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Diagnostics and updated catalogue of *Acalyptris* Meyrick, the second largest genus of Nepticulidae (Lepidoptera) in the Americas

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Abstract

We list all 56 currently known *Acalyptris* Meyrick species from North and South America, designate five new species groups, and provide pictorial diagnostics for all nine revised species groups of the American fauna. We describe seven new species: *A. marmor* Stonis & Diškus, **sp. nov.**, *A. barbudo* Stonis & Remeikis, **sp. nov.**, *A. jareki* Stonis & Diškus, **sp. nov.**, *A. hilli* Stonis & Diškus, **sp. nov.**, *A. mortalis* Diškus & Stonis, **sp. nov.**, *A. hyacinthum* Stonis & Vargas, **sp. nov.**, and *A. extremus* Stonis & Diškus, **sp. nov.** We provide new data on morphology, biology or distribution for the following species: *A. murex* Diškus & Stonis, *A. hispidus* Puplesis & Robinson, *A. trifidus* Puplesis & Robinson, *A. bifidus* Puplesis & Robinson, *A. terrificus* Šimkevičiūtė & Stonis, and particularly *A. yucatani* Remeikis & Stonis. We transfer *Fomoria miranda* Diškus & Stonis to *Acalyptris* and provide the first photographic documentation of *A. novenarius* Puplesis & Robinson, *A. fortis* Puplesis & Robinson, *A. martinheringi* Puplesis & Robinson, *A. basihastatus* Puplesis & Diškus, *A. pseudohastatus* Puplesis & Diškus, *A. articulosus* Puplesis & Diškus, *A. bovicorneus* Puplesis & Diškus, and *A. insolentis* Puplesis & Diškus. We also comment on the re-deposition of some type series to the collection of the Zoological Museum of the Natural History Museum of Denmark, Copenhagen.

Key words: distribution, leaf mines, new species, pygmy moths, Neotropics, North America, South America, species groups

Introduction

Acalytris Meyrick is the second largest genus of Nepticulidae (pygmy moths) in the Americas. Its members occur in very different habitats of the Western Hemisphere, and are particularly common in lowland, tropical, or subtropical premontane habitats of the Neotropics, including the lush tropical forests of Central America, tropical slopes of the Andes, and steamy rainforests of the Amazon. General characterization of this genus was provided by several authors, notably Wilkinson & Scoble (1979), Wilkinson (1979), Scoble (1983), van Nieukerken (1986), Johansson *et al*. (1990), Puplesis (1994), Puplesis & Robinson (2000), and Puplesis & Diškus (2003). The following genitalic characters are of diagnostic importance for recognition of *Acalytris*: in the male genitalia the capsule usually posseses lateral apodemes, the phallus has large carinae, and usually with minute spine-like cornuti or none cornuti; in the female genitalia the vestibulum usually has a distinct vaginal sclerite (or sclerites and spines). *Fomoria* Beirne possesses similar genitalia, but *Acalyptris* differs from it by the venation of forewing where the closed cell is strongly shifted basally, partially or occasionally fully reduced. Below, we provide a catalogue of all 56 currently known species and their distribution, including two unnamed taxa (#32, *A.* specimen 12 and #46, *A.* species AG016) (Fig. 1), along with descriptions of seven new species, which were recently collected in various tropical habitats of Central and South America (Figs 2–11). We revise the species groups and for diagnostic purposes designate five new species groups: the *A. trifidus*, *A. bifidus*, *A. statuarius*, *A. fortis*, and *A. bovicorneus* groups.

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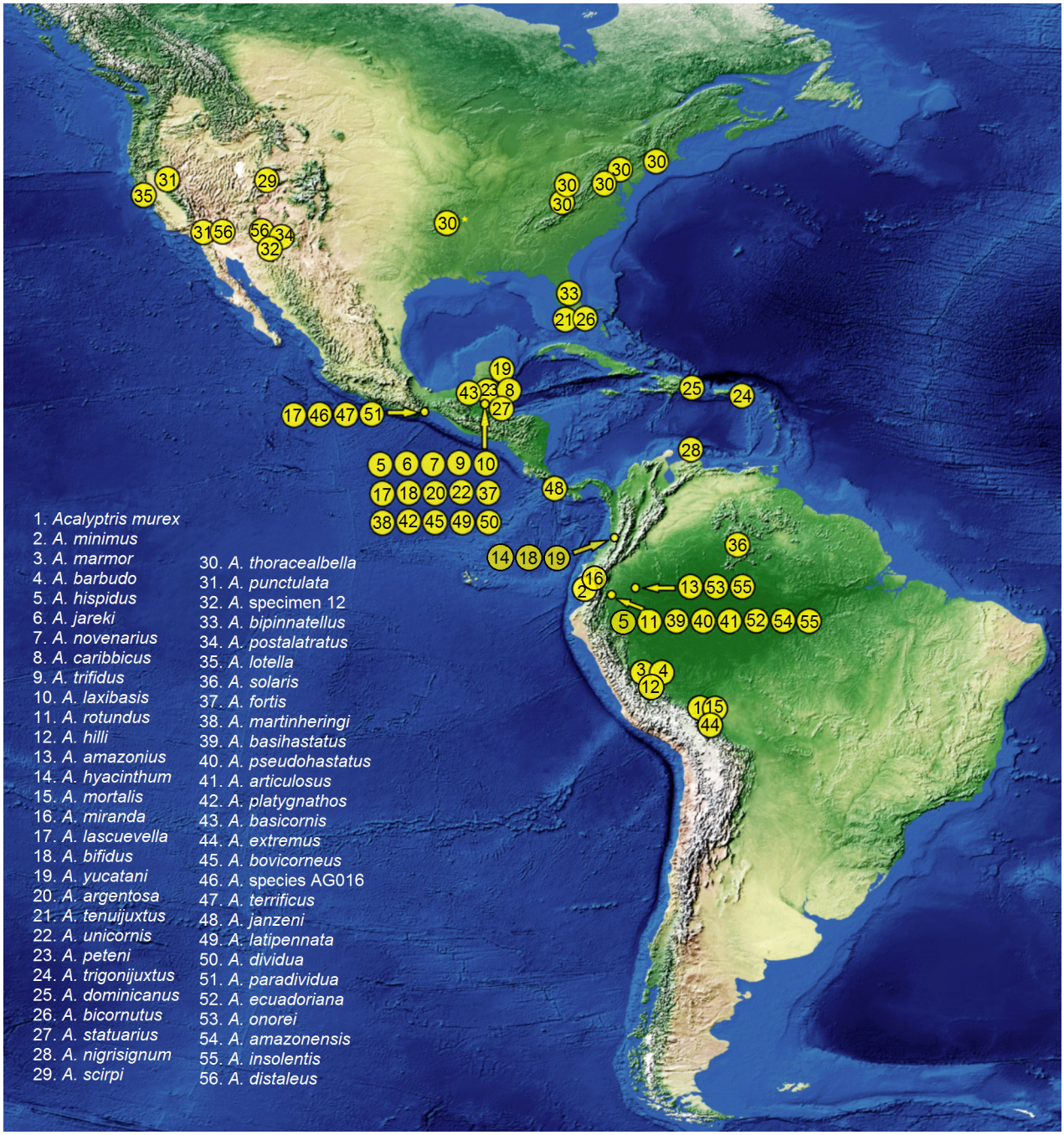


FIGURE 1. Distribution map of *Acalyptris* species currently known in the Americas.

Materials and methods

Descriptions of the new species treated in this paper are based on material deposited in the collection of the Zoological Museum, Natural History Museum of Denmark, Copenhagen (ZMUC), the Natural History Museum, London (NHMUK), and in the collection of Laboratorio de Entomología, UNESIS, Departamento de Biología, Pontificia Universidad Javeriana, Bogotá, Colombia (MPUJ). Additionally, some material of species described earlier by Puplesis and Robinson (2000) and Puplesis and Diškus (in Puplesis *et al*. 2002) was available from the Lithuanian University of Educational Sciences (LEU, formerly abbreviated as VPU), Vilnius, Lithuania and now, because the closure of LEU, this material was transferred to ZMUC.

FIGURES 2–11. Habitats of *Acalyptris* species. 2–5, habitat of *A. marmor* **sp. nov.**, *A. barbudo* **sp. nov.**, and *A. hilli* **sp. nov.**, selva central ("selva alta"), Satipo, Peru, 750 m; 6–9, habitat of *A. mortalis* **sp. nov.**, *A. extremus* **sp. nov.**, and *A. murex* Diškus & Stonis, Yungas, Coroico, Bolivia, ca. 1300 m; 10, 11, habitat of *A. hyacinthum* **sp. nov.**, *A. bifidus* Puplesis & Robinson, and *A. yucatani* Remeikis & Stonis, tropical montane forest at the edge with the Choco biogeographical province, Valle del Cauca, Colombia, 550 m.

Collecting methods and protocols for species identification and description are outlined in Puplesis & Diškus (2003) and Stonis *et al.* (2014a, 2018b). 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 30–34, 43, 44, 49–51, 57, 65, 80, 89, 138, 151–154, and 164 which were photographed using a Lomo MBS10 stereoscopic microscope and a temporarily attached Samsung Galaxy S7 cellular telephone with a camera.

Molecular methods used in this paper are described in detail in Stonis *et al*. (2019).

Diagnostics of the species groups

Species groups are informal units (Stonis *et al.* 2018b). For diagnostic purposes, species groups are widely in use, *e.g.*, in the Nepticulidae (see Stonis *et al.* 2013a, 2014b, 2016, 2017c, 2018b, Stonis & Diškus, 2018) and Elachistidae (*see* e.g. Kaila 2011, 2015, Kaila *et al*. 2015). Previously, a few species groups were designated in *Acalyptris* for taxa in the American fauna or globally (Puplesis & Diškus 2003, van Nieukerken 2007, Stonis & Remeikis 2015, van Nieukerken *et al* 2016a, Stonis *et al*. 2018a, Stonis & Diškus 2018). In this paper, we revise species groups of the American fauna and, purely for diagnostic purposes, designate five new groups. We also erect the *A. bicornutus* complex, formerly designated within the *A. peteni* group by Stonis & Remeikis (2015), and name it as the *A. statuarius* species group. We provide diagnostic notes and a pictorial key to all groups of the Americas (Fig. 12).

The *Acalyptris murex* group (designated by Stonis *et al*. 2018a: 853)
Major diagnostic characters (Fig. 12): in the male genitalia, phallus with unique ventral carinae (except for all satellite species, i.e. taxa which lack one or two major diagnostic characters); gnathos with a base (except for the satellite species: *A. novenarius* and *A. caribbicus*); valva simple, with a transtilla; in the female genitalia vaginal sclerite with spines (however, females of only a few species have been discovered and studied).

Other supportive characters: forewing speckled, often with a false fascia; androconia absent (except for two satellite species). In the male genitalia, pseuduncus always undivided, and never wide. Host-plant family is Fabaceae, however, the satellite *A. caribbicus* mines leaves of Verbenaceae. Currently, the group is comprised of four species distributed in tropical habitats of Central and South America; another four internally similar species (see the Catalogue) were treated here as satellite taxa because they lack one or two major diagnostic characters.

Remarks. The species of the *A. murex* group slightly resemble the groups known from the Old World, i.e., the *A. staticis* and *A. platani* groups. From the latter, the *A. murex* group differs in the presence of a wide outer part of signum (absent in the *A. platani* group), absence of an inner process of the valva (present in the *A. platani* group), and the presence of transtilla (absent in the *A. platani* group). From the *A. staticis* group, the *A. murex group* differs in the presence of a distinctive vaginal sclerite in the female genitalia (absent in the *A. staticis* group).

The *A. trifidus* group (designated here)
Major diagnostic characters (Fig. 12): in the male genitalia, uncus is always three-lobed or with three processes; phallus always with cornuti (sometimes aggregated into a cluster), and usually with slender lateral carinae; valva simple, with a transtilla.

Other supportive characters: forewing speckled, with a false fascia, sometimes very glossy (*A. mortalis, A. hilli, A. miranda*); androconia absent (except for *A. trifidus*). In the male genitalia, pseuduncus always undivided, often wide; gnathos with or without a base; vinculum often short, only sometimes long, but always with only a shallow posterior excavation; juxta often present. Female genitalia with a vaginal sclerite; signum usually with an indistinct or without spined outer part. Host-plant family is Fabaceae (exclusively clade Mimosoideae). Currently the group comprises 16 species distributed in Central and South America.

The *A. bifidus* group (designated here)
Major diagnostic characters (Fig. 12): in the male genitalia, pseuduncus always bilobed; juxta distinctly triangular; phallus always with small cornuti and short lateral carinae; valva simple (except *A. lascuevella* possessing a small inner process), without a transtilla.

Other supportive characters: forewing speckled, without androconia (except for the glossy *A. argentosa* pos-

sessing androconia). In the male genitalia, gnathos often with a base; vinculum very short (except for *A. argentosa*), with a shallow or deep posterior excavation. Female genitalia without a vaginal sclerite; signum without outer part. Host-plant family is Fabaceae. Currently the group comprises four species distributed in Central America and western Colombia.

The *A. peteni* group (*sensu stricto*, revised here) (= the *A. tenuijuxtus* complex *sensu* Stonis & Remeikis 2015)

Major diagnostic characters (Fig. 12): uncus always with five processes; juxta with an apical spine; phallus with two characteristic short ventral lobes and an unique, sinuous, large cornutus; valva simple, without a transtilla.

Other supportive characters: forewing speckled, sometimes with androconia (*A. peteni*, *A. dominicanus*). In the male genitalia, pseuduncus always undivided, slender; vinculum always with large lateral lobes and deep posterior excavation; phallus sometimes with tiny cornuti. Female unknown. Host-plant family is Fabaceae. Currently the group is comprised of five species, predominantly distributed in the Caribbean region and adjacent territories.

The *A. statuarius* group (designated here) (= the *A. bicornutus* complex *sensu* Stonis & Remeikis 2015)

Major diagnostic characters (Fig. 12): in the male genitalia, pseuduncus always very wide, often truncated; gnathos without a base; juxta unique, paired; phallus with complex carinae; valva simple, usually with a transtilla.

Other supportive characters: forewing speckled. In the male genitalia, vinculum with long and slender lateral lobes, and very deep posterior excavation (except for *A. nigrisignum*). Female genitalia with a vaginal sclerite and sometimes with additional brush-like structures; signum with a wide outer part, without spines, ductus spermathecae with numerous large convolutions. Host-plant family is unknown. Currently the group comprises three species distributed in the Caribbean region.

The *A. scirpi* group (designated by van Nieukerken *et al*. 2016a)

Major diagnostic characters (Fig. 12): in the male genitalia gnathos always without a base; juxta present; phallus with two large processes and a distinct cluster of small, spine-like cornuti; valva simple, usually with a transtilla. The female genitalia with unusually long posterior apophyses.

Other supportive characters: forewing speckled, sometimes dark scales form spots or false fascia (except for the very glossy satellite *A. solaris*). In the male genitalia, vinculum with large lateral lobes and very deep posterior excavation (except for *A. postalatratus*, *A. lotella*, and *A.* specimen 12). Female genitalia with vaginal spines and thickenings (instead of a distinctive vaginal sclerite); signum with many rows of cells and a slender outer part, or with one-two rows of cells and without an outer part. Host-plant families are Cyperaceae, Rhamnaceae, and Fabaceae. Currently the group is comprised of six named and one unnamed species from North America; additionally, eight species from South America *A. solaris* is treated here as a satellite taxon because of differences in forewing scaling, head morphology (see Stonis & Remeikis 2018), and the male genitalia.

The *A. fortis* group (designated here)

Major diagnostic characters (Fig. 12): in the male genitalia, juxta absent; phallus with large carinae and tiny cornuti; valva distinctly armed: with one or two large, horn-like processes, and with a transtilla.

Other supportive characters: forewing speckled, sometimes dark scales form indistinctive spots; androconia absent. In the male genitalia, pseuduncus very wide or widely bilobed; gnathos without a base; vinculum with large or small lateral lobes (except for *A. platygnathos*) and a shallow posterior excavation (except for *A. platygnathos*). Female and biology unknown. Currently the group is comprised of eight species occurring in the tropical habitats of Central and South America.

The *A. bovicorneus* group (designated here)

Major diagnostic characters (Fig. 12): in the male genitalia, phallus with two extraordinary large processes; valva simple, without a transtilla.

Other supportive characters: forewing speckled, sometimes dark. In the male genitalia, pseuduncus varies from wide, truncated to triangular or slightly bilobed; gnathos with or without a base; vinculum with large lateral lobes (except for *A. terrificus*). Female genitalia with a vaginal sclerite; signum with a slender row of cells and a wide, spined outer part. Host-plant family is unknown. Currently the group is comprised of three named and one unnamed species from Central America.

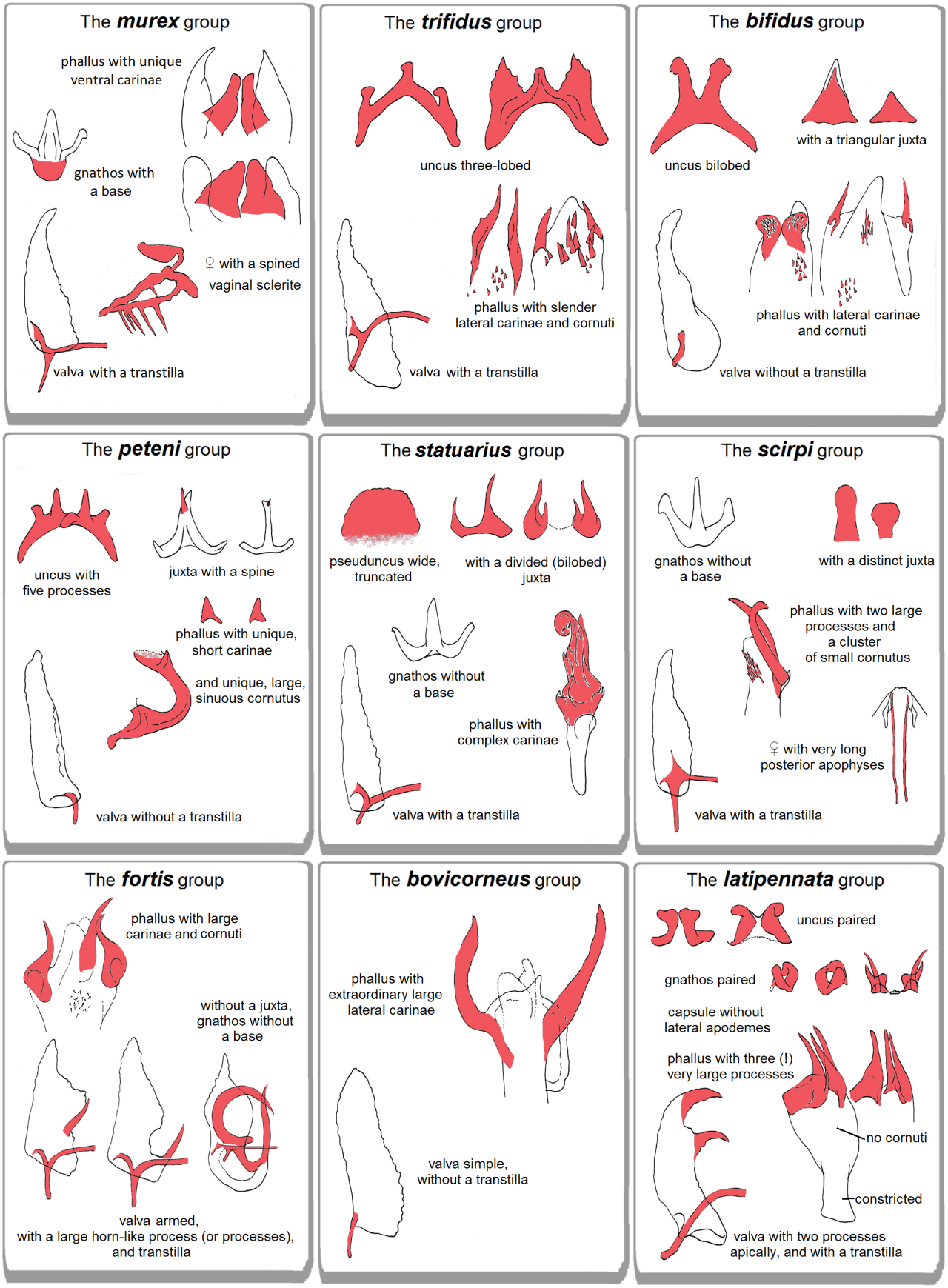


FIGURE 12. Diagnostics of the species groups of *Acalyptris* occurring in the Americas.

The *A. latipennata* group (designated by Puplesis *et al.* 2002b)

Major diagnostic characters (Fig. 12): in the male genitalia, genital capsule without lateral apodemes; uncus always distinctly paired; gnathos paired (except for *A. latipennata*); juxta absent; phallus always with three large processes, and with no cornuti; valva distinctly armed: with two large, horn-like processes apically (except for *A. ecuadoriana* and *A. insolentis*), and with a transtilla.

Other supportive characters: forewing usually wide, with a distinct postmedian fascia, shiny in *A. amazonensis*. In the male genitalia, pseuduncus triangular (except for *A. onorei* and *A. amazonensis* possessing slightly or distictly divided pseuduncus); vinculum very large, with or without a very shallow posterior excavation; juxta present. Female unknown. The host-plant family is Rubiaceae, however, known only for a single species, *A. amazonensis*. Currently the group comprises seven species occurring exclusively in the tropical habitats of Central America and the Amazon

Remark. The group was recently discussed in detail by Stonis & Diškus (2018).

Updated illustrated catalogue of the American *Acalyptris*, with description of new species

Genus *Acalyptris* Meyrick, 1921

Acalyptris Meyrick, 1921: 410.

