



## *Hoplothrips* species recorded from China (Thysanoptera, Phlaeothripidae), with one new species from Yunnan

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The genus *Hoplothrips* is the third most species-rich in the subfamily Phlaeothripinae (Mound *et al.* 2020), and currently comprises 131 species (ThripsWiki 2020). Most of these live on dead branches of woody angiosperm trees and are presumed to feed on fungal hyphae or their liquid breakdown products (Kobro & Rafoss 2006). Many species in this genus exhibit considerable sexual dimorphism, also considerable polyphenism associated with variation in body size. As a result of this variation in body structure, species identification in this genus is often difficult (Mound & Walker 1986; Mound 2017; Mound *et al.* 2018).

From China, six species of *Hoplothrips* have been recorded (Mirab-balou *et al.* 2011), but Han (1997) is the only revisionary work from China on this genus, and some misidentifications have recently been detected. For example, the name “*Hoplothrips flavipes*” has been listed from China on at least five occasions (Mirab-balou *et al.* 2011), whereas the Hawaiian species of that name, *Hoplothrips flavipes* (Bagnall), is known only from three slide mounted specimens taken in 1896 on the Hawaiian island of Maui (Mound 2017). The records of *flavipes* from China are essentially bibliographic, and none of them make any reference to those original specimens. Some of the records seem likely to refer to *Hoplandrothrips flavipes* (Bagnall), a widespread tropical species that is similarly associated with fungi on dead branches (teste Tong Xiaoli *in litt.* xi.2019). Moreover, one specimen labelled by Han Yunfa as “*Hoplothrips flavipes*” has been studied on loan from Beijing, and this female is clearly a species of the genus *Liothrips*. That specimen is probably the basis for the illustration of *flavipes* given by Han (1997: 404) in which antennal segments III–IV are illustrated as having one and three sense cones respectively. We conclude that the various records of *Hoplothrips flavipes* from China are all misidentifications, and this name is here not considered further.

Han (1997) also records from China *Hoplothrips aceris* (Karny), described originally from Japan. However, Okajima (2006) studied the holotype of *aceris* and recognized it as the same species as the widespread species *corticis* (De Geer). The illustration of “*aceris*” provided by Han (1997) is of a species with five pairs of capitate pronotal major setae, very similar to the condition found in *Hoplothrips fungosus*, as also illustrated by Han. In contrast, *corticis* has only four pairs of major pronotal setae all of which are pointed. A single female labelled as *aceris* by Han has been studied on loan from Beijing, and this agrees with the 1997 illustration, but the specimen is seriously distorted and even its generic relationship remains unclear. This unidentified species differs from *fungosus* in having the tube brown, in lacking reticulation in the ocellar region of the head, and apparently in lacking prosternal basantra.

Because of the misidentifications, also because of the poor quality of the available slides, it is not possible to present here a satisfactory revision of the species of *Hoplothrips* from China. The key to species provided below is no more than a guide to facilitate the sorting of future collections of *Hoplothrips* specimens in China. The main purpose here is to describe from southern China a new species in the genus *Hoplothrips* that has the body unusually small for members of this genus, and that has an unusual host association on the dead leaflets of a species of *Cryptomeria* [Cupressaceae].

### Acknowledgements and abbreviations

The first author collected this new species during field work in Yunnan that was generously supported by Zhang Hongrui. For the loan of specimens we are grateful to Tong Xiaoli of South China Agricultural University, Guangzhou, and to Qiao Ge-Xia of the Zoological Institute, Academy of Sciences, Beijing. The major setae on the pronotum are referred to as follows: am—anteromarginals; aa—anteroangulars; ml—midlaterals; epim—epimerals; pa—posteroangulars. Major setae are designated as S1, S2, & S3, where S1 is the pair closest to the mid-line.

