

Records of thrips on bamboo, take and sasa (Poaceae: Bambusoideae) in the Kyoto Botanical Garden, with a special reference to ovoviviparity in Phlaeothripinae (Insecta: Thysanoptera)

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Abstract : Thrips on the bamboo, take, and sasa plants in the Kyoto Botanical Garden at Shimogamo in Kyoto City were collected in May and July of 2016. A total of 9 species was collected, five species were reported here for the first time from Kyoto Prefecture, and four of them seem to have close association with various bamboo, take, and sasa plants. Several species of thrips recorded here are predators of small arthropods. We mentioned that some predaceous or omnivorous tuburiferan thrips in *Phlaeothrips*-lineage and *Haplothrips*-lineage are likely to be ovoviviparous species.

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Introduction

Thysanoptera is an insect order involving ca. 6,000 species in the world (Buckman et al. 2013). In Japan, 405 species have been recorded (Masumoto 2016), but accurate number of species living in Japan is obscure yet. For local governmental lists of Thysanoptera in the Kanto region, in Gunma Prefecture only 6 species are listed at 2011, 33 species in Tochigi Prefecture, 96 species in Kanagawa in 2004, and 88 species in Tokyo (Kanasugi 2011). In the Kinki region, no information is available about the number of species of Thysanoptera. In Kyoto Prefecture, one of authors of the present report, SN added 32 species of Thysanopteran insect in the revision of faunal list revised in 2015 (Kyoto Prefecture 2015). However, in our collection there are over ten species that have not been shown in the revised list of Kyoto Prefecture. These species might be added to the list in future. In addition to them that were mainly collected between 1990 and 1999 in Kyoto, we recently collected thrips to reveal the thysanopteran fauna in Kyoto by a joint research program between Kyoto Prefectural University and the Kyoto Botanical Garden, and successfully got some species that were found in Kyoto Prefecture for the first time. Here, we listed thrips collected from bamboo, take, and sasa by beating method in the botanical garden (Shimogamo, Kyoto City) in 2016. In the present report, we newly record 5 thrips species from Kyoto Prefecture.

1. Thrips associated with bamboo, take and sasa

(1) *Stenchaetothrips pleioblasti* Masumoto & Okajima

Material examined. 1 ♀, on *Phyllostachys auvea* var. *flavescens-inversa*, 2-V-2016; 1 ♀, on *Phyllostachys nigra* f. *bicolor*, 25-VII-2016.

This terebrantian species (Thripidae) was recently described by Masumoto and Okajima (2013) based on specimens from Honshu Island, and was known as an endemic in Japan. This species is usually found on *Pleioblastus chino* and seems to be phytophagous thrips (Masumoto & Okajima 2013). Other records from some plant species of

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Poaceae (ex. *Pseudosasa japonica*, *Miscanthus sinensis*), Cyperaceae, Asteraceae, and Cornaceae etc (Masumoto & Okajima 2013). It has been known that this species distributes in Miyagi, Fukushima, Kanagawa, and Ibaragi Prefectures, and on Chichi-jima Island in Tokyo (Masumoto & Okajima 2013). The present paper is the first record from *Phyllostachys*, and Kyoto Prefecture is added as a new locality.

(2) *Aleurodothrips fasciapennis* (Franklin)

Material examined. 1 ♀, on *Bambusa multiplex*, 2-V-2016; 1 ♀, on *Tetragonocalamus quadrangularis*, 25-VII-2016.

Only one species is known in the genus *Aleurodothrips*, and this could well be included in the *Phlaeothrips*-lineage (Okajima 2006). This tuburiferan species is widespread in the tropics and subtropics around the world, and has been known from Kyushu and Ryukyu Islands in Japan (Okajima 2006). The present report is the first record from Honshu Island. At present, Kyoto City is the northern edge of the distribution. It is known that this species occurs on many kinds of plants, but frequently does on bamboo in East Asia, and is a predator of scale insect and whitefly (Okajima 2006). It is reported that this species feed most vigorously on Diaspididae such as *Anidiella aurtii* (Maskell), *Aspidiotus* spp., and *Lepidosaphes* spp. etc (Palmer & Mound 1990).

(3) *Bamboosiella sasa* Okajima

Material examined. 1 ♀, on *Pleioblastus multifolium*, 25-VII-2016.

