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Species diversity among Thysanoptera—Phlaeothripinae in phyllode galls on *Acacia fasciculifera* (Fabaceae), including one new species

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Abstract

Four morphologically diverse phlaeothripine species from three genera have been collected from several *Acacia fasciculifera* (Fabaceae) trees in southeast Queensland. These species were found within galls of two very different forms—pea-pod shaped galls or twisted/dimply galls. *Teuchothrips toowoomba* is the main gall inducer of the pea-pod shaped galls and *T. jarowair* is the inducer of twisted/dimply galls. *Paracholeothrips phillipsi* was found in small numbers mostly associated with the pea-pod shaped galls. *Xaniothrips sueae* **sp.nov.** is described as probably a kleptoparasite of pea-pod shaped galls. The roles of these four species are discussed and interpreted, but further field studies are needed to understand their roles more clearly.

Key words: Gall-induction, gall-kleptoparasite, host-plant, *Paracholeothrips*, *Teuchothrips*, *Xaniothrips*

Introduction

The clade of phlaeothripine thrips that breed exclusively on plants of the genus *Acacia* in Australia comprises in excess of 250 species (Crespi *et al*. 2004). Most of these thrips have been found on plants in Sections Juliflorae or Plurinerves of *Acacia* subgenus *Phyllodineae*. In contrast, very few phlaeothripines have ever been taken from any species in the third and most species-rich Section: Phyllodineae (Crespi *et al*. 2004—Appendix pp 308–312). The purpose of this article is to give some account of the curious diversity of phlaeothripines discovered recently on the phyllodes of a species of Section Phyllodineae, *Acacia fasciculifera*. This is a tree that grows only in eastern Queensland and is recorded between Brisbane in the South and Townsville in the North (AVH 2025). The observations recorded here were all made on a few trees growing about 80km northwest of Brisbane, near Esk or a little further south at Lark Hill.

Not only is this a novel and unusual *Acacia* species to be recorded as host plant for any species of Phlaeothripinae, but two of the phlaeothripine species here recorded from *A. fasciculifera* are members of the species-rich genus *Teuchothrips*. Members of this genus are all known as breeding on leaves, some inducing rolled-leaf galls, and with 34 species currently recognised from Australia (Mound *et al*. 2023). Despite extensive field studies, no species of the genus *Teuchothrips* has previously been taken from any species of *Acacia*. Most previous studies on the phlaeothripines associated with *Acacia* have been made in the arid or semi-arid zones of Australia, where the behaviour of some of the thrips species has involved gall-induction, domicile building, kleptoparasitism and eusociality (Crespi *et al*. 2004). The *Acacia* species considered here grows in a less arid area, and it is possible that the behaviour of the two species in the genera *Paracholeothrips* and *Xaniothrips* may be less rigid than that of their arid zone relatives.

The four phlaeothripine species reported here were found in galls of two very different forms—pea-pod shaped galls (Figs 1, 2) and twisted/dimply galls (Fig. 3)—and both types of gall were sometimes found on the same tree. *Teuchothrips toowoomba* Mound, Dang & Tree was the most common species found in the pea-pod shaped galls,

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with a majority of new galls of this type containing a single adult of this species. However, 13 such galls contained 1 to 3 adults of *Paracholeothrips phillipsi*, and nine of the 13 included immatures and/or eggs. These two species were not found together in any gall, but it seems likely that both species can induce production of this type of gall. However, a number of the pea-pod shaped galls each contained a single adult of *Xaniothrips sueae* **sp.nov.** Other species of that genus have been found to be kleptoparasites that invade thrips galls (Crespi *et al*. 2004), with the females driving out the gall inhabitants using as a weapon their array of stout abdominal spines (Fig. 11).

In the twisted/dimply galls *Teuchothrips jarowair* was the most common species. The majority of new galls of this type each contained a single adult of this species, and it seems probable that this thrips is the inducer of these galls. *T. toowoomba* was not found in any of these galls, but a few contained low numbers of *X. sueae* **sp.n**ov. or *P. phillipsi*. As noted above, species of *Xaniothrips* are considered to be kleptoparasites of thrips galls, and *Paracholeothrips* species are usually considered to be gall inducers (Crespi *et al*. 2004). However further field studies are needed to confirm the roles of these species within the *T. jarowair* galls.

