead twigs, 23.xii.2006;

Non-paratypes: **New South Wales:** Cabbage Tree Creek, 2 females, 1 male from moss and litter, 21.ii.1969; Tallaganda, Lowden Forest Park, 1 male from *Eucalyptus* nuts and mosses, 27.ii.2011. **Australian Capital Territory,** National Botanic Gardens, 1 female from fern in gully, 17.iv.2003.

Comments. The specimens from southern New South Wales and the ACT are excluded from the type series because the sternal pore plate on the two available males is only about 75 microns wide in contrast to more than 100 microns on males of the type series. Apart from this, both sexes are similar in structure to the type specimens. The third antennal segment of *thomsonae* is slightly more slender than that of other species of this genus from Australia, but it shares many character states with *gersoni*. One of the females from Bunya Mountains listed above is the only macropterous specimen of this genus known from Australia or New Zealand.

***Williamsiella* Hood**

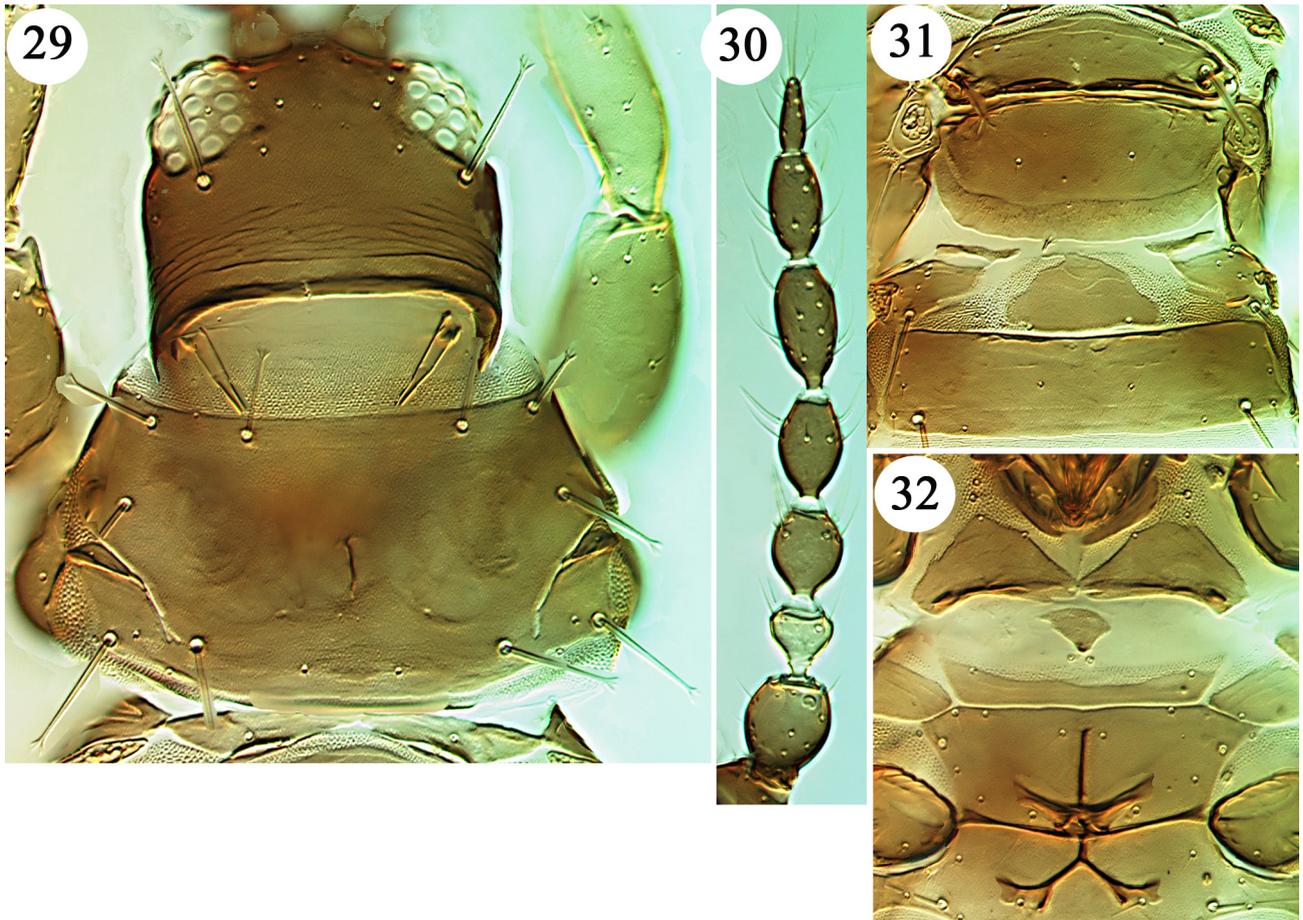
Williamsiella Hood, 1925: 60. Type species *W. bicoloripes* Hood.

