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A 2010–2020 évek között, 16 kötetben megjelent Microlepidoptera.hu (ISSN 2062–6738) összeolvadt a most Lepidopterologica Hungarica néven folytatódó lepkészeti kiadvánnyal. A Lepidopterologica Hungarica formailag és tartalmilag teljesen azonos a megszűnt Microlepidoptera.hu folyóirattal, s folytatja annak kötet számozását. A Lepidopterologica Hungarica évente 1–3 füzetben jelenik meg nyomtatott és online változatban. Tanulmányokat, monográfiákat közöl a lepkékkel kapcsolatos kutatásokról; taxonómia, rendszertan, faunisztika, állatföldrajz, ökológia, természetvédelem, tudománytörténet. A folyóirat nyomtatott formában, a szerkesztő címén megrendelhető.
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Lepidopterologica Hungarica merged with Microlepidoptera.hu (ISSN 2062–6738) journal. The new journal is completely identical in form and content to the previous one. Publishes original studies and monographs on Lepidoptera research; taxonomy, faunistic, biogeography, ecology and nature conservation. Lepidopterologica Hungarica publishes original research or discoveries on time, distributing them free via open access on the internet on the date of publication.

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Dichagyris chasmapsyche sp. n. from Tajikistan (Lepidoptera, Noctuidae)

Péter Gyulai

Citation. Gyulai P. 2023: *Dichagyris chasmapsyche* sp. n. from Tajikistan (Lepidoptera, Noctuidae). – Lepidopterologica Hungarica 20(1): 5–10.

Abstract. Description of ***Dichagyris chasmapsyche* sp. n.** (Lepidoptera, Noctuidae), with 8 colour illustrations and 8 genitalia figures.

Keywords. Asia, taxonomy, Noctuidae, new description.

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Introduction

The latest publications on the Palaearctic taxa of the genus *Dichagyris* Lederer, 1867 were published by Varga, Ronkay & Ronkay 2020; Gyulai & Saldaitis 2021/a; Gyulai 2021/a; Gyulai & Saldaitis 2021/b; Gyulai 2021/b; Varga, Ronkay & Ronkay, 2021; Varga, Ronkay & Ronkay, 2023. In these communications, many new taxa were described from the high mountains of Asia, additionally three of them were species group revisions, as well. Here, the diagnosis and description of a new species is given, partly based upon of the expedition of D. Goshko to a rather unexplored area of Tajikistan.

The female genitalia of the new species and closely related taxa are figured below, even though the differences between them are mostly slight, as it is well known in this genus.

Abbreviations for personal and institutional collections used herein: HT = holotype; PT = paratype; PGM = collection of Péter Gyulai (Miskolc, Hungary); GYP = genitalia slide Péter Gyulai; BB = collection of Balázs Benedek (Mohács, Hungary).

Description of new taxa

***Dichagyris chasmapsyche* sp. n.** (Figs 1–3, 9–11)

Holotype: female (Fig. 1), S.Tajikistan, South Ghissar mts.; Kulyab distr., Sari-Chashma, vill., South part of Hazretisho range, 1200 m, 22. V. 2023 leg. D. Goshko, slide no. GYP 5909 (coll. Péter Gyulai, Miskolc).

Paratypes: 4 females, with the same data as of the holotype; 3 females S.Tajikistan, South Ghissar mts.; Kulyab distr., Sari-Chashma, vill., South part of Hazretisho range, 1200 m, 17. V. 2023 leg. D. Goshko, slide nos. GYP 5907 and 5908 (coll. PGM); 5 females, from the same locality and collector, with the date 16-31. V. 2023. (BB).

Diagnosis. *Dichagyris chasmapsyche* sp. n. (Figs 1–3, 9–11) is an early flight species and only a series of females was found in the second half of May. Its flight period seems to be earlier than most of the taxa of the genus, with the exception of the taxa of the *Dichagyris forficula* species group and some species of the subgenus *Yigoga* Nye, 1975.

Without the knowledge of the male genitalia configuration, it cannot be associated with anyone of the *Dichagyris* species groups. In the external features, it resembles mostly *D. armeniaca* Kozhantshikov, 1930 (Figs 4, 12) (and its subspecies) and in the size and wing pattern also *D. ignara* (Staudinger, 1896) (Figs 5, 13), and *D. kongur* Varga, 1996 (Figs 6, 14), while *D. clara*

(Staudinger, 1888) (Figs 7, 15), (and its subspecies) and *D. celebrata* (Alpheraky, 1897) (Figs 8, 16), (and its subspecies) are less similar to the new species. The new species can be easily distinguished from all the above mentioned taxa by its whitish ground color of the forewings with scattered brown scales; the broad, whitish with light brown variegated cilia and the lighter, almost evenly pale brownish hindwings. This whitish-ochreous colouration of forewings occurs also in *D. armeniaca* (subsp. in Central Anatolia). However, the pattern of the new species is more contrasty than in *D. armeniaca*.

In the female genitalia configuration, the new species (Figs 9–11) reveals some unique features and is very easily distinguished from those of all the similar, closely related congeners mentioned above, by the much shorter ovipositor with angular, setose papillae anales; shorter apophyses anteriores and a. posteriores; by shorter, anteriorly broader, posteriorly much weaker ductus bursae and shorter but distally much broader appendix bursae. The female genitalia are mostly resembling to those of the *D. celebrata* species group (*D. celebrata*, *D. armeniaca*, *D. kongur*), but clearly differentiated by the essentially shorter and weakly sclerotised papillae anales. The male is unknown.

Description (Figs 1–3). Wingspan 28–34 mm, length of forewing 15–18 mm. The vesture of the body and ground color of the forewings evenly whitish with slight ochreous shade, and densely scattered with brownish scales. Orbicular and reniform stigmata as the ground colour, very finely black encircled; claviform stigma not present. The most conspicuous characters of the wing pattern: the big, blackish triangular subapical patch, the fine, black, zigzag antemedian line, the lacy, arched postmedian line and the fine, sinuous subterminal line, with a row of black wedge-shaped spots in the inner side. Cilia white and light brown variegated. Hindwings light brown with a long, faint, radial, slightly suffused stripe medially; much darker suffused in the marginal area; discal spot absent, cilia whitish. The underside of the wings very unical; the forewing whitish with faint light brown suffusion; submarginally with conspicuous, anteriorly broadened then evenly tapering ghost of the subterminal line; the marginal area white. Hindwing whitish with diffuse, slight brownish marginal suffusion.

Male genitalia. Unknown.

Female genitalia (Figs 9–11). Papillae anales weakly sclerotised, setose, angular; apophyses posteriores about twice as long as apophyses anteriores. The antrum finely sclerotized, U-shaped, the bilateral symmetrical extensions slight. Ductus bursae broadly tubular, anteriorly the broadest and longitudinally wrinkled, sclerotized, and more or less evenly weaker posteriorly. Appendix bursae large, rather short, more or less globular, distally much broaden; corpus bursae conspicuously longer, saccate.

Biology and distribution. The new species is known only from the type locality, near to rocky precipices, in medium altitude.

Etymology. *D. chasmapsyche* sp. n. is named from the combination „chasma“, which means rock precipice in C. Asia; „psyche“ is the ghost; its name means the soul of the rock precipice.

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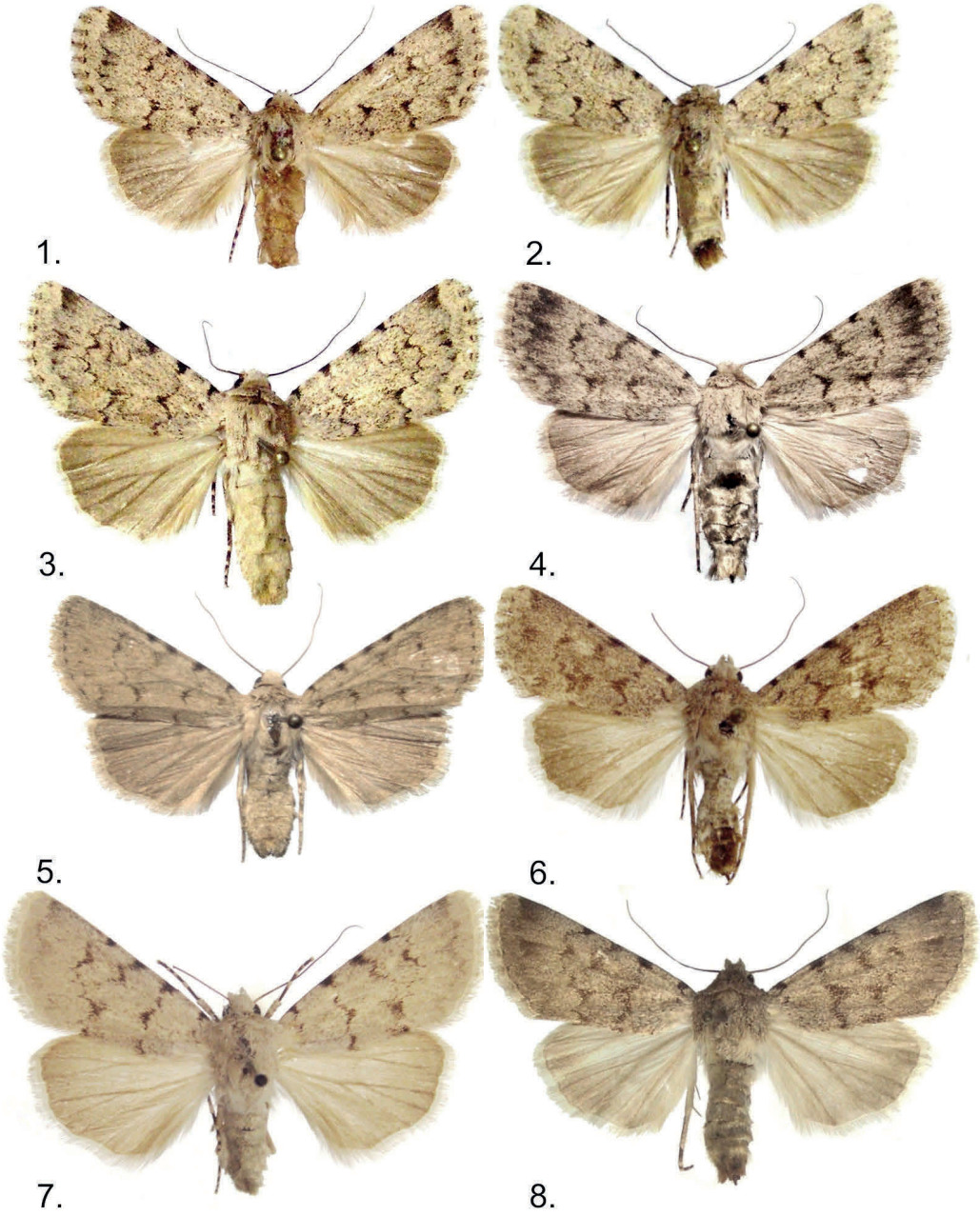
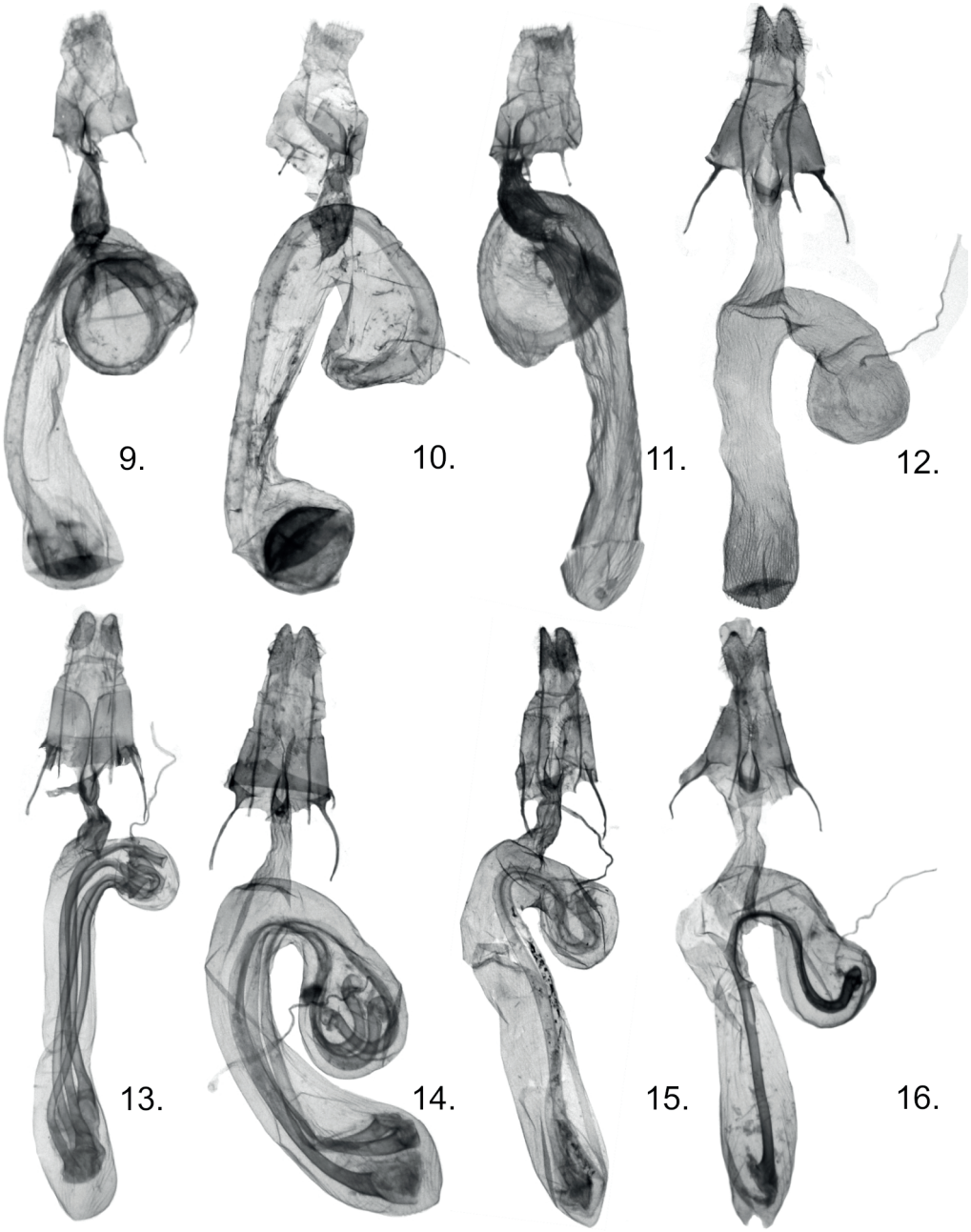


Figures 1–8. Females of *Dichagyris* spp. adults. 1. *D. chasmapsyche* **sp. n.**, HT, S.Tajikistan, S. Hissar, Sari-Chashma, GYP 5909 (PGM); 2. and 3. *D. chasmapsyche* **sp. n.**, PT, S.Tajikistan, S. Hissar, Sari-Chashma (PGM); 4. *D. armeniaca* Kozhanchikov, 1930, Armenia, 15 km NE of Meghri, GYP 5912 (PGM); 5. *D. ignara* (Staudinger, 1896), China, Daban Shan, Xining (PGM); 6. *D. kongur* Varga, 1996, PT, Kazakhstan, Boguty Mts. (PGM); 7. *D. clara* (Staudinger, 1888), Kyrgyzstan, 5 km S. Enilchek, (PGM); 8. *D. celebrata* (Alpheraky, 1897), Iran, prov. Semnan, (PGM).



Figures 9–16. Female genitalia of *Dichagyris* spp. 9. *D. chasmapsyche* **sp. n**., HT, S.Tajikistan, S. Hissar, Sari-Chashma, GYP 5909 (PGM); 10. and 11. *D. chasmapsyche* **sp. n.**, PT, S.Tajikistan, S. Hissar, Sari-Chashma, GYP 5907 and GYP 5908 (PGM); 12. *D. armeniaca* Kozhanchikov, 1930, Armenia, Meghri, GYP 5912 (PGM); 13. *D. ignara* (Staudinger, 1896), Mongolia, Bayanchongor aimak, Hangaj, GYP 5910 (PGM); 14. *D. kongur* Varga, 1996, PT, Kazakhstan, Tshundzha, GYP 5608 (PGM); 15. *D. clara (*Staudinger, 1888), Kyrgyzstan, 5 km S. Enilchek, GYP 5911 (PGM); 16. *D. celebrata* (Alpheraky, 1897), Turkmenistan, Kopet Dagh, GYP 4080 (PGM).

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Éjjeli nagylepkék faj- és egyedszámának változásai lámpázási megfigyelések alapján (Lepidoptera, Macrolepidoptera)

Variations in Species and Abundance of Moths Based on Light Source Observations, Hungary (Lepidoptera, Macrolepidoptera)

Gergely Péter

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Abstract. The author presents data on 395 macro moth species observed by light source operating at the same site in Csobánka (Hungary) during 2019 and 2023. The variation of number of species and their abundance were analysed.

Keywords. moths, Macrolepidoptera, abundance, light source

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Summary. The author investigated whether variability in number of macro moth species and their abundance can predict their population dynamics if the investigations by light source are restricted to the same site and repeated several times during five consecutive years. The investigations took place in Csobánka between 2019 and 2023. The biotopes around this site were reported earlier (Gergely 2023).

During this period 395 macro moth species were spotted. Most species displayed a pronounced variability in abundance, markedly in more common species. The variability of common species, *Aedia funesta, Agrotis segetum, Axylia putris, Cymatophorina diluta, Eilema sororcula* and *Noctua pronuba* was evident on a 2 to 3-year basis. The variability of abundance of less common species was less striking, however *Noctua fimbriata* and *Xestia c-nigrum* showed similar strong, though opposite, variability. Some locally frequent species, e.g., *Dioszeghyana schmidtii* displayed similar fluctuation, with highest peaks in 2020 (2 observations, 10 specimens) and in 2023 (3 observations, 7 specimens), while only one observation in 2019 and 2022, and none in 2021. Therefore, the abundance of common and locally frequent species may be judged by repeated investigations with lamp source if continuous light trapping is not available.

The number of investigations run parallel with the number of species and their abundance. Therefore, more frequent investigations result in a more appropriate assessment of moth populations.

Seventy-nine species were found only on one occasion as a single specimen during this 5-year period. Some of them (33) have already been observed at this site, but the majority (46) was unique to this place. This fact necessitates multiple or continuous lamp investigations to find all species inhabiting a given site/biotope.

Zusammenfassung. Der Autor untersuchte, ob die Variabilität in der Anzahl der Makrofalterarten und ihre Abundanz ihre Populationsdynamik vorhersagen kann, wenn die Untersuchungen nach Lichtquelle auf denselben Standort beschränkt sind und mehrmals in fünf aufeinanderfolgenden Jahren wiederholt werden. Die Untersuchungen fanden in Csobánka zwischen 2019 und 2023 statt. Über die Biotope um diesen Standort wurde bereits früher berichtet

(Gergely 2023). In diesem Zeitraum wurden 395 Makrofalterarten gesichtet. Die meisten Arten wiesen eine ausgeprägte Variabilität in der Häufigkeit auf, insbesondere die häufigeren Arten. Die Variabilität der häufigen Arten *Aedia funesta, Agrotis segetum, Axylia putris, Cymatophorina diluta, Eilema sororcula* und *Noctua pronuba* war in einem Zeitraum von zwei bis drei Jahren zu beobachten. Die Variabilität der Häufigkeit von weniger häufigen Arten war weniger auffällig, jedoch zeigten *Noctua fimbriata* und *Xestia c-nigrum* eine ähnlich starke, wenn auch entgegengesetzte, Variabilität. Einige lokal häufige Arten, z. B. *Dioszeghyana schmidtii*, wiesen ähnliche Schwankungen auf, mit den höchsten Werten im Jahr 2020 (2 Beobachtungen, 10 Exemplare) und im Jahr 2023 (3 Beobachtungen, 7 Exemplare), während nur eine Beobachtung in den Jahren 2019 und 2022 und keine im Jahr 2021 erfolgte. Daher kann die Abundanz von allgemein häufigen und lokal häufigen Arten durch wiederholte Untersuchungen mit einer Lampenquelle beurteilt werden, wenn kein kontinuierlicher Lichtfang verfügbar ist. Die Anzahl der Untersuchungen verläuft parallel zur Anzahl der Arten und ihrer Abundanz. Daher führen häufigere Untersuchungen zu einer angemesseneren Bewertung der Mottenpopulationen. Neunundsiebzig Arten wurden in diesem 5-Jahres-Zeitraum nur einmal in einem einzigen Exemplar gefunden. Einige von ihnen (33) wurden bereits an diesem Standort beobachtet, aber die meisten (46) wurden nur an diesem Ort gefunden. Diese Tatsache macht mehrere oder kontinuierliche Lampenuntersuchungen erforderlich, um alle an einem bestimmten Standort/Biotop vorkommenden Arten zu finden.

Résumé. L'auteur a cherché à savoir si la variabilité du nombre d'espèces de macrophytes et leur abondance peuvent prédire la dynamique de leur population si les recherches par source lumineuse sont limitées au même site et répétées plusieurs fois au cours de cinq années consécutives. Les recherches ont eu lieu à Csobánka entre 2019 et 2023. Les biotopes autour de ce site ont déjà fait l'objet d'un rapport (Gergely 2023). Au cours de cette période, 395 espèces de papillons de nuit ont été observées. La plupart des espèces ont montré une variabilité prononcée dans l'abondance, de manière marquée pour les espèces les plus communes. La variabilité des espèces communes, *Aedia funesta, Agrotis segetum, Axylia putris, Cymatophorina diluta, Eilema sororcula et Noctua pronuba* était évidente sur une base de 2 à 3 ans. La variabilité de l'abondance des espèces moins communes était moins frappante, mais Noctua fimbriata et Xestia c-nigrum présentaient une variabilité aussi forte, bien qu'opposée. Certaines espèces localement fréquentes, comme *Dioszeghyana schmidtii*, ont affiché des fluctuations similaires, avec des pics en 2020 (2 observations, 10 spécimens) et en 2023 (3 observations, 7 spécimens), alors qu'il n'y a eu qu'une seule observation en 2019 et en 2022, et aucune en 2021. Par conséquent, l'abondance des espèces communes et localement fréquentes peut être évaluée par des investigations répétées avec une source lumineuse si le piégeage lumineux continu n'est pas disponible. Le nombre d'enquêtes est parallèle au nombre d'espèces et à leur abondance. Par conséquent, des investigations plus fréquentes permettent une évaluation plus appropriée des populations de papillons de nuit. Soixante-dix-neuf espèces n'ont été trouvées qu'à une seule occasion en tant que spécimen unique au cours de cette période de cinq ans. Certaines d'entre elles (33) ont déjà été observées sur ce site, mais la majorité (46) était unique à cet endroit. Ce fait nécessite des recherches multiples ou continues sur les lampes afin de trouver toutes les espèces habitant un site/biotope donné.

Bevezetés – Introduction

A rovarok, így az éjjeli lepkék fajösszetétele és egyedszáma évenként változik ugyanazon az élőhelyen vizsgálva is (Kempton 1977; Gaston 1988; Conrad et al. 2004; Szabó et al. 2007). Ennek sokféle oka van, egyfelől az időjárás, főleg annak szélsőséges megnyilvánulásai, az élőhely változásai, beleértve az antropogén hatásokat is, valamint a biológiai rendszerek változásai, így maga a gradáció, illetve a gazdaszervezet-parazita kapcsolatai (Spitzer & Lepš 1988; Lepš et al., 1998; Highland et al. 2013). Egy konkrét faj populációjának dinamikáját viszonylag egzaktan lehet mérni, így elég megbízható adatokat nyerünk pl. egy-egy erdészeti kártevő egyedszámának változásairól (Baltensweiler et al. 1977; Hoch et al. 2001), habár az időjárás ezeket a vizsgálatokat is erősen befolyásolja (Holyoak et al. 1997; Jonason et al. 2014). A több faj po-

puláció-dinamikáját legjobban fénycsapda befogásos módszerekkel lehet vizsgálni, különösen, ha több helyen egy időben szinkron zajlik a vizsgálat (Spitzer & Lepš 1988; Conrad et al. 2004). Az időnként egy-egy adott élőhelyen végzett éjjeli lámpázás keresztmetszeti képet ad az adott időpontban repülő lepkékről, elsősorban a fajok előfordulásáról, kevésbé azok egyedszámáról. Egy adott élőhely fajösszetételét pedig legjobban egy fix helyen felállított fénycsapdával lehet felmérni, kivált, ha azt több éven át működtetik (Szabó et al. 2007). A fajok egyedszámának összetétele jobban kifejezi a környezet állapotát, mint az ott előforduló fajok listája (Kempton 1977). Ezért az egyszerű fajlisták megállapítása mellett érdemes az egyedszámokat is figyelembe venni.

