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Documenting new and little known leaf-mining Nepticulidae from middle and southwestern areas of the Asian continent

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Table of contents

Abstract . . . 401
Introduction . . . 402
Material and methods . . . 402
Taxonomic treatment with descriptions of new species . . . 406
Stigmella maloidica Puplesis, 1991 . . . 406
Stigmella ziziphifolia Rocienė & Stonis, sp. nov. . . . 406
Stigmella damocles Remeikis, sp. nov. . . . 407
Stigmella pyramidata Diškus & Navickaitė, sp. nov. . . . 408
Stigmella alilediella Diškus & Navickaitė, sp. nov. . . . 408
Stigmella longa Remeikis & Stonis, sp. nov. . . . 409
Stigmella latilobata Diškus & Navickaitė, sp. nov. . . . 418
Stigmella paniculata Diškus & Navickaitė, sp. nov. . . . 418
Ectoedemia orbiculata Diškus, Remeikis & Stonis, sp. nov. . . . 419
Ectoedemia jacutica Puplesis, 1988 . . . 420
Ectoedemia insignata Puplesis, 1988 . . . 421
Ectoedemia spinosella (de Joannis, 1908) . . . 421
Ectoedemia ingloria Puplesis, 1988 . . . 422
Ectoedemia tadshikiella Puplesis, 1988 . . . 423
Acalyptris brunipexus Stonis, Diškus & Remeikis, sp. nov. . . . 424
Acalyptris auratilis Puplesis & Diškus, 2003 . . . 425
Acalyptris noctilucus Rocienė & Stonis, sp. nov. . . . 425
Acalyptris nasutus Diškus & Navickaitė, sp. nov. . . . 426
Discussion . . . 427
Acknowledgements . . . 451
References . . . 451

Abstract

We review eighteen species of Nepticulidae (Lepidoptera: Nepticuloidea) from Asia and describe eleven new species from Central Asia and the western Himalaya: *Stigmella ziziphifolia* Rocienė & Stonis, **sp. nov.**, *S. damocles* Remeikis, **sp. nov.**, *S. pyramidata* Diškus & Navickaitė, **sp. nov.**, *S. alilediella* Diškus & Navickaitė, **sp. nov.**, *S. longa* Remeikis & Stonis, **sp. nov.**, *S. latilobata* Diškus & Navickaitė, **sp. nov.**, *S. paniculata* Diškus & Navickaitė, **sp. nov.**, *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.**, *Acalyptris brunipexus* Stonis, Diškus & Remeikis, **sp. nov.**, *A. noctilucus* Rocienė & Stonis, **sp. nov.**, and *A. nasutus* Diškus & Navickaitė, **sp. nov.** The new taxa are illustrated with photographs of the adults, their genitalia, and, if available, leaf mines. We also provide the first photographic documentation of adults and male genitalia of some Asiatic species. We synonymize *E. petrosa* Puplesis with *E. spinosella* (de Joannis), and *E. rosiphila* Puplesis with *E. ingloria* Puplesis.

Key words: *Acalyptris*, *Ectoedemia*, *Stigmella*, hair pencil, leaf mines, pygmy moths

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Introduction

Pygmy moths (Nepticulidae) are a very distinct and cosmopolitan family of phylogenetically primitive monotrysian Lepidoptera, comprising some of the smallest lepidopterans on Earth (García-Barros *et al*. 2016). Along with other organisms, they provide some light on the genesis and evolutionary ties of Earth's biota and serve as an express tool for monitoring or assessing biodiversity, and even determine areas of priority from the environmental point of view (Stonis *et al.* 2020). Larvae of pygmy moths are predominantly monophagous or oligophagous (van Nieukerken 1986b, Johansson *et al.* 1990, Puplesis & Diškus 2003), live and feed inside green tissues of plants and sometimes, being very abundant leaf or stem miners, damage plants (Johansson *et al.* 1990, Puplesis 1994) including cultivated fruit and berry plants (Kuznetzov & Puplesis 1994), ornamental, pharmaceutically significant, aromatic, endemic or protected plants (Remeikis 2017). A detailed morphological and biological characterization of Nepticulidae is given in Johansson *et al*. (1990), Puplesis (1994), Puplesis & Diškus (2003).

In the face of global changes, studies of biodiversity, including taxonomic diversity of leaf-mining lepidopterans, improving their diagnostics, and defining their interactions with plants, are of the greatest importance (Diškus & Stonis 2012, Stonis *et al*. 2020). Despite their extraordinary wide range of habitats (Remeikis 2017), Nepticulidae have been insufficiently studied in many regions of the world (van Nieukerken 1986a, van Nieukerken *et al*. 2016, Stonis *et al*. 2016, 2017, 2018; Stonis & Remeikis 2018) and, therefore, a relatively small proportion of their diversity has been described from Asia (e.g., Kemperman & Wilkinson 1985, Falkovitsh 1986, Puplesis 1994, Puplesis *et al*. 1996, van Nieukerken & Liu 2000, Navickaitė *et al*. 2011, Puplesis & Diškus 2003, Rocienė & Stonis 2013, Stonis & Rocienė 2013, van Nieukerken *et al*. 2016, Yagi *et al*. 2019, Shin *et al.* 2020). Reviews of Nepticulidae with lists of references were published only for a few regions of Asia: Central Asia (Puplesis & Diškus 2003), the Himalaya (Puplesis & Diškus 2003), continental part of the Russian Far East (Rocienė & Stonis 2014). An exhaustive taxonomic checklist of pygmy moths of Russia (including the Asian part of the country) was recently provided by van Nieukerken & Sinev (2019).

Based on specimens from various localities in Asia (Fig. 1), we reviewed eighteen species of Nepticulidae, described eleven new species of *Stigmella* Schrank, *Ectoedemia* Busck, *Acalyptris* Meyrick, and synonymized two species (*Ectoedemia petrosa* Puplesis with *E. spinosella* (de Joannis) and *E. rosiphila* Puplesis with *E. ingloria* Puplesis). Additionally, for the first time, we provided photographic documentation of the male genitalia of some previously little known species, reported on new geographic distribution and associations with host plants (Figs 2–6), as well as provided data on the re-deposition of the type material of some species.

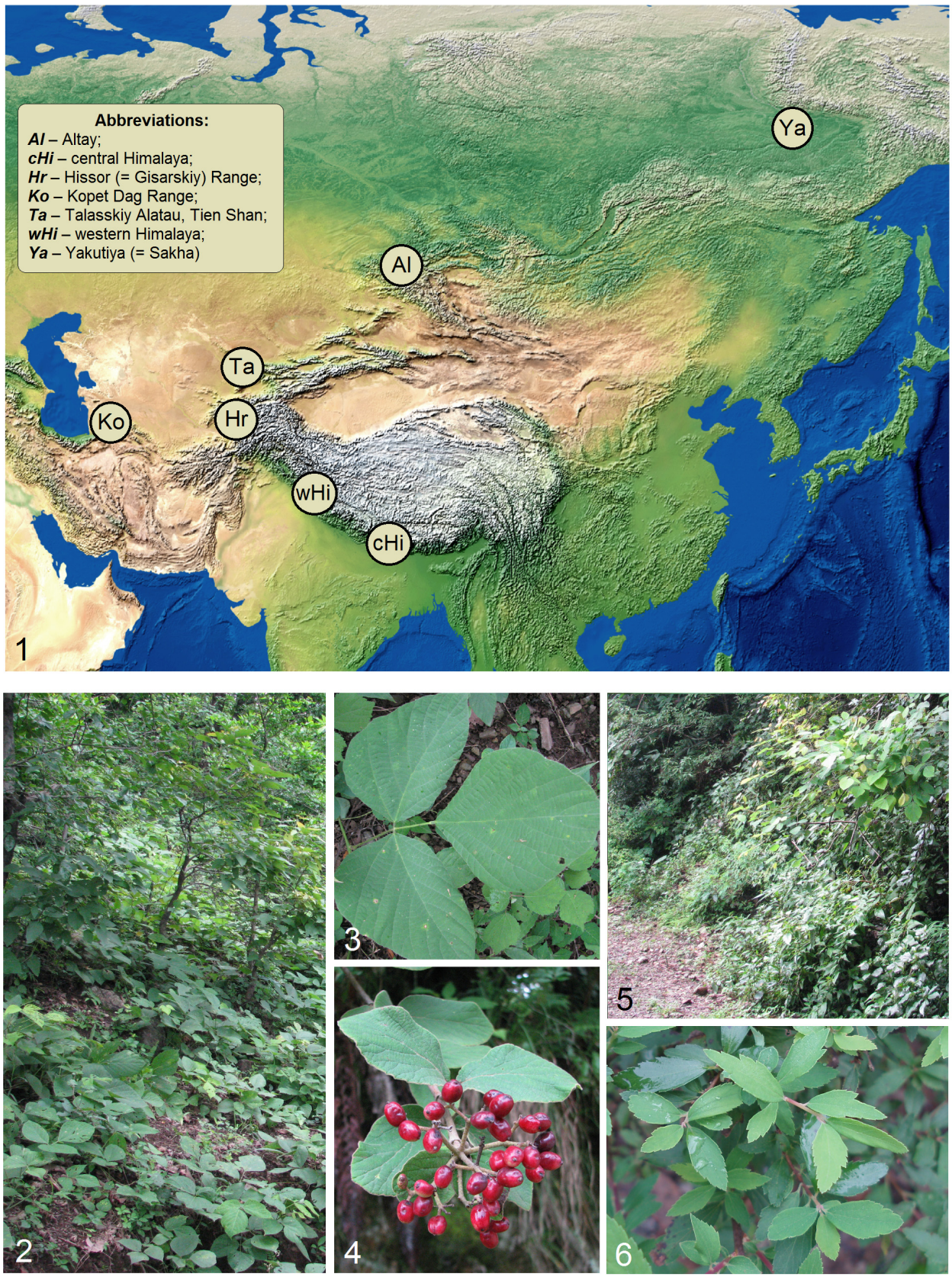
The main goal of this paper is to validate eleven new species names of pygmy moths for our forthcoming taxonomic analysis (Stonis *et al*. *in prep*.). It will also contribute to a more detailed account of the diversity of leaf-mining Nepticulidae in Asia and stimulate further studies. It is obvious that many species still await to be discovered and described.

Material and methods

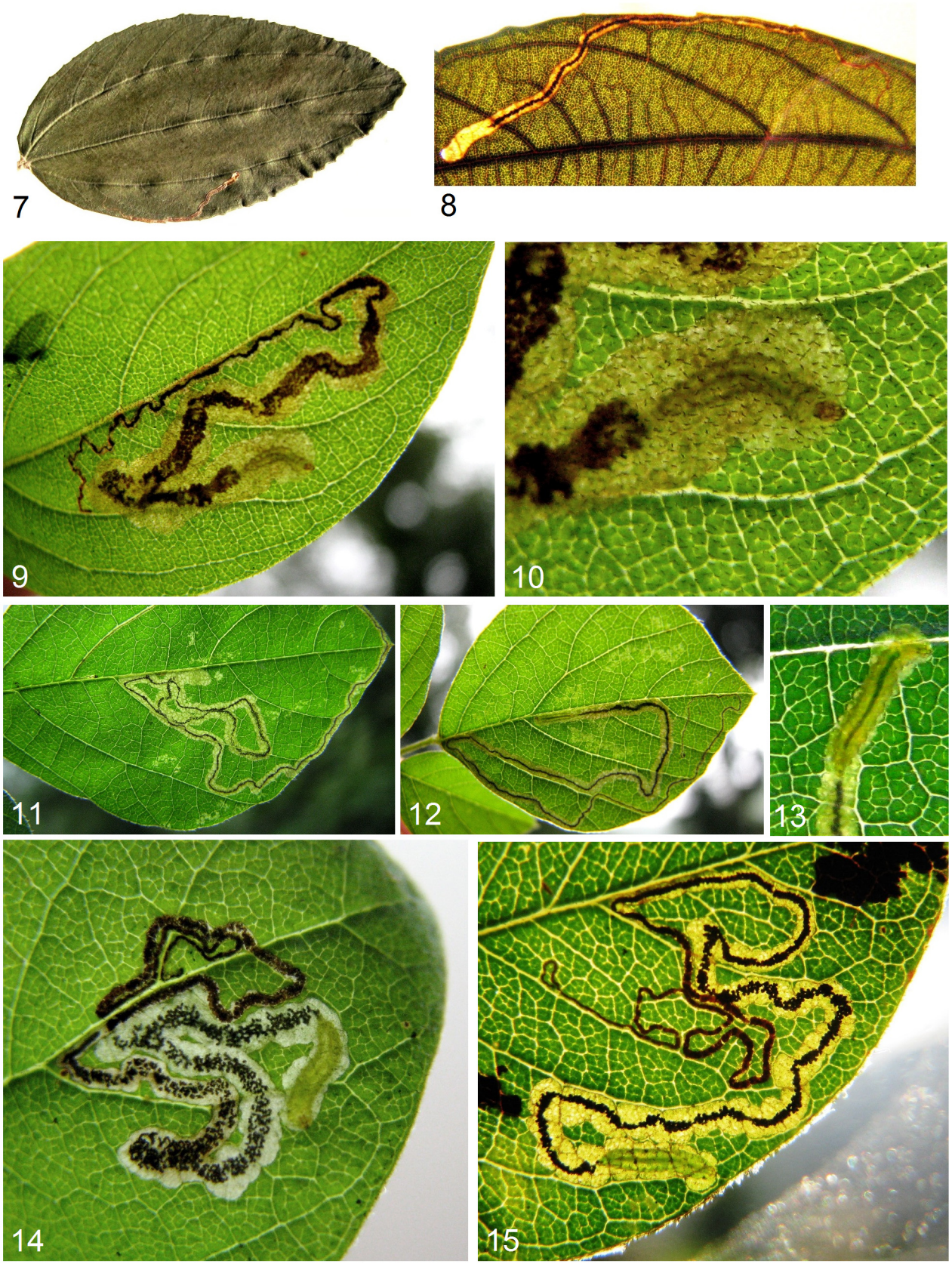
Descriptions of all new species were based on material which, according to the informal agreement with the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN) will be deposited in the collection of ZIN. Type series of some earlier described species were received for our study from the Lithuanian University of Educational Sciences, Vilnius, Lithuania (LEU, formerly abbreviated as VPU); these type series, according to the agreement with ZIN, will be transferred to the collection of the Zoological Institute in St. Petersburg because of the LEU closure.

Collecting methods, including rearing of adults from mining larvae, were outlined in Puplesis (1994), Diškus & Stonis (2012), and Stonis *et al*. (2016). Protocols for species identification and description were outlined in Johansson *et al*. (1990), Puplesis (1994), and Puplesis and Diškus (2003).

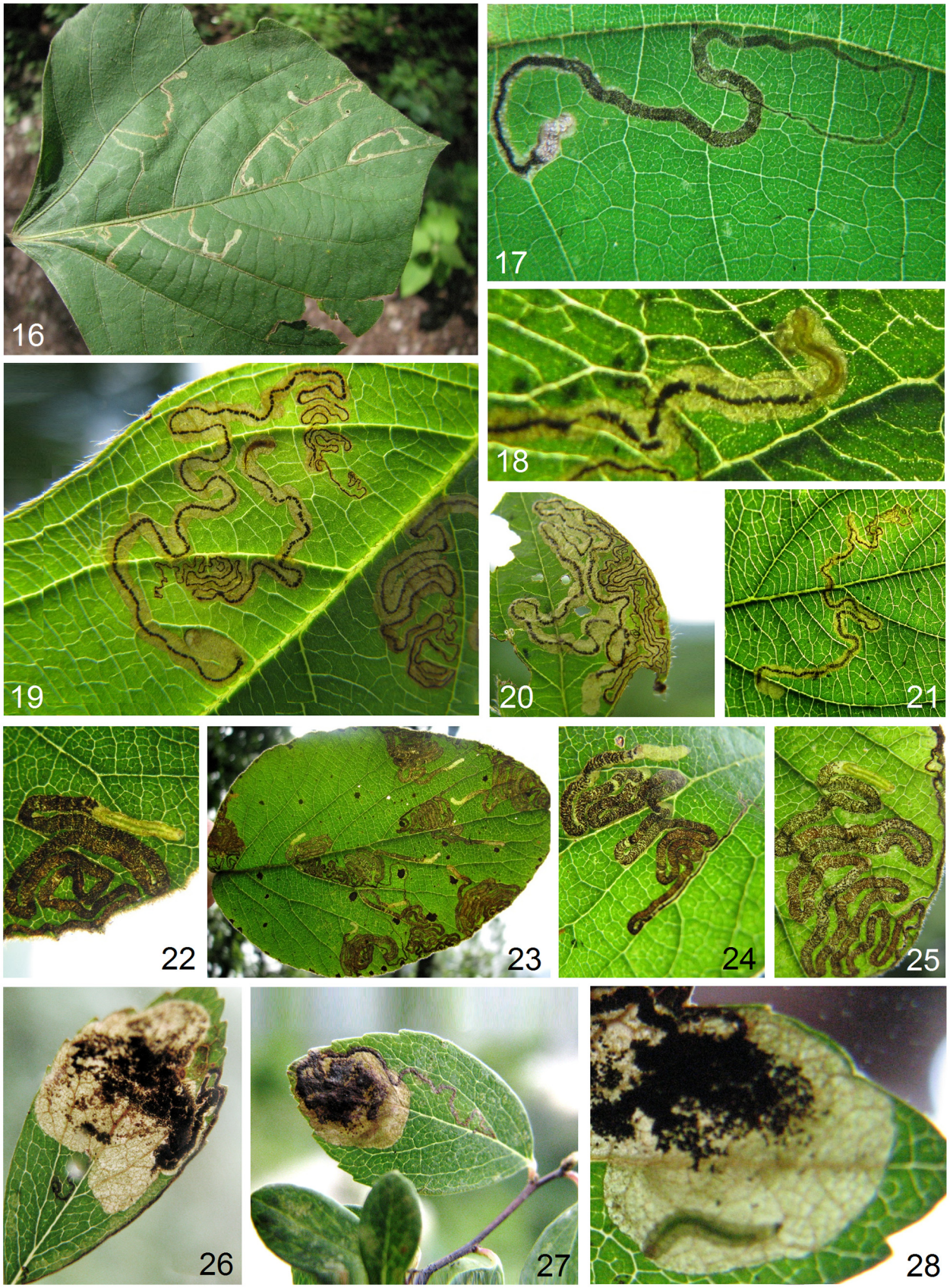
Preparation of temporary and permanent micro-mounts of genital structures were undertaken following the method by Stonis *et al*. (2014). After maceration of the abdomen in 10% KOH and subsequent cleaning, abdominal pelts, and female genitalia were stained with Chlorazol Black (Direct Black 38/Azo Black), but male genitalia were left unstained. The male genital capsules were removed from the abdomen and mounted ventral side uppermost. The phallus was usually severed from the genital capsule. Both male and female genitalia were mounted in Euparal.



FIGURES 1–6. A geographical map (courtesy of T. Patterson, USA) and new host plants of Nepticulidae. 1, localities in this study; 2, 3, *Ototropis elegans* (DC.) H. Ohashi & K. Ohashi, Fabaceae, a host plant of *Stigmella longa* sp. nov.; 4, *Viburnum cotinifolium* D. Don., Adoxaceae, a host plant of *Acalyptris nasutus* sp. nov; 5, *Ototropis* sp., Fabaceae, a host plant of *Stigmella pyramidata* sp. nov.; 6, *Spiraea canescens* D. Don., Rosaceae, a host plant of *Ectoedemia orbiculata* sp. nov.



FIGURES 7–15. Leaf mines of new species of Nepticulidae. 7, 8, *Stigmella ziziphifolia* Rocienė & Stonis, **sp. nov.**; 9, 10, *S. alilediella* Diškus & Navickaitė, **sp. nov.**; 11–13, *S. pyramidata* Diškus & Navickaitė, **sp. nov.**; 14, *S. latilobata* Diškus & Navickaitė, **sp. nov.;** 15, *S. paniculata* Diškus & Navickaitė, **sp. nov.**



FIGURES 16–28. Leaf mines of new species of Nepticulidae. 16, 17, *Stigmella longa* Remeikis & Stonis, **sp. nov.**; 18–21, *Acalyptris brunipexus* Stonis, Diškus & Remeikis, **sp. nov.**; 22–25, *A. nasutus* Diškus & Navickaitė, **sp. nov.**; 26–28, *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.**

Permanent 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; details of forewing scaling were studied by a Leica DM2500 microscope.

The descriptive terminology of morphological structures follows Johansson *et al*. (1990) and Puplesis (1994), except for the term "aedeagus", which is referred here as "phallus" and the term "cilia", which is referred here as "fringe".

Taxonomic treatment with descriptions of new species

Stigmella maloidica Puplesis, 1991

(Figs 87–93)

Stigmella maloidica Puplesis, in Puplesis & Arutyunova 1991: 573.
Stigmella maloidica Puplesis, in Puplesis 1994: 60–61.

Material examined. 11 ♂♀ (holotype and paratypes): Tajikistan, 30 km N of Dushanbe, Varzob Canyon, Kondara, 1200 m, mining larvae on *Malus* and *Cotoneaster*, 5.vii.1986, 6–9.xi.1989, R. Puplesis, genitalia slide nos AD525 ♂ (holotype), AN336♂, AN337♂, AN338♂, AN339♂ (ZIN, also see Remarks); 4 ♂, same locality, at light, 4–8.vii.1991, V. Sruoga (ZIN); 1 ♂, same locality, at light, 2.viii.1990, R. Puplesis (ZIN); 1 ♂, same locality, at light, 22.vi.1990, R. Puplesis & Diškus (ZIN); 2 ♂ (paratypes) 45 km N of Dushanbe, Chodzha Obi Garm, 7.xi.1989, R. Puplesis (ZIN); 1 ♂, 60 km N of Dushanbe, Ziddi, 2000 m, at light, 7.viii.1990, R. Puplesis (ZIN).

Diagnosis. *Stigmella maloidica* belongs to the *S. lapponica* group. Externally and in the male genitalia, this species is the most similar and obviously related to *S. ziziphifolia* **sp. nov.** (described below). However, *S. maloidica* differs from *S. ziziphifolia* in the short lateral lobes of the vinculum (Figs 87, 89), split caudal process of the gnathos (Figs 91, 92), and absence of large, spine-like cornuti in the male genitalia (Fig. 93). This species also differs from *S. ziziphifolia* and all other species of the group in its biology. Larvae of *S. maloidica* feed on *Cotoneaster* Medik. and *Malus* Mill. (Rosaceae) (*S. ziziphifolia* feeds on *Ziziphus* Mill., Rhamnaceae), produce gradually widening, usually contorted leaf mines with an interrupted frass line (*S. ziziphifolia* produces slender leaf mines with an uninterrupted frass line). Additionally, *S. maloidica* occurs in temperate, semi-arid temperate areas in Central Asia, and *S. ziziphifolia* occurs in the subtropical, humid habitats of the Himalaya.

Description. Forewing length 2.3–2.6 mm; wingspan 5.1–5.7 mm. Described in Puplesis & Arutyunova, 1991: 573 (in Russian) and redescribed in Puplesis 1994: 60–61 (in English).

Bionomics. Host plants are *Cotoneaster hissaricus* Pojark., *C. insignis* Pojark., *Malus domestica* Borkh., and *M. sieversii* (Ledeb.) M. Roem. (Rosaceae). Larvae mine leaves from July to November. Leaf mine is a long, contorted or sinuous, gradually widening gallery with an interrupted central line of black frass (illustrated by Puplesis 1994: fig. 782). Cocoon yellowish orange to pale brown. Adults fly in late June–July and possibly over a much longer period.

Distribution. Known from Varzob Canyon in the Hissor Range, Tajikistan, at the elevation of 1200–2000 m (Fig. 1: *Hr*).

Remarks. We provide the first photographic documentation of the male genitalia of the species (Figs 87–93). The holotype and 12 paratypes, earlier deposited at LEU (=VPU) will be transferred to ZIN (see Material & Methods).

Stigmella ziziphifolia Rocienė & Stonis, sp. nov.

(Figs 7, 8, 33, 34, 94–102)
urn:lsid:zoobank.org:act:5D6AD8F5-D9A8-45DF-9972-028312298598

Type material. 3 ♂ (holotype & paratypes): India, Uttarakhand, Dehradun Distr., Dhanaulti, 30°25'17"N, 78°15'05"E, 16.viii.2010, A. Šimkevičiūtė, genitalia slide nos AD130 (holotype), AG131, AG132 (ZIN).

Diagnosis. *Stigmella ziziphifolia* **sp. nov.** belongs to the *Stigmella lapponica* group. Externally, and in the male genitalia, this new species is the most similar and obviously related to *S. maloidica* (see above). However, *S. ziziphi-*

folia **sp. nov.** differs from *S maloidica* in the long, slender lateral lobes of the vinculum (Fig. 100), unsplit, usually slender, caudal process of the gnathos (Figs 94, 96), and the presence of some large, spine-like cornuti in the male genitalia (Figs 99, 102). This species also differs from *S. maloidica* and all other species of the group in its biology: larvae of *S. ziziphifolia* feed on *Ziziphus* Mill., Rhamnaceae (*S. maloidica* feeds on *Cotoneaster* Medik. and *Malus* Mill., Rosaceae), produce slender leaf mines with an uninterrupted frass line (*S. maloidica* produces gradually widening, often contorted leaf mines with an interrupted frass line). Additionally, *S. ziziphifolia* occurs in the humid subtropical habitats of the Himalaya, and *S. maloidica* occurs in temperate, semi-arid areas in Central Asia.

Male (Figs 33, 34). Known from three adults in pupal skin. Forewing length about 1.5–1.7 mm; wingspan 3.3–3.7 mm (n = 3).

Head. Palpi golden cream; frontal tuft ochreous orange; collar and scape golden cream; flagellum grey.

Thorax. Tegula, thorax and forewing covered with grey-black scales with some purple iridescence; fascia of forewing cream, median, sometimes interrupted in the middle; fringe dark grey; forewing underside black. Hindwing and fringe dark grey with some green and purple iridescence. Legs glossy golden cream with dark grey scales on upper side.

Abdomen. Colour of scaling unknown. Genitalia (Figs 94–102) with capsule 275 µm long, 150 µm wide. Vinculum with long and slender lateral lobes (Fig. 100). Uncus with two small triangular lobes (Figs 94, 96). Gnathos with one long, distinctly slender, apically pointed caudal process (Figs 94, 96); occasionally caudal process can be split. Valva (Figs 98, 101) about 155 µm long, with a slender and curved apical process; inner lobe of valva heavily papillated. Transtilla (Fig. 95) with short, triangular corners, without sublateral processes. Phallus (Figs 99, 102) about 185 µm long; vesica with numerous tiny cornuti and some large, spine-like cornuti (Fig. 99).

