Zootaxa 4852 (2): 239–245
https://www.mapress.com/j/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4852.2.10
http://zoobank.org/urn:lsid:zoobank.org:pub:FF7918E8-AD57-4C71-BB5D-4480190AB9E2

Character state variation among species of *Thrips* genus (Thysanoptera) in Malaysia, with one new species and two new records

Y. F. NG[1] & L. A. MOUND[2]
[1]*Centre for Insect Systematics, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.*
[2]*Australian National Insect Collection, CSIRO, Canberra, ACT 2601, Australia.*
[1] *ng_yf@ukm.edu.my; https://orcid.org/0000-0001-9895-415X*
[2] *laurence.mound@csiro.au; https://orcid.org/0000-0002-6019-4762*

Abstract

Thrips korbuensis **sp.n.** is described from a high elevated area in Peninsular Malaysia. It shares many character states with *Thrips coloratus* but has 8-segmented antennae and abdominal segment VIII–X uniformly dark. It also shares some features with *Thrips florum*, and variation in some character states used to distinguish species in the *Thrips hawaiiensis* group are discussed. Two species, *Thrips brevistylus* and *Thrips subnudula*, are recorded for the first time from Malaysia, and an updated checklist is provided of 27 species of the genus *Thrips* recorded from Malaysia.

Key words: Thripinae, identification, *Thrips hawaiiensis* group

Introduction

The genus *Thrips* Linnaeus is the most species-rich Thysanoptera genus. The large number of included species, currently almost 300 worldwide (ThripsWiki 2020), often leads to confusing results when trying to identify even some of the common pest species of the Asian tropics. For example, *Thrips florum*, *T. hawaiiensis* and *T. palmi* are all considered species of economic importance in Peninsular Malaysia (Ng & Saiful Zaimi 2018), and *T. parvispinus* is the most abundant species in this area on various ornamental plants (unpublished data in Ng, Y.F. collection). However, collections of each of these four sometimes include samples of individuals that cannot be recognised satisfactorily (Palmer 1992), and each of these species has been collected from a range of different plant species. *Thrips hawaiiensis* is presumably native to Asia, but is clearly polyphagous and was the pollinator in Malaysia of the introduced oil palm trees (*Elaeis guineensis*) before the pollinator weevil, *Elaeidobius kamerunicus,* was introduced in early 1982 (Wahid & Kamarudin 1997). In southeast Asian rainforests the dominant trees are species of the Dipterocarpaceae. Thysanoptera are recorded in the flowers of these trees (Appanah & Chan 1981), and Ng *et al*. (2019) described *Tenothrips keruing* from the flowers of *Dipterocarpus sublamellatus* at Pasoh Forest Reserve, about 70km south of Kuala Lumpur. However, it seems likely that there is a considerable undescribed Thysanoptera fauna in association with these rain forest trees, although this remains largely unexplored, including the host plants on which even the most common species actually breed. The lack of such precise biological data, and hence the absence of reliable data on intra-population structural variation, leads to problems in identifying species of the genus *Thrips*. The objectives here are to consider variation in some character states among the commonly collected species in the *Thrips hawaiiensis* group. We record for the first time from Peninsular Malaysia three further species of genus *Thrips*, one of which is newly described, and present a revised list of *Thrips* species from Malaysia (Table 1).

Several extensive reviews of *Thrips* genus in Asia have been published. These include: Asia Pacific area – 91 species (Palmer 1992); Philippines – 20 species (Reyes 1994); Peninsular Malaysia – 23 species (Mound & Azidah 2009); China – 33 species (Zhang *et al*. 2011); Japan – 36 species (Masumoto & Okajima 2013; 2019). However, use of these keys can lead to inconsistent conclusions. Many of the most common species of this genus are members of the "Group V" of Palmer (1992: 20), particularly those referred to in couplets 79 to 93 of the key to females provided in that paper. Two of the most common species, *T. hawaiiensis* and *T. florum*, are readily distinguished from

Accepted by A. Cavalleri: 17 Aug. 2020; published: 15 Sept. 2020

each other on character states of the fore wing clavus and mesonotum (Bhatti 1999; Mound & Tree 2020). However, the character states involved are not unique to these two species. Similar in structure to these two are *T. coloratus*, *T. razanii* and the new species described below, *T. korbuensis* **sp.n.**, all of which are from Peninsular Malaysia.

