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Bicentenary of Ludwig Leichhardt: Contributions to Australia's Natural History in honour of his scientific work exploring Australia

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Leichhardt's vanishing thrips: a remarkable new genus and species of Insecta, Thysanoptera, Phlaeothripinae

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ABSTRACT

Leichhardtithrips evanidus gen. et sp. nov., a wingless, fungus-feeding species of Phlaeothripidae, is described from a single female taken in D'Aguilar National Park, Brisbane. This species has exceptionally reduced sclerotisation rendering systematic comparisons of the new genus difficult. The cylindrical form of the eighth antennal segment is unique in the family, and the compound eyes are not developed on the ventral surface of the head. □ *Thysanoptera*, *Tubulifera*, *Phlaeothripidae*, *Phlaeothripinae*, *bark spray*.

There are many reasons for a time lag between a species being collected and being formally described, but two are particularly important in our studies on insects of the Order Thysanoptera. When first collected, species exhibiting particularly unusual character states are often represented only by single individuals, and possible reasons for this are discussed below. However, efforts to locate a representative population of such a species, or at least a few more individuals, can lead to considerable delays. Equally important is that of the 365 genera of extant species in the major subfamily Phlaeothripinae 45% are monobasic, and we consider it prudent to hesitate before adding to this lack of phylogenetic structure (Buckman *et al.* 2013). The taxon described below is an example of this situation. Despite being collected at a site to which much collecting activity has been directed in recent years, only one wingless female has been found. The structure of this female is so remarkable, with extreme

reduction in sclerotisation of most parts of the body, that there are few shared character states from which to recognise relationships. Considering the mysterious disappearance of Ludwig Leichhardt, this unusual new species is described here in a new genus, for which the Latin name can be translated as “Leichhardt’s Vanishing Thrips”.

Fungus-feeding thrips are generally collected by hand-beating dead plant tissue or processing leaf-litter through Berlese funnels. However, during 2008 and 2009 a technique of insecticide spraying was employed to survey the fungus-feeding thrips on the bark of living trees (Tree & Walter 2012). This survey produced two interesting new thrips records for Australia: *Uzelothrips scabrosus* Hood, a South American species representing a monobasic family (Tree 2009), and *Anaglyptothrips dugdalei* Mound & Palmer, a monobasic genus previously known only from New Zealand (Mound &

Dang in press). These collections also included the unusual Phlaeothripinae specimen that is the subject of this paper. Unfortunately, further sampling, by both spraying of bark and extractions from leaf litter, has failed to yield any more specimens, therefore the natural habitat of this species remains unknown.

Leichhardtithrips gen. nov.

Diagnosis. Small apterous, weakly sclerotised Phlaeothripinae. Antennae apparently 6-segmented (Fig. 2); segments III–V fused, VI elongate quadrate, VII no longer than wide, VIII slender and 4 times longer than wide; segment II with two small broadly capitate setae, sensorium in distal third; III with 1 ventrolateral sensorium, IV and V each with 2, VI with 1 ventro-apical sensorium, VIII with ventral row of small sensoria. Head longer than wide (Figs 5, 6); slightly prolonged in front of eyes, ocelli absent; compound eyes not extending onto ventral surface; maxillary stylets close together in middle of head retracted to compound eyes with small loop in prothoracic region; dorsal surface of head with 4 pairs of short capitate setae; mouth cone broadly pointed, extending between fore coxae; ventral surface of head with 3 pairs of long, slender setae, maxillary palp 3-segmented?. Pronotum (Fig. 8); sculptured medially but strongly eroded laterally, with 6 (7?) pairs of broadly capitate setae, including posteromedian pair; epimera eroded, setae arising from membrane. Mesonotal acrotergites prominent, transverse (Fig. 8); meso and metanota broadly joined, sculptured medially but strongly eroded around margins, both with 2 pairs of broadly capitate setae arising far apart; meso and metathoracic spiracular areas broad and dorso-ventrally elongate. Thoracic sternites largely membranous (Fig. 7); basantra with 4 or 5 pairs of small setae, ferna present as pairs of weakly sclerotised triangles; sternopleural sutures broadly expanded, median metasternal area in form of X-shaped sclerite between mid and hind coxae; meso and metasterna each with 1 pair of long slender setae laterally. Fore tarsus with no tooth, but inner and outer ventral hamus well developed; fore femora with 3 pairs of short broadly capitate setae, mid and hind femora

each with 2 pairs, fore coxae with 1 pair. Pelta (Fig. 8) weakly sclerotised, extending across anterior margin of tergite II, with 1 pair of broadly capitate setae laterally; spiracular area large; tergites II–VII with 3 pairs of broadly capitate marginal setae, these setae longer on VIII; spiracular area on VIII small; tergite IX S1 and S2 capitate, S3 slender and acute; tube short (Fig. 4), margins strongly convex, narrowing to apex, anal setae short. Sternites III–VIII with 2 transverse rows of minute discal setae (Fig. 3).