Female. Unknown.

Bionomics (Figs 7, 8). Host plant is *Zizyphus* Mill., Rhamnaceae (Fig. 7). Larvae mine in leaves in August. Leaf mine is a long, slender gallery with an interrupted central line of black frass. Cocoon ochre-beige, 2.5–2.8 mm long, 1.5 mm wide. Adults fly in late August and possibly over a much longer period.

Distribution. Known only from a single locality in the western Himalaya (Uttarakhand: Dhanaulti), at the elevation of ca. 2200 m (Fig. 1: *wHi*)

Etymology. The species name is derived from Latin name of the host plant *Ziziphus* in combination with Latin *folium* (a leaf), in reference to the feeding habit of the new species. Acording to E. J. van Nieukerken (pers. comm.), "there are many names ending in -foliae, but linguistically it is wrong. The Latin *folium* is neuter and has no form ending in *ae*". Therefore we chose *ziziphifolia*, a noun in apposition.

Stigmella damocles Remeikis, sp. nov.

(Figs 35–37, 103–108)

urn:lsid:zoobank.org:act:2167AC23-7E27-4750-BB6B-9770F4EA76DB

Type material. Holotype: ♂, Turkmenistan, western Kopet Dag range, 40 km E Garrygala (Kara Kala), 21.v.1993, R. Puplesis and A. Diškus, genitalia slide no. AN459 (ZIN).

Diagnosis. Belongs to the *Stigmella sanguisorbae* group. Externally, this new species can be confused with many other, similarly speckled nepticulid species with an ill-defined fascia of the forewing. In the male genitalia, the combination of long, slender lobes of the vinculum (Fig. 108) and absence of cornuti in the phallus distinguishes *S. damocles* **sp. nov.** from all known species of the *S. sanguisorbae* group.

Male (Figs 35–37). Forewing length 2.3 mm; wingspan 5.1 mm (n = 1).

Head. Frons, palpi and pecten grey cream; frontal tuft brown-grey, collar and scape white cream; flagellum cream.

Thorax. Tegula and thorax covered with dark brown scales. Forewing greyish cream, irregularly speckled with brown, ochre-glossy scales; fascia wide, ill-defined, greyish cream; fringe cream; forewing underside grey cream, without spots or androconia. Hindwing and fringe grey cream on upper side and underside, without androconia. Legs greyish cream.

Abdomen. Colour of scaling unknown. Genitalia (Figs 103–108) with capsule 240 µm long, 130 µm wide. Vinculum with very long and slender lateral lobes (Figs 103, 108). Uncus with small triangular lobes (Fig. 103). Gnathos with two slender, apically pointed caudal processes (Figs 107, 108). Valva (Fig. 105) about 130 µm long, with

a slender apical process; inner lobe of valva rounded and ribbed (Fig. 105). Transtilla with short, triangular, distally pointed sublateral processes (Figs 103, 108). Phallus (Figs 104, 106) about 175 µm long, vesica without cornuti.

Female. Unknown.

Bionomics. Adults occur in late May. Otherwise, biology is unknown.

Distribution. Known from a single locality in the western Kopet Dag Range, Turkmenistan, Garrygala, at the elevation of about 800 m (Fig. 1: *Ko*).

Etymology. The species is named after Damocles, a character in the story "The Sword of Damocles", in reference to the unusually long and pointed, sword-like lateral lobes of vinculum, also distinctly pointed and slender processes of valva and gnathos in the male genitalia.

Stigmella pyramidata Diškus & Navickaitė, sp. nov.

(Figs 5, 11–13, 109–112)

urn:lsid:zoobank.org:act:673A3FBA-3438-4EA7-9DB6-A29D9E17B680

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Mussoorie, 30°27'33"N, 78°01'43"E, elevation ca. 1980 m, larva on *Ototropis* sp., 16.viii.2010, A. Diškus and A. Navickaitė, genitalia slide no. AD494 (ZIN).

Diagnosis. In the male genitalia, the unique, pyramid-like gnathos (Figs 111, 112) and unique phallus with a large, lobe-like cornutus and a compact cluster of contorted cornuti (Fig. 109) distinguish *S. pyramidata* **sp. nov.** from all known *Stigmella* species.

Male. Known from adult in pupal exuvia; only genitalia are preserved and desribed.

Genitalia (Figs 109–112) with capsule 230 µm long, 155 µm wide. Vinculum with large lateral lobes (Fig. 109). Uncus large, undivided, distally rounded or truncated (Fig. 111). Gnathos pyramid-shaped (Figs 109, 112), with two caudal processes and transverse bar (Fig. 111). Valva (Fig. 110) 120 µm long, contricted in apical half. Transtilla with wide, triangular sublateral processes (Fig. 112). Phallus (Figs 109, 112) 150–170 µm long, pointed apically, with a large, lobe-like carina (Figs 109, 110); vesica with a compact cluster of large cornuti (Figs 109, 112).

Female. Unknown.

Bionomics (Figs 5, 11–13). Host plant is *Ototropis* Nees, Fabaceae (Fig. 5). Larvae mine in leaves in August and, judging from observed old (empty) leaf mines, in July. Larva pale green, with a bright green intestine and pale brown head (Fig. 13). The mine is a sinuous gallery, with a thin line of black frass (Figs 11, 12). Cocoon yellowish beige, oval-shaped, 2.0 mm long, 1.0 mm wide. Adults occur in August.

Distribution. Known from a single locality in the western Himalaya (Uttarakhand: Mussoorie), at the elevation of about 2000 m (Fig. 1: *wHi*).

Etymology. The species name is derived from Latin *pyramidatus* (pyramid-like), in reference to the unique, pyramid-like gnathos in the male genitalia.

Stigmella alilediella Diškus & Navickaitė, sp. nov.

(Figs 9, 10, 29, 30, 113–121)

urn:lsid:zoobank.org:act:C440BE35-9934-44AC-86EF-A0B71855EA16

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Mussoorie, 30°27'31"N, 78°01'46"E, elevation ca. 1980 m, 16.viii.2010, A. Diškus & A. Navickaitė, genitalia slide no. AD488 (ZIN).

Diagnosis. Belongs to the *Stigmella aurella* group. Externally and in the male genitalia, this new species is the most similar and obviously related to *S. lediella* (Schleich, 1867). However, *S. alilediella* **sp. nov.** differs from *S. lediella* in the presence of three clusters of large cornuti (Figs 117, 118), also in the wider plate of the gnathos (Figs 114, 115).

Male (Figs 29, 30). Forewing length 1.8 mm; wingspan 4.0 mm (n = 1).

Head. Palpi ochre cream; frontal tuft ochreous orange; collar dark brown, golden glossy, with distinctive purple iridescence; scape golden shiny yellowish cream; antenna slightly shorter than one half the length of forewing; flagellum dark brown, golden glossy, with some purple iridescence on upper side, yellowish brown on underside.

Thorax. Tegula and thorax dark brown, golden glossy, with purple iridescence. Forewing dark brown, golden

glossy, with strong purple iridescence in basal third; medially and apically blackish brown with some golden gloss and little purple iridescence; median fascia wide, especially on tornal margin, silvery shiny, with some purple iridescence; apical fascia short, silvery shiny, with some purple iridescence; fringe black-brown; fringe line black, inconspicuous; forewing underside black-brown, without spots or androconia. Hindwing without androconia, dark brown with some golden gloss on upper side, black brown on underside; fringe dark brown. Legs brown-black on upper side and golden cream on underside.

Genitalia (Figs 113–121) with capsule 230 μm long, 170 μm wide. Uncus triangular, distally bifid (Fig. 114). Gnathos with a wide transverse plate and two stout caudal processes (Fig. 115). Valva (Figs 114, 121) about 150 μm long, with a bulged inner lobe and long, slender apical process. Vinculum with a wide but shallow excavation anteriorly (Fig. 121). Phallus about 240 μm long, bent medially (Fig. 117), without carinae; vesica with three clusters of large cornuti (Figs 116, 118–120).

Female. Unknown.

Bionomics (Figs 9, 10). Host plant is unknown (unidentified). Larva is pale green, with a brownish green intestine and brown head (Fig. 10). Larvae mine in leaves in August. The leaf mine starts as a slender gallery almost fully filled with blackish brown frass; further on the gallery widens, with a wide line of dark brown frass (Fig. 9). Adults fly in late August.

Distribution. Known from a single locality in the western Himalaya (Uttarakhand: Mussoorie), at the elevation of about 2000 m (Fig. 1: *wHi*).

Etymology. The species is named after closely similar species, *S. lediella*, with a Latin prefex *ali* (another).

Stigmella longa Remeikis & Stonis, sp. nov.

(Figs 2, 3, 16, 17, 31, 32, 122–129)
urn:lsid:zoobank.org:act:5F63E3B8-7385-43A5-B1BE-B9AF82D830C5

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Rishikesh, 30°07’52”N, 78°18’45”E, elevation ca. 700 m, mining larva on *Ototropis elegans*, 9.viii.2010, A. Remeikis and J. R. Stonis, genitalia slide no. RA264 (ZIN).

Diagnosis. This new species is left unattributed to a species group, however it shows some similarity to the *Stigmella betulicola* group. Externally, *S. longa* **sp. nov.** can be confused with many other dark-speckled *Stigmella* species. In the male genitalia, the combination of long caudal processes of the uncus, unique, U- shaped gnathos (Fig. 123), and phallus with two very long cornuti and wringled, thickened vesica (Figs 127–129) distinguishes *S. longa* from all known congeneric species.

Male (Figs 31, 32). Forewing length 1.7 mm; wingspan 3.8 mm (n = 1).

Head. Palpi cream; frontal tuft pale ochreous orange; collar rubbed in the holotype; scape yellowish cream; antenna slightly shorter than one half the length of forewing; flagellum with 24–25 segments, brown-grey, distally pale brown.

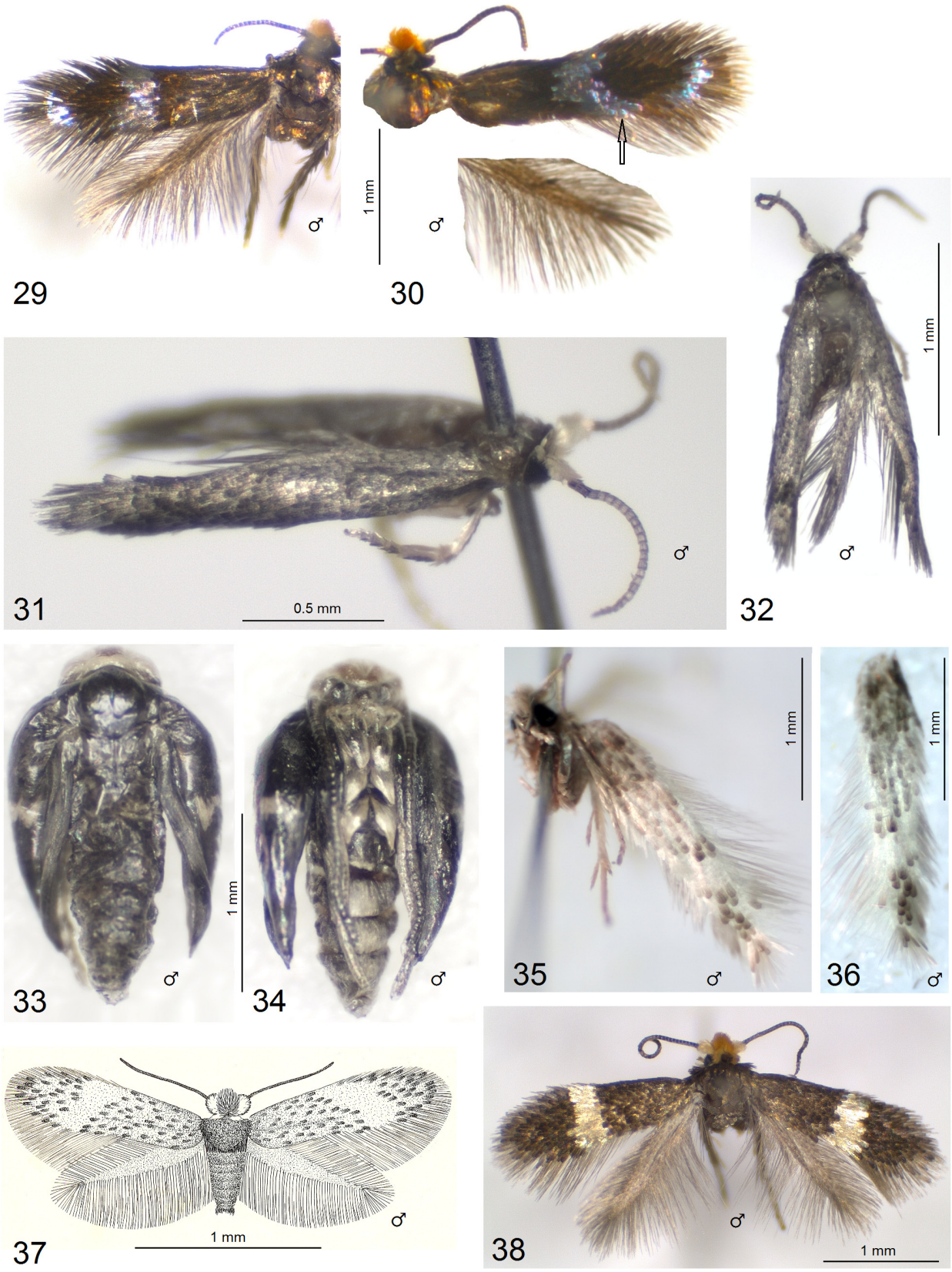
Thorax. Tegula, thorax and forewing with some purple iridescence, brownish grey, densely irrorated with dark, black-brown scales; fringe dark grey-brown. Hindwing dark grey. Legs yellowish cream, golden glossy, with some purple iridescence and grey-brown scales on upper side.

Genitalia (Figs 122–129) with capsule about 305 μm long, 175 μm wide. Uncus (Fig. 123) with long caudal processes laterally. Valva (Figs 123–126) about 200 μm long; transtilla without sublateral processes (Fig. 122). Juxta large, plate-like, basally contricted (Figs 123, 125, 126). Vinculum large, without lateral lobes (Fig. 12). Phallus (Figs 124, 127–129) about 215 μm long, with two very long cornuti: a stout, horn-like cornutus and a slender, spine-like cornutus; vesica wringled, thickened.

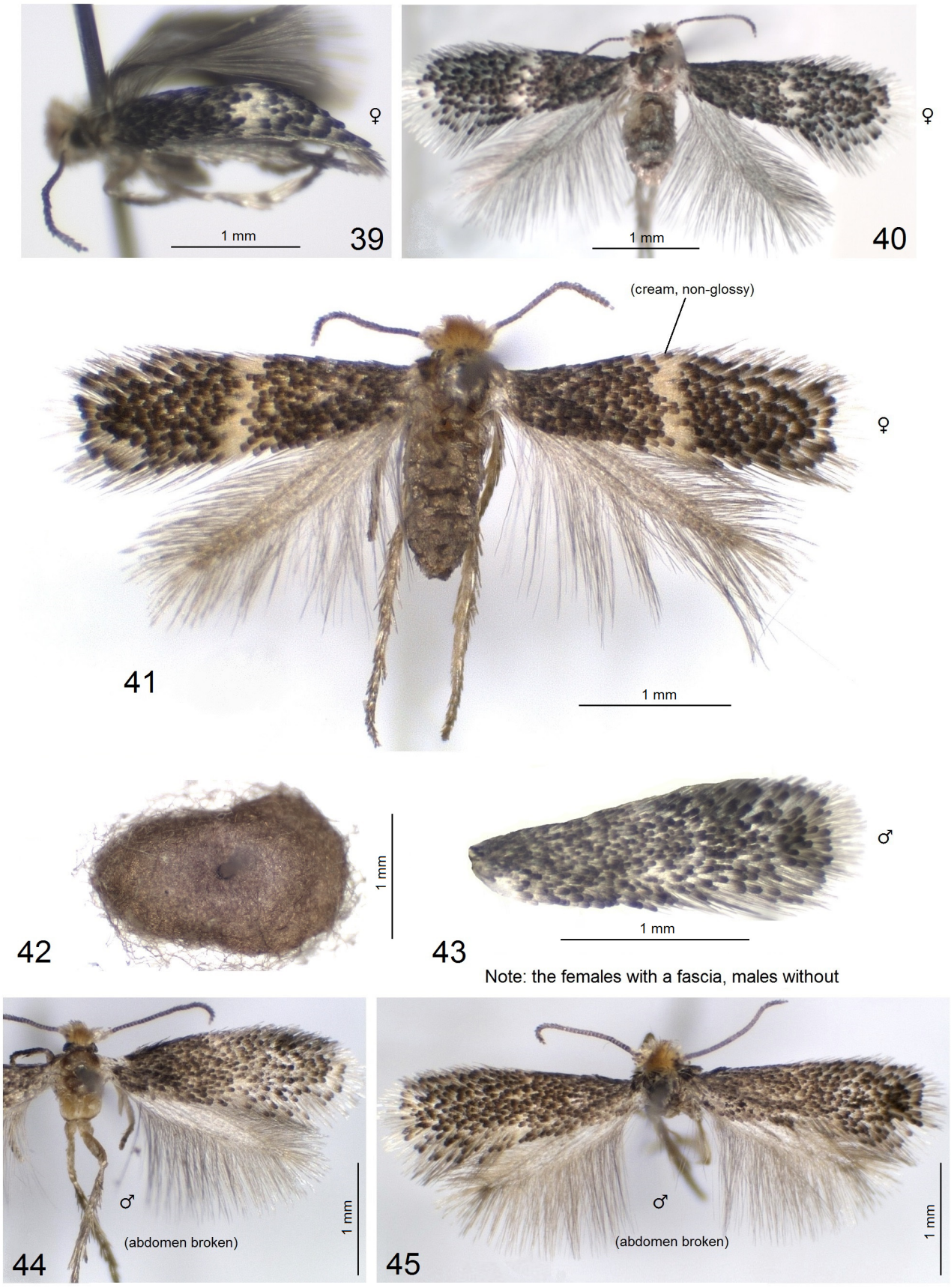
Female. Unknown.

Bionomics (Figs 2, 3, 16, 17). Host plant is *Ototropis elegans* (DC.) H. Ohashi & K. Ohashi (= *Desmodium elegans* DC.), Fabaceae (Figs 2, 3). Larvae mine in leaves in August. The leaf mine is a slender, sinuous gallery; in the beginning it is fully filled with dark green frass; further on frass is greenish black to black; in the last quarter, frass with unfilled margins of the gallery (Fig. 17). Adults fly in late August.

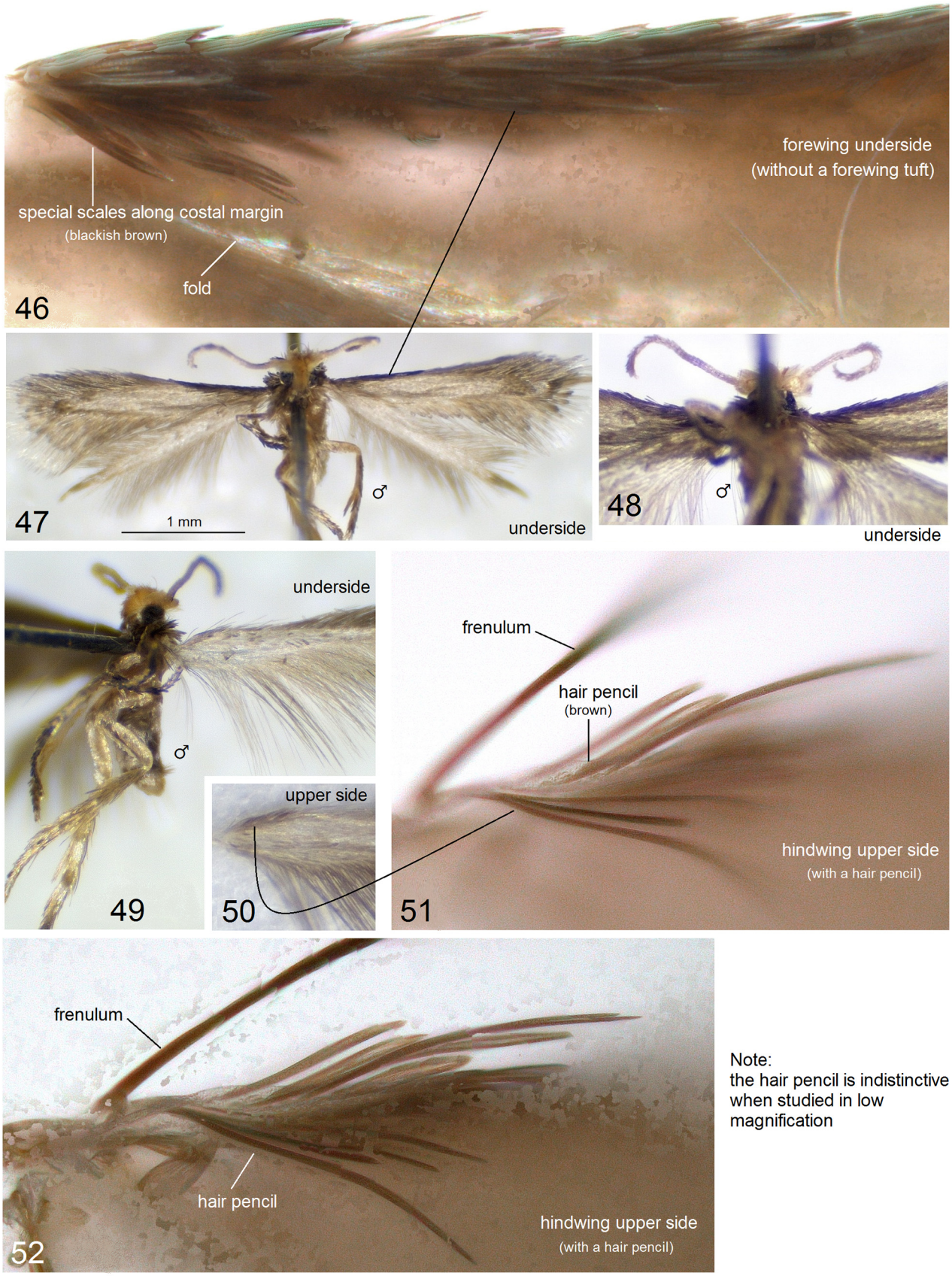
Distribution. Known from a single locality in the western Himalaya, Uttarakhand, Rishikesh, at the elevation of about 700 m (Fig. 1: *wHi*).



