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Fungus-feeding thrips from Australia in the worldwide genus *Hoplandrothrips* (Thysanoptera, Phlaeothripinae)

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Abstract

From Australia, 16 species of *Hoplandrothrips* are here recorded, of which 11 are newly described. An illustrated key is provided to 15 species, but *Phloeothrips leai* Karny cannot at present be recognised from its description. The generic relationships between *Hoplandrothrips*, *Hoplothrips* and some other Phlaeothripinae that live on freshly dead branches are briefly discussed.

Key words: fungus-feeding, *Hoplandrothrips*, *Hoplothrips*, Phlaeothripina, Hoplothripina

Introduction

Thrips are commonly thought of as phytophages, with the most well-known species breeding in flowers or damaging crops (Mound & Masumoto 2005; Mound & Minaei 2007). However, almost 50% of Thysanoptera species are fungivorous (Morse & Hoddle 2006), with about 700 species, the Idolothripinae, apparently ingesting fungal spores (Mound & Palmer 1983; Tree *et al.* 2010; Eow *et al.* 2011), and at least 1500 species of Phlaeothripinae feeding on fungal hyphae (Mound 2005). Many of these fungivorous thrips breed on dead branches of trees, others breed on dead leaves particularly when these remain hanging in bunches, and yet others breed almost exclusively in leaf litter (Mound & Marullo 1996; Tree & Walter 2012). Most of the species in the genus considered here, *Hoplandrothrips*, breed on dead branches and twigs. In eastern Australia, species of this genus have been found mainly in wet sclerophyll forest or rain forest, but two species are widespread across Australia on dead *Eucalyptus* branches in dry sclerophyll forests.

Judging from the diversity in size and structure within many species, the biology of fungivorous thrips that live on dead wood can involve strong competition, either for mates or for food. Individuals of some species vary greatly in size, sexual dimorphism is common, and polymorphism amongst males is often very great (Palmer & Mound 1978). This polymorphism is presumably related to competitive behaviour between males, although sexual behaviour has been studied in detail in only a few Phlaeothripidae (Crespi 1996, 1998). Fungivorous species that live in leaf litter rarely exhibit intra-specific structural diversity (Mound 2002); presumably such species are less likely to live in discrete colonies, with all the interactions that are associated with such a life style.

Of the 16 species considered here as members of the genus *Hoplandrothrips*, two new species are each described from single specimens, and several more new species are described from single samples. This low number of available specimens in no way reflects our extensive collecting efforts across the continent of Australia that have been directed toward discovering the thrips associated with dead plant tissues. Presumably the low numbers of specimens reflects in some way the population structure, and high diversity, of species in this type of habitat. Australia has a particularly high diversity of predatory ants and spiders on dead branches and in leaf litter, and this presumably both limits the individual population size of thrips that share these habitats, and contributes to driving the rate of diversification of the thrips fauna. Unfortunately, such low populations limit the security of taxonomic decisions, because optimally these should be based on extensive series in order to recognise intra-population structural variation (Mound & Marullo 1996: 306).

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Fungus-feeding Phlaeothripinae were included by Priesner (1960) in several apparently distantly related subtribes, of which the two largest were the Phlaeothripina and the Hoplothripina. Thus Priesner appears to have considered that fungus-feeding was a habit that had arisen several times within the subfamily Phlaeothripinae. In contrast, Stannard (1957) placed most of the genera of fungus-feeding species into his "*Neurothrips* line", including both *Hoplandrothrips* and *Hoplothrips*. Subsequently, this group was recognised by Mound & Marullo (1996) as the "*Phlaeothrips* lineage", and this grouping implies that fungus-feeding was adopted by a single evolutionary lineage within this subfamily. Most of the genera listed by Priesner in the Hoplothripina involve thrips that feed on green leaves, and these were referred to by Mound & Marullo (1996) as the "*Liothrips* lineage", a group largely equivalent to Stannard's "*Gigantothrips* line". The classification proposed by Priesner (1960) seems to have very limited phylogenetic significance. Some support for recognition of the three "lineages" mentioned above was provided by an analysis using five genetic loci (Buckman *et al.* 2013), but a far larger group of taxa now needs to be used for such studies in order to obtain a more robust resolution of relationships.

The species currently listed within the genus *Hoplandrothrips* exhibit a wide diversity of body form, and possibly do not comprise a monophyletic group. Worldwide, 106 species are listed in the genus (ThripsWiki 2013), with a further 26 species names in synonymy. No substantial revisionary study has ever been attempted for the genus, the main keys in recent years being to eight species from Illinois (Stannard 1968), four species from New Zealand (Mound & Walker 1986), 17 species from the Neotropics (Mound & Marullo 1996), and nine species from Japan (Okajima 2006). Of the 106 species, 48 are described from the New World: 22 from North America, nine from Mexico, and 17 from various parts of the Neotropics. More than 25 species are described from different parts of Africa, 10 from various parts of Europe, nine from Japan, and three from New Zealand. Three of the species treated here in *Hoplandrothrips* were described from Australia, a fourth species is widespread in the tropics and has previously been recorded here, and 11 new species from this continent are described below. In addition, *Phloeothrips leai* Karny, described from Norfolk Island, is considered to be a species of *Hoplandrothrips*, but cannot be placed in the key from the description, as discussed below.

Four genus-group names are listed in synonymy with *Hoplandrothrips* worldwide (ThripsWiki 2013). Two were based on single tropical species in which the males have particularly well-developed secondary sexual characters, but are otherwise typical members of *Hoplandrothrips*. One was erected for some North American species in which the head is relatively elongate and females lack a fore tarsal tooth, and one was erected for a single European species that shares these character states and is micropterous. A further genus, *Carathrips*, is scarcely distinguishable, and comprises a series of small South American species (Mound & Marullo 1996) in which the head is relatively long and there is limited sexual dimorphism. More importantly, the worldwide genus *Hoplothrips*, with 129 included species, is distinguished traditionally from *Hoplandrothrips* by the fore wings being parallel-sided, and by the frequent occurrence of wingless adults. However, these differences are not consistent, and other proposed differences, including a less reticulate head among *Hoplothrips* species, are equally inconsistent and do not distinguish these traditional genera satisfactorily.

The purpose of this article is limited to distinguishing the *Hoplandrothrips* species known from Australia.

Acknowledgements, depositaries and abbreviations

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Holotypes of the new species described below are deposited in the Australian National Insect Collection, Canberra (ANIC), with paratypes in ANIC and in the Queensland Primary Industries Insect Collection, Brisbane (QDPC). Full nomenclatural details of all thrips taxa mentioned here are web-available (ThripsWiki 2013).

The following abbreviations are used: po—postocular seta; am—pronotal anteromarginal seta; aa—pronotal anteroangular seta; ml—pronotal midlateral seta; pa—pronotal posteroangular seta; epim— pronotal epimeral setae; S1—seta pair I on abdominal tergite IX (the setal pair nearest the mid-line); S2—seta pair II on abdominal tergite IX; S3—seta pair III on abdominal tergite IX. Mesoeusternum is the major sternal sclerite of the mesothorax, as distinct from the anterior sclerite, the mesopresternum.

Hoplandrothrips Hood

Phloeothrips (Hoplandrothrips) Hood, 1912: 145. Type species *Phloeothrips (Hoplandrothrips) xanthopus* Hood, now considered a synonym of *Phloeothrips jennei* Jones.

Diagnosis. Often sexually dimorphic, with males varying in body size; head shape variable, usually longer than wide, constricted behind eyes, reticulate dorsally; postocular setae usually well developed, wide apart; stylets usually retracted to eyes and close together medially, rarely short and wider apart; mouth cone variable; antennae 8-segmented, III with 2–4 (usually 3) sensoria, IV with 4; pronotum usually with 5 pairs of major setae, major males commonly with anteroangular pair particularly long; notopleural sutures complete; basantra absent; mesopresternum transverse, or divided into three plates; metathoracic sternopleural sutures present; metanotum usually reticulate medially; fore tarsal tooth present in both sexes, male fore femur often with pair of apical tubercles; fore wings usually weakly constricted medially, with duplicated cilia; pelta usually bell-shaped; tergites II–VII each with 2 pairs of wing-retaining setae; tube shorter than head, anal setae usually as long as tube or longer; male sternite VIII with or without pore plate; some males with specialized areas of reticulation anterolaterally on several sternites.

Structural diversity among Australian *Hoplandrothrips* species. Among these, *flavipes* is a tropical tramp that has been found occasionally in northern Queensland. In its antennae, this species is particularly similar to species of the genus *Ecacanthothrips* from Southeast Asia (Palmer & Mound 1978; Okajima 1983). However, one new species described below, *brunneicinctus*, shares several character states with *flavipes* but has different antennal sensoria. In both species, the median metanotal setae arise on the anterior half of this sclerite, there are no additional minor setae on the anterior half of the metanotum (or at least no more than one pair), and the fore femora of males have a pair of tubercles at the inner apical margin. In contrast, *xanthocnemis* and three new species described below, *hemiflavus*, *howei*, and *hylaius*, all have the median metanotal setae arising on the posterior half of the sclerite, the anterior half of this sclerite bears several additional minor setae, and the fore femora of males do not bear any tubercles. The three species of *Hoplandrothrips* described from New Zealand (Mound & Walker 1986) also have additional metanotal discal setae, but have the postocular setae closer to the midline on the head. Species with the largest bodies in this group often have additional pairs of tergal wing-retaining setae, including *hylaius* and a related undescribed species from New Caledonia. Large males of *Hoplandrothrips* species often have the pronotal anteroangular pair of setae unusually long (Fig. 20), and in some species the postocular setae of males are longer than those of females. Similarly, males commonly have the anterior margin of the mesoeusternum considerably narrower than that of females (Figs 27, 28), and the mesopresternum of such species also differs in shape between the sexes.

Key to *Hoplandrothrips* species from Australia

(excluding *leai* q.v.)

