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Discovery of leaf-mining Tischeriidae (Lepidoptera) in Colombia and their distribution in the Neotropics

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Abstract

This is the first report of the family Tischeriidae in Colombia. We describe two new species recently discovered in the department of Valle del Cauca in southwestern Colombia: *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.**, and *A. colombiana* Stonis & Vargas, **sp. nov**. The latter is a leaf miner of Asteraceae, while *A. ochrimaculosa* is trophically associated with Malvaceae. *Astrotischeria colombiana* is known only from Colombia, but *A. ochrimaculosa* is more widely distributed from Colombia to Peru. The new species are illustrated with photographs of their habitats, adults, male and female genitalia, and leaf mines. We comment on the rarity of tischeriids in collections and their current known distribution in the Neotropics.

Key words: Asteraceae, *Astrotischeria colombiana, Astrotischeria ochrimaculosa*, fauna, leaf miners, leaf mines, Malvaceae, new species, Tischeriidae, trumpet leafminer moths

Introduction

Tischeriidae (or trumpet leafminer moths) are a well-defined, easily recognizable family of monotrysian Lepidoptera whose larvae are leaf miners during all stages of their development. Adults of tischeriids have a distinctive general appearance. The head has a face-overlapping frontal tuft and a speckled forewing pattern; and the male antenna has long sensillae trichodea with strongly recurved bases, and the flagellum has a strongly enlarged 3rd segment. The female genitalia have a prela or rod-like and wide lobe-like projections, and male genitalia have a strongly narrowed, distally bifurcated phallus (for a complete list of diagnostic characters see Puplesis & Diškus 2003 and Stonis *et al*. 2018).

The study of the Tischeriidae fauna in the Neotropics began in the late nineteenth to early twentieth century with descriptions of two species from the Caribbean (Walsingham 1897), one species from southwestern Mexico (Walsingham 1914), one species from Guyana, and three species from Ecuador and Peru (Meyrick 1915). However, only during the last two decades has the study of Neotropical Tischeriidae become more purposeful and active through collecting in the field and development of inventories in South America. The research presented here was preceded by other publications about the Tischeriidae from South America (Puplesis & Diškus 2003; Landry & Roque-Albelo 2004; Stonis & Diškus 2007, 2008; Diškus & Stonis 2015; Stonis *et al*. 2008, 2016, 2017, 2018). However, prior to this study no representatives of Tischeriidae were known from Colombia. In 2019, during our most recent fieldwork in southwestern Colombia, we collected tischeriid specimens that we determined are species new to science and that belong to *Astrotischeria* Puplesis & Diškus. Based on the specimens collected in the Valle del Cauca region (Fig. 1), we describe *A. colombiana* Stonis & Vargas **sp. nov.** and *A. ochrimaculosa* Diškus, Stonis & Vargas **sp. nov.** Both new species, particularly *A. ochrimaculosa*, are characterized by rather unusual morphology of the male and female genitalia.

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Materials and methods

Descriptions of the new species are based mostly on material deposited in the collection of Laboratorio de Entomología, UNESIS, Departamento de Biología, Pontificia Universidad Javeriana, Bogotá, Colombia (MPUJ), that were collected in February to early March 2019 in Valley del Cauca, northwest of Dagua (southwestern Colombia) by Jonas R. Stonis and Sergio A. Vargas, assisted by Franklin J. Galindo (Collecting Permit No. 2019007511-1-000 by *Autoridad Nacional de Licencias Ambientales,* Bogotá, Colombia). Additional material of *Astrotischeria ochrimaculosa* was collected in June 2018 in La Convención Province, Cusco region (Peru) by A. Diškus and J. R. Stonis, and will be deposited in the collection of the United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM).

Collecting methods, and protocols for species identification and description are outlined in Puplesis & Diškus (2003) and Stonis *et al.* 2018. After maceration of the abdomen in 10% KOH and subsequent cleaning, male genital capsules were removed from the abdomen and mounted ventral side uppermost. Abdominal pelts and female genitalia were stained with Chlorazol Black (Direct Black 38/Azo Black) (for detailed methods see Stonis *et al*. 2014).

Permanent preparations on microscope slides were photographed and studied using a Leica DM2500 microscope and Leica DFC420 digital camera. Adults were photographed using a Leica S6D stereoscopic microscope with attached Leica DFC290 digital camera, except for Figs. 22–25, 27, and 28, which were photographed using a Russian Lomo MBS10 stereoscopic microscope and a temporarily attached cellular telephone Samsung Galaxy S7 with a camera.

The descriptive terminology of morphological structures follows Puplesis & Diškus (2003), except for the term "aedeagus", which is referred here as "phallus", and the term "cilia", which is referred here as "fringe".

Descriptions of new species

Astrotischeria colombiana Stonis & Vargas, sp. nov.

(Figs. 1–28, 33–57)

Type material. Holotype: COLOMBIA: ♂, Departamento de Valle del Cauca, Municipio de Dagua, Lobo Guerrero, 850 m, 3°45'58''N, 76°40'43''W, larvae on Asteraceae, fieldcard no. SV004, 11.ii–3.iii.2019, J. R. Stonis & S. A. Vargas, genitalia slide no. AD960 (MPUJ). Paratypes: 2 ♂, 1 ♀, same data as holotype, slide nos. AD956♂, AD958♂, AD957♀ (MPUJ).

Diagnosis. The combination of a broad, dorsally thickened anellus and minute ventral lobes of the uncus in the male genitalia distinguishes *A. colombiana* from all known *Astrotischeria* species. The unique morphology of its phallus also makes this species very distinctive.

Male (Figs. 26–28). Forewing length 3.7–4.0 mm; wingspan 8.0–8.5 mm (n = 3). Head: Face triangular, smoothly-scaled, cream; labial palpus cream to yellowish cream; frontal tuft comprised of grey, yellowish-tipped lamellar scales or sometimes entirely yellowish cream; antenna distinctly longer than half the length of forewing; flagellum dark grey, glossy; sensillae very fine, cream. Thorax: Predominantly yellowish cream, also with some scales that are basally ochre cream. Tegula and forewing speckled with black, white-tipped, and ochre scales; latter particularly common in apical half of wing forming characteristic, distinct, ochre stripes: one long, along forewing fold, and one to three short closer to anterior margin of forewing; fringe grey, at apex grey to ochre; fringe line distinct, comprised of black scales; forewing underside blackish grey, without spots or androconia. Hindwing and its fringe blackish grey on upper side and underside, without androconia, with brown frenulum and about 10 brown-black costal bristles. Legs dark grey, densely speckled with cream-tipped scales. Abdomen: Brown-black with purple and blue iridescence on upper side, predominantly yellowish cream with some irregularly scattered brown scales on underside; anal tufts blackish grey, distinctive, merged into one tuft; genital plates dark grey, distally yellowish cream. Genitalia (Figs. 33–53) with capsule 505–580 µm long, 220 µm wide. Uncus (Figs. 35, 36) comprised of two long dorsal lobes and two very short, pointed ventral lobes. Valva divided (Figs 34, 48, 51): ventral lobe (main body) straight, gradually narrowed towards apex, about 350 µm long (excluding the basal process); dorsal lobe 2.5 times shorter, inwardly curved; transtilla absent; basal process of valva long (Figs. 37, 51, 52). Anellus thickened, ventral part with 3–4 setae laterally (Fig. 39), dorsal part long and wide, distally rounded (Fig. 38). Phallus 585–610 µm long, distally deeply bifurcated (Figs. 43–46), with lateral processes and fine spines (Figs. 40–42).

