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Australian species of spore-feeding Thysanoptera in the genera *Carientothrips* and *Nesothrips* (Thysanoptera: Idolothripinae)

LI-XIN EOW¹, LAURENCE A MOUND², DESLEY J TREE³ & STEPHEN L CAMERON¹

¹Earth, Environmental & Biological Sciences School, Science & Engineering Faculty, Queensland University of Technology, GPO Box 2434, Brisbane, QLD 4001, Australia. E-mail: eowlixin@gmail.com, sl.cameron@qut.edu.au

²CSIRO Ecosystem Sciences, PO Box 1700, Canberra, ACT 2601. E-mail: laurence.mound@csiro.au

³Queensland Primary Industries Insect Collection (QDPC), GPO Box 267, Brisbane, Qld, 4001. E-mail: desley.tree@daff.qld.gov.au

Abstract

The species from Australia in the genera *Carientothrips* and *Nesothrips* are reviewed and an illustrated key is provided. *Carientothrips* is distinguished based on the unusual form of the maxillary palps. Two species, *badius* Hood **comb.n.** and *capricornis* Mound **comb.n.**, are transferred to *Nesothrips* from *Carientothrips*; and *Nesothrips melinus* Mound **syn.n.** is synonymised with *Carientothrips miskoi* Mound. In *Carientothrips* the following six new species are described: *alienatus* **sp.n.**, *calami* **sp.n.**, *horni* **sp.n.**, *palumai* **sp.n.**, *snowi* **sp.n.**, *tasmanica* **sp.n.**; while *flavitibia* Moulton **stat.rev.** is recalled from synonymy with *C. mjobergi* (Karny). In *Nesothrips* four new species are described: *barrowi* **sp.n.**, *brigalowi* **sp.n.**, *coorongi* **sp.n.**, *rossi* **sp.n.**; while *rhizophorae* (Girault) **syn.n.** is placed as a synonym of *minor* Bagnall.

Key words: spore-feeding thrips, Australia, leaf-litter, Idolothripinae, *Carientothrips*, *Nesothrips*

Introduction

Species in the two genera *Carientothrips* and *Nesothrips* live mainly on dead branches, with a few in leaf-litter and some at the base of grasses. Currently, these comprise 23% of the species known from Australia in the Thysanoptera subfamily Idolothripinae, all of which are considered to feed on fungal spores (Mound & Palmer 1983). More than 70% of the species in the first of these genera are described from Australia, and more than 40% of species in the second from either Australia or New Zealand. In both genera, most of the remaining species are from various Pacific Ocean territories, with a few described from further North into the Oriental Region (ThripsWiki 2014).

These two genera are considered to be closely-related within the subtribe Diceratothripina (Mound & Palmer 1983). Of the 11 genera placed in Diceratothripina, six comprise only one or two species. Of the larger genera, *Diceratothrips* is entirely Neotropical, whereas *Acallurothrips* and *Neosmerinthothrips* are both pantropical. Despite the structural diversity amongst these genera, each of the species usually has four sensoria on the fourth antennal segment, the maxillary stylets rather wide apart within the head, the metathoracic sternopleural sutures present, and the tube without any prominent lateral setae.

Carientothrips and *Nesothrips* have remained unsatisfactorily distinguished from each other, based on a difference in the orientation of the maxillary stylets within the head (Mound & Palmer 1983). Most species referred to *Nesothrips* have these stylets wide apart and arranged in a V-shape (Figs 47–55). In contrast, species referred to *Carientothrips* have the stylets closer together and often parallel or subparallel within the head (Figs 1–5). However, this is not a functionally reliable difference. The stylets are easily moved from their position during the process of slide mounting for study, and the stylet-position in several species of *Carientothrips* might equally well be interpreted as widely U-shaped when the head is depressed. An additional problem is that some short-bodied species in the two genera, such as *Nesothrips propinquus* and *Carientothrips miskoi*, are very similar in general appearance, possibly as a result of sharing a similar habitat. In these species the tergites are shorter than the sternites on the median abdominal segments, and this correlates with the behaviour of both species in suddenly

raising the tube over the head when disturbed (Mound 2004). This abdomen-tilting behaviour has the effect of making the adults of these species suddenly look like mites rather than thrips as they walk across a beating tray. A similar behaviour, and similar abdominal structure, has been observed in species of the genera *Acallurothrips* and *Neosmerinthothrips*, in which the tube is often rather swollen. The function of this behaviour is not known, but it is more likely to be related to the defensive release of chemicals from the tube than to be some form of mimicry (Mound & Morris 1999).

During the course of the studies reported here a significant difference was recognised in the form of the maxillary palps. *Nesothrips* species have the first segment short and quadrate with the second segment longer and more slender—a condition that is normal amongst Phlaeothripidae (Fig. 56). In contrast, species of *Carientothrips* have the maxillary palp first segment considerably longer than wide, and sometimes longer than the second segment, and the latter often bears transverse striae (Figs 16–20). This condition of the maxillary palps of *Carientothrips* species is, as far as is known at present, unique amongst Phlaeothripidae. The difference in the palps between species of these two genera correlates well with the previously recognised difference in the arrangement of the maxillary stylets (Mound 1974b).

A further distinction recognised during this study is in the form of the ventral prolongation of the compound eyes. Several species of *Carientothrips* have the eyes prolonged on the ventral surface, but this involves a simple row of one or two large ommatidia (Figs 7–9). In contrast, the ventral prolongation of the eyes in some species of *Nesothrips* involves the entire ventral posterior margin of the eye, with this prolongation two or three ommatidia wide, as in *N. propinquus* (Fig. 57).

The species of *Carientothrips* and *Nesothrips* have a pair of setae associated with the posterior ocelli, and the position and length of these setae is often used in species recognition. While this is sometimes a useful character, the precise position of this pair of setae is variable in several species of *Nesothrips*, and is not always strictly bilaterally symmetrical. Wing polymorphism is another problem in species definition, because a few species in both genera have been found to exist as apterae, micropterae, hemimacropterae and macropterae, and the shape of the pelta varies between these morphs. Moreover, males of some species vary greatly in body size, the extremes being referred to as major and minor males. Major males are usually flightless, but macropterous males are not always minor individuals.

As a result of the character state differences discussed above, two species are here transferred to the genus *Nesothrips* from *Carientothrips*. Moreover, recent field collections have led to the recognition here of 10 new species, and also to the conclusion that *Nesothrips melinus* actually represents the male of *Carientothrips miskoi*. Full nomenclatural and bibliographic details of the species considered in this paper are available on the web in ThripsWiki (2014).

Methods and material

This study is based on slide-mounted specimens in ANIC—the Australian National Insect Collection, Canberra, and in QDPC—the Queensland Primary Industries Insect Collection, Brisbane. Holotypes are deposited in ANIC, with some paratypes in QDPC. Slides were prepared using the method by Mound and Marullo (1996) or the schedule in ThripsWiki (2014) under “Collecting and preparing thrips for study”. Field collecting techniques included beating dead branches and suitable vegetation over a plastic tray, bark spraying with insecticide (Tree & Walter 2012), and leaf-litter extraction using Berlese funnels, with particular emphasis on acquiring good series of specimens at any one site and establishing host and habitat associations. The images were taken with a Leica DM2500 microscope using DIC illumination and Automontage software, and prepared using Adobe Illustrator CS5.

Abbreviations: head setae: po (postocular); pronotal major setae: am (anteromarginal), aa (anteroangular), ml (midlateral), pa (posteroangular), epim (epimeral).

Carientothrips Moulton

Bolothrips (*Carientothrips*) Moulton, 1944: 306. Type species *Bolothrips* (*Carientothrips*) *fijiensis* Moulton, by monotypy.

This genus is no longer considered to be closely related to *Bolothrips*, a genus that is now placed in the subtribe Compsothripina in which the species have three (rarely two) sensoria on the fourth antennal segment. Mound (1974b) provided a key to the 18 species of *Cariantothrips* then recognised. However, with the six new species described here (*alienatus*, *calami*, *horni*, *palumai*, *snowi*, *tasmanica*), a further species recalled from synonymy (*flavitibia*), and two species transferred to *Nesothrips* (*badius*, *capricornis*), the total is now 23, of which 18 are from Australia and with one each from Japan (*japonicus*), New Guinea (*grayi*), Fiji (*fijiensis*), Rapa (Austral Islands) (*biformis*), and the extreme south of South America (Tierra del Fuego and Falkland Islands) (*denticulatus*). Judging from the gut contents, all of the Australian species feed on whole fungal spores. Many of them breed on dead leaves, particularly of *Eucalyptus* trees, one is specific to dead rattan palm fronds (*Calamus*), but others are found breeding at the base of grasses, rather like *Bolothrips* species in the Holarctic Region.

As indicated above in the Introduction, the maxillary palps of *Cariantothrips* species are unusual amongst Phlaeothripidae, in that the basal segment is relatively long and sometimes longer than the second segment which often bears transverse striae. Intra-specific structural variation is confusing within many species of this genus. Part of this variation is sexual, with males commonly having enlarged fore femora, a large fore tarsal tooth, and often an enlarged prothorax with swollen fore coxae, also differences in the form of some setal apices. In females of this genus, the fore tarsal tooth is usually absent, although it is present in the females of *C. calami* and *C. denticulatus*. Some character states that have been used to distinguish species previously require careful assessment and are possibly not reliable, these include relative head length, the form of setal apices whether acute, blunt, or weakly capitate, and extent of yellow colour on parts of the body. One character state has proved particularly interesting—the prolongation of the compound eyes on the ventral surface of the head. Mound (1974a) considered that this varied within the species *mjobergi*, but that conclusion is rejected here. The ventral prolongation of the eyes in *Cariantothrips* species involves the displacement posteriorly of one (more rarely two or even three) ommatidia along a special groove (Figs 7–9). It is not comparable to the eye prolongation found in some other Idolothripinae genera, including *Nesothrips propinquus*, in which the entire multifaceted posterior margin of the eyes is prolonged (Figs 57, 68). Because of the absence of any individuals with the eyes in any suitable intermediate condition, the difference between eyes ventrally prolonged or not prolonged is here interpreted as indicating a difference between species. As a result, four closely similar species are recognised here: *alienatus*, *flavitibia*, *mjobergi*, and *tasmanica*.

Key to *Cariantothrips* species from Australia

1. Metanotum anteromedially, with 2–10 setae in addition to the median pair of major setae (Figs 37–39); notopleural sutures incomplete (see Fig. 15) 2
- Metanotum with only one pair of major setae medially (Figs 31, 34), sometimes with one small pair midlaterally; notopleural sutures usually complete 5
2. Antennal segment III with sharp-edged swelling near base (Fig. 29) *acti*
- Pedicel of antennal segment III not or scarcely swollen (see Figs 24–26) 3
3. Pronotal am setae as long as aa setae (Fig. 10) *horni* sp.n.
- Pronotal am setae no longer than pronotal discal setae (see Fig. 15) 4
4. Antennal segment III less than 2.3 times as long as wide (Fig. 25) *reedi*
- Antennal segment III more than 2.6 times as long as wide (Fig. 26) *vesper*
5. Antennal segment III with sharp-edged swelling near base (Fig. 30) *pictilis*
- Pedicel of antennal segment III not swollen 6
6. Head (Fig. 11), metanotum and tergites strongly reticulate, surface of fore femora with distinctive sculpture; tube with longitudinal ridges on basal third (Fig. 23) *calami* sp.n.
- Head, metanotum, tergites and fore femora not strongly sculptured; tube without ridges 7
7. Compound eyes ventrally with no ommatidia displaced to posterior (Fig. 6) 8
- Compound eyes ventrally with one or more ommatidia displaced to posterior (Figs 7–9) 14
8. Body, legs and antennae dark brown, except paler pedicel of antennal III and apex of tube; pronotal am setae weakly capitate and as long as aa setae *casuarinae*
- At least yellow in part on head, antennae, or legs; pronotal am setae acute and/or shorter than aa setae 9
9. Tergites IV–VI with setae S1 arising near posterior margin, as long and acute as S2 and extending far beyond posterior margin of tergite; wing-retaining setae straight and acute (Fig. 46) *snowi* sp.n.
- Tergites IV–VI with setae S1 usually near median campaniform sensilla (see Fig. 45), and much smaller than S2; wing-retaining setae curved (when present) 10
10. Antennal segment IV slender, 3.2 times as long as wide *magnetis*

-.	Antennal segment IV no more than 3.0 times as long as wide	11
11.	Head and antennal segment I uniformly brown, head almost as dark as abdomen.	<i>alienatus</i> sp.n.
-.	Head and antennal segment I yellow to brownish-yellow, paler than abdomen.	12
12.	Head distinctly yellow on anterior area and between compound eyes but shaded brown posterolaterally [antennal segment I yellow] (Fig. 14)	<i>palumai</i> sp.n.
-.	Head and pronotum brownish-yellow but abdomen darker, head not distinctly paler on anterior area (see Fig. 12)	13
13.	Tergite IX setae less than 0.8 as long as tube with apices broadly blunt; tergites IV–VI of apterous females with median transverse row of 10–20 equally small setae (males often with fewer setae); tergal wing-retaining setae of apterae minute, length less than 15 microns (Fig. 44).	<i>semirufus</i>
-.	Tergite IX setae about as long as tube with apices pointed to finely acute; tergites IV–VI of apterae with median transverse row of 6–10 setae with median pair longer than lateral pairs, and wing-retaining setae 25–50 microns long (Fig. 45)	<i>loisthus</i>
14.	Females with tube sharply yellow in distal third or half (Fig. 22) (but brownish yellow in males); head not projecting in front of eyes; usually apterous without ocelli	<i>miskoi</i>
-.	Tube uniformly dark brown in both sexes, sometimes shading to weakly paler in distal third; head with short projection in front of eyes (see Figs 1, 2, 9); wing morphs variable, ocelli present in aptera	15
15.	Antennal segment VI sub-spherical/ovoid and sharply constricted to narrow pedicel (Fig. 28)	<i>pedicillus</i>
-.	Antennal segment VI longer, at least elongate ovoid	16
16.	Compound eye ventrally with two or three ommatidia displaced to posterior (Fig. 9); antennal segment I clear yellow [Mid and hind tibiae varying from brown to brownish yellow, but never sharply clear yellow in contrast to brown femora].	<i>tasmanica</i> sp.n.
-.	Compound eye ventrally with only one ommatidium displaced to posterior; antennal segment I brown	17
17.	All tibiae sharply clear yellow in contrast to brown femora.	<i>flavitibia</i>
-.	Mid and hind tibiae largely brown, concolorous with femora	<i>mjobergi</i>

***Carientothrips acti* Mound, 1974a: 25**

(Figs 29, 38)

This species appears to be widespread in *Eucalyptus* leaf-litter in south-eastern Australia. It has been taken commonly around Canberra, but has also been seen from southern New South Wales, Victoria (including Mallacoota on the southern coast), Kangaroo Island in South Australia, and also southeast Queensland, Mt. Coottha, Brisbane. Only one macropterous individual has been seen, a female from South Australia near Keith. Mound (1974b) referred to the “*acti*-species group”, comprising *japonicus*, *pictilis*, *reedi* and *vesper*, but this is a poorly defined group, and two further species, *semirufus* and *loisthus*, are also rather similar in having a relatively long head and slender body.

