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Oxypteryx dubiella Huemer & Šumpich, sp. nov., a new species of Aristoteliinae from Spain (Lepidoptera: Gelechiidae)

Peter Huemer & Jan Šumpich

Abstract

Oxypteryx dubiella Huemer & Šumpich, sp. nov. (Gelechiidae, Aristoteliinae), is described from specimens collected in south and east of Spain (provinces Alicante, Almeria, Valencia). The new species differs from related congeneric taxa by several characters of male and female genitalia, as well as by the highly divergent DNA barcode (cytochrome c oxidase subunit 1). Adults, and male and female genitalia are figured. Considering the isolated position within *Oxypteryx* Rebel, 1911 and in absence of a suprageneric revision of Aristoteliinae the generic combination is tentative.
Keywords: Lepidoptera, Gelechiidae, Aristoteliinae, *Oxypteryx dubiella*, description, new species, Spain.

Oxypteryx dubiella **Huemer & Šumpich, sp. nov., una nueva especie de Aristoteliinae procedente de España (Lepidoptera: Gelechiidae)**

Resumen

Oxypteryx dubiella Huemer & Šumpich, sp. nov. (Gelechiidae, Aristoteliinae) se describe a partir de especímenes recolectados en el sur y este de España (provincias de Alicante, Almería y Valencia). La nueva especie se diferencia de los taxones congéneres relacionados por varios caracteres de los genitales masculinos y femeninos, así como por el código de barras de ADN altamente divergente (subunidad 1 de la citocromo c oxidasa). Se ilustran los adultos y la genitalia del macho y de la hembra. Teniendo en cuenta la posición aislada dentro de *Oxypteryx* Rebel, 1911y la ausencia de una revisión supragenérica de Aristoteliinae, la combinación genérica es provisional.
Palabras clave: Lepidoptera, Gelechiidae, Aristoteliinae, *Oxypteryx dubiella*, descripción, nueva especie, España.

Introduction

With around 5600 described species, Gelechiidae are a lepidopteran group that occurs on all continents except for Antarctica. In Europe, the family is overproportionally diverse with around 920 species. For a long time, it was considered to be particularly difficult from a taxonomic point of view, but the inventory of species has been massively advanced in recent decades, both regionally and on a continental basis, so that at least certain tribes or even subfamilies are now easily identifiable (Huemer & Karsholt, 1999, 2010). Meanwhile, in addition to classical morphologically based methods, the implementation of genetic analyses, in particular DNA barcoding, has become established for reliable species delimitation. Despite these efforts, however, around 100 taxa that have already been sampled are considered possible cryptic species that require further integrative taxonomic investigations (Huemer et al. 2020).

Here we present one of the previously undescribed species. Due to its affiliation to the as yet unrevised subfamily Aristoteliinae, its generic classification appeared problematic. However, in contrast to other recently described Gelechiidae genera (e.g. Bidzilya & Karsholt 2008; Corley et al. 2020), we refrain from

introducing a new generic unit and hope for a future, comprehensive revision of the Aristoteliinae. The newly described species, previously only known from Spain, is morphologically and genetically closely related to *Oxypteryx* Rebel, 1911, but differs significantly in some characteristics. However, as the species delimitation is completely unambiguous, we would like to make the taxon available despite the deficits mentioned.

Material and methods

In total, we examined 229 individuals of the new *Oxypteryx* available for morphological and partially for genetic analysis. Species identification is based on the phenotypic characteristics of adults (wing markings) and is partly confirmed by dissections and DNA barcoding.

Male genitalia preparation implemented the so-called unrolling technique as introduced for the preparation of complex male genitalia in Gelechiidae by Pitkin (1986).

Tissue samples (single hind leg) from six *O. dubiella* Huemer & Šumpich, sp. nov. were prepared according to prescribed standards to obtain DNA barcode sequences of a 658 bp segment of the mitochondrial COI gene (cytochrome c oxidase subunit 1). The material was successfully processed at the Canadian Centre for DNA Barcoding (CCDB, Biodiversity Institute of Ontario, University of Guelph) using the standard high-throughput protocol described in deWaard et al. (2008). In addition, 37 private barcode sequences from 17 species in the Barcode of Life Data Systems (BOLD; Ratnasingham & Hebert, 2007; Ratnasingham, 2018) with *Aristotelia subericinella* (Duponchel, [1843]) as out-group were used for analysis. All barcodes range between 635 and 658 bp. Further details including complete voucher data and images can be accessed in the public dataset DS-OXYPTSPN "New Oxypteryx from Spain" in BOLD.

