

Research article

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***Bradyrrhoa andreae* sp. nov. from Central Italy
(Lepidoptera: Pyralidae)**

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Abstract

The habitus of a series of specimens from Central Italy referable to the genus *Bradyrrhoa* Zeller, 1848, combined with the examination of their genitalia and with a DNA barcoding analysis performed on 6 specimens, allowed the identification of a new species, which is described here as *Bradyrrhoa andreae* sp. nov. *B. imperialella* is also reported for the first time in Umbria (Central Italy).

Keywords: Taxonomy, new species, DNA barcoding, integrative taxonomy, Central Italy.

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Introduction

According to Roesler (1993), the genus *Bradyrrhoa* Zeller, 1848 (Pyralidae: Phycitinae, Phycitini) includes seven species: *Bradyrrhoa gilveolella* (Treitschke, 1832), *Bradyrrhoa trapezella* (Duponchel, 1836), *Bradyrrhoa cantenerella* (Duponchel, [1837]), *Bradyrrhoa confiniella* Zeller, 1848, *Bradyrrhoa luteola* (de La Harpe, 1860), *Bradyrrhoa marianella* Ragonot, 1887, *Bradyrrhoa mesobaphella* Ragonot, 1888.

The likely endemic *Bradyrrhoa adrianae* Asselbergs, 2002, was subsequently described from southern Spain (Asselbergs 2002). To the above listed species, *Bradyrrhoa imperialella* (Ragonot, 1887), originally described in the genus *Nephopterix*, can also be added, as most recent authors consider it to belong to this genus (Budashkin & Savchuk 2010; Scalercio et al. 2016; Plant 2016).

Roesler (1993) also considered *Bradyrrhoa subflavella* Ragonot, 1887, described on specimens from Sicily, synonymous with *B. cantenerella*. Most recently, Kemal & Koçac (2017) described a new subgenus *Kasikoparania* for *Bradyrrhoa mesobaphella*, based on the distinct shape of the male genitalia, particularly the valva, which differs significantly from all other species of *Bradyrrhoa*. This species appears to be confined to Turkey.

The genus *Bradyrrhoa* originally exhibits a Palearctic distribution. However, *B. gilveolella* has recently been introduced into Australia and North America as a biological control agent of the weed *Chondrilla juncea* Linnaeus, 1753 (Kashefi et al. 2008).

In Italy, the Checklist of Italian Fauna Species (Bassi et al. 1995) lists six species of *Bradyrrhoa*: *B. cantenerella*, *B. confiniella*, *B. gilveolella*, *B. luteola*, *B. trapezella* and *B. subflavella*. Given the synonymy of *Bradyrrhoa subflavella* with *B. cantenerella*, only five species of *Bradyrrhoa* are then currently known from Italy. These are distributed mainly in southern peninsular Italy, Sicily, and Sardinia. To these species was added *B. imperialella*, not reported in Bassi et al. (1995), recently discovered in Central Italy (Pinzari et al. 2010), in Southern Italy on the Pollino Massif (Scalercio et al. 2016) and in Umbria [Umbria, Polino (Terni province), 1100 m, 11.VIII.2024, 1 specimen, legit Giuseppe Longoturri, personal communication].

A small number of *Bradyrrhoa* specimens with a distinctive external habitus were collected during an excursion on Monte Gorzano, in the Laga Mountains near Cortino (Abruzzo Region, Teramo province, central Italy) on 11 July 2021. Morphological analysis and DNA barcoding of these specimens, alongside additional specimens later found in various collections, have led to the identification of a new taxon, described below. The aims of this article are to describe this new species, enhance our understanding of the microlepidopteran fauna of Central Italy, and expand current knowledge of the distribution of members of the genus *Bradyrrhoa*.

Material and methods

Seven specimens of an undescribed *Bradyrrhoa* species were collected by the authors in the Monti della Laga

[Laga Mts.]. Additional four specimens were found in the personal collection of the first author; they were collected on Mt. Catria in northern Marche region and the Sibillini Mts. in southern Marche (Macerata province, Central Italy). Twelve further specimens were in the M. Guaschino collection, nine specimens in the T. Mayr collection, 36 specimens in the Mario & Manuela Pinzari collection, one specimen in the Z. Zerunian collection and one specimen in the G. Longoturri collection. In total, 70 specimens of the undescribed species were examined.

Six specimens of *Bradyrrhoa* collected from various locality in Central Italy along with one specimen each of *B. adrianae*, *B. gilveolella*, *B. trapezella* and *B. confiniella* were used for DNA barcoding analysis. All specimens were successfully barcoded. DNA barcoding was performed at the Canadian Centre for DNA Barcoding (CCDB) following standard protocols (e.g., Ivanova et al. 2006). The resulting sequences have been deposited in the public BOLD dataset under *Bradyrrhoa andreae*.

For this study, we utilized the ten sequences obtained from our specimens and added all the sequences of the genus *Bradyrrhoa* (a total of 35) available on Barcode of Life Data Systems (BOLD) as shared data. These sequences represent data from various European countries, Central Asia, and the United States (Table 1). The data were used to construct a maximum likelihood tree, generated using Mega 11 (Kumar et al. 2018).

Ten specimens of *Bradyrrhoa* collected in Central Italy were dissected. Additional specimens of the genus *Bradyrrhoa* were also dissected; all are embedded in DMHF and mounted on permanent microscope slides for further comparison. Male and female genitalia, as illustrated in various volumes or online sources, were also examined [Roesler 1993; Yepishin et al. 2020; Yepishin et al. 2021; Asselbergs 2002; Gastón & Morente-Benitez 2002; Lepiforum e.V. (ed.), 2025].

For the analysis of external characters, over 100 specimens of different species of the genus *Bradyrrhoa* were examined, along with many additional specimens visible in publications or on websites.

For adult photographs, a Nikon D300 digital camera with a Nikkor AF-S 18-70 mm lens was used. Photos of the genitalia were taken with a Nikon D300 digital camera connected to a Leitz Dialux 20 EB trinocular microscope, using Leitz Wetzlar 4/0.12 and 10/0.25 objectives. The Zerene Stacker program was employed to combine the various focal planes.

External morphology and genitalia terminology follows that of Slamka (2019).

The specimens studied are preserved in the following collections:

Research collection of Guido Govi, Forlì, Italy: GG;

Research collection of Gabriele Fiumi, Forlì, Italy: GF;

Research collection of Toni Mayr, Feldkirch, Austria: TM;
Research collection of Michele Guaschino, Sarzana (La Spezia), Italy: MG;

Research collection of Giuseppe Longo Turri, Quinzano (Verona), Italy: GLT;

Research collection of Manuela & Mario Pinzari, Rome, Italy: MP;

Research collection of Z. Zerunian, Assisi (Perugia), Italy: ZZ.

Results and taxonomy

The examination of external morphological characters, genitalia, and DNA barcoding has led to the identification of a new taxon, here described as *Bradyrrhoa andreae* sp. nov..

Bradyrrhoa andreae Govi & Fiumi, sp. nov.

(Figs 1-6)

Material examined: Type material. Holotype: female, **Italy**, Abruzzo, Teramo province, pendici M.te Gorzano [slopes of Gorzano Mt.], 1000 m, 11.VII.2021, leg. G. Fiumi, BOLD ID: BC ZSM Lep 115246, dissected by G. Fiumi, (temporarily in coll. GF; it will be deposited in Museo di Storia Naturale La Specola, Florence, Italy).