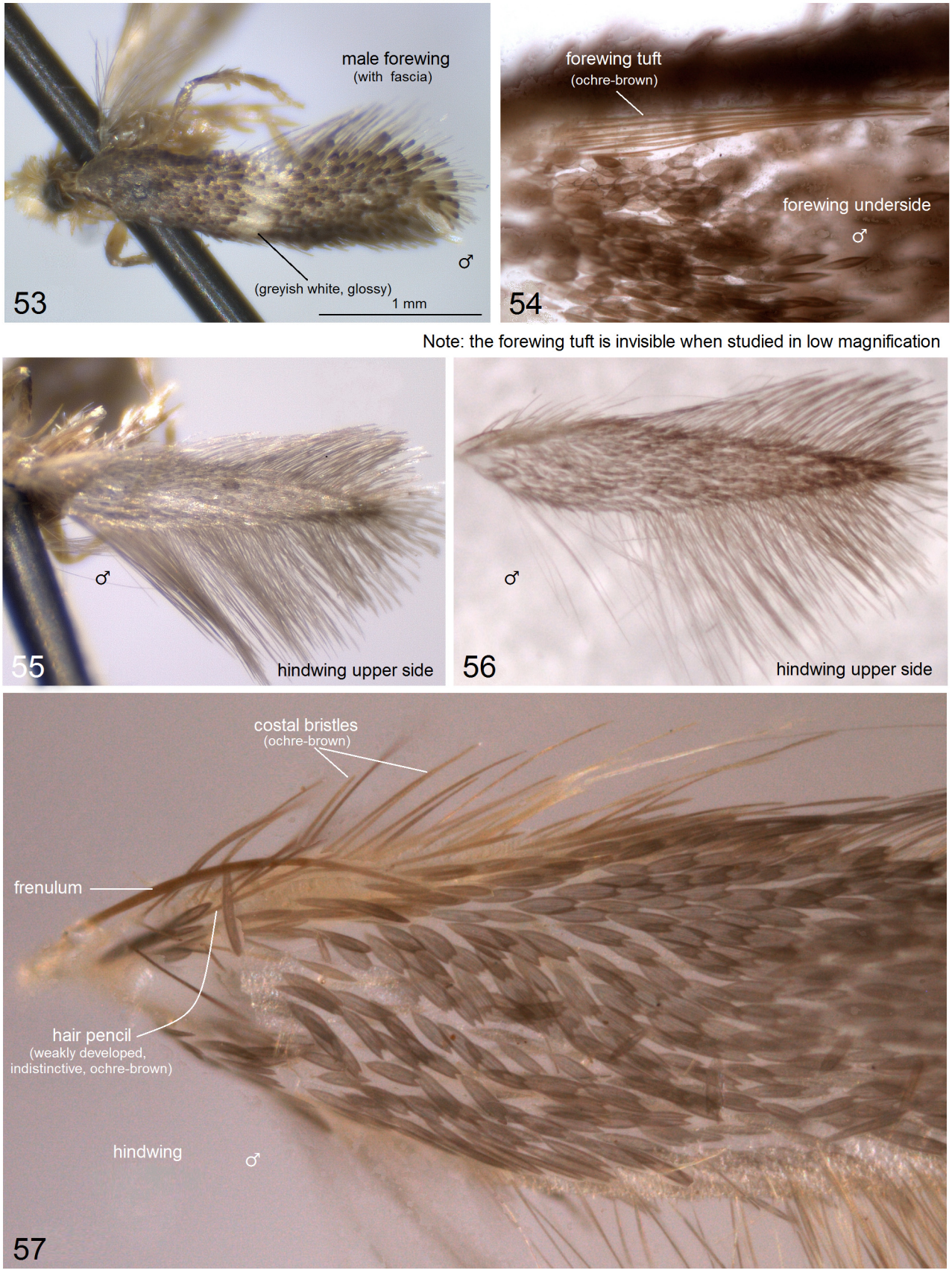
FIGURES 29–38. Adults of new species of Nepticulidae. 29, 30, *Stigmella alilediella* Diškus & Navickaitė, **sp. nov.**, holotype; 31, 32, *Stigmella longa* Remeikis & Stonis, **sp. nov.**, holotype; 33, *S. ziziphifolia* Rocienė & Stonis, **sp. nov.**, holotype, upper side; 34, same, underside; 35–37, *S. damocles* Remeikis, **sp. nov.**, holotype; 38, *S. latilobata* Diškus & Navickaitė, **sp. nov.**, holotype (ZIN)



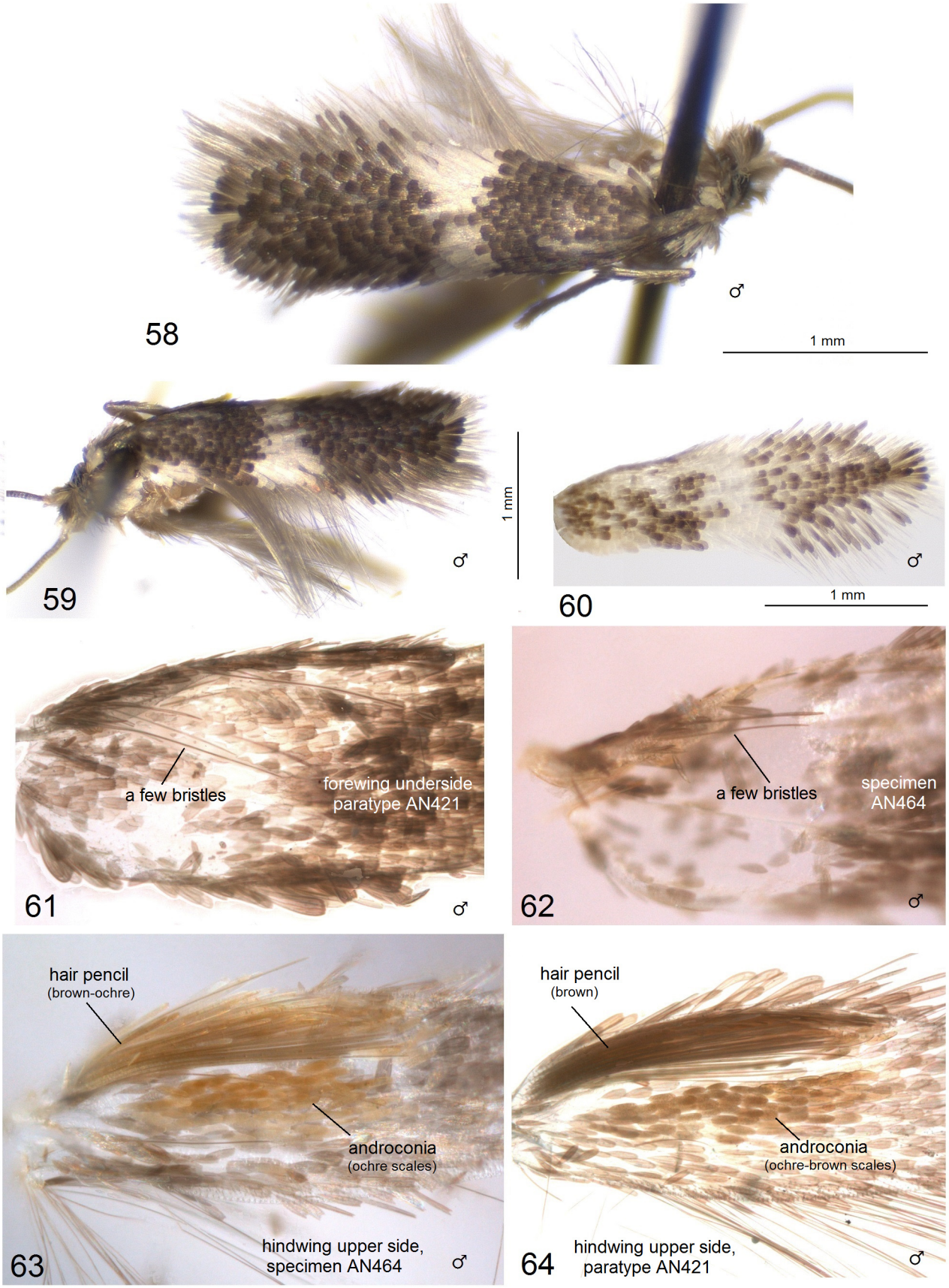
FIGURES 39–45. Adults of *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.** 39–41, female paratypes; 42, cocoon; 43, 44, male paratypes; 45, male holotype (ZIN)



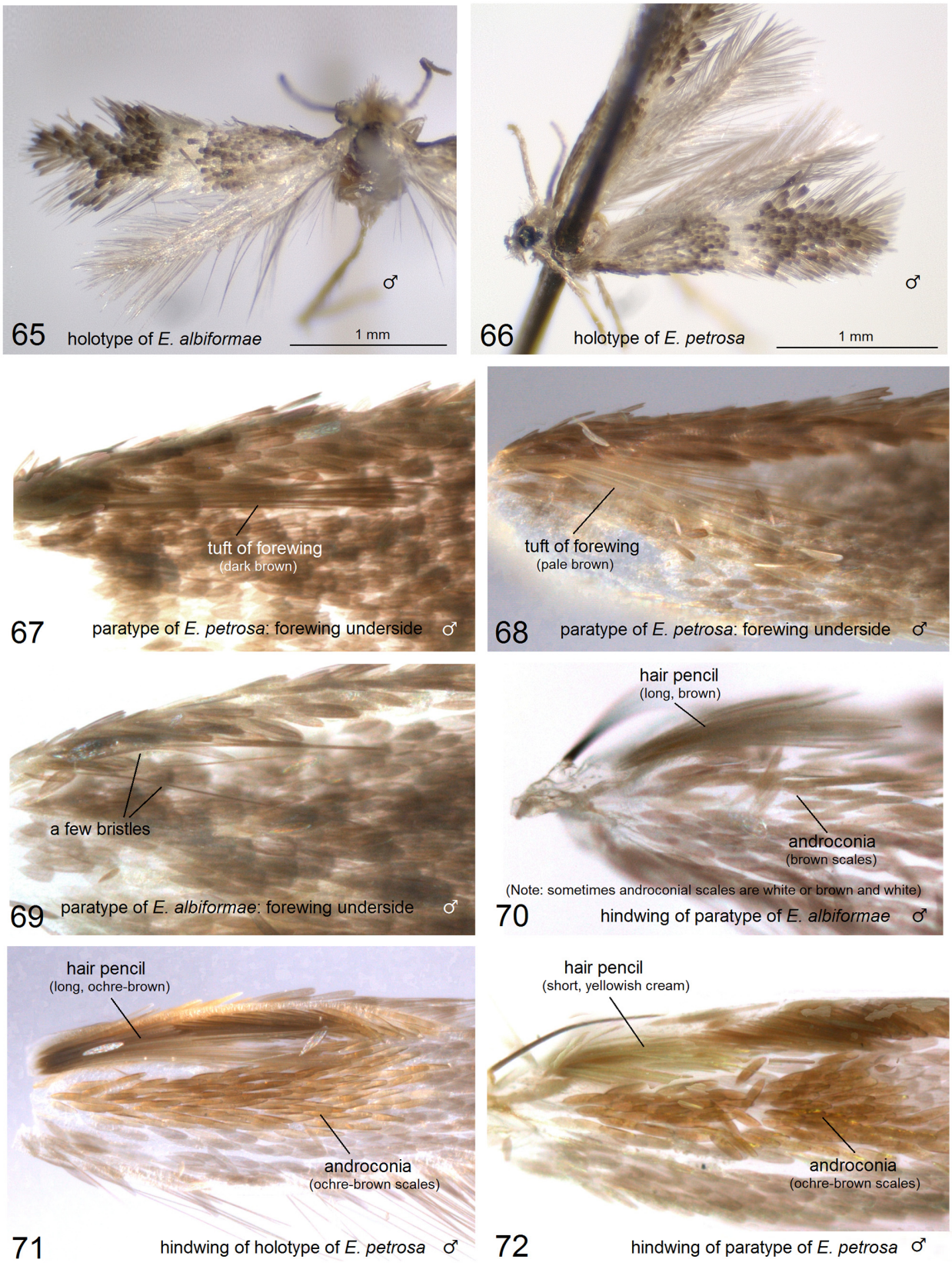
FIGURES 46–52. Details of male adults of *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.** 46–48, forewing underside, paratype; 49–52, hindwing upper side, paratype (ZIN)



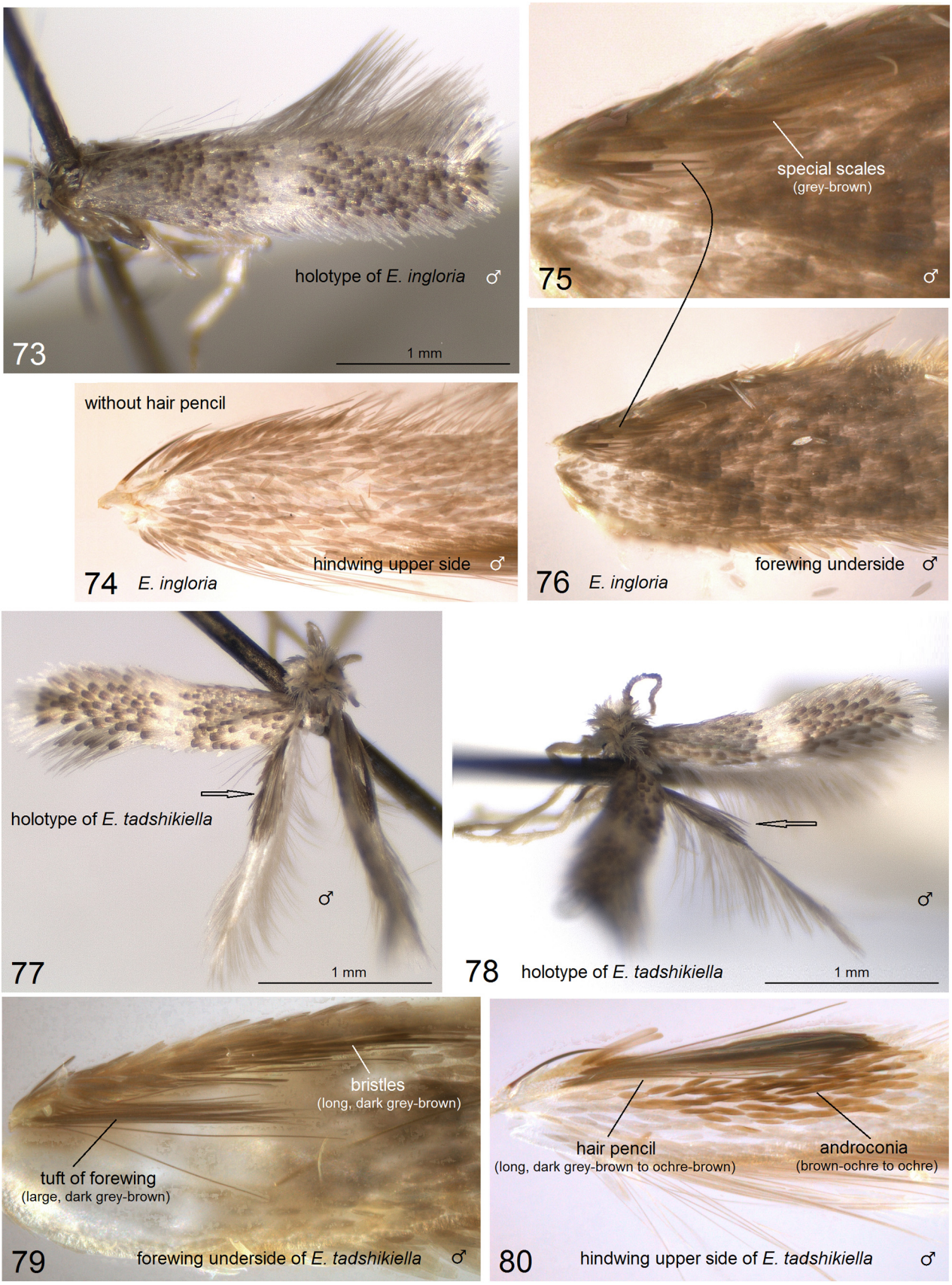
FIGURES 53–57. Male adult of *Ectoedemia jacutica* Puplesis, holotype (ZIN). 53, forewing upper side; 54, forewing underside; 55–57, hindwing upper side



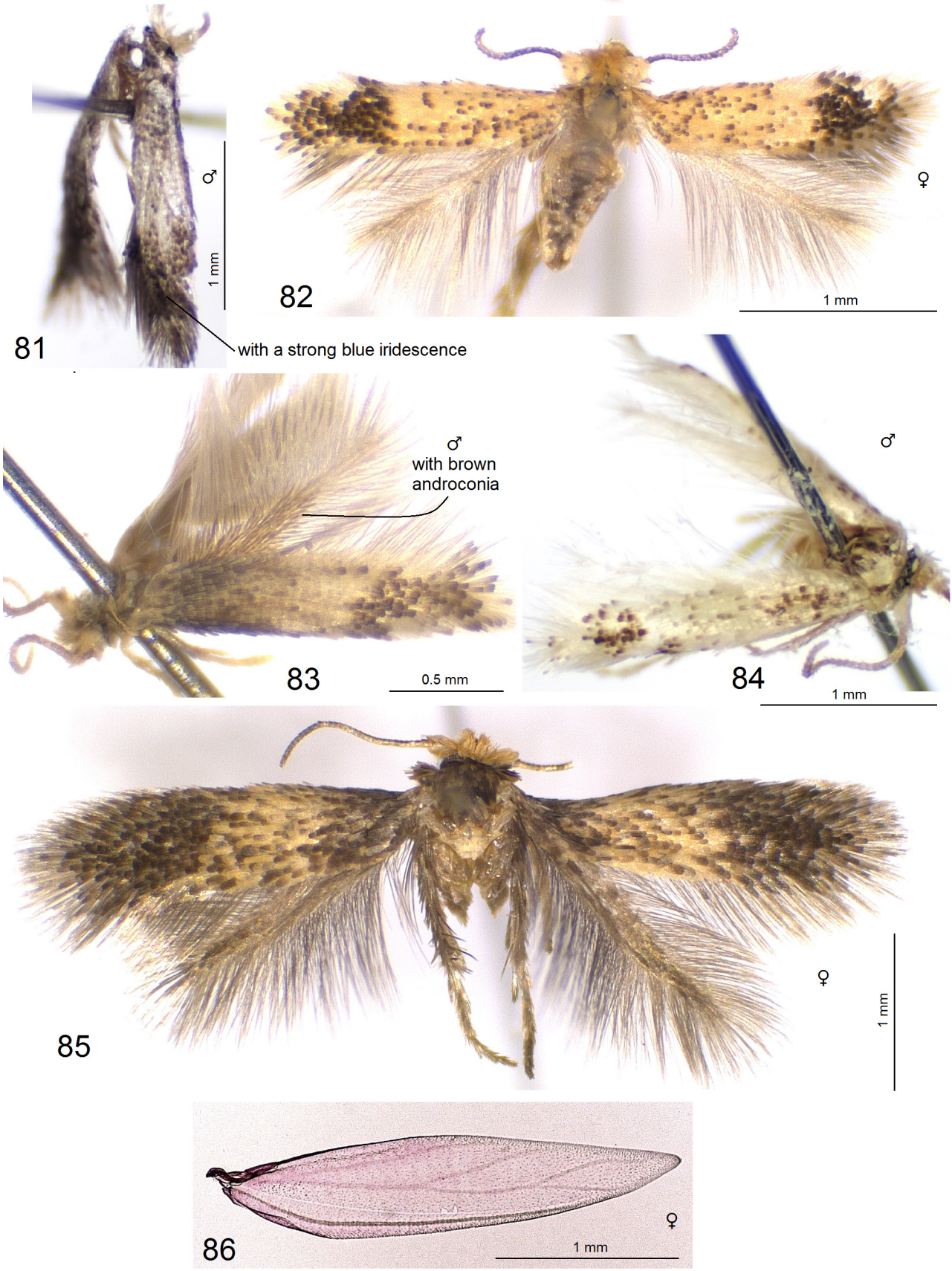
FIGURES 58–64. Male adults of *Ectoedemia insignata* Puplesis. 58, 59, forewing upper side, holotype; 60, same, paratype AN423; 61, forewing underside, paratype AN421; 62, same, specimen AN464; 63, hindwing upper side, specimen AN464; 64, same, paratype AN421 (ZIN)



FIGURES 65–72. Male adults of *Ectoedemia spinosella* (de Joannis) (= *E. albiformae* Puplesis & Diškus; *E. petrosa* Puplesis, **syn. nov.**). 65, general view, holotype of *E. albiformae* (ZIN); 66, same, holotype of *E. petrosa* (ZIN); 67, 68, forewing upper side, paratypes *E. petrosa*, specimens AN421 and AN432 (ZIN); 69, same, paratype *E. albiformae*, specimen AN421 (ZIN); 70, hindwing upper side, paratype *E. albiformae*, specimen AN421 (ZIN); 71, 72, same, paratypes of *E. petrosa*, specimens AN458 and AN440 (ZIN)



FIGURES 73–80. Male adults of *Ectoedemia* spp. 73, holotype of *E. ingloria* Puplesis, general view (ZIN); 74, same, hindwing upper side; 75, 76, same, forewing underside; 77, 78, holotype of *E. tadshikiella* Puplesis, general view (ZIN); 79, same, forewing underside; 80, same, hindwing upper side.



FIGURES 81–86. Adults of *Acalyptris* spp. 81, *A. noctilucus* Rocienė & Stonis, **sp. nov.**, male holotype; 82, *A. brunipexus* Stonis, Diškus & Remeikis, **sp. nov.**, female paratype; 83, same, male holotype; 84, *A. auratilis* Puplesis & Diškus, specimen AG127; 85, *A. nasutus* Diškus & Navickaitė, **sp. nov.**, female holotype; 86, same, forewing venation, slide AD479b (ZIN).

Etymology. The species name is derived from Latin *longus* (long), in reference to the long cornuti and processes of the uncus in the male genitalia.

Stigmella latilobata Diškus & Navickaitė, sp. nov.

(Figs 14, 38, 130–132)

urn:lsid:zoobank.org:act:A46A65DB-9FD5-4DDB-8549-B27679C6DD8F

Type material. Holotype: ♂, India, Uttarakhand, Tehri Garhwal Distr., Chamba, 30°24’28”N, 78°17’24”E, elevation ca. 2600 m, 23.viii.2010, A. Diškus and A. Navickaitė, genitalia slide no. AD484 (ZIN).

Diagnosis. *S. latilobata* sp. nov. belongs to the *Stigmella ruficapitella* (*sensu lato*) or *S. hemargyrella* (*sensu stricto*) group. In the male genitalia, this new species differs from other representatives of the group in the combination of a long vinculum (Fig. 130) and a unique set of cornuti (Fig. 132).

Male (Fig. 38). Forewing length 2.0 mm; wingspan 4.5 mm (n = 1).

Head. Palpi yellowish cream; frontal tuft bright ochreous orange; collar yellowish cream; scape glossy, yellowish cream; antenna one half the length of forewing; flagellum blackish brown with some purple iridescence on upper side and underside.

Thorax. Tegula, thorax and forewing dark coppery brown, with some golden gloss and purple iridescence; fascia postmedian, wide, golden shiny; fringe brown; forewing underside dark brown, without spots or androconia. Hindwing brown on upper side and underside, without androconia; fringe brown. Legs glossy, yellowish cream, covered with dark grey-brown scales with purple iridescence on upper side.

Genitalia (Figs 130–132) with capsule 170 µm long, 105 µm wide. Uncus with two well-separated lateral lobes (Figs 130, 131). Gnathos U-shaped, with weakly chitinized caudal processes (Fig. 131). Valva (Fig. 130) about 80 µm long, with a straight inner lobe and slender apical process. Transtilla with large, distally splitted sublateral processes (Fig. 131). Vinculum very large, one half the length of capsule or little longer, with very shallow excavation anteriorly (Fig. 130). Phallus (Fig. 132) about 125 µm long, without carinae; vesica with a large, basally curved cluster of spine-like cornuti and a group of three–four very large cornuti apically.

Female. Unknown.

Bionomics (Fig. 14). Host plant is unknown (unidentified). Larva is pale green, with a green intestine and pale brown head (Fig. 14). Larvae mine in leaves in August. The leaf mine is a slender sinuous or contorted gallery; in the initial part, black to brown-black frass fills the width of the gallery; further on, brown-black to brown frass is deposited in a wide central line (Fig. 14). Adults fly in late August.

Distribution. Known from two localities in the western Himalaya (Uttarakhand: Chamba and Mussoorie), at the elevation of about 2500–2600 m (Fig. 1: *wHi*).

Etymology. The species name is derived from Latin *latus* (wide) combined with Latin *lobatus* (lobed), in reference to the large ventral lobe of the vinculum in the male genitalia.

Stigmella paniculata Diškus & Navickaitė, sp. nov.

(Figs 15, 133–136)

urn:lsid:zoobank.org:act:4ACFA17B-D8BB-4902-A3EC-9B846230B904

Type material. Holotype: ♂, India, Uttarakhand, Tehri Garhwal Distr., Chamba, 30°20’39”N, 78°23’59”E, 24.viii.2010, A. Diškus and A. Navickaitė, genitalia slide no. AD496 (ZIN).

Diagnosis. *S. paniculata* **sp. nov.** belongs to the *Stigmella ruficapitella* group. In the male genitalia, this new species differs from other representatives of the group in the presence of a basal set of very long, transverse cornuti (Fig. 135) and apically rounded valva without a conspicuous apical process (Fig. 136).

Male. Known from adult in pupal skin; only genitalia are preserved and desribed.

Genitalia (Figs 133–136) with capsule 180 µm long, 140 µm wide. Uncus with two very short, well-separated lateral lobes (Figs 133, 134). Gnathos U-shaped (Fig. 133). Valva (Fig. 136) about 130 µm long, with a slightly concave and heavily papillated inner lobe and rounded apex without pronounced apical process. Transtilla with long and slender sublateral processes. Vinculum with a short ventral plate and short triangular lateral lobes (Fig. 133).

Phallus (Figs 133, 135) about 180 μm long, without carinae; vesica with a set of four very long, transverse cornuti basally (Fig. 135).

Female. Unknown.

Bionomics (Fig. 15). Host plant is unknown (unidentified). Larva is green, with a dark green intestine and pale, yellowish brown head (Fig. 15). Larvae mine in leaves in late August and possibly in September. The leaf mine is a slender, contorted gallery; in the initial part, brown-black frass fills the width of the gallery; further on, black frass is deposited in a slender central line (Fig. 15). Adults fly in September.

Distribution. Known from a single locality in the western Himalaya (Uttarakhand: Chamba), at the elevation of about 2600 m (Fig. 1: *wHi*).

Etymology. The species name is derived from Latin *panicula* (a cluster), in reference to the set of four very long and slender cornuti in the male genitalia.

Ectoedemia orbiculata Diškus, Remeikis & Stonis, sp. nov.

(Figs 6, 26–28, 39–52, 137–157)

urn:lsid:zoobank.org:act:ADB5203C-E64D-4AA8-81D8-44BCDA1F1457

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Mussoorie, 30°27’46”N, 78°04’17”E, elevation ca. 2000 m, feeding larva on *Spiraea canescens*, 11.viii.2010, A. Diškus & A. Navickaitė, genitalia slide no. AD489♂ (ZIN). Paratypes: 2 ♂, 5 ♀, same label data as holotype, genitalia slide nos AD498♂, AD487♀ (ZIN); 1 ♂, 2 ♀, same label data as holotype, 10–13.viii.2010, A. Remeikis & J. R. Stonis, genitalia slide nos RA271♂, RA270♀, RA272♀ (ZIN); 1 ♂, Rishikesh, 30°07’40”N, 78°19’03”E, elevation ca. 450 m, at light, 07.viii.2010, A. Šimkevičiūtė, genitalia slide no. AG129♂ (ZIN).

Diagnosis. This new species belongs to the *Ectoedemia angulifasciella* species group. *Ectoedemia orbiculata* **sp. nov.** is the most similar to, and probably closely related to, the European *E. spiraeae* Gregor and Povolný and Siberian *E. jacutica* Puplesis. Currently *E. orbiculata* was COI barcoded by us.

Externally, the speckled forewing with a tornal spot distinguishes males of *E. orbiculata* from all species of the *E. angulifasciella* group, possessing a distinctive forewing fascia. However, the fasciated females of *E. orbiculata* can be confused with other species of the group. From the related *E. spiraeae*, the males of new species differ in tufts of the wings: forewing underside of *E. orbiculata* is characterized by the presence of specials scales along the costal margin (Fig. 46), absence of a tuft (*E. spiraeae* is with a white tuft of piliform scales), and hindwing upper side with a brown hair pencil (Fig. 51) (yellowish white in *E. spiraeae*).

From the similar *E. jacutica*, the males of new species differ in forewing underside which is characterized by the presence of special scales along the costal margin (Fig. 46), absence of a tuft (*E. jacutica* with an ochre-brown tuft of piliform scales, Fig. 54), and hindwing upper side of *E. orbiculata* with a brown hair pencil (Fig. 52) (ochre-brown, indistinctive in *E. jacutica*, Fig. 57).

In the genitalia, the large apical process of the valva, and apically very slender pseuduncus in the male genitalia, distally bent anterior apophyses, oval signa, tube-like vesicle, very large terminal part (forming up to one half of the female genitalia length) distinguish *E. orbiculata* from *E. spiraeae*; from *E. jacutica*, the new species differs in the absence of a proximal excavation of vinculum (Fig. 158), smaller apical process of valva and the presence of basal joint between valvae (Fig. 137).

The round blotch-like part of the leaf mine of *E. orbiculata* is also distinctive and specific (Fig. 27).

Male (Figs 43–52). Forewing length 2.1–2.3 mm; wingspan 4.6–5.1 mm (n = 5).

Head. Frons and palpi cream, frontal tuft orange ochre; collar cream, comprised of short piliform scales; antenna as half the length of forewing; flagellum grey-brown.

Thorax. Tegula, thorax and forewing densely speckled with brown-black scales; forewing with an indistinctive, greyish cream tornal spot; fringe cream, with a fringe line; forewing underside dark grey, with special scales along costal margin (Figs 46–48). Hindwing grey, with brown hair pencil on upper side; fringe grey. Legs ochre cream, with dark grey to black scales on upper side.

