

RESEARCH PAPER

A revision of the genus *Ivanauskiella* (Lepidoptera: Gelechiidae)Oleksiy BIDZILYA¹⁾, Ole KARSHOLT²⁾ & Jan ŠUMPICH^{3,*)}¹⁾ Institute for Evolutionary Ecology of the National Academy of Sciences of Ukraine, 37 Academician Lebedev str., 03143, Kyiv, Ukraine; e-mail: olexbid@gmail.com; ORCID: 0000-0001-9243-2481²⁾ Zoological Museum, Natural History Museum of Denmark, Universitetsparken 15, DK-2100 Copenhagen, Denmark; e-mail: okarsholt@snm.ku.dk; ORCID: 0000-0002-6969-2549³⁾ National Museum of the Czech Republic, Department of Entomology, Cirkusová 1740, CZ-193 00 Praha 9 – Horní Počernice, Czech Republic; e-mail: jansumpich@seznam.cz; ORCID: 0000-0002-0262-2941

*) Corresponding author

Accepted:
22nd March 2023Published online:
11th May 2023

Abstract. We revise the genus *Ivanauskiella* Ivinskis & Piskunov, 1980. Six new species are described: *I. sutteri* sp. nov. (Greece: Crete), *I. bovis* sp. nov. (Morocco), *I. nigripunctata* sp. nov. (Spain), *I. annekrystinae* sp. nov. (France: Corsica), *I. limoniella* sp. nov. (Bulgaria, Ukraine, Turkey, Russia), *I. albinmarginata* sp. nov. (Armenia, Iran). *Ivanauskiella turkmenica* Ivinskis & Piskunov, 1980, sp. restit., is reinstated as a separate species from synonymy with *I. psamathias* (Meyrick, 1891). Updated distribution records are provided for all ten species recognised in *Ivanauskiella*. Illustrations of adults, and male and female genitalia are provided, as well as data on the DNA barcode when available.

Key words. Lepidoptera, Gelechiidae, *Ivanauskiella*, *Limonium*, cytochrome oxidase I, DNA barcoding, host plant, new records, new species, revision, taxonomy, Palearctic Region

Zoobank: <http://zoobank.org/urn:lsid:zoobank.org:pub:18E498A5-FF22-46F9-8A95-5C8A3629F945>

© 2023 The Authors. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Licence.

Introduction

The genus *Ivanauskiella* Ivinskis & Piskunov, 1980 was described as monotypic with *I. turkmenica* Ivinskis & Piskunov, 1980 as type species. Later, *Apodia ainella* Chrétien, 1908 and *Apodia psamathias* Meyrick, 1895 from Algeria were transferred to *Ivanauskiella* and *A. psamathias* was considered a senior synonym of *I. turkmenica* (PISKUNOV 1990: 309). Subsequent authors followed this conception, and specimens from Russia, Ukraine and Croatia were identified as *I. psamathias* (KOSTJUK et al. 1994; BIDZILYA 1997, 2009; JUNNILAINEN et al. 2010; ŠUMPICH 2013). Additionally, NEL & VARENNE (2013) established the monotypic genus *Spatuncusella* Nel & Varenne, 2013 to accommodate *S. occitanica* Nel & Varenne, 2013 from southern France. Both these taxa were soon synonymised: *Spatuncusella* with *Ivanauskiella* and *S. occitanica* with *I. psamathias* (NEL & VARENNE 2017). The latter synonymy, however, was rejected, and *I. occitanica* was reinstated as a separate species (HUEMER & KARSHOLT 2020). Thus, at the beginning of our study the genus *Ivanauskiella* comprised three described species, two undescribed species from Spain and Russia were suggested (HUEMER & KARSHOLT

2020), and several potentially new species were discovered in various collections by authors of this paper. Here we describe six new species, provide some taxonomic and nomenclatural changes and update distribution records.

Species of *Ivanauskiella* are exceptionally uniform in the male genitalia; therefore, the species are primarily arranged based on differences in the female genitalia. The placement of two species with unknown female sex is provisional.

Material and methods

Specimens and photographic documentation. The specimens examined were partly collected by authors using different methods, above all attracting to ultraviolet light, light trapping and netting. Additional material was excerpted from various private and museum collections, the abbreviations of which are given below.

Pinned specimens were photographed with a Canon EOS 5DS R DSLR camera (OB) and a Canon 750D camera with a Canon MP-E-65 mm lens (JŠ). Male and female genitalia were dissected and prepared using stan-



standard methods for the Gelechiidae (HUEMER & KARSHOLT 2010). Male genitalia were spread implementing the unrolling technique described by PITKIN (1986) and HUEMER (1988). Slide-mounted genitalia were photographed with a Canon EOS 600D DSLR camera mounted on an Olympus U-CTR30-2 trinocular head mounted on a Carl Zeiss compound microscope (OB) and a Canon EOS 200D camera mounted on an Olympus CX31 stereomicroscope (JŠ). For each photograph, a set of 10–60 images was taken at different focal planes and focused-stacked using Helicon Focus 6 with the final image edited in Adobe Photoshop CS5. For holotypes the information is cited verbatim as on the labels (transliterated in case of Cyrillic), whereas for other material it is cited in a standardised format rather than verbatim.

The present contribution is based on material deposited in the following collections:

ECKU	Collection of Ecology-Centre, Kiel University, Kiel, Germany;
MfN	Museum für Naturkunde, Berlin, Germany;
MNHN	Muséum national d'Histoire naturelle, Paris, France;
MZHF	Finnish Museum of Natural History, Helsinki, Finland;
NHMUK	The Natural History Museum, London, United Kingdom;
NMPC	National Museum of the Czech Republic, Prague, Czech Republic;
NUPP	Research collection of Kari & Timo Nupponen, Espoo, Finland;
RCGB	Research collection of Giorgio Baldizzone, Asti, Italy;
RMNH	Naturalis Biodiversity Center, Leiden, the Netherlands;
SMNK	Staatliches Museum für Naturkunde, Karlsruhe, Germany;
TLMF	Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria;
ZIN	Zoological Institute of Russian Academy of Sciences, Sankt Petersburg, Russia;
ZMKU	Zoological Museum, Kyiv Taras Shevchenko National University, Kyiv, Ukraine;
ZMUC	Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark.

Other abbreviations:

OB	Oleksiy Bidzilya;
OK	Ole Karsholt;
JŠ	Jan Šumpich;
TL	type locality.

DNA barcoding. Sixteen selected specimens of *Ivanauskiella* species presented in this study were barcoded at the Canadian Centre for DNA Barcoding (CCDB, Biodiversity Institute of Ontario, University of Guelph). Dry legs were used for DNA extraction. Barcode sequences of the mitochondrial cytochrome c oxidase subunit I gene (COI) were obtained (592–658 base-pair long segments of the 5' terminus of cytochrome c oxidase I). Details of the sequenced specimens comprising faunistic data and images were uploaded to the Barcode of Life Data Systems (BOLD; RATNASINGHAM & HEBERT 2007), and they are becoming public now. All sequences were subsequently calculated

under the Kimura 2-parameter model using analytical tools of BOLD Systems v. 4.0. (<http://www.boldsystems.org>). A neighbour-joining tree of DNA barcode data was constructed using MEGA X software (KUMAR et al. 2018) under the Kimura 2-parameter model for nucleotide substitutions. For each species we present the Barcode Index Numbers (BIN) (RATNASINGHAM & HEBERT 2013).

Taxonomy

Family Gelechiidae Stainton, 1854 Subfamily Anomologinae Meyrick, 1926

Ivanauskiella Ivinskis & Piskunov, 1980

Ivanauskiella Ivinskis & Piskunov, 1980: 23 (original description; type species: *Ivanauskiella turkmenica* Ivinskis & Piskunov, 1980: 25, by original designation)

Spatuncusella Nel & Varenne, 2013: 35 (original description; type species: *Spatuncusella occitanica* Nel & Varenne, 2013: 40, by original designation). Synonymized by NEL & VARENNE (2017).

Diagnosis. *Ivanauskiella* is characterised by clavate valva, narrow elongate sacculus, long clavate uncus and stout phallus with needle-shaped spines in vesica in the male genitalia. Normally double signum with small rounded anterior one and large horned posterior one, in combination with distinct colliculum that usually bears short thorn-shaped sclerites (but see details below) are characteristic for the female genitalia.

Most of these characters are scattered within other genera of Anomologinae: strong uncus is present in *Psamathocrita* Meyrick, 1925, slender saber-shaped sacculus, somewhat similar valva, needle-shaped cornuti and distinct colliculum can be found in some *Monochroa* Heinemann, 1870, whereas signum with characteristic thorns is common for *Oxypteryx* Rebel, 1911 and *Bryotropha* Heinemann, 1870. However, the unique double signum in combination with the above-mentioned suite of characters unambiguously separates species of *Ivanauskiella* from other genera of the tribe.

Description. *Head* smoothly scaled; labial palpus up-curved, long, protruding over head, segment 2 of labial palpus about as broad as or just slightly broader than segment 3, smooth, dark with light apex, segment 3 0.66–0.75 length of segment 2, slender, pointed, uniformly coloured or with indistinct belts; scape of antenna without pecten, flagellum filiform, weakly or distinctly light annulated.

Thorax and tegula concolorous with head. Forewing elongate, moderately slender, wingspan 6.0–12.5 mm, normally more or less uniformly light grey to light brown and brown, with slight sheen in some species, dark suffusion along margins and termen in some species, pattern (if present) consists of three brown spots in cell, brown spot (or touch) in fold, and additional diffuse small dark spots below costal margin; costal and dorsal margins distinctly lightened in *I. albimarginata* sp. nov.; hindwing light grey to dark grey, with distinct subapical excavation and slender pointed apex. The venation for *I. occitanica* is described and illustrated by NEL & VARRENNE (2013).

Frenulum simple in male and consisting of two (*I. limo-*

Table 1. The group mean distance according to the tree in Fig. 1 computed by MEGAX.

	<i>limoniella</i>	<i>occitanica</i>	<i>nigripunctata</i>
<i>limoniella</i>			
<i>occitanica</i>	0.0775		
<i>nigripunctata</i>	0.1162	0.1093	

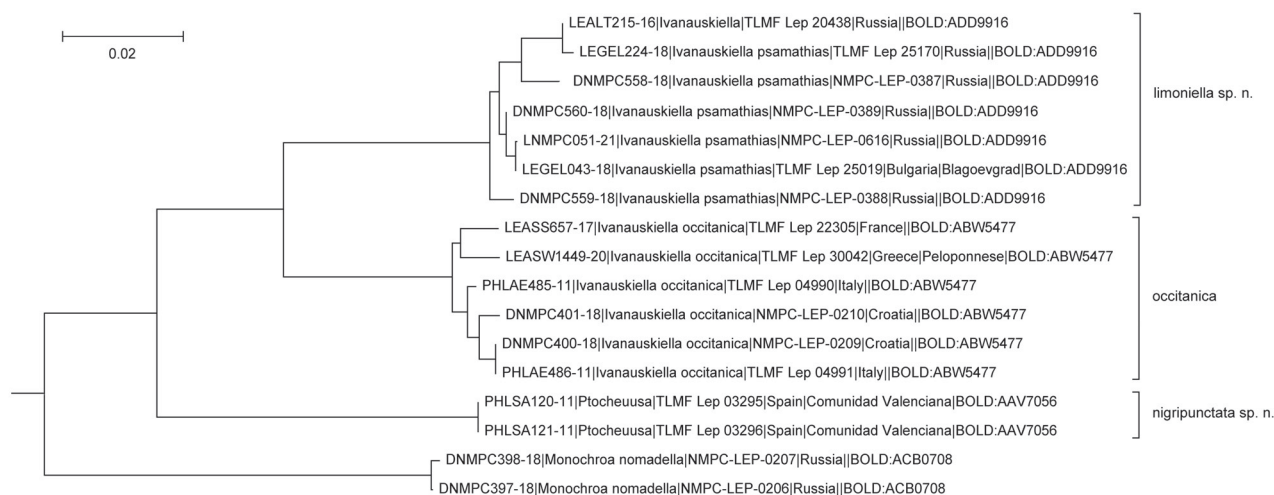


Fig. 1. Neighbor-Joining tree of *Ivanauskiella* species and *Monochroa nomadella* (Zeller, 1868) as an outgroup. Source: Barcode of Life Database, cf. RATNASINGHAM & HEBERT (2007).

niella sp. nov.) or three (*I. bovis* sp. nov.) acantae in female.

Abdomen. Male segment VIII slightly longer than remaining abdominal segments, sternum subrectangular, tergum trapezoidal, with pairs of hair-like tufts and tufts of grape-shaped coremata arising from membranous connection between posterior margin of segment VIII and genitalia capsule. Female segment VII twice as long as remaining abdominal segments, with row of dense scales along dorsal margin, sternum subquadrate to subrectangular, tergum VII twice as long as broad; sternum II with distinct venulae and well developed apodeme.

Male genitalia. Uncus long, slender with apex strongly flattened laterally, with posterior margin finely serrate, connected with tegumen by distinct basal sclerotised arms; gnathos absent; tegumen as broad as or slightly broader than long, subrectangular, with broad triangular posteromedial and shallow anteromedial emarginations, lateral parts wrapped inside; valva clavate, with narrow medial portion and strongly broadened apex covered with short setae; sacculus direct, weakly bent to saber-shaped, 0.33–0.50× as long as valva; vinculum very short; saccus short, subtriangular or subrectangular; phallus stout, long, parallel-sided, cornuti in vesica vary in number and shape from several comparatively large thorn-shaped to about 20 small, needle-shaped spines, additional group of minute spines gathered in rounded apical plate is usually present, in some species vesica bears numerous minute spines only; lamina ducti ejaculatorii as long as phallus with anterior sclerite.

Female genitalia. Papilla analis subovate, covered with short hair-like setae; apophysis posterioris straight or weakly curved, as long as or slightly longer than apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, about as long as broad, slightly narrowing posteriorly, sternum VIII evenly sclerotised except for subtriangular posterior plates, posterior margin straight with row of strong setae; ostium indistinct; apophysis anterioris straight, divided at base into two processes: one of them extending posteriorly towards subtriangular plate under posterior margin of sternum VIII, another one

directed dorso-laterally; ductus bursae moderately broad, of equal width or slightly broadened anteriorly, colliculum subtriangular belt, situated at 0.33–0.66 of ductus bursae, part of ductus bursae anteriorly adjacent to colliculum is modified bearing one or two thorn-shaped sclerites, densely covered with short teeth and weakly wrinkled, ductus seminalis arises slightly anteriorly from colliculum (for practical reasons we treat thorn-shaped sclerites as part of colliculum in species descriptions), corpus bursae rounded to ovate, signum usually paired: anterior one small rounded or weakly elongate, densely serrate plate, posterior one elongate or irregularly shaped plate with two distinct horn-shaped processes, in some species both signa are small plates without projections, one species with single signum with four horn-shaped processes.

Biology. The larvae of *I. turkmenica* and *I. limoniella* sp. nov. were observed feeding on *Limonium* sp. (FALKOVITSH & BIDZILYA 2006, 2009). Host plants for other species are unknown.

Distribution. Species of *Ivanauskiella* occur mainly in open landscapes (grasslands, coastal habitats, mountain steppe slopes) in the Palaearctic Region from Spain and Morocco to Mongolia and Southern Yakutia of Russia.

Remarks. *Ivanauskiella bovis* sp. nov., *I. psamathias*, *I. nigripunctata* sp. nov., *I. albimarginata* sp. nov., *I. annekrystinae* sp. nov., *I. ainella* and *I. turkmenica* can be recognised by their forewing pattern. Superficial identification of the uniformly coloured species (*I. limoniella* sp. nov., *I. occitanica* and *I. sutteri* sp. nov.) should be confirmed by examination of genitalia. The male genitalia of *Ivanauskiella* are rather uniform in the shape of gnathos, valva, sacculus and saccus. The shape and number of cornuti in the phallus as well as the shape of signa in the female genitalia are the most important diagnostic characters for separating species of *Ivanauskiella*.

Molecular data are available for *I. limoniella* sp. nov., *I. occitanica* and *I. nigripunctata* sp. nov. (HUEMER et al. 2020: suppl. data 2), and partially for *I. albimarginata* sp. nov. and support the taxonomy based on morphological characters.

Key to adults based on external characters

- 1 Forewing light brown with costal and dorsal margin lighter. *I. albimarginata* sp. nov.
- Forewing with markings or uniformly coloured. 2
- 2 Forewing with markings. 3
- Forewing uniformly coloured. 5
- 3 Forewing with diffuse pale subapical fascia.
- *I. turkmenica* Ivinskis & Piskunov, 1980
- Forewing without pale subapical fascia. 4
- 4 Forewing light brown with darker brown streak in fold and brown spots in cell and under costal margin, wingspan 10–13 mm. *I. ainella* (Chrétien, 1908)
- Forewing without brown streak in fold, wingspan 6.0–9.0 mm. 5
- 5 Wingspan 6.0–7.1 mm, apex concolorous with forewing. 6
- Wingspan 8.7–10.0 mm, apex of forewing spotted with white. *I. psamathias* (Meyrick, 1891)
- 6 Segment 2 of labial palpus brown with white apex, forewing light grey with small black markings.
- *I. nigripunctata* sp. nov.
- Segment 2 of labial palpus uniformly white, forewing white with large black markings.
- *I. annekristinae* sp. nov.
- 7 Forewing ochreous brown, wingspan 10.0–12.5 mm.
- *I. bovis* sp. nov.
- Forewing light brown to grey or greyish brown, with or without sheen, wingspan 7.5–9.0 mm. 8
- 8 Forewing with distinct sheen. ... *I. limoniella* sp. nov.
- Forewing without sheen. 9
- 9 Forewing white mottled with light brown.
- *I. sutteri* sp. nov.
- Forewing greyish brown, without sheen.
- *I. occitanica* sp. nov.

Key to males based on genitalia

- 1 Vesica with numerous minute spines.
- *I. turkmenica* Ivinskis & Piskunov, 1980
- Vesica with large needle-shaped spines and small thorn-shaped spines. 2
- 2 3–4 big needle-shaped spines.
- *I. psamathias* (Meyrick, 1891)
- 8–20 big needle-shaped spines. 3
- 3 Uncus widened after 1/4 length. *I. sutteri* sp. nov.
- Uncus widened after 1/2–3/4 length. 4
- 4 25–30 needle-shaped spines in vesica. 5
- 8–20 needle-shaped spines in vesica. 6
- 5 Uncus gradually widened posteriorly, saccus U-shaped. *I. annekristinae* sp. nov.
- Uncus strongly widened posteriorly, saccus usually triangular. *I. nigripunctata* sp. nov.
- 6 8–10 needle-shaped cornuti in vesica.
- *I. limoniella* sp. nov.
- 10–15 needle-shaped cornuti in vesica. 7
- 7 Vesica with about 8–10 short and broad, and 8–10 long narrow cornuti. *I. bovis* sp. nov.
- Number of long cornuti exceeds number of short cornuti. 8

- 8 10–12 needle-shaped cornuti. 9
- 12–15 needle-shaped cornuti.
- *I. occitanica* (Nel & Varenne, 2013)
- 9 Saccus as right triangle. ... *I. ainella* (Chrétien, 1908)
- Saccus longer than broad at base.
- *I. albimarginata* sp. nov.