Diagnosis. Apterous, rarely macropterous, body brown, or with head and thorax paler; head long, reticulate on ocellar region and laterally, ocelli absent, postocellar setae slender and acute, postocular stout and capitate, maxillary stylets less than 0.3 of head width apart and retracted to eyes, maxillary palp segment I 2.5–3 times as long as wide, segment II 0.5–0.7 as long as I; eyes well developed dorsally but small ventrally with only 4–5 visible ommatidia; antennal segment III with sharp-edged swelling near base (Fig. 29). Pronotal notopleural sutures incomplete, am setae minute. Metanotum with several small setae anteromedially (Fig. 38). Pelta wide with broadly flattened median lobe; tube shorter than head. Male smaller than female, with small fore tarsal tooth.

***Carientothrips alienatus* sp.n.**

(Figs 4, 6, 17, 36)

Female macroptera. Head, thorax, abdomen and femora uniformly brown, tibiae variable from yellow to brown, tarsi yellow; fore wing weakly shaded except near base; major setae pale; antennal segment I brown, II brown and paler distally, III–V yellow with gradually more shaded apex, VI brown with pedicel yellow, VII–VIII brown.

Head weakly reticulate near margins, longer than wide, weakly projecting in front of eyes (Fig. 4); postocellar setae and postocular setae well-developed, long, slender and acute, mid-dorsal setae minute and acute; compound eyes usually smaller ventrally than dorsally (Fig. 6); maxillary stylets about 0.5 of head width apart, retracted almost to postocular setae; maxillary palp segment I about 3 times as long as wide, segment II slightly shorter than I with weak transverse lines (Fig. 17). Antennal segment VIII not narrowed to base.

Pronotum transverse, notopleural sutures complete; 4 pairs of major setae developed, aa, ml and epim blunt to weakly capitate but pa acute, am minute and acute; basantra small and weakly sclerotised, mesopresternum

transverse (Fig. 36); metathoracic sternopleural sutures long and curved. Metanotum weakly reticulate, median setae slender and acute. Fore femora not enlarged, fore tarsal tooth absent. Fore wing parallel sided; sub-basal setae S1 and S2 weakly capitate, S3 acute; 3–7 duplicated cilia.

Pelta with long, slender lateral lobes connected narrowly to elongate median lobe, campaniform sensilla absent; tergites III–VII each with one pair of sigmoid wing-retaining setae, setae S1 minute medially on tergite, S2 long and blunt to weakly capitate; tergite IX setae S1 acute, S2 blunt. Tube shorter than head. Sternites with median transverse row of about 12 minute discal setae, median posteromarginal setae small and arising in front of margin.

Measurements (holotype female in microns). Body length 2550. Head, length 310; width 255; postocellar setae 50; po setae 75. Pronotum, length 150; width 280; major setae am 40, aa 45, ml 55, epim 75, pa 90. Fore wing, length 950; sub-basal setae 35, 65, 85. Tergite IX setae S1 135, S2 155. Tube length 185. Antennal segments III–VIII length 80, 85, 85, 70, 55, 35.

Male macroptera. Similar to female except fore tarsus with small tooth.

Male hemimacroptera (Fig. 4). Similar to female in structure, except head slightly narrower, fore femora swollen, fore tarsal tooth stout; pronotum larger, aa and ml setae finely acute, epim and pa setae bluntly pointed; fore wings about 1.5 times as long as pterothorax width, but fore wing length continuously variable among males, microptera fore wings shorter than pterothorax width.

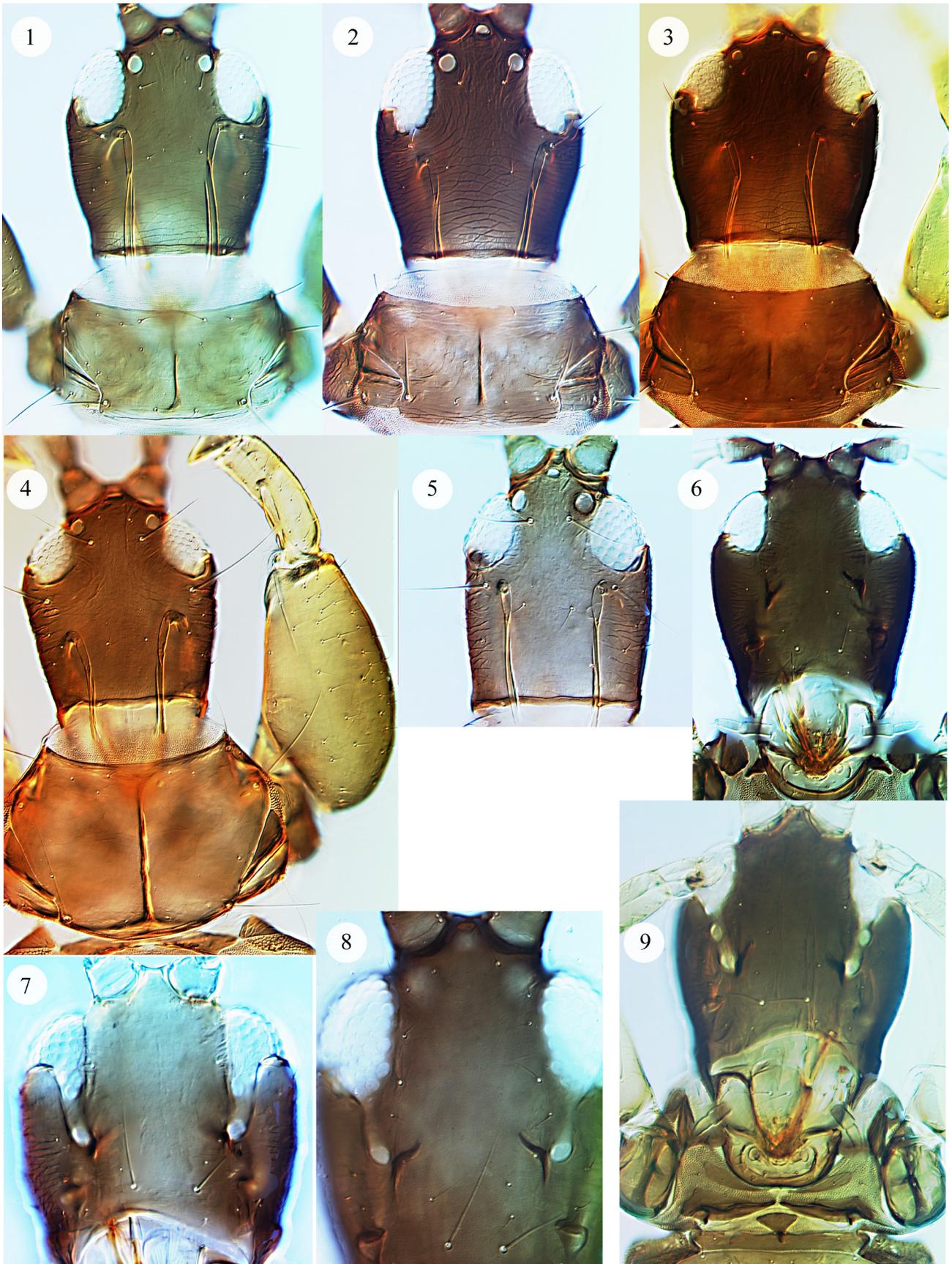
Measurements (large, hemimacropterous male in microns). Body length 2400. Head, length 250; width 215; postocellar setae 75; po setae 130. Pronotum, length 185; width 275; major setae am 35, aa 75, ml 130, epim 100, pa 100. Fore wing, length 280; sub-basal setae 60, 80, 90. Tergite IX setae S1 125, S2 150. Tube length 175. Antennal segments III–VIII length 75, 75, 80, 60, 55, 35.

Specimens studied. Holotype female macroptera. **Australia, South Australia**, 40km southeast of Mt. Gambier, from dead *Eucalyptus obliqua* nuts, 12.iii.2011 (LAM5465).

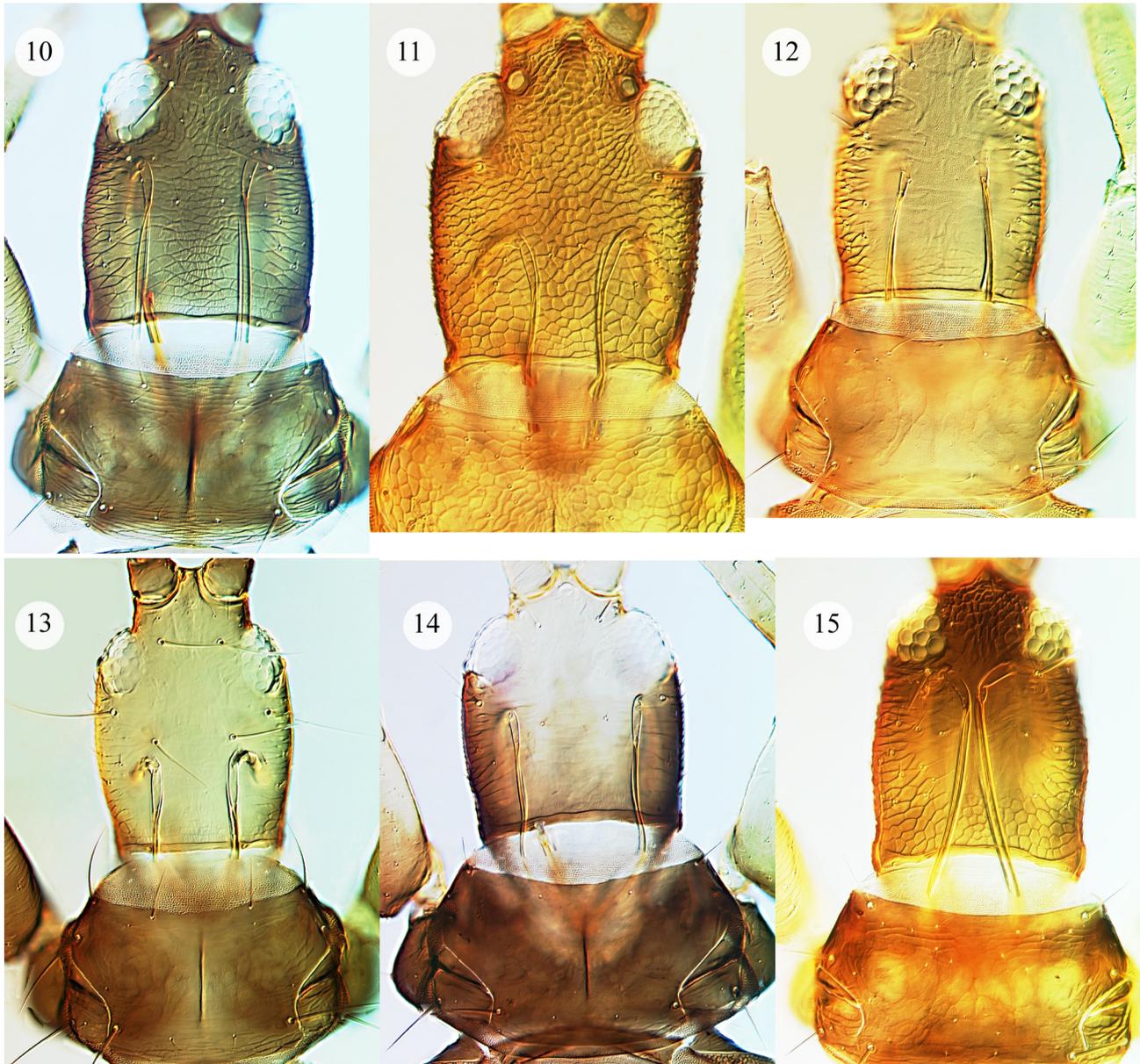
Paratypes: 4 females, 7 males hemimacropterae taken with holotype; **South Australia**, Adelaide, Mt. George, 2 female, 2 males, from *Eucalyptus* dead nuts, 19.xii.2005. **Victoria**, 25km north of Cann River, 2 females, 9 male macropterae and hemimacropterae, from dead *Eucalyptus* leaves, 2.iv.2011. **Tasmania**, 17 Mile Plain, 1 male, 11.iii.2010; Flinders Island, 1 female, 27.xi.2011. **Australian Capital Territory**, Black Mt., 4 females, 3 males from dead *Eucalyptus* leaves, 30.iv.2011. **New South Wales**, Talaganda, 2 males 6.viii.2006, 2 females 1 male, 27.ii.2011 from dead *Eucalyptus*; Moruya 1 female from dead *Eucalyptus* leaves, 15.ix.2012. **Queensland**: Beerwah, 2 females from *Casuarina* dead pods, 29.ix.1998; Mt. Coot-tha, 1 male from dead leaves, 29.xii.2006; D'Aguilar National Park, 1 female from dead branches, 3.iv.2011, 1 female from dead wood, 26.iii.2013, 1 female from dead leaves, 10.v.2007, 1 female from dead wood 1.viii.2012; Blackbutt, 2 female, 2 males from dead wood, 8.iv.2012; Blackall Range, 1 male from dead leaves 17.v.2007; Moreton Island, 1 female from dead *Lophostemon confertus* nuts 26.viii.2009; Stanthorpe, 1 female, 1 male from dead leaves, 29.xii.2011, 1 male from dead leaves, 17.v.2007; Cape Tribulation, 1 female from dead leaves, 9.x.2012.

Specimens excluded from type series: **Queensland**: Brisbane Forest Park, 4 females 1 male, 26.iii.2013; Girraween N.P., 1 female, 2 males, 29.xii.2011; Mt. Gammy, 16.viii.2010; Queen Mary's Falls, 1 female, 6.iv.2007; Moreton Is., 1 female, 28.viii.2009; Cape Tribulation, 1 male, 8.x.2012.