## Key to *Hoplothrips* species from China

1. Prosternal basantra fully sclerotized as discrete sclerites (Fig. 6); male sternite VIII without a pore plate . . . . . *fungosus*
- Prosternal basantra not present as discrete sclerites but several chitinous islets are sometimes closely associated (Fig. 5); male with broad pore plate on sternite VIII (Fig. 3) . . . . . 2
2. Female with no fore tarsal tooth; maxillary stylets 0.2–0.3 of head width apart (Fig. 1), maxillary bridge distinct; prosternal basantra weakly indicated by series of coalescing chitinous islets; mesopresternum complete (Fig. 5); body length less than 2000 microns . . . . . *hongruiae* sp.n.
- Female with fore tarsal tooth well-developed; maxillary stylets close together medially in head without a maxillary bridge; prosternal basantra clearly absent; mesopresternum reduced to pair of lateral triangles; body length at least 3000 microns . . . 3
3. Antennal segment III sense cones short and straight (Fig. 7) . . . . . *corticis*-group
- Antennal segment III sense cones long and curved (Fig. 8) . . . . . 4
4. Antennal segments IV–VI uniformly brown . . . . . *orientalis*
- Antennal segments IV–VI yellow at the base . . . . . *fungi*

### *Hoplothrips corticis*-group

In China this seems to comprise three nominal species: *corticis* (De Geer), *japonicus* (Karny), and *mainlingensis* Han. Amongst these, *corticis* can usually be distinguished because the lateral margins of the pelta are completely confluent with the anterior margin of the second tergite, whereas in the other two the lateral margin curves away from the tergite margin. The distinction of *mainlingensis* from *japonicus* seems far less secure. Okajima (2006) states that the width of antennal segment III of *japonicus* is 42.5–44 microns, whereas Han (1997) states that this width in *mainlingensis* is only 38 microns. Specimens of *mainlingensis* have been studied on loan from Beijing, including specimens that apparently are from the type series. These specimens have been compared with various specimens of both sexes that are identified as *japonicus*, and no significant differences have been found. It seems possible that these two names represent a single widespread species. A further species from Japan, *persimilis* Okajima, seems to be structurally very similar but was described as having sculpture lines in the ocellar region of the head, and the pronotal posteroangular setae clearly shorter than the epimeral setae.

### *Hoplothrips fungi* (Zetterstedt)

There seems to be no authentic record from China of this common and widespread Holarctic species. It is included here in order to facilitate future identifications. It is generally recognized from the long, curved sense cones on antennal segment III, the longest of which is longer than the apical width of the segment (Mound *et al.* 2018).

### *Hoplothrips fungosus* Moulton

There are specimens from China labelled as this species by Han Yunfa in the Beijing collection, and these are similar to specimens studied from northern Australia (Mound *et al.* 2020). However, one slide labelled as this species has been studied from the collection of Tong Xiaoli, Guangdong. Although this female has prosternal basantra present, it has no sculpture in the ocellar region, tergite IX is brown, and the tube is longer than in typical members of *fungosus*. This specimen possibly represents yet another species in this complex.