Paratypes: 1 ♂, **Italy**, Abruzzo, Teramo province, pendici M.te Gorzano, 1000 m, 11.VII.2021, leg. G. Fiumi, BOLD ID: BC ZSM Lep 115245, dissected by G. Fiumi; 2 ♂, *ibidem* 11.VII.2021, dissected by G. Fiumi, 3 ♂, *ibidem*: all in coll. GF.

1 ♂, **Italy**, Marche, Monte Catria, 1100 m, 11.VIII.2021, leg. G. Govi, BOLD ID: BC ZSM Lep 115247, dissected by G. Fiumi; 1 ♂, *ibidem*; 1 ♀, **Italy**, Marche, Monte Catria, 1350 m, 25.VII.2022, leg. G. Govi; 1 ♀ **Italy**, Marche, Monti Sibillini, Casali di Ussita (Macerata province), 1300 m, 17.VIII.1997, leg. G. Govi: all in coll. GG.

1 ♀, **Italy**, Abruzzo, Roccaraso (L'Aquila province), Sacrario militare [Militar Sacrar], 1620 m, 29-VII / 5-VIII-2023, BC ZSM Lep 119584, leg. M. Guaschino; 1 ♂, *ibidem*, dissected by G. Fiumi: both in coll. G. Govi. 3 ♂ 7 ♀, same locality and date, in coll. MG.

1 ♂, **Italy**, Abruzzo, Maiella, Pennapiedimonte, 700-800 m, 24.VII.2011, leg. T. Mayr, BOLD ID: BC ZSM Lep 119580, dissected by G. Fiumi; 1 ♀ same locality and date, BOLD ID: BC ZSM Lep 119581, dissected by G. Fiumi; 4 ♂ 1 ♀ **Italy**, Abruzzo, Maiella (Chieti province), Pian di Valle, Taranta Peligna, 790 m, 20 / 21-VII-2011, leg. T. Mayr; 1 ♀, **Italy**, Lazio, Monte Terminillo sud (Rieti province) 31-VII-2021, leg. T. Mayr; 1 ♂, **Italy**, Abruzzo, Monte Terminillo sud, Maiella, Roccamorice (Pescara province), Vallone di Santo Spirito, 920 m, 23-VII-2011: all in coll. TM.

1 ♂, **Italy**, Umbria, Polino (Terni province), 1140 m, 11.VIII.2024, leg. et coll. GLT.

1 ♂ (gen. praep. 878 Zilli), Lazio, Villa Camponeschi di Posta Italy (Rieti province), Colle Petruccio, 1000 m, 29.VI.2001, 1 ♀ (gen. praep. 879, Zilli); *ibidem*, 1-8.VIII.2001, leg. A. Zilli, 1 ♀ (gen. praep. PIRA 154,

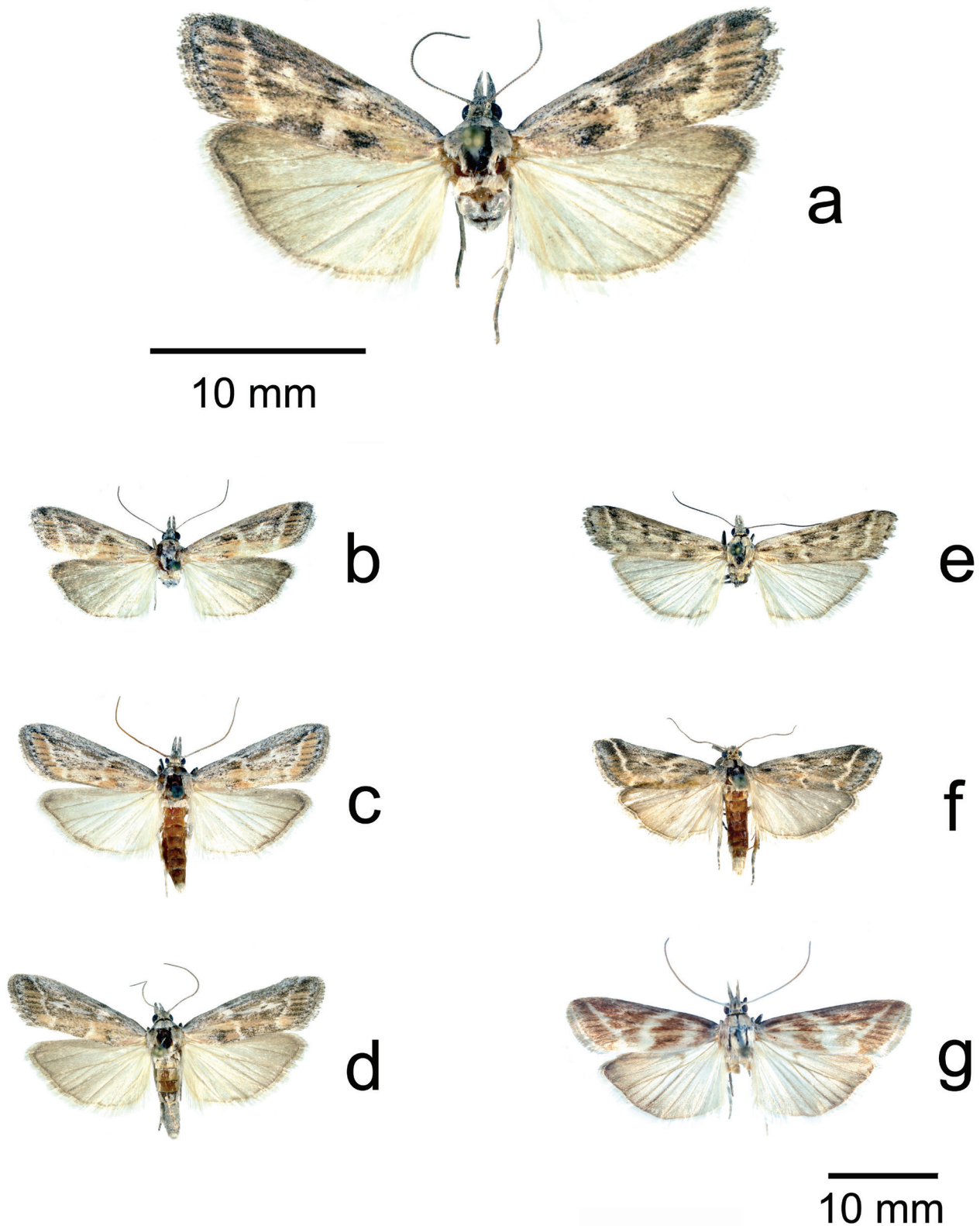


Fig. 1 – Imagoes of different species of the genus *Bradyrrhoa*: **a**, *Bradyrrhoa andreae* **sp. nov.**, holotype, Italy, Abruzzo, slopes of Gorzano Mt., 1000 m, 11.VII.2021, leg. et coll. GF. **b**, *Bradyrrhoa andreae* **sp. nov.** paratype, Abruzzo, Maiella (CH), Pian di Valle, Taranta Peligna, 790 m, 20 / 21-VII-2011, leg. et coll. TM. **c**, *Bradyrrhoa andreae* **sp. nov.** paratype, Italy, Abruzzo, Maiella, Roccamorice, Vallone di Santo Spirito, 920 m, 23.VII.2011, leg. et coll. TM. **d**, *Bradyrrhoa andreae* **sp. nov.** paratype, Italy, Abruzzo, pendici M.te Gorzano, 1000 m, 11.VII.2021, leg. et coll. GF. **f**, *Bradyrrhoa adrianae*, Spain, Granada, Sierra Nevada, Collado de Las Sabinas, 2200 m, 1.VII.2021, leg. F. Morente, in coll. TM; **g**, *Bradyrrhoa confiniella*, Albania, Himare, under the castle, 18.VII.2023, leg. et coll. GG. **h**, *Bradyrrhoa gilveolella*, Greece, Epirus, Mitsikeli Mt., near Ioannina, 850 m, 7.VI.2005 leg. et coll. TM.