Comments. The paratypes from Mt. George, South Australia, were taken together with *C. mjobergi*, and Mound (1974a) interpreted the difference in the form of the eyes between these two species as being intraspecific variation. However, no intermediate specimens have been found between the conditions—eyes with one isolated posterior ommatidium, and eyes rather smaller ventrally than dorsally without an isolated ommatidium. Moreover, apart from the obvious eye difference, the males of *alienatus* differ from those of *mjobergi* in having the head more slender with very long and acute postocellar and postocular setae, and the pronotal aa and ml setae are also long and acute in contrast to the usually shorter and more blunt setae of *mjobergi*. Also similar in general appearance is the rainforest species, *flavitibia*, but that has the eyes prolonged ventrally, and the hind tibiae more sharply yellow in contrast to the brown femora. Despite this, several specimens are listed above, mainly from southeastern Queensland, that judging from the form of the eyes seem to represent *alienatus*, but that have the mid and hind tibiae ranging from light brownish yellow to the same clear yellow colour that is found in *flavitibia*.



FIGURES 1–9. *Carientothrips* species. Head: (1) *mjobergi*, (2) *flavitibia*, (3) *tasmanica*, (4) *alienatus* major male, (5) *loisthus* macropterae. Ventral eye surface: (6) *alienatus*, (7) *miskoi*, (8) *flavitibia*, (9) *tasmanica*.



FIGURES 10–15. *Carientothrips* species. Head: (10) *horni*, (11) *calami*, (12) *semirufus*, (13) *snowi*, (14) *palumai*, (15) *vesper*.

***Carientothrips calami* sp.n.**

(Figs 11, 23, 31)

Female macroptera. Body strongly sculptured, head, thorax and abdomen reticulate, tube with longitudinal ridges (Fig. 23), femora tuberculate. Body bicoloured, abdominal segments I–II brownish-yellow, III–VIII brown, IX brownish-yellow, tube brown with distal end paler; head and pterothorax brownish-yellow but darker laterally, legs brownish-yellow; fore wing colourless (or pale yellow); major setae pale yellowish; antennal segments brownish-yellow, apex of VI darker, and VII–VIII pale brown.

Head longer than wide, projecting in front of eyes (Fig. 11); postocellar setae minute; postocular setae with apices blunt; compound eyes relatively small, posterolateral ommatidia enlarged; eyes not prolonged ventrally; ventral surface of head weakly reticulate, without long setae except one posterior pair; maxillary stylets about 0.3 of head width apart, retracted almost to postocular setae; mandible scarcely retracted anterior to postoccipital ridge; maxillary palp segment I about twice as long as wide, segment II twice as long as I with transverse lines. Antennal segment VIII not narrowed to base.

Pronotum transverse, notopleural sutures complete; only 4 pairs of major setae well-developed with blunt to weakly capitate apices, am no larger than discal setae; basantra and ferna reticulate; mesopresternum transverse; metathoracic sternopleural sutures long and curved. Mesonotum anterior half with small microtrichia on lines of reticulation; metanotum strongly reticulate, median setae minute and acute (Fig. 31). Fore femora bulbous but not enlarged, fore tarsal tooth small and blunt. Fore wing parallel sided; sub-basal setae S1–S3 capitate; 6–10 duplicated cilia. Pelta with long, slender lateral lobes connected narrowly to elongate median lobe (Fig. 31), campaniform sensilla present; tergites III–VII each with one pair of sigmoid wing-retaining setae, and close to these one pair of prominent weakly capitate setae; tergite IX setae S1 and S2 capitate and 0.5 as long as tube, S3 acute. Tube longitudinally ridged, almost as long as head. Sternites with median transverse row of up to 20 minute discal setae, posteromarginal setae small and arising in front of margin.

Measurements (holotype female in microns). Body length 2900. Head, length 350; width 260; po setae 55. Pronotum, length 210; width 350; major setae am 15, aa 25, ml 20, epim 70, pa 50. Fore wing, length 1070; sub-basal setae 25, 25, 30. Tergite IX setae S1 140, S2 170. Tube length 350. Antennal segments III–VIII length 85, 100, 85, 70, 55, 30.

Male macroptera. Similar to female in structure, except fore femora enlarged, fore tarsal tooth stouter.

Specimens studied. Holotype female. **Australia, Queensland**, Cairns, Crystal Creek, from dead rattan palm frond, 4.x.2012 (LAM5629).

Paratypes all from Queensland: 3 males taken with holotype; Daintree Ferry, 4 females from *Calamus* dead fronds, 4.viii.2004; Cairns, James Cook University campus, 1 female from dead rattan stem, 1 female from dead branches, 3.xi.2008, 5 females and 1 male from dead rattan canes, 19.ix.2013; Julatten, 1 female from dead leaves, 6.viii.2004; Cape Tribulation, 6 males from dead rattan, 9.vii.1995, 1 female in flight trap, x.1996, 4 females from dead rattan canes, 7-8.x.2012.

Comments. This species appears to live only on the dead leaves of the scrambling rattan palm, *Calamus*, and is known only from northern Queensland. It is similar in structure and sculpture to *Carientothrips grayi* from New Guinea, but that species is dark brown, with antennal segment III yellow only at the extreme base, the eyes are larger and slightly prolonged ventrally, the postocular setae acute, and the lateral wings of the pelta broadly attached to the median lobe. No other member of this genus is as strongly sculptured as *calami*.

***Carientothrips casuarinae* Mound, 1974a: 26**

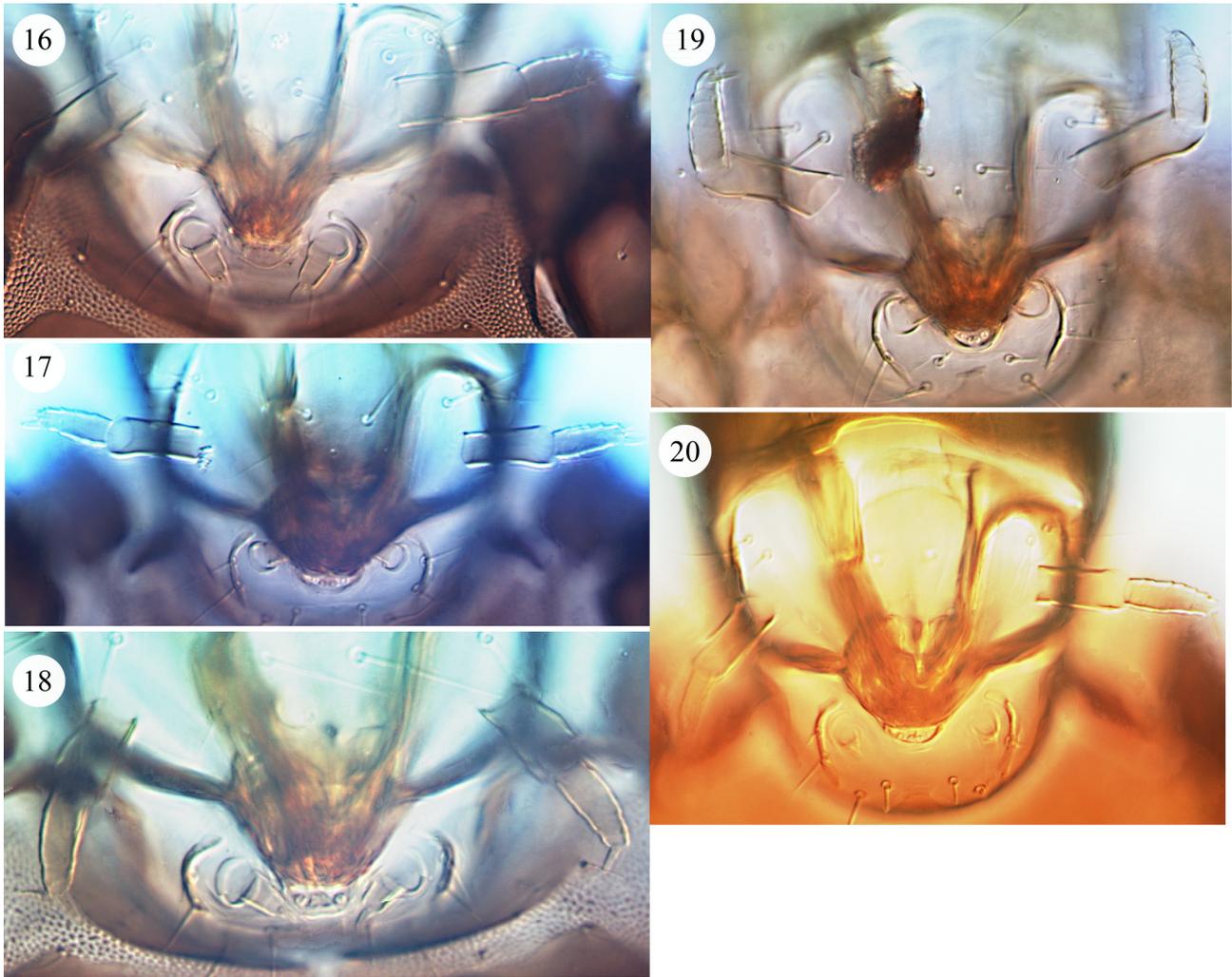
This appears to be a particularly dark and robust form of the species mentioned above under *acti*. It has been taken several times in association with dead *Casuarina* branches mainly in eastern New South Wales, but also in Tasmania.

Diagnosis. Dark brown, pedicel of antennal segment III paler, major setae pale; apterous and macropterous; head scarcely 1.3 as long as wide, eyes smaller ventrally than dorsally, postocellar setae well-developed, postocular setae shorter than width of an eye; maxillary palp segment I twice as long as wide, segment II 1.5 times as long as I. Pronotal notopleural sutures complete, am setae as long as aa setae. Pelta very broadly triangular, tube shorter than head. Male with small fore tarsal tooth.

***Carientothrips flavitibia* (Moulton, 1968: 117) stat.rev.**

(Figs 2, 8, 20, 35)

Described originally in *Bolothrips*, from five females taken near Cairns in northern Queensland, also a male from Barrington Tops area in New South Wales, this species appears to live mainly in rainforest. It has been found widely in suitable rainforest areas of eastern Queensland near Brisbane and near Cairns, and a few specimens have also been studied from Lord Howe Island and Norfolk Island. It is closely related to *mjobergi*, the common species of dry sclerophyll forest, but has brightly bicoloured legs with the tibiae yellow, and the second maxillary palp with transverse sculpture lines. Moreover, the sculpture is more strongly developed, particularly on the head, and the pelta is rather wider. As noted above, a few individuals from Queensland, provisionally identified as *alienatus* but excluded from the type series of that species, have the mid and hind tibiae clear yellow and thus look very like *flavitibia* despite the eyes not being prolonged ventrally.



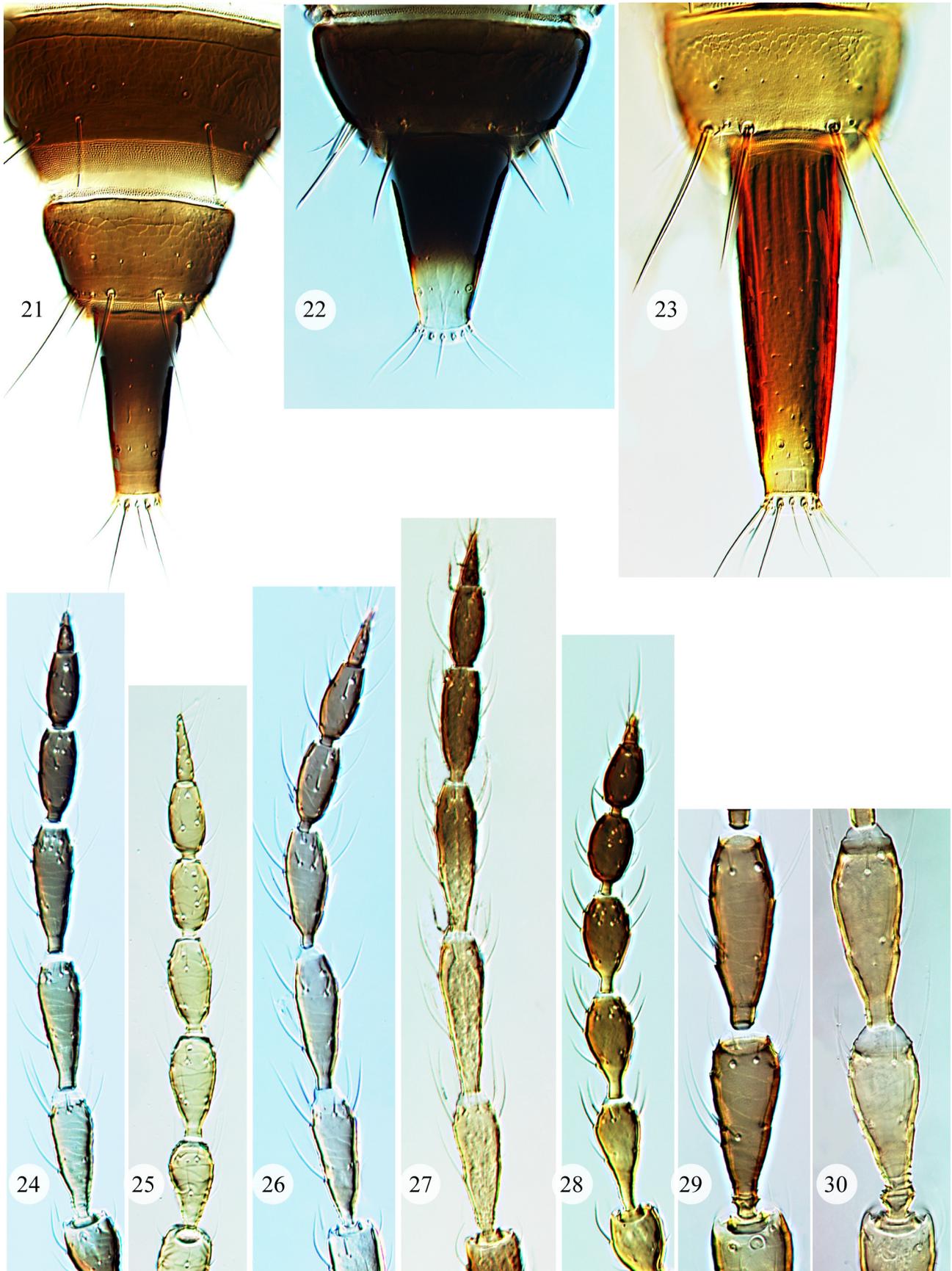
FIGURES 16–20. *Carientothrips* species. Maxillary palps: (16) *palumai*, (17) *alienatus*, (18) *tasmanica*, (19) *loisthus*, (20) *flavitibia*.