Type species: *Acalyptris psammophricta* Meyrick, 1921: 410.

Microcalyptris Braun, 1925: 224.

Type species: *Microcalyptris scirpi* Braun, 1925: 225 (syn. by van Nieukerken 1986: 14).

Weberia Müller-Rutz, 1934: 122; homonym.

Type species: *Weberia platani* Müller-Rutz, 1934: 122–123 (syn. by van Nieukerken 1986: 14).

Niepeltia Strand, 1934: 241. (syn. by van Nieukerken 1986: 14)

Replacement name for *Weberia* Müller-Rutz nec Robineau-Desvoidy, 1830 (Diptera: Tachinidae).

Weberina Müller-Rutz, 1934: 148.

Replacement name for *Weberia* Müller-Rutz. (syn. by van Nieukerken 1986: 14).

The *murex* group (designated by Stonis *et al*. 2018a: 853)

1. ***Acalyptris murex*** Diškus & Stonis, 2017 (Figs 13–23)

Acalyptris murex Diškus & Stonis, in Stonis *et al*. 2017a : 58–60.

Acalyptris murex Diškus & Stonis, in Stonis *et al*. 2018a: 846, 847.

Host plant. *Collaea speciosa* (Loisel.) DC. (Fabaceae: Faboideae).

Distribution. Bolivia (Yungas: Coroico).

DNA barcode. We barcoded one female specimen of the species; the sequence is available at GenBank under voucher/sample ID MN982360.

2. *Acalyptris minimus* Diškus & Stonis, 2018

Acalyptris minimus Diškus & Stonis, in Stonis *et al*. 2018a: 844–849.

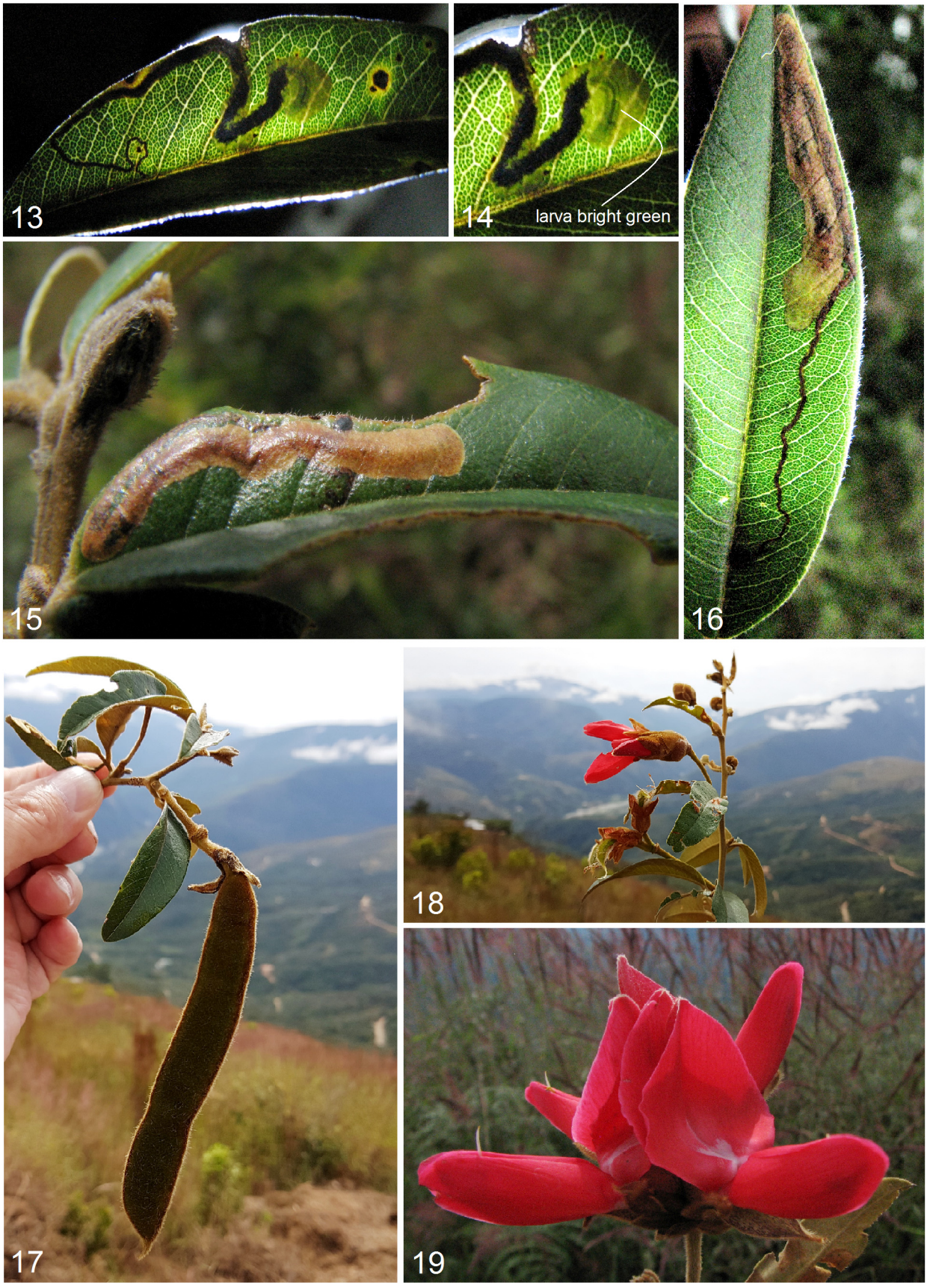
Host plant. *Centrolobium ochroxylum* Rudd (Fabaceae: Faboideae).

Distribution. Ecuador (tropical western slopes of the Andes: Bucay).

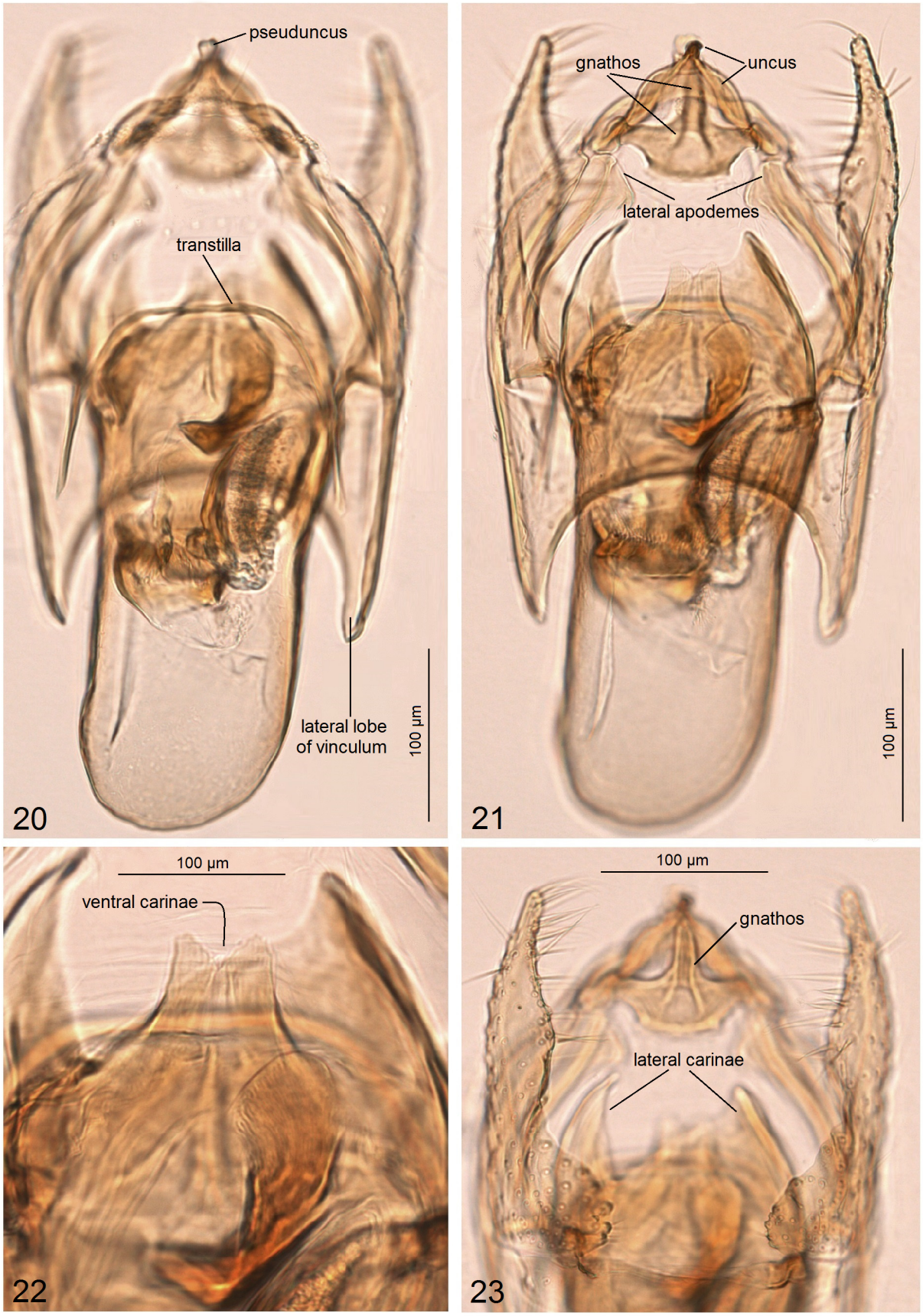
DNA barcode. We barcoded one male paratype of the species; the sequence is available in GenBank under voucher/sample ID MN982366.

3. *Acalyptris marmor* Stonis & Diškus, **sp. nov.** (Figs 24–29)

Diagnosis. External characters of *A. marmor* are not always sufficient for species identification, however, the new species differs from most Neotropical *Acalyptris* by the densely speckled, grey-brown forewing (Figs 24, 25). In the male genitalia, the uniquely-shaped carinae of the phallus easily distinguishes *A. marmor* from all known *Acalyptris* species.



FIGURES 13–19. Bionomics of *Acalyptris murex* Diškus & Stonis, 2017. 13–16, leaf mines; 17–19, host plant *Collaea speciosa* (Loisel.) DC., Fabaceae (Faboideae), Bolivia (Yungas: Coroico).



FIGURES 20–23. Male genitalia of *Acalyptris murex* Diškus & Stonis, 2017, genitalia slide no. AD947 (not type) (ZMUC). 20, 21, general view; 22, apical part of phallus with ventral carinae; 23, valvae.

Description. Male (Figs 24, 25). Forewing length 2.5 mm; wingspan 5.5 mm (n = 1).

Head. Scape yellowish cream with some pale ochreous scales; frontal tuft pale orange; collar comprised of greyish orange piliform scales; antenna slightly shorter than one-half length of forewing; flagellum dark grey-brown on upper side, brownish cream on underside, with 34 segments.

Thorax. Tegula, thorax, and forewing densely speckled with dark grey-brown and black-brown scales with some blue and purple iridescence; fringe grey, without fringe line; forewing underside blackish brown, without spots or androconia. Hindwing and fringe grey to dark grey on upper side and underside, without androconia. Legs silvery glossy, ochre cream, with black-brown scales on upper side.

Abdomen. Blackish grey with some purple iridescence on upper side, glossy, metallic grey on underside; anal tufts short, dark grey; genital plates brownish cream. Genitalia (Figs 26–29) with capsule about 330 µm long, 200 µm wide. Phallus about 215 µm long, with unique, wide ventral carinae (Figs 28, 29).

Female. Unknown.

Bionomics. Host plant is unknown. Adults fly in May (one specimen was attracted to light). Otherwise, biology is unknown.

Distribution (Fig. 1). Currently known from a single locality in Peru, Departamento de Junín: Selva Central, Satipo, at an altitude about 750 m (Figs 2–5).

Etymology. The species name derived from the Latin *marmor* (marble, stone), in reference to the dark grey-brown speckled forewing of the new species.

Type material. Holotype: ♂, PERÚ, Junín Region, Satipo, 11°15'30"S, 74°37'56"W, 750 m, at light, 13–15.v.2018, leg. J. R. Stonis & S. R. Hill, genitalia slide no. AD950 (ZMUC).

4. ***Acalyptris barbudo*** Stonis & Remeikis, **sp. nov.** (Figs 30–37)

Diagnosis. Externally, the new species is distinguishable from all other *Acalyptris* by the large grey-brown basal spot of the forewing (Fig. 31) and tufts of rising, piliform androconia (see Fig. 32) of the abdomen. In the male genitalia, the combination of short lateral lobes of vinculum, rounded pseuduncus, and phallus with unique carinae and lateral spines (Figs 36, 37) distinguishes *A. barbudo* from all known *Acalyptris* species.

Description. Male (Figs 30–34). Forewing length 2.2 mm; wingspan 5.1 mm (n = 1).

Head. Labial palpus cream; scape cream; frontal tuft white; collar comprised of white piliform scales; antenna longer than one-half length of forewing; flagellum glossy, ochre cream or grey (depending on angle of view), with about 34 segments.

Thorax. Tegula cream to whitish cream; thorax whitish cream only proximally, anteriorly grey-brown, colorous with basal spot of forewing; Forewing whitish cream with silvery gloss, sparsely speckled with grey-brown scales and with a large grey-brown spot basally (Fig. 30); fringe cream, without fringe line; forewing underside dark brown, except small, cream spot basally; no androconia. Hindwing and fringe white or grey (depending on angle of view), on underside, cream. Legs glossy, golden cream, with some black-brown scales on upper side.

Abdomen. With six tufts of cream, piliform androconia on upper side; scaling black-brown on upper side, distally grey cream, brownish cream on underside. Genitalia (Figs 35–37) with capsule about 325 µm long, 205 µm wide. Phallus about 255 µm long, with unique ventral carinae and spines laterally (Fig. 37).

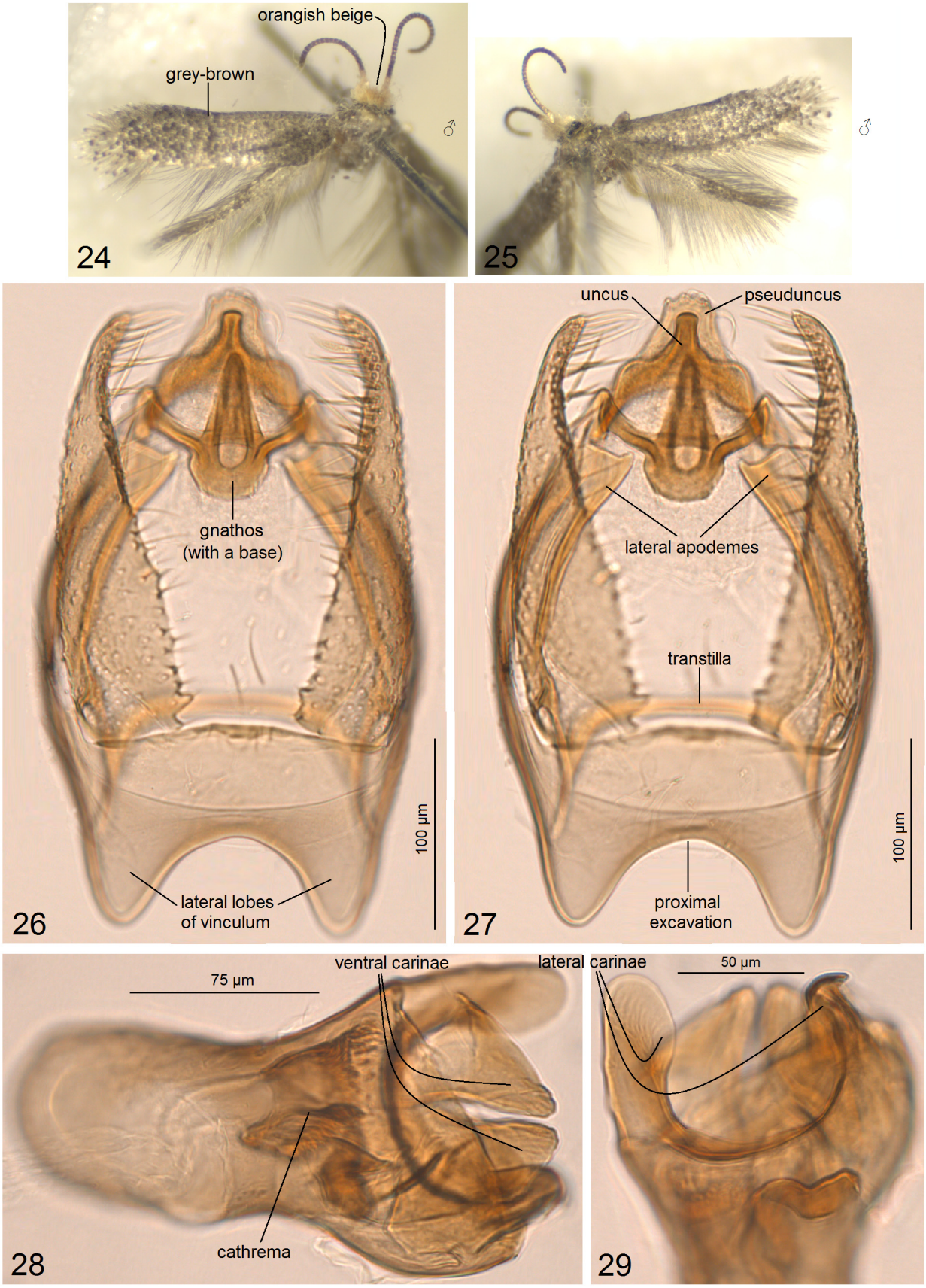
Female. Unknown.

Bionomics. Host plant is unknown. Adults fly in May (one specimen was attracted to light). Otherwise, biology is unknown.

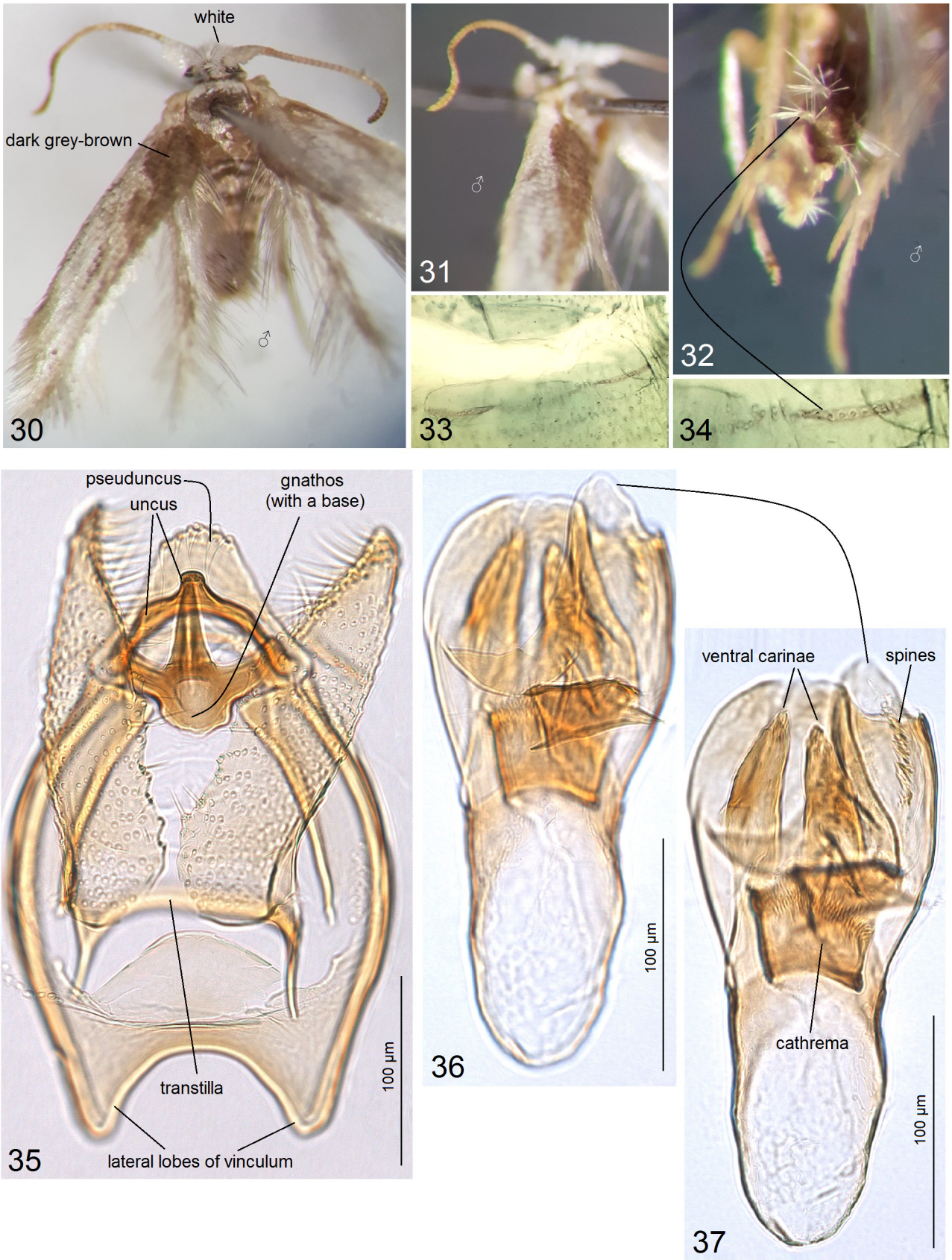
Distribution (Fig. 1). Currently known from a single locality in Peru, Departamento de Junín: Selva Central, Satipo, at altitude about 750 m (Figs 2–5).

Etymology. The species name derived from the Spanish *barbudo* (bearded), in reference to the unique, rising androconia of the abdomen.

