MISCELLANEOUS PAPERS

****

Centre for Entomological Studies Ankara

****

No 166 **5 November 2017** **ISSN 1015-8235**

http://zoobank.org/urn:lsid:zoobank.org:pub:428DD2A7-4F7A-44A2-B10F-F533FC29C2E2

Depressaria junnilaineni, a new species from the *veneficella* species-group (Depressariinae, Lepidoptera) from the West Palaearctic, with additional information on the rare species *D. pentheri* and *D. erzurumella*

Peter Buchner[1]

Abstract: *Depressaria junnilaineni*, a new species from the *veneficella* species-group (Depressariinae, Lepidoptera) from the West Palaearctic, with additional information on the rare species *D. pentheri* and *D. erzurumella*. *Centre for Entomological Studies, Miscellaneous Papers* 166: 1-19.

The species *Depressaria junnilaineni* sp. n. is described. It is closely related to *D. hannemanniana, D. erzurumella* and *D. pentheri*. The two last species have so far only been inadequately known; supplementary data are presented here. Barcodes examined in 2013 of "*Depressaria discipunctella*" from Spain resulted in two distinct clusters. Differences in male genitalia and in external appearance associated with the different clusters indicated a specific difference, but strong similarity with male genitalia of *D. pentheri* in combination with insufficient knowledge of that species at first prevented description as a new species. The discovery of a recently collected specimen of *D. pentheri* in a private collection filled these gaps. The new species is known from Greece, Morocco, Spain, Syria and Turkey.

Keywords: Lepidoptera, Gelechioidea, Depressariidae, *Depressaria*, Croatia, Greece, Morocco, Spain, Turkey, Syria, new species, DNA barcoding.

Abbreviations

DEEUR "Depressariinae of Europe", prefix for number of a photo or slide made by P.Buchner
HNHM Hungarian Natural History Museum Budapest
KLM Kärntner Landesmuseum, Klagenfurt, Austria
MFN Museum für Naturkunde, Berlin, Germany
NHMV Naturhistorisches Museum, Vienna, Austria
NMPC National Museum, Prague, Czech Republic
SMNK Staatliche Museum für Naturkunde Karlsruhe, Germany
TLMF Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria
ZMUC Zoological Museum, University of Copenhagen, Denmark
ZSM Zoologische Staatssammlung München, Germany

Material and methods

Material has been examined from KLM, MFN, NHMV, NMPC, SMNK, TLMF, ZMUC, ZSM and additionally specimens from many private collectors have been checked, here only listed if the material was of particular importance for this paper: Marek Dvořák (Czech Republic), Theo Grünewald (Germany), Jari Junnilainen (Finland), Rudi Keller (Germany), Knud Larsen

[1] Peter Buchner, Scheibenstraße 335, 2625 Schwarzau am Steinfeld, Austria. E-mail: buchner.324@tele2.at

Received on 18th October, 2017 - Accepted on 1st November, 2017

(Denmark), Kari Nupponen (Finland), Tomi Nupponen (Finland), E.A. Rau (Germany), Willibald Schmitz (Germany), Peter Sonderegger (Switzerland), Lubomír Srnka (Slovakia), Jan Šumpich (Czech Republic), Cs. Szaboky (Hungary), Franz Theimer (Germany), Joachim Viehmann (Germany) and Andreas Werno (Germany). 37 specimens (24 males, 13 females) of *D. junnilaineni* sp.n. have been examined.

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. In females, a different method has been used for embedding on the slide: once put into Euparal, a piece of a cover glass is put on, covering the VIII segment but not the papillae anales. On either side of the papillae anales, feet for the final cover glass are fixed. The preparation has to be stored in a dust-free place for drying for about one month, before the final cover glass is put on. This double-mounting allows both a good fixation of the slide and preservation of the natural shape of papillae anales. If the shape of papillae anales in lateral view is shown, the photo was taken from the free floating genitalia before embedding. Special care has been taken to preserve the ductus seminalis, because the number of turns may be an important feature for species determination. All slides have been made by the author, if not specified.

Decisive for the choice of the specimen as holotype was a good state of preservation and the male sex (because female genitalia are not distinctive for the new species), it will be stored in TLMF.

Photographic documentation: Photos of whole specimens were taken with Canon EOS 5D Mark III and Canon lens EF 100mm 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 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.

DNA-Barcoding. The full length lepidopteran DNA barcode sequence is a 658 basepair long segment of the 5' terminus of the mitochondrial COI gene (cytochrome c oxidase 1). DNA samples (dried leg) were prepared according to the accepted standards and were processed at the Canadian Centre for DNA Barcoding (CCDB, Biodiversity Institute of Ontario, University of Guelph) to obtain DNA barcodes using the standard high-throughput protocol described in deWaard et al. (2008). DNA sequencing of five specimens of *D. junnilaineni* sp.n. resulted in two full barcode fragments, three sequences are incomplete (624, 622 and 612 bp). Detailed specimen data are listed under molecular data of species description. Sequences were submitted to GenBank, details including complete voucher data and images can be accessed in the public dataset DS-DEEUR335 at http://www.boldsystems.org/index.php/Public_SearchTerms?query=DS-DEEUR335 in the Barcode of Life Data Systems (BOLD; Ratnasingham and Hebert 2007). Neighbour-joining trees of DNA barcode data were constructed using MEGA5 (Tamura et al., 2011) under the Kimura 2 parameter model for nucleotide substitutions.

Introductory remark

The genus *Depressaria* Haworth, 1811 includes around 125 species (website "Lepidoptera and some other life forms", 2017. But note, this estimation had been made without checking the status of every listed taxon). The greatest number is found in the Palaearctic region. The majority of the species are rather similar externally, but for the most part, the male genitalia give clear differences between species. Indeed there is such diversity in genital morphology within the genus that it is difficult to characterise the genus using genitalia characters and also to point out subgroups, but some can be clearly defined. One is the *veneficella* group (Hannemann, 1953), currently with 14 species described from the Palaearctic region extending from western Europe and North Africa through the Middle East to central Asia, with the most eastern records from north-east China, Mongolia and the Altai region of Siberia, here listed in alphabetic order:

Depressaria albarracinella CORLEY, 2017
Depressaria altaica ZELLER, 1854
Depressaria cervicella HERRICH-SCHÄFFER, [1854]
Depressaria deverrella CHRÉTIEN, 1915
Depressaria discipunctella HERRICH-SCHÄFFER, [1854]
Depressaria eryngiella MILLIÈRE, 1881
Depressaria erzurumella LVOVSKY, 1996
Depressaria gallicella CHRÉTIEN, 1908
Depressaria hannemanniana LVOVSKY, 1990
Depressaria ivinskisi LVOVSKY, 1990
Depressaria kailai LVOVSKY, 2009
Depressaria pentheri REBEL, 1904
Depressaria rjabovi LVOVSKY, 1990
Depressaria veneficella ZELLER, 1847

Depressaria junnilaineni sp.n.

http://zoobank.org/urn:lsid:zoobank.org:act:E4A7D5F0-3F1D-49E4-BE73-BB02358E7E13

Holotype: ♂, Greece, Epirus, Ammoudia 10 km SE Parga, 0m, 39°14,85' N 20°28,90' E, 23.VI.2008, leg. W. Schmitz, ex coll. W. Schmitz, Gp DEEUR 5997 P. Buchner, will be stored in TLMF.

Paratypes:

1 ♂, Greece, Drama, 41°9,03' N 24°8,6' E, 20.VIII.1987, leg. M. Fibiger, coll. ZMUC. (DEEUR specimen number 5454)
1 ♂, Greece, Aroania (Mt. Chelmos), 37°58,42' N 22°12,38' E, 8.VII.2005, leg. & coll. E.A.Rau. (1483)
1 ♂, Greece, Parnassos, Amfiklia, 39°14,85' N 20°28,90' E, 30.V.2006, leg. & coll. W. Schmitz. (5994)
1 ♂, Morocco, Moyen Atlas [Middle Atlas], Ifrane, 1900 m, 30.VI.2005, 33°27' N 5°2,4' W, leg. M. Dvořák, coll. NMPC. (6125)
1 ♂, Spain, Teruel, Montes Universales, Frias de Albarracin, 40°20' N 1°37' W, 7.IX.1991, leg. N. Keil, coll. R. Keller. (0687)
1 ♀, Spain, Teruel, Royuela, 40°22,6' N 1°30' W, 31.X.1995, leg. & coll. Th. Grünewald. (1875)
3 ♂, Spain, Zaragossa, Castejon de Monegros, 23.V.1996, leg. J. Šumpich, coll. NMPC. (6130, 6131, 6132)
1 ♀, Spain, Catalunya, Llaberia near Reus, 30.V.1996, leg. J. Šumpich, coll. NMPC. (6129)
3 ♂, Spain, Huesca, 15 km S Candasnos, 1.III.2003, leg. & coll. W. Schmitz. (5982, 5984, 5992)
1 ♀, Spain, Huesca, 20 km S Candasnos, 2.III.2003, leg. & coll. W. Schmitz. (5980)
1 ♀, Spain, Almeria, Rambla de Tabernas, 37°1,2' N 2°26,5' W, 5.III.2003, leg. J. Viehmann, coll. W. Schmitz. (5986)
1 ♂, Spain, Granada, Otivar, 24.VII.2003, leg. P. Skou, coll. ZMUC. (3844)
1 ♂, 1 ♀, Spain, Aragon, Sierra de Javalambre, Javalambre Hill, 2020m, 11.VI.2007, leg. J. Šumpich, coll. NMPC. (6133, 6134)
2 ♀, Spain, Almeria, Sierra de los Filabres, Alto del Calar del Gallinero, 1900 - 2020 m, 18.VI.2007, leg. J. Šumpich, coll. NMPC. (6135, 6136)
1 ♀, Spain, Almeria, Rambla de Tabernas, 3.V.2008, leg. & coll. L. Srnka. (1139)
1 ♀, Spain, Teruel, Albarracin, 40°24,5' N 1°26,6' W, 1.X.2008, leg. & coll. L. Srnka. (1095)
1 ♂, Spain, Cuenca, Sierra del Escornadero las Hondanada, 13.VII.2010, leg. & coll. L. Srnka. (1079)
1 ♂, Spain, Villargorda del Cabriel, Val Kiko Park, 21.VI.2011, leg. & coll. F. Theimer. (1913)
2 ♂, Spain, Albacete, Elche de la Sierra, 10 km W Yeste, 1.IV.2012, leg. J. Viehmann, coll. W. Schmitz. (5962, 5979)
1 ♂, Spain, Aragon, Huesca, Collado de Sahún, 2100 m, 13.VII.2013, leg. M. Dvořák, coll. NMPC. (6124)

3 ♂, Spain, Zaragossa, Bujaraloz, 41°28,4' N 0°9,4' W, 29.V.2015, leg. J. Viehmann, coll. W. Schmitz. (3906, 3912, 3914)
1 ♂, Spain, Huesca, Candasnos, 41°30,4' N 0°4' W, 30.V.2015, leg. J. Viehmann, coll. W. Schmitz. (4841)
1 ♀, Spain, Teruel, Sierra Alta, 25.VI.2016, leg. J. Viehmann, coll. W. Schmitz. (4792)
1 ♂, Spain, Albarracin, Val de Vecar, 1100 m, 20.III.2017, leg. J. Viehmann, coll. W. Schmitz. (6045)
1 ♂, Syria, 25 km W Damaskus, 3.VI.1961, leg. Kasy & Vartian, coll. SMNK (5626)
1 ♀, Turkey, Adana, Saimbeyli, 1200 m, 29.VII.1998, leg. & coll. K. Larsen. (3253)
1 ♀, Turkey, Afyon, Sultandağ, 1760 m, 10.VII.2001, leg. & coll. K. Larsen. (3270)

Diagnosis

Externally *D. junnilaineni* differs from most other species of the *veneficella* group in the pale area at costa in basal half of forewing, which contrasts with the darker colour of the rest of the wing, and in the central forewing pattern, for details see description. Similar and externally not discernible are *D. hannemanniana*, *D. kailai* and some forms of *D. veneficella*; no information was available on the external appearance of *D. ivinskisi* and *D. rjabovi*. Good characters are found in male genitalia, which are different from all other species, this is best set out in a key. Female genitalia are less distinct as *D. discipunctella*, *D. pentheri* and *D. junnilaineni* share the same features, but these three species show different external appearance, so determination of females is also possible. Labial palp features are rather similar over the whole species group and therefore not helpful for determination.