All sequences were assigned to Barcode Index Numbers (BIN), algorithm-based operational taxonomic units that provide an accurate proxy for the true species. BINs were automatically calculated for records in BOLD that comply with the DNA Barcode standard (Ratnasingham & Hebert, 2013).

Degrees of intra- and interspecific variation of DNA barcode fragments were calculated using the Kimura two-parameter model on the platform of BOLD systems v. 4.0. (https://boldsystems.org). A Neighbor-Joining tree was constructed using the Kimura two-parameter model in MEGA11 (Kumar et al. 2021).

Photographs of adults were taken with a Canon 750D camera fitted with a Canon MP-E-65 mm lens (J. Šumpich), genitalia photographs with a Zeiss Axiolab 5 microscope, mounted with an Olympus OM-D Mark III camera (P. Huemer). Stacked photographs were edited using Helicon Focus 4.8 and Adobe Photoshop 6.0.

The present study based on material from the following collections

MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
NMPC	National Museum of the Czech Republic, Prague, Czech Republic
RCZT	Research collection of Zdeno Tokár, Močovice, Czech Republic
TLMF	Tiroler Landesmuseum Ferdinandeum, Hall, Austria
ZMUC	Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark

Results

Molecular analysis

Molecular analysis is based on full DNA barcodes of 658 bp for 5 specimens of *O. dubiella* sp. nov., and a shorter sequence of 550 bp. Furthermore, 37 sequences of 17 European species are considered for analysis.

The sequences grouped into 20 and strongly divergent clusters, each with different BINs, representing 18 species, with two genetically variable species (*O. libertinella* (Zeller, 1872), *O. nigritella* (Zeller, 1847). The *O. dubiella* sp. nov. sequences were assigned to a unique cluster (Figure 1).

The mean intraspecific p-distance of *O. dubiella* sp. nov. is 0.19%, maximum p-distance is 0.48% (BIN:BOLD:AAV7596) (n=7). The minimum p-distance to the nearest neighbor, *Teleiodes luculella* (Hübner, 1813) (BIN:BOLD:AEG5539; n=4), is 10.42%.

Taxonomy

***Oxypteryx dubiella* Huemer & Šumpich, sp. nov.**
https://zoobank.org/9BB626DB-2FE6-4702-BE86-C832B45B2FC6

Type material: Holotype ♀, SPAIN, Valencia El Saler, Albufera, 5 m 39º19,67'N, 00º18,47'W, 21-V-2004, leg. Huemer; genitalia slide P. Huemer GEL 1356♀ (TLMF).

Paratypes: 95 ♂, 7 ♀, same data as holotype, genitalia slide P. Huemer GEL 1355♀, DNA barcode ID TLMF Lep 03844; 3 ♂, ditto, but 16-V-2004; 6 ♂, ditto, but 18-V-2004; Alicante, Sierra de Crevillente, 5 km NE Albatera, 450 m, 14 ♂, 38º15,22'N, 00º54,86'W, 23-V-2004, P. Huemer leg.; 6 ♂, ditto, but 24-V-2004, DNA barcode IDs TLMF Lep 03237, TLMF Lep 03238; 14 ♂, ditto, but 26-V-2004, genitalia slide P. Huemer GEL 1354♂, DNA barcode IDs TLMF Lep 03239, TLMF Lep 03841, TLMF Lep 03842, TLMF Lep 03843. Alicante 44 ♂, 28 ♀, 8 km N Albatera, 270 m, 38º15' N, 0º52' W, 28-IV-2008, DNA barcode ID TLMF Lep 25227, J. Šumpich leg. (NMPC); 2 ♂, 1 ♀, ditto, but gen. prep ZT 14983, 14991 and 14984), Z. Tokár leg.; 3 ♂, 3 ♀, ditto, but 5-V-2008, gen. prep ZT 10950, 10951, 10952, 10953, 14994. Almeria, Sierra de Alhamilla, Nijar env., 560 m, 1 ♀, 30-IV-2008, gen. prep ZT 10966, Z. Tokár leg. (all RCZT, ZMUC). Valencia, Santa Pola, Playa del Pinet, 5 m, 1 ♂, 38º9,51'N, 00º37,54'W, 22-V-2004, P. Huemer leg. (all TLMF, MNCN).