Type material. Holotype: ♂, PERÚ, Junín Region, Satipo, 11°15'30"S, 74°37'56"W, 750 m, at light, 13–15.v.2018, leg. J. R. Stonis & S. R. Hill, genitalia slide RA1005 (ZMUC).



FIGURES 24–29. *Acalyptris marmor* Stonis & Diškus, **sp. nov.**, holotype (ZMUC). 24, 25, male adult; 26, 27, male genitalia, slide no. AD950, capsule; 28, 29, same, phallus.



FIGURES 30–37. *Acalyptris barbudo* Stonis & Remeikis, **sp. nov.**, holotype (ZMUC). 30, 31, male adult; 32, same, abdomen; 33, 34, dorsal fragment of macerated abdomen, slide no. RA1005; 35, male genitalia, slide no. RA1005, capsule; 36, 37, same, phallus.

Satellite species close to the *murex* group

5. *Acalyptris hispidus* Puplesis & Robinson, 2000
Acalyptris hispidus Puplesis & Robinson 2000: 48.

Host plant. Unknown.

Distribution. Belize: Chiquibul Forest: Las Cuevas Biological Station (Puplesis & Robinson 2000); Ecuador: Oriente / Región amazónica: Misahualli (**new distribution**).

Material examined. 1 ♂, ECUADOR, Napo Region, near Rio Napo, Misahualli, premontane rainforest, 400–500 m, 8.ii.2007, leg. V. Sruoga, J. R. Stonis & S. R. Hill (ZMUC).

6. *Acalyptris jareki* Stonis & Diškus, **sp. nov.** (Figs 38–42)
Acalyptris species 29135, in Puplesis & Robinson 2000: 53–54.

Diagnosis. The new species is distinguishable from all other Neotropical *Acalyptris* by the combination of a densely speckled thorax and forewing (Fig. 38), wide, truncated pseuduncus (Fig. 41), and unique, spine-like carinae of phallus (Figs 39, 40).

Description. Male (Fig. 38). Forewing length about 2.3 mm; wingspan 5.1 mm (n = 1). For full description see Puplesis & Robinson 2000: 53.

Abdomen. Male genitalia (Figs 39–42) with capsule much longer (ca 380 μm) than wide (ca 245 μm). Pseuduncus large, truncated. Valva simple, with a transtilla. Phallus (Figs 39, 40) about 390 μm long; maximal width at apex 75 μm, without unique carinae, without cornuti.

Female. Unknown.

Bionomics. Host plant is unknown. Adults fly in April (single male was attracted to a light trap). Otherwise, biology is unknown.

Distribution (Fig. 1). This species occurs in Chiquibul Forest Reserve in Belize.

Etymology. The species is named after Jarek Jagela (Vilnius, Lithuania), with our compassion for his uncurable illness.

Type material. Holotype: ♂, BELIZE, Cayo District, Chiquibul Forest Reserve, Las Cuevas Biological Station, 3–16.iv.1998, leg. R. Puplesis & S. R. Hill, genitalia slide no. 29135 (NHMUK)

7. *Acalyptris novenarius* Puplesis & Robinson, 2000 (Figs 43–48)
Acalyptris novenarius Puplesis & Robinson 2000: 48–49.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

Remark. Two paratypes formerly deposited at LEU are transferred to ZMUC: 2 ♂ (paratypes), Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, at light, 3–16.iv.1998, R. Puplesis and S. Hill, genitalia slide no. AD0301 (ZMUC).

8. *Acalyptris caribbicus* Diškus & Stonis, 2013
Acalyptris caribbicus Diškus & Stonis, in Stonis *et al*. 2013b: 106–109.

Host plant. *Lantana involucrata* L. (Verbenaceae).

Distribution. Belize (Caribbean Archipelago: Ambergris Cay).

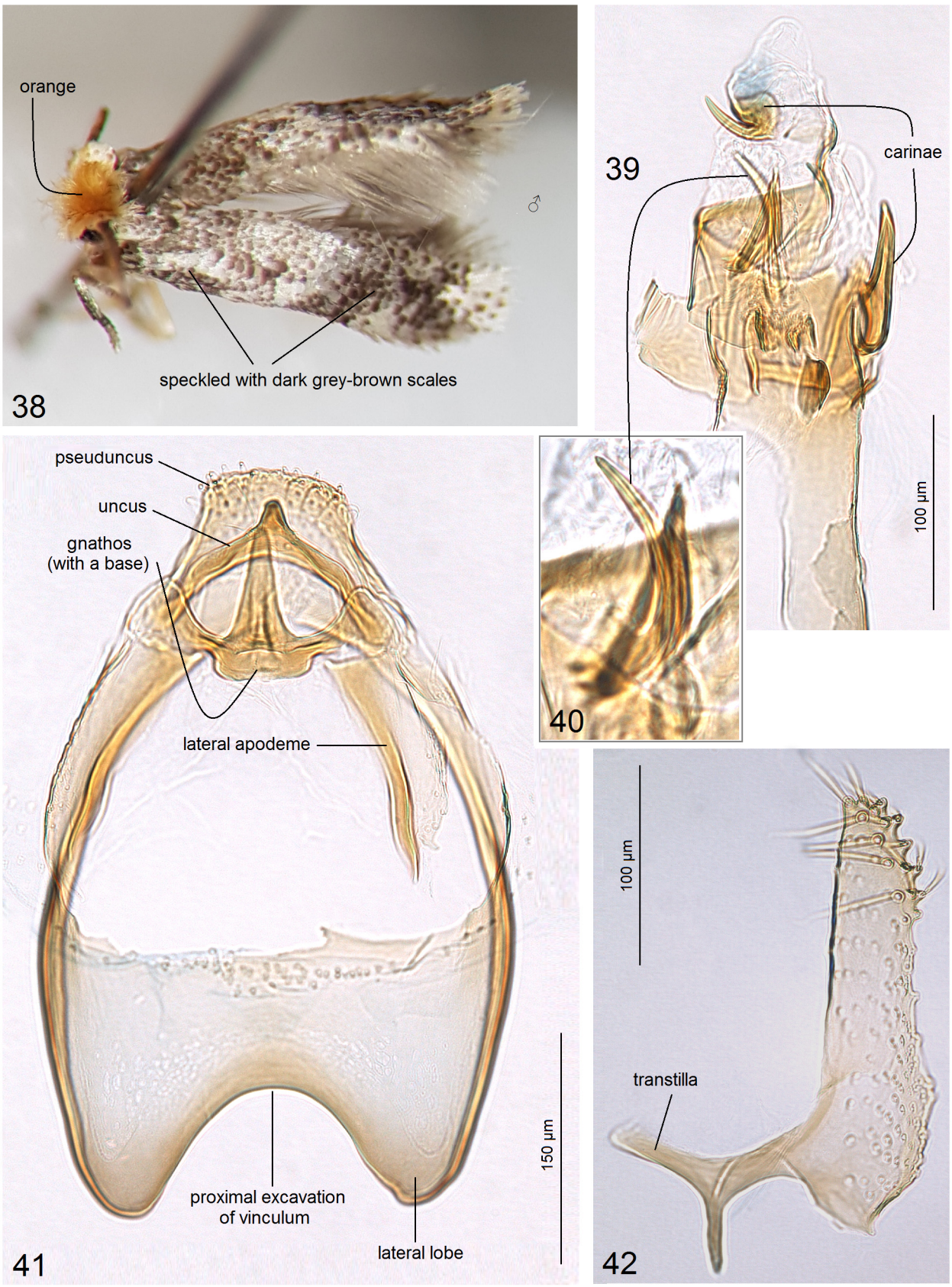
The *trifidus* group (new, designated above)

9. *Acalyptris trifidus* Puplesis & Robinson, 2000 (Figs 49–64)
Acalyptris trifidus Puplesis & Robinson 2000: 50–51.
Acalyptris species 29140 Puplesis & Robinson 2000: 55–56 (**new attributed female**) (Figs 57, 62 – 64)

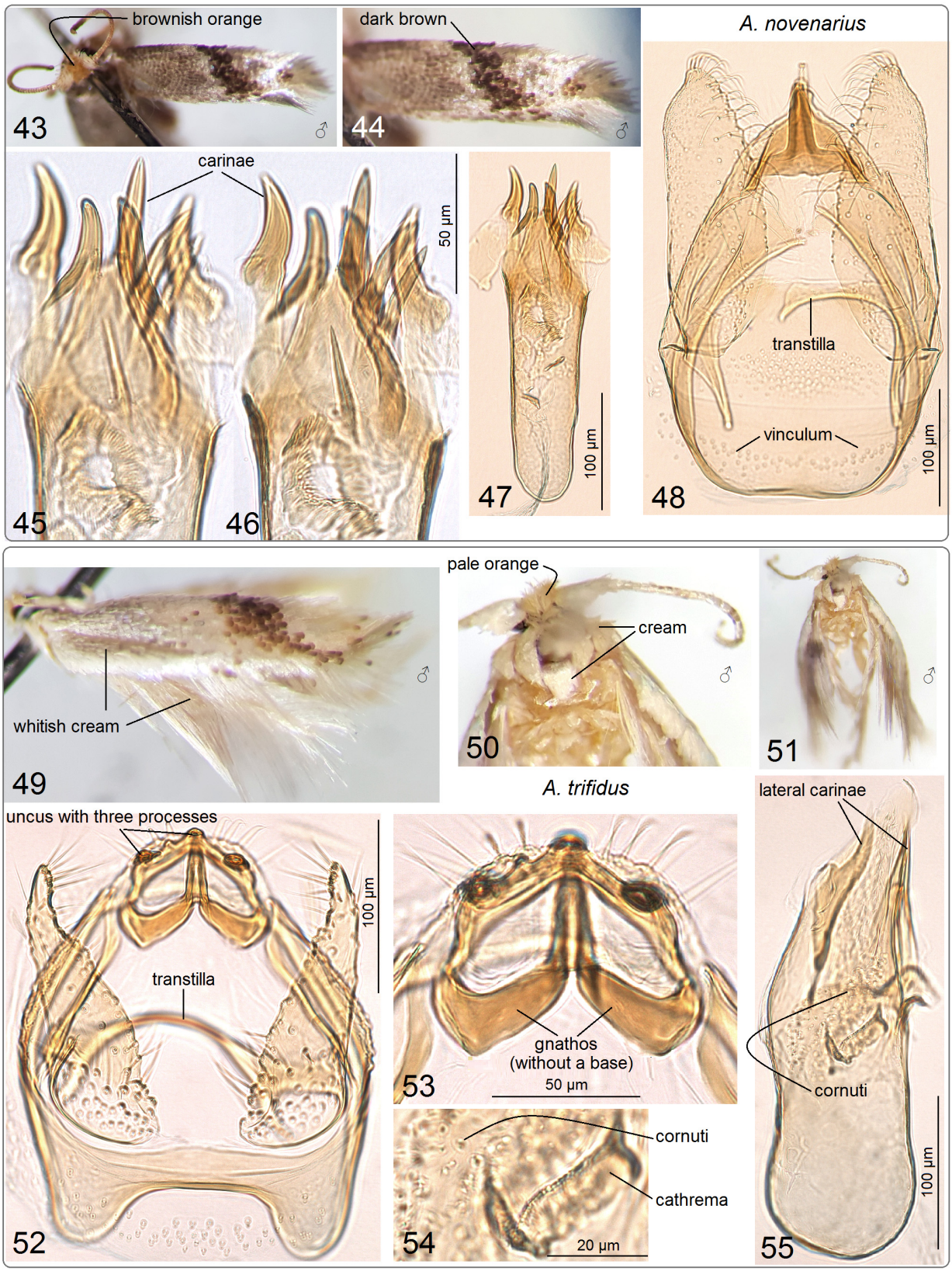
Host plant. *Lonchocarpus lineatus* Pittier (Fabaceae: Faboideae).

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

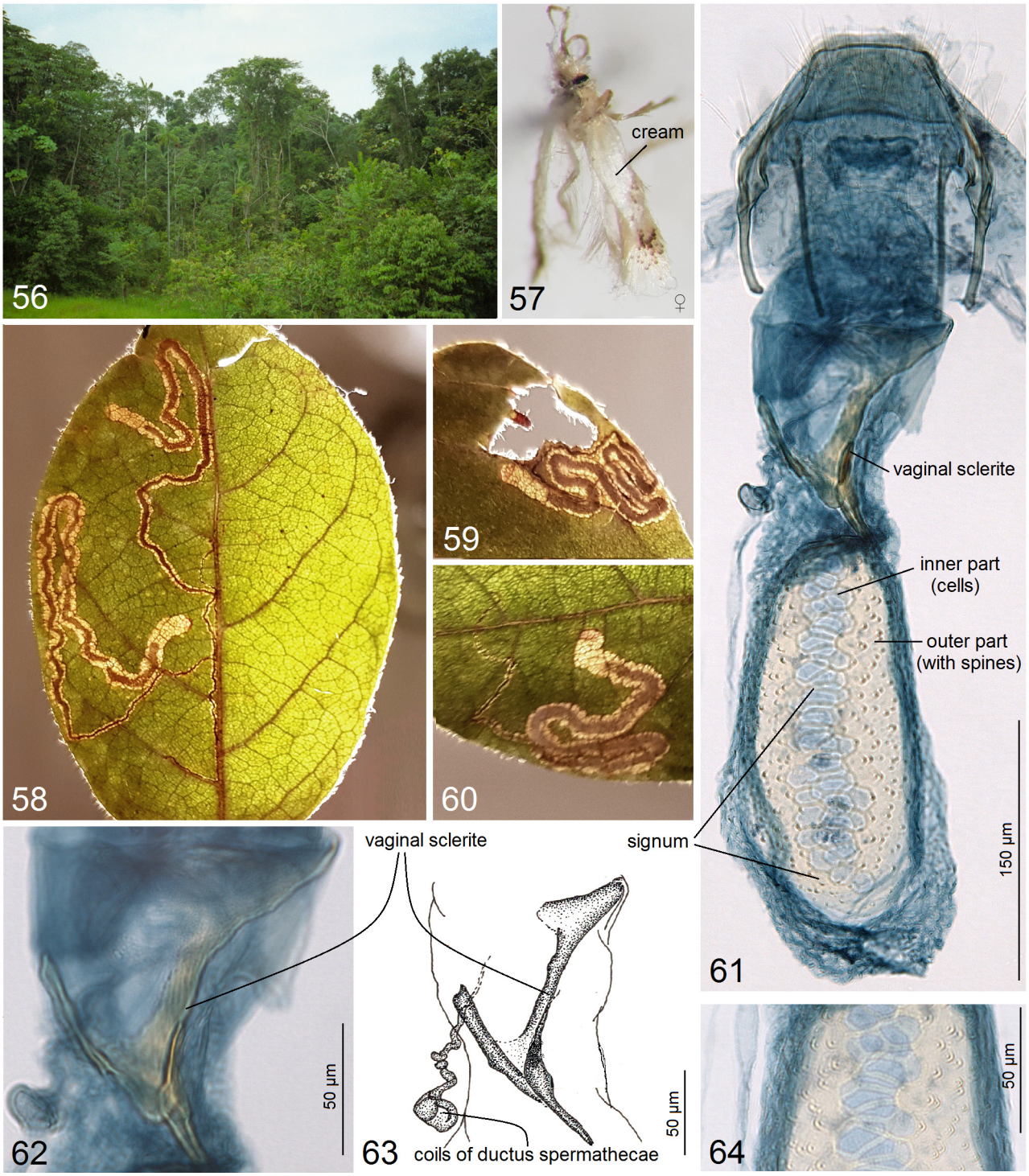
Remark. Three paratypes formerly deposited at LEU are transferred to ZMUC: 2 ♂ , 1 ♀ (paratypes), Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, 3–16.iv.1998, R. Puplesis and S. Hill, genitalia slide nos. AD0310♂, AD0312♀, AD953♂ (ZMUC).



FIGURES 38–42. *Acalyptris jareki* Stonis & Diškus, **sp. nov.**, holotype (NHMUK). 38, male adult; 39, 40, male genitalia, slide no. 29135, phallus; 41, same, capsule without valvae; 42, same, valva and transtilla.



FIGURES 43–55. *Acalyptris* spp. 43, 44, *A. novenarius* Puplesis & Robinson, 2000, male adult, paratype, Belize, Las Cuevas (ZMUC) (**first photographic documentation**); 45–47, male genitalia, slide no. AD0301, paratype, phallus (ZMUC); 48, same, capsule; 49–51, *A. trifidus* Puplesis & Robinson, 2000, male adult, paratype, Belize, Las Cuevas (ZMUC) (**first photographic documentation**); 52, male genitalia, slide no. AD0310, paratype, capsule (ZMUC); 53, same, pseuduncus, uncus and gnathos; 54, 55, same, phallus.



FIGURES 56–64. *Acalyptris trifidus* Puplesis & Robinson, 2000. 56, type locality, Chiquibul Forest Reserve, Belize; 57, female adult (**newly attributed female**; formerly documented as species 29140 by Puplesis & Robinson 2000: 55–56); 58–60, leaf mines on *Lonchocarpus lineatus* Pittier (Fabaceae: Faboideae) (**new biology**); 62, 63, female genitalia, slide no. AD0312, vaginal sclerite (ZMUC); 63, same, general view; 64, same, fragment of signum.

10. *Acalyptris laxibasis* Puplesis & Robinson, 2000

Acalyptris laxibasis Puplesis & Robinson 2000: 52–53.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

11. ***Acalyptris rotundus*** Puplesis & Diškus, 2002

Acalyptris rotundus Puplesis & Diškus, in Puplesis *et al.* 2002a: 31–32.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Jatun Sacha).

12. ***Acalyptris hilli*** Stonis & Diškus, **sp. nov.** (Figs 65–77)

Diagnosis. External characters of *A. hilli* are not always sufficient for species identification, however, the new species differs from the most Neotropical *Acalyptris* by the silvery glossy forewing with strong purple iridescence and black postmedian fascia (Figs 65–67). In the male genitalia, the presence of large cornuti in the phallus, uniquely-shaped uncus (Fig. 77), large, bilobed juxta (Fig. 69), and extremely short vinculum (Fig. 69) easily distinguishes *A. hilli* from all known *Acalyptris* species.

Description. Male (Figs 65–67). Forewing length 2.2 mm; wingspan 4.9 mm (n = 1).

Head. Scape cream with some pale ochre scales; frontal tuft dark ochre; collar small, comprised of brownish cream piliform scales; antenna distinctly shorter than one-half length of forewing; flagellum dark grey-brown on upper side and underside, with some golden gloss and purple iridescence, with about 30 segments.

Thorax. Tegula and thorax dark grey, glossy, with some blue and purple iridescence; forewing pale grey with strong purple iridescence, some yellowish cream tint along costal margin, distinctive, oblique, postmedian fascia comprised of brown-black or black scales and some black scales apically (Fig. 65); fringe silvery shiny, pale grey (or grey on tornus), without fringe line; forewing underside grey-brown, with some purple iridescence, without androconia or spots, except a small, elongated scaless spot at the base. Hindwing and fringe dark grey-brown on upper side and underside, with slight purple iridescence, without spots or androconia. Legs glossy, dark grey-brown on upper side, brownish cream on underside.

Abdomen. Black with purple iridescence on upper side, glossy cream on underside; anal tufts distinctive, brown-grey or pale brown; genital plates brownish cream. Genitalia (Figs 68–77) with capsule about 235 µm long, 210 µm wide. Pseuduncus with two wide lobes (Fig. 75). Uncus three-lobed (Figs 76, 77). Phallus about 280 µm long, with horn-like carinae and spine-like cornuti (Figs 70–72).

Female. Unknown.

Bionomics. Host plant is unknown. Adults fly in May (one specimen was attracted at light). Otherwise, biology is unknown.

Distribution (Fig. 1). Currently known from a single locality in Peru, Departamento de Junín: Selva Central, Satipo (Figs 2–5).

Etymology. The species is named in honour of Simon R. Hill (London, U.K.), a passionate collector and friend.

Type material. Holotype: ♂, PERÚ: Junín Region, Satipo, 11°15'30"S, 74°37'56"W, elevation 1660 m, at light, 13–15.v.2018, J. R. Stonis & S. Hill, genitalia slide no. AD951 (ZMUC).

13. ***Acalyptris amazonius*** Puplesis & Diškus, 2002

Acalyptris amazonius Puplesis & Diškus, in Puplesis *et al.* 2002a: 32–33.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Yasuni NP).

Remark. One non-type series specimen formerly deposited at LEU is transferred to ZMUC: 1 ♀, Ecuador, Napo Region, SE of Coca, near Rio Tiputini, Yasuni National Park, 260 m, 15–25.i.2000, R. Puplesis and S. Hill, genitalia slide no. AD0330 (ZMUC).

