

Depressariinae of Madeira and the Azores Islands (Lepidoptera: Depressariidae)

With 35 figures

PETER BUCHNER¹ and OLE KARSHOLT²

¹ Scheibenstraße 335, A-2625 Schwarzau am Steinfeld, Austria. – buchner.324@drei.at

² Zoological Museum, Natural History Museum of Denmark, Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark. – okarsholt@snm.ku.dk

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Abstract

We review and illustrate the species of Depressariinae known from Madeira and the Azores Islands. The following six species are treated: *Agonopterix scopariella* (HEINEMANN, 1870), *A. conciliatella* (REBEL, 1892), *A. vendettella* (CHRÉTIEN, 1908) (new to Madeira), *A. perezi* WALSINGHAM, 1908, *Depressaria marcella* REBEL, 1901 (new to Madeira and the Azores), and *D. halophilella* CHRÉTIEN, 1908. The latter replaces *Depressaria ultimella* STANTON, 1849 in the list of Lepidoptera found in Madeira. *Depressaria iliensis* REBEL, 1936 is a synonym of *Agonopterix vendettella* (CHRÉTIEN, 1908) (syn. nov.). *Depressaria halophilella* is new to the Canary Islands. We provide brief notes on each of the species and give short diagnoses for correctly identifying them, and we discuss previous misidentifications of Madeiran Depressariinae.

Key words

Lepidoptera, Depressariinae, Madeira, Azores Islands

Zusammenfassung

Wir überprüfen und illustrieren die von Madeira und den Azoren bekannten Depressariinae. Folgende sechs Arten werden behandelt: *Agonopterix scopariella* (HEINEMANN, 1870), *A. conciliatella* (REBEL, 1892), *A. vendettella* (CHRÉTIEN, 1908) (neu für Madeira), *A. perezi* WALSINGHAM, 1908, *Depressaria marcella* REBEL, 1901 (neu für Madeira und die Azoren), und *D. halophilella* CHRÉTIEN, 1908. Letztere ersetzt *Depressaria ultimella* STANTON, 1849 in der Liste der von Madeira nachgewiesenen Lepidoptera. *Depressaria iliensis* REBEL, 1936 ist ein Synonym von *Agonopterix vendettella* (CHRÉTIEN, 1908) (syn. nov.). *Depressaria halophilella* ist neu für die Kanarischen Inseln. Neben kurzen Notizen zu jeder Art verweisen wir auf die zur richtigen Bestimmung entscheidenden Merkmale und diskutieren frühere Fehlbestimmungen bei Depressariinae von Madeira.

Schlüsselwörter

Lepidoptera, Depressariinae, Madeira, Azoren

Introduction

The Lepidoptera fauna of the Madeira Islands is relatively poor, with only 331 recorded species (AGUIAR & KARSHOLT, 2008). This is undoubtedly due to their small size and isolated position in the Atlantic Ocean. In spite of this they have been the subject of regular studies by lepidopterists since the middle of the 19th century.

The Macrolepidoptera fauna, and especially the butterflies (Papilionoidea), is considered well known, with only a few and mostly invasive species being added in recent years. Among the Microlepidoptera, new discoveries still occur regularly, and a number of taxonomic problems still await resolution. A brief introduction to the lepidopterology in Madeira was published by KARSHOLT (2000). In several earlier papers different families of Microlepidoptera from Madeira have been dealt with in detail (GAEDIKE & KARSHOLT, 2001; KAILA & KARSHOLT, 2002; KARSHOLT & SINEV, 2004; ROTA et al., 2014).

The Lepidoptera fauna of the Azores Islands has – with only 159 species (KARSHOLT & VIEIRA, 2005; VIEIRA & KARSHOLT, 2010) – an even lower diversity of Lepidoptera than the fauna of the Madeira Archipelago.

Only one species (and probably one specimen) of supposed *Depressariinae* has hitherto been reported from the Azores. GODMAN (1870: 106) listed a “*Depressaria* —?” from the island of Flores. This record was referred to as questionable *Depressaria conciliatella* by REBEL (1940b: 8), and in later literature (e.g., CARVALHO, 1995: 577 and VIEIRA, 1997: 14) the question mark was removed. However, it was not listed by KARSHOLT & VIEIRA (2005) or VIEIRA & KARSHOLT (2010) because its identity could not be confirmed.

The *Depressariinae* have had a rather stormy life in Lepidoptera systematics since they were removed from Oecophoridae. Here we follow the concept of HEIKKILÄ et al. (2014).

After having been excluded from Oecophoridae they became part of Elachistidae for a few years (NIEUKERKEN et al., 2011), until *Depressariidae* was redefined in a wider sense (HEIKKILÄ et al., 2014), including about 2300 species known so far from subfamilies Acriinae, Aeolanthinae, Cryptolechiinae, *Depressariinae*, Ethmiinae, Hypercalliinae, Hypertrophinae, Peleopodinae, Oditinae, Stenomatinae, and a diversity of predominantly New World taxa previously excluded from Lypusidae (Amphisbatidae of authors) but left without family position. This paper only deals with *Depressariinae* (which may be paryphyletic with respect to the genus *Semioscopis*), and within this subfamily only with genera *Agonopterix* and *Depressaria*. *Agonopterix* is currently known from 95 species in Europe, about 180 in Holarctis and 250+ species worldwide, and *Depressaria* is known from 64 species in Europe, about 130 in Holarctis and probably more than 150 species worldwide.

Besides *Depressariinae* the only other representative of the family *Depressariidae* found in Madeira and the Azores is *Ethmia bipunctella* (FABRICIUS, 1775) (Ethmiinae).

Methods

Morphological examination: Genitalia preparations followed standard techniques (ROBINSON 1976). Male preparations were stained with mercurochrome and females with chlorazol, which brings a better result than using the same stain for both sexes.

Photographic documentation: Photos of whole specimens were taken with Canon EOS 5D Mark III and Canon lens EF 100 mm 2.8 L IS USM at 1:1. Specimens were illuminated with two diffused flashes, using a third flash for setting the background whiteness. Photos of specimen details were taken with Canon lens MP-E 65 at 2:1, using ring flash. Genitalia photos were taken with microscope (Wild Heerbrugg) using a 10x objective and a 2.5x ocular. All photos were taken by the first author and edited using the software Helicon Focus 4.80 and Adobe Photoshop 6.0. For creating the black and white photos, the G alpha channel of the RGB originals was used in males and the Y alpha channel of the CMYK originals in females, due to the different stains.

All slides and photos were made by P. Buchner, if not otherwise specified.

Plant names follow World Flora Online (2011–2019).

For each species a short description of external characters is given. The genitalia are not described, but discussed in the chapters on diagnosis.

Abbreviations

ICLAM	Insect Collection Laboratório de Qualidade Agrícola, Madeira, Portugal
ZfB	Zentrum für Biodokumentation des Saarlandes, Landsweiler-Reden, Germany
NHMUK	The Natural History Museum, London, U.K.
NHMW	Naturhistorisches Museum Wien, Austria
SMNK	Staatliches Museum für Naturkunde, Karlsruhe, Germany
RCMC	Research Collection Martin Corley, Faringdon, U.K.
TLMF	Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria
ZMUC	Zoological Museum, University of Copenhagen, Denmark
ZSM	Zoologische Staatssammlung München, Germany

General remarks about the determination of *Depressariinae* to species level

In many species of the large genus *Agonopterix* one can find the same basic wing patterns. The most important are mentioned in Fig. 1.

If exact information about the host-plant is available determination is usually rather simple, because every species is restricted to a few related host-plants or even

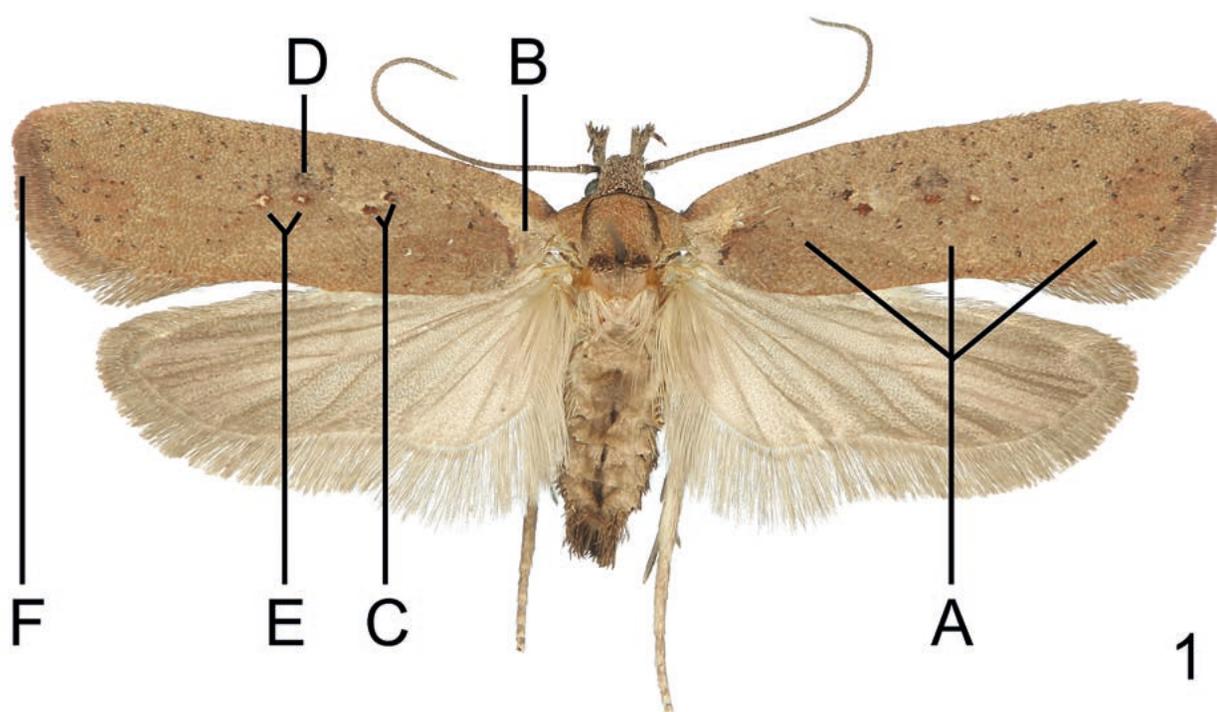


Fig. 1: Basic wing patterns, shown with *A. conciliatella* as an example. – A. Ground colour of forewings. – B. Basal field of forewing. Contrast against ground colour and further details may be of diagnostic value. – C. Oblique pair of dots at 1/3. Distance, presence of white scales, shape, absence of one or both dots may be of diagnostic value. – D. Diffuse dark spot. – E. Pair of dots at 1/2. Distance, presence of white scales, absence of one or both dots may be of diagnostic value. – F. Outer margin (termen): Outline (concave, straight, convex) may be of diagnostic value.

to one plant species. Specimens without information about host-plant can often be determined from external features, if they are in good condition. But there remain species pairs or species groups where external patterns do not lead to species level. Specimens from such species-groups and most worn specimens need dissection of genitalia. In males it leads (with few exceptions) to species level without problems. In females it is more difficult, because the differences are small and the structures are very delicate, so it is difficult not to destroy important features during preparation. If everything else fails, the last resort is DNA examination, usually barcoding.

The situation in the other large genus, *Depressaria* is similar to *Agonopterix*, with two differences. Even if specimens are in good condition determination from external patterns is often impossible, but genitalia patterns are usually distinct in both sexes.

Taxonomic treatment of species

Agonopterix scopariella (HEINEMANN, 1870)

(Figs 2–4, 8, 10)

Depressaria scopariella HEINEMANN, 1870: 149.

Depressaria conciliatella sensu auct. (nec REBEL); See remarks.