Palmer (1992: 51, 53) indicated that in European museum collections she had studied at least 50 unidentified specimens from Asia that she could not assign to any species satisfactorily, due to character state variation. For example, the position of the metanotal median setae, either on or posterior to the anterior margin of this sclerite (Fig. 3), is used as an important key character state (Palmer 1992), but in specimens identified as *T. coloratus* both conditions occur. Similarly, the basal colour of the fore wings is an important key character state, with Palmer (1992) identifying as *florum* and *hawaiiensis* specimens with the fore wings clearly paler at the base. In contrast, the wings of *coloratus* are stated in that key to be "without base distinctly paler". However, in the key to species from Japan (Masumoto & Okajima 2019) *coloratus* is grouped together with *hawaiiensis* after a couplet "fore wing dark with base pale". This difference is presumably partly a matter of interpretation and partly the different effects on slight colour differences resulting from the use of sodium hydroxide solution to clear specimens before slide-mounting. Females of *T. coloratus* collected in various countries between Thailand and Australia often have the basal area of the fore wing less densely pigmented than the median area of the wing, although not "distinctly paler" in the sense of *hawaiiensis*. Another character state used in keys that is occasionally difficult to interpret is the presence or absence on the fore wing of a "long gap" in the first vein setal row. The fore wing of *T. korbuensis* **sp.n.** (Fig. 10) is typical of this problem, and might be interpreted as having, or as not having, such a gap. Also, the curvature of the upper surface of a thrips head often makes it difficult to decide the precise position of ocellar setae pair III, whether outside the ocellar triangle or on the anterior margins of the triangle.

Another key characteristic used in identifying species of genus *Thrips* is the number of lateral marginal setae on the second abdominal tergite, whether three or four. The most common condition involves four setae in a single row along the tergal margin, and this occurs in 50% of the *Thrips* species known from Australia (Mound & Tree 2020) and 45% of those from Britain (Mound *et al*. 2018). However, reduction to three occurs in at least two independent ways. Seta I is commonly the smallest seta in this series, and is situated at the anterior end of the row, where it is closely associated with a campaniform sensilla. However, in some species this seta is absent (*T. physapus*, *T. tabaci*), and in some the seta has apparently migrated ventro-laterally onto the pleurotergite (*T. orientalis, T. parvispinus*). The resultant 3-seta row is not homologous with the 3-seta row found in *T. imaginis* and *T. subnudula*, in which seta III of this row is migrated onto the dorsal surface of the tergite. As a result, these species have across the tergite three pairs of setae in a transverse row. But the position of this migrated seta is variable, in *T. florum* and *T. hawaiiensis*, and apparently also in *T. coloratus*, from slightly to very distinctly dorsal (Figs 6, 7). Further character states that can be significant when distinguishing species in the *T. hawaiiensis* group are the relative lengths of the terminal and sub-terminal setae on the fore wing clavus (Figs 11, 12), the degree of variation in the length of the microtrichia on the posteromarginal comb of tergite VIII (Figs 8, 9), and even the length of the tenth abdominal segment (Fig. 4).