Relationships among the 25 known species of this genus (ThripsWiki 2015) were discussed by Mound (1989), together with extensive notes on the structural variation they exhibit. Of these species, 22 are known only from the Americas, mainly the Neotropics, with one species described from Fiji, and two described from Africa. The new species described below is the first record of this genus from Australia.

***Williamsiella insperata* sp.n.**

(Figs 29–32)

Female aptera: Body, all femora and antennal segments IV–VIII brown; tibiae yellowish brown, tarsi and antennal segment III yellow, tube dark brown, major setae weakly shaded. Head wider than long (Fig. 29), weakly reticulate on posterior third; compound eyes with about 12 facets dorsally, ventrally with about 10 facets; po setae long and capitate; maxillary stylets wide apart, restricted to large mouth cone. Antennae 8-segmented (Fig. 30), III smaller than IV, with one small sense cone on inner margin (sometimes absent?), IV with 2 large sense cones, VIII slender and narrowed to small basal pedicel. Pronotum transverse, without sculpture, notopleural sutures long but incomplete; all five major setae long and capitate (Fig. 29). Fore tarsal inner apical margin with small tooth. Mesonotum almost without sculpture, paired lateral setae long, no fore wing lobe; metanotum without sculpture, median setae small and fine (Fig. 31). Prosternal ferna weakly indicated, basantra pointed medially, mesopresternum transverse but narrow medially, anterior margin of mesoeusternum transverse (Fig. 32); metathoracic sternopleural sutures not developed. Abdomen with pelta small, irregular D-shape, campaniform sensilla present; tergites with median setae minute, III–VI each with 2 pairs of long capitate setae laterally, external pair on VII pointed; tergite IX setae finely pointed, longer than tube; anal setae shorter than tube. Sternites with 4 to 6 minute discal setae, median marginal setae longer than lateral pair.



FIGURES 29–32. *Williamsiella insperata*. (29) Head & pronotum; (30) Antenna; (31) Meso & metanota and pelta; (32) Thoracic sternites.

Measurements (holotype female in microns). Body length 1150. Head, length 75; width 115; po setae 50. Pronotum, length 100; width 175; setae—am 38, aa 38, ml 40, epim 45, pa 40. Mesonotum lateral setae length 38. Tergite IX setae S1 90. Tube length 75. Antennal segments III–VIII length, 22, 28, 33, 40, 38, 23.

Male aptera. Smaller than female but very similar in structure; tergite IX setae S2 short and stout; sternites with only 2 discal setae, VIII with no pore plate.

Measurements (paratype male in microns). Body length 950. Pronotum, length 85; width 165; setae—am 25, aa 25, ml 35, epim 38, pa 38. Tergite IX setae S1 75; S2 25. Tube length 70.

Material studied. Holotype female aptera, **Australia, Northern Territory**, Litchfield National Park, Tabletop Swamp, barkspray of *Eucalyptus* trunk, 3.v.2014 (DJT 1804).

Paratypes: 2 females, 3 males taken with holotype. **Queensland**, Cape Tribulation, Carbeen Road, 1 female from barkspray of buttress roots, 7.x.2012.

Comments. According to Table I in Mound (1989), only five species of *Williamsiella* have the antennae 8-segmented with segment eight narrowed to the base, and the third segment with one sense cone. From those five species, as from most other members of this genus, the new species differs in having all five pairs of pronotal major setae long and capitate. However, the head shape is similar to that of *bicoloripes*, the type species that is widespread between Texas and Brazil, as well as to some other species including *jacoti* from Angola.

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