Examined material: Madeira. 1 ♂, Monte, coll. Bethune-Baker, genitalia slide BM 19853 (NHMUK); 1 ♂, Funchal

Lido, 4–14.ix.1973, leg. N. L. Wolff; 1 ♂, 2 ♀♀, Serra d'Água, 660 m, 7.ix.1973, leg. O. Lomholdt & N. L. Wolff; 1 ♂, same data but 17.x.1994, leg. O. Karsholt; 1 ♂, Serra d'Água, Pousada, 660 m, 31.viii.1975, leg. N. L. Wolff; 1 ♂, same data but Pousada dos Vinhaticos, 15–16.vi.1976; 1 ♀, same data but Central, 600 m, found dead, 15.–16.vi.1976; 1 ♀, Madeira, Fajã da Nogueira, 1000 m, 20.viii.1974, leg. E. Traugott-Olsen; 1 ♀, Rabaçal, 1050 m, 22.viii.1974, leg. E. Traugott-Olsen; 1 ♂, Ribeira das Cales, 1000 m, 28.VIII.1975, leg. N. L. Wolff; 1 ♀, Madeira, Caniço, 12–18.ix.1977, leg. O. Lomholdt & N. L. Wolff (all ZMUC); 1 ♂, Ilha, Quinta Grande, Cabo Girao, 22.v.1989, leg. M. Hellers (ZfB); 1 ♀, Ponta del Sol, 0–10 m, 12.vi.1993, leg. O. Karsholt; 1 ♂, Encumeada, 1000 m, 18.vi.1993, leg. O. Karsholt; 1 ♂, Eira de Serrado, 1450 m, 15.x.1997, leg. B. Skule (all ZMUC); 1 ♂, C. Lobos, Curral das Freiras, road to Colmeal, 29.ix.1998, leg. F. Aguiar (ICLAM).

Description: Adult (Figs 2–4). Wingspan 18–22 mm, ground colour variable, e.g. pale greyish, pale yellowish, reddish brown, dark brown. Dark scales irregularly interspersed, number varying from nearly absent to rather dense. Oblique pair of dots at 1/3 (Fig. 1C) and pair of dots at 1/2 (Fig. 1E) present, usually all accompanied with white scales especially on outer margin, diffuse dark spot (Fig. 1D) present. Basal field (Fig. 1B) markedly paler than ground colour of forewing, divided from ground colour by a narrow dark line in rear half, confluent with ground colour in front

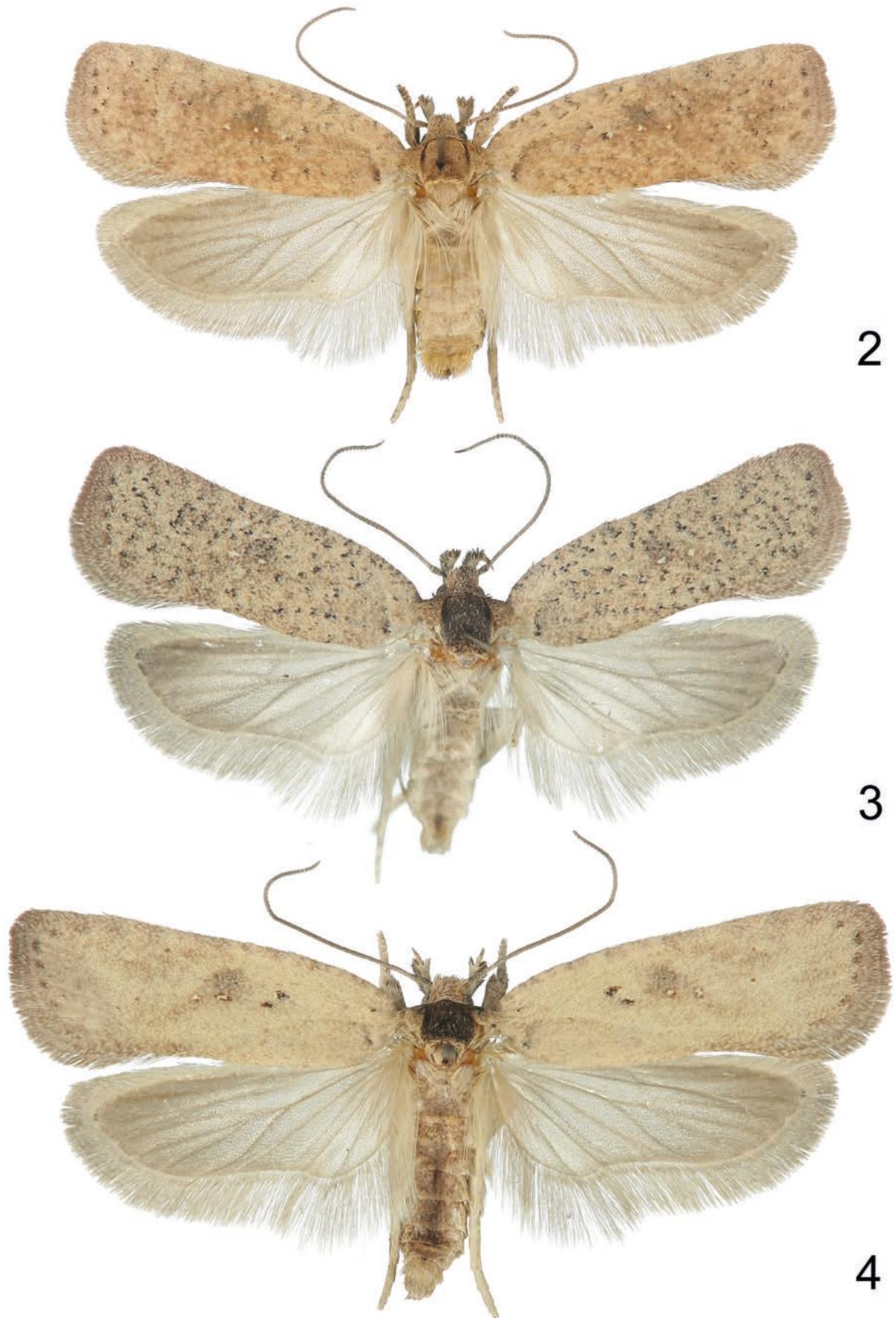


Fig. 2: *A. scopariella* ♂, Madeira, Santo da Serra, 15.v.1967, e.l. *Sarothamnus*, leg. F. Kasy, coll. NHMW. – Fig. 3: *A. scopariella* ♀, Greece, Peloponnes, Mystras, 3.vi.2009, ex larva, leg. & coll. P. Sonderegger. – Fig. 4: *A. scopariella* ♂, Spain, Mallorca, Puig Mayor, 22.vi.1969, e.l. *Calycotome spinosa*, leg. J. Klimesch, coll. ZSM.

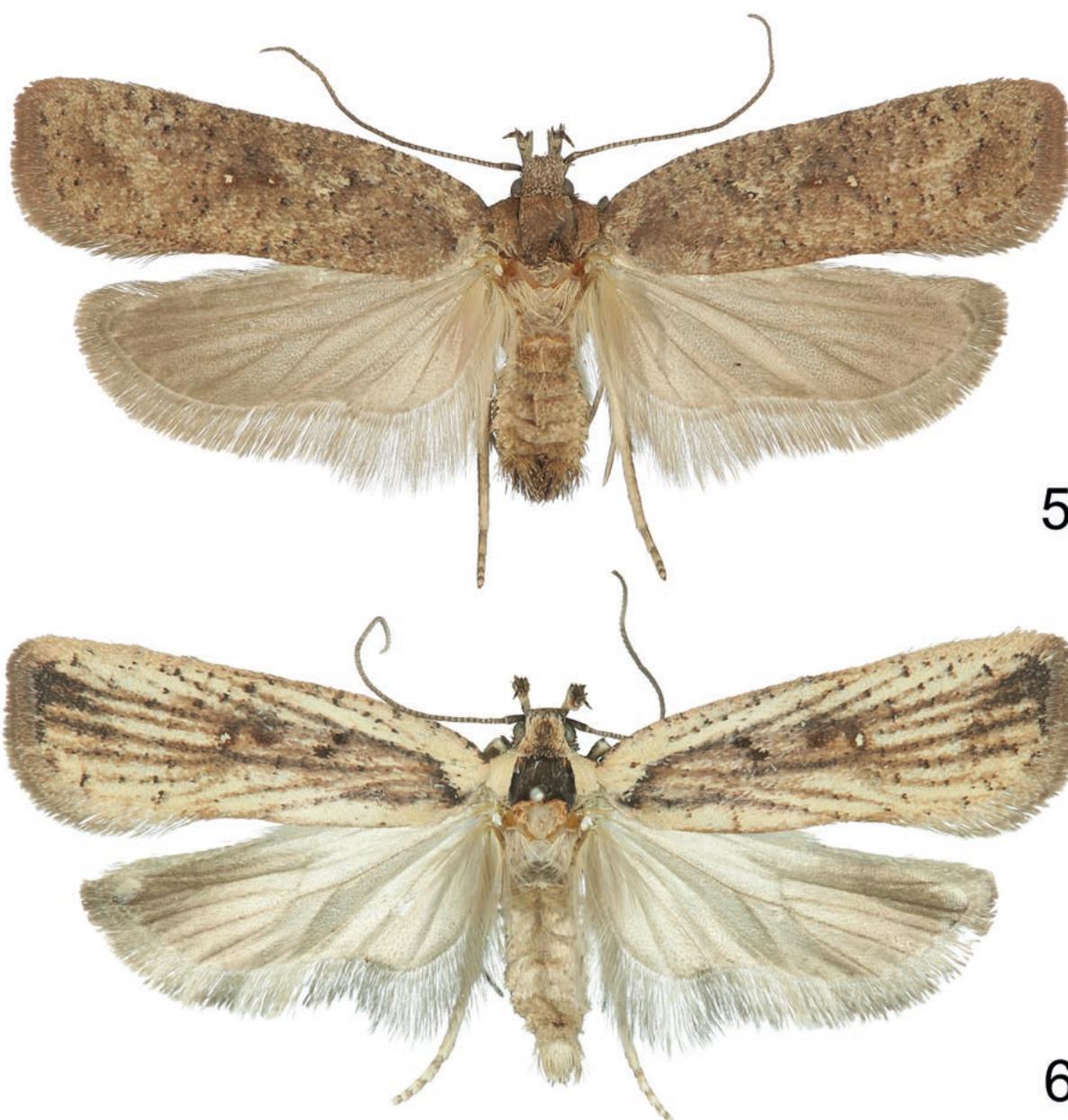


Fig. 5: *A. conciliatella* ♀, Spain, La Gomera, El Cedro, 26.v.1965, e. l. *Adenocarpus*, leg. J. Klimesch, coll. ZSM. – Fig. 6: *A. conciliatella* ♂, Portugal, Madeira, Encumeada, 1000 m, 16.vi.1993, e. l. *Genista tenera*, leg. O. Karsholt, coll. ZMUC.

half. Outer margin (termen, Fig. 1F) concave or at least straight, but not convex.

Diagnosis: Similar to *A. conciliatella*, for details see there. *A. subpropinquella* (not found in Madeira), a species frequently confused with *A. scopariella*, has no white scales in the forewing dots and a much less distinct basal field.

For genitalia differences of *A. scopariella* and *A. conciliatella* see paragraph “diagnosis” under the next species.

Bionomics: Larvae on Fabaceae, e.g. *Cytisus scoparius* (L.) Link.

Distribution: A widespread and in the Mediterranean area a very common species.

Remarks: *A. scopariella* is the only species of *Depressariinae* which is common in Madeira. It was first recorded by CARVALHO (1995: 563), but most earlier records of ‘*Depressaria*’ *conciliatella* by e.g. WALSINGHAM (1894: 546) refer to *A. scopariella*.