Female. Head and Thorax: Externally similar to male, but thorax and forewing pattern tend to be much paler; forewing with some brown and black-brown scales, but ochre cream scales prevail; dark ochre stripes on forewing less distinct, however still visible. Hindwing and its fringe dark grey. Abdomen: Grey-brown, glossy on upper side, yellowish cream on underside; yellowish cream anal tuft highly contrasting with surrounding grey-brown scales. Genitalia (Figs. 54–56) total length about 1900 µm. Ovipositor lobes small, clothed with short, stout and darker, modified setae ('peg setae') (Fig. 55); area between ovipositor lobes indistinct, with tiny papillae and some short setae. Second pair of lobes, lateral and anterior to the ovipositor lobes, similar in size to ovipositor lobes, but bearing very long slender setae, without stout, modified 'peg setae.' Anterior and posterior apophyses long, stout (Figs. 54, 56); remaining two apophyses pairs represent slender, rod-like and wide lobe-like projections called prela. Tips of one pair of rod-like prela articulating with anterior apophyses in a groove 1/2 way of their length (Fig. 55). Vestibulum without antrum, however, vestibulum may look thickened laterally because of the prela (Fig. 55). Ductus bursae long and very narrow (Fig. 54), without pectinations. Corpus small, oval-shaped (Fig. 54), without spines or signum. Ductus spermathaecae very narrow (broken in the slide AD956, Fig. 54), with about 3.5 coils (Fig. 57), utriculus absent or not preserved (Fig. 54).

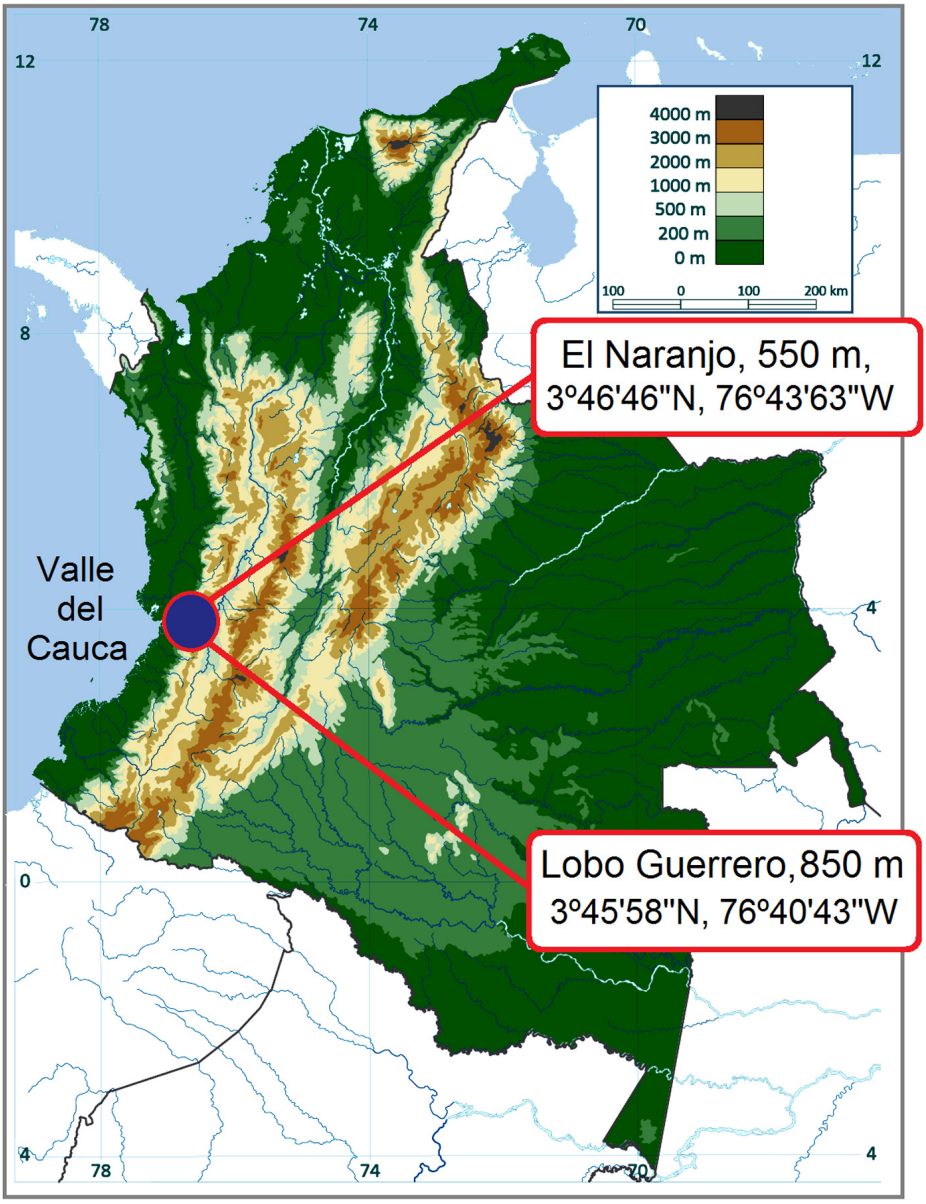


FIGURE 1. Type locality of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.** (Lobo Guerrero) and *A. ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.** (El Naranjo) in Valle del Cauca, southwestern Colombia.

FIGURES 2–8. Habitat and host plants of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.** 2, 3, habitat, Lobo Guerrero, Valle del Cauca, 850 m, 3°45’58’’N, 76°40’43’’W; 4–8, host plant, *Wedelia calycina* Rich., Asteraceae (see Remarks).

Bionomics (Figs. 2–19). The host plant is *Wedelia calycina* Rich. (Asteraceae: Heliantheae: Ecliptinae) (Figs. 4–8). Mining larvae are recorded from February and early March. The blotch mine is irregular, usually dark, but with little irregularly deposited frass (Figs. 9–19); fully developed mines sometimes may bend (distort) the mined leaf (Figs. 18, 19); old vacant leaf mines usually appear pale brown or whitish brown. A silk-lined nidus is usually indistinct inside of the mine. The larva is pale yellowish green, with a dark green intestine and a blackish brown head (Figs. 11, 14). Pupation occurs inside the leaf mine; the pupa is brown to grey-beige. An exit slit usually is on the upper side. Adults occur from February and late March.

Distribution. The species is known from the single locality, Lobo Guerrero, Valle del Cauca, southwestern Colombia (Fig. 1) at an elevation of about 850 m, mostly from drier rocky slopes along an abandoned railway (Figs. 2, 3).

Etymology. The species is named after the country, Colombia.

Remarks. The host plant resembles some species of *Sphagneticola* O. Hoffm. (L. Katinas *pers. comm.*) and *Tithonia* Desf. ex Juss. (E. Moreno *pers. comm.*), but on the basis of photographs, it was identified as *Wedelia calycina* Rich. by research botanist Francisco Fajardo Gutiérrez (Herbarium of Jardín Botánico de Bogotá).

Astrotischeria ochrimaculosa Diškus, Stonis & Vargas, sp. nov.

(Figs. 1, 29–32, 58–88)