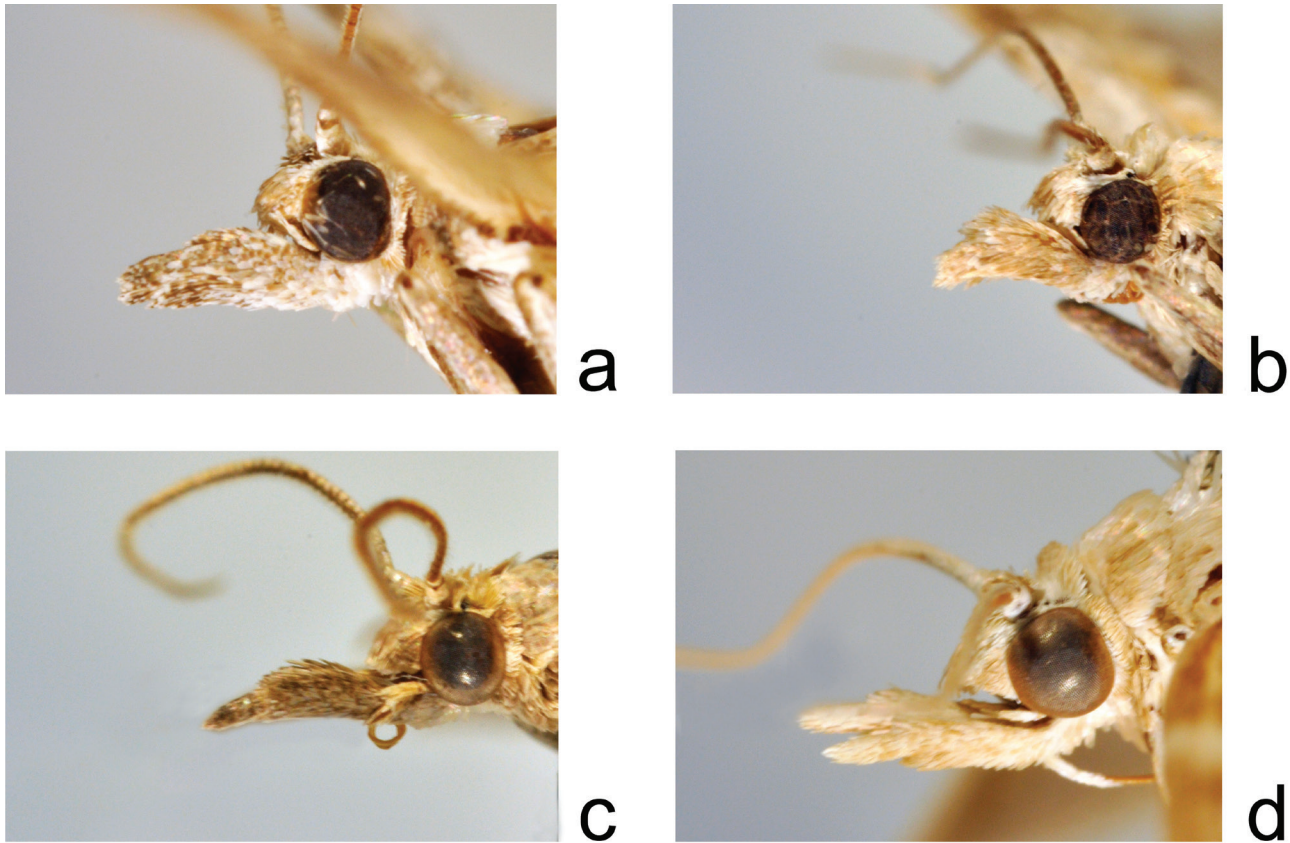


Fig. 2 – Comparison of labial palpi of some species of the genus *Bradyrrhoa*: **a**, *Bradyrrhoa andreae* sp. nov.; **b**, *Bradyrrhoa adrianae*; **c**, *Bradyrrhoa confiniella*; **d**, *Bradyrrhoa gilveolella*.

M. Pinzari); Lazio, Vallemare di Borbona (Rieti province), Colle Marcone, 1121 m, 9.VIII.1987, 1 ♂, *ibidem*, 10.VIII.1989, 1 ♀ (gen. praep. PIRA 650, M. Pinzari), *ibidem*, 14.VIII.1989, 1 ♂, *ibidem*, 13.VII.2004, 1 ♂, *ibidem*, 1.VIII.2005, 1 ♂, *ibidem*, 5.VIII.2005, 1 ♀, *ibidem*, 20.VII.2007, 1 ♀ (gen. praep. PIRA 651, M. Pinzari), *ibidem*, 28.VII.2007, 2 ♀♀ (gen. praep. PIRA 648, M. Pinzari), *ibidem*, 2.VIII.2007, 1 ♀ (gen. praep. PIRA 652, M. Pinzari), *ibidem*, 1.VIII.2008, 1 ♀ (gen. praep. PIRA 653, M. Pinzari), *ibidem*, 22.VII.2009, 1 ♀ (gen. praep. PIRA 656, M. Pinzari), *idem*, 7.VIII.2009, 1 ♂, *ibidem*, 8.VIII.2009, 1 ♀ (gen. praep. PIRA 649, M. Pinzari), *ibidem*, 10.VIII.2009, 1 ♀, *ibidem*, 11.VIII.2009, 1 ♂, *ibidem* *em*, 6.VIII.2010, 1 ♀, *ibidem* *m*, 13.VIII.2010, 1 ♀ (gen. praep. PIRA 655, M. Pinzari), *ibidem*, 9.VII.2011, 1 ♂ (gen. praep. PIRA 645, M. Pinzari), *ibidem*, 29.VII.2012, 1 ♂, 1 ♀ (gen. praep. PIRA 646, M. Pinzari), *ibidem*, 30.VII.2012, 1 ♀, *ibidem*, 2.VIII.2012, 1 ♂ (gen. praep. PIRA 410, M. Pinzari), *ibidem*, 6.VIII.2012, 1 ♀, *ibidem*, 5.VIII.2015, 1 ♀, *ibidem*, 7.VIII.2019, 1 ♀, *ibidem*, 8.VIII.2019, 1 ♀ (gen. praep. PIRA 624, M. Pinzari), *ibidem*, 9.VIII.2020, 1 ♂, *ibidem*, 2.VIII.2021, 1 ♀ (gen. praep. PIRA 654, M. Pinzari), *ibidem*, 31.VII.2022, 2 ♀♀, *idem*, 4.VIII.2022, 1 ♀, *ibidem*, 17.VIII.2023, 1 ♀, *ibidem*, 27.VIII.2023: all leg. M. Pinzari in coll. MP.