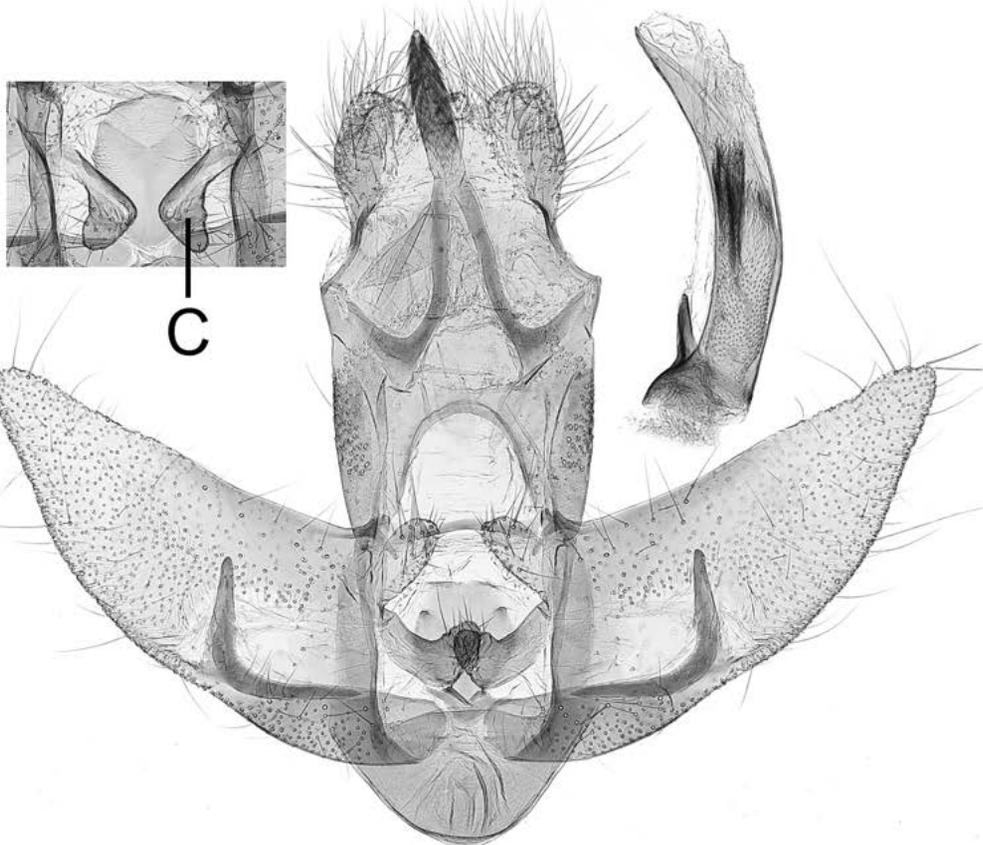
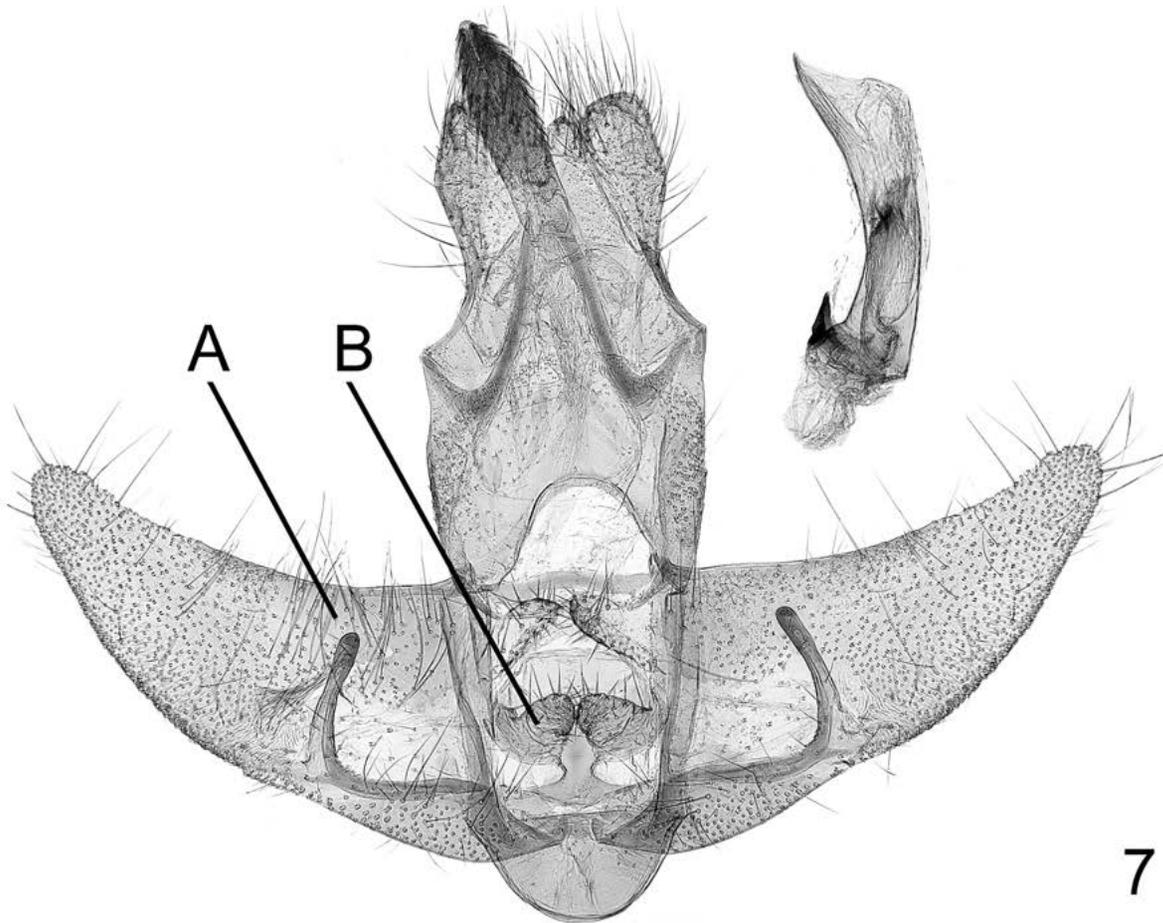


Fig. 7: *A. conciliatella* ♂, Spain, La Gomera, El Cedro, 31.v.1965, e.l. *Adenocarpus*, leg. J. Klimesch, coll. ZSM. –
Fig. 8: *A. scopariella* ♂, Croatia, Novi Vinodolsky, 20.v.2001, leg. & coll. L. Srnka; insert (8C): The Netherlands, 1870, coll. NHMW.

Agonopterix conciliatella (REBEL, 1892)

(Figs 5–7, 9)

Depressaria conciliatella REBEL, 1892: 272, pl. 17, fig. 14.*Agonopterix mutata* HANNEMANN, 1989: 391, figs 4–5, pl. 10, figs 1–3, pl. 11, figs 1–2.

Examined material: 1 ♂, Ilha, Quinta Grande, Fortinhas, 7.vii.1991, leg. M. Meyer (ZfB); 1 ♂, Encumeada, 1000 m, la. 15.vi.1993, *Genista tenera*, leg. O. Karsholt (ZMUC); 2 ♂♂, Encumeada, Fortinhas, 13.x.1993, leg. M. Meyer (ZfB).

Description: Adult (Figs 5–6). Size, basic patterns and wing shape as in *A. scopariella*, but variability markedly larger. Forms with rather uniform ground colour (Fig. 5) are separable from *A. scopariella* only by dissection (or barcoding), but forms with strongly contrasting dark veins against pale ground colour (Fig. 6) are not found in *A. scopariella* and therefore these forms can be determined as *A. conciliatella* at first glance.

Diagnosis: Similar to *A. scopariella*.

In the male genitalia the cuiller (A) is blunt in *A. conciliatella* (Fig. 7) and pointed in *A. scopariella* (Fig. 8); anellus lobes (B) are shorter and broader than in *A. scopariella*, not overlapping in standard preparations. To avoid overlapping, which can cause technical problems during spreading, in *A. scopariella* the anellus lobes are some times turned outward (insert C, Fig. 8), but this is not standard preparation.

In the female genitalia the caudal margin of sternite VIII is evenly rounded in *A. conciliatella* (Fig. 9A), and straight with sharply upcurved structure in *A. scopariella* (Fig. 10B).

Bionomics: Larvae on Fabaceae, e.g. *Cytisus* spec., *Genista* spec.; it has also been reared from *Adenocarpus foliosus* in Canary Islands. In Madeira the larva is recorded from *Genista tenera* (Murray) Kuntze.

Distribution: Canary Islands and Madeira.

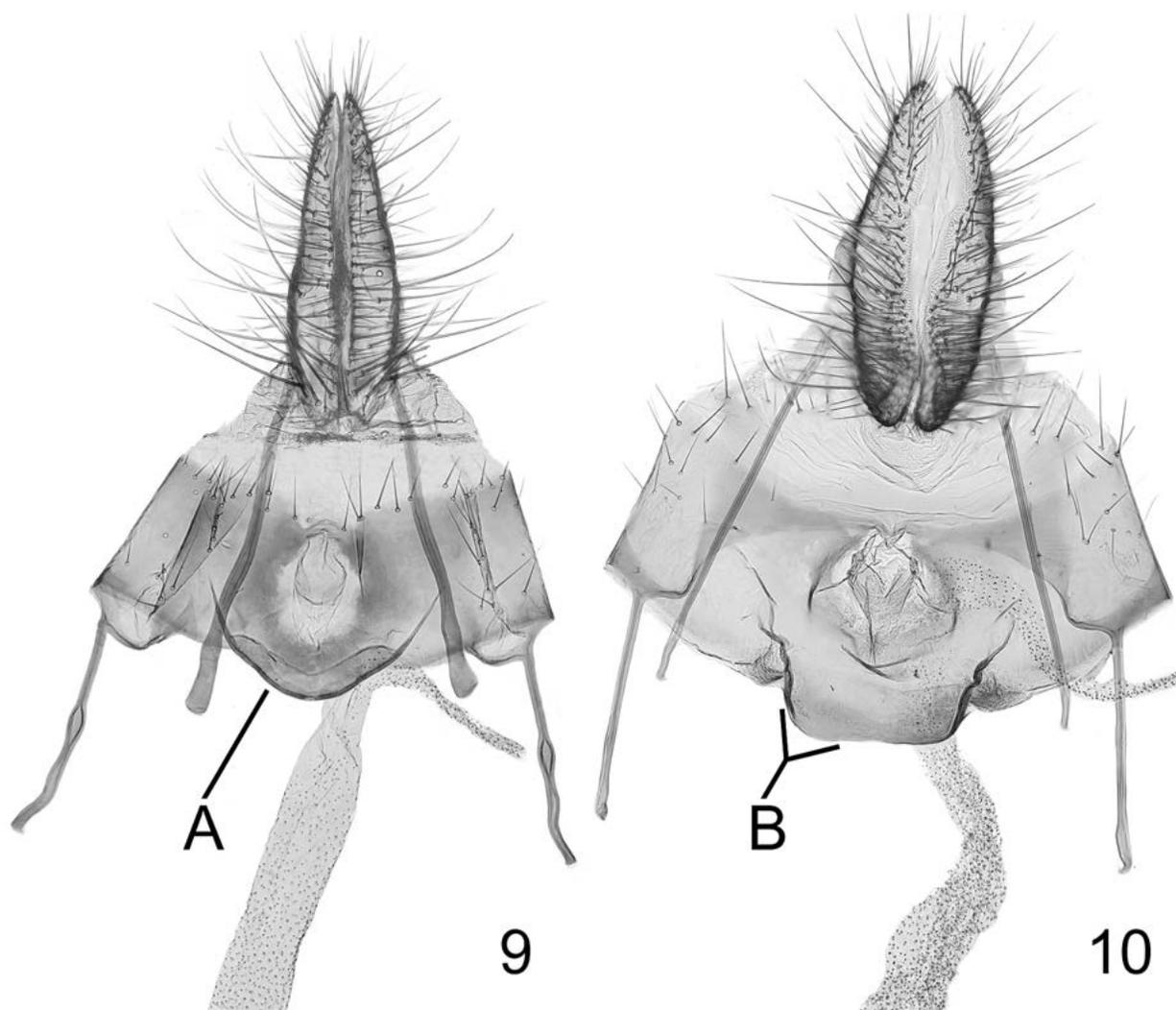


Fig. 9: *A. conciliatella* ♀, Spain, Gran Canaria 3 km S Lanzarote, 7.9.2012, leg. & coll. A. Stübner. – Fig. 10: *A. scopariella* ♀, Marokko, Marrakesch, Tensift al Haouz, Toufine, 2100 m, 23.5.2010, leg. & coll. A. Werno.

Remarks: WALSINGHAM (1894: 546) recorded '*Depressaria conciliatella*' from Madeira, based on a misidentified specimen of *Agonopterix scopariella* (listed above under examined material of *A. scopariella*). Most subsequent records of *A. conciliatella* from Madeira (see AGUIAR & KARSHOLT, 2006: 46–47 for details) are not based on additional material, but refer to Walsingham, and the specimens listed above are the only correctly identified ones from Madeira known to us. REBEL (1940a: 22) recorded three specimens from Madeira, Rabaçal as '*Depressaria conciliatella*'. One of these is kept in the NHMW, but it is unfortunately without abdomen and its identity cannot be established.