Key to females based on genitalia

Note. Females of *I. annekristinae* sp. nov. and *I. turkmenica* are unknown.

- 1 Signum single, with four processes.
- *I. sutteri* sp. nov.
- Signum paired, posterior one with two processes or simple. 2
- 2 Posterior signum without processes.
- *I. psamathias* (Meyrick, 1891)
- Posterior signum with processes. 3
- 3 Signum joined, posterior one bull skull-shaped with long processes. *I. bovis* sp. nov.
- Signum separated. 4
- 4 Colliculum with one thorn-shaped sclerite. 5
- Colliculum with two thorn-shaped sclerites. 6
- 5 Posterior signum with upcurved processes.
- *I. ainella* (Chrétien, 1908)
- Posterior signum with transverse processes.
- *I. nigripunctata* sp. nov.
- 6 Anterior signum rounded. 7
- Anterior signum elongated.
- *I. occitanica* (Nel & Varenne, 2013)
- 7 Posterior signum with processes directed posteriorly.
- *I. limoniella* sp. nov.
- Posterior signum with processes directed posterolaterally. *I. albimarginata* sp. nov.

Review of species***Ivanauskiella sutteri* sp. nov.**

(Figs 2–3, 51, 72)

Type material. HOLOTYPE: ♀, GREECE: CRETE: Makrigialos, Aspros Potamos, 20 m, LF, 3.ix.2001, R. Sutter leg. (gen. slide 165/20, OB) (SMNK). PARATYPE: 1 ♂, same data as for holotype but 8.ix.2001 (gen. slide 6630, Sutter) (SMNK).

Diagnosis. This new species can be recognized externally by the white head and white forewing strongly mottled with light brown scales. The male genitalia are identifiable from a broad valva (in basal half about as broad as at apex) and uncus strongly widened after 1/4 (after 1/2–3/4 in the remaining species). Two short teeth on colliculum and a single four-horned signum are characteristic for the female genitalia.

Description. *Adult* (Figs 2–3). Wingspan 7.6–8.0 mm. Head white; labial palpus white mixed with brown on outer surface; scape of antenna light brown with white apex, flagellum light brown ringed with white; thorax and forewing covered with white, brown-tipped scales, very indistinct markings and diffuse brown spot in fold in one specimen, fringe white; hindwing white.

Male genitalia (Fig. 51). Uncus very slender at base, strongly widened after 1/4–1/3, extending to top of valva,

apex triangular, posterior margin weakly serrate; tegumen subrectangular, slightly broader than medial portion of uncus; valva broad, weakly narrowed in middle, gradually bent, top and base as broad as top of uncus; sacculus 1/3–1/2 length of valva, as broad as valva in middle; vinculum short; saccus short, triangular, pointed; phallus with 15–17 large needle-shaped and small, short, thorn-shaped spines, distal plate large, of irregular shape.

Female genitalia (Fig. 72). Papilla analis subovate, covered with short hair-like setae; apophysis posterioris straight, as long as apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae gradually broadening anteriorly, colliculum with two short thorn-shaped sclerites, situated at 1/3 of ductus bursae; corpus bursae egg-shaped, signum single plate with four horn-shaped processes – posterior ones shorter than anterior ones.

Molecular data. No barcode available.

Etymology. The species is named in honour of the late German microlepidopterist Reinhard Sutter, who collected the type series of the new species.

Biology. Host plant unknown. Adults were collected at light at an altitude of 20 m in early September.

Distribution. Greece: South-eastern Crete.

Ivanauskiella bovis sp. nov.

(Figs 4–7, 46, 52, 73–74)

Type material. HOLOTYPE: ♀, MOROCCO: HIGH ATLAS: 7 km S of Ouirgane, 950 m, 31°8'19"N 8°5'51"W, 1.–5.v.2016, C. Hviid, K. Larsen & D. Nilsson leg. (gen. slide 164/20, OB) (ZMUC). PARATYPES: MOROCCO: HIGH ATLAS: 3 ♂♂, 27 km NW Taroudant, 670 m, N31.2519, W87.76916, 29.iv.2013, J. Tabell leg. (ZMUC); 3 ♂♂ 6 ♀♀, 6 km NW Ouirgane, road to Amizmiz, 1050 m, 31°12'29"N, 8°4'23"W, 1.–2.v.2016, C. Hviid, K. Larsen & D. Nilsson leg. (gen. slide 132/20, OB; 5302 OK) (ZMUC); 19 ♂♂ 13 ♀♀, 7 km S Ouirgane, 950 m, 31°8'19"N, 8°5'51"W, 1.–5.v.2016, C. Hviid, K. Larsen & D. Nilsson leg. (gen. slide 164/20, OB) (NMPC, ZMKU, ZMUC); 1 ♂ 1 ♀, 3 km S Ouirgane, 950 m, 31°11'31"N, 8°3'16"W, 1.–5.v.2016, C. Hviid, K. Larsen & D. Nilsson leg. (gen. slide 132/20, OB) (ZMUC); 5 ♂♂, Guelmim-Qued Noun, Sidi Ifni, 29°23'00"N, 10°10'21"W, 5.–7.iii.2017, sea level, C. Hviid, O. Karsholt, K. Larsen & D. Nilsson leg. (gen. slide 131/20, OB) (ZMUC). ANTI ATLAS: 1 ♂, 12 km E Tafraout, 1690 m, N29.72454, W8.84551, 27.iv.2013, J. Tabell leg. (ZMUC).

Diagnosis. This new species is identifiable externally by the uniformly coloured ochreous brown forewing, which has not been observed in other species of *Ivanauskiella*. The male genitalia of *I. bovis* sp. nov. are rather similar to those of *I. ainella* and *I. limoniella* sp. nov., but can be separated by the shape of the cornuti in the vesica, which are comparatively short and broad in *I. bovis* sp. nov. contrary to the slender needle-shaped cornuti in related species. In the female genitalia colliculum with one large tooth situated at 2/3 of ductus bursae and the connected signa with bull skull shaped posterior ‘horns’ are diagnostic.

Description. Adult (Figs 4–7). Wingspan 10.0–12.5 mm. Head, thorax and tegulae ochreous brown with slight sheen, frons whitish; labial palpus uniformly brown, with inner surface light brown, scape of antenna and flagellum as head, with indistinct light rings; forewing ochreous brown, fold and some veins look darker in some specimens; hindwing light grey.

Variability. The specimens of the type series vary slightly in the colour of the forewing, from lighter to darker ochreous brown. Some specimens have the fold slightly darker and a tendency to a dark spot at the end of the cell. In other specimens there is a diffuse whitish subapical fascia.

Male genitalia (Figs 46, 52). Uncus very slender from 1/3 to 3/4, apex strongly widened, rounded, extending to top of valva, posterior margin weakly serrate; tegumen sub-rhomboid; valva moderately broad, in middle twice as broad as uncus, gradually bent, apical 1/3 and base as broad as top of uncus; sacculus about 1/2 length of valva, as broad as valva in middle; vinculum short; saccus short, triangular; phallus with 10–12 prominent comparatively short and broad cornuti and 8–10 small thorn-shaped spines, distal plate large, of irregular shape.

Female genitalia (Figs 73–74). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris straight, as long as apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae of even width, colliculum with one large thorn-shaped sclerite, situated at 2/3 of ductus bursae; corpus bursae egg-shaped, signa connected: anterior one rounded to weakly elongate plate, posterior one shaped as bull skull with more or less strongly curved horns.

Molecular data. No barcode available.

Etymology. The species name is genitive of the Latin word *bos*, bull, and refers to the bull skull shaped signum that is characteristic for the new species.

Biology. Host plant unknown. Adults were collected at light at stony localities from March to May – at altitudes from near sea level near the coast of the Atlantic Ocean up to 1690 m in the Anti-Atlas Mts.

Distribution. Morocco.

Ivanauskiella psamathias (Meyrick, 1891)

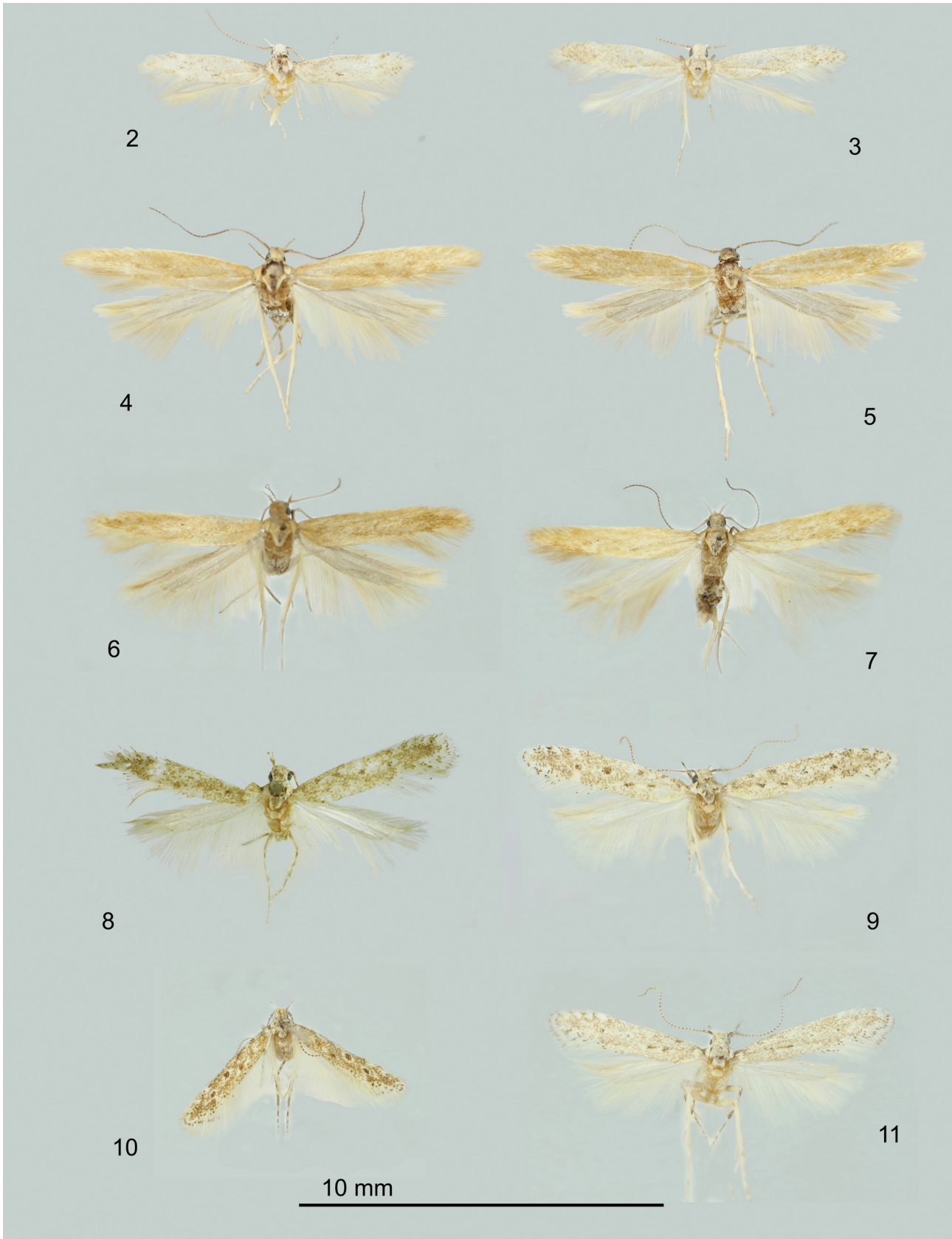
(Figs 8–11, 53, 75)

Apodia psamathias Meyrick, 1891: 56. TL: Algeria, Biskra
Aristotelia psamathias (Meyrick, 1891): CLARKE (1969: 302)
Ivanauskiella psamathias (Meyrick, 1891): PISKUNOV (1990: 309)

Type material examined. LECTOTYPE: ♂, ALGERIA: ‘Biskra, Algeria, 21/4/90 | *Apodia psamathias* Meyr., Holotype, ♂ | Meyrick Coll. B.M. 1938-290 | Type | Lectotype | ♂ genitalia on slide 19.ii.1949, J.F.G.C. 9056 | Slide NHMUK 010316668’ (NHMUK).

Additional material examined. ALGERIA: 1 ♂, ‘Biskra, [18]97, St[au]d[in]g[er].’ (gen. slide 297/20♂, OB) (MfN). TUNISIA: 6 ♂♂ 5 ♀♀, ‘Mauritania’, Tunisia-Sud, Oasis Tozeur, 28.iv.–11.v.1981, M. & W. Glaser leg. (gen. slide 323/19♀, 5/20♂, 24/20♂, 97/22♂, 98/22♀, OB) (SMNK); 12 ♂♂ 28 ♀♀, Nefta area, 1.–4.v.1988, O. Karsholt leg. (gen. slides 4706, 4707 Hendriksen) (NMPC, ZMKU, ZMUC); 9 ♂♂, 3 specimens without abdomen, 5 km W Douz, 17.–18.iv.1984, K. Mikkola leg. (gen. slides Hk5534, Hk5444, Hk5547, Hk5548, Hk5549; 5425 OK) (MZHF, ZMUC); 1 specimen without abdomen, 1 km W. Douz, 19.iv.1984, K. Mikkola leg. (MZHF).

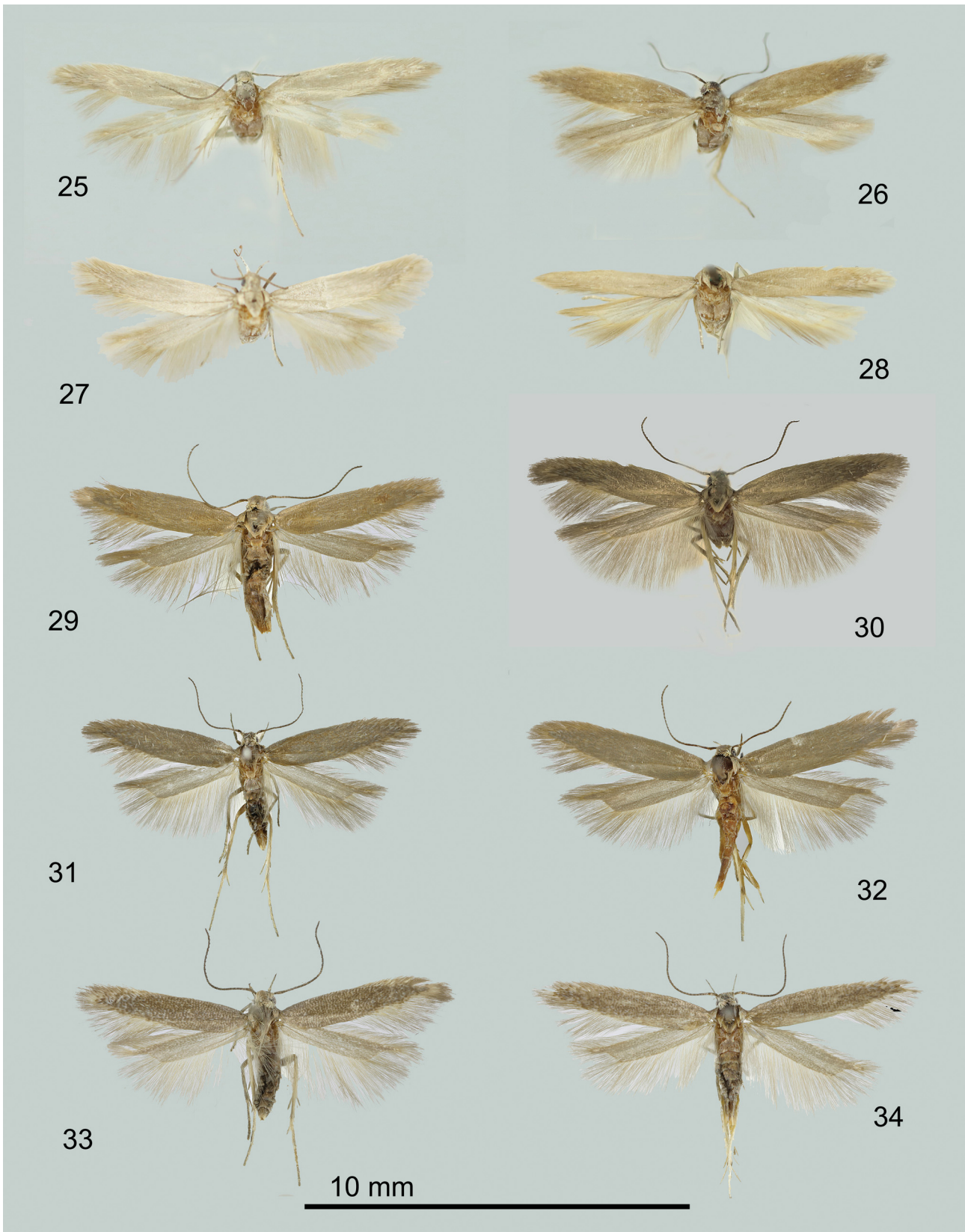
Diagnosis. *Ivanauskiella psamathias* is distinctive by having light, greyish-brown forewing with three distinct dark spots in cell, one in fold and two below basal 1/3 of costal margin. *Ivanauskiella nigripunctata* sp. nov. is similar but smaller (6.5–7.7 mm in wingspan). 3–5 large thorn-shaped and a few small spine-like cornuti in vesica in combination with narrow saccus are characteristic for