1. Anterior area of metanotum with at least one pair of small discal setae (Figs 16, 19) 2
-. Anterior discal area of metanotum with no setae apart from the median major pair (Figs 4, 13) 6
2. Antennal segment III with only 2 sensoria; pronotal ml setae minute; mesopresternum incomplete medially, forming pair of lateral triangles; pelta broad, about twice as wide as long (Fig. 16); male sternite VIII with small circular pore plate . . . . . *hemiflavus* **sp.n.**
-. Antennal segment III with 3 sensoria; pronotal ml setae well-developed; mesopresternum usually complete and transverse in both sexes; pelta more elongate; male sternite VIII with broadly transverse pore plate. 3
3. Mid and hind tibiae yellow in sharp contrast to brown femora . . . . . *xanthocnemis*
-. Mid and hind tibiae not sharply different in colour from femora, mainly brown 4
4. Antennal segment III with prominent ring-like ridge near base (Fig. 7); antennal segment VIII not constricted at base . . . . . *coorongi* **sp.n.**
-. Antennal segment III without a ring-like ridge near base; antennal segment VIII more or less constricted at base 5
5. Body, mid and hind legs uniformly brown . . . . . *howei* **sp.n.**
-. Pronotum yellow, head brown with paired pale longitudinal stripes laterally (Figs 17, 18) . . . . . *hylaius* **sp.n.**
6. Antennal segment IV with 3 stout sensoria; VIII broad at base; male sternite VIII with pore plate 7
-. Antennal segment IV with 4 slender sensoria; VIII often narrowed to base; male pore plate present or absent 8
7. Macropterae; hind tibiae brown but tarsi yellow; male sternite VIII with transverse pore plate . . . . . *tareei* **sp.n.**

-. Known only from male micropterae (Figs 22, 25); hind tibiae and tarsi yellow; male sternite VIII medially with small, circular pore plate*i* . . . . . .*bisci* **sp.n.**
8. Antennal segment III with 4 exceptionally broadly based sensoria; hind tibiae yellow; male sternite VIII with no pore plate . . . . . .*flavipes*
-. Antennal segment III with 3 (or 2) slender sensoria; other characters various 9
9. Metanotum with closely spaced prominent longitudinal striae (Figs 5, 14) 10
-. Metanotum weakly sculptured or reticulate (Figs 6, 13) 11
10. Pronotum almost smooth (Fig. 2); postocular setae arise behind inner margin of eye (Fig. 2); antennal segment yellow at base but brown in distal half . . . . . *bartlei* **sp.n.**
-. Pronotum with complex sculpture (Fig. 11); postocular setae arise behind mid-point of eye (Fig. 11); antennal segment III clear yellow, IV–V dark brown . . . . . *gloriosi* **sp.n.**
11. Female with fore tarsal tooth absent or minute 12
-. Both sexes with fore tarsal tooth prominent, at least 0.5 as long as tarsal width 14
12. Antennal segment III with 2 sensoria, mainly brown but yellow at base, IV–V uniformly brown; pronotal setae no longer than antennal segment III (Fig. 1); male sternite VIII with transverse pore plate . . . . . *abrasi* **sp.n.**
-. Antennal segment III yellow, with 3 sensoria, IV–V yellow in part; male sternite VIII with no pore plate 13
13. Body largely yellow, brown laterally on head and tergite II; metanotum reticulate between median pair of setae (Fig. 6) . . . . . *brunneicinctus* **sp.n.**
-. Body uniformly dark brown; metanotum with no sculpture between median setae (Fig. 23) . . . . . .*oreillyi* **sp.n.**
14. Major setae with apices acute, or slightly blunt, pronotal am and aa setae scarcely longer than discal setae (Fig. 24); antennal segments III–V almost uniformly brown; male sternite VIII without a pore plate . . . . . .*quadriconus*
-. Major setae with apices broadly capitate, including pronotal am and aa setae; antennal segments III–V dark brown but yellow at base; male sternite VIII with a transverse pore plate . . . . . *fuscus*

Hoplandrothrips abrasi **sp.n.**

(Figs 1, 4)

Male macroptera. Body, legs and antennae brown, base of antennal segment III yellow; all major setae pale; fore wings pale.

Head with cheeks convex, weakly reticulate dorsally, ventrally with 3 pairs of longer setae; maxillary stylets retracted to postocular setae, about one-sixth of head width apart medially (Fig. 1); postocular setae wide apart, capitate, shorter than eye length; mouth cone short and pointed. Antennae 8-segmented; III with 2 sensoria, IV with 4 sensoria; VII and VIII broad at base, non-pedicellate.

Pronotum with weak sculpture near posterior margin, median apodeme weak; 4 pairs of capitate major setae, am setae no larger than discal setae; basantra absent, chitinous islets not large; mesopresternum divided into 2 lateral triangles and large median area. Fore femora and tibiae slender, fore tarsal tooth large, about as long as tarsal width. Mesonotum weakly sculptured, lateral setae small and pointed. Metanotum with no sculpture medially (Fig. 4), median setae acute and arising on anterior third of sclerite. Fore wings broad, parallel sided, sub-basal setae S1 and S2 capitate, S3 acute; with 8 duplicated cilia.

Pelta bell-shaped; tergites II–VII with 2 pairs of wing retaining setae, no lateral discal setae, lateral setae S1 weakly capitate, S2 bluntly pointed; tergite IX setae S1 weakly capitate, S2 blunt, intermediate seta shorter than S2. Sternite V with 6 discal setae, VIII with transverse pore plate medially.

Measurements (holotype male in microns). Body length 1470. Head, length 185; width across cheeks 150; postocular setae 35. Pronotum, length 90; width 175; major setae—am 5, aa 20, ml 10, epim 25, pa 25. Fore wing, length 600; sub-basal setae 20, 25, 50. Tergite IX setae, S1 75; S2 40; S3 75. Tube length 100. Antennal segments III–VIII length 45, 50, 50, 45, 40, 20.

Female macroptera. Similar to male in colour and structure, except slightly larger; fore tarsal tooth very small; mesopresternum three segments sometimes weakly united; tergites with 1 or 2 small lateral discal setae; tergite IX setae S1 and S2 weakly capitate; sternite V with 10 discal setae.

Measurements (paratype female in microns). Body length 1700. Head length 210; postocular setae 35. Pronotum, length 100; width 210. Tergite IX setae, S1 70; S2 75. Tube length 100.

Specimens examined. Holotype male macroptera, **Tasmania**, St Helens, Binalong Bay, from dead *Eucalyptus*, 10.xii.2012 (DJ Tree 1580).

Paratypes: 1 male, 3 females taken with holotype.

Comments. This species does not seem closely related to any of the others discussed here. The broad bases to the two terminal antennal segments are unique amongst the *Hoplandrothrips* species from Australia, the slight

separation of the maxillary stylets occurs among these Australian species only in *ibisci*, and the presence of only two sensoria on the third antennal segment is also relatively unusual.

Hoplandrothrips bartlei **sp.n.**

(Figs 2, 5)

Female macroptera. Body, legs and antennae brown, tarsi and apices of tibiae paler, antennal segment III paler in basal third, also pedicel of IV; epimeral setae pale, but 4 pairs of capitate pronotal setae dark, also postocular and median metanotal setae; fore wings weakly shaded.

Head weakly reticulate dorsally, ventrally with 3 pairs of long setae; maxillary stylets retracted to eyes, close together medially (Fig. 2); postocular setae short and capitate, arising behind inner margin of eyes; mouth cone pointed, extending to mesosternum. Antennae 8-segmented; III with 3 sensoria, IV with 4 sensoria; VII with pedicel, VIII broadly pedicellate but narrower than apex of VII.

Pronotum with no sculpture except near posterior margin; major setae with fringed capitate apices, epimeral setae with apices greatly asymmetric; basantra absent; mesopresternum broadly boat-shaped. Fore legs slender, fore tarsus with small tooth on inner margin. Mesonotal sculpture lines weakly dentate, lateral setae small, capitate. Metanotum strongly striate (Fig. 5), median setae capitate and arising on anterior half of sclerite. Fore wings slender, sub-basal setae capitate; with about 6 duplicated cilia.

Pelta elongate bell-shaped; tergites II–VII with 2 pairs of wing retaining setae, each anterior pair weaker than each posterior pair; tergites laterally with dentate sculpture; lateral setae S1 on II–VI with asymmetric, fringed apex; and S2 capitate; tergite IX setae S1 and S2 weakly capitate, intermediate seta not elongate.

Measurements (holotype female in microns). Body length 1900. Head, dorsal length 230; ventral length to mouth cone apex 450; width across cheeks 175; postocular setae 40. Pronotum, length 110; width 230; major setae—am 20, aa 25, ml 20, epim 60, pa 25. Fore wing, length 650; sub-basal setae 20, 20, 50. Tergite IX setae, S1 55; S2 65; S3 100. Tube length 150. Antennal segments III–VIII length 65, 60, 50, 50, 45, 25.

Specimens examined. Holotype female, **Queensland**, Mt Bartle Frere, pyrethrum fogging of logs, 19.xi.2009 (G. Monteith & F. Turco).

Comments. Known from only a single female, this species is distinctive within the genus in the striate form of the metanotal sculpture and the broadly capitate and fringed, but dark, major setae. The rather elongate head is similar to North American species placed in *Phloeobiothrips*, although that is now considered a synonym of *Hoplandrothrips*.

