



Description of a new species of the genus *Dendrothrips* Uzel (Thysanoptera: Thripidae) from Japan

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Abstract

A new species, *Dendrothrips kinape*, is described and illustrated from *Oryza sativa* at Hokkaidō, Japan. In this genus, this species is very peculiar in its uniformly pale body color and in its host plant (first record from Monocotyledoneae). A key to Japanese species of the genus is provided.

Key words: *Dendrothrips kinape*, host plant, tergites sculpture, *Oryza sativa*, Hokkaidō

Introduction

Dendrothrips Uzel is a genus of small-sized and generally arboreal thrips (Marullo 2003). It includes 56 species from across the Old World, whereas no species is known to be native to the New World (Mound 1999; Mound & Tree 2016; Wang *et al.* 2019). Most species in this genus are known from Africa, northern Europe through the Palaetropics to Japan, and Australia (Mound & Tree 2016). The genus is characterized by the enlarged metathoracic furca extending to the mesothorax, the fore wing with curved anterocostal margin and long anterior fringe cilia arising from behind the costal vein ventrally, and S1 setae on abdominal tergites longer than their interval. The enlarged metathoracic furca is associated with the enlargement of the trochanter muscles, which makes it possible for these species to jump strongly (Masumoto & Okajima 2003). This enlarged furca characterizes the subfamily Dendrothripinae with 11 genera although the monophyly of the subfamily requires further study (Mound & Tree 2016; Zhang *et al.* 2019). *Dendrothrips* species are mostly associated with trees and shrubs (Marullo 2003), but some members of Dendrothripinae inhabit grasses or ferns such as *Edissa* and *Leucothrips*. In Japan, all five recorded species, *D. amamiensis* Masumoto & Okajima, *D. latimaculatus* Nonaka & Okajima, *D. magnoliae* Kudo, *D. minowai* Priesner and *D. utari* Kudo are known to inhabit tree leaves.

Recently, Mr. Sota Nakazaki obtained a species of *Dendrothrips* from leaves of *Oryza sativa* [Poaceae] in Hokkaidō, Japan. Superficially, this species resembles a South African species, *D. oleae* Faure, by having a pale body, 9-segmented antennae and transverse sculpture on the abdominal tergites. *Dendrothrips priesneri* zur Strassen from Canary Islands is also similar to the Japanese species by uniformly pale body. However, the present species clearly differs in some morphological and behavioral features, thus we concluded that it is a previously undescribed species.

In this paper we describe this new species and provide an identification key to *Dendrothrips* species known from Japan.

Materials and methods

The collected specimens were stored in 80% ethanol. We made slide mounted specimens using the following procedures. The holotype was macerated in Proteinase K solution for 2 hours at 45°C. The paratypes were macerated

in 8–10% KOH solution for 6 hours at room temperature (about 20°C) following Okajima (2006). The holotype and 20 paratypes were mounted in Euparal following a dehydration series. Two paratypes were mounted using Canada balsam following a dehydration series. The specimens were observed under a Zeiss Axiophot microscope (Carl ZeissAG, Jena, Germany). The mounted specimens were photographed using AxioCam ERc 5s attached to Zeiss Axiophot microscope (Carl ZeissAG, Jena, Germany), and the final images were prepared by using Photoshop CC2018 (Adobe Inc., San Jose, California, USA). The following abbreviations are used: S1-S2 setae (order of major setae from mid-line to outside), L (length), W (width). Scale-bars used in figures 1–6 are 25µm.