Table 1: Key to males of species of the *Depressaria veneficella* group (see comparison in figs. 1 and 2)

The key below includes those species of *D. veneficella*-group with male genitalia matching the following criteria: gnathos elongated (at least 2 times longer than broad), tip of valva sharply pointed, saccus rather long (at least 1/3 of valva length). This excludes *D. altaica* and *D. kailai* (gnathos nearly globose), *D. ivinskisi* (tip of valva obtuse) and *D. gallicella*, *D. cervicella* and *D. rjabovi* (saccus very short, below 1/3 valva length). Genitalia of *D. kailai* and *D. gallicella* are not keyed out, but depicted also, because they must be compared for determination of *D. junnilaineni* sp.n.

1	Valva gradually tapering to a sharp tip (fig. 1 except *D. gallicella*)	**2**
-	Outer edge of the valva with a strong bend shortly before tip ("subapical hump") then running straight to the tip, this part running downwards in standard preparation (fig. 2 except *D. kailai*)	**6**
2	Cornutus longer than half of aedeagus	**3**
-	Cornutus shorter than half of aedeagus	**4**
3	Distal part of valva, beyond median bulge, slender, length to width ratio of this part 3:1 or more	*eryngiella* MILLIÈRE, 1881
-	Distal part of valva, beyond median bulge, not so slender, length to width ratio of this part clearly below 3:1	*deverrella* CHRÉTIEN, 1915
4	Cornutus short, shorter than one-third of aedeagus	*veneficella* ZELLER, 1847
-	Cornutus longer than one-third of aedeagus	**4**
5	Saccus less than half as long as valva	*albarracinella* CORLEY, 2017
-	Saccus longer, more than half as long as valva	*discipunctella* HERRICH-SCHÄFFER, [1854]
6	Outline of valva from tip to tegumen rather straight, without a strong bulge	**7**
-	Outline of valva from tip to tegumen with a strong bulge, forming a deep semicircular excavation between tip and bulge	**8**
7	Valva rather slender in distal part (valva ratio 25 - 26 % as shown in fig. 8), cornutus more than half of aedeagus length (53.5 %, but note, only one specimen was available for this feature)	*pentheri* REBEL, 1904
-	Valva more broad in distal part (valva ratio 29 - 34 % as shown in fig. 8), cornutus less than half of aedeagus length (37 - 44 %, average ratio of 41.75 % based on 10 specimens)	*junnilaineni* **sp.n.**
8	Cornutus very short (17 - 19 % of aedeagus length, based on 2 specimens), valva very broad in distal part (valva ratio 37 - 38 %, compare fig. 8)	*erzurumella* LVOVSKY, 1996
-	Cornutus longer than one-third of aedeagus (37 - 46 % of aedeagus length, based on 10 specimens), valva more slender in distal part (valva ratio 27 - 32 %, compare fig. 8)	*hannemanniana* LVOVSKY, 1990

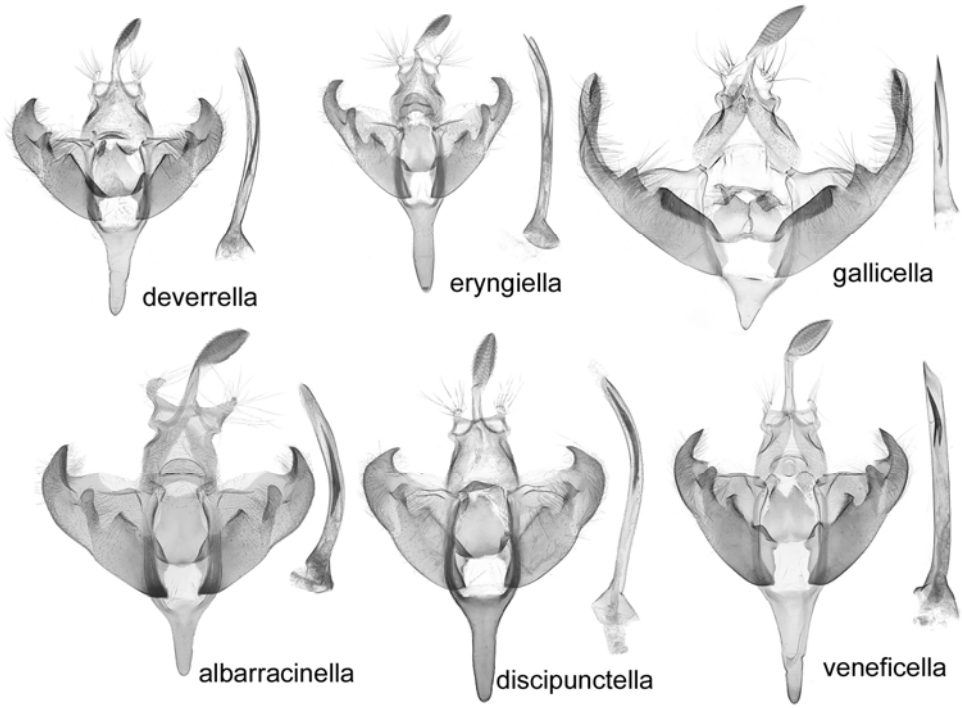

Figure 1: Comparison of male genitalia of *Depressaria veneficella* group species.
D. deverrella (Algeria, Oran)
D. eryngiella (Turkey, Kahramanmaraş, Nurhak Dağı)
D. gallicella (Switzerland, Saillon)
D. albarracinella (Greece, Arachova)
D. discipunctella (Macedonia, Petrina)
D. veneficella (Italy, Sicily)

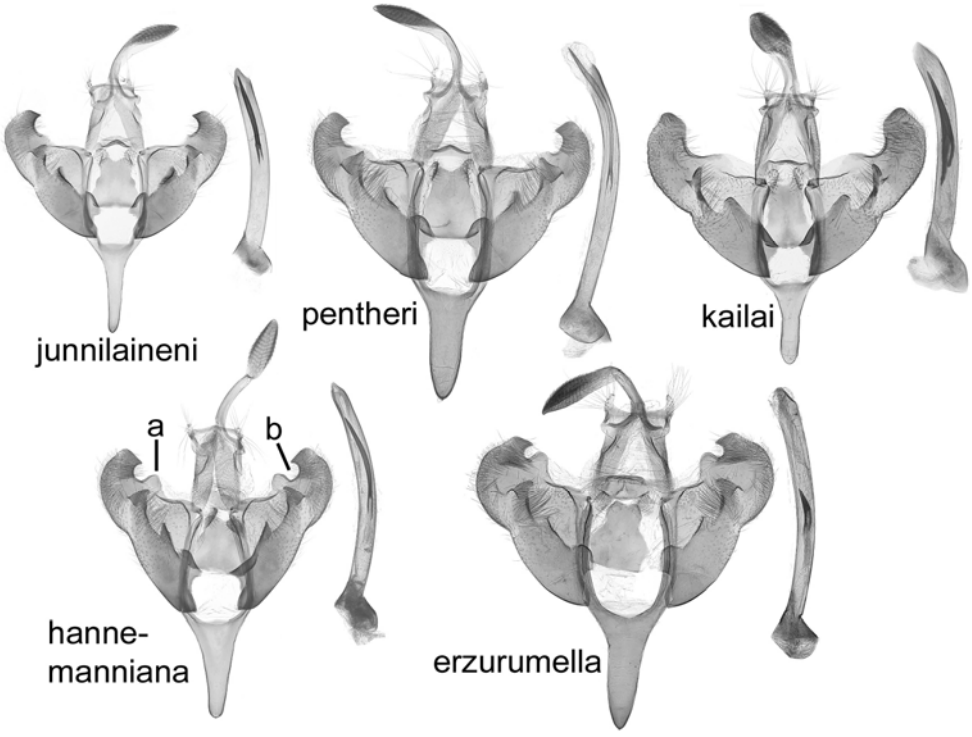

Figure 2: Comparison of male genitalia of *Depressaria veneficella* group species.
D. junnilaineni (Spain, Montes Universales)
D. pentheri (Croatia, South Velebit)
D. kailai (Turkey, Erzurum, Horasan)
D. hannemanniana (Kazakhstan, Charyn River)
D. erzurumella (Greece, Loutra Kilinis) prep. W. Schmitz, remounted by the author

Description

Adult (Figs 3-5, 6a). Wingspan 20-24 mm. Head medium brown on neck and crown, tips of the scales paler than the rest; face pale greyish. Labial palp segment 2 with an irregular mix of medium greyish brown and blackish scales, segment 3 2/3 length of segment 2, bicoloured, blackish at base and shortly above middle, medium brown between the dark areas and at the tip. Antenna dark brown. Thorax and tegulae light to medium brown. Forewing brown, distinctly paler in costal 1/3, especially in basal half, this pale costal area often enclosing a narrow black streak nearly parallel to the costa (in figs. 3+4 marked with magenta, a). Central forewing pattern: a first longitudinal black spot or streak at 10 - 20 % (marked blue, b), a second black streak, parallel to the first and nearer to costa starts at 25 % and extends till 65 %, often interrupted in its middle (marked with green, c), a third black streak, parallel to the second and nearer to costa starts at 35 % and extends till 55 % (marked with red, d), area between second and third streak distinctly paler than ground colour, these 3 elements oblique (angle about 15 - 20°) to the two vein-associated black streaks nearest to costa (marked with yellow, e). Distal half of forewing interspersed with whitish scales forming an acute angled transverse line with tip at about 80 % (f), angle about 55°, distinct vein-associated blackish longitudinal streaks predominantly distal to this transverse line. Interneural dots usually distinct, cilia a mix of brown and blackish scales, without obvious cilia line. Hindwing light grey, slightly darker posteriorly, with narrow grey-brown line around terminal and dorsal margins; cilia concolorous to hindwings, weak cilia lines present. Legs without distinct patterns, covered with a mixture of light grey and blackish scales. Abdomen greyish, with broad dark line laterally.