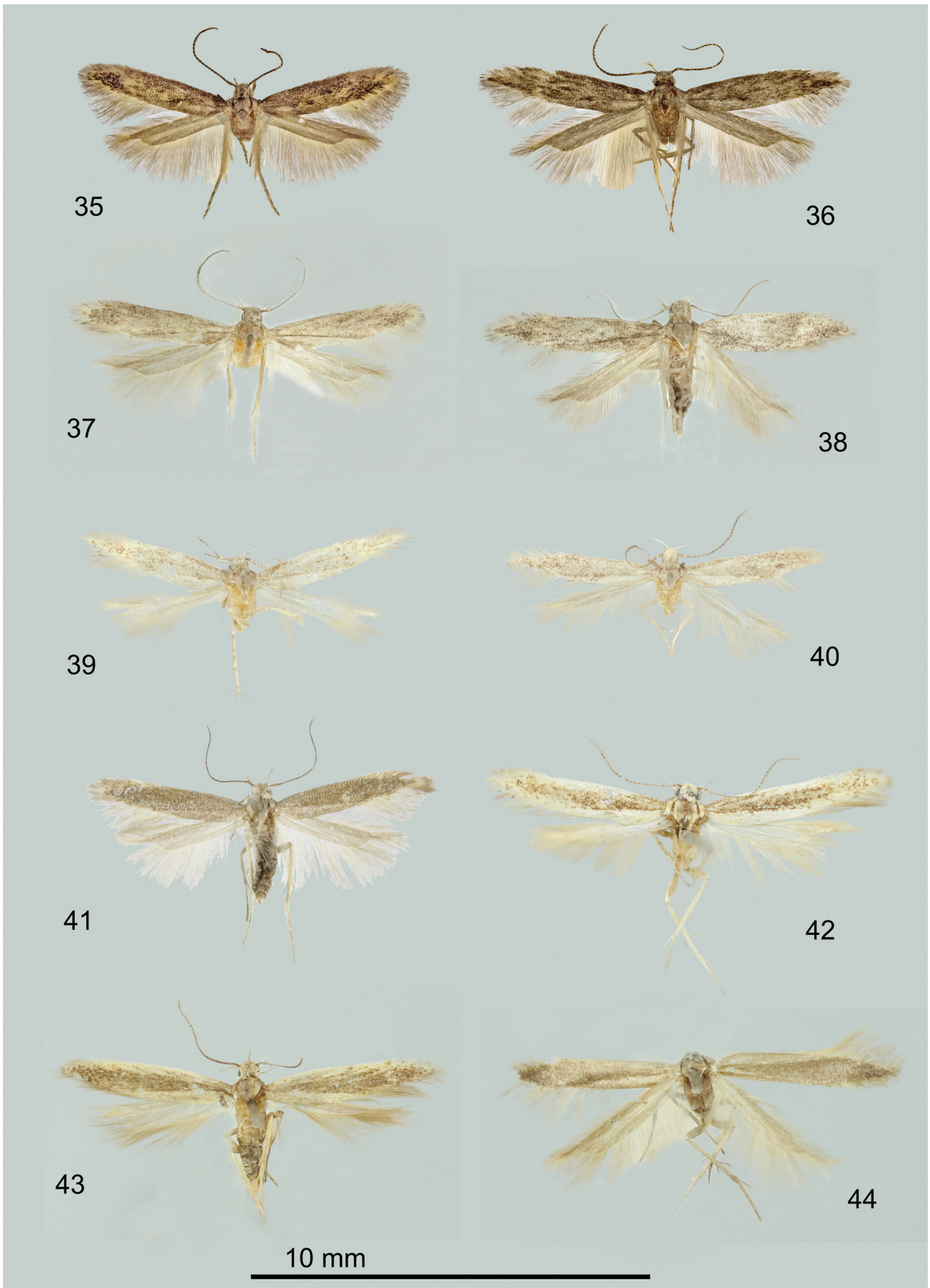
Figs 2–11. Adults of *Ivanauskiella* species. 2–3 – *I. sutteri* sp. nov., Crete: 2 – holotype, female (gen. slide 165/20, OB); 3 – paratype, male (gen. slide 6630, R. Sutter). 4–7 – *I. bovis* sp. nov., Morocco: 4 – holotype, female (gen. slide 164/20, OB); 5 – paratype, female (gen. slide 132/20, OB); 6 – paratype, male (gen. slide 131/20, OB); 7 – paratype, male. 8–11 – *I. psamathias* (Meyrick, 1891): 8 – lectotype, male, Algeria (gen. slide J.F.G.C. 9056); 9 – male, Tunisia (gen. slide 5/20, OB); 10 – female, Tunisia (gen. slide 98/22, OB); 11 – male, Tunisia (gen. slide 24/20, OB).



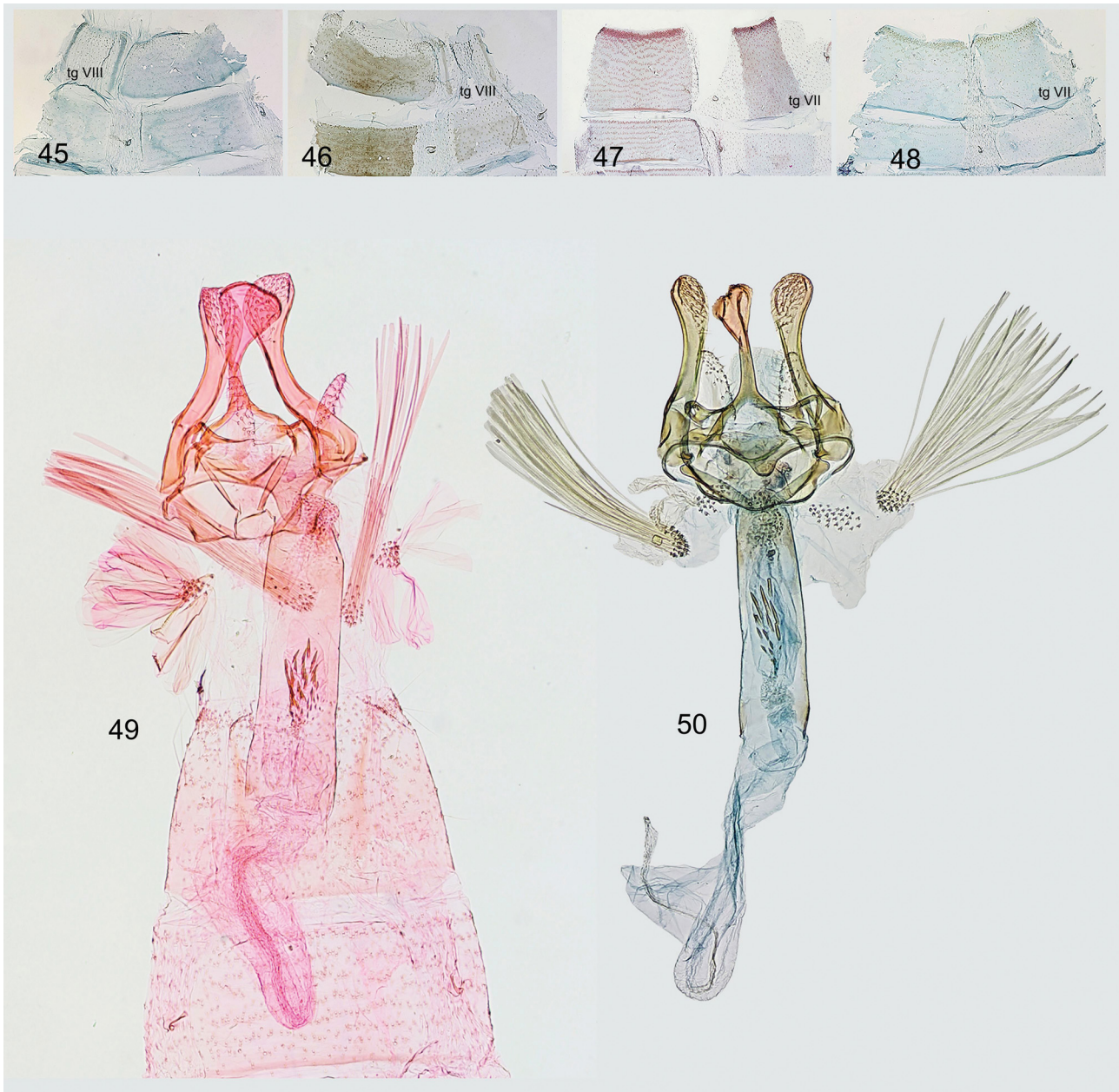
Figs 12–24. Adults of *Ivanauskiella* species. 12–15 – *I. ainella* (Chrétien, 1908): 12 – male, paratype, Algeria (gen. slide 139/20, OB); 13–15 – Morocco: 13 – male (gen. slide 180/22, OB); 14 – male (gen. slide 177/22, OB); 15 – female (gen. slide 187/22, OB). 16–22 – *I. nigripunctata* sp. nov., Spain: 16 – holotype, male; 17 – paratype, female (gen. slide 136/20, OB); 18 – paratype, male (gen. slide 135/20, OB); 19 – paratype, female (gen. slide 151/20, OB); 20 – paratype, male (gen. slide 18084, JŠ); 21 – paratype, male (gen. slide 23015, JS); 22 – paratype, female (gen. slide 183/22, OB). 23–24 – *I. annekristinae* sp. nov., males, France, Corsica, paratypes: 23 – gen. slide 137/20, OB; 24 – male.



Figs 25–34. Adults of *Ivanauskiella limoniella* sp. nov. 25–26 – Ukraine: 25 – holotype, male (gen. slide 171/20, OB); 26 – paratype, female (gen. slide 22/20, OB); 27 – Bulgaria, female; 28–32 – Russia: 28 – Zabaikalskiy krai, male (gen. slide 25/20, OB); 29–30 – Ural: 29 – female (gen. prep. 23016, JŠ); 30 – male (gen. prep. 18083, JŠ); 31–32 – Altai: 31 – male (gen. slide 23012, JŠ); 32 – female (gen. prep. 23011, JŠ); 33–34 – Armenia: 33 – male (photo 23004, JŠ); 34 – female (gen. prep. 23006, JŠ).



Figs 35–44. Adults of *Ivanauskiella* species. 35–40 – *I. occitanica* (Nel & Varenne, 2013): 35–36 – Croatia: 35 – male (gen. slide 23001, JŠ); 36 – male (gen. slide 18507, JŠ); 37 – female, Italy, Sardinia (gen. slide 38/20, OB); 38 – female, Italy, Sicily; 39 – male, Spain (gen. slide 185/22, OB); 40 – female, Spain (gen. slide 184/22, OB). 41–43 – *I. albimarginata* sp. nov., males: 41 – holotype, Armenia (barcode NMPC-Lep_0727); 42 – paratype, Iran (gen. slide 14/22, OB); 43 – paratype, Iran (gen. slide 1/23, OB). 44 – *I. turkmenica* Ivinskis & Piskunov, 1980, male, Uzbekistan (gen. slide 168/20, OB).



Figs 45–50. Details of morphology of *Ivanauskiella* species. 45–46 – male abdominal segments VII–VII: 45 – *I. ainella* (Chrétien, 1908) (gen. slide 139/20, OB); 46 – *I. bovis* sp. nov. (gen. slide 131/20, OB). 47–48 – female abdominal segments VI–VII: 47 – *I. limoniella* sp. nov. (gen. slide 22/20, OB); 48 – *I. occitanica* (Nel & Varenne, 2013) (gen. slide 141/20, OB). 49–50 – male genitalia of *I. occitanica* with coremata: 49 – grape-shaped and hair-like coremata, Greece (gen. slide 188/22, OB); 50 – hair-like coremata, Turkey (gen. slide 152/20, OB).

the male genitalia. Other species of the genus have more, but smaller cornuti. In the female genitalia both signa are rounded and densely covered with short thorns.

Redescription. Adult (Figs 8–11). Wingspan 8.7–10.0 mm. Head, thorax and tegulae covered with white brown-tipped scales, frons white; labial palpus upcurved, segment 2 brown with white basal and apical ring, segment 3 white with brown subapical ring; scape of antenna light brown with base and apex white, flagellum light brown ringed with white; forewing covered with white brown-tipped scales, two distinct brown spots in cell and two spots in fold surrounded with white, indistinct brown spots under 1/3 of costal margin and diffuse white tornal and costal spots at 3/4 in some specimens, fringe white, brown tipped; hindwing white.

Male genitalia (Fig. 53). Uncus slender from base to 2/3, then strongly widened towards triangular apex, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular; valva comparatively broad, in middle twice as broad as medial portion of uncus, dorsal margin straight, ventral margin bent, apical 1/3 as broad as top of uncus; sacculus about half length and as broad as valva in middle; vinculum short; saccus very slender, pointed; phallus with 3–5 elongate, needle-shaped and 5–7 very small thorn-shaped spines, distal plate large, of irregular shape.

Female genitalia (Fig. 75). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris slightly longer than apophysis ante-

rioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae of even width except for gradually broadened anterior portion, colliculum at 1/2 of ductus bursae with one large thorn-shaped sclerite; corpus bursae ovate, both signa rounded serrate plates: anterior one larger than posterior one.

Molecular data. No barcode available.

Biology. Early stages and host-plant unknown. The specimens from Tunisia were collected at light in a semi-desert habitat.

Distribution. The species is restricted to North-West Africa: Algeria and Tunisia (MEYRICK 1891, CARADJA 1920). Records from Europe and Asia should be referred either to *I. turkmenica* or *I. limoniella* sp. nov. or *I. occitanica* (details under those species). ‘Mauretania’ on the labels on some specimens refers to an old concept of Mauretania, covering all of North-West Africa.

Remarks. *Apodia psamathias* was described based on two males collected in April 1890 at the oasis of Biskra, Algeria. CLARKE (1969: 302, figs 1–1b) designated one specimen as lectotype and provided a monochrome photographs of the left wings, phallus and ventral view of the male genitalia of this specimen. Photographs of the lectotype in high resolution and a slide of its genitalia have been examined by authors and compared with specimens from Tunisia. Despite the lectotype looking more unicoloured with less distinct spots in the fold, its wing pattern with characteristic markings in the cell corner and apex spotted with white match well ‘fresher’ specimens collected in Tunisia. Four large thorn-shaped cornuti in the vesica of the lectotype of *A. psamathias* also justify its conspecificity with specimens from Tunisia.

Ivanauskiella ainella (Chrétien, 1908)

(Figs 12–15, 45, 54, 76)

Apodia ainella Chrétien, 1908: 91. TL: Algeria, Biskra

Ivanauskiella ainella (Chrétien, 1908): PISKUNOV (1990: 309)

Type material examined. PARATYPES: ♂, ‘*Apodia ainella* Chret. | 11.4 | Paratype’ (gen. slide 193/20, OB) (SMNK); 2 ♀♀, ‘Biskra, 30.4.[19]07’ (MNHN).

Additional material examined. ALGERIA: 1 ♂, Biskra, i.–v.1901, Steinbach leg. (genitalia in vial, 139/20, OB) (MfN). MOROCCO: 12 ♂♂ 10 ♀♀, Erfoud/Rissani area, 13.–14.iv.1989, 900 m, O. Karsholt leg. (gen. slide 177/22♂; 178/22♀; 180/22♂, OB) (NMPC, ZMKU, ZMUC).

Diagnosis. *Ivanauskiella ainella* is a comparatively large light brown species with dark brown markings (spots and streaks). The male genitalia are characterised by 10–11 slender spine-like cornuti in vesica in combination with equilateral triangular saccus. The female genitalia resemble those of *I. nigripunctata* sp. nov. but differ in upcurved rather than transverse processes of posterior signum.

Redescription. **Adult** (Figs 12–15). Wingspan 10.0–13.0 mm. Head and tegulae uniformly greyish brown, frons light grey, thorax dark brown; labial palpus slender, upcurved, light brown, darker on outer surface, segment 2 with light apical ring; scape of antenna brown, flagellum brown, indistinctly ringed with grey; forewing light greyish-brown with dark brown suffusion along veins, in fold, below costal margin and in subapical 1/4, diffuse blackish

spots in cell and below base of costa, blackish elongate spot and slender streak in fold; fringe grey, brown tipped; hindwing light grey.

The examined specimens show variation in the colour of the forewing, from light brown to blackish brown. In specimens with dark forewings the blackish spots become obsolete.

Male genitalia (Figs 45, 54). Uncus slender from base to 2/3, then strongly widened towards rounded apex, extending to top of valva, posterior margin serrate; tegumen subrectangular; valva gradually bent, in middle twice as broad as medial portion of uncus, apical 1/3 as broad as top of uncus; sacculus about half length and as broad as valva in middle; vinculum short; saccus broad, triangular, weakly acute; phallus with 12–15 elongated, needle-shaped spines and a few small thorns, distal plate large, of irregular shape.

Female genitalia (Fig. 76). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris straight, slightly longer than apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, as broad as long; apophysis anterioris straight; ductus bursae weakly broadened anteriorly, colliculum with one large thorn-shaped sclerite, situated at 2/3 of ductus bursae; corpus bursae egg-shaped, anterior signum rounded plate, posterior signum irregular plate with two upcurved horns.

Molecular data. No barcode available.

Biology. Host plant unknown. Adults were recorded in April–May.

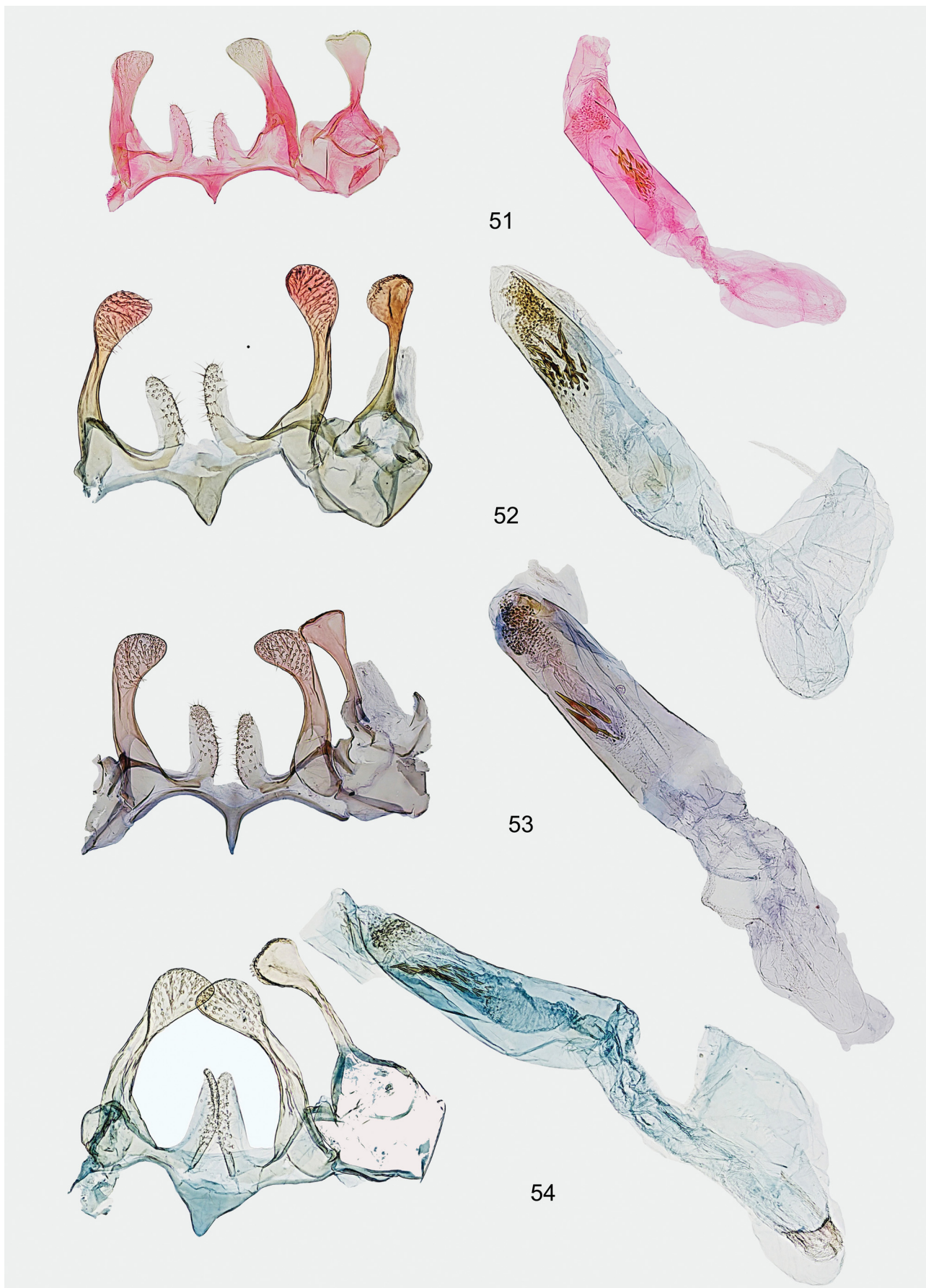
Distribution. Algeria, Morocco (new record).