Host plants of previously known species of *Dendrothrips* in Japan

Dendrothrips amamiensis is associated with *Macaranga tanarius* [Euphorbiaceae] in Amami-ohshima Island, although the holotype was collected from *Stylax* sp. [Stylacaceae]. *Dendrothrips latimaculatus* and *D. utari* are associated with Oleaceae as follows: *latimaculatus* from *Fraxinus griffithii* in Ishigaki-jima Island, *utari* from *F. sieboldiana* in the mountainous area or northern part of Honshu. *Dendrothrips magnoliae* is associated with *Magnolia kobus* [Magnoliaceae] in the mountainous area of central Honshu. *Dendrothrips minowai* is mainly collected from *Camellia sinensis* [Theaceae] in Honshu and Kyushu. Most of these species are endemic to Japan but *D. minowai* is also known from China and North Korea (Mirab-balou *et al.* 2011).

Key to the Japanese species of *Dendrothrips*

1. Fore wing almost uniformly covered with microtrichia (Fig. 8) 2
- Fore wing not uniformly covered with microtrichia, microtrichia absent from basal area and between veins except for apical area (Fig. 9) 5
2. Abdominal tergites with transverse sculpture lines bearing microtrichia, body and antennal segments I–IV almost entirely pale *kinape* sp.n.
- Abdominal tergites with anastomosing striae or reticles, at least partly reticulate; body never entirely pale 3
3. Antennal segments III and IV each with a simple sense cone; fore wing grayish brown with a white cross band *minowai*
- Antennal segments III and IV with forked sense cones; fore wing differently colored 4
4. Antennal segment VI cylindrical but tapering in distal third; fore wing dark brown with basal fifth pale; abdominal tergites V–VII without large doughnut-like pale areas *amamiensis*
- Antennal segment VI constricted at base, widest near base and gradually narrowing forward to apex; fore wing dark brown with three small pale areas (one beyond middle, and two in proximal third); abdominal tergites V–VII usually with two large doughnut-like pale areas *magnoliae*
5. Antennal segments III and IV with rows of microtrichia; segment II with subbasal seta on dorsal surface, fore wing scale without microtrichia medially *latimaculatus*
- Antennal segments III and IV without rows of microtrichia; segment II without subbasal seta on dorsal surface, fore wing scale uniformly covered with microtrichia *utari*

Dendrothrips kinape sp. n.

(Figs 1–7)

Female macroptera. Distended body length about 1.0 mm. Body uniformly pale; antennal segments I to IV pale, segment V pale with extreme distal area light brown, segment VI brown with base pale, segments VII to IX brown; all femora and tibiae pale; all tarsi pale with distal area light brown; fore wing pale; prominent body setae pale.

Head (Fig. 1) L/W 0.4–0.5 (holotype: 0.5); dorsal surface irregularly reticulate near posterior margin but almost smooth within ocellar triangle; cheeks slightly narrowed postward; ocellar setae pair I absent, pairs II and III minute, pair II in front of fore ocellus, pair III situated in front of posterior ocelli; dorsal length of compound eyes about 0.7–0.8 times head length (holotype: 0.7 times). Distance between posterior ocelli and posterior margin of head 0.5 times as long as distance between posterior ocelli. Antennae (Fig. 2) 9-segmented; segments III and IV with forked sense-cones on outer and dorsal surfaces, respectively, segment VI with a long conspicuous simple sense-cone on inner side that extends practically to the apex of IX, and segment VIII with a thinner cone on outer side near base extending to beyond the tip of IX; segments III to VI each with two to four rows of microtrichia on dorsal and ventral surfaces. L/W of antennal segments I to IX (holotype) 1.9–2.3 (1.9), 1.0–1.2 (1.2), 0.5–0.8 (0.6),

0.6–0.8 (0.7), 0.6–0.8 (0.7), 0.5–0.6 (0.6), 1.0–1.4 (1.2), 0.7–1.0 (0.8), 0.3–0.5 (0.4), respectively. Maxillary palpi 2-segmented. Pronotum (Fig. 1) L/W 0.5–0.6 (holotype: 0.5), weakly sculptured with transverse anastomosing striae, and with internal granules on anterior half, without elongate setae, with 13–17 discal setae (holotype: 14); 5 pairs of posteromarginal setae. Mesonotum (Fig. 3) with transverse anastomosing striae and no wrinkles between striae, with campaniform sensilla. Metascutum without campaniform sensilla, sculptured with widely spaced longitudinal anastomosing striae. Fore wings (Fig. 4) uniformly covered with microtrichia except a transverse narrow area on first vein at basal one-fifth, with costal margin down turned; costal vein with 25–30 minute setae (holotype: left wing 29, right wing 26); first vein with two to three basal and two distal setae; second vein without setae; scale with two to three (holotype: three) veinal setae and one discal seta. Tarsi 1-segmented.