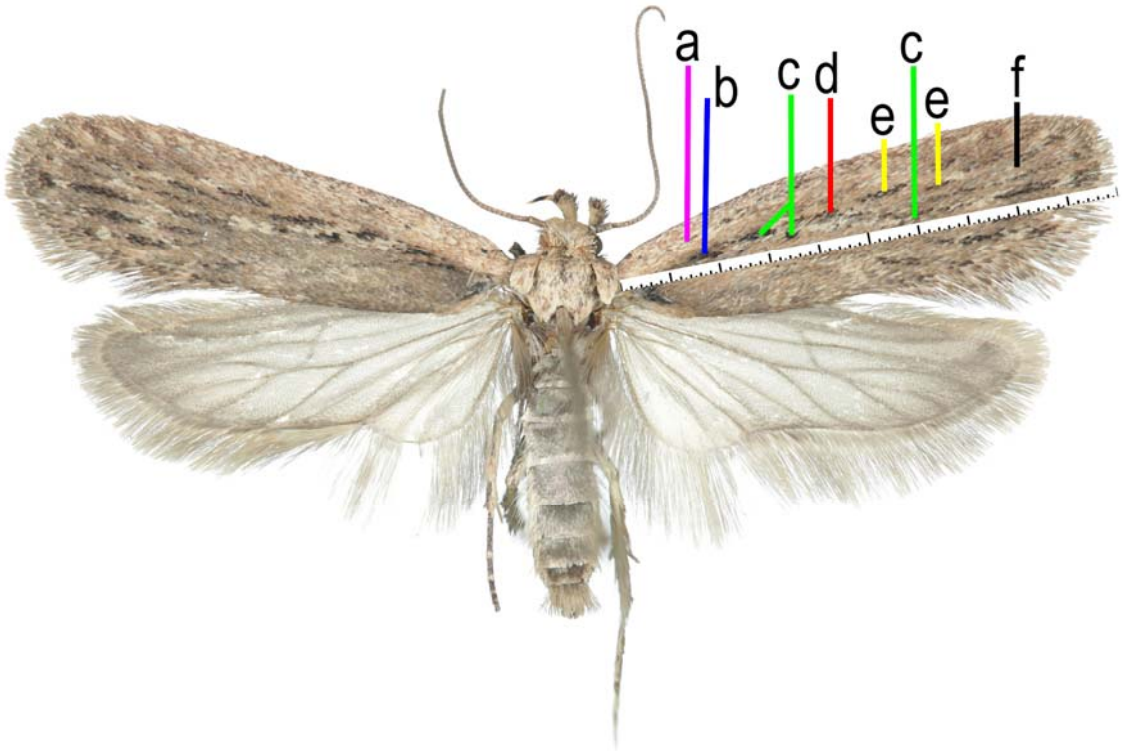

Figure 3: *Depressaria junnilaineni* sp.n., forewing pattern (for details see description)
Spain, Zaragossa, Bujaraloz. 29.V.2015, leg. J. Viehmann.

Figure 4: *Depressaria junnilaineni* sp.n., specimen with exceptionally clear wing patterns, for details on colour markings see description.
Spain, Villargorda del Cabriel, Val Kiko Park, 22.VI.2010, leg. F. Theimer.

Figure 5: *Depressaria junnilaineni* sp.n., underside.
Same data as fig. 3, but different specimen

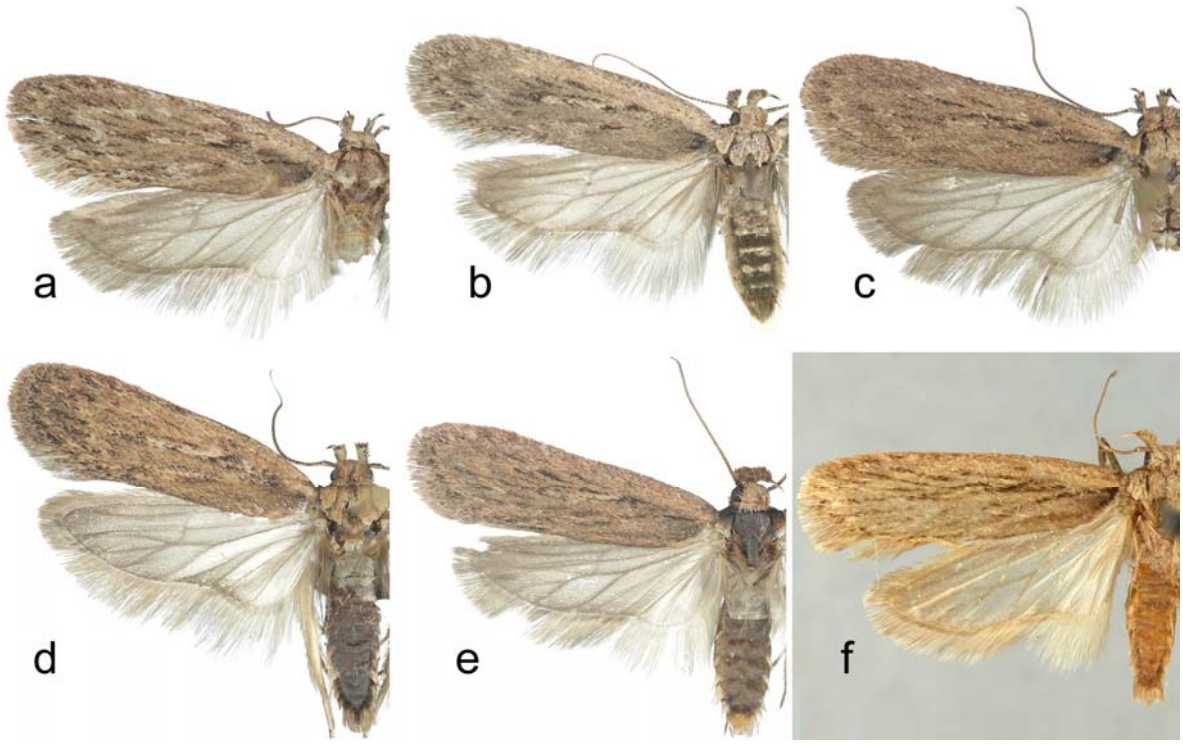

Figure 6: *Depressaria junnilaineni* sp.n. and species with similar wing pattern, not discernable externally:
a: *D. junnilaineni* sp.n., holotype, Greece, Ammoudia, Parga, 23.VIII.2008, leg. W.Schmitz.
b: *D. hannemanniana*, Kazakhstan, Konyrolen River, 2.X.2015, leg. K. Nupponen.
c: *D. erzurumella,* Greece, Loutra Kilinis, Patrias, 28.VI.2007, leg. J. Viehmann.
d: *D. veneficella,* Italy, Sardinia, Azzanido, 25.V.2017, leg. A. Werno.
e: *D. albarracinella,* Spain, Huesca, Candasnos, 30.V.2015, leg. J. Viehmann, specimen with exceptionally distinct wing patterns.
f: *D. kailai,* Turkey, "Marasch, Achyr Dagh, Bertiz Jaila", 13.VI.1929, leg. E. Pfeiffer, coll. ZSM.

Male genitalia (Figs. 2+7). Gnathos elongate; socii elongate, parallel-sided, valva about 2/3 of aedeagus-length, cucullus with outer margin evenly curved till shortly before tip, here with a bend or hump ("subapical hump", fig. 7a), then running straight to the tip, this part running downwards in standard preparation. Sacculus with two lobes, the inner short, the second longer but not reaching costa of valva, anellus trapezoid, distal margin emarginated; saccus narrow triangular, about 2/3 of valva length; aedeagus about 1½ times valva length, with slightly expanded base, then of same width till its oblique tip, slightly curved in lateral view, width about 6 - 8 % of its length, with one cornutus about 2/5 length of aedeagus (37 - 44%, based on 10 specimens, graph see fig. 9), cornutus forked at base (visibility depends on position, compare fig. 7b, lateral view and 7c, ventral view).

Male genitalia most similar to that of *D. pentheri*. Differences are in length of cornutus (53.5 % of aedeagus length in *D. pentheri*, but only one male was available for this feature) and shape of distal part of valva: more elongated in *D. pentheri* than in *D. junnilaineni* sp.n., best visible when superimposed, see fig. 8a. To point out this difference in a numerical way, a valva ratio had been calculated, details and comparison see fig. 8b and 8c. Similar also to *D. hannemanniana* and *D. erzurumella* (fig. 2), but both differ in the presence of a semicircular bulge (fig. 2a) in the middle of costa of valva, which creates a semicircular excavation between this bulge and tip of valva (fig. 2b). *D. kailai*, which is externally similar to *D. junnilaineni* sp.n. and *D. gallicella*, which is externally similar to *D. pentheri*, have distinctly different genitalia, compare fig. 1 and fig. 2.

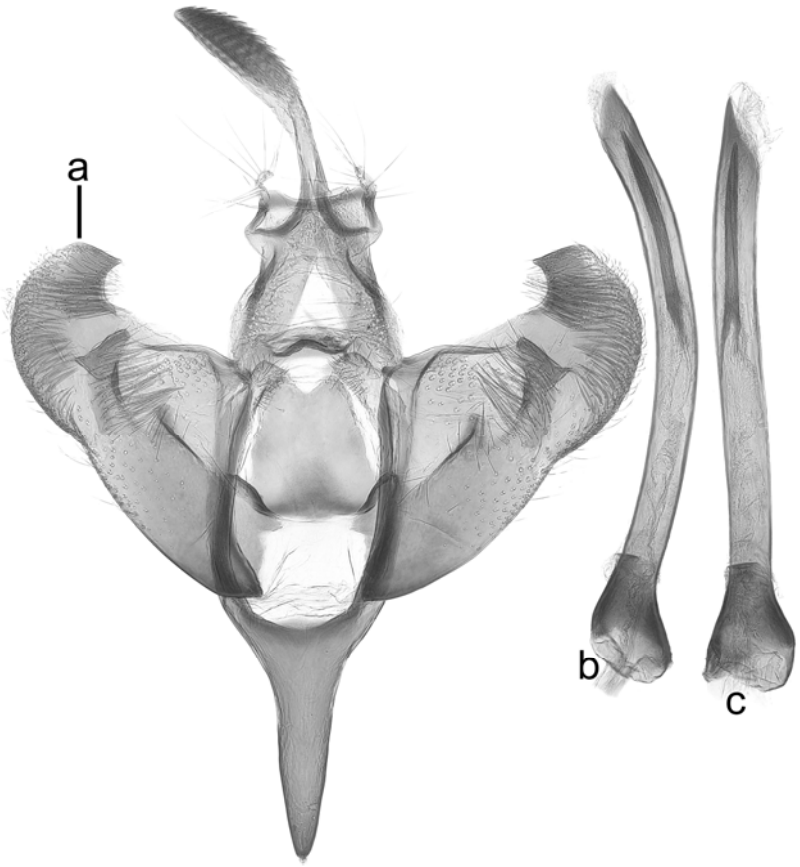

Figure 7: male genitalia of *Depressaria junnilaineni* sp.n., holotype, Greece, Ammoudia, Parga, 23.VIII.2008, leg. W. Schmitz.
a: subapical hump, b: aedeagus in lateral view, c: aedeagus in ventral view