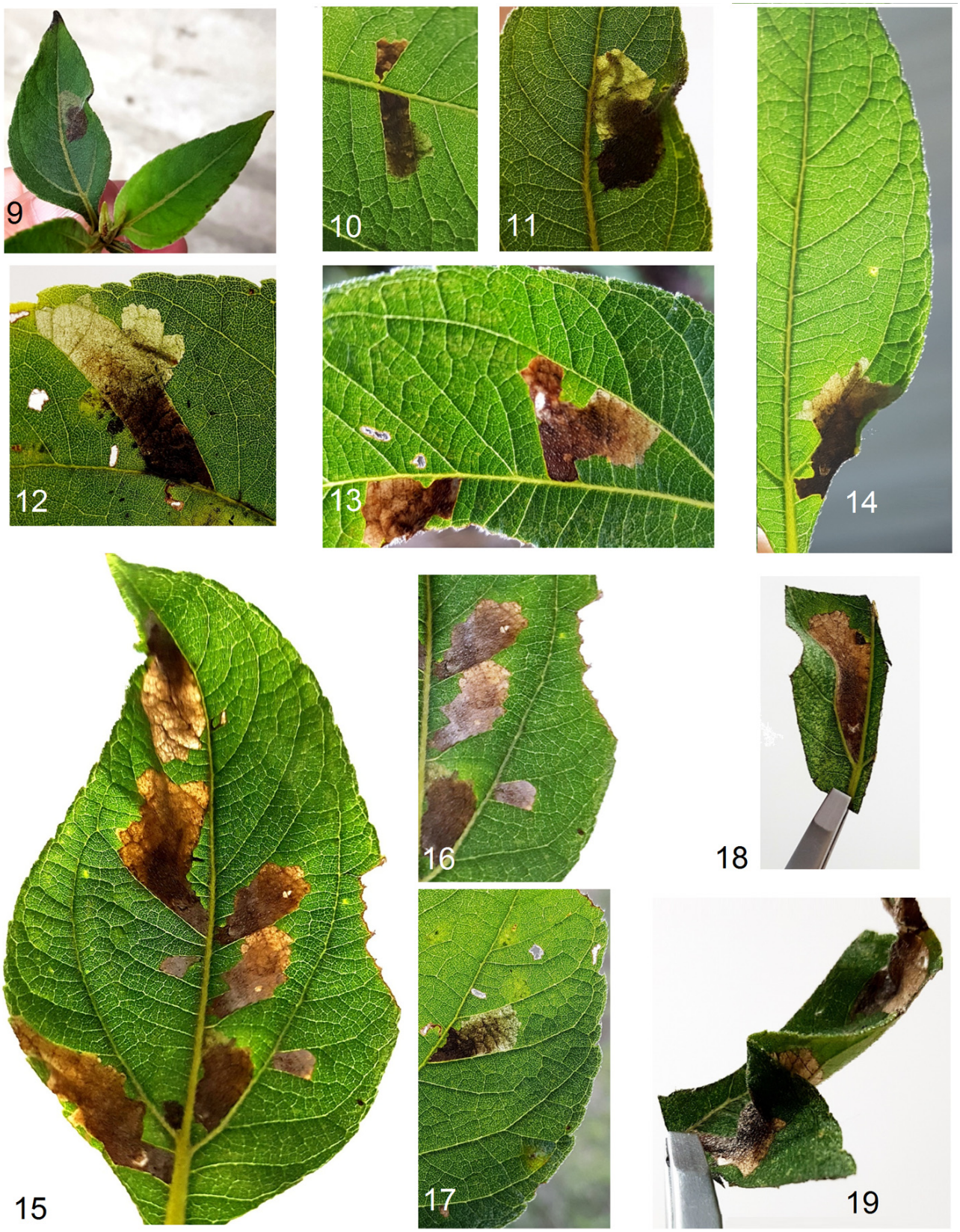
Type material. Holotype: COLOMBIA: ♂, Departamento de Valle del Cauca, Municipio de Dagua, El Naranjo, 550 m, at light, 3°46'46''N, 76°43'63''W, 21–23.ii.2019, J. R. Stonis & S. A. Vargas, genitalia slide no. AD959♂ (MPUJ). Paratypes: 3 ♂, 2 ♀, PERU: Cusco Region, La Convención Province, Cerro Quintalpata, 13°0'24"S, 72°36'36"W, elevation 1260 m, 23.vi.2018, ex pupa vii.2018, field card no. 5290, A. Diškus & J. R. Stonis, genitalia slide nos AD961♂ (from an adult in pupal skin, no moth preserved), AD963♀, AD964♀ (USNM).

Leaf mines also photographed, but not collected: PERU: Cusco Region, La Convención Province, Maranura, 12°57'56"S, 72°39'18"W, elevation 1220 m, 21.vi.2018, A. Diškus & J. R. Stonis (Figs. 85, 85).

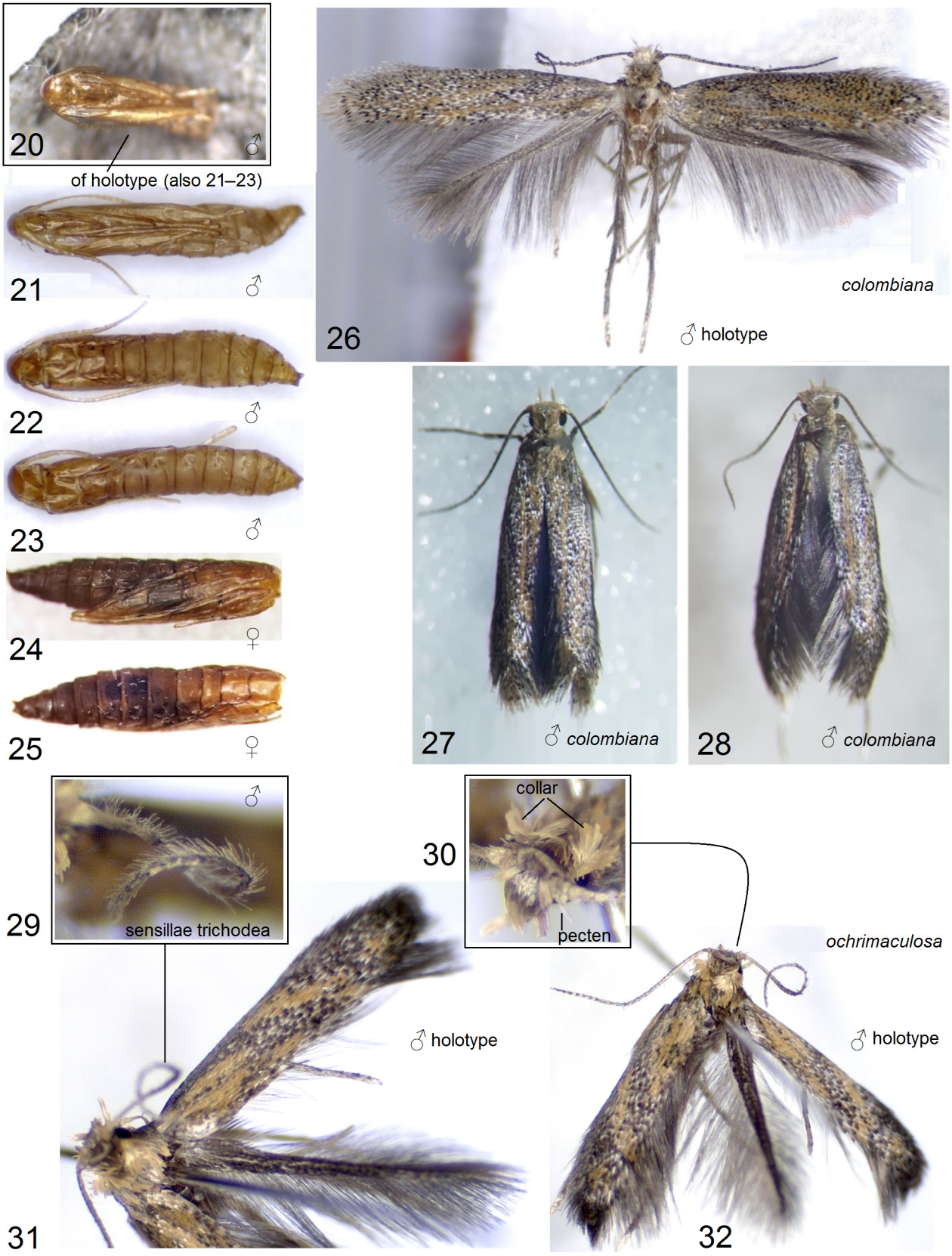
Diagnosis. A remarkably distinctive species among *Astrotischeria* because of its small size and unique morphology of the phallus in the male genitalia (Figs. 59, 60), and the greatly reduced ovipositor lobes in the female genitalia (Fig. 76). The large, dorsally undivided and thickened uncus (Fig. 73), very short vinculum (Figs, 61, 70), and very large dorsal lobe of valva (Fig. 70) make this species very distinctive.