Diagnosis. Macropterous or micropterous with fore wing lobe as long as thorax width; body uniformly brown, mid and hind tibiae and tarsi clear yellow in contrast to brown femora, antennal segment I–II brown, III yellow, IV–V yellow with apex gradually more strongly shaded, VI brown with pedicel yellow, VII–VIII brown; fore wings pale brown. Head longer than wide, projecting in front of eyes (Fig. 2); eyes with one ommatidium displaced to posterior on ventral surface (Fig. 8) (sometimes slightly displaced not far posteriorly); postocellar setae acute, arising posterior to hind ocelli; postocular setae long and slightly blunt; maxillary stylets parallel about half of head width apart, retracted to postocular setae; maxillary palp segment I about 3 times as long as wide, segment II slightly shorter than I with transverse sculpture lines (Fig. 20); pronotal am small slender and acute; aa, ml, epim blunt to weakly capitate, pa pointed; notopleural sutures complete; pelta median lobe elongate, narrowly connected to lateral wings (Fig. 35); tergite IX setae bluntly pointed, about 0.8 as long as tube; tube shorter than head. Male smaller than female; fore tarsus with stout tooth; large males with setae on head and pronotum longer and more pointed.

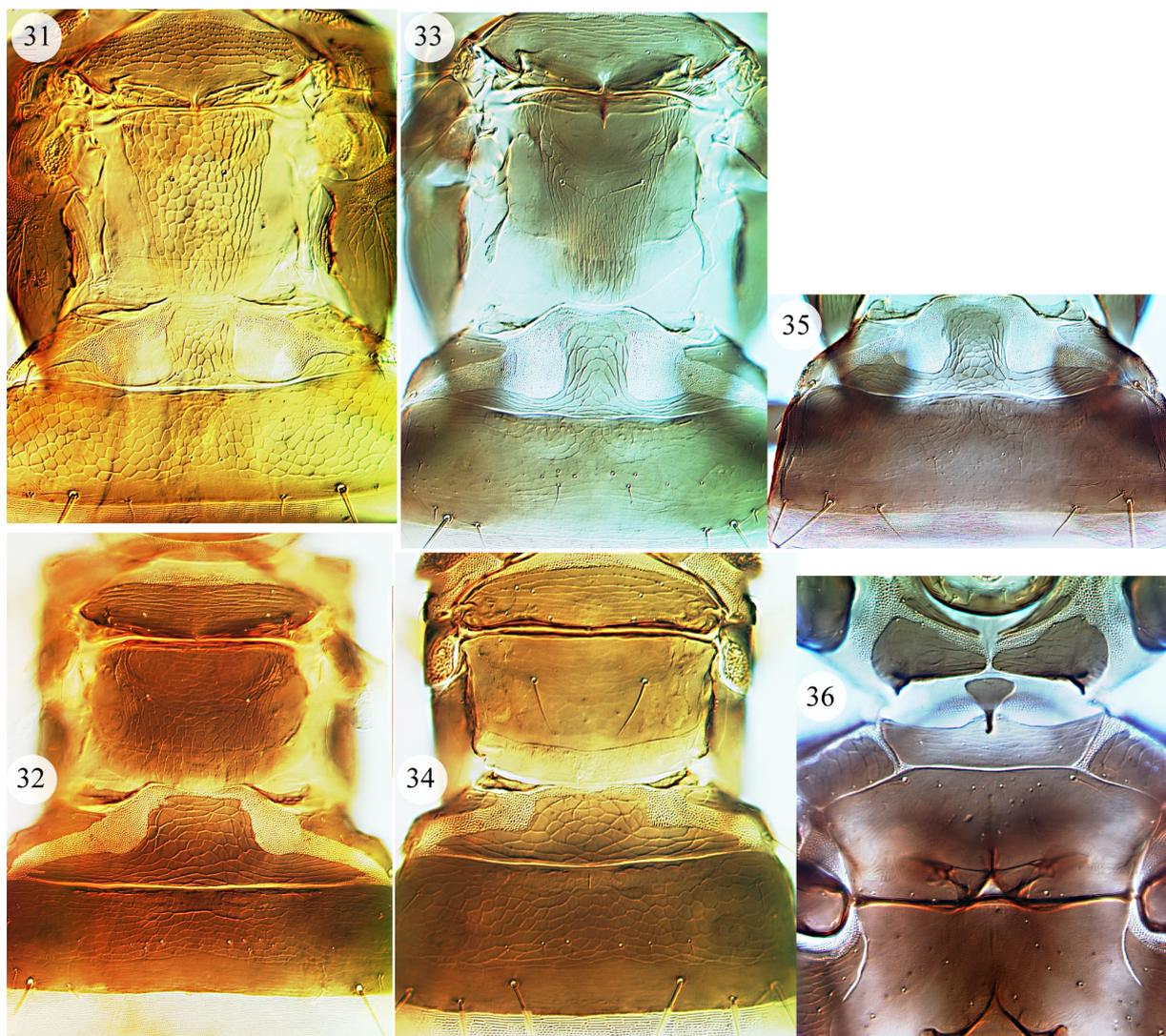
***Carientothrips horni* sp.n.**

(Figs 10, 24, 37)

Female microptera. Body, head and femora uniformly brown, tibiae and tarsi paler, tube paler apically; antennal segments III–VIII progressively darker (Fig. 24).



FIGURES 21–30. *Carientothrips* species. Tergites VIII–X (tube): (21) *snowi*. Tergites IX–X (tube): (22) *miskoi* female, (23) *calami*. Antenna segments III–VIII: (24) *horni*, (25) *reedi*, (26) *vesper*, (27) *magnetis*, (28) *pedicillus*. Antennal segments III–IV: (29) *acti*, (30) *pictilis*.



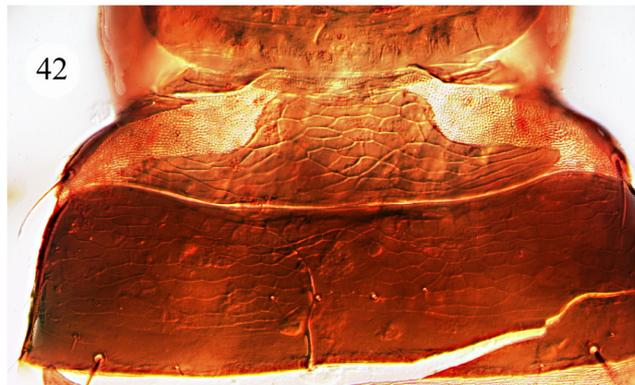
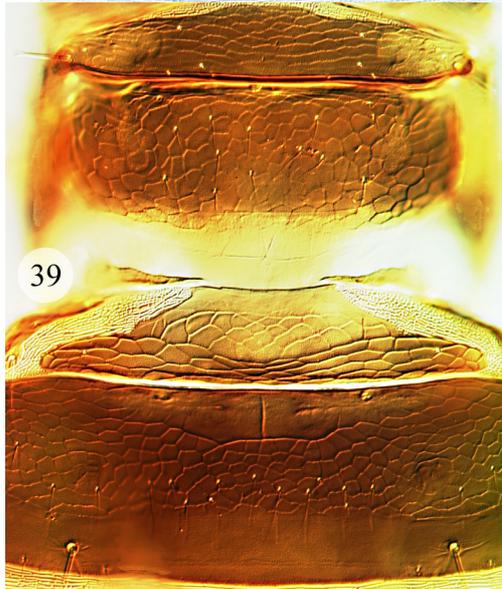
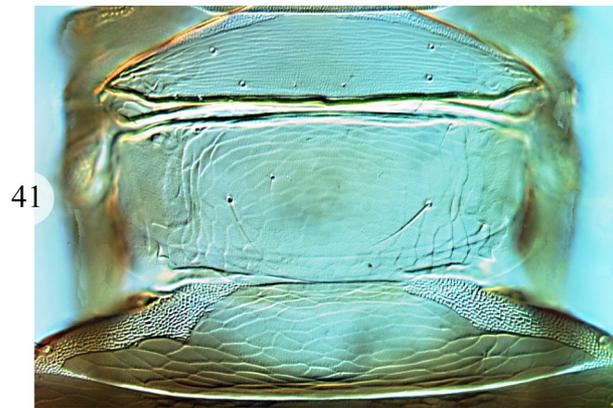
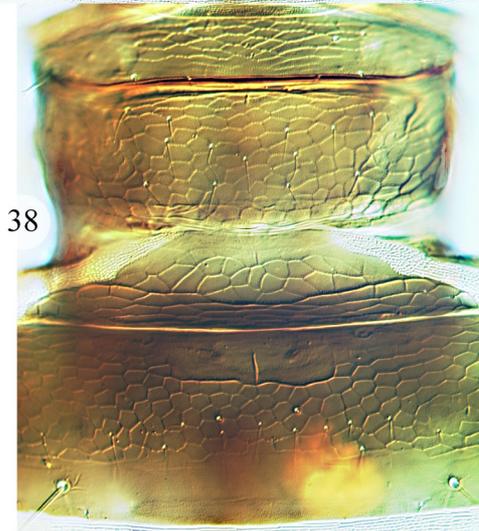
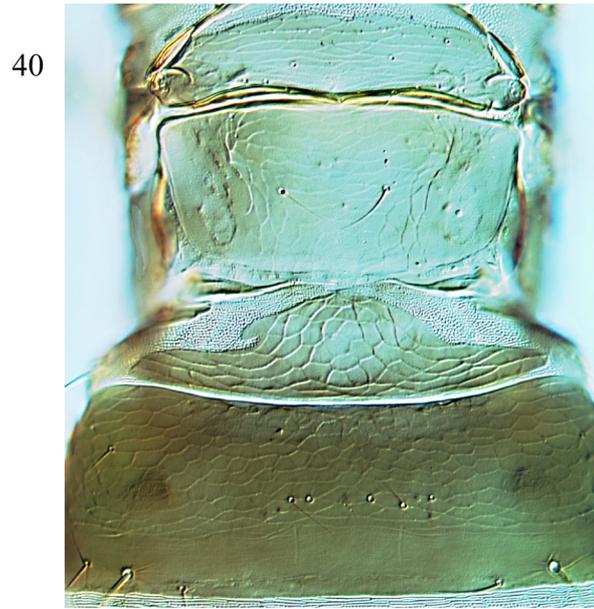
FIGURES 31–36. *Carientothrips* species. Metathorax and pelta: (31) *calami*, (32) *tasmanica*, (33) *mjobergi*, (34) *snowi*. Pelta: (35) *flavitibia*. Thoracic sternites: (36) *alienatus*.

Head longer than wide, weakly projecting in front of eyes, weakly reticulate (Fig. 10); posterior ocelli small; postocellar and postocular setae weakly capitate; compound eyes smaller ventrally than dorsally; maxillary stylets more than 0.3 of head width apart, retracted up to almost posterior margin of eyes (Fig. 10); maxillary palp segment I slightly longer than wide, segment II twice as long as I, without transverse lines, terminal sensorium stout. Antennal segment VIII not narrowed to base (Fig. 24).

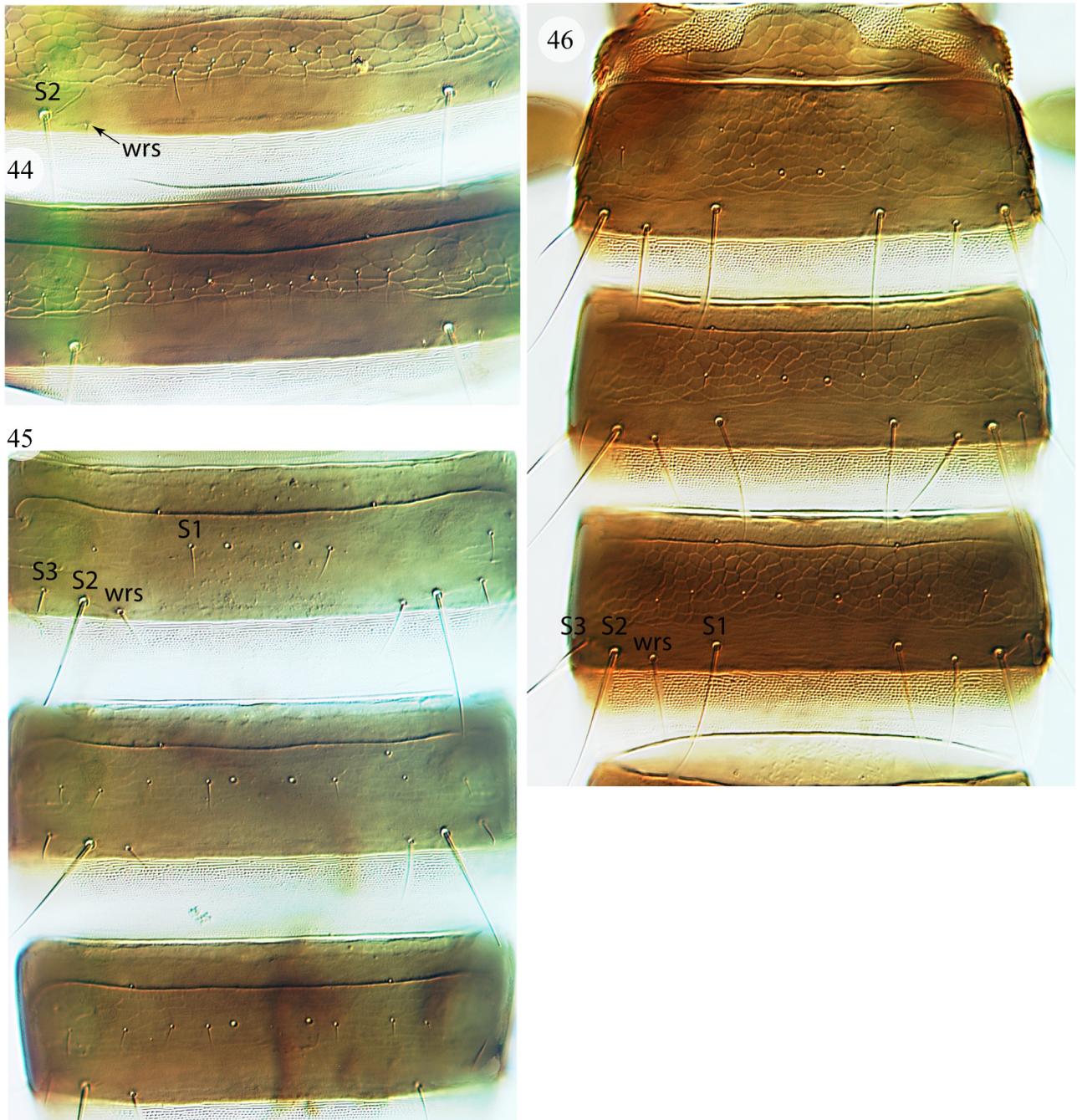
Pronotum transverse, reticulate only near margins, notopleural sutures incomplete (Fig. 10); all 5 pairs of major setae well-developed, capitate; mesopresternum transverse; metathoracic sternopleural sutures long and curved. Metanotum with about 3–5 minor setae anteromedially, median setae wide apart, slender and acute (Fig. 37). Fore femora not enlarged, fore tarsal tooth absent. Fore wing represented by small lobe, with 2 capitate sub-basal setae.