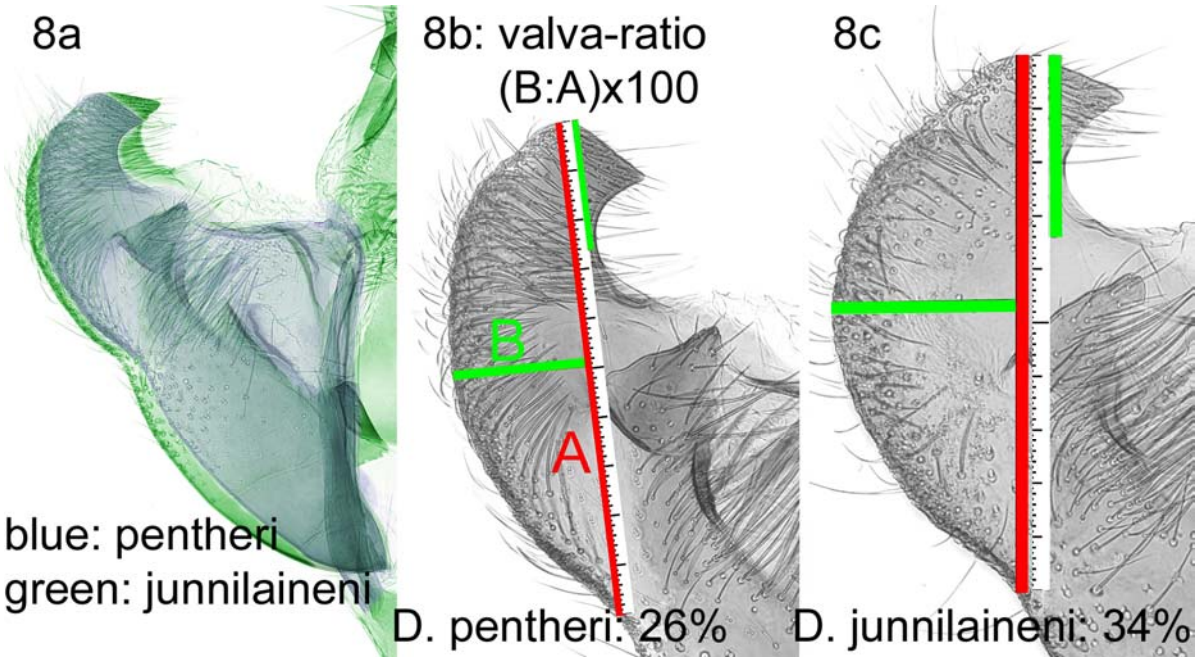

Figure 8: male genitalia of *Depressaria junnilaineni* sp.n. and *D. pentheri* compared, for further details see description.

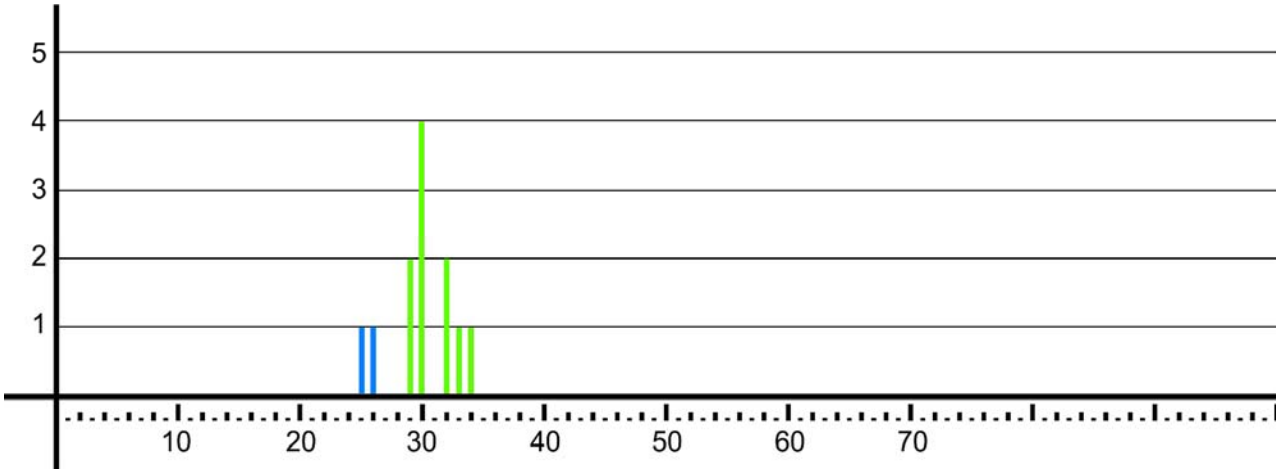

Figure 9: Valva ratio of 2 specimens of *D. pentheri* (blue) and 10 specimens of *D. junnilaineni* sp.n. (green) compared. Horizontal line: Valva ratio in %, vertical line: number of specimens.

Female genitalia (Figs. 10+11). Anterior margin of sternite VIII with very shallow sinus, ostium close to posterior margin of sternite VIII, forming a small bulge there, nearly round, anteriorly with a triangular structure on either side extending nearly to anterior margin, ductus bursae long and narrow, starting with a weakly scerotised part without structures in first 1/6, in its further course with longitudinal sclerotisations and densely covered with tiny dots, at 5/6 expanded and then twisted and finally constricted at entrance to corpus bursae, which is elliptic (about 2 times longer than wide), medium sized (width about lateral expansion of VIII sternite), with a rhombus-shaped signum with lateral expansion about 1/2 width of corpus bursae.

Female genitalia not discernable from that of *D. pentheri* and *D. discipunctella*. But both species are externally different, compare figs. 15 and 16: Central forewing pattern not like in *D. junnilaineni*, only consisting of three or four diffuse dark dots, *D. discipunctella* also differs in not having paler costal region and very reduced black vein streaks (only distal to pale transverse line sometimes distinct, fig. 15b), *D. pentheri* (fig. 16a), which shows the paler costal region, differs by overall grey but not brown colour. *D. gallicella* (fig. 16b), which is extremely similar to *D. pentheri* externally, has completely different genitalia.
To distinguish *D. junnilaineni* and *D. hannemanniana* based on female genitalia is possible, but difficult. Best features are found in and around ostium: in *D. junnilaineni* sp.n., ostium slightly broader than long, posterior margin not bulged (red line in insert of fig. 11), area of sternite VIII posterior to ostium weakly sclerotised and weakly bulged (green line in insert of fig. 11); in *D. hannemanniana* ostium slightly longer than broad, posterior margin distinctly bulged (red line in insert of fig. 12), part of sternite VIII posterior to ostium strongly sclerotised and strongly bulged (green line in insert of fig. 12). The latter feature best seen in lateral view, see fig. 13.
Female genitalia of *D. veneficella* and *D. kailai*, which are similar externally, are completely different, compare fig. 14.

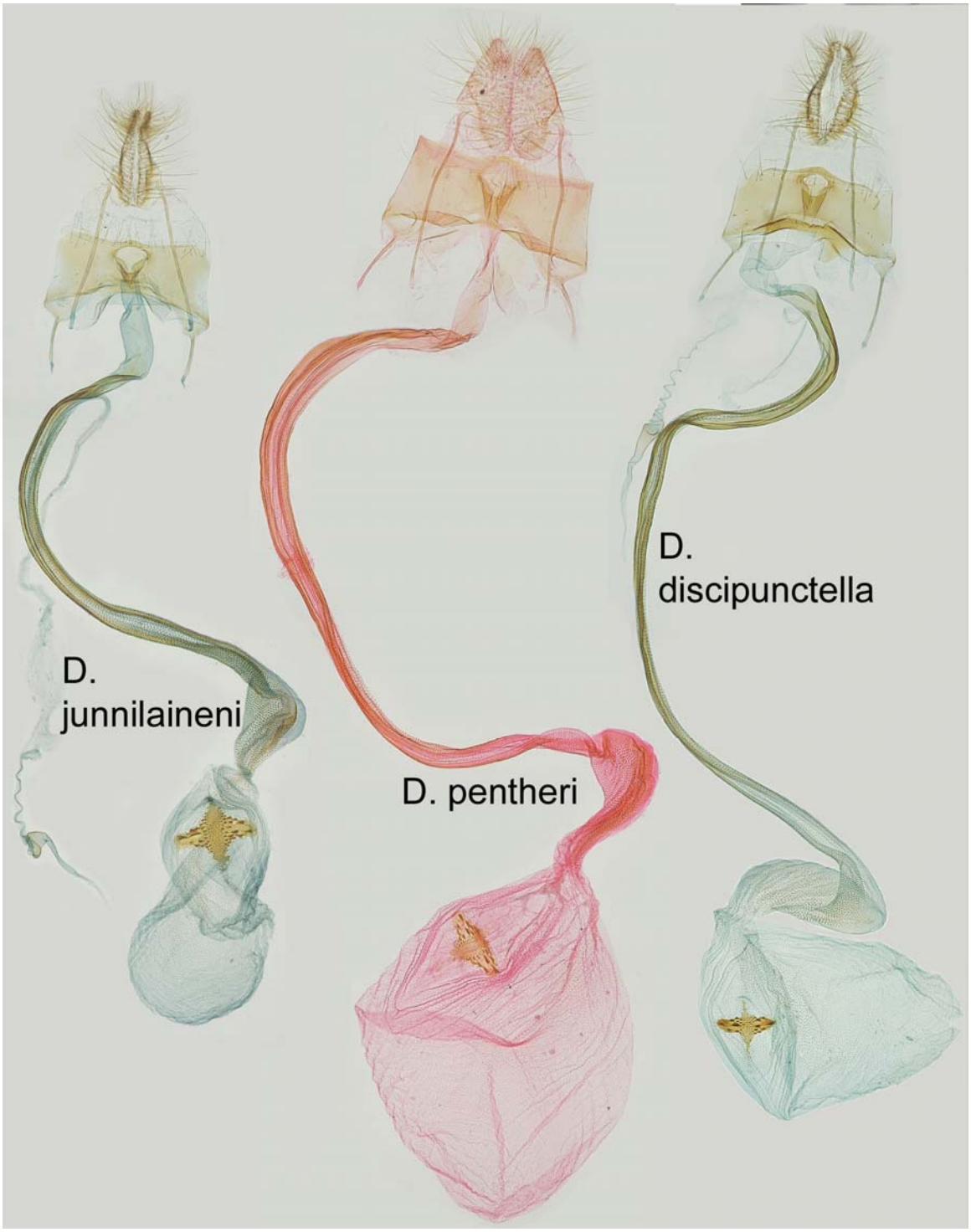

Figure 10: female genitalia, total view
D. junnilaineni: Spain, Sierra Alta, 25.VI.2016, leg. J. Viehmann
D. pentheri holotype: Bosnia and Herzegovina, Podasje, 22.VII.1901, leg. Penther, coll. NHMV, prep. H.J. Hannemann
D. discipunctella: Greece, Evritania, Karpenision, 24.IX.1986, leg. H.P. Schreier, coll. K. Larsen