Male (Figs. 29–32). Forewing length 3.0 mm (n = 1, holotype from Colombia), 3.6 mm (n = 1, paratype from Peru); wingspan 6.6 (n = 1, holotype from Colombia), 7.9 mm (n = 1, paratype from Peru). Head: Face triangular, smoothly-scaled, grey, glossy, distally yellowish cream; labial palpus yellowish cream; frontal tuft brown-grey, with some yellowish cream lamellar scales; collar large, distinct, yellow cream (Fig. 30); antenna distinctly longer than half the length of forewing; pecten yellowish cream (Fig. 30), flagellum yellowish grey to grey; sensillae very fine, 3–5 times longer than width of the flagellum (Fig. 29). Thorax: Yellow cream with some grey scales distally. Tegula grey, distally yellow cream. Forewing densely covered with blackish grey scales and with elongate, irregular ochre-yellow patches; fringe black-grey, without a fringe line; forewing underside entirely black-grey, without spots or androconia. Hindwing and its fringe black-grey on upper side and underside, with little purple iridescence, and without androconia. Legs speckled with yellow cream and dark grey scales. Abdomen: Black-brown on upper side and underside, but with some yellowish cream scales on underside, more so distally; anal tufts short, indistinct; genital plates yellowish cream. Genitalia (Figs. 58–61, 69–74) with capsule 380 µm long, 230 µm wide (holotype from Colombia), 340 µm long, 190 µm wide (paratype from Peru). Uncus (Figs. 58, 59, 72, 73) comprised of a very large, undivided dorsal lobe and two large ventral lobes, each possessing a process distally (Fig. 73). Valva divided (Figs. 59, 61, 69, 70): ventral lobe (main body) straight and narrow; dorsal lobe inwardly curved, very large, wide in basal half, very slender apically; transtilla absent; basal process of valva moderately long (Fig. 59). Anellus long and distally thickened only dorsally (Figs. 72, 73), but mostly membranous and indistinct ventrally (Fig. 60). Phallus very small, 160–170 µm long (in both, Colombian and Peruvian specimens), distally furcated, without spines (Figs. 59, 60, 71, 74).

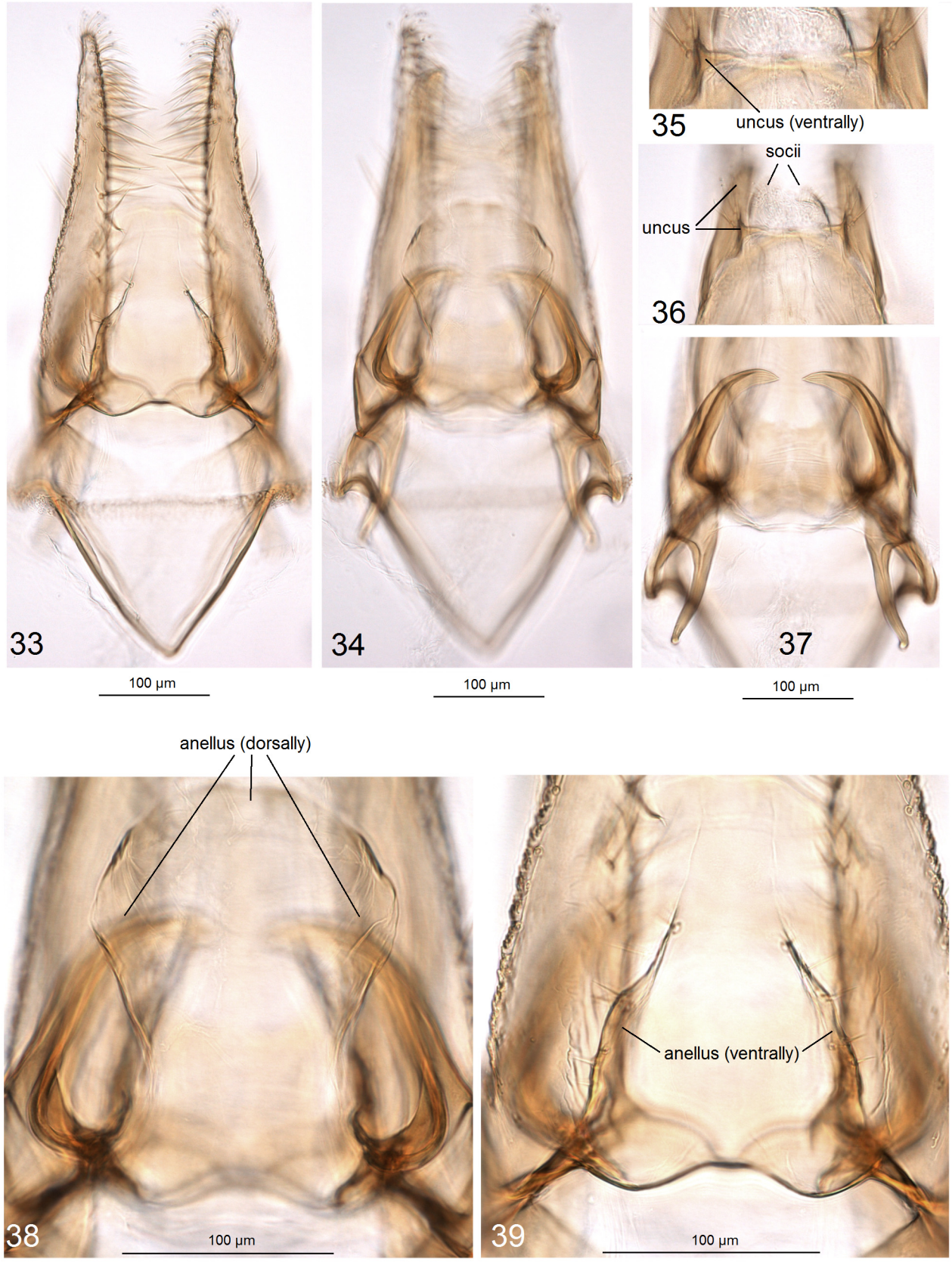
Female. Head and Thorax: Externally similar to male, but thorax and forewing pattern is paler. Abdomen: Genitalia (Figs. 75–79) with ovipositor almost pointed, with triangular, greatly reduced lobes; area between ovipositor lobes indistinct, with tiny papillae and some short setae. Second pair of lobes indisctinct. Anterior and posterior apophyses stout (Figs. 75, 78), anterior apohpyses distinctly longer than posterior ones; remaining two apophyses pairs represent slender, rod-like and broad lobe-like projections called prela. Tips of one pair of rod-like prela articulating with anterior apophyses in a groove 1/2 of their length (Fig. 77). Vestibulum without antrum, however, vestibulum may appear thickened laterally because of prela (Figs. 76, 77). Ductus bursae lost in slide no. AD963 (Figs 75–79). Ductus spermathaecae with about 10–11 large coils (Fig. 79).



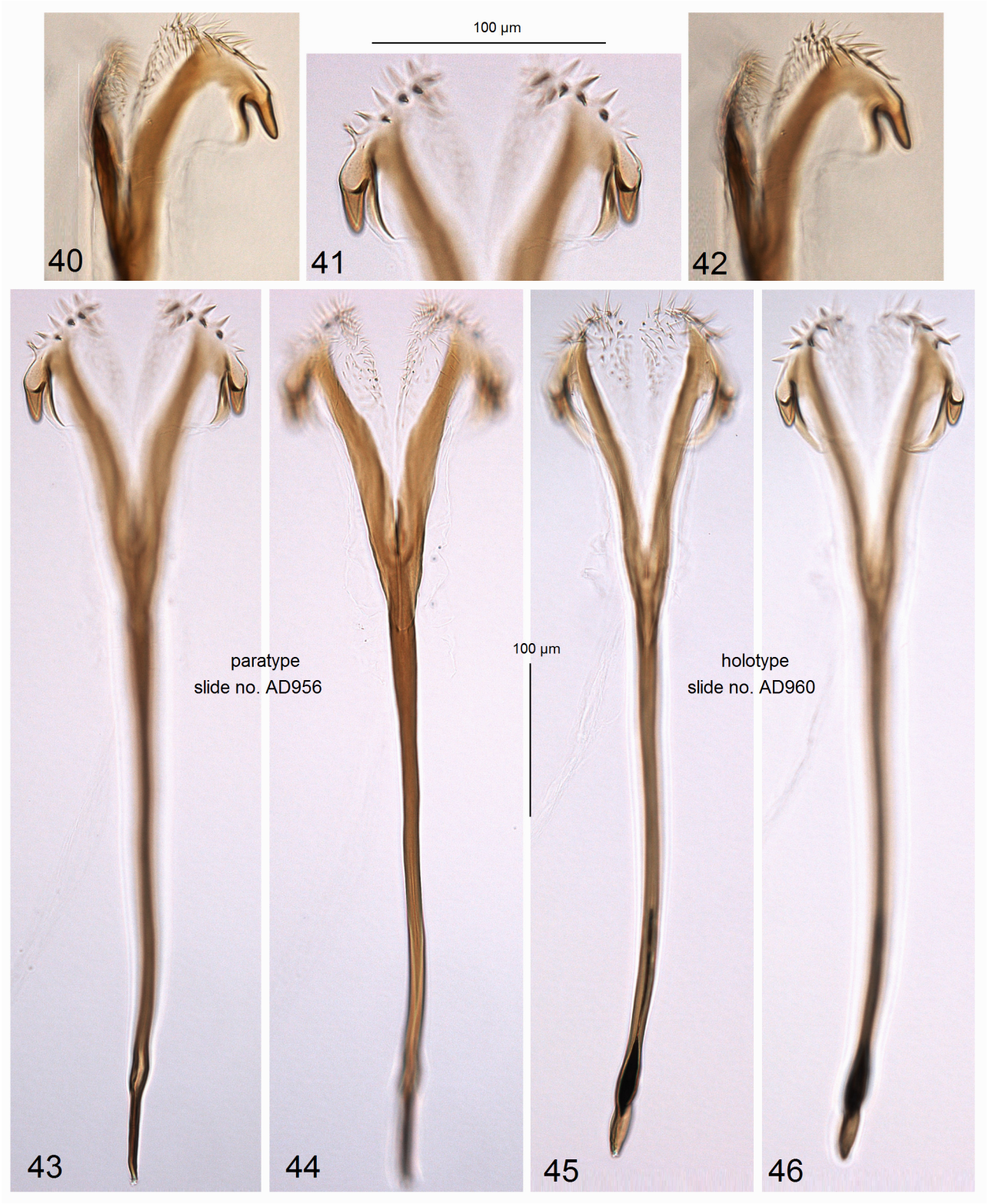
FIGURES 9–19. Leaf mines of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.**, Lobo Guerrero, Valle del Cauca, Colombia.