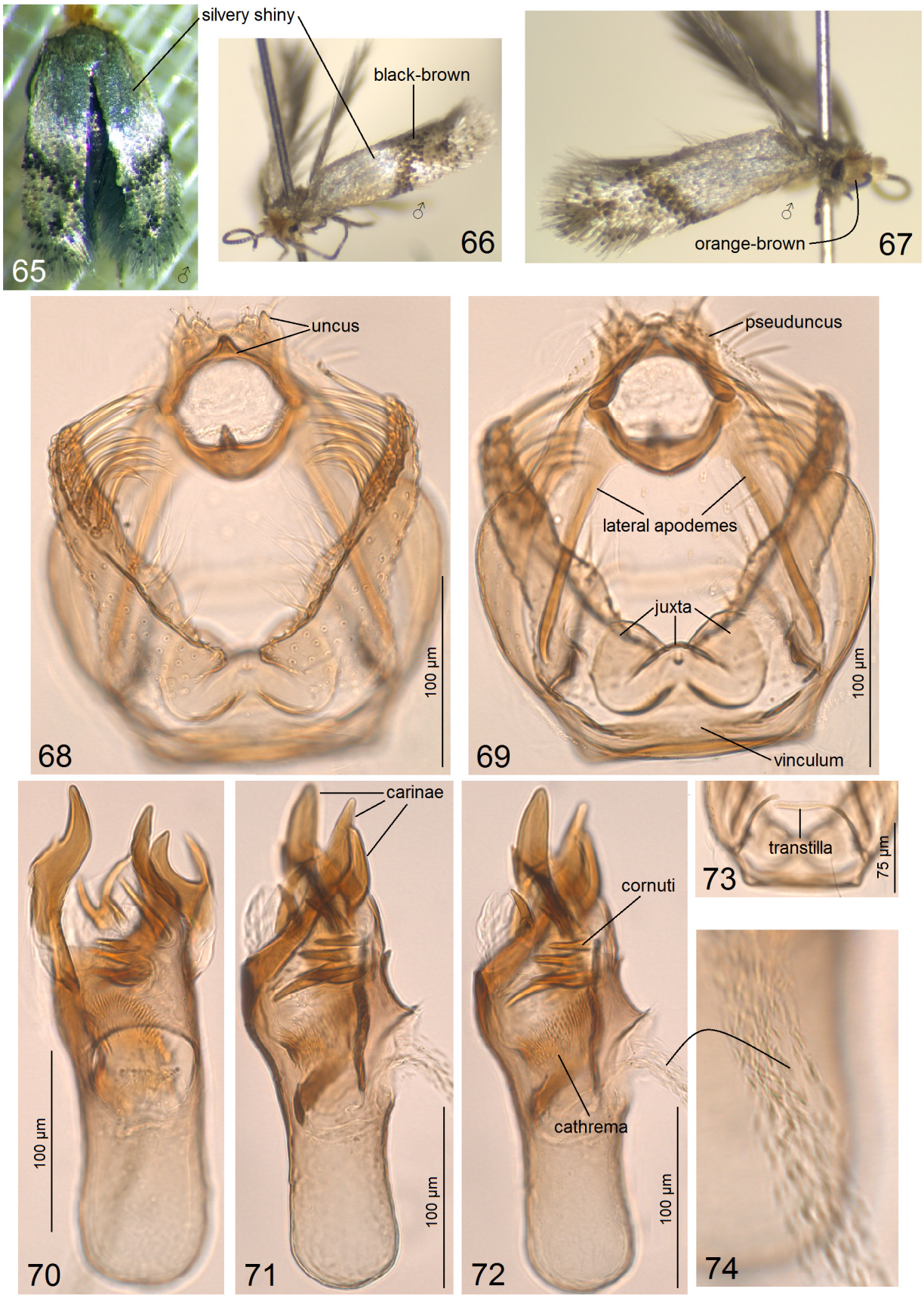
14. ***Acalyptris hyacinthum*** Stonis & Vargas, **sp. nov.** (Figs 78–83)

Diagnosis. Externally, adults of the new species are distinguishable from all other Neotropical Nepticulidae, including the congeneric *Acalyptris*, by a strong blue iridescence of the forewing, also thorax and scape. In the female genitalia, the unique vaginal sclerites, including two rows of large spines are hypothesized to be unique to this species.

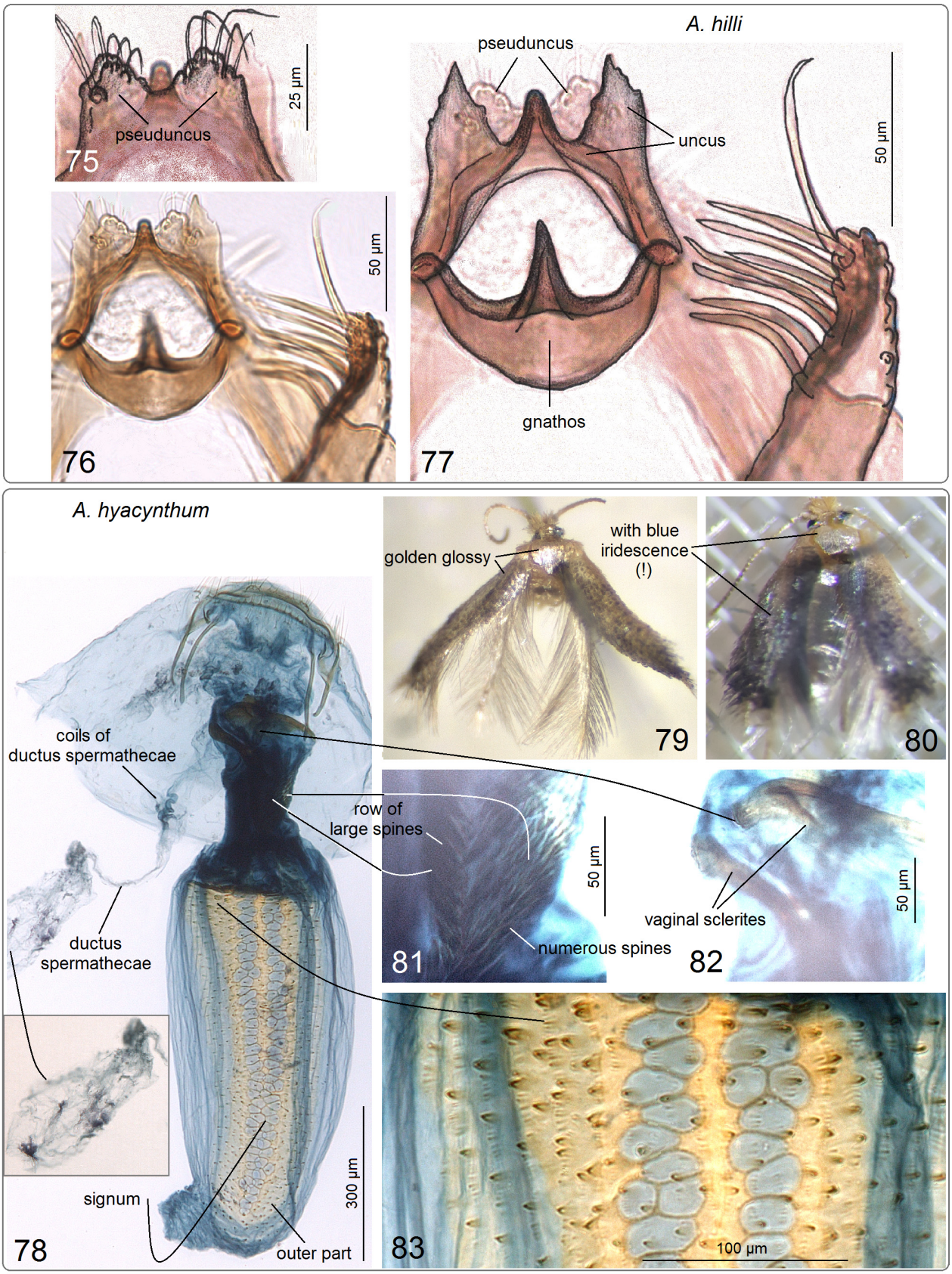
Description. Male. Unknown.

Female (Figs 79, 80). Forewing length about 1.7 mm; wingspan about 3.8 mm (n = 1).

Head: Frontal tuft orangish ochre; collar comprised of piliform, cream scales; scape golden glossy, laterally with blue and purple iridescence; antenna shorter than the length of forewing; flagellum golden glossy.



FIGURES 65–74. *Acalyptris hilli* Stonis & Diškus, **sp. nov.**, holotype (ZMUC). 65–67, male adult; 68, 69, 73, male genitalia, slide no. AD951, capsule; 70–74, same, phallus.



FIGURES 75–83. New species of *Acalyptris*. 75–77 *A. hilli* Stonis & Diškus, **sp. nov.**, holotype, pseuduncus, uncus and gnathos, genitalia slide no. AD951 (ZMUC); 78, *A. hyacinthum* Stonis & Vargas, **sp. nov.**, female genitalia, holotype, slide no. RA1023 (MPUJ); 79, 80, same, female adult, holotype (MPUJ); 81–83, same, details of female genitalia, slide no. RA1023 (MPUJ).

Thorax: Tegula golden glossy; thorax golden glossy with blue iridenscence, distally densely covered with dark brown scales; forewing with strong blue iridescence, speckled with blackish brown scales, entirely golden glossy basally; fringe brownish cream, without a fringe line; on underside, forewing pale grey-brown with purple and blue iridescence. Hindwing glossy, greyish cream, with blue iridescence. Legs brownish cream.

Abdomen: Ochre-brown with strong golden gloss on upper side, golden cream on underside; no anal tufts, genital segments golden cream. Genitalia (Figs 78–83) total length about 1290 μm. Vestibulum with vaginal sclerites (Figs 78, 82) and numerous large spines (Fig. 81). Signa spined (Fig. 83). Abdominal apex widely rounded.

Bionomics. Host plant is unknown. Adults fly in late February (single female was attracted to a light trap). Otherwise, biology is unknown.

Distribution (Fig. 1). This species occurs at altitude about 550 m on the western slopes of the Andes (western Colombia), bordering with the lowland Choco province: Valle del Cauca, El Naranjo (Figs 10, 11).

DNA barcode. We barcoded the female holotype of the new species; the sequence is available at GenBank under voucher/sample ID MN982364.

Etymology. The species name is derived from the Latin *hyacinthum* (blue), in reference to the particularly strong blue iridescence of the adult.

Type material. Holotype: ♀, COLOMBIA, Departamento de Valle del Cauca, Municipio de Dagua, El Naranjo, 550 m, at light, 3°47'2"N, 76°43'14"W, 21–23.ii.2019, leg. J. R. Stonis & S. A. Vargas, genitalia slide no. RA1023 (MPUJ).

15. ***Acalyptris mortalis*** Diškus & Stonis, **sp. nov.** (Figs 84–106)

Diagnosis. Externally, the new species can be distinguished from all other Neotropical *Acalyptris* by the sliver glossy forewing with black postmedian fascia (Figs 90–92). In the male genitalia, the unique, small uncus and inverted V-shaped gnathos distinguish *A. mortalis* from all known congeneric species. This species is also distinctive because no other species in this genus is known to feed on *Inga saltensis*.

Description. Male (Figs 90–92). Forewing length 1.6–1.8 mm; wingspan 3.6–4.1 mm (n = 2).

Head. Scape golden cream, distally grey or pale brown; frontal tuft pale ochre orange; collar comprised of brownish cream piliform scales; antenna one-half length of forewing; flagellum grey-black on upper side, grey-brown on underside, with 23 segments.

Thorax. Tegula and thorax grey-black to black, with some purple iridenscence; forewing silvery glossy with blue and purple iridescence, and wide postmedian facia of brown-black or black scales with some purple iridescence; fringe grey, at tip cream, without fringe line; forewing underside grey-black, without androconia or spots, except for an elongated, scaless basal spot along costal margin. Hindwing and fringe grey to dark grey on upper side and underside, with some purple iridescence, without androconia. Legs black on upper side, dark grey with silvery gloss on underside, distally brownish cream.

Abdomen. Abdomen black with some purple iridescence on upper side, dark grey, silvery shiny on underside; anal tufts distinctive, black-grey; genital plates brownish cream, contrasting with the abdominal colour. Genitalia (Figs 93–102) with capsule about 250–265 μm long, 155–170 μm wide. Phallus about 240–260 μm long, with numerous large cornuti (Figs 97–102).

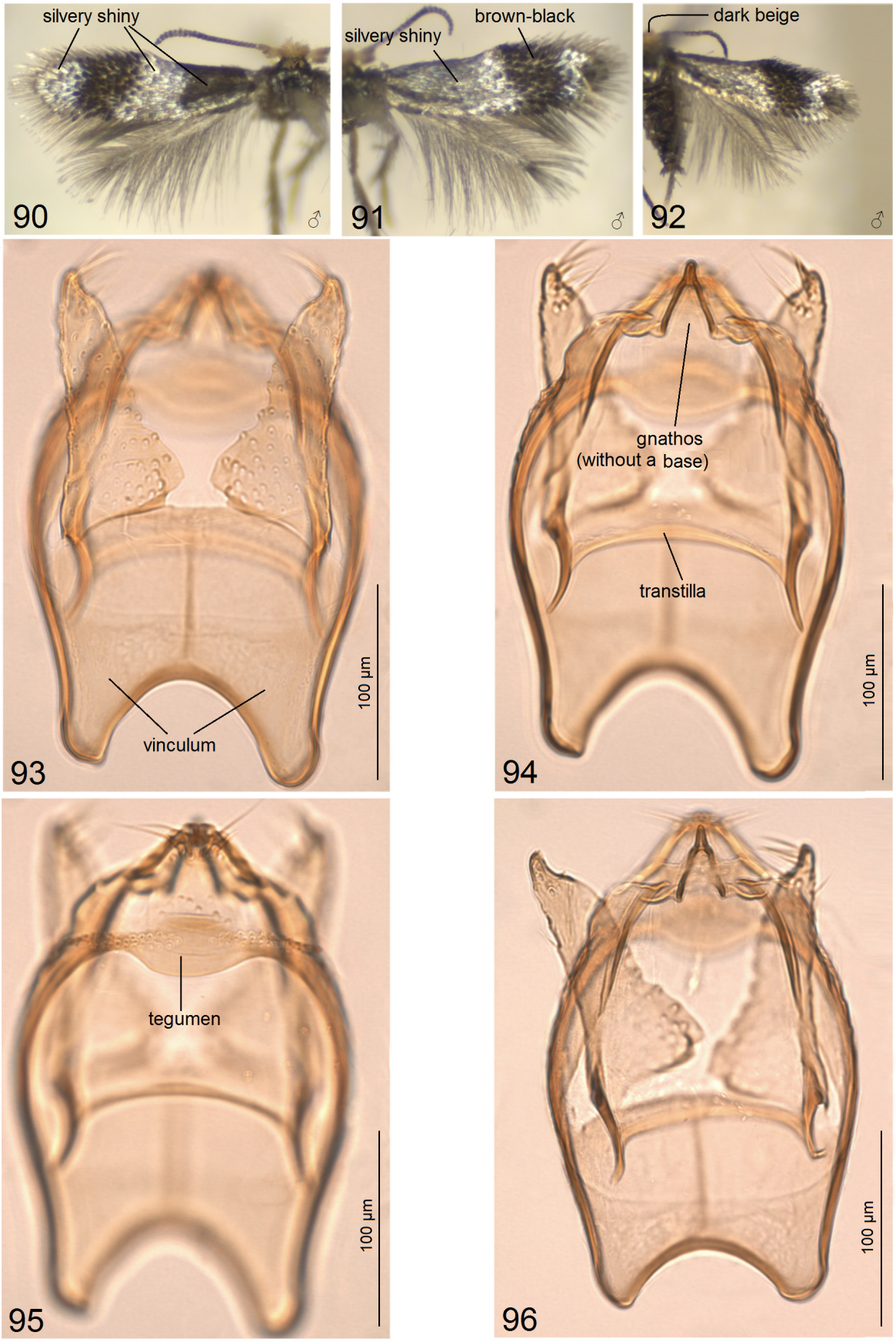
Female. Externally similar to male. Antenna usually curved, distinctly shorter than one-half length of forewing. Abdominal apex flat and truncated, without anal tufts. Genitalia (Figs 103–106) 525 μm long, with a large vaginal sclerite (Fig. 105).

Bionomics (Figs. 84 – 89). Host plant is *Inga saltensis* Burkart (Fabaceae: Mimosoidea) (Fig. 84). Egg ovoid, brown, glossy, usually laid on upper side of the leaf (hard to find). Larva pale green to dark green, with a dark green intestine and pale brown head. Larvae mine in June, produce sinuous, gallery-like leaf mines (Figs 85–88), with a wide central line of black frass; initial part of leaf mines always contorted. Cocoon (Fig. 89) beige. Adults fly in July.

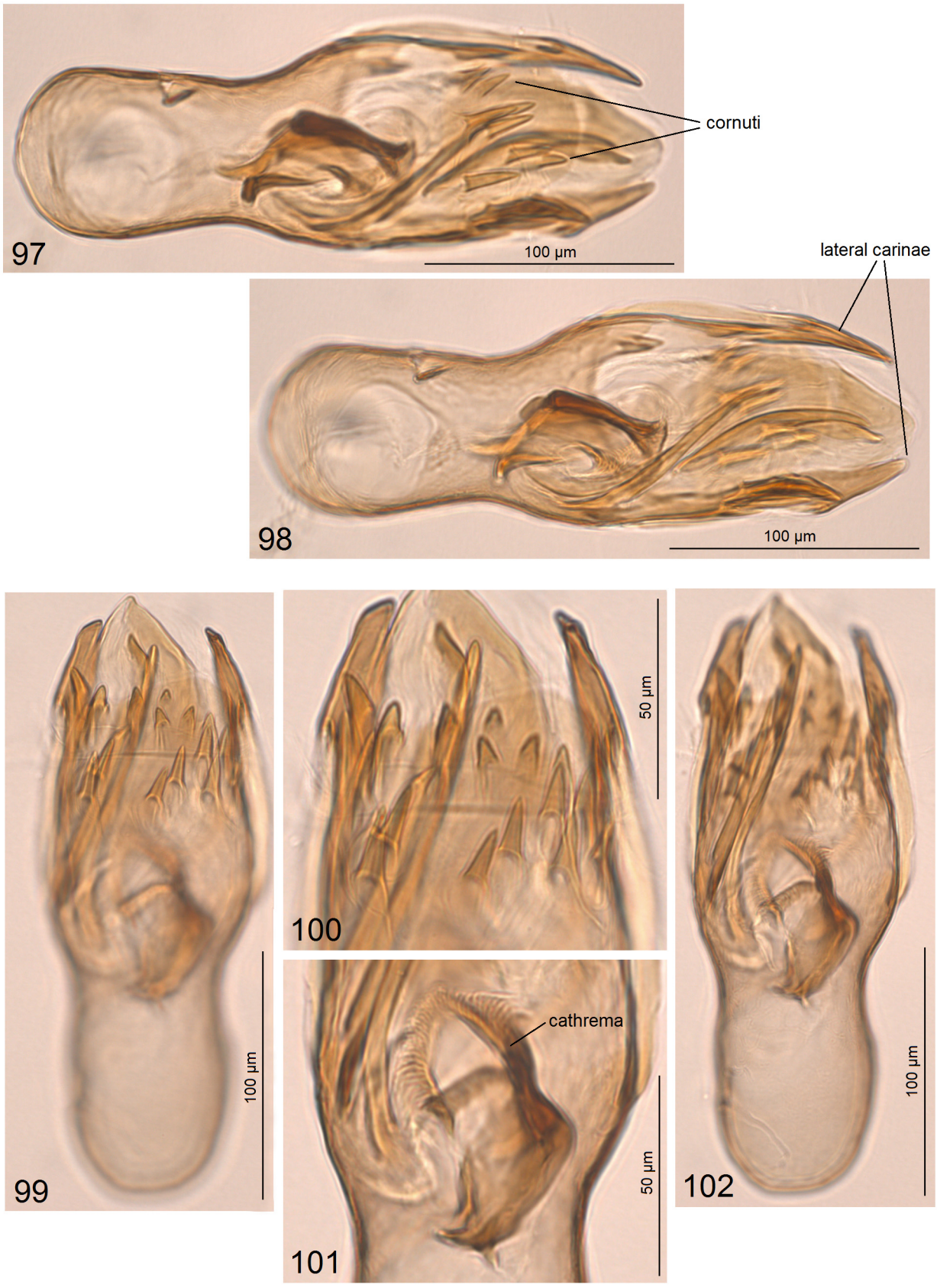
Distribution (Fig. 1). Currently known from a single locality in Bolivia (Yungas: Coroico, Camino de la muerte / N Yungas Road), at altitude about 1300 m (Figs 6–9).

Etymology. The species name derived from the Latin *mortalis* (deathlike), in reference to the unusual, dark, mournful appearance of the moth, as well as the worldwide famous type locality of the new species (Camino de la Muerte).