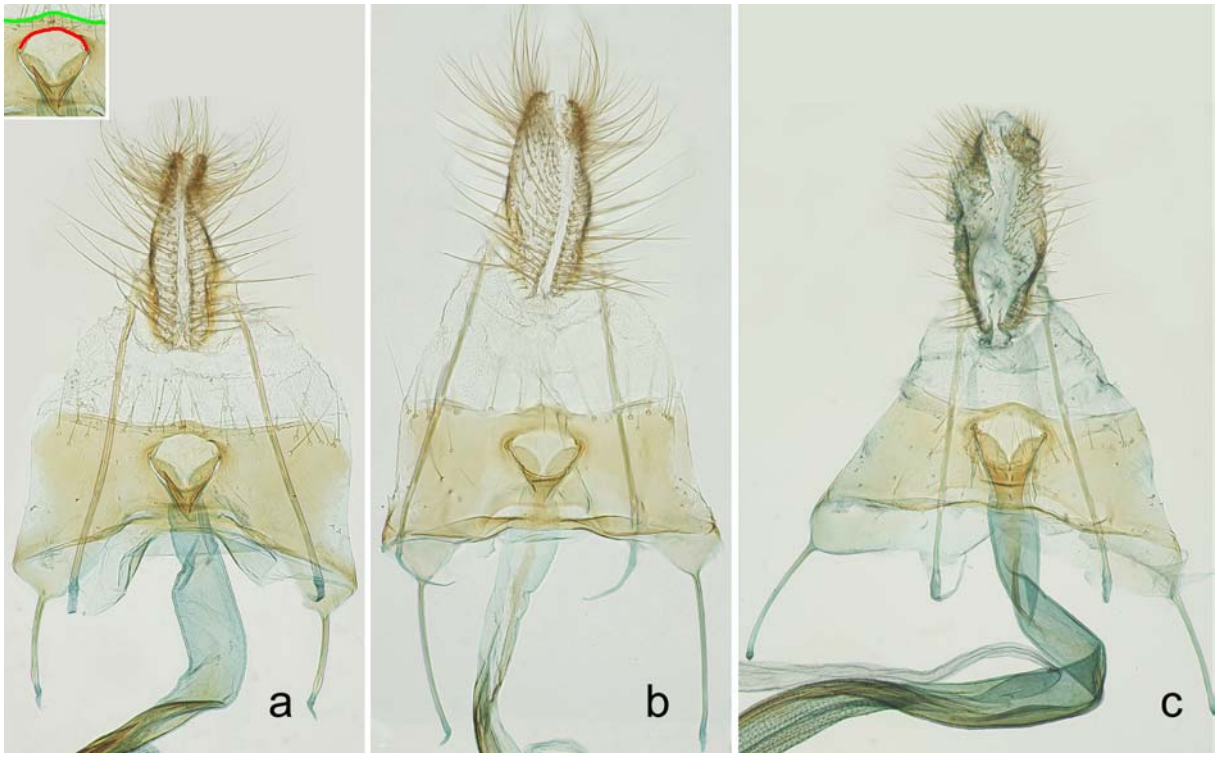

Figure 11: *D. junnilaineni* sp. n**.,** female genitalia, detail, for insert top left see description
a: Spain, Sierra Alta, 25.VI.2016, leg. J. Viehmann
b: Greece, Kalavrita, Mt. Chelmos, 8.VII.2005, leg. E. A. Rau
c: Spain, Aragon, Albarracin, Royuela, 31.X.1995, leg. Th. Grünewald

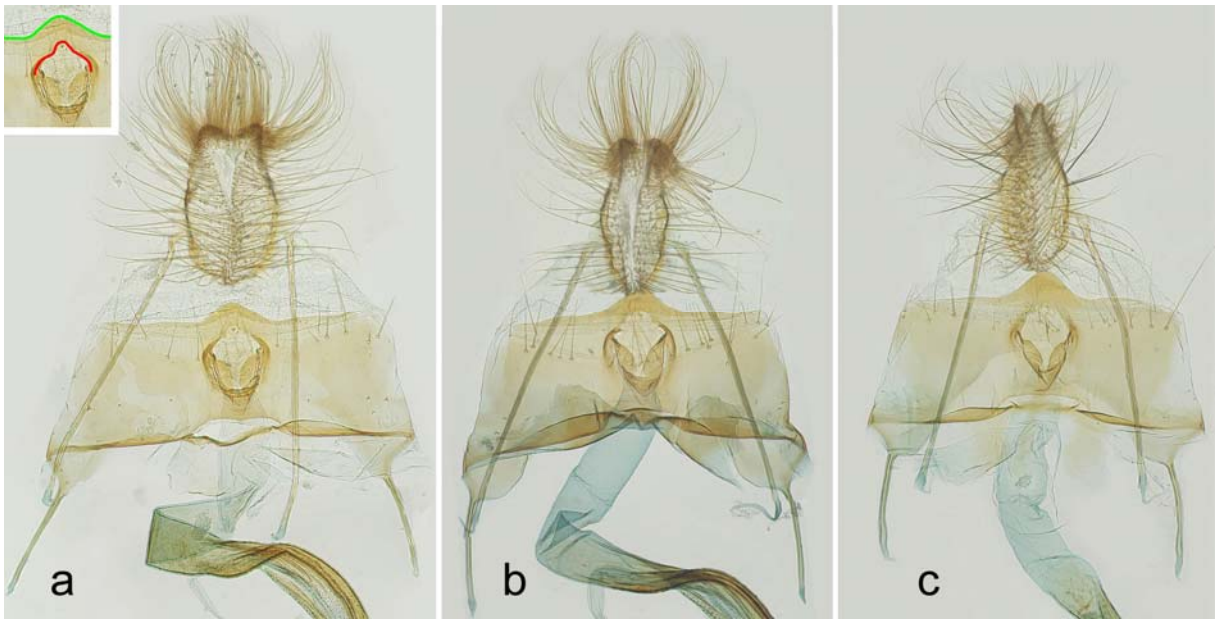

Figure 12: *D. hannemanniana***,** female genitalia, detail, for insert top left see description
a: Kazakhstan, Katutau Mts., Konyrolen River, 2.X.2015, leg. K. Nupponen
b: Tadjikistan, 24.VI.1949, leg. Shetkin, coll. MFN
c: Kirghizia, Bakten, Zardaly, 9.VI.2010, leg. Ch. Wieser, coll. KLM

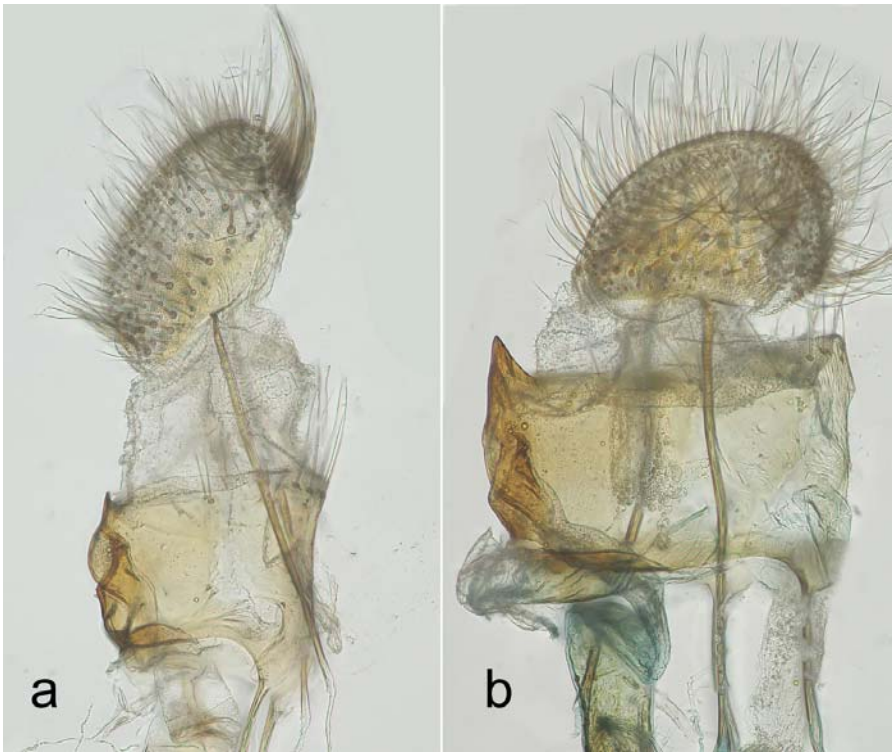

Figure 13: female genitalia in lateral view, free floating
a: *D. junnilaineni* sp.n.*,* Greece, Kalavrita, Mt. Chelmos, 8.VII.2005, leg. E. A. Rau
b: *D. hannemanniana,* Kirghizia, Bakten, Zardaly, 9.VI.2010, leg. Ch. Wieser, coll. KLM

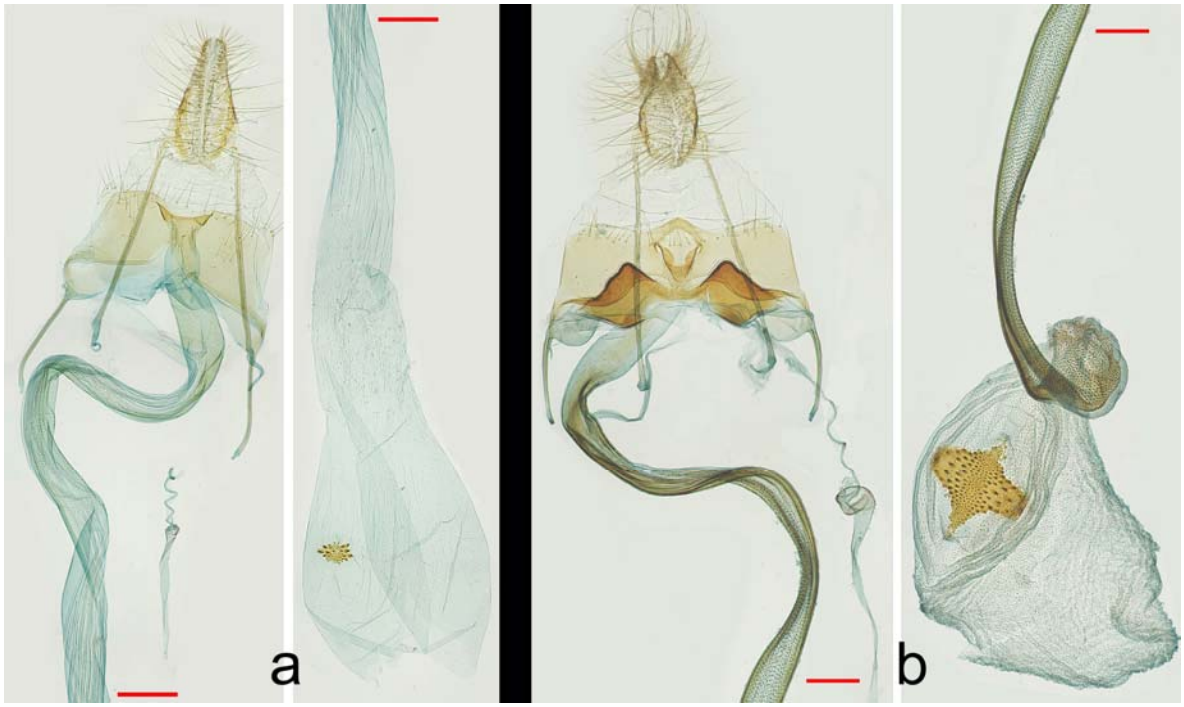

Figure 14: female genitalia of *D. kailai* and *D. veneficella*
a: *D. kailai,* Turkey, "Marasch, Achyr Dagh, Bertiz Jaila", 13.VI.1929, leg. E. Pfeiffer, coll. ZSM
b: *D. veneficella*, Morocco, Ifrane, 19.IV.1989, leg. O. Karsholt, coll. ZMUC
Photos of genitalia were split into two parts that overlap a little bit, here is a red bar showing how the parts need to be put together.