Munkámban arra kerestem a választ, hogy ha ugyanazon a helyen vizsgáljuk a lámpára repülő lepkéket éveken keresztül, vajon mennyire lehet következtetni ezekből az adatokból a lepkék populációinak dinamikájára, illetve mennyiben kapunk megbízható eredményt a fajok előfordulásáról.

Anyag és módszer – Materials and Methods

2019 és 2023 között Csobánkán a kertben a fehér házfal előtt felállított állványon egy 160 wattos kevertfényű égőt és egy 20 wattos UVA lámpát használtam. A környező élőhelyeket a korábbi közlemény tartalmazza (Gergely 2003). A megfigyelések az időjárástól függően évente 23 -40 alkalommal történtek:
2019: 23 (április 30 – október 9)
2020: 36 (április 17 – október 10)
2021: 21 (május 4 – október 5)
2022: 29 (május 5 – október 13)
2023: 40 (április 22 – október 11)
A lepkéket közvetlenül sötétedés után, majd kora hajnalban figyeltem meg. A megfigyelt lepkékről fényképet készítettem, illetve naplót vezettem. A kora tavaszi, illetve késő őszi/áttelelő fajokat nem, vagy csak korlátozottan figyelhettem meg (lásd lámpázási időszakok!), az ezekre a fajokra utaló adatok (*-gal jelölve) csak kellő kritikával értékelhetők.
A észleléseket gyakoriságuk szerint négy csoportra osztottam:
1. Leggyakoribb fajok, az észlelések száma ≥30 (32 faj)
2. Közepes gyakoriságú fajok, az észlelések száma ≥20, <30 (24 faj)
3. Kisebb gyakoriságú fajok, az észlelések száma ≥10, <20 (62 faj)
4. Ritkább fajok, az észlelések száma <10 (277 faj); ezen a csoporton belül külön tárgyalom az egyszeri alkalommal észlelt fajokat (79 faj).

Eredmények és következtetések – Results and Discussion

Az öt év alatt összesen 395 fajt figyeltem meg, ez a Csobánkán és környékén észlelt 518 fajnak (Gergely 2023) 76,2%-a. A leggyakrabban észlelt fajokat az 1. táblázat és az 1. ábra mutatja be. Hat faj erősen változó gyakorisággal (a minimális előfordulás a maximum < 10%-a) jelent meg (1. ábra). Az egyébként gyakori *Axylia putris* 2020-ban 14 alkalommal, míg 2023-ban csupán egy alkalommal repült a lámpára. Ugyancsak ilyen gyakran jelent meg 2020-ban az *Eilema sororcula é*s az *Aedia funesta* is, megjelenésük mélypontja 2022-ben, illetve 2021-ben volt. Figyelemre méltó a szintén gyakori *Agrotis segetum* hiánya 2019-ben, miközben 2023-ban 11 alkalommal is repült a lámpára. A *Cymatophorina diluta* 2019-ben csupán egy alkalommal jelentkezett, minden más alkalommal sokkal gyakrabban. Magyarázhatná, hogy az utolsó megfigyelés október 9-én volt 2019-ben és a faj szokásosnál később repülhetett, de az októberi, egyéb élőhelyeken végzett megfigyelések sem utaltak jelentősebb populációra. A faj legtöbb alkalommal 2023-ban jelentkezett. Az egyébként igen gyakori *Agrotis exclamationis* 2020-ban jelentkezett legtöbbször (13 alkalommal), a következő évben pedig mindössze 3 alkalommal (1. táblázat). Ezt a kifejezett éves ingadozást fénycsapda vizsgálatokkal is kimutatták (Conrad et al. 2004). A közepes gyakoriságú fajok esetén is megfigyelhető hasonló éves fluktuáció (2. táblázat, 2. ábra). A szintén gyakori *Noctua fimbriata* és *Xestia c-nigrum* előfordulása is erősen ingadozott, de a két faj ingadozása nem volt szinkronban (2. ábra). A szintén gyakori *Epirrhoe al-*

ternata fluktuációja hasonló volt a *Xestia c-nigrum* esetén megfigyelthez. A szintén gyakori *Ligdia adustata* 2019-ben egyáltalán nem jelentkezett, a többi évben viszont nagyjából azonosan, fluktuáció nélkül. A lokálisan gyakori fajok közül a *Dioszeghyana schmidtii* mutatott erős éves fluktuációt: a leggyakrabban 2020-ban (2 alkalommal, 10 egyedszámmal), illetve 2023-ban (3 alkalommal 7 egyedszámmal) jelentkezett, míg 2019-ban és 2020-ban egyetlen alkalommal jelentkezett, 2021-ben pedig egyáltalán nem. A *Phalera bucephaloides* leggyakrabban és legnagyobb egyedszámban 2019-ben jelentkezett (3 alkalommal, 6 egyedszámmal), 2021-ben nem mutatkozott, a többi 3 évben 2-2 alkalommal. A *Marumba quercus* minden évben többször (4-5 alkalommal) jelentkezett 7-15 példányban, de 2021-ben egyetlen alkalommal sem. Egyik lokálisan jellemző faj sem mutatkozott 2021-ben, de ez magyarázható a megfelelő időpontokban végzett kevésszámú vizsgálattal is (áprilisban 1, júniusban 3 vizsgálat).

A kevésbé gyakori, illetve ritkán jelentkező fajok esetében (3., 4., 5. táblázat, 3. ábra), ez a fluktuáció – érthetően – kevésbé feltűnő. A 3. ábrán jól láthatók azok az évek, mikor bizonyos fajok egyáltalában nem jelentkeztek, a legtöbb ilyen ”negatív” adat 2021-ből és 2022-ből származik. A ritkán jelentkező fajok között 79 olyan faj is akadt, amely az öt éves periódus folyamán csupán egyetlen alkalommal volt megfigyelhető (5. táblázat). 33 faj korábban egy vagy több alkalommal az adott helyen előfordult, de így is volt 46 olyan faj, mely első és egyetlen alkalommal jelent meg ezen idő alatt.

A 4. ábra három vándorfaj (*Agrius convolvuli, Dysgonia algira, Helicoverpa armigera*) előfordulását mutatja – habár az utóbbi faj már nem csupán “vándorfaj”, hiszen hazánkban is szaporodik. Az *Agrius convolvuli* egyes években igen nagy számban észlelhető (ilyen év volt például 2011), míg másokban sokkal ritkábban. Ez a fluktuáció az ábrán is látható, a legtöbb észlelés 2023-ban történt.

Felmerült, hogy a megfigyelések gyakorisága mennyiben befolyásolja az eredményeket. Az 5. ábra mutatja az összefüggést a fajok, illetve megjelenések száma, valamint a megfigyelések (lámpázások) száma között. Nem folyamatos megfigyelés esetén érdemes a melegebb estékre összpontosítani a sokkal nagyobb faj- és egyedszám miatt (Jonason et al. 2014). Elég egyértelműnek tűnik, hogy a megfigyelések száma alapvetően befolyásolja mind a fajok, mind az egyedszámok alakulását. 2019-ben, illetve 2021-ben volt a legkevesebb megfigyelés, ennek megfelelően ebben a két évben volt a legkevesebb faj, illetve a legalacsonyabb az összes megjelenés száma. Az adatok szerint, elsősorban a gyakori (általánosan gyakori, illetve az adott élőhelyen gyakori) fajok esetén, a megjelenések száma és a populáció aktuális nagysága közötti kapcsolat valószínűsíthető. Mercx et al. (2014) szerint a gyakori vizsgálat adekvát adatokat szolgáltat a lokális fauna változásairól.

Az a tény, hogy az öt éves megfigyelés alatt 79 olyan faj jelentkezett (az összes megfigyelt faj 19%-a), mely csupán egy alkalommal repült a lámpára, arra utal, hogy még az ismételt lámpázások is csak egy részét képesek felmérni egy adott hely lepkefaunájának. Ennek magyarázata lehet, hogy a ritkán előforduló fajok egy része nem a fényforrás közelében él (akcidentális kóborló), míg mások kevésbé látogatják a fényforrásokat (Szabó et al. 2007; Mercx et al. 2014). Például az *Amata phegea* 2023-ban igen nagy tömegben repült a nappali órákban, de a fényre csak 3 alkalommal. Ezek a “ritkán” észlelt fajok elsősorban olyan biotópok esetén fordulnak elő, melyek erősen heterogének, így fennáll a lehetősége annak, hogy a fényforrástól távolabbi – más típusú – élőhelyekről is érkeznek vendégek, de ezek előfordulása esetleges. A csobánkai vizsgálati hely is ilyen, ezért a dominánsan erdei fajok mellett sziklagyepi, patakvölgyi élőhelyekről szórványosan érkeznek lepkék, mint pl. a *Charissa variegata*.

Végső következtetések:

1. Az általánosan vagy lokálisan gyakori fajok állománya megbecsülhető ugyanazon a helyen végzett ismételt lámpás vizsgálattal, ha folyamatos fénycsapda alkalmazása nem lehetséges. A legtöbb faj populációja éves vagy több éves csúccsal, illetve mélyponttal változik.
2. A vizsgálatok számának növelése nagyobb faj- és egyedszámot eredményezve javítja az eredmények megbízhatóságát.
3. Ismételt, több éves vizsgálatok is csak egy részét – habár nagyobb részét – mutatják ki az adott élőhelyen élő fajoknak.

1. táblázat. A leggyakoribb fajok (előfordulás ≥30/5 év), melyek évente többé-kevésbé egyenletes számban jelentek meg
Table 1. Most frequent species (occurrence: ≥30/5 years) with more or less stable occurrence

Faj	Összes[1]	Mini-mum[2]	Maxi-mum[3]	Leggyakoribb (év)
Acontia trabealis	61	8	16	2023
Agrotis exclamationis	48	3	13	2020
Amphipyra pyramidea	47	3	17	2022[4], 2023[4]
Autographa gamma	52	7	17	2023
Campaea margaritata	46	5	14	2020
Camptogramma bilineata	52	4	16	2020, 2023
Craniophora ligustri	52	6	17	2020[4], 2023[4]
Cryphia algae	38	5	10	2020, 2022
Cryphia fraudatricula	30	3	9	2020
Cyclophora ruficilaria	32	3	12	2020, 2022
Drymonia querna	37	5	11	2022
Dysgonia algira	36	5	9	2019
Helicoverpa armigera	56	5	13	2020
Hoplodrina octogenaria	31	4	9	2022
Idaea aversata	56	5	15	2022, 2023
Idaea degeneraria	49	3	18	2022
Laspeyria flexula	55	3	22	2023
Lithosia quadra	31	3	12	2019, 2020[4]
Lygephila craccae	30	4	9	2019, 2020
Mimas tiliae	34	5	9	2019
Noctua comes	45	4	20	2023
Noctua janthe/janthina	38	3	10	2020, 2022
Peribatodes rhomboidaria	79	10	21	2020, 2023
Tiliacea sulphurago	30	3	9	2022[4], 2023[4]
Tyta luctuosa	64	6	18	2023
Watsonalla binaria	57	5	19	2022[4]

1 Összes előfordulás 5 év alatt
2 Legalacsonyabb éves előfordulás
3 Legmagasabb éves előfordulás
4 Tömeges megjelenés

Noctua comes (Graphics by Imre Fazekas)

2. táblázat. Közepes gyakoriságú fajok (előfordulás: ≥20,<30/5 év), melyek évente többé-kevésbé egyenletes számban jelentek meg
Table 2. Moderately frequent species (occurrence: ≥20, <30/5 years) with more or less stable occurrence

Faj	Összes	Mini-mum	Maximum	Leggyakoribb (év)
Acronicta rumicis	28	5	7	2022
Agrochola litura	23	3	6	2020
Agrochola nitida	21	2	8	2023
Catocala nymphagoga	20	1	6	2023
*Conistra vaccinii**	20	1	10	2022
Dryobotodes eremita	24	1	10	2022, 2023
Eilema complana	25	2	10	2023
Eilema lurideola	20	2	6	2020, 2022
Eupithecia ericeata	21	2	6	2022
Eupithecia icterata	24	2	7	2021
Eupithecia inturbata	25	1	10	2021, 2022, 2023
Euxoa obelisca	23	1	8	2022
Hadula trifolii	27	3	8	2020, 2023
Meganola strigula	23	1	8	2022, 2023
Mythimna ferrago	23	3	7	2023
Paracolax tristalis	24	2	7	2020
Protodeltote pygarga	24	1	9	2020
Rhodostrophia vibicaria	26	3	8	2020, 2022
Spatalia argentina	26	2	7	2020, 2023
Tiliacea aurago	21	1	10	20222, 2023

Graphics by Imre Fazekas

Eupithecia icterata

Eupithecia inturbata

3. táblázat. Kisebb gyakoriságú fajok (előfordulás: ≥10,<20/5 év), melyek évente többé-kevésbé egyenletes számban jelentek meg
Table 3. Less frequent species (occurrence: ≥10,<20/5 years) with more or less stable occurrence

Faj	Összes	Mini-mum	Maximum	Leggyakoribb (év)
Ammoconia caecimacula	11	1	6	2022, 2023
Ascotis selenaria	19	1	8	2020
Atethmia centrago	10	1	3	2020, 2022
Calliteara pudibunda	16	1	5	2020
Colocasia coryli	19	2	5	2020
Cosmia trapezina	16	1	7	2022
Cyclophora annularia	14	1	7	2020
Ectropis crepuscularia	17	1	7	2023
Egira conspicillaris	11	1	5	2023
Elaphria venustula	12	2	3	2020, 2021
Ematurga atomaria	15	1	5	2020
Eugnorisma depuncta	19	2	6	2023
Eupithecia abbreviata	12	1	5	2023
Euplagia quadripunctaria	11	1	4	2023
Harpyia milhauseri	12	0	5	2019
Heliomata glarearia	17	2	5	2022
Herminia tarsicrinalis	18	2	7	2022
Herminia tarsipennalis	10	1	4	2020
Horisme tersata	18	2	6	2022
Hyloicus pinastri	14	1	4	2020, 2023
Lymantria dispar	16	1	5	2019, 2023
Macaria notata	13	1	4	2019
Oligia strigilis	18	1	7	2022
Peridea anceps	14	2	4	2023
Pseudoips prasinana	17	1	7	2022
Rivula sericealis	17	1	5	2019
Scopula marginepunctata	15	1	6	2023
Thalpophila matura	12	1	4	2020
Xestia xanthographa	16	1	6	2023

4.1. táblázat. Ritkábban – de több, mint egy alkalommal – jelentkező fajok (előfordulás: >1,<10/5 év)
Table 4.1. Rarely (but more than once) occurring species (occurrence: >1, <10/5 years)

Faj	Összes	Minimum	Maximum	Leggyakoribb (év)
Abrostola asclepiadis	4	0	4	2020
Abrostola tripartita	6	0	3	2021
Abrostola triplasia	3	0	2	2019
Acronicta aceris	2	0	1	
Acronicta psi	7	0	2	2019
Actinotia polyodon	8	0	3	2019
Aedia leucomelas	4	0	3	2020
Agrochola circellaris	8	0	2	2022
Agrochola helvola	2	0	1	
Agrochola lychnidis	7	0	6	2022
Agrotis cinerea	4	0	3	2023
Amata phegea	6	0	3	2023
Amphipyra berbera	6	0	4	2022
Amphipyra livida	2	0	1	
Angerona prunaria	4	0	2	2020
Antonechloris smaragdaria	2	0	1	
Apamea illyria	2	0	2	2020
Aporophyla lutulenta	3	0	3	2023
Arctia villica	3	0	1	
Arctornis l-nigrum	5	0	2	2022, 2023
Artiora evonymaria	8	0	3	2023
Atethmia ambusta	2	0	2	2023
Auchmis detersa	7	0	4	2020
Bena bicolorana	8	0	6	2020
*Biston betularia**	2	0	2	
Calophasia lunula	4	0	2	2020
Caradrina aspersa	2	0	2	2023
Caradrina clavipalpis	5	0	3	2020
Caradrina kadenii	9	0	4	2023
Catarhoe cuculata	2	0	1	
Catephya alchymista	2	0	2	2020
Catocala elocata	5	0	3	2023
Catocala fulminea	9	0	3	2023
Catocala nupta	8	0	3	2020
Catocala promissa	8	0	3	2022
Catocala sponsa	4	0	2	2022
Charissa obscurata	4	0	2	2022
Charissa variegata	3	0	2	2019
Chlorissa viridata	5	0	3	2019
Chloroclysta siterata	6	0	5	2022
Cleora cinctaria	7	0	3	2019
Cloantha hyperici	3	0	2	2019
Colostygia pectinaria	4	0	4	2020

4.2. táblázat. Ritkábban – de több, mint egy alkalommal – jelentkező fajok (előfordulás: >1,<10/5 év)
Table 4.2. Rarely (but more than once) occurring species (occurrence: >1, <10/5 years)

Faj	Összes	Minimum	Maximum	Leggyakoribb (év)
Cloantha hyperici	3	0	2	2019
Colostygia pectinaria	4	0	4	2020
Comibaena bajularia	4	0	2	2019
*Conistra ligula**	4	0	4	
*Conistra rubiginosa**	2	0	2	
Cosmia affinis	2	0	1	
Cosmia diffinis	2	0	1	
Cosmia pyralina	2	0	1	
Cosmorhoe ocellata	8	0	4	2020
Crocallis elingaria	6	0	3	2022
Cryphia raptricula	7	0	3	2023
Cucullia xeranthemi	2	0	1	
Cyclophora punctaria	6	0	4	2020
Cyclophora puppillaria	4	3		2023
Deilephila elpenor	4	0	3	2019
Diachrysia chrysitis	6	0	3	2021
Diachrysia stenochrysis	4	0	2	2020
Diacrisia sannio	2	0	2	2020
Diachygyris nigrescens	2	0	2	2022
Dichonia comvergens	5	0	2	2022
Dicranura ulmi	5	0	2	2020
*Diloba caerulocephala**	9	1	3	
Dioszeghyana schmidtii	7	0	3	2020
Drymonia dodonaea	8	0	5	2023
Drymonia ruficornis	5	0	3	2020
Drymonia velitaris	2	0	1	
Dryobotodes monochroma	4	0	2	2022
Dypterygia scabriuscula	5	0	3	2022
Dysauxes ancilla	6	0	2	2019
Eilema depressa	2	0	1	
Eilema griseola	3	0	3	2019
Eilema lutarella	2	0	1	
Eilema palliatella	6	0	3	2023
Eilema pseudocomplana	2	0	1	
Eilema pygmeola	3	0	2	2019
Ennomos autumnaria	7	0	3	2021
Ennomos quercinaria	2	0	2	2022
Epilecta linogrisea	7	0	5	2023
Epirrhoe galiata	8	0	4	2023
Episema tersa	4	0	2	2019
Eublemma purpurina	2	0	1	
Eulithis mellinata	3	0	2	2020
Eulithis pyraliata	4	0	2	2020

4.3. táblazat. Ritkábban – de több, mint egy alkalommal – jelentkező fajok (előfordulás: >1,<10/5 év)
Table 4.3. Rarely (but more than once) occurring species (occurrence: >1, <10/5 years)

Faj	Összes	Minimum	Maximum	Leggyakoribb (év)
Eupithecia absinthiata	2	0	2	2023
Eupithecia dodoneata	3	0	3	2020
Eupithecia virgaureata	2	0	1	2023
Eupithecia tripunctaria	2	0	1	
*Eupsilia transversa**	8	1	3	
Eutelia adulatrix	7	0	3	2023
Euxoa temera	2	0	2	2023
Furcula furcula	2	0	1	
Gortyna flavago	2	0	1	
*Griposia aprilina**	8	0	5	
Hada plebeja	2	0	1	
Heliothis viriplaca	2	0	1	
Herminia grisealis	5	0	2	2020
Hoplodrina ambigua	6	0	4	2022
Hoplodrina respersa	5	0	3	2022
Hoplodrina superstes	7	0	3	2020
Horisme corticata	5	0	2	2020
Horisme radicaria	7	0	4	2023
Hylaea fasciaria	2	0	1	
Hyles euphorbiae	5	0	2	2021
Hypena proboscidalis	8	0	3	2021
Hypomecis roboraria	6	0	4	2020
Idaea deversaria	5	0	3	2020
Idaea dimidiata	5	0	5	2022
Idaea moniliata	2	0	1	
Idaea muricata	2	0	2	2022
Idaea pallidata	2	0	2	2020
Idaea politaria	3	0	3	2020
Idaea rufaria	7	0	3	2020
Idaea seriata	6	0	2	2020
Idaea straminata	5	0	2	2022
Idia calvaria	9	1	4	2021
Lacanobia aliena	3	0	3	2022
Lacanobia oleracea	3	0	3	2020
Lacanobia w-latinum	7	0	2	2020
Lamprosticta culta	5	0	3	2022
Laothoe populi	3	0	2	2023
Lomaspilis marginata	3	0	1	
Lomographa bimaculata	3	0	1	
Lomograhga temerata	2	0	1	
Luperina testacea	3	0	2	2023
Lymantria monacha	2	0	1	
Macaria liturata	4	0	2	2020

4.4. táblázat. Ritkábban – de több, mint egy alkalommal – jelentkező fajok (előfordulás: >1,<10/5 év)
Table 4.4. Rarely (but more than once) occurring species (occurrence: >1, <10/5 years)

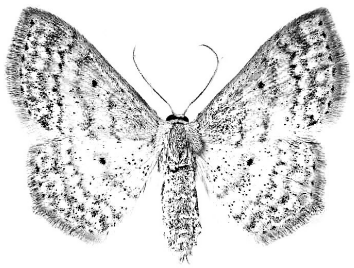
Faj	Összes	Minimum	Maximum	Leggyakoribb (év)
Mamestra brassicae	2	0	1	
Meganola albula	5	0	3	2020
Mesapamea secalis/ella	9	1	3	2022
Mesoligia furuncula	7	0	4	2023
Miltochrista miniata	3	0	1	
Minucia lunaris	2	0	2	2020
Mniotype satura	5	0	3	2019
Moma alpium	2	0	1	
Mythimna l-album	9	0	4	2021
Mythimna pudorina	2	0	2	2022
Mythimna vitellina	3	0	2	2023
Noctua interposita	6	0	6	2022
Noctua orbona	7	0	3	2023
Nola aerugula	8	0	5	2020
Nola cicatricalis	2	0	1	
Nola confusalis	4	0	3	2023
Notodonta dromedarius	2	0	2	2023
Notodonta tritophus	2	0	2	2019
Notodonta ziczac	3	0	2	2019
Nycteola asiatica	8	0	4	2020
Ochropleura plecta	4	0	2	2019
Odonestis pruni	4	0	2	2022
Oligia latruncula	5	0	4	2023
Opistograptis luteolata	5	0	2	2020
*Orthosia cerasi**	3	0	2	
*Orthosia cruda**	3	0	2	
*Orthosia gothica**	3	0	2	
Ourapteryx sambucaria	2	0	1	
*Panolis flammea**	2	0	2	
Pasiphila chloerata	4	0	3	2020
Pechipogo plumigeralis	3	0	3	2023
Pechipogo strigilata	5	0	2	2020
Phaiogramma etruscaria	2	0	2	2023
Phalera bucephala	3	0	2	2021
Philerema transversata	4	0	3	2023
Phlogophora meticulosa	6	0	3	2023
Phragmatobia fuliginosa	8	0	4	2020
Phyllodesma tremulifolia	7	0	4	2022
Plagodis dolabraria	7	0	3	2020
Plagodis pulveraria	2	0	1	
Polymixis polymita	5	0	2	2020
Polyphaenis sericata	9	0	4	2023
*Polyploca ridens**	2	0	1	

4.5. táblázat. Ritkábban – de több, mint egy alkalommal – jelentkező fajok (előfordulás: >1,<10/5 év)
Table 4.5. Rarely (but more than once) occurring species (occurrence: >1, <10/5 years)

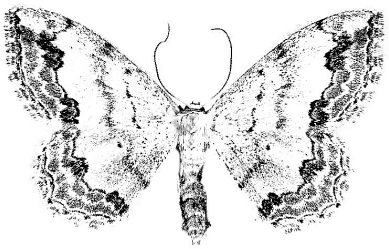
Faj	Összes	Minimum	Maximum	Leggyakoribb (év)
Prodotis stolida	3	0	2	2022
Ptilodon cucullina	5	0	2	2021
Rileyiana fovea	3	0	1	
Saturnia pyri	5	0	3	2023
Scopula corrivalaria	2	0	2	2022
Scopula floslactata	7	0	6	2020
Scopula immorata	6	0	3	2020
Scopula immutata	2	0	1	
Scopula ornata	2	0	1	
Scopula rubiginata	6	0	3	2021
Scopula virgulata	5	0	3	2020
Scotochrosta pulla	5	0	2	2022
Scotopteryx chenopodiata	2	0	1	
Selidosema plumaria	3	0	2	2022
Sideridis rivularis	6	0	3	2020
Siona lineata	3	0	1	
Sphinx ligustri	3	0	1	
Stegania cararia	2	0	1	
Tephrina arenacearia	7	0	2	2019
Thaumatopoea processionea	3	0	2	2019
Thetidia smaragdaria	2	0	1	
Tholera decimalis	5	0	2	2020
Thyatira batis	8	0	4	2020
Trachea atriplicis	5	0	4	2019
Trichiura crataegi	2	0	2	2021
Trisateles emortualis	4	0	4	2020
*Valeria oleagina**	2	0	1	
Xanthia icteritia	2	0	2	2021
Xanthorhoe fluctuata	6	0	2	2020
Xestia baja	2	0	2	2022
Xestia stigmatica	6	0	2	2022
Xestia triangulum	2	0	2	2020
Zanclognatha lunalis	2	0	1	