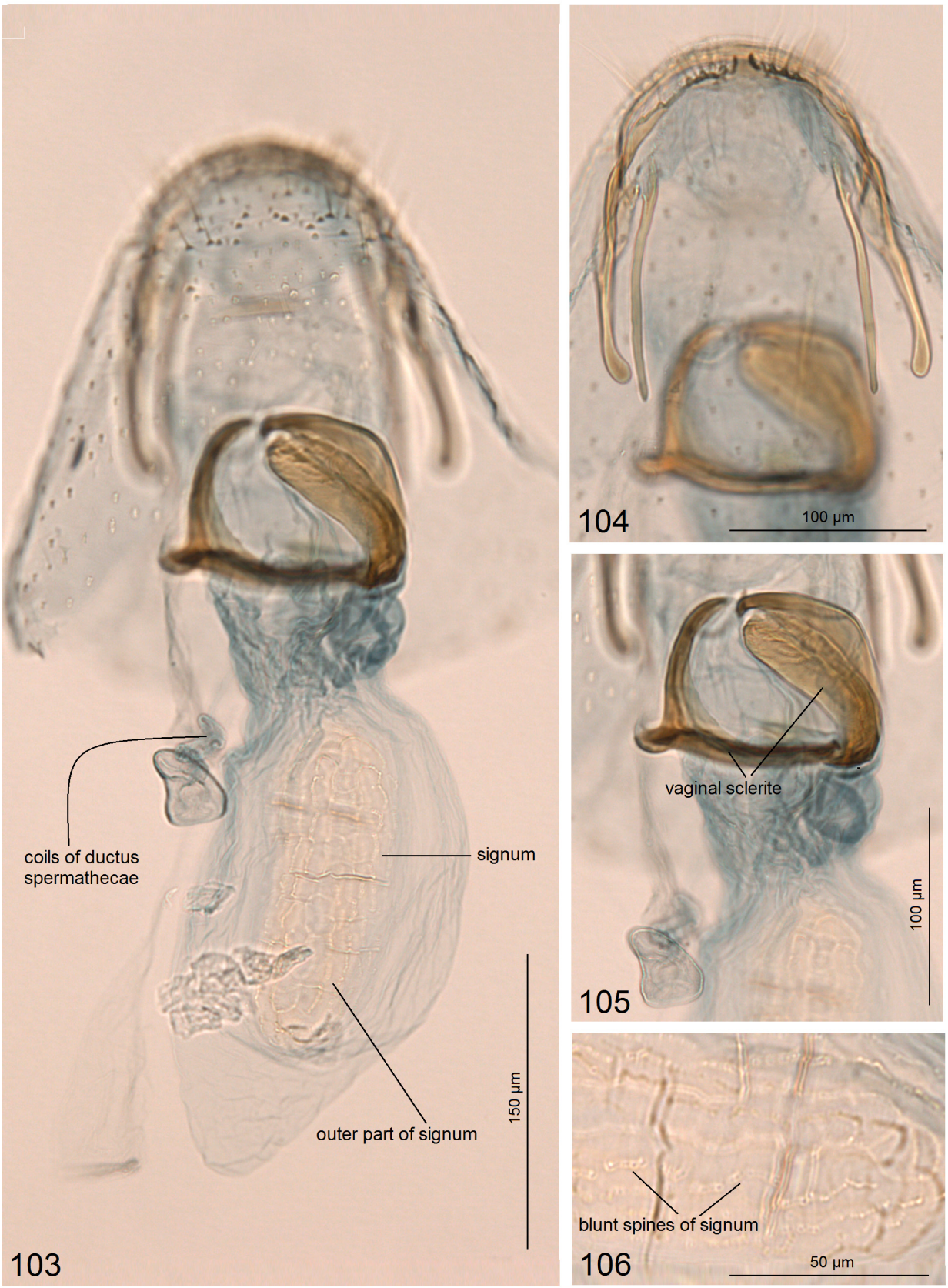
FIGURES 84–89. Bionomics of *Acalyptris mortalis* Diškus & Stonis, **sp. nov.** 84, host plant *Inga saltensis* Burkart (Fabaceae: Mimosoidea), Bolivia, Yungas, Coroico (Camino de la muerte); 85–88, leaf mines; 89, cocoon.



FIGURES 90–96. *Acalyptris mortalis* Diškus & Stonis, **sp. nov.** (ZMUC). 90, 91, male adult, holotype; 92, same, paratype; 93–95, male genitalia, capsule, holotype, slide no. AD955; 96, same, paratype, slide no. AD949.



FIGURES 97–102. Phallus of *Acalyptris mortalis* Diškus & Stonis, **sp. nov.** (ZMUC). 97, 98, holotype, genitalia slide no. AD955; 99–102, paratype, genitalia slide no. AD949.



FIGURES 103–106. Female genitalia of *Acalyptris mortalis* Diškus & Stonis, **sp. nov.**, paratype, genitalia slide no. AD952 (ZMUC). 103, general view; 104, apophyses; 105, vaginal sclerite; 106, fragment of signum.

Type material. Holotype: ♂, BOLIVIA, Nor Yungas Province, Coroico (Yolosa, Camino de la muerte / N Yungas Road), 16°13'38"S, 67°44'36"W, elevation 1270 m, mining larvae on *Inga saltensis* Burkart (Fabaceae), 11.vi.2018, ex pupa vii.2018, field card no. 5257, A. Diškus & J. R. Stonis, genitalia slide no. AD955♂ (ZMUC). Paratypes: 2 ♂, 2 ♀, same label data as holotype, genitalia slides nos. AD949♂ (from mature pupa, adult not preserved), AD952♀ (only genitalia slide; the adult totally consumed for DNA studies) (ZMUC).

16. *Acalyptris miranda* (Diškus & Stonis, 2017) (**new comb.**)
Fomoria miranda Diškus & Stonis, in Stonis *et al*. 2017b: 31, 33–35.

Host plant. *Inga spectabilis* (Vahl) Willd. or *I. edulis* Mart. (Fabaceae: Mimosoidea).

Distribution. Ecuador (tropical western slopes of the Andes: Bucay).

The *bifidus* group (new, designated above)

17. *Acalyptris lascuevella* Puplesis & Robinson, 2000
Acalyptris lascuevella Puplesis & Robinson 2000: 49–50.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station), Mexico (Pacific Coast, Oaxaca Region: Puerto Angel).

18. *Acalyptris bifidus* Puplesis & Robinson, 2000 (Figs 125–128)
Acalyptris bifidus Puplesis & Robinson 2000: 50.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station), Colombia (the western tropical slopes of the Andes: Valle del Cauca) (**new distribution**).

DNA barcode. We barcoded one male specimen of the species; the sequence is available at GenBank under voucher/sample ID MN732880.

Material examined. 1 ♂, COLOMBIA, Departamento de Valle del Cauca, Municipio de Dagua, El Naranjo, 550 m, at light, 3°47’2”N, 76°43’14”W, 21–23.ii.2019, leg. J. R. Stonis & S. A. Vargas, genitalia slide no. RA1029 (MPUJ).

19. *Acalyptris yucatani* Remeikis & Stonis, 2013 (**redescription**) (Figs 107–124)
Acalyptris yucatani Remeikis & Stonis, in Stonis *et al*. 2013c: 227–229.

Diagnosis. External characters, except the male hindwing covered in pale brown scales, are not sufficient for species identification. In the male genitalia, the long and curved chetae of valva (fig. 117), very short vinculum (Fig. 116), and the unique, spined carinae of phallus (Figs 117, 120) distinguish *A. yucatani* from all known *Acalyptris* species. In the female genitalia, the net-like structure of a corpus bursae (Fig. 122) and unique, spined, asymmetrical signa (Fig. 123) distinguish the new species from all known congeneric species. This species is also distinctive because no other species in this genus is known to feed on *Gliricidia*.

Description. Male (first record) (Figs 113–115). Forewing length 2.2–2.4 mm; wingspan 4.8–5.3 mm (n = 4).

Head. Labial palpus cream; scape yellowish cream; frontal tuft dark beige to brown; collar cream, comprised of piliform scales; antenna distinctly shorter than one-half length of forewing; flagellum glossy, brownish grey to dark grey-brown.

Thorax. Tegula and thorax brownish cream with some dark brown scales. Forewing yellowish cream to greyish cream, speckled with dark brown scales, particularly distinct on apical half of forewing; fringe yellowish cream, without fringe line; forewing underside pale brown or ochre-brown, with slight purple iridescence, without androconia. Hindwing glossy cream or greyish cream (depending on angle of view), densely covered with pale brown or ochre-brown androconial scales, except the glossy cream apical 1/4; fringe cream. Legs glossy, cream, with some grey-brown scales on upper side.

Abdomen. Pale brown to dark grey-brown and some purple iridescence on upper side, golden cream on underside; genital plates cream; anal tufts inconspicuous or absent. Genitalia (Figs 116–120) with capsule about 500–520 μm long. Phallus about 410 μm long, with spined carinae (Figs 117, 120).

Female. Externally similar to male but without brown scales on hindwing. Genitalia (Figs 121–124) about 1170 µm long, without a vaginal sclerite.

Bionomics (Figs 107–111). Host plant is *Gliricidia sepium* (Jacq.) Kunth ex Walp., commonly known as matarratón (Fabaceae: Faboideae) (Figs 107, 108) (**new host plant**); the previous record of *Schinus* sp. (Anacardiaceae) (Stonis *et al*. 2013c, Stonis & Remeikis 2017) was based on an incorrect identification. Egg laid singly, both on upper and underside of the leaf; egg case flat, shiny, black-grey when filled with frass. Larvae mine leaves from early December (Stonis *et al*. 2013c) to early March; based on numerous older, vacant leaf mines observed in western Colombia, the mining may be particularly active in January; voltism unknown. Larva bright green to yellow, with a dark green intestine and pale brown head. Leaf mine (Figs 110, 111) as a gallery filled with dark green frass. Cocoon (Fig. 109) 1.7–1.8 mm long, 1.2–1.3 mm wide (n = 8), beige, only sometimes dark brown. Adults of the Colombian series emerged in late February to early March; one specimen was also attracted to light. Otherwise, biology is unknown.

Distribution (Fig. 1). Mexico, Yucatán: Quintana Roo, Tulum (Stonis et al. 2013c); Colombia, the western tropical slopes of the Andes: Valle del Cauca, Dagua, Lobo Guerrero and El Naranjo (Figs 10, 11) (**new distribution**).

DNA barcode. We barcoded four specimens of the Colombian series of this species; sequences are available in GenBank under voucher/sample ID's MN732881, MN982361, MN982362, MN982363.

Material examined. 9 ♂, 4 ♀, COLOMBIA: Valle del Cauca, Lobo Guerrero, 850 m, 3°45'42''N, 76°39'46''W, larvae on *Gliricidia sepium*, field card no. SV002, 8.ii–3.iii.2019, leg. J. R. Stonis & S. A. Vargas, genitalia slide no. RA1031♂, RA1028♂, RA1031♀ (MPUJ); 1 ♀, El Naranjo, 550 m, at light, 3°47'2"N, 76°43'14"W, 21–23.ii.2019, J. R. Stonis & S. A. Vargas, genitalia slide no. RA1032♀ (MPUJ).,

20. ***Acalyptris argentosa*** (Puplesis & Robinson, 2000)
Glaucolepis argentosa Puplesis & Robinson 2000: 57.
Acalyptris argentosa (Puplesis & Robinson, 2000), in Stonis *et al*. 2017c: 502, 503; Stonis & Remeikis 2018: 464, 466–468.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

Remark. Two paratypes formerly deposited at LEU are transferred to ZMUC: 2 ♂ (paratypes), Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, 3–16.iv.1998, R. Puplesis and S. Hill, genitalia slide nos. AD0303, AD875 (ZMUC).

The *peteni* group (*sensu stricto*, revised here)
(= the *A. tenuijuxtus* complex *sensu* Stonis & Remeikis 2015: 86)

21. ***Acalyptris tenuijuxtus*** (Davis, 1978)
Microcalyptris tenuijuxtus Davis 1978: 216–217.

Host plant. *Galactia* sp. (Fabaceae: Faboidea) (E. J. van Nieukerken, pers. comm. 22.xi.2013).

Distribution. USA (Florida: Key Largo).

22. ***Acalyptris unicornis*** Puplesis & Robinson, 2000
Acalyptris unicornis Puplesis & Robinson 2000: 51–52.

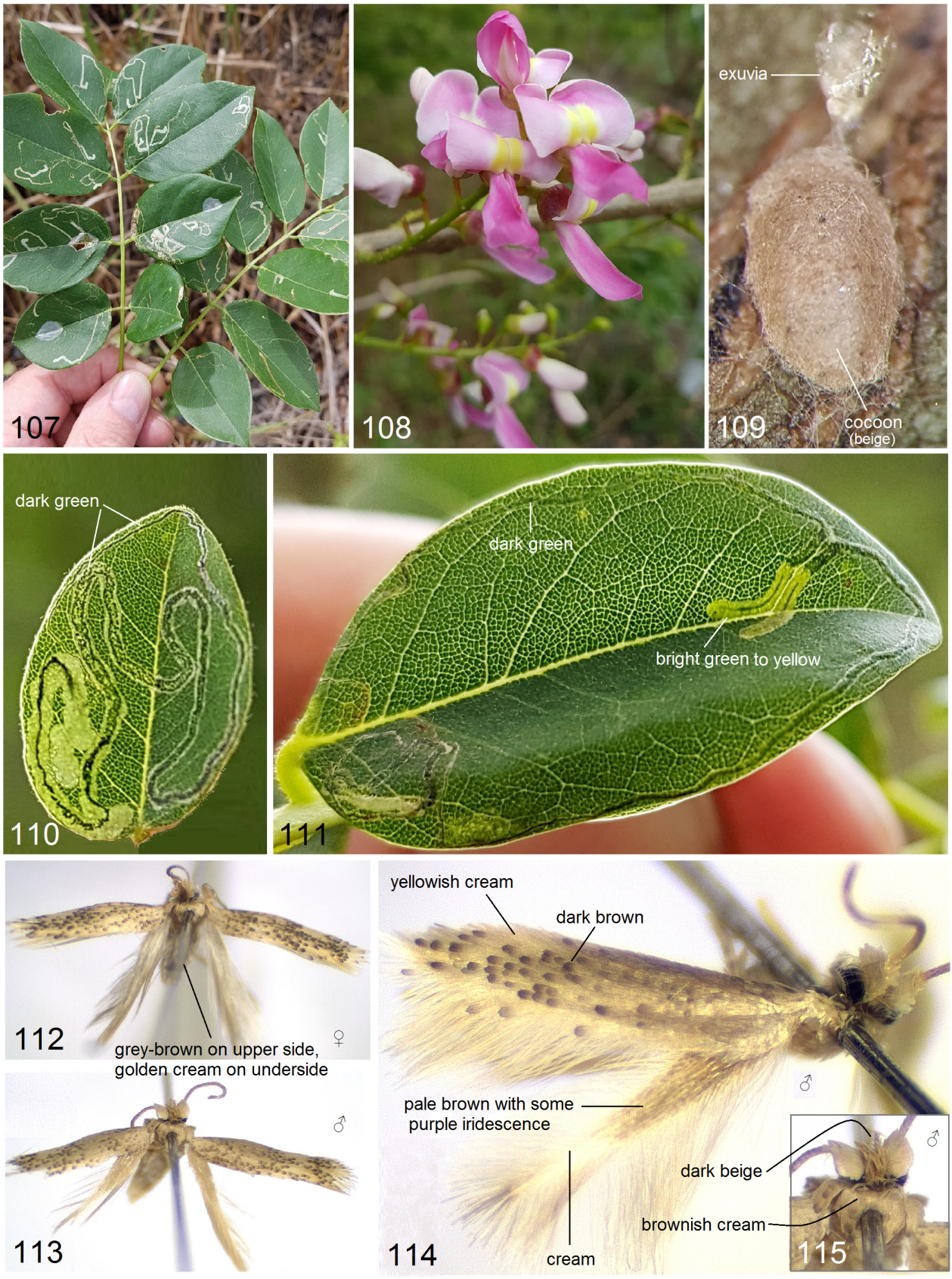
Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

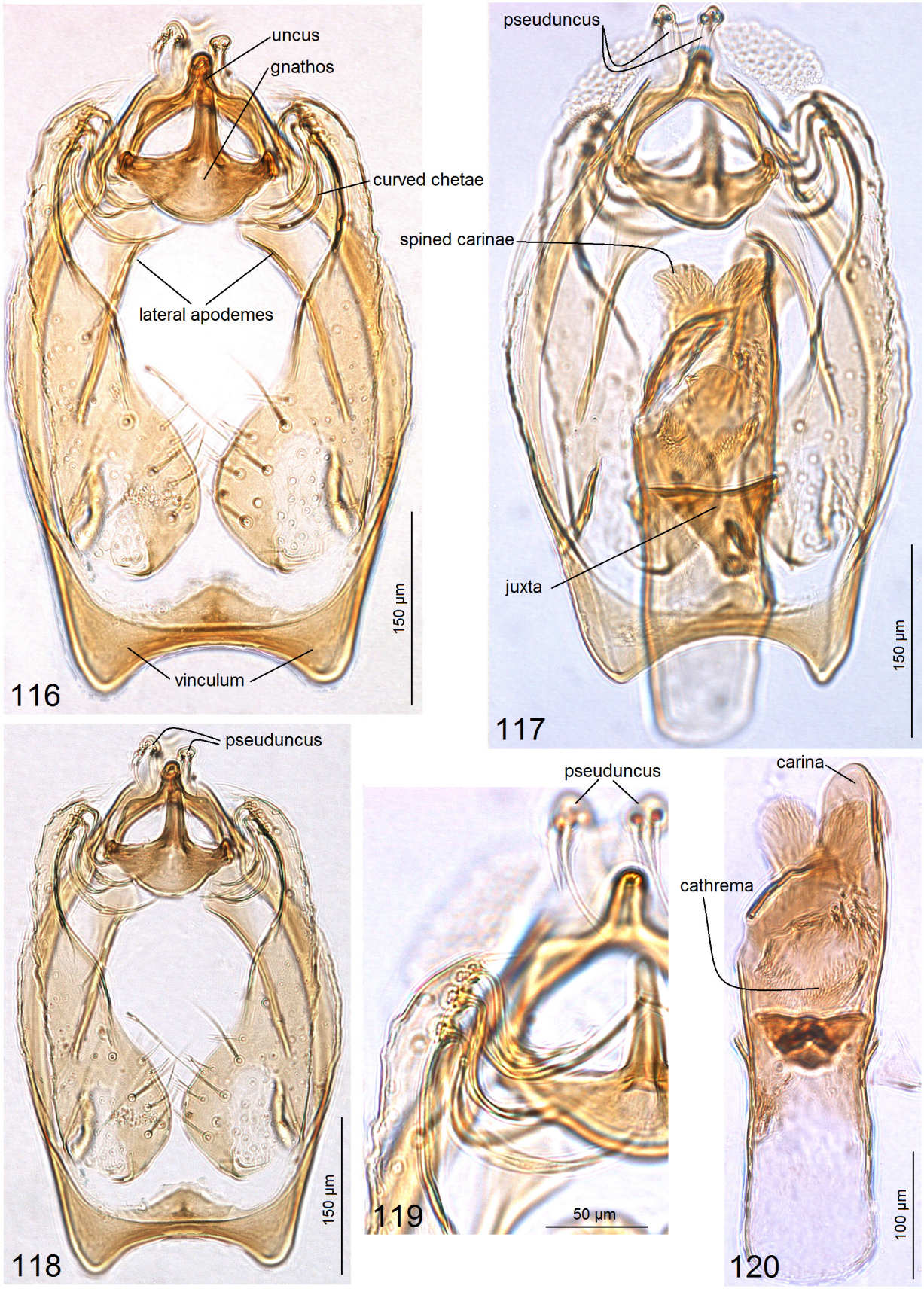
23. ***Acalyptris peteni*** Diškus & Stonis, 2013
Acalyptris peteni Diškus & Stonis, in Stonis *et al*. 2013b: 102, 104–106.

Host plant. Unknown.

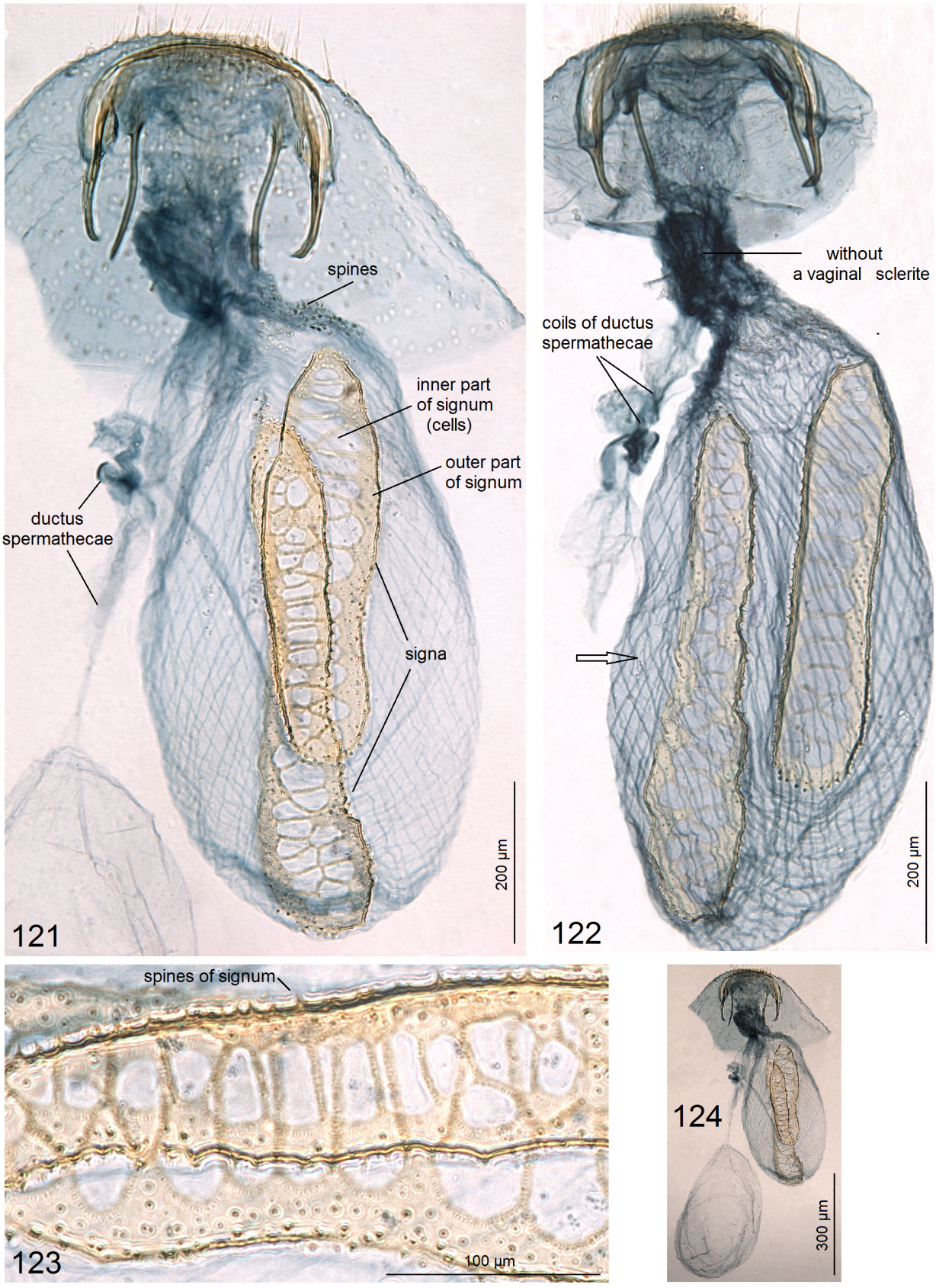
Distribution. Guatemala (Petén Region).