Agonopterix conciliatella was listed in the genus *Exaeretia* STAINTON, 1849 by AGUIAR & KARSHOLT (2006: 20, 47; 2008: 340). That was based on a mismatch of the slide-labels of the holotypes of *Exaeretia thurneri* and *Agonopterix conciliatella*, caused by HANNEMANN in year 1952, leading to publication of *A. conciliatella* in the genus *Exaeretia* (and *E. thurneri* in the genus *Agonopterix*) by HANNEMANN (1953). These two species were consequently treated in the wrong genera until the clarification of this mismatch (BUCHNER, 2015).

Agonopterix vendettella (CHRÉTIEN, 1908)

(Figs 11–14, 16, 18)

Depressaria vendettella CHRÉTIEN, 1908b: 258.

Depressaria iliensis REBEL, 1936: 36; syn. nov.

Examined material: Madeira. 2 ♂♂, Fajã da Nogueira, 600 m, 27.viii.1975, leg. N. L. Wolff (ZMUC); 1 ♀, same data but 500 m, la. 20.vi.1993, *Oenanthe pteridifolia*, leg. O. Karsholt (ZMUC); 10 ♂♂, 4 ♀♀, Encumeada, 1000 m, la. 8.vi.1993, *Oenanthe pteridifolia*, leg. O. Karsholt (ZMUC).

Description: Adult (Figs 11–13). Wingspan 18–22 mm, ground colour warm brown (Figs 11–12) or greyish brown (Fig. 13). Oblique pair of dots at 1/3 accompanied with pale or whitish scales especially on outer margin, the dark part of the lower usually elongated, the dark part of the dots may be confluent which creates a comma-shaped dark marking (Fig. 11, intermediate in Fig. 12), or the dark parts of the dots are divided by ground colour (Fig. 13). Diffuse dark spot present. From the pair of dots at 1/2 only the inner one present, usually (but not always) with white scales in the centre and at inner margin. Basal field markedly paler than ground colour of forewing, divided from ground colour by a rather broad dark line in rear 2/3, confluent with ground colour in costal 1/3. Outer margin (termen) convex.

Diagnosis: The warm brown form with confluent dots at 1/3 found in Madeira is very similar to *A. perezi* (for external differences see under that species). The continental

form is very similar to *A. curvipunctosa* and determination needs dissection. Differential diagnosis of the closely related species *A. vendettella* and *A. curvipunctosa* (not found in Madeira so far) based on genitalia.

In the male genitalia the base of anellus in both species shows a structure which is not found in other *Agonopterix* species. In *A. vendettella* (Fig. 14) this structure shows two elongated, narrow tips directed towards vinculum (Fig. 14A, also as an inset where this structure is highlighted in black). In *A. curvipunctosa* (Fig. 15) these tips are shorter and evenly rounded (Fig. 15C). The phallus in *A. vendettella* has a basal process of about 30 % of the phallus length (which is markedly longer than in most other *Agonopterix* spec.), phallus not becoming broader from base to tip in lateral view, and teeth on outer surface (if present, Fig. 14B) are predominately dorsal at about 3/4. In *A. curvipunctosa* the basal process is also remarkable long, even slightly longer than in *A. vendettella* with about 35–40 % of phallus length, phallus becoming broader from base to tip in lateral view with broadest part at about 3/4, and teeth on outer surface (if present, Fig. 15D) are predominately ventral at about 3/4.

Also the female genitalia of both species show a structure which is not found in other *Agonopterix* species. The first part of ductus bursae, from ostium to caudal margin of sternite VIII (colliculum) is strongly sclerotized, and a short unsclerotized part is followed by a second sclerotization. In *A. vendettella* the colliculum is longer than broad with deeply excavated caudal margin (Fig. 16A), and ductus between colliculum and the second sclerotization is swollen and appearing globose in standard preparations (Fig. 16B). In *A. curvipunctosa* the colliculum is about as long as broad with shallow excavated caudal margin (Fig. 17A), and ductus below colliculum is dilatated, but not forming a globose structure (Fig. 17B).

Bionomics: Larvae on Apiaceae. The most important host plant is *Smyrniolum olusatrum* L., but it has also been found on *Conium maculatum* L. in mainland Portugal (M. Corley, pers. comm.). Specimens from Madeira have been reared from *Oenanthe pteridifolia* LOWE.

Distribution: Italy, France, Spain, Portugal, Morocco, the Canary Islands and Madeira, usually near the coast.

Remarks: All examined specimens from Madeira represent the warm brown form with confluent dots at 1/3. On the Canary Islands, this form dominates but the more grey coloured form with separated dots at 1/3 also can be found; the last mentioned is the common form of continental Europe.

Agonopterix iliensis (REBEL, 1936), so far reported from Italian mainland and Sardinia, is conspecific with *A. vendettella* (according to genitalia slide from the holotype, Fig. 18: Aritzio, 10. 9. 34, Predota, gen. slide



11



12



13

Fig. 11: *A. vendettella* ♀, Spain, Tenerife, Guimar, 14.iii.1969, ex larva, leg. J. Klimesch, coll. ZSM. – Fig. 12: *A. vendettella* ♂, Portugal, Madeira, Faja da Nogueira, 500 m, la. 20.vi.1993, *Oenanthe pteridifolia*, leg. O. Karsholt, coll. ZMUC. – Fig. 13: *A. vendettella* ♀, Spain, La Palma, 540 m, 11.xi. 2010, leg. & coll. B. Müller.

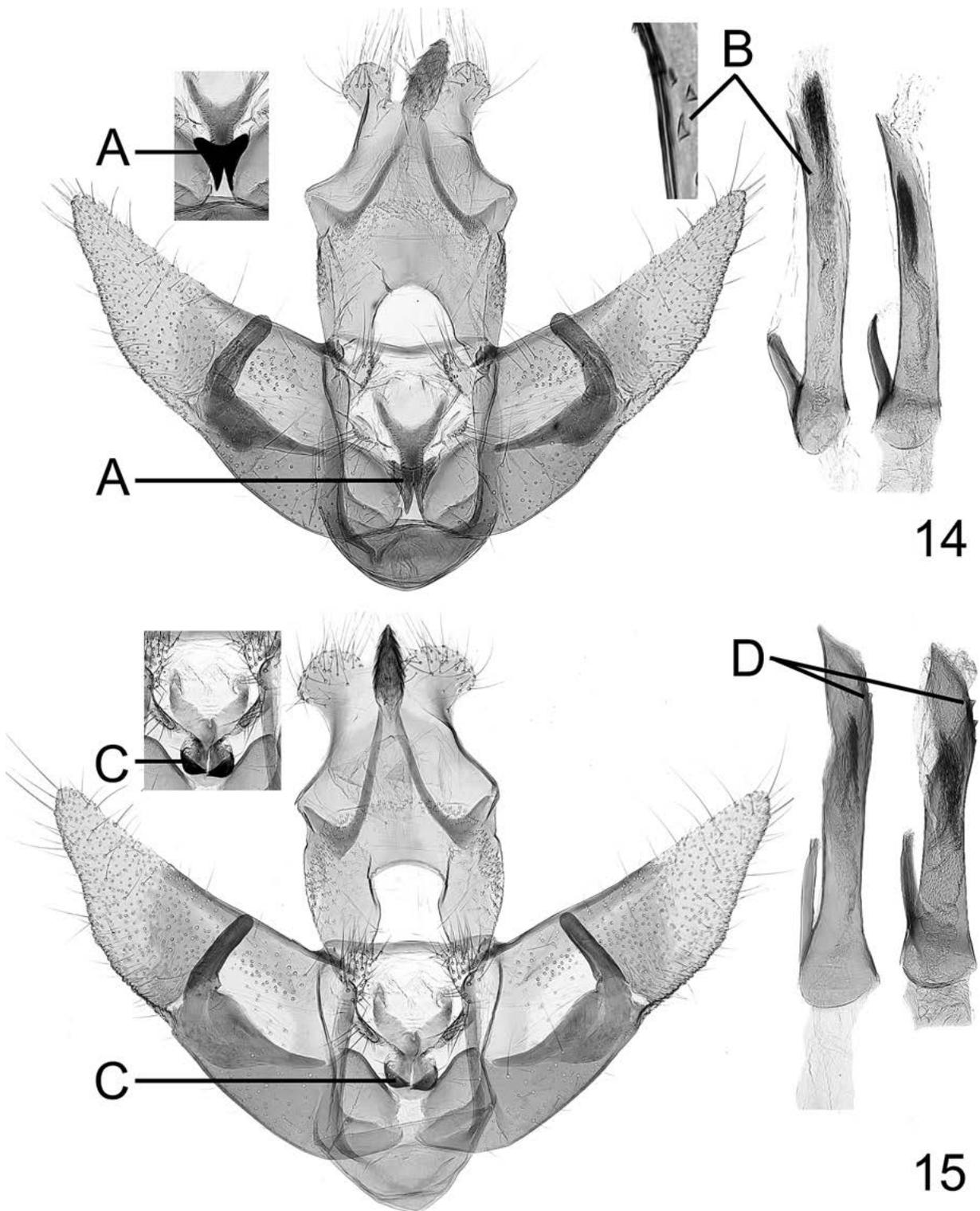


Fig. 14: *A. vendettella* ♂, Spain, Tenerife, Las Montanas de Anaga, El Bailadero, 700 m, 22.iv. 1998, leg. & coll. K. Larsen. Inserted second (right) phallus: Italy, Sardegna, Mela Murgia, Quartucciu, 9.xii.2011, leg. P.F. Murgia, coll. L. Morin. – Fig. 15: *A. curvipunctosa* ♂, Austria, Oberloiben, 17.iv.2011, leg. & coll. W. Stark. Inserted second (right) phallus: Austria, Hundsheimer Berge, 26.vii.2008, leg. & coll. P. Buchner.

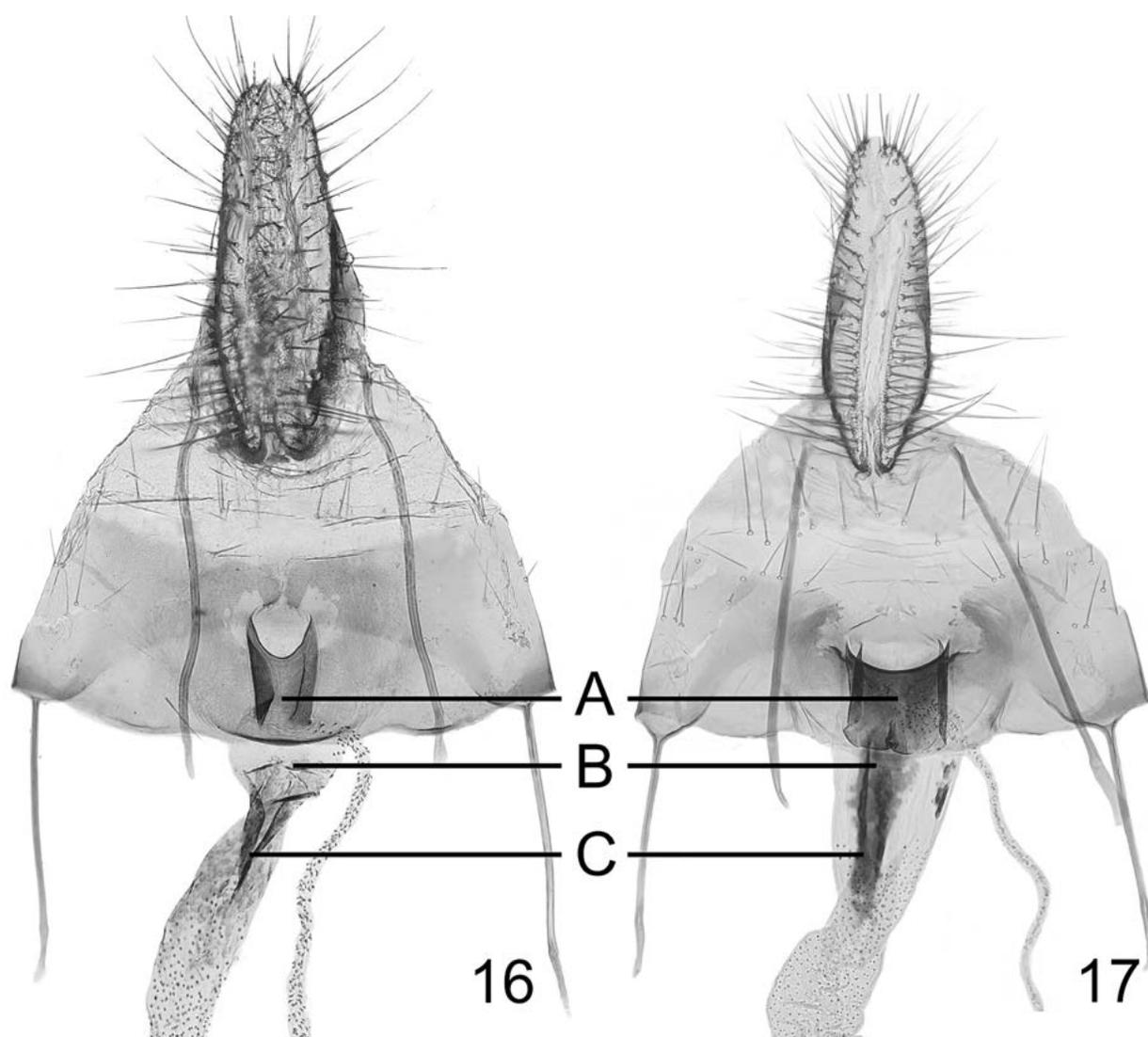


Fig. 16: *A. vendettella* ♀, Italy, Naples, Procida, 2014, leg. & coll. F. Vegliante. – Fig. 17: *A. curvipunctosa* ♀, Hungaria, Debrecen, Hortobagy, 4.vii.1993, leg. & coll. K. Larsen.