As noted during studies on *Gynaikothrips* on *Ficus* leaves (Tree & Walter 2009) and also on gall thrips on *Acacia* phyllodes (Crespi *et al*. 2004), it is not unusual for adult thrips to emerge from their domiciles or galls and wander across the host plant. During such an emergence, an adult *T. toowoomba* was seen flicking its long tube at a smaller *T. jarowair* until the latter species fell off the phyllode (DJT observation 1.ix.2025).

Teuchothrips Hood

Teuchothrips Hood, 1919: 86. Type species *L. simplicipennis* Hood, by original designation from six species.

Erected by Hood (1919) for a group of six species from Australia, a full revision of the 34 Australian species now known has been published recently (Mound *et al*. 2023). These species share the essential character states of members of the "*Liothrips*-lineage" (Mound & Marullo 1996), and the genus essentially replaces *Liothrips* in much of Australia, south of the tropical zone (Mound *et al*. 2023). The major distinction between these genera is that *Teuchothrips* species generally have a fore tarsal tooth present in both sexes, whereas no *Liothrips* species has a fore tarsal tooth in either sex.

Teuchothrips jarowair Mound, Dang & Tree

Teuchothrips jarowair Mound, Dang & Tree, 2023: 457

This species has been known only from the original type series of two females and three males taken by bark-spraying tree trunks and logs at Redwood Park, Toowoomba, in southeast Queensland. Recent studies presented here indicate that *T. jarowair* induces the youngest phyllodes on a branch of *Acacia fasciculifera* to form twisted/dimply irregular galls, leading to the serious deterioration or even death of the tissues involved (Fig. 3). Most of these irregular galls have been found without any other invasive thrips species. The association of the thrips with this plant species is interesting, because there is an old botanical record of *Acacia fasciculifera* at the type locality of this thrips just outside the city of Toowoomba (AVH 2–25). Thus, the host association is possibly specific and correct.

Amongst the species of *Teuchothrips*, this species shares with *T. toowoomba* the unusual character state of having no elongate setae on the pronotum apart from the epimeral setae. However, these two differ in the length of the tube, and *T. jarowair* is apparently unique in having a small subcircular pore plate on sternite VIII of males. The size of the fore tarsal tooth varies amongst the available specimens. Moreover, three females of *T. jarowair* have been studied from Lark Hill that have character states outside the expected range of variation. These females not only have the fore tarsal tooth clearly longer than the tarsal width, but the head is also longer (about 1.6 times as long as wide in contrast to 1.3 times in holotype), the pronotal epimeral setae unusually short (30 microns instead of 65), and antennal segment IV bearing only two sense cones.

Specimens studied. A total of 60 adults were collected from the following sites in a total of 36 twisted/dimply galls—ranging from 1 to 5 adults per gall—with 22 galls including immatures or eggs. Of these 36 galls, 26 contained only *T. jarowair*, but 10 also included one to three adults of either *Xaniothrips sueae* or *Paracholeothrips phillipsi*.

The following specimens were slide-mounted: **Australia**, **Queensland**, from *Acacia fasciculifera* galled phyllodes: 4 females. Glenmorgan Vale, 21.vii.2025 (DJT 2125); Lark Hill, 3 females, 21.vii.2025 (DJT 2127), 5 females, 1.ix.2025 (DJT 2133).

Teuchothrips toowoomba Mound, Dang & Tree

Teuchothrips toowoomba Mound, Dang & Tree, 2023: 473

This species has previously been known only from the original type series of four females taken by bark-spraying tree trunks and logs at Redwood Park, Toowoomba, in southeast Queensland. Taken originally together with *T. jarowair* the comments made above about that species concerning the hostplant and type locality are also relevant here. Amongst 34 Australian species of *Teuchothrips*, this one is immediately distinguished by the remarkably elongate tube. The only male studied is slightly smaller and with a smaller fore tarsal tooth than females. It is effectively distinguishable from females only by the presence of the internal male genitalia; it apparently lacks a pore plate on sternite VIII. On *Acacia fasciculifera* this thrips induces typical "leaf-fold" galls, in which a phyllode is commonly folded to produce a pea-pod type gall that remains slightly open along one side (Figs 1, 2). On the trees observed, at both sites, this species was apparently the prime inducer of thrips galls. These galls then provided housing for the two further species discussed below.