FIGURES 107–115. Bionomics and adults of *Acalyptris yucatani* Remeikis & Stonis, 2013 from Colombia, tropical western slopes of the Andes, Valle del Cauca (**new distribution, host plant, and newly attributed male**). 107, 108, host plant *Gliricidia sepium* (Jacq.) Kunth ex Walp., Fabaceae, Faboideae; 109, cocoon; 110, 111, leaf mines; 112, adult, female; 113–115, same, male.



FIGURES 116–120. Male genitalia of *Acalyptris yucatani* Remeikis & Stonis, 2013 from Colombia, tropical western slopes of the Andes, Valle del Cauca (**newly attributed male**). 116, 118, 119, capsule without phallus, genitalia slide no. RA1028 (MPUJ); 117, capsule with phallus, genitalia slide no. RA1013 (MPUJ); 120, phallus, genitalia slide no. RA1028 (MPUJ).



FIGURES 121–124. Female genitalia of *Acalyptris yucatani* Remeikis & Stonis, 2013 from Colombia, tropical western slopes of the Andes, Valle del Cauca (**new distribution**). 121, general view, genitalia slide no. RA1031 (MPUJ); 122, same, genitalia slide no. RA1032 (MPUJ); 123, fragment of signum, genitalia slide no. RA1031 (MPUJ); 124, general view, genitalia slide no. RA1031 (MPUJ).

24. ***Acalyptris trigonijuxtus*** Remeikis & Stonis, 2015
Acalyptris trigonijuxtus Remeikis & Stonis, in Stonis & Remeikis 2015: 83, 84.
Host plant. Unknown.
Distribution. British Virgin Islands.

25. ***Acalyptris dominicanus*** Remeikis & Stonis, 2015
Acalyptris dominicanus Remeikis & Stonis, in Stonis & Remeikis 2015: 85, 86.
Host plant. Unknown.
Distribution. Dominica.

The *statuarius* group (= The *bicornutus* complex *sensu* Stonis & Remeikis 2015: 86)

26. ***Acalyptris bicornutus*** (Davis, 1978)
Microcalyptris bicornutus Davis 1978: 212–214.
Host plant. *Lantana* sp. (Verbenaceae) (E. J. van Nieukerken, pers. comm. 22.xi.2013).
Distribution. USA (Florida: Key Largo).

27. ***Acalyptris statuarius*** Diškus & Stonis, 2013
Acalyptris statuarius Diškus & Stonis, in Stonis *et al*. 2013b: 109–111.
Host plant. Unknown.
Distribution. Belize (Caribbean Archipelago: Ambergris Cay).

28. ***Acalyptris nigrisignum*** Remeikis & Stonis, 2015
Acalyptris nigrisignum Remeikis & Stonis, in Stonis & Remeikis 2015: 81–83.
Host plant. Unknown.
Distribution. Curaçao (formerly the Netherlands Antilles).

The *scirpi* group (designated by van Nieukerken *et al*. 2016a: 147)

29. ***Acalyptris scirpi*** (Braun, 1925)
Microcalyptris scirpi Braun 1925: 225.
Host plant. *Bolboschoenus maritimus* subsp. *paludosus* (A.Nelson) T. Koyama (= *Scirpus paludosus* A. Nelson) (Cyperaceae).
Distribution. USA (Utah).

30. ***Acalyptris thoracealbella*** (Chambers, 1873)
Nepticula thoracealbella Chambers 1873: 127.
Nepticula badiocapitella Chambers 1876: 160 (syn. by Braun 1917: 189).
Host plant. Unknown.
Distribution. USA (Arkansas, Kentucky, New York, Ohio, Pennsylvania, Virginia), Canada (southern Ontario) (Pohl *et al*. 2018).

31. ***Acalyptris punctulata*** (Braun, 1910)
Nepticula punctulata Braun 1910: 174.
Host plants. *Ceanothus cuneatus* (Hook.) Nutt., *Frangula californica* (Eschsch.) A.Gray (= *Rhamnus californica* Eschsch.) (Rhamnaceae).
Distribution. USA (California: Dutch Flat, Loma Linda).
Remarks. Male genitalia unknown (Wilkinson 1979).

32. *Acalyptris* specimen 12 (Figs 129, 130)
Microcalyptris specimen 12, in Wilkinson 1979: 73–75.

Host plant. Unknown.

Distribution. USA (Arizona: Flagstaff).

Remarks. According to Wilkinson (1979), *Acalyptris* „specimen 12“ may be conspecific with the externally slightly different *Acalyptris punctulata*; the male genitalia of the latter is unknown.

33. *Acalyptris bipinnatellus* (Wilkinson, 1979)
Microcalyptris bipinnatellus Wilkinson 1979: 75–77.

Host plant. Cyperaceae (E. J. van Nieukerken, unpublished, pers. comm. 22.xi.2013).

Distribution. USA (Florida: Lake Placid, Archbold Biological Station).

34. *Acalyptris postalatratus* (Wilkinson, 1979)
Microcalyptris postalatratus Wilkinson 1979: 77–78.

Host plant. Unknown.

Distribution. USA (Arizona: Chiricahua Mts.).

35. *Acalyptris lotella* (Wagner, 1987)
Microcalyptris lotella Wagner 1987: 278–282.

Host plant. *Syrmatium glabrum* Vogel (= *Lotus scoparius* (Nutt.) Ottley) (Fabaceae: Faboideae).

Distribution. USA (California: Contra Costa).

Satellite species close to the *scirpi* group

36. *Acalyptris solaris* Remeikis & Stonis, 2018
Acalyptris solaris Remeikis & Stonis, in Stonis & Remeikis 2018: 462–465.

Host plant. Unknown.

Distribution. Venezuela (Estado Amazonas, former Territorio Federal Amazonas: Cerro de la Neblina).

The *fortis* group (new, designated above)

37. *Acalyptris fortis* Puplesis & Robinson, 2000 (Figs 131–133)
Acalyptris fortis Puplesis & Robinson 2000: 47–48.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

Remark. One paratype specimen formerly deposited at LEU is transferred to ZMUC: 1 ♂, Belize, Pook's Hill Nature Reserve, S. of Teakettle Village, 28–29.iv.1998, R. Puplesis and S. Hill, genitalia slide no. AD0311 (ZMUC).

38. *Acalyptris martinheringi* Puplesis & Robinson, 2000 (Figs 134–137)
Acalyptris martinheringi Puplesis & Robinson 2000: 46–47.

Host plant. Unknown.

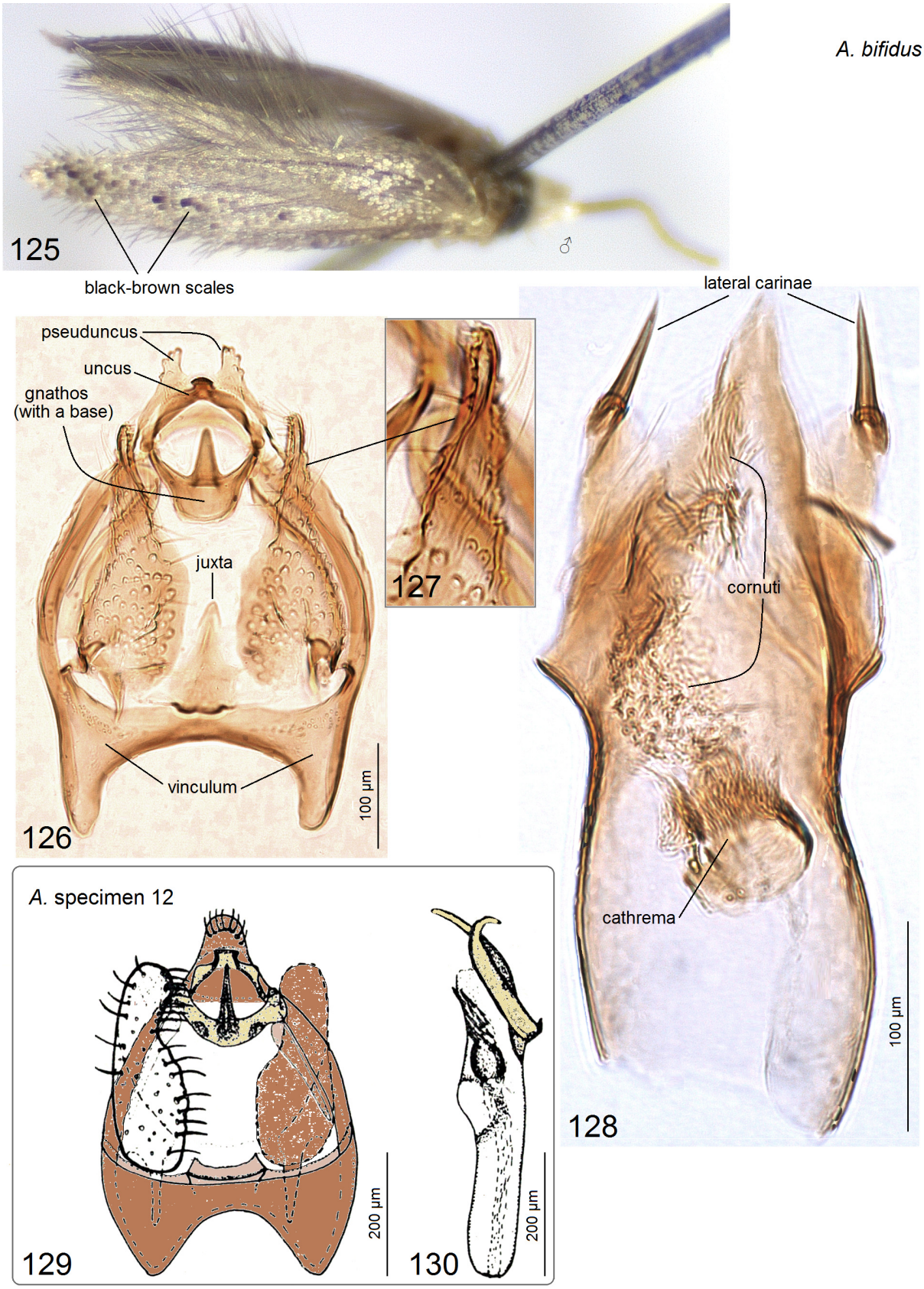
Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

Remark. Two paratypes formerly deposited at LEU are transferred to ZMUC: 2 ♂ (paratypes), Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, at light, 3–16.iv.1998, R. Puplesis and S. Hill, genitalia slide no. AD0304 (ZMUC).

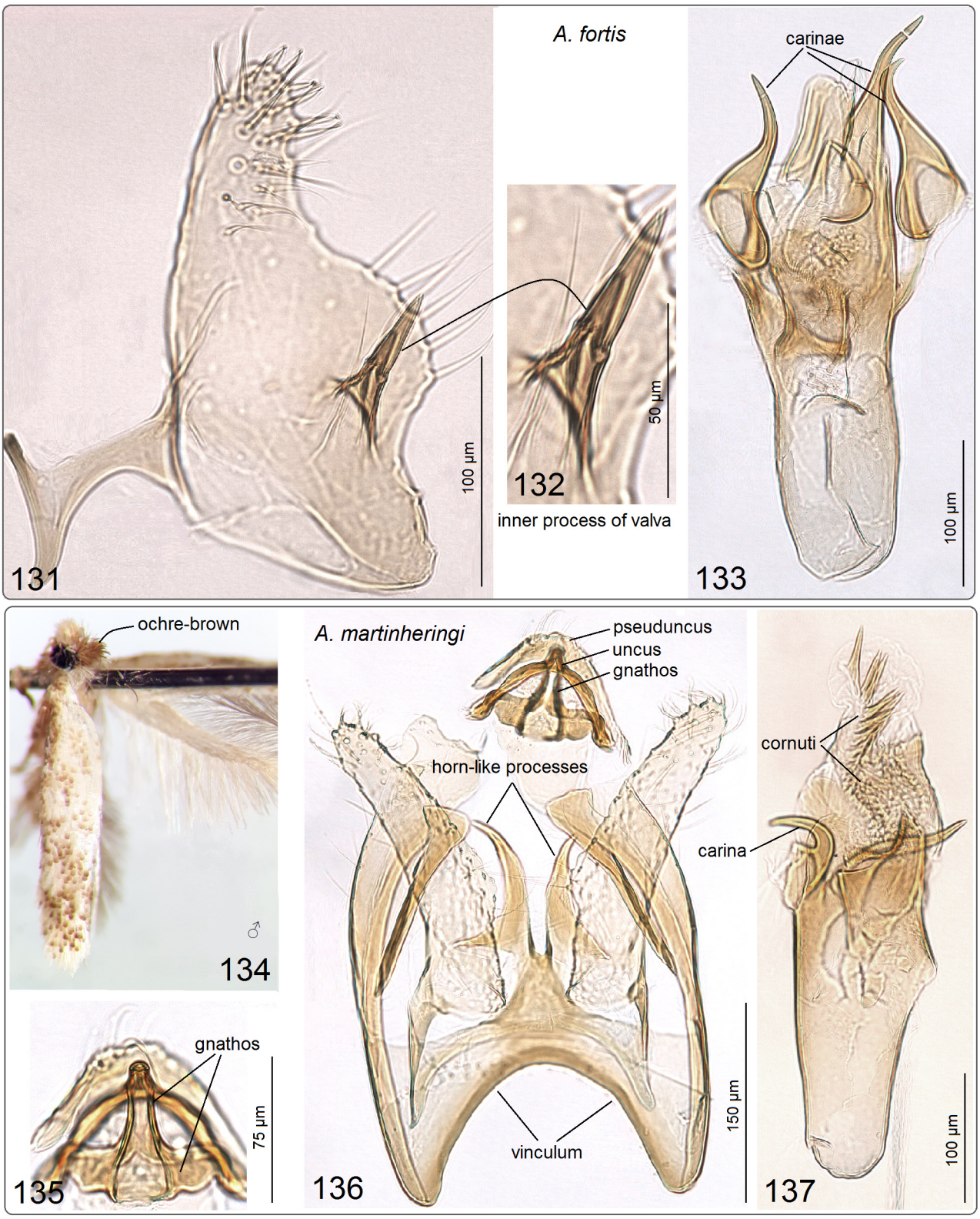
39. *Acalyptris basihastatus* Puplesis & Diškus, 2002 (Figs 138–141)
Acalyptris basihastatus Puplesis & Diškus 2002a: 29–30.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Jatun Sacha and Misahualli).



FIGURES 125–130. *Acalyptris* spp. 125, *A. bifidus* Puplesis & Robinson, 2000 from Colombia, tropical western slopes of the Andes, Valle del Cauca (**new distribution and first photographic documentation**), male adult; 126, 127, same, male genitalia, slide no. RA1029, capsule (MPUJ); 128, same, phallus; 129, *A*. specimen 12, capsule; 130, same, phallus (after Wilkinson 1979).



FIGURES 131–137. *Acalyptris* spp. 131, 132, *A. fortis* Puplesis & Diškus, 2002 (**first photographic documentation**), male genitalia, slide no. AD0311, paratype, valva (ZMUC); 133, same, phallus; 134, *A. matinheringi* Puplesis & Robinson, 2000 (**first photographic documentation**), male adult, paratype (ZMUC); 135–137, same, male genitalia, slide no. AD0304, paratype (ZMUC).

Remark. Three paratype specimens formerly deposited at LEU are transferred to ZMUC: 2 ♂, Ecuador, Napo Region, near Rio Napo, Jatun Sacha, premontane rainforest, 400–500 m, 26–31.i.2000, R. Puplesis & S. Hill, genitalia slide nos. AD0316, AD0317 (ZMUC); 1 ♂, Ecuador, Napo Region, near Rio Napo, Misahualli, premontane rainforest, 400–500 m, 22–31.i.2001, R. Puplesis & S. Hill, genitalia slide no. AD0350 (ZMUC).

40. ***Acalyptris pseudohastatus*** Puplesis & Diškus, 2002 (Figs 142–145)

Acalyptris pseudohastatus Puplesis & Diškus 2002a: 30.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Jatun Sacha).

Remark. Two paratype specimens formerly deposited at LEU are transferred to ZMUC: 2 ♂, Ecuador, Napo Region, near Rio Napo, Jatun Sacha, premontane rainforest, 500 m, 26–31.i.2000, R. Puplesis & S. Hill, genitalia slide nos. AD0318, AD0319 (ZMUC).

41. ***Acalyptris articulosus*** Puplesis & Diškus, 2002 (Figs 146–150)

Acalyptris articulosus Puplesis & Diškus 2002a: 30–31.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Jatun Sacha).

Remark. One paratype specimen formerly deposited at LEU is transferred to ZMUC: 1 ♂, Ecuador, Napo Region, near Rio Napo, Jatun Sacha, premontane rainforest, 500 m, 26–31.i.2000, R. Puplesis & S. Hill, genitalia slide no. AD0320 (ZMUC).

42. ***Acalyptris platygnathos*** Puplesis & Robinson, 2000

Acalyptris platygnathos Puplesis & Robinson 2000: 54–55.

Host plant. Unknown.

Distribution. Central America: Belize (Chiquibul Forest: Las Cuevas Biological Station).

43. ***Acalyptris basicornis*** Remeikis & Stonis, 2013

Acalyptris basicornis Remeikis & Stonis, in Stonis *et al*. 2013b: 102–103.

Host plant. Unknown.

Distribution. Guatemala (Petén region: El Remate).

44. ***Acalyptris extremus*** Stonis & Diškus, **sp. nov**. (Figs 151–163)

Diagnosis. External characters of *A. extremus* are not sufficient for species identification. In the male genitalia, the unique shape of valva with a strongly bulged inner lobe (Fig. 156), and particularly two pairs of extremely developed horn-like processes (Fig. 159) easily distinguish the new species from all known *Acalyptris* species.

Description. Male (Figs 151–154). Forewing length 2.1 mm; wingspan 4.7 mm (n = 1).

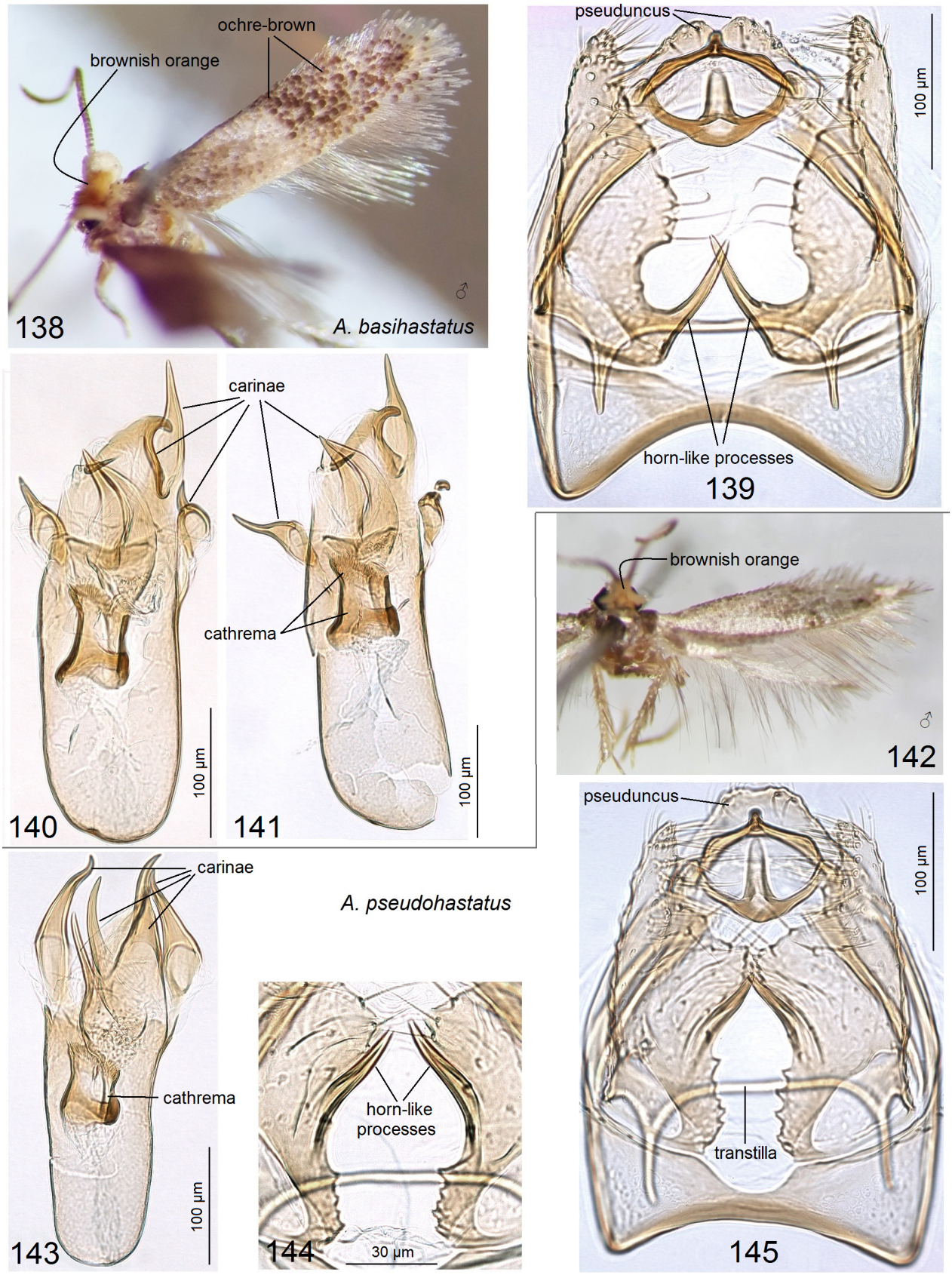
Head. Scape golden cream; frontal tuft orangish ochreous to ochre-brown; collar comprised of pale ochreous piliform scales; antenna slightly shorter than one-half length of forewing; flagellum ochreous cream with golden gloss on upper side and underside, with about 39 segments.

