



Key to world *Stictothrips* species with description of a new species from Iran (Thysanoptera: Phlaeothripidae)

KAMBIZ MINAEI¹ & LAURENCE MOUND²¹Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, Iran.✉ kminaei@shirazu.ac.ir; <https://orcid.org/0000-0002-0168-178X>²CSIRO Australian National Insect Collection, PO Box 1700, ACT 2601, Australia.✉ laurence.mound@csiro.au; <https://orcid.org/0000-0002-6019-4762>

Abstract

An illustrated key is provided to distinguish seven species of the genus *Stictothrips* Hood. Information is provided concerning the distribution and variation among these fungus-feeding thrips, and a new species of the genus, *S. denaeus* sp. n., is described from both sexes collected in Kohgiluyeh and Boyer-Ahmad province, south-west of Iran.

Key words: new species, fungus-feeding thrips

Introduction

Seven species are recognized here in the genus *Stictothrips*, including one new species (ThripsWiki 2020). The type species of the genus, *S. maculatus* (Hood), is from North America, but the other six species have been found widely across the world (Table 1). These species are all fungus-feeding, and most of them are known from few specimens, with two species based on single individuals. The pattern of character state variation amongst these species is curious (see below), leading to a consideration that the species may not be congeneric; that is, the seven species do not represent a lineage derived from a single common ancestor. However, they share a curious fore wing shape, with this wing constricted at about one-third of its length from the base and sharply bent at that point, although *S. aoristus* is known only from a micropterous female and *S. farsi* is known only from apterae. Antennal segments III and IV bear one and two sense cones, respectively, but segment VIII is closely joined to VII in *S. aoristus* and *S. farsi* but long and slender in the other species. The body colour of most species is yellow with a variable pattern of brown spots, but *S. aoristus* and *S. maculatus* are almost uniformly brown. The maxillary stylets are deeply retracted into the head and close together medially, except that in *S. namadji* they are wide apart. The notopleural sutures on the pronotum are typically incomplete in this genus but are complete in *S. aoristus* and *S. farsi*. Abdominal segment X, the tube, is typically long and slender but in *S. aoristus* and *S. farsi* it is much shorter. Despite *S. aoristus* and *S. farsi* sharing several unusual character states, they come from such widely separated parts of the world (Table 1) that they seem unlikely to be particularly closely related. All of the *Stictothrips* species have complex body sculpture although this varies in intensity. The variation among these character states does not correlate in any sensible way, and so the interpretation of the genus as a single lineage is retained here. The relationships of this lineage to other genera of Phlaeothripinae remain obscure. Stannard (1957) suggested a relationship between *Stictothrips* and *Neurothrips*, and members of these two genera share a similar form of fore wing, sharply angled medially. But, in discussing the *Idiothrips* genus-group, Mound and Tree (2015) reported a rather similar wing form in species of *Strepterothrips*. However, *Neurothrips* species have three sense cones on antennal segments III and IV, there are no prosternal basantra, and there are three pairs of wing-retaining setae on the tergites; this genus is probably related to *Phlaeothrips* and similar genera. In contrast, *Stictothrips* species have only one sense cone on III and two on IV, the prosternal basantra are present but weak, and the tergites bear two pairs of wing-retaining setae.

Material and methods

Most photomicrographs and measurements were made using an Olympus BX51 phase-contrast microscope with DP27 digital camera and cellSens software. Figures 16 and 17 were prepared with a Leica DM2500 microscope with Nomarski illumination and processed with Automontage software. Figure 18 was copied from Mound *et al.* (2019). Some major pronotum setae are difficult to measure so marked by “?”. The holotype of the new species is deposited in the Natural History Museum, London, United Kingdom (NHM). Paratypes are deposited in the Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, Iran (PPSU). Full nomenclatural information about Thysanoptera is available at ThripsWiki (2020).

TABLE 1. Species of *Stictothrips* Hood.