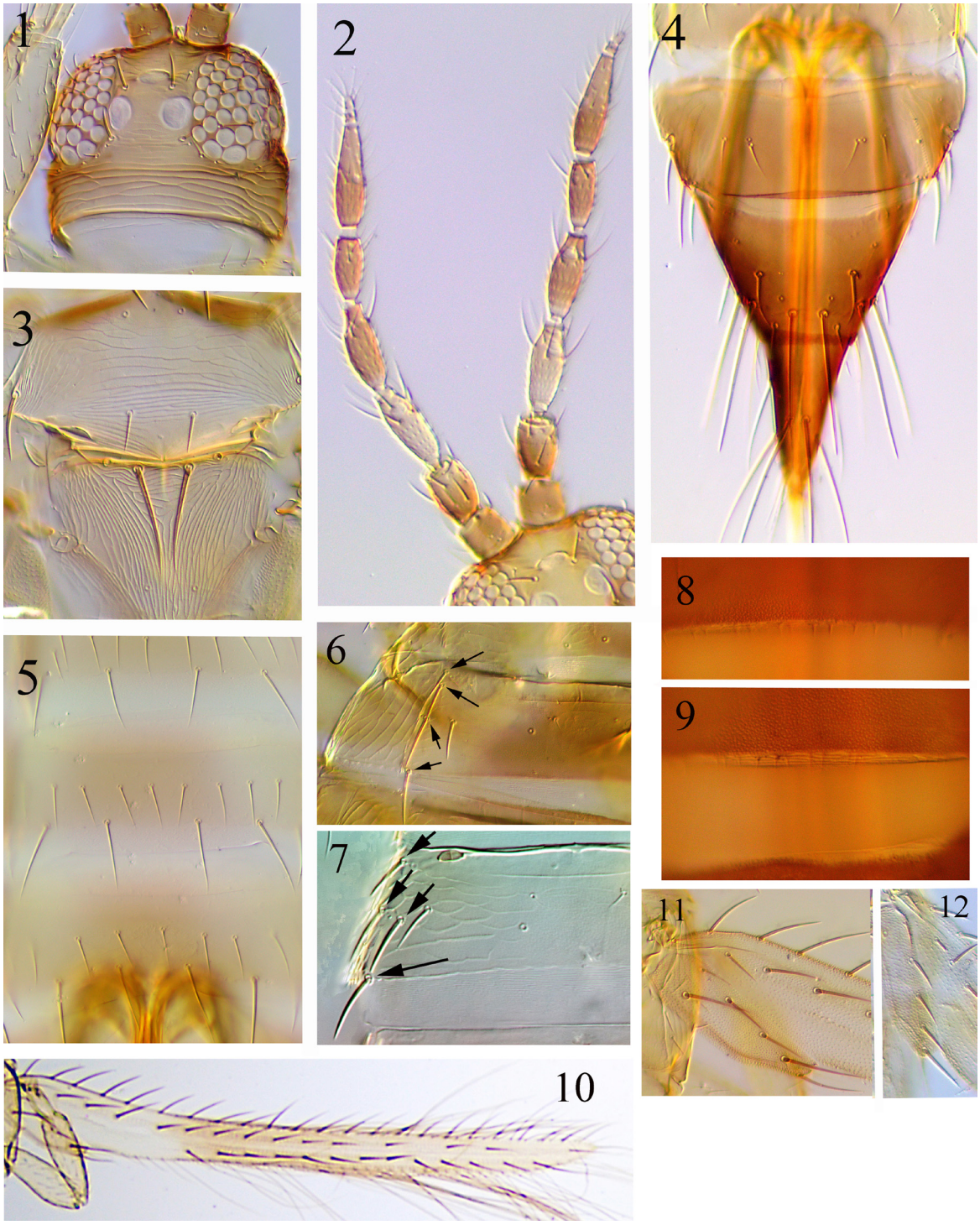
There is thus considerable unreliability in these individual character states that are used to distinguish species, particularly among about 10 species that are structurally similar to *T. hawaiiensis* in the "Group V" of Palmer (1992). Most of these species are distinguished from each other only by a particular combination of character states, not by any unique autapomorphy. Moreover, most of these species have been collected from more than one plant species, and there is little evidence that any of them has a specific host-plant association that might confirm their validity as a distinct species. Without rearing experiments and more detailed field work the significance of the colour and structural variation among populations of "Group V" species, particularly of *coloratus* will remain in doubt.

Nomenclatural details are available in ThripsWiki (2020), and the following abbreviations are used: CPS - campaniform sensilla; ANIC - Australian National Insect Collection, Canberra. CISUKM - Centre for Insect Systematics, Universiti Kebangsaan Malaysia, Bangi.

Thrips korbuensis sp. n.