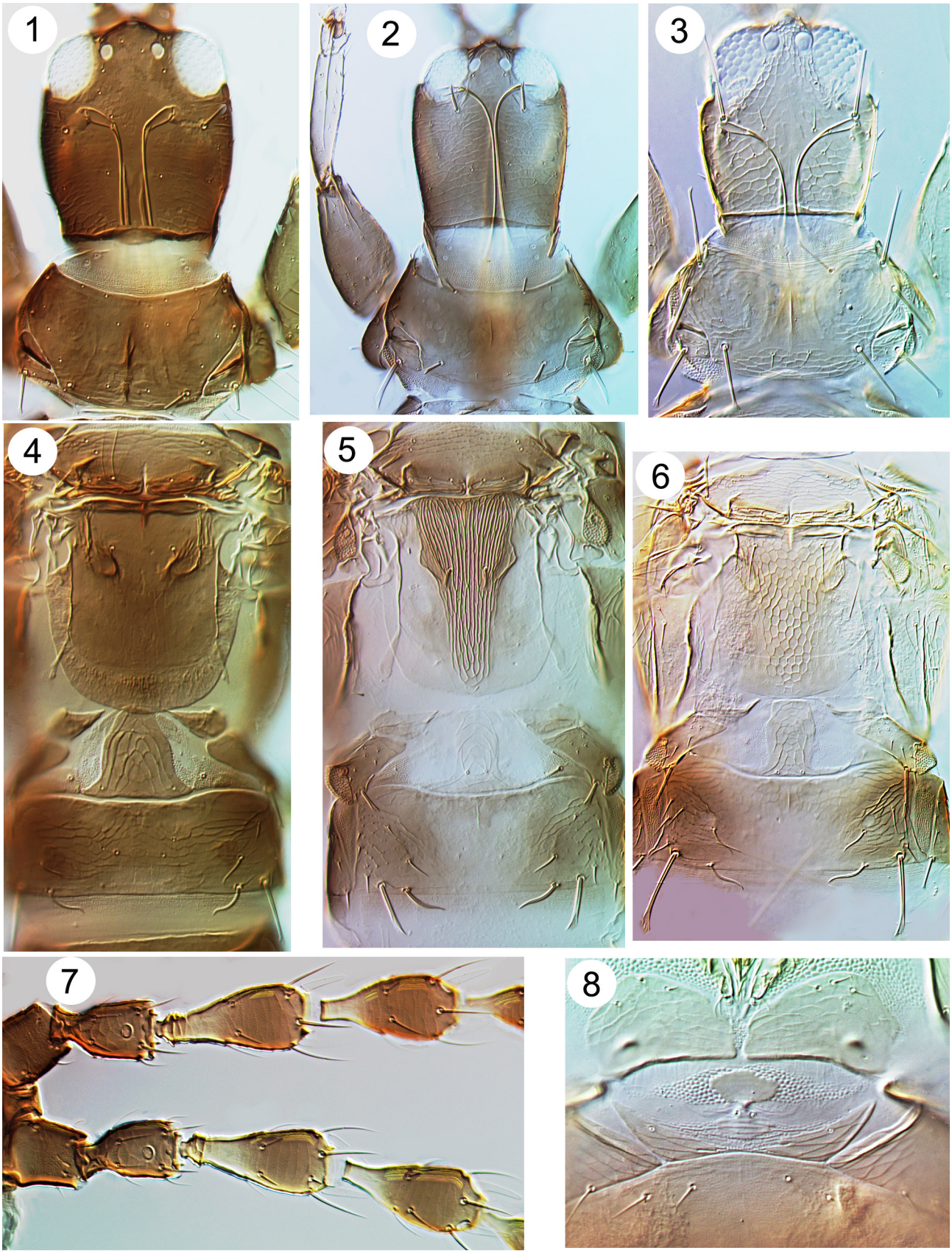
Hoplandrothrips brunneicinctus **sp.n.**

(Figs 3, 6, 8)

Male macroptera. Body and legs mainly yellow, tube pale brown, tergite II laterally and anterolateral margins of head with pale brown markings; antennae mainly light brown, segment III paler; all major setae pale; fore wings light brown, paler medially and near base.

Head with cheeks swollen behind eyes, weakly reticulate dorsally, sculpture particularly weak medially and in small males, ventrally with 3 pairs of longer setae; maxillary stylets retracted to postocular setae, close together medially (Fig. 3); postocular setae wide apart, capitate and as long as eye length; mouth cone short and pointed. Antennae 8-segmented; III with 3 sensoria, IV with 4 sensoria; VII and VIII slender, each with small pedicel.

Pronotum with weak sculpture near posterior margin; all 5 major setae capitate, aa setae of largest male 2.5 times as long as am setae but in smallest male scarcely 1.3 times; basantra absent, chitinous islets not large; anterior border of mesoeusternum narrow in largest male, mesopresternum reduced to 2 slender triangles (Fig. 8). Large males with fore femora swollen, inner apex with two stout tubercles, fore tibiae stout, inner margin with one sub-apical and one sub-basal tubercle, fore tarsal tooth longer than 0.5 of tarsal width. Small males with fore femora slender, only one apical tubercle, tibiae without tubercles, fore tarsal tooth small. Mesonotal lateral setae elongate, capitate. Metanotum reticulate, median setae acute and arising on anterior third of sclerite (Fig. 6). Fore wings relatively slender, parallel sided or scarcely constricted medially, sub-basal setae capitate; with 4–6 duplicated cilia.



FIGURES 1–8. *Hoplandrothrips* from Australia. Head & pronotum 1–3: **(1)** *abrasi* **sp.n.**; **(2)** *bartlei* **sp.n.**; **(3)** *brunneicinctus* **sp.n.** Meso & metanotum, pelta & tergite II, 4–8: **(4)** *abrasi* **sp.n.**; **(5)** *bartlei* **sp.n.**; **(6)** *brunneicinctus* **sp.n.** **(7)** *coorongi* antennal segments I–IV. **(8)** *brunneicinctus* **sp.n.** male mesopresternum.

Pelta bell-shaped (Fig. 6); tergites II–VII with 2 pairs of wing retaining setae, also 3–4 pairs of lateral discal setae arranged in a line, lateral setae S1 and S2 capitate; tergite IX setae S1 weakly capitate, S2 blunt, intermediate seta longer than S2. Sternite V with 14 discal setae, VIII with no pore plate.

Measurements (holotype male in microns, with small male in parentheses). Body length 1600 (1400). Head, length 230 (195); width 170 (150); po setae 90 (65). Pronotal setae length: am 35 (25), aa 90 (35), ml 55 (35), epim 65 (50), pa 70 (35). Fore wing length 750 (600). Tergite IX setae: S1 95 (65); intermediate seta 65 (50); S2 35 (30); S3 125 (110). Tube length 110 (110). Antennal segments III–VIII length 70 (65), 65 (55), 65 (50), 55 (45), 45 (35), 35 (30).

Male microptera. Similar to macroptera but fore wings no longer than width of pterothorax; largest microptera with fore legs exceptionally large, and postocular and pronotal aa setae both very long (100 microns).

Female macroptera. Similar to male in colour and structure, slightly larger with sculpture on head and pronotum stronger; fore tarsal tooth absent or minute; fore femora and tibiae without tubercles; mesopraesternal triangles large, almost meeting medially; mesoeusternal margin transverse; pronotal aa setae scarcely longer than am setae.

Female microptera. Similar to macroptera, fore wing no longer than pterothorax width.

Specimens examined. Holotype male macroptera, **Queensland**, 11km north of Kuranda, from rainforest leaf litter, 30.x.1969 (J.G. Brooks).

Paratypes: **Queensland**: 4 males, 3 females collected with holotype; 30km north of Kuranda, 1 female, 4.xi.1969; 27km south of Atherton, 1 male microptera, 11.xi.1969; Townsville, Gadgarra, 1 female mac., 4 female mic., 2 male mic., in rainforest leaf litter, 18.xii.1974; Mt Spec, 3 females, 1 male in pitfall trap, i–x.1995; Cairns, 2 females, 2 males, 1.ii.1998; Cape Tribulation, 2 females in flight trap, x. 1996; 3 females, 2 males from leaf litter, x.2012.

Comments. This new species shares, in the male, a series of character states with the tropical tramp species, *flavipes*. However, in contrast to that species the body is largely yellow, antennal segment III is more slender with slender sensoria, and the fore tarsus of females is effectively without a lateral tooth. Also sharing several character states is *oreillyi* **sp.n**., a species described below with the body uniformly brown.

Hoplandrothrips coorongi sp.n.

(Figs 7, 9)

Male macroptera. Body and legs brown, hind tarsi slightly paler, fore tarsi yellow; antennal segments III–V yellow at base; all major setae pale; fore wings pale, weakly shaded medially.

Head weakly reticulate dorsally, with no long setae ventrally; cheeks convex, with one pair of stout setae in basal third; maxillary stylets retracted to eyes, close together medially (Fig. 9); postocular setae capitate, wide apart; mouth cone short and pointed. Antennae 8-segmented; III with prominent ring-like ridge near base (Fig. 7), III with 3 sensoria, IV with 4 sensoria; VII pedicellate, VIII broad at base.

Pronotum without sculpture, strong median longitudinal apodeme; major setae capitate, except aa setae no larger than discal setae; basantra absent; mesopresternum formed of two lateral triangles. Fore femora large, inner apex without tubercles; fore tibiae stout; fore tarsal tooth as long as tarsal width. Mesonotal lateral setae small, capitate. Metanotum weakly reticulate with pair of weak longitudinal ridges, median setae acute and arising on anterior third of sclerite, with 2 pairs of minor setae anteromedially. Fore wings parallel sided, sub-basal setae S1 and S2 capitate, S3 slender and acute; with 13 duplicated cilia.

Pelta broadly triangular; tergites II–VII with 2 pairs of wing retaining setae, also 3–4 pairs of lateral discal setae arranged in a line, lateral setae S1 and S2 capitate to broadly spoon-shaped; tergite IX setae S1 and S2 capitate, intermediate seta 0.5 as long as S2. Sternite III–VI with paired reticulate areas laterally; VIII with broadly transverse pore plate.

Measurements (holotype male in microns). Body length 2400. Head, length 250; width across cheeks 225; postocular setae 60. Pronotum, length 200; width 320; major setae—am 5, aa 55, ml 30, epim 55, pa 30. Fore wing, length 900; sub-basal setae 35, 35, 50. Tergite IX setae, S1 70; S2 50; S3 135. Tube length 150. Antennal segments III–VIII length 80, 70, 60, 30, 40, 35.