Type species. *Leichhardtithrips evanidus* sp. nov.

RELATIONSHIPS

The curious structural features of this new taxon are mainly associated with wing loss and reduction in sclerotisation. As a result, many of these features also occur in other species of Phlaeothripinae that live in leaf litter. For example, the wingless species of *Biconothrips* and *Stephanothrips* have antennal segments III–V fused in essentially the same way, but species in these two genera have the two terminal antennal segments fused into one long segment. In contrast, the slender and almost cylindrical shape of the eighth antennal segment of this new species is unlike that of any other species of Phlaeothripidae, although the typical ventral longitudinal row of small sensoria is present on this segment. Reduction in sclerotisation of the dorsal sclerites of the thorax and abdomen is not unique to this new species, nor are the short and broadly capitate major setae; such features recur in other Phlaeothripinae, even in apterae of the unrelated, phytophagous, *Scopaeothrips* species that feed on *Opuntia* in western America.

The autapomorphies of this new taxon are the failure of the compound eyes to extend onto the ventral surface of the head, the slender form of antennal segment VIII, the strongly convex margins of the tenth abdominal segment, and the presence of a double row of minute discal setae on the abdominal sternites. Although clearly a species of Phlaeothripinae, it is difficult to suggest any close relationships for this genus. The arrangement of the antennal sensoria indicates that the genus is a member of the “*Phlaeothrips* lineage”, and is not related



FIGS 1–4. *Leichhardtthrips evanidus*. 1, female holotype; 2, antennae (detail of segment II inset); 3, sternites IV–V; 4, tergites VII–X.

to the *Liothrips* or *Haplothrips* lineages of phytophagous species (Mound & Marullo 1996). Within that large group of fungus-feeding thrips this genus is possibly a highly aberrant member of the *Urothrips* group. Most of the species in that group have the tenth abdominal segment elongate (Mound 1972), but *Adurothrips atopus* Mound was interpreted as a member of this group despite having the tube and anal setae short (Mound 1995).