Mus. Vind. 16.508, prep. Peter Huemer). In the original description the holotype is stated to be a male, but in fact it is a female.

Agonopterix perezii WALSINGHAM, 1908
(Figs 19–22)

Agonopterix perezii WALSINGHAM, 1908: 957, pl. 52, fig. 8.
Depressaria applana auct. (not Fabricius). See remarks.

Examined types: Holotype ♂, Funchal, 7.ii., leg. T. V. Wollaston (NHMUK); Paratype ♀, “Madeira, B.-Baker coll.” (NHMUK).

Other examined material: Madeira. 2 ♂♂, 1 ♀, Ponta de São Lourenço, 0–10 m, 26.vi.1993, leg. O. Karsholt; 1 ♂, Porto Santo, 0–10 m, 14.iv.1996, leg. O. Karsholt (all ZMUC); 1 ♀, Funchal, Santo António, Casas Próximas, 12.i.2003, leg. J. Jesus; 1 ♀, Ribeira Brava, Campanário,

Corujeira, 10.iii.2003, leg. Y. Gonçalves; 6 ♂♂, Santa Cruz, Caniço, Assomada, 9.iv.2010, *Ruta chalepensis*, leg. C. Brazão (all ICLAM); 1 ♀, Funchal, 12.ix.2004, leg. M. Corley, genitalia slide Corley 2276 (RCMC).

Description: Adult (Figs 19–20). Wingspan 18–21 mm. Ground colour greyish brown (Fig. 19) or warm brown to reddish brown (Fig. 20). Oblique pair of dots at 1/3 accompanied by pale yellowish scales especially on outer margin, the dark part of the dots usually confluent. Diffuse dark spot present. Pair of dots at 1/2 usually present and with pale yellowish scales in the centre, but these dots may be weak or even invisible. Basal field pale, with distinct contrast against a rather broad dark line in rear 2/3, confluent with ground colour in front 1/3. Outer margin (termen) concave or at least straight.

Diagnosis: Externally very similar to the form of *A. vendettella* with the warm brown ground colour and confluent dots at 1/3. Best feature to separate these two

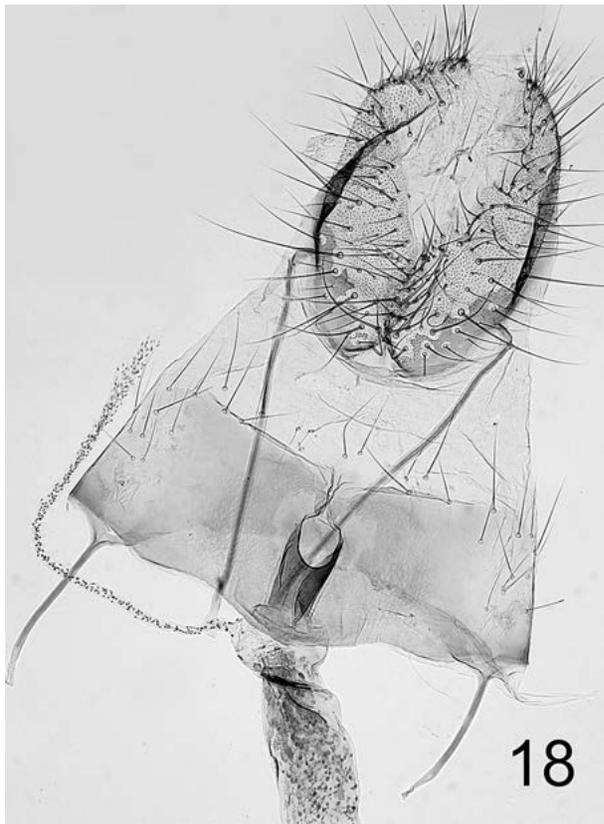


Fig. 18: *A. vendettella* (*A. iliensis* holotype) ♀, Italy, Arizzo, 10.ix.1934, leg. Predota, gen. slide Mus. Vind. 16.508, prep. Peter Huemer, coll. NHMW.

species is the wing shape: outer margin evenly rounded in *A. vendettella*, convex or at least straight in some part in *A. perezii*. The dark line which separates the rear 2/3 of basal field from ground colour is markedly more distinct in *A. perezii* than in *A. vendettella*. Genitalia (Figs 21, 22) are clearly different, which indicates there is no close relationship between the two species.

Bionomics: *A. perezii* has been reared from *Ruta pinnata* L. on Canary Islands (Klimesch). The record from *Oenanthe divaricate* R.Br. (Mabb.) (a synonym of *O. pteridifolia* LOWE) by AGUIAR & KARSHOLT (2006: 47) refers to *A. vendettella*.

Distribution: Canary Islands and Madeira.

Remarks: *Agonopterix heracliana* (LINNAEUS) was recorded from Madeira by WALSINGHAM (1894, 1908), REBEL (1901, 1911) and CARVALHO (1995). These literature records are based on two specimens: one found by Wollaston and recorded as *Depressaria applana* (FABRICIUS) by WALSINGHAM (1894: 546). Later, when describing *A. perezii* WALSINGHAM (1908: 957–958) pointed out that Wollaston's specimen of 'applana' belongs to *perezii*. CARVALHO (1995: 563) recorded a second specimen of *heracliana* from Cural das Freiras, 11.vi.1980, but on the same page he also recorded a

specimen of *perezii* from the same locality and date. We have not examined Carvalho's specimens, but these two species are very similar, and we find it likely that records of both belong to one species: *perezii*, and we agree with AGUIAR & KARSHOLT (2006: 46–47) that *A. heracliana* should be removed from the list of Madeiran Lepidoptera until its presence there is confirmed. This case is extraordinarily confusing because the name *heracliana* (LINNAEUS, 1758) was used until about 1970 for a widespread species of *Depressaria* (see next note), but now it is considered the valid name of one of the most common species of European *Agonopterix* (KARSHOLT et al., 2006).

The paratype listed above has an additional label "Paralectotype", but to our knowledge no lectotype has been published.

Depressaria marcella REBEL, 1901

(Figs 23–27)

Depressaria marcella REBEL, 1901: 174.

Examined material: Madeira: 1 ♂, Assomada, 15.vi.1969, leg. Pinker (LNK); 1 ♂, Funchal Lido, 17–22.iv.1974, leg. N. L. Wolff, genitalia slide Wolff 4256; 2 ♂♂, Serra d'Água, Pousada dos Vinhaticos, 650 m, 8.vi.1976, leg. N. L. Wolff, genitalia slide Wolff 4340; 1 ♂, Ponto do São Lourenço, Serra de Picolade, 80 m, 4.vii.1991, leg. M. Meyer; 1 ♀, Ponta de São Lourenço, 0–10 m, 26.vi.1993, leg. O. Karsholt; 2 ♂♂, 1 ♀, Porto Santo, 0–10 m, 23–24.x.1994, leg. O. Karsholt (all ZMUC). Azores: 3 ♂♂, Terceira, Porto Judea, 10 m, 10–14.vi.2018, genitalia slide Karsholt 5357 (ZMUC).

Description: Adult (Figs 23–24). Wingspan 14–17 mm, ground colour blackish brown, usually interspersed by pale brown arches forming 3 diffuse and irregular transverse bands (Fig. 23) or whole forewing very diffuse blackish brown (Fig. 24). Differs by its small size from most other *Depressaria* species.

Bionomics: Larva on Apiaceae, e.g. *Daucus carota* L. and *Foeniculum vulgare* MILL.

Distribution: Azores Islands (new record), Madeira (new record). Widespread in South Europe and North Africa.

Diagnosis: The form with transverse fasciae is usually very distinct, but forms with more or less uniform forewings may be confused with different other species, including some non-Depressariidae (especially of Gelechiidae) which, however, have a more or less distinct emargination at the termen of the hindwing. Moreover the labial palps (Fig. 25) can help to exclude Gelechiidae and the genitalia (Figs 26, 27) in both sexes are characteristic.



19



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Fig. 19: *A. perezi* ♀, Spain, Puerto de la Cruz, 6.iv.1971, e. l. *Ruta pinnata*, leg. J. Klimesch, coll. ZSM. – Fig. 20: *A. perezi* ♂, Portugal, Madeira, Ponto de São Laurencu, 0 m, 26.vi.1993, leg. O. Karsholt, coll. ZMUC.

Depressaria halophilella CHRÉTIEN, 1908

(Figs 28–30, 33, 35)

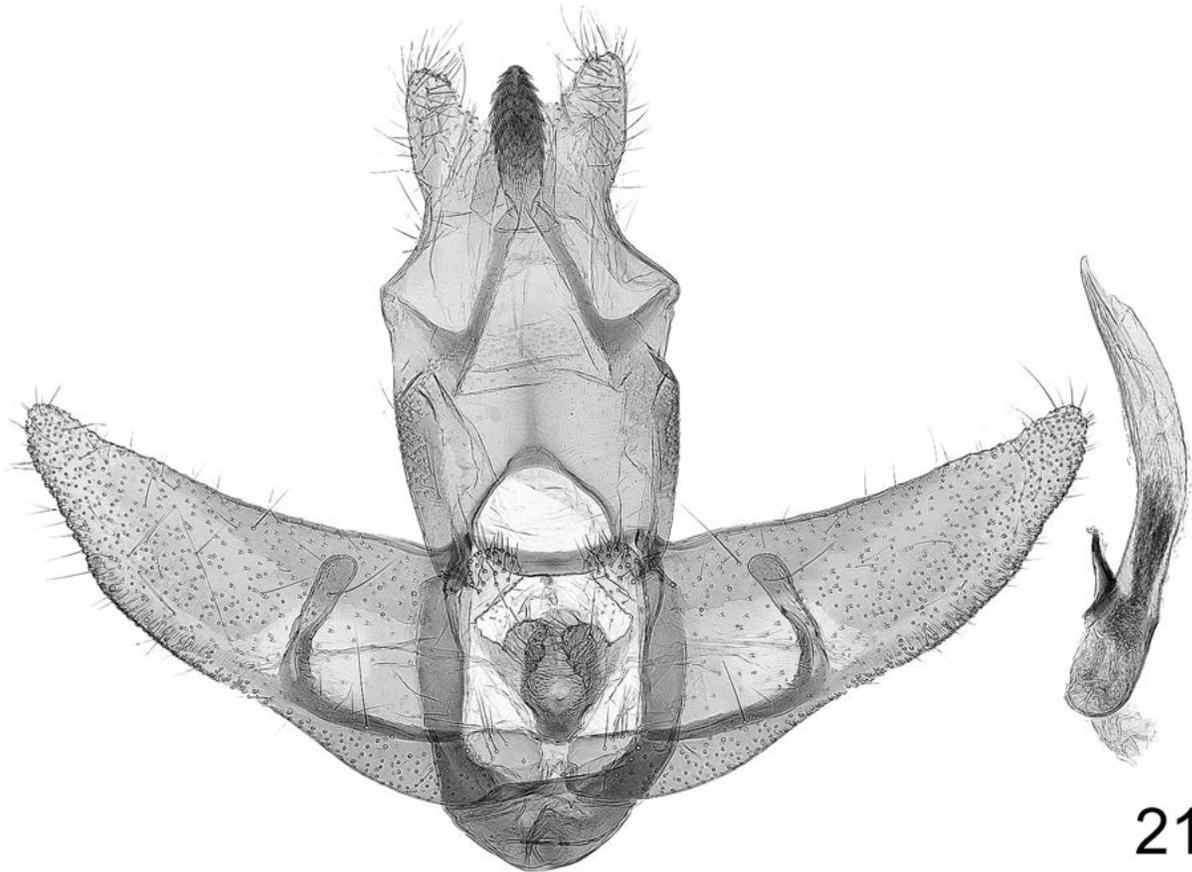
Depressaria halophilella CHRÉTIEN, 1908a: 60.