Female macroptera. Similar to male in colour, but differing in structure as follows: head with postocular setae

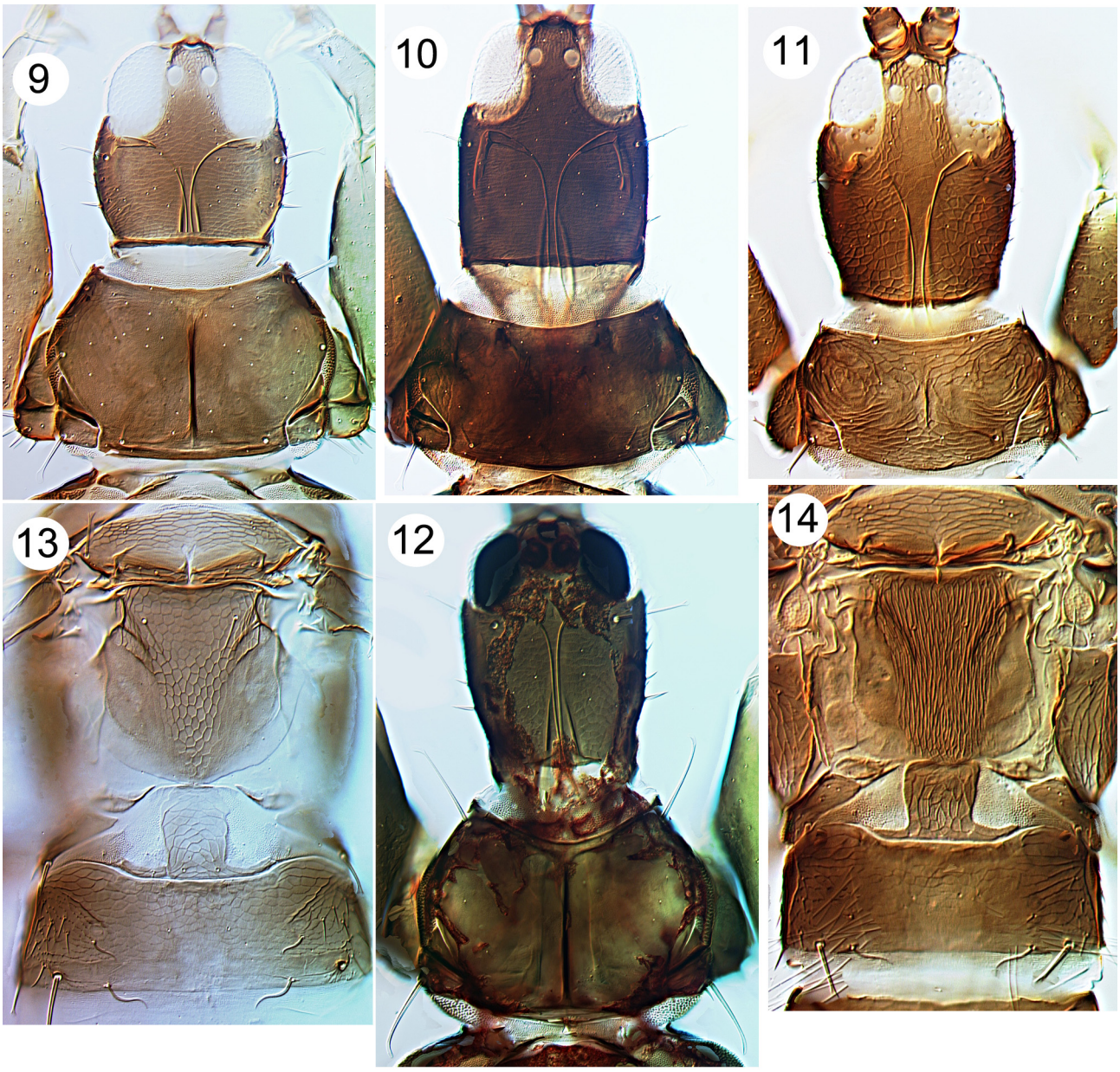
capitate but not reaching posterior margin or eyes; pronotum reticulate, am setae similar to aa and pa setae; mesopresternum complete transverse; abdominal sternites without paired reticulate areas.

Measurements (paratype female in microns). Body length 2350. Head, length 250; width across cheeks 225; postocular setae 15. Pronotum, length 160; width 280; major setae—am 20, aa 20, ml 30, epim 55, pa 25. Tergite IX setae, S1 55; S2 70; S3 135. Tube length 150.

Specimens examined. Holotype male macroptera, **South Australia**, Salt Creek 15km south of Coorong, from dead *Eucalyptus* branches, 11.iii.2011 (LAM 5460).

Paratype female, taken with holotype.

Comments. Although sharing several character states with *hylaius* and *xanthocnemis*, this species has a remarkable ring-like structure at the base of the third antennal segment, and the postocular setae of the female are exceptionally short.



FIGURES 9–14. *Hoplandrothrips* from Australia. Head & pronotum 9–12: **(9)** *coorongi* **sp.n.**; **(10)** *fuscus*; **(11)** *gloriosi* **sp.n.**; **(12)** *howei* **sp.n.** Meso & metanotum, pelta & tergite II, 13–14: **(13)** *flavipes*; **(14)** *gloriosi* **sp.n.**

***Hoplandrothrips flavipes* Bagnall**
(Fig. 13)

Hoplandrothrips flavipes Bagnall, 1923: 628

Described originally from Kenya, this species is frequently intercepted in quarantine in temperate countries and has been seen from many parts of the tropics (Mound & Marullo 1996), including Papua New Guinea, Christmas Island and Timor Leste. Although a typical member of *Hoplandrothrips*, with the fore wings weakly constricted medially and antennal segment VIII constricted at the base, the presence of four large sensoria on the third antennal segment is an unusual character state shared only with a few species from southern Japan (Okajima 2006). In *flavipes* these sensoria are particularly stout, and this is similar to some Asian species placed in *Ecacanthothrips* (Okajima 1983). The body is largely brown, although the median abdominal segments are sometimes pale; the femora are brown but the tibiae yellow. The chaetotaxy is essentially the same as described above for *brunneicinctus*. In the male, the fore femora has two stout teeth at the apex, the pronotal anteroangular setae are elongate and capitate, sternite VIII lacks a pore plate, tergal lateral setae S1 and S2 are capitate except that on IX S2 is short and acute. Also, the intermediate seta between S1 and S2 on IX is longer than S2 and about 0.7 as long as S1. This suite of male character states is shared with *brunneicinctus*.

Specimens examined. **Queensland**, Mission Beach, Clump Point, 1 male from dead branches, 21.vii.1968; Cairns, Smithfield Conservation Park, 2 female 3 male, from dead Rattan, 2.x.2012; Cape Tribulation, Emmagen Creek, 3 females 1 male from dead leaves, 8.x.2012.

***Hoplandrothrips fuscus* (Moulton)**
(Fig. 10)

Poecilothrips fuscus Moulton, 1968: 94

First placed in the genus *Hoplandrothrips* by Mound & Houston (1987), this species was described from one female and one male taken at Perth in 1933. However, it has been found widely across Australia, although usually in low numbers. Specimens have been studied from Western Australia, near Perth and Albany; from South Australia, at Victor Harbour and Kangaroo Island, from NSW, Dalmeny, from ACT near Canberra, and from Southeast Queensland at Dalby. It appears to be associated with dead branches both of *Eucalyptus* and *Acacia* species. Contrary to the original illustration, although antennal segment VIII is well separated from segment VII, it is broad at the base with no constriction. There is strong sexual dimorphism, particularly in the length of the postocular setae, and the males share with several species, including *quadriconus* and *xanthocnemis*, the presence of specialised reticulate areas on some sternites.

Diagnosis. Both sexes macropterous; body and legs dark brown, antennal segment III yellow in basal half but with transverse shaded area sub-basally; segments IV–VI yellow at base; all major setae pale; fore wings very faintly shaded on basal half. Head longer than wide, slightly constricted behind large eyes, cheeks with one small pair of setae in basal third; postocular setae placed far apart, their lengths in microns in one female, and one small and one large male, 35, 60, 105; maxillary stylets retracted to eyes, close together medially (Fig. 10). Pronotum weakly reticulate; major setae variable, epimerals long and capitate, remaining 4 pairs capitate but sometimes much smaller. Fore tarsus with large tooth, particularly in larger males. Basantra absent; mesopresternum of paired lateral triangles, mesoeusternal margin transverse in female, angulate in male. Mesonotal lateral setae capitate in female, acute in male. Metanotum strongly reticulate, median setae acute, wide apart, on anterior third of sclerite. Fore wing parallel sided with 15–20 duplicated cilia. Pelta broadly bell-shaped with irregular lateral margins; median tergites with row of 4 small setae anterolaterally, one pair of small setae medially near campaniform sensilla; lateral setae S1 and S2 broadly capitate, including on tergite IX. Male sternites III–V with paired areas of specialised reticulation anterolateral to discal setae particularly in large males; sternite VIII with transverse pore plate posteromedially; setae S2 on tergite IX blunt.

***Hoplandrothrips gloriosi* sp.n.**
(Figs 11, 14)

Male macroptera. Body, legs and antennae brown, except antennal segment III clear yellow, tarsi yellow, hind tibiae bicoloured yellow at base and apex but brown medially.

Head with cheeks weakly convex, head with weak reticulation medially but stronger laterally; median dorsal area with no sculpture; ventrally with only one pair of long setae; postocular setae far apart, capitate, shorter than eye width; eyes much longer dorsally than ventrally; maxillary stylets retracted to compound eyes, close together medially (Fig. 11); mouth cone short and rounded. Antennae 8-segmented; sensoria slender, III with 3 sensoria, IV with 4 sensoria; VIII narrowed to pedicellate base.

Pronotum sculptured, with swirling lines anterolaterally (Fig. 11); all 5 pairs of setae capitate; basantra absent, chitinous islets small; mesopresternum of two lateral triangles. Fore legs slender, without tubercles; fore tarsal tooth very small. Mesonotum transversely reticulate, lateral setae small, capitate. Metanotum striate medially (Fig. 14); median setae acute, arising on anterior third of sclerite. Fore wings parallel sided, sub-basal setae capitate.

Pelta almost rectangular with base flared; tergites II–VII with 2 pairs of wing retaining setae; laterally with reticulate sculpture bearing small teeth; tergal lateral setae capitate, S1 with apex asymmetric on II–V; tergite IX setae S1 and S2 weakly capitate, intermediate seta as long as S2. Sternites III–VII with few discal setae, no specialised reticulation; sternite VIII with broadly transverse pore plate medially.