Abdomen. Brown to grey-brown, with some purple iridescence on upper side, greyish cream to grey-brown on underside; genital plates cream; anal tufts brown, inconspicuous.

Genitalia (Figs 137–157) with capsule about 250–275 µm long, 200–205 µm wide. Pseuduncus (Figs 138, 139, 145) slender distally. Valva (Figs 137, 139, 142, 144, 148) 160–170 µm long, with a large apical process, basally with a joint (Figs 137, 140–142). Juxta (Figs 140–142) membranous and inconspicuous. Vinculum with moderately long (Figs139, 143, 144) or small lateral lobes (Figs 137, 142, 148) (note that length of the lobes depends on genitalia prepararation and in older genitalia mounts the lateral lobes of vinculum usually look shorter). Phallus (Figs 149–152) 240–250 µm long, with numerous, tiny spine-like cornuti (Fig. 147), but without lateral carinae.

Female (Figs 39–41). Forewing length 2.2–2.4 mm; wingspan 4.7–5.4 mm (n = 5). Similar to male, but forewing with a distinctive, yellowish cream fascia. Genitalia (Figs 153–157) 550–665 µm long. Abdominal apex truncated, with short setae; Anterior and posterior apophyses equal in length; anterior apophyses bent inwardly (Figs 153, 154). Corpus bursae with two large, oval-shaped signa (Figs 153, 154, 157); one signum is slightly shorter (Fig. 157). Ductus spermathaecae with 3.5–4 coils and a tube-like vesicle (Fig. 156).

Bionomics (Figs 6, 26–28, 42). Host plant is *Spiraea canescens* D. Don. (Rosaceae), a plant native in northern Pakistan to the Himalaya. Larvae mine in leaves in August. Larva pale green, with dark green intestine and brown head (Fig. 28). The leaf mine starts as a slender gallery filled with brown-black or black frass (Fig. 26); distally the leaf mines expand to a round blotch (Fig. 27), with frass scattered irregularly. Cocoon ochre-brown to reddish brown, 2.0–2.2 mm long, 1.2–1.5 mm wide (Fig. 42). Adults fly in September.

Distribution. Known from a few localities in the western Himalaya, Uttarakhand, at the elevation of about 450–2000 m (Fig. 1: *wHi*), but the host plant has a much wider distribution.

Etymology. The species name is derived from Latin *orbiculatus* (round, globosus), in reference to the round leaf mine of this species.

Ectoedemia jacutica Puplesis, 1988

(Figs 53–57, 158)

Ectoedemia jacutica Puplesis 1988: 26.
Ectoedemia jacutica Puplesis, in Stonis *et al.* 2015: 116–122; Yagi *et al.* 2019: 226, 227.

Material examined. 2 ♂ (holotype and paratype): Russia, Eastern Siberia, Sakha Republic (former Yacutiya), Yakustk, 05.vii.1986, A. Rastorguev, genitalia slide nos AN540 (holotype, in poor condition), AN539 (paratype) (ZIN); 1 ♂ [examination based on the genitalia photographs only], Russia, western Altay, Katun valley, Mikkola *et al.*, genitalia slide no. 15041 JCK (courtesy of E. J. van Nieukerken, Naturalis Biodiversity Centre, Leiden, the Netherlands).

Diagnosis. This species belongs to the *Ectoedemia angulifasciella* species group. *Ectoedemia jacutica* is the most similar and probably closely related to the European *E. spiraeae* Gregor and Povolný and Himalayan *E. orbiculata* sp. nov. (see described above).

From the related *E. spiraeae* and *E. orbiculata*, the males of *E. jacutica* differ in the tufts of the wings: *Ectoedemia jacutica* is characterized by the presence of a brown, weakly-developed tuft on forewing underside (Fig. 54) (white in *E. spiraeae*, absent in *E. orbiculata*), inconspicuous costal bristles and hair pencil on upper side of male hindwing (*E. spiraeae* possesses a yellowish white tuft, *E. orbiculata* has a brown tuft). The specimens of the type series also were characterized as having glossy, greyish white fascia (in *E. spiraeae* fascia is non-glossy, cream, in *E. orbiculata*, fascia is replaced with cream, non-glossy, dorsal spot).

In the male genitalia, the combination of a proximal excavation of the vinculum (Fig. 158), bulged inner margin of the valva (Fig. 158), with a relatively small apical process (Fig. 158), short sublateral processes of the transtilla, and a caudally slender pseuduncus distinguishes *E. jacutica* from *E. spiraeae and E. orbiculata*.

Possibly, the boreal distribution of *E. jacutica* also may distinguish the latter from the Himalayan *E. orbiculata,* which occurs in a humid, subtropical habitat.

Remarks. Forewing length 2.5 mm; wingspan 5.5 mm (n = 2) (Fig. 53). Male genitalia with a distinctive proximal excavation of vinculum (Fig. 158), relatively small apical process and bulged inner margin of valva. For a description see Puplesis 1988 (in Russian) or Stonis *et al.* 2015 (in English).

Bionomics. Host plant is unknown because it is still unclear if specimens from Japan and China, associated with *Aruncus dioicus* (Walter), *Spiraea salicifolia* L., *S. chamedryfolia* L., and *S. japonica* L., Rosaceae (Yagi *et al.* 2019), are *E. jacutica* or a different species.

Distribution. Originally this species was known from a single locality in eastern Siberia, Yakutsk (Fig. 1: *Ya*). Additionally, the specimen collected in the western Altay (see Material examined, Fig. 1: *Al*) also belongs to *E. jacutica* (see illustrated in Stonis *et al.* 2015: fig. 12). The recent discovery of *E. jacutica* in Japan and China (Yagi *et al.* 2019) may be correct, however, it needs confirmation.

Ectoedemia insignata Puplesis, 1988

(Figs 58–64, 159–173)

Ectoedemia insignata Puplesis, 1988: 281–282.
Ectoedemia insignata Puplesis, in Puplesis 1994: 201, figs 649–651.

Material examined. 6 ♂, 3 ♀ (holotype and paratypes): Tajikistan, 30 km N Dushanbe, Varzob Canyon, Kondara, elevation ca. 1200 m, 27.vi–21.viii.1986, R. Puplesis, genitalia slide nos AD574 (holotype), AN419♂, AN420♂, AN421#, AN422#, AN423# (ZIN, also see Remarks). 3 ♂, 1♀: Tajikistan, same locality, 13.vi–19.vii.1991, R. Puplesis and A. Diškus, genitalia slide nos AN464♂, AN467♂ (ZIN).

Diagnosis. This species belongs to the *Ectoedemia angulifasciella* species group. Externally, *E. insignata* differs from species of the group in the white tegula and white basal spot of the forewing (Figs 58–60). The combination of brown hair pencil surrounded by ochre androconial scales of upper side of male hindwing (Figs 63, 64) and presence of few transverse bristles on the underside of male forewing (Figs 61, 62) also distinguishes *E. insignata* from other representatives of the group.

In the male genitalia, the combination of wide, plate-like caudal process of gnathos (Figs 159, 168), presence of large apical spines of phallus (Fig. 170), and absence of lateral lobes of the vinculum (Figs 161, 162, 172) distinguishes *E. insignata* from other species of the *E. angulifasciella* group.

Remarks. Forewing length 2.2–2.5 mm; wingspan 4.6–5.3 mm (n = 6). For a description see Puplesis 1994: 201.

Bionomics. Host plant is unknown. Adults fly in June–August, and October. Otherwise, biology is unknown.

Distribution. Known from a single locality in Hissor Range, Tajikistan (Varzob Canyon: Kondara) at elevation of about 1200 m (Fig. 1: *Hr*).

Remarks. We provide the first photographic documentation of the male genitalia (Figs 159–173). The holotype and eight paratypes, earlier deposited at LEU (=VPU) will be transferred to ZIN (see Material & Methods).

Ectoedemia spinosella (de Joannis, 1908)

(Figs 65–72, 174–184)

Nepticula spinosella de Joannis, 1908: 328.
Ectoedemia spinosella (de Joannis), in van Nieukerken 1986: 75, 76; Johansson *et al.* 1990: 317, 318; A. Laštůvka & Z. Laštůvka 1997: 209; Puplesis & Diškus, 2003: 186, 187.
Ectoedemia petrosa Puplesis, 1988: 282 (**syn. nov.**).
Ectoedemia petrosa Puplesis, in Puplesis 1994: 199, 200 (**syn. nov.**).

Material examined. 6 ♂, 11 ♀ (holotype and paratypes of *Ectoedemia albiformae*): Turkmenistan, western Kopet Dag Range, 40 km E Garrygala (=Kara Kala), 800m, 30.v.–27.vi.1993, R. Puplesis & A. Diškus, genitalia slide nos AD0422♂ (holotype), AD0420♂, AD0423♀, AD0425♂ (ZIN); 2 ♂ (paratypes of *E. albiformae*), same locality, 28.v.1988, R. Puplesis, genitalia slide nos AD0421, AD0426 (ZIN); 9 ♂, 12 ♀, same locality as holotype of *E. albiformae*, 13.vi–14.vii.1993, R. Puplesis and A. Diškus, genitalia slide nos AN414♂, AN415♂, AN535♀ (ZIN); 24 ♂, 2 ♀ (holotype and paratypes of *Ectoedemia petrosa*), Tajikistan, 30 km N Dushanbe, Varzob Canyon, Kondara, 1200m, 28.vi.–21.viii.1986, R. Puplesis, genitalia slide nos AN428♂, AN429♂, AN430♂, AN431♂, AN432♂, AN433♂, AN434♂, AN435♂, AN436♂, AN437♂, AN438♂, AN439♂, AN440♂, AN441♂, AN458♂ (holotype of *E. petrosa*) (ZIN); 21 ♂ (not type series, identified as *E. petrosa* by A. Navickaitė), same locality as holotype, 3–20.viii.1986, 18.viii.1989, 5.vii.–15.viii.1990, R. Puplesis (ZIN); 1 ♂, same locality as holotype, 02.vii.1991, R. Puplesis and A. Diškus (ZIN).

Diagnosis. This species belongs to the *Ectoedemia angulifasciella* species group. Externally, the combination of a brown to grey cream hair pencil surrounded by brown or ochre-brown (occasionally brown and white cream together) androconial scales of the upper side of the male hindwing (Figs 70–72) and a tuft of transverse bristles on the underside of male forewing (Figs 67–69) distinguishes *E. spinosella* from the most representatives of the group, except for *E. tadshikiella*; however, the latter has different male genitalia.

In the male genitalia, the combination of a very wide pseuduncus (Figs 174, 175, 179, 180), small caudal process of the gnathos (Figs 176, 181, 182), and pointed apical process of the valva (Figs 174, 182) distinguishes *E. spinosella* from other species of the group.

Remarks. Forewing length 1.5–2.3 mm; wingspan 3.2–5.0 mm. Forewing underside with a brown (Fig. 67) to brownish cream (Fig. 68) tuft of long bristles scales; occasionally the tuft can appear only as a few bristles (probably undeveloped or rubbed) (Fig. 69). Hindwing upper side with a brown, pale grey-brown (Figs 70, 71) or brownish cream (Fig. 72) hair pencil, surrounded by brown (Fig. 70) or ochre-brown (Figs 71, 72) androconial scales. In the type series of the former *E. albiformae*, some males with white cream androconia, some with brown, and some with both (mostly white and a few brown). For a full description see Nieukerken 1986 or Johansson *et al.* 1990; for a description of the former *E. albiformae* (now synonymized with *E. spinosella*), see Puplesis & Diškus 2003; for a description of the former *E. petrosa* (synonymized with *E. spinosella*), see Puplesis 1994: 199, 200.

Bionomics. Host plants are *Prunus* spp., Rosaceae. The leaf mine was described and illustrated by Johansson *et al.* 1990: 317, 318 (fig. 753). In Asia (the western Kopet Dag Range), larvae mine in May–early July; in Europe, from late June to October (Johansson 1990). In Asia (the western Kopet Dag Range), adults were collected in May–June; in Europe, adults fly in June–July (Johansson 1990).

Distribution. Known from Europe (except the northern regions) and the mountain ranges of Central Asia, where it seems to be abundant (Puplesis & Diškus 2003): the western Kopet Dag Range, Turkmenistan, at elevation of about 800 m (Fig. 1: *Ko*) and Hissor Range, Tajikistan (Fig. 1: *Hr*) (**new distribution**).

Remarks. We provide the first photographic documentation of the type-series specimens of *S. albiformae* Puplesis & Diškus (synonymized with *S. spinosella*) and *E. petrosa* Puplesis (now synonymized with *E. spinosella*), and report on new distribution of *E. spinosella* in Tajikistan. The holotypes and paratypes of *E. albiformae* and *E. petrosa*, earlier deposited at LEU (=VPU) will be transferred to ZIN (see Material & Methods).

Ectoedemia ingloria Puplesis, 1988

(Figs 73–76, 185–197)

Ectoedemia ingloria Puplesis, 1988: 280, 281.
Ectoedemia ingloria Puplesis, in Puplesis 1994: 200.
Ectoedemia rosiphila Puplesis, in Puplesis *et al.* 1992: 55–57 (**syn. nov.**)
Ectoedemia rosiphila Puplesis, in Puplesis 1994: 201, 202.

Material examined. 2 ♂ (holotype and paratype): Tajikistan, 30 km N Dushanbe, Varzob Canyon, Kondara, elevation ca. 1200 m, 7.vii–20.viii.1986, R. Puplesis, genitalia slide nos AN457 (holotype), AN427 (paratype) (ZIN, also see Remarks); 1 ♂: same locality as holotype, 1.vii.1991, R. Puplesis and A. Diškus, genitalia slide no. AN426 (ZIN); 1 ♂: Tajikistan, 30 km N Gissar, Hanaka, 1100 m, 23.vii.1990, R. Puplesis, genitalia slide no. AN425 (ZIN); 1 ♂: Tajikistan, 60 km N Dushanbe, env. Ziddi, 2000 m, 24.vii.1990, R. Puplesis, genitalia slide no. AN424 (ZIN); 1 ♂ (holotype of *Ectoedemia rosiphila* Puplesis), Kazakhstan, Talasskiy Alatau, Tyan Shan, 90 km E Chimkent, Aksu Dzhabagly (Zhabagly) Reserve, 1300 m, larva on *Rosa fedtschenkoana* Regel, 20.viii.1987, ex. pupa i.1988 (indoors), R. Puplesis, genitalia slide AN466 (ZIN, also see Remarks).

Diagnosis. This species belongs to the *Ectoedemia angulifasciella* species group. Externally, the combination of some brown special scales along the costa on male forewing underside (Figs 75, 76) and absence of hair pencil on upper side of male hindwing (Fig. 74) distinguishes *E. ingloria* from other representatives of the group.

In the male genitalia, *E. ingloria* is most similar to *E. insignata* which also possesses larger spines on the phallus apically, a wide pseuduncus, a pointed apical process of valva and inconspicuous lobes of the vinculum, however, *E. ingloria* differs from *E. insignata* in the unique shape of gnathos with small caudal process on dentate plate (Fig. 186) and externally.

Remarks. Forewing length 2.4–2.6 mm; wingspan 5.2–5.7 mm. Forewing with a greyish white fascia (Fig. 73); forewing underside with a row of grey-brown, special scales along costal margin (Figs 75, 76); hindwing without a hair pencil (Fig. 74). We provide the first photographic documentation of the holotype of *E. ingloria* (Figs 73–76, 185–191). For a full description see Puplesis 1988: 280, 281, and Puplesis 1994: 200.

We have studied and provided the first photographic documentation of the holotype of *E. rosiphila* Puplesis (Figs 192–197) and found no external or internal differences when compared with *E. ingloria*; therefore, *E. rosiphila* is now synonymized with *E. ingloria*; for original description of *E. rosiphila* see Puplesis *et al.* 1992: 55–57.

Bionomics. Host plants are *Rosa* spp., including *Rosa fedtschenkoana* Regel, Rosaceae (Puplesis 1994). Larvae mine in leaves in August. The initial part of the mine is a slender gallery with an interrupted line of black frass; further on the mine turns into an oval blotch with dispersed frass. Generations are unknown; it is expected only one generation per year.

Distribution. Known from the mountains of Central Asia: Hissor Range, a mountain range in the western part of the Pamir-Alay system, Tajikistan (Fig. 1: *Hr*) and the Talasskiy Alatau in the western Tien Shan (Tyan Shan), Kazakhstan (Fig. 1: *Ta*) (**new distribution**).

Remarks. We provide the first photographic documentation of the holotype *E. rosiphyla* Puplesis (now synonymized with *E. ingloria*) and report on new distribution of *E. ingloria* in Kazakhstan. Additionally, the holotypes and paratypes of *E. ingloria* and *E. rosiphila*, earlier deposited at LEU (=VPU) will be transferred to ZIN (see Material & Methods).

Ectoedemia tadshikiella Puplesis, 1988

(Figs 77–80, 198–205)

Ectoedemia tadshikiella Puplesis, 1988: 25, 26.
Ectoedemia tadshikiella Puplesis, in Puplesis 1994: 200, 201.

Material examined. 4 ♂, (holotype and paratypes): Tajikistan, 30 km N Dushanbe, Varzon Canyon, Kondara, 1200 m, 4.vii.–13.viii.1986, R. Puplesis, genitalia slide no. AN456 (holotype) (ZIN); 3 ♂ (paratypes), same label data as holotype, R. Puplesis, genitalia slide nos AN416, AN417, AN418 (ZIN); 4 ♂ (not type series), same locality as holotype, 13–21.viii.1986, R. Puplesis (ZIN); 4 ♂ (not type series), same locality as holotype, 20.vii.–15.viii.1990, R. Puplesis (ZIN); 2 ♂ (not type series), same locality as holotype, 30.vi.–19.vii.1991, R. Puplesis and A. Diškus (ZIN); 5 ♂ (not type series), Turkmenistan, Kugitangtau, env. Svinsoviy (Svinsovyy) Rudnik, Sajat, 12–13.viii.1989, 29.viii.1990, R. Puplesis (ZIN).

Diagnosis. This species belongs to the *Ectoedemia angulifasciella* species group. Externally, it can be confused with some other species possessing a large hair pencil of the hindwing, surrounded by ochre scales (Fig. 80). Nevertheless, the combination of a large, brown tuft and long special piliform scales along the costal margin on the forewing underside (Fig. 79) has some value in differentiation of *E. tadshikiella.*

In the male genitalia, the unique, apically rounded valva and short, rounded lobes of the vinculum (Fig. 203) instantly distinguish *E. tadshikiella* from other species of the group.

Remarks. Forewing length 1.7 mm; wingspan 3.7 mm. Forewing underside with a large, dark brown tuft and long bristles along costal margin (Fig. 79). Hindwing upper side with a large, ochre-brown hair pencil, surrounded by ochre androconial scales (Fig. 80). For a full description see Puplesis 1994: 200, 201.

Bionomics. Host plant and leaf mine are unknown. Adults were collected from late June to August.

Distribution. Known from the Hissor Range, Tajikistan (Fig. 1: *Hr*), at altitude about 1200 m, and adjacent Kugitangtau Range (eastern Turkmenistan).

Remarks. We provide the first photographic documentation of the male genitalia of *E. tadshikiella* (Figs 198–205) and report on the type-series transfer: the holotype and six paratypes of *E. tadshikiella*, earlier deposited at LEU (=VPU) will be transferred to ZIN (see Material & Methods).

***Acalyptris brunipexus* Stonis, Diškus & Remeikis, sp. nov.**
(Figs 18–21, 82, 83, 206–214)
urn:lsid:zoobank.org:act:3A306391-5FFE-4732-9ED0-F85B6ABF44BC

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Rishikesh, 30°07'41"N, 78°18'59"E, elevation ca. 510 m, 08.viii.2010, A. Diškus and A. Navickaitė, genitalia slide no. AD495 (ZIN). Paratypes: 4 ♂, 5 ♀, same label data as holotype, genitalia slide nos AD482♂, AD486♀, AD497♂ (ZIN); 1 ♂, same label data as holotype, 30°07'40"N, 78°19'03"E, elevation ca. 450 m, at light, 08.viii.2010, A. Remeikis and J. R. Stonis, genitalia slide no. RA278 (ZIN).

Diagnosis. This new species belongs to the *Acalyptris platani* species group. *A. brunipexus* **sp. nov.** is the most similar, and probably closely related, to the Himalayan *A. melanospila* (Meyrick, 1934), *A. auratilis* Puplesis & Diškus, 2003, and *A. nigripexus* Puplesis & Diškus, 2003.

Externally, males of *A. brunipexus* differ from similar species of the *A. platani* group in the presence of long, pale brown androconia (Fig. 83) which cover the basal two-thirds of the hindwing and overlaps the fringe (*A. auratilis* does not possess androconia, *A. melanospila* has a basal patch of white androconia, and *A. nigripexus* has distinctly black androconia).

Internally, in the male genitalia, the combination of unique-shaped ventral carinae (Figs 210, 211), presence of a cluster of spine-like cornuti in the phallus (Figs 208, 210, 213), the large, unique, hook-like cornutus (Figs 208, 213), the stout tube of the phallus (Fig. 208), and the unique shape of the proximal lobes of vinculum (Fig. 207) distinguish the new species from the most similar species, *A. melanospila*, *A. auratilis*, and *A. nigripexus*. Additionally, the little chitinized apex of the phallus (Figs 208, 210) distinguishes *A. brunipexus* from *A. auratilis* (the latter possesses a strongly chitinized, rounded apical lobe), and the simply shaped inner lobe of the valva (Fig. 207) distinguishes *A. brunipexus* from *A. nigripexus* (for an illustrated review of the similarHimalayan *A. melanospila*, *A. auratilis*, and *A. nigripexus* see Puplesis & Diškus 2003: figs 423–428, 477–495).

Male (Fig. 83). Forewing length 1.5–1.6 mm; wingspan 3.2–3.5 mm (n = 2).

Head. Palpi cream, frontal tuft grey-brown; collar inconspicuous, cream, comprised of short piliform scales; scape brownish cream with some pale brown scales; antenna significantly shorter than one-third the length of forewing, with about 21 segments; flagellum pale brown basally, paler apically, sometimes with some purple iridescence.

Thorax. Tegula and thorax brownish cream, irregularly speckled with some brown scales. Forewing ochreous cream, with some purple iridescence, basally irrorated with pale grey-brown scales, apically densely speckled with black-brown scales; fringe cream, without a fringe line; underside of forewing pale ochre-brown, with some purple iridescence, without spots or androconia on upper side and underside. Hindwing covered with slender, long, pale brown androconia with purple iridescence, except for the apical third of the wing which is cream; the long, brown androconia also overlap the fringe. Legs glossy yellowish cream; hindlegs covered with brown scales on upper side.

Abdomen. Dark grey-brown with some purple iridescence on upper side, predominantly cream on underside. Otherwise, abdomen is unknown. Genitalia (Figs 206–213) with capsule about 190–200 µm long, 125–130 µm wide. Pseuduncus (Figs 206, 212) triangular-shaped, truncated or rounded distally. Valva (Figs 207, 211) 125–130 µm long, with an inner lobe. Vinculum with moderately long, triangular-shaped lateral lobes and two unique proximal lobes (Fig. 207). Phallus with a stout tube (not constricted medially) (Figs 208–210, 213), about 205 µm long, with a unique-shaped ventral carinae (Figs 210, 211), some tiny cornuti, an apical cluster of 5–7 spine-like cornuti (Figs 208, 210, 213), a large sinuous cornutus (Figs 208, 209), and large, unique, hook-like cornutus (Figs 208, 209, 213).

Female (Fig. 82). Forewing length 1.5–1.7 mm; wingspan 3.2–3.7 mm (n = 4). Similar to male, but lighter in color. Frontal tuft pale ochreous orange. Scape golden cream, glossy. Antenna very short, curved, with about 16 segments; flagellum dark brown basally, pale yellowish brown in apically.

Forewing golden cream, sparsely speckled with dark-brown scales in the basal two-thirds and densely covered with black-brown scales in the apical third, sometimes forming a false fascia. Fringe glossy cream. Forewing underside glossy ochreous to glossy pale brown, without spots. Hindwing golden cream, glossy to pale brown-grey depending from angle of view. Legs glossy yellowish cream, with little or no brown scales on upper side.

Abdomen. Dark grey-brown with some purple iridescence on upper side, golden cream, glossy on underside. Genitalia (Fig. 214) about 525 μm long. Abdominal apex truncated, with short setae; anterior and posterior apophyses equal in length. Vestibulum with a unique, weakly-developed and weakly-chitinized vaginal sclerite. Corpus bursae with two large signa; one signum is slightly shorter. Ductus spermathaecae with about 2 coils and a unique, round vesicle (Fig. 214).

Bionomics (Figs 18–21). Host plant is unknown (unidentified). Larvae mine in leaves in August and, judging from observed old (empty) leaf mines, in July. Larva pale yellowish green, with brownish green intestine and pale brown head (Fig. 18). The leaf mine is linear, as a slender gallery, contorted in the beginning, further on sinuous, with a thin central line of black frass (Figs 19–21). Adults occur in August–September.

Distribution. Known from a single locality in the western Himalaya (Uttarakhand: Rishikesh), at the elevation of about 500–700 m (Fig. 1: *wHi*).

Etymology. The species is named after the similar *A. nigripexus* (possessing black androconia), with a change of *nigri-* to *bruni-* (brown), in reference to the pale brown androconia of the hindwing of the new species.

Acalyptris auratilis Puplesis & Diškus, 2003

(Figs 84, 215–223)

Acalyptris auratilis Puplesis & Diškus, 2003: 219, 220.

Material examined. 3 ♂ (holotype and paratypes), Nepal, 70 km W of Kathmandu, Baikunthapuri, subtropical montane forest, 19, 20.iv.1995, R. Puplesis, genitalia slide nos AD0378 (holotype), AD0379 (paratype) (ZIN, also see Remarks); 1 ♂, India, Uttarakhand, Dehradun Distr., Rishikesh, 30°08’13”N, 78°19’55”E, elevation ca. 450 m, at light, 09.viii.2010, A. Šimkevičiūtė, genitalia slide no. AG127 (ZIN).

Diagnosis. This species belongs to the *Acalyptris platani* species group. *Acalyptris auratilis* is the most similar and probably closely related to the Himalayan *A. melanospila* (Meyrick, 1934), *A. nigripexus* Puplesis & Diškus, 2003, and *A. brunipexus* **sp. nov**. (described above).

Externally, males of *A. auratilis* differ from similar species of the *A. platani* group in the absence of androconia (Fig. 84) (*A. melanospila* has a basal patch of white androconia, *A. nigripexus* is with distinctly black androconia, and *A. brunipexus* possesses pale brown androconia of the hindwing).