Depressaria ultimella sensu auct. (nec STAINTON). See remarks.

Examined material: Madeira. 1 ♂, Funchal Lido, 17–22. iv.1974, leg. N. L. Wolff (ZMUC); 5 ♂♂, 3 ♀♀, Porto Moniz, 0–10 m, 4–7.vii.1993, leg. O. Karsholt, genitalia slide Corley 2384, Karsholt 5039; 3 ♂♂, same data but 13.x.1994; 1 ♂, same data but 19–22.iv.1996 (all ZMUC). **Canary Islands:** 1 ♀, Gran Canaria, Baranco Virgen, Moya, 400 m, 20.vii.1984, leg. P. Olsen, B. Skule & P. S. Nielsen (ZMUC).

Description: Adult (Figs 28–30). Wingspan 15–18 mm, in fresh specimens ground colour of forewings a warm medium brown, veins covered by black scales, especially in distal part, black lines usually accompanied with some whitish scales. In older specimens ground colour turns to pale or translucent, while the black lines stay distinct, at least in part, which produce an increase of contrast in such specimens (Fig. 30).

Diagnosis: Closely related and similar to *D. ultimella*. Fresh specimens are usually distinguishable by a longitudinal concentration of white scales in the centre of the forewings (Fig. 31A) and a sharply angled transverse fascia at 3/4 (red underlined in Fig. 31B), often also by a much darker ground colour.



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Fig. 21: *A. perezii* ♂, Portugal, Madeira, Porto Santo, 14.iv.1996, leg. O. Karsholt, coll. ZMUC.

In the male genitalia of *D. halophilella* (Fig. 33) A is an acute angle and B an obtuse angle; lateral outline of vinculum moderately to markedly convex (C), the number of cornuti (D) is usually eight or more (note, that cornuti can be lost and a small number may be an artefact). In *D. ultimella* (Fig. 34) A and B both about right angles; lateral outline of vinculum straight or slightly convex, cornuti usually 3–8.

In the female genitalia (Fig. 35) *D. halophilella* differs from nearly all other *Depressaria* species by its very short apophyses anteriores (E). Only *D. ultimella* shows the same feature, and female genitalia of these two species are not separable.

Bionomics: Monophagous on *Crithmum maritimum* L. (Apiaceae), a strictly coastal plant.

Distribution: Widespread on coasts around the Mediterranean Sea, but not reaching the northern range of *Crithmum maritimum* (e.g. Great Britain). Larvae of *D. ultimella* feed on *Oenanthe* spec., *Apium* spec. and *Sium* spec. (Apiaceae).

Remarks: Whereas *D. halophilella* is a new name on the list of Lepidoptera found in Madeira the species has been known there for a long time, being misidentified under different names. We believe that *halophilella* was

already found in Madeira by Wollaston in the 1850s and recorded (as *Siganorosis heracliana* DEGEER) by WALSINGHAM (1894: 546). Later WALSINGHAM (1908: 959–960) corrected his identification of the specimen to *D. apiella* (HÜBNER) (a junior synonym of *D. daucella* (DENIS & SCHIFFERMÜLLER)). This was followed by REBEL (1917: 12; 1940: 8). CARVALHO (1995: 577) listed *Depressaria rubricella* (DENIS & SCHIFFERMÜLLER) (another synonym of *D. daucella*) from Madeira without exact date and locality, probably based on the records by Walsingham and Rebel. The records of *D. heracliana* by REBEL (1901: 173) and *D. pastinacella* (DUPONCHEL) by ZHANG (1994: 178) most likely date back to Walsingham's record of Wollaston's specimen (see the note above under *A. perezii* for discussion of the synonymy of *heracliana*). *D. daucella* is externally similar to *halophilella*, and since Walsingham changed his opinion about the single specimen it may not have been in perfect condition. We were unable to trace Wollaston's specimen in the NHMUK, but we find it likely that it belonged to *D. halophilella*. The record of *D. apiella* (HÜBNER) from Tenerife by WALSINGHAM (1908: 959) refers to *Depressaria sarahae* GASTÓN & VIVES, 2017 ssp. *tabelli* BUCHNER, 2017. AGUIAR & KARSHOLT (2006: 21, 47) listed *D. halophilella* from Madeira under the name of *D. ultimella* STAINTON because of misidentification.

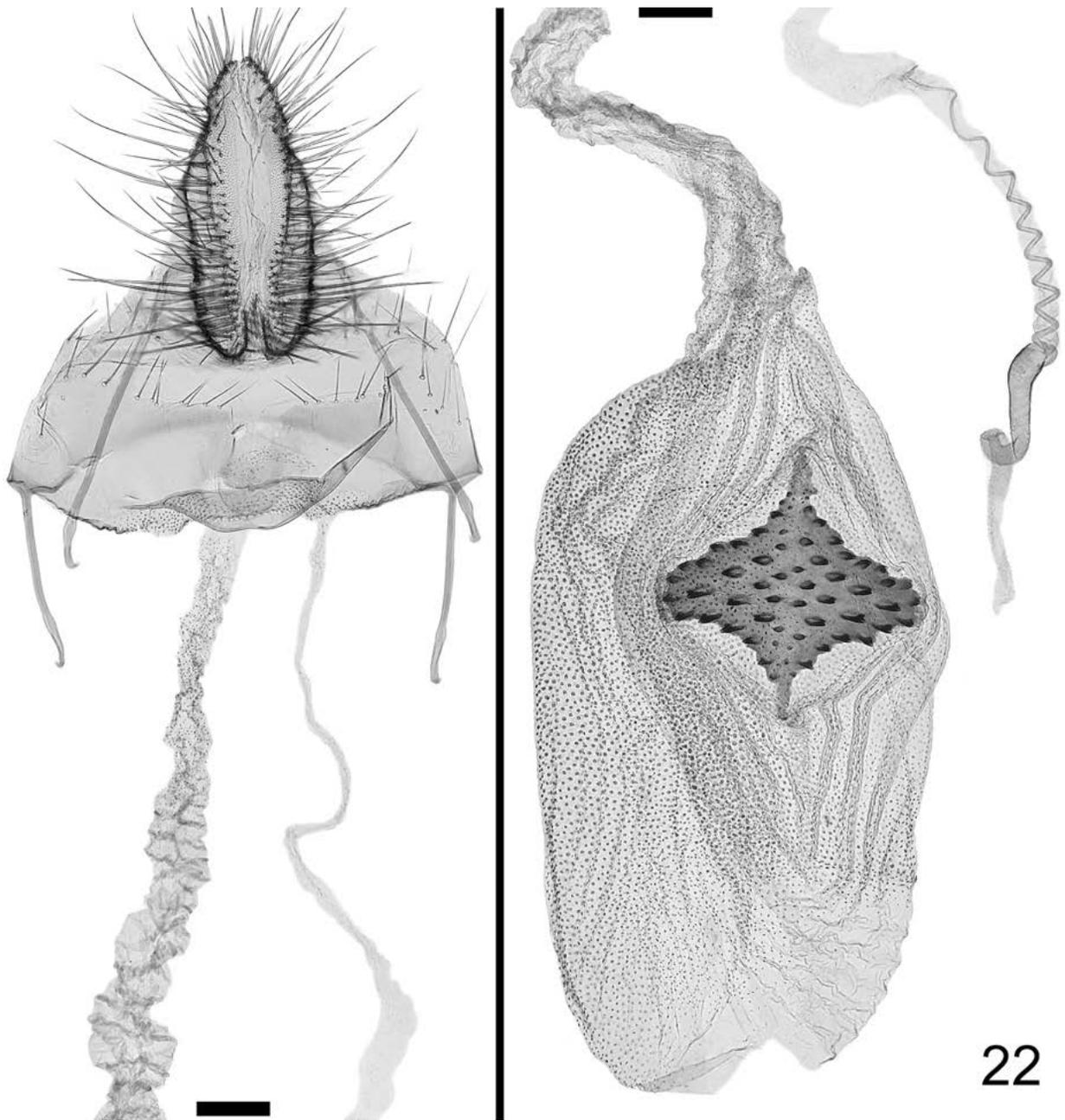


Fig. 22: *A. perezii* ♀, Spain, Puerto de la Cruz, 5.iv.1971, e. l. *Ruta pinnata*, leg. J. Klimesch, coll. ZSM.

Discussion: One of the aims of this paper is to provide the necessary information for correctly identifying Madeiran *Depressariinae*, because misidentifications have been common in the past.

Despite the low number of species of this subfamily found in Madeira: four in AGUIAR & KARSHOLT (2008: 340), six in Lvovsky (2004–2019) (*Ethmia bipunctella* not included), these are unusually confused. The differences in the number between these two lists are due to the inclusion of two additional, misidentified species (*A. heracliana* and *A. daucella*) in the latter.

Many *Depressariinae* moths are difficult to identify, especially if only limited material in more or less worn condition is available. In former days the species of the subfamily were highly confused. If fresh specimens,

preferably bred from larvae (and the host plant is noted) are available, many specimens can be identified from external characters. Moreover, the genitalia exhibit in most cases reliable characters for identification. And nowadays problematic specimens can be identified from their DNA-barcode. These tools were not available for lepidopterists in the 19th and first part of the 20th century, and it is therefore no wonder that the few specimens of *Depressariinae* available to them were often misidentified.

Both Madeira and the Azores Islands are well known for their many endemic animals and plants, and that is also the case for their *Lepidoptera* faunas. It is therefore rather surprising that none of these archipelagos house endemic species of *Depressariinae* – although two of the species



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Fig. 23: *D. marcella* ♀, France, Montpellier, 18.x.2001, leg. & coll. T. Grünewald. – Fig. 24: *D. marcella* ♂, Portugal, Madeira, Porto Santo, 24.x.1994, leg. O. Karsholt, coll. ZMUC.

listed above (*A. conciliatella* and *A. perezi*) are Macaronesian endemics, being only found in Madeira and in the Canary Islands.

Throughout the years the authors examined the collections of Microlepidoptera kept in most major natural history museums in Europe, and we were surprised that we found no or only very few specimens of Depressariinae from this area there. The short lists of examined material for each species listed above is thus not a result of superficiality, but reflects that these species are rare (or at least little collected) in Madeira and the Azores. It is therefore quite possible that these islands contain at least a few additional species which may turn up during future field work. For that we can especially recommend to search for larvae, especially on endemic plants of Apiaceae or Asteraceae.