Abdomen tergites II to VIII (Fig. 5) sculptured with transverse striae, only partly anastomosing striae sparsely having microtrichia at outside of S2 setae and a few striae at middle, microtrichia distinct at each side and posterior segments, without wrinkles between the lines; tergites III to VIII with six pairs of setae: tergite VIII with posteromarginal comb complete; tergite IX 1.8–2.3 times as long as X (holotype: 2.0), with numerous microtrichia in posterior two-thirds, S1 setae longer than S2 setae; tergite X not divided, with paired campaniform sensilla and microtrichia; sternites II–VII sculptured with transverse striae; posteromarginal setae of sternum VII (Fig. 6) situated ahead of posterior margin, S1 setae closer to S2 setae than each other. Ovipositor 1.7–1.9 times as long as pronotal median length (holotype: 1.7 times).

Male. Unknown.

Measurements (holotype female in microns). Distended body length 967. Head length 87, width across cheeks 174; compound eye dorsal length 63, width 45; distance between posterior ocelli 52; distance between posterior ocelli and posterior margin of head 25; antennal length 168. Pronotum length 104, width 213. Fore wing length 733. Abdominal tergite IX length 62; S1, S2 setae lengths 55, 40, respectively; tergite X length 31. Ovipositor length 181. Length of antenna 170; length (Width) of antennal segments I to IX 14 (25), 26 (30), 29 (18), 25 (16), 27 (18), 24 (14), 6 (8), 8 (6), 11 (4), respectively.