Remarks. *Apodia ainella* was described based on an unspecified number of specimens collected in April and May at the oasis of Biskra, Algeria. It was compared with *I. psamathias*, and stated to differ in larger size, darker wings and elongate (instead of rounded) black spots in the forewing (CHRÉTIEN 1908: 91). A male and a female from the type series deposited in MNHN were examined by D. Povolný, who designated the male as lectotype (POVOLNÝ 1983: 184–185) and provided drawings of its left wings (POVOLNÝ 1983: fig. 29) and genitalia (POVOLNÝ 1983: pl. 6, fig. 31).

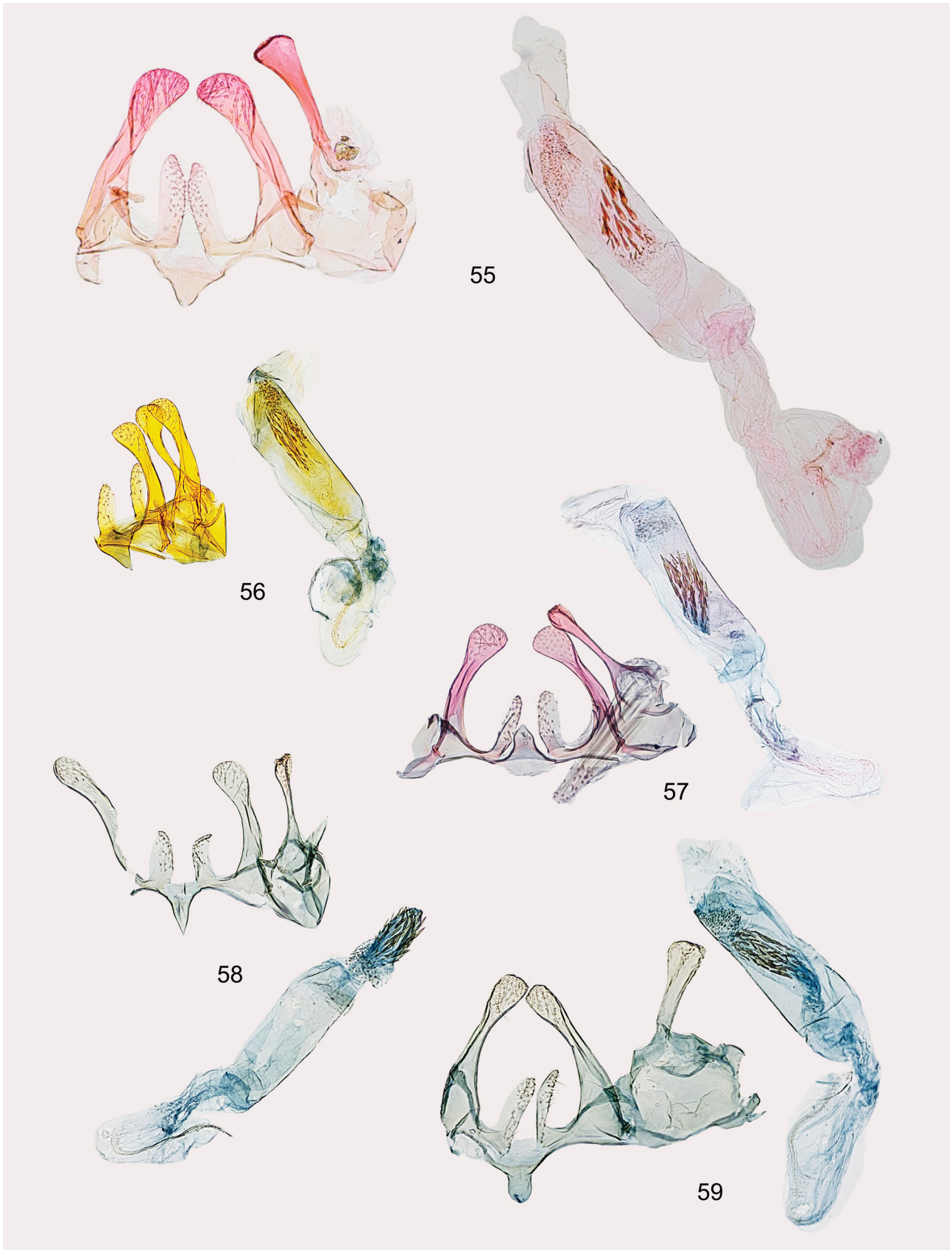
Ivanauskiella nigripunctata sp. nov.

(Figs 16–22, 56–58, 77–79, 86–87)

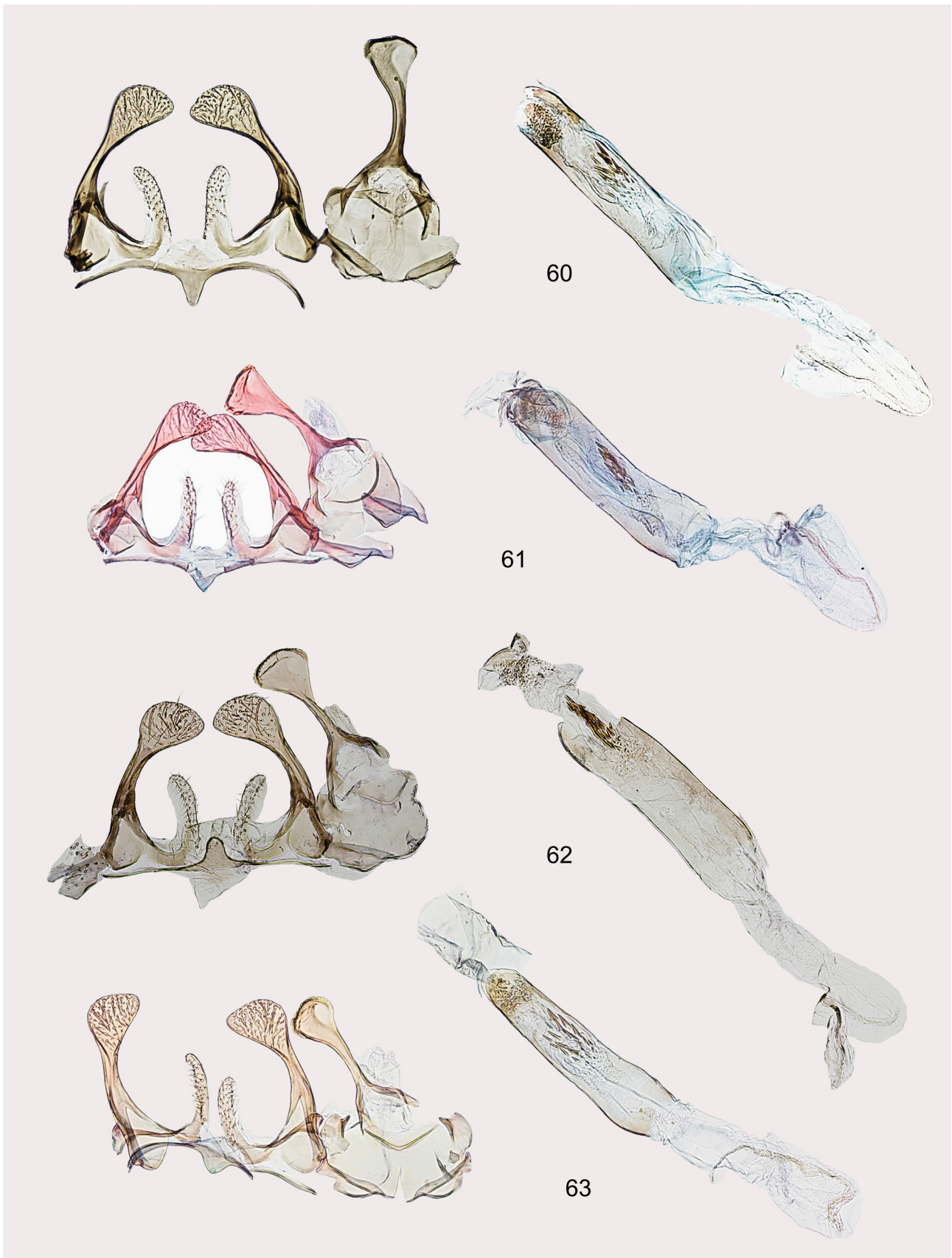
Type material. HOLOTYPE: ♂, SPAIN: ALICANTE: Santa Pola, Playa del Pinet, 3809.51N, 0037.54W, 5 m, 5.ix.2005, P. Huemer leg. (Barcode TLMF Lep 03295) (TLMF). PARATYPES: 2 ♂♂ 1 ♀, same data as for holotype (gen. slide 156/20♂, 157/20♀, OB) (Barcode TLMF Lep 03296) (TLMF); 2 ♂♂, Santa Pola, 12.vi.2007, J. Šumpich leg. (gen. prep. 23014, JŠ) (Barcode TLMF Lep 25225 [failed]) (NMPC); 1 ♂, La Marina, Platje el Pinet, 16.ix.2001, J. Wolschrijn leg. (gen. slide 155/20, OB) (ZMUC); 1 ♀, same data as for preceding but 10.ix.2002 (gen. slide 136/20, OB) (ZMUC). MURCIA: 1 ♂, 4 km S Aguilas Callarcone, 5.–6.vi.2003, H. van der Wolf leg. (gen. slide 5274, Hendriksen) (ZMUC). ALMERIA: 1 ♂, Sierra de Alhamilla, route Huebro–Colotivi, 800–900 m, 29.iv.2008, J. Šumpich leg. (gen. prep. 23015, JŠ) (NMPC); 1 ♂ 2 ♀♀, 6 km SW Tabernas, Mini Hollywood, 400 m, 24.–25.ix.1994, H. van der Wolf leg. (gen. slide Wf 6071) (ZMUC); 1 ♂ 1 ♀, same data but 15.–16.ix.1995, H. van der Wolf leg. (gen. slide Wf 6081♂; gen. slide 151/20♀, OB) (RMNH); 2 ♀♀, Camping Capo de Gata, 8.–9.ix.1997, H. van der Wolf leg. (RMNH); 1 ♀, El Pozo del Esparto, 10 m, 7.–8.iv.2008, P. Skou leg. (gen. slide 183/22, OB) (ZMUC). GRANADA: 1 ♂, Baza, 110 km NE Granada, 7.x.1976, M. & W. Glaser leg. (gen. slide 96/22, OB) (SMNK).



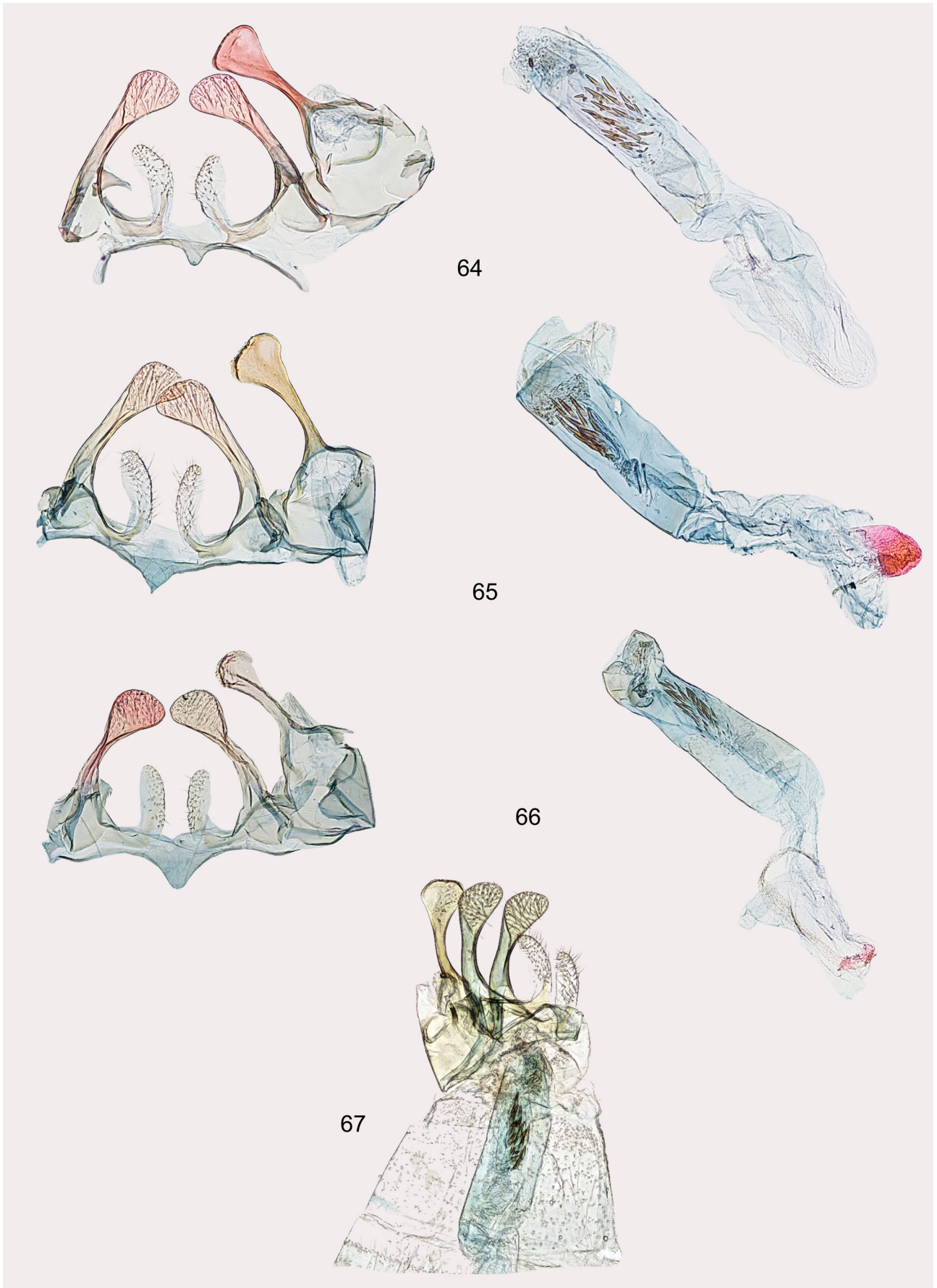
Figs 51–54. Male genitalia of *Ivanauskiella* species. 51 – *I. sutteri* sp. nov., paratype, Greece, Crete (gen. slide 6630, R. Sutter). 52 – *I. bovis* sp. nov., Morocco, paratype (gen. slide 131/20, OB). 53 – *I. psamathias* (Meyrick, 1891), Tunisia (gen. slide 24/20, OB). 54 – *I. ainella* (Chrétien, 1908): paratype, Algeria (gen. slide 139/20, OB).



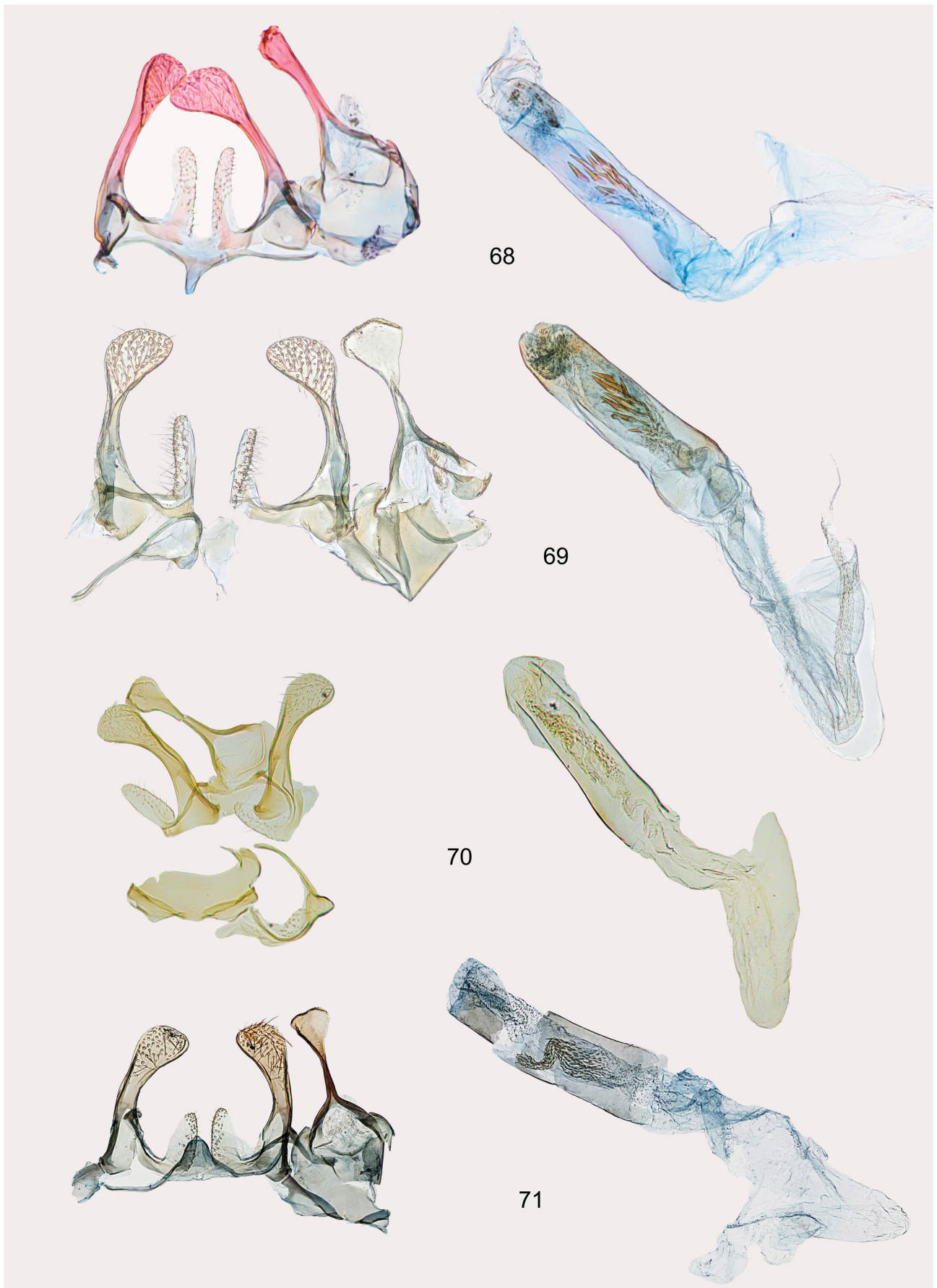
Figs 55–59. Male genitalia of *Ivanauskiella* species. 55 – *I. ainella* (Chrétien, 1908), Morocco (gen. slide 180/22, OB). 56–58 – *I. nigripunctata* sp. nov.: 56 – paratype, Spain (gen. slide Wf 6081); 57 – paratype, Spain (gen. slide 156/20, OB); 58 – paratype, Spain (gen. slide 151/20, OB). 59 – *I. annekrystinae* sp. nov., paratype, France, Corsica (gen. slide 137/20, OB).