* késő őszi, kora tavaszi/áttelelő fajok, melyek esetén az adatok nem megbízhatók

Graphics by Imre Fazekas



Scopula corrivalria



Scopula ornata

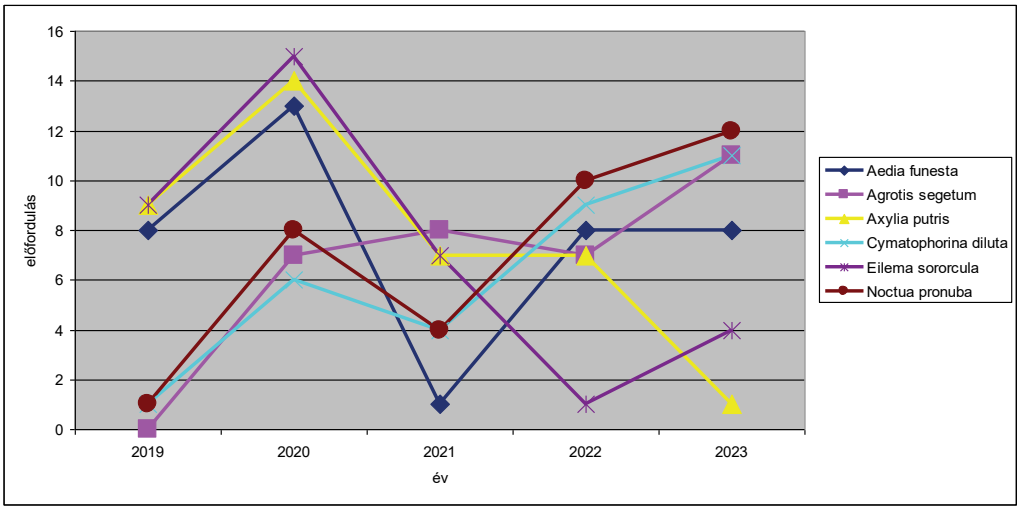
5.1. táblázat. Egy alkalommal egy példányban észlelt fajok
Table 5.1. Species observed only once as a single specimen

Faj	**Észlelés éve**	**Korábbi csobánkai észlelések**
Acontia lucida	2020	
Acronicta auricoma	2020	Egy észlelés: 2011
Acronicta euphorbiae	2020	Egy észlelés: 2016
*Agriopis bajaria**	2020	2005 és 2015 között gyakori
Agrotis ipsilon	2019	
Anticlea derivata	2021	2 észlelés 2013-ban
Apamea sordens	2022	
Apeira syringaria	2022	2 észlelés: 2014, 2016
Aplocera efformata	2023	
*Asphalia ruficollis**	2023	2005 és 2015 között gyakori
Aspitates gilvaria	2019	
Asthena albulata	2020	
Athetis gluteosa	2023	
Cataclysme riguata	2020	2 észlelés: 2015, 2018
Cilix glaucata	2019	Egy észlelés: 2016
Clostera curtula	2022	
Colostygia olivata	2021	Egy észlelés: 2018
*Conistra veronicae**	2023	Egy észlelés: 2014
Cucullia umbratica	2023	5 észlelés 2005 és 2018 között
Cyclophora porata	2020	Egy észlelés 2011-ben
Dychagyris signifera	2021	
Ennomos fuscantaria	2023	
Epirrhoe pupillata	2022	
*Epirrita dilutata**	2022	2004 és 2016 között gyakori
Eriogaster catax	2023	Egy észlelés 2014-ben
Eucarta amethystina	2022	
Euclidia glyphica	2019	
Eupithecia abietaria	2023	
Eupithecia centaureata	2022	Egy észlelés: 2005
Eupithecia indigata	2021	
Eupithecia venosata	2022	
Euproctis chrysorrhoea	2022	Egy észlelés: 2015
Euxoa tritici	2022	
Gluphisia crenata	2020	Egy észlelés: 2014
Gnophos furvata	2022	
Habrosyne pyritoides	2020	5 észlelés 2005 és 2015 között
Hadena confusa	2023	2 észlelés: 2007, 2017
Heliothis adaucta	2022	3 észlelés: 2014, 2015, 2017
Horisme vitalbata	2022	
Hydria cervinalis	2023	9 észlelés 2006 és 2018 között
Idaea dilutaria	2020	2 észlelés: 2007, 2014
Idaea humiliata	2020	
Idaea ochrata	2020	Egyszer észlelve 2013-ban

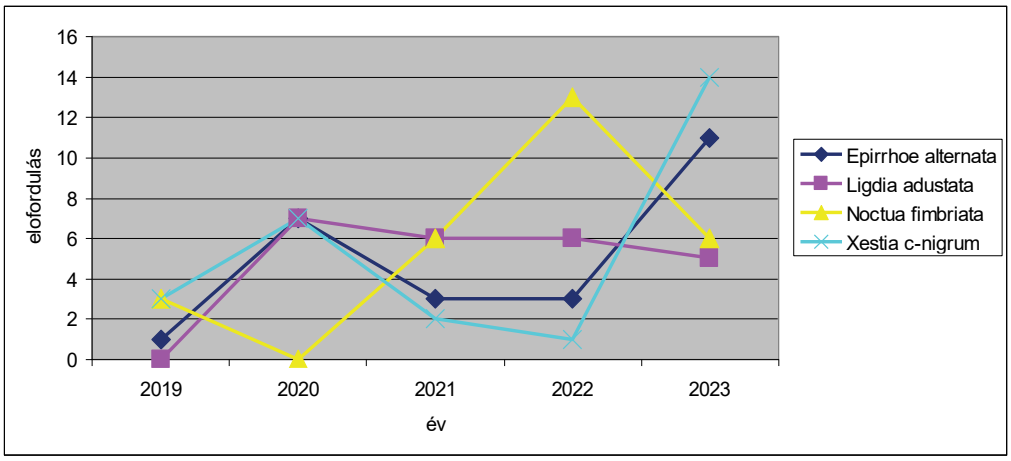
5.2. táblázat. Egy alkalommal egy példányban észlelt fajok
Table 5.2. Species observed only once as a single specimen

Faj	Észlelés éve	Korábbi csobánkai észlelések
Idaea subsericeata	2022	
Lacanobia thalassina	2019	Egy észlelés: 2011
*Lycia hirtaria**	2023	2007 és 2015 között gyakori
Lygephila pastinum	2020	
Malacosoma neustria	2022	Egy észlelés 2018-ban
Melanchra persicariae	2020	Egy észlelés: 2005
*Meganephria bimaculosa**	2023	Egy észlelés 2018-ban
Mesogona acetosellae	2021	3 észlelés: 2004, 2005, 2013
Mesoleuca albicillata	2022	
Metachrostis dardouini	2022	
Mythimna straminea	2020	
Mythimna turca	2023	
Noctua interjecta	2021	
Omphalophana antirrhinii	2020	
Pabulatrix pabulatricula	2023	
Paradarisa consonaria	2019	
Parascotia fuliginaria	2019	
Pelosia muscerda	2020	
Perizoma lugdunaria	2020	
Pheosia tremula	2019	
Ptilodon capucina	2019	
Rhizedra lutosa	2020	
Sabra harpagula	2020	
Scopula incanata	2020	
Scopula nigropunctata	2023	2011 és 2019 között gyakori
Sideridis lampra	2019	
Simyra nervosa	2020	
Spilosoma lubricipeda	2022	4 észlelés: 2011, 2015, 2018
Spilosoma lutea	2023	
Stegania dilectaria	2022	
Tethea ocularis	2019	
Tethea or	2020	
Thera juniperata	2020	
Watsonalla cultraria	2020	
Watsonartia deserta	2019	3 észlelés: 2008, 2014, 2015
Xanthia togata	2020	2 észlelés: 2010, 2013

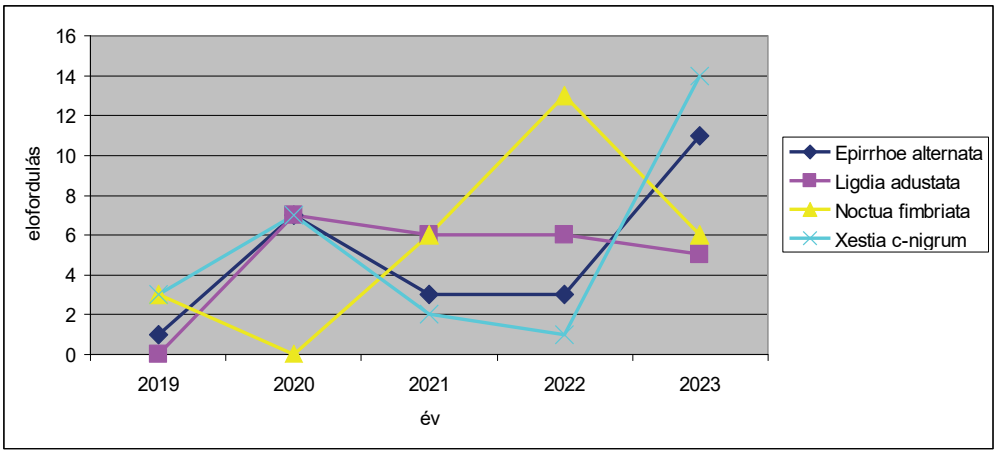
* késő őszi, kora tavaszi/áttelelő fajok, az adat nem megbízható



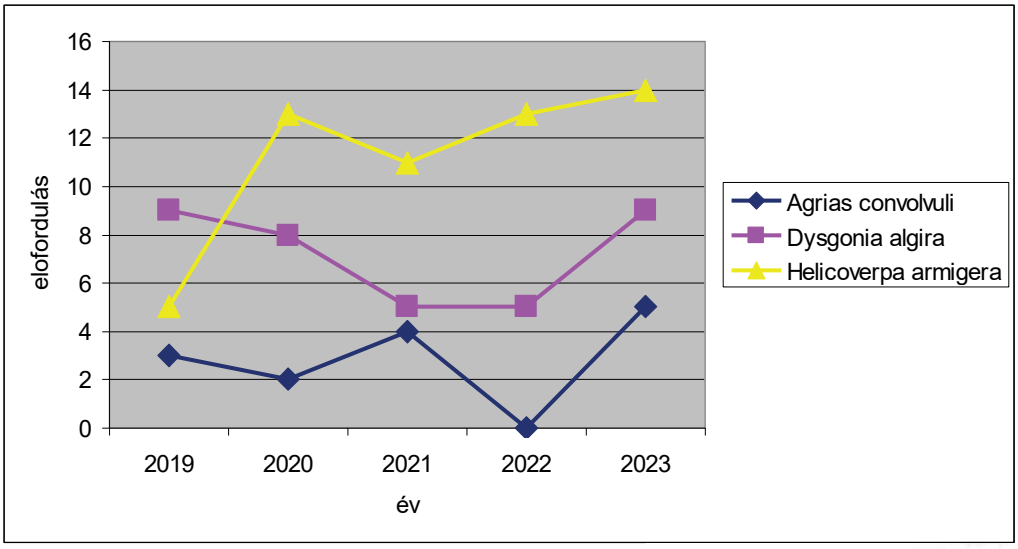
1. ábra. A leggyakoribb fajok (előfordulás: ≥30/5 év), melyek évente erősen változó számban jelentek meg (a minimális szám a maximum kevesebb, mint 10%-a)
Figure 1. Most frequent species (occurrence ≥30/5 years) with strongly fluctuating numbers (minimum <10% of maximum)



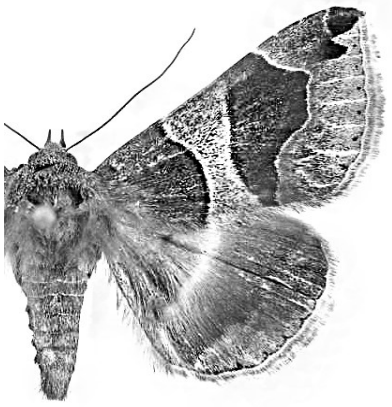
2. ábra. Közepes gyakoriságú fajok (előfordulás: ≥20, <30/ 5 év), melyek évente erősen változó számban jelentek meg (a minimális szám a maximum kevesebb, mint 10%-a)
Figure 2. Moderately frequent species (occurrence ≥20, <30/5 years) with strongly fluctuating numbers (minimum <10% of maximum)



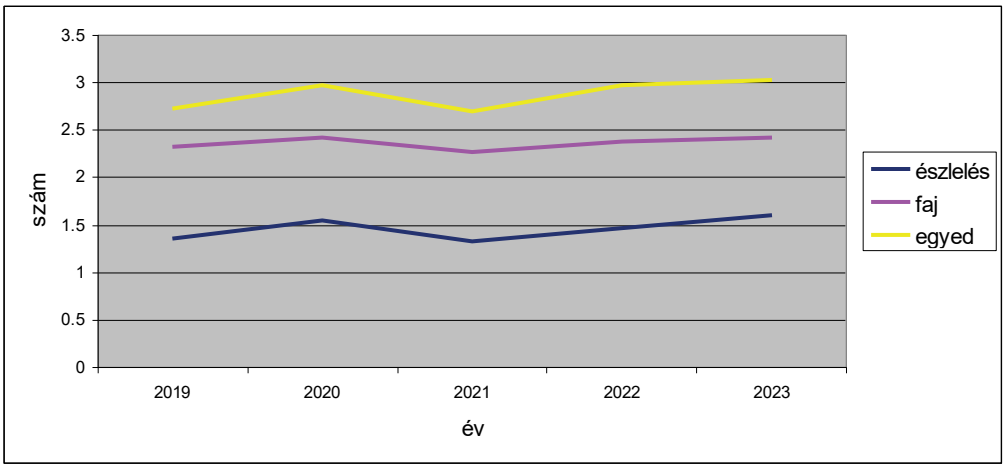
3. ábra. Kisebb gyakoriságú fajok (előfordulás: ≥10, <20/5 év), melyek évente erősen változó számban jelentek meg (minimum legalább egy alkalommmal 0)
Figure 3. Less frequent species (occurrence ≥10,<20/5 years) with strongly fluctuating numbers (minimum <10% of maximum)



4. ábra. Vándorfajok előfordulása
Figure 4. Occurrence of migratory species



Dysgonia algira (Graphics by Imre Fazekas)



5. ábra. A megfigyelések, fajok és egyedek száma az évek függvényében (logaritmikusan transzformált adatok)
Figure 5. Relationship between number of observations, species and abundance according to years (numbers are log transformed)

6. ábra. A vizsgálati hely (Csobánka) földrajzi elhelyezkedése Magyarországon (fekete kör). A szerző családi házának fehér fala, melyet a lámpákkal megvilágított (alsó kép).
Figure 6. Location of the study site (Csobánka) in Hungary (black circle). The white wall of the author's family house that was illuminated by the lamps (bottom).

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New observations on *Aristotelia calastomella* (Christoph, 1872) in Hungary and further additions to the bionomics and geographical distribution of the species (Lepidoptera, Gelechiidae)

Imre Fazekas

Abstract. New locality of *Aristotelia calastomella* (Christoph, 1872) from Hungary. Summary description of the geographical distribution and bionomics of the species from the Western Palaearctic.

Keywords. New occurrence, habitat description, phylogeographical note.

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Résumé. Dans cet article, je résume les connaissances que j'ai rassemblées sur l'espèce. En particulier, je considère qu'il est important de présenter les habitats fragmentés en Hongrie, car ces isolats se trouvent à la limite occidentale de l'aire de répartition géographique *d'A. calastomella* et ont une importance historique sur le plan de la faune. Je présente une carte préliminaire des sites de toutes les espèces d'*Aristotelia* en Hongrie. Il s'agit de la première tentative en Hongrie d'examiner ensemble les schémas de répartition géographique des espèces.

Zusammenfassung. In dieser Abhandlung fasse ich das Wissen zusammen, das ich über die Art gesammelt habe. Insbesondere halte ich es für wichtig, die fragmentierten Lebensräume in Ungarn vorzustellen, da diese Isolate am westlichen Rand des geografischen Verbreitungsgebiets von *A. calastomella* liegen und von faunistischer historischer Bedeutung sind. Ich präsentiere eine vorläufige Standortkarte aller *Aristotelia*-Arten in Ungarn. Dies ist der erste Versuch, die geografischen Verbreitungsmuster der Arten in Ungarn zusammenzufassen.

Introduction

So far, 6 species of the genus *Aristotelia* Hübner, 1825 have been identified in Hungary: *A. decurtella* (Hübner, [1813]), *A. decoratella* (Staudinger, 1879), *A. ericinella* (Zeller, 1839), *A. subdecurtella* (Stainton, 1859), *A. subericinella* (Duponchel, 1843), A. *calastomella* (Christoph, 1872). Most of the species have been observed in many areas of the country. The *A. ericinella* species was collected only in the Bakony mountains [Salföld, Uzsa] (see Gozmány 1958, Szabóky 1982). The most interesting is the occurrence of *A. calastomella* in Hungary. In Central Europe, it was first discovered in Eastern Hungary, near the Romanian border (Bélmegyer) in 1995. Since then, no new Hungarian locality has been discovered until 2021. In that year, moth collector Szilvia Gulyás caught an unknown moth in Egerfarmos. She sent me this specimen for identification. After examining the genitalia, I determined that it was a female *A. calastomella*. This was the second locality discovered in Hungary. The settlement of Egerfarmos is 130 km northwest of the first Hungarian site (Bélmegyer).

In this paper, I summarise the knowledge I have gathered about the species. I consider it important to present the fragmented habitats in Hungary, as these isolates are on the western edge of the geographical range of *A. calastomella* and have faunistic historical significance. I present a preliminary site map of all the *Aristotelia* species in Hungary. This is the first attempt in Hungary to see together the geographical distribution patterns of the species.

Material and methods

Recognisable, undamaged specimens were identified by stereomicroscopy. I also examined the genitalia of all problematic specimens. Genitalia dissections were made following Robinson (1976). Some of the genitalia were mounted in Euparal on slides; others were preserved in mi-

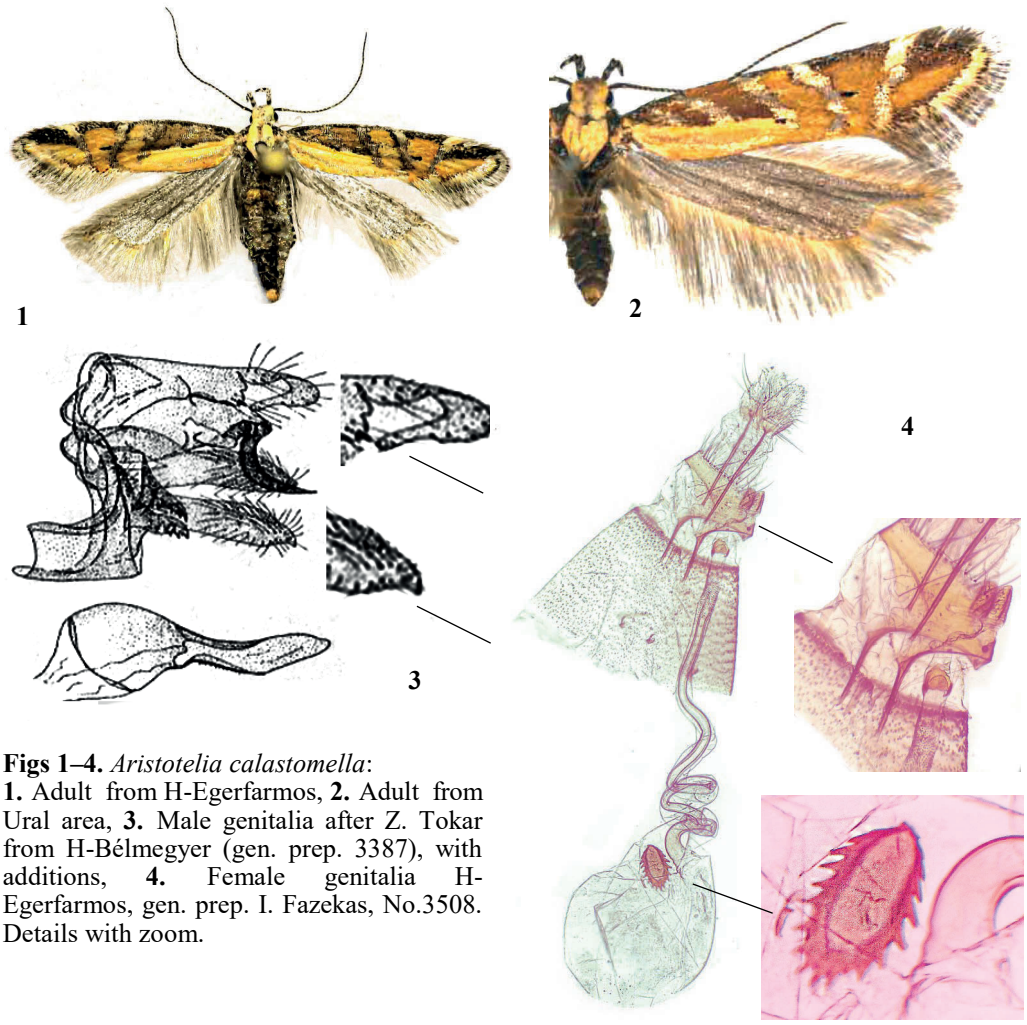
crovials filled with glycerol. Analysis of genitalia of worn, damaged specimens of *Aristotelia* was performed using the simple and rapid method by Fazekas (2020, 2021: p. 87, Fig 1.), and Wanke & Rajaei (2018). The data of the Hungarian distribution maps are stored in a computer database, partly in Word and Excel formats. I have drawn only the sites of clearly identified specimens on the maps.

Results

Aristotelia calastomella (Christoph, 1872) (Fig. 1–2)
Ergatis calastomella Christoph, 1872; Horae Soc. ent. Ross. 9: 24, pl. 2a, f. 21. Locus typicus: Uralsk.

New data: ♀, Egerfarmos, 08.14.2021, leg. et coll. Szilvia Gulyás; det. et gen. prep. Imre Fazekas, No. 3508. One female genitalia preparation was preserved in glycerol. Cattle and sheep graze in the meadow and the meadow is also mown.

Distribution in Hungary. The first specimens (42 specimens) were collected in Hungary east of the Tisza River, near the Hungarian-Romanian border in 1995 (see Szabóky 1998): Hungary, Bélmegyer, Fáspuszta, Szolga-erdő, 3–14.08.1995, leg. et coll. Szabóky Cs. (Budapest), gen. prep. No. 3222, 3387, Tokár Z., det. Karsholt O.



Figs 1–4. *Aristotelia calastomella*:
1. Adult from H-Egerfarmos, **2.** Adult from Ural area, **3.** Male genitalia after Z. Tokar from H-Bélmegyer (gen. prep. 3387), with additions, **4.** Female genitalia H-Egerfarmos, gen. prep. I. Fazekas, No.3508. Details with zoom.

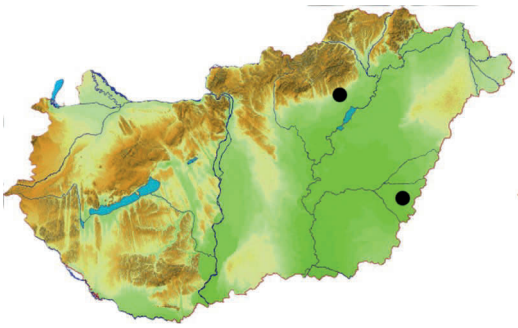


Fig. 5. Localities of *Aristotelia calastomella* in Hungary

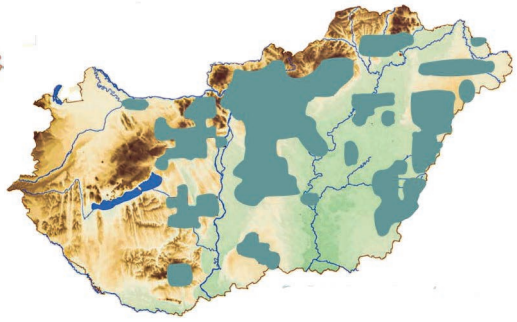


Fig. 6. Euro Siberian steppe forests with *Quercus* spp. in Hungary (schematic map)

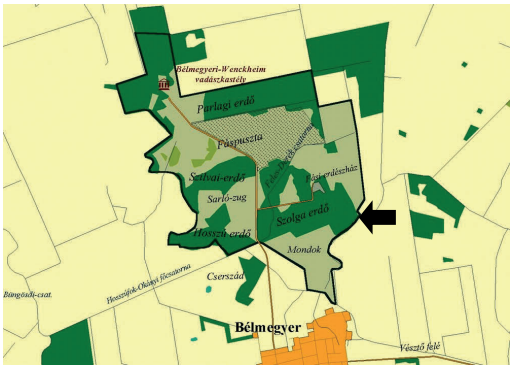


Fig.7. The first collection site of *A. calastomella* in Hungary (black arrow): Bélmegyer, a near the Romanian border (see Figure 5)

Fig. 8. The second collection site of *A. calastomella* in Hungary: habitat photo at Egerfarmos (© Sz. Gulyás)

The moths flew from midnight to dawn to a 125-watt mercury vapour lamp in a forest clearing. The site is one of the last remaining intact "closed lowland steppe oak forests" in Hungary. This habitat is of outstanding value because it was once a typical forest community of the Great Hungarian Plain. The distribution pattern of this relict community (Natura 2000: 91I0 Euro Siberian steppe forests with *Quercus* spp.) is presented and described Bölöni et al. (2011).