1 ♂ (gen. praep. PIRA 409, M. Pinzari), **Italy** Umbria, Mt. Subasio (Perugia province), Ca Piombino, 470 m, 17.VII.2014, leg. Z. Zerunian in coll. ZZ.

Diagnosis

The new species is clearly characterized and distinct from all other known species of the genus *Bradyrrhoa*, both morphologically and genetically.

In terms of external morphology, *Bradyrrhoa andreae* is similar to *B. adrianae*, from which it can be distinguished by several characters, as outlined in the species description below. However, it is also distinctly different from *B. confiniella*, another species in the genus with a vaguely similar appearance, not only in wing pattern but also in antennal structure, as described below, and in the structure and length of the labial palpi. In *B. andreae*, the third segment of the labial palpus is notably shorter and stocky (as seen in *B. adrianae*), whereas it is much longer and thinner in *B. confiniella* (as also observed in *B. gilveolella*, *B. cantenerella*, and *B. luteola*).

Based on wing pattern, *B. andreae* can be further distinguished from all other congeners.

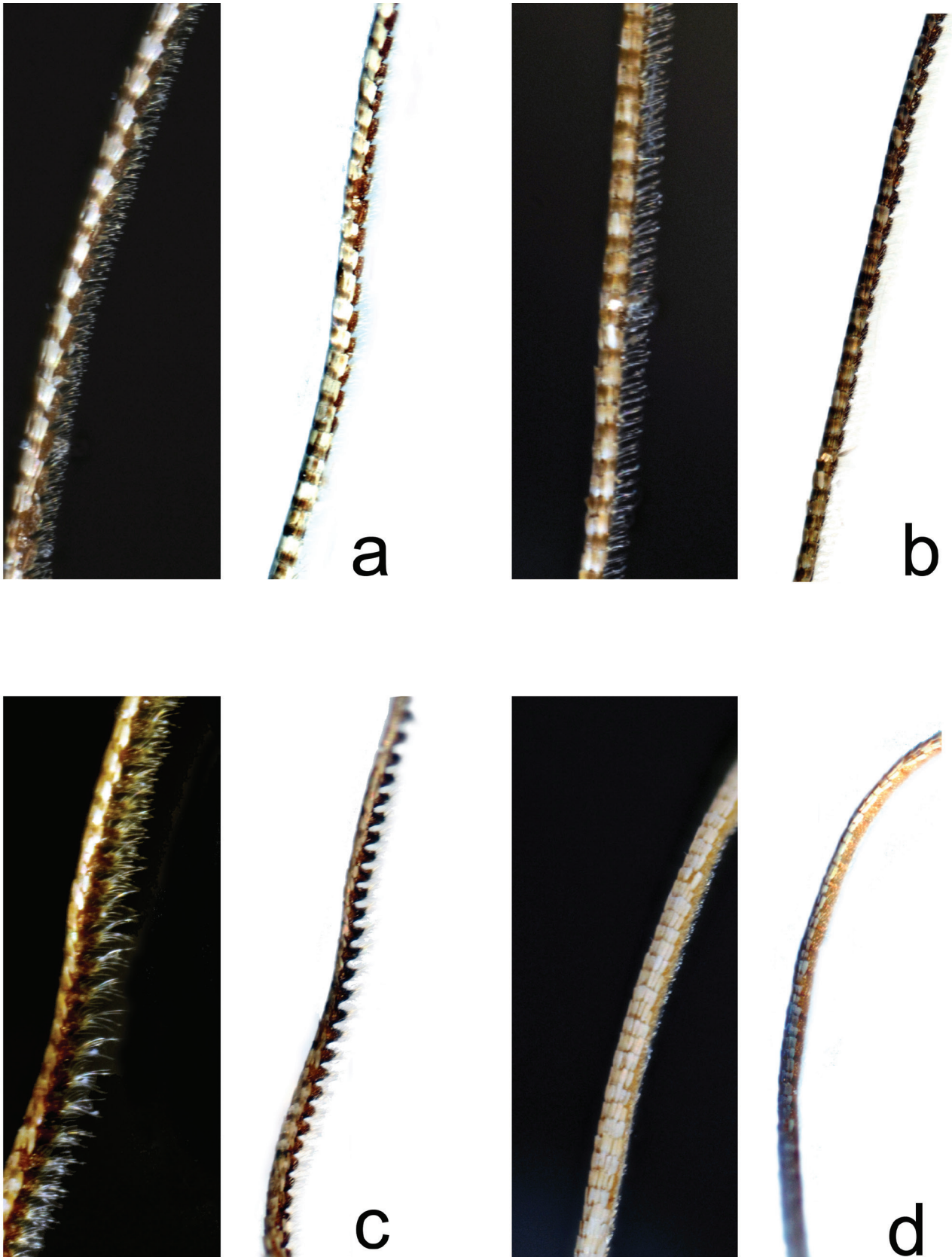


Fig. 3 – Comparison of the central part of the antenna of the male of some species of the genus *Bradyrrhoa*: **a**, *Bradyrrhoa andreae* sp. nov.; **b**, *Bradyrrhoa adrianae*; **c**, *Bradyrrhoa confiniella*; **d**, *Bradyrrhoa gilveolella*.

Table 1 – List of thus far available *Bradyrrhoa* species and specimens with DNA barcodes (COI).