Pelta extending across 90% of tergite II anterior margin, rounded median lobe with broad lateral lobes (Fig. 37), campaniform sensilla absent; tergal wing-retaining setae small and straight; tergite IX setae S1 blunt, S2 capitate, S3 acute. Tube shorter than head. Sternites with median transverse row about 10 small discal setae, posteromarginal setae small and arising in front of margin.

Measurements (holotype female in microns). Body length 2500. Head, length 300; width 230; postocellar setae 60; po setae 75. Pronotum, length 170; width 290; major setae am 45, aa 55, ml 60, epim 65, pa 75. Fore wing, length 50; sub-basal setae 30, 40. Tergite IX setae S1 130, S2 125. Tube length 155. Antennal segments III–VIII length 85, 95, 85, 70, 60, 25.



FIGURES 37–43. *Carientothrips* species. Metathorax and pelta: (37) *horni*, (38) *acti*, (39) *vesper*, (40) *loisthus*, (41) *semirufus*. Pelta: (42) *palumai*, (43) *miskoi*.



FIGURES 44–46. *Carientothrips* species. Tergites: (44) *semirufus* female segments II–III, (45) *loisthus* segments III–V, (46) *snowi* pelta and segment II–IV.

Male: not known.

Specimens studied. Holotype female. **Australia, Queensland,** Horn Island, from dead *Dianella*, 20.xi.2009 (LAM5334).

Paratypes all from Queensland: one female taken with holotype; Townsville, Harvey Range, 1 female from grass, 14.vii.1995.

Comments. This species shares with three others two unusual character states: presence of several small setae anteromedially on the metanotum, and incomplete notopleural sutures. In the other members of the genus considered here, the notopleural sutures are fully complete although in the holotype of *magnetis* these sutures are only just complete, and in one of the available specimens of *pictilis* one of the sutures is not quite complete.

***Carientothrips loisthus* Mound, 1974a: 29**

(Figs 5, 19, 40, 45)

Described originally from a single apterous female taken at Adelaide, South Australia, this species has subsequently been found widespread in eastern Australia as far north as Cape Tribulation in northern Queensland. Moreover it is common on Lord Howe Island, and has been taken widely in New Zealand (Mound & Walker 1986). The major setae of this species are long and acute, as in the related species *snowi*, and the median pair of tergal discal setae are commonly longer than the more lateral pairs. These two species are similar to *semirufus*, although the tergal chaetotaxy is different as indicated in the key above.

Diagnosis. Apterous (macropterae rare), body brown to weakly bicoloured with head and thorax paler than brown abdomen, tube paler distally; legs variable in colour, tibiae usually yellowish; head longer than wide, projecting in front of eyes, postocellar and postocular setae long and finely pointed (Fig. 5); stylets about 0.5 of head width apart and retracted to postocular setae; maxillary palp segment I twice as long as wide, segment II slightly shorter than I; eyes variable, small or very small, with few ommatidia ventrally. Pronotal am and aa setae shorter than the other 3 pairs, notopleural sutures complete. Female without fore tarsal tooth. Metanotum with little or no sculpture. Pelta with broad median lobe broadly joined to lateral areas (Fig. 40); tergites with less than 10 discal setae, wing-retaining setae usually long and straight (Fig. 45); tergite IX setae acute, almost as long as tube. Males smaller than females, fore tarsal tooth present, large in large males.

***Carientothrips magnetis* Mound, 1974a: 30**

(Fig. 27)

A long-headed member of the complex mentioned above under *acti*, this species remains known only from one female collected in Queensland, near Townsville. This is a rather pale specimen that is possible not fully mature.

Diagnosis. Micropterous, light brown with yellowish legs; head longer than wide, postocellar and postocular setae long and weakly capitate; stylets about 0.5 of head width apart and retracted to postocular setae; maxillary palp segment I twice as long as wide, segment II slightly longer than I; antennae slender (Fig. 27). Pronotal am setae acute, more than 0.5 times as long as aa setae, notopleural sutures complete. Metanotum with 1 pair of small setae in front of median setal pair. Pelta broad with large median lobe; tergites III–VI with median transverse row of 15–20 small setae, wing-retaining setae minute; tube shorter than head.

***Carientothrips miskoi* Mound, 1974a: 31**

(Figs 7, 22, 43)

Nesothrips melinus Mound, 1974a: 72. **syn.n.**

This species was described from three females taken in southern New South Wales, and the synonym *melinus* from three males taken in Queensland. More recently the two sexes have been collected together from several sites in eastern New South Wales, the ACT, and southeastern Queensland. It is remarkably similar in general appearance to *Nesothrips propinquus*, but is readily distinguished by the different maxillary palps. The sexes differ significantly in colour. The females are brown to bicoloured, with the tube distinctively sharply pale yellow on the distal third (Fig. 22). In contrast, males are much paler, the body and tube with a brownish yellow gradient. Most specimens have been taken in leaf litter.

Diagnosis. Apterous without ocelli, female brown or with head and thorax paler than dark abdomen, tube sharply pale yellow on distal third (Fig. 22); antennal segments I–II yellow, III–VI largely yellow with apices increasingly shaded brown, VII–VIII brown. Head slightly wider than long, not projecting in front of eyes; eyes with a cluster of about 3 ommatidia near ventral posterior margin but with only one ommatidium displaced to posterior (Fig. 7); postocellar setae small and blunt, postocular setae longer and blunt; maxillary stylets one third of head width apart, retracted to eyes; maxillary palp segment I twice as long as wide, segment II longer than I with weak transverse lines; pronotal am small and acute; remaining 4 pairs blunt to weakly capitate; notopleural sutures complete; metanotum weakly sculptured; pelta wide, median lobe large, broadly connected to lateral areas, basal

with continuous transverse sculpture (Fig. 43); tergites III–VI with transverse row of minute discal setae; tergite IX setae blunt and 0.6 as long as tube; tube shorter than head. Male smaller than female, mainly brownish yellow, tergite IX setae 0.8 as long as tube; fore tarsus with small sharp or stout tooth.

***Carientothrips mjobergi* (Karny, 1920: 42)**

(Figs 1, 33)

Described from eastern Queensland, this species is widespread in dry sclerophyll *Eucalyptus* forest from Kangaroo Island in South Australia, and also Tasmania, northward throughout eastern Australia to Cairns in Queensland. A few specimens have also been seen from the southwest of Western Australia. This species was interpreted by Mound (1974a) as having the eyes either prolonged or not prolonged ventrally, but this assumption is rejected here. The eyes of *mjobergi* are here considered to have a single ommatidium displaced to the posterior on the ventral surface. The body and legs are uniformly dark brown, with tarsi yellowish and fore tibiae lighter brown. In contrast, the tibiae of *flavitibia* and *tasmanica* are much paler. Females of *mjobergi* are usually macropterous, but in both sexes the fore wing length of flightless individuals is variable from micropterous to hemimicropterous. Similar variation in wing reduction is noted above in *alienatus*. The shape of the pelta varies, the median lobe being wider in major males, both micropterae and macropterae.

Diagnosis. Body uniformly brown, tarsi and fore tibia brownish-yellow, antennal segment I–II brown, III–V yellow with gradually stronger shade of brown apices, VI brown but sometimes the short pedicel yellow, VII–VIII brown, tube dark brown with paler tip; wings slightly brownish. Head slightly longer than wide, slightly projecting in front of eyes (Fig. 1); eyes with one ommatidium displaced to posterior on ventral surface; postocellar setae small and acute, arising posterior to hind ocelli; postocular setae long and slightly blunt; maxillary stylets parallel about half of head width apart, retracted to postocular setae; maxillary palp segment I twice as long as wide, segment II slightly longer than I; pronotal am small slender and acute; aa, ml, epim, pa blunt to weakly capitate; notopleural sutures complete; pelta median lobe elongate, very narrowly connected to lateral wings (Fig. 33); tergite IX setae S1 blunt 0.8 as long as tube, S2 and S3 about as long as tube; tube shorter than head. Male smaller than female, particularly macropterous male; fore tarsus with stout tooth.

***Carientothrips palumai* sp.n.**

(Figs 14, 42)

Female aptera. Bicoloured, thorax and abdomen brown, posterior segments darkest, head yellow anteromedially but shading to brown at margins and posterior (Fig. 14); legs brownish yellow, tarsi yellow; antennal segment I yellow, II brown, III–V yellow but shaded at apex, VI brown with yellow pedicel, VII–VIII brown.

Head longer than wide, projecting in front of eyes, weakly reticulate laterally; ocelli reduced; postocellar and postocular setae blunt, mid-dorsal setae minute; compound eyes slightly smaller ventrally than dorsally, posterolateral ommatidia enlarged; maxillary stylets more than 0.5 of head width apart, retracted almost to postocular setae; maxillary palp segment I about 3 times as long as wide, segment II about 0.8 as long as I with transverse lines, terminal sensorium normal. Antennae segment VIII slightly constricted at base.

Pronotum transverse, weakly reticulate near posterior margin, notopleural sutures complete; with 4 pairs of major capitate setae, am no larger than discal setae; mesopresternum transverse; metathoracic sternopleural sutures curved but not prominent. Metanotum without reticulation medially, median setae minute, slender and acute. Fore femora not enlarged, fore tarsal tooth absent. Fore wing lobe scarcely 10 microns long, with no long setae.

Pelta extending across 90% of tergite II anterior margin, rounded median lobe with broad lateral lobes (Fig. 42), campaniform sensilla absent; tergites III–VI with only one pair of discal setae; tergal wing-retaining setae minute and straight; tergite IX setae S1 acute, S2 and S3 capitate. Tube shorter than head. Sternites with median transverse row about 8 minute discal setae, posteromarginal setae small and arising in front of margin.

Measurements (holotype female in microns). Body length 2500. Head, length 270; width 235; postocellar setae 55; po setae 70. Pronotum, length 165; width 300; major setae am 10, aa 40, ml 55, epim 75, pa 75. Tergite IX setae S1 105, S2 125. Tube length 200. Antennal segments III–VIII length 80, 85, 85, 70, 60, 40.

Male. Similar to female but smaller, with stout, acute fore tarsal tooth; tergite IX setae similar to female.

Female macroptera. Similar to aptera, except fore wing present and darkly shaded, ocelli well-developed, metanotum weakly reticulate, fore wings fully developed with 2 or 3 duplicated cilia and sub-basal setae S1 minute, S2 and S3 well-developed and bluntly pointed, tergites with sigmoid wing-retaining setae.

Measurements (female macroptera in microns). Body length 2400. Fore wing length 1000; sub-basal setae 15, 40, 60.

Specimens studied. Holotype female aptera. **Australia, Queensland**, Paluma, from dead leaves, 15.vii.1995 (LAM2766).

Paratypes: 2 apterous females, 1 apterous male taken with holotype; **Queensland**: Cape Tribulation, 1 macropterous female from dead leaves, 7.vii.1995; 1 female, 1 male macropterae, Lake Eacham, in flight trap, iii.1988; Cairns, 2 females from dead wood, 2.x.2012, 1 female from dead leaves, 4.x.2012; Mt. Lewis, 2 males from dead wood & leaves, 18.ix.2013; Lamington National Park, 1 female from dead leaves, 13.iii.2007. **New South Wales**, Crystal Creek, 1 female from dead palm fronds, 24.xii.2006.

Comments. This species is generally similar in appearance to *semirufus*, but with a shorter head, and has only one pair of discal setae on each tergite.

***Carientothrips pedicillus* Mound, 1974a: 32**

(Fig. 28)

Known only from a single female taken near Canberra, this species appears to be related to *mjobergi*, but has stout postocellar setae and the antennal segments VI & VII are remarkably short and rounded with the pedicel distinctly constricted (Fig. 28).

Diagnosis. Apterous, bicoloured with head and thorax paler than dark brown abdomen; head as wide as long, weakly projecting in front of eyes, eyes with one ommatidium displaced to posterior on ventral surface, postocellar setae blunt to very weakly capitate and as long as width of antennal segment III; pronotal am setae minute, notopleural sutures complete; metanotum without sculpture medially; pelta broad, lateral lobes broadly joined to median area, tube shorter than head.

***Carientothrips pictilis* Mound, 1974a: 33**

(Fig. 30)

Described originally from one apterous female taken in central New South Wales, the following specimens have been collected more recently: South Australia, Loxton, 2 females, 1 male in pitfall traps, xi–xii.1998. This species is mentioned above as one of the species similar in appearance to *acti*. From most of these it differs in having small postocellar setae, the eyes narrowed and slightly prolonged ventrally, and the third antennal segment with a sub-basal ring (Fig. 30).

Diagnosis. Apterous, bicoloured, head and abdomen dark brown, but thorax, legs, pelta and antennal segments II–IV mainly yellow; head longer than wide, projecting in front of eyes, stylets retracted to eyes and about one third of head width apart; eyes with one ommatidium displaced to posterior on ventral surface; maxillary palp segment I twice as long as wide, II about 1.5 times as long as I. Pronotal am setae small, acute, remaining 4 pairs longer and weakly capitate, notopleural sutures complete or almost complete. Metanotum without sculpture. Pelta broad with large median lobe; tergites III–VI with median transverse row of about 20 small setae, wing-retaining setae minute; tergite IX setae shorter than tube, tube shorter than head.

***Carientothrips reedi* Mound, 1974a: 34**

(Fig. 25)

This species is known from eastern New South Wales and Southeastern Queensland. It is very similar to *vesper* from western Australia, but has shorter antennae (Fig. 25, cf. Fig. 26) and the major setae are less capitate. The available specimens were taken from grasses and dead twigs.

Diagnosis. Apterous or macropterous, body and legs brownish yellow with tube dark; head longer than wide, not projecting in front of eyes, vertex reticulate; eyes well developed dorsally but small ventrally with only 4–5 visible ommatidia; postocellar finely acute, postocular setae weakly capitate. Pronotal am setae short and acute, the other 4 pairs long and capitate, aa setae arising slightly mesad of anterior angle; notopleural sutures incomplete. Metanotum reticulate, with 4–6 minor setae anteromedially. Pelta broadly triangular with rounded margins (also macroptera); tergites III–VI with about 10 small discal setae in transverse row, wing-retaining setae minute in aptera, sigmoid in macroptera; tergite IX setae blunt and shorter than tube. Male with no fore tarsal tooth.

***Carientothrips semirufus* (Girault, 1928: 4)**

(Figs 12, 41, 44)

This species has remained inadequately distinguished from *loisthus*, a species that is equally widespread in eastern Australia. However, as indicated in the key above, the abdominal tergal chaetotaxy is very different. Moreover, *loisthus* is usually found at the base of grasses, whereas *semirufus* is associated with dead leaves and leaf-litter, as is the related new species *snowi*. Specimens of *semirufus* have been seen from Tasmania, eastern New South Wales including the ACT, and Queensland near Brisbane as well as from Cairns and Cape Tribulation in northern Queensland.