Measurements (holotype male in microns). Body length 1500. Head, length 225; width across cheeks 150; postocular setae 30. Pronotum, length 100; width 200; major setae—am 15, aa 15, ml 15, epim 38, pa 38. Fore wing, length 600; sub-basal setae 25, 25, 25. Tergite IX setae, S1 35; S2 50; S3 115. Tube length 120. Antennal segments III–VIII length 55, 55, 50, 45, 35, 30.

Female macroptera. Colour and structure similar to male; head with sculpture stronger; mesopresternum transverse but slender; fore tarsus without tooth; fore wing slightly narrowed medially, with 6 duplicated cilia; tergite IX setae S1 and S2 weakly capitate, intermediate seta about half as long as S2.

Measurements (paratype female in microns). Body length 1850. Head, length 250; postocular setae 30. Pronotum, length 150; width 230; Fore wing, length 750. Tergite IX setae, S1 65; S2 65; S3 80. Tube length 150.

Specimens examined. Holotype male. **Queensland**, Brisbane, Mt Glorious, from dead leaves and branches, 10.v.2007 (DJ Tree 464).

Paratype female, same locality, from dead branch, 9.iii.2006.

Comments. The metanotal sculpture of this species is similar to that of *bartlei*, but the antennal sensoria are long and slender, the mouth cone short and rounded, and the pronotum has distinctive sculpture.

***Hoplandrothrips hemiflavus* sp.n.**
(Figs 15, 16)

Male macroptera. Body bicoloured; pronotum yellow; pterothorax, abdominal segments I and VIII–X brown, also anterolateral margins of head and antennal segments I–II and VI–VIII; abdominal tergites II–V yellow with brown area medially, VI–VII yellowish brown; antennal segments III–V yellow at base; mid and hind legs brown; fore wings and all major setae pale.

Head broadly convex behind large eyes, median dorsal area with no sculpture; postocular setae far apart; maxillary stylets retracted to compound eyes, close together medially (Fig. 15). Antennae 8-segmented; sub-basal area of segment III slightly swollen and ridged, III with only 2 sensoria, IV with 4 sensoria; VIII narrowed to pedicellate base.

Pronotum without sculpture; am and ml setae minute, remaining 3 pairs capitate; basantra absent, but chitinous islets large; mesopresternum of two slender lateral triangles. Fore femora moderately swollen, without sub-apical tubercles; fore tarsal tooth slender. Mesonotal lateral setae small. Metanotum medially with very faint reticulation (Fig. 16); median setae acute, arising on posterior half of sclerite; 2–3 pairs of minor discal setae on anterior half of sclerite. Fore wings parallel sided (or very weakly constricted medially), sub-basal setae S3 small and acute; 12 duplicated cilia.

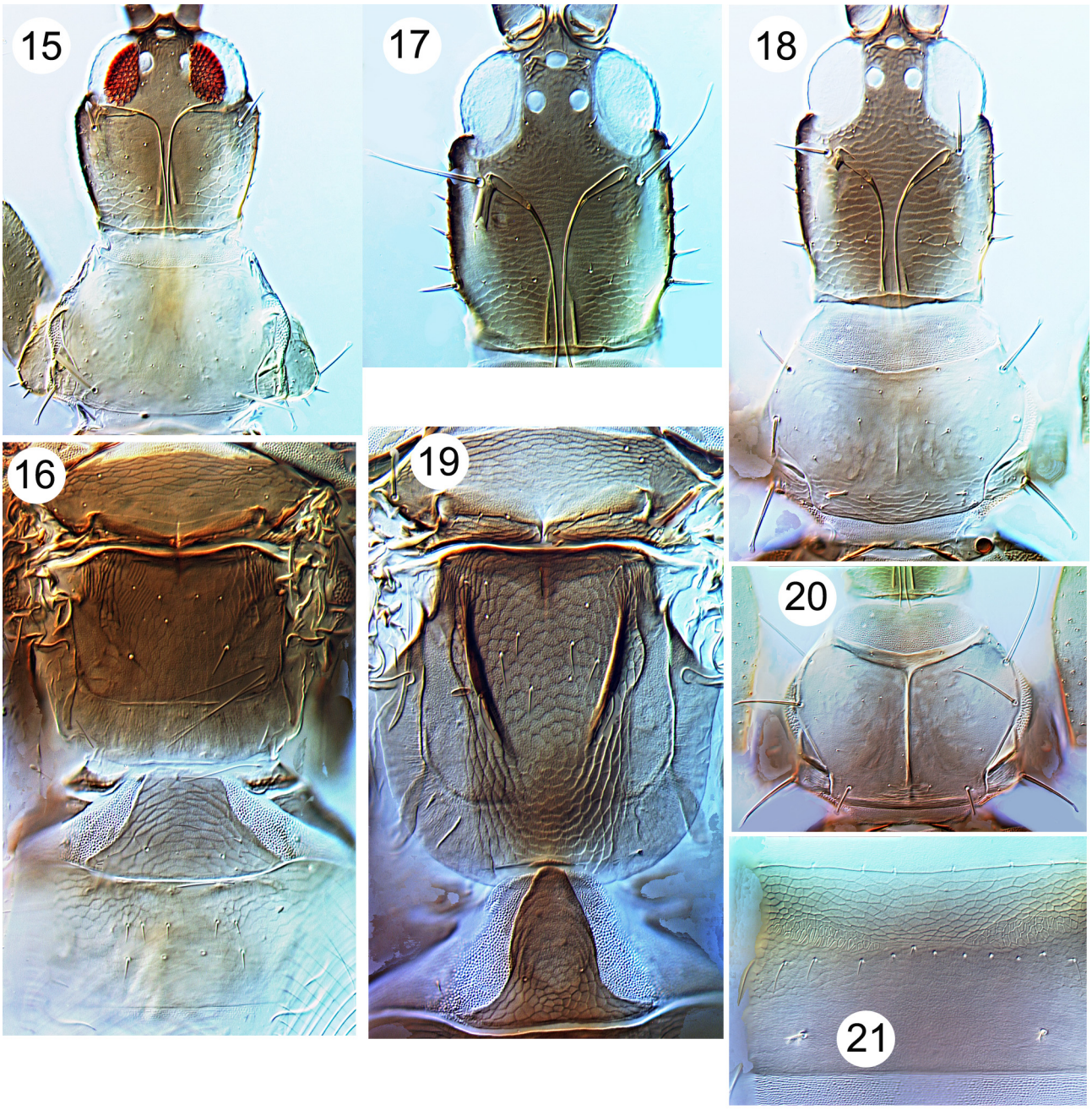
Pelta almost rectangular; tergites II–VII with 2 pairs of wing retaining setae, also 1–3 setae laterally and 2–3 pairs of small setae medially; tergal lateral setae S1 with asymmetric spatulate apex, S2 elongate and capitate.

Sternites III–VII with median three pairs of discal setae arising close to antecostal ridge; sternite VIII with circular pore plate scarcely 20 microns in diameter.

Measurements (holotype male in microns). Body length 2000. Head, length 225; width 185; po setae 50. Pronotal setae length: am 10, aa 50, ml 10, epim 50, pa 65. Fore wing length 850. Tergite IX setae: S1 55; intermediate seta 20; S2 45; S3 90. Tube length 125. Antennal segments III–VIII length 75, 65, 65, 50, 40, 35.

Specimens examined. Holotype male, **Australian Capital Territory**, Canberra, Black Mt., under *Eucalyptus* bark, 25.v.1961 (E.M.Reed).

Comments. This species is known from a single male. The chaetotaxy of the abdominal tergites and sternites are unusual within this genus. The pronotal am setae are also minute in *howei*, but only in *hemiflavus* are the ml setae minute. The presence of only two sensoria on antennal segment III is also unusual, but that is shared with *H. coloratus* Okajima from the Ryukyu Islands, Japan, a species with a brown pronotum and yellow pterothorax.



FIGURES 15–21. *Hoplandrothrips* from Australia. *hemiflavus* **sp.n**. 15–16: **(15)** head & pronotum; **(16)** Meso & metanotum, pelta & tergite II. *hylaius* **sp.n**. 17–21: **(17)** holotype head; **(18)** small male head & pronotum; **(19)** holotype meso & metanotum and pelta; **(20)** holotype pronotum; **(21)** male sternite V.

***Hoplandrothrips howei* sp.n.**
(Fig. 12)

Male macroptera. Body and femora brown with red internal pigment; fore tibiae yellow, mid and hind tibiae brown with extreme apex yellow; all tarsi yellow; antennal segment III yellow with weak shading in apical third, IV–V yellow at base; fore wing faintly shaded medially.

Head longer than wide, slightly wider behind large eyes then narrowing to basal constriction (Fig. 12); dorsal surface reticulate; cheeks with several pairs of setae including one stout pair in basal third; postocular setae slightly lateral to inner margins of eyes, about as long as eye width; maxillary stylets retracted anterior to postocular setae, close together medially; mouth cone pointed, extending across prosternum. Antennal segment III with 3 sensoria, IV with 4 sensoria; VII clearly pedicellate, VIII slightly narrowed to base.

Pronotum with no sculpture, with stout median longitudinal apodeme; am and pa setae no longer than discal setae, aa, ml and epim setae long and capitate, aa setae almost as long as basal width of head. Fore femora stout, without tubercles, fore tarsal tooth stout. Basantra absent, chitinous islets large; mesopresternum broadly boat-shaped, mesoeusternal anterior margin slightly narrowed, sternopleural sutures well-developed. Mesonotal lateral, and metanotal median setae short and capitate. Metanotum weakly reticulate at anterior with 2 or more small discal setae; sublaterally with weak pair of longitudinal ridges. Fore wing very weakly constricted medially; sub-basal setae all capitate, S3 longer than S1 and S2; 12 duplicated cilia.

Pelta elongate bell-shaped, broadly flared at base; tergites II–VII with anterior wing retaining setae slightly weaker than posterior pair; one pair of small setae near campaniform sensilla medially; lateral setae S1 on II–VI with apex smoothly spoon-shaped, III–VI with S2 similar; tergite IX S1 weakly capitate, S2 blunt; sternites III–VII with paired areas of specialised reticulation anterolateral to discal setae, VIII with broad transverse pore plate.