Taxon	Sequence page	Country, region	Collection	Specimen ID	BIN	Sequence length (bp)
<i>B. andreae</i>	GWOUK714-22	Italy Abruzzo	Research Collection of Gabriele Fiumi	BCZSM Lep115245	BOLD:AGP4385	628
<i>B. andreae</i>	GWOUK715-22	Italy Abruzzo	Research Collection of Gabriele Fiumi	BCZSM Lep115246	BOLD:AGP4385	628
<i>B. andreae</i>	GWOUK716-22	Italy Marche	Research Collection of Guido Govi	BCZSM Lep115247	BOLD:AGP4385	628
<i>B. andreae</i>	GWOUO015-24	Italy Abruzzo	Research Collection of Toni Mayr	BCZSM Lep119581	BOLD:AGP4385	489
<i>B. andreae</i>	GWOUO018-24	Italy Abruzzo	Research Collection of Michele Guaschino	BCZSM Lep119584	BOLD:AGP4385	658
<i>B. andreae</i>	GWOUO014-24	Italy Abruzzo	Research Collection of Michele Guaschino	BCZSM Lep119580	BOLD:AGP4385	542
<i>Bradyrrhoa</i> sp.	PHLAF215-11	North Macedonia	Tiroler Landesmuseum Ferdinandeum	TLMF Lep 05385	BOLD:ABA3063	658
<i>Bradyrrhoa</i> sp.	DEEUR2266-19	Montenegro	Research Collection of F. Graf	TLMF Lep 26166	BOLD:ABA3063	658
<i>Bradyrrhoa</i> sp.	LEFIJ11643-20	Bulgaria Blagoevgrad	Research Collection of Jari Junnilainen	MM26968	BOLD:ABA3063	655
<i>B. confiniella</i>	BSNTN1510-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H01	BOLD:AA9449	658
<i>B. confiniella</i>	BSNTN1511-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H02	BOLD:AA9449	658
<i>B. confiniella</i>	BSNTN1512-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H03	BOLD:AA9449	658
<i>B. confiniella</i>	BSNTN1513-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H04	BOLD:AA9449	658
<i>B. confiniella</i>	LEASW1427-20	Greece Peloponnese	Tiroler Landesmuseum Ferdinandeum	TLMF Lep30020	BOLD:AA9449	658
<i>B. confiniella</i>	LEFIJ11606-20	Cyprus	Research Collection of Jari Junnilainen	MM26931	BOLD:AA9449	655
<i>B. confiniella</i>	LPAL1583-23	Greece Crete	Tiroler Landesmuseum Ferdinandeum	TLMF_Lep_35367	BOLD:AA9449	654
<i>B. confiniella</i>	LPAL3075-23	Greece Crete	Tiroler Landesmuseum Ferdinandeum	TLMF_Lep_36859	BOLD:AA9449	653
<i>B. confiniella</i>	PYRCR030-11	Greece Crete	Research Coll. of Walter Ruckdeschel	BCZSM Lep46536	BOLD:AA9449	658
<i>B. confiniella</i>	PYRCR294-12	PYRCR436-12	Research Coll. of Walter Ruckdeschel	BCZSM Lep51315	BOLD:AA9449	658
<i>B. confiniella</i>	PYRCR294-12	Greece Crete	Research Coll. of Walter Ruckdeschel	BCZSM Lep61715	BOLD:AA9449	658
<i>B. confiniella</i>	GWOUO021-24	Albania	Research Collection of Guido Govi	BCZSM Lep119587	BOLD:AA9449	622
<i>Bradyrrhoa</i> sp.	BSNTN1514-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H05	BOLD:AFH3010	658
<i>Bradyrrhoa</i> sp.	BSNTN1515-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H06	BOLD:AFH3010	658
<i>Bradyrrhoa</i> sp.	BSNTN1516-24	Greece Crete	Research Collection of Kai Berggren	BGE_00268_H07	BOLD:AFH3010	658
<i>B. gilveolella</i>	PBLEA307-11	Kazakhstan Ak-tyubinsk	Research Coll. of Tatyana A. Trofimova	B10-2011	BOLD:AAZ2640	658
<i>B. gilveolella</i>	MNAP110-12	United States Idaho	Canadian National Collection of Insects,	CNCLEP00091711	BOLD:AAZ2640	658
<i>B. gilveolella</i>	MNAP109-12	United States Idaho	Canadian National Collection of Insects,	CNCLEP00091710	BOLD:AAZ2640	658
<i>B. gilveolella</i>	LEASS274-16	Romania	Landesmuseum Kaernten	KLM Lep 06069	BOLD:AAZ2640	658
<i>B. gilveolella</i>	LEASZ456-22	Kyrgyzstan	Tiroler Landesmuseum Ferdinandeum	TLMF Lep 32944	BOLD:AAZ2640	658
<i>B. gilveolella</i>	GWOUO784-23	Albania	Research Collection of Guido Govi	BCZSM Lep118830	BOLD:AAZ2640	658
<i>B. gilveolella</i>	ANICP271-10	Greece	Australian National Insect Collection	10ANIC 12267	BOLD:AAZ2640	550
<i>B. gilveolella</i>	ANICP272-10	Greece	Australian National Insect Collection	10ANIC 12268	BOLD:AAZ2640	550
<i>B. gilveolella</i>	LPAL3982-23	Kyrgyzstan Jalal-Abad Oblasti	Tiroler Landesmuseum Ferdinandeum	TLMF_Lep_37766	BOLD:AAZ2640	654
<i>B. gilveolella</i>	LPAL769-23	Kyrgyzstan Jalal-Abad Oblasti	Tiroler Landesmuseum Ferdinandeum	TLMF_Lep_34553	BOLD:AAZ2640	654
<i>B. trapezella</i>	LPRCL763-20	France Corse	Museum national d'Histoire naturelle	BC-LRCCorse5291	BOLD:AAZ8647	658
<i>B. trapezella</i>	LPRCL768-20	France Corse	Museum national d'Histoire naturelle	BC-LRCCorse5296	BOLD:AAZ8647	656
<i>B. trapezella</i>	LPRCL766-20	France Corse	Museum national d'Histoire naturelle	BC-LPRCorse5294	BOLD:AAZ8647	655
<i>B. trapezella</i>	LPRCL772-20	France Corse	Museum national d'Histoire naturelle	BC-LPRCorse5300	BOLD:AAZ8647	655
<i>B. trapezella</i>	GWOUO019-24	Italy Sardinia	Research Collection of Patrizio Barberis	BCZSM_Lep_119585	BOLD:AAZ8647	594
<i>B. adrianae</i>	GWOUO017-24	Spain Granada	Research Collection of Toni Mayr	BCZSM_Lep_119583	BOLD:AGH5551	621
<i>B. imperialella</i>	FGMLG476-16	Turkey Ankara Province	Zoologische Staatssammlung Muenchen	BC ZSM Lep 92917	BOLD:ACY0227	658
<i>B. imperialella</i>	BIBSA855-15	Italy Calabria	Consiglio per la Ricerca in Agricoltura	LEP-SS-00365	BOLD:ACY0227	658

In terms of male genitalia, the new species is similar to *B. adrianae*, *B. marianella*, and *B. gilveolella* in the presence of a long, straight cornutus in the aedeagus. However, in *B. andreae*, the *cornutus* is shorter than in the aforementioned species.

The female genitalia of *B. andreae* are distinctive and differ from all other species of the genus *Bradyrrhoa*. Unfortunately, a comparison with the female genitalia of *B. adrianae* was not possible, as we did not have access to a

female specimen of this species. Furthermore, it appears that the female genitalia of *B. adrianae* have not been illustrated in any publication.

Overall, the species of *Bradyrrhoa* to which *B. andreae* is most similar is *B. adrianae*, a species endemic to southern Spain.

Description. Adult (Figs 1 a-d). Wingspan 21- 29 mm, average 26 mm, forewing 10-14,5 mm, average 12,2 mm.

Head grey with some brown scales. The labial palpus (Fig. 2 a) is approximately twice the diameter of the eye, similar to *B. adrianae* (Fig. 2 b). In particular, the third segment of the palpus is stocky and as long as the first segment, whereas in *B. confiniella* (Fig. 2 c), as well as in *B. gilveolella* (Fig. 2 d), *B. cantenerella*, and *B. luteola*, it is long and tapered. This character allows for easy differentiation of *B. andreae* from these species.

Antennae (male) (Fig. 3 a): The cilia are approximately as long as the thickness of the antennal segment. In the central part of the antenna, the antennal segments bear small, barely visible hooks, similar to those in *B. adrianae* (Fig. 3 b). The antennae of *B. andreae* differ significantly from those of *B. confiniella* (Fig. 3 c), a species with a somewhat similar habitus, as the central antennomeres in *B. confiniella* have very prominent hooks, almost as large as the antennal segments. In *B. gilveolella* (Fig. 3 d), the antennae are smooth, lacking hooks, and the cilia are very small.