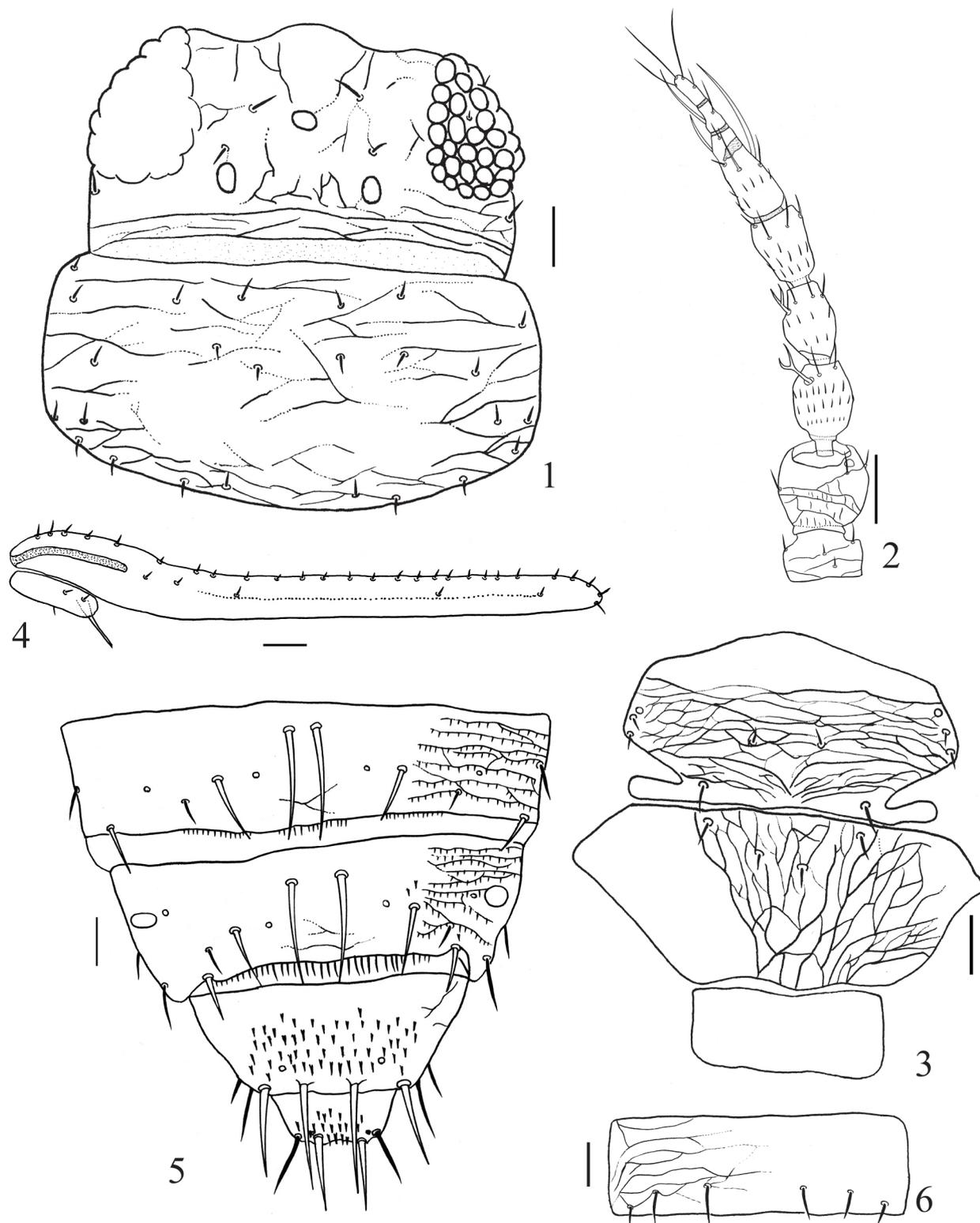
Type series. Holotype female: Japan, Hokkaidô, Sapporo City, Hokkaido University, on *Oryza sativa*, 28-VII-2018, S. Nakazaki. Paratypes: 22 females, same data as for holotype. These types are deposited in the Hokkaido University Insect Collection, Sapporo, Japan.

Non-paratypic specimens: Hokkaidô, Sapporo City, Hokkaido University, 6-VI-2019, 1 female, 7-VI-2019, 1 female from *Poa annua*, by S. Noguchi.

Remarks. *D. kinape* (Fig. 7) is very conspicuous by its entirely pale colored body and fore wing, whereas the species of *Dendrothrips* generally have the body and fore wing pigmented. This species shares several features with *D. oleae* from South Africa as follows: pale body including legs and fore wing, fore wing almost uniformly covered with microtrichia except basal area, and abdominal tergites with transverse sculpture lines bearing microtrichia (Faure 1960, zur Strassen 1968). However, *D. kinape* can be distinguished clearly from *D. oleae* by the entirely pale body, antennal segments III–V pale, VI with long inner sense cone, and the fore wing second vein without setae, whereas in *D. oleae*, abdominal tergites laterally with grayish markings, antennal segments III–IX brown, VI with inner sense cone just reaching to base of segment IX, and the fore wing second vein with 3 setae. Moreover, in *D. oleae*, sculpture lines on the pronotum are more distinct, and the pronotal posteroangular setae are relatively long. *Dendrothrips priesneri* from Canary Islands is also similar to *D. kinape* by uniformly pale body color and the antennal segment VI with long inner sense cone, but it differs from the new species by having more slender head, 1.4–1.5 times as wide as long (1.9–2.3 times in *D. kinape*), longer antenna, 208–221 μm (163–172 μm in *D. kinape*), the fore wing first vein with 9–10 setae and second vein with 4–5 setae, and metascutum distinctly reticulate (zur Strassen 1965).