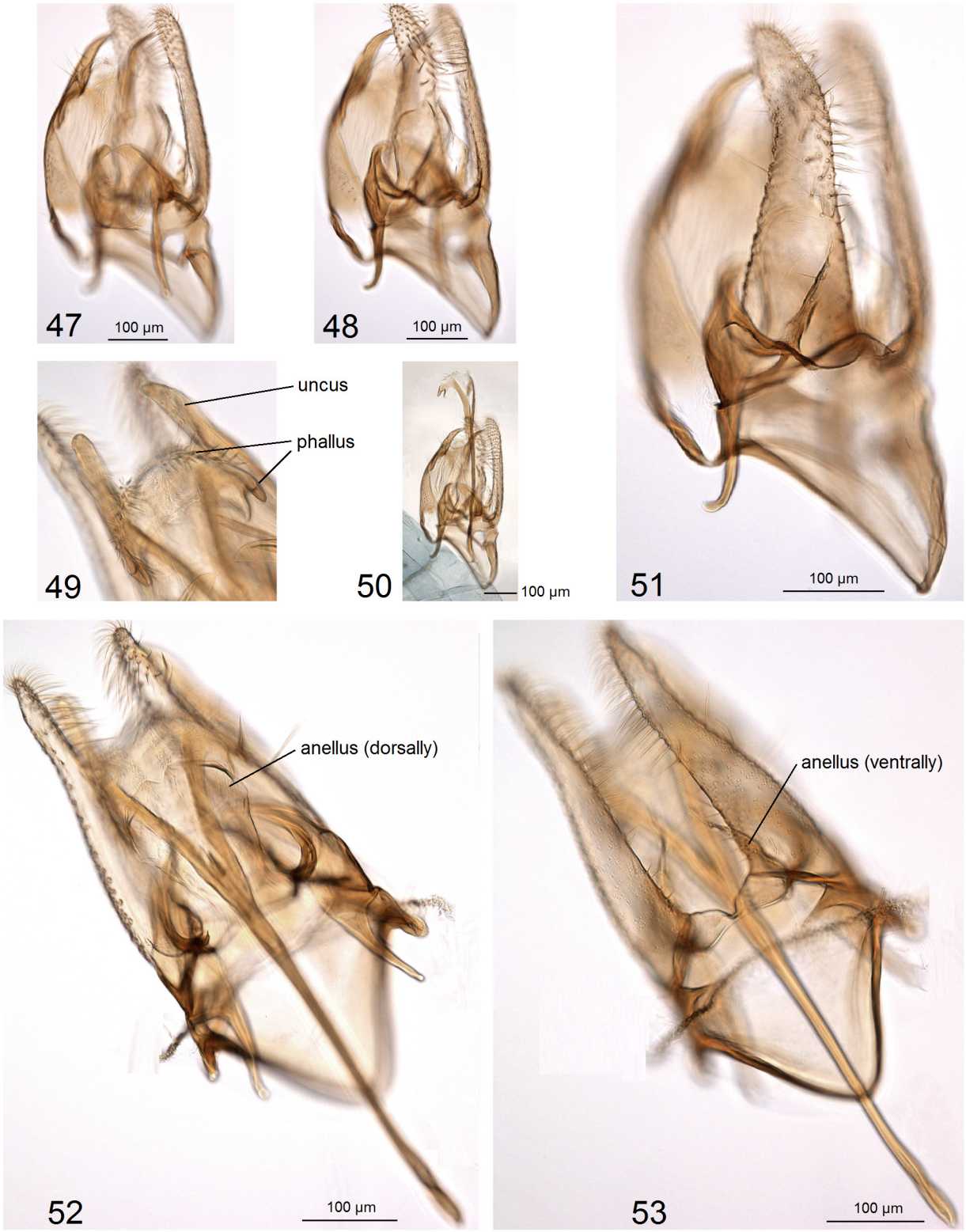
FIGURES 20–32. Exuviae and adults of new Tischeriidae species from Colombia. 20–25, *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.**, exuviae; 26, same, male adult, holotype; 27, same, paratype; 28, same, other paratype; 29–32, *A. ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.**, male adult, holotype (MPUJ).



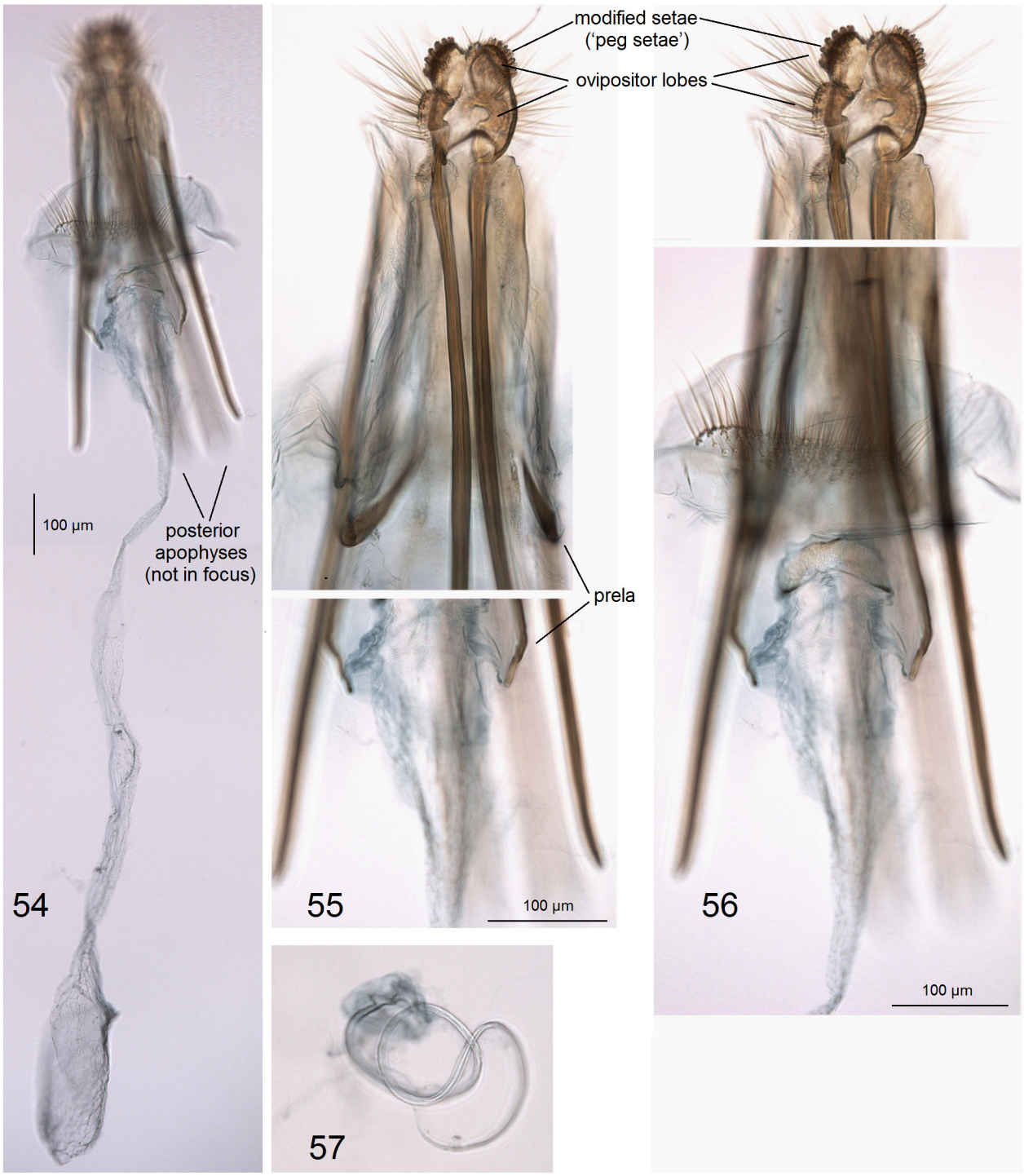
FIGURES 33–39. Male genitalia of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.**, capsule with phallus removed, holotype, genitalia slide no. AD960 (MPUJ).