Diagnosis. Apterous, usually clearly bicoloured with yellowish head (Fig. 12) and thorax distinct from brown abdomen; legs yellow; head longer than wide, distinctly projecting in front of eyes, postocellar and postocular setae blunt to weakly capitate. Pronotal am setae slender and acute, the other 4 pairs stouter, longer and weakly capitate, notopleural sutures complete (Fig. 12). Metanotum with weak transverse reticulation. Pelta with broad median lobe broadly joined to lateral areas (Fig. 41); tergites usually with about 20 small discal setae in transverse row, wing-retaining setae minute (Fig. 44); tergite IX setae blunt and shorter than tube. Male with fore tarsal tooth.

***Carientothrips snowi* sp.n.**

(Figs 13, 21, 34, 46)

Female aptera. Bicoloured, head yellow, thorax and abdomen brown (Fig. 13), legs variably yellowish brown, tarsi brown; antennal segment I brown but yellow basally, II variably light brown to brown, III–VIII brown III sometimes paler near base [one paratype with legs and most antennal segments yellow]; tube paler in distal third (Fig. 21). Head longer than wide, strongly projecting in front of eyes, weakly reticulate laterally; ocelli absent; postocellar, postocular and mid-dorsal setae long and finely acute; compound eyes smaller ventrally than dorsally; maxillary stylets about 0.5 of head width apart, retracted almost to postocular setae; maxillary palp segment I about 3 times as long as wide, segment II about 0.5 as long as I with transverse lines, terminal sensorium small. Antennal segment VIII not constricted at base. Pronotum transverse, weakly reticulate near margins, notopleural sutures complete (Fig. 13); with 5 pairs of long, slender, acute major setae; mesopresternum transverse almost boat-shaped; metathoracic sternopleural sutures long and curved. Metanotum weakly reticulate, median setae well-developed, slender and acute (Fig. 34). Fore femora not enlarged, fore tarsal tooth absent. Fore wing lobe not developed. Pelta extending across 90% of tergite II anterior margin, median lobe broadly flattened with edges rather angular, broadly connected with lateral lobes (Fig. 34), campaniform sensilla absent; tergal setae S1 long and finely acute arising posterior to transverse row of discal setae; tergal wing-retaining setae very long and straight (Fig. 46); tergite IX setae long and acute. Tube shorter than head. Sternites with median transverse row about 10 minute discal setae, posteromarginal setae small and arising in front of margin.

Measurements (holotype female aptera in microns). Body length 2500. Head, length 300; width 210; postocellar setae 85; po setae 125; mid-dorsal setae 85. Pronotum, length 160; width 275; major setae am 55, aa 100, ml 110, epim 125, pa 135. Tergite IV setae S1 120, wing-retaining setae 75; tergite IX setae S1 150, S2 165. Tube length 170. Antennal segments III–VIII length 60, 75, 70, 55, 45, 35.

Male. Similar to female but smaller, with stout, acute fore tarsal tooth, fore tibia stout in larger males; tergite IX setae similar to female.

Specimens studied. Holotype female aptera. **Australia, Norfolk Island**, Palm Grove Track, from dead palm fronds, 27.xii.2012 (LAM5731).

Paratypes all from Norfolk Island on dead palm fronds: 4 females, 2 males taken with holotype, also 4 females, 1 male, same site and date, 1 female same site, 22.xii.2012, 4 females, 1 male with larvae at same site, 23.xii.2013; 1 female Red Road, 27.xii.2012; 1 female, Mt. Bate, 24.x.2013.

Comments. The tergal chaetotaxy of this species is unique in this genus, with the median pair of setae exceptionally long and situated toward the posterior margin of each tergite (Fig. 46). This thrips has been found breeding only on the dead fronds of *Rhopalostylis baueri*, the endemic Norfolk Island palm.

***Carientothrips tasmanica* sp.n.**

(Figs 3, 9, 18, 32)

Female microptera. Head, thorax, and abdomen uniformly brown, legs varying in colour brownish yellow to light brown with yellow markings, tarsi yellow; major setae pale brown; antennal segment I yellow, II brownish yellow, III–V yellow with apex shaded, VI brown with pedicel yellow, VII–VIII brown. Head weakly reticulate, about as long as wide, not projecting in front of eyes (Fig. 3), cheeks convex; postocellar setae small and acute; postocular setae long and acute, mid-dorsal setae minute; compound eyes prolonged ventrally with 2 or 3 ommatidia displaced to posterior (Fig. 9); maxillary stylets about 0.5 of head width apart, retracted to postocular setae; maxillary palp segment I about twice as long as wide, segment II slightly longer than I with no transverse lines (Fig. 18). Antennal segment VIII not narrowed to base. Pronotum transverse, notopleural sutures complete; 4 pairs of major setae developed, am small and acute, aa, ml and epim blunt; basantra small; mesopresternum transverse, boat-shaped; metathoracic sternopleural sutures long and curved. Metanotum reticulate, median setae acute. Fore wing lobe short with two major setae. Fore femora not enlarged, fore tarsal tooth absent. Pelta extending across 90% of tergite II anterior margin, median lobe broad and rather angular, broadly connected with lateral wings (Fig. 32), campaniform sensilla absent; tergites III–VII each with one pair of slightly curved wing-retaining setae, setae S1 minute medially on tergite, S2 long and acute; tergite IX setae S1 acute; tergite IX setae long and acute. Tube shorter than head. Sternites with median transverse row of about 12 minute discal setae, median posteromarginal setae small and arising in front of margin.

Measurements (holotype female in microns). Body length 2370. Head, length 275; width 260; postocellar setae 25; po setae 70. Pronotum, length 150; width 285; major setae am 20, aa 25, ml 25, epim 80, pa 60. Fore wing lobe 125. Tergite IX setae S1 135, S2 150. Tube length 185. Antennal segments III–VIII length 80, 85, 85, 70, 55, 35.

Male microptera. Slightly smaller than female, fore tarsus with small sharp tooth.

Specimens studied. Holotype female. **Australia, Tasmania**, 17 Mile Plain, from *Eucalyptus obliqua* dead leaves, 12.iii.2010 (Alice Wells 10/39).

Paratypes: 4 females, 5 males taken with holotype, 1 female same locality, 10.iii.2010; Hobart, Mt. Wellington, 8 females and 6 males from *Eucalyptus* dead branch, 27.xi.2012; Flinders Island, 1 male, 27.xi.2011; Binalong Bay, 1 male from dead *Eucalyptus* dead branch 10.xi.2012; Bicheno, 1 female from *Eucalyptus* dead leaves; Mt. Field, 1 female and 1 male from *Eucalyptus* dead leaves, 1.xii.2012; Geeveston, 2 females and 1 male from *Eucalyptus* dead leaves 27.xi.2012.

Non-paratypes: Tasmania, Buckland, 3 females, 27.xi.2010.

Comments. This species is similar to *mjobergi* in having the posterior margin of the eyes prolonged ventrally. However, in contrast to that species, the prolongation comprises two or even three ommatidia instead of just a single one. In some specimens the yellow colour of the tibiae is more similar to that of *flavitibia*, but these specimens also have pale femora. In a few specimens, the hind legs are almost as brown as those of *mjobergi*, although the first antennal segment in that species is dark brown whereas it is yellow in *tasmanica*. Three females have been studied from Buckland in eastern Tasmania that have the ventral prolongation of the eyes with only a single ommatidium; the specific identity of these specimens remains in doubt.

***Carientothrips vesper* Mound, 1974a: 35**

(Figs 15, 26, 39)

This species from Western Australia is distinguished from the eastern Australian species *reedi* only by the longer

antennae (Fig. 26) and more clearly capitate major setae. It was described from a single female collected at Manjimup, but a further male and female have since been collected from Dwellingup. The pelta (Fig. 39) is similar to that of *acti*.

Diagnosis. Apterous, weakly bicoloured with head and thorax paler than brown abdomen, legs brownish yellow; head longer than wide, scarcely projecting in front of eyes, vertex smooth medially except near posterior margin, maxillary stylets retracted to eyes and close together (Fig. 15); maxillary palp segment I 2.5 times as long as wide, segment II rather shorter with stout terminal sensorium; eyes well developed dorsally but small ventrally with only 4–5 visible ommatidia; postocellar finely acute, postocular setae capitate. Pronotal am setae short and acute, the other 4 pairs long and capitate; notopleural sutures incomplete. Metanotum reticulate, with about 8 minor setae anteromedially. Pelta broad with truncate apex; tergites III–VI with about 20 small discal setae in transverse row, wing-retaining setae minute; tergite IX setae capitate and shorter than tube. Male with fore tarsal tooth.

Nesothrips Kirkaldy

Nesothrips Kirkaldy, 1907: 103. Type species *Nesothrips oahuensis* Kirkaldy, by monotypy.

Of the 27 *Nesothrips* species previously listed, seven were described from Australia (*aoristus*, *carveri*, *hemidiscus*, *melinus*, *propinquus*, *rhizophorae*, *yanchepi*), six from New Zealand, with most of the others from various Pacific islands. To these, four new species are here described from Australia (*barrowi*, *brigalowi*, *coorongi*, *rossi*), two species are placed into synonymy (*melinus*, *rhizophorae*), and two species transferred to this genus from *Cariantothrips* (*badius*, *casuarinae*). As a result, 31 species are now placed in *Nesothrips*, of which 13 are known from Australia. Some species of this genus, including *propinquus*, *minor*, and *lativentris*, are widespread pantropically, presumably distributed along human trading-ship routes in hay, seed pods, coconut husks (cf. Mound 1974b; Mound & Palmer 1983). Keys were provided by Mound (1974b) to the 14 species recognised in this genus at that time, also keys to seven species recorded from Australia Mound (1974a), and the six species described from New Zealand (Mound & Walker 1986). The generic synonyms involved were treated by Mound & Palmer (1983). As in *Cariantothrips*, the species of *Nesothrips* often exhibit intra-specific structural variation in relation to wing morphs and sexual dimorphism. Males vary in size and body form, from major to minor males, particularly in the size and shape of the prothorax and fore femora, and presence of a fore tarsal tooth. Females of *Nesothrips* species recorded from Australia do not have a fore tarsal tooth, although this is present in females of a few species such as *N. douli* and *N. leveri* (Mound 1974b).

In contrast to the species of *Cariantothrips*, all species of *Nesothrips* have the maxillary palps similar in structure to the condition found throughout the Phlaeothripidae, with the first segment quadrate, and the second segment at least five times as long as the first segment (Fig. 56). *Nesothrips* species have complete pronotal notopleural sutures, the metathoracic sternopleural sutures are usually present although variable in *propinquus* and absent in some species (*oahuensis*).

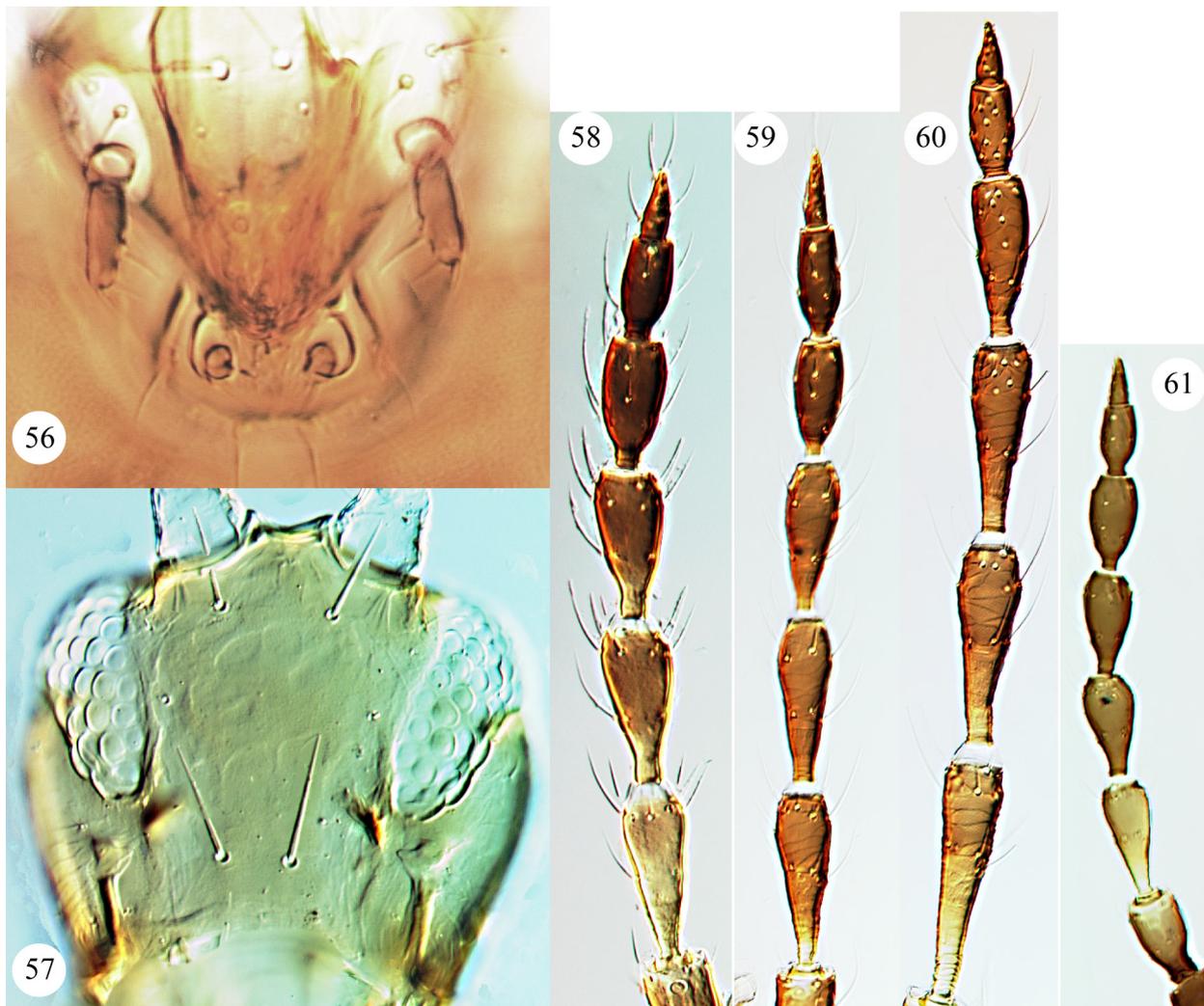
Key to *Nesothrips* species from Australia