Diagnosis: At first glance, the new species resembles unrelated Gelechiidae such as *Pragmatodes* sp., *Apatetris* sp., *Ptocheuusa* sp. or *Ephysteris* sp. Within the genus *Oxypteryx*, the whitish base colour of the forewings with fine dark mottling and four obscure light brown spots is unique. The male genitalia are vaguely similar to *O. helotella* (Staudinger, 1859), *O. parahelotella* (Nel, 1995) and *O. marieae* Huemer, 2020 (Huemer, 2020; Nel, 1995), but differ in the club-shaped uncus and the shape of the valva and sacculus. The female genitalia are characterised by extremely long posterior and anterior apophyses, a largely membranous antrum and prominent appendages of the signum.

Description: Adult **(**Figures 2-5). Head white-scaled, with increasingly speckled brown towards the crown; proboscis white; labial palps white, 2nd segment with weak distal brush, brown scaling of varying extent on the outside and partly also on the inside, 3rd segment slightly shorter than 2nd segment, white with brown scales, especially on the outside; antenna white with dark brown rings. Thorax and patagia covered with white scales tipped with dark brown, legs white with extensive dark brown scaling. Forewing length: ♂ 3.0-4.1 mm, ♀ 3.8-4.0 mm; upper side of forewing white, numerous white scales tipped light brown, four weakly developed ochre spots, two in the fold and two in and at the end of the cell, fringe white with distinct dark dividing line; underside of forewing cream white. Upper side of hindwing light grey, pearlescent, fringe long, light grey; underside of hindwing white. Abdomen white. No substantial differences between sexes.

Variation: In general, the variability of external appearance is very low. In some specimens, the ochre spots may be more pronounced on a light background (Figure 4), sometimes dark forms occur, on which the ochre spots are almost not evident (Figures 3, 5).

Male genitalia (Figures 6-7): Uncus massive, club-shaped, finely spined throughout; tegumen broad, with strongly sclerotised posterior edge bearing long setae; pedunculi broadly rounded; valva sub-rectangular, especially distally with some medium-length setae, apex broad and straight-cut, ventroapical with tooth-shaped projection; sacculus basally broader than valva, lobed, apically pointed, covered with some setae particularly at edges; saccus triangular, distally evenly tapered; phallus about as long as genital capsule, massive, very broad basally, distally increasingly tapered, postmedially with tooth-like appendage.

Female genitalia (Figures 8-9): Papillae anales short, oblong; apophysis posterior long,ca. 1.8 mm; segment VIII ca. 0.5 mm long, membraneous, without structures, posterior edge sclerotizted with long setae; apophysis anterior nearly length of apophysis posterior, ca. 1.7 mm; ostium bursae hardly discernible, membranous; ductus bursae without sclerotized antrum, long, membraneous, anteriorly gradually dilated without a clear transition to corpus bursae; corpus bursae leongated sub-obval; Signum with irregualry shaped oblong basael plate, three very long and strong thorn-like processes and ca. one dozen of small spines (Figure 9).

Biology: Hostplant and early stages are unknown. Adults have been collected from late April to the end of May at light. The observations come from both sandy coastal areas and steppic inland habitats and range from sea level to an altitude of around 450 meters (Figure 10).

Distribution: Spain (Alicante, Almeria, Valencia).

Etymology: The species name is derived from the latin adjective *dubius* (=doubtful) and refers to the doubtful generic assignment.

Discussion

New descriptions of species that cannot be assigned to undisputed genera are always a particular