### *Hoplothrips orientalis* (Ananthakrishnan)

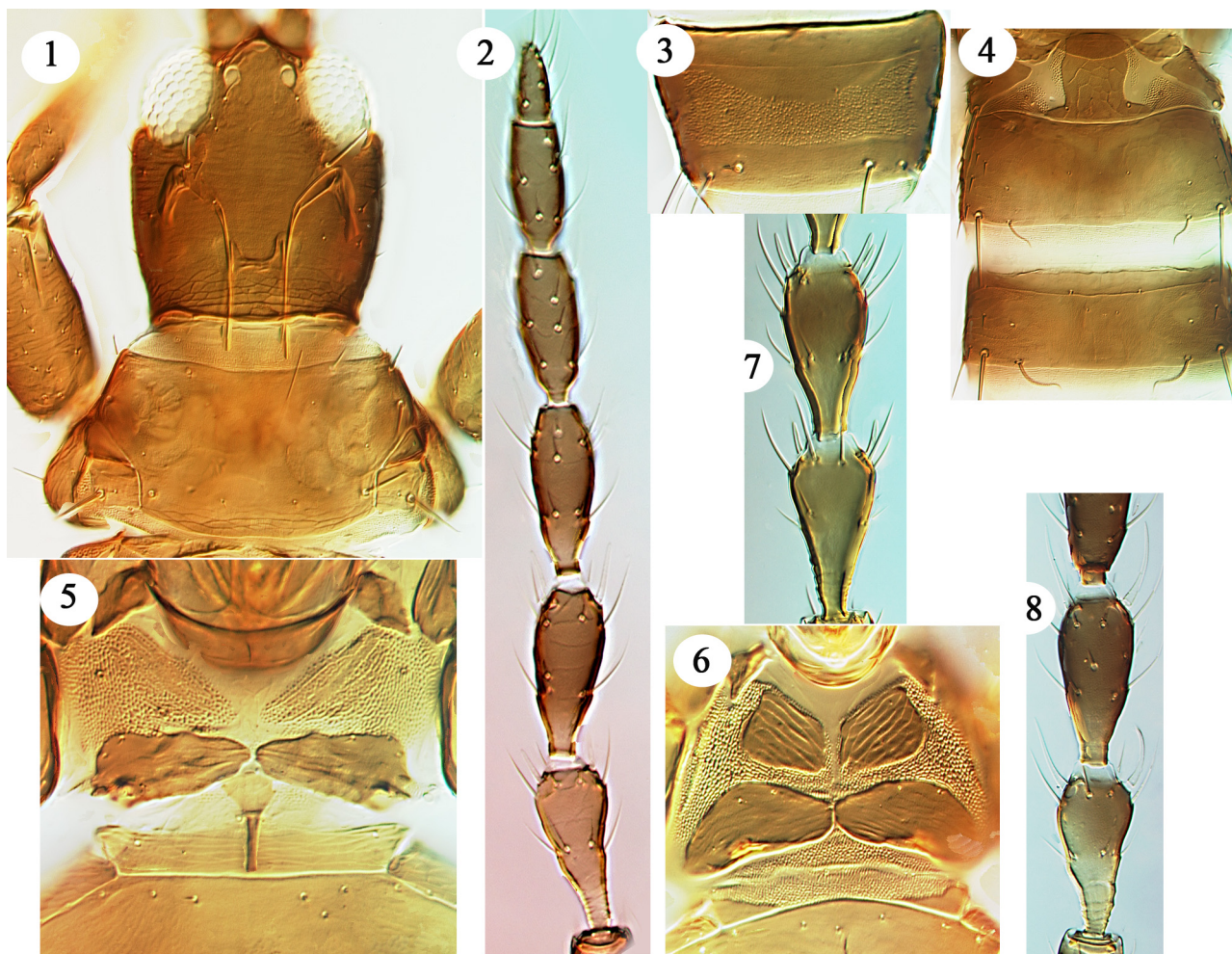
In structure, this is very similar to *fungi* and it is interpreted as the southern hemisphere equivalent of that species (Mound & Walker 1986; Mound *et al.* 2020), differing only in the colour of the antennae. It was described from southern India but is recorded from Taiwan, southern Japan, Australia, and New Zealand.

### *Hoplothrips hongruiae* sp. n.

(Figs 1–5)

*Female macroptera.* Body and femora brown, basal half of tube darker; tarsi and apex of tibiae yellow; antennal segment III mainly yellow, IV–V variably yellow at base; fore wings pale; major setae brown. Head (Fig. 1) with transverse polygonal sculpture near base, without distinct sculpture on anterior half; cheeks widest behind eyes, narrowing to base; compound eyes about one third of head length; postocular setae capitate, much shorter than dorsal eye length; ocelli well

developed; postocellar setae pointed, longer than the diameter of posterior ocelli; maxillary stylets retracted to postocular setae, 0.2–0.3 of head width apart medially, with distinct maxillary bridge. Antennae 8-segmented (Fig. 2), segment III with 2 slender sense cones, IV with 4 sense cones, VIII broad at base and much shorter than VII. Pronotum with weak transverse sculpture near posterior margin; with 5 pairs of capitate major setae (Fig. 1). Mesonotum with transverse reticulation on anterior half, lateral setae weakly capitate; metanotum with weak polygonal sculpture, median setae acute. Prosternum (Fig. 5) with basantra weakly indicated by variable coalescence of some chitinous islets; ferna triangular almost meeting medially; mesopresternum complete; mesoeusternal anterior margin entire. Fore tarsal tooth absent. Fore wing parallel sided, with three sub-basal setae, S1 and S2 capitate, S3 longest and pointed, 4 duplicated cilia. Pelta with weak sculpture and small lateral lobes (Fig. 4), campaniform sensilla located almost on margin; tergites II–VII each with two pairs of sigmoid wing-retaining setae; sternites each with 3–5 pairs of discal setae; tergite VIII median setae capitate; tergite IX setae S1 much shorter than tube and blunt, S2 pointed; anal setae shorter than tube.