Thorax. Tegula yellowish cream with some irregularly scattered brown scales; thorax yellowish cream with golden gloss; forewing yellowish cream with golden gloss and some sparsely scattered brown and dark brown scales prevailing in apical 1/3; fringe golden cream, without fringe line; forewing underside densely covered with pale grey-brown scales, with some purple iridescence; no androconia. Hindwing and fringe grey to yellowish cream (depending on angle of view), without androconia. Legs glossy, yellowish cream, with dark grey-brown scales on upper side.

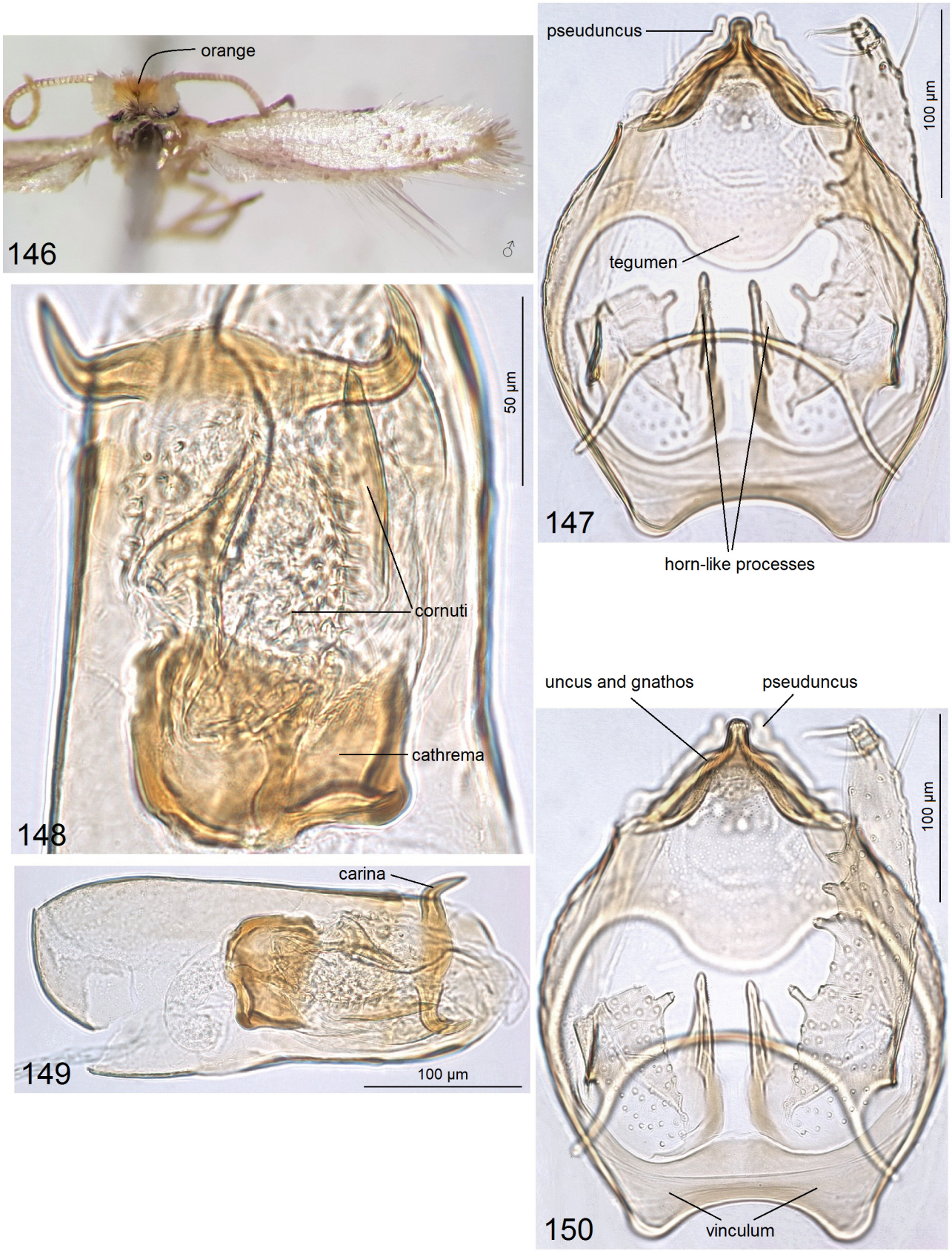
Abdomen. Fuscous on upper side, grey cream on underside; anal tufts inconspicuous; genital plates large, cream. Genitalia (Figs 155–163) with capsule about 360 µm long, 240 µm wide. Valva with two pairs of extremely large processes (Figs 156, 159). Phallus about 290–330 µm long, with a large cathrema and unique carinae (Figs 161–163).

Female. Unknown.

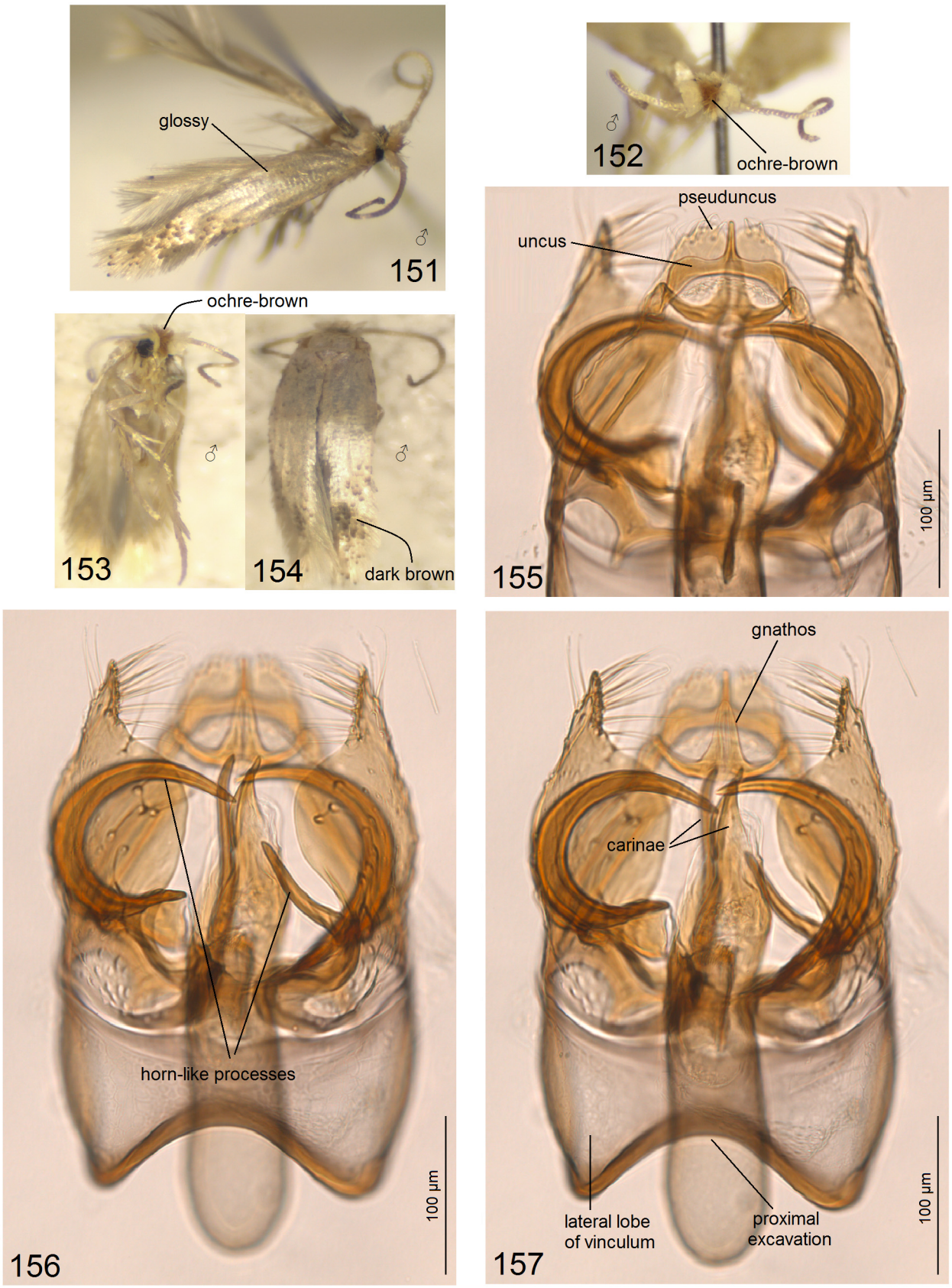
Bionomics. Host plant is unknown. Adults fly in June (one specimen was attracted to light). Otherwise, biology is unknown.



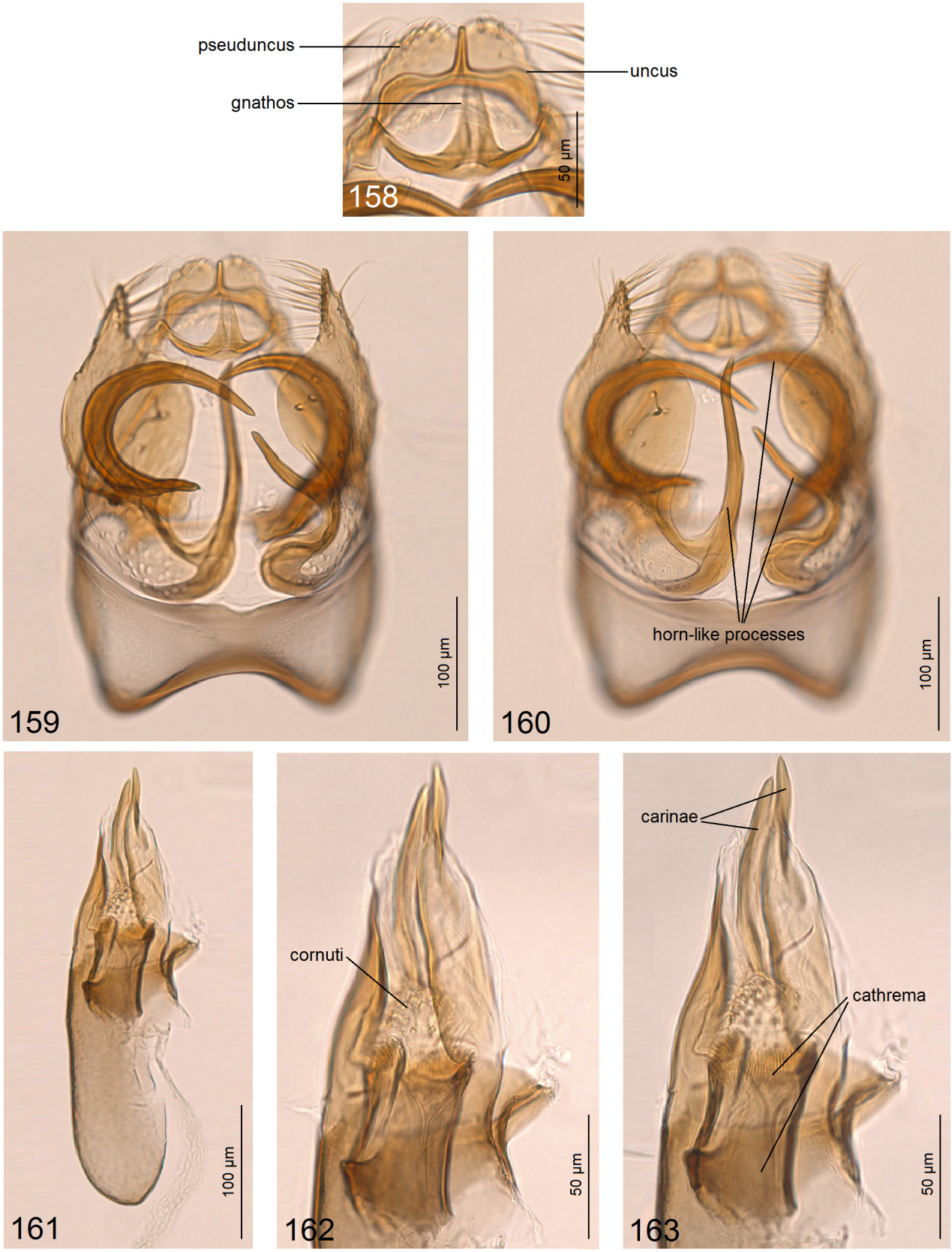
FIGURES 138–145. *Acalyptris* spp. 138, *A. basihastatus* Puplesis & Diškus, 2002 (**first photographic documentation**), male adult, paratype (ZMUC); 139–141, same, male genitalia, slide no. AD0317 (ZMUC); 142, *A. pseudohastatus* Puplesis & Diškus, 2002 (**first photographic documentation**), male adult, paratype (ZMUC); 143–145, same, male genitalia, slide no. AD0319 (ZMUC).



FIGURES 146–150. *Acalyptris articulosus* Puplesis & Diškus, 2002 (**first photographic documentation**). 146, male adult, paratype (ZMUC); 147, 150, male genitalia, slide no. AD0320, capsule (ZMUC); 148, 149, same, phallus (ZMUC).



FIGURES 151–157. *Acalyptris extremus* Stonis & Diškus, **sp. nov.**, holotype (ZMUC). 151–154, male adult; 155–157, male genitalia, slide no. AD945.



FIGURES 158–163. Male genitalia of *Acalyptris extremus* Stonis & Diškus, **sp. nov.**, holotype, genitalia, slide no. AD945 (ZMUC). 158, pseuduncus, uncus, and gnathos; 159, 160, capsule without phallus; 161–163, phallus.

Distribution (Fig. 1). Currently known from a single locality in Bolivia (Yungas: Coroico) at elevation about 1660 m (Figs 6–8).

DNA barcode. We barcoded the male holotype of the new species; the sequence is available at GenBank under voucher/sample ID MN982365.

Etymology. The species name is derived from the Latin *extremus* (extreme), in reference to the unique, extremely developed horn-like processes of valva in the male genitalia.

Type material. Holotype: ♂, BOLIVIA, Nor Yungas Province, Coroico, 16°12'25"S, 67°43'53"W, elevation 1660 m, at light, 15.vi.2018, A. Diškus & J. R. Stonis, genitalia slide no. AD945 (ZMUC).

The *bovicorneus* group (new, designated above)

45. ***Acalyptris bovicorneus*** Puplesis & Robinson, 2000 (Figs 164–166)
Acalyptris bovicorneus Puplesis & Robinson 2000: 45–46.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

Remark. One paratype formerly deposited at LEU is transferred to ZMUC: 1 ♂ (paratype), Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, at light, 3–16.iv.1998, R. Puplesis and S. Hill, genitalia slide no. AD0307 (ZMUC).

46. ***Acalyptris*** **species AG016**
Acalyptris species AG016, in Šimkevičiūtė *et al*. 2009: 276.

Host plant. Unknown.

Distribution. Mexico (Pacific Coast, Oaxaca Region: Puerto Angel).

47. ***Acalyptris terrificus*** Šimkevičiūtė & Stonis, 2009
Acalyptris terrificus Šimkevičiūtė & Stonis, in Ðimkevičiűtė *et al*. 2009: 275.
Acalyptris species AG015, in Šimkevičiūtė *et al*. 2009: 275–276 (**newly attributed female**).

Host plant. Unknown.

Distribution. Mexico (Pacific Coast, Oaxaca Region: Puerto Angel).

48. ***Acalyptris janzeni*** van Nieukerken & Nishida, 2016
Acalyptris janzeni van Nieukerken & Nishida, 2016, in van Nieukerken *et al*. 2016b: 55–58.

Host plant. Unknown.

Distribution. Costa Rica (Guanacaste Province).

The *latipennata* group (designated by Puplesis *et al*. 2002b: 66)

49. ***Acalyptris latipennata*** (Puplesis & Robinson, 2000)
Fomoria latipennata Puplesis & Robinson 2000: 45.
Acalyptris latipennata (Puplesis & Robinson, 2000), in Puplesis *et al.* 2002: 66.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

50. ***Acalyptris dividua*** Puplesis & Robinson, 2000 (Figs 171, 179, 180)
Acalyptris dividua Puplesis & Robinson 2000: 54.

Host plant. Unknown.

Distribution. Belize (Chiquibul Forest: Las Cuevas Biological Station).

51. ***Acalyptris paradividua*** Šimkevičiūtė & Stonis, 2009
Acalyptris paradividua Šimkevičiūtė & Stonis, in Šimkevičiūtė *et al*. 2009: 272–274.

Host plant. Unknown.

Distribution. Mexico (Pacific Coast, Oaxaca Region: Puerto Angel).

52. ***Acalyptris ecuadoriana*** Puplesis & Diškus, 2002 (Figs 172–174, 177)

Acalyptris ecuadoriana Puplesis & Diškus, in Puplesis *et al*. 2002a: 27, 28.

Acalyptris ecuadoriana Puplesis & Diškus, in Stonis & Diškus 2018: 195–197.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Jatun Sacha and Misahualli).

Remark. Two paratype specimens formerly deposited at LEU are transferred to ZMUC: 1 ♂ (paratype), Ecuador, Napo Region, near Rio Napo, Jatun Sacha, premontane rainforest, 400–500 m, 26–31.i.2000, R. Puplesis & S. Hill, genitalia slide no. AD0325 (ZMUC); 1 ♂ (paratype), Ecuador, Napo Region, near Rio Napo, Misahualli, premontane rainforest, 400–500 m, 22–31.i.2001, R. Puplesis & S. Hill, genitalia slide no. AD0349 (ZMUC).

53. ***Acalyptris onorei*** Puplesis & Diškus, 2002 (Fig. 175)

Acalyptris onorei Puplesis & Diškus, in Puplesis *et al*. 2002a: 28, 29.

Acalyptris onorei Puplesis & Diškus, in Stonis & Diškus 2018: 196, 197.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Yasuní N.P.).

Remark. One paratype specimen formerly deposited at LEU is transferred to ZMUC: 1 ♂ (paratype), Ecuador, Napo Region, SE of Coca, near Rio Tiputini, Yasuni National Park, 260 m, 15–25.i.2000, R. Puplesis & S. Hill, genitalia slide no. AD0324, forewing venation slide no. AD0351 (ZMUC).

54. ***Acalyptris amazonensis*** Stonis & Diškus, 2018 (Figs 176, 178)

Acalyptris amazonensis Stonis & Diškus 2018: 192–198.

Host plant. *Psychotria* L. (Rubiaceae).

Distribution. Ecuador (Oriente / Región amazónica: Misahualli).

Remark. The holotype is transferred to ZMUC: 1 ♂, Ecuador, Napo Province, Misahualli, 17 km SE of Tena, 410 m, 28.i.2001, R. Puplesis & S. Hill, genitalia slide no. AD0352 (ZMUC).

55. ***Acalyptris insolentis*** Puplesis & Diškus, 2002 (Figs 167–170)

Acalyptris insolentis Puplesis & Diškus, in Puplesis *et al*. 2002a: 33.

Host plant. Unknown.

Distribution. Ecuador (Oriente / Región amazónica: Yasuní N.P. and Jatun Sacha).

Remark. Two paratype specimens formerly deposited at LEU are transferred to ZMUC: 1 ♂, Ecuador, Napo Region, near Rio Napo, Jatun Sacha, premontane rainforest, 500 m, 26–31.i.2000, R. Puplesis & S. Hill, genitalia slide no. AD0329 (ZMUC); 1 ♂, Ecuador, Napo Region, SE of Coca, near Rio Tiputini, Yasuni National Park, 260 m, 15–25.i.2000, R. Puplesis & S. Hill, genitalia slide no. AD0323 (ZMUC).

A species not attributed to a group

56. ***Acalyptris distaleus*** (Wilkinson, 1979)

Microcalyptris distaleus Wilkinson 1979: 78–81.

Host plant. Unknown.

Distribution. USA (Arizona: Flagstaff, California: Loma Linda).

Remark. The species may not belong to *Acalyptris*.

Discussion

Despite the striking characters of the genitalia of all nine species groups and their intrinsic value for their diagnostics, some of the groups (e.g., *A. bovicorneus* group) may be paraphyletic. Molecular studies provided limited as-

sistance because only a small proportion of American species, particularly the Neotropical *Acalyptris* species, could be sequenced. In our preliminary, best resolved tree, the *fortis* species group is the sister group to the *statuarius* group (Fig. 181). Morphological characters support this because in the male genitalia of both groups the transtilla is present, and the gnathos is usually without a base. However, the most important character is that *A. statuarius* possesses an inner process which is similar to and possibly homologous with those in the *fortis* species group. It is interesting that the *murex* group clusters with the *peteni* group. It is possible that the unique ventral carinae of the *murex* species group and the small carinae of the *peteni* species group have the same origin. Moreover, at least one species in the *murex* species group possesses a cornutus similar to the sinuous cornutus of the *peteni* species group. In regards to the potential sister group relationship between the *scirpi* and the *bovicorneus* species groups, or the *trifidus* and the *bifidus* species groups, morphology of the male genitalia, specifically the similarity of the carinae of the phallus, supports these results. The alternative tree (Fig. 182) is similar, especially in regards to the *murex* and *peteni* species groups, but the other groups discussed above cluster slightly differently, and this tree is less supported by morphological data.

The overall impression is that the American fauna is an isolated entity: there is no overlap at the species level, or even at the species group level, between the fauna of the New World and that of the Old World. And some species groups in the Americas are almost exclusively tropical, one Caribbean, and only one group predominatly Nearctic.