Species	Distribution
<i>aoristus</i> Mound & Tree, 2015	Australia (Queensland)
<i>denaeus</i> sp.n.	Iran
<i>farsi</i> Hakimara, Minaei, Sadeghi & Mound, 2019	Iran
<i>faurei</i> Hood, 1925	India, Iran, South Africa, Timor
<i>leopardinus</i> Priesner, 1932	Egypt
<i>maculatus</i> (Hood, 1909)	USA (California, Colorado, Michigan, New York, Oregon)
<i>namadji</i> Mound & Tree, 2015	Australia (Australian Capital Territory)

Key to species of *Stictothrips*

(*leopardinus* not examined)

1. Body brown (Fig. 14) 2
- Body bicoloured (Figs 1, 6, 13) 3
2. Antennal segment VIII broadly joined to VII; notopleural sutures complete *aoristus*
- Antennal segment VIII lanceolate (Fig. 18); notopleural sutures incomplete *maculatus*
3. Post ocular setae developed but not extending beyond hind margin of eye (Fig. 15); notopleural sutures complete; sternite VIII of male with pair of round pore plates (Fig. 16) *farsi*
- Post ocular setae not developed; notopleural sutures incomplete; sternite VIII of male with one median pore plate (Fig. 12) 4
4. Head with maxillary stylets about 50% of head width apart (Fig. 17); fore tarsal tooth not developed in either sex (Fig. 17) *namadji*
- Head with maxillary stylets close together medially (Figs 2, 15, 19); fore tarsal tooth developed in both sexes (Figs 2, 9, 10, 19) 5
5. Antennal segment VII as uniformly brown as VI and VIII (Fig. 7); tube uniformly brown (Fig. 4) *denaeus* sp.n.
- Antennal segment VII sharply paler than VI and VIII (Fig. 20); tube brown only on distal half (Fig. 21) 6