Specimens studied. From a total of 30 pea-pod shaped galls 322 adults of this species were collected—ranging from 1 to 88 adults per gall. Of the 30 galls, 27 contained only *T. toowoomba*, with 23 containing immatures or eggs. Three galls were found each with one male *Xaniothrips sueae*. The following specimens were slide-mounted: **Australia**, **Queensland**, from *Acacia fasciculifera* galled phyllodes: Esk, Mt. Beppo, 1 male, 11 females, 4.vii.2025 (DJT 2124); Lark Hill, 2 females, 26.viii.2025 (DJT 2129).

Paracholeothrips Moulton

Paracholeothrips Moulton, 1968: 110. Type species *Paracholeothrips validus* Moulton, by monotypy.

Seven species are now recognised in this genus, including the one considered below that was described recently (Mound & Tree 2025). All these species are considered domicile builders on the phyllodes of various *Acacia* species, although this has yet to be clearly demonstrated for *P. phillipsi*. The domiciles are generally created by an adult female glueing or sewing together pairs of phyllodes, and then breeding in the enclosure produced. This behaviour has been clearly observed in some species of the genus, including a widespread species on the semi-arid zone tree, mulga, *A. aneura*. The *Paracholeothrips* species found on *Acacia fasciculifera* is particularly unusual within the genus, both in its host association and in the elongation of the anterior half of its body.