In many species of *Dendrothrips*, the abdominal tergites are more or less reticulate, and the striated condition appears to be exceptional. Tergite sculpture and relationships among *Dendrothrips* species were discussed by Wang *et al.* (2019), who suggested that similar sculpture on the abdominal tergites might indicate close relationships. On this basis there might be a relationship between *D. oleae* and *D. kinape*, both of which have transverse striae without inner markings and ridges on lines. However, their disjunct distribution and the difference in their host plants contradicts this view. Many *Dendrothrips* species, including *D. oleae*, are associated with trees and shrubs (Marullo 2003). However, *D. kinape* was collected from a paddy field (*Oryza sativa* with almost no other weeds) surrounded by Poaceae weeds. There were many poplar trees around this paddy field, but *D. kinape* has not been collected from the leaves of these or any other trees around the paddy field. However, larvae have not been collected from *Oryza*, and no feeding damage was observed. Moreover, in May and June many adults of this new species were collected

from dead branches of poplar that had been cut in August and September and left through winter. The species thus possibly overwinters as pupa or adult. Further research is needed to establish the true host plant of this thrips, and confirm its relationship to Poaceae. All known host plants of *Dendrothrips* species are Dicotyledoneae (Marullo 2003), and the adults recorded here represent the first example of a *Dendrothrips* species possibly associated with a monocotyledonous plant. In contrast, species of the Dendrothripinae genus *Edissa* Faure are known to be associated with grasses (Mound 1999).



FIGURES 1–6. *Dendrothrips kinape*, female. (1) Head and pronotum; (2) Antenna; (3) Meso and metanota; (4) Fore wing; (5) Tergites VII–X; (6) Sternite VII.

Etymology. The species epithet “kinape” means “dew” in the language of Ainu, the native Hokkaidō people (Hattori 1981).