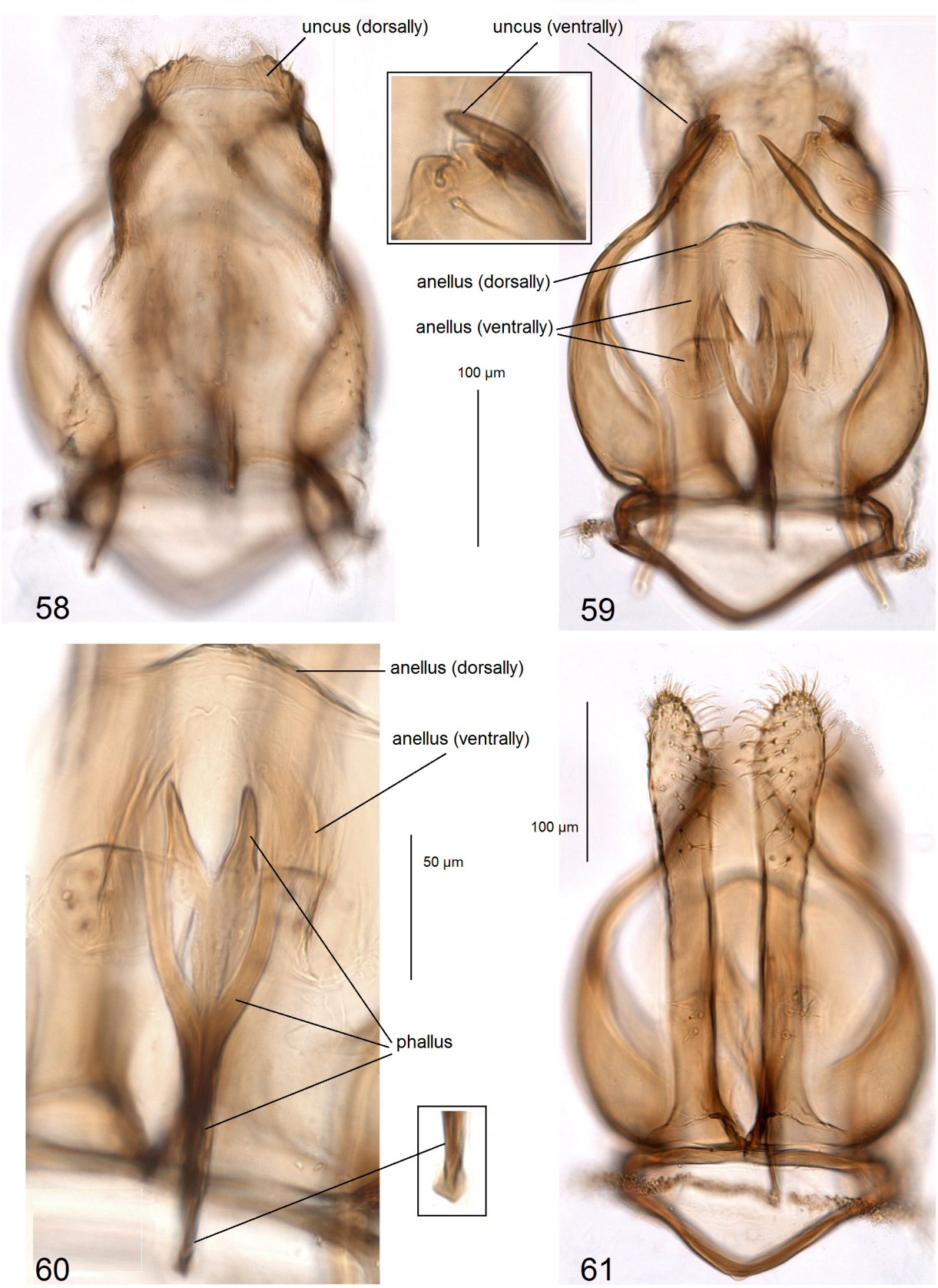
FIGURES 40–46. Male genitalia of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.**, phallus. 40–42, apical part, lateral and ventral (41) view; 43–44, general view, paratype, genitalia slide no. AD956; 45–46, same, holotype, genitalia slide no. AD960 (MPUJ).



FIGURES 47–53. Male genitalia of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov**. 47, 48, 50, 51, lateral view of capsule (50, with phallus little removed), paratype, genitalia slide no. AD956; 49, ventral view of uncus, genitalia slide no. AD958; 52, 53, general view of capsule with phallus, paratype, genitalia slide no. AD958 (MPUJ).