Bionomics. The adults have so far been collected in June, July, and August. The exact flight data are not yet known. No exact data on larvae and food plants are available. Mainly based on the collection sites in Russia, it is a salt-steppe species. However, this standpoint is much more nuanced by the knowledge of the Hungarian localities.

General description of the new site and its surroundings

Hevesi Grasslands Landscape Protection Area (= Hevesi Füves Puszták Tájvédelmi Körzet (Natura 2000: HUBN10004)

The protected area is dominated by mosaic rocky vegetation communities. Loess grasslands have been exploited here since the Neolithic. These areas are characterised by sessile grassland, loess grassland, and herbaceous sessile grassland. Most of these flats are bare bogs or contain a few small groups of trees, mainly *Pseudoacacia*, but there are also occasional patches of sand oak communities in the large lowland wooded heaths that once formed the landscape. Here and there, small streams or watercourses cross the dry habitats of the salt marshes, but due to poor drainage of the streams, they are transformed into small or large marshy, brackish habitats, sometimes with salt marshy, cattail willow or poplar groves along their banks.

The area falls within the warm, moderately hot, dry climate zone. It is among the driest landscapes in Hungary. The annual precipitation in the area is between 450 and 550 mm, with a

high degree of precipitation uncertainty. The wettest month is June. The average rainfall is 55–70 mm. The average temperature fluctuation in the area is high. The mean annual temperature is 10.0–10.2 °C. Winters are relatively harsh, with mean temperatures in January ranging from -2 to -3 °C. The average number of snow days per year is around 35, with an average snow depth of 16–18 mm. Despite the relatively cold winter, the thaw starts early, with daily mean temperatures reaching 10 °C between 10 and 15 April and remaining below this level until around 20 October. Summer is hot. The average temperature in July is around 21–21.5°C. The number of summer days is 75–85, and the number of heat days is 20–25. The annual daylight hours are between 1930 and 2000. The frequent fog in winter is not conducive to sunshine, but in the summer half-year, the area falls within the zone of optimum sunshine. So far, nearly 400 Lepidoptera species are known from the region. Of these, 3 species are specially protected, 30 species are protected, and 23 species are of faunistic interest. Among the protected species, the Hungarian spring spotted moth (*Dioszeghyana schmidtii*), which lives on the chert oak, is known from a few large forest patches. The great rock moth (*Gortyna borelii lunata*), which lives in the chicory, has been found in several grassland fragments, while the steppe moth (*Paracossulus thrips*), which inhabits roots of *Phlomis tuberosa*, has been found in only one loess grassland.

Geographical distribution

Extremely local, little-known species; in Central Europe only reported from Hungary. Also known from southern Russia, the Crimean Peninsula and Cyprus.

According to Junnilainen et al. (2010), "The species was described from the vicinity of Volgograd (Sarepta), Russia. Anikin et al. (1999) mention that they have seen only a single old

Fig. 9. Preliminary geographical distribution map of *Aristotelia calastomella* based on observations. Distances between fragmented populations are marked in km. Details are given in the text.

specimen originating from the region collected by Christoph and suppose that the species has vanished from its type locality. Thus, our records might represent the first record from Russia since the original description in the 19th century. The habitat is a meadow with plenty of *Glycyrrhiza glabra* L. and *Limonium gmelini* (Willd.)." Burannoe: Orenburg oblast, 50°58'N 54°25'E, 100 m, near Burannoe village, Ilek river valley. Lowland *Artemisia* steppes, moist meadows, and wetlands.

The details of Junnilainen and his colleagues are further amended by the new Russian catalogue. Distribution data for Russia in more detail (Sinev et al. 2019): Mid-Volga region: Nizhny Novgorod, Penza, Ulyanovsk and Samara regions, Republics of Tatarstan, Mari El, Chuvashia, Mordovia. Volga-Don region: Saratov, Volgograd, and Rostov Oblasts. Crimean region: the Crimean Peninsula. South Urals region: Republic of Bashkortostan, Orenburg, Chelyabinsk, and Kurgan oblasts.

From a zoogeographical point of view, the occurrence of the species in Cyprus (in the Larnaca area) deserves special attention. Arenberger (1994, p. 281) wrote very briefly about the species: "127. *Aristotelia calastomella* Christoph, 1872 | Ar: Larnaca, 3.-7.8.81. Verbreitung: Russland." The analysis fauna of Cyprus does not contain any notes on the species *A. calastomella*. At the time of the publication of this study, only the Russian sites were known. Either the author did not realise the importance of the Cyprus occurrence for the zoogeography of the study, or he forgot about it while writing the study.

Historically, the species was first discovered in Central Europe (Hungary: Bélmegyer) only in 1995. This was a very important faunistic record, as the species is extremely rare and local in the Palearctic.

If we look at the natural vegetation of Eurasia, we can see that the habitats of the species are in the so-called temperate grasslands. The island of Cyprus does not fit in this distribution pattern. The island is an area of Mediterranean forests and shrublands, at a considerable geographical distance from the disjunct areas in Hungary and Russia.

Phylogeographical notes

Aristotelia calastomella is a highly fragmented species. The current distribution of European *Aristotelia* species in the last ice age may have played the most important role in shaping the pattern of the last ice age. It is a well-known phenomenon that during the ice ages individual species or species groups are relegated to a refuge. During the coldest period of the last ice age (18,000–10,000 years ago), three major refuges (Balkans, Apennine- and Iberian Peninsula) in southern Europe are thought to have been where organisms may have retreated. The phylogeography of several disciplines (molecular biology, genetics, and ecology) aims to understand the spatial and temporal structure of populations and temporal changes in the structure of moths, using molecular biological methods, and historical events that may play a role in the evolution of lineages currently occurring in the geographical distribution of lineages. Phylogeographic methods have rarely been used in moth research. This would be much needed in the future. Perhaps an explanation could be found for the extremely interesting geographical distribution of species such as *Aristotelia calastomella*. The prediction of the area should be investigated using geo-referenced bioclimatic variables in the currently known dispersal area.

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Adatok a Sötétvölgy Természetvédelmi Terület és közvetlen környezetének Macrolepidoptera faunájához (Lepidoptera)

Contribution to the Macrolepidoptera Fauna (Lepidoptera) of Sötétvölgy Nature Reserve and its surroundings (South Hungary, Tolna County)

Kalotás Zsolt

Abstract. The author has been conducting faunistic surveys of Macrolepidoptera in the Sötétvölgy Nature Reserve and its immediate surroundings for 18 years. Surveys were carried out by daytime field visits, night-time lamping, baiting and using sex pheromones. During the survey, 556 species were detected in the area, of which 42 species are legally protected in Hungary. The survey also detected several butterfly species that were not previously known from the Szekszárd Hills.

Keywords. Hungary, Sötétvölgy Nature Reserve, faunistic, protected species

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Summary. The author collected data on the Macrolepidoptera fauna of the Szekszárd Hills Special Conservation Area Natura 2000, the Sötétvölgy Nature Reserve and its immediate surroundings, using daytime field surveys from 2005, and 78-night lamp surveys from 2017 to 2023, using red wine bait and sex pheromone. During the 18-year study period, 556 species of Macrolepidoptera were recorded, 42 of which are protected in Hungary. The surveys also confirmed the presence of several species not previously known from the Szekszárd Hills (*Boudinotiana notha, Lycia pomonaria*, *Arytrura musculus, Drymonia velitaris, Acontia candefacta, Diachrysia chryson, Orbona fragariae, Rileyiana fovea, Leucania (Acantholeucania) loreyi, Limenitis reducta, etc.*). The data of the survey indicate that, due to the warming of the climate, several species of southern-distributing moths have become a permanent part of the Hungarian fauna in recent years and have also appeared in the Szekszárd Hills, which were previously unknown in the Carpathian Basin (*Aedia leucomelas*, *Athetis hospes*, *Mythimna congrua).* Based on the results confirming the existence of a rich butterfly fauna, the paper makes recommendations for the future continuation of sustainable, nature-friendly forest management.

Zusammenfassung. Der Autor sammelte Daten über die Makrolepidoptera-Fauna des besonderen Schutzgebiets Natura 2000 Szekszárd-Gebirge, des Naturschutzgebiets Sötétvölgy und seiner unmittelbaren Umgebung, indem er seit 2005 tagsüber Felduntersuchungen und von 2017 bis 2023 78 nächtliche Untersuchungen mit Rotweinködern und Sexualpheromonen durchführte. Während des 18-jährigen Untersuchungszeitraums wurden 556 Arten von Makrolepidopteren erfasst, von denen 42 in Ungarn geschützt sind. Die Erhebungen bestätigten auch das Vorkommen mehrerer Arten, die bisher nicht aus dem Szekszárd-Gebirge bekannt waren (*Boudinotiana notha, Lycia pomonaria, Arytrura musculus, Drymonia velitaris, Acontia candefacta, Diachrysia chryson, Orbona fragariae, Rileyiana fovea, Leucania (Acantholeucania) loreyi, Limenitis reducta,* usw.). Aus den Daten der Untersuchung geht hervor, dass aufgrund der Klimaerwärmung in den letzten Jahren mehrere Arten südlich verbreiteter Nachtfalter zu einem festen Bestandteil der ungarischen Fauna geworden sind und auch in den Szekszárd-Bergen vorkommen, die zuvor im Karpatenbecken unbekannt waren (*Aedia leucomelas, Athetis hospes, Mythimna congrua*). Auf der Grundlage der Ergebnisse, die das Vorhandensein einer reichhaltigen Schmetterlingsfauna bestätigen, werden Empfehlungen für die künftige Fortführung einer nachhaltigen, naturverträglichen Waldbewirtschaftung ausgesprochen.

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Résumé. L'auteur a recueilli des données sur la faune de macrolépidoptères de la zone de conservation spéciale Natura 2000 des collines de Szekszárd, de la réserve naturelle de Sötétvölgy et de ses environs immédiats, à l'aide de relevés de terrain diurnes depuis 2005 et de 78 relevés nocturnes de 2017 à 2023, en utilisant des appâts à base de vin rouge et de phéromones sexuelles. Au cours de la période d'étude de 18 ans, 556 espèces de Macrolépidoptères ont été enregistrées, dont 42 sont protégées en Hongrie. Les études ont également confirmé la présence de plusieurs espèces qui n'étaient pas connues auparavant dans les collines de Szekszárd (*Boudinotiana notha, Lycia pomonaria, Arytrura musculus, Drymonia velitaris, Acontia candefacta, Diachrysia chryson, Orbona fragariae, Rileyiana fovea, Leucania (Acantholeucania) loreyi, Limenitis reducta,* etc.) Les données de l'enquête indiquent qu'en raison du réchauffement du climat, plusieurs espèces de papillons de nuit à distribution méridionale sont devenues une partie permanente de la faune hongroise ces dernières années et sont également apparues dans les collines de Szekszárd, alors qu'elles étaient auparavant inconnues dans le bassin des Carpates (*Aedia leucomelas, Athetis hospes, Mythimna congrua*). Sur la base des résultats confirmant l'existence d'une riche faune de papillons, l'article formule des recommandations pour la poursuite future d'une gestion forestière durable et respectueuse de la nature.

Bevezetés

A Szekszárdi-dombság alatti kőzetköpenyt a 10–16 millió évvel ezelőtti vulkánikus működés hozta létre, majd a felszín süllyedését követően a területet elborította a Szarmata-tenger. Miután a kéregmozgások következtében a felszín újra megemelkedett, a sekély tenger kiszáradt és 80–90 méter vastag felső-pannóniai üledéket hagyott maga után. Erre a mészkő aljzatra a jégkorszakok folyamán 60–70 méter vastagságban szénsavas mészben gazdag lösztakaró rakódott. Ezt követően a felszínt a legváltozatosabb formájú eróziós és deráziós folyamatok alakították, patakvölgyek hálózatát, suvadásokat hozva létre. A különböző irányú szerkezeti törésvonalakban 15–30 méter mélységű eróziós völgyek alakultak ki, amelyek alján a lösz lepusztulása következtében néhol akár 10–20 méter mély „szurdikok" (löszmélyutak) keletkeztek. A beszivárgó csapadékvíz a porózus szerkezetű löszön átjutva a pannóniai vízzáró agyag határán források formájában lépett a felszínre. (Ádám 1964). A Szekszárdi-dombságot jól felismerhető szerkezeti vonalak határolják. Ny-on a Rák-patak, É-on a Sió völgye, K-en a Duna által feltöltött Sárközisíkság, D-en a Lajvér-patak rajzolja ki a határait. Felszínét erős tagoltság, és sűrű, mély völgyhálózat jellemzi, és területén észak-déli irányban két éghajlati körzet húzódik végig. Klímájában mind az atlanti, mind a mediterrán hatások érvényesülnek A napsütéses órák száma évi 1900–2000 óra. Az évi középhőmérséklet 10–10,5 °C. Az évi csapadékmennyiség átlagosan 660–680 mm, amely az utóbbi évtizedekben – vélhetően a gyorsuló klímaváltozás miatt – csökkenő tendenciát mutat. Gyakoriak az aszályos évek, és jelentősen csökkent a hóval borított napok száma is. Az uralkodó szélirány É-ÉNY-i, de a dombság felszínének eltérítő hatása miatt viszonylag gyakori a NY-i szél is. A központi, erdővel borított dombhátakon a felszínen a 3-6 % humusztartalmú Ramann-féle barna erdőtalajt, illetve agyagbemosódásos barna erdőtalajt találunk. A völgyaljakon helyenként a pangóvizek hatására réti jellegű talajok alakultak ki. Az eredeti vegetációt az emberi beavatkozások napjainkra jelentősen átalakították. Az erdők kivétel nélkül erdőtelepítések eredményei, de a természetes erdőtípusok maradványait jelző növényfajok még ma is megtalálhatók (Anonymus 2005).

Jelen közleményben a vizsgált terület középpontja a Sötétvölgy Természetvédelmi Terület, de a védett terület határai mesterségesen megrajzoltak, azt nem természetes határok jelölik ki. A Sötét-völgy és környéke a Szekszárdi-dombság ÉNy-i részén található. Határát Ny-ról a 6-os főközlekedési út egyértelműen kirajzolja, de a DNy-i irányú kiterjedését a centrifugális völgyhálózat és a mesterségesen kialakított utak és erdőtagok miatt nehéz egyértelműen lehatárolni. Vegetációjában a hegyvidéki, a síkvidéki és a nyugat balkáni (illír) hatások is jelen vannak. Még fellelhetők idős ezüsthársas gyertyános-tölgyes, ezüsthársas cseres-tölgyes és bükkös maradványfoltok, amelyeket az erdőgazdálkodás megkímélt. Ezek a refugiumok természetvédelmi szempontból a legértékesebbek, több védett növény- és állatfaj találja meg bennük életfeltételeit. A természetszerű erdőtársulás-foltokban a kocsánytalan tölgy (*Quercus petraea*), a gyertyán (*Carpinus betulus*) és az ezüsthárs (*Tilia tomentosa*) dominál, de színező elemként, a vadcse-

resznye (*Prunus avium*) is megjelenik. A cseres-tölgyesek aránya csekély, és ezek az erdőfoltokban az elegyfák aránya is alacsonyabb. Az erdőszegélyekben több helyen előfordul a tatár juhar (*Acer tataricum*). A szegélyek gazdag cserjeszinttel rendelkeznek, melyek között gyakori a mogyoró (*Corylus avellana*), az egybibés galagonya (*Crataegus monogyna*), a fagyal (*Ligustrum vulgare*), a veresgyűrű som (*Cornus sanguinea*), a húsos som (*Cornus mas*), valamint a cserjékre felkúszó erdei iszalag (*Clematis vitalba*). Az utak mentén, a vágások szegélyeiben olyan illír hatást jelző védett fajok is megjelennek, mint a pirítógyökér (*Tamus communis*) és a jerikói lonc (*Lonicera caprifolium*). Az üde völgyek alján a cserjeszintet főleg a fekete bodza (*Sambucus nigra*), gyalogbodza (*Sambucus ebulus*), vadrózsa-fajok (*Rosa ssp*.) és a hamvas szeder (*Rubus caesia*) együttese alkotják. Sajnos a legtöbb fiatal erdőtagban már azonos korú és azonos fafajú erdőrészeket találunk, de ezek az erdőrészletek is jelentős természeti értékkel bírnak, mert aljnövényzetük fajgazdag. A nyílt dombtetőkön néhány helyen még megmaradtak a virágos kőrissel (*Fraxinus ornus*) vegyes molyhos tölgyes (*Quercus pubescens*) foltok, kiterjedésük azonban nem számottevő. A korábbi évek elhibázott erdőgazdálkodásának egyik szégyenfoltja, hogy a 285 méter magasságú Óriás-hegyen a múlt század 80-as éveiben a tarra vágott 120 éves kocsánytalan tölgyes helyére nem ide illő fajokat, például erdei fenyőt (*Pinus sylvestris*) és idegenhonos feketefenyőt (*Pinus nigra*) is telepítettek (Anonymus 2005). Nagyobb fenyőtelepítéseket találunk a Gemenci Erdő- és Vadgazdaság Zrt. által üzemeltetett Gemenc Szabadidőközpontból parkerdőbe vezető út melletti dombvonulat északi lejtőjén, ahol még fellelhetők be nem erősített gyepfoltok is. A dombtetőkön számos helyen akácosok is vannak, és spontán betelepült fehér akácok (*Robinia pseudo-acacia*) már a természetszerű erdők szegélyeiben többhelyen is megtelepedtek. A völgytalpakon, az időszakos vízfolyások mentén, a közkedvelt kirándulóhelynek számító Erzsébet-tisztásnál, valamit a 6-os főközlekedési úttól a Sötét-völgybe vezető aszfaltozott út melletti völgyben mézgás éger (*Alnus glutinosa*) és nemesnyár (*Populus nigra x deltoides*) telepítéseket láthatunk. A völgyaljakon természetes úton megtelepedett fafajok is megjelentek, mint például a fehér fűz (*Salix alba*) és a fehér nyár (*Populus alba*), de jelentős az özönfafajnak számító a zöld juhar (*Acer negundo*) aránya is. A szivárgó vizek hatására nedves völgytalpon fekete bodzából, gyalogbodzából, varjútövis bengéből (*Rhamnus catharticus*), kányabangitából (*Viburnum opulus*), kecskerágóból (*Eunymus europaeus*), valamint a bokrokra, fákra felkúszó komlóból (*Humulus lupulus*), és talajszintet elborító hamvas szederből álló gazdag cserjeszint alakult ki. A parkerdőbe vezető utat juharlevelű platánok (*Platanus x acerifolia*), diófák (*Juglans regia*) és törökmogyoró fák (*Corylus colurna*) is kísérik. A Vár-hegy keleti oldalán múlt század végén arborétumot tervezetek kialakítani, de a kezdeményezés nem érte el célját, és ebben a magára hagyott, mára teljesen elburjánzott növényegyüttesben több tájidegen fa- és cserjefaj még a mai napig megtalálható. A Vár-hegy lankáján még idegenhonos fekete dió (*Juglans nigra*) telepítésre is van példa. A völgytalpi nedves részek buja magaskórós növényzetében a nagy csalán (*Urtica dioica*) és az aranyvessző-fajok (*Solidago ssp*.) uralkodnak, de réteken és az árokpartok vegetációjában helyenként sajnos már megjelent az invazív selyemkóró (*Asclepias syriaca*) is. A Sötét-völgyi Parkerdőben a turistautak mentén tisztások élénkítik a táj képét. Ilyen nyílt területek az ifjúsági tábor és a Haramia-forrás közötti völgyalji rétek, valamit a sötét-völgyi horgásztótól a Sötét-völgybe vezető út melletti kaszálórét is. Ezek a degradálódott, egykor franciaperjés rétek – bár növényfajokban szegények a rendszeres és azonos időszakban végzett gépi kaszálások miatt – az élőhelyi diverzitás szempontjából még így is rendkívül fontosak (Görföl et al. 2019).

A Sötétvölgy Természetvédelmi Terület helyi (megyei) védettségét a Tolna Megyei Tanács Végrehajtó Bizottsága 1975-ben 42.111/1975. VB határozatával hirdette ki 502,8 hektáron. A rendszerváltást követően Szekszárd Megyei Jogú Város Önkormányzatának Közgyűlése pedig 41/2007. (XII. 5.) rendeletével megerősítette a védelmi státuszt. Az indoklásban kiemelték, hogy elsődlegesnek tartják az itt található növény- és állatfajok közösségének és élőhelyüknek a megóvását, és különösen fontosnak a területen fészkelő védett madarak zavartalan életfeltételeinek biztosítását. A rendelet kimondja, hogy a területen folyó gazdálkodást a természetvédelmi céloknak kell alárendelni, és a gazdálkodás és a túrizmus nem csökkentheti a védett terület biológiai sokféleségét, nem hátráltathatja a természetes folyamatok érvényesülését. A helyi védelem alatt álló terület három település (Szekszárd, Kakasd, Grábóc) határához tartozó területrészből áll. A Szekszárdi-dombság – és ezen belül annak kisebb része a Sötétvölgy Természetvédel-

mi Terület is – az európai uniós csatlakozással a HUDD20011 kódszámú Szekszárdi-dombvidék különleges természetmegőrzési területként néven részévé vált a hazai Natura 2000 hálózatnak. A helyi védelem alatt álló terület – az önkormányzati tulajdonban levő ifjúsági tábor és az Erzsébet-rét mellett található egykori erdészház kivételével – állami tulajdonban áll. A védett terület erdőgazdasági kezelője a Gemenc Erdő- és Vadgazdaság Zrt. Bátaszéki Erdészete, természetvédelmi kezelője pedig a Tolna Vármegyei Önkormányzat (Görföl et al. 2019). Sajnos a védelem alatt álló terület a védetté nyilvánítás óta sokat veszített természetességéből, természeti értékeiből. A védetté nyilvánítás kiemelt indokaként nevesített békászó sas (*Clanga pomarina*), fekete gólya (*Ciconia nigra*) már évek óta nem költ a területen, aminek elsődleges oka, hogy olyan erdőtagokban költöttek, amelyek az erdőtervek szerint véghasználatra lettek jelölve, és ezek a véghasználatokat az erdőgazdaság végre is hajtotta (Kalotás 1996., 1997., 2001.) Ez különösen azért szomorú, mert ez már a helyi védettség kimondása után történt, amikor már jogszabály tiltotta a fokozottan védett madárfajok fészke körüli erdőfoltok letermelését. Sajnos az erdei élőhelyeket átalakító erdészeti munkák napjainkban is zavartalanul folynak, mivel a terület nem számít a gazdálkodásból kivettnek, így az erdőgazdasági üzemtervek felülírják a védett természeti területeken a természetvédelmi érdekek érvényesítést. Sajnos idős korú erdők már szinte csak a parkerdő központi részein, a kirándulók által leginkább kedvelt, a látogatók részére kialakított fogadóterek környékén, azaz az Erzsébet-tisztás körül maradtak meg. A Sötétvölgy Természetvédelmi Területen a múltban nem folytattak gerinctelen fajokkal kapcsolatos felméréseket, és ezen belül a lepkékre irányuló kutatásokat sem (Anonymus 2005). Még az 1992-ben megjelent, Tolna vármegye nappali lepkéit bemutató kötetben (Fazekas 1992), sem találunk a szekszárdi Sötét-völgyre vonatkozó faunisztikai adatokat. A 2018-ban megjelent nappali lepkék fényképes határozását segítő könyv ugyan tartalmaz az ország területére vonatkozó elterjedési térképeket a hazai nappali lepkékről (Gergely et al. 2018), de ezek nem olyan részletesek, hogy egy ilyen kisebb területegységre, mint a Sötétvölgy Természetvédelmi Terület relevánsak legyenek. A ritkább nappali lepke fajok megfigyeléseiről időnként értesülhettünk lepkészettel foglalkozó hazai internetes közösségi oldalakról, de ez nem pótolja a Szekszárdi-dombság területén előforduló lepkefauna tényleges megismerését. Jelen dolgozatban szereplő adatok első ízben nyújtanak összefoglaló képet a Szekszárdi-dombság természetvédelmi szempontból különleges figyelmet kapó részének, a Sötétvölgy Természetvédelmi Terület és közvetlen környékének nagylepke (Macrolepidoptera) faunájáról, így e közlemény a vizsgált terület nagylepke lepkefaunájának alapvetése.