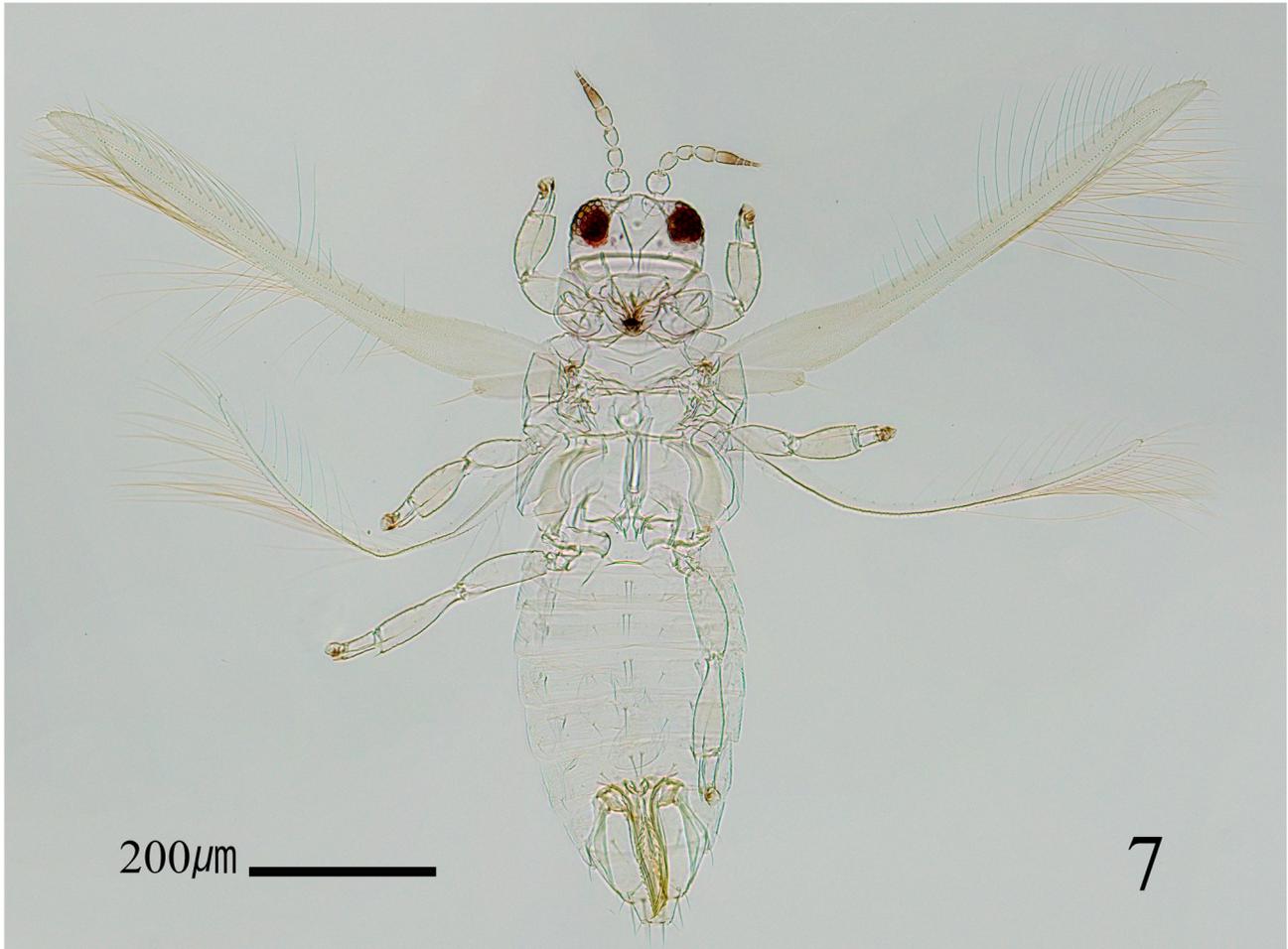
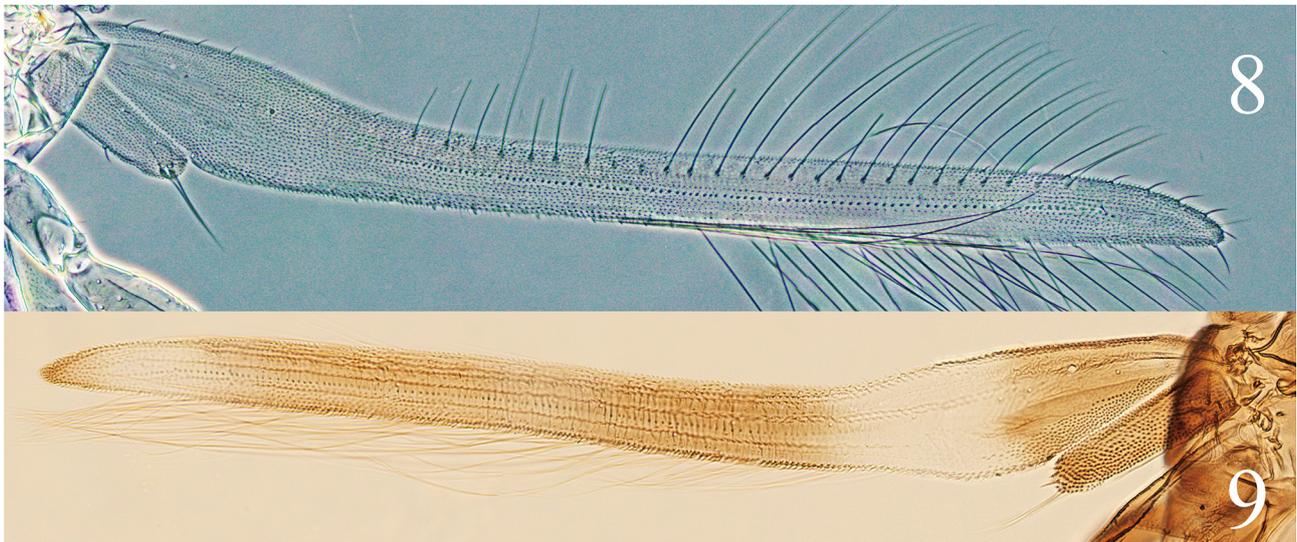


FIGURE 7. *Dendrothrips kinape*, female.