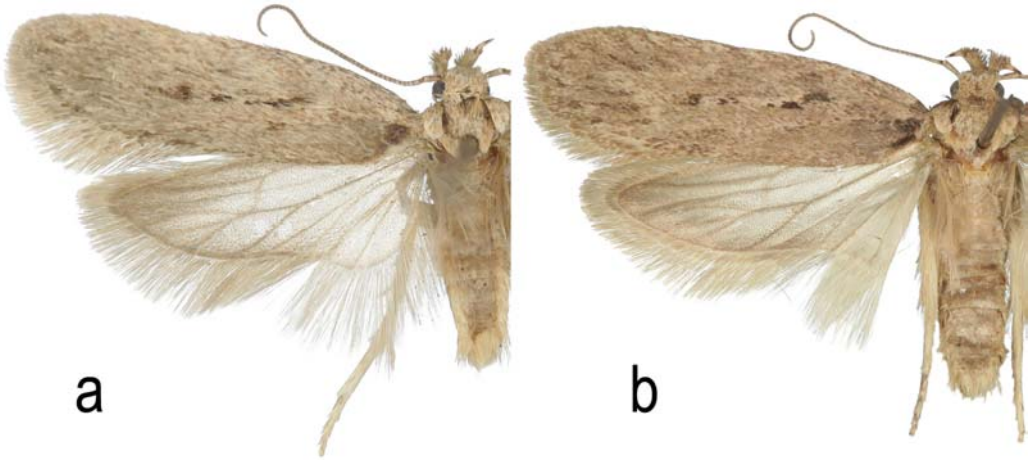

Figure 15: *D. discipunctella,* external appearance
a: Croatia, Zengg, 5.VI.1916, leg. Tobiasch, coll. NHMV
b: Morocco, Ketama, 13.VI.1954, leg. W. Marten, coll. ZSM

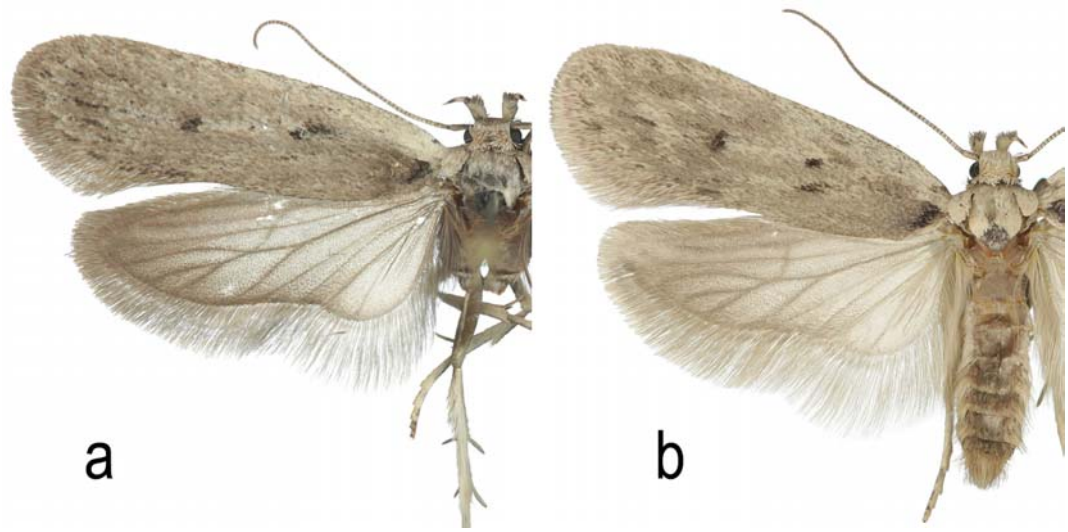

Figure 16: *D. pentheri* and *D. gallicella,* external appearance
a: *D. pentheri,* Croatia, South Velebit, 5.VI.2008, leg. J. Junnilainen.
b: *D. gallicella,* Switzerland, Valais, Vouagnoz, 10.VII.2008, leg. P. Sonderegger.

Molecular data

Data of barcoded specimens. TLMF Lep 21968 (612 bp.[on], ♀, Turkey, Saimbeyli, 37° 59'N; 36° 5'E, 29.VII.1998, leg. et coll. K. Larsen); TLMF Lep 21990 (658 bp.[on], ♀, Turkey, Afyon, Sultan dağları, 38° 20'N; 31° 20'E, 10.VII.2001, leg. et coll. K. Larsen); TLMF Lep 07202 (658 bp.[on], ♀, Spain, Teruel, Albarracin, 40° 49'N; 1° 5'W, 1.X.2008, leg. & coll. L. Srnka); TLMF Lep 07061 (624 bp.[on], ♂, Spain, Cuenca, Sierra del Escornadero, 40° 10'N; 1° 49'W, 13.VII.2010, leg. & coll. L. Srnka); TLMF Lep 07061 (622 bp.[on], ♂, Spain, Albarracin, Val de Vecar, 40° 25'N; 1° 27'W, 25.VI.2016, leg. J. Viehmann).

Neighbour-joining analysis shows *D. veneficella* as the nearest neighbour with 0.97% p-distance, *D. pentheri* as the second nearest neighbour with 1.3% p-distance and *D. hannemanniana* as the third nearest neighbour with 2.01% p-distance, but all these 3 species share the same BOLD-BIN. Intraspecific variability, based on present knowledge, 0.31%.

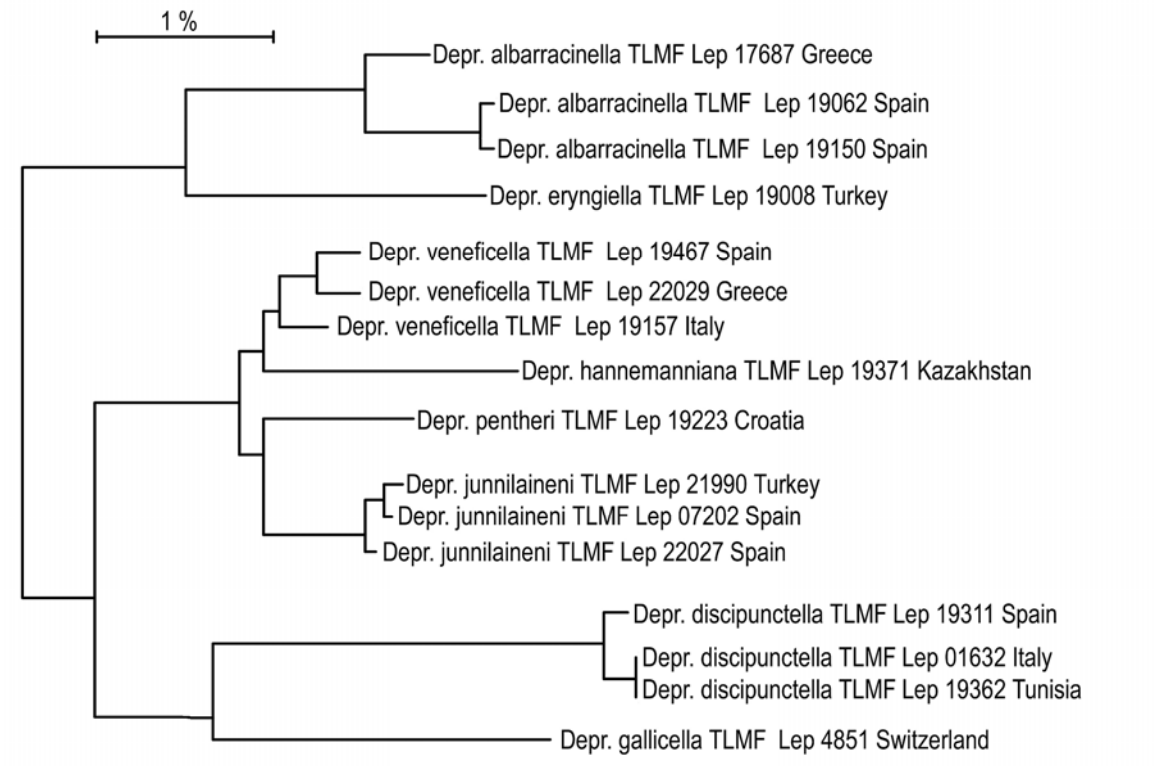

Figure 17 Neighbour-joining tree of *Depressaria junnilaineni* sp. n. and related species.
Associated BOLD BINs:
D. albaracinella: BOLD:ACX8130
D. discipunctella: BOLD:AAO4681
D. eryngiella: BOLD:ADB1140
D. gallicella: BOLD:ABA1484
D. hannemanniana: BOLD:ACF9097
D. junnilaineni: BOLD:ACF9097
D. pentheri: BOLD:ACF9097
D. veneficella: BOLD:ACF9097

Barcode data are accessible via the public dataset DS-DEEUR335

Etymology

The species name, a noun in the genitive case, honours Jari Junnilainen, the Finnish lepidopterologist, who collected the third specimen ever found of *D. pentheri*, and the only specimen collected in recent time. This specimen was essential to understand *D. pentheri* and *D. junnilaineni* sp.n. as distinct species and therefore it was the prerequisite to describe this new species at all.

Distribution

So far known from Greece, Morocco, Spain, Syria and Turkey.

Related species

Based on genitalia, *D. junnilaineni* sp.n. is closely related to *D. pentheri*, *D. hannemanniana* and *D. erzurumella*, which is also confirmed by barcode (but sequence of *D. erzurumella* not yet available). *D. veneficella*, which is the nearest neighbour in barcode p-distance, has rather different genitalia in both sexes and may therefore not be as close as the three other species.

Bionomics

Moths have been found over much of the year including in early spring, indicating that it overwinters as an adult. Foodplant is unknown, but it is likely to belong to Apiaceae, because all species of the *D. veneficella* group feed on Apiaceae, as far as known.

Remarks

Remarks on *Depressaria pentheri*:

D. pentheri was described in 1904 from a single female. In the description, Rebel compares it with *D. floridella* Mann, 1864 and *Depressaria* (now *Exaeretia*) *ciniflonella* Lienig & Zeller, 1846 but he could not compare it with the (undescribed!) *D. gallicella* Chrétien, 1908, the most similar species. In 1955 Hannemann dissected the holotype, the specimen and the slide are stored in NHMV. There were two further specimens, both male and collected in 1911 from "Velebit, Ostaria". One was dissected by Hannemann in 1952, the other, with somewhat different external appearance, was dissected in 2015 by the author and turned out to be *D. discipunctella*. So only two specimens of *D. pentheri* remained, and despite searches for further specimens in private and museum collections no more were found. At that time a genitalia mismatch in the collection of NHMV, caused by Hannemann, had been discovered (Buchner, 2015): He labelled his slide of "*Depressaria*" (now *Agonopterix*) *conciliatella* Rebel, 1892 as "*Depressaria thurneri*" and his slide of "*Depressaria*" (now *Exaeretia*) *thurneri* Rebel, 1940 as "*Depressaria conciliatella*". Subsequently he put the species *Agonopterix conciliatella* into the genus *Exaeretia* (because the slide with the "*conciliatella*" label showed *Exaeretia* - genitalia features) and published it as *Exaeretia conciliatella* and vice versa the species *Exaeretia thurneri* as *Agonopterix thurneri* (Hannemann, 1953 and unchanged in Hannemann, 1995), overlooking the external appearance of these two species which contradicts the generic placements.