Internally, in the male genitalia, the combination of unique-shaped ventral carinae (Figs 221, 222), a large dorsal lobe of phallus (Fig. 217), a long, slender pseuduncus (Fig. 220), small, scale-like cornuti in the phallus (Figs 217, 223), and the unique shape of the proximal lobe of vinculum (Figs 215, 219) distinguishes this species from the most similar *A. melanospila*, *A. nigripexus*, and *A. brunipexus*.

Male (Fig. 84). Forewing length 2.0–2.1 mm; wingspan 4.4–4.6 mm (n = 4). Described and illustrated by Puplesis & Diškus, 2003: 219, 220: figs 424, 480–483, 488, 491, 494.

Female. Unknown.

Bionomics. Host plant is unknown. Adults were collected at light in April and August. Otherwise, biology is unknown.

Distribution. Known from the subtropical forest of the western Himalaya: 70 km W of Kathmandu (Fig. 1: *cHi*) and Uttarakhand, Rishikesh (Fig. 1: *wHi*) (**new distribution**).

Remarks. We provide the first photographic documentation of the male genitalia (Figs 217–221, 223), for the first time report on new distribution of the species in India (Figs 215, 216). Additionally, the holotype and two paratypes, earlier deposited at LEU (formerly abbreviated as VPU) will be transferred to ZIN (see Material examined) because of the LEU closure.

Acalyptris noctilucus Rocienė & Stonis, sp. nov.

(Figs 81, 224–229)

urn:lsid:zoobank.org:act:63000FA3-3094-4A3C-BF02-A48FF1B7B4DB

Type material. Holotype: ♂, India, Uttarakhand, Dehradun Distr., Rishikesh, 30°07’40.01”N, 78°19’03.9”E, el-

evation ca. 450 m, at light, 6.viii.2010, A. Šimkevičiūtė, genitalia slide no. AG128♂ (ZIN). Paratypes: 2 ♂, same label data as holotype, 30°08'13.73"N, 78°19'55.12"E, elevation ca. 450 m, at light, 9.viii.2010, A. Šimkevičiūtė, genitalia slide nos AG125♂, AG126♂ (ZIN).

Diagnosis. This new species belongs to the *Acalyptris platani* species group. *A. noctilucus* **sp. nov.** is most similar to the Oriental *A. auratilis* Puplesis & Diškus, 2003, *A. acontarcha* (Meyrick, 1926), and some Afrotropical *Acalyptris* with modified, simple lobe-shaped ventral carina, a truncated proximal lobe of vinculum, and valva without a pronounced inner lobe, including *A. umdoniensis* (Scoble, 1980) and *A. rubiaevora* (Scoble, 1980).

Externally, males of *A. noctilucus* differ from all similar species of the *A. platani* group by the presence of shiny, brightly blue iridescent scales on the dark forewing.

Internally, in the male genitalia, *A. noctilucus* differs from all similar species in the absence of lateral carinae of the phallus (Fig. 225) and the unique-shaped ventral carinae as a long and slender single lobe (Fig. 226).

Male (Fig. 81). Forewing length 1.7–1.8 mm; wingspan 3.8–4.0 mm (n = 2).

Head. Palpi cream, frontal tuft pale ochre orange; collar pale ochre; scape very large, golden cream to ochreous cream; antenna shorter than one half the length of forewing; flagellum golden cream.

Thorax. Tegula, thorax and forewing densely covered with dark, grey-brown scales; these dark scales with a strong blue iridescence, especialy in the apical half and apex of the forewing; fringe pale grey-brown, without a fringe line; underside of forewing pale grey-brown, without spots or androconia. Hindwing brownish cream without androconia on upper side and underside, with little purple iridescence; fringe ochreous cream to grey cream depending on angle of view. Legs ochreous cream with some pale brown scales on upper side.

Abdomen. Colouration of the scaling is unknown. Genitalia (Figs 224–229) with capsule about 290 µm long, 195 µm wide. Pseuduncus (Figs 224) triangular-shaped, rounded or truncated distally. Valva (Figs 224, 227, 229) about 200 µm long, widened in the basal 1/3, but without a prominent, individualized inner lobe (Fig. 224). Vinculum with short or very short, distally rounded lateral lobes and a truncated proximal lobe, strongly chitinized along caudal margin (Fig. 224). Phallus (Figs 225, 226, 227, 229) about 315 µm long, without lateral carinae, with a modified ventral carinae as a long and slender single lobe (Fig. 226); cornuti tiny and pointed apically (Figs 225, 226).

Female. Unknown.

Bionomics. Host plant is unknown. Adults fly in August. Otherwise, biology is unknown.

Distribution. Known from a single locality in the western Himalaya (Uttarakhand: Rishikesh), at the elevation of about 500 m (Fig. 1: *wHi*).

Etymology. The species is named after other night luminous insects (including the beetle *Pyrophorus noctilucus* (L.)), in reference to the bright blue lustrous (iridescent) scales on the dark forewing of the new species.

Acalyptris nasutus Diškus & Navickaitė, sp. nov.

(Figs 4, 22–25, 85, 86, 230–235)

urn:lsid:zoobank.org:act:2F209F64-5C8F-4585-B0BE-FC5F604EA350

Type material. Holotype: ♀, India, Uttarakhand, Tehri Garhwal Distr., 25 km NW Chamba, 30°24'28"N, 78°17'24"E, elevation ca. 2600 m, feeding larva on *Viburnum cotinifolium*, 23.viii.2010, A. Diškus and A. Navickaitė, genitalia slide no. AD485 (ZIN). Paratypes: 2 ♀, same label data as holotype, genitalia slide no. AD479 (ZIN).

Diagnosis. This new species belongs to the *Acalyptris platani* species group. Because the shape of vaginal sclerite and long, slender signa, *A. nasutus* **sp. nov.** seems similar to the Mediterranean *A. platani* (Müller-Rutz, 1934), *A. loranthella* (Klimesh, 1937), and the South African *A. loranthivora* (Janse, 1948). However, the unique parttern with a wide, golden cream pseudofascia on a dark forewing and the unique biology of larvae feeding on *Viburnum* and producing unique, contorted leaf mines, distinguish the new species from other species of the *A. platani* group.

Male. Unknown.

Female (Figs 85, 86). Forewing length 2.5–2.6 mm; wingspan 5.5–5.7 mm (n = 3).

Head. Palpi golden cream, frontal tuft dark ochre-beige on vertex, bright ochreous orange on frons; collar yellowish cream, indistinctive, comprised of piliform scales; scape large, yellowish cream; antenna as half the length of forewing, with about 32 segments; flagellum dark grey-brown, with some purple iridescence.

Thorax. Tegula and thorax speckled with dark grey-brown scales. Forewing basally speckled with grey-brown

scales, medialy with a wide dark golden cream area (pseudofascia) sparsely irrorated with dark grey brown scales, apically densely speckled with brown- black scales; fringe grey, without a fringe line; underside of forewing dark-brown except for a small, elongated, whitish cream scaleless patch basally, without androconia. Hindwing dark grey-brown on upper side and underside, golden glossy on upper side. Legs glossy, golden cream, densely covered with grey-brown scales on upper side.

Abdomen. Dark grey-brown some purple iridescence on upper side, golden glossy, brownish grey on underside. Genitalia (Figs 230–235) 720–735 µm long. Abdominal apex truncated, with short setae. Anterior and posterior apophyses almost equal in length. Vestibulum with a strongly chitinized, complex vaginal sclerite, with nose-like projection (Figs 231, 235). Corpus bursae with two very long signa. Ductus spermathaecae with 3–3.5 coils and a tube-like vesicle (Fig. 234).

Bionomics (Figs 4, 22–25). Host plant is *Viburnum cotinifolium* D. Don., Adoxaceae (formerly attributed to Caprifoliaceae). Larvae mine in leaves in August. Larva pale yellowish green, with a bright dark green intestine and pale brown head (Fig. 22). The leaf mine is linear, as a slender and distinctly contorted gallery; frass, brown to greenish black or black, fills the width of the gallery except for the initial part where it is deposited as a thin central line. Adults occur in August.

Distribution. Known from two localities in the western Himalaya (Uttarakhand: Chamba and Dhanaulti), at the elevation of 2200–2600 m (Fig. 1: *wHi*).

Etymology. The species name is derived from Latin *nasutus* (with a nose), in reference to the distinctive, nose-like projection of the vaginal sclerite in the female genitalia.

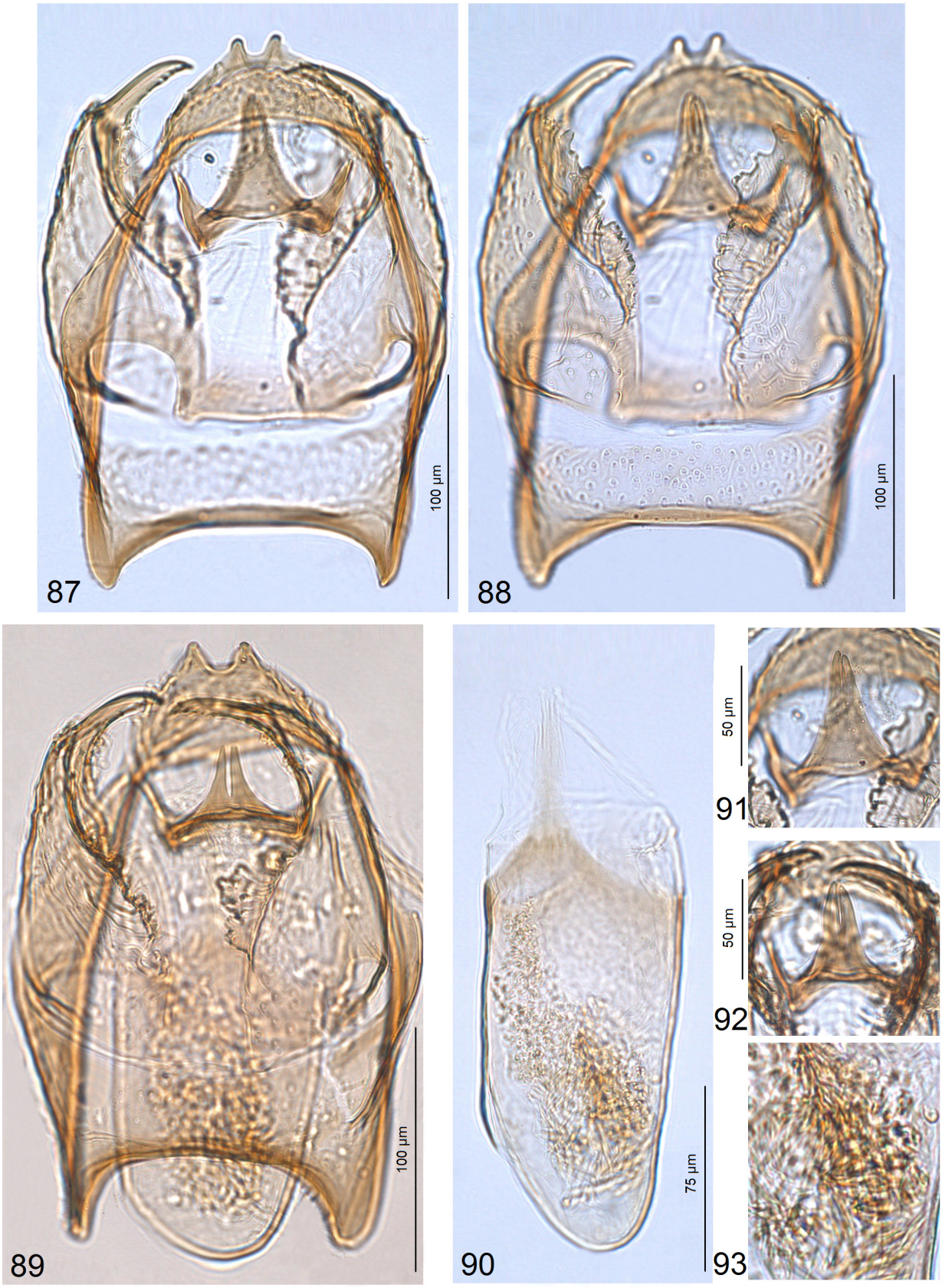
Discussion

In the course of this study, we made several observations with respect to genitalia slide mounts, species diagnostics, and variation in androconial scale colour.

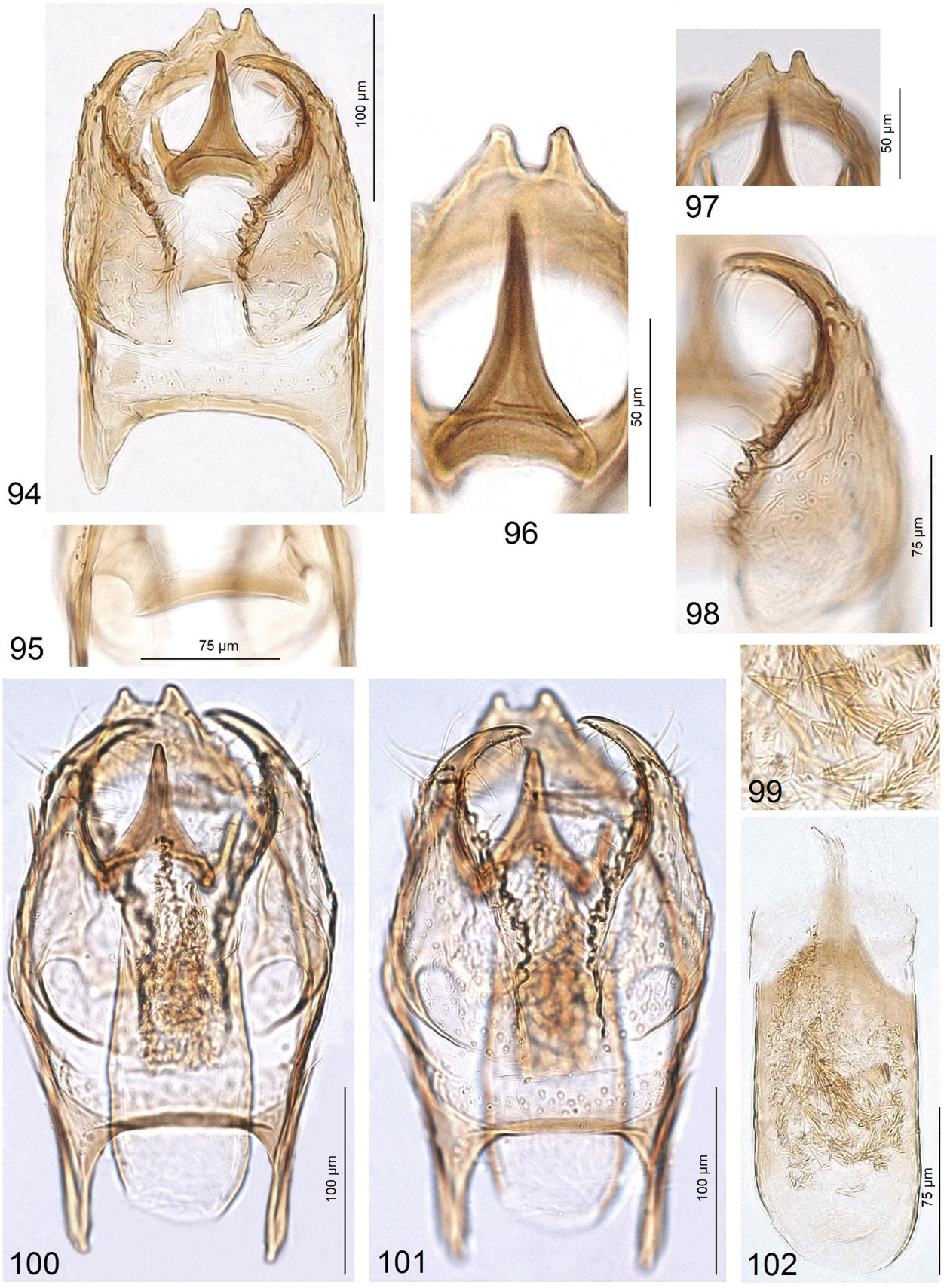
1. We found that genitalia structures in slide mounts of some Nepticulidae species may appear slightly different with time. For example, in the case of *Ectoedemia orbiculata* we provided photographs of both freshly made slides in Euparol (see Figs 139, 144, 232, 233, and 235) and 10-year old, fully dried slides (see Figs 137, 142, 143, 230, 231, and 234). In the case of *Stigmella alilediella*, the genitalia do not look different, but the valvae are in a different position (Fig. 121) in comparison to the freshly made mount in Fig. 114. And in slide no. AN459 of the holotype of *S. damocles* (Fig. 106), the phallus turned laterally after the slide dried (Fig. 104).

2. Regarding species diagnostics, the *Ectoedemia angulifasciella* group is one of the most difficult species groups in Nepticulidae. The forewing of different species is almost always with a simple, indistinguishable pattern, and the male genitalia are uniform and possess very little diagnostic characters. Moreover, some characters, notably the lateral lobes of the vinculum and the apical process of the valva, can look slightly different depending on the genitalia mount, and the gnathos is movable in *Ectoedemia* therefore, by turning ventrally, it can appear morphologically different. Nevertheless, all species of the *E. angulifasciella* group reviewed in this paper have been successfully differentiated by combining external and male genitalia characters (see Fig. 236).

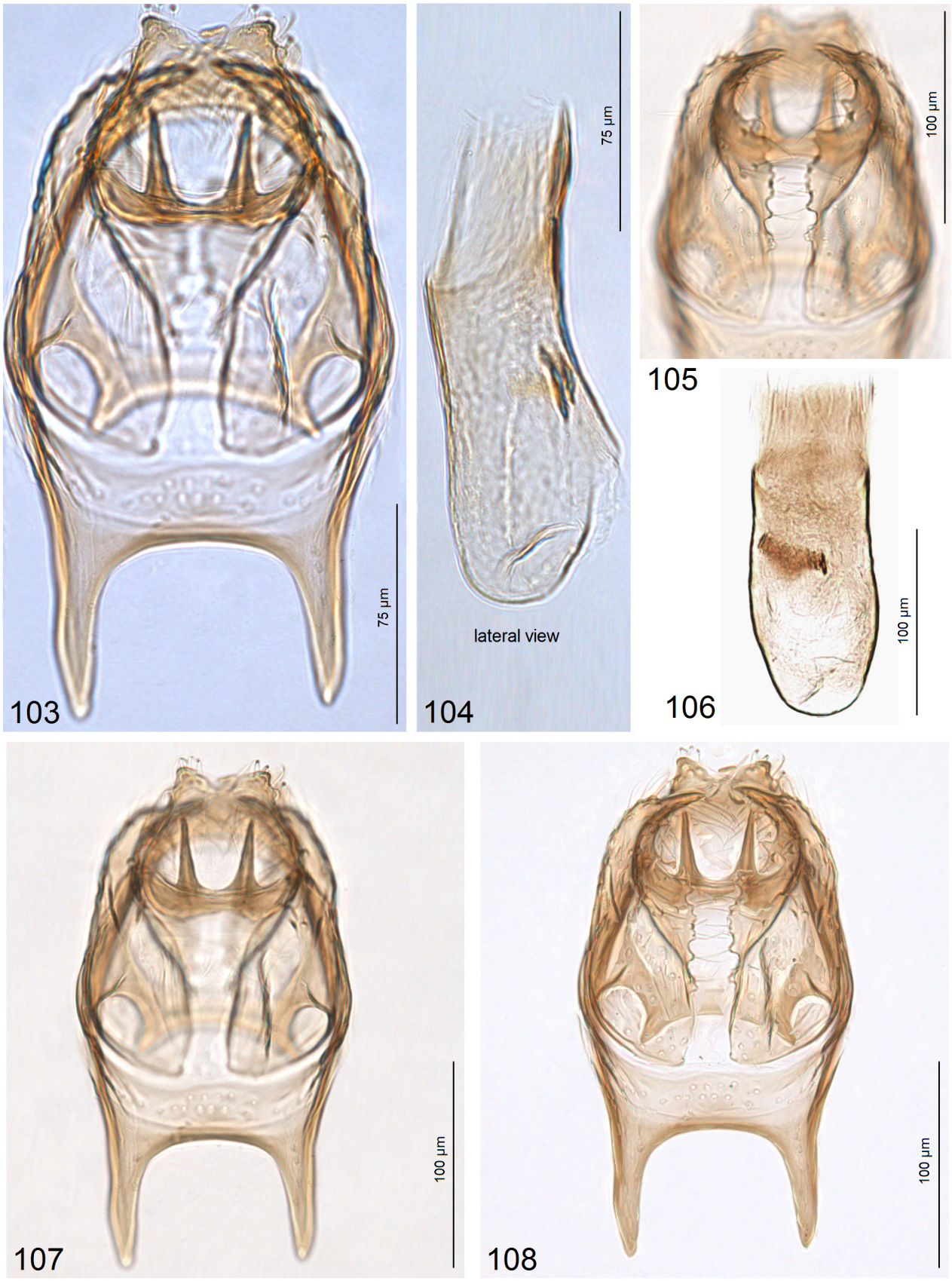
3. The special (androconial) scales, tufts, and hair pencils on the *Ectoedemia* male forewing and hindwing were described and illustrated by van Nieukerken (1985). Prior to our study, we assumed that these structures were very reliable diagnostic characters. However, despite their great value for diagnostics, they appear to be variable in a few species. We found that the hair pencil of *E. spinosella* varies in length and colour from pale, yellowish cream to ochre-brown or brown. The androconial scales that surround the hair pencil are usually brown, but they may also vary. We found that some specimens of *E. albiformae* (synonymized with *E. spinosella*) have white androconia or, in the case of some specimens from the same collecting series, have brown androconia with a few white androconial scales, or possess an androconial patch of white scales with some brown androconial scales medially. In *E. insignata*, the hair pencil of the hindwing is brown surrounded by ochre-brown scales, but in some other specimens from the same locality, the hair pencil may be brown-ochre surrounded by ochre scales.



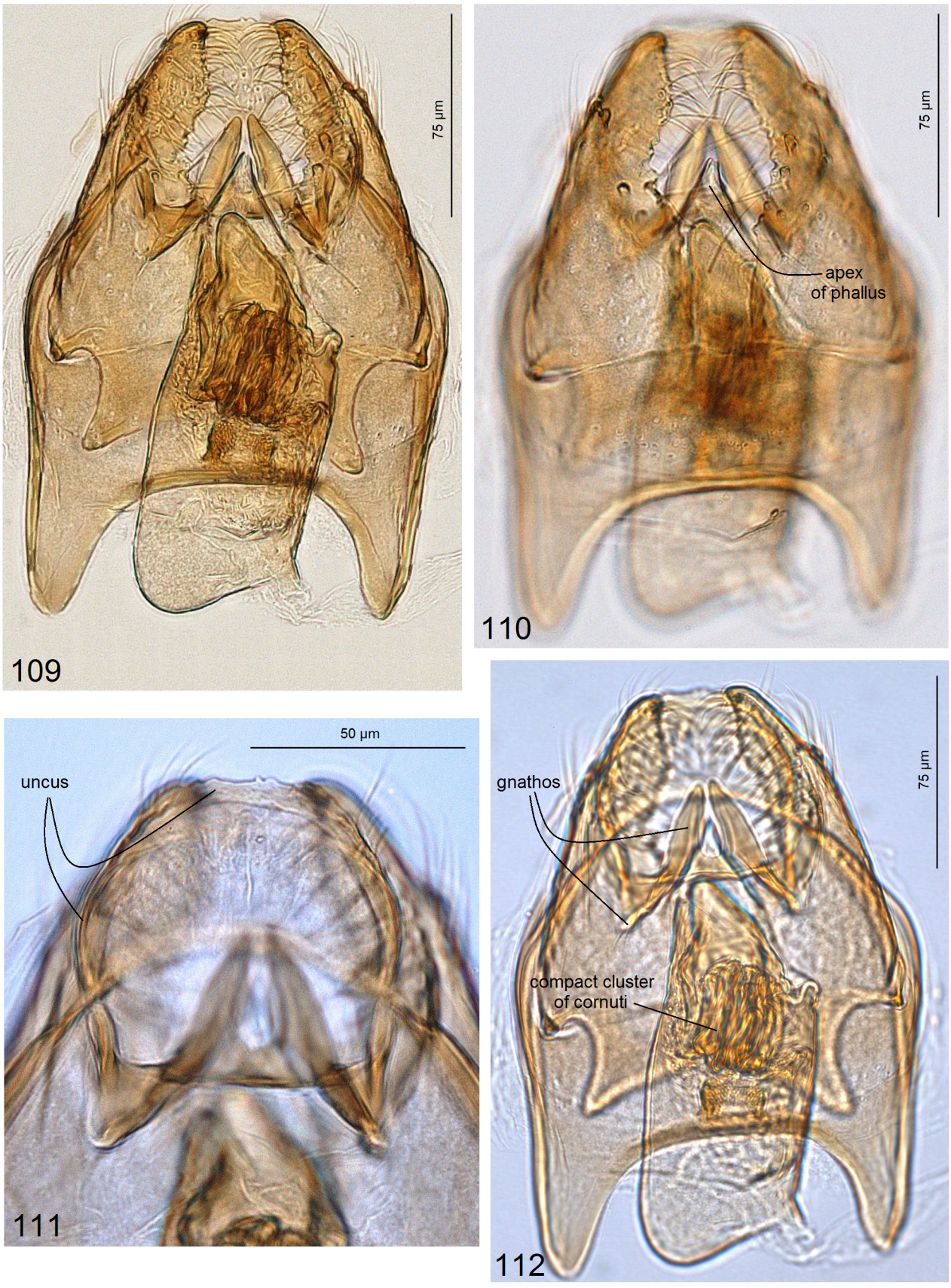
FIGURES 87–93. Male genitalia of *Stigmella maloidica* Puplesis. 87, 88, capsule with phallus removed, holotype, genitalia slide no. AD525; 89, capsule with phallus inside, paratype, genitalia slide no. AD339; 90, phallus, holotype, genitalia slide no. AD525; 91, gnathos, holotype, genitalia slide no. AD525; 92, same, paratype, genitalia slide no. AD336; 93, cornuti, holotype, genitalia slide no. AD525 (ZIN)