Anyag és módszer

Macrolepidopterológiai felméréseim nem kötődtek szigorúan a Sötétvölgy Természetvédelmi Területhez, mivel védett területet határait sajnálatos módon a mai napig nem jelölték meg táblákkal, sőt pontos határai még az interneten közzétett nyilvántartásokban sem szerepelnek, ezért vizsgálataimban a védett területen kívül is jelöltem ki mintavételi pontot annak érdekében, hogy a felmérések minél jobban reprezentálják a terület élőhelyi sokféleségét. A faunisztikai adatok gyűjtését 2005-től kezdtem, de 2017-ig kizárólag területbejárásokat végeztem a nappal aktív nagylepkefajok megfigyelésére koncentrálva. Az éjjel aktív nagylepke-fajok felmérését 2017-ben kezdtem, és változó évi aktivitással 2023. végéig folytattam. Elsősorban éjszakai lámpázásokra hagyatkoztam, de alkalmaztam a vörösboros csalétkes és szex-feromonos módszert is. A hét év alatt összesen 78 éjszaka végeztem lámpázást a területen. A vörösboros csalétkes eljárást elsősorban a tavaszi időszakban (március és április hónapokban), valamint a nyár végi és az őszi időszakban (augusztustól november végéig) alkalmaztam. Szex-feromont kizárólag a *Saturnia pavoniella* kimutatására használtam. Lámpázásokat és csalizásokat 16 különböző mintavételi helyen végeztem. Ezek az következő helyszínek voltak: 1. A sötét-völgyi horgásztó melletti erdőfolt, 2. A Vár-hegy alatti erdőtelepítés völgy felé eső déli része, 3. A horgásztótól a védett terület központja felé vezető aszfaltozott úttól nyugatra fekvő kaszálórét, 4. A horgásztótól az védett terület központja felé vezető aszfaltozott út melletti kaszálórét keleti szélén található cseres-tölgyest és feketefenyvest elválasztó erdei út, 5. Az Erzsébet-tisztás, 6. Az Erzsébet-tisztás szélén található egykori erdészház előtti tér, 7. A Sötét-völgyi Parkerdő kaszálórétjének nyugati sarka, 8. Az ifjúsági tábor előtti kaszálórét, 9. A Sötét-völgyi Parkerdő fiatal égertelepí-

tése melletti kaszálórét, 10. A Kis-Bükk-völgy déli bejáratánál levő kaszálórét, 11. A Fazekas-völgy kaszálórétjének völgytalpi része, 12. A Haramia-forrás előtti rét, 13. Gulyás-völgy, 14. A Telek-hegy és a Hosszú-völgy közötti irtás, 15. A Sötét-völgyi Parkerdőbe vezető aszfaltozott út jobb oldalán található fiatal égertelepítés és az idős gyertyános-tölgyes sarka, 16. A Feketeforrás völgyének medvehagymás bükköse (Lásd: 1. ábra / Figure 1.)

A felmérések egyik meghatározó módszere az éjszakai lámpázás volt, amely során egy 220x220 cm-es alumíniumcső-keretre feszített fehér lepedő egyik oldalát 160 W-os kevertfényű (HMLI) izzóval, a másik oldalát pedig 20 W-os teljesítményű SYLVANIA típusú UV-A fénycsővel világítottam meg. Néhány alkalommal elevenfogó vödörcsapdát is használtam, amelynek fényét egy 20 W-os teljesítményű SYLVANIA típusú UV-A fénycső vagy az UV tartományban világító LepiLed Standard 1.1 biztosította. A nyári időszakban általában éjjel 1 óra körül fejeztem be a lámpázást, a rövid nappalok időszakában (kora tavasszal és késő ősszel) a lámpázást a lepkék rajzásának leállásáig folytattam. Ettől csak akkor tértem el, ha az időjárási tényezők (eső, szél) a megkezdett munkát ellehetetlenítették. Néhány alkalommal társult a sötét-völgyi éjszakai lámpázásaimhoz Gergely Péter, és egy alkalommal Gór Ádám is. Ezekben az esetekben az általuk felállított lámpázási módszerek (LepiLed, UV fényű LED-szalag, higanygőz lámpa)) eredményeit is felhasználtam a fajlisták összeállításában. A nappali lepkék felmérését a februártól októberig tartó alkalmi terepbejárások során végeztem. A lepkékről Canon 5D Mark III, Canon 7D és Canon 7D II típusú fényképezőgép vázakkal, Canon 3,5/180 L macro USM, valamint SIGMA 1:2,8 DG Macro HSM optikák, valamint Canon Macro Tween Lite MT 24ex vaku segítségével nagyfelbontású fotókat készítettem. A felmérést követően a fotók alapján elvégeztem a faji azonosításokat. Ha nem sikerült pontosan fajra meghatároznom a fotókon látott lepkéket, mert sérültek vagy kopottak voltak, gyakorlott szakemberek segítségét (Gergely Péter, Ronkay László, Tóth Balázs) kértem. A fajlistát a Varga Zoltán (2012) által szerkesztett Magyarország nagylepkéi c. kötet 2. kiadásának rendszertani felosztása és nevezéktana alapján állítottam össze, figyelembe véve Pastoralis, Buschmannn & Ronkay (2016) közleményében leírt taxonómia változásokat is.

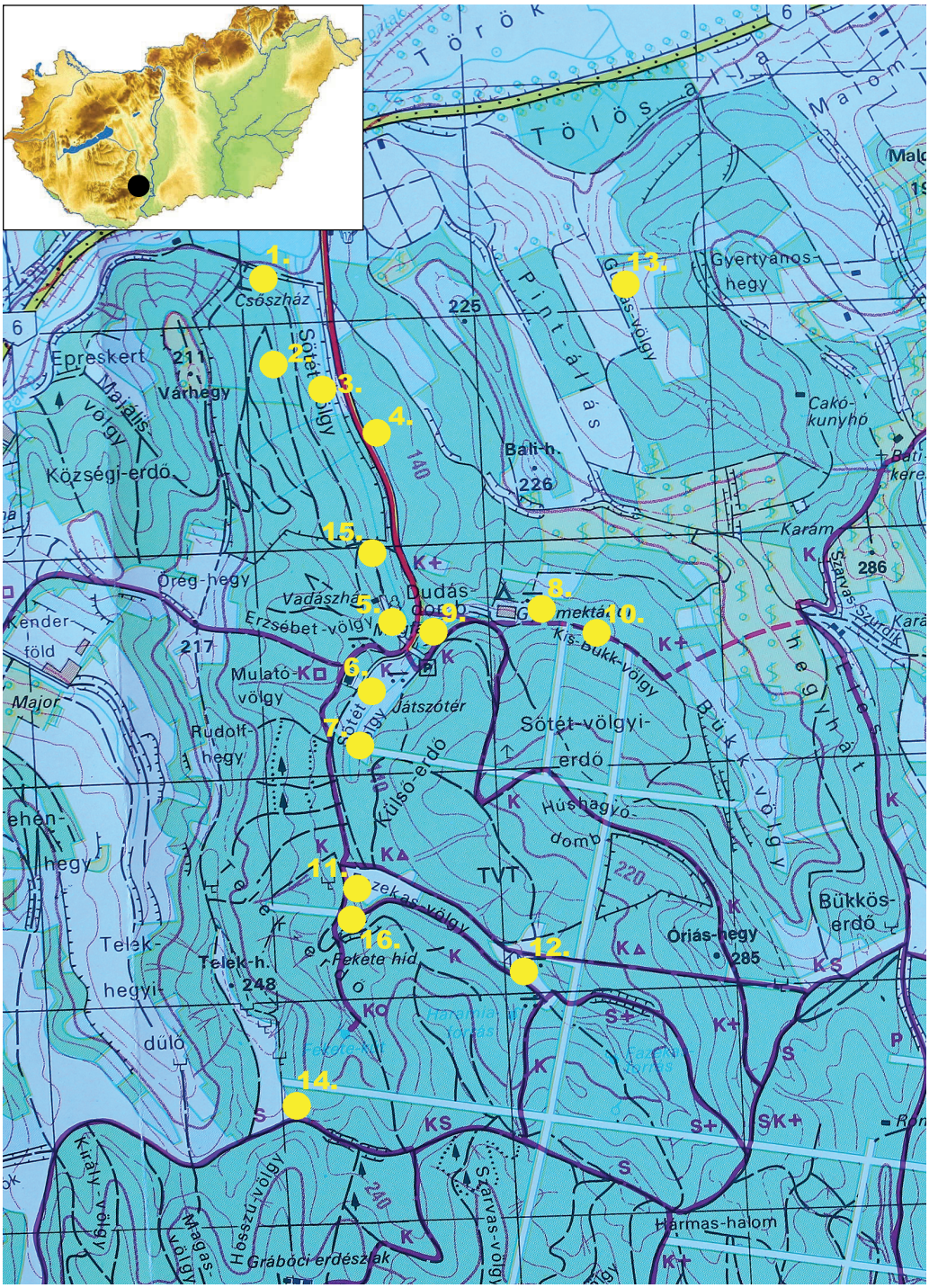
Eredmények

A 2005-től a folytatott terepbejárások során 80 nappali nagylepkefaj jelenlétét sikerült megállapítani. A 7 éven keresztül végzett 78 lámpázás és a vörösboros csali együttes alkalmazása pedig 476 éjszakai aktivitású Macrolepidoptera faj jelenlétét igazolta, így összesen 556 nagylepke faj került elő a vizsgálati időszak alatt a Sötétvölgy Természetvédelmi Területről és közvetlen környékéről. A kimutatott fajok közül 42 áll hazánkban törvényes természetvédelmi oltalom alatt. A védett nagylepkék közül 28 a nappali lepke (Diurna), és 14 az éjszakai faj. A felmérések részletes eredményét a 1. számú függelék (Annex 1.) tartalmazza.

A felmérések során kimutatott nagylepke-fajok közül részletesebben is ismertetem azokat, amelyeknek előkerülése különös figyelmet érdemel, amelyek általában ritkának vagy lokálisnak számítanak, illetve a védelem alatt állók közül kiemeltem azokat, amelyeket a Szekszárdi-dombság területéről eddig még nem mutatták ki, vagy kevés megfigyelési adatuk van a Dél-Dunántúlról.

Boudinotiana puella (Esper, 1787). Védett. Kizárólag a Sötét-völgyi Parkerdőbe vezető aszfaltozott út melletti nemesnyár telepítés mellett sikerült megfigyelni 2022 februárjában néhány példányát ennek a Dél-Mezőföld- és a Duna ártér fehérnyarasaiban egyébként nem ritka fajnak.

Boudinotiana notha (Hübner, 1803). Védett. A vizsgálati területen egyetlen helyen sikerült kimutatni jelenlétét: a 6-os út, és a Sötét-völgybe vezető műút kereszteződéstől 250 méterre északra levő nemesnyaras szegélyében, ahol február végén minden évben megfigyelhető volt akár több példány is. Az imágókat rendszerint avaron napozva, illetve a kopár talaj nedves foltjain, állati ürüléken vagy vízzel teli kátyúban petézést követően elpusztult erdei béka (*Rana dalmatina*) tetemén szívogatva figyeltem meg. Néhány alkalommal a 6-os főút melletti kecskefűzek (*Salix caprea*) barkáin táplálkoztak. Az irodalmi adatok szerint *Boudinotiana notha* hernyóinak tápnövénye elsősorban a rezgő nyár (*Populus tremula*), és a nyír (*Betula ssp*.), amely fafajok a közelben nem fordulnak elő, így nagy valószínűséggel a lárvák a kecskefűzön fejlődhet-



1. ábra/Figure 1. A vizsgálati terület térképe a mintavételi helyekkel / Map of the study area with sampling locations (részletes magyarázat a szövegben/detailed explanation in the text detailed explanation in the text).

nek. A vörhenyes nappaliaraszoló korábban sem a Szekszárdi-dombságon, sem Tolna vármegyében nem került még elő .

Lycia pomonaria (Hübner, 1790). Nem védett. Hazánkban a Dunántúlon (Soproni-hegység, Zselic, Nyugat-Mecsek, Gerecse, Budapest környéke) lokális és ritka faj. Úgy tűnik, hogy az utóbbi évtizedekben jelentősen visszaszorult a Mecsekben (Uherkovich 2018), ahol korábban több helyről is előkerült (Fazekas 2004). Az izeltlauak.hu honlapon az elmúlt 6 évből csupán 5 észlelése van a nyugati és a keleti határszélről, illetve Budapest környékéről (2023. október 31.-i állapot). A Sötét-völgyben 2023. február 20-án az Erzsébet-rét felé vezető betonút mellett található letermelt égererdő és az ezüsthársas gyertyános tölgyes és nemesnyár telepítés találkozásánál UV lámpa és a kevert fényű izzó fényére összesen 4 példány érkezett, ami kisebb itt élő populációt jelez. A faj itteni észlelése különösen érdekes, mivel Tolna vármegyei megfigyelése eddig nem volt. Fogyatkozó hazai adatai alapján egyértelműen a veszélyeztetettek közé sorolható, mielőbb törvényes védelmet érdemelne.

Marumba quercus ([Denis & Schiffermüller]. Védett. A Sötét-völgyben általánosan elterjedt, főleg az idősebb tölgyesek környékén lehet számítani megjelenésére. A lámpázások során a június végétől július közepéig alkalmanként 1–3 példány repült a fényre a sötét-völgyi ifjúsági tábornál, az Erzsébet-tisztásnál, a Haramia-forrásnál és a Fekete-forrásnál.

Saturnia pyri ([Denis & Schiffermüller], 1775). Védett. A Sötét-völgyben kifejezetten ritka. Csupán két alkalommal sikerült kimutatnom. Mindkétszer a Haramia-forrásnál (14. számú mintavételi hely) jött a fényre 1–1 példány. A hazánkban egykor gyakorinak számító faj a 2017 és 2023 közötti időszakban Tolna vármegyében végzett lámpázásaim során csak a Sötét-völgyből, a Kapszeg-tónál és Tolna város belterületén került elő, az elmúlt 7 év alatt a Dél-Mezőföldön egyetlen alkalommal sem találkoztam vele.

Saturnia pavoniella (Scopoli, 1763). Védett. A Fazekas-völgyben, valamint a Sötét-völgyi Parkerdőbe vezető betonút melletti kaszálóréten figyeltem meg repülő hímjeit 2020. és 2021. áprilisában. A 6-os út és a Sötét-völgybe vezető út kereszteződésénél levő kökénybokrosnál szex-feromonra repült be néhány példánya 2020 áprilisában. A meghálózott és lefotózott hímek szárnymintázata *pavoniella*-jelleget mutatott. Varga (2012) szerint a *Saturnia pavoniella* és a *Saturnia pavonia* szimpatrikus fajok, de elterjedésük hazánkban még nem kellőképpen tisztázott. Amennyiben mindkét fajt validnak fogadjuk el, akkor az eddigi adatok alapján elterjedésük Magyarországon átfedést mutat, ami egyértelműen valószínűsíti a hibridizálódásukat. A hibrideket morfológiai alapon biztonságosan nehéz elkülöníteni, és az mtDNS szekvenciáak sem mutatnak lényeges különbséget. Fazekas (2020) vizsgálatai szerint a Mecsekben korábban a *Saturnia pavonia* volt a jellemző (korábban nem is sikerült *pavoniella*-kat fognia), de a 2019-től végzett szex-feromonos eljárással fogott példányok már mind *Saturnia pavoniella*-k voltak, ami a *pavoniella* vonal terjedését látszik igazolni.

Aglia tau (Linnaeus, 1758). Védett. Fényre nem repült. 2023. április elején sikerült megfigyelnem 2 példány nőstényt repülve kereső hímet a Fekete-forráshoz vezető erdei útnál.

Dicranura ulmi ([Denis & Schiffermüller], 1775). Védett. Gyakorlatilag minden tavasszal (áprilisban, május első napjaiban) megjelent néhány példány a lepedőn. Általánosan elterjedt a Sötét-völgyben és a környékén is. Bár Varga (2012) szerint az ezredforduló környékén a faj országszerte megritkult, de a Dél-Dunántúlon, a Dél-Mezőföldön és a Balaton-felvidéken folytatott felméréseim azt mutatják, hogy a Dunántúlon az utóbbi évtizedben újra gyarapodásnak indultak populációi.

Drymonia velitaris (Hufnagel, 1766). Védett. Az irodalmi adatok alapján középhegységeink tölgyeseiben szórványosan fordul elő. A Szekszárdi-dombság területéről korábban még nem került elő. A Sötét-völgyben két évben összesen háromszor repült fényre 1–1 példány. Mindhárom alkalommal a Haramia-forrásnál az erdő szélén felállított fényforrás vonzotta (14. számú mintavételi hely).

Phalera bucephaloides (Ochsenheimer, 1810). Védett. 2019-ben és 2022-ben sikerült megfigyelni néhány alkalommal. Legkorábban július 15-én, legkésőbben augusztus 9-én észleltem. Rendszerint 1–3 példány érkezett a fényre az éjfél közeli órákban. A Kelet-Mecsek tölgyeseiben tapasztalataim szerint jelentős állományai élnek.

Arytrura musculus (Ménétriés, 1859). Fokozottan védett. Vörös könyvben is szereplő Natura 2000 jelölőfaj. 2022. 07. 22-én az Erzsébet-rét autóparkolójánál található fiatal égeresből re-

pült a lámpára egy teljesen friss példány (10. számú mintavételi hely). A közelmúlt felmérései alapján úgy tűnik, hogy az *Arytrura musculus* az ország keleti régiójában fogyatkozik a Dél-Dunántúlon viszont terjeszkedik, de ez betudható annak is, hogy a populációdinamikai ingadozások miatt egyes években az észlelési küszöb alatt maradnak a kisebb állományok. A Dráva völgyében található láperdőkben, rekettyefüzesekben az utóbbi évtizedben több helyen is sikerült kimutatni jelenlétét és a Dél-Alföldről (Homorúd) is előkerült (Sum 2019), Korábban Baranyában (Sumony, Orfű) is sikerült igazolni meglétét (Uherkovich 2018). A Szekszárdi-dombságon mindenképpen meglepetést jelent előkerülése, különösen annak fényében, hogy a szakirodalomban fő tápnövényének ismert rekettyefűz (*Salix cinerea*) a Sötét-völgy belső területein nem fordul elő. Sum (2014) szerint nem zárható ki, hogy a faj kivételes esetben égerlápokon, akár kisebb élőhelyfoltokon is megél. Tapasztalatai szerint az *Arytrura musculus* ragaszkodik élőhelyeihez és attól nem távolodik el nagyobb távolságokra. Hogy valóban él-e itt a Sötét-völgy aránylag apró égeresében egy kisebb szaporodó állomány, azt a jövőbeli célzott kutatások tisztázhatják.

Catocala fraxini (Linnaeus, 1767). Védett. A Dél-Mezőföld nyarasaiban sok helyen él, ennek ellenére mégis meglepetés volt, hogy 2020. 08. 28-án a számára nem tipikus élőhelynek számító, idős kocsánytalan tölgyekkel ölelt Erzsébet-tisztáson (5. számú mintavételi hely) a lepedőre repült 1 példánya. Vélhetően a közeli sötét-völgyi bekötőút melletti nyártelepítések jelenthetik ennek a jól repülő fajnak a szaporodóhelyét.

Diachrysia chryson (Esper, 1789). Védett. Kijelenthető, hogy állandó szaporodó állománya él a Sötét-völgyben. Tápnövényei a *Salvia glutinosa*, az *Eupatorium cannabinum* és a *Melissa vulgaris* az idős, üde erdőkben, valamint réteken, illetve az erdőszegélyek magaskórósaiban gyakorinak számítanak. 2020. 06. 29.-én és 2020 07. 09.-én a Haramia-forrásnál levő réten (14. számú mintavételi hely) 1-1 példány, a Kis-Bükk-völgy bejárata előtti réten (11. számú mintavételi hely) 2022. 02. 17-én 2 példány, majd ugyanott 2022. 07. 17-én 1 példány. jelentkezett a lepedőn.

Athetis hospes (Freyer, [1831]. Nem védett. A fajt 2018-ban mutatták ki első alkalommal hazánk területéről (Szeöke & Avar 2019), és az ezt követő években egyre több helyről jelezték előfordulását. Tolna megyében első alkalommal 2020-ban a Kapszeg-tónál került elő. A hazai adatok alapján a Kárpát-medencében 2 generációja fejlődik (Kalotás 2022). A Sötét-völgyben 4 megfigyelését rögzítettem a 2020- és 2021-ben június, augusztus és szeptember hónapokban. Haramia forrásnál (14. számú mintavételi hely) és az Erzsébet-tisztáson (5. számú mintavételi hely) is két-két alkalommal sikerült 1–1 példányát megfigyelni.

Orbona fragariae (Esper, 1794). Védett. Országosan ritka és lokális elterjedésű faj, amely a nedves, hűvös, gazdag aljnövényzetű erdőket, patakvölgyeket, szurdokerdőket kedveli (Ronkay & Ronkay 2006). Legtöbb hazai adata középhegységeinkből származik. A Szekszárdi-dombságon korábban még nem került elő. 2023. 03. 19-én az Erzsébet-tisztás felé vezető aszfaltozott bekötő út mellett található letermelt égerlápot határoló ezüsthárssal vegyes gyertyános tölgyesben egy *Quercus petrae* törzsére permetezett vörösboros csalira jött 2 példány, pár nappal később pedig (2023. 03. 24-én) pedig a Gulyás-völgyben alján levő erdei út melletti cseres tölgyesben egy középkorú csertölgy (*Quercus cerris*) törzsére permetezett vörösboros csalin táplálkozott 1 példány. Ezek az adatok arra utalnak, hogy vélhetően szaporodó állománya is van az óriás télibagolynak a Szekszárdi-dombság völgyalji erdeiben.

Rileyiana fovea (Treitschke, 1825). Védett. A Szekszárdi-dombság területéről korábban nem volt ismert, de a késő őszi csalizások eredményei alapján egyáltalán nem számít itt ritkának. Valószínűleg a 2018-2022. években tapasztalt országos állománynövekedésének hatása érződött a Sötét-völgyben és környékén található tölgyesekben is, mert az október 28. és november 18. között végzett felmérések során minden alkalommal megjelent a vörösboros csalin. Volt, hogy csak 1 példány (2020. 10. 28.), de előfordult, hogy 8 példány is táplálkozott a naplementét követően a tölgyek törzsére permetezett vörösboros csalin (2022. 11. 11.). A fény nem vonzotta a zörgőbaglyokat, a lepedőn egyetlen alkalommal sem jelentek meg. 2023-ban már nem sikerült megfigyelnem a Sötét-völgyben, de a Mecsekben és a Balaton-felvidéken folytatott lámpázások és vörösboros csalizások alkalmával is jóval kisebb egyedszámban lehetett megfigyelni zörgőbaglyokat mint a korábbi években. Ez vélhetően az állománydinamika

hanyatló szakaszának és a csapadékos késő ősznek tulajdonítható, ugyanis a fagymentes október végén és november elején a lepkék még bőven találhattak természetes táplálkozási lehetőségeket. Ebben az időszakban a csalit kedvelő többi bagolylepke-faj is csak nagyon kis számban kereste fel a felkínált vörösboros csalit.

Mythimna congrua (Hübner, 1817). Nem védett. A 2018. 08. 09-ei első hazai előfordulását követően (Sum & Benedek 2020) a faj napjainkra gyakorlatilag meghódította Kárpát-medencét. A Kapszeg-tó nagylepke faunájáról írt dolgozatomban (Kalotás 2022), már utaltam a *Mythimna congrua* sötét-völgyi előfordulásaira (2020. és 2021 között 4 észlelés). Az ezt követő két évben az adatok száma további 2 megfigyeléssel növekedett. A Fekete-forrásnál 2023. 06. 22-én 1 példány, és az Erzsébet-tisztásnál 2023. 08. 25-én újabb 1 példány jött a fényre.