taxonomic challenge and, due to the lack of available conceptual frameworks, require a certain willingness to compromise on the part of the taxonomists involved. The existing desire for an unambiguous classification of species into undisputed genera cannot always be realized, even for Lepidoptera in well-studied Europe. A good example are parts of the family Gelechiidae, which are still insufficiently revised, particularly several genera of the subfamilies Aristoteliinae and Anomologinae. Although some species-rich genera such as *Bryotropha* Heinemann, 1870 , *Ptycerata* Ely, 1910, *Megacraspedus* Zeller, 1839, *Dirhinosia* Rebel, 1905 and *Ivanauskiella* Ivinski & Piskunov, 1980 have been revised in the recent past (Bidzilya & Karsholt, 2021; Bidzilya et al. 2023; Huemer & Karsholt, 2018; Karsholt & Rutten, 2005; Tokár & Gozmány, 2005), other genera such as *Aproaerema* Durrant, 1897, *Isophrictis* Meyrick, 1917, *Aristotelia* Hübner, [1825], *Metzneria* Zeller, 1839and also *Oxypteryx* remain insufficiently known. Apart from comprehensive descriptions of the species composition in these genera, there is still a lack of phylogenetic analysis at the genus level that takes global aspects into account. In many cases, even well-known European species can only be correctly assigned to a genus after intensive research, as was recently the case with *Tiranimia epidolella* Chrétien, 2015 and *Lanceoptera panochra* Janse, 1960 (Karsholt et al. 2023). Even the isolated introduction of new genera in the recent past has not provided a fundamental improvement (Bidzilya & Karsholt, 2008; Nel et al. 2022; Varenne et al. 2017). The acute lack of phylogenetically based generic revisions therefore urgently needs to be remedied. However, since only very few resources are available for such time-consuming revisionary work, the systematic survey and formal description of previously unrecognized species diversity is at risk. We have therefore - 20 years after sampling efforts of an unknown taxon preliminary and incorrectly identified as *Ptocheuusa* sp. (Huemer & Wieser, 2010) - opted for assigning a new species to an available genus despite all reservations, and conversely, in the absence of a global revision of the Aristoteliinae, refraining from introducing a further genus.

Oxypteryx dubiella is a genetically isolated species whose phylogenetic relationships are doutbful. Its closest neighbour in the DNA barcode, *Teleiodes luculella* (Hübner, [1813]), is assigned to the tribe Litini within Gelechiinae, and does not appear to be closely related due to the enormous genetic distance of approximately 10% and the entire morphology. In fact, our tentative assignment to the Aristoteliinae in general and the genus *Oxypteryx* in particular is based exclusively on morphological characteristics, especially the genital armature of both sexes, even though genetic data and the phenotypic appearance of the species cast doubt on the genus assignment.

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Conflict of Interest

The authors declare that there is no known financial interest or personal relationship that could have influenced the work presented in this article.

References

Bidzilya, O., & Karsholt, O. (2021). A review of the Palearctic *Ptycerata* Ely, 1910 (= *Caulastrocecis* Chrétien, 1931, syn. nov.) based on morphology (Lepidoptera, Gelechiidae). *Zootaxa*, *5026*(2), 151-181. https://doi.org/10.11646/zootaxa.5026.2.1 PMid:34810935

Bidzilya, O., Karsholt, O., & Šumpich, J. (2023). A revision of the genus *Ivanauskiella* (Lepidoptera: Gelechiidae).

Acta Entomologica Musei Nationalis Pragae, *63*(1), 135-164. https://doi.org/10.37520/aemnp.2023.007

deWaard, J. R., Ivanova, N. V., Hajibabaei, M., & Hebert, P. D. N. (2008). Assembling DNA Barcodes: Analytical Protocols. In C. C. Martin (Ed.). *Methods in Molecular Biology: Environmental Genomics* (pp. 275-293). Humana Press Inc. https://doi.org/10.1007/978-1-59745-548-0_15 PMid:18642605

Hobern, D., Sattler, K., & Lee, S. (2025). Catalogue of World Gelechiidae (version 1.1.25.114). In Bánki, O., Roskov, Y., Döring, M., Ower, G., Hernández Robles, D. R., Plata Corredor, C. A., Stjernegaard Jeppesen, T., et al., *Catalogue of Life* (Version 2025-05-13). Catalogue of Life, Amsterdam, Netherlands. https://doi.org/10.48580/dgqdn-4th

Huemer, P. (2020). *Oxypteryx marieae* sp. n. - eine neue Schmetterlingsart (Lepidoptera) aus der Fenner Schlucht (Südtirol, Italien). *Wissenschaftliches Jahrbuch der Tiroler Landesmuseen*, *13*, 349-355.