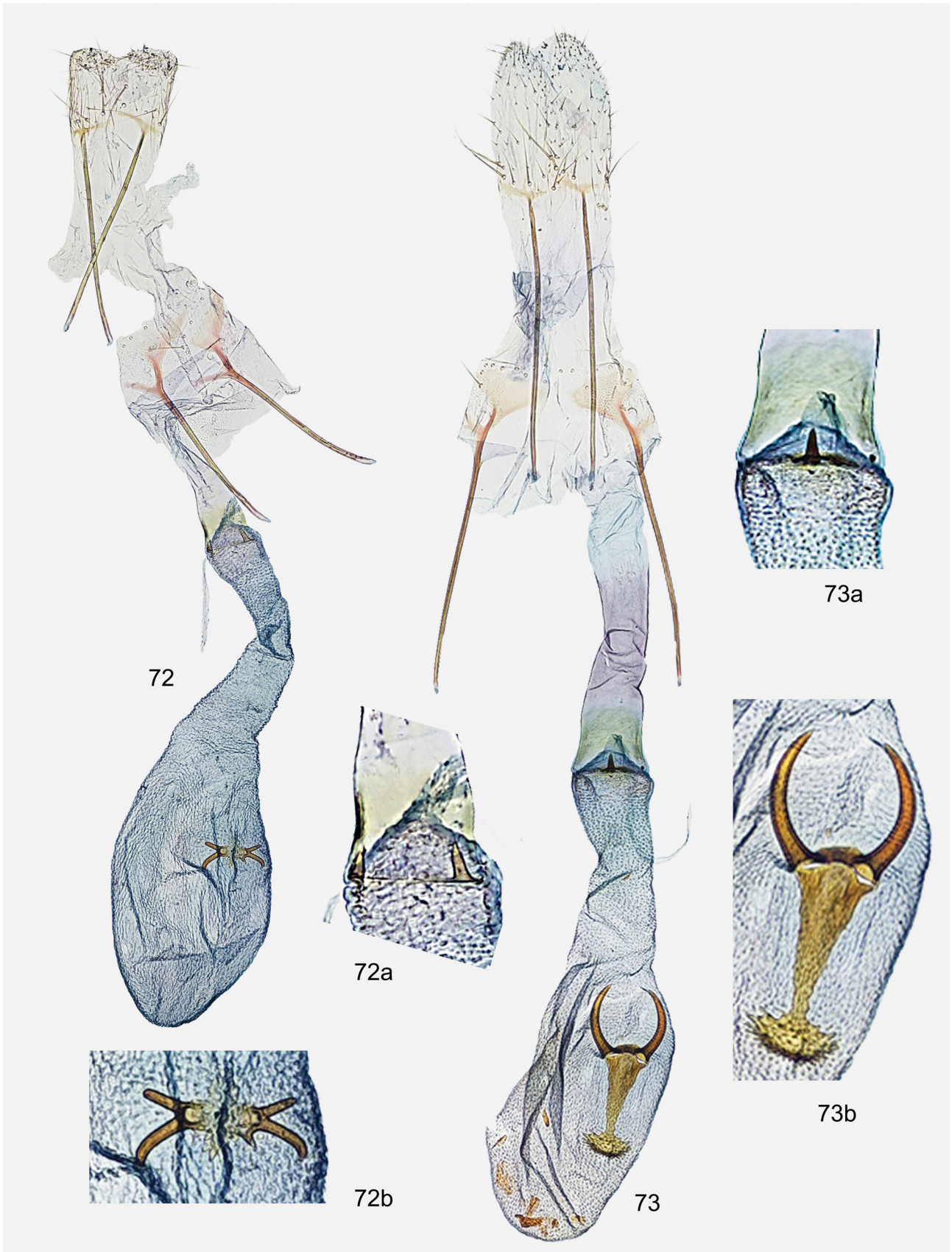
Figs 60–63. Male genitalia of *Ivanauskiella limoniella* sp. nov. 60 – holotype, Ukraine (gen. slide 171/20, OB); 61 – paratype, Bulgaria (gen. slide 159/20, OB); 62 – paratype, Russia, Zabaikalskiy krai (gen. slide 25/20, OB); 63 – paratype, Turkey (gen. slide 150/20, OB).



Figs 64–67. Male genitalia of *Ivanauskiella occitanica* (Nel & Varenne, 2013). 64 – Sicily (gen. slide 148/20, OB); 65 – Croatia (gen. slide 142/20, OB); 66 – Greece (gen. slide 163/20, OB); 67 – Croatia (gen. prep. 18507, JŠ).



Figs 68–71. Male genitalia of *Ivanauskiella* species. 68–69 – *I. albimarginata* sp. nov.: 68 – paratype, Iran (gen. slide 14/22); 69 – paratype, Armenia (gen. prep. 23008, JŠ). 70–71 – *I. turkmenica* Ivinskis & Piskunov, 1980: 70 – holotype, Turkmenistan (gen. slide 14809, Piskunov, remounted by OK); 71 – Uzbekistan (gen. slide 168/20, OB).



Figs 72–73. Female genitalia of *Ivanauskiella* species. 72 – *I. sutteri* sp. nov., Greece, Crete, holotype (gen. slide 165/20, OB); 73 – *I. bovis* sp. nov., Morocco, HT (gen. slide 164/20, OB). a – colliculum (enlarged); b – signum (enlarged).

Diagnosis. This new species is characterised by its white head, thorax and white forewing mottled with light brown and with light brown markings in the cell, fold and under the costal margin. *Ivanauskiella psamathias* has similar wing pattern but looks darker, the brown suffusion is more developed, the apex is spotted with white, and its wingspan is larger (8.7–10.0 mm contrary to 6.0–7.1 mm in *I. nigripunctata* sp. nov.). *Ivanauskiella sutteri* sp. nov. is similar in having predominantly white appearance, but it is more uniformly coloured without distinct brown markings. *Ivanauskiella annekristinae* sp. nov. differs in uniformly white segment 2 of the labial palpus and white forewing with large markings. A large number (about 25–30) of dense needle-shaped spines in vesica is characteristic for the male genitalia of *I. nigripunctata* sp. nov. In the female genitalia the transverse processes of the posterior signum are the most reliable diagnostic characters of this species.

Description. Adult (Figs 16–22). Wingspan 6.0–9.1 mm. Head white, thorax and tegulae covered with white to light grey, brown-tipped scales; segment 2 of labial palpus brown with white apex, inner surface almost white, segment 3 white with broad brown ring; scape of antenna light brown, flagellum light brown ringed with white; forewing light grey mottled with light brown, two brown spots in cell and two spots in fold, fringe grey, tipped with brown; hindwing grey.

Variability. Two specimens from Almeria collected in early spring, a male from Huebro (gen. prep. 23015, JŠ) and a female from El Pozo del Esparto (gen. slide 183/22, OB), are larger in wingspan (8.5–9.1 mm), greyish (not yellowish) with less distinct markings and the head is covered with grey scales (yellowish in other specimens). These specimens may represent the spring generation, whose specimens can be larger than those of the subsequent generations (personal observations in some other gelechiid species), and they can also differ slightly in external appearance. However, additional material is needed to clarify this assumption. In any case, we found no significant differences in the genitalia.

Male genitalia (Figs 56–58). Uncus very slender from 1/3 to 3/4, apex strongly widened, rounded, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular, slightly broader than medial portion of uncus; valva moderately broad, in middle twice as broad as uncus, gradually bent, top and base as broad as top of uncus; sacculus about half length of valva, as broad as valva in middle; vinculum short; saccus short, shape varying from triangular to almost U-shaped except for pointed apex; phallus with 25–30 dense needle-shaped spines, distal plate ovate.

Female genitalia (Figs 77–79). Papilla analis subovate, covered with short hair-like setae; apophysis posterioris straight, as long as apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae gradually broadening anteriorly, colliculum with two short thorn-shaped sclerites, situated at 1/3 to 1/2 of ductus bursae; corpus bursae egg-shaped, signa paired: anterior one rounded to elongate plate, posterior one elongate plate with two short transverse processes.

Molecular data. BIN: BOLD:AAV7056. The intraspecific average distance of the barcode region is 0% (n = 2). The minimum distance to the nearest neighbour, *Teleiopsis te-rebinthinella* (Herrich-Schäffer, [1856]), is 8.43% (p-dist). The mean distance to the only two hitherto successfully barcoded *Ivanauskiella* species is 11.62% (*I. limoniella* sp. nov.) and 10.93% (*I. occitanica*) (cf. Table 1). In spite of the relatively high genetic distance from other species of *Ivanauskiella* we do not place it in another genus. One should take into account that the genetic distance between *I. limoniella* sp. nov. and *I. occitanica* is also quite high (7.75%, respectively 6.75% according to BOLD) and barcode data of most species of this genus are still not available.

Etymology. The species name is derived from the Latin words ‘*punctum*’ (= point, spot, speckle) and ‘*niger, -a, -um*’ (= black), and refers to the black spots in the forewing which are characteristic for the new species; adjective.

Biology. Host plant unknown. Adults were observed from early April to early June and then from September to early October, probably in two generations. Most of the specimens from the type series were collected in salt marshes (Fig. 89).

Distribution. Spain.

Ivanauskiella annekristinae sp. nov.

(Figs 23–24, 59)

Type material. HOLOTYPE: ♂, FRANCE: CORSICA: Calvi, 10 m, 18.–19. viii.1998, O. Karsholt leg. (ZMUC). PARATYPES: 9 ♂♂, same data as for holotype (gen. slide 137/20, OB; 3099 ♂, Hendriksen) (NMPC, ZMKU, ZMUC).

Diagnosis. *Ivanauskiella annekristinae* sp. nov. is characterized by the pure white head, thorax, tegulae and labial palpus, and the white forewings with rather large, dark brown markings. *Ivanauskiella nigripunctata* sp. nov. is similar but differs in the colour of segment 2 of the labial palpus being brown with white apex, and light grey forewings with smaller brown markings. The male genitalia are similar to those of *I. nigripunctata* sp. nov. except for the broader uncus and the U-shaped, rather than triangular saccus in *I. nigripunctata* sp. nov.

Description. Adult (Figs 23–24). Wingspan 7.0 mm. Head, thorax and tegulae white; labial palpus white, segment 3 about 2/3 length of segment 2 and at its base almost as wide as segment 2, acute; scape of antenna light brown, flagellum light brown, ringed with white; forewing white with gentle light brown suffusion at base, along costal margin and in fold, apex covered with darker, light brown scales with brown tips, two small blackish brown spots in fold, large blackish brown spot at 2/3 and another small spot at 3/4; fringe white, tipped with brown; hindwing and fringe white.

Male genitalia (Fig. 59). Uncus moderately broad, apex slightly widened, rounded, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular, slightly broader than medial portion of uncus; valva moderately broad, in middle twice as broad as uncus, gradually bent, top and base as broad as top of uncus; sacculus about half length of valva, as broad as valva in middle; vinculum short; saccus short, U-shaped; phallus with 25–30 dense needle-shaped spines, distal plate ovate.

Female genitalia. Unknown.

Molecular data. No barcode available.

Etymology. The new species is named after Anne Kristine Karsholt for supporting OK by collecting the type series during their honeymoon to Corsica 25 years ago.

Biology. Host plant unknown, but possibly *Limonium* sp., which grew at the type locality. The adults were collected in a light trap with an 8 Watt actinic tube during mid-August. The trap was placed on a cliff ledge facing the Mediterranean Sea.

Distribution. France: Corsica.

Remarks. *Ivanauskiella annekristinae* is superficially similar to *Phragmatodes cyrneogonella* Nel & Varenne, 2012, which is endemic to Corsica and Sardinia. The latter has larger blackish spots and more blackish brown suffusion in the forewing, and the outside of segment 2 of the labial palpus is blackish brown.

***Ivanauskiella limoniella* sp. nov.**

(Figs 25–34, 47, 60–63, 80–82, 89–90)

Ivanauskiella psamathias (misidentification): KOSTJUK et al. (1994); BIDZILYA (1997: 124); BIDZILYA (2009: 3); JUNNILAINEN et al. (2010: 27).

Type material examined. HOLOTYPE: ♂, UKRAINE: LUHANSK REGION: Melovoi distr., Streltsovskaya Steppe Nature Reserve, 6.vii.2002, on light, O. Bidzilya leg. (gen. slide 171/20, OB) (ZMKU). PARATYPES: 1 ♀, same data as for holotype but 10.vii.2002 (gen. slide 22/20, OB). ZAPORIZHZHYA REGION: 1 ♀, Volnyansk distr., Balchanskaya balka, 25.vi.1997, O. Zhakov leg. (gen. slide 27/20, OB); 1 ♂, same data as for preceding but 22.vi.1997; 2 ♂♂. DONETSK/ZAPORIZHZHYA REGION: Kamennye Mohyly Nature Reserve, 9.vii.1991, O. Zhakov leg. (genitalia in vial with glycerine); 1 ♂, Zaporizhzhya, Khortitsa Island, 3.vii.1991, O. Zhakov leg. DNIPROPETROVSK REGION: 1 ♂, Majorka vill., 23.vi.2011, V. Afanasieva leg. (gen. prep. in vial with glycerine) (all ZMKU). BULGARIA: 3 ♂♂, Čerepovo, 14.vi.2005, J. Buszko leg. (ZMUC); 10 ♂♂ 2 ♀♀, Blagoevgrad, 5 km N Sandanski, 150–200 m, 23.–27.v.2010, O. Karsholt leg. (gen. slide 159/20♂, OB; 5228 OK) (ZMUC); 16 ♂♂ 9 ♀♀, Sandanski env., Sandanski Ploski, 250 m, 17.–31.v.2010, N. Savenkov leg. (ECKU). TURKEY: GÜMÜŞHANE: 1 ♂, Kop Pass, Gümüşhane, 2300 m, 19.vii.1989, M. Fibiger & N. Esser leg. (gen. slide 150/20, OB) (ZMUC). KONYA: 1 ♂, Aksehir, Sultan Dag, 1900 m, 11.–12.vi.1986, M. Fibiger leg. (gen. slide 179/22, OB) (ZMUC). NEVŞEHİR: 2 ♂♂, 7 km SE Avanos, 1200 m, 2.viii.1989, M. Fibiger & N. Esser leg. (gen. slide 152/20, OB) (ZMUC). RUSSIA: ORENBURG DISTRICT: 3 ♂♂, 20 km S from Pokrovka village, Schibendy valley, 1.–2.vii.2003, K. Nupponen leg. (ZMUC); 2 ♂♂ 1 ♀, Akbulak, Pokrovka Chalk Hills, 28.–30.vi.2017, N. Savenkov & H. Roweck leg. (ECKU); 1 ♂, Verbljushka Mount, 6 km W from Donskoje village, 51°23'N 56°49'E, 130–340 m, 24.–28.vi.2009, J. Šumpich leg. (gen. prep. 18083, J. Šumpich) (Barcode TLMF Lep 25170) (NMPC); 1 ♀, Kidriasovo village, Mednogorsk 20 km S, 51°13'N 57°37'E, 350 m, 21.vi.2009, J. Šumpich leg. (gen. prep. 23016, J. Šumpich) (NMPC). ALTAI REPUBLIC: 3 ♂♂, Kosh-Agach Distr., Kurai env. (6.5 km SW), 50°10'35"N, 87°53'55"E, grassy steppe, 1550 m, 9.–10.vii.2014, J. Šumpich leg. (Barcode NMPC-Lep-0388) (gen. prep. 23001, JŠ) (NMPC); 1 ♀, Belyashi (Dzhazator) env. (25 km NW), confluence of Argut and Karagam rivers, 49°51'56"N, 87°10'22"E, rocky steppe, 1400 m, 27.–28.vii.2017, J. Šumpich leg. (Barcode NMPC-Lep-0389) (NMPC); 3 ♂♂, Kosh-Agach Distr., Kurai env. (15 km SW), Dzhangyskol lake, 50°10'49"N; 87°44'19"E, coniferous forest/steppe, 1830 m, 24.–25.vi.2015, J. Šumpich leg. (NMPC); 1 ♂, same locality but 29.–30.vi.2019, J. Šumpich leg. (NMPC); 1 ♂, Aktash vill., 50°19'12"N; 87°36'00"E, grassy steppe, rocks, 1400 m, 11.vii.2014, J. Šumpich leg. (NMPC); 1 ♀, same locality but 21.vi.2015, J. Šumpich leg. (NMPC); 2 ♂♂ 4 ♀♀, 45 km N of Ulagan vill., Chulyshman valley, 51°01'03"N; 88°00'39"E, grassy steppe, rocks, 600 m, 27.–28.vi.2015, J. Šumpich leg. (DNA Barcode NMPC-Lep-0387) (NMPC); 18 ♂♂ 4 ♀♀, same locality but 26.–27.vi.2019, J. Šumpich leg. (gen. prep. 23002, JŠ) (NMPC, ZMUC); 11 ♂♂, same locality but 4.–5.vii.2019, J. Šumpich leg. (DNA Barcode

NMPC-Lep-0616) (gen. slide 263/20, OB) (NMPC); 1 ♂, Kosh-Agach Distr., Chagan-Uzun env., Krasnaya Gorka hill, 50°05'00"N; 88°25'15"E, rocky steppe, 1870 m, 4.vii.2014, J. Šumpich leg. (NMPC); 4 ♂♂ 2 ♀♀, same locality but 1.–3.vii.2019, J. Šumpich leg. (NMPC); 1 ♀, Kosh-Agach Distr., 40 km NW Belyashi village, 49°52'N; 87°10'E, 1270 m, 26.–28.vi.2014, S. Sinev leg. (ZIN); 1 ♂, Kosh-Agach Distr., Tabozhok river valley, 50°05'N; 88°44'E, 2100 m, 2.–4.viii.2016, S. Sinev leg. (ZIN). ZABAYKALSKY KRAI: 1 ♂, Barun Torey Lake east bank, Mergen, 18.vi.1988, I. Kostjuk leg. (gen. slide 25/20, OB) (ZMKU). YAKUTIA: 3 ♂♂, 50 km S Yakutsk, near Oktemtsy village, steppes slope, 24.–27.vi.2005, A. Lvovsky leg. (ZIN).

Diagnosis. *Ivanauskiella limoniella* sp. nov. is a uniformly coloured grey species with distinct sheen. *Ivanauskiella turkmenica* is also nearly uniformly coloured but light brown rather than grey, and with diffuse subapical pale fascia. Specimens of *I. albimarginata* sp. nov. with indistinct white suffusion along margins remotely resemble *I. limoniella* sp. nov. but differ in the absence of sheen that is very characteristic for the latter species. The male genitalia are characterised by 8–10 large thorn-shaped cornuti, a few minute spine-shaped cornuti and a distal plate of minute thorns in the vesica. *Ivanauskiella ainella* has the same suit of cornuti but 12–15 rather than 8–10 large cornuti, and the medial part of the valva in *I. ainella* is broader than the medial part of uncus (as broad as uncus in *I. limoniella* sp. nov.). The female genitalia are distinctive by having a small rounded anterior signum and a large posterior signum with posteriorly directed horn-shaped processes.