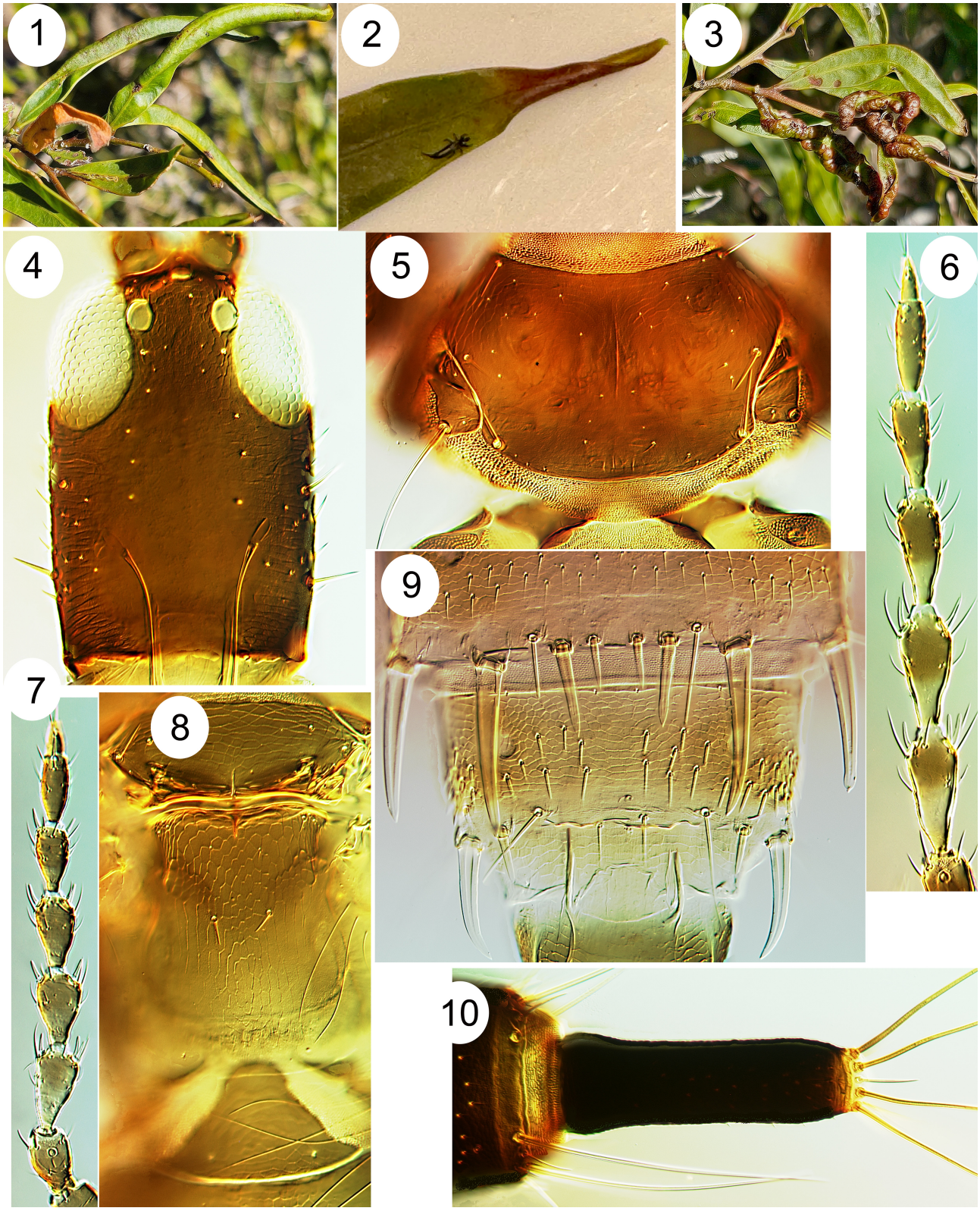
Paracholeothrips phillipsi Mound & Tree

Paracholeothrips phillipsi Mound & Tree, 2025: 143

This species was described from 19 females and four males that were collected from a total of 13 galls in which numbers of adults ranged from 1 to 3 per gall. The galls were pea-pod shaped, involving part or the whole of a phyllode, and nine galls contained only this thrips species, with eight of these also including immatures and/or eggs. The males are not greatly dissimilar to the females, both sexes having a stout fore tarsal tooth, and elongate head, pronotum and prosternal basantra.

Xaniothrips Mound

Xaniothrips Mound, 1971: 457. Type species *Xaniothrips xantes* Mound, by original designation.



FIGURES 1–10. *Acacia fasciculifera* galls and thrips. Phyllode galls 1–3: **(1)** Pea-pod shaped gall. **(2)** *Teuchothrips toowoomba* and young gall. **(3)** Twisted/dimply galls. *Xaniothrips sueae* **sp.nov.** 4–10: **(4)** Head. **(5)** Pronotum. **(6)** Female antenna. **(7)** Male antenna. **(8)** Meso & metanota and pelta. **(9)** Teneral female sternites VII–VIII. **(10)** Tube.

Females of species in this genus are characterised by an array of exceptionally stout setae ventrolaterally on two or more segments of the abdomen. These thrips are recorded as invading domiciles created by other phlaeothripine

species that glue together two or more *Acacia* phyllodes. A female *Xaniothrips* uses its armed abdomen as a weapon, walking backwards and thrashing it around to drive out the domicile occupants (Crespi *et al*. 2004). Six of the seven described species are known only from *Acacia* species in Section Juliflorae, but *X. xantes* is common on *Acacia harpophylla*, the Brigalow tree that is widespread in southern Queensland and is a member of Section Plurinerves.

All known members of *Xaniothrips* share the following character-states: Antennae 8-segmented, segments III & IV each with 3 sense cones. Head with maxillary stylets well separated and genae with one pair of stout setae. Pronotum anteromarginal setae small, notopleural sutures complete; prosternal basantra absent; metathoracic sternopleural sutures long. Both sexes without a fore tarsal tooth, and female abdomen with at least segments VII & VIII bearing several pairs of greatly enlarged ventrolateral setae. Male with no stout abdominal setae, sternite VIII without pore plate.

***Xaniothrips sueae* sp.nov.**
(Figs 4–12)

Female macroptera: Blackish-brown when fully mature, including stout setae on abdominal segments VII & VIII; tarsi yellow, fore tibiae brownish yellow; antennal segments III–VI brown distally but pale basally, VII–VIII brown; major setae pale but anals brown; fore wing pale; when not fully mature body colour commonly pale brown or even yellow, with stout abdominal setae almost translucent. With the generic character states indicated above; head about 1.5 times as long as wide (Fig. 4); antennal segments V and VI without a group of small sensoria ventrally (Figs 6, 7); pronotal setae shorter in smaller paratypes than in large holotype, particularly anteroangular and midlateral setae (Fig. 5); metanotum clearly reticulate (Fig. 8); fore wing duplicated cilia present; sternite VII with one pair of very stout posteroangular setae, posterior margin with one pair of similar setae and one pair of small stout setae (Fig. 9); sternite VIII with one pair of stout posteroangular setae (Fig. 9); tube about 3 times as long as basal width, with no anal setae stout (Fig. 10).