6. Head with cheeks strongly convex and swollen (Fig. 19); antennal segment III at least 2.5 times as long as wide (Fig. 20) *faurei*
- Head with genae not swollen but weakly convex (cf. Fig. 15); antennal segment III about 2.0 times as long as wide *leopardinus*

Stictothrips denaeus sp. n.

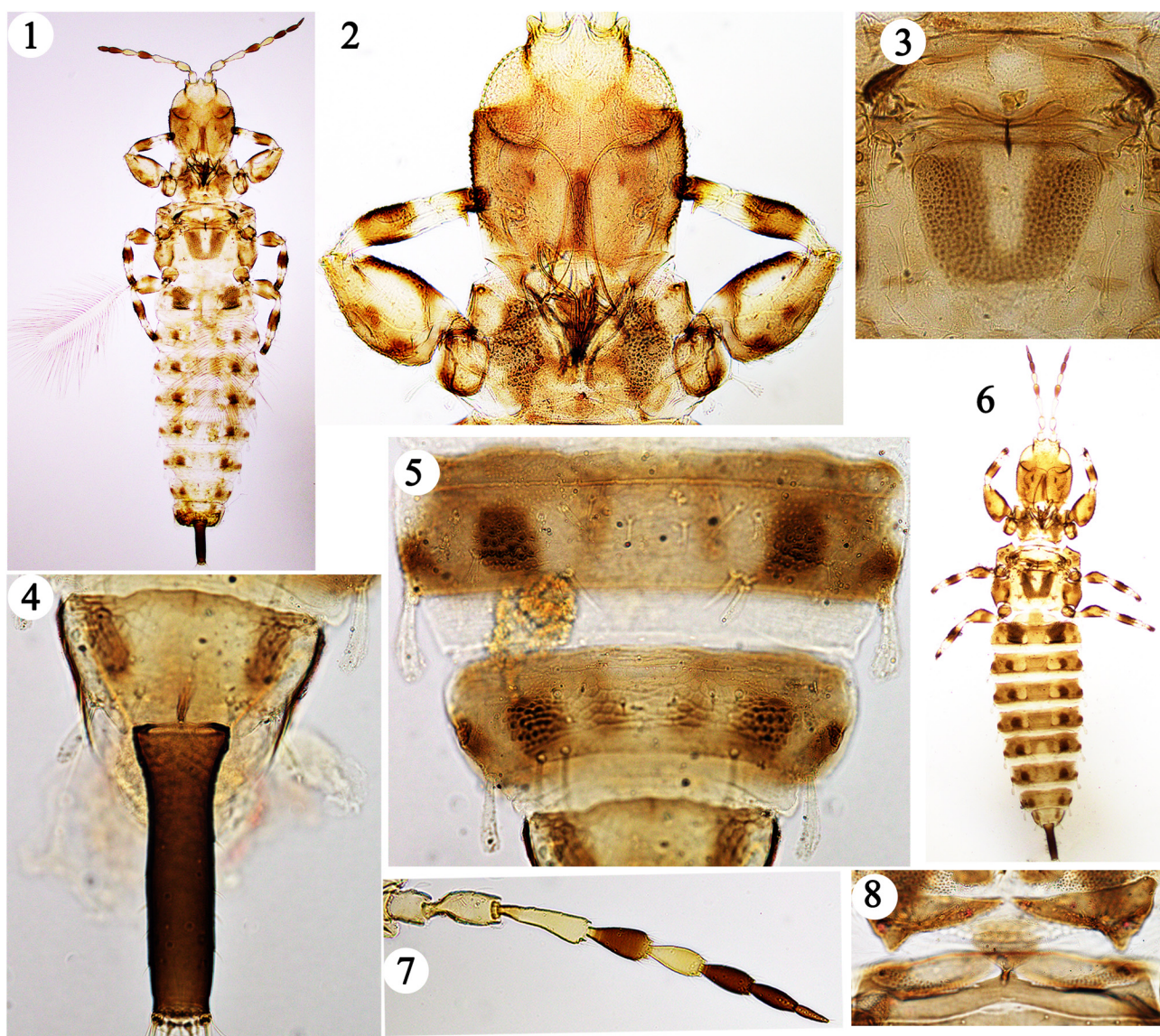
Female macroptera (Fig. 1). Body light brown with complex reticulate sculpture, legs and antennae bicoloured; basal and distal part of tibiae yellow, tarsi brown; antennal segments I–III and V almost yellow, other segments brown (cf. Fig. 7), all major setae pale (Fig. 5). Antennae 8-segmented, III with one sense cone, IV with two major sense cones, VIII narrowed at base but not constricted (cf. Fig. 7). Head longer than wide, post ocular setae not developed; mouth cone short; maxillary stylets close together medially (Fig. 2). Pronotum with 4 pairs of relatively broadly expanded, fan-shaped major setae (anteroangulars, midlaterals, epimerals, and posteroangulars), epimerals longest, anteromarginals not developed; notopleural sutures incomplete. Fore tarsal tooth developed (Fig. 2). Metanotum has a striking U-shaped marking (Fig. 3). Metathoracic sternopleural sutures extend posteriorly from the mid-coxal cavities. Prosternal ferna transverse, not meeting medially; mesopresternum transverse (Fig. 8). Fore wing constricted sub medially, without duplicated cilia. Pelta bell shaped, reticulate with a pair of campaniform