1. Head 1.3–1.5 times as long as wide (Figs 47–50); tergite IX setae S1 more than 0.75 as long as tube 2
- . Head wider than long, or no more than 1.1 times as long as wide (Figs 51–55); tergite IX setae S1 less than 0.6 as long as tube 6
2. Head with postocellar setae elongate, more than twice as long as distance between their bases (Fig. 47) [body dark brown with antennal segment III yellow, IV yellow on basal half] *lativentris*
- . Head with postocellar setae shorter than distance between their bases 3
3. Postocellar setae long, about 0.8 as long as distance between their bases, with broadly blunt apices; pronotum with 2 pairs of major epimeral setae (Fig. 67) [legs, head, thorax and abdominal segment I yellow, abdomen dark brown] *capricornis*
- . Postocellar setae small, no more than 0.5 as long as distance between their bases, with apices pointed; pronotum usually with only one pair of long setae on each epimeron 4
4. Pronotum with 5 pairs of major setae (Fig. 62); vertex weakly reticulate, mid-dorsal head setae well developed (Fig. 50) *coorongi* sp.n.
- . Pronotum with only 3 pairs of major setae; vertex without reticulation even in ocellar region, mid-dorsal head setae small. . . 5

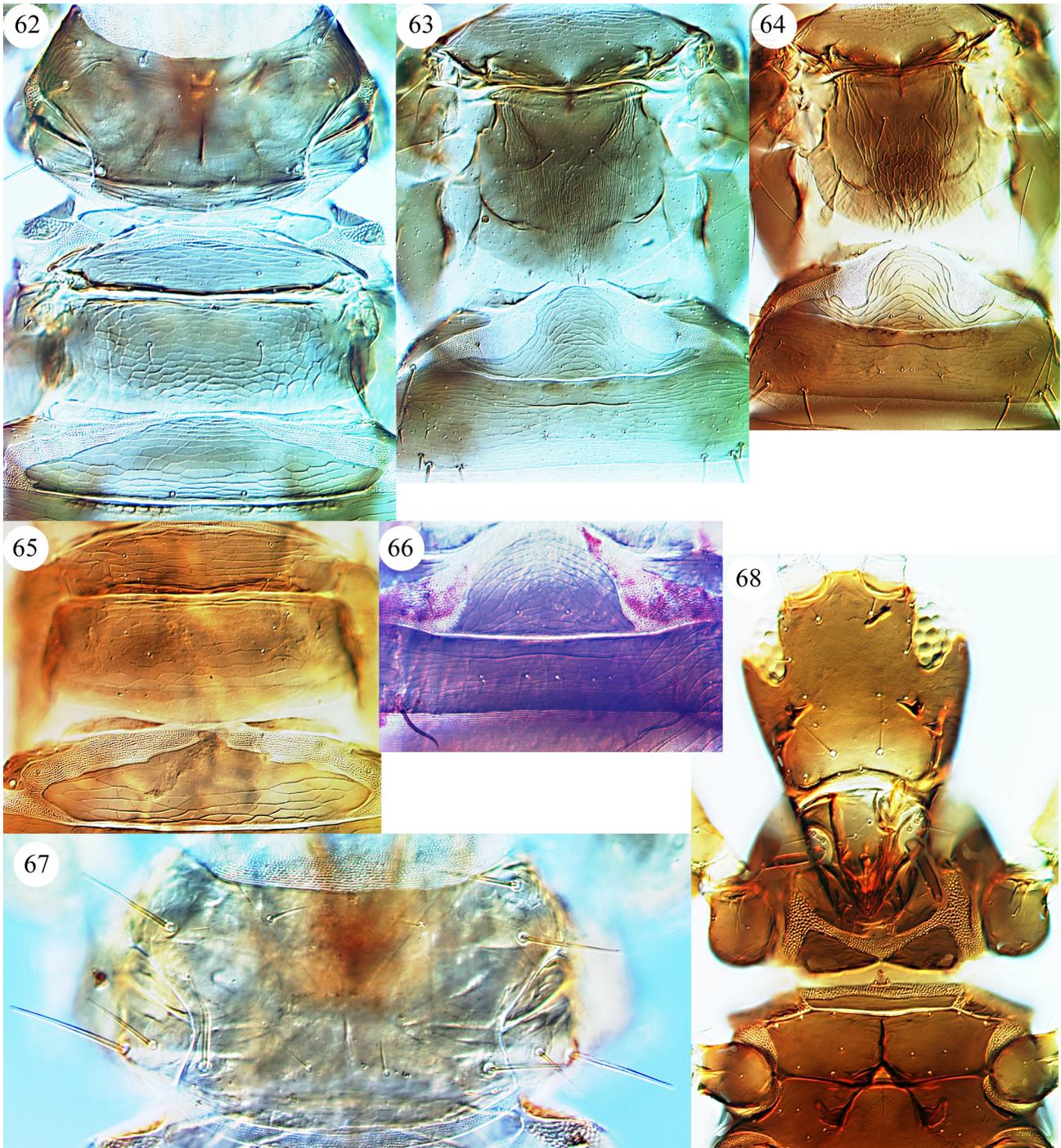


FIGURES 47–55. *Nesothrips* species. Head: (47) *lativentris*, (48) *badius*, (49) *barrowi*, (50) *coorongi*, (51) *propinquus*, (52) *minor* major male, (53) *carveri*, (54) *brigalowi*, (55) *rossi*.

5. Antennal segment III almost 4 times as long as apical width (Fig. 60); pronotal aa setae less than 0.5 as long as postocellar setae. *barrowi* sp.n.
- Antennal segment III less than 3 times as long as wide (Fig. 59); pronotal aa setae about 2.0 times as long as postocellar setae *badius*
6. Pelta D-shaped, with no lateral lobes (Fig. 66). *hemidiscus*
- Pelta with lateral lobes 7
7. Metanotum with no sculpture on anterior third, with narrowly linear reticulation on posterior two-thirds (Fig. 63) *rossi* sp.n.
- Metanotal sculpture different, often with equiangular reticulation (see Fig. 64) 8
8. Female tergite IX setae S3 short, no longer than basal width of tube; major setae on head, pronotum and metanotum unusually stout and dark [eyes not prolonged ventrally]. *aoristus*
- Female tergite IX setae S3 long, much longer than basal width of tube; major setae on head, pronotum and metanotum not stout and dark 9
9. Entire posterior margin of eyes prolonged on ventral surface (Fig. 57); usually apterous with ocelli absent (Fig. 51) [antennal segment I yellow] *propinquus*
- Ventral posterior margin of eyes not prolonged; usually winged, if micropterous then wing lobe relatively long and hind ocelli present 10
10. Antennal segment I brown, as dark as head 11
- Antennal segment I yellow to brownish yellow, much paler than head. 12
11. Antennae brown but III sharply yellow near base (Fig. 61) *carveri*
- Antennal brown but segment III mainly yellow, IV–V yellow at base. *yanchepei*
12. Ocellar setae arise on or anterior to a tangent between *anterior* margins of hind ocelli (Fig. 54) *brigalowi* sp.n.
- Ocellar setae arise posterior to tangent between *anterior* margins of hind ocelli and close to tangent between *posterior* margins of hind ocelli (Fig. 52). *minor*



FIGURES 56–61. *Nesothrips* species. Maxillary palps: (56) *badius*. Eye ventral surface: (57) *propinquus*. Antennal segments III–VIII: (58) *yanchepei*, (59) *badius*, (60) *barrowi*. Antennal segments II–VIII: (61) *carveri*.



FIGURES 62–68. *Nesothrips* species. Thoracic features and pelta: (62) *coorongi*, (63) *rossi*, (64) *brigalowi*, (65) *barrowi*. Pelta: (66) *hemidiscus*. Pronotum: (67) *capricornis*. Maxillary palps and mesopresternum: (68) *propinquus*.

***Nesothrips aoristus* Mound, 1974a: 68**

This species remains known only from the original series of three females and two males that were collected in South Australia, south of Adelaide. The head bears a pair of prominent postocellar setae that are similar in position and size to those of *lativentris*, the major setae on the pronotum are unusually stout as are the median setae on the metanotum.

Diagnosis. Micropterous with very short fore wing lobe; body, legs and antennae dark brown, pedicel of antennal segment III yellow; head slightly longer than wide, postocellar and postocular setae long and dark;

pronotum with 5 pairs of long, stout dark setae; metanotal median setae long and stout; pelta with large median lobe and slender lateral wings; tergites III–VII with one pair of weakly sigmoid wing-retaining setae, discal area with one pair of small setae medially and one pair laterally; tergite IX with the ventro-lateral pair of setae, S3, unusually short and stout. Male smaller than female, large male with L-shaped fore femora and large fore tarsal tooth; tergite IX setae S3 longer than S2.

***Nesothrips badius* (Hood, 1918: 143) comb.n.**

(Figs 48, 56, 59)

Described in *Cryptothrips*, this species was transferred to *Bolothrips* by Mound (1974a) because of the long head and small eyes (Fig. 48), as well as its habitat at the base of grasses and sedges. Subsequently it was re-assigned to *Cariantothrips* because of the presence of four sensoria on the fourth antennal segment (Mound 1974b). However, it is here transferred to *Nesothrips* because of the arrangement of the maxillary stylets, wide apart and V-shaped in the head (Fig. 48), and because of the form of the maxillary palps, with the first segment short and quadrate and the second segment three times as long as the first (Fig. 56). This species is widespread in eastern Australia from northern Queensland to Tasmania, and is also common in New Zealand (Mound & Walker 1986). The most closely related species is *barrowi* sp.n. that is known only from a single specimen taken on Barrow Island, off the north-western coast of Western Australia.

Diagnosis. Usually effectively apterous with the wing lobe less than 40 microns long and the ocelli absent; body, legs and antennae dark brown with segment III briefly paler at base (Fig. 59); head elongate, cheeks sinuate, constricted behind eyes but broader medially, maxillary stylets wide V-shaped, not retracted as far as postocular setae; eyes small, postocellar and postocular setae small and acute; pronotum am setae small, remaining major setae not large; mesopresternum boat-shaped, metathoracic sternopleural sutures not present; metanotum weakly sculptured; pelta very broadly triangular with rounded corners; tergites with about 10 discal setae in median transverse row, median pair longer than lateral setae, wing-retaining setae long and straight; tergite IX setae acute, about as long as tube. Male smaller than female, with fore tarsal tooth; pronotum of large male with thickened median apodeme.

***Nesothrips barrowi* sp.n.**

(Figs 49, 60, 65)

Female aptera. Body and legs uniformly brown, abdomen darker toward apex, tube dark brown; antennal segments uniformly brown, III with pedicel yellow; major setae pale.

Head longer than wide, not projecting in front of eyes, cheeks sinuate, vertex without sculpture except near margins (Fig. 49); ocelli absent; postocellar and postocular setae well developed, acute; compound eyes with about 20 ommatidia, smaller ventrally; maxillary stylets wide V-shaped, not retracted as deeply as postocular setae (Fig. 49); maxillary palp segment I about as long as wide, segment II about 3 times as long as I, without transverse lines, terminal sensorium setaceous. Antennal segment III elongate, sensoria relatively short, VIII slightly constricted at base (Fig. 60). Pronotum transverse, weakly reticulate near margins, notopleural sutures complete; with 3 pairs of long, stout, acute major setae, am and aa small; mesopresternum crescent-shaped, posterior margin curved; mesoeusternal anterior margin incomplete medially; metathoracic sternopleural sutures absent. Meso and metanotum reticulate, fore wing lobe not developed. Metanotal median setae small and acute, widely spaced. Pelta broadly triangular, extending less than 80% across anterior border of tergite II (Fig. 65); tergites with no wing retaining setae, median transverse row of 8–10 small discal setae; tergite IX setae acute, longer than tube, tube shorter than head.

Measurements (holotype female in microns). Body length 3250. Head, length 360; width 260; postocellar setae 60; po setae 130. Pronotum, length 195; width 330; major setae am 20, aa 15, ml 70, epim 150, pa ?. Tergite IX setae S1 370, S2 330. Tube length 280. Antennal segments III–VIII length 150, 125, 115, 100, 55, 35.

Specimens studied. Holotype female. **Western Australia**, Barrow Island, iv.2005 (Jonathan Majer)

Comments. This species is very similar to *badius* in structure but is much larger, with an unusually large head,

the third antennal segment elongate and the mesoeusternal anterior margin discontinuous medially. The absence of metathoracic sternopleural sutures is a character state shared with *badius* as well as with *oahuensis*, the type species of *Nesothrips*.

***Nesothrips brigalowi* sp.n.**

(Figs 54, 64)

Female macroptera. Body uniformly brown, femora and tibiae brown but distal end of each paler, tarsi yellow; antennal segment I brown, II yellow, III–V yellow with apical brown shading progressively increasing, VI–VIII uniformly brown; major setae brown; fore wing lightly shaded.

Head wider than long, not projecting in front of eyes, vertex weakly reticulate only near margins; postocellar setae acute, arising within ocellar triangle (Fig. 54); postocular setae long, acute; compound eyes almost equal in size dorsally and ventrally, several ventral ommatidia weakly pigmented; maxillary stylets wide V-shaped, retracted nearly to postocular setae; maxillary palp segment I about as long as wide, segment II about 3 times as long as I, without transverse lines, terminal sensorium setaceous. Antennal segment VIII not constricted at base.

Pronotum transverse, weakly reticulate near posterior margin, notopleural sutures complete; with 5 pairs of acute major setae, am more slender; mesopresternum transverse, boat-shaped; metathoracic sternopleural sutures long and curved. Mesonotum with reticulation bearing microtrichia on anterior half (Fig. 64). Metanotum reticulate medially; median setae well-developed (Fig. 64). Fore wing with about 10 duplicated cilia, sub-basal setae well-developed and acute. Pelta with rounded median lobe, constricted where lateral wings are connected, extending about 80% across anterior border of tergite II (Fig. 64); tergites III–VII each with pair of sigmoid wing-retaining setae; tergite IX setae acute, shorter than tube; tube shorter than head.

Measurements (holotype female in microns). Body length 2050. Head, length 200; width 235; postocellar setae 25; po setae 70. Pronotum, length 120; width 235; major setae am 35, aa 35, ml 25, epim 75, pa 55. Fore wing, length 850; sub-basal setae 40, 65, 100. Tergite IX setae S1 85, S2 150, S3 135. Tube length 190. Antennal segments III–VIII length 70, 70, 65, 65, 45, 30.

Male macroptera. Similar to female but much smaller, fore tarsus with small pointed tooth.

Specimens studied. Holotype female. **Australia, Queensland**, Dalby, from *Acacia harpophylla*, 27.ix.1997 (LAM3329).