(Figs 1–12)

*Female macroptera***.** Body bicoloured, abdominal segments VIII–X uniformly brown (Fig. 4), segments II–VII with median area largely brown; legs pale; antennal segments I–II and IV–VIII brown, segment III and apex of II pale (Fig. 2); fore wing basal and apical areas pale, median area largely brown (Fig. 10); major setae on pronotum and



FIGURES 1–12. ***Thrips korbuensis*** **sp.n.** Female (1) Head; (2) Antennal segments I–VIII; (3) Meso- and metanotum; (4) Abdominal tergites VII–X; (5) Sternites V–VII; (6) Tergite II; (8) Tergite VIII (close up of Holotype); (9) Tergite VIII (close up of Paratype); (10) Fore wing; (11) Fore wing clavus. ***Thrips coloratus*** (7) Tergite II; (12) Fore wing clavus.

metanotum dark. Antennae 8-segmented, segments VII–VIII small (Fig. 2). Head wider than long; with faint irregular striations in front of first ocellus but ocellar area smooth; vertex with fine transverse striations (Fig. 1); ocellar setae III outside anterior margins of ocellar triangle; postocular setae arising in a row parallel to eye margin, seta I largest, seta II minute. Pronotum wider than long, with faint transverse striations or almost none medially, fine transverse lines at posterior margin; with more than 20 small scattered discal setae; 2 pairs of long posteroangular setae, posterior margin with 3 pairs of short setae. Mesonotum with fine transverse striations, but no sculpture lines close to anteromedian CPS (Fig. 3). Metanotum transversely striate on anterior half, with longitudinal but more widely

spaced striations on posterior half; median pair of setae stout, at anterior margin, arising closer to lateral pair than to each other, with a pair of CPS (Fig. 3). Fore wing first vein with about 10–12 setae on basal half, 3–4 widely spaced setae on distal half; second vein with 14–17 setae (Fig. 10); fore wing clavus with 4–5 veinal setae and one discal seta, with subapical veinal seta longer than apical seta (Fig. 11). Abdominal tergite I transversely reticulate, CPS close to posterior margin; tergite II with 4 lateral marginal setae (Fig. 6); tergites II–VII with 1 or 2 faint transverse lines anteriorly, but almost no sculpture medially; tergite VIII posteromarginal comb complete but microtrichia unusually small (Figs 8 & 9); tergite IX with 2 pairs of CPS, median pair of setae (S1) not extending beyond apex of X. Pleurotergites without discal setae. Sternites III–VII with about 10 discal setae, II with a pair of discal setae and 3 pairs of marginal setae; sternite VII posteromarginal setae long, S1 arising in front of posterior margin (Fig. 5).

Measurements (holotype female in microns). Body length 1525. Head, length 120; width across eyes 155; ocellar setae III length 22. Pronotum, length 130, width 220; posteroangular setae 70–80; posteromarginal setae 15–28. Metanotum median setae 55. Fore wing, length 760; distal setae on first vein length 40–60. Tergite X length 130. Antennal length 310; segments III–VIII length 58, 55, 41, 63, 6, 10.

Male unknown.

Specimens studied. Holotype female: **MALAYSIA**, Perak, Gunung Korbu (4°69'N, 101°21'E), asl 850 meter, from flowers of Rubiaceae plant, 1–7.vii.2019 (Ng, Y.F.) (in Centre for Insect Systematics, UKM, Malaysia). Paratypes: 4 females all collected with holotype (in CISUKM; Australian National Insect Collection, Canberra, Australia).

Comments. This new species runs to couplet 13 in the key to the species of *Thrips* genus recorded from Peninsular Malaysia (Mound & Azidah 2009). Most of the morphological character states of this new species are shared with the complex of species in "Group V" of Palmer (1992: 20). Using the key in that paper this new species can be tracked to more than one species. If the fore wing first vein setal row (Fig. 10) is interpreted as not having a distinct gap (couplet 75 in Palmer 1992: 14), then this species tracks to *T. samoaensis*. However, that Pacific Island species is described as having a uniformly light brown body. Alternatively, the new species tracks to *T. florum* or even to *T. coloratus*. It shares with *T. florum* the absence of sculpture lines around the mesonotal campaniform sensilla, also the minute size of postocular setae pair II, and moreover it has the sub-apical seta on the fore wing clavus slightly longer than the apical seta. However, it has more numerous setae on the fore wing first vein than *T. florum* both on the basal half and the distal half, and tergite X is unusually long. It is similar to *T. coloratus*, and to most specimens of *T. florum*, in having only seven antennal segments. However, it differs from *T. coloratus* in having the fore wing more sharply pale at the base, and the distal part of the fore wing increasingly pale (Fig. 10). Moreover, *T. coloratus* has lines of sculpture around the mesonotal campaniform sensilla, and the fore wing clavus apical seta is clearly longer than the sub-apical (Fig. 12). The new species is also distinguished by having antennal segments I–II pale brown instead of yellow, abdominal segments VIII–X uniformly dark, and tergite VIII with the microtrichia of the posteromarginal comb unusually small. Another member of this group that was described from various different flowers in Peninsular Malaysia is *Thrips razanii*. This is also similar to *T. florum* in having no sculpture lines around the mesonotal campaniform sensilla, and postocular setal pair II minute, but the fore wing is uniformly dark and not paler at the base, antennal segment III is brown not yellow, the metanotal median setae are closer to each other than to the lateral pair, and the metanotal sculpture is irregular medially.