With this mismatch in mind and the fact that no further specimen of *D. pentheri* had been found despite checking hundreds of *Depressaria* specimens from Croatia, the author concluded that it was probable that a species with the combination of external appearance and genitalia as found in "*Depressaria pentheri*" does not exist at all: the female genitalia of the holotype are indiscernible from *D. discipunctella*, therefore it appears probable that the moth belongs to *D. gallicella* and the mounted genitalia to some specimen of *D. discipunctella*, also mismatched by Hannemann. The male Hannemann had dissected shows genitalia features like *D. junnilaineni*, at the time still undescribed, but these genitalia features were known by the author from a specimen collected in Spain (at the time under manuscript name "Spanish *D. discipunctella*"). So the male "*D. pentheri*" could also be the product of a mismatch: moth *D. gallicella*, genitalia "Spanish *D. discipunctella*". Both specimens were collected about one hundred years ago, too old to obtain barcodes which would have been useful to bring light into this matter, leaving the possibility that *D. pentheri* might finally be treated as a nomen dubium.

However in 2016 a piece of good fortune helped to resolve this mystery. The author received from Jari Junnilainen a lot of *Depressaria* specimens collected by Finnish lepidopterists in southern Europe and Asia, for determination and study, among them a male from Croatia looking like *D. gallicella*, but with genitalia exactly matching the male of *D. pentheri* dissected by Hannemann. At once several details became clear: the grey *D. gallicella*-like external appearance and the male genitalia feature like "Spanish *D. discipunctella*" belong together, and Hannemann had not mismatched anything when preparing *D. pentheri*. This second male *D. pentheri* genitalia also showed that although they are similar, there are differences in shape of valva of *D. pentheri* and the "Spanish *D. discipunctella*". So no more doubts remain, the species *D. pentheri* as found in NHMV exists, and the "Spanish *D. discipunctella*" is a closely related, but distinct species, which is described now as *D. junnilaineni*. The recently collected *D. pentheri* also offered the chance to get a barcode, which confirmed this opinion. And the indiscernibility of female genitalia of *D. pentheri* also became plausible, because *D. junnilaineni*, a species well characterised by barcode, male genitalia and external appearance, also has female genitalia indiscernible from those of *D. discipunctella*.

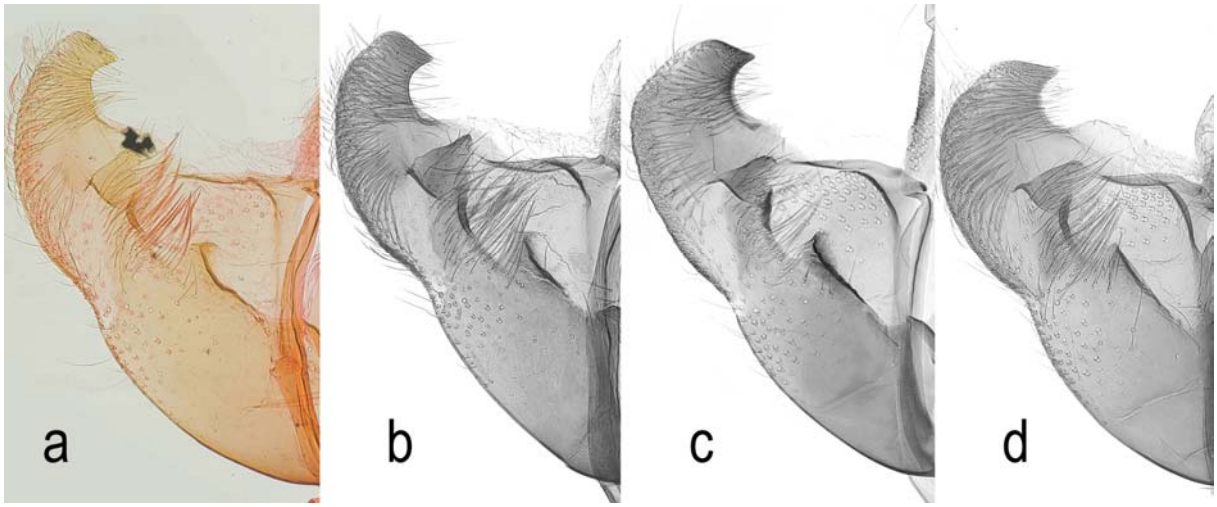

Figure 18: left valva to show differences between *D. pentheri* (a+b) and *D. junnilaineni,* (c+d)
a: Croatia, Velebit, Ostaria, VII.1911, leg. ?, coll. NHMV, prep. H.J.Hannemann
b: Croatia, South Velebit, 5.VI.2008, leg. &. prep. J. Junnilainen
c: Spain, Teruel, Montes Universales, leg. N. Keil, coll. R. Keller
d: Spain, Villargorda del Cabriel, Val Kiko Park, 22.VI.2010, leg. F. Theimer

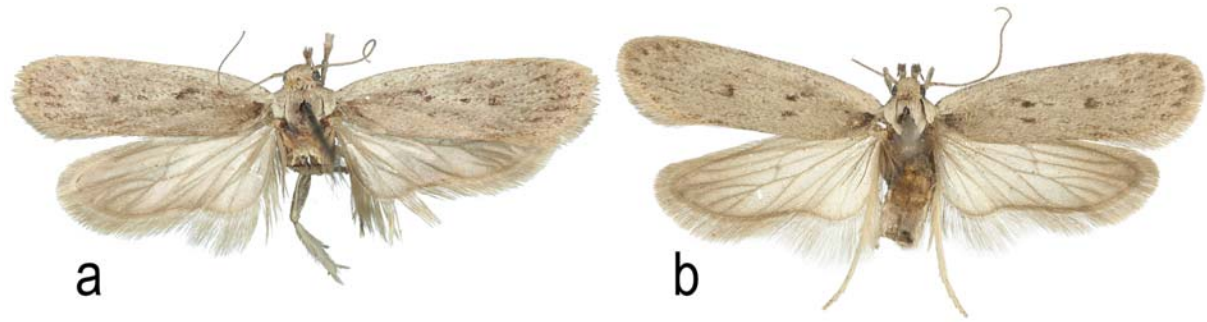

Figure 19: *D. pentheri,* external appearance
a: Holotype, Bosnia and Herzegovina, Podasje, 22.VII.1901, leg. Penther, coll. NHMV
b: Croatia, Velebit, Ostaria, VII.1911, leg. ?, coll. NHMV

Remarks on *Depressaria erzurumella*:

This species was described from a single male, and the difference pointed out in the original description from the nearest species, *D. hannemanniana*, is a single quantitative feature: the length of the cornutus. The original description is cited here in full: “The species is most similar to *D. hannemanniana* LVOVSKY, 1990, but differs from it by the short spine (cornutus) in the aedeagus. In *D. hannemanniana* the ratio cornutus: aedeagus length is 1:2.7, whereas in the new species it is 1:6.3.” (Lvovsky, 1996)

As the author had neither seen further specimens in any collections nor found mention of any further specimens in the literature, the status of *D. erzurumella* remained rather unsatisfactory. It was certainly possible that the cornutus character might fall within the normal variability of *D. hannemanniana*. Therefore all accessible (n=9) male slides of *D. hannemanniana* were checked for the cornutus ratio. The result showed that it is a rather constant feature, with cornutus length between 37 and 46 % of aedeagus-length, while the holotype of *D. erzurumella* has a cornutus 19 % of aedeagus length, far outside the normal range of *D. hannemanniana*, which supports the view that *D. erzurumella* is a distinct species. Nevertheless the possibility that the holotype of *D. erzurumella* is an abnormal specimen could not be excluded.

Again a lucky coincidence helped to clarify this situation: While searching for specimens of *D. junnilaineni* in the private collection of W. Schmitz, a dissected male from Greece with very short cornutus was found, reminiscent of *D. erzurumella*. Comparison of whole genitalia with the holotype showed a perfect match, not only in cornutus, but also in shape of valva. So a second independent feature to separate *D. erzurumella* from *D. hannemanniana* had been found, and these two characters in combination were present in specimens found thousands of kilometres apart. The possibility that the holotype of *D. erzurumella* is nothing but an aberrant individual can be excluded.

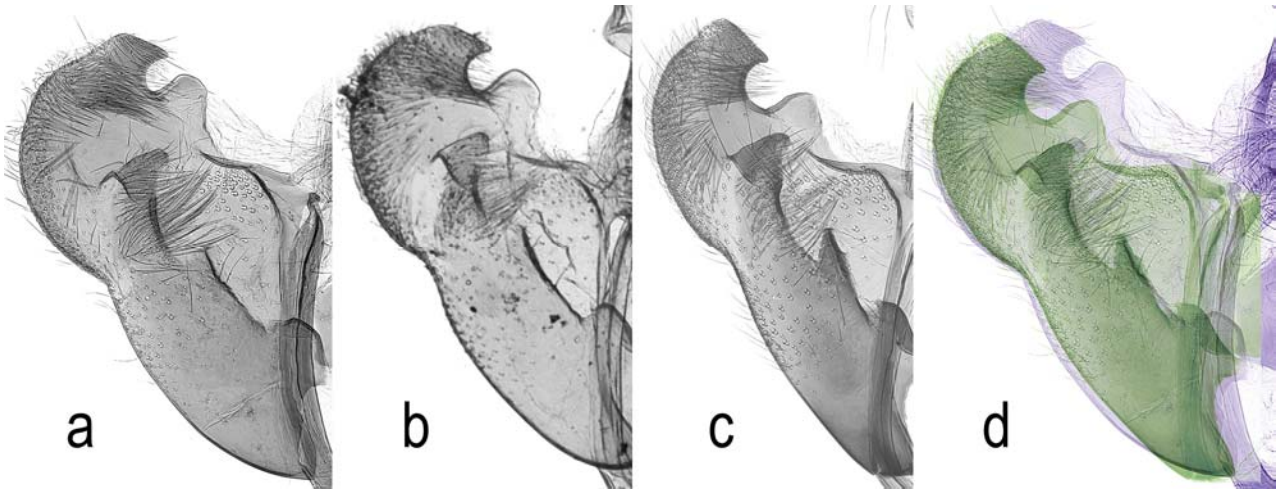

Figure 21: *D. erzurumella* and *D. hannemanniana,* shape of valva compared
a: *D. erzurumella,* Greece, 28.VI.2007, leg. J. Viehmann, coll. W. Schmitz
b: *D. erzurumella,* holotype, Turkey, Erzurum, 20.VII.1989, leg. Fibiger & Esser, coll. ZMUC
c: *D. hannemanniana,* Kazakhstan, Charyn river, 31.V.2014, leg. K. Nupponen & R. Haverinen
d: *D. erzurumella* (blue) and *D. hannemanniana* (green), left valva superimposed