Leucania (Acanlholeucania) loreyi (Duponchel, 1827). Nem védett, kozmopolita faj. Az egész Óvilágban elterjedt, helyenként közönséges vándor bagolylepke, amely néhol mezőgazdasági kártevőnek is számít. Magyarországon – a sötét-völgyi előkerüléssel együtt eddig négy alkalommal észlelték. Első alkalommal 1993. november 7-én a Somogy vármegyei Vejtinél Dráva-parti fűzligetben mutatták ki (Uherkovich & Ábrahám 1995). Második alkalommal 1996 október 6-án a Szigetközben, Győr–Bács határában került elő (Horváth 1997). Ott HMLI -160W kevert fényű izzó fényére repült 1 példánya. 2023.szeptember 28-án a 6-os főúttól a Sötét-völgybe vezető betonút mentén félúton levő cseres-tölgyesben kifeszített vörösboros csalival átitatott zsinóron jelent meg 1 példány, ami a faj harmadik hazai adatának minősül. 2023. november 2-án a Zala megyében, Páka község határában Németh Krisztián is fotózott egy LED szalag fényére berepült példányt (izeltlabuak.hu), amely a faj negyedik hazai adata. Európában a Mediterráneumban élnek nagyobb állományai a déli rétibagolynak. Magyarországi megjelenése feltehetően klímánk melegedésével magyarázható, és ha ez a melegedési folyamat állandósul, a jövőben vélhetően gyakoribbá válik nálunk is.

Zerynthia polyxena ([Denis & Schiffermüller], 1775). Védett. Monofág faj, amelynek hernyói kizárólag a farkasalmán (*Aristolochia clematitis*) fejlődnek. Mivel vizsgált területen a farkasalma előfordulása kifejezetten lokális, és csak az útmenti szegélyekre korlátozódik, így a farkasalmalepkének is csak a 6-os főút mentén a sötét-völgyi kereszteződésnél, valamit a Haramia-forrásnál levő kaszálóréten él két kisebb állománya.

Parnassius mnemosyne (Linnaeus, 1758). Védett. A Sötét-völgyben különösen erős állománya él. A gyertyános-tölgyesek aljnövényzetében sűrű állományt alkot az odvas keltike (*Corydali cava*), a *Parnassius mnemosyne* hernyóinak tápnövénye, biztosítva az itt élő populáció fennmaradását. Májusban, a faj rajzásának idején az ifjúsági tábor melletti kaszálóréteken, az Erzsébet-tisztás rétjein, a Fazekas-réten tucatjával látni repkedő, virágokon táplálkozó imágókat. A sötét-völgyi populáció fennmaradásának biztosítéka a szálaló erdőgazdálkodási módszer alkalmazása, amely megkíméli az odvas keltikés aljnövényzetet. Amennyiben az üzemtervezett erdőterületeken tarvágásos véghasználatot végeznek, a faj visszaszorulása, sőt akár eltűnése is bekövetkezhet. Szerencsére a kis Apolló-lepke élőhelye gyakorlatilag a Sötétvölgyi Parkerdő központi, turisztikai szempontból a legfrekventáltabb részére esik, ahol az erdőgazdaság az eddigi gyakorlat szerint a jövőben is előtérbe helyezi a rekreációs célokat, és megkíméli az idők korú tölgyeseket.

Favonius quercus (Linnaeus, 1758). Védett. A Sötét-völgyben lokális és ritka. A Haramia -forrásnál sikerült két alkalommal találkozni a faj imágójával. 2012. 07. 14-én egy alkalommal a forrás rétre szivárgó vizétől nedves talajon szívogatott 1 példány, 2020. 06. 29-én pedig 1 példány repült éjszakai lámpázás alkalmával a fényre.

Thecla betulae (Linnaeus, 1758). Védett. A Szekszárdi-dombságon ritkának számít. 2012-ben és 2015-ben néhány alkalommal júliusban sikerült megfigyelni a Sötétvölgyi Parkerdőbe vezető műút menti völgyben gyalogbodza virágzatokon táplálkozni 1–1 példányát. Sáfián Szabolcs 2022. 08. 11-én ugyanott látott 2 példányt (https://lepketerkep.termeszet.org/).

Satyrium w-album (Knoch, 1782). Védett. A Szekszárdi-dombságon ritka. 2005. – 2012. között a Sötétvölgyi Parkerdőbe vezető műút menti völgyben gyalogbodza virágzatokon még gyakran láttam táplálkozó példányait, de mióta az erdészet rendszeresen kaszáltatja az útmenti elektromos távvezeték alatti magaskórósokat nem találkoztam a fajjal.

Satyrium pruni (Linnaeus, 1758). Védett. A Szekszárdi-dombságon lokális és ritka. 2005. – 2012. között a Sötétvölgyi Parkerdőbe vezető műút menti völgyben a fekete bodza virágzatokon több alkalommal is megfigyeltem. Amióta az az út menti magaskórósokat nyár közepén lekaszálják nem sikerült itt megtalálnom.

Maculinea arion ligurica (Wagner, 1904). Védett. Nekem sajnos nem sikerült találkoznom a fajjal, de Hudák Tamás 2012. 07. 22-én a Sötét-völgybe vezető aszfaltozott út melletti kaszálóréten megfigyelt 1 példányt (Hudak T. pers comm.). Varga (2012) szerint az atlanti-mediterrán *Maculinea arion ligurica* tápnövényei a kakukkfű-fajok (*Thymus ssp*.) és a szurokfű (*Origanum vulgare*). Ezek a növényfajok a kaszálóréten nem fordulnak elő, de az út bal oldalán levő hegyoldalon vannak még olyan be nem erdősült gyepfoltok, ahol a lepke mindkét tápnövénye megtalálható, így szaporodásának a feltételei adottak. A Szekszárdi-dombságon korábban nem volt ismert a nagyfoltú hangyaboglárka kései alakja. Hogy napjainkban él-e még a területen azt csak célzott kutatásokkal lehet bizonyítani.

Limenitis reducta (Staudinger, 1901). Védett. Első alkalommal 2005 júliusában sikerült megfigyelnem az Erzsébet-tisztás mellett vezető erdei út szegélynövényzetében egy jerikói lonc levélen napozó példányt. Az ezt követő években sajnos már nem került a szemem elé a kék lonclepke, amit annak tulajdonítok, hogy a Gemenc Zrt. Bátaszéki Erdészete közmunkásokkal az erdei utak melletti erdőszegélyekben található cserjék jelentős részét kivágatta. Sajnos a nyiladékok és az erdőszegélyekben tenyésző *Lonicera caprifolium* állomány jelentős része áldozatul esett az átgondolatlan cserjeirtásnak, így az itt élő *Limenitis reducta* populáció jórészt elvesztette tápnövényét. Szerencsére mégsem tűnt el végérvényesen a faj a területről, mert 2022. augusztus 11-én Sáfián Szabolcsnak sikerült megfigyelnie itt egy aranyvessző virágzaton táplálkozó példányt (pers. comm.). A kék lonclepkének jelenleg a Szekszárdi-dombság területén van a legészakibb dél-dunántúli előfordulása hazánkban. Tolna vármegyében ezen kívül csak a Geresdi-dombságon (Mórágy – Szúnyog-völgy, Bátaszék–Kövesd-puszta) ismerünk lokálisan kisebb *Limenitis reducta* állományokat (https://lepketerkep.termeszet.org/).

Neptis sappho (Pallas, 1771). Védett. A Sötét-völgyben kifejezetten gyakori. Rajzás idején napos időben rendszeresen megfigyelhetők az erdei utakon a talajon vagy a bokrokon napozó példányai.

Argynnis pandora ([Denis & Schiffermüller], 1775). Védett. A Szekszárdi-dombság területén gyakori. Július- augusztus folyamán a nem erdősült völgyaljakon tenyésző virágzó növényeken (*Eupatorium cannabinum, Solidago ssp. Sambucus ebulus, Rubus caesius* stb.) rendszeresen megfigyelhető alkalmanként akár több példány is.

Euphydryas maturna (Linnaeus, 1758). Védett. Natura 2000 jelölőfaj. A Sötét-völgyben erdei utak mentén, nyiladékokban, ahol a szegélyekben a hernyók tápnövénye a fagyal is előfordul májusban több helyen is megfigyelhető. Legerősebb mikropopulációk az Erzsébet-tisztás és a Fazekas-rét közötti erdei szekérút mentén élnek. Leggyakrabban a cserjék levelein napozó vagy a virágzó veresgyűrű som virágzatán táplálkozó példányokat láthatjuk, de esők után a nedves talajon szívogató vagy állati ürülékeken táplálkozó imágókat is megfigyelhetünk. Sajnos az erdészet megbízásából végzett szegélycserje irtás az *Euphydryas maturna* életfeltételeit is jelentősen rontotta a fagyalcserjék ritkításával, mivel élőhelyén másik tápnövénye a kőris (*Fraxinus ssp.)* még elegyfaként sem jellemző. Ábrahám & Sum (2014) szerint az *Euphydryas maturna* populációk megőrzésének kulcsa az okszerű, fentartható erdőgazdálkodás, és különösen fontos a szegélyek háborítatlanságának biztosítása. A szálaló erdőgazdálkodási módszer bevezetése különösen kívánatos lenne a Szekszárdi-dombság más részein is, és nem csak az odvas keltikés erdőrészletekben.

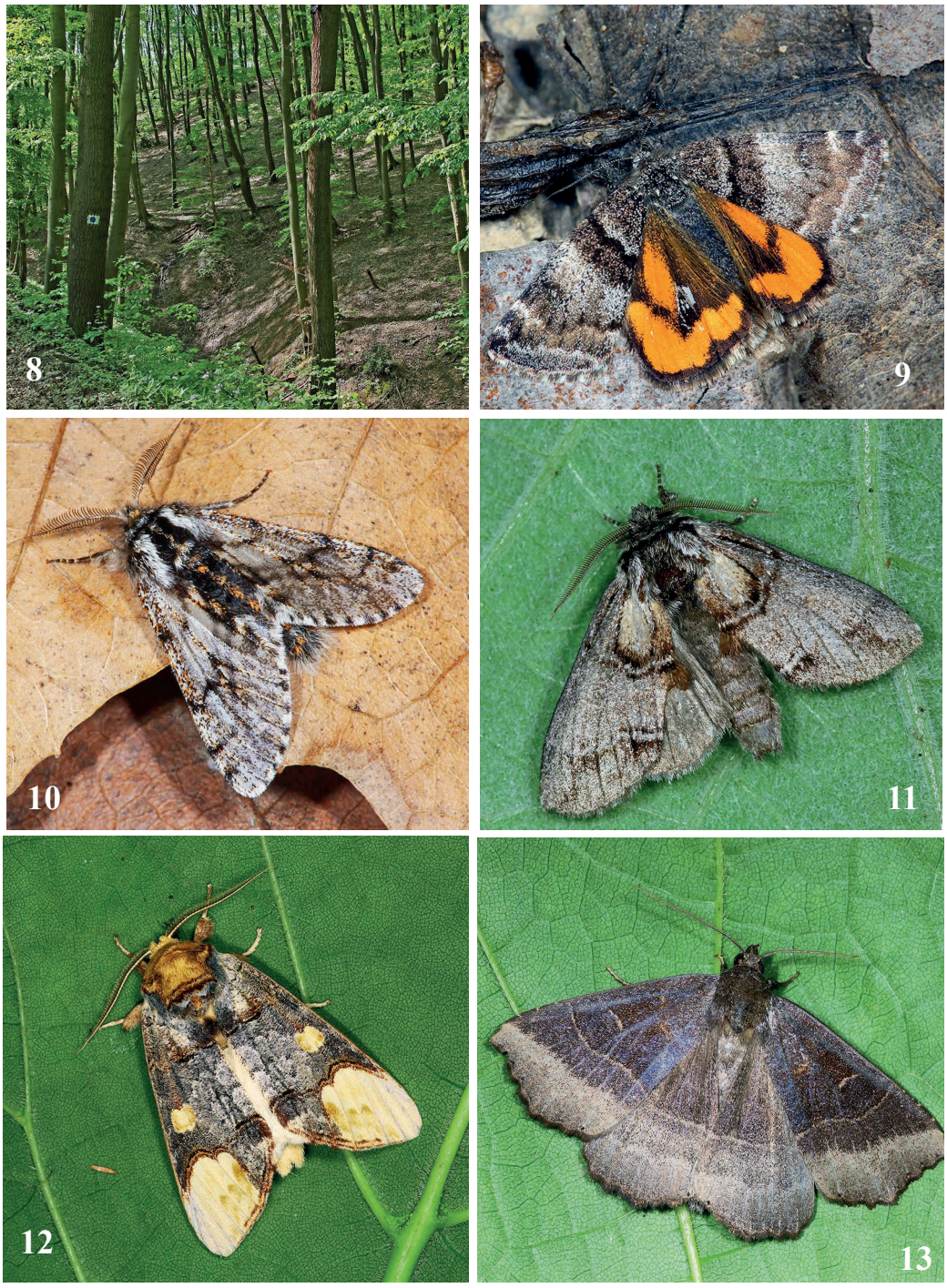
Nem sikerült kimutatnom a területről, ezért nem is szerepel a fajlistában az *Euchalcia variabilis* (Piller 1783) pedig Fazekas-völgy völgyalji bükkösében és a Kis-Bükk-völgyben is nagy területen összefüggő állományai vannak tápnövényének, a farkasölő sisakvirágnak (*Aconitum vulparia*). 2020-tól három éven keresztül számos alkalommal célzottan lámpáztam a faj rajzási idejében ezeken a területrészeken, miután korábban a Mecsekből már előkerült a faj (Fazekas 2004, 2005, 2006). Például abból a magyaregregyi Vár-völgyből is kimutatták már, ahol látszólag korántsem olyan alkalmas az élőhely számára, mint a Sötét-völgyben, hi-

szen tápnövénye csak kisebb foltokban fordul elő. A sikertelen próbálkozások ellenére is úgy gondolom van remény, hogy a jövőben a Sötét-völgyből is elő fog kerülni a sisakvirág aranybagoly.

A felmérések során szerzett tapasztalataim és az eredmények alapján arra következtetésre jutottam, hogy a nappali lepkék esetében a fajlista közel teljes képet nyújt a Sötét-völgynek és közvetlen környékének lepkefaunájáról, de az éjjeli aktivitású lepkék esetében a 6 évet felölelő felmérések nyilvánvalóan csak közelítő képet adhatnak a vizsgált területen élő és alkalmilag előforduló nagylepkékről. Gergely (2024) szerint a lámpák fényén elsősorban a területen élő, általánosan elterjedt fajok jelennek meg. A lokális elterjedésű és ritka fajok – legyenek azok a területen szaporodók vagy alkalmi vendégek – még hosszabb, több évet felölelő vizsgálatokkal sem biztosan kimutathatóak, mivel az időjárás és populációdinamikát befolyásoló egyéb ökológiai tényezők miatt csak ritkán jönnek a fényre vagy a csalira. A lámpázások nem alkalmasak a negatív fototaxist mutató fajok kimutatására sem, és vannak olyan taxonok is, amelyek sem lámpázással, sem pedig a csalétkes módszerrel nem mutathatók ki. Mindennek ellenére azonban a felmérés során összegyűlt adatok arra egyértelműen elegendőek, hogy megállapítsuk, a Sötét-völgy és annak közvetlen környezete még mindig nagyon gazdag lepkefaunával rendelkezik. A jövőben a felméréseket folytatni fogom, és az éjjeli aktivitású fajok esetében igyekszem a területen újabb felvételi pontokat is kijelölni, mert meggyőződésem, hogy még számos nehezen detektálható faj előfordulása várható, amely segítheti az okszerű természetvédelmi kezelés megvalósítását. A Sötétvölgy Természetvédelmi Terület kezelési tervében több mint 200 védett növény- és állatfajt sorolnak fel a közel 500 ha nagyságú védett területen, ami hazai viszonyok között egészen kiemelkedő, de nagy valószínűséggel ez a védett fajok száma még tovább nőne, ha a jövőben tervszerű, több évre kiterjedő feltáró kutatómunkát végeznének (Görföl et al. 2019). A Szekszárdi-dombság természetvédelmi szempontból legértékesebb részeinek országos védetté emelésére már az ezredfordulón javaslatot tettek. A javaslatban a jelenlegi helyi védettségű területnek, a Sötét-völgyek és környékének országos védetté való átminősítése és a területi védelem bővítése szerepelt. 2005-ben már elkészült a tervezett Szekszárdi-Geresdi-dombság Tájvédelmi Körzet természetvédelmi kezelési terve is (Anonymus 2005), de sajnos a védetté nyilvánítási folyamata megakadt. Csak remélni lehet, hogy ennek a természeti értékekben még mindig bővelkedő terület jövője mihamarabb megnyugtatóan rendeződni fog. A jelen közleményben a nagylepkékre vonatkozó felmérés is azt igazolja, hogy nemcsak a helyi védelem alatt álló területen, de azon túl is sokszínű, élővilág található, amelyben a védett fajok aránya kifejezetten magas, a nagylepkék vonatkozásában 7,6 százalék. Éppen ezért nagyon fontos volna, hogy az országos területi védelem mihamarabb kiterjedjen a Szekszárdi-dombság természeti értékekben gazdag területrészeire, és ott olyan fenntartható, természetkímélő erdőgazdálkodást folytassanak, ami biztosítja a faji- és élőhelyi sokféleség megőrzését.

Köszönetnyilvánítás. Hálásan köszönöm Gergely Péternek – akivel néhány alkalommal együtt is lámpáztunk a Sötét-völgyben – Ronkay Lászlónak (Noctuoidea) és Tóth Balázsnak (Geometridae) a számomra nehezen határozható és gyakran erősen kopott lepkék fotóinak faji beazonosítását, valamint a határozásokhoz fűzött szakmai tanácsokat. Köszönöm Hudák Tamásnak és Sáfián Szabolcsnak, hogy sötét-völgyi megfigyelésüket megosztották velem, ezzel is gazdagítva a dolgozatban a vizsgált területre vonatkozó nagylepke faunisztikai adatokat.

2–7. ábra/Figures 2–7. 2. Medvehagymás völgy (18. mintavételi hely / **2.** Wild garlic-valley (sample location 18); **3**. Gyertyános tölgyes tavasszal / **3.** Oek-hornbeam forest in spring; **4.** Fiatal cseres-tölgyes (4. mintavételi hely) / **4.** Sessile oak forest (sample location 4); **5.** Ezüsthársas gyertyános-tölgyes (17. mintavételi hely) / **5**. Oek-hornbeam forest (sample location 17); **6.** Erzsébet-tisztás, turista pihenőhely (5. mintavételi hely) / **6.** Elizabeth-meadow resting-place (sample location 5); **7.** Erzsébet-tisztás az erdészház előtti rét (6. mintavételi hely) **7.** Elizabeth-meadow (sample location 6).



8-13. ábra/Figs 8–13. 8. Bükkös szurdokvölgy (16. mintavételi hely) / Beech-grove glen (sample location 16); **9.** *Boudinotiana notha* (Hübner, 1803); **10.** *Lycia pomonaria* (Hübner, 1790); **11.** *Drymonia velitaris* (Hufnagel, 1766); **12.** *Phalera bucephaloides* (Ochsenheimer, 1810); **13.** *Arytrura musculus* (Ménétriés, 1859)

14–19. ábra/Figs 14–19. 14. *Diachrysia chryson* (Esper, 1789); **15.** *Orbona fragariae* (Esper, 1794); **16.** *Rileyiana fovea* (Treitschke, 1825); **17.** *Leucania (Acanlholeucania) loreyi* (Duponchel, 1827); **18.** *Zerynthia polyxena* ([Denis & Schiffermüller], 1775); **19.** *Parnassius mnemosyne* (Linnaeus, 1758). [Változó méretarányok/Variable scales]

20–21. ábra/Figs 20–21. 20. *Limenitis reducta* (Staudinger, 1901); **21.** *Euphydryas maturna* (Linnaeus,1758)

1. függelék/Annex 1
A Sötétvölgy Természetvédelmi Területen és közvetlen környékén kimutatott nagylepke fajok jegyzéke – List of observed of Macrolepidoptera in the Sötétvölgy Nature Reserve and its immediate vicinity
Jelmagyarázat: / Legend: * – védett faj/protected species, HT– Hudák Tamás megfigyelése/ observation of Tamás Hudák
Rövidítés: Den. & Schiff. = ([Denis. & Schiffermüller], 1775)

Lasiocampidae
Poecilocampa populi (Linnaeus, 1758)
Euthrix potatoria (Linnaeus, 1758)
Odonestis pruni (Linnaeus, 1758)
Lasiocampa quercus ([Den. & Schiff.], 1775)
Lasiocampa trifolii ([Den. & Schiff.], 1775)
Macrothylacia rubi (Linnaeus, 1758)
Dendrolimus pini (Linnaeus, 1758)
Gastropacha populifolia (Esper, 1783)
Gastropacha quercifolia (Linnaeus, 1758)
Phyllodesma tremulifolia (Hübner, 1810)

Sphingidae
Agrius convolvuli (Linnaeus, 1758)
Sphinx ligustri (Linnaeus, 1758)
Hyloicus pinastri (Linnaeus, 1758)
Laothoe populi (Linnaeus, 1758)
Marumba quercus ([Den. & Schiff.], 1775)*
Mimas tiliae (Linnaeus, 1758)
Smerinthus ocellatus (Linnaeus, 1758)
Macroglossum stellatarum (Linnaeus, 1758)
Deilephila elpenor (Linnaeus, 1758)
Deilephila porcellus (Linnaeus, 1758)
Hyles euphorbiae (Linnaeus, 1758)

Saturniidae
Antheraea yamamai (Guerin-Méneville, 1861)
Saturnia pavoniella (Scopoli, 1763)*
Saturnia pyri ([Den. & Schiff.], 1775)*
Aglia tau (Linnaeus, 1758)*

Drepanidae
Cilix glaucata (Scopoli, 1763)
Drepana curvatula (Borkhausen, 1790)
Drepana falcataria (Linnaeus, 1758)
Sabra harpagula, (Esper, 1786)
Watsonalla binaria (Hufnagel, 1767)
Watsonalla cultraria (Fabricius, 1775)

Thyatiridae (Tetheidae)
Thyatira batis (Linnaeus, 1758)
Tethea ocularis (Linnaeus, 1767)
Tethea or ([Den. & Schiff.], 1775)
Habrosyne pyritoides (Hufnagel, 1766)
Polyploca ridens (Fabricius, 1787)
Cymatophorina diluta ([Den. & Schiff.], 1775)
Asphalia ruficollis ([Den. & Schiff.], 1775)

Notodontidae
Cerura erminea (Esper, 1783)
Furcula furcula (Clerk, 1759)
Harpyia milhauseri (Fabricius, 1775)
Stauropus fagi (Linnaeus, 1758)
Dicranura ulmi ([Den. & Schiff.], 1775)*
Drymonia velitaris (Hufnagel, 1766)*
Drymonia obliterata (Esper, 1785)
Drymonia ruficornis (Hufnagel, 1766)
Drymonia querna ([Den. & Schiff.], 1775)
Gluphisia crenata (Esper, 1785)
Notodonta dromedarius ([Den. & Schiff.], 1775)
Notodonta trithopus ([Den. & Schiff.], 1775)
Notodonta ziczac (Linnaeus, 1758)
Pheosia tremula (Clerck, 1759)
Pterostoma palpina (Clerck, 1759)
Spatalia argentina ([Den. & Schiff.], 1775)
Ptilodon capucina (Linnaeus, 1758)
Ptilodon cucullina ([Den. & Schiff.], 1775)
Ptilophora plumigera ([Den. & Schiff.], 1775)
Phalera bucephaloides (Ochsenheimer, 1810)*
Clostera anachoreta ([Den. & Schiff.], 1775)
Clostera curtula (Linnaeus, 1758)
Clostera pigra (Hufnagel, 1766)

Geometridae
Boudinotiana notha (Hübner, 1803)*
Boudinotiana puella (Esper 1787)*
Alsophila aescularia ([Den. & Schiff.], 1775)
Alsophila aceraria ([Den. & Schiff.], 1775)
Geometra papilionaria (Linnaeus, 1758)
Comibaena bajularia ([Den. & Schiff.], 1775)
Thetidia smaragdaria (Fabricius, 1787)
Hemistola chrysoprasaria (Esper, 1795)
Jodis lactearia (Linnaeus, 1758)
Thalera fimbrialis (Scopoli, 1763)
Hemithea aestivaria (Hübner, 1789)
Chlorissa viridata (Linnaeus, 1758)
Chlorissa cloraria (Hübner, [1813])
Idaea muricata (Hufnagel, 1767)
Idaea rufaria (Hübner, 1799)
Idaea sericeata (Hübner, 1813)
Idaea ochrata (Scopoli, 1763)
Idaea rusticata ([Den. & Schiff.], 1775)
Idaea filicata (Hübner, [1799])
Idaea moniliata ([Den. & Schiff.], 1775)
Idaea dilutaria (Hübner, 1799)
Idaea fuscovenosa (Goeze, 1781)
Idaea humiliata (Hufnagel, 1767)
Idaea politaria (Hübner, 1799)
Idaea seriata (Schrank, 1802)
Idaea subsericeata (Haworth, 1809)
Idaea sylvestraria (Hübner, 1789)
Idaea dimidiata (Hufnagel, 1767)
Idaea trigeminata (Haworth, 1809)
Idaea biselata (Hufnagel, 1767)
Idaea nitidata (Herrich-Schäffer, 1861)
Idaea aversata (Linnaeus, 1758)
Idaea degeneraria (Hübner, 1799)
Idaea deversaria (Herrich-Schäffer, 1847)