New Malaysian Records

The following two species are newly recorded from Peninsular Malaysia. The first is known from Java and Philippines (Reyes 1994), whereas the second is widespread from Pakistan to northern Australia.

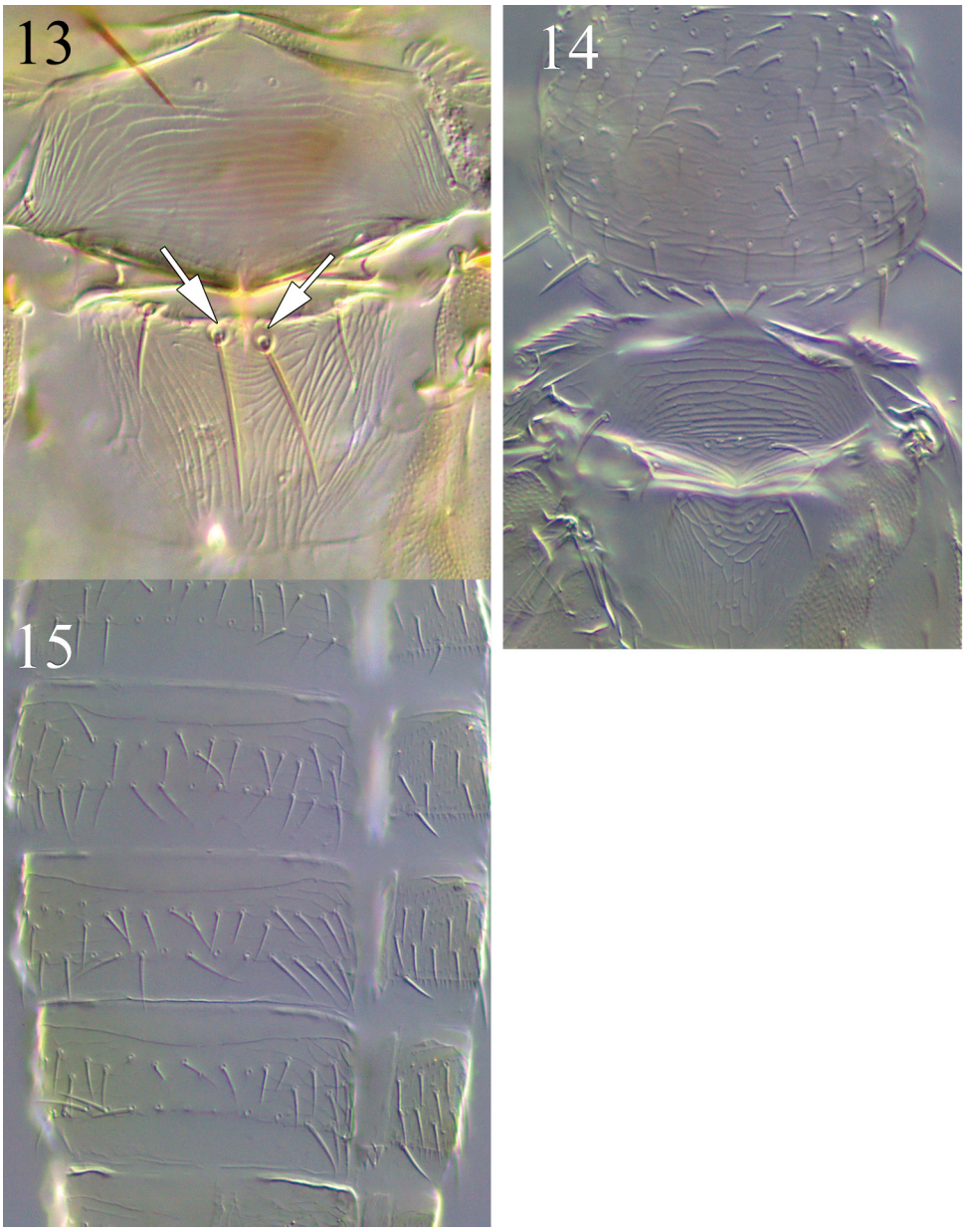
Thrips brevistylus (Priesner)

(Fig. 13)

Described in the genus *Taeniothrips*, this species was recognised by Palmer (1992) as a member of "Group V" in the genus *Thrips*. It is unusual in having the pair of median setae on the metanotum arising closer together than to the lateral pair (Fig. 13), a condition shared with one other species in "Group V". However, the males of *T. pavettae*

are brown (Palmer 1992), whereas the males of *T. brevistylus* are bicoloured (Reyes 1994). Originally from Java, *T. brevistylus* was later recorded from Philippines (Reyes 1994) and is here recorded for the first time from Peninsular Malaysia. Females are uniformly dark, with the fore wings, legs and antennae dark except for segment III that is pale. Males have the body bicolored, with the head, thorax and legs pale, abdominal segments I–VII dark medially, and VIII–X dark.

Specimens studied. MALAYSIA, Kuala Lumpur, Universiti Malaya Campus, 6 males from ?*Aristolochia* sp., 9.vii.2014 (Ng, Y.F.) (in Centre for Insect Systematics, UKM, Malaysia).



FIGURES 13–15. ***Thrips brevistylus*** (13) Meso- and metanotum; ***Thrips subnudula*** (14) Pronotum, meso- and metanotum, (15) abdominal stenites III–VI.

Thrips subnudula **(Karny)**

(Figs 14, 15)

This distinctive species was described from India in a monobasic genus *Ramaswamiahiella* but was placed by Palmer (1992) in her "Group IV" of genus *Thrips*. The species in that group bear an unusually large number of setae, on the pronotum (Fig. 14), sternites and pleurotergites. *T. subnudula* is unusual in having the sternal posteromarginal

setae duplicated, such that there are usually 12 setae across the margins of sternites III–VI. There are 14–16 sternal discal setae, and 4–8 pleurotergal discal setae (Fig. 15). It is a small pale species, with 7-segmented antennae, ocellar setae pair III arising behind the first ocellus, and with the posteromarginal comb on tergite VIII broadly interrupted medially. In India this species is associated with the weedy plant *Parthenium hysterophorus*, but it has been found widely across Asia between Pakistan and northern Australia. It is also recorded from Nigeria (Palmer 1992) and apparently Uganda and South Africa (see zur Strassen list in ThripsWiki 2020), but this is the first record of the species from Malaysia.

Specimens studied: **MALAYSIA**, Selangor, Kajang Utama, 6 females, 3 males without host record, 14.iv.2012 (Ng, Y.F.) (in Centre for Insect Systematics, UKM, Malaysia).

TABLE 1. Species of genus *Thrips* from Malaysia.

Thrips alatus Bhatti, 1980
Thrips alius Palmer, 1992
Thrips aspinus Mound & Masumoto, 2005
Thrips brevistylus (Priesner, 1938)
Thrips coloratus Schmutz, 1913
Thrips decens Palmer, 1992
Thrips facetus Palmer, 1992
Thrips flavus Schrank, 1776
Thrips florum Schmutz, 1913
Thrips hanifahi Mound & Azidah, 2009
Thrips hawaiiensis Morgan, 1913
Thrips javanicus Priesner, 1934
Thrips korbuensis **sp.n.**
Thrips leeuwenii Priesner, 1938
Thrips levatus Bhatti, 1980
Thrips malloti Priesner, 1934
Thrips melastomae Priesner, 1934
Thrips mirus Bhatti, 1967
Thrips morindae Priesner, 1934
Thrips orientalis Bagnall, 1915
Thrips palmi Karny, 1925
Thrips parvispinus Karny, 1922
Thrips razanii Ng, Eow & Mound, 2010
Thrips subnudula (Karny, 1926)
Thrips simplex Morison, 1930
Thrips unispinus Moulton, 1940
Thrips vitticornis Karny, 1922