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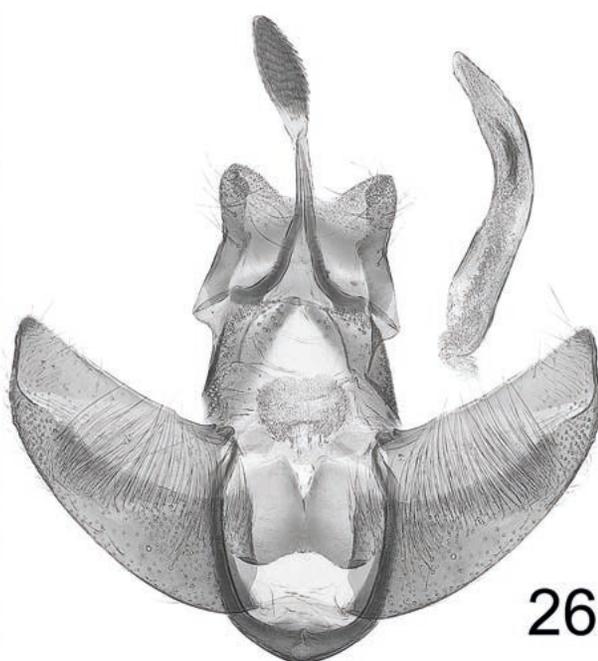


Fig. 25: *D. marcella* ♀, Portugal, Herdade da Comenda, Elvas, 1.viii.2008, e.l. *Daucus muricata*, leg. M. Corley (RCMC). – Fig. 26: *D. marcella* ♂, Portugal, Madeira, Porto Santo, 24.10.1994, leg. O. Karsholt, coll. ZMUC.

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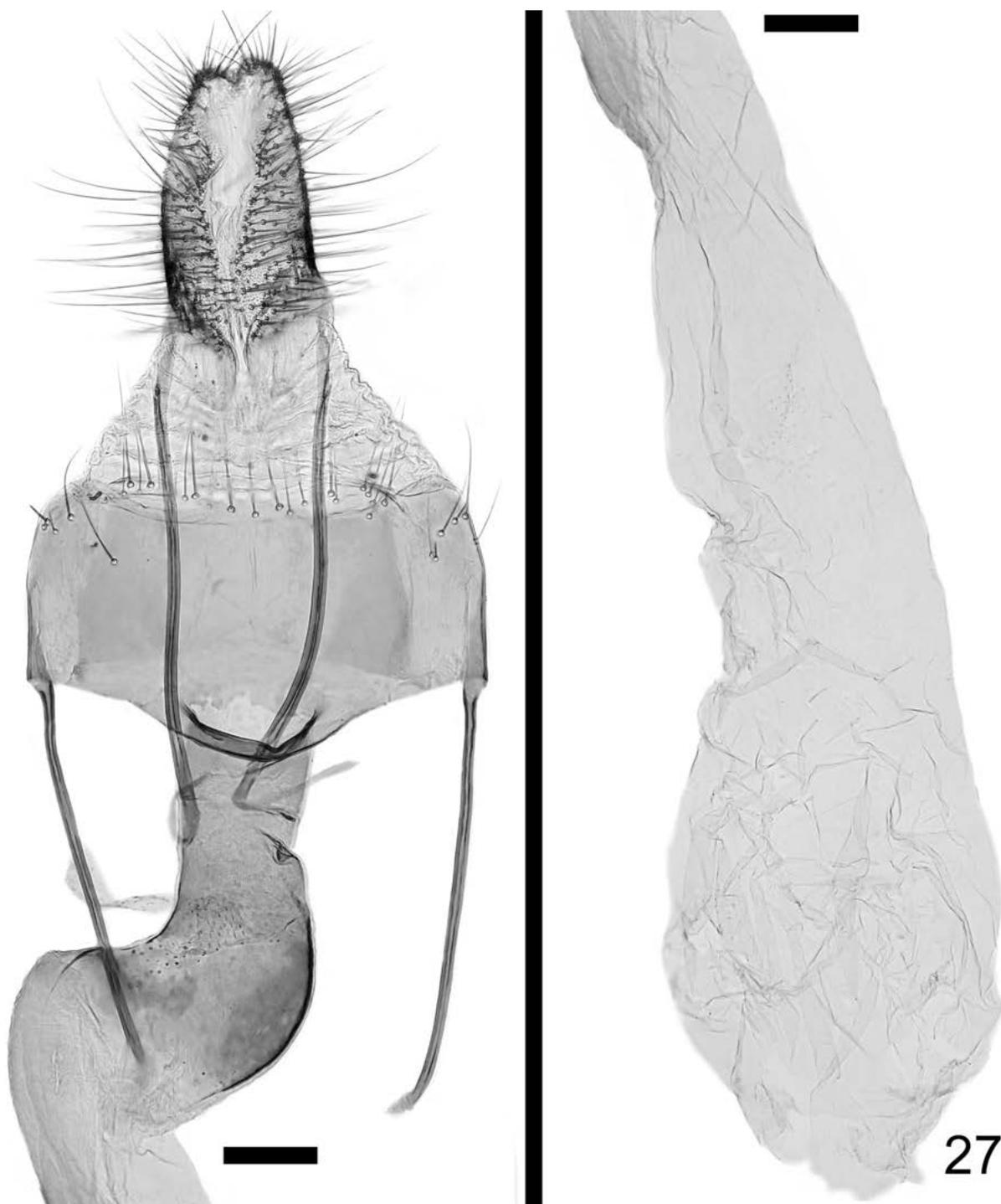


Fig. 27: *D. marcella* ♀, Turkey, Side, 16.v.1990, leg. & coll. R. Keller.

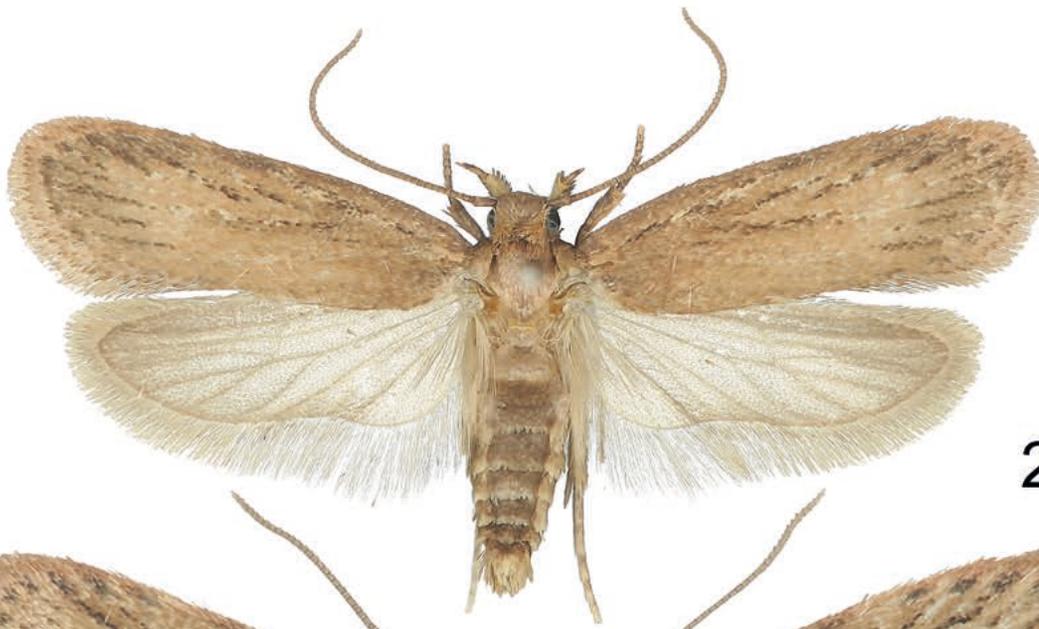
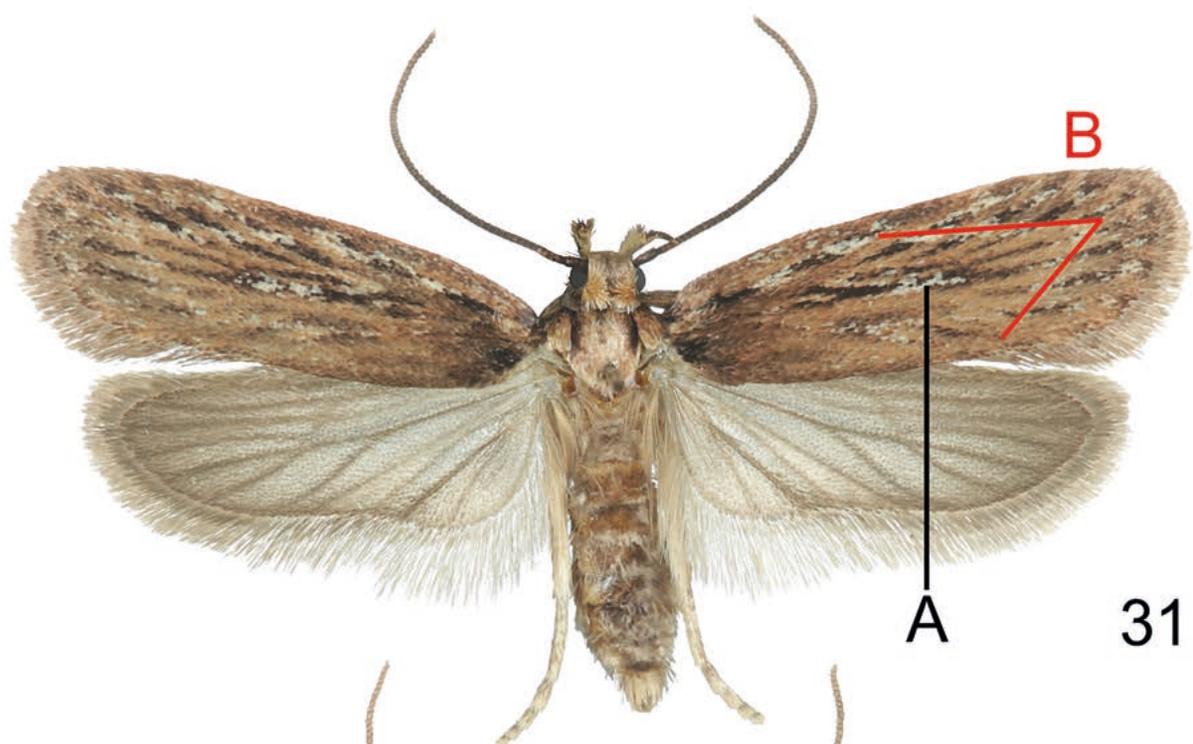
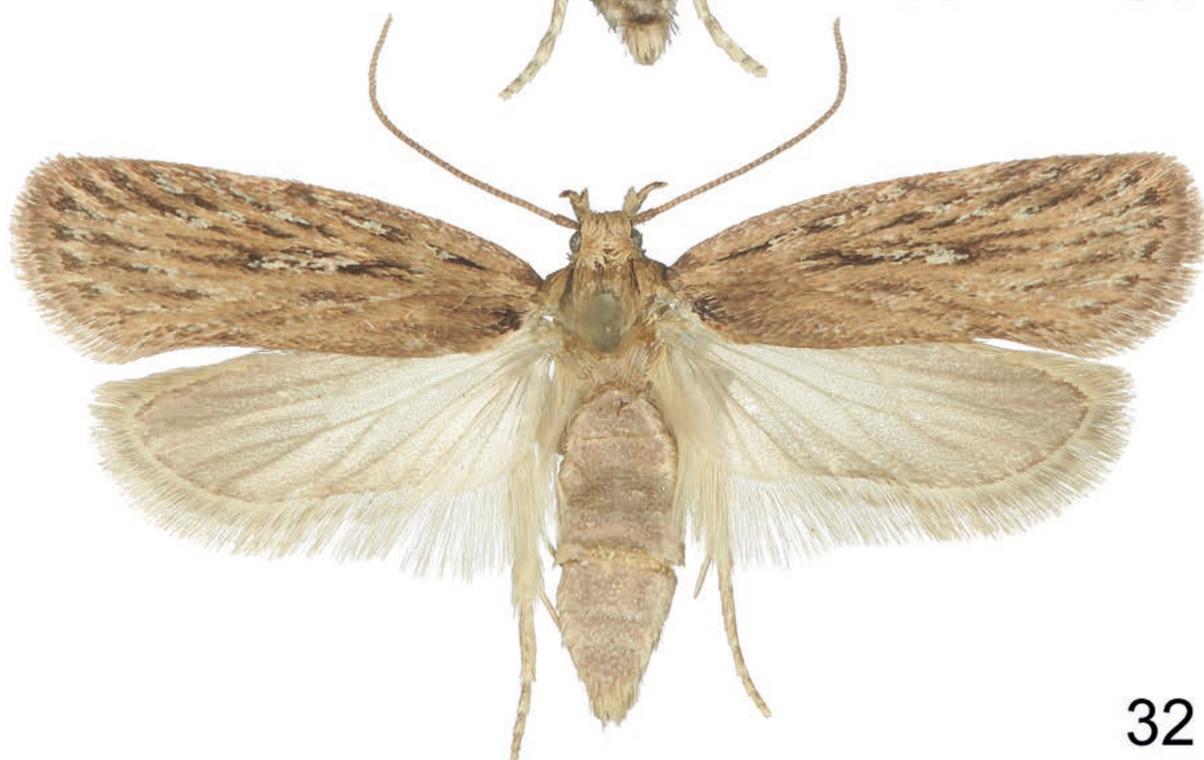


Fig. 28: *D. halophilella* ♂, Spain, Portbou, 29.ix.1974, e.l. *Crithmum maritimum*, leg. J. Klimesch, coll. ZSM. –
Fig. 29: *D. halophilella* ♂, France, Var, Port d’Alon, 31.iii.2014, e.l. *Crithmum maritimum*, leg. & coll. P. Sonderegger.
– Fig. 30: *D. halophilella* ♂, Spain, Mallorca, Albufera, 13.vi.2013, leg. D. Nilsson, coll. ZMUC.