Huemer, P., & Karsholt, O. (1999). Gelechiidae I (Gelechiinae: Teleiodini, Gelechiini). In P. Huemer, O. Karsholt & L. Lyneborg (Eds.). *Microlepidoptera of Europe* (Vol. 3). Apollo Books. https://doi.org/10.1163/9789004629028

Huemer, P. & Karsholt, O. (2010). Gelechiidae II (Gelechiinae: Gnorimoschemini). In P. Huemer, O. Karsholt & M. Nuss (Eds.). *Microlepidoptera of Europe* (Vol. 6). Apollo Books. https://doi.org/10.1163/9789004260986

Huemer, P., & Karsholt, O. (2018). Revision of the genus *Megacraspedus* Zeller, 1839, a challenging taxonomic tightrope of species delimitation (Lepidoptera, Gelechiidae). *ZooKeys, 800*, 1-278. https://doi.org/10.3897/zookeys.800.26292 PMid:30532621 PMCid:PMC6284011

Huemer, P., & Karsholt, O. (2020). Commented checklist of European Gelechiidae (Lepidoptera). *ZooKeys*, *921*, 65-140. https://doi.org/10.3897/zookeys.921.49197 PMid:32256151 PMCid:PMC7109147

Huemer, P., Karsholt, O., Aarvik, L., Berggren, K., Bidzilya, O., Junnilainen, J., Landry, J-F., Mutanen, M., Nupponen, K., Segerer, A., Sumpich, J., Wieser, Ch., Wiesmair, B., & Herbert, P. D. N. (2020). DNA barcode library for European Gelechiidae (Lepidoptera) suggests greatly underestimated species diversity. *ZooKeys*, *921*, 141-157. https://doi.org/10.3897/zookeys.921.49199 PMid:32256152 PMCid:PMC7109146

Huemer, P., & Wieser, C. (2010). Beitrag zur Faunistik der Schmetterlinge (Lepidoptera) in der Region Valencia (Spanien) - Teil II. *Denisia*, *29*, 139-164.

Karsholt, O., Baldizzone, G., & Gomboc, S. (2023). Overview of the Gelechiidae moths (Lepidoptera) of Krk Island, Croatia: Diversity, distribution, and ecological insights. Panoramica sui microlepidotteri della famiglia Gelechiidae (Lepidoptera) dell'Isola di Krk, Croazia: Diversità, distribuzione e aspetti ecologici. *Gortania*, *45*, 95-124.

Karsholt, O., & Rutten, (2005). The genus *Bryotropha* Heinemann in the Western Palaearctic (Lepidoptera: Gelechiidae). *Tijdschrift voor Entomologie*, *148*, 77-207. https://doi.org/10.1163/22119434-900000168

Nel, J. (1995). Sur quelques espèces nouvelles ou peu connues de Gelechiidae observées au Mont Ventoux (Vaucluse) et en Basse-Provence. Quatrième contribution à la connaissance des Gelechiidae du sud de la France (Lepidoptera). *Alexanor*, *19*(1), 37-45.

Nel, J., Varenne, T., & Bassi, G. (2022). *Huemeria* gen. nov. et description de *Huemeria campicolella tyrrhenica* ssp. nov. (Lepidoptera, Gelechiidae, Isophrictini). *Revue de l'Association Roussillonnaise d'Entomologie*, *31*(2), 114-119.

Pitkin, L. M. (1986) A technique for the preparation of complex male genitalia in Microlepidoptera. *Entomologist's Gazette*, *37*, 173-179.

Ratnasingham, S. (2018). *BOLD Barcode of Life Data System, version 4*. http://www.boldsystems.org.

Ratnasingham, S., & Hebert, P. D. N. (2007). BOLD: The Barcode of Life Data System (http://www. barcodinglife.org). *Molecular Ecology Notes, 7*, 355-364. https://doi.org/10.1111/j.1471-8286.2007.01678.x Mid:18784790 PMCid:PMC1890991

Ratnasingham, S., & Hebert, P. D. N. (2013). A DNA-based registry for all animal species: The Barcode Index Number (BIN) system. *PLoS ONE, 8*(7), e66213. https://doi.org/10.1371/journal.pone.0066213. PMid:23861743 PMCid:PMC3704603

Tamura, K., Stecher, G., & Kumar, S. (2021). MEGA11: Molecular Evolutionary Genetics Analysis version 11. *Molecular Biology and Evolution*, *38*, 3022-3027. https://doi.org/10.1093/molbev/msab120. PMid:33892491 PMCid:PMC8233496

Varenne, T., Huemer, P., & Nel, J. (2017). *Chimericorsa nioloensis* gen. nov., sp. nov., découvert en Corse. *Chimericorsa nioloensis* gen. nov., sp. nov., from Corsica (Lepidoptera, Gelechiidae, Anomologinae). *Revue de l'Association Roussillonnaise d'Entomologie*, *26*(3), 126-134.