Patagia and tegulae are grey with some brown scales.

Forewing: The antemedial and postmedial lines are generally closer together than in *B. adrianae*. The antemedial line is variable, ranging from oblique and subrectilinear to wavy. It originates from the costa and reaches the wing base at one-third to one-half of the distance from the wing base. The postmedial line originates from the costa at approximately 5/6 of the distance from the wing base, running subparallel to the wing margin before making a slight outward curve near the base. Both the antemedial and postmedial lines lack dark edges, which are present in *B. adrianae*. Only in some specimens are one or two tiny, barely visible black discal spots present, whereas in *B. adrianae*, there are always two superimposed, round black discal spots with white edges. The space between the antemedial and postmedial lines is suffused with grey. The termen bears 6-7 black dots. The fringes are darker at the base, with the outer half being greyish.

Hindwings: In males, the hindwings are somewhat hyaline, uniformly light greyish-brown, with a clearly marked marginal line. In females, the hindwings are darker, with the edge appearing slightly less defined and only marginally darker. The fringes are greyish-white. The underside is uniformly greyish-brown, with the forewings slightly darker than the hindwings.

Female genitalia (Fig. 4) Papillae anales large, covered with long filiform scales, taper abruptly toward the distal part forming a small dome. Posterior apophyses slightly longer than the anterior ones. They have a straight course and exceed by about a third of their length the eighth tergite. The anterior apophyses also have a straight course and almost reach the bursa copulatrix. Eighth tergite slightly longer than wide. Ductus bursae about twice as long as its length and very sclerotized. Ductus seminalis evident and wide from a third to a half of the ductus bursae. Bursa copulatrix approximately rounded with many

very small V-shaped signa. From the lower part of the bursa copulatrix an appendage of approximately triangular shape detaches itself, half to 2/3 of the diameter of the bursa in length.

Male genitalia (Fig. 5 a-b). The male genitalia of *B. andreae* (Fig. 5a) are very similar to those of *B. adrianae* (Fig. 5b). The uncus is approximately twice as long as its wide, with a flat top. The gnathos is clearly tapered, about a third of the length of the uncus. The vinculum has parallel straight and thickened parallel edges and is concave at the base, slightly shorter than the length of the valva (measured along the costa). It is slightly longer than in *B. adrianae*, where the vinculum is shorter in relation to the length of the valva. The valva has a more sclerotized costal list, and the sacculus is about 5/6 the length of the valva, measured from the most proximal point on the sacculus to the cucullus, as in *B. adrianae*. In a central position on the valva, there is a clasper of variable shape, generally subquadrangular, which does not exceed the height of the costa. The aedeagus has a large cornutus, straight or slightly curved at its terminal part, approximately two-thirds the length of the aedeagus. In *B. adrianae*, the cornutus is longer (almost as long as the aedeagus). The culcita is variable, and we have not identified constant specific differences that are useful for diagnostic purposes.

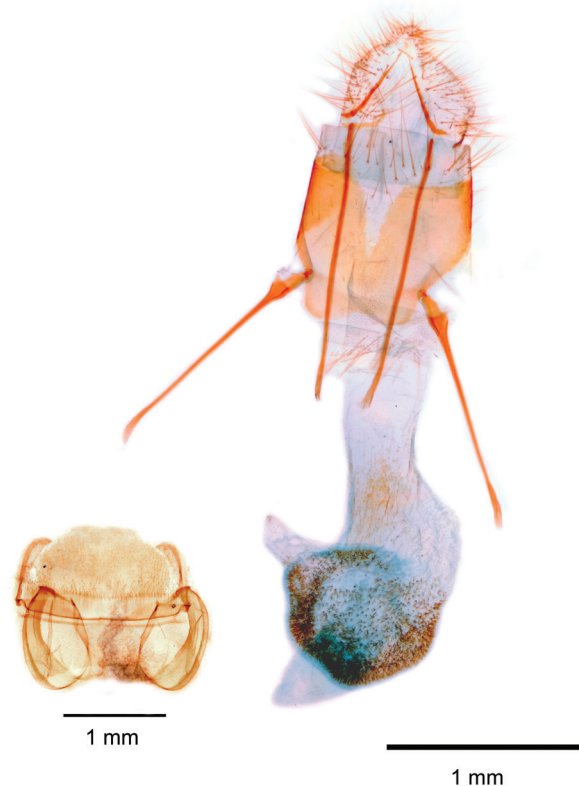


Fig. 4 – Female genitalia of *Bradyrrhoa andreae* sp. nov. with timpanal organ: female holotype.