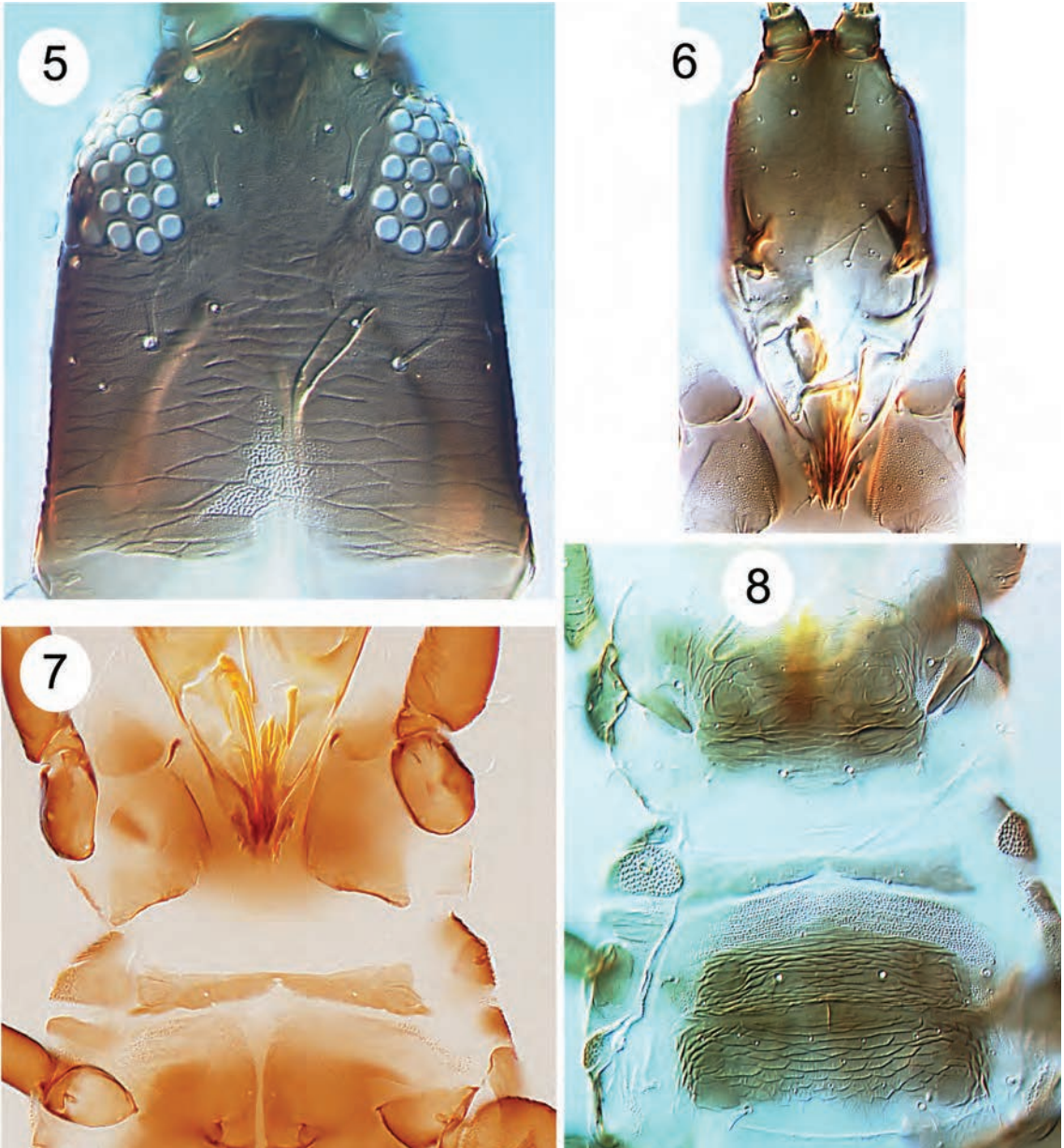
Leichhardtthrips evanidus sp. nov.
(Figs 1–8)

Female aptera. Body and legs brown except for the membranous eroded areas of sclerites, antennal segments brown, segment II with pedicel brown but yellow at apex; abdomen darker toward apex,

tube orange brown. With the structural character states in the generic description above.

Measurements. (HOLOTYPE in microns) Body length 1520. Head, length 165; median width 140; median ocellar setae III 18; median mid-dorsal setae 19. Pronotum, length 190; maximum width 265; major setae - anteroangulars 16, anteromarginals 14, posteromarginals 14, posteroangulars 13, midlaterals 16, epimerals 16. Metanotum median setae 13. Tergite V S1 setae 19. Tergite IX setae S1 37, S2 41. Tube, length 100; median width 65. Antennal segments length III–V 102, VI 42, VII 9, VIII 22.

Material Examined. HOLOTYPE female, Queensland, D'Aguiar National Park (formerly Brisbane Forest Park), Centre Rd, from bark spray of *Eucalyptus* major trunk, 5 October 2008 (Desley Tree 728), in the Australian National Insect Collection, Canberra ACT.



FIGS 5–8. *Leichhardtithrips evanidus*. 5, head (dorsal); 6, head (ventral); 7, thorax (ventral); 8, thorax and tergites I–II (dorsal).

DISCUSSION

Despite waiting for almost five years since collecting this new species, and repeated visits to the original site, no further specimens have

been found. This raises questions about the biology of the species, and the problems of apparent rarity. Many thrips species in Australia are known only from single samples. *Odontothripiella biloba* Bagnall remains known

only from a single female collected in Western Australia (Mound *et al.* 2013), but the members of this genus are associated with the flowers of Fabaceae, and this species may eventually prove to be locally common in the flowers of one particular legume. More difficult to understand is the apparent rarity of some fungus-feeding thrips. For example, *Uzelothrips scabrosus* remains known in Australia from four females collected on different occasions at the same site as *Leichhardtithrips evanidus* (Tree & Walter 2012). Similarly, *Bocathrips okajimai* Goldarazena remains known from three specimens that were collected at a site in Canberra that is regularly searched for thrips, and there are several other undescribed fungus-feeding thrips species that are known from single individuals despite active searches for more specimens. Rather than being host- or even habitat-specific, such species seem more likely to have populations that vary in size unpredictably, such that they are usually difficult to collect.

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