This is an endemic species of Honshu Island. *Bamboosiella* in the Oriental region is a member of *Phlaeothrips*-lineage (Mound & Minaei 2007). Okajima (2006) stated that this species occurs in sheaths of bamboo, *Sasa paniculata* in the temperate region. The genus *Bamboosiella* is seemed to contain both predator and fungus-feeder, and this species seems to be predator (Okajima 1995, 2006). The present report is a first record from *Pleioblastus multifolium*, and the first record from Kyoto Prefecture. A single individual of this species contain a broken chorion, and the egg might contain embryo (Fig 1; A and B). In addition to this, one individual of *Haplothrips* sp. (*H. ganglbaueri* or *H. brevitubus*) on *Pleioblastus chino* var. *viridis* in the present collections also has a whole chorion with a developing embryo (Fig 1; C and D). These two individuals suggest that ovoviviparity may be prevalent in *Bamboosiella* and *Haplothrips*. Ovoviviparous thrips are well known in fungus-feeders in Idolothripinae (Ananthakrishnan 1984, 1990), ex. *Bactrothrips* (Krantz et al. 2002), however, we do not know ovoviviparous thrips in *Phlaeothrips*-lineage and *Haplothrips*-lineage. It is noteworthy that some predaceous or omnivorous tuburiferan thrips are likely to be ovoviviparous species.

(4) *Podothrips odonaspicola* (Kurosawa)

Material examined. 1 ♀, on *Pleioblastus multifolium*, 25-VII-2016.

Podothrips is a worldwide genus, and a member of *Haplothrips*-lineage. The genus *Podothrips* includes 24 species, and all species of this genus appear to be coccid predators living on Poaceae (Mound & Minaei 2007). It is known that *Podothrips odonaspicola* feeds on *Odonaspis secreta* (Cockerell) (Palmer & Mound 1990). The present paper is the first record of *P. odonaspicola* from Kyoto Prefecture. This species had been recorded from Honshu and India (Okajima 2006).

(5) *Haplothrips ganglbaueri* Schmutz

Material examined. 1 ♂, on *Pleioblastus linearis*, and 1 ♀, on *Bambusa multiplex*, 2-V-2016.

This species is known as a pest thrips of rice and other grasses (Abraham et al. 1972; Ananthakrishnan & Thangavelu 1976), but one of the author, SN had confirmed that this species complete development from egg to adult eclosion only by feeding *Thrips* larvae (unpublished data). Thus this is an omnivorous thrips.

(6) *Haplothrips brevitubus* (Karny)

Material examined. 1 ♀, on *Pleioblastus chino* var. *vaginatus*, and 2 ♀, on *Phyllostachys nigra* f. *bicolor*, 25-VII-2016.

This species is known as a biological control agent against pest thrips in the main lands in Japan (Kakimoto et al. 2005). This omnivorous thrips feeds on pine pollen, thrips, and eggs of small insects and mite, etc.