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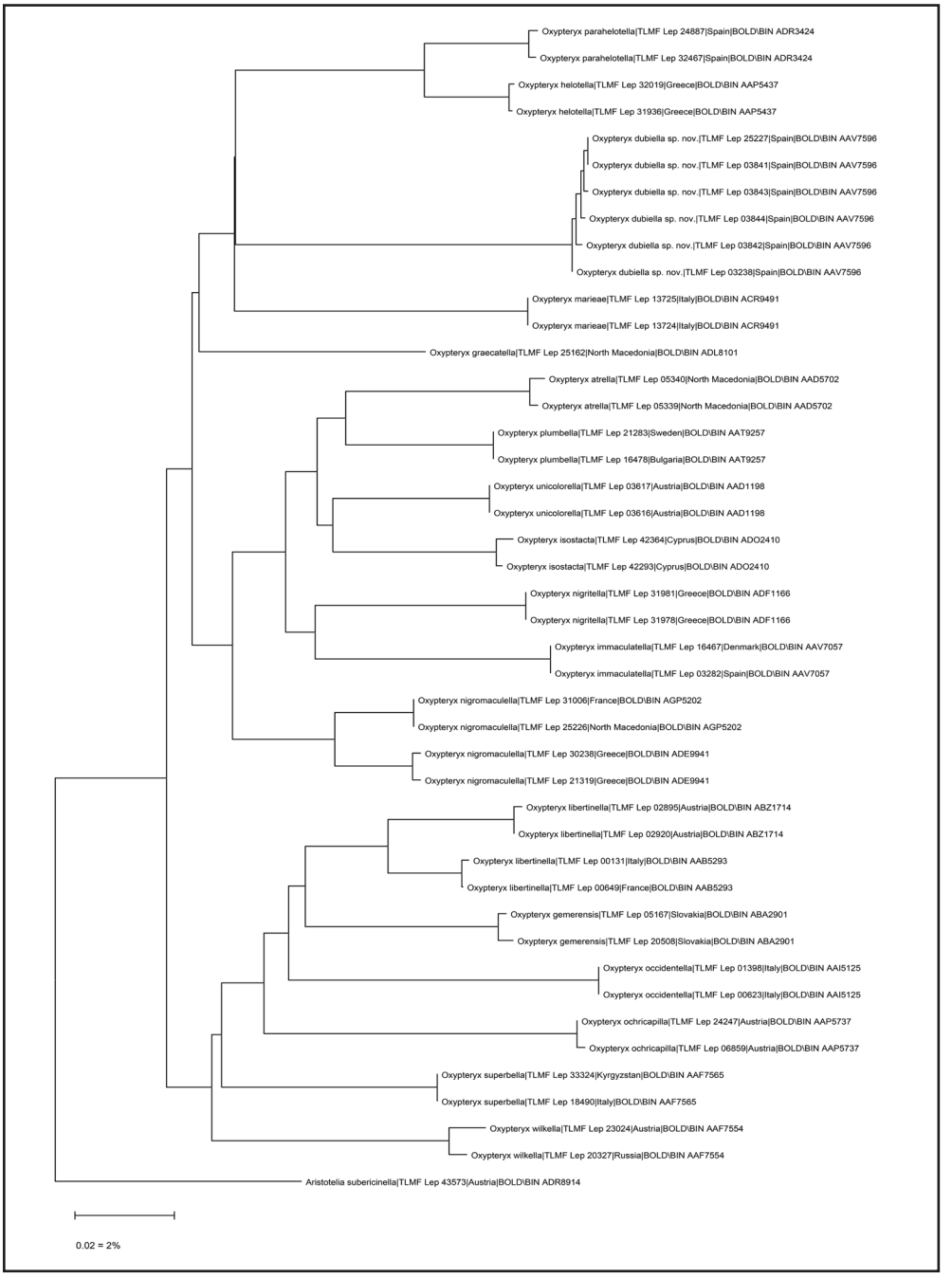
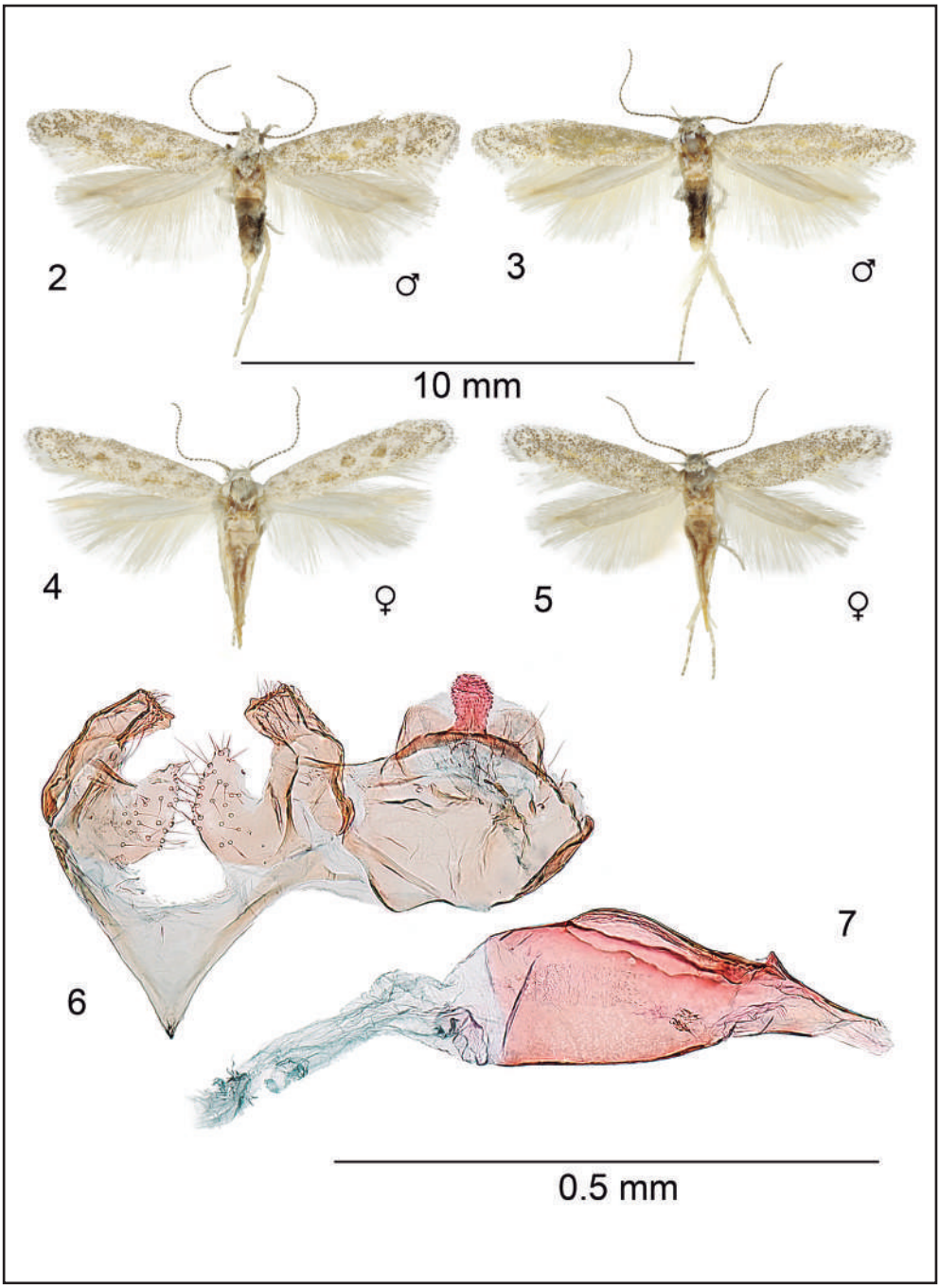
Figure 1. Neighbor-Joining tree of *Oxypteryx* spp. (Kimura 2-parameter, built with MEGA11 (Kumar et al. 2021), rooted for *Aristotelia subericinella* (Duponchel, [1843]) as out-group; Source: DNA Barcode data from BOLD (Barcode of Life Database; Ratnasingham 2018).



Figures 2-7. *Oxypteryx dubiella* Huemer & Šumpich, sp. nov., Spain, paratypes. **2-5.** Adults. **6-7.** Male genitalia, gen. slide GEL 1354. **6.** Unrolled view. **7.** Phallus.



Figures 8-10. 8-9. Female genitalia, holotype, gen. slide GEL 1356. **8.** General view. **9.** Detail of signum. **10.** Steppe habitats north of Albatera (Alicante, Spain), type locality in 2008 year.