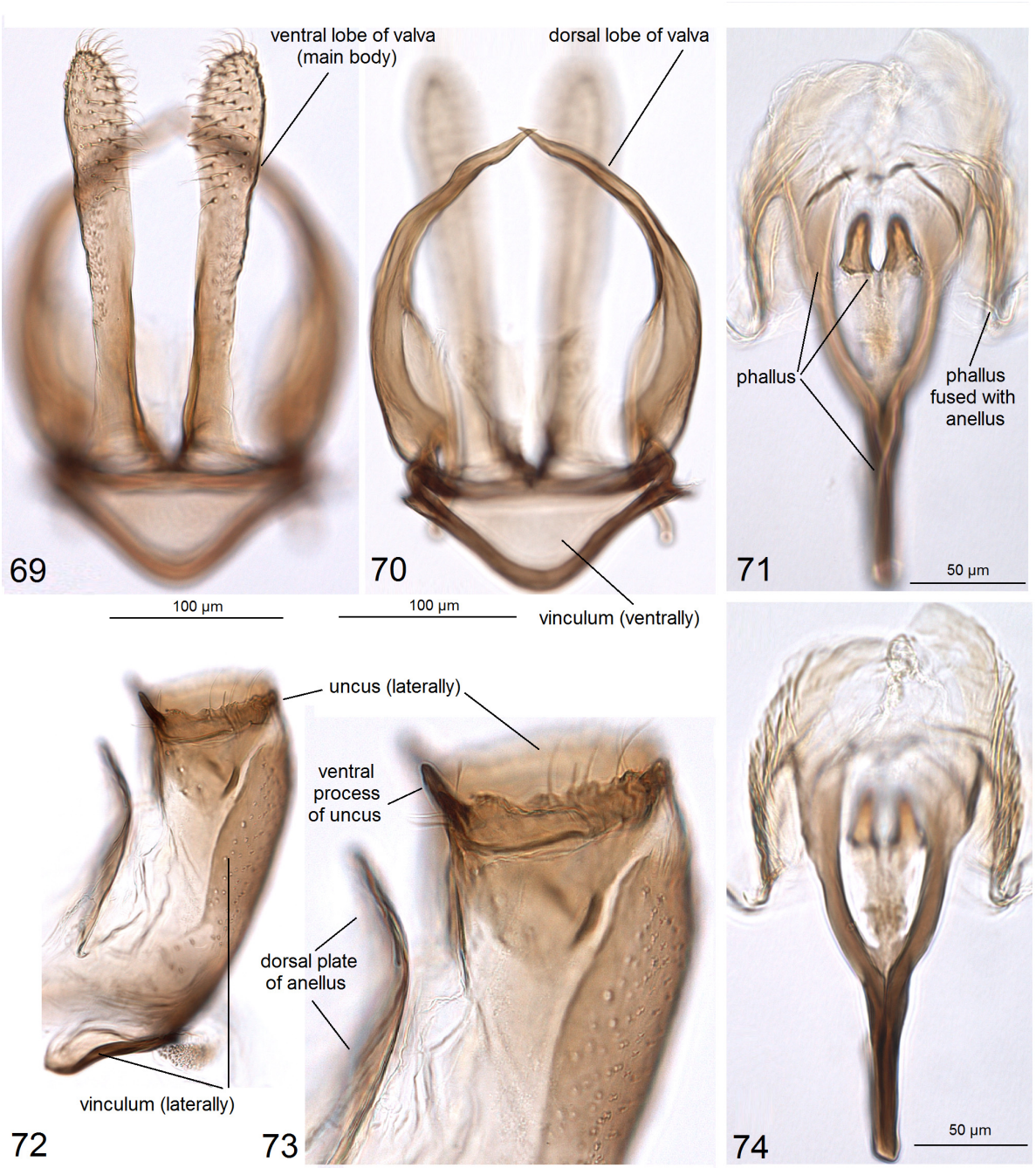


FIGURES 54–57. Female genitalia of *Astrotischeria colombiana* Stonis & Vargas, **sp. nov.**, paratype, genitalia slide no. AD956 (MPUJ). 54, general view; 55, 56, apophyses and ovipositor; 57, coils of ductus spermathecae (broken off).



FIGURES 58–61. Male genitalia of *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.**, capsule with phallus, holotype, genitalia slide no. AD959 (MPUJ).

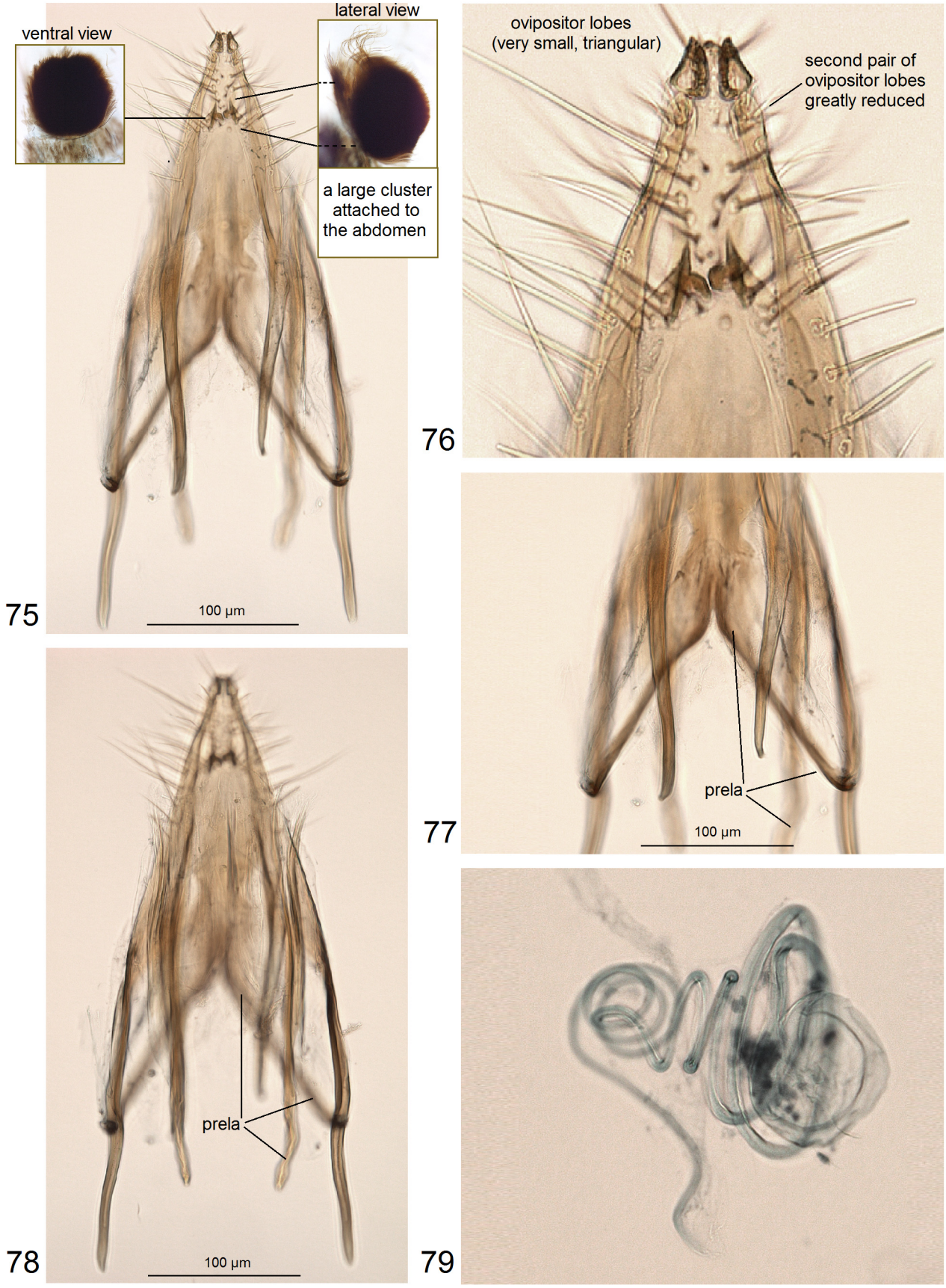
FIGURES 62–68. Habitat and collecting of *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.** in Colombia. 62–65, habitat, El Naranjo, 550 m, Valle del Cauca, 3°46’46”N, 76°43’08”W; 66–68, collecting at light using a Philip bulb ML 220–230 V, 160 W (from left to right: Franklin J. Galindo, Sergio A. Vargas and Jonas R. Stonis, El Naranjo, February 2019).



FIGURES 69–74. Male genitalia of *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.**, paratype, Peru, genitalia slide no. AD961 (USNM). 69, 70, capsule with phallus removed; 71, 74, phallus; 72, 73, uncus and vinculum, lateral view.

Bionomics (Figs. 62–65, 80–88). The larvae mine the leaves of *Abutilon* Mill., possibly *A. divaricatum* Turcz. (Malvaceae: Malvoideae: Malvea) (Figs. 81–83) (see Remarks); mining larvae are recorded from June. The blotch mine is irregular, with very little or no frass (Figs 84, 85, 87); in fully developed mines the margin of the mined leaf is usually bent (Figs 85–86). The larva is pale green, with a dark green intestine (Fig. 87). Pupation occurs inside the leaf mine. The exit slit is on upper side of the leaf. Adults are attracted to light; the holotype was collected by a light trap in February (Figs. 66–68).

Distribution. The species is known from El Naranjo, Valle del Cauca (Fig. 1), a rather lush tropical locality/habitat on the eastern edge of the Choco biogeographical province in southwestern Colombia at an elevation of about 550 m (Figs. 62–65), and also from a tropical habitat in Cusco Region, Peru, at an elevation about 1200–1300 m (Fig. 80).



FIGURES 75–79. Female genitalia of *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.**, paratype, Peru, genitalia slide no. AD963 (USNM). 75–78, ovipositor, apophyses and prela; 79, coils of ductus spermathecae.

FIGURES 80–88. Bionomics of *Astrotischeria ochrimaculosa* Diškus, Stonis & Vargas, **sp. nov.** 80, habitat, Peru, Cusco Region, La Convención Province, Maranura, 12°57'56"S, 72°39'18"W, elevation 1220 m; 81–83, host plant, *Abutilon* sp., Malvaceae (see Remarks); 84–88, leaf mines.