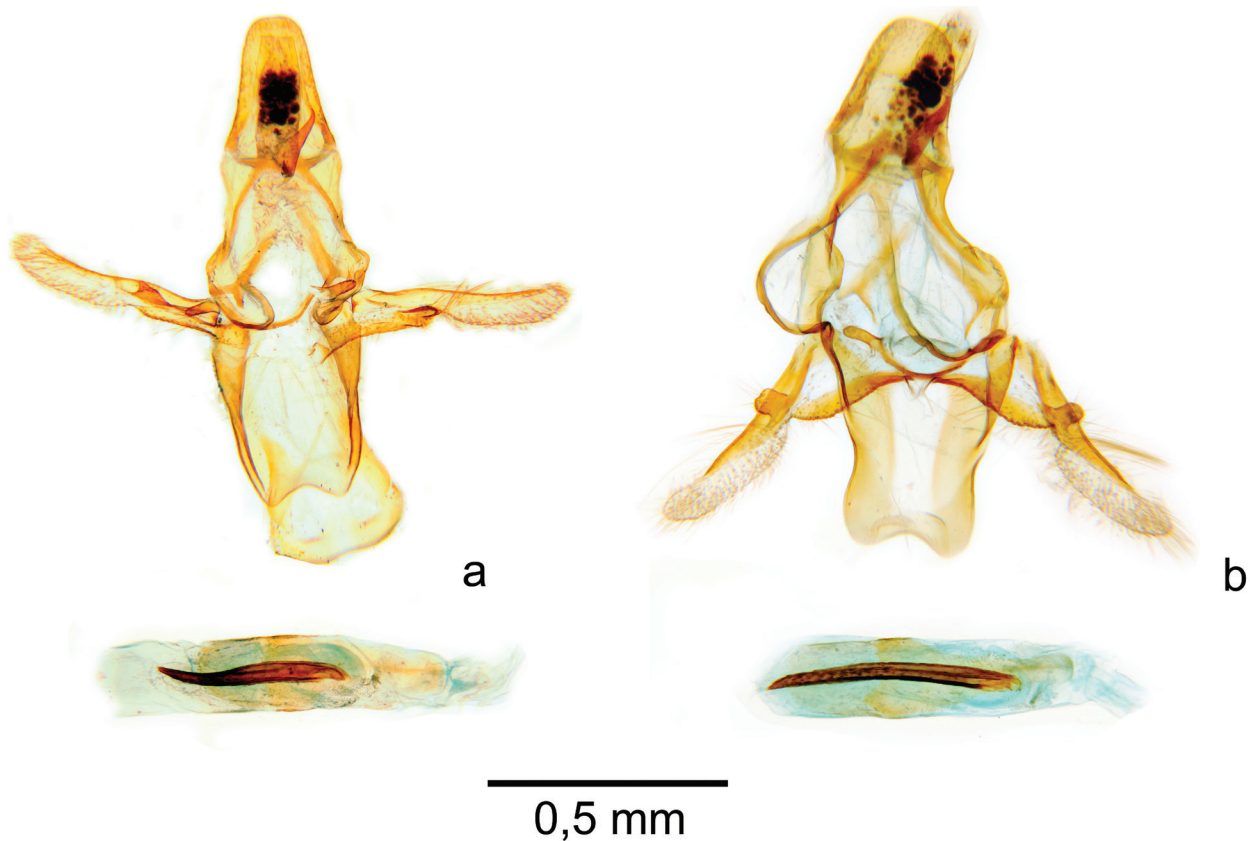


Fig. 5 – Male genitalia of *Bradyrrhoa andreae* sp. nov. and *Bradyrrhoa adrianae*; **a**, *Bradyrrhoa andreae* sp. nov., male paratype, Italy, Marche, Monte Catria, 1100 m, 11.VIII.2021, leg. et coll. GG; **b**, *Bradyrrhoa adrianae*, male, Spain, Granada, Sierra Nevada, Collado de Las Sabinas, 2200 m, 1.VII.2021, leg. F. Morente, in coll. TM.

DNA Barcoding

We utilized six DNA sequences obtained from our specimens and compared them with four sequences obtained from other species specimens of *Bradyrrhoa* (*B. adrianae*, *B. gilveolella*, *B. trapezella*, *B. confiniella*), as well as with all sequences of *Bradyrrhoa* available as shared data (a total of 35) from the BOLD database, representing data from various European countries, Central Asia, and the United States (Table 1).

The different species of *Bradyrrhoa* show significant genetic divergence from each other, and the systematics derived from genetic data agree very well with classical morphological systematics.

Barcoding analysis (Fig. 6) revealed that the six examined specimens of *Bradyrrhoa andreae* share the same BIN, BOLD:AGP4385 (Ratnasingham & Hebert 2013). The intra-specific average distance within this BIN is 0.13% (n = 6). The closest species to *B. andreae* in terms of genetic distance is *B. adrianae*, with a distance of 7.00% (n = 1).

The genetic distances between *Bradyrrhoa andreae* and the other species of the genus with available DNA barcodes are considerable: *B. gilveolella* (8.70%), *B. confiniella* (10.40%), *B. trapezella* (10.85%), and *B. imperialella* (11.55%).

Additionally, BOLD includes a group of three specimens from the Balkans (Macedonia, Bulgaria, and Montenegro) that belong to a different BIN (ABA 3063). These specimens show low intra-BIN variability (0.60%) and exhibit a close genetic relationship to *B. andreae*, with a genetic distance of 1.60%. Although we were unable to examine these specimens directly, the modest genetic distance suggests that they may belong to the same species or, at most, represent a different subspecies.

Immature stages: unknown.

Biology and ecology. The species appears to be monovoltine, with a flight period ranging from second ten days of July to first ten days of August. It is restricted to mountainous areas at altitudes between ca. 700 and 1.600 meters above sea level, occurring in both xerothermic vegetation on calcareous substrates, and mesophilous vegetation on marly substrates (Monti della Laga – Fig. 7). The host plants remain unknown.

Distribution. Comparison with Pyralidae specimens in the authors' collections and those of other colleagues has revealed the species' presence in various locations across

Central Italy (Marche, Umbria, Abruzzo, and Lazio). Given the discovery of this new species, all previous records of *B. confiniella* from Central and Southern Italy, as well as from Sicily, require re-evaluation.

As discussed above, the three specimens from the Balkans (Macedonia, Bulgaria, and Montenegro) present in the BOLD database, which are genetically very similar to *B. andreae*, could potentially belong to this new species. In this case, *B. andreae* might exhibit a trans-Adriatic distribution.

Additionally, a specimen from Northern Greece (Epirus), housed in the T. Mayr collection, shows the external morphological characteristics of *B. andreae* but has a longer cornutus in the aedeagus than that of *B. andreae*.

Further studies are needed to investigate the systematic position of the Balkan populations genetically and morphologically close to *B. andreae* in order to determine if *B. andreae* is an Italian endemic species or if it exhibits a trans-Adriatic distribution.

Etymology. The species is named after Andrea Govi, the son of the first author, with the name used on the genitive case of the Latin name “Andreas”.

Discussion and conclusion

Research conducted in the Gran Sasso and Monti della Laga National Park has led to the description of a new species of Lepidoptera, further contributing to the growing list of new species of Lepidoptera described in recent years from Central and Southern Italy. This discovery highlights the ongoing need for further research, as additional surprises and novelties may emerge from additional studies. It also underscores the importance of the protected areas in Central and Southern Italy, which constitute a valuable treasure trove of biodiversity.

Further field studies and additional checks in collections are also necessary to fully understand the distribution of the new species and to verify the systematic position of the Balkan populations that are genetically and morphologically similar to *Bradyrrhoa andreae*.

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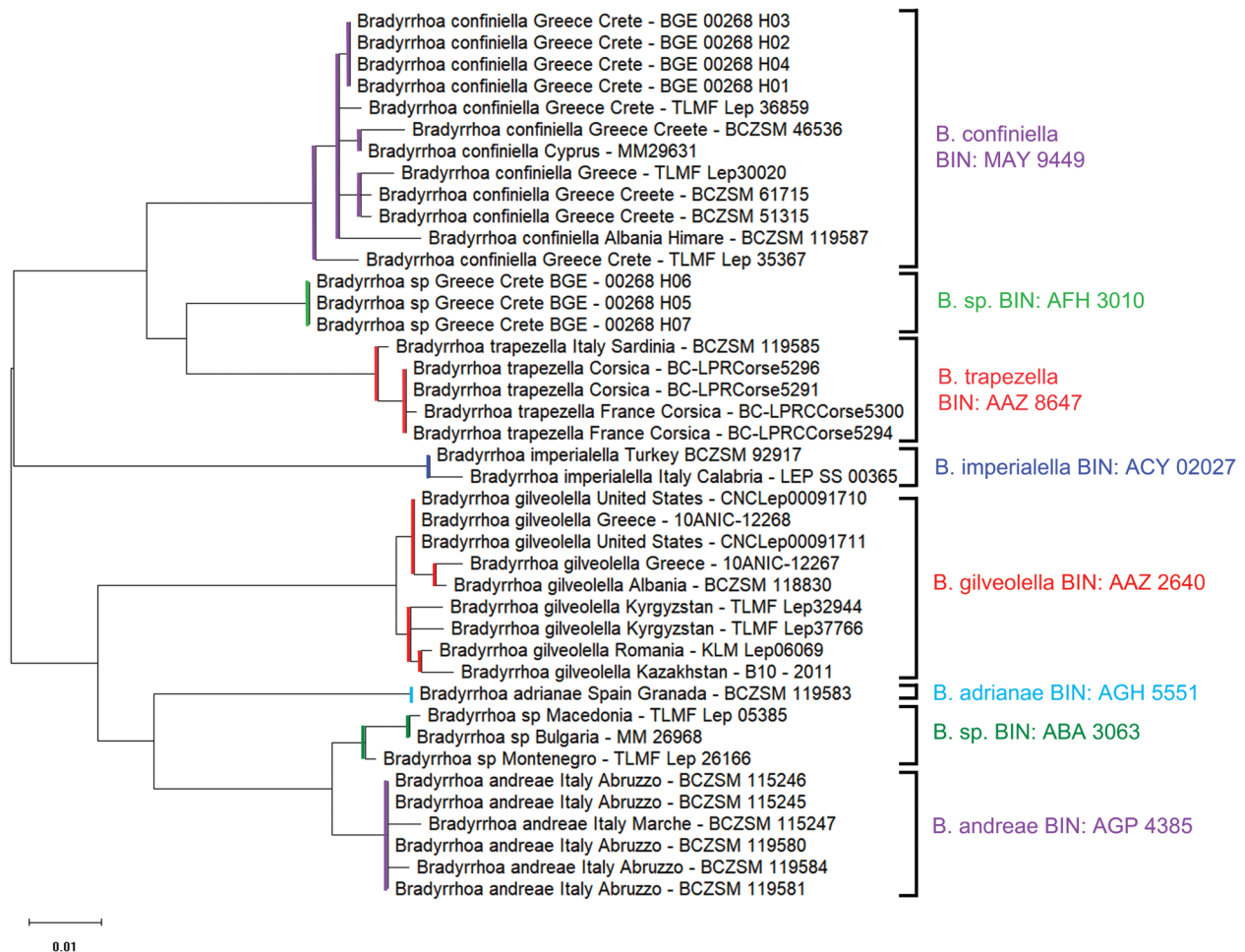