sensilla (cf. Fig. 11); abdominal tergites II–VII with two pairs of wing-retaining setae, segment IX with seta S1 and S2 broadly capitate, tube long, at least three times longer than basal width but shorter than head (Fig. 4).

Measurements (holotype macropterous female in microns): Body distended length 1785. Head, length 275; width across genae 235. Pronotum, length 180; median width 280; major setae, anteroangulars 20, midlaterals 20, epimerals 40, posteroangulars 30. Fore wing length 610. Tube length 160; basal width 55. Antennal segments I–VIII length 40, 65, 87, 60, 60, 50, 47, 37.

Female microptera. Very similar to macroptera, including the pelta (Fig. 6).

Male macroptera. Generally similar to female but smaller and a little paler. Fore tarsal tooth variable, as female or less developed than female (Figs 9–10); sternites VII and VIII with large median but weakly defined pore plate (Fig. 12). Aedeagus spoon shaped.

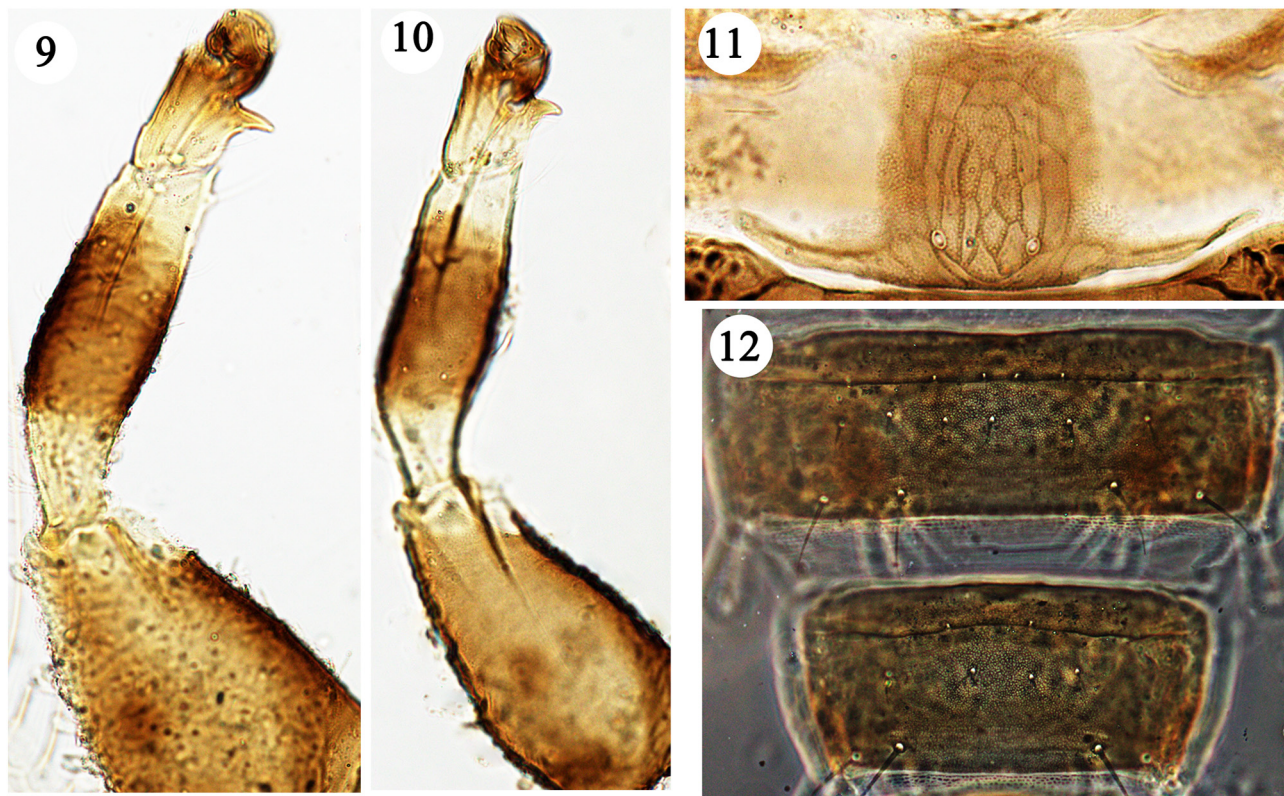


FIGURES 1–8. *Stictothrips denaeus* sp.n., macropterous and micropterous female. Macropterous: (1) Body; (2) Head, pronotum and prolegs; (3) Meso & metanotum; (4) Abdominal tergite IX and tube; (5) Abdominal tergites VII and VIII. Micropterous: (6) Body; (7) Antenna; (8) Ferna & mesopresternum.

Measurements (paratype male in microns): Body distended length 1620. Head, length 240; width across genae 200. Pronotum, length 115; median width 230; major setae, anteroangulars ?, midlaterals ?, epimerals 40, posteroangulars 25. Fore wing length 530. Tube, length 130; basal width 45. Antennal segments I–VIII length 35, 60, 80, 58, 53, 50, 48, 30.

Male microptera. Very similar to macroptera.

Material studied. Holotype macropterous female, IRAN, Kohgiluyeh and Boyer-Ahmad province, Kareyak (30.8179° N, 51.4178° E), *Platanus orientalis* (twigs), 23.viii.2017 (KM 1699) (in NHM).



FIGURES 9–12. *Stictothrips denaeus* sp.n., macropterous male: (9–10) Fore leg; (11) Pelta; (12) Abdominal sternites VII–VIII.