**FIGURES 1–8.** *Hoplothrips* species. *H. hongruiae* sp. n. 1–5: (1) Head & pronotum; (2) Antenna; (3) Male sternite VIII; (4) Pelta & tergites II–III; (5) Prosternum & mesopresternum. (6) *H. fungosus* prosternites. Antennal segments III–IV 7–8: (7) *H. corticis*; (8) *H. orientalis*.

**Measurements** (holotype female in microns). Body length 1760. Head, length 208; median width 175; dorsal eye length 70; postocular setae 40, distance between their bases 98. Pronotum, length 113; median width 230; major setae am 20, aa 20, ml 21, epim 43, pa 35. Mesonotum lateral setae 20. Metanotum median setae 25. Tergite IV median marginal setae 68; tergite VIII median setae 60; tergite IX setae S1 99, S2 90. Tube length 138; anal setae 115. Fore wing length 680; sub-basal setae S1 30, S2 37, S3 82. Antennal segments III–VIII length 62, 62, 58, 50, 45, 28.

*Female microptera.* Similar to macropterous female, ocelli smaller; wing-retaining setae smaller.

**Measurements** (in microns). Body length 1860. Head, length 223; width 170; compound eyes length 70; postocular setae 30; fore wing lobe 175; longest sense cone on antennal segment III 21.



*Male macroptera*. Similar to female but smaller; fore tarsal tooth present but small; tergite IX S2 setae short and stout; sternite VIII with large transverse pore plate that extends to spiracles (Fig. 3); sternites without reticulate areas.

**Measurements** (in microns). Body length 1410. Head, length 188; width 145; postocular setae 27. Pronotum, length 95; median width 185; major setae am 15, aa 14, ml 14, epim 38, pa 16. Tergite IX setae S1 87, S2 23. Tube length 105, anal setae 100. Fore wing length 560. Antennal segments III–VIII length 53, 55, 55, 48, 42, 25.

*Male microptera*. Similar to macropterous male, ocelli smaller; wing-retaining setae smaller.

**Measurements** (in microns). Body length 1450. Head, length 200; width 150; postocular setae 31; fore wing lobe 133.

**Specimens studied**. Holotype female macroptera. **China**, Yunnan, Kunming, Western Mts, from dead leafy stems of *Cryptomeria* sp. [Cupressaceae] (LAM 6445) in Yunnan Agricultural University, Kunming.

Paratypes collected with the holotype: 8 macropterous females, 2 micropterous females, 7 macropterous males, 4 micropterous males. Paratypes are in the authors' collections, at Canberra and at Jilin University.

**Comment**. This new species is named in recognition of the outstanding and critical contributions made to our knowledge of Thysanoptera in China by Prof. Zhang Hongrui. Within the genus *Hoplothrips* the species is unusual for its small size, but particularly in having the maxillary stylets relatively far apart with a maxillary bridge present (Mound *et al.* 2020), the mesopresternum complete, and the pronotal posteroangular setae distinctly shorter than the epimeral setae. Moreover, the prosternal basantra are faintly indicated by the coalescence of some of the chitinous islets, and when the prosternal membrane is viewed slightly obliquely this can give the impression of basantra being present. However, in contrast to *fungosus* there is no clear sclerite present. The host association is also unusual, although no immature stages were collected. The adults were found as scattered individuals, amongst dead “leafy” stems that had fallen from the Coniferous trees. In the field this small thrips was assumed to be a species of *Hoplothrips*, however it differs from members of the Haplothripini in the following character states: absence of basantral sclerites on the prosternum; absence of any constriction medially on the fore wing; presence of a pore plate on sternite VIII in males. However, as noted above, the male pseudovirga appears to be similar to that of *Hoplothrips* species, although such a structure is not well-developed in all Haplothripinae including *Dolichothrips* species (Mound & Okajima 2015). The current classification within the Phlaeothripinae is historically derived from the European fauna. The new species here is yet another tropical or southern hemisphere taxon that, like *Mirothrips* from Brazil (Cavalleri *et al.* 2013), does not fully conform to the accepted classification.

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