Scopula immorata (Linnaeus, 1758)
Scopula caricaria (Reutti, 1853)
Scopula nigropunctata (Hufnagel, 1767)
Scopula virgulata ([Den. & Schiff.], 1775)
Scopula ornata (Scopoli, 1763)
Scopula rubiginata (Hufnagel, 1767)
Scopula marginepunctata (Goeze, 1781)
Scopula immutata (Linnaeus, 1758)
Scopula subpunctaria (Herrich-Schäffer, 1847)
Rhodostrophia vibicaria (Clerck, 1759)
Timandra comae (Schmidt, 1931)
Cyclophora pendularia (Clerck, 1759)
Cyclophora annularia (Fabricius, 1775)
Cyclophora puppillaria (Hübner, 1799)
Cyclophora ruficiliaria (Herrich-Schäffer, 1855)
Cyclophora porata (Linnaeus, 1767)
Cyclophora punctaria (Linnaeus, 1758)
Cyclophora linearia (Hübner, 1799)
Lythria purpuraria (Linnaeus, 1758)
Lythria cruentaria (Hufnagel, 1767)
Cataclysme riguata (Hübner, 1813)
Scotopteryx chenopodiata (Linnaeus, 1758)
Scotopteryx luridata (Hufnagel, 1767)
Orthonama obstipata (Fabricius, 1794)
Xanthorhoe biriviata (Borkhausen, 1794)
Xanthorhoe spadicearia ([Den. & Schiff.], 1775)
Xanthorhoe ferrugata (Clerck, 1759)
Xanthorhoe quadrifasiata (Clerck, 1759)
Xanthorhoe fluctuata (Linnaeus, 1758)
Catarhoe rubidata ([Den. & Schiff.], 1775)
Catarhoe cuculata (Hufnagel, 1767)
Epirrhoe alternarta ((Müller, 1764)
Epirrhoe rivata (Hübner, 1813)
Epirrhoe galiata ([Den. & Schiff.], 1775)
Euphya biangulata (Haworth, 1809)
Costaconvexa polygrammata (Borkhausen, 1794)
Camptogramma bilineata (Linnaeus, 1758)
Pelurga comitata (Linnaeus, 1758)
Cosmorhoe ocellata (Linnaeus, 1758)
Eulithis pyraliata, ([Den. & Schiff.], 1775)
Ecliptopera silaceata ([Den. & Schiff.], 1775)
Chloroclysta siterata (Hufnagel, 1767)
Pennithera firmata (Hübner, 1822)
Eustroma reticulata ([Den. & Schiff.], 1775)
Electrophaes corylata (Thunberg, 1792)
Colostygia pectinataria (Knoch, 1781)
Horisme vitalbata ([Den. & Schiff.], 1775)
Horisme tersata ([Den. & Schiff.], 1775)
Horisme corticata (Treitschke, 1835)
Melanthia procellata ([Den. & Schiff.], 1775)
Paraulype berberata ([Den. & Schiff.], 1775)
Rheumaptera cervinalis, (Scopoli, 1763)
Philereme transversata (Hufnagel, 1767)
Epirrita dilutata ([Den. & Schiff.], 1775)
Operophtera brumata (Linnaeus, 1758)
Perizoma alchemillata (Linnaeus, 1758)
Perizoma bifaciata (Haworth, 1809)
Perizoma lugdunaria (Herrich-Schäffer, 1855)
Gymnoscelis rufifasciata (Haworth, 1809)
Chloroclystis v-ata (Haworth, 1809)
Pasiphila rectangulata (Linnaeus, 1758)
Eupithecia haworthiata (Doubleday, 1856)
Eupithecia inturbata (Hübner, 1817)
Eupithecia linariata ([Den. & Schiff.], 1775)
Eupithecia abbreviata (Stephens, 1831)
Eupithecia dodoneata (Guenée, 1857)
Eupithecia silenicolata (Mabille, 1867)
Eupithecia tripunctaria (Herrich-Schäffer, 1852)
Eupithecia virgaureata (Doubleday, 1861)
Eupithecia absinthiata (Clerck, 1759)
Eupithecia icterata (Villers, 1789)
Aplocera plagiata (Linnaeus, 1758)
Asthena albulata (Hufnagel, 1767)
Asthena anseraria (Herrich-Schäffer, 1855)
Minoa murinata (Scopoli, 1763)
Trichopteryx polycommata ([Den. & Schiff.], 1775)
Lomaspilis marginata (Linnaeus, 1758)
Ligdia adustata ([Den. & Schiff.], 1775)
Stegania cararia (Hübner, 1790)
Heliomata glarearia ([Den. & Schiff.], 1775)
Macaria notata (Linnaeus, 1758)
Macaria alternata ([Den. & Schiff.], 1775)
Chiasmia clathrata (Linnaeus, 1758)
Tephrina arenacearia ([Den. & Schiff.], 1775)
Plagodis pulveraria (Linnaeus, 1758)
Plagodis dolabraria (Linnaeus, 1767)
Opisthograptis luteolata (Linnaeus, 1758)
Epione repandaria (Hufnagel, 1767)
Pseudopanthera macularia (Linnaeus, 1758)
Eilicrinia trinotata, (Metzner, 1845)
Apeira syringaria (Linnaeus, 1758)
Ennomos quercinaria (Hufnagel, 1767)
Ennomos fuscantaria (Haworth, 1809)
Ennomos erosaria ([Den. & Schiff.], 1775)
Selenia dentaria (Fabricius, 1775)
Selenia lunularia (Hübner, 1788)
Selenia tetralunaria (Hufnagel, 1767)
Artiora evonymaria ([Den. & Schiff.], 1775)
Crocallis elinguaria (Linnaeus, 1758)
Ourapteryx sambucaria (Linnaeus, 1758)
Colotois pennaria (Linnaeus, 1761)
Angerona prunaria (Linnaeus, 1758)
Apocheima hispidaria ([Den. & Schiff.], 1775)
Apocheima pilosaria ([Den. & Schiff.], 1775)
Lycia hirtaria (Clerck, 1759)
Lycia pomonaria (Hübner, 1790)
Biston strataria (Hufnagel, 1767)
Biston betularia (Linnaeus, 1758)
Agriopis leucophaearia ([Den. & Schiff.], 1775)
Agriopis aurantiaria (Hübner, [1799])
Agriopis bajaria ([Den. & Schiff.], 1775)
Agriopis marginaria (Fabricius, 1776)
Erannis defoliaria (Clerck, 1759)
Synopsia sociaria (Hübner, 1799)
Peribatodes rhomboidaria ([Den. & Schiff.], 1775)
Peribatodes secundaria ([Den. & Schiff.], 1775)
Hypomecis roboraria ([Den. & Schiff.], 1775)
Hypomecis punctinalis (Scopoli, 1763)
Ascotis selenaria ([Den. & Schiff.], 1775)
Ectropis crepuscularia ([Den. & Schiff.], 1775)

Cleora cinctaria ([Den. & Schiff.], 1775)
Aethalura punctulata ([Den. & Schiff.], 1775)
Ematurga atomaria (Linnaeus, 1758)
Bupalus piniarius (Linnaeus, 1758)
Cabera pusaria (Linnaeus, 1758)
Cabera exanthemata (Scopoli, 1763)
Lomographa bimaculata (Fabricius, 1775)
Lomographa temerata ([Den. & Schiff.], 1775)
Campaea margaritata (Linnaeus, 1767)
Siona lineata (Scopoli, 1763)

Erebidae
Rivula sericealis (Scopoli, 1763)
Laspeyria flexula ([Den. & Schiff.], 1775)
Trisateles emortualis ([Den. & Schiff.], 1775)
Paracolax tristalis (Fabricius, 1794)
Herminia tarsipennalis (Treitschke, 1835)
Herminia tarsicrinalis (Knoch, 1782)
Herminia grisealis ([Den. & Schiff.], 1775)
Herminia tenuialis (Rebel, 1899)
Polypogon tentacularia (Linnaeus, 1758)
Pechipogo strigilata (Linnaeus, 1758)
Pechipogo plumigeralis (Herrich-Schäffer, 1825)
Zanclognatha lunalis (Scopoli, 1763)
Hypena proboscidalis (Linnaeus, 1758)
Hypena rostralis (Linnaeus, 1758)
Eublemma purpurina ([Den. & Schiff.], 1775)
Colobochyla salicalis ([Den. & Schiff.], 1775)
Calyptra thalictri (Borhausen, 1790)
Scoliopteryx libatrix (Linnaeus, 1758)
Lymantria dispar (Linnaeus, 1758)
Euproctis chrysorrhoea (Linnaeus, 1758)
Orgyia antiqua (Linnaeus, 1758)
Calliteara pudibunda (Linnaeus, 1758)
Arctornis l-nigrum (Müller, 1764)
Spilosoma lutea (Hufnagel, 1766)
Spilosoma lubricipeda (Linnaeus, 1758)
Spilosoma urticae (Esper, 1789)
Hyphantria cunea (Drury, 1773)
Phragmatobia fuliginosa (Linnaeus, 1758)
Arctia villica (Linnaeus, 1758)
Rhyparia purpurata (Linnaeus, 1758)
Diacrisia sannio (Linnaeus, 1758)
Callimorpha dominula (Linnaeus, 1758)
Euplagia quadripunctaria (Poda, 1761)
Miltochrista miniata (Forster, 1771)
Cybosia mesomella (Linnaeus, 1758)
Thumatha senex (Hübner, 1808)
Pelosia muscerda (Hufnagel, 1766)
Pelosia obtusa (Herrich-Schäffer, 1847)
Lithosia quadra (Linnaeus, 1758)
Eilema griseola (Hübner, 1803)
Eilema depressa (Esper, [1787])
Eilema lutarella (Linnaeus, 1758)
Eilema lurideola (Zincken, 1817)
Eilema caniola (Hübner, 1808)
Eilema palliatella (Scopoli, 1763)
Eilema complana (Linnaeus, 1758)
Eilema pseudocomplana (Daniel, 1939)
Eilema pygmaeola pallifrons (Zeller, 1847)
Eilema sororcula (Hufnagel, 1766)
Amata phegea (Linnaeus, 1758)
Dysauxes ancilla (Linnaeus, 1767)
Lygephila lusoria (Linnaeus, 1758)
Lygephila pastinum (Hübner, 1790)
Lygephila craccae ([Den. & Schiff.], 1775)
Lygephila procax (Hübner, 1813)
Arytrura musculus (Ménétriés, 1859)*
Euclidia glyphica (Linnaeus, 1758)
Dysgonia algira (Linnaeus, 1767)
Prodotis stolida, (Fabricius, 1775)
Catocala fulminea (Scopoli, 1763)
Catocala nymphagoga (Esper, 1787)
Catocala hymenaea ([Den. & Schiff.], 1775)
Catocala fraxini (Linnaeus, 1767)*
Catocala nupta (Linnaeus, 1767)
Catocala electa (Vieweg, 1790)
Catocala elocata (Esper, 1787)
Catocala promissa ([Den. & Schiff.], 1775)
Meganola kolbi (Daniel, 1935)
Meganola strigula ([Den. & Schiff.], 1775)
Meganola albula ([Den. & Schiff.], 1775)
Nola aerugula (Hübner, 1793)
Nola cicatricalis (Treitschke, 1835)
Nola confusalis (Herrich-Schäffer, 1847)
Pseudoips prasinana (Linnaeus, 1758)
Earias clorana (Linnaeus, 1761)
Earias vernana (Fabricius, 1787)
Nycteola asiatica (Krulikovsky, 1904)

Noctuidae
Abrostola tripartita (Hufnagel, 1766)
Abrostola asclepiadis ([Den. & Schiff.], 1775)
Abrostola triplasia (Linnaeus, 1758)
Chrysodeixis chalcites (Esper, 1789)
Macdunnoughia confusa (Stephens, 1850)
Diachrysia chryson (Esper, 1789)*
Diachrysia chrysitis (Linnaeus, 1758)
Diachrysia stenochrysis (Warren, 1913)
Autographa gamma (Linnaeus, 1758)
Protodeltote pygarga (Hufnagel, 1766)
Deltote bankiana (Fabricius, 1775)
Acontia candefacta (Hübner, 1813)
Acontia lucida (Hufnagel, 1766)
Acontia trabealis (Scopoli, 1763)
Aedia funesta (Esper, 1786)
Aedia leucomelas (Linnaeus, 1758)
Colocasia coryli (Linnaeus, 1758)
Diloba caeruleocephala (Linnaeus, 1758)
Craniophora ligustri ([Den. & Schiff.], 1775)
Moma alpium (Osbeck, 1778)
Acronicta alni (Linnaeus, 1767)
Acronicta psi (Linnaeus, 1758)
Acronicta auricoma ([Den. & Schiff.], 1775)
Acronicta rumicis (Linnaeus, 1758)
Acronicta aceris (Linnaeus, 1758)
Acronicta megacephala ([Den. & Schiff.], 1775)
Tyta luctuosa ([Den. & Schiff.], 1775)
Amphipyra pyramidea (Linnaeus, 1758)
Amphipyra berbera svensoni (Fletcher, 1968)

Amphipyra tragopogonis (Clerck, 1759)
Amphipyra livida ([Den. & Schiff.], 1775)
Asteroscopus sphinx (Hufnagel, 1766)
Brachionycha nubeculosa (Esper, 1785)
Valeria oleagina ([Den. & Schiff.], 1775)
Meganephria bimaculosa (Linnaeus, 1767)
Lamprosticta culta ([Den. & Schiff.], 1775)
Allophyes oxyacanthae (Linnaeus, 1758)
Eucarta amethystina (Hübner, 1803)
Pyrrhia umbra (Hufnagel, 1766)
Heliothis adaucta (Butler, 1878)
Helicoverpa armigera (Hübner, 1808)
Cryphia fraudatricula (Hübner, 1803)
Cryphia algae (Fabricius, 1775)
Pseudeustrotia candidula ([Den. & Schiff.], 1775)
Elaphria venustula (Hübner, 1790)
Caradrina morpheus (Hufnagel, 1766)
Caradrina kadenii (Freyer, 1836)
Caradrina clavipalpis (Scopoli, 1763)
Hoplodrina octogenaria (Goeze, 1781)
Hoplodrina blanda ([Den. & Schiff.], 1775)
Hoplodrina superstes (Oschenheimer, 1816)
Hoplodrina ambigua ([Den. & Schiff.], 1775)
Charanyca trigrammica (Hufnagel, 1766)
Rusina ferruginea (Esper, 1785)
Athetis lepigone (Möschler, 1860)
Athetis hospes (Frayer, 1831)
Dypterygia scabriuscula (Linnaeus, 1758)
Trachea atriplicis (Linnaeus, 1758)
Polyphaenis sericata (Esper, 1787)
Thalpophila matura (Hufnagel, 1766)
Actinotia polyodon (Clerck, 1759)
Chloantha hyperici ([Den. & Schiff.], 1775)
Phlogophora meticulosa (Linnaeus, 1758)
Euplexia lucipara (Linnaeus, 1758)
Calamia tridens (Hufnagel, 1766)
Gortyna flavago ([Den. & Schiff.], 1775)
Hydraecia micacea (Esper, 1789)
Amphipoea oculea (Linnaeus, 1761)
Luperina testacea ([Den. & Schiff.], 1775)
Rhizedra lutosa (Hübner, 1803)
Nonagria typhae (Thunberg, 1784)
Lenisa geminipuncta (Haworth, 1809)
Globia sparganii (Esper, 1790)
Pabulatrix pabulatricula (Brahm, 1791)
Apamea monoglypha (Hufnagel, 1766)
Apamea remissa (Hübner, 1809)
Apamea sordens (Hufnagel, 1766)
Apamea epomidion (Haworth, 1809)
Apamea aquila (Donzel, 1837)
Loscopia scolopacina (Esper, 1788)
Mesapamea secalis (Linnaeus, 1758)
Mesapamea secalella (Remm, 1983)
Mesoligia furuncula ([Den. & Schiff.], 1775)
Oligia strigilis (Linnaeus, 1758)
Oligia latruncula ([Den. & Schiff.], 1775)
Oligia versicolor (Borkhausen, 1792)
Cosmia affinis (Linnaeus, 1767)
Cosmia trapezina (Linnaeus, 1758)
Atethmia centrago (Haworth, 1809)
Tiliacea citrago (Linnaeus, 1758)
Tiliacea aurago ([Den. & Schiff.], 1775)
Tiliacea sulphurago ([Den. & Schiff.], 1775)
Lithophane ornitopus (Hufnagel, 1766)
Xylena exsoleta (Linnaeus, 1758)
Orbona fragariae (Vieweg, 1790) *
Eupsilia transversa (Hufnagel, 1766)
Conistra vaccinii (Linnaeus, 1761)
Conistra ligula (Esper, 1791)
Conistra rubiginosa (Scopoli, 1763)
Conistra veronicae (Hübner, 1813)
Conistra rubiginea ([Den. & Schiff.], 1775)
Conistra erythrocephala ([Den. & Schiff.], 1775)
Agrochola lychnidis ([Den. & Schiff.], 1775)
Agrochola nitida ([Den. & Schiff.], 1775)
Agrochola humilis ([Den. & Schiff.], 1775)
Agrochola litura (Linnaeus, 1758)
Agrochola helvola (Linnaeus, 1758)
Agrochola lota (Clerck, 1759)
Agrochola macilenta (Hübner, 1809)
Agrochola circellaris (Hufnagel, 1766)
Agrochola laevis (Hübner, 1803)
Xanthia togata (Esper, 1791)
Cirrhia icteritia (Hufnagel, 1766)
Cirrhia gilvago ([Den. & Schiff.], 1775)
Cirhia ocellaris (Borkhausen, 1792)
Parastichtis suspecta (Hübner, 1817)
Atypha pulmonaris (Esper, 1790)
Rileyiana fovea (Treitschke, 1825)*
Dichonia convergens ([Den. & Schiff.], 1775)
Griposia aprilina (Linnaeus, 1758)
Dryobotodes eremita (Fabricius, 1775)
Ammoconia caecimacula ([Den. & Schiff.], 1775)
Aporophyla lutulenta ([Den. & Schiff.], 1775)
Blepharita satura ([Den. & Schiff.], 1775)
Mythimna turca (Linnaeus, 1761)
Mythimna pudorina ([Den. & Schiff.], 1775)
Mythimna pallens (Linnaeus, 1758)
Mythimna vitellina (Hübner, 1808)
Mythimna albipuncta ([Den. & Schiff.], 1775)
Mythimna ferrago (Fabricius, 1787)
Mythimna l-album (Linnaeus, 1767)
Mythimna congrua (Hübner 1817)
Leucania loreyi (Duponchel, 1827)
Hadula trifolii (Hufnagel, 1766)
Sideridis rivularis (Fabricius, 1775)
Conisania luteago ([Den. & Schiff.], 1775)
Mamestra brassicae (Linnaeus, 1758)
Melanchra persicariae (Linnaeus, 1761)
Lacanobia w-latinum (Hufnagel, 1766)
Lacanobia oleracea (Linnaeus, 1758)
Panolis flammea ([Den. & Schiff.], 1775)
Orthosia incerta (Hufnagel, 1766)
Orthosia miniosa ([Den. & Schiff.], 1775)
Orthosia cerasi (Fabricius, 1775)
Orthosia cruda ([Den. & Schiff.], 1775)
Orthosi populeti (Fabricius, 1781)
Orthosia gracilis ([Den. & Schiff.], 1775)
Orthosia gothica (Linnaeus, 1758)
Anorthoa munda ([Den. & Schiff.], 1775)

Egira conspicillaris (Linnaeus, 1758)
Tholera decimalis (Poda, 1761)
Peridroma saucia (Hübner, 1808)
Euxoa obelisca ([Den. & Schiff.], 1775)
Agrotis exclamationis (Linnaeus, 1758)
Agrotis segetum ([Den. & Schiff.], 1775)
Agrotis ipsilon (Hufnagel, 1766)
Axylia putris (Linnaeus, 1761)
Ochropleura plecta (Linnaeus, 1761)
Noctua pronuba (Linnaeus, 1758)
Noctua fimbriata (Schreber, 1759)
Noctua orbona (Hufnagel, 1766)
Noctua interposita (Hübner, 1790)
Noctua comes (Hübner, 1813)
Noctua interjecta (Hübner, 1803)
Noctua janthina ([Den. & Schiff.], 1775)
Noctua janthe (Borkhausen, 1792)
Epilecta linogrisea ([Den. & Schiff.], 1775)
Xestia baja ([Den. & Schiff.], 1775)
Xestia stigmatica (Hübner, 1813)
Xestia xanthographa ([Den. & Schiff.], 1775)
Xestia c-nigrum (Linnaeus, 1758)
Xestia triangulum (Hufnagel, 1766)
Eugnorisma depuncta (Linnaeus, 1761)

Hesperidae
Erynnis tages (Linnaeus, 1758)
Carcharodus alceae (Esper, [1780])
Pyrgus malvae (Linnaeus, 1758)
Pyrgus carthami (Hübner, [1813])
Pyrgus armoricanus (Oberthür, 1910)
Carterocephalus palaemon (Pallas, 1771)
Heteropterus morpheus (Pallas, 1771)*
Thymelicus lineola (Ochsenheimer, 1808)
Thymelicus sylvestris (Poda, 1761)
Hesperia comma (Linnaeus, 1758)
Ochlodes sylvanus (Esper, [1777])

Papilionidae
Zerynthia polyxena ([Den. & Schiff.], 1775)*
Parnassius mnemosyne (Linnaeus, 1758)*
Iphiclides podalirius (Linnaeus, 1758)*
Papilio machaon (Linnaeus, 1758)*

Pieridae
Colias hyale (Linnaeus, 1758)
Colias alfacariensis (Ribbe, 1905)
Colias croceus (Geoffroy in Fourcroy, 1785)
Colias erate (Esper, 1805)
Gonepteryx rhamni (Linnaeus, 1758)*
Leptidea sinapis (Linnaeus, 1758)
Pieris brassicae (Linnaeus, 1758)
Pieris rapae (Linnaeus, 1758)
Pieris napi (Linnaeus, 1758)
Pontia daplidice edusa (Fabricius, 1777)
Anthocharis cardamines (Linnaeus, 1758)

Riodinidae
Hamearis lucina (Linnaeus, 1758)

Lycaenidae
Lycaena dispar rutilus (Werneburg, 1864)*
Lycaena phlaeas (Linnaeus, 1761)*
Lycaena thersamon (Esper, [1784])
Lycaena tityrus (Poda, 1761)
Neozephyrus quercus (Linnaeus, 1758)*
Thecla betulae (Linnaeus, 1758)*
Satyrium w-album (Knoch, 1782)*
Satyrium pruni (Linnaeus, 1758) *
Satyrium spini ([Den. & Schiff.], 1775)*
Satyrium ilicis (Esper, [1779])*
Satyrium acaciae (Fabricius, 1787)
Celastrina argiolus (Linnaeus, 1758)
Cupido argiades (Pallas, 1771)
Maculinea arion ligurica (Wagner, 1904)* HT
Glaucopsyche alexis (Poda, 1761) *
Plebejus argus (Linnaeus, 1758)
Plebejus argyrognomon (Bergsträsser, 1779)
Aricia agestis ([Den. & Schiff.], 1775)*
Polyommatus icarus (Rottemburg, 1775)
Polyommatus daphnis ([Den. & Schiff.], 1775)
Polyommatus bellargus (Rottemburg, 1775)

Nymphalidae
Libythea celtis (Laicharting, 1782)*
Limenitis reducta (Staudinger, 1901)*
Neptis sappho (Pallas, 1771)*
Argynnis pandora ([Den. & Schiff.], 1775)*
Argynnis paphia (Linnaeus, 1758)*
Argynnis adippe ([Den. & Schiff.], 1775)
Issoria lathonia (Linnaeus, 1758)
Brenthis daphne ([Den. & Schiff.], 1775)*
Boloria dia (Linnaeus, 1767)
Euphydryas maturna (Linnaeus, 1758)*
Melitaea cinxia (Linnaeus, 1758)
Melitaea didyma (Esper, 1778)
Melitaea phoebe ([Den. & Schiff.], 1775)
Melitaea athalia (Rottemburg, 1775)
Melitaea britomartis (Assmann, 1847)
Araschnia levana (Linnaeus, 1758)
Nymphalis io (Linnaeus, 1758)*
Nymphalis polychloros (Linnaeus, 1758)*
Nymphalis c-album (Linnaeus, 1758)*
Vanessa atalanta (Linnaeus, 1758)*
Vanessa cardui (Linnaeus, 1758)
Pararge aegeria tircis (Godart, 1821)
Lasiommata megera (Linnaeus, 1767)
Lasiommata maera (Linnaeus, 1758)
Coenonympha pamphilus (Linnaeus, 1758)
Coenonympha arcania (Linnaeus, 1761)
Coenonympha glycerion (Borkhausen, 1788)
Maniola jurtina (Linnaeus, 1758)
Melanargia galathea (Linnaeus, 1758)
Aphantopus hyperantus (Linnaeus, 1758)
Minois dryas (Scopoli, 1763)
Brintesia circe (Fabricius, 1775)

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Contribution to the knowledge of the Asiatic *Amphipyra* Ochsenheimer, 1816 with the description of four new species and one new subspecies (Noctuidae, Amphipyrinae Guenee, 1837)

Péter Gyulai

Abstract. Description of four new species and one new subspecies of *Amphipyra* Ochsenheimer, 1816 is provided with 22 adult images and 31 genitalia figures.