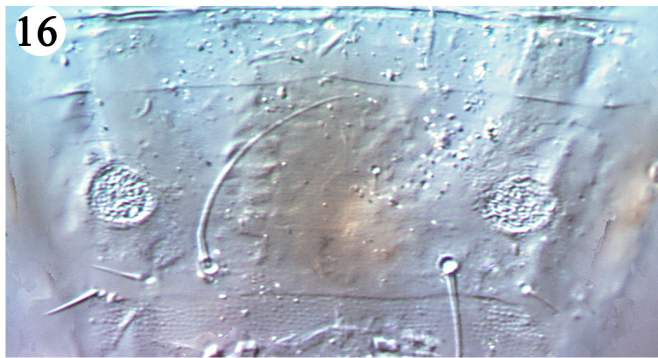
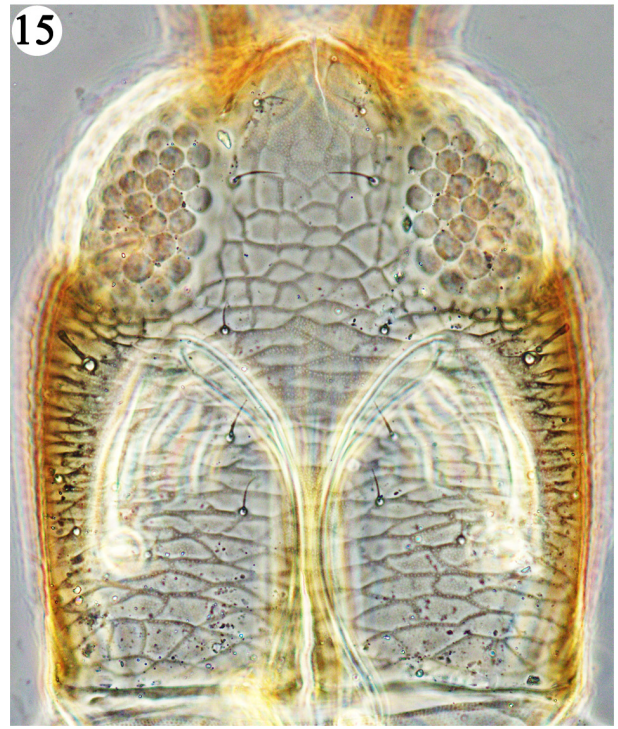
Paratypes: 1 male (macropterous), same data as holotype; 1 female (macropterous), 1 female (micropterous), 3 males (macropterous), 2 males (micropterous), same locality and plant, 24.v.2018 (KM 1906) (in PPSU).

Comments. The new species described here is similar to the type species of the genus, *maculatus*, in having the tube uniformly brown and antennal segment VII as brown as VI and VIII. These character states distinguish it from *S. faurei* and *S. leopardinus* but the shape of the genae on the head is intermediate between these two species. It shares with *leopardinus* the form of the U-shaped brown marking on the metanotum, whereas in *faurei* there are two separate brown marks on the metanotum. However, it shares with *faurei* a slender antennal segment III whereas Priesner (1932) described and clearly illustrated this segment for *leopardinus* as shorter and stouter.

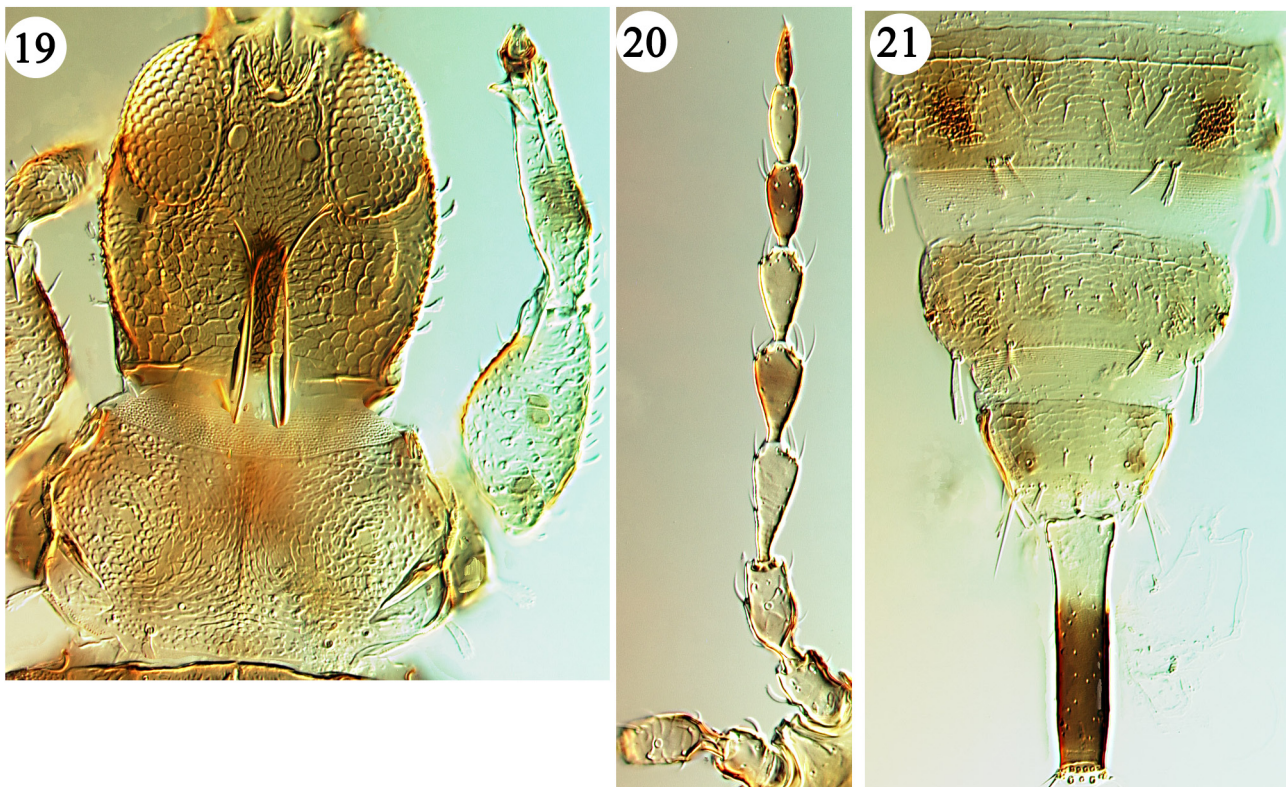
Etymology. Dena is the name for a sub-range within the Zagros Mountains. Mount Dena is situated on the boundary of three provinces of Iran: Isfahan, Kohgiluyeh and Boyer-Ahmad and Chaharmahal and Bakhtiari. This mount has more than 40 peaks higher than 4000 meters.