Measurements (holotype male in microns). Body length 2500. Head, length 275; width 200; po setae 80. Pronotal setae length: am 10, aa 100, ml 85, epim 85, pa 15. Fore wing length 1000. Tergite IX setae S1 100; S2 45; S3 150. Antennal segments III–VIII length 85, 85, 75, 65, 50, 35.

Female macroptera. Similar to male in colour and general appearance, major setae dusky; head less constricted to base with weaker cheek setae; pronotum weakly sculptured near anterior and posterior margins, all 5 pairs of major setae capitate with fringed apices. Mesopresternum transverse. Setae S1 on tergites II–VI with apices strongly asymmetric and fringed, S2 setae shorter but similar; S1 and S2 on VIII–IX weakly capitate, intermediate setae on IX not elongate.

Specimens examined. Holotype male, **New South Wales, Lord Howe Island**, Lagoon Beach, from dead branches, 24.xi.1996 (LAM 3062).

Paratype female, collected with holotype.

Comments. Despite collecting efforts over several years on Lord Howe Island, this species remains known only from two specimens. It is closely similar to *xanthocnemis* in many character states, differing most obviously in the dark tibiae, but also in the reduced pronotal am and pa setae of the male. The female paratype was taken together with the male holotype, and these two are similar in the colour and form of the antennae, and the metanotal chaetotaxy. The female has the head more elongate than the male, with weak cheek setae, the pronotal am and pa setae well developed, and the major setae on the pronotum and tergites dusky with their apices strongly asymmetric and fringed. Similar differences between sexes in the tergal setae are known in *xanthocnemis*, and differences in pronotal chaetotaxy between sexes are common in *Hoplandrothrips* species. In colour, *howei* resembles the description of *leai*, but the head is considerably more elongate than indicated in the original illustration of that species.

***Hoplandrothrips hylaius* sp.n.**
(Figs 17–21)

Male macroptera. Body bicoloured, light brown and yellow; antennal segment III mainly yellow, IV–VI light brown with base yellow; pronotum yellow browner medially, head light brown with pair of longitudinal submarginal yellow areas; pterothorax brown, abdomen variably brown with II–VII yellow submedially; mid and hind legs light brown, tarsi yellow; fore wing uniformly but weakly shaded with base slightly darker; major setae dark on head and pronotum, pale on tergites II–VIII.

Head longer than wide, wider behind large eyes then narrowing to basal constriction (Figs 17, 18); dorsal surface reticulate; cheeks with several pairs of prominent setae including one stout pair in basal third particularly in large males; postocular setae placed laterally, longer than eye in large males; maxillary stylets retracted anterior to postocular setae, close together medially; mouth cone pointed, not extending across prosternum. Antennal segment III with 3 sensoria, IV with 4 sensoria; VII clearly pedicellate, VIII narrowed to base.

Pronotum with reticulation only near posterior margin; large male with strong longitudinal apodeme (Fig. 20); am setae acute, no larger than discal setae, remaining 4 pairs of setae capitate, aa of large male longer than head width; basantra absent, chitinous islets large; large males with anterior margin of mesoeusternum narrow and mesopresternum small and boat-shaped; small males with mesopresternum transverse across wide mesoeusternal margin; sternopleural sutures well-developed. Large males with fore femora swollen, inner apex without tubercles; fore tibiae stout, inner margin with one sub-apical tubercle; fore tarsal tooth longer than tarsal width. Small males with fore femora and tibiae slender, tarsal tooth shorter than tarsal width. Mesonotal lateral setae elongate, capitate. Anterior half of metanotum weakly reticulate (Fig. 19), with pair of longitudinal ridges in large males; median setae usually acute, arising on anterior half of sclerite, with 2–5 pairs of discal setae anteromedially. Fore wings not quite parallel sided, very weakly constricted medially and toward apex; sub-basal setae S1 and S2 capitate, S3 long and pointed; with about 20 duplicated cilia.

Pelta elongate bell-shaped, broadly flared at base; tergites II–VII with 2 pairs of wing retaining setae, also 1–3 pairs of variably curved discal setae laterally, lateral setae S1 and S2 capitate; tergite IX setae S1 weakly capitate, S2 blunt, intermediate seta not elongate. Sternite V with 14–18 discal setae; II–V with pair of specialised reticulate areas anterolateral to discal setae in many specimens (Fig. 21); VIII with rectangular pore plate medially.

Measurements (holotype male in microns, with small male in parentheses). Body length 3700 (2400). Head, length 375 (300); width 250 (200); po setae 140 (65). Pronotal setae length: am 20 (10), aa 210 (65), ml 115 (35), epim 110 (70), pa 50 (25). Fore wing length 1400 (1000). Tergite IX setae: S1 85 (75); S2 60 (50); S3 150 (140). Tube length 200 (170). Antennal segments III–VIII length 105 (80), 115 (85), 100 (80), 65 (65), 55 (50), 45 (40).

Female macroptera. Larger than, but similar in structure to, small males; metanotal median setae capitate; tergite IX setae S1 and S2 capitate.

Measurements (paratype female in microns). Body length 3400. Head length 360; width 250; po setae 80. Pronotal setae length: am 30, aa 55, ml 50, epim 90, pa 55. Fore wing length 1300. Tergite IX setae: S1 100; S2 90; S3 160. Tube length 230. Antennal segments III–VIII length 105, 105, 95, 75, 55, 45.

Larva II. Yellow, with large numbers of irregular bright red spots, some of which coalesce.

Specimens examined. Holotype male (on slide with smallest male paratype), **New South Wales**, Mt Dromedary summit, from dead branches in rainforest, 25.xii.2010 (LAM 5411–13).

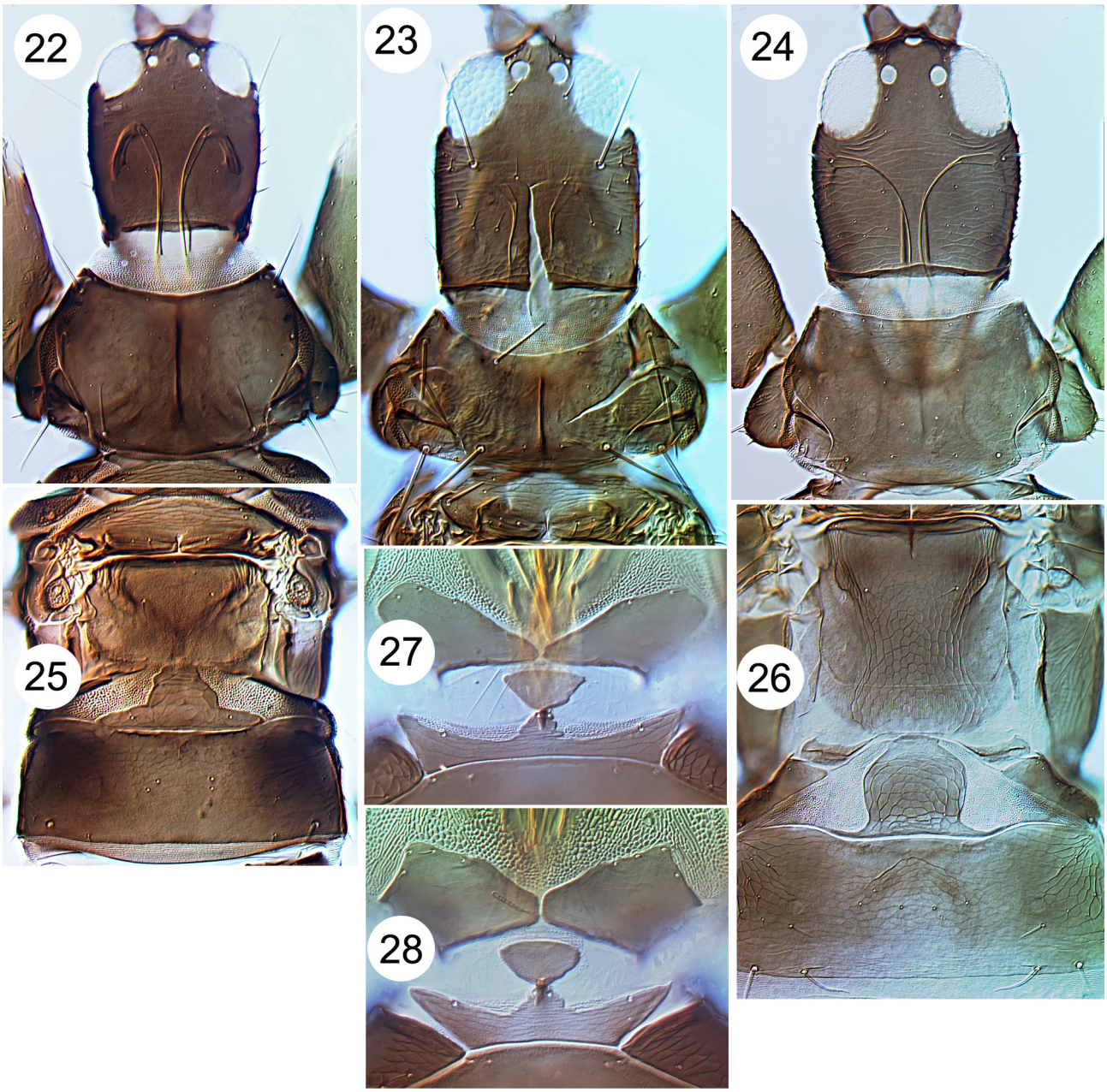
Paratypes: **New South Wales**, 8 males, 7 females taken with holotype and larvae; Chichester Forest at 900m, 4 males, 3 females, also larvae from old dead branch of *Nothofagus moorei*, 24.xii.2000. **Queensland**, Lamington, 1 female by insecticide fogging of *Nothofagus moorei*, 10.xii.1990. **South Australia**, Adelaide Hills, Waterfall Gulley, 1 female from dead leaves, 22.x.2004. **Tasmania**, Mt Wellington, 1 male from dead *Eucalyptus* leaves, 27.xi.2012; 17 Mile Plain, 1 female from gum nuts, 10.iii.2010; 6 males, 5 females with no host data, from various sites between Launceston, Huon Valley and Bruny Island.

Comments. This species is widely distributed in wetter areas of the eastern forests of Australia. The differences in structure between large and small males are impressive, with the cheek setae and head shape, and the length of the pronotal anteroangular setae exhibiting positive allometry. Similarly, the differences are remarkable between females and large males in the structure of the mesopresternum and mesoeusternal anterior margin, and these differences are potentially confusing. The significance of the specialised areas of reticulation on the sternites of large males remains unclear. Similar structures are found in several species discussed here, but are particularly typical of species placed in the worldwide genus *Holothrips* (see Okajima 2006).

Hoplandrothrips ibisci **sp.n.**

(Figs 22, 25)

Male microptera. Body, legs and antennae brown, except tibiae and tarsi yellow, also antennal segment III mainly yellow with apex shaded, IV brown with base paler; major setae pale, coxal setae darker.



FIGURES 22–28. *Hoplandrothrips* from Australia. Head & pronotum 22–24: **(22)** *ibisci* **sp.n.**; **(23)** *oreillyi* **sp.n.**; **(24)** *quadriconus*. Meso & metanotum, pelta & tergite II, 25–26: **(25)** *ibisci* **sp.n.**; **(26)** *quadriconus*. Mesopresternum of *xanthocnemis*, 27–28: **(27)** female; **(28)** male.

Head almost without sculpture dorsally, with one pair of long setae ventrally; cheeks weakly convex, with one or more setae; postocular setae wide apart, capitate, longer than eye; maxillary stylets retracted to postocular setae, about one fifth of head width apart (Fig. 22); mouth cone pointed, not extending across prosternum. Antennal segment III with 2 (or 3) sensoria, IV with 3 (or 2) sensoria; VII with distinct pedicel, VIII broad at base.

Pronotum without sculpture, with median longitudinal apodeme; am setae acute, no larger than discal setae, remaining 4 pairs of setae capitate; basantra absent, chitinous islets large; anterior margin of mesoeusternum narrow and angulate, mesopresternum formed of two small triangles; sternopleural sutures well-developed. Fore femora swollen, inner apex without tubercles; fore tibiae slender; fore tarsal tooth as long as tarsal width. Mesonotal lateral setae minute. Metanotum without sculpture (Fig. 25), median setae acute, arising on anterior half of sclerite. Fore wing lobe very small, without setae.

Pelta broad at base (Fig. 25); tergites without sculpture and few minor setae, wing retaining setae weak or straight, 2 pairs only on VI–VII, lateral setae S1 and S2 slender, capitate; tergite IX setae S1 capitate, S2 blunt,

intermediate seta as long as S2. Sternites II–V with pair of very weak reticulate areas anterolaterally; VIII with small, circular pore plate medially.

Measurements (holotype male in microns). Body length 1600. Head, length 200; width across cheeks 155; po setae 80. Pronotal setae length: am 3, aa 70, ml 50, epim 60, pa 50. Fore wing length 60. Tergite IX setae: S1 75; S2 35; S3 100. Tube length 100. Antennal segments III–VIII length 60, 50, 55, 50, 45, 25.

Specimens examined. Holotype male, **Queensland**, Lamington, O'Reilly's, from dead branches, 11.x.2006 (LAM4592).

Paratypes: same locality as holotype, 2 males from dead twigs, 9.x.2006.

Comments. Although clearly different from the other species considered here, because of the yellow tibiae, lack of sculpture dorsally, maxillary stylets one fifth of head with apart, and small circular pore plate on sternite VIII, there are problems in defining this species. Two of the specimens have two sensoria on antennal segment III, and three sensoria on segment IV. However, on the third specimen the right antenna has three small sensoria on segment III and three on segment IV, but the left antenna has two larger sensoria on both III and IV.

Hoplandrothrips leai (Karny)

Phloeothrips leai Karny, 1925: 37

Based on two specimens from Norfolk Island, the original description of this species does not include sufficient detail to place it in the key above. However, the illustration provided by Karny indicates that the head is only 1.1 times as long as wide, with cheeks swollen behind the eyes and bearing many small setae, and the postocular setae shorter than the width of an eye. The description states that it is a dark brown species with dark mid and hind tibiae that are narrowly yellow at base and apex with yellow tarsi, three sensoria on antennal segment III, and long pronotal anteroangular setae. In this combination of characters *leai* apparently differs from all of the species considered here. The original two specimens have not been found in the South Australian Museum, nor amongst the slide collections of Karny in the Senckenberg Museum, Frankfurt. One female from New Caledonia that closely resembles the description apart from dark tibiae and tarsi is in the Australian National Insect Collection.

Hoplandrothrips oreillyi sp.n.

(Fig. 23)

Male macroptera. Body, legs and antennae brown, except yellow tarsi, antennal segment III and base of IV–V; major setae on head and pronotum dark, on abdomen pale; fore wings pale at base, with longitudinal light brown mark medially, weakly shaded distally.

Head with weak reticulation only near posterior margin and laterally, ventrally with 3 pairs of longer setae; cheeks convex; maxillary stylets retracted to postocular setae, close together medially; postocular setae capitate and as long as eye length (Fig. 23); mouth cone short and pointed. Antennae 8-segmented, long and slender; III with 3 sensoria, IV with 4 sensoria; VII with weak pedicel, VIII slightly narrowed to base.

Pronotum with weak sculpture near posterior margin, median longitudinal apodem present; all 5 major setae long and capitate; basantra absent, chitinous islets not large; mesopresternum complete, slender medially. Fore femora and tibiae slender, without tubercles, fore tarsal tooth about 0.5 of tarsal width. Mesonotum transversely reticulate, lateral setae elongate, capitate. Metanotum without sculpture anteromedially, median setae acute and arising on anterior third of sclerite. Fore wings relatively slender, parallel sided, sub-basal setae long, S1 and S2 capitate, S3 bluntly acute; with 6 duplicated cilia.

Pelta bell-shaped; tergites II–VII with 2 pairs of wing retaining setae, also 3–4 pairs of lateral discal setae arranged in a line, lateral setae S1 and S2 long and capitate; tergite IX setae S1 weakly capitate, S2 blunt, intermediate seta as long as S2. Sternite V with 12 discal setae, VIII with no pore plate.

Measurements (holotype male in microns). Body length 1950. Head, length 230; width 170; po setae 90. Pronotal setae length: am 55, aa 65, ml 70, epim 90, pa 85. Fore wing length 900; sub-basal setae 70, 75, 110. Tergite IX setae S1 75; intermediate seta 25; S2 30; S3 80. Tube length 150. Antennal segments III–VIII length 65, 70, 80, 75, 60, 45.

Female macroptera. Body colour and structure similar to male. Tergite IX intermediate setae almost as long as setae S1.

Measurements (paratype female in microns). Body length 2100. Head, length 230; po setae 100. Tergite IX setae S1 75; intermediate seta 55; S2 85; S3 85. Tube length 160.

Specimens examined. Holotype male, **Queensland**, Lamington, O'Reilly's, from tree bark, i. 2007 (IBISCA 22194).

Paratypes: same locality as holotype, 5 females, March, September & November, 2007.

Comments. This species has unusually long major setae on the head and pronotum in both sexes, but the male is known only from one specimen.

***Hoplandrothrips quadriconus* (Girault)**

(Figs 24, 26)

Horistothrips quadriconus Girault, 1928: 4

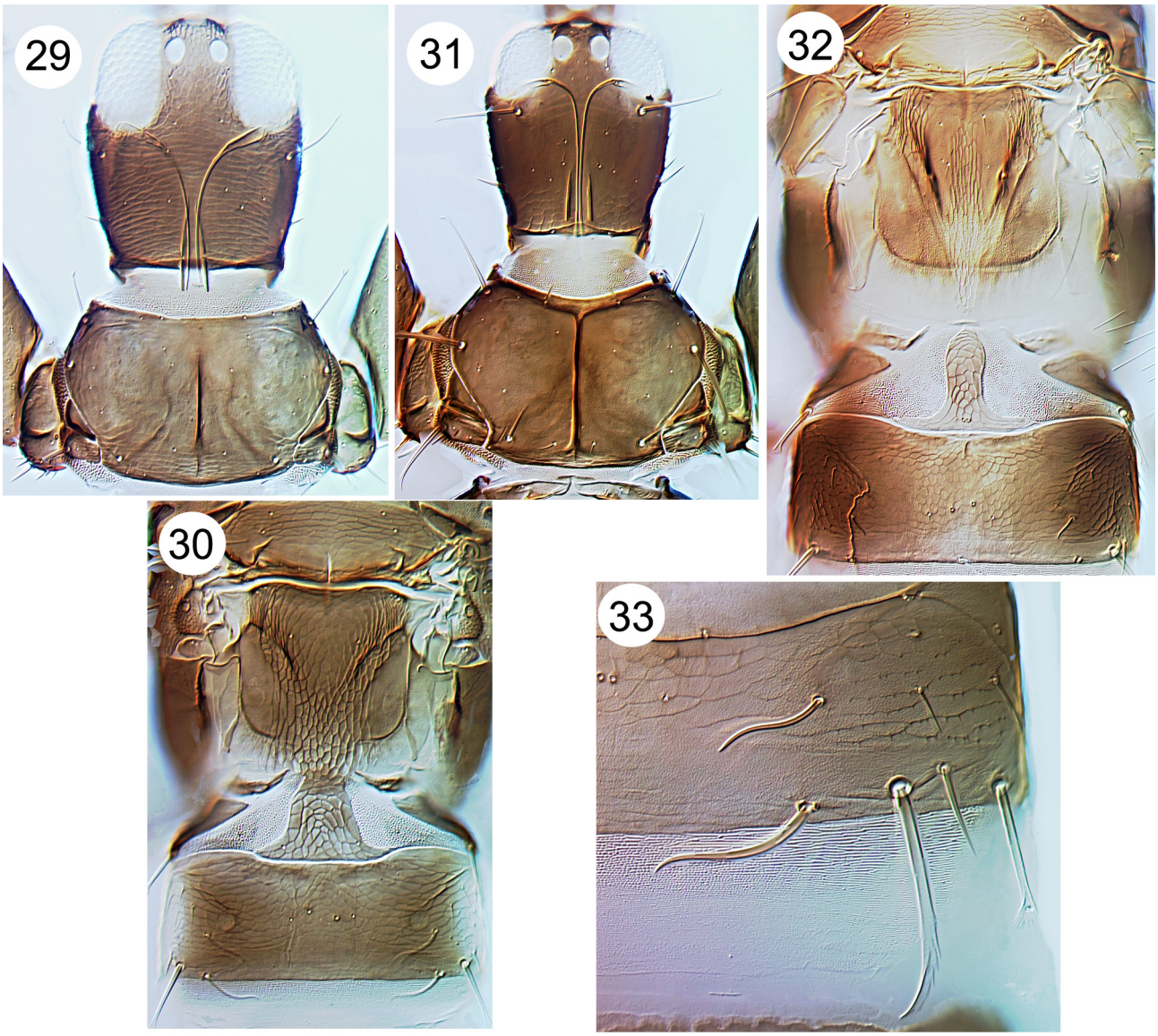
The original, 4-line, description was based on an unspecified number of specimens with the published data: "Under bark, Bogong Plains, 6000ft., Victoria, Jany., F.E.Wilson". One slide bearing the name *quadriconus* was found in the Girault collections at the Queensland Museum labelled "Types. F.E.Wilson". The slide carried seven females and three males under one cover glass. These ten specimens were considered syntypes, and remounted onto individual slides, with one female here designated LECTOTYPE. This species has been found in large numbers under the bark of dead *Eucalyptus* branches at various sites in the ACT and eastern NSW as far north as Narrabri. Specimens have also been seen from Brisbane Forest Park, and also from Narrogin in Western Australia. Within this genus, *quadriconus* is unusual in the short pronotal setae, and it shares with some other species discussed here the presence of reticulate sculptured areas on the sternites of some males.