Etymology. The species name is derived from the Greek *ochra* (ochre) and Latin *maculosus* (spotted), referring to the forewing pattern with irregular yellowish ochre patches.

Remarks. The host plant, *Abutilon* Mill., possibly *A. divaricatum* Turcz., was identified by research botanist Francisco Fajardo Gutiérrez (Herbarium of Jardín Botánico de Bogotá) based on photographs. Hence, the identification is somewhat provisional.

Discussion

The discovery of these two highly distinctive and morphologically rather unusual new species is important because it provides novel morphological and diversity data about the endemic Neotropical genus *Astrotischeria*. Both of the newly discovered species have a strongly developed and thickened dorsal plate of the anellus, which was unknown for *Astrotischeria*, except for *A. casila* Diškus & Stonis (Stonis *et al.* 2018). Previously, it was believed that such an elaborate anellus occurred only in *Paratischeria* (Xu *et al.* 2017, Stonis *et al.* 2017). It is also interesting to note that the uncus of *A. ochrimaculosa* also exhibits a unique morphology, with a very large, undivided dorsal lobe and two large ventral lobes. The phallus in *A. ochrimaculosa* is very small in comparison to other Neotropical tischeriids, and the distal quadrafurcation resembles that of another genus, the Bolivian *Paratischeria fasciata* Diškus & Stonis. Moreover, the female genitalia of *A. ochrimaculosa* have a ductus spermathecae with many large coils and a unique ovipositor among all Tischeriidae, the presence of reduced, very small primary lobes but indistinct secondary lobes. In addition, the female abdomen has a large, round tuft (called telpek) in the area of the apophyses. We surmise that *A. ochrimaculosa* occupies a prominent or unique position in the genus *Astrotischeria*, and future studies with additional material may find that it represents a separate species group.

Tischeriidae are rare in many scientific collections. Documentation of these tiny, but ecologically and economically important, leaf-mining insects is hampered by the lack of qualified specialists and the small size of the adults. The total number of Tischeriidae of the Neotropics now numbers 28 described species including the two newly discovered species in this paper. Only two species are recorded over a broad range in the Neotropics: *Paratischeria neotropicana* (Diškus & Stonis), occurring from Belize to the Amazonian provinces of Peru (Diškus & Stonis 2015) and to Bolivia (Diškus, *unpubl*.), and *Astrotischeria selvica* Diškus, Carvalho-Filho & Stonis, occurring from Central America to the Atlantic coast of equatorial Brazil (Stonis *et al*. 2018). Surprisingly, *A. ochrimaculosa* also shows a broad distributional range from Colombia to Peru in South America. All remaining Neotropical species are known from a single locality or restricted area which suggests that they are either poorly sampled or very restricted. The number of described Tischeriidae species by country is unequal mostly due to different efforts, i.e., amount of the previously conducted research: Caribbean countries (3 species), Mexico (1 species), Belize (8 species), Guatemala (3 species), Guyana (1 species), Colombia (2 species), Ecuador (7 species), Peru (5 species), Brazil (1 species), Bolivia (2 species), Chile (1 species), and Argentina (2 species). Some species occur in more than in one country, therefore, there is some overlap, and the total (36) does not agree with the total 28 species known from the Neotropics. Countries that are not listed above have no published Tischeriidae records. Additional 55 new species have already been recognized, dissected, and are under preparation for publication by J. R. Stonis and A. Diškus: seven species from Belize, 18 species from Guatemala, four from Honduras, five from Ecuador, 10 from Peru, six from Bolivia, one from Paraguay, one from Brazil, one from Uruguay, and two from Argentina. More fieldwork and focused collecting of Tischeriidae in Colombia is necessary and is being planned by us in the foreseeable future.

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References

Diškus, A. & Stonis, J.R. (2015) *Astrotischeria neotropicana* sp. nov.—a leaf-miner on *Sida*, Malvaceae, currently with the broadest distribution range in the Neotropics (Lepidoptera, Tischeriidae). *Zootaxa*, 4039 (3), 456–466. https://doi.org/10.11646/zootaxa.4039.3.5

Landry, B. & Roque-Albelo, L. (2004) First report of Tischeriidae (Lepidoptera) on the Galapagos Islands, Ecuador, with descriptions of two new endemic species. *Revue suisse de Zoologie*, 111 (3), 599–609. https://doi.org/10.5962/bhl.part.80255

Meyrick, E. (1915) Descriptions of South American Micro-Lepidoptera. *The Transactions of the Entomological Society of London*, 48 (2), 201–256. https://doi.org/10.1111/j.1365-2311.1915.tb02527.x

Puplesis, R. & Diškus, A. (2003) *The Nepticuloidea & Tischerioidea (Lepidoptera) a global review, with strategic regional revisions*. *Monograph*. Lututė, Kaunas, 512 pp., figs. 612.

Stonis, J.R. & Diškus, A. (2007) Distribution of *Tischeria gouaniae* sp. n. from the tropical forest of Belize – an exotic new addition to the American fauna of Tischeria (Insecta: Lepidoptera: Tischeriidae). *Zoological Science*, 24 (12), 1286–1291. https://doi.org/10.2108/zsj.24.1286

Stonis, J.R. & Diškus, A. (2008) Checklist of American *Coptotriche* (Insecta: Lepidoptera: Tischeriidae) with descriptions of two new species from the tropical forest of Belize (Central America). *Zoological Science*, 25 (1), 99–106. https://doi.org/10.2108/zsj.25.99

Stonis, J.R., Diškus, A., Carvalho Filho, F. & Lewis, O.T. (2018) American Asteraceae-feeding *Astrotischeria* species with a highly modified, three-lobed valva in the male genitalia (Lepidoptera, Tischeriidae). *Zootaxa*, 4469 (1), 1–69. https://doi.org/10.11646/zootaxa.4469.1.1

Stonis, J.R., Diškus, A., Remeikis, A. & Cumbicus Torres, N. (2016) First description of leaf-mining Nepticulidae and Tischeriidae (Insecta, Lepidoptera) feeding on the Chilean endemic plant genus *Podanthus* Lag. (Asteraceae). *Zootaxa*, 4061 (2), 119–130. https://doi.org/10.5281/zenodo.268268

Stonis, J.R., Diškus, A., Remeikis, A. & Monro, A.K. (2017) The mystery of the tiny Urticaceae-feeders: documentation of the first leaf-mining Nepticulidae (Lepidoptera) species from equatorial America associated with *Phenax*, *Boehmeria* and *Pilea*. *Biologija*, 62 (1), 1–22. https://doi.org/10.6001/biologija.v63i2.3523

Stonis, J.R., Diđkus, A., Remeikis, A. & Navickaitė, A. (2014) Study methods of Nepticulidae: micro-mounts of genitalia structures. *In*: Stonis, J.R., Hill, S.R., Diškus, A. &Auškalnis, T. (Eds.), *Selected abstracts and papers of the First Baltic International Conference on Field Entomology and Faunistics*. Edukologija Publishers, Vilnius, pp. 32–35.

Stonis, J.R., Diškus, A. & Sruoga, V. (2008) Redescription of *Coptotriche pulverea* (Walsingham)—an unusual species of the American Tischeriidae fauna (Insecta: Lepidoptera). *Acta Zoologica Lituanica*, 18 (3), 169–173. https://doi.org/10.2478/v10043-008-0023-y

Walsingham, L. (1897) Revision of the West-Indian Micro-Lepidoptera, with descriptions of new species. *Proceedings of the General Meetings for Scientific Business of the Zoological Society of London*, 1, 54–183. https://doi.org/10.5962/bhl.title.53759

Walsingham, L. (1914) Insecta. Lepidoptera—Heterocera. *In*: Godman, F.D. & Salvin, O. (Eds.), *Biologia Centrali—Americana*. *4*. Taylor & Francis, London, pp. 225–393, pls. 10.

Xu, J., Dai, X., Liu, P., Bai, H., Diškus, A. & Stonis, J.R. (2017) First report on *Paratischeria* from Asia (Lepidoptera: Tischeriidae). *Zootaxa*, 4350 (2), 331–344. https://doi.org/10.11646/zootaxa.4350.2.8