31



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Fig. 31: *D. ultimella* ♂, Sweden, Öland, Långlött, Åstad, e. l. *Conium*, leg. R. Johansson, coll. ZMUC. – Fig. 32: *D. ultimella* ♀, Belgium, Mons, e. l. *Apium graveolens*, leg. A. Dufrane, coll. ZSM.

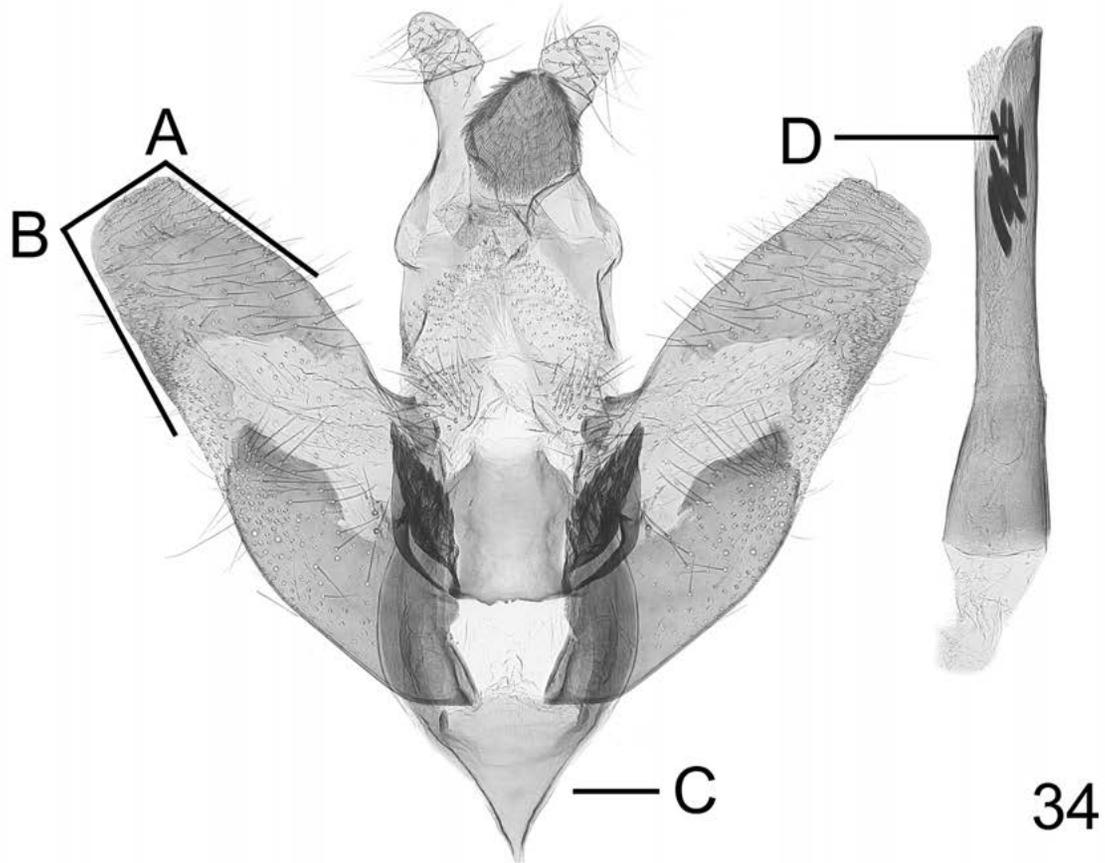
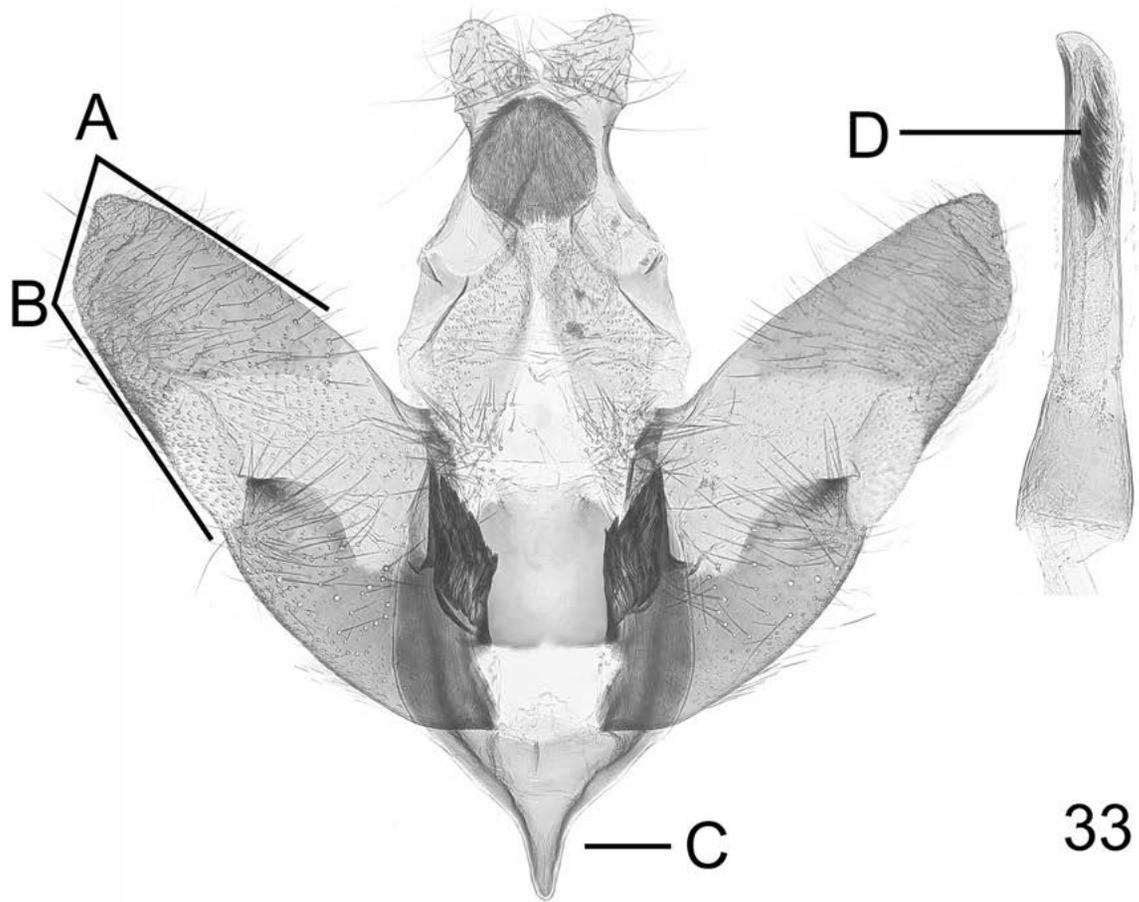


Fig. 33: *D. halophilella* ♂, France, Var, Port d'Alon, 31.iii.2014, e. l. *Crithmum maritimum*, leg. & coll. P. Sonderegger. –
Fig. 34: *D. ultimella* ♂, Austria, Drösing/March, 14.vii.1990, leg. F. Lichtenberger, coll. TLMF.

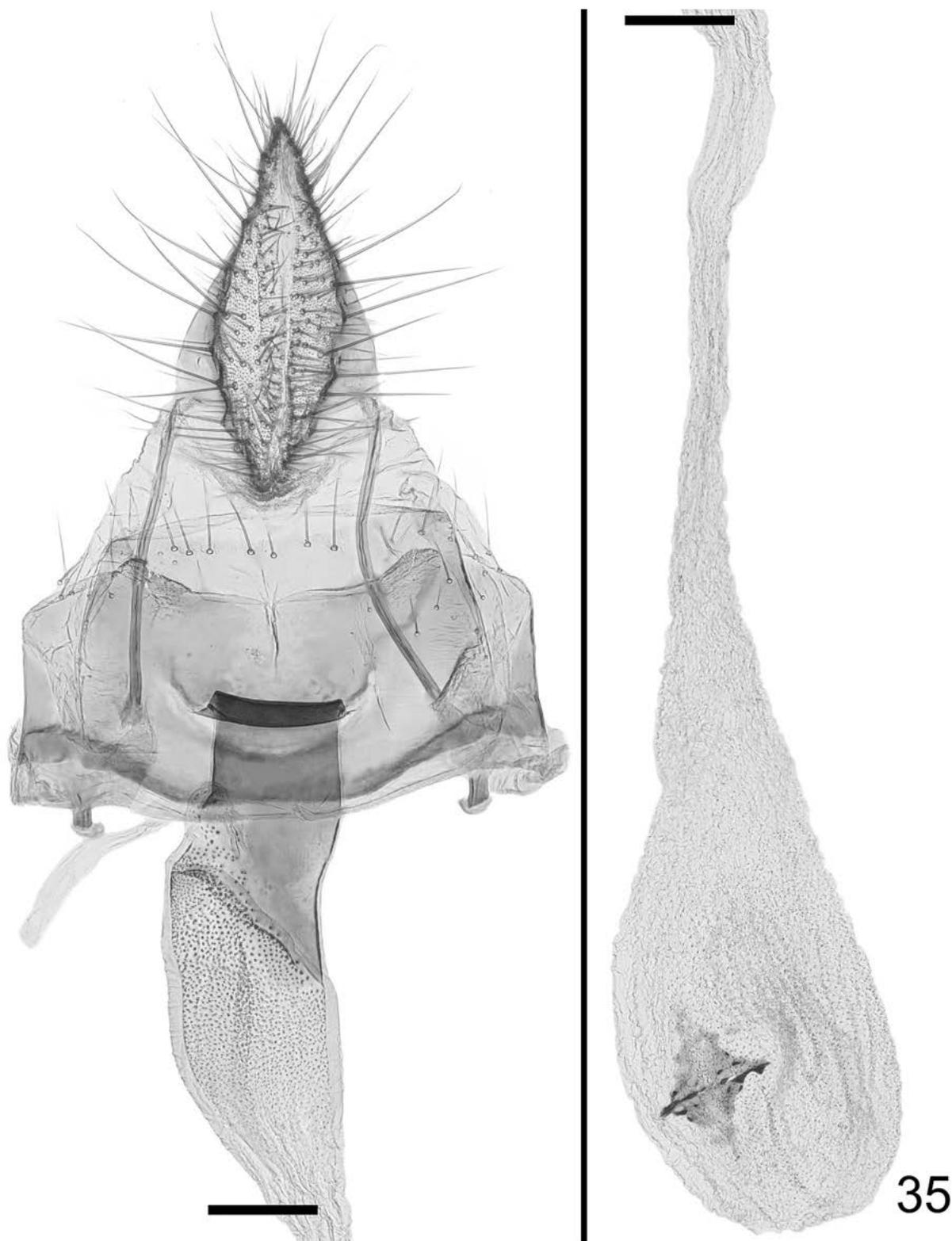


Fig. 35: *D. halophilella* ♀, France, Var, Port d'Alon, 12.iii.1995, e. l. *Crithmum maritimum*, leg. & cult. J. Nel (RCMC).