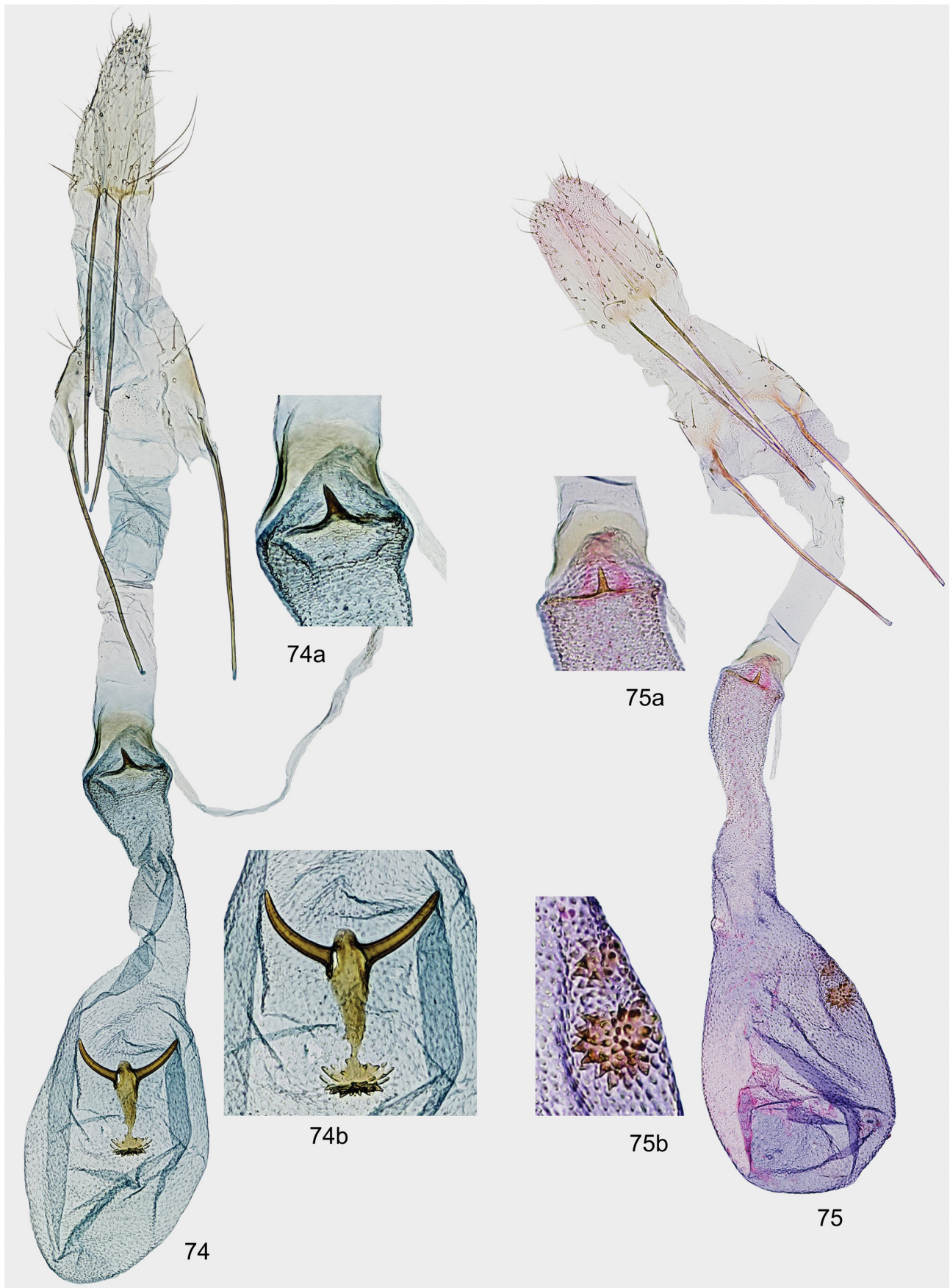
Description. Adult (Figs 25–34). Wingspan 7.5–11.0 mm. Head, thorax and tegulae light grey to greyish brown, with distinct sheen; labial palpus grey with inner surface light grey; scape of antenna brown, flagellum brown with indistinct grey rings; forewing uniformly light grey to light brown or olive grey with distinct sheen, no markings, fold mottled with brown in some specimens, fringe light grey; hindwing grey.

Variability. Specimens from Bulgaria are variable in wingspan (7.5–9.0 mm).

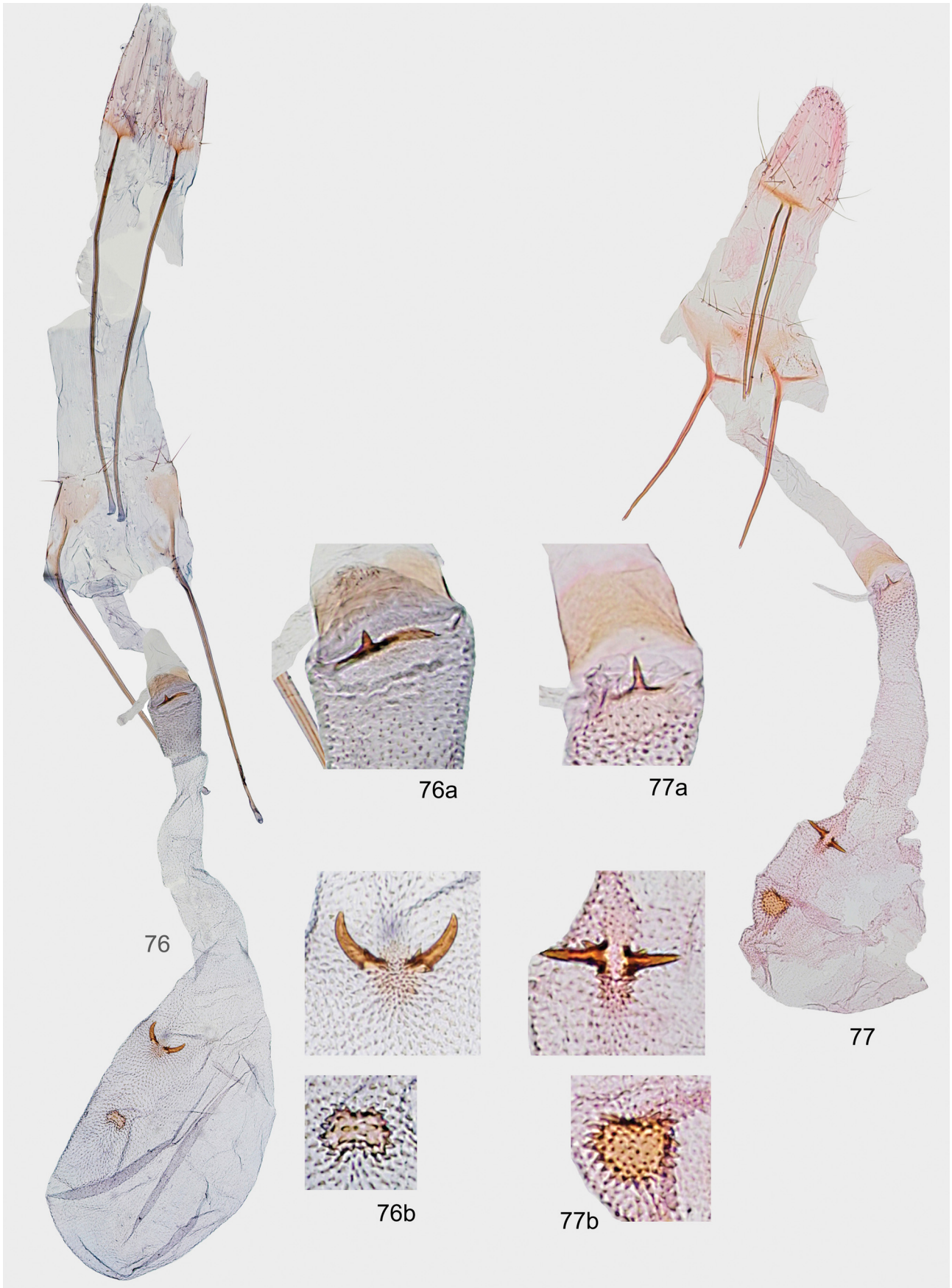
Male genitalia (Figs 60–63). Uncus slender from base to half of its length, then strongly widened towards triangular apex, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular; valva constricted, in middle as broad as uncus, gradually bent, apical third as broad as top of uncus; sacculus about half length of valva, as broad as valva in middle; vinculum short; saccus short, triangular; phallus with 8–10 comparatively large and 5–7 small thorn-shaped spines, distal plate large, of irregular shape.

Female genitalia (Figs 47, 80–82). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris longer than apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae of even width except for gradually broadened anterior portion, colliculum with two short thorn-shaped sclerites, situated in middle of ductus bursae; corpus bursae rounded, anterior signum small rounded plate, posterior signum elongate plate with two posteriorly directed horns.

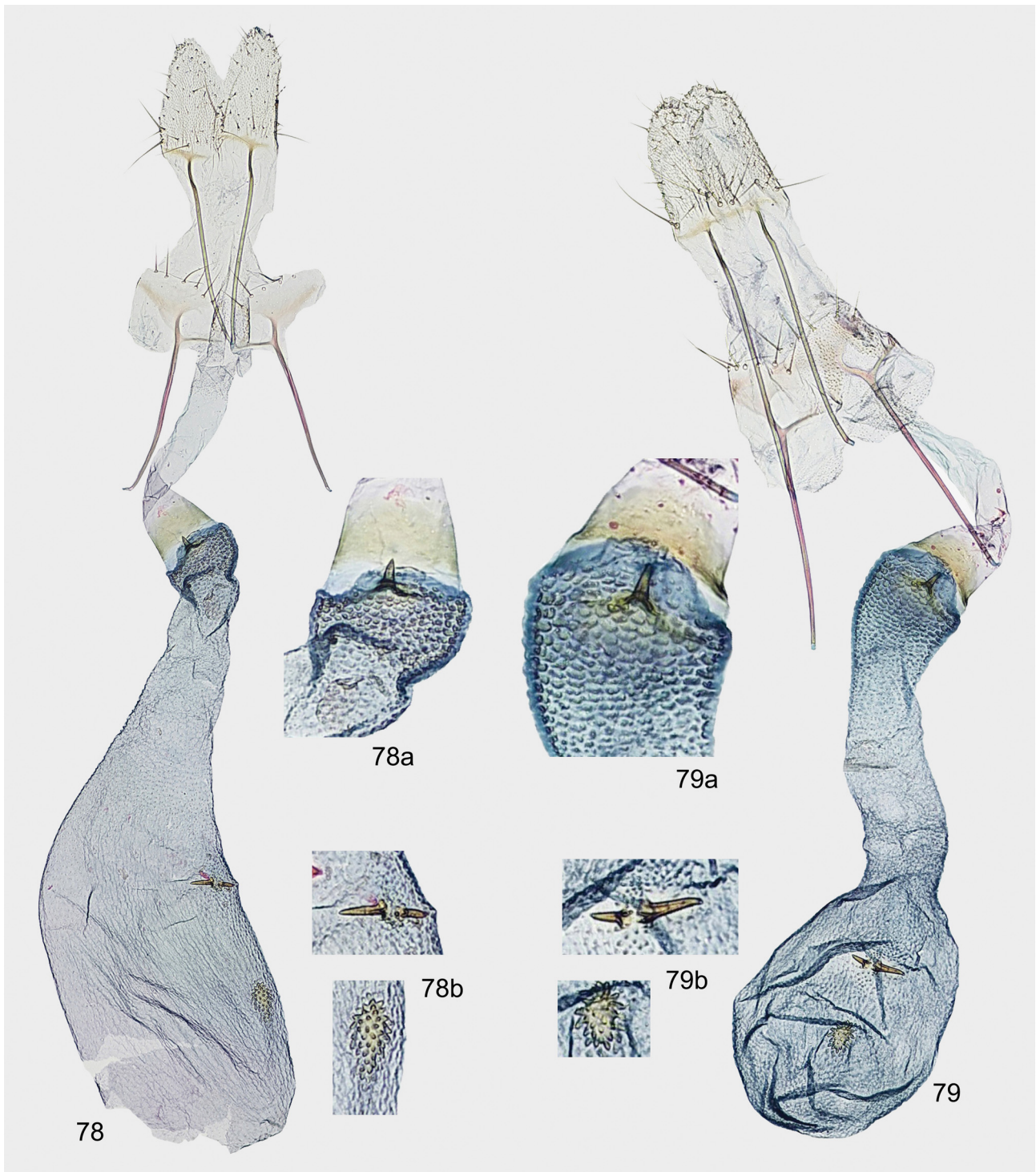
Molecular data. BIN: BOLD:ADD9916. The intraspecific average distance of the barcode region is 1.11% (n = 7). The minimum distance to the nearest neighbour, *I. occitanica*, is 6.75% (p-dist).



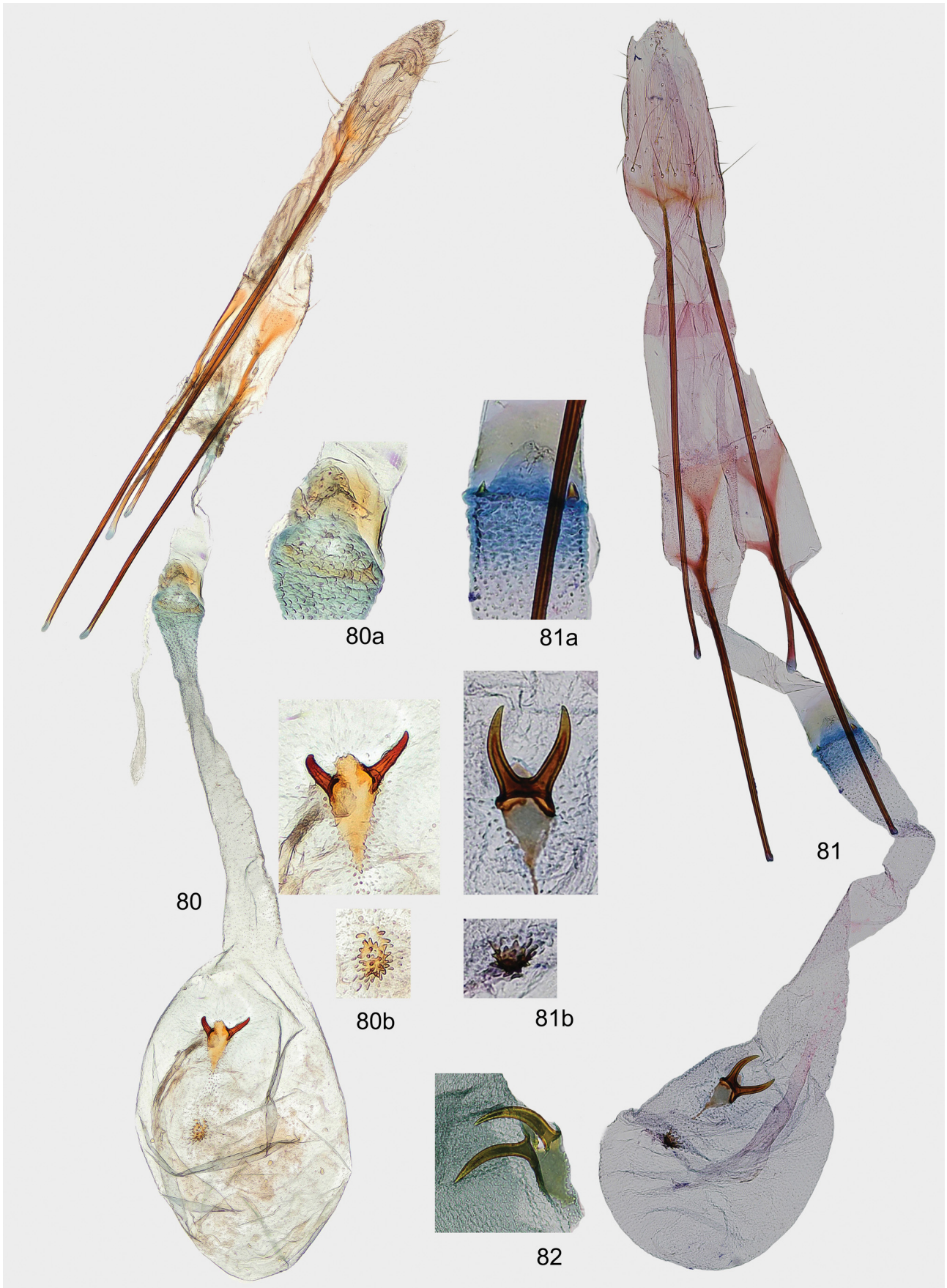
Figs 74–75. Female genitalia of *Ivanauskiella* species. 74 – *I. bovis* sp. nov., paratype (gen. slide 132/20, OB); 75 – *I. psamathias* (Meyrick, 1891), Tunisia (gen. slide 323/19, OB). a – colliculum (enlarged); b – signum (enlarged).