Measurements (holotype female in microns). Body length 3900. Head, length 400; maximum width 250; postocular setae 50. Pronotum, length 250; width 450; major setae—anteroangulars 50, midlaterals 50, epimerals 200, posteroangulars 100. Fore wing length 1800; sub-basal setae length 80; number of duplicated cilia 17. Tergite IX setae, S1 350, S2 350. Tube, length 350; basal width 115. Antennal segments III–VIII length 100, 100, 90, 75, 75, 35.

Male macroptera: Smaller and paler than female but varying in colour from yellow to medium brown depending on maturity; major setae and antennal segments shorter than in female (Figs 6, 7); tergites VII & VIII without stout setae; tergite IX setae S2 shorter than S1.

Measurements (paratype male in microns). Body length 2750. Head, length 300; postocular setae 20. Pronotum major setae—midlaterals 30, epimerals 125, posteroangulars 30. Tergite IX setae, S1 240, S2 100. Tube, length 215; basal width 90.

Specimens studied. Holotype female: **Australia**, **Queensland**, from *Acacia fasciculifera* galled phyllodes, Glenmorgan Vale, 21.vii.2025 (DJT 2125).

Paratypes: 12 females taken with holotype; **Australia**, **Queensland**, from *Acacia fasciculifera* galled phyllodes: Lark Hill, 3 females, 6 males, 21.vii.2025 (DJT2126), 6 females, 26.vii.2025 (DJT 2129); Esk, 8 females, 11 males, 4.vii.2025 (DJT 2124).

Comments

About 140 adults of this species were collected from a total of 38 pea-pod shaped galls, ranging from 1 to 35 adults per gall. Of these 38 galls, 28 contained only this thrips species with 14 including immatures and/or eggs. About 10 galls contained one or two adults of one of the other three species discussed here. From these collections it is not possible to be certain that this thrips is an invading kleptoparasite of galls induced by other species, but this seems to be the most likely scenario. There is an intriguing possibility that, under the less arid conditions under which this tree species grows, there is less stringent control over thrips behaviour than under that which has been observed of related species in the arid zones of Australia.

As in the other described members of *Xaniothrips*, the sexual dimorphism in this species is confusing (Figs 11, 12). Males are not only smaller than females, but they lack any stout setae ventrolaterally on the abdomen. The colour variation in both sexes adds to the confusion when specimens are examined in the field or in ethanol—both sexes range in colour from pale yellowish to brown, with females often dark brown. In teneral females, the stout ventrolateral setae sometimes lack pigmentation, and are thus scarcely visible (Fig. 9).

FIGURES 11–12. *Xaniothrips sueae* **sp.nov.** adults. **(11)** Female. **(12)** Male.

Amongst the seven previously described species of *Xaniothrips*, the females of this new species share only with those of *eremus* and *rhodopus* the following four character-states (Crespi *et al*. 2004): no anal setae stout; only abdominal segments VII and VIII with enlarged stout setae posterolaterally; antennal segments V and VI without a group of small sensoria ventrally; fore wing duplicated cilia present. In contrast to the new species, both *eremus* and *rhodopus* have the head wider than long, the tube scarcely twice as long as its basal width, and the metanotum with sculpture absent or faint. The image (Fig. 9) of sternites VII & VIII of *sueae* is based on a teneral female. This is because mature females are too dark to clearly observe the chaetotaxy that involves three pairs of stout setae on VII and only one pair on VIII. In contrast, *eremus* has six or seven on VII, and nine on VIII, whereas *rhodopus* has two pairs and four pairs on these segments.

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We are deeply grateful to Sue and Brian Phillips for recognising that the distorted phyllodes which they observed on *Acacia fasciculifera* were associated with thrips. They not only thus discovered two remarkable new species, one described here as *Xaniothrips sueae*, but also revealed the curious associations between these and two species of *Teuchothrips*. Figures 11 and 12 were kindly produced by Debbie Jennings at CSIRO Coleoptera section, and we are grateful to the *Zootaxa* editor Adriano Cavalleri for critical advice.

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