Keywords. *Amphipyra*, new description, taxonomy, Asia.

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Introduction

The most recent publication on the genus *Amphipyra* Ochsenheimer, 1816 by Ronkay et al. (2023), gives the diagnosis of altogether six new species and a new subspecies, as well as revises the status of a taxon and designates a lectotype. The author of the present paper carefully studied his own vast *Amphipyra* material, during which, in addition to those mentioned in the publication cited above, he managed to establish the existence of four additional species and one subspecies of *Amphipyra* that are new to science. Below are descriptions of the new taxa, with color and genitalia images. Unfortunately, most of the species are very local or rare, in some cases they are only known from one or a few specimens and it was possible to study a large series of only a few of them. It is worth mentioning that most of the taxa within this genus are very similar to each other in their external features (different shades of the brownish or greyish ground color of forewings only, and very simple forewing pattern of dorsal forewing surface) and also in male and female genitalia configuration. The best keys for a positive determination of the males are the size and shape of the uncus and the configuration of the vesica (number, arrangement and size of the diverticuli, cornuti, plates and scobination). In females, the shape of the ductus bursae and the appendix and corpus bursae are the most worthy of study.

Abbreviations for personal and institutional collections used herein: HM = genitalia slide of Márton Hreblay; HMB = collection of Márton Hreblay in HNHM (Budapest, Hungary); HNHM = Hungarian Natural History Museum (Budapest, Hungary); GYP = genitalia slide of Péter Gyulai; PGM = collection of Péter Gyulai (Miskolc, Hungary); RL= genitalia slide of László Ronkay; ZFMK = Zoologisches Forschungsmuseum Alexander Koenig (Zoological Research Museum Alexander Koenig), (Bonn, Germany); m = male; f = female; HT = holotype; PT = paratype; prov. = province.
The type material of *Amphipyra charon* Draudt, 1950 is deposited in ZFMK, while all of the types and figured specimens are deposited in the collection of the author.

Descriptions of the new taxa

Amphipyra huilini sp. n. (Figs 1, 23, 24)

Holotype. Male, "CHINA, Prov. Sichuan, Ching-cheng Shan, 1500-1800 m, 31°12' N, 102°47' E, 1-30. IX. 2006, leg. V. Siniaev & Team", slide no. GYP 5953 (depisoted in PGM).

Citation. Gyulai P. 2024: Contribution to the knowledge of the Asiatic *Amphipyra* Ochsenheimer, 1816 with the description of four new species and one new subspecies (Noctuidae, Amphipyrinae Guenee, 1837). – Lepidopterologica Hungarica 20(1): 57–69.

Diagnosis. The new species (Fig. 1) is the sister species of the Indo-Chinese *Amphipyra owadai* Hreblay, Peregovits & Ronkay, 1999 and of the Chinese *Amphipyra joelmineti* L. Ronkay & G. Ronkay, 2023 (Fig. 2). It is the smallest species among the three relative taxa; its wingspan 45 mm, while *Amphipyra joelmineti* 53–58 mm and *A. o. owadai* is 61–63 mm, and the specimens of ssp. *nepalensis* are 53–59 mm. Besides the significantly smaller size, *Amphipyra huilini* **sp. n.** can be distinguished from *A. o. owadai* and the ssp. *nepalensis* (figured in Ronkay & Ronkay, 2023) by its unicolorous dark brown forewings, without wing pattern; from the most similar *A. joelmineti* by its less elongated forewings and the much more reddish hindwings. The male genitalia of *A. huilini* **sp. n.** (Figs 23, 24) conspicuously differ from the most similar *A. joelmineti* (Figs 25, 26) and that of the less resembling further two relative taxa by the broadly rounded (and not angular) medial section of the dorsal side of the valvae, the reduced left one and the very small thorn-like right one of the two asymmetrical saccular processes, which are much longer and differently shaped in the three relative taxa.

Description. Wingspan 45 mm. Antennae filiform. Head and thorax dark brown. Forewing mono-chromatic shining dark brown, almost black, without any of visible wing pattern; fringe like the ground color. Hindwing dark red, with a dark brown wedge-like field in the fore section, broadening towards the margin. Wing pattern absent, fringe pale reddish. Underside of wings shining, slightly paler in colour than upperside.

Male genitalia (Figs 23, 24) can be characterized by the long and strong uncus, terminated with an elongated thorn; subquadrangular, dorsally extended juxta; long, v-shaped vinculum; broad valvae, broadly rounded medial section of dorsal side of valvae, with a regressed and not prominent left saccular process and a very small thorn-like right one. Aedeagus strong, with a long, strongly sclerotised carinal plate. Vesica tube having a small prominence dorsally and a row of small cornuti with almost the same size basally; subbasally armed with a row of somewhat larger ones, continuing medially with some very long and strong ones sitting on a broad sclerotized base. The cornuti field terminated with some strong sclerotized bars.

Distribution. The new species is known from Central China (Prov. Sichuan).

Etymology. The new species is dedicated to Mr. Han Hui Lin (Harbin, China), a specialist of the Asiatic Noctuidae.

Amphipyra perflua sichuana ssp. n. (Figs 3, 4, 27, 28, 29, 30, 43)

Holotype. male, "CHINA, prov. Sichuan, SW of Heishui, 3100 m, 320031°N, 1030151° E, 4-8. VIII. 2012, leg. M. Murzin", slide no. GYP 5947 (deposited in PGM).

Paratypes. 5 males, 3 females, "CHINA, prov. Gansu, 2350 m, Min Shan, 50 km W of Wudu, 33°30' N, 104°35' E, 27. VII.-14. VIII. 2000, leg. Plutenko & Siniaev" (PGM); slide nos.: GYP 5975 (male), 5959 (female).

Diagnosis and description. *Amphipyra perflua* (Fabricius, 1787) (Figs 5, 6) is a widely distributed Transpalaearctic species. The southern-easternmost populations in central and southern China (Figs 3, 4) are similar both in the external and genitalia features to the nominotypical subspecies, however somewhat differ from the nominotypical subspecies by in average larger size (49–57 mm and 44–50 mm, respectively). The best character for separation (besides the very different geographical distribution pattern) in the external features is the end of the postmedial line; it ends perpendicular on the inner edge of the forewing in the nominotypical subspecies, while oblique in the new subspecies. In the male genitalia of the new subspecies (Figs 27, 28, 29, 30) the cornuti of the bundle in the vesica is longer than in the nominotypical subspecies (Figs 31, 32). In the female genitalia, the shape of the antrum plate is very variable in both taxa, but of the new subspecies the ductus bursae and the corpus bursae are longer than in the nominotypical one (Figs 43 and 44).

Distribution and biology. The new subspecies is known from the provinces of Sichuan and Gansu in China. It occurs at higher altitudes in late summer.

Etymology. The name of the new subspecies is after the province of the holotype locality.

Amphipyra yunnannocturna sp. n. (Figs 7, 8, 9, 12, 33, 34, 45, 46)

Holotype. female, China, N Yunnan, Diqing Tibetan Aut. Pref., 5 km SE of Deqin, 3356 m, 19. VI. 2009, leg. B. Benedek, GYP 5936 (deposited in PGM).

Paratypes. 2 males, with the same data as of the holotype. (PGM); 1 male, with the same data as of the holotype, but with the date 19. VI. 2009. (PGM); 2 females, China, prov. Sichuan, env. Shade, (N of Jiulong), 3400 m, 19-21. VIII. 2007, leg. S. Murzin (PGM); slide nos.: RL 9977 (male), GYP 5937 (female).

Diagnosis. The most similar, close relative of *Amphipyra yunnannocturna* **sp. n.** (Figs 7, 8, 9, 12) is *Amphipyra charon* Draudt, 1950 (Figs 10, 11), but the new species has a much darker ground color of the wings without the red-brown suffusion and lacks or almost lacks the conspicuous diffuse light shade on the outer edge of the transverse lines, particularly on the subterminal line, compared to *A. charon*. No male genitalia figure was available from the closely related species *A. charon,* since the entire type series consists of only female individuals, so a diagnostic comparison of the male genitalia was not possible.

It is very easy to distinguish the female genitalia of the new species (Figs 45, 46), from those of *A. charon* (Fig. 47), since *A. yunnannocturna* **sp. n.** has much shorter ductus bursae, much smaller appendix bursae and longer, more elongated corpus bursae.

Description. (Figs 7, 8, 9, 12) Medium-sized species, with a wingspan of 37–44 mm. Antennae filiform in both sexes. Head and thorax dark brown. Forewing monochromatic dark brown, slightly shining. Wing pattern not conspicuous, pale brownish; only the sinuous, zigzagging antemedial and postmedial transverse lines and the orbicular spot being well visible. Hindwing light unicolorous brown, with obscure darker discal spot, marginal area with broad, slightly darker suffusion. Underside of the wings shining, and brownish, inner costal area of forewing and of hindwing much lighter. The diffuse shade of the postmedial line in the forewing and of the medial line in the hindwing well visible.

Male genitalia (Figs 33, 34). Uncus very long, almost evenly broad, apically with a tiny horn. Vinculum long, v-shaped. Valva elongated, straight, slightly broaden distally, cucullus section asymmetrically rounded terminally. Aedeagus broad, straight, ventral carinal bar long, slim, and strongly sclerotized. Vesica recurved dorsad, broad, bear about ten strong, shortly conical cornuti sitting on a broad base distally and subterminally.

Female genitalia. (Figs 45, 46). Papillae anales elongate, apically rounded. Apophyses posteriores and anteriores very long and slim, the apophyses anteriores shorter. Antrum funnel-like. Ductus bursae long, tubular. Appendix bursae small, terminally rounded. Corpus bursae elongated-saccate, tapering in the long medial section, while much broader anteriorly and enlarged terminally.

Distribution and biology. The new species is known only from the Chinese provinces Yunnan and Sichuan, above 3000 m.

Etymology. The name of the new species refers to the discovery of the first specimens in the province of Yunnan by night.

Amphipyra meridionalis sp. n. (Figs 13, 14, 15, 35, 36, 48, 49)

Holotype. male, "IRAN, prov. Boyerahmad-va- Kohgiluyeh, SE- Zagros, 3000 m, Kuh-e-Dena, n. Bijan pass, 6 km N of Cisakht; 5 - 6. VI. 2005, leg. P. Gyulai & A. Garai", slide no. GYP 2370 (deposited in PGM).

Paratypes. 1male, IRAN, prov. Boyerahmad-va- Kohgiluyeh, SE- Zagros, 3000 m., Kuh-e-Dena, n. Bijan pass, 6 km N of Cisakht; 8 - 9. X. 2002, leg. P. Gyulai & A. Garai (PGM); 1 female, same data, but 10-11. V. 2002, leg. P. Gyulai & A. Garai (PGM); 2 males, IRAN, prov. Boyerahmad-va-Kohgiluyeh, SE- Zagros, Kuh-e-Dena, 2450 m, 5 km SW of Sisakht, 04 - 05. VI. 2005, leg. P. Gyulai & A. Garai (PGM); 1 male, 1 female, IRAN, prov. Boyerahmad-va-Kohgiluyeh, SE- Zagros, 3000 m, Kuh-e-Dena, n. Bijan pass, 6 km N of Sisakht, 13 - 14. VII. 2010, leg. P. Gyulai & A. Garai (PGM); 1 male, IRAN, prov. Esfahan, C - Zagros, 2600 m, 2 km NE of Semirom, 05 - 10. V. 2002, leg. P. Gyulai & A. Garai (PGM); 2 males, IRAN, prov. Esfahan, C - Zagros, 2600 m, 2 km NE of Semirom, 03 - 04. VI. 2005, leg. P. Gyulai & A. Garai (PGM); 1 male, IRAN, prov. Busher, S - Zagros, 400 m, near Dalekhi, 24. - 25. X. 2003, leg. P. Gyulai & A. Garai (PGM); 1 male, IRAN, prov. Fars, S - Zagros, 7 km N of Sivand; 9 - 10. VI. 2003. leg. P. Gyulai & A. Garai (PGM); slide nos.: GYP 1859, 2029, 2120, 2530, 2723 (males), 2567, 5938 (females).

Diagnosis. The closest relatives of the new species (Figs 13, 14, 15) are *A. tragopoginis*

(Clerck, 1759) (Figs 16, 17), and *A. turcomana* Staudinger, 1888 (Figs 20, 21), however, *A. meridionalis* is rather resembling to the former one in the external features, while more similar to the second species in the male genitalia features, whereas the new species has individual features in the female genitalia. *Amphipyra meridionalis* **sp. n.** (Figs 13, 14, 15) can be separated from both known species with its lighter, shining greyish suffused forewings with the sinuous, ribbon-like, conspicuously darker, greyish-brown subterminal field and the lighter, greyish suffused hindwings. In the male genitalia, the new species (Figs 35, 36) differs from *A. turcomana* (Figs 41, 42) in its medially more tapering valvae with less broad cucullus, shorter uncus, longer dorsal medial extension of the deltoid juxta, and the much less ample terminal diverticulum with a denser cover of short, hair-like spiculi and a much stronger, longer single spine. The male genitalia of the new species are more distinctive from those of *A. tragopoginis* (Figs 37, 38), having much shorter uncus, less robust, medially more tapering valvae, much longer dorsal medial appendage of the deltoid juxta, much smaller terminal diverticulum of the vesica with a dense cover of short hair-like spiculi (while it is practically naked in *A. tragopoginis*) and the less numerous cornuti and spines are composed in one group (while those are in two groups in *A. tragopoginis*). In the female genitalia, the new species (Figs 48, 49) has calyculate ductus bursae (it is tubular both in *A. tragopoginis* (Fig. 50) and in *A. turcomana* (Figs 52, 53)) and larger appendix bursae than *A. turcomana* (Figs 52, 53) (which has a very small appendix bursae), but smaller than that of *A. tragopoginis* (Fig. 50), being conjoined with the corpus bursae in the whole inner section. Additionally, the corpus bursae of the new species is strongly tapering terminally, while it is broadly rounded in the two relative species. The apophyses anteriores of *A. meridionalis* **sp. n.** are conspicuously longer than in *A. tragopoginis*.

Description. (Figs 13, 14, 15). Medium-sized species, wingspan 30–33 mm. Antennae filiform in both sexes. Head and thorax brown. Forewing monochromatic light shining greyish-brown, suffused with blackish scales. Wing pattern reduced; only the sinuous, ribbon-like, conspicuously darker, greyish-brown subterminal field visible, while orbicular and reniform stigmata present by a single and a double dot. Hindwing light unicolorous greyish brown, with obscure darker discal spot, the marginal area slightly broadly darker and darker suffused; medial line and cilia ochreous. The underside of wings shining, whitish-greyish.

Male genitalia (Figs 35, 36). Uncus long, elongate spatulate. Vinculum rather short, v-shaped. Valva evenly curved dorsad, cucullus strongly broaden and hairy. Juxta deltoid, dorsomedial extension long. Aedeagus broad, curved ventrad, carinal bar broadly sclerotized. Vesica bears two diverticuli, from which the subbasal dorsal one rather small, tongue-like, while the terminal one globular with a dense cover of short, hair-like spiculi and a much stronger, longer single spine.

Female genitalia. (Figs 48, 49). Papillae anales elongate, apically rounded. Apophyses posteriores and anteriores very long and slim, the apophyses anteriores much shorter. Antrum funnel-like. Ductus bursae short, and posteriorly broaden. Appendix bursae long, less prominent, terminally broaden, angular. Corpus bursae elongated-saccate, strongly curved and tapering terminally.

Distribution and biology. The new species is known only from the southern Zagros Mts. in Iran. It occurs mostly in higher altitudes in mid-summer, but appears in the low ranges near the Persian Gulf in autumn. The habitat of the type is shown in fig. 22.

Etymology. The name of the new species is after its southern distribution pattern.

Amphipyra occithianshanica sp. n. (Figs 18, 19, 39, 40, 51)

Holotype. male, "USSR, ÜBSSR (Uzbekistan), W Thian-Shan, Chimgan, 800-2000 m, 18-25. 07. 1990, leg. P. Gyulai & M. Hreblay", slide GYP 2121 (deposited in PGM).

Paratypes. 43 males, 11 females, with the same data as of the holotype (PGM); 27 males, 24 females, with the same data as of the holotype (HMB, HNHM); 4 males, 4 females, with the same data as of the holotype (HNHM); slide nos.: GYP 5991(male), 5977 (female).

Diagnosis. The closest relatives of the new species (Figs 18, 19) are *A. tragopoginis* (Clerck, 1759) (Figs 16, 17) and *A. turcomana* Staudinger, 1888 (Figs 20, 21). *Amphipyra occithianshanica* **sp. n.** is rather similar to the latter one with its light, shining brownish suffused forewings but the double dark brown points of the reniform stigma and the single one of the or-

bicular stigma are present and well visible, like in *A. tragopoginis*, from which the new species differs in the much lighter forewings. In the male genitalia, the new species (Figs 39, 40) shows more affinities to *A. turcomana* (Figs 41, 42) but differs from it by the less concave ventral-medial section of the valvae with less broad cucullus, and the much longer dorsal medial extension of the deltoid juxta. In the aedeagus, the ventral carinal plate of the new species is much larger than in *A. turcomana*. In the vesica of *A. occithianshanica* **sp. n.,** the subbasal diverticulum is smaller and less prominent, and the terminal diverticulum has a much larger and denser bundle and cover of hair-like spiculi with different lengths than in *A. turcomana*, besides the long, arched spines. The male genitalia of the new species are more distinctive from *A. tragopoginis* (Figs 37, 38) since it has shorter uncus, and much longer dorso-medial extension of the less deltoid juxta. In the vesica of *A. occithianshanica* **sp. n.**, the subbasal diverticulum is significantly smaller, the terminal diverticulum bearing a much larger and denser bundle and cover of hair-like spiculi with different length (besides the long arched spines), while the terminal diverticulum is practically naked from the small hair like spiculi in *A. tragopoginis*. However, the female genitalia of *A. occithianshanica* **sp. n.** (Fig. 51) are more similar to those of *A. tragopoginis* (Fig. 50). The new species has much larger appendix bursae than in *A. turcomana* (Figs 52, 53) (which has a very small appendix bursae), and significantly longer apophyses anteriores and posteriores and somewhat longer ductus bursae than in *A. tragopoginis* (Fig. 50).

Description. (Figs 18, 19) Medium-sized species, with a wingspan 30–34 mm. Antennae filiform in both sexes. Head and thorax brown. Forewing monochromatic light shining greyish-brown, suffused with blackish scales. Wing pattern reduced; only the sinuous, ribbon-like, conspicuously darker, greyish-brown subterminal field visible, while the orbicular and reniform stigmata being marked with one single and one double dots. Hindwing light unicolorous greyish brown, with obscure darker discal spot, the marginal area slightly broadly darker and darker suffused. The underside of wings shining, whitish-greyish.

Male genitalia (Figs 39, 40). Uncus long, elongate spatulate. Vinculum rather short, v-shaped. Valva evenly curved dorsad, cucullus strongly broaden and hairy. Juxta deltoid, with long dorso-medial extension. Aedeagus broad, curved ventrad, carinal bar broadly sclerotized. Vesica bears two diverticuli, from which the subbasal dorsal one rather small, and tongue-like, while the terminal diverticulum globular with a dense cover of short, hair-like spiculi and a few much stronger and longer spines.

Female genitalia. (Fig. 51). Papillae anales elongate, apically rounded. Apophyses posteriores and anteriores very long and slim, while the apophyses anteriores much shorter. Antrum funnel-like. Ductus bursae short, posteriorly broaden. Appendix bursae long, less prominent, terminally broaden, and angular. Corpus bursae elongated-saccate, strongly curved and tapering terminally.

Distribution and biology. The new species is known only from the western Thian Shan.

Etymology. The name of the new species is after its distribution, since it was found only in the western Thian Shan.

Remark. It is worth mentioning that all the dissected specimens from the western Thian Shan belong to the new species, while all the externally similar dissected male and female specimens from the other parts of Uzbekistan and from Tajikistan and NE Iran proved to be *A. turcomana* and only in one case *A. tragopoginis*.

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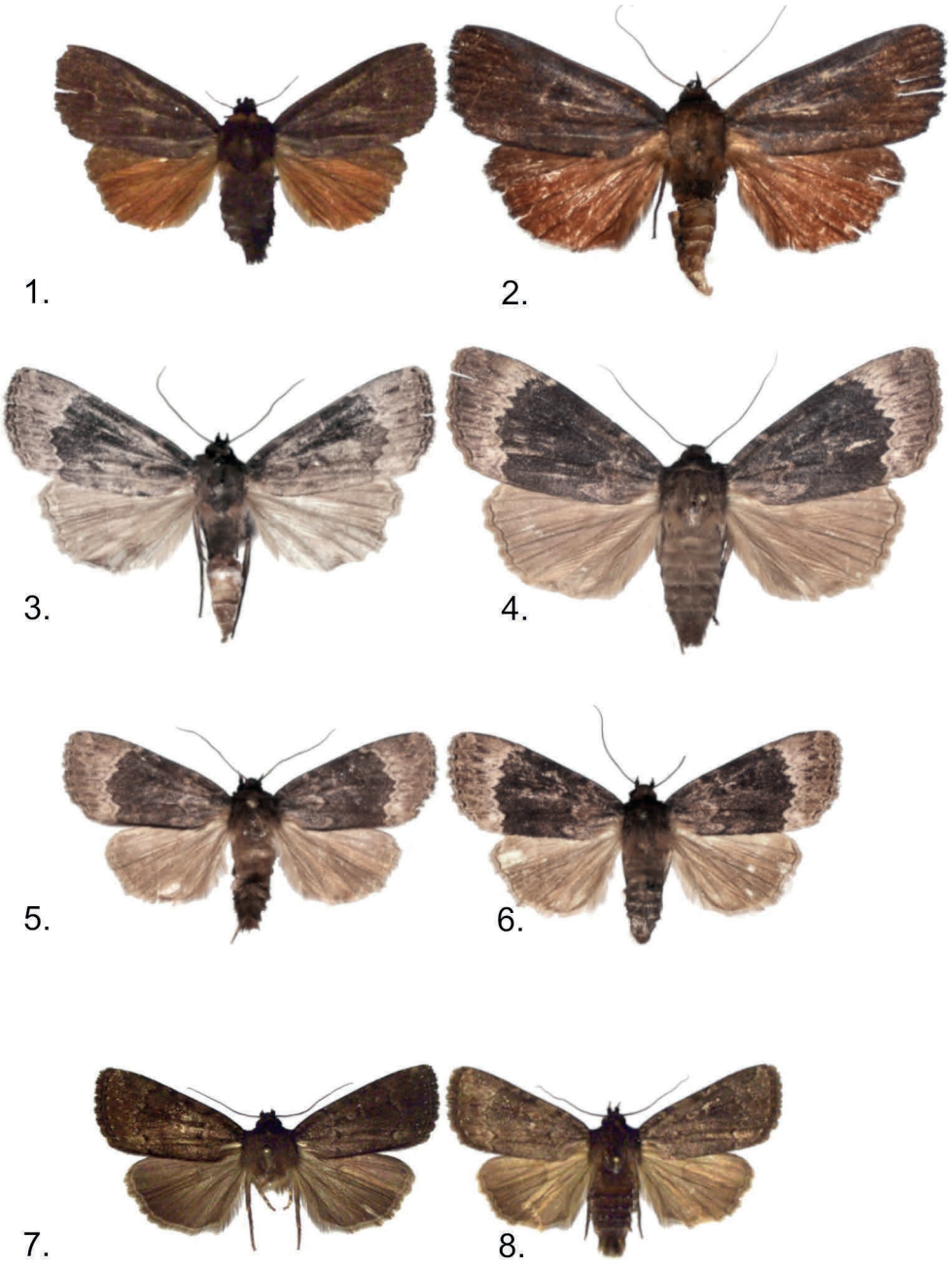

Figures 1–8. *Amphipyra* spp. and ssp. adults. **1.** *A. huilini* **sp. n.**, HT, m, China, Sichuan, GYP 5953; **2.** *A. joelmineti* Ronkay & Ronkay, 2023, m, China, Hunan, GYP 5951; **3.** *A. perflua sichuana* **ssp. n.**, HