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Most trumpet moths don't feed on plants of the nettle family but *Paratischeria* does: the first discovery of Tischeriidae (Lepidoptera) on Urticaceae in Asia

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Abstract

This is the first record of Urticaceae-feeding trumpet moths (Tischeriidae) from Asia. We describe *Paratischeria boehmerica* Diškus & Stonis, **sp. nov.** and *P. grossa* Diškus & Stonis, **sp. nov.**, two distinctive new species of Tischeriidae recently discovered from Laos, South East Asia, feeding on plants of the nettle family. Urticaceae is a rare host-plant family for leaf-mining Tischeriidae worldwide. The new species are illustrated with photographs of the adults, male and female genitalia, and the leaf mines.

Key words: host plants, leaf mines, taxonomy, trumpet moths

Introduction

Together with other organisms, trumpet moths (Tischerioidea: Tischeriidae) are important for global biodiversity assessments and the compilation of data needed to understand the functioning and links of global biota (Stonis *et al*. 2020b). Tischeriids, however, are still poorly studied in many regions of the world and not well-represented in museum holdings (Stonis *et al*. 2020c). Larvae of trumpet moths are leaf miners and they live and feed inside green (photosynthetic) tissues during all instars. The leaf mines they produce are irregular, usually blotch-like (Fig. 1), but sometimes slender and sinuous or occasionally of another shape (Braun 1972).

For the biological (and morphological) characterization of Tischeriidae, we recommend the monographs by Braun (1972) and Puplesis & Diškus (2003), as well as some more recent papers (Diškus & Stonis 2015; Kobayashi *et al*. 2016; Xu *et al*. 2017; Stonis *et al.* 2019a, 2019b, 2019c, 2020a, 2020b, 2020c, 2021; Stonis & Solis 2020).

The Urticaceae (or the nettle family) is a moderate-sized plant family comprising about 2625 species worldwide (Christenhusz & Bing 2016). It is a pantropical and temperate family comprising herbs, shrubs, trees, lianas, and hemi-epiphytes. The majority of generic and species diversity is found in the tropics, with a centre for species-richness in the Neotropics, and centre of generic diversity in the Indo-Malayan region (Wu *et al*. 2018). Urticaceae are characterised by the combination of stipules, lactifers, flowers comprising a single whorl of sepals that are free or fully fused, and the presence of cystoliths within the palisade mesophyll. These spindle-shaped, crystal-like bodies are composed of cellulose microfibrils heavily impregnated with calcium carbonate, magnesium, and silicon, and may also comprise a sheath of siliceous material (Watt *et al*. 1987). Whilst the role of cystoliths does not appear to have been well studied, they have been proposed to play a role in repelling phytophagous insects (Finley 1999) and light-scattering associated with photosynthesis (Gal *et al*. 2012).

Below we describe and name *Paratischeria boehmerica* Diškus & Stonis, **sp. nov.** and *P. grossa* Diškus & Stonis, **sp. nov.**, two new species of trumpet moths recently discovered from Laos, South East Asia, and characterized by a peculiar biology: feeding in leaves of plants from the Urticaceae family.

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FIGURE 1. Leaf mines on *Boehmeria* sp., sample no. 5319, Laos, Luang Prabang Province, 30 km SW Luang Prabang, elevation ca. 560 m

Material and methods

The descriptions of the new species are based on material deposited at the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN). Paratype specimens of each species were also deposited at the Nature Research Centre, Vilnius, Lithuania (NRC) and the entomological collections of the Nanling Herbarium, Gannan Normal University, China (GNU).

The following protocols for Tischeriidae have been previously described: collecting and rearing of leaf mines by Stonis *et al*. (2018), and techniques of specimen dissection and genitalia mounts in Euparal by Stonis *et al*. (2014). The descriptive terminology, with a few exceptions, follows Puplesis & Diškus (2003).

Permanent preparations on microscope slides were photographed and studied with a Leica DM2500 microscope and Leica DFC420 digital camera. Adults were measured and studied using Lomo stereoscopic microscopes MBS-10 and photographed using a Leica S6D stereoscopic microscope with attached a Leica DFC290 digital camera.

Identifications of the Urticaceae host plants were undertaken by experts in taxonomy of the family with field experience in Asia. Being based exclusively on field photographs (herbarium specimens were not collected and preserved) they should be considered preliminary.

For the morphological characterization of *Boehmeria* and *Dendrocnide* we used Wilmot-Dear & Friis (2013) and Chew (1969) respectively.

Taxonomic accounts

Paratischeria boehmerica Diškus & Stonis, sp. nov.

urn:lsid:zoobank.org:act:2F42E305-3BCE-4818-9786-A2670C17AE62
(Figs. 1–43)

Type material. Holotype: ♂, LAOS: Luang Prabang Province, 30 km SW Luang Prabang, 19°44’58”N, 101°59’22”E, elevation ca. 560 m, mining larva on Urticaceae, 7.ii.2020, ex pupa ii.2020, field card no. 5319, leg. A. Diškus &

M. Jocius, genitalia slide no. AD1055♂ (ZIN). Paratypes: 4 ♀, same label data as holotype, genitalia slide no. AD1062♀ (ZIN); 2 ♂, 1 ♀, 30 km SW Luang Prabang, 19°44’57”N, 101°59’35”E, elevation ca. 460 m, mining larvae on Urticaceae, 7.ii.2020, ex pupa ii.2020, field card no. 5318, leg. A. Diškus & M. Jocius, genitalia slide nos. AD1063♂, AD1064♀ (ZIN); 1 ♂, 1 ♀, Vientiane Province, Vang Vieng, 18°56’03”N, 102°25’32”E, elevation ca. 250 m, mining larvae on *Boehmeria* sp. (Urticaceae), 3.ii.2020, ex pupa ii.2020, field card no. 5309, leg. A. Diškus & M. Jocius, genitalia slide no. AD1036♂ (ZIN); 1 ♂, same label data (NRC); 1 ♂, same label data (GNU).

Diagnosis. *Paratischeria boehmerica* **sp. nov.** belongs to the *P. ferruginea* group designated and described by Stonis *et al*. (2017a). Externally, this new species differs from South American and African members of the group in the yellow-ochre colour of the forewing speckled with dark brown scales; from the most similar South East Asian *P. grossa* **sp. nov.** (described below) it differs in the smaller size and paler colour of the forewing. In the male genitalia, *P. boehmerica* differs from *P. grossa* in the unique, caudally rounded dorsal sclerite (Fig. 31), absence of lobe-like anterior processes of the tegumen, and the truncated basal lobe of the valva (Fig. 30); from the resembling African *P. urticolella* (Ghesquière), the new species differs in the presence of a basal lobe of the valva and significantly less deep apical bifurcation of the phallus. In the female genitalia, the smaller size (about 1045–1330 µm) and the short corpus bursae without distinctive coils distinguish *P. boehmerica* from *P. grossa* (female of *P. urticolella* is unknown).

The new species is also distinctive because no other species in this genus is known to feed on *Boehmeria* Jacq. (Urticaceae) in Asia.

Male (Figs. 22, 23). Forewing length 2.3–2.8 mm; wingspan 5.1–6.2 mm (n = 4).

Head. Frons, palpus, and pecten cream to yellowish brown; frontal tuft and collar pale brownish grey to ochre-brown, sometimes with purple iridescence; antenna slightly longer than one half the length of forewing; flagellum grey-brown to ochre-brown; sensilla very fine, relatively short, inconspicuous.

Thorax. Tegula blackish grey with some purple and blue iridescence, distally pale brown to ochre-brown. Thorax and forewing pale brownish yellow to pale ochre-yellow, occasionally ochre. Along costal margin and apically, forewing densely speckled with dark brown or blackish brown scales with purple and blue iridescence; dark brown scales also sparsely irrorate the rest of forewing and form a small, irregular spot on tornus; fringe dark grey on costal margin, yellow-ochre apically, pale grey on tornus; fringe line distinctive, comprised of dark brown scales or inconspicuous, incomplete; forewing underside dark brown, without spots or androconia. Hindwing grey to pale grey on upper side and underside, without androconia; fringe pale grey. Legs glossy brownish cream, dark grey-brown to blackish brown on upper side.

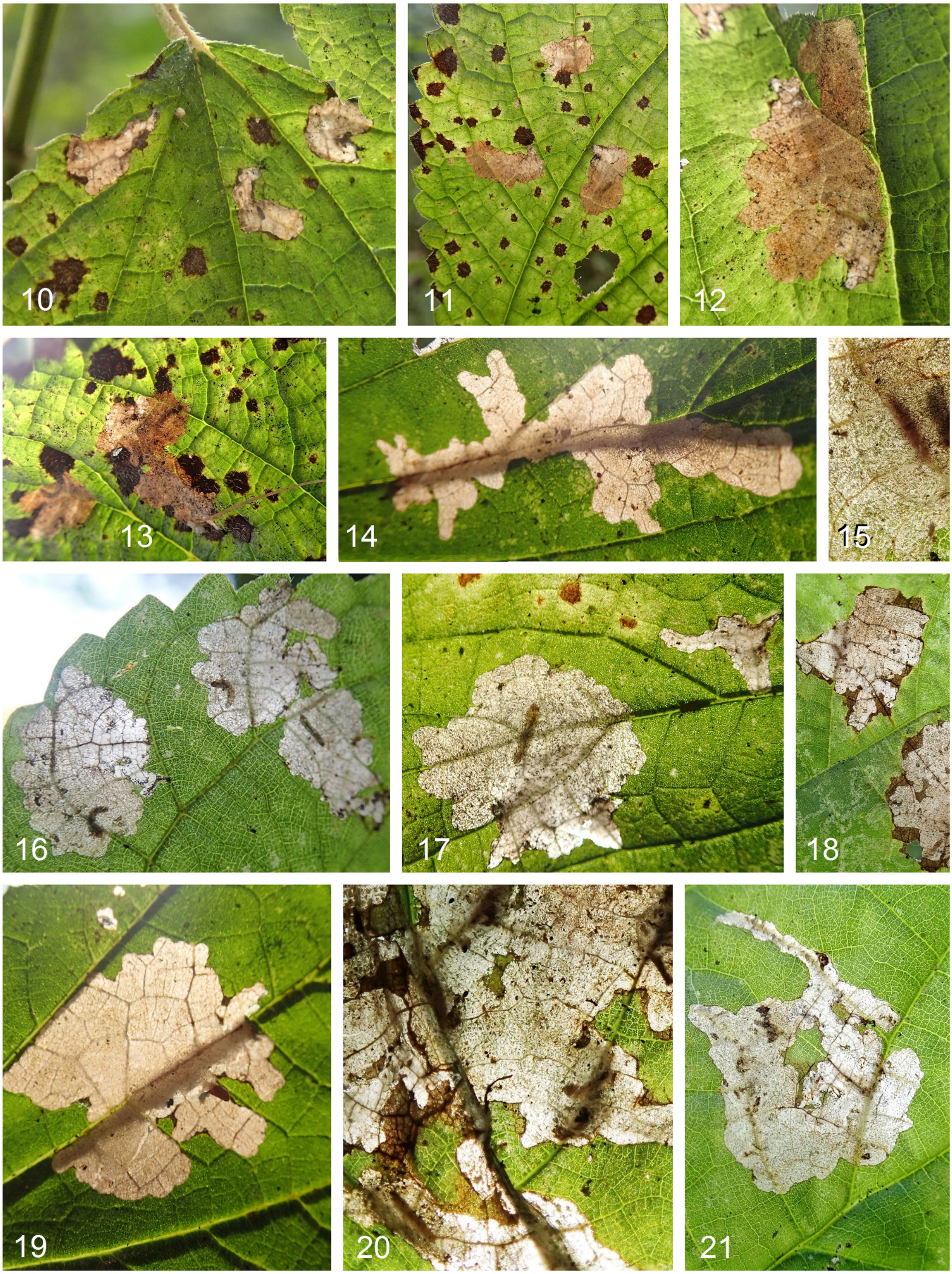
Abdomen. Metallic glossy, grey to dark brown on upper side and underside, sometimes with purple iridescence and ochre or pale brown scales on underside; anal tufts short, indistinctive, grey to greyish cream; genital segments cream to grey or golden ochre. Genitalia (Figs. 27–39) with capsule 290–390 µm long (or 460 µm long if measured from valval tips to vinculum), 220–250 µm wide. Uncus (Figs. 28, 34) with two long and slender lobes. Valva (Figs. 30, 35) about 320 µm long, basally with a short lobe (Fig. 30). Anellus (Figs. 32, 38, 39) strongly thickened laterally and caudally. Dorsal sclerite well-developed (Fig. 34), rounded caudally (Fig. 33). Vinculum rounded (Fig. 30). Phallus 230–240 µm long, apically deeply bifurcated, weakly thickened, without spines, basally very wide (Figs. 30–32, 37).

Female (Figs. 24–26). Forewing length 2.3–3.6 mm; wingspan 7.1–7.9 mm (n = 4) (also see Remarks). Similar to male.

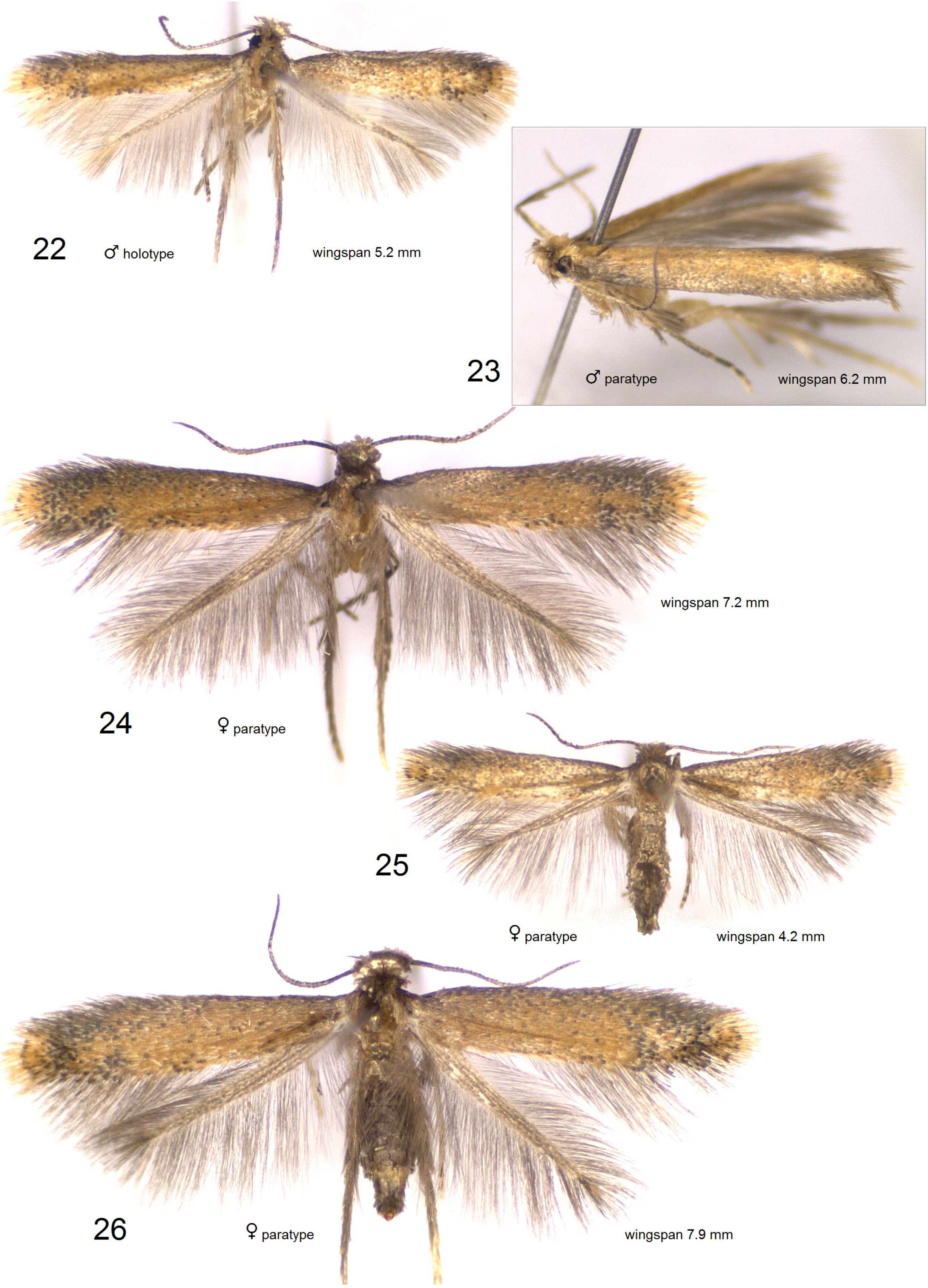
Genitalia (Figs. 40–43) 1045–1330 µm long. Ovipositor lobes large, rounded, densely clothed with short, modified setae (‘peg setae’); area between ovipositor lobes wide, with tiny papillae and some short setae. Second pair of lobes, lateral and anterior to the ovipositor lobes, 3–4 times smaller than ovipositor lobes, but bearing very long, slender lamellar setae. Anterior and posterior apophyses almost equal in length; prela (Fig. 42) comprised of three pairs of projections. Corpus bursae long and slender, basally oval, without pectinations or signum. Accessory sac absent. Ductus spermathecae slender, relatively short, without distinctive coils but with an irregular, slender vesicle.

Bionomics (Figs. 1–21). Host plants are *Boehmeria* Jacq. including *B. clidemioides* var. *diffusa* (Wedd.) Handel-Mazzetti and plants from the species complex represented by *Boehmeria japonica* (L.f.) Miq. and *B. zollingeriana* Wedd. (Figs. 3–7, 9) (see also Remarks). Larvae mine leaves in February and produce irregular blotch-like leaf mines, with little or no frass (Figs. 10–21). Pupation in the leaf mine, in an inconspicuous nidus (Fig. 15). Adults occur in late February–March. Otherwise, the biology is unknown.

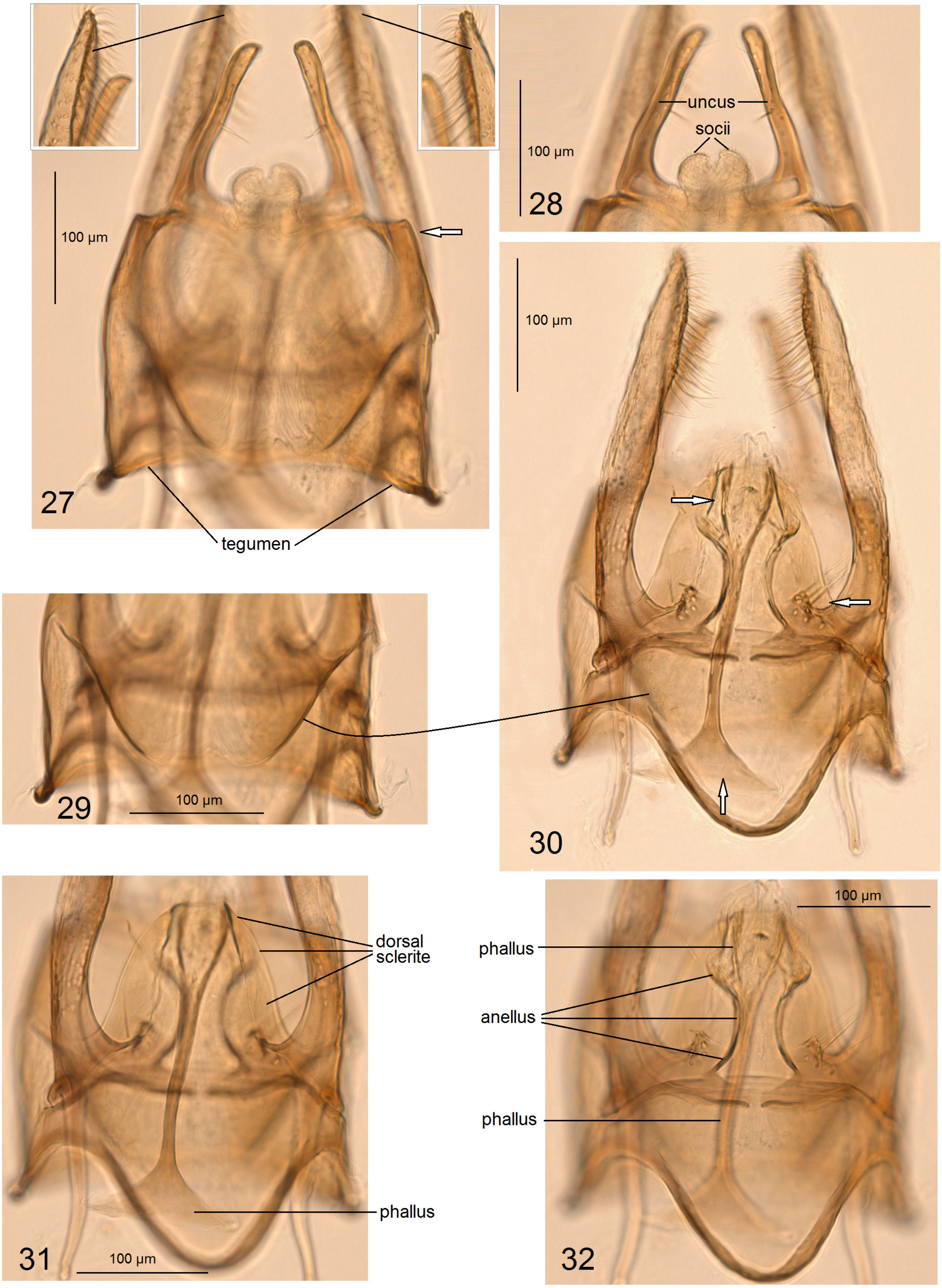
FIGURES 2–9. Bionomics of *Paratischeria boehmerica* **sp. nov.** 2–5, habitat and host plant *Boehmeria clidemioides* var. *diffusa* (Wedd.) Handel-Mazzetti, sample no. 5309, Vang Vieng, Vientiane Province, Laos, elevation ca. 250 m; 6, 7, host plant *Boehmeria* sp., possibly *B. japonica* (L.f.) Miq., sample no. 5319, Luang Prabang, Laos, elevation ca. 460 m; 8, 9, habitat and host plant *Boehmeria* sp., possibly a species from the species complex comprising *B. zollingeriana* Wedd., sample no. 5318, Laos, Luang Prabang, elevation ca. 460 m



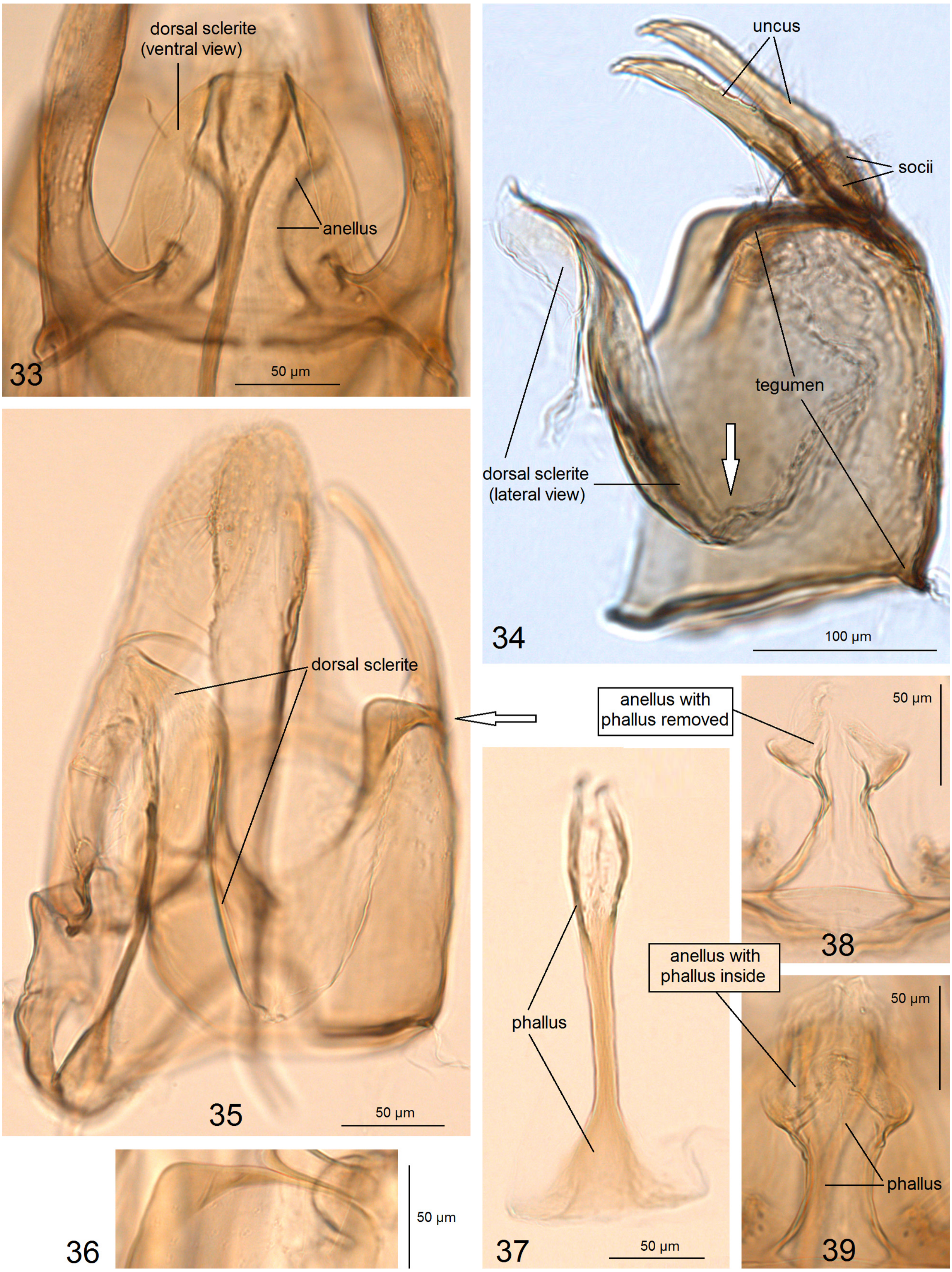
FIGURES 10–21. Leaf mines, mining larvae, and pupae of *Paratischeria boehmerica* **sp. nov.** 10–13, sample no. 5309 from *Boehmeria clidemioides* var. *diffusa* (Wedd.) Handel-Mazzetti; 14, 17, 19, sample no. 5319 from *Boehmeria* sp., possibly *B. japonica* (L.f.) Miq., 15, 16, 18, 20, 21, sample no. 5318 from *Boehmeria* sp., possibly a species from the species complex comprising *B. zollingeriana* Wedd.



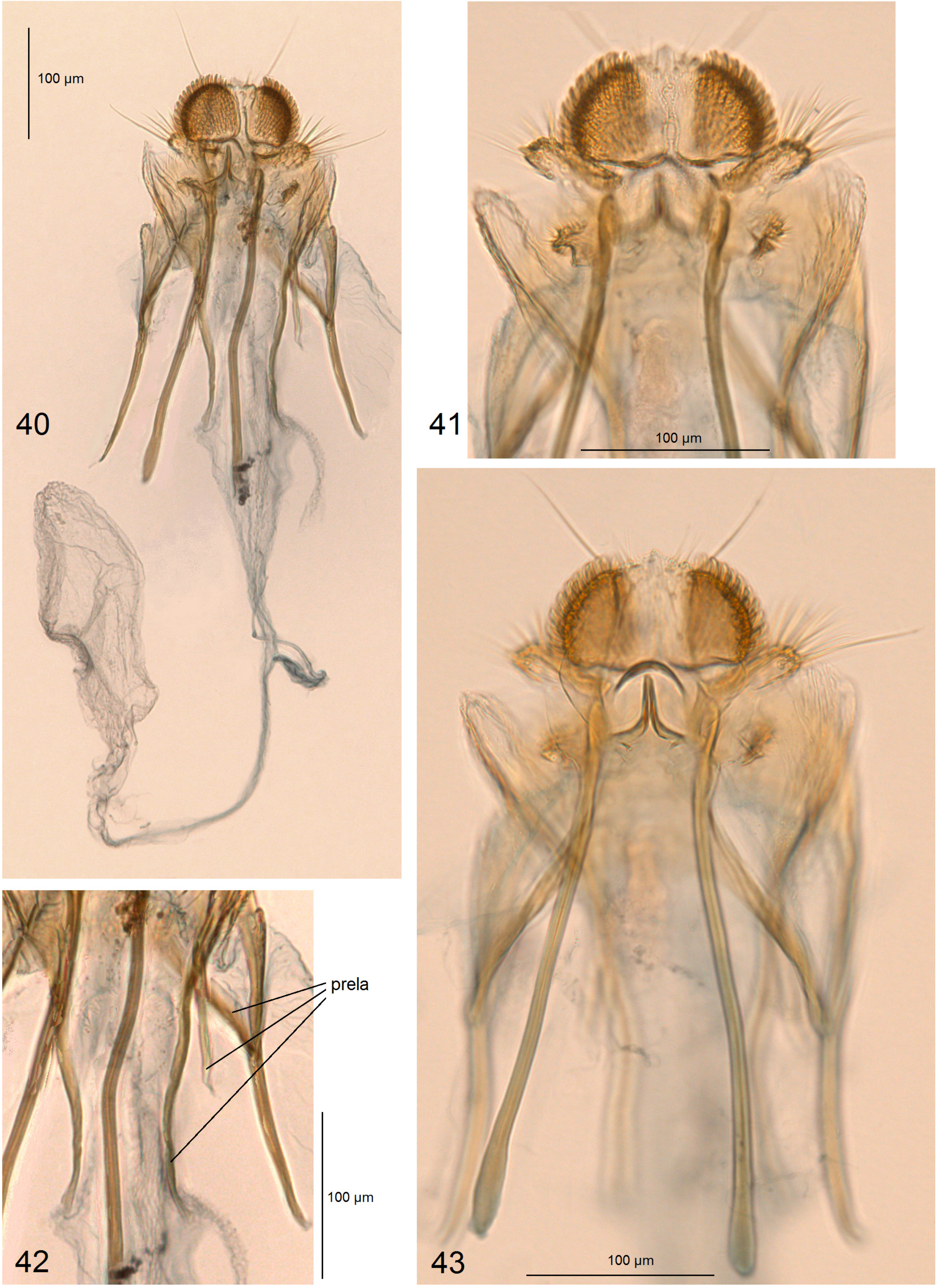
FIGURES 22–26. Adults of *Paratischeria boehmerica* Diškus & Stonis, **sp. nov.** 22, holotype, sample no. 5319 from *Boehmeria* sp., possibly similar with *B. japonica* (L.f.) Miq.; 23, 24, paratypes, sample no. 5318 from *Boehmeria* sp., possibly a species from the species complex comprising *B. zollingeriana* Wedd.; 25, 26, paratypes, sample no. 5319 from *Boehmeria* sp., possibly similar with *B. japonica* (L.f.) Miq. (ZIN)



FIGURES 27–32. Male genitalia of *Paratischeria boehmerica* Diškus & Stonis, **sp. nov**., holotype, genitalia slide no. AD1055 (ZIN)



FIGURES 33–39. Male genitalia of *Paratischeria boehmerica* Diškus & Stonis, **sp. nov**. 33, dorsal sclerite, ventral view, holotype, slide no. AD1055; 34, dorsal sclerite, tegumen and uncus, lateral view, paratype, slide no. AD1036; 35, capsule, lateral view, paratype, slide no. AD1063; 36, same, left side, fragment of tegumen; 37, phallus, paratype, slide no. AD1036; 38, same, anellus; 39, anellus with phallus inside, holotype, slide no. 1055 (ZIN)



FIGURES 40–43. Female genitalia of *Paratischeria boehmerica* Diškus & Stonis, **sp. nov**., paratypes. 40, 42, genitalia slide no. AD1064 (ZIN); 41, 43, genitalia slide no. AD1062 (ZIN)

Distribution. *Paratischeria boehmerica* is known from three sites in Luang Prabang and Vientiane provinces of Laos, at an elevation of about 250–560 m.

Etymology. The species is named after the host plant, *Boehmeria* Jacq. (Urticaceae).

Remarks. One paratype female specimen seems to be aberrant, being unusually small, with forewing 1.9 mm long and wingspan 4.2 mm (it was reared indoors; deposited at NRC) (Fig. 25).

P. boehmerica **sp. nov.** was found mining several species of *Boehmeria* (Figs. 2–9): sample no. 5309 was collected from *Boehmeria clidemioides* var. *diffusa* (Wedd.) Handel-Mazzetti; nos. 5318 and 5319 were collected from plants of the species complex comprising *Boehmeria* sp., similar with *B. japonica* (L.f.) Miq. and *B. zollingeriana* Wedd., and the leaf mines of each differed slightly in their shape (Figs. 10–21). Despite this, the dissected genitalia of insects feeding on different host plants did not display any variation. We therefore conclude that *P. boehmerica* is an oligophagous species feeding on different but related host plants.

Paratischeria grossa Diškus & Stonis, sp. nov.

urn:lsid:zoobank.org:act:79DA8D55-5963-4EC4-9579-766A7C74EB5C
(Figs. 44–73)

Type material. Holotype: ♂, LAOS: Luang Prabang Province, 30 km SW Luang Prabang, 19°44’57”N, 101°59’35”E, elevation ca. 460 m, mining larva on *Dendrocnide* sp. (Urticaceae), 16.ii.2020, ex pupa ii–iii.2020, field card no. 5335, leg. A. Diškus & M. Jocius, genitalia slide no. AD1066♂ (ZIN). Paratypes: 2 ♀, same label data as holotype, genitalia slide no. AD1059♀ (ZIN); 1 ♂, same label data as holotype, genitalia slide no. AD1037♂ (from adult in pupal exuviae, no pinned moth preserved) (GNU); 2 ♂, same label data as holotype, genitalia slide nos. AD1065♂, AD1067♂ (from adult in pupal exuviae, no pinned moth preserved) (NRC).

Diagnosis. *Paratischeria grossa* **sp. nov.** belongs to the *P. ferruginea* group (for a description of this group see Stonis *et al*. 2017a). Externally, this new species differs from South American and African members of the group in the ochre colour of the forewing speckled with black-brown scales; from the most similar South East Asian *P. boehmerica* **sp. nov.** (described above) it differs in the larger size and darker, intense yellow-ochre or ochre colour of the forewing. In the male genitalia, *P. grossa* differs from *P. boehmerica* in the unique, caudally truncated dorsal sclerite (Figs. 58, 68), presence of a rounded, lobe-like anterior processes of the tegumen (Fig. 63), and the pointed, process-like lobe of the valva (Figs. 67, 69). In the female genitalia, the significantly larger size (about 1910 μm) and the longer corpus bursae with large coils distinguish *P. grossa* from *P. boehmerica.*

Male (Figs. 54, 55). Forewing length about 4.0 mm; wingspan about 8.8 mm (n = 1) (also see Remarks).

Head. Frons, palpus, and pecten pale yellowish ochre to dark ochre; frontal tuft and collar glossy brown-ochre to pale ochre, with some purple iridescence; antenna distinctly longer than one half the length of forewing; flagellum ochre to dark brown-ochre; sensilla long, distinctive, whitish cream.

Thorax. Tegula and thorax dark ochre, pale ochre distally. Forewing intense yellow-ochre with strong blue iridescence, sometimes dark brown at base. Brown-black or black scales very sparse, except for a small, irregular, subapical patch along costa and a small, irregular tornal spot; fringe bright yellow-ochre, except for a black-grey area on costal margin of the forewing; fringe line distinctive, comprised of brown-black scales; forewing underside dark brown-grey to grey-black, with a black basal area along costa and slender area along fold; no androconia. Hindwing grey to dark grey on upper side and underside, without androconia; fringe pale brownish grey or ochreous grey. Legs glossy, pale ochreous yellow on underside, dark grey-black on upper side (also see Remarks).

Abdomen. Metallic glossy, dark brown, with some purple iridescence on upper side; blackish brown with some ochre scales on underside; anal tufts short, indistinctive, yellowish ochre; genital segments golden ochre. Genitalia (Figs. 58–69) with capsule 670–685 μm long, 380–420 μm wide. Uncus with two long and slender lobes. Valva (Figs. 58, 61, 69) 465–480 μm long (excluding basal process), basally with a pointed, horn-like process (Figs. 61, 67). Anellus (Figs. 60, 69) only strongly thickened laterally and caudally. Dorsal sclerite strongly developed, truncated caudally (58, 62, 68). Vinculum large, widely rounded (Figs. 61, 69). Phallus 340–360 μm long, apically deeply bifurcated, without spines, basally very wide (Figs. 58, 66).

Female (Figs. 53, 56, 57). Forewing length 4.1–4.2 mm; wingspan 9.1–9.3 mm (n = 2). Similar to male.

Genitalia (Figs. 70–73) 1910 μm long. Ovipositor lobes large, rounded, densely clothed with short, modified setae (‘peg setae’); area between ovipositor lobes wide, with some short setae, tiny papillae, and a larger papilla caudally. Second pair of lobes, lateral and anterior to the ovipositor lobes, 3–4 times smaller than ovipositor lobes, but bearing very long, slender lamellar setae. Anterior apophyses distinctly shorter than posterior apophyses; prela (Fig. 73) comprised of three pairs of projections; one of these pairs form a large, angular, plate-like thickening (Fig. 71). Corpus bursae long and slender, without pectinations or signum. Accessory sac absent. Ductus spermathecae slender, very short, with two large coils (Fig. 70).

Bionomics (Figs. 44–52). The host plant is *Dendrocnide* sp., possibly *D. sinuata* (Blume) Chew (Figs. 45, 46) which, whilst not documented from Laos or Cambodia (Plants of the World Online), is known to occur in all the surrounding countries (China, Myanmar, Vietnam, Malaysia) and so is expected to occur there also. The larvae mine leaves in February and produce irregular blotch-like leaf mines, with little or no frass (Figs. 47–52). Pupation occurs in the leaf mine; a silken nidus is present but inconspicuous. Adults occur in late February and March. Otherwise, the biology is unknown.

Distribution. The species is known from a single site in Luang Prabang Province, Laos, at an elevation of about 460 m.

Etymology. The species name is derived from the Latin *grossus* (thick, fat, large), referencing the large and robust male and female genitalia.

Remarks. One male paratype seems to be aberrant, unusually small, with forewing 2.7 mm long and wingspan 5.8 mm; in comparison with the holotype or female paratypes, the forewing of this specimen is slightly paler and with an additional, oblique, postmedian patch of black scales; otherwise, as in the holotype. The genitalia are identical with the holotype but slightly shorter (with capsule 520 µm long). Unlike other specimens, this specimen was reared indoors; it was deposited at NRC (Fig. 55).

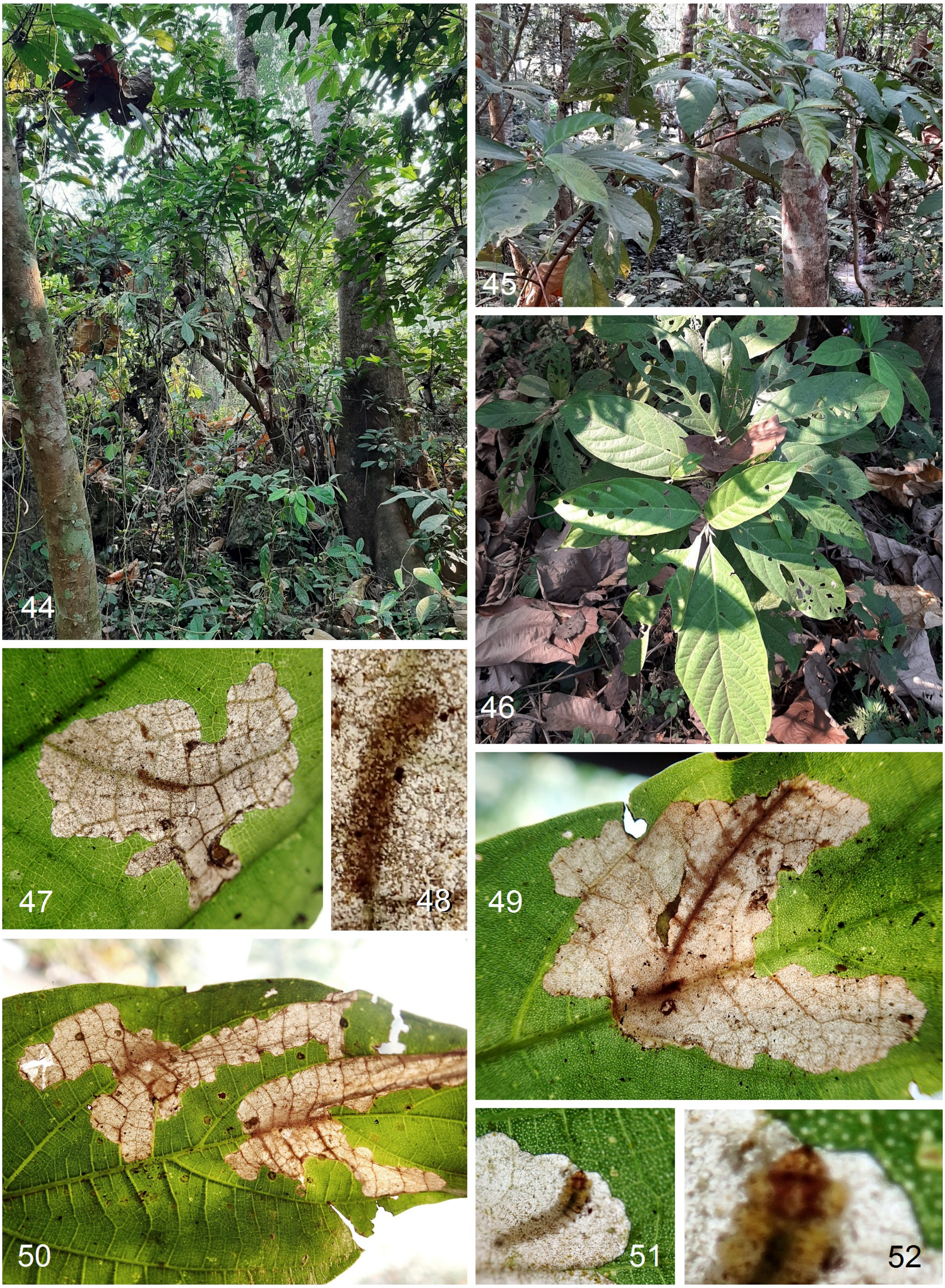
Discussion

Urticaceae is a moderately sized but morphologically diverse flowering plant family whose centre of generic diversity is the Indo-Malayan region (Friis 1989; Takhtajan 2009; Stevens 2017; Wu *et al*. 2018). Prior to our study, no Tischeriidae had been known to be trophically associated with Asian Urticaceae; this is the first time Urticaceae-feeding Tischeriidae are recorded and described from Asia.

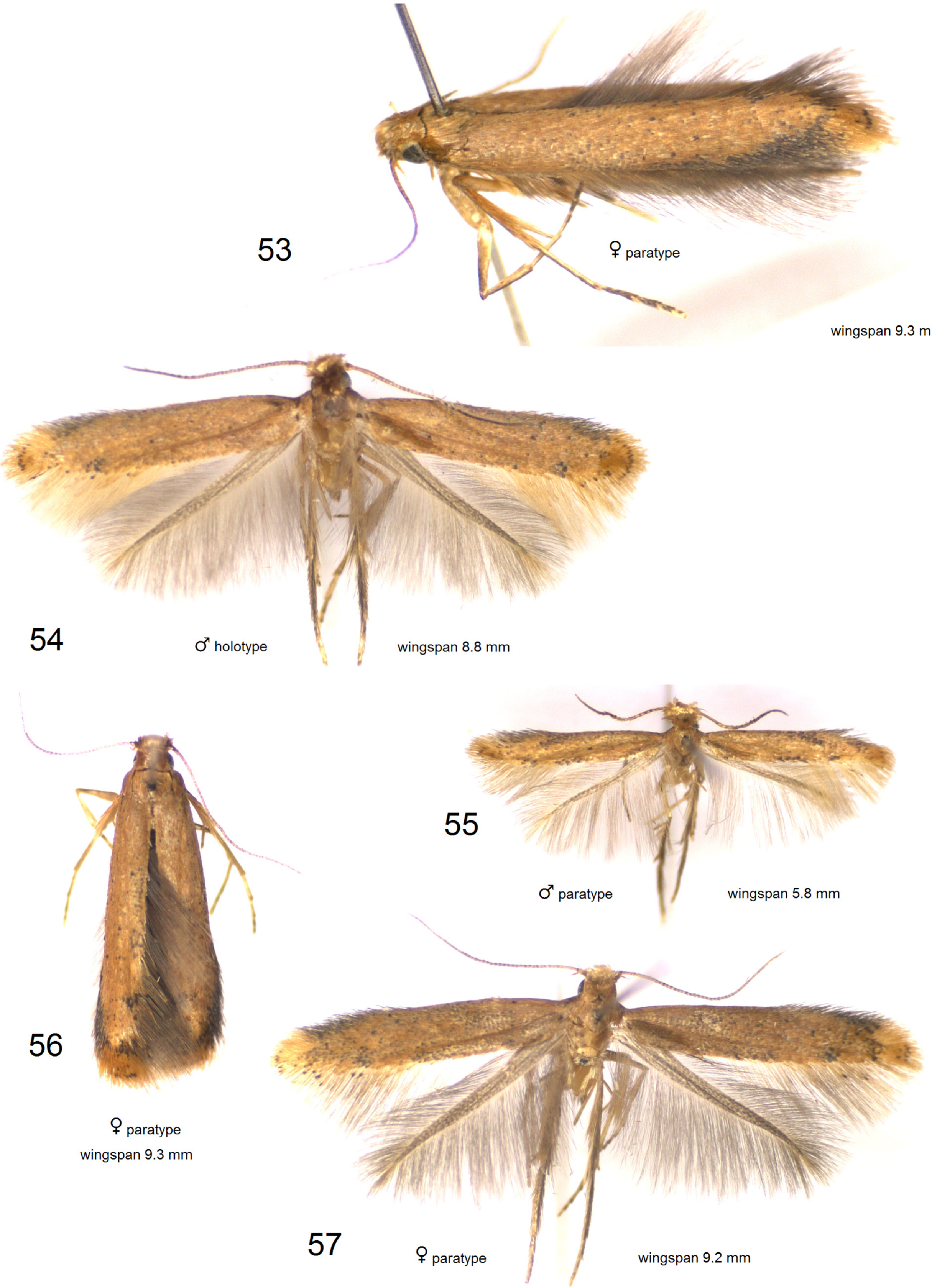
The leaf-mining larvae of Tischeriidae are very selective of their host plants, i.e. stenophagous: monophagous or oligophagous (Stonis *et al*. 2018). In general, global Tischeriidae are trophically associated with plants belonging to rosid and asterid I core eudicot angiosperms and known to feed on plants from the following families: Euphorbiaceae, Hypericaceae (Malpighiales), Fabaceae (Fabales), Rhamnaceae, Rosaceae, Ulmaceae, Urticaceae (Rosales), Betulaceae, Fagaceae (Fagales), Combretaceae (Myrtales), Anacardiaceae, Sapindaceae (Sapindales), Malvaceae, including the former families Sterculiaceae and Tiliaceae (Malvales), Ericaceae, Theaceae, Symplocaceae (Ericales), Apocynaceae (Gentianales), and Asteraceae (Asterales) (Xu *et al*. 2018; Stonis *et al.* 2020b). Ongoing discoveries of host plants, however, suggest that the number of host-plant families will continue to increase (Stonis *et al*. 2018).

Urticaceae very rarely serve as host plants for leaf-mining Tischeriidae despite being widespread and relatively abundant in disturbed habitats (A. Monro, pers. obs.). The first ever known Urticaceae-feeding Tischeriidae species is *Paratischeria urticolella* (Ghesquière), from equatorial Africa, feeding on *Laportea ovalifolia* (Schumach. & Thonn.) Chew (Ghesquière 1940; Puplesis & Diškus 2005). Recently, Urticaceae-feeding Tischeriidae were discovered in the Andes of Ecuador and Bolivia and extensively documented by Stonis *et al.* (2017a). A similar survey of Urticaceae feeders was recently published by Stonis *et al*. (2017b), which highlighted that Nepticulidae records from Urticaceae host plants have come exclusively from tropical and subtropical zones around the Pacific.

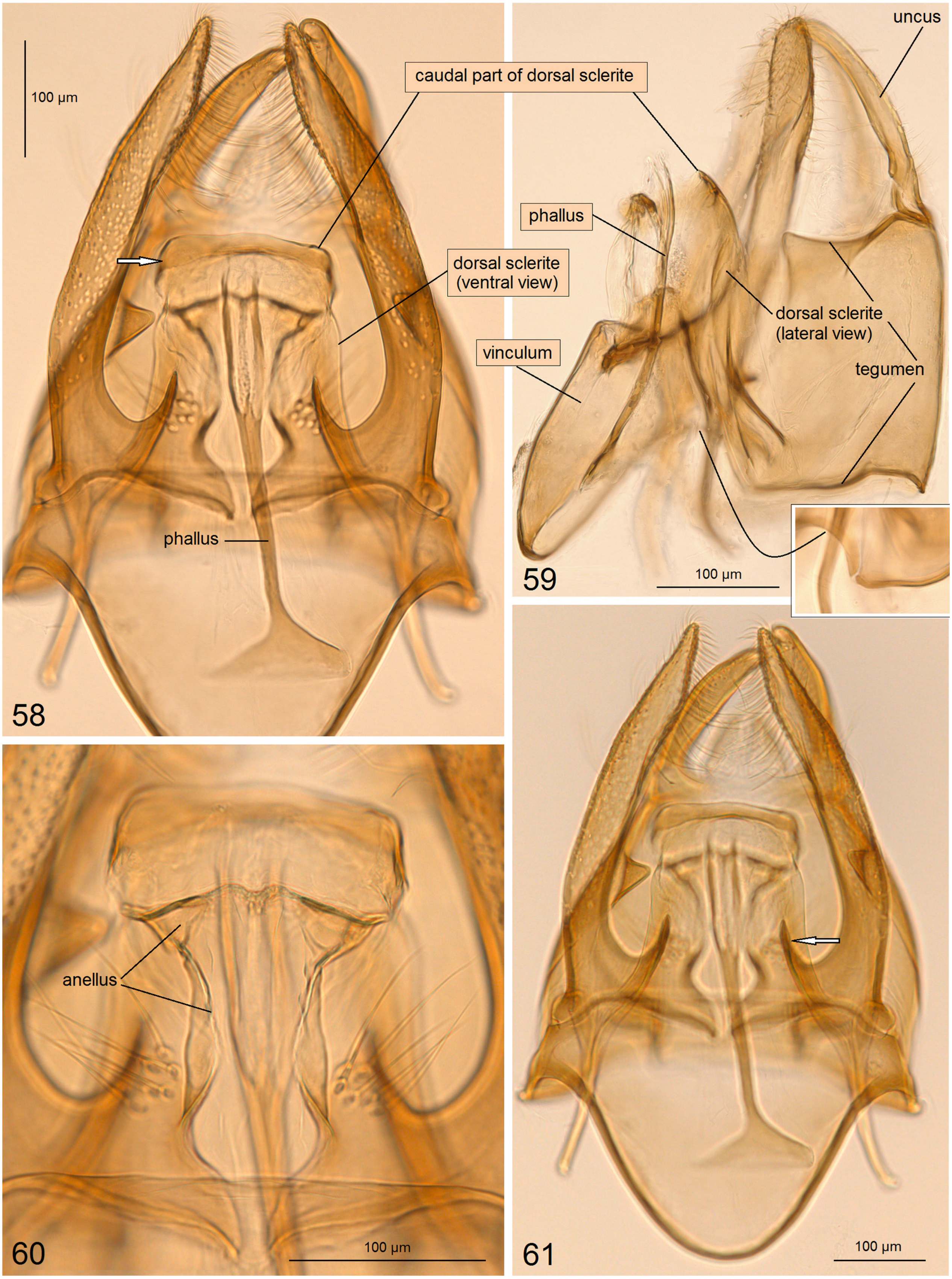
Urticaceae-feeding Tischeriidae belong to the recently described genus *Paratischeria* Diškus & Stonis (Stonis *et al*. 2017a). Although *Paratischeria* was already recorded from Asia (but feeding on Malvaceae; Xu *et al*. 2017), no Urticaceae-feeding trumpet moths had been recorded from the Asian continent or adjacent territories. Only four of the 57 Urticaceae genera are known to serve as hosts for Tischeriidae: *Laportea* (Ghesquière 1940; Puplesis & Diškus 2005), *Phenax* (Stonis *et al*. 2017a), *Boehmeria*, and *Dendrocnide* (this study). It is interesting to note that these genera occur within only two of the seven proposed Urticaceae tribes (Monro *et al*., in prep.): Boehmerieae (*Phenax*, *Boehmeria*) and Urticeae (*Dendrocnide*, *Laportea*). Both of these tribes are associated with disturbed habitats but are phylogenetically, relatively distantly related to each other (Wu *et al*. 2013).



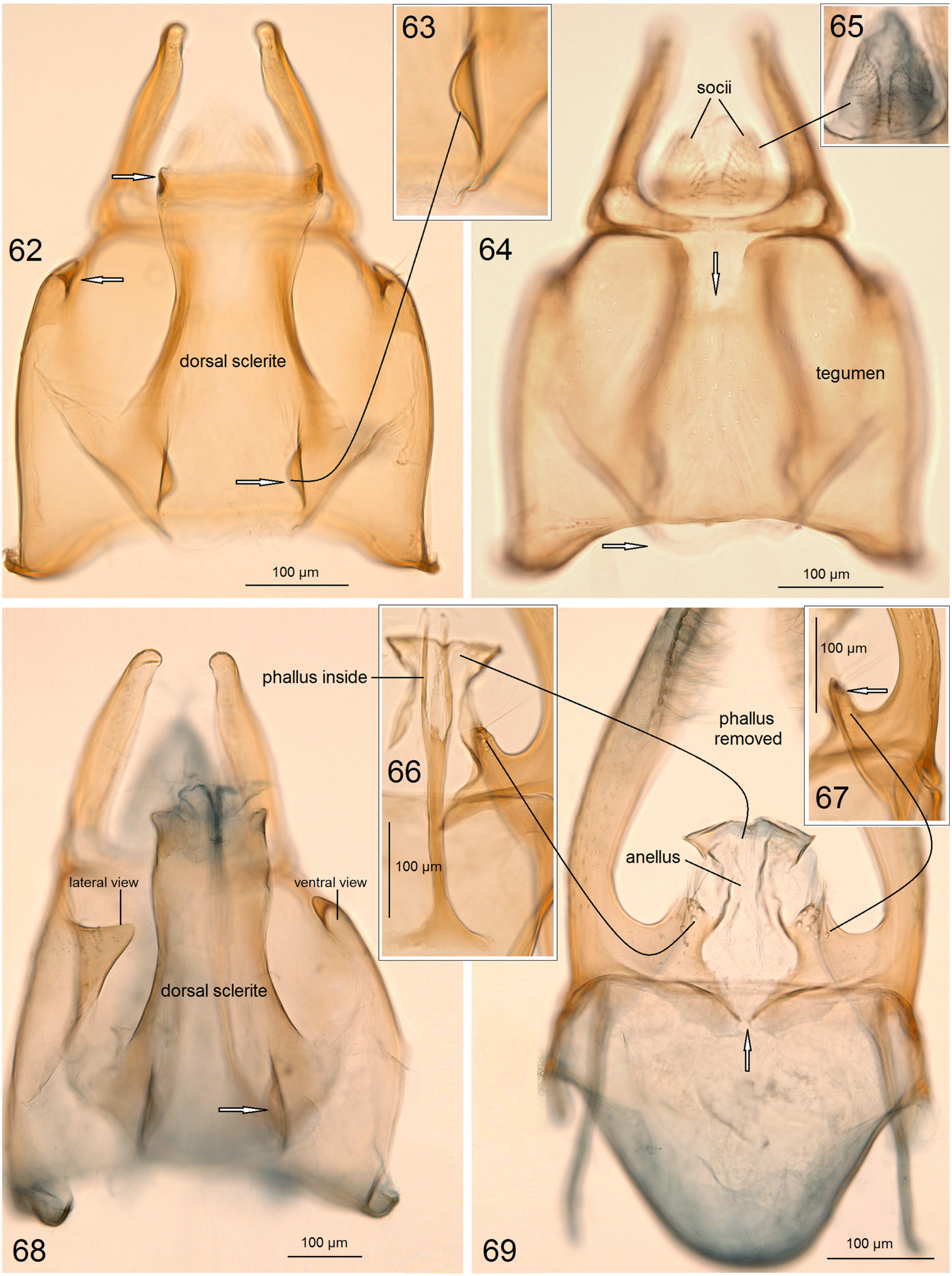
FIGURES 44–52. Bionomics of *Paratischeria grossa* **sp. nov.** 44, habitat, 30 km SW Luang Prabang, Laos, elevation ca. 460 m; 45, 46, host plant *Dendrocnide* sp., possibly *D. sinuata* (Blume) Chew, sample no. 5335; 47–52, same sample, leaf mines and larvae



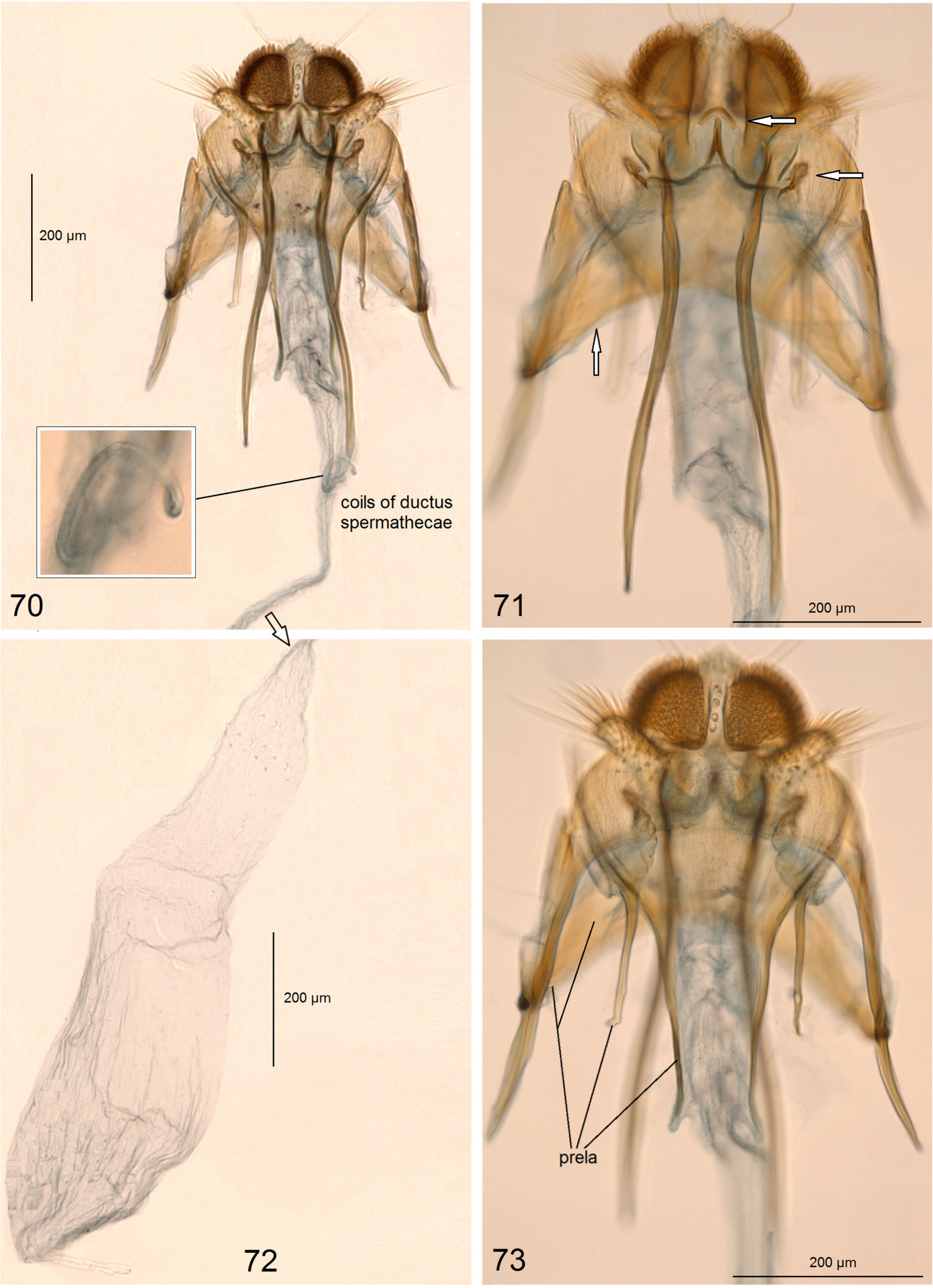
FIGURES 53–57. Adults of *Paratischeria grossa* Diškus & Stonis, **sp. nov.**, sample no. 5335 from *Dendrocnide* sp., possibly *D. sinuata* (Blume) Chew. 53, 56, paratype (ZIN); 54, holotype (ZIN); 55, paratype (NRC); 57, paratype (ZIN)



FIGURES 58–61. Male genitalia of *Paratischeria grossa* Diškus & Stonis, **sp. nov.** 58, holotype, ventral view, genitalia slide no. AD1066 (ZIN); 59, paratype, lateral view, genitalia slide no. AD1065 (NRC); 60, holotype, ventral view, genitalia slide no. AD1066, focused on anellus (ZIN); 61, same, general view



FIGURES 62–69. Male genitalia of *Paratischeria grossa* Diškus & Stonis, **sp. nov**., dissected genitalia capsules of paratypes. 62–64, tegumen and uncus, genitalia slide no. AD1067 (NRC); 65, socii, genitalia slide no. AD1037 (GNU); 66, 67, details of genitalia, slide no. AD1067 (NRC); 68, genitalia slide no. AD1037, uncus, tegumen, and dorsal sclerite (GNU); 69, same, valvae, anellus, and vinculum (GNU)



FIGURES 70–73. Female genitalia of *Paratischeria grossa* Diškus & Stonis, **sp. nov.**, paratype, genitalia slide no. AD1059 (ZIN).

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