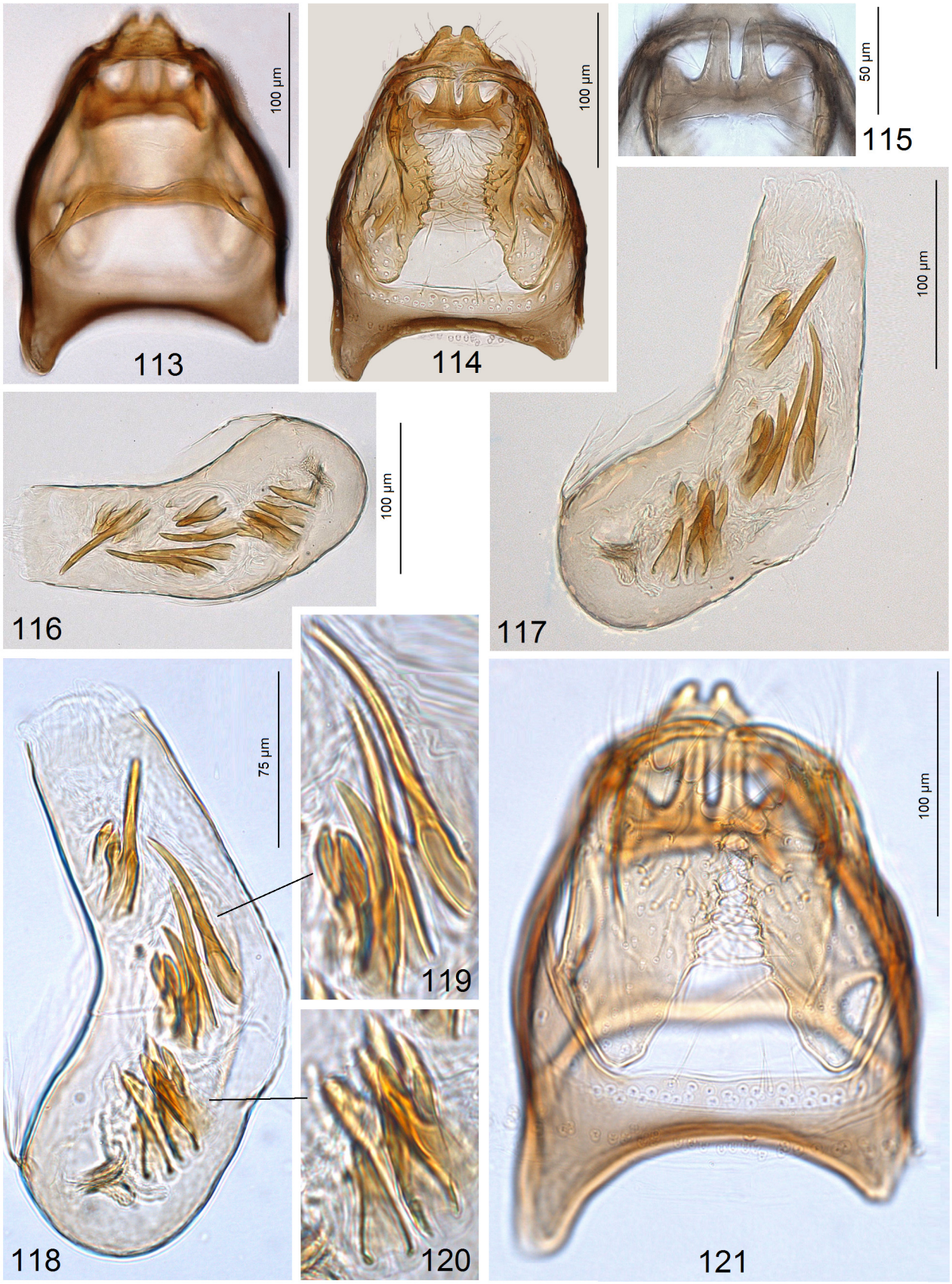
FIGURES 94–102. Male genitalia of *Stigmella ziziphifolia* Rocienė & Stonis, **sp. nov.** 94, holotype, genitalia slide no. AG130, capsule with phallus removed; 95, same, transtilla; 96, same, gnathos; 97, same, uncus, 98, same, valva; 99, same, cornuti; 100, paratype, genitalia slide no. AG131, capsule with phallus inside; 102, phallus, holotype, genitalia slide no. AG130 (ZIN)



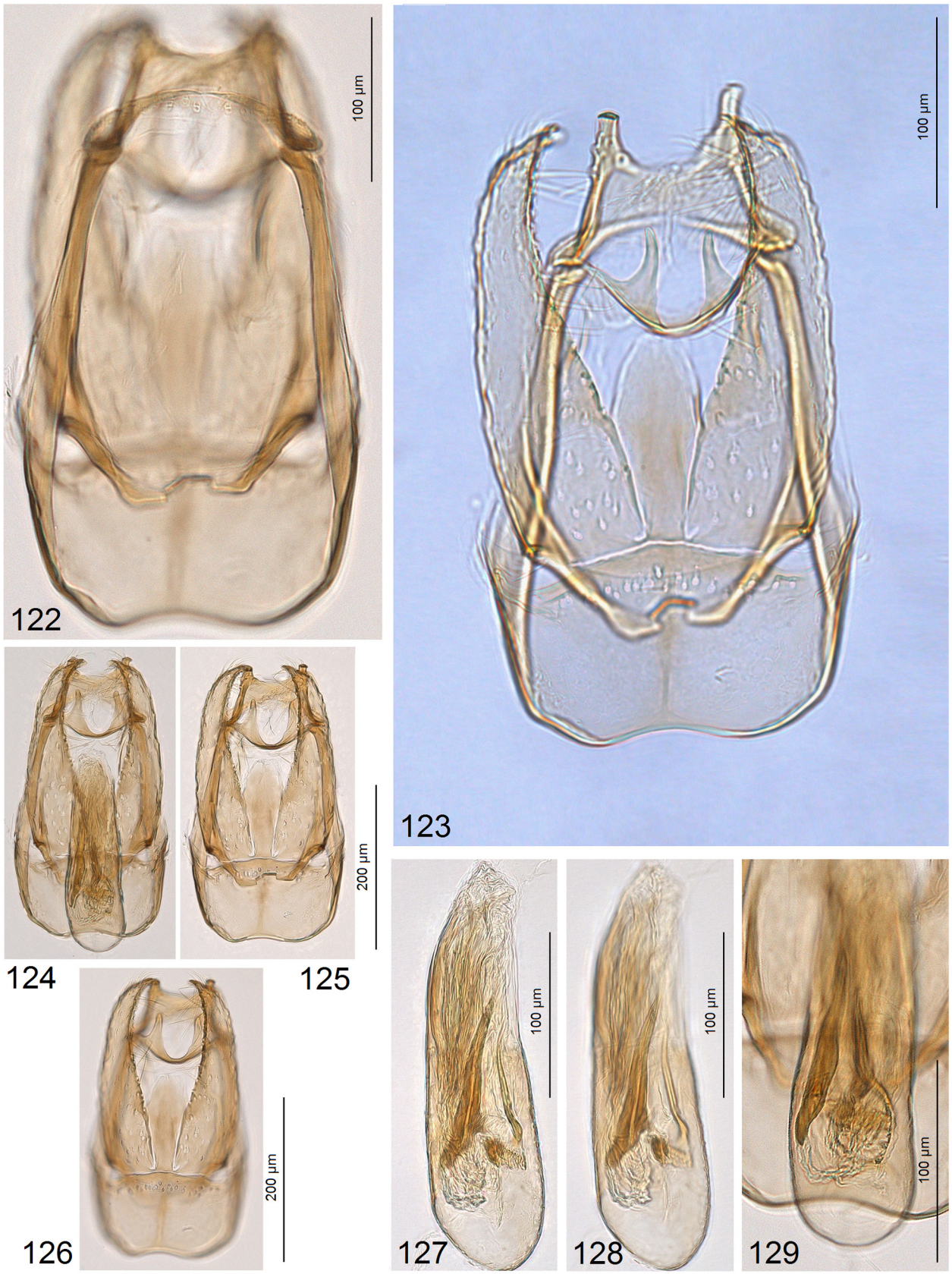
FIGURES 103–108. Male genitalia of *Stigmella damocles* Remeikis, **sp. nov.**, holotype, genitalia slide no. AN459 (ZIN). 103, capsule with phallus removed; 104, phallus; 105, valvae; 106, phallus; 107, 108, capsule



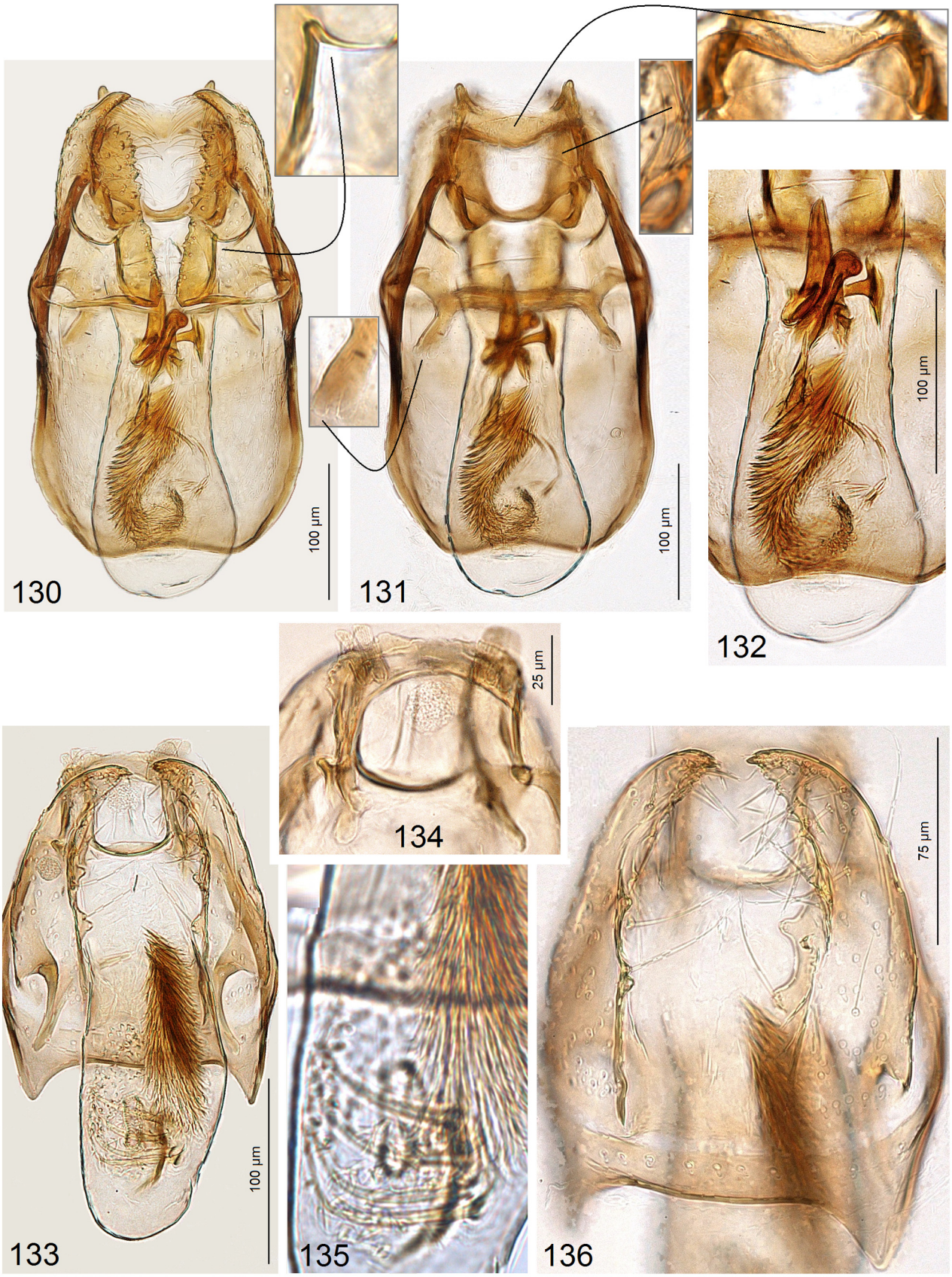
FIGURES 109–112. Male genitalia of *Stigmella pyramidata* Diškus & Navickaitė, **sp. nov.**, holotype, genitalia slide no. AD494 (ZIN). 109, capsule with phallus inside; 110, same, focused on valvae; 111, uncus; 112, capsule with phallus inside



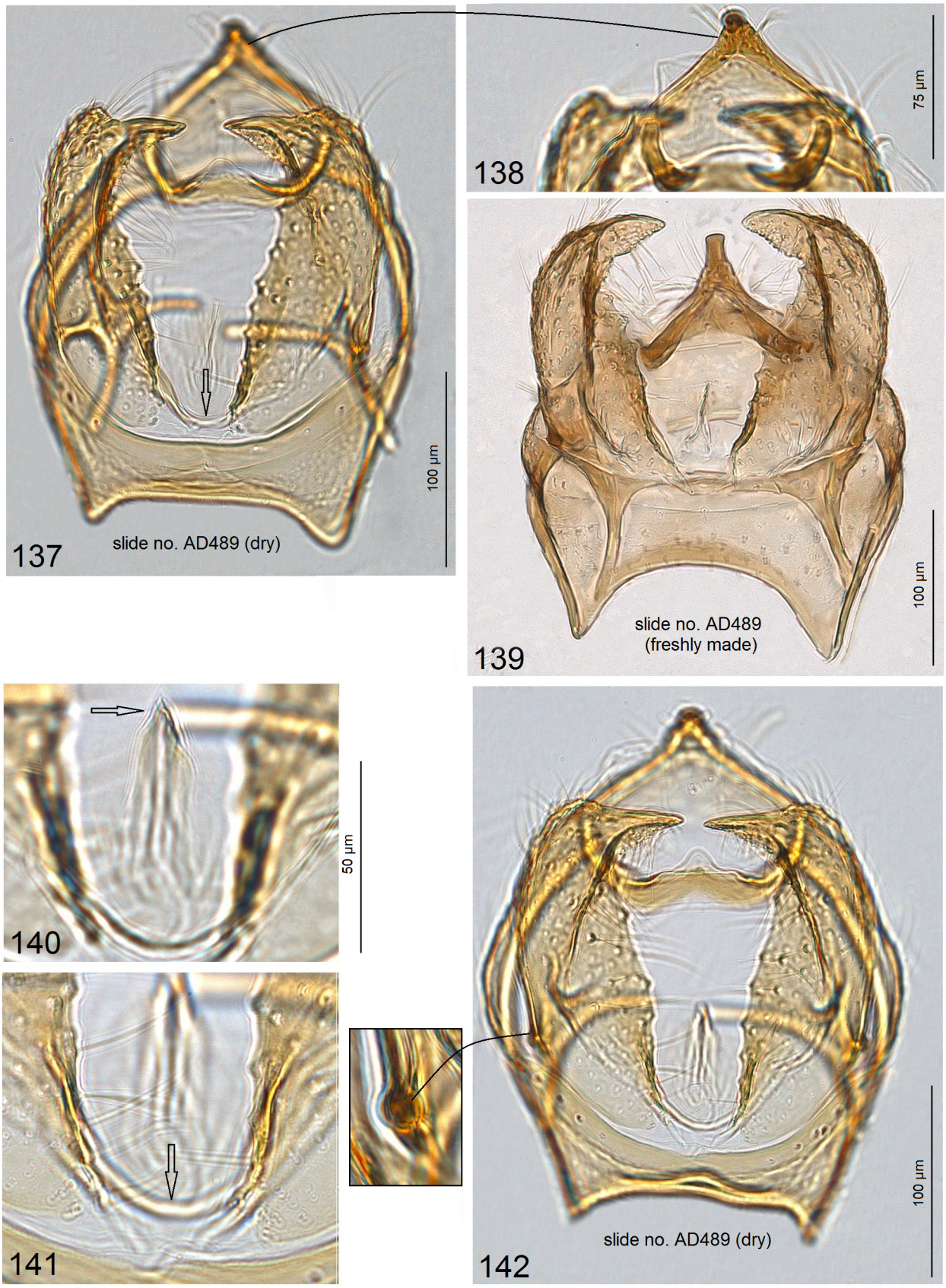
FIGURES 113–121. Male genitalia of *Stigmella alilediella* Diškus & Navickaitė, **sp. nov.**, holotype, genitalia slide no. AD488 (ZIN). 113, 114, capsule with phallus removed; 115, gnathos; 116–118, phallus; 119, 120, cornuti; 121, capsule with phallus removed



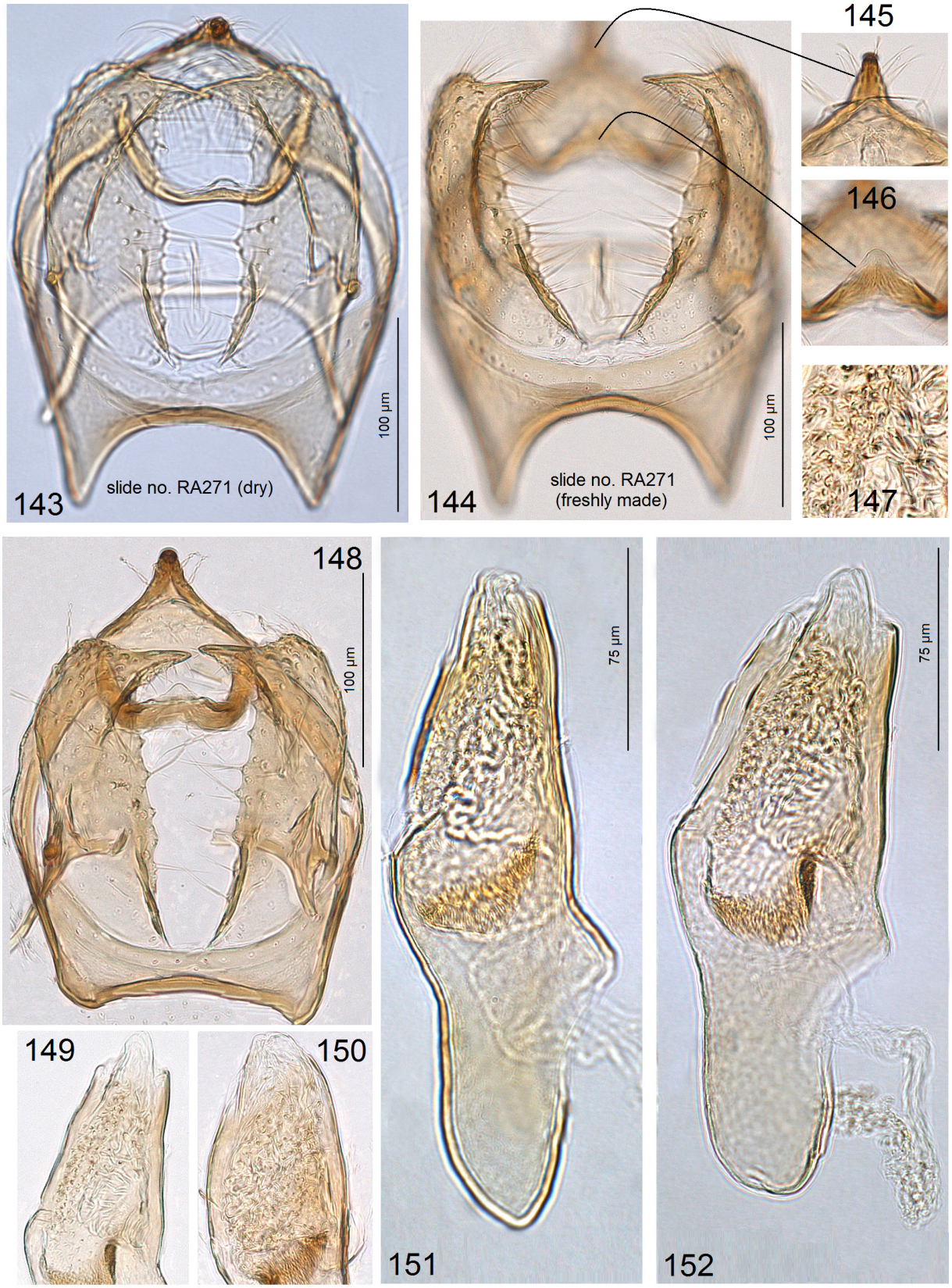
FIGURES 122–129. Male genitalia of *Stigmella longa* Remeikis & Stonis, **sp. nov.**, holotype, genitalia slide no. RA264 (ZIN). 122–126, capsule with phallus removed; 127–129, phallus



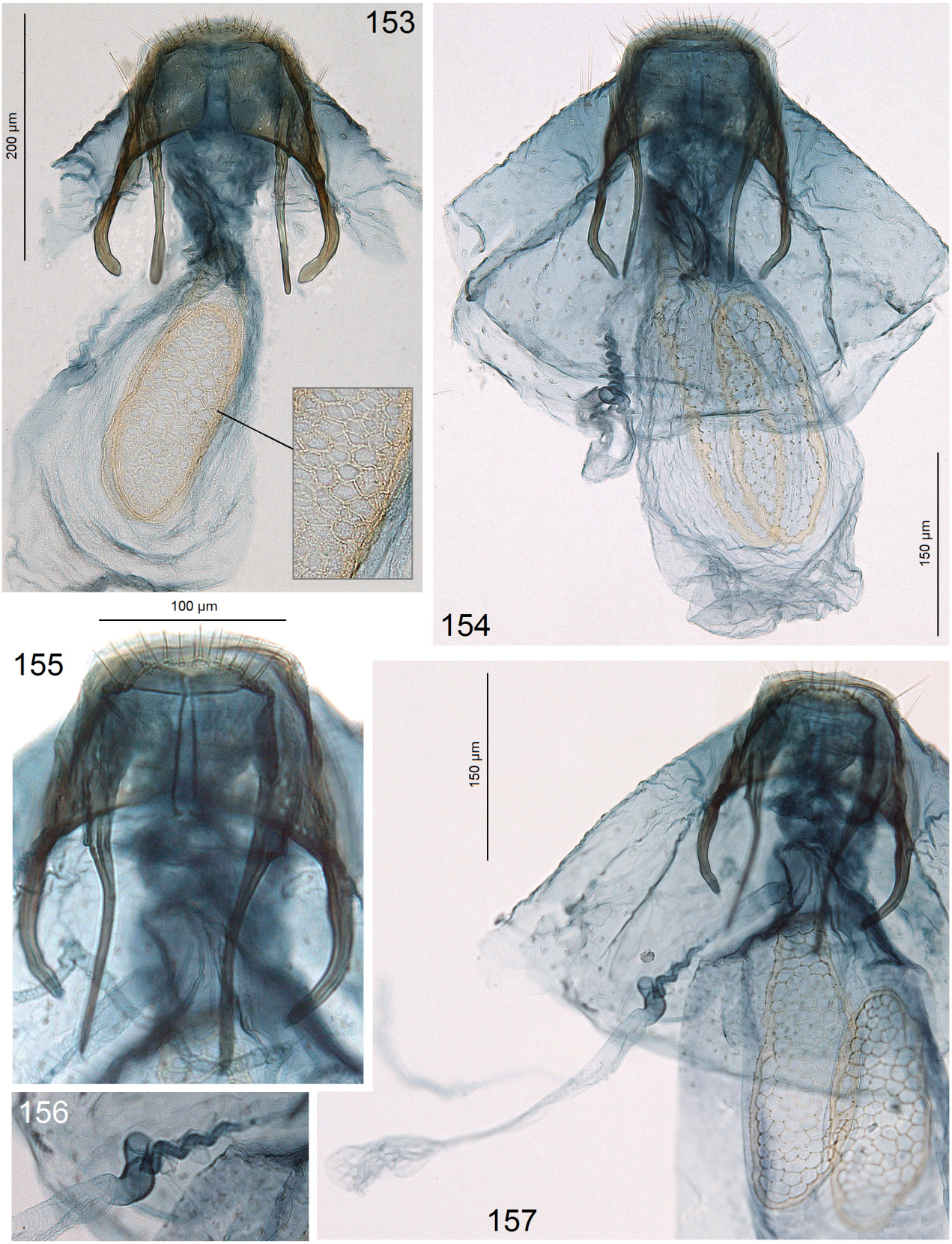
FIGURES 130–136. Male genitalia of new *Stigmella* species. 130, 131, holotype of *S. latilobata* Diškus & Navickaitė, **sp. nov.**, genitalia slide no. AD484, capsule with phallus inside; 132, same, phallus; 133, holotype of *S. paniculata* Diškus & Navickaitė, **sp. nov.**, capsule with phallus inside; 134, same, uncus and gnathos; 135, same, cornuti; 136, same, valvae (ZIN).