In total, the world fauna of *Acalyptris* now numbers 111 described and named species. The American fauna forms approximately one-half of the currently known species (Fig. 183). The history of species description (authorship) is given in Figs 184 and 186. Many workers have described at least one species of *Acalyptris*, but the largest proportion or species (Fig. 186) have been discovered and described by a few researchers in recent decades, notably, J. R. Stonis (= formerly Puplesis), A. Diškus, and their collaborators.

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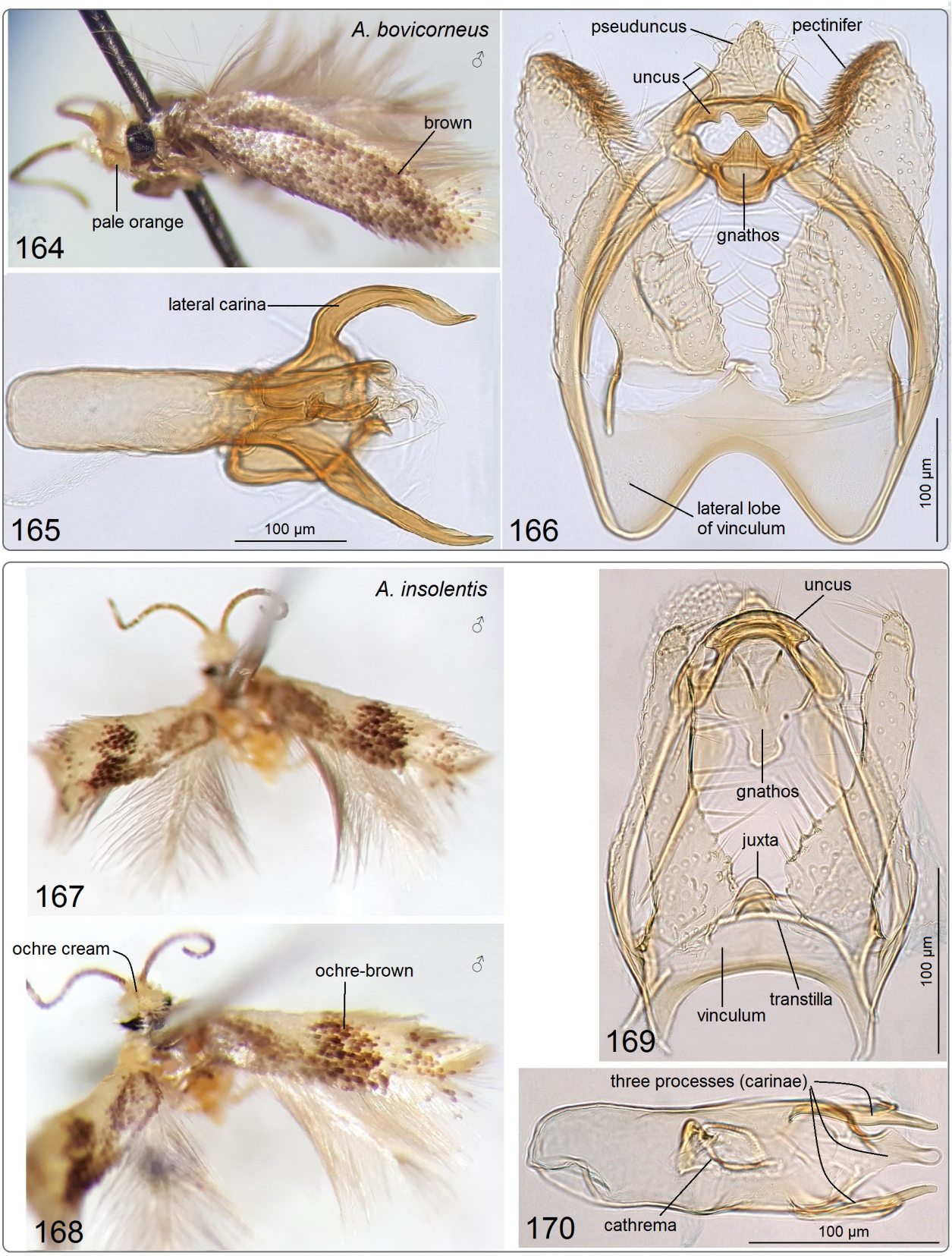
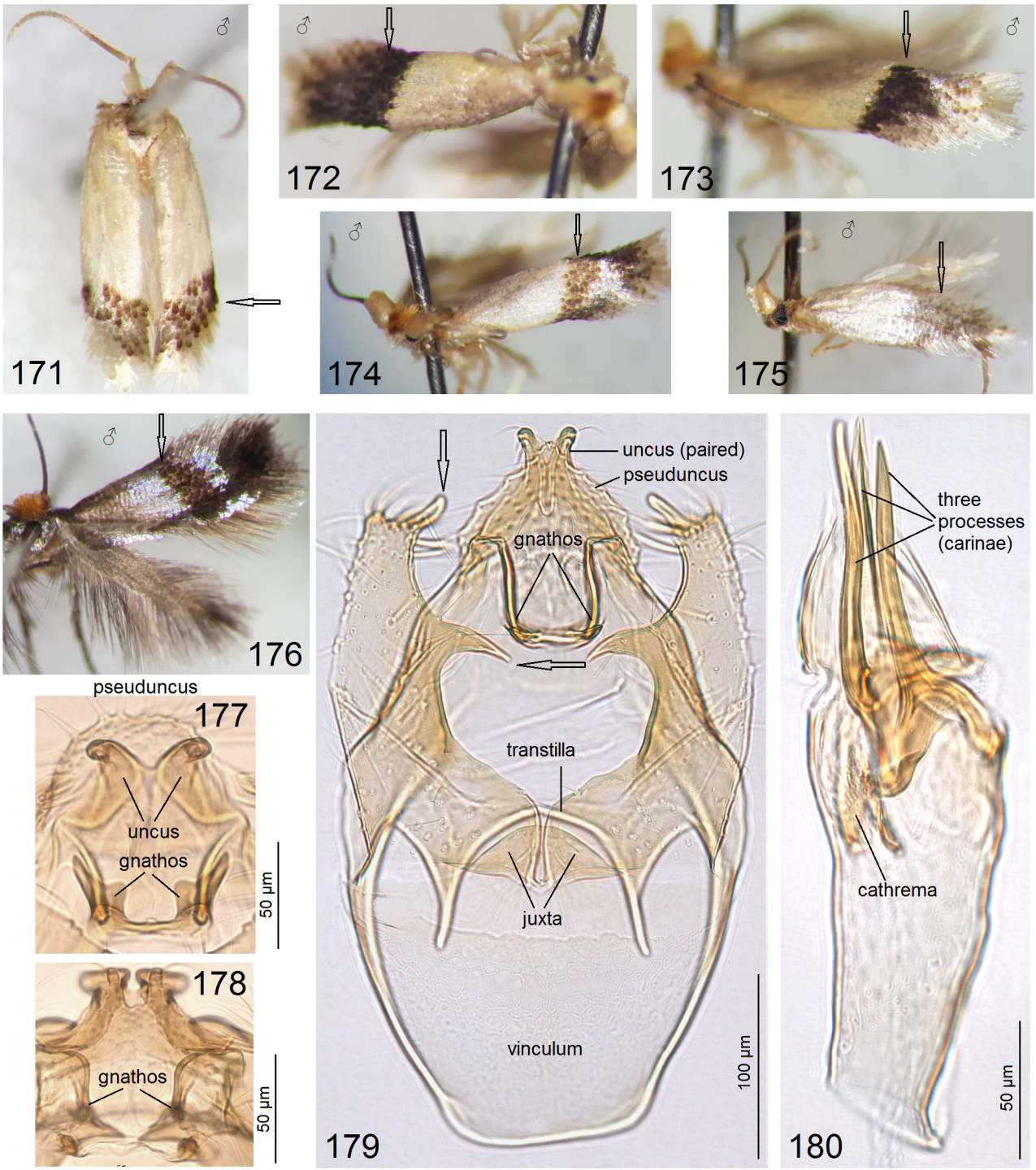
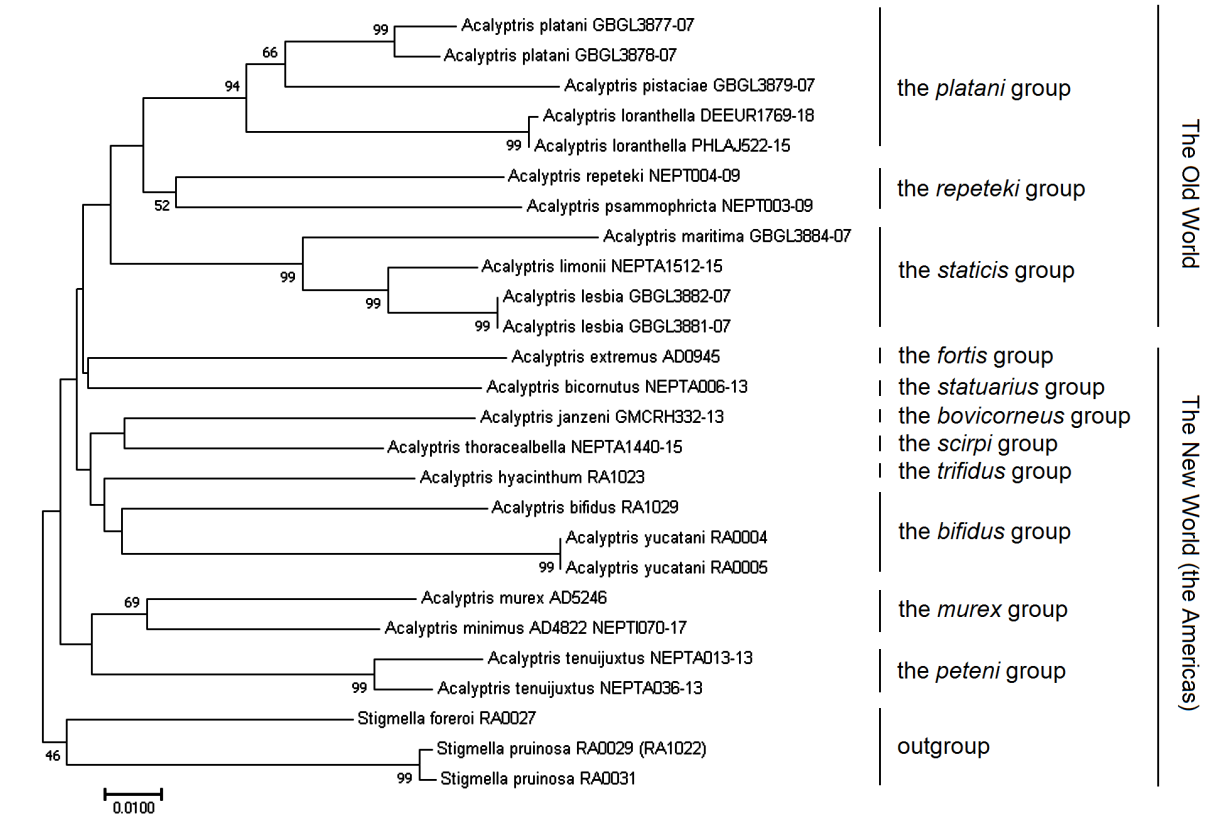


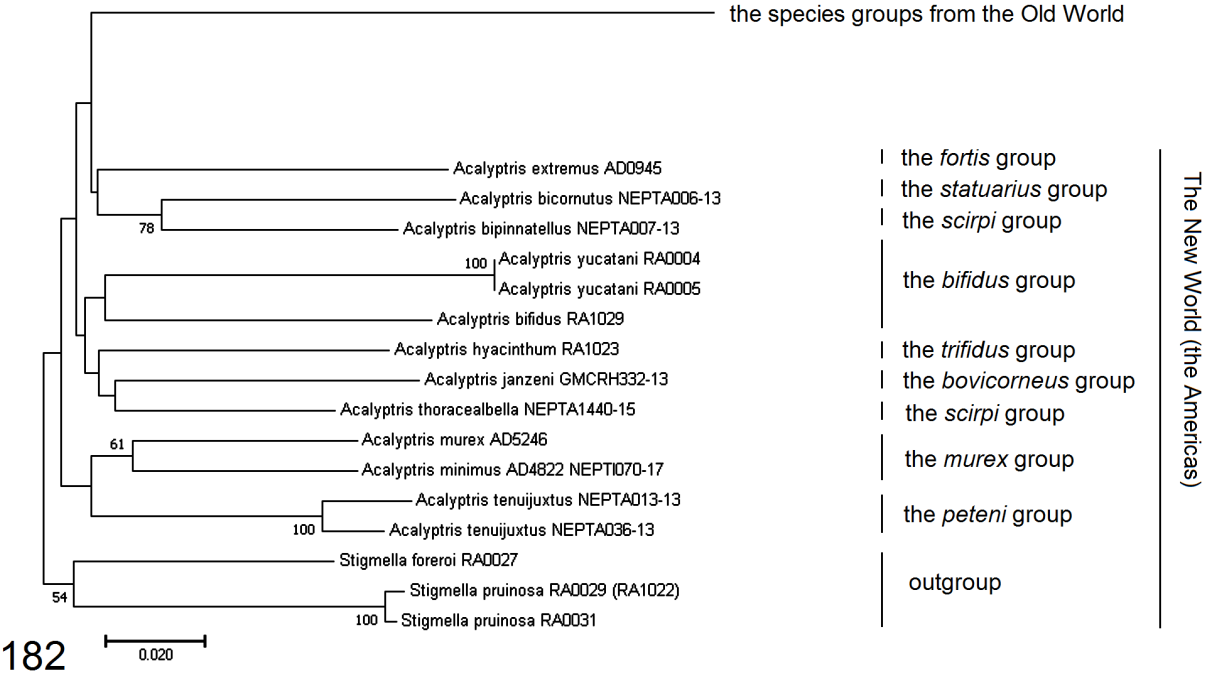
FIGURES 164–170. *Acalyptris* spp. 164, *A. bovicorneus* Puplesis & Robinson, 2000 (**first photographic documentation**), male adult, paratype (ZMUC); 165, same, male genitalia, slide no. AD0307 (ZMUC), phallus; 166, same, capsule; 167, 168, *A. insolentis* Puplesis & Diškus, 2002 (**first photographic documentation**), paratype, male adult (ZMUC); 169, same, male genitalia, slide no. AD0323 (ZMUC), capsule; 170, same, phallus.



FIGURES 171–180. The *Acalyptris latipennata* species group. 171, *A. dividua* Puplesis & Robinson, 2000, male adult, paratype (ZMUC); 172–174, *A. ecuadoriana* Puplesis & Diškus, 2002, male adult, paratype (ZMUC); 175, *A. onorei* Puplesis & Diškus, 2002, male adult, paratype (ZMUC); 176, *A. amazonensis* Stonis & Diškus, 2018, male adult, holotype (ZMUC); 177, uncus and gnathos, *A. ecuadoriana* Puplesis & Diškus, paratype, slide no. AD325 (ZMUC); 178, same, *A. amazonensis* Stonis & Diškus, holotype, genitalia slide no. AD0352 (ZMUC); 179, 180, male genitalia of *A. dividua* Puplesis & Robinson (**first photographic documentation**), paratype, slide no. AD0309 (ZMUC).

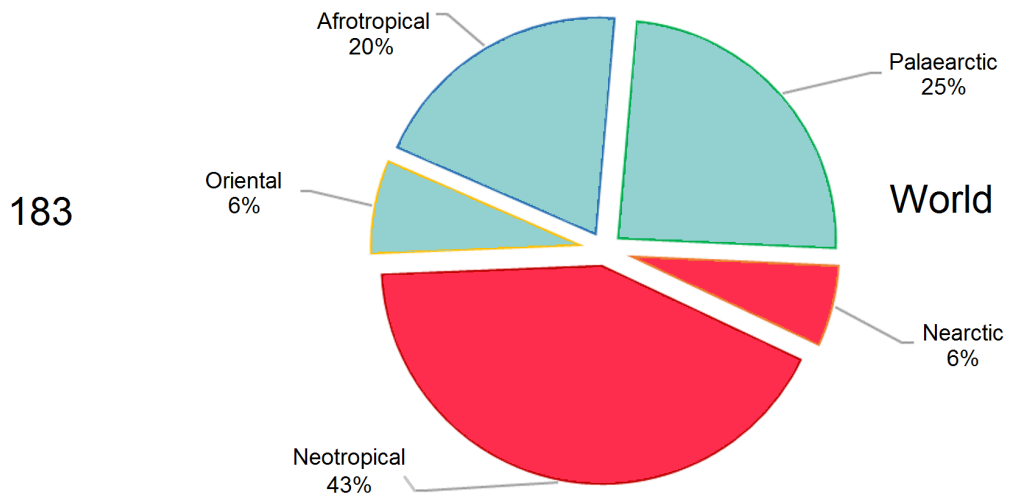


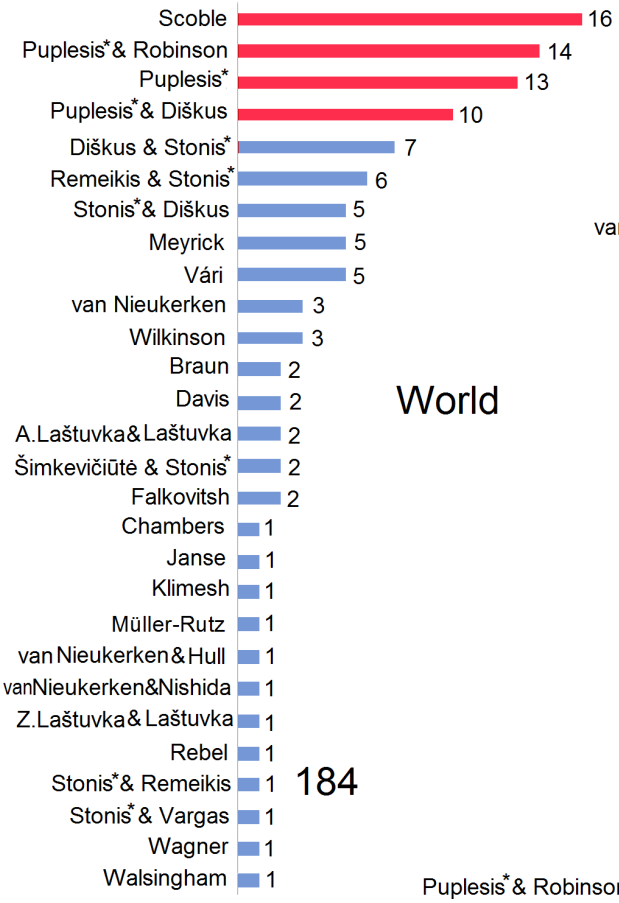
181

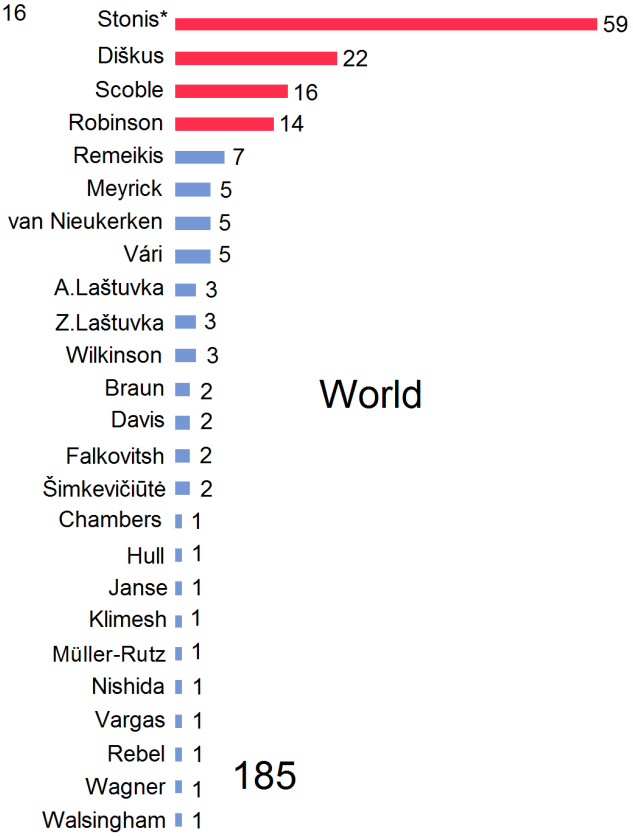


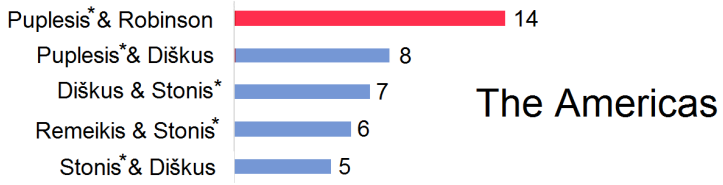
182

FIGURES 181, 182. Fragments of two major versions of the Neighbour-Joining tree of *Acalyptris*. The divergence was calculated using the Kimura 2-parameter model on the basis of 597 (in Fig. 181) and 657 bp mtDNA COI sequences (in Fig. 182). Low bootstrap values are not shown. The sequences of the *Stigmella foreroi* Stonis & Vargas (available at GenBank under sample ID MN982355) and *S. pruinosa* Puplesis & Robinson from Colombia (available at GenBank under sample ID's MN982357 and MN982359) were used as an outgroup.









FIGURES 183–186. Overview on the world fauna and history of description of *Acalyptris*. 183, currently described diversity of *Acalyptris* in major zoogeographical regions (note: only named species were counted); 184, exact authorship of all curently known *Acalyptris* species of the world fauna; 185, participation of researchers in species descriptions of the world fauna presented by an individual researcher; note that species overlap because many species were described in authorship of two researchers; 186, top authorship of *Acalyptris* species of the American fauna (authorship with less than 5 described species was omitted) (*—Jonas Rimantas Stonis, formerly Rimantas Puplesis).

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