Fig. 6 – The maximum likelihood tree of the *Bradyrrhoa* species-group.



Fig. 7 – The habitat of *Bradyrrhoa andreae* **sp. nov.**: Central Italy, Abruzzo, Parco Nazionale Gran Sasso e Monti della Laga, Monti della Laga, slopes of Gorzano Mt. near Cortino (Teramo province), 11.VII.2021.

of the Gran Sasso and Monti della Laga National Park for granting research permits in the Park area.

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References

- Asselbergs J.E.F. 2022. *Bradyrrhoa adrianae* Asselbergs, sp. n., from Spain. *Epischidia* (*Epischidia*) *fulvostrigella* (Eversmann, 1844) and *Ancylosis* (*Ancylosis*) *maculifera* Staudinger, 1870 new to the Spanish fauna (Lepidoptera: Pyralidae, Phycitinae). SHILAP Revista de Lepidopterología, 30 (120): 291–295.
- Bassi G., Passerin d'Entrèves P., Speidel W., Zangheri S. 1995. Lepidoptera Pyraloidea. In: Minelli A., Ruffo S., La Posta S. (eds), Checklist delle specie della fauna italiana, 87. Calderini, Bologna.
- Budashkin Y.I., Savchuk V.V. 2010. New faunal and bionomic materials of the Crimean Lepidoptera. In: Optimization and Protection of Ecosystems, 2. TNU, Simferopol, pp. 42–57. [in Russian]
- Roesler R.-U. 1993. Quadrefine Acrobasiina. 2. Teilband der Phycitinae. In: Amsel H.G., Gregor F., Reisser H., Roesler R.-U. (Eds): Microlepidoptera Palaearctica, 8 (1–2). G. Braun, Karlsruhe, pp. i–xxii + 1–305 & pls 1–82.
- Kashefi J., Markin G.P., Littlefield J.L. 2008. Field studies of the biology of the moth *Bradyrrhoa gilveolella* (Treitschke) (Lepidoptera: Pyralidae) as a potential biocontrol agent for *Chondrilla juncea*. Proceedings of the XII International Symposium

- on Biological Control of Weeds, La Grande Motte, France, 22-27 April, 2007: 568–572.
- Gastón J., Morente-Benítez F.J. 2002. Primera cita de *Bradyrrhoa adrianae* Asselbergs, 2002 fuera de Sierra Nevada (Granada, España) (Lepidoptera, Pyralidae, Phycitinae). Boletín de la Sociedad Entomológica Aragonesa (S.E.A.), 55 (31/12/2014): 310–311.
- Ivanova N., deWaard J.R., Hebert P. 2006. An inexpensive, automation-friendly protocol for recovering high-quality DNA. Molecular Ecology Notes, 6(4): 998–1002.
- Kemal M., Koçak A.Ö. 2017. On the Pyralidae of Bahçesaray district, with some eco-faunistical and taxonomical notes (Van Province, East Turkey) (Lepidoptera). Priamus, 14(4): 161–245.
- Kumar S., Stecher G., Li M., Knyaz C., Tamura K. 2018. MEGA X: Molecular Evolutionary Genetics Analysis across computing platforms. Molecular Biology and Evolution, 35: 1547–1549.
- Pinzari M., Pinzari M., Zilli A. 2010. Deep lepidopterological exploration of Mt Cagno and surroundings (Central Italy), a restricted mountain massif and hotspot for butterfly and moth diversity (Lepidoptera). Bollettino dell'Associazione Romana di Entomologia, 65 (1-4): 3–383.
- Plant C.W. 2016. An Annotated Systematic, Synonymic and Distributional Checklist of the Pyraloidea of Bulgaria (Lepidoptera, Crambidae & Pyralidae). Neue Entomologische Nachrichten, 72: 1–231.
- Ratnasingham S., Hebert P.D.N. 2013. A DNA-Based Registry for All Animal Species: The Barcode Index Number (BIN) System. Plos One, 8: 1–16.
- Slamka S. 2019. Pyraloidea of Europe, Lepidoptera, 4, Phycitinae, part 1.
- Scalercio S., Greco S., Infusino M. 2016. First Record of *Phycita imperialella* (Ragonot, 1887) from Western Europe (Pyralidae). Journal of the Lepidopterists' Society, 70(1): 75–76.
- Yepishin V., Bidzilya O., Budashkin Yu., Zhakov O., Mushynskiy V., Novytskyi S. 2020. New records of little known pyraloid moths (Lepidoptera: Pyraloidea) from Ukraine. Zootaxa, 4808 (1): 101–120. Doi: <https://doi.org/10.11646/zootaxa.4808.1.5>.
- Yepishin V., Khalaim Y., Budashkin Yu., Zhakov O., Mushynskiy V., Novytskyi S. 2021. New records of pyraloid moths (Lepidoptera: Pyraloidea) from different regions of Ukraine. Zootaxa, 5023 (3): 366–388. Doi: <https://doi.org/10.11646/zootaxa.5023.3.3>.

Sitography

- Lepiforum e.V. [ed.] (2008-2019): Bestimmungshilfe für die in Europa nachgewiesenen Schmetterlingsarten. Visited on March 23, 2025. [<https://lepiforum.org/wiki/taxonomy/Pyraloidea/Pyralidae/Phycitinae/Phycitini/Bradyrrhoa?view=0®ions>]
- Nuss M., Landry B., Mally R., Vegliante F., Tränkner A., Bauer F., Hayden J., Segerer A., Schouten R., Li H., Trofimova T., Solis M.A., De Prins J., Speidel W. 2003–2024: Global Information System on Pyraloidea. - www.pyraloidea.org. Visited on March 23, 2025