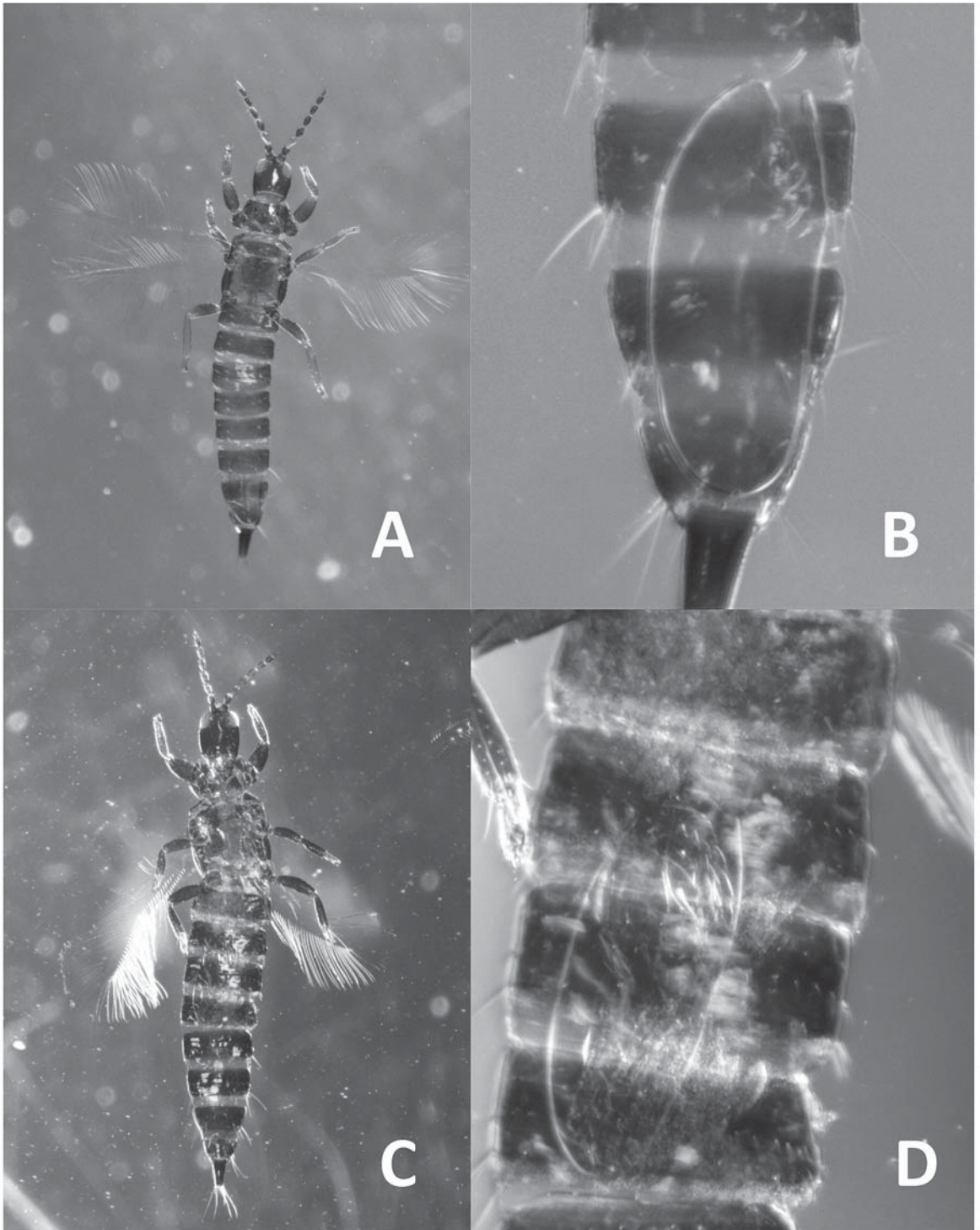


Fig. 1. Female adult of *Bamboosiella sasa* (A and B) and *Haplothrips* sp. (C and D) containing developing embryo in chorion (B and D).

2. Thrips hovering on bamboo, take and sasa

(1) *Trichromothrips elegans* Masumoto & Okajima

Material examined. 2 ♀, on *Pleioblastus linearis*, and 1 ♀, on *Bambusa multiplex*, 2-V-2016.

This species was described in 2005 by Masumoto and Okajima, and one of 5 species in the genus from Japan. Males were unknown. Various kinds of evergreen trees are known as host plants of this species: *Aucuba japonica*, *Neolistsea serica*, *Lithocarpus edulis*, and *Machilus thunbergii* (Masumoto & Okajima 2005). The genus *Trichromothrips* containing over 30 species is distributed worldwide, although species diversification has taken place predominantly in South Asia (Bhatti 2000; Masumoto & Okajima 2005, 2011; Ng & Mound 2015). *Trichromothrips elegans* has been known from Tokyo and Kanagawa Prefecture. This is the first record from Kyoto Prefecture.

(2) *Heliothrips haemorrhoidalis* (Bouché)

Material examined. 1 ♀, on *Chimonobambusa tumidissinoda*, 5-VII-2016.

This species is known as a pest thrips of *Vitis* spp. and *Citrus* spp., and recorded from various plants including *Machilus thunbergii*, *Persea americana*, *Camellia japonica*, *Rosa* spp. and so on (Uesumi 1988). Well-known as the glasshouse thrips throughout the world.

(3) *Thrips coloratus* Schmutz

Material examined. 1 ♀, on *Chimonobambusa marmoreal* var. *variegata*, 5-VII-2016.

This species is known as a pest thrips of *Eriobotrya japonica* and *Ficus carica*, and recorded from various plants, such as *Cosmos bipinnatus*, *Camellia japonica*, *Rosa* spp., *Castanea crenata*, and *Cinnamomum japonicum* (Onogi & Fujimoto 1988; Nakao unpublished).

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