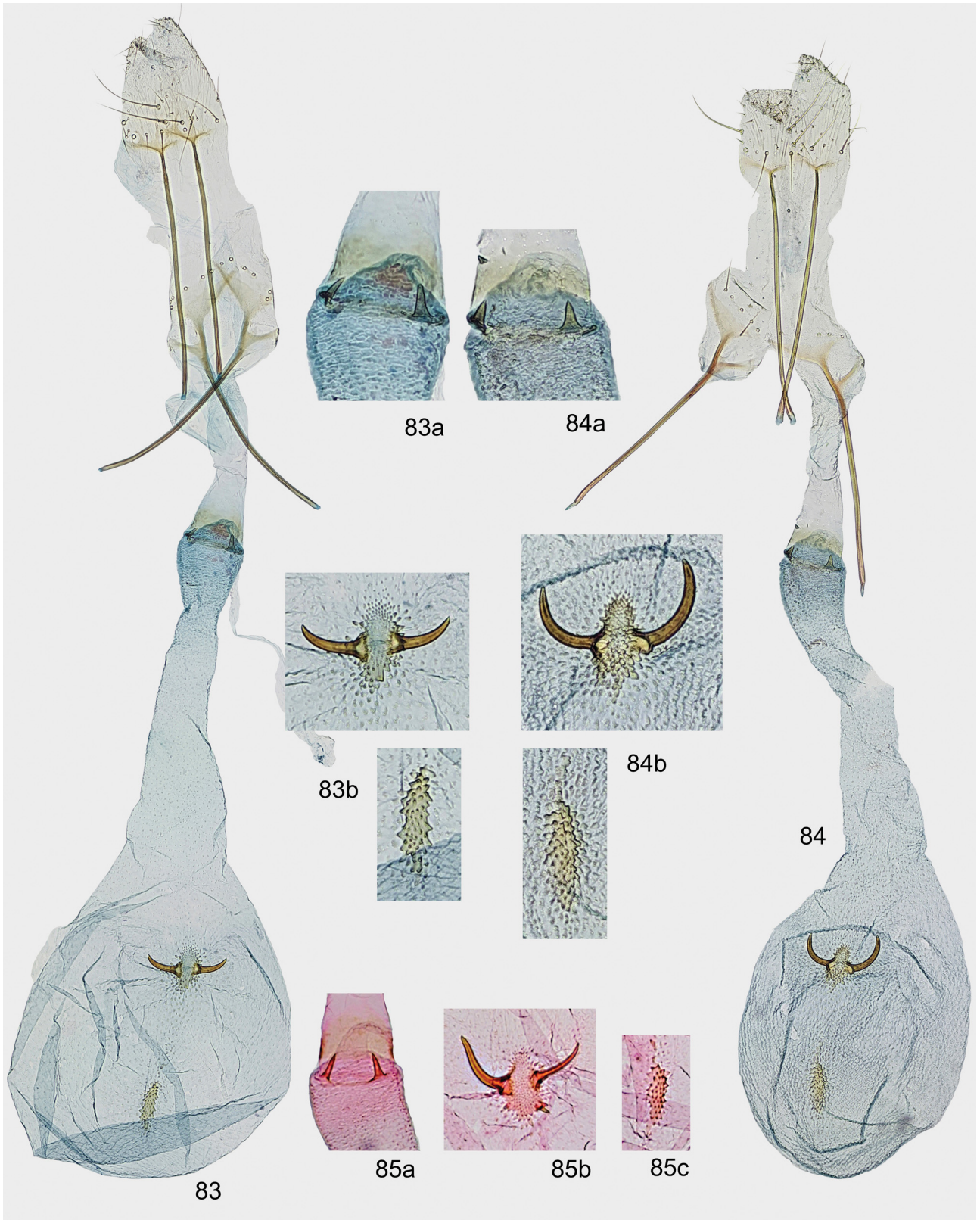
Figs 76–77. Female genitalia of *Ivanauskiella* species. 76 – *I. ainella* (Chrétien, 1908), Morocco (gen. slide 178/22, OB). 77 – *I. nigripunctata* sp. nov., Spain, paratype (gen. slide 183/22, OB). a – colliculum (enlarged); b – signa (enlarged).



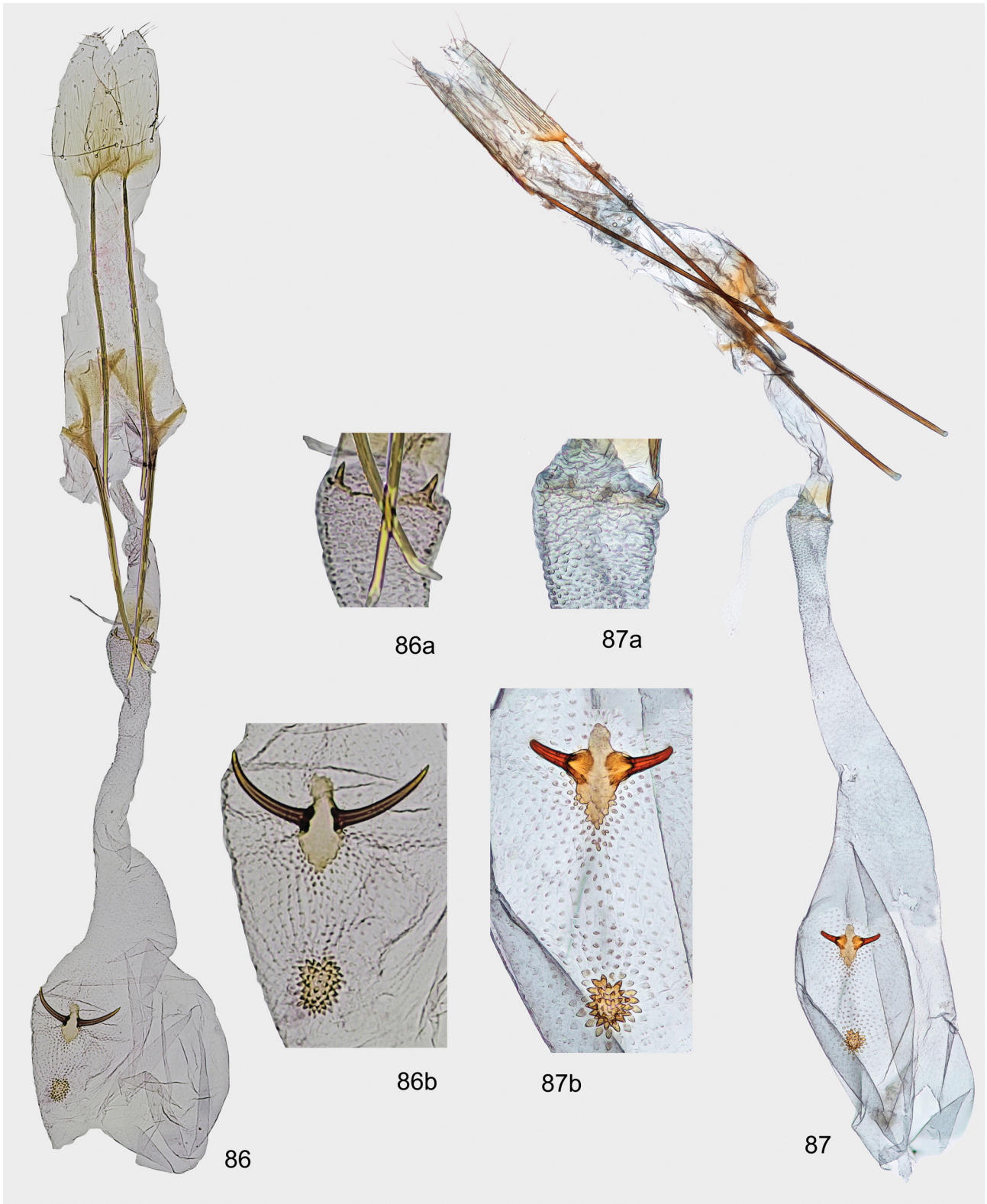
Figs 78–79. Female genitalia of *Ivanauskiella nigripunctata* sp. nov., Spain: 78 – paratype (gen. slide 136/20, OB); 79 – paratype (gen. slide 157/20, OB). a – colliculum (enlarged); b – signa (enlarged).



Figs 80–82. Female genitalia of *Ivanauskiella limoniella* sp. nov. 80 – Russia, Altai (gen. prep. 23002, JŠ); 81–82 – Ukraine: 81 – gen. slide 22/20, OB; 82 – posterior signum, lateral view (enlarged) (gen. slide 27/20, OB). a – colliculum (enlarged); b – signa (enlarged).



Figs 83–85. Female genitalia of *Ivanauskiella occitanica* (Nel & Varenne, 2013). 83 – Croatia (gen. slide 141/20, OB); 84 – Italy (gen. slide 149/20, OB); 85 – Spain (gen. slide 184/22, OB). a – colliculum (enlarged); b – posterior signum (enlarged); c – anterior signum (enlarged).



Figs 86–87. Female genitalia of *Ivanauskiella albimarginata* sp. nov. 86 – Iran (gen. slide 120/23, OB); 87 – Armenia (gen. prep. 23006, JŠ). a – colliculum (enlarged); b – posterior and anterior signa (enlarged).

Etymology. The species name is derived from the host plant of the larva – *Limonium* sp. (Plumbaginaceae); noun in apposition.

Biology. The larva was observed feeding in the inflorescence of *Limonium* sp. Adults fly from late May to mid-July. They were collected by sweeping of *Limonium* sp. during night in South-West Bulgaria and were also attracted to light. The habitat there is a very dry, sandy hill. Altaic specimens were collected in open grassland and rocky steppe (Figs 91–92). In the eastern Ukraine the moths were attracted to light in forb steppe.

Distribution. The species was recorded as *I. psamathias* from Bulgaria and Russia: South Ural (JUNNILAINEN et al. 2010), Ukraine (BIDZYLIA 1997), Russia: Volgograd region (ANIKIN & PISKUNOV 2001: 263), Zabaikalskiy krai (KOSTJUK et al. 1994) and Yakutia (BIDZYLIA 2009). Additional verified records are from Turkey and additional regions of Russia (the Altai Republic and Orenburg District).

Ivanauskiella occitanica (Nel & Varenne, 2013)

(Figs 35–40, 48–50, 64–67, 83–85, 88)

Spatuncusella occitanica Nel & Varenne, 2013: 40. TL: France, Pyrénées-Orientales, Saint-Laurent de la Salanque, La Ramada

Ivanauskiella occitanica (Nel & Varenne, 2013): HUEMER & KARSHOLT (2020: 126)

Ivanauskiella psamathias (misidentification): ŠUMPICH (2013: 24)

Material examined. SPAIN: GRANADA: 1 ♂, Rio de Baza, 12.–13.vii.1987, G. Baldizzone & E. Traugott-Olsen leg. (ZMUC); 3 ♂♂ 1 ♀, Camino Baza-Benamaurei, 15 km from Baza, 16.vii.1987, G. Baldizzone & E. Traugott-Olsen leg. (gen. slide 184/22♀; 185/22♂, OB) (ZMUC). ALMERIA: 1 ♂, 6 km SW Tabernas, Mini Hollywood, 400 m, 25.iii.1994, H. van der Wolf leg. (RMNH); 1 ♂, 7 km S Tabernas, Mini Hollywood, 650 m, 2.–3.v.2000, H. van der Wolf leg. (RMNH). FRANCE: HERAULT: 1 ♂, Frontignan plage, 21.–23.viii.2001, A. Cox leg. (gen. slide 5139 Hendriksen) (ZMUC). ITALY: SICILY: 4 ♂♂ 6 ♀♀, 5 km W Pachino, Pantano Longarini, see lev., 12.ix.2002, M. Fibiger, G. Jeppesen & O. Karsholt leg. (gen. slide 148/20♂, 149/20♀, OB; 3792♀, 3793♂, Hendriksen) (ZMKU, ZMUC). SARDINIA: 1 ♀, La Caletta, 6.ix.2007, H. Roweck & N. Savenkov leg. (gen. slide 183/20, OB) (ECKU). CROATIA: KRK ISLAND: 3 ♂♂ 4 ♀♀, Soline, 11.–15.viii.1976, G. Baldizzone leg. (gen. slide 3337 Hendriksen); 1 ♂, same data but 10.viii.1978 (gen. slide 142/20, OB); 1 ♀, same data but 15.viii.1979 (gen. slide 141/20, OB); 4 ♀♀, 13.viii.2007 (gen. slide 22326 Nel) (RCBG, ZMUC). NORTHERN DALMATIA: 2 ♂♂, Pirovac env., Tisno, 13.–20.viii.2007, J. Šumpich leg. (gen. prep. 23001 and 18507, JŠ) (Barcodes NMPC-LEP-0209, NMPC-LEP-0210) (NMPC). GREECE: PELOPONNESE: 1 ♂, Kalogria, 10.ix.2020, 5 m, P. Huemer leg. (Barcode TLMF Lep 30042) (TLMF). EVROS: 2 ♂♂, 35 km N Alexandropolis, Kirki, 500 m, 8.vii.1986, M. Fibiger leg. (gen. slide 163/20, 188/22, OB) (ZMUC). TURKEY: KAYSERI: 1 ♂, 5 km NW Erciys Dađı, 2000 m, 22.vii.1986, M. Fibiger leg. (ZMUC); 1 ♀, 20 km S Erciys Dađı, 2000 m, 28.vii.1989, M. Fibiger & A. Esser leg. (gen. slide 11.279, Baldizzone) (ZMUC).

Diagnosis. The species is characterized externally by having the forewing covered with grey-brown tipped scales. *Ivanauskiella turkmenica* differs in having diffuse pale subapical fasciae. *Ivanauskiella limoniella* sp. nov. is similar but is glossy. 12–15 needle-shaped spines in the vesica separate *I. occitanica* sp. nov. from the externally similar *I. limoniella* sp. nov., which has 8–10 spines. Two comparatively long thorn-shaped sclerites on colliculum in combination with broadly separated and laterally directed processes of posterior signum in the female genitalia

of *I. occitanica* are unique among species of the genus. *Ivanauskiella nigripunctata* sp. nov. has somewhat similar signa, but the horn-shaped processes are shorter, the anterior signum is rounded or weakly elongate, and the colliculum bears one thorn-shaped sclerite.

Description. *Adult* (Figs 35–40). Wingspan 7.5–9.5 mm. Head, thorax and tegulae grey to greyish brown; segment 2 of labial palpus brown with light grey apex, segment 3 grey, mixed with brown; scape of antenna greyish-brown, flagellum brown, ringed with grey; forewing covered with grey brown-tipped scales, indistinct blackish spot at end of cell; fringe dark grey; hindwing grey.

Male genitalia (Figs 49–50, 64–67). Uncus slender from base to 1/2–2/3, strongly widened towards triangular apex, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular; valva constricted, in middle slightly broader than medial portion of uncus, gradually bent, apical 1/3 as broad as top of uncus; sacculus about 1/2 length and slightly broader than valva in middle; vinculum short; saccus short, triangular; phallus with 12–15 elongate, needle-shaped and 5–7 very small thorn-shaped spines, distal plate large, of irregular shape.

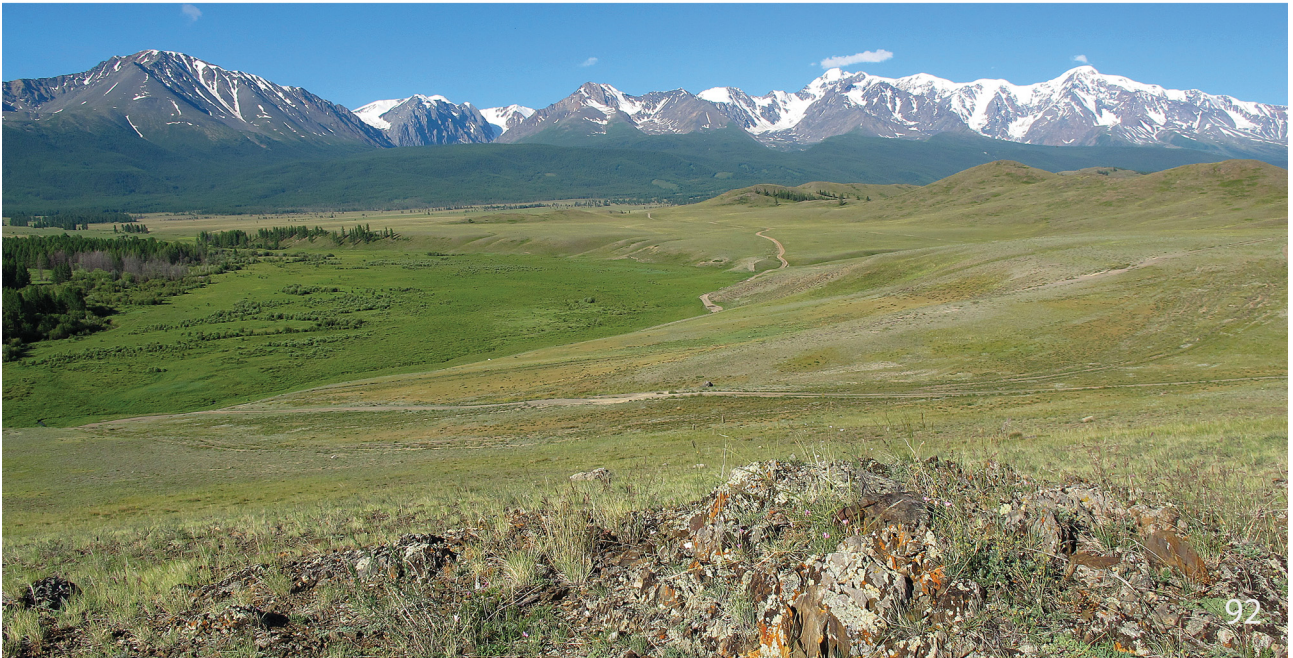
Female genitalia (Figs 48, 83–85). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris slightly longer than apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae of even width except for gradually broadened anterior portion, colliculum with two comparatively large thorn-shaped sclerites, situated at 1/3 of ductus bursae; corpus bursae rounded, anterior signum elongate plate, posterior signum irregular plate with two lateral weakly or distinctly curved horns.

Molecular data. BIN: BOLD:ABW:5477. The intraspecific average distance of the barcode region is 1% (maximum 1.61%) (n = 6). The minimum distance to the nearest neighbour, *I. limoniella* sp. nov., is 6.75% (p-dist).

Biology. Host plant unknown, but probably *Limonium* sp. Adults have been recorded from early August to mid-September. In southern Sicily moths were collected by sweeping among *Limonium* sp. during night in a salt marsh. In Croatia it was found in forest-steppe near the coast (Fig. 90).

Distribution. Spain (new record), France, Italy (new record), Croatia (new record), Greece (new record), Turkey (new record).

Remarks. *Spatuncusella occitanica* was described as a type species for the genus *Spatuncusella* Nel & Varenne, 2013. Later, the genus was synonymized with *Ivanauskiella* and *S. occitanica* with *I. psamathias* by NEL & VARENNE (2017), but recently reinstated as a separate species (HUEMER & KARSHOLT 2020). Specimens from Spain differ in smaller wingspan and lighter forewing and hindwing. However, male and female genitalia match specimens of *I. occitanica* from other regions. Croatian specimens (Pirovac) were previously published as *I. psamathias* (ŠUMPICH 2013).



Figs 88–92. Habitats of *Ivanauskiella* species. 88 – sands near Vedi in Armenia – habitat of *I. albimarginata* sp. nov.. 89 – rocky steppe near Tabernas in Spain – habitat of *I. nigripunctata* sp. nov.. 90 – coast near Pirovac in Croatia – habitat of *I. occitanica* (Nel & Varenne, 2013). 91–92 – habitats of *I. limoniella* sp. nov., Russia: 91 – southern Ural, steppe near Kidriasovo; 92 – Altai Mts, Kurai steppe near Kurai village.

***Ivanauskiella albimarginata* sp. nov.**

(Figs 41–43, 68–69, 86–87)

Material examined. HOLOTYPE: ♂, ARMENIA: ARARAT: Vedi env., Goravan vill., Goravan Sands, 956 m, 39°53'20"N, 44°43'58"E, sandy steppe, 31.v.2017, J. Šumpich leg. (Barcode NMPC-Lep-0727) (NMPC). PARATYPES: 7 ♂♂ 1 ♀, same locality as for holotype (gen. prep. 23007, JŠ; 23008, JŠ; 23006, JŠ) (NMPC); 7 ♂♂ 2 ♀♀, same locality as for preceding but 25.–29.v.2019, O. Karsholt & N. Savenkov leg. (ZMUC, ECKU); 2 ♂♂ 1 ♀, Urtsadzor env., EcoLodge in Wildlife Refuge, 39°56'57"N, 44°53'10"E, 20.–30.v.2019, H. Roweck & N. Savenkov leg. (ECKU); 1 ♂, Noravank monastery, 1330 m, 39°41'44"N, 45°12'52"E, 2.vi.2017 (gen. prep. 23009, JŠ), J. Šumpich leg. (NMPC); 2 ♂♂, Vedi env., Dashtakar vill., rocky steppe, 1013 m, 39°56'45"N, 44°44'41"E, 1.vi.2017, J. Šumpich leg. (NMPC). IRAN: TEHRAN: 5 ♂♂, 40 km östl. [east] Teheran, 1500 m, 16.vi.1969, H.G. Amsel leg. (gen. slide 237/21, 3/22, 14/22, OB) (SMNK). KORDESTAN: 1 ♂, Strasse Sageh-Baneh, 21 km NE Baneh, 1950 m, 30.vi.–2.vii.1975, G. Ebert & H. Falkner leg. (gen. slide 1/23, OB) (SMNK). ZANJAN: 1 ♀, Ab Bar circuit, Hezar Rud. vill. (51 km N Zanjan), 800 m, 29.–30.iv.2008, E. Rutjan leg. (gen. slide 120/23, OB) (ZMKU).