FIGURES 8–9. Fore wings of *Dendrothrips*, female. (8) *Dendrothrips kinape*; (9) *D. utari*.

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Reference

- Faure, J.C. (1960) Thysanoptera of Africa—4. *Journal of the Entomological Society of Southern Africa*, 23 (2), 237–277.
- Kannari, M. (1981) Sky and Weather. In: Hattori, S. (Ed.), *An Ainu dialect dictionary*. Iwanami Shoten, Publishers, Tokyo, pp. 1–230. [in Japanese]
<https://doi.org/10.11501/2503388>
- Kudo, I. (1984) The Japanese Dendrothripini with descriptions of four new species (Thysanoptera: Thripidae). *Kontyû*, 52, 387–505.
- Marullo, R. (2003) Host relationships at plant family level in *Dendrothrips* Uzel (Thysanoptera: Thripidae: Dendrothripinae) with a new Australian species. *Australian Journal of Entomology*, 42, 46–50.
<https://doi.org/10.1046/j.1440-6055.2003.00321.x>
- Masumoto, M. & Okajima, S. (2003) Two new Dendrothripinae (Insecta: Thysanoptera: Thripidae) from Japan. *Species Diversity*, 8, 35–46.
<https://doi.org/10.12782/specdiv.8.35>
- Mirab-balou, M., Tong, X., Feng, J. & Chen, X.-X. (2011) Thrips (Insecta, Thysanoptera) of China. *Check List*, 7 (6), 720–744.
<https://doi.org/10.15560/11009>
- Mound, L.A. (1999) Saltatorial leaf-feeding Thysanoptera (Thripidae: Dendrothripinae) from Australia and New Caledonia, with newly recorded pests of ferns, figs and mulberries. *Australian Journal of Entomology*, 38, 257–273.
<https://doi.org/10.1046/j.1440-6055.1999.00112.x>
- Mound, L.A. & Tree, D.J. (2016) Genera of the leaf-feeding Dendrothripinae of the world (Thysanoptera, Thripidae), with new species from Australia and Sulawesi, Indonesia. *Zootaxa*, 4109 (5), 569–582.
<https://doi.org/10.11646/zootaxa.4109.5.5>
- Nonaka, T. & Okajima, S. (1991) Descriptions of two new species of the genus *Dendrothrips* Uzel (Thysanoptera, Thripidae) from Japan and Taiwan. *Bulletin of the Biogeographical Society of Japan*, 46, 1–22.
- Okajima, S. (2006) *Microscope slide preparation. The Insects of Japan. Vol. 2. The suborder Tubulifera (Thysanoptera)*. Touka Shobo Co Ltd., Fukuoka, pp. 24–25.
- Wang, Z., Mound, L.A. & Tong, X. (2019) Character state variation within *Dendrothrips* (Thysanoptera: Thripidae) with a revision of the species from China. *Zootaxa*, 4590 (2), 231–248.
<https://doi.org/10.11646/zootaxa.4590.2.2>
- zur Strassen, R. (1965) Die erste *Dendrothrips*-Art von den kanarischen Inseln (Insecta, Thysanoptera, Thripidae). *Senckenbergiana Biologica*, 46 (4), 273–277.
- zur Strassen, R. (1968) Tabellarische Arten-Übersicht der Fransenflügler Gattung *Dendrothrips* Uzel, 1895 (Thysanoptera: Thripidae). *Journal of the Entomological Society of Southern Africa*, 31, 213–220.