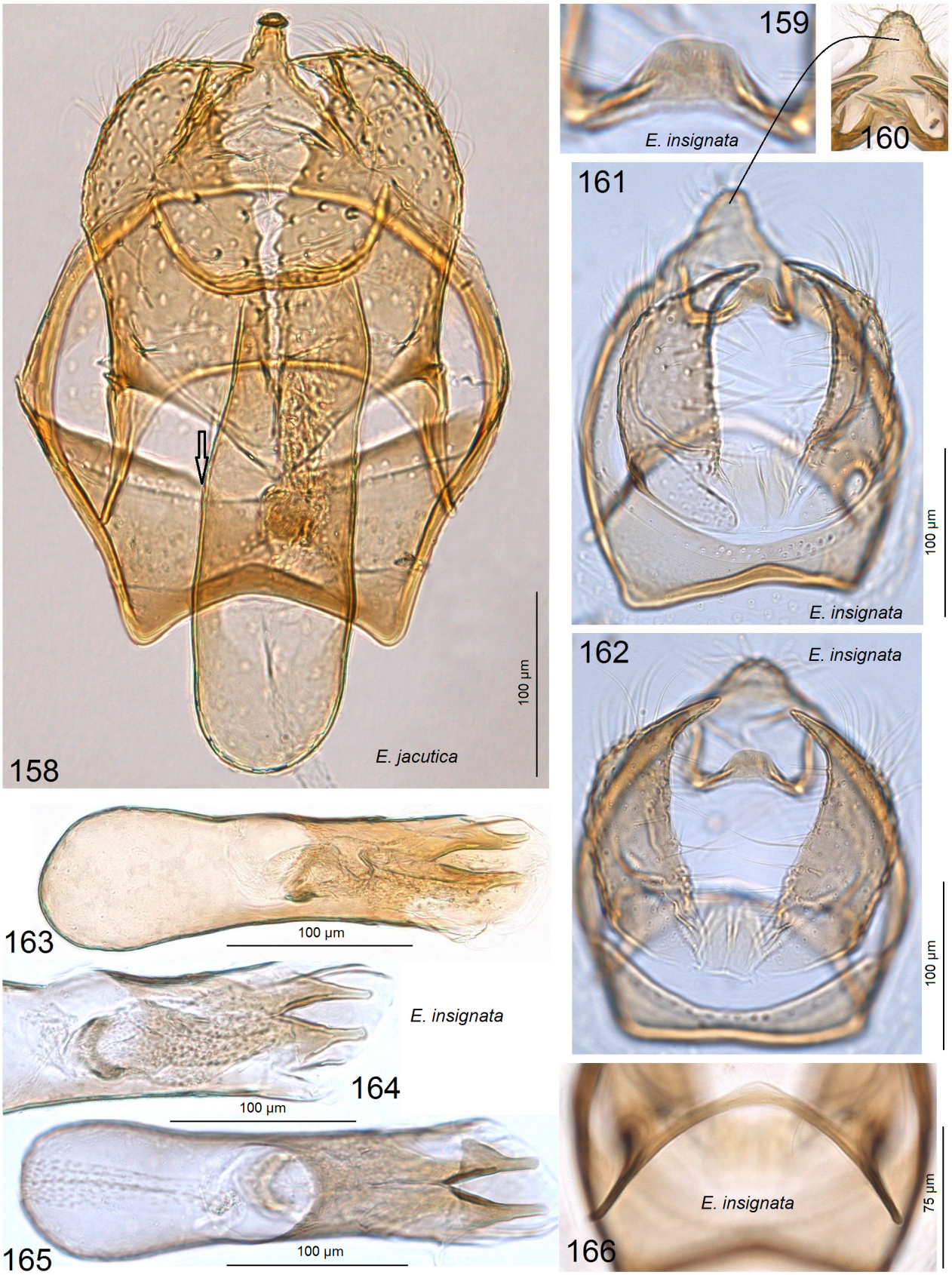
FIGURES 137–142. Male genitalia of *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.** 137, holotype, genitalia slide no. AD489, capsule with phallus removed; 138, same, uncus; 139, same, photographed freshly made in Euparal; 140, 141, paratype, genitalia slide no. AD498, juxta; 142, same, capsule with phallus removed (ZIN)



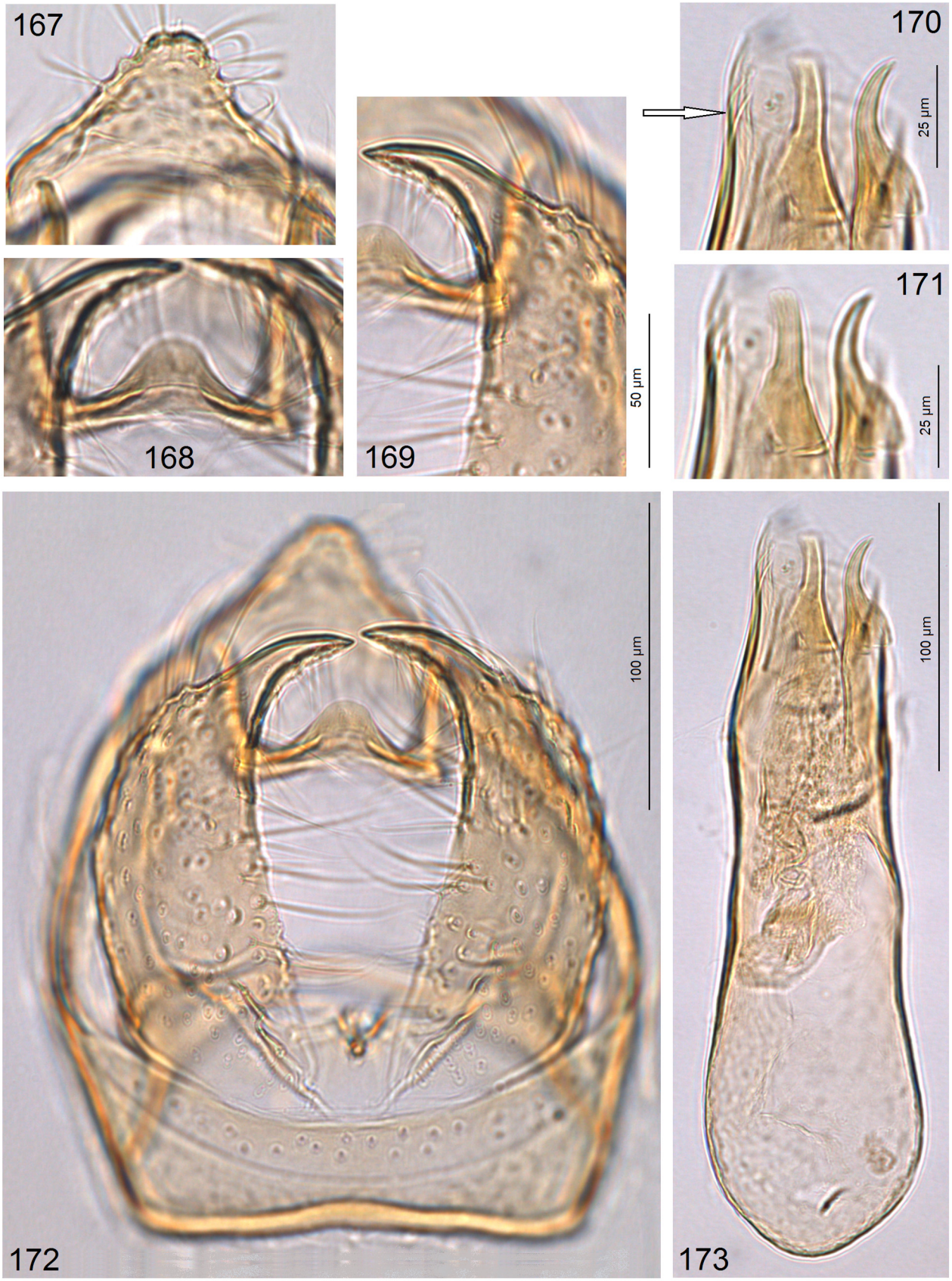
FIGURES 143–152. Male genitalia of *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.** 143, paratype, slide no. RA271, capsule; 144, same, photographed freshly made in Euparal; 145, pseuduncus, paratype, slide no. RA271; 146, gnathos, paratype, slide no. RA271; 147, cornuti, holotype, slide no. AD489; 148, capsule, paratype, slide no. AG129; 149, apex of phallus, holotype, slide no. AD489; 150, same, paratype, slide no. AG129; 151, phallus, general view, holotype, slide no. AD489; 152, same, paratype, slide no. AG129 (ZIN)



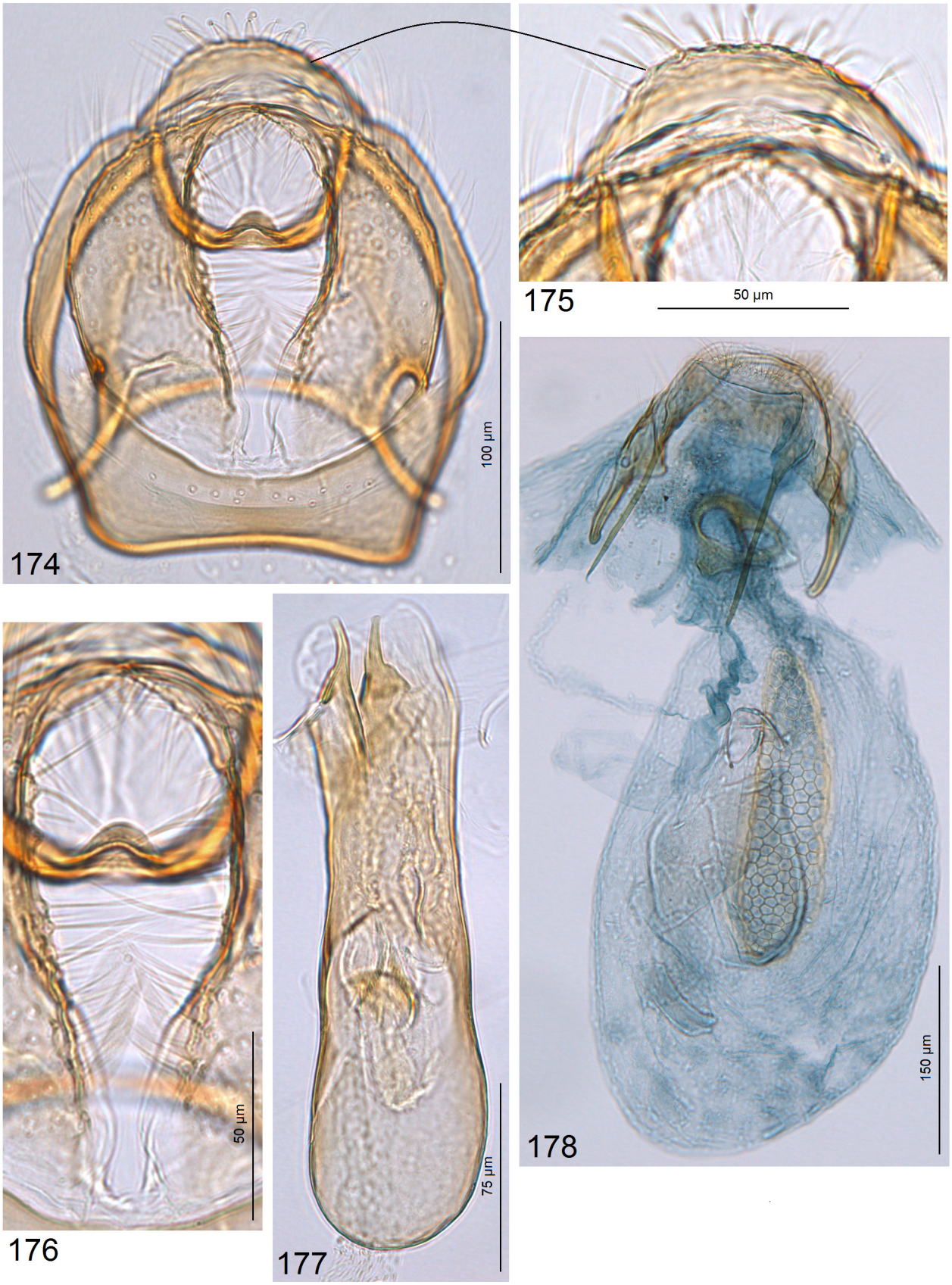
FIGURES 153–157. Female genitalia of *Ectoedemia orbiculata* Diškus, Remeikis & Stonis, **sp. nov.** 153, paratype, genitalia slide no. AD487; 154, same, genitalia slide no. RA270; 155–157, details of genitalia, paratype, genitalia slide RA272 (ZIN)



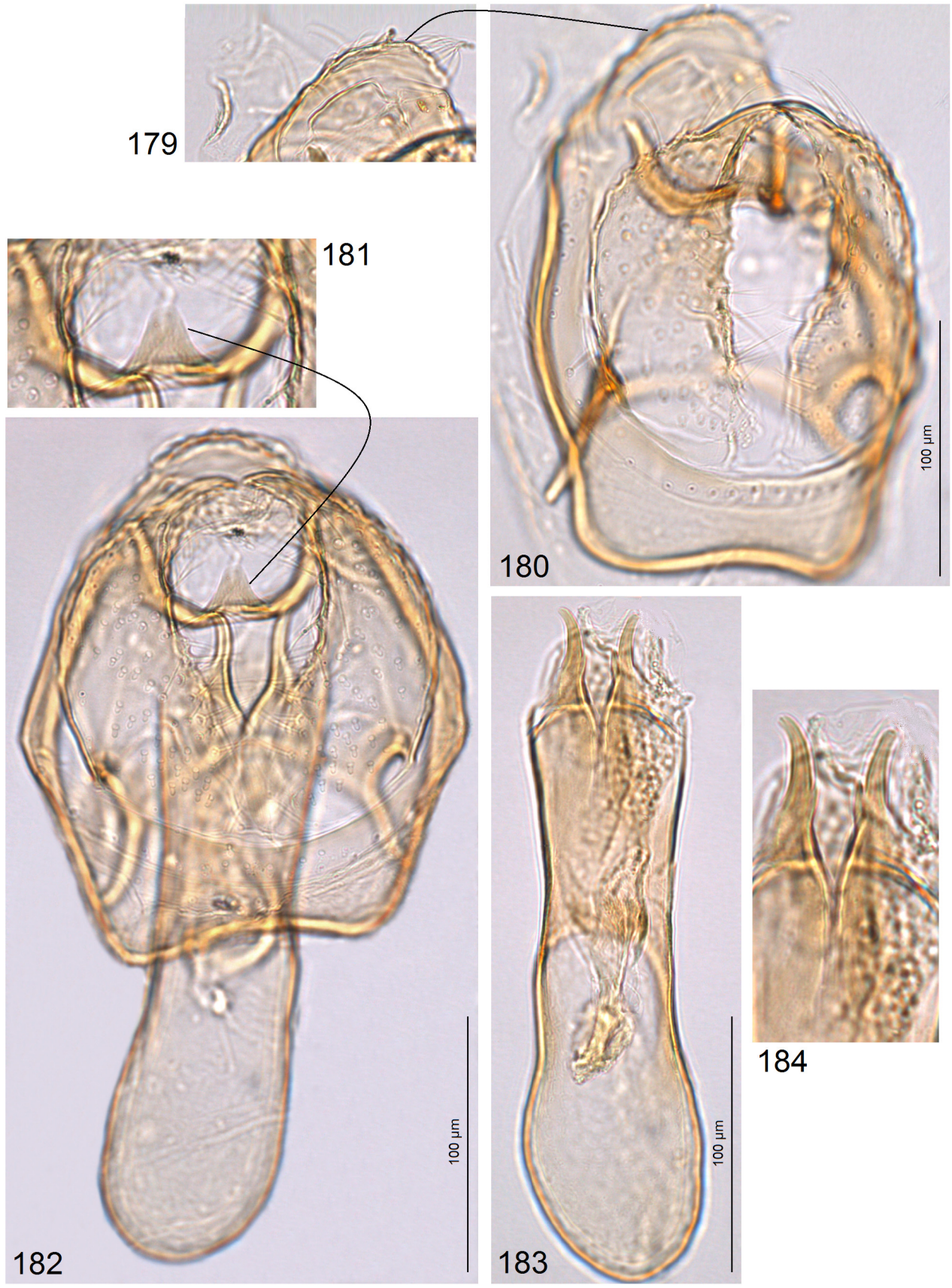
FIGURES 158–166. Male genitalia of *Ectoedemia* spp. 158, *E. jacutica* Puplesis, paratype, genitalia slide no. AN539 (ZIN); 159, *E. insignata* Puplesis, gnathos, genitalia slide no. AN464; 160, same, pseuduncus, slide AN467; 161, same, capsule with phallus removed, slide no. AN467; 162, same, slide AN464; 163, phallus, slide no. AN467; 164, 165, same, slide no. AN464; 166, transtilla, slide no. AN467 (ZIN)



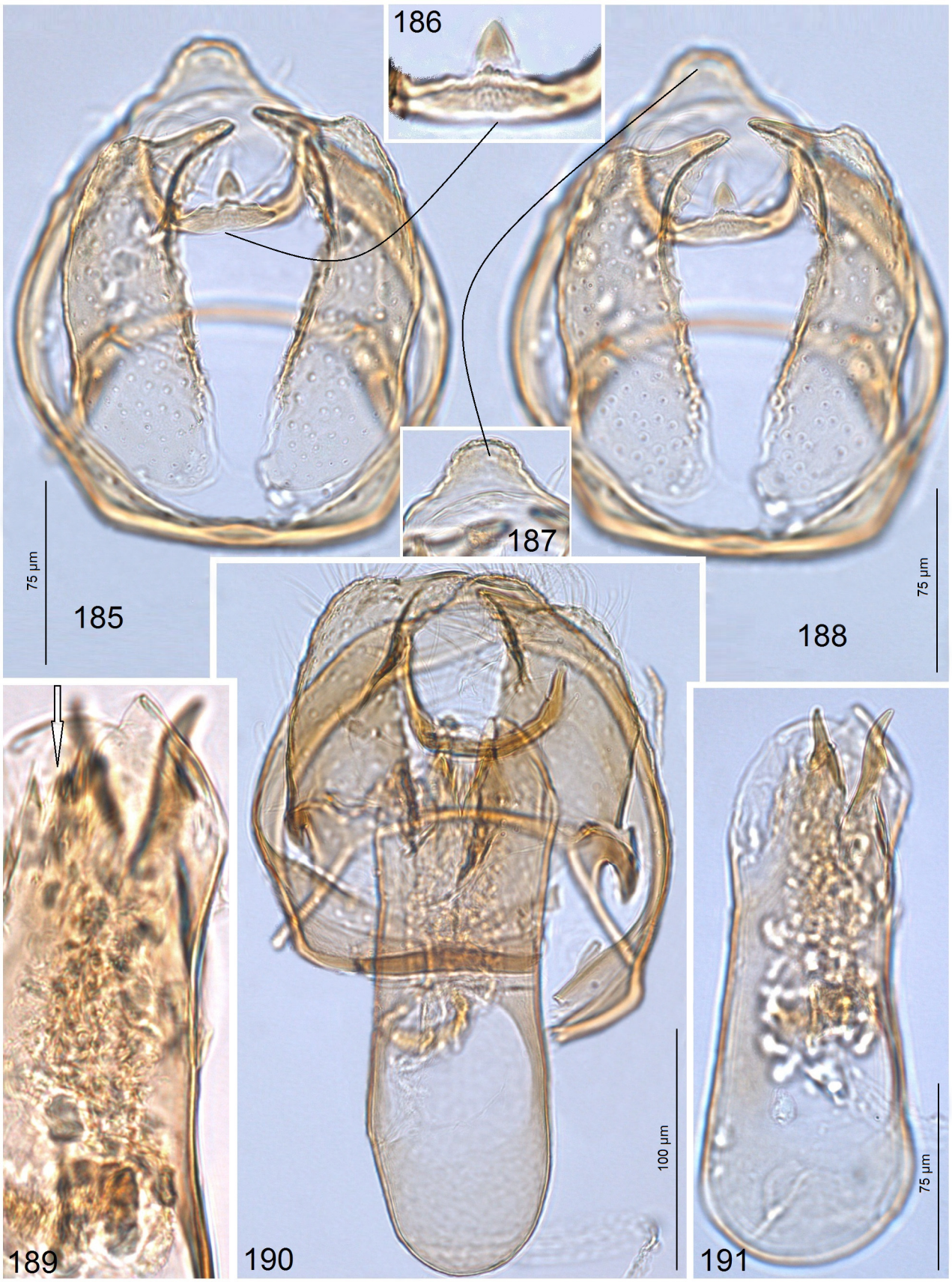
FIGURES 167–173. Male genitalia of holotype of *Ectoedemia insignata* Puplesis, genitalia slide no. AD574 (ZIN). 167, pseudunucus; 168, gnathos; 169, valva, 170, 171, apex of phallus; 172, capsule with phallus removed; 173, phallus



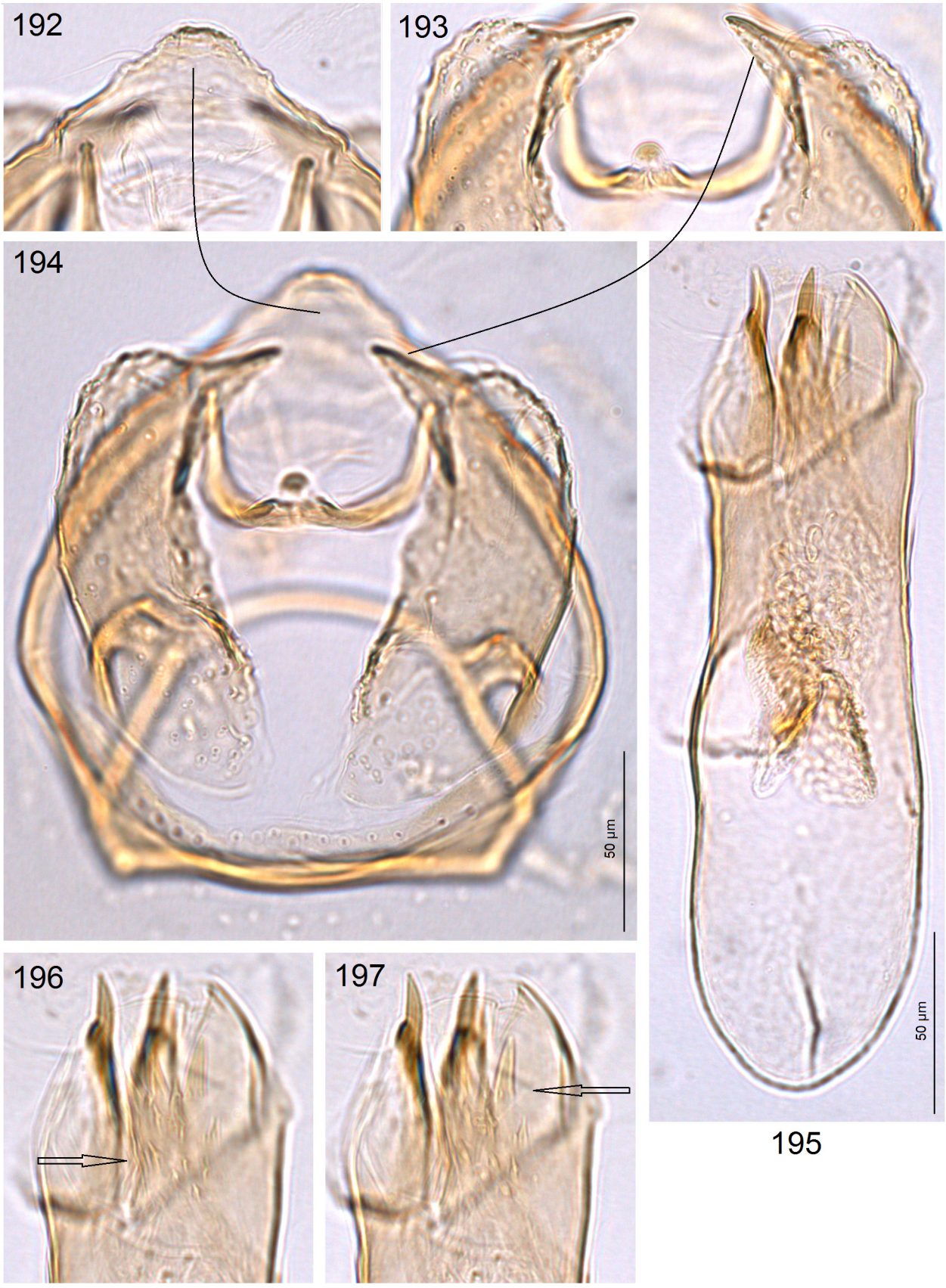
FIGURES 174–178. Genitalia of *Ectoedemia spinosella* (de Joannis) (= *E. albiformae* Puplesis & Diškus). 174, holotype of *E. albiformae*, male genitalia, capsule with phallus removed, slide no. AD422; 175, same, pseuduncus; 176, same, gnathos; 177, same, phallus; 178, paratype of *E. albiformae*, female genitalia, slide no. AD423 (ZIN)



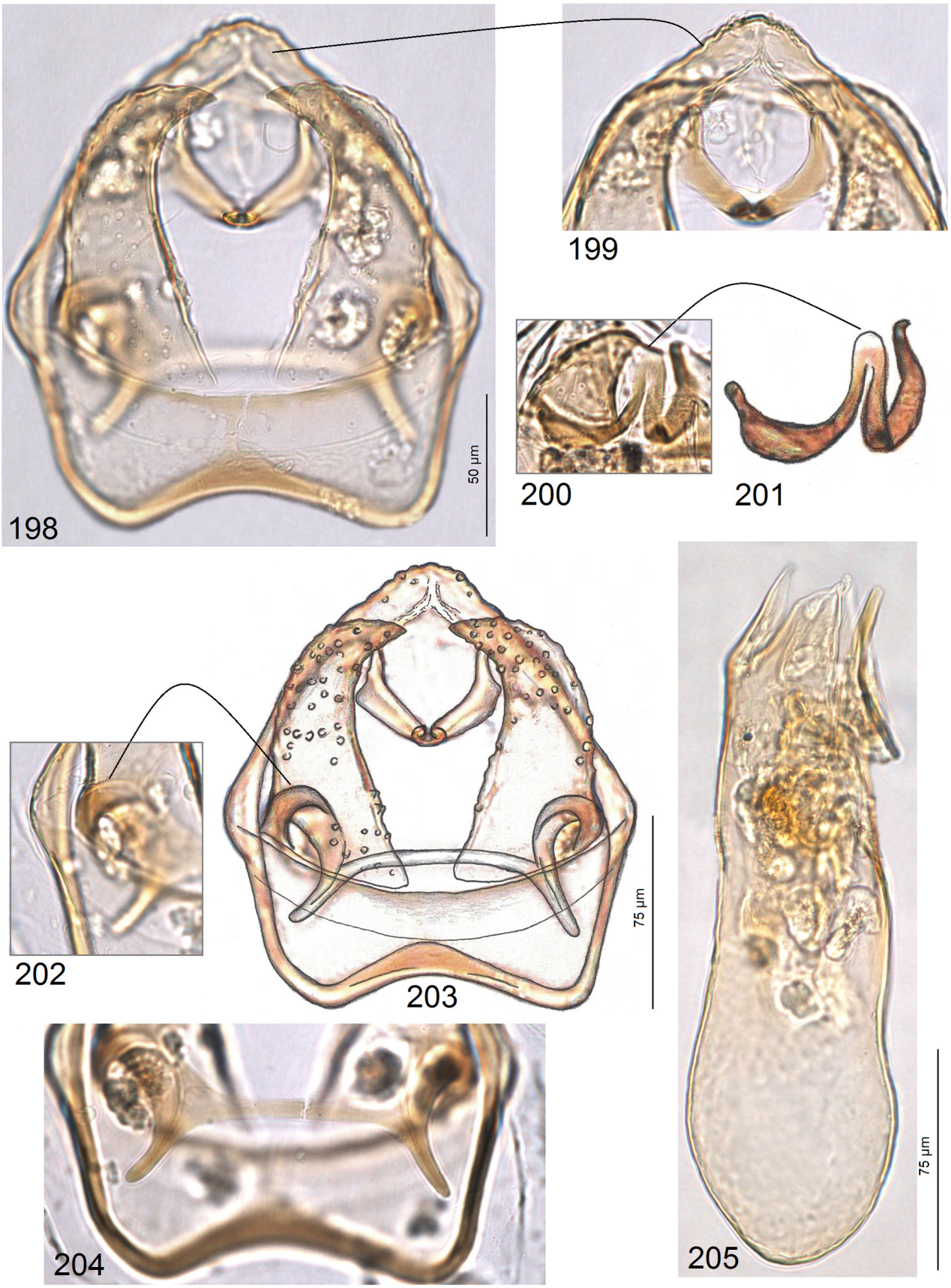
FIGURES 179–184. Male genitalia of *Ectoedemia spinosella* (de Joannis) (= *E. petrosa* Puplesis, **syn. nov.**). 179, 180, holotype of *E. petrosa*, capsule with phallus removed, slide no. AN458; 181, 182, paratype of *E. petrosa*, capsule with phallus inside, slide no. AN441; 183, 184, holotype of *E. petrosa*, phallus, slide no. AN458 (ZIN)