Diagnosis. The species is characteristic due to its brown forewing with white costal and dorsal margins. The male genitalia with about 10–12 needle-shaped cornuti in the vesica resemble those of *I. ainella* (12–15 cornuti) and *I. limoniella* sp. nov. (8–10 cornuti), but *I. ainella* has the saccus much broader at the base. The female genitalia resemble those of *I. limoniella* sp. nov., but can be separated by laterally directed (posteriorly directed in *I. limoniella* sp. nov.) horns of posterior signum.

Description. Adult (Figs 41–43). Wingspan 9.2–10.4 mm. Head dirty white to light grey, frons white; labial palpus light brown with white apex, inner surface light grey to white; scape of antenna light brown, flagellum brown ringed with grey; thorax, tegulae and forewing covered with grey, brown-tipped scales, costal and dorsal margin of forewing white to light grey, fringe grey; hindwing grey.

Male genitalia (Figs 68–69). Uncus very slender from base to 2/3, then strongly widened towards triangular or rounded apex, extending to top of valva, posterior margin weakly serrate; tegumen subrectangular; valva comparatively broad, in middle twice as broad as medial portion of uncus, dorsal margin straight, ventral margin bent, apical 1/3 slightly broader than apex of uncus; sacculus about half length and as broad as valva in middle; vinculum short; saccus very slender to broadly triangular; phallus with 10–12 elongate, needle-shaped and a few very small thorn-shaped spines, distal plate large, of irregular shape.

Female genitalia (Figs 86–87). Papilla analis subovate, covered with short hair-like setae and strong basal setae; apophysis posterioris slightly longer than apophysis anterioris; segment VIII weakly sclerotised, subtrapezoidal, slightly broader than long; apophysis anterioris straight; ductus bursae of even width except for gradually broadened anterior portion, colliculum with two comparatively large thorn-shaped sclerites, situated at 1/3 of ductus bursae; corpus bursae rounded, anterior signum rounded plate, posterior signum irregular plate with two lateral horns.

Variability. Horns of posterior signum vary from long, slender, weakly curved in specimen from Iran to comparatively short and strongly curved in Armenian specimens.

Molecular data. Holotype was barcoded but only 355

bp were obtained. Despite the short sequence, BIN: BOLD:ADD9916 was assigned to it. However, this BIN belongs to *I. limoniella* sp. nov., and full sequence most likely will generate new BIN. In future, holotype will be barcoded once again using primers for degraded material.

Etymology. The name of the new species is derived from the Latin words 'albus' (= white), and 'margo' (= margin), referring to the forewing pattern of the new species; adjective.

Biology. Host plant unknown. Adults have been recorded from mid-June to early July at altitudes between 800 and 1950 m. Armenian specimens were observed flying in sandy habitats (Fig. 88).

Distribution. Armenia, Iran (north regions).

Ivanauskiella turkmenica**Ivinskis & Piskunov, 1980, sp. restit.**

(Figs 44, 70–71)

Ivanauskiella turkmenica Ivinskis & Piskunov, 1980: 25. TL: Turkmenistan, Serhetabad [Kushka]

Ivanauskiella psamathias (misidentification): PISKUNOV (1990: 309); FALKOVITSH & BIDZYLIA (2006); FALKOVITSH & BIDZYLIA (2009).

Type material examined. HOLOTYPE: ♂, TURKMENISTAN: MARY PROVINCE: 'g. Kushka, Turkmenskaya SSR, 26.iv.1974, P. Ivinskis | Mikr. Prep. № 14809, ♂, holotypus | *Ivanauskiella turkmenica* Ivinskis et Piskunov, sp. n., gen. n., 1979 | *Ivanauskiella turkmenica* Ivinskis et Pisk., 1979, ♂, det. Piskunov | *Ivanauskiella turkmenica* Ivinskis et Piskunov, Turkmenia, Piskunov, ♂ | " Coll. ZIN, Zool. Inst. AN, Leningrad, ♂, gen. prep. №., V. Piskunov, ♂ (ZIN).

Additional material examined. UZBEKISTAN: BUKHARA REGION: 1 ♂, 140 km NW Shafrikan, Zhamansai, 18.iv.1966, M. Falkovitsh leg. (gen. slide 168/20, OB) (ZIN). KAZAKHSTAN: TURKISTAN: 1 ♂, 150 km NE Alma-Ata, Ili river, right bank, Mynbulak, e. l. from *Limonium*, 31.viii.1990, M. Falkovitsh leg. (ZIN). AZERBAIJAN: QOBUSTAN: 1 ♂, 50 km S Baku, Gobustan, 6.v.1987, R. Puplesis leg. (gen. slide 5427 OK) (ZMUC).

Diagnosis. *Ivanauskiella turkmenica* is a uniformly coloured species with slightly bronze-brown sheen and indistinct pale subapical fascia. Numerous minute spines in the vesica (contrary to distinct large needle-shaped spines in other *Ivanauskiella* species) of phallus are characteristic for the male genitalia.

Redescription. Adult (Fig. 44). Wingspan 9.0–10.0 mm. Head, thorax, tegulae and forewing uniformly greyish brown with slight bronze sheen; labial palpus dirty white with dark apex; scape of antenna and flagellum brown; forewing with indistinct pale broadly interrupted subapical fascia at 3/4, fringe grey; hindwing grey.

Male genitalia (Figs 70–71). Uncus very slender from base to about half of its length, then strongly widened towards triangular apex, extending to top of valva; tegumen subrectangular; valva comparatively broad, in middle 3 times as broad as medial portion of uncus, dorsal margin almost straight, ventral margin bent, apical 1/3 as broad as top of uncus; sacculus about 1/3 length of valva and in its base broader than valva in middle; vinculum short; saccus broadly triangular, weakly pointed; phallus with numerous minute spines in vesica, distal plate large, of irregular shape.

Female genitalia. Unknown.

Molecular data. No barcode available.

Biology. Larvae were observed feeding in inflorescence of *Limonium* sp. in SE Kazakhstan in September. The mature larva overwinters. Adults emerged in late August. Other specimens were collected in late April which suggests the existence of two generations (FAL KOVITSH & BIDZILYA 2006: 98, 2009: 71).

Distribution. Verified records from Azerbaijan (new record), SE Kazakhstan (FAL KOVITSH & BIDZILYA 2006), Turkmenistan (IVINSKIS & PISKUNOV 1980) and Uzbekistan (FAL KOVITSH & BIDZILYA 2009). A record from Mongolia (PISKUNOV 1990: 309) needs verification. Records from Russia (KOSTJUK et al. 1994; BIDZILYA 1997: 124; BIDZILYA 2009: 3; JUNNILAINEN et al. 2010: 27) refer to *I. limoniella* sp. nov.

Remarks. The species was described based on the male holotype collected in Kushka (now Serhetabad), South Turkmenistan. Later *I. turkmenica* was synonymized with *I. psamathias* (PISKUNOV 1990: 309). We have no doubt that *I. turkmenica* is a separate species that differs well both externally and in the male genitalia from *I. psamathias* and it is here reinstated as a separate species. *Ivanauskiella psamathias* differs in having light forewing with distinct markings and a few large thorn-shaped cornuti in the vesica.

Discussion

Ivanauskiella was originally placed in the tribe Metzneriini (currently a junior synonym of Anomologinae) based on unmodified abdominal segment VIII, saber-shaped sacculus, reduced gnathos, short tegumen, comparatively short saccus, large phallus without basal process and grape-shaped coremata in the male genitalia. It was also postulated that the long unusually shaped uncus indicates a possible relation of *Ivanauskiella* with *Ptocheuusa* Heinemann, 1870 and especially *Paltodora* Meyrick, 1894 (currently a junior synonym of *Monochroa*), whereas the elongate clavate valva of *Ivanauskiella* is unique within the tribe (IVINSKIS & PISKUNOV 1980: 25).

Based on our current knowledge of male and female genital morphology of *Ivanauskiella* and related genera of Anomologinae, we can state that it is characterised by a suite of the following characters or their combinations, which have not been so far observed in other genera of Gelechiidae: 1) Double signum. 2) Presence of thorns on ductus bursae anteriorly adjacent to colliculum. 3) Long spatulate uncus in combination with completely reduced gnathos. 4) Large (compared with genitalia capsule) phallus with numerous needle-shaped cornuti. This combination of characters clearly indicates affinity of *Ivanauskiella* to Anomologinae. However, the placement of the genus within this subfamily remains rather unclear. The saber-shaped sacculus and stout cylindrical phallus with large number of cornuti may indicate affinity of *Ivanauskiella* to some species of *Monochroa*, e.g., *M. ferrea* (Frey, 1870) and *M. nomadella* (Zeller, 1868). The relation of *Monochroa* to *Ivanauskiella* is supported by the characteristic distinct broad, band-shaped colliculum and horned signum present in some *Monochroa* species (e.g., *M. divisella* (Douglas, 1850)). *Ivanauskiella* also shows affinities to the genus

Oxypteryx Rebel, 1911, which has a large phallus and a long (although unsclerotised) uncus in the male genitalia, and a signum with processes at its margin. Summarizing the above, we tend to consider *Ivanauskiella* a highly specialised branch, which may have been derived from a common ancestor with *Monochroa*. In the current system of European Gelechiidae (HUEMER & KARSHOLT 2020) *Ivanauskiella* is placed between *Monochroa* and *Oxypteryx*. Based on our study *Ivanauskiella* has its main distribution in the countries around and in the Mediterranean Sea. However, this may change. Species of *Ivanauskiella* are small and more or less dull coloured, and until now they have not received much attention among lepidopterists. Five of the ten species are found in Europe, but the first one was described only ten years ago, and four of the five European species are described here as new. One can therefore expect that additional species of *Ivanauskiella* will be discovered in Africa, Arabia and Asia when the fauna of Gelechiidae from these areas becomes better explored.

Updated list of *Ivanauskiella* species

- I. ainella* (Chrétien, 1908) (NW Africa: Algeria, Morocco)
- I. albimarginata* sp. nov. (Armenia, Iran)
- I. annekristinae* sp. nov. (France: Corsica)
- I. bovis* sp. nov. (Morocco)
- I. limoniella* sp. nov. (Bulgaria, Ukraine, Turkey, Russia: European part, Siberia)
- I. nigripunctata* sp. nov. (Spain)
- I. occitanica* (Nel & Varenne, 2013) (S Europe, Turkey)
- I. psamathias* (Meyrick, 1891) (NW Africa: Algeria, Tunisia)
- I. sutteri* sp. nov. (Greece: Crete)
- I. turkmenica* Ivinskis & Piskunov, 1980, sp. restit. (Central Asia)

Acknowledgements

We are grateful to Giorgio Baldizzone (Asti, Italy), Théo Léger (MfN), the late Kari Nupponen (Espoo, Finland), Hartmut Roweck (Kiel, ECKU), Peter Huemer (TLMF), Nikolay Savenkov (Riga and ECKU), Sergey Sinev (ZIN) and Hugo van der Wolf (Nuenen, The Netherlands) for making material from their collections available to us. Jonas Rimantas Stonis (Institute of Ecology, Nature Research Centre, Vilnius, Lithuania), Carsten Hviid, Knud Larsen, Danny Nilsson and Peder Skou (all Denmark) kindly donated specimens of *Ivanauskiella* to ZMUC. David Lees (NHMUK) kindly provided photographs of the lectotype of *I. psamathias*. Robert Trusch and Michael Falkenberg (SMNK) provided various assistance during our study of the collection material under their care. Sree Gayathree Selvantharan (ZMUC) photographed figure 70. Lauri Kaila (MZHF) and Leif Aarvik (Natural History Museum, Oslo, Norway) provided very careful and detailed reviews, corrected misprints, and provided very helpful comments and suggestions. We are very indebted to Jitka Ansari (London, United Kingdom) for improvements of the English language. Jan Šumpich expresses his gratitude to Gayane Karagyan (Scientific Center of Zoology and Hydroecology,

Yerevan, Armenia) for her company during the trip to Armenia and for directions to the important Armenian sites. Ole Karsholt thanks Ruben Khachatryan (Director of the Armenian Foundation for the Preservation of Wildlife and Cultural Assets) and Mark Kalashian (Scientific Center of Zoology and Hydroecology, Yerevan, Armenia) for their support of his field work in Armenia. The first author carried out his part of the work in the framework of the implementation of the State Budget Program “Support for the Development of Priority Areas of Scientific Research”, Ukraine (Code: 6541230). Jan Šumpich carried out his part of the work on this article with support from the Ministry of Culture of the Czech Republic (DKRVO 2019–2023 / 5.I.e, National Museum, 00023272).

References

- ANIKIN V. V. & PISKUNOV V. I. 2001: *Vyemchatokrylye moli Nizhnego Povolzhia*. [Gelechiid Moths (Lepidoptera, Gelechiidae) on Lower Volga]. Pp 259–264. Izvestiya Saratovskogo gosudarstvennogo universiteta, Seria biologicheskaya, vypusk specialnyy. Izdatelstvo Saratovskogo Universiteta, Saratov, 264 pp (in Russian).
- BIDZILYA O. V. 1997: New records of gelechiid moths (Lepidoptera, Gelechiidae) from the Ukraine. *Russian Entomological Journal* **6**: 123–126 (in Russian, English abstract).
- BIDZILYA O. 2009: On the distribution of gelechiid moths (Lepidoptera, Gelechiidae) in Siberia. *Proceedings of Zoological Museum of Kiev Taras Shevchenko National University* **5**: 3–13.
- CARADJA A. 1920: Beitrag zur Kenntnis der geographischen Verbreitung der Microlepidopteren des palaearktischen Faunengebietes nebst Beschreibung neuer Formen. III. Teil. *Deutsche Entomologische Zeitschrift Iris* **34**: 75–178.
- CHRÉTIEN P. 1908: Description de deux Géléchides nouvelles d'Algérie. *Bulletin de la Société Entomologique de France* **13**: 91–93.
- FALKOVITSH M. I. & BIDZILYA O. V. 2006: The Turanian Gelechiid Moths of the tribe Gnorimoschemini (Lepidoptera, Gelechiidae) living on plants of the family Chenopodiaceae, with descriptions of new species. *Proceedings of Zoological Museum Kiev Taras Shevchenko National University* **4**: 61–104 (in Russian, English abstract).
- FALKOVITSH M. I. & BIDZILYA O. V. 2009: A list of gelechiid moths (Lepidoptera, Gelechiidae) of the Southern Kyzylkum. *Proceedings of Zoological Museum Kiev Taras Shevchenko National University* **5**: 65–98 (in Russian, English abstract).
- HUEMER P. & KARSHOLT O. 2020: Commented checklist of European Gelechiidae (Lepidoptera). *ZooKeys* **921**: 65–140.
- IVINSKIS P. & PISKUNOV V. 1980: Opisaniye roda semeistva vyemchatokrylykh molei *Ivanauskiella* Ivinskis et Piskunov, gen. n. i vida *Ivanauskiella turkmenica* Ivinskis et Piskunov, sp. n. iz Turkmenskoi SSR. [Description of Gelechiid moth genus *Ivanauskiella* Ivinskis et Piskunov, gen. n. and species *Ivanauskiella turkmenica* Ivinskis et Piskunov, sp. n. from the Turkmenian SSR]. *Lietuvos TSR Mokslų Akademijos Darbai, C Serija* **2** (90): 23–27 (in Russian).
- JUNNILAINEN J., KARSHOLT O., NUPPONEN K., KAITILA J.-P., NUPPONEN T. & OLSCHWANG V. 2010: The gelechiid fauna of the southern Ural Mountains, part II: list of recorded species with taxonomic notes (Lepidoptera: Gelechiidae). *Zootaxa* **2367**: 1–68.
- KOSTJUK I. Yu., BUDASHKIN Yu. I. & GOLOVUSHKIN M. I. 1994: *Teshuekrylye Daurского zapovednika (annotirovannyi spisok vidov)*. [The Lepidoptera of the Dahursky Nature Reserve (An annotated checklist)]. Kiev, 36 pp (in Russian).
- KUMAR S., STECHER G., LI M., KNYAZ C. & TAMURA K. 2018: MEGA X: Molecular Evolutionary Genetics Analysis across computing platforms. *Molecular Biology and Evolution* **35**: 1547–1549.
- MEYRICK E. 1891: A fortnight in Algeria, with descriptions of new Lepidoptera. *Entomologist's Monthly Magazine* **27**: 9–13, 55–62.
- NEL J. & VARENNE T. 2013: *Spatuncusella occitanica* gen. nov., sp. nov., découvert dans le Midi de la France (Lepidoptera, Gelechiidae, Gelechiinae, Anomologini). *Revue de l'Association Roussillonnaise d'Entomologie* **22** (1): 35–40.
- NEL J. & VARENNE T. 2017: Nouvelles synonymies: *Ivanauskiella psamathia* (Meyrick, 1891) = *Spatuncusella occitanica* Nel & Varenne, 2013, syn. nov., et *Cochylis millierana* (Peyerimhoff, 1877), bona species, stat. rest. = *Cochylis sannitica* Trematerra, 1995, syn. nov. (Lepidoptera, Gelechiidae, Tortricidae). *Revue de l'Association Roussillonnaise d'Entomologie* **26** (1): 13–16.
- PISKUNOV V. I. 1990: Vtoroe dopolnenie k faune vyemchatokrylykh molei (Lepidoptera, Gelechiidae) Mongolii. [Second addition to the fauna of gelechiid moths (Lepidoptera, Gelechiidae) of Mongolia]. *Nasekomye Mongolii* **11**: 286–316 (in Russian).
- POVOLNÝ D. 1983: Eine Typenrevision der von französischen Autoren beschriebenen Gnorimoschemini (Lepidoptera, Gelechiidae). *Acta Entomologica Musei Nationalis Pragae* **41**: 159–187.
- RATNASINGHAM S. & HEBERT P. D. N. 2007: BOLD: The Barcode of Life Data System (<http://www.barcodinglife.org>). *Molecular Ecology Notes* **7**: 355–364.
- RATNASINGHAM S. & HEBERT P. D. N. 2013: ADNA-based registry for all animal species: the Barcode Index Number (BIN) system. *PLoS ONE* **8** (8) (e66213): 1–16.
- ŠUMPICH J. 2013: Faunistic records of some Microlepidoptera from Croatia. *Entomologia Croatica* **17**: 13–33.