Acknowledgements

The authors are grateful to Ministry of Education Malaysia (MOHE) via Fundamental Research Grant Scheme (FRGS/1/2018/WAB13/UKM/02/1) for funding thrips research. Thanks to Minerals and Geoscience Department, Perak State and Kinta Valley National Geopark for organising the scientific expedition to Mount Korbu, Perak in 2019. A special thanks to the reviewers for their invaluable comments.

References

Appanah, S. & Chan, H.T. (1981) Thrips: the pollinators of some Dipterocarps. *The Malaysian Forester*, 44**,** 234–252.
Bhatti, J.S. (1999) New characters for identification of the pest species *Thrips hawaiiensis* and *florum* (Terebrantia:

Thripidae). *Thrips*, 1, 31–53.
Masumoto, M. & Okajima, S. (2013) Review of the genus *Thrips* and related genera (Thysanoptera, Thripidae) from Japan. *Zootaxa*, 3678 (1), 1–65.
https://doi.org/10.11646/zootaxa.3678.1.1
Masumoto, M. & Okajima, S. (2019) Three new species of the genus *Thrips* (Thysanoptera, Thripidae) in Japan. *Zootaxa*, 4614 (3), 575–584.
https://doi.org/10.11646/zootaxa.4614.3.9
Mound, L.A. & Azidah, A.A. (2009) Species of the genus *Thrips* (Thysanoptera) from Peninsular Malaysia, with a checklist of recorded Thripidae. *Zootaxa*, 2023 (1), 55–68.
https://doi.org/10.11646/zootaxa.2023.1.4
Mound, L., Collins, D. & Hastings, A. (2018) *Thysanoptera Britannica et Hibernica. A guide to British thrips*. Lucidcentral.org, Identic Pty Ltd, Queensland. Available from: https://keys.lucidcentral.org/keys/v3/british_thrips/ (accessed 19 August 2020)
Mound, L.A. & Tree, D.J. (2020) *Thysanoptera Australiensis—Thrips of Australia*. Lucidcentral.org, Identic Pty Ltd, Queensland. Available from: https://keys.lucidcentral.org/keys/v3/thrips_australia/index.html (accessed 19 August 2020)
Ng, Y.F. & Zaimi, J.S. (2018) The economically important thrips from Malaysia, with a key to species (Thysanoptera, Thripinae). *ZooKeys*, 810, 113–126.
https://doi.org/10.3897/zookeys.810.28457
Ng, Y.F., Ain, N. & Lau, K.H. (2019) A new species of *Tenothrips* pollinating *Dipterocarpus sublamellatus* in Malaysia. *Zootaxa*, 4695 (4), 397–400.
https://doi.org/10.11646/zootaxa.4695.4.9
Palmer, J.M. (1992) Thrips (Thysanoptera) from Pakistan to the Pacific: a review. *Bulletin British Museum Natural History*, Entomology, 61, 1–76.
Reyes, C.P. (1994) Thysanoptera (Hexapoda) of the Philippine Islands. *Raffles Bulletin of Zoology*, 42, 107–507.
ThripsWiki (2020) ThripsWiki-Thrips. Available from: https://thrips.info/wiki/Thrips (accessed 4 July 2020)
Wahid, M.B. & Kamarudin, N.H. (1997) Role and effectiveness of *Elaeidobius kamerunicus*, *Thrips hawaiiensis* and *Pyroderces* sp. in pollination of mature oil palm in Peninsular Malaysia. *Elaeis*, 9 (1), 1–16.
Zhang, H.R., Xie, Y.H. & Bei, Y.W. (2011) Identification key to species of *Thrips* genus from China (Thysanoptera, Thripidae), with seven new records. *Zootaxa*, 2810 (1), 37–46.
https://doi.org/10.11646/zootaxa.2810.1.4