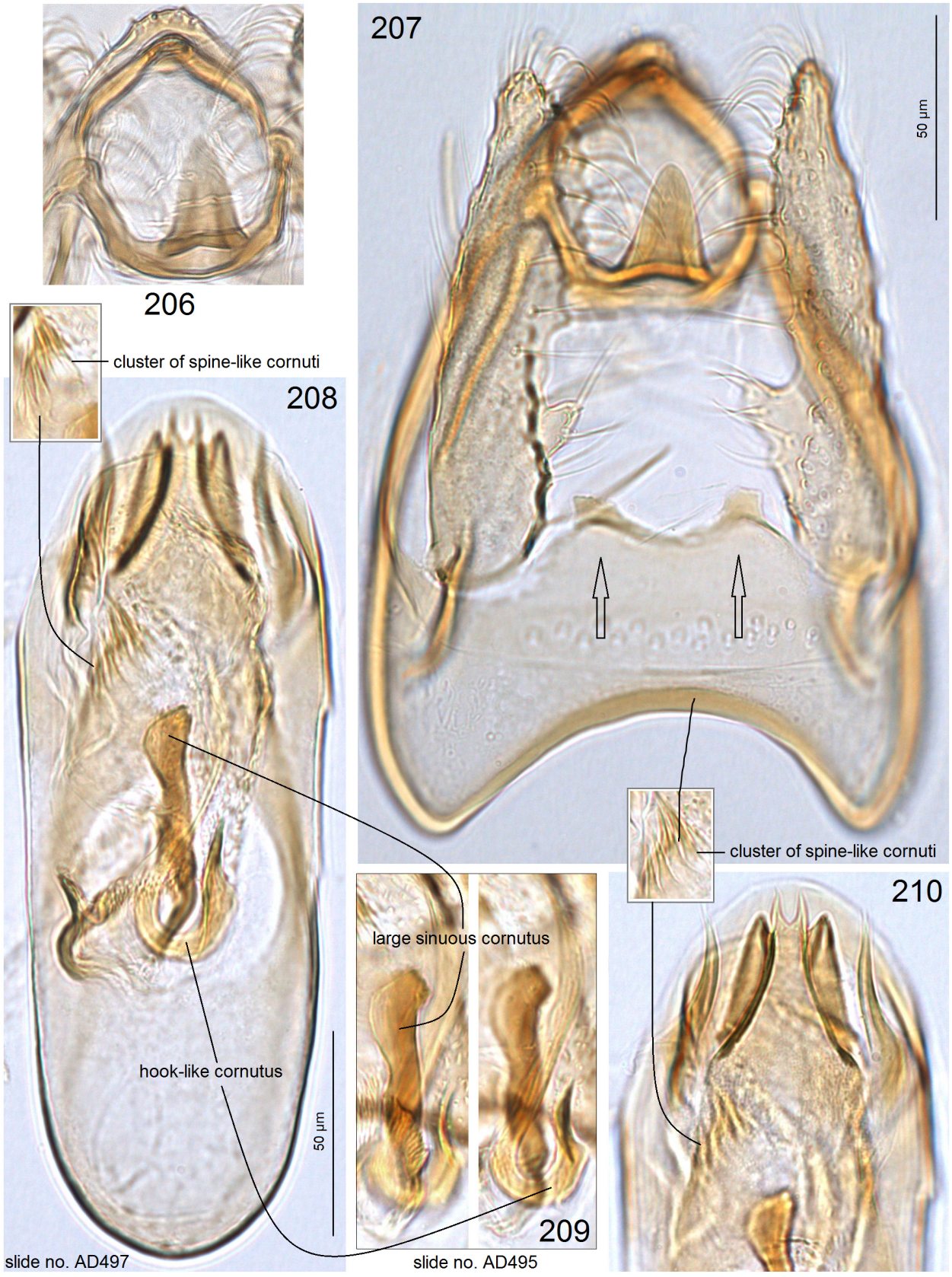
FIGURES 185–191. Male genitalia of *Ectoedemia ingloria* Puplesis. 185–188, holotype, genitalia slide no. AN457, capsule with phallus removed; 189, 191, same, phallus; 190, paratype, genitalia slide no. AN424, capsule with phallus inside (ZIN)



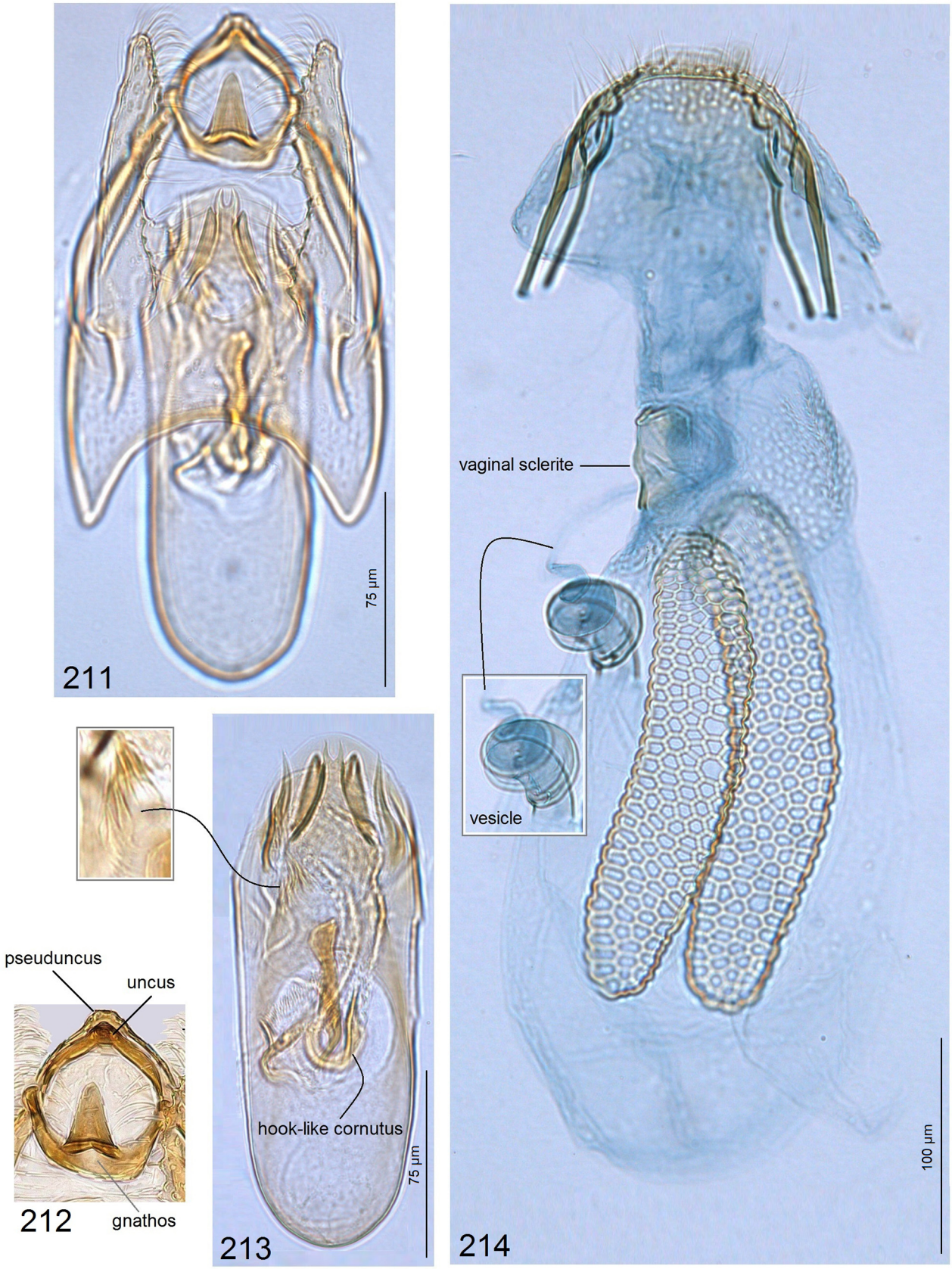
FIGURES 192–197. Male genitalia of *Ectoedemia ingloria* Puplesis (= *E. rosiphila* Puplesis, **syn. nov.**). 192–194, holotype of *E. rosiphila*, capsule with phallus removed, slide no. AN466; 195–197, same, phallus (ZIN)



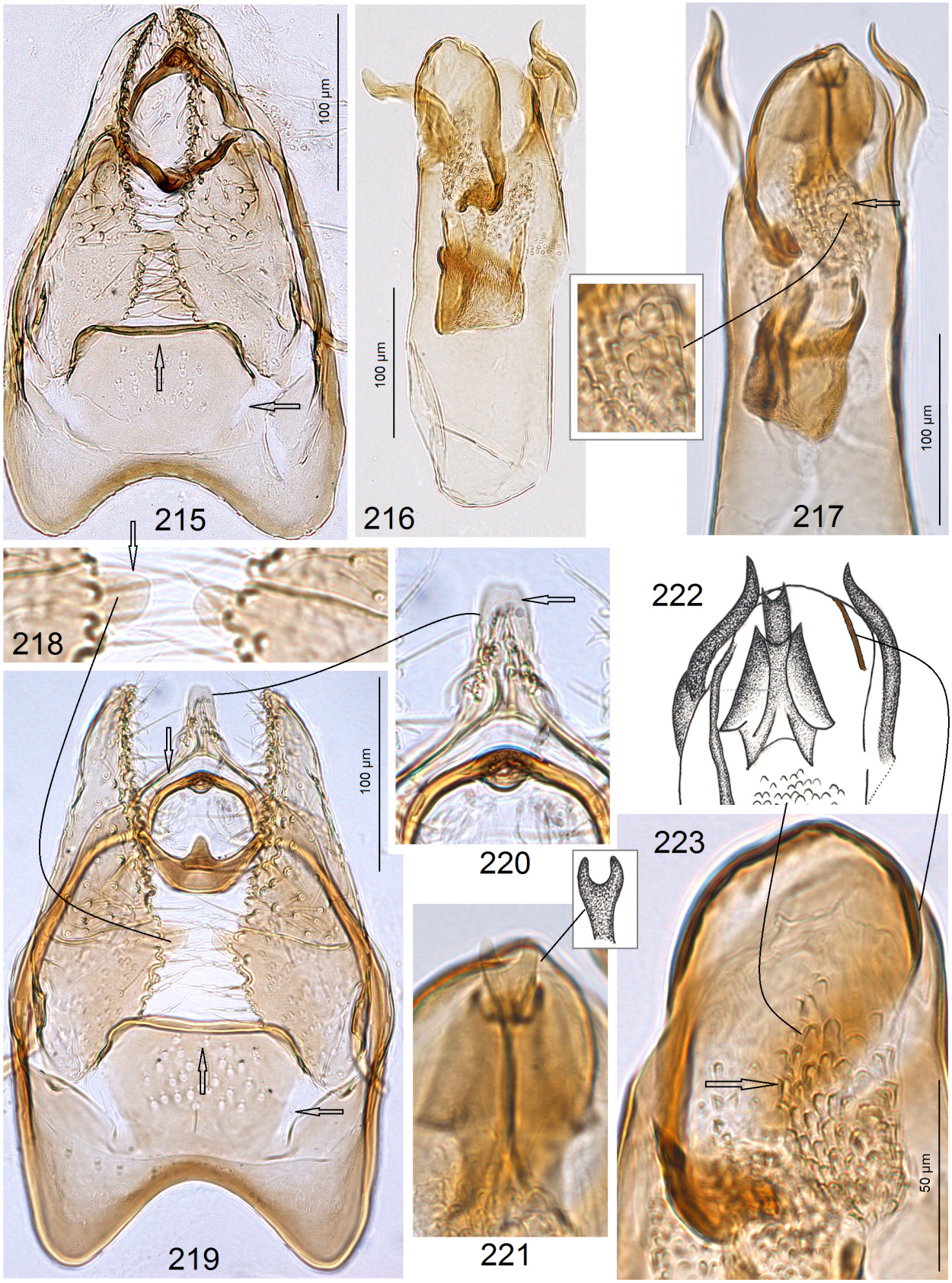
FIGURES 198–205. Male genitalia of *Ectoedemia tadshikiella* Puplesis. 198, 199, capsule with phallus removed, holotype, slide no. AN456; 200, 201, gnathos, paratype, genitalia slide no. AN417; 202–204, capsule with phallus removed, holotype, slide no. AN456; 205, same, phallus (ZIN)



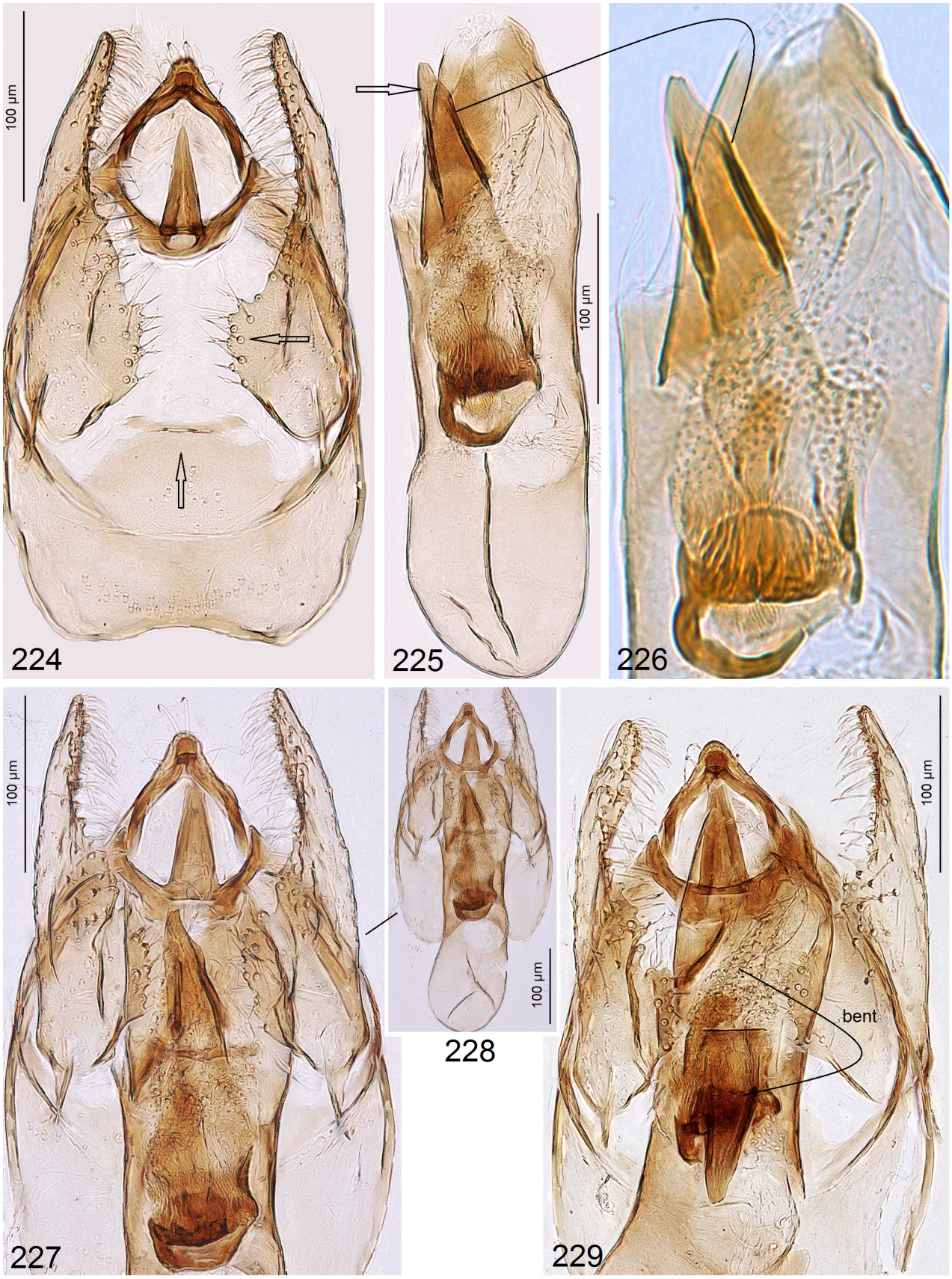
FIGURES 206–210. Male genitalia of *Acalyptris brunipexus* Stonis, Diškus & Remeikis, **sp. nov.** 206, paratype, genitalia slide no. RA278, gnathos, uncus and pseuduncus; 207, paratype, genitalia slide no. AD497, capsule with phallus removed; 208, same, phallus; 209, holotype, genitalia slide no. AD495, large sinuous cornutus; 210, paratype, genitalia slide no. AD497, carinae (ZIN)



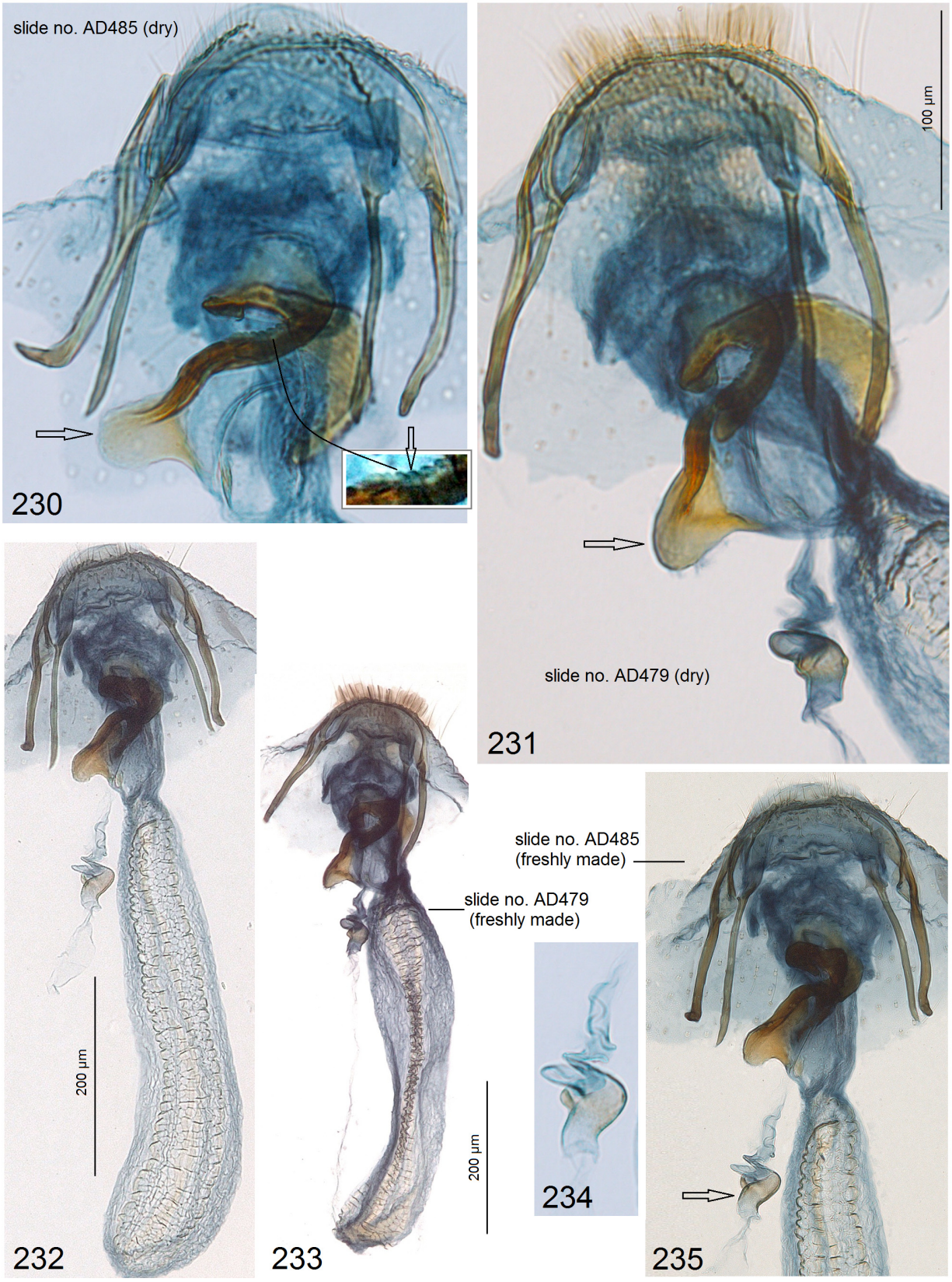
FIGURES 211–214. Genitalia of *Acalyptris brunipexus* Stonis, Diškus & Remeikis, **sp. nov.** 211, holotype, genitalia slide no. AD495, capsule with phallus inside; 212, same, gnathos, uncus and pseuduncus; 213, paratype, genitalia slide no. AD497, phallus; 214, paratype, genitalia slide AD486, female genitalia (ZIN)



FIGURES 215–223. Male genitalia of *Acalyptris auratilis* Puplesis & Diškus. 215, genitalia slide no. AG127, capsule with phallus removed; 216, same, phallus; 217, holotype, genitalia slide no. AD0378, phallus; 218–220, same, capsule with phallus removed; 221, same, carinae; 222, same, after Puplesis & Diškus 2003; 223, paratype, genitalia slide no. AD0379, apex of phallus with scale-like cornuti (ZIN)



FIGURES 224–229. Male genitalia of *Acalyptris noctilucus* Rocienė & Stonis, **sp. nov.** 224, holotype, genitalia slide no. AG128, capsule with phallus removed; 225, 226, same, phallus; 227, 228, paratype, genitalia slide AG126, capsule with phallus inside; 229, paratype, genitalia slide no. AG125, capsule with phallus and ventrally bent carina (ZIN)



FIGURES 230–235. Female genitalia of *Acalyptris nasutus* Diškus & Navickaitė, **sp. nov.** 230, holotype, slide no. AD485, apophyses and vaginal sclerite; 231, same, paratype, slide no. AD479; 232, general view, holotype, slide no. AD485; 233, same, paratype, slide no. AD479; 234, coils and vesicle of ductus spermathecae, holotype, slide no. AD485; 235, same, general view (ZIN). Note: the slides in Figs 230, 231, and 234 were photographed old, 10 years after they been prepared; slides in Figs 232, 233, and 235 were photographed freshly made, immediately after their preparation in Euparal

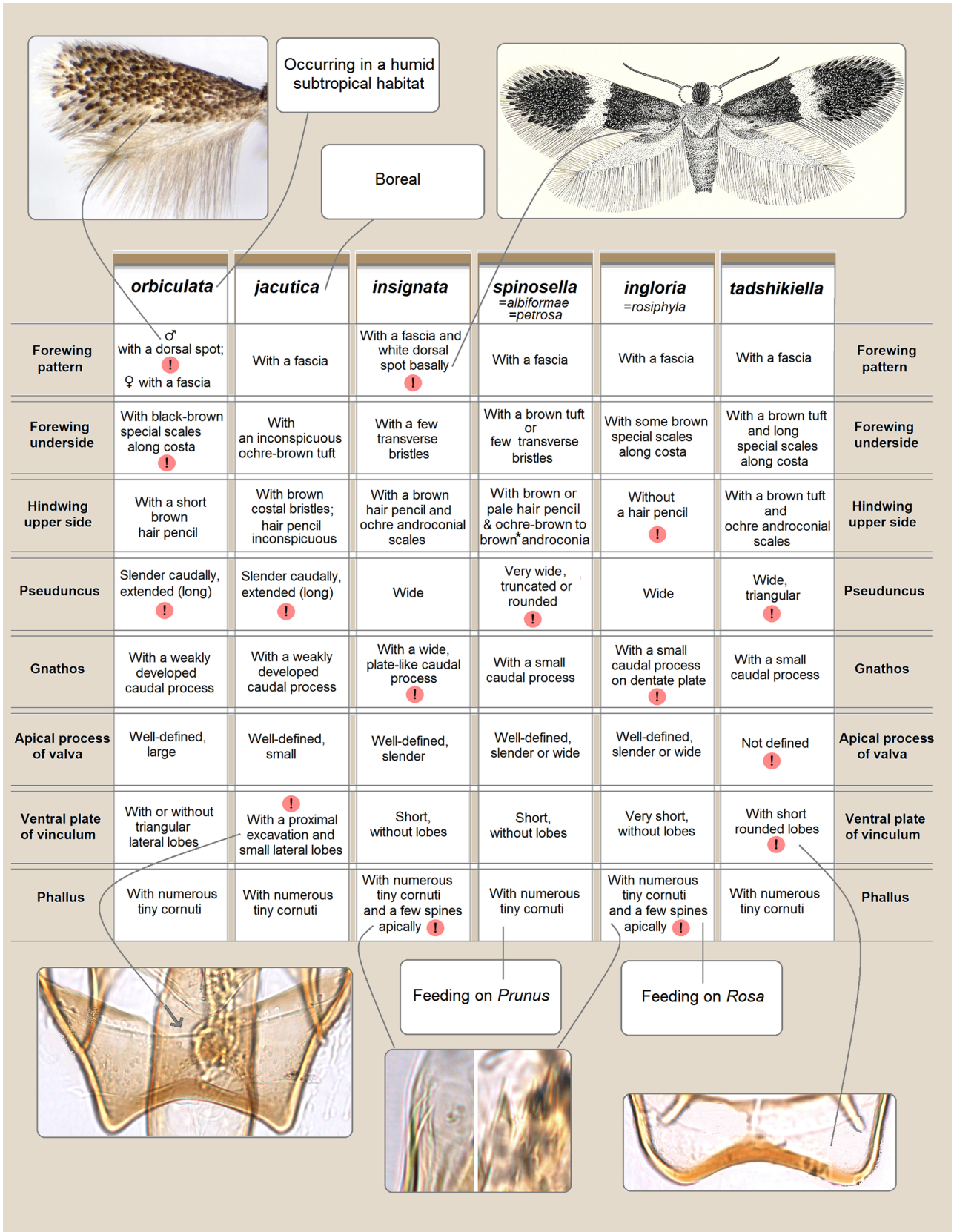


FIGURE 236. Diagnostics of species of the *Ectoedemia angulifasciella* group
*—sometimes with white or brown and white androconia

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