Paratypes all from Queensland from same host: 1 male with same date and site as holotype; Dalby, Lake Broadwater, 2 females, 19.vii.1995, 2 females 2 males from dead branches, 8.iii.2006; Rosewood, 2 females from dead *Acacia harpophylla* leaves, 13.x.2006; 10km East of Moonie, 1 female, 28.ix.1997; 30km West of Charters Towers, 1 female, 30.vii.1993.

Comments. This is a typical member of *Nesothrips*, with widely spaced maxillary stylets, long maxillary palp segment II, and well-developed ocellar setae arising within the ocellar triangle anterior to the posterior ocelli. It is very similar to *minor*, apart from the position of the ocellar setae and the darker colour of the first antennal segment.

***Nesothrips capricornis* (Mound, 1974a: 23) comb.n.**

(Fig. 67)

Although described in *Bolothrips*, this species was transferred to *Carientothrips* because of the presence of four sensoria on the fourth antennal segment (Mound, 1974b), but is here recognised as a species of *Nesothrips* because of the form of the maxillary palps. It remains known only from two females collected in northern Queensland, near Townsville.

Diagnosis. Micropterous, body bicoloured with head, thorax and legs yellow in contrast to dark brown abdomen; head much longer than wide, maxillary stylets widely spaced, V-shaped, retracted to mid-dorsal setae, postocellar setae stout and broadly blunt, postocular setae long and finely blunt; pronotum with 2 pairs of large epimeral setae (Fig. 67); metanotum with no sculpture medially; pelta broadly triangular; tergites III–VI with wing-retaining setae very long and straight, discal area with transverse row of about 20 small setae; tergite IX setae about 0.8 as long as tube.

***Nesothrips carveri* Mound, 1974a: 71**

(Figs 53, 61)

This species has been found commonly on dead branches of *Eucalyptus* trees around Canberra, and has also been taken around Adelaide and in Victoria. It is an extensively brown species, with only the slender base of the third antennal segment paler (Fig. 61).

Diagnosis. Macropterous or micropterous, body, legs and antennae dark brown with base of antennal segment III yellow; head wider than long, maxillary stylets widely spaced, V-shaped, not retracted to postocular setae (Fig. 53); postocellar setae acute arising on or near tangent to posterior margin of hind ocelli; postocular setae long and pointed; maxillary palp segment I as long as wide; pronotum with 5 pairs of major setae, am and aa smaller than the other setae (Fig. 53); metanotum with no sculpture, median setae long and acute; metathoracic sternopleural sutures absent; pelta with large median lobe and broad lateral wings; tergites III–VII with wing-retaining setae weakly sigmoid (almost straight in micropterae), discal area with one pair of small setae medially and one pair laterally; tergite IX setal pair S3 as long as tube, S1 and S2 no more than 0.6 as long as tube. Male microptera pronotum with stout median apodeme, fore femora swollen, fore tarsal tooth large.

***Nesothrips coorongi* sp.n.**

(Figs 50, 62)

Female microptera. Body and legs uniformly brown; antennal segments brown except pedicel of III yellow; major setae pale.

Head wider than long, not projecting in front of eyes, cheeks convex, vertex weakly reticulate, ocelli small (Fig. 50); postocellar setae blunt, posterior to inner margin of posterior ocelli; postocular setae blunt; mid-dorsal setae well-developed, blunt; compound eyes slightly smaller ventrally than dorsally; maxillary stylets wide V-shaped, retracted to postocular setae; maxillary palp segment I as long as wide, segment II about 5 times as long as I, without transverse lines, terminal sensorium setaceous. Antennal segment VIII not constricted at base.

Pronotum transverse, weakly reticulate near margins, notopleural sutures complete, with 5 pairs of blunt major setae (Fig. 62); mesopresternum transverse, boat-shaped; metathoracic sternopleural sutures absent. Meso- and metanotum transverse, reticulate. Fore wing lobe small, bearing 1 or 2 setae.

Pelta broadly triangular, extending about 80% across anterior border of tergite II, reticulate, campaniform sensilla present (Fig. 62); tergites III–VII each with wing-retaining setae minute; tergite IX setae S1 and S2 blunt, shorter than tube, S3 finely acute; tube shorter than head.

Measurements (holotype female in microns). Body length 2750. Head, length 330; width 250; postocellar setae 35; po setae 70; mid-dorsal setae 45. Pronotum, length 175; width 360; major setae am 35, aa 60, ml 75, epim 90, pa 75. Fore wing lobe 65. Tergite IX setae S1 210, S2 210, S3 210. Tube length 260. Antennal segments III–VIII length 110, 110, 100, 80, 60, 25.

Male microptera. Similar to female except smaller, fore tarsus with sharp tooth; head length 300; tergite IX setae 130, 160, 190; tube 215.

Specimens studied. Holotype female. **Australia, South Australia,** Meningie Airport, from *Apodesmia*, 15.i.2002. (LAM4103).

Paratypes: 3 females, 1 male taken with holotype.

Comments. This species has a longer head and a wider, non-lobed pelta than other members of this genus related to *propinquus* and *minor*. The head and postocellar setae resemble some species of the genus *Cariantothrips*, but the maxillary palps and the widely spaced, V-shaped, maxillary stylets are typical of *Nesothrips*.

***Nesothrips hemidiscus* Mound, 1974a: 71**

(Fig. 66)

This species remains known from the original series of 8 females and 2 males taken at Mareeba in northern Queensland from dead *Casuarina* branches. The D-shaped pelta of this thrips is unique in *Nesothrips*.

Diagnosis. Macropterous; body, legs and antennae dark brown, pedicel of antennal segment III yellow; head slightly wider than long, postocellar setae small and arising behind ocelli, postocular setae long and dark; pronotum strongly transverse, with 5 pairs of major setae, aa close to ml setae; metanotal median setae long and stout; pelta D-shaped with no lateral lobes (Fig. 66); tergites II–VII with one pair of sigmoid wing-retaining setae, discal area with one pair of small setae medially and one pair laterally; tergite IX setae S1 short, no longer than basal width of tube, S2 and S3 more than 0.5 as long as tube.

***Nesothrips lativentris* (Karny, 1913: 129)**

(Fig. 47)

Described originally from Taiwan, this species is widespread across the tropics from the Pacific islands including Fiji to the Seychelles in the Indian Ocean. It is known in Australia from Darwin in the Northern Territories, from Queensland around Brisbane and Cairns, and also from Lord Howe Island and Christmas Island.

Diagnosis. Macropterous or micropterous, body and legs dark brown, tarsi paler, antennal segment III largely yellow, also basal half of IV–V; head longer than wide, postocellar setae longer than distance between their bases, arising on tangent between posterior margins of hind ocelli (Fig. 47); postocular setae long and acute; maxillary palp segment I as long as wide; pronotum with 5 pairs of major setae, am and aa small; metathoracic sternopleural sutures long and curved; metanotum weakly sculptured, with one pair of anteromedian discal setae; pelta with large median lobe and broadly joined lateral lobes; tergites II–VII with transverse row of 10–20 minute discal setae, wing-retaining setae only weakly sigmoid in micropterae; tergite IX setae about 0.8 as long as tube. Large male with strong longitudinal pronotal apodeme, fore femora L-shaped, fore tarsal tooth large.

***Nesothrips minor* (Bagnall, 1921: 287)**

(Fig. 52)

Cryptothrips rhizophorae Girault, 1927: 2. **syn.n.**

This species was described from Rodrigues in the Indian Ocean. Mound (1974b) treated *brevicollis* from Japan as a senior synonym of *minor*, but Okajima (1990, 2006) treated these two as distinct, with *brevicollis* known only from Japan, and *minor* widely distributed between Fiji and Hawaii in the Pacific through southern Japan, Indonesia and Malaysia to India and Rodrigues. In the present study, specimens have been examined from Mauritius, Cocos Keeling Islands, Java, Malaysia, East Timor, northern Australia, and Lord Howe Island. The shape of the tube, and the length of the tube relative to the head length, was found to be variable amongst these specimens. However, all of our specimens have the wing-retaining setae long and curved, and the posterior margin of the pelta entire. In contrast, Okajima (2006) indicates that *brevicollis* has the wing-retaining setae short and straight, and the posterior margin of the pelta slightly eroded medially. The specimen described by Girault as *rhizophorae* cannot be distinguished from the specimens here identified as *minor*.

Diagnosis. Macropterous, hemimacropterous and micropterous, body brown, abdomen darker, tube distal end paler; antennal segments I–III yellow, IV yellow with apex variably shaded brown, V brown with yellow pedicel, VI–VIII brown; mid and hind legs with femora shading from brown at base to yellow postero-distally, tibiae brown, tarsi yellow; fore wings light brown. Head as long as wide, not projecting in front of eyes; postocellar setae acute, on or close to tangent between posterior margin of hind ocelli (Fig. 52); postocular setae acute to weakly blunt; eyes slightly smaller ventrally than dorsally; maxillary stylets widely spaced V-shaped; maxillary palp segment I as long as wide, segment II about 3 times as long as I. Pronotum with 5 pairs of major setae, am acute, remaining pairs stout and rather blunt, notopleural sutures complete; mesopresternum boat-shaped; metathoracic sternopleural sutures long and curved. Mesonotum anterior with small microtrichia on sculpture lines; metanotum reticulate with one pair of median setae. Pelta with broadly rounded median lobe and relatively flat lateral wings; tergites III–VII wing-retaining setae vary from sigmoid to curved, with one pair of discal setae medially; tergite IX setae acute, about 0.8 as long as tube, S3 longest. Major male with large pronotum, swollen fore femora, stout fore tarsal tooth (Fig. 52).

***Nesothrips propinquus* (Bagnall, 1916: 408)**

(Figs 51, 57, 68)

This species is widespread along the old sailing ship route between New Zealand, Australia and Europe, and Mound & Walker (1986) suggest that it came originally from New Zealand. It is common across Australia in grass tussocks, particularly in southern Australia, although it has been taken in eastern Queensland as far north as the Torres Strait Islands. However, macropterae seem rare in Australia. Amongst the Australian species of *Nesothrips*, this species is usually distinguishable by the ventral prolongation of the eyes. Several synonyms are indicated in ThripsWiki (2014).

Diagnosis. Usually apterous, body brown, abdomen darker than head and thorax; antennal segments I–V often yellow, but III–V variably shaded toward apex, VI–VIII brown; mid and hind legs usually yellow to brownish yellow. Head wider than long; postocellar setae acute, close to tangent between posterior margin of hind ocelli; postocular setae acute to weakly blunt, eyes ventrally with entire posterior margin prolonged (Figs 57, 68); ocelli small but often absent; maxillary stylets widely spaced, V-shaped (Fig. 51); maxillary palp segment I as long as wide, segment II about 3 times as long as I. Pronotum with 5 pairs of major pointed setae, am small, notopleural sutures complete (Fig. 51); mesopresternum boat-shaped but partly eroded (Fig. 68); metathoracic sternopleural sutures present, curved. Mesonotum and metanotum transverse, metanotum with no sculpture medially. Pelta variable, median lobe broadly rounded with lateral lobes either connected or not connected; tergites III–VII wing-retaining setae small and straight, with transverse row of about 10 discal setae; tergite IX setae short and acute, about 0.6 as long as tube, S3 longest. Major male with large pronotum, swollen fore femora, stout fore tarsal tooth.

***Nesothrips rossi* sp.n.**

(Figs 55, 63)

Female macroptera. Body uniformly brown with tube paler at apex, femora paler toward apex, tarsi brownish yellow; antennal segment I and base of II concolourous with head, III yellow, IV–V yellow with apex weakly shaded, VI with yellow pedicel, VII–VIII brown; major setae brown; fore wings pale.

Head wider than long, not projecting in front of eyes, cheeks convex, vertex weakly reticulate (Fig. 55); postocellar setae small and acute posterior to inner margin of posterior ocelli; postocular setae long, acute; compound eyes equal in size dorsally and ventrally; maxillary stylets wide V-shaped, not retracted as deeply as postocular setae; maxillary palp segment I about as long as wide, segment II about 2 times as long as I, without transverse lines, terminal sensorium setaceous. Antennal segment VIII not constricted at base.

Pronotum transverse, weakly reticulate near margins, notopleural sutures complete (Fig. 55); with 5 pairs of major setae, most blunt but am acute; mesopresternum transverse, boat-shaped; metathoracic sternopleural sutures short. Metanotum without sculpture anteromedially but with longitudinal reticulation on posterior half; median setae long. Fore wing with about 16 duplicated cilia, sub-basal setae long and acute.

Pelta with broadly rounded median lobe and short lateral wings curving away from anterior margin of tergite II, extending about 70% across anterior border of tergite (Fig. 63); tergites III–VII each with pair of sigmoid wing-retaining setae; tergite IX setae S1 and S2 blunt, shorter than tube, S3 finely acute and almost as long as tube; tube shorter than head.

Measurements (holotype female in microns). Body length 2500. Head, length 240; width 250; postocellar setae 30; po setae 100. Pronotum, length 130; width 280; major setae am 35, aa 30, ml 40, epim 105, pa 50. Fore wing, length 1000; sub-basal setae 30, 75, 130. Tergite IX setae S1 115, S2 155, S3 190. Tube length 215. Antennal segments III–VIII length 80, 80, 70, 65, 45, 30.

Male macroptera. Similar to female except fore femora enlarged, fore tarsi with stout tooth; pronotum with strong median longitudinal apodeme; tergite IX setae S3 as long as tube.

Specimens studied. Holotype female. **Australia, Queensland**, Townsville, Aitkenvale, Ross River, from dead leaf of *Melaleuca leucadendra*, 17.viii.1993 (L.M.Brown).

Paratypes: 1 female, 1 male taken with holotype.

Comments. This species is similar in general appearance to several other short-headed members of this genus, but is distinguished particularly by the linear sculpture on the posterior half of the metanotum (Fig. 63).

Nesothrips yanchepi Mound, 1974a: 71

(Fig. 58)

This species remains known only from the original series of two females and one male taken from sedges in Western Australia just north of Perth. It is similar to *carveri* and *minor*, but with the third antennal segment less slender at the base and extensively yellow (Fig. 58). The single male paratype has enlarged fore femora and large fore tarsal tooth.

Diagnosis. Micropterous, body and legs dark brown, hind femora and hind tibiae yellow only at extreme apices, tarsi yellow; head as long as wide, postocellar setae acute and arising on tangent between posterior margins of hind ocelli; postocular setae long and acute; pronotal am and aa setae small and acute, ml, epim and pa well-developed; metanotum with equiangular reticulation laterally but smooth medially; pelta with large median lobe and broadly joined lateral lobes; tergites II–VII with wing-retaining setae very long and straight, discal area with one pair of small setae medially; tergite IX setae about 0.6 as long as tube.

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