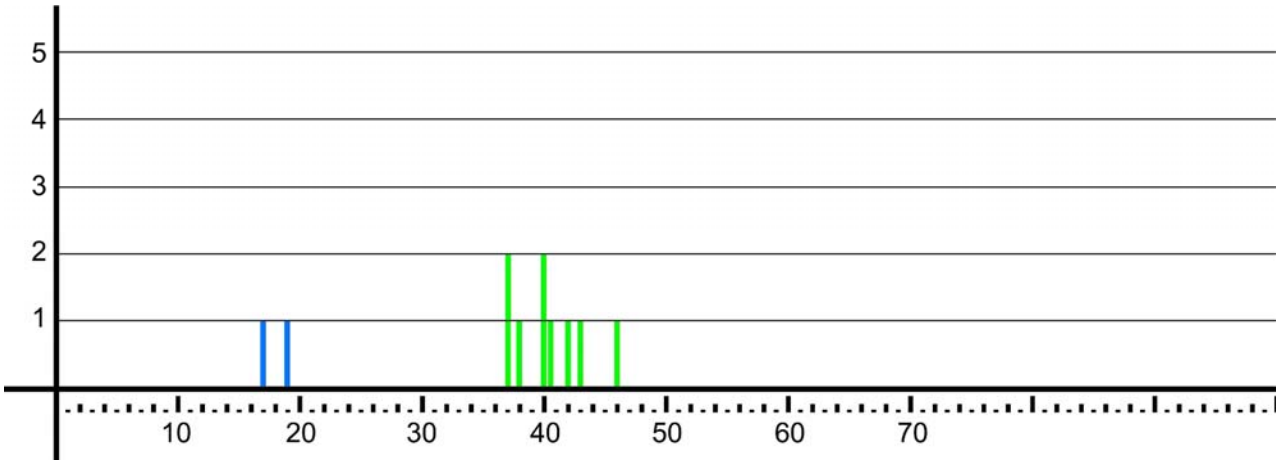

Figure 21: cornutus ratio of *D. erzurumella* (blue) and *D. hannemanniana* (green)
horizontal line: cornutus length in % of aedeagus length, vertical line: number of specimens

Acknowledgements

The author is most grateful to the following people who have assisted in various ways: Dr Peter Huemer (TLMF, Innsbruck) who suggested collecting barcode data of all species and helped generously in the implementation and made the connection with Paul Hebert and the BOLD team; and particularly to the Canadian Centre for DNA Barcoding (Guelph, Canada), whose sequencing work was enabled by funding from the Government of Canada to Genome Canada through the Ontario Genomics Institute and to the Ontario Ministry of Research and Innovation and to NSERC for their support of the BOLD informatics platform; Dr Marko Mutanen (University of Oulu, Finland) for support in obtaining barcodes and ML-analysis and giving access to his barcode data; Dr Wolfram Mey (MFN, Berlin), Dr Lazlo Ronkay (HNHM, Budapest), Dr Christian Wieser (KLM, Klagenfurt), Dr Martin Lödl and Dr Sabine Gaal-Haszler (NHMV, Vienna), Jan Šumpich (NMPC, Prague), Dr Robert Trusch (SMNK, Karlsruhe), Dr Andreas Segerer (ZMS, Munich), Dr Ole Karsholt (ZMUC, Copenhagen) and all private collectors mentioned above under Material and Methods for the loan of specimens, Martin Corley for linguistic corrections and helpful comments on the manuscript, and Prof. Dr Ahmet Ö. Koçak for helpful comments, corrections and the offer to publish in this journal.

References

Buchner, P. (2015): Untersuchungen an "*Agonopterix thurneri*" und ihr überraschendes Ergebnis (Lepidoptera: Depressariidae: Depressariinae) — *Quadrifina* 12: 1-15.

Buchner, P., Corley, M. & J. Junnilainen (2017): Three new species and one new subspecies of Depressariinae (Lepidoptera) from Europe. — *ZooKeys* 684: 119-154 (12 July 2017); doi: https://doi.org/10.3897/zookeys.684.13383 [zookeys.pensoft.net]

deWaard, J.R., Ivanova, N.V., Hajibabaei, M. & Hebert, P.D.N. (2008): Assembling DNA Barcodes: Analytical Protocols, 275–293. — In: Cristofre M. (ed.): *Methods in Molecular Biology: Environmental Genetics*. Humana Press Inc., Totowa, USA, 364 pp. http://jeremydewaard.com/wp-content/uploads/pubs/deWaard_et_al_2008-book_chapter.pdf (accessed 27 October 2017)

Hannemann, H.J. (1953): Natürliche Gruppierung der europäischen Arten der Gattung *Depressaria* s.l. (Lep. Oecoph.) — *Mitteilungen aus dem Zoologischen Museum in Berlin*, 29 (2): 269–373.

Hannemann, H.J. (1995): Kleinschmetterlinge oder Microlepidoptera. 4. Flachleibmotten (Depressariidae) — In *Die Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise,* ed.:F. Dahl. 69. Jena & Stuttgart: Gustav Fischer Verlag.

Lvovsky, A. L. (1990): New and little known species of Microlepidoptera (Lepidoptera: Oecophoridae, Xyloryctidae, Tortricidae) of the fauna of USSR and neighbouring countries — *Ent. Obozr*. 69 (3): 638-655

Lvovsky, A. L. (1996): New and little known species of *Depressaria* (Haworth, 1811) (Lepidoptera, Depressariidae) — *Atalanta 27* (1/2): 421-425.

Ratnasingham, S., Hebert, P. D. N. (2007): The Barcode of Life Data System — *Molecular Ecology Notes*, 7 (3): 355–364 (http://www.barcodinglife.org) http://dx.doi.org/10.1111/j.1471-8286.2007.01678.x (accessed 27 October 2017).

Rebel, H. (1904): Studien über die Lepidopterenfauna der Balkanländer. II. Teil. Bosnien und Herzegovina — *Annalen des Naturhistorischen Museums in Wien* 19: 97-377, Taf. IV-V.

Robinson, G.S. (1976): The preparation of slides of lepidoptera genitalia with special references to the microlepidoptera — *Entomologist´s Gazette* 27: 127–132 http://itp.lucidcentral.org/id/lep/lbam/Robinson_1976.pdf (accessed 27 October 2017).

Tamura K., Peterson D., Peterson N., Stecher G., Nei M. & Kumar S. (2011): MEGA5: Molecular Evolutionary Genetics Analysis using Maximum Likelihood, Evolutionary Distance, and Maximum Parsimony Methods — *Molecular Biology and Evolution* 28: 2731–2739. http://dx.doi.org/10.1093/molbev/msr121 (accessed 27 October 2017).

Websites:

Savela, M (ed.): Lepidoptera and some other life forms. http://ftp.funet.fi/index/Tree_of_life/insecta/lepidoptera/ditrysia/gelechioidea/depressariidae/depressariinae/depressaria/ (accessed 27 October 2017)

MISCELLANEOUS PAPERS **ISSN 1015-8235**

Miscellaneous Papers is a peer reviewed online serial of the Centre for Entomological Studies Ankara, established in 1989. It appears at irregular interval in a year, as PDF format and includes original articles of the research workers of the Centre, regarding on various subjects on Entomology (taxonomy, nomenclature, checklist, fauna, biodiversity, distribution, biogeography, ecology, insect-plant interactions, bionomy, and behaviour).
The CESA is a non-profit group, no royalties will be paid to authors of contributions. Papers accepted become the copyright of the related serial.
Miscellaneous Papers is currently archived online at "Internet Archive", in accordance with the publication rules of the ICZN. It is an open-access serial, distributed under the terms of the "*Creative Commons Attribution License*", which permits free use, and distribution in any medium, provided the original author(s) and source are credited.

Centre for Entomological Studies Ankara

(A scientific Consortium)
(co-operation of research workers for pure-scientific, not commercial purpose)

Web Page of the Cesa: http://www.cesa-tr.org/
Scientific Serials: Priamus & Priamus Supplement (print and online versions) (ISSN 1015-8243)[2], Miscellaneous Papers (print and online versions) (ISSN 1015-8235) [3], Memoirs (print and online versions) (ISSN-8227)[4] DVD Films[5], Iconographia Insectorum[6] (online), Cesa Publications on African Lepidoptera (online)[7], Cesa News (online)[8], Cesa Books (online) [9]
Owners / Sahipleri - Editors / Yayıncılar: Prof. em. Dr. Ahmet Ömer Koçak (c/o Yüzüncü Yıl University, Van, Turkey), Asst. Prof. Dr. Muhabbet Kemal Koçak (c/o Yüzüncü Yıl University, Van, Turkey).
Editorial Board of all Scientific Serials of the CESA / Bütün Bilimsel Yayınların Yayın Kurulu: Insecta, taxonomy, nomenclature, ecology, faunistics: Prof. Dr. Ahmet Ömer Koçak (Yüzüncü Yıl Üniversitesi, Turkey), Asst. Prof. Dr. Muhabbet Kemal Koçak (Yüzüncü Yıl University, Turkey).
Chief referees of all Scientific Serials of the CESA: Prof. em. Dr. Ahmet Ömer Koçak & Asst. Prof. Dr. Muhabbet Kemal Koçak: Insecta, taxonomy, nomenclature, fauna, ecology, catalogues, checklists of the Old World.
Expert referees according to the subject areas: Dr. Peter Huemer (Austria): Gelechiidae, and some Microlepidoptera groups in Palaearctic (Lepidoptera). Dr. J. B. Heppner (U.S.A.): Microlepidoptera of Nearctic and Neotropical. Dr. G. Baldizzone (Italy): Coleophoridae (Lepidoptera). Dr. V. Korneyev (Ukraine): Tephritidae, Pyrgotidae, Ulidiidae (Diptera). Prof. Dr. Y.G.Verves (Ukraine): Sarcophagidae (Diptera). Dr. Daniel Burckhardt (Switzerland): Psyllidae (Homoptera). Prof. Dr. E. Heiss (Austria): Hemiptera. Dr. R. Ehrmann (Germany): Mantodea. Prof. Dr. Mustafa Ünal (Bolu, Turkey): Orthoptera. Prof. Dr. Hüseyin Özdikmen (Turkey): Coleoptera. Prof. Dr. Suat Kıyak (Turkey): Hemiptera, Hymenoptera (Cynipidae).
Plant taxonomy, flora and vegetation: Assoc. Prof. Dr. Murat Ünal, Asst. Prof. Dr. Mesut Pınar, (Yüzüncü Yıl University, Van, Turkey).
Editorial policy: The submitted manuscript is evaluated by the Chief Editor and Referee. In case of need, the manuscript is sent to expert referees according to the subject areas.

Correspondences should be addressed to: Prof. em. Dr. Ahmet Ömer Koçak, c/o Yüzüncü Yıl University, Fen Fakültesi, Biyoloji Bölümü, Kampus, Van / Turkey. - e-mail: cesa_tr@yahoo.com.tr

All the serials of the Cesa are archived regularly by the Internet Archive (300 Funston Ave., San Francisco, CA 94118, U.S.A.),
in accordance with the rules of the International Codes of Zoological Nomenclature (ICZN)
https://archive.org/

also recorded regularly by the Zoological Record,
Thomson Reuters, Enterprise House, Innovation Way, Heslington, York, YO10 5NQ, United Kingdom
https://clarivate.com/

[2] http://www.cesa-tr.org/Pri.htm
[3] http://www.cesa-tr.org/Miscell.htm
[4] http://www.cesa-tr.org/Memoirs.htm
[5] http://www.cesa-tr.org/CDF.htm
[6] http://www.cesa-tr.org/Icon.htm
[7] http://www.cesa-tr.org/CPAL.htm
[8] http://www.cesa-tr.org/Cesanews.htm
[9] http://www.cesa-tr.org/Cesabooks.htm