Diagnosis. Both sexes macropterous, varying in body size; body and legs dark brown with red internal pigment; antennal segments III–IV scarcely paler at base; major setae all pale, except stout setae on fore coxae; fore wing very faintly shaded medially. Head longer than wide, slightly constricted behind large eyes, cheeks with a few small setae each arising on a tubercle; postocular setae short in female, as long as eye width in male; maxillary stylets retracted to postocular setae, close together medially (Fig. 24). Antennal segments slender, III with 3 sensoria, IV with 4 sensoria; VII pedicellate, VIII scarcely constricted at base. Pronotum almost without sculpture, male with median longitudinal apodeme; am and ml setae scarcely larger than discal setae, aa, pa and epim setae acute, shorter than width of antennal segment I. Fore tarsus with long slender tooth in both sexes; fore femora swollen, without tubercles. Prosternal basantra absent, chitinous islets often large; female with mesopresternum transverse across mesoeusternal margin, male with mesopresternum of two lateral triangles and mesoeusternal margin angulate. Mesonotum transversely reticulate, lateral setae small and acute. Fore wings parallel sided, with about 20 duplicated cilia. Metanotum weakly reticulate (Fig. 26), median setae acute, wide apart, on anterior third of sclerite. Pelta broadly bell-shaped with small slender lateral wings (Fig. 26); median tergites with row of 4 small discal setae anterolaterally, two or more pairs of small setae medially near campaniform sensilla; anterior pair of wing retaining setae weak; lateral setae S1 and S2 blunt or acute, S2 on VI–VII long and acute, S2 on VIII weakly capitate; tergite IX S1 short and acute, S2 weakly capitate in female, acute in male, intermediate setae small; male sternite VIII with no pore plate, sternites III–V commonly with paired areas of specialised reticulation anterolateral to discal setae.

***Hoplandrothrips tareei* sp.n.**

(Figs 29, 30)

Male macroptera. Body and legs mainly brown; fore tibiae and all tarsi yellow; abdominal tergites II–VII with inconspicuous pale area anterolaterally; antennal segment III brownish yellow with base paler, IV–V yellow at base; major setae pale; fore wing faintly shaded medially with apex pale.



FIGURES 29–33. *Hoplandrothrips* from Australia. *tareei* **sp.n**. 29–30: **(29)** head & pronotum; **(30)** Meso & metanotum, pelta & tergite II. *xanthocnemis* 31–33: **(31)** male head & pronotum; **(32)** male meso & metanotum, pelta & tergite II; **(33)** female tergite IV.

Head longer than wide; cheeks narrowing to basal constriction; weakly reticulate dorsally, ventral surface with only one pair of long setae; cheeks with several pairs of weak setae; postocular setae arising laterally, longer than eye width; maxillary stylets retracted anterior to postocular setae, close together medially (Fig. 29); mouth cone short and bluntly pointed. Antennal segment III with 3 sensoria, IV with 3 stout sensoria; VII clearly pedicellate, VIII broad to base.

Pronotum weakly reticulate only near posterior margin, with median longitudinal apodeme; 4 pairs of major setae long and capitate, am setae no longer than discal setae. Fore femora stout, without tubercles, fore tarsal tooth stout. Basantra absent, chitinous islets large; mesopresternum comprising paired lateral triangles and a median area; mesoeusternal anterior margin slightly narrowed. Mesonotal lateral setae short and capitate. Metanotum weakly reticulate at anterior but more strongly so on posterior half; median setae finely acute on anterior half of sclerite (Fig. 30). Fore wing almost parallel-sided; sub-basal setae S1 and S2 capitate, S3 acute; 9–11 duplicated cilia.

Pelta broadly bell-shaped (Fig. 30); tergites II–VII with 2 pairs of large wing retaining setae; one pair of small setae near campaniform sensilla medially; lateral setae S1 on II–IX long, apices capitate and weakly fringed; S2 on IX blunt; sternal reticulate areas very faintly indicated anterolateral to discal setae, VIII with slender transverse pore plate.

Measurements (holotype male in microns). Body length 1850. Head, length 210; width 180; po setae 60. Pronotal major setae, am 5, aa 55, ml 30, epim 55, pa 40. Fore wing length 700. Tergite IX setae: S1 90; S2 50; S3 90. Tube length 110. Antennal segments III–VIII length 55, 55, 55, 45, 40, 30.

Female macroptera. Similar to male in colour and general structure; head less constricted to base, postocular setae shorter than eye width. Pronotal am setae capitate; mesoeusternum anterior margin broader than in male, mesopresternum comprising three sclerites. Tergites III–IX with setae S1 and S2 capitate and weakly fringed.

Measurements (paratype female in microns). Body length 2050. Head, length 250; width 215; po setae 45. Pronotal major setae, am 25, aa 45, ml 40, epim 60, pa 35. Fore wing length 750. Tergite IX setae: S1 90; S2 110; S3 120. Tube length 140. Antennal segments III–VIII length 65, 60, 60, 50, 40, 30.

Specimens examined. Holotype male. **New South Wales**, Lorien, Lansdowne, near Taree, from *Ficus coronata*, 13.iv.2002 (LAM4134).

Paratypes: **New South Wales**, 1 female from same site as holotype, 18.x.2001; 1 female from Kiwarrak, near Taree, 29.x.2001. **Queensland**, Red Cedar, 15km west of Mt Glorious, 1 male from *Ficus coronata*, 13.x.2006.

Comments. The holotype male is a rather small individual, and large males of this species can be expected to look rather different. It is an unusual species in having only three sensoria on the fourth antennal segment.

Hoplandrothrips xanthocnemis **(Karny)**

(Figs 27, 28, 31–33)

Horistothrips xanthocnemis Karny, 1920: 39

The original description of this species consisted of 2.5 lines in a key. It shares many character states with several of the *Hoplandrothrips* species from Australia, including the presence of metanotal discal setae and the presence in large males of elongate pronotal anteroangular setae, but the metanotal median setae have expanded apices. It is a distinctive species with an elongate pelta, and sharply yellow hind tibiae. In comparison to *hylaius* and *coorongi* the head has straighter cheeks and the mouth cone is longer. In females, the apices of tergal setae S1 are greatly asymmetric and fringed, but not in males. This rainforest species has been taken from dead branches of various tree species at sites in eastern Australia, sometimes in association with *H. hylaius* described above. Localities from which specimens have been studied include, in New South Wales: Mt Dromedary in the south, also Gosford, Chichester Forest near Barrington Tops, and Warrumbungle National Park; in Queensland: near Brisbane at Mt Glorious and at Lamington, as well as further north at Tulley, Atherton and Cairns.

Diagnosis. Both sexes macropterous; body and femora brown with red internal pigment, tibiae and tarsi yellow; antennal segment III largely yellow, IV–V yellow at base; major setae pale, except stout setae on fore coxae; fore wing very faintly shaded medially. Head longer than wide (Fig. 31), slightly wider behind large eyes then narrowing to base and sharply constricted in largest male; dorsal surface reticulate; cheeks with one or more pairs of small setae, large male with one pair stout in basal third; postocular setae almost posterior to inner margins of eyes, about as long as eye width in both sexes; maxillary stylets retracted to postocular setae, close together medially; mouth cone pointed, extending across prosternum. Antennal segment III with 3 sensoria, IV with 4 sensoria; VII clearly pedicellate, VIII slightly narrowed to base. Pronotum sculptured near posterior margin, male with median longitudinal apodeme; all 5 pairs of major setae long and capitate, aa long in males, largest male with aa setae almost as long as basal width of head. Fore femora stout, without tubercles, fore tarsus with prominent tooth in both sexes. Basantra absent, chitinous islets not large; mesopresternum sexually dimorphic (Figs 27, 28). Mesonotal lateral, and metanotal median setae short and capitate. Metanotum weakly reticulate at anterior with 2 or more pairs of small discal setae (Fig. 32). Fore wing very weakly constricted medially; sub-basal setae all capitate, S3 elongate. Pelta elongate bell-shaped, broadly flared at base; tergites II–VII with anterior wing retaining setae weaker than posterior pair; one pair of small setae near campaniform sensilla medially; lateral setae S1 on II–VI elongate with apex strongly asymmetric and fringed in female (Fig. 33) but smoothly spoon-shaped in male, S2 capitate; tergite IX S2 in male pointed; male sternite VIII with broad transverse pore plate, sternites II–VII of large males with paired reticulate areas anterolateral to discal setae.

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