Acknowledgment

The authors wish to express their thanks to Adriano Cavalleri (Universidade Federal do Rio Grande, Brazil) as well as two anonymous reviewers for their valuable comments that allowed us to improve the quality of the paper.



FIGURES 13–18. (13) *Stictothrips farsi*, female; (14) *S. aoristus*, female; (15) *S. farsi*, head, female; (16) *S. farsi*, sternite VIII, male; (17) *S. namadji*, head & pronotum, female; (18) *S. maculatus*, antenna, female.



FIGURES 19–21. *Stictothrips faurei*, female: (19) Head, fore leg & pronotum; (20) Antenna; (21) Abdominal tergites VII–X.

References

- Hakimara, M., Minaei, K., Sadeghi, S. & Mound, L. (2019). Fungus-feeding thrips in Iran with a new species of *Stictothrips* (Thysanoptera: Phlaeothripidae). *Zootaxa*, 4652 (3), 557–567.
<https://doi.org/10.11646/zootaxa.4652.3.11>
- Hood, J.D. (1909) A new genus and a new species of North American Phloeothripidae (Thysanoptera). *Entomological News*, 20, 249–252.
- Hood, J.D. (1925) On some new Phloeothripidae (Thysanoptera) from the Transvaal. *Psyche*, 31, 293–301.
<https://doi.org/10.1155/1924/29195>
- Mound, L.A., Hoddle, M.S. & Hastings, A. (2019) *Thysanoptera California* - Thrips of California. Lucidcentral.org, Identic Pty Ltd, Queensland. Available from: https://keys.lucidcentral.org/keys/v3/thrips_of_california_2019/index.html (accessed 20 April 2020)
- Mound, L.A. & Tree, D. (2015) Fungus-feeding Thysanoptera: Phlaeothripinae of the *Idiothrips* genus-group in Australia, with nine new species. *Zootaxa*, 4034, 325–341.
<https://doi.org/10.11646/zootaxa.4034.2.5>
- Priesner, H. (1932) Contribution towards a knowledge of the Thysanoptera of Egypt, VI. *Bulletin de la Societe Royale entomologique d’Egypte*, 16, 17–23.
- Stannard, L.J. (1957) The phylogeny and classification of the North American genera of the sub-order Tubulifera (Thysanoptera). *Illinois Biological Monographs*, 25, 1–200.
<https://doi.org/10.5962/bhl.title.50287>
- ThripsWiki (2020) *providing information on the World’s thrips*. Available from: <http://thrips.info/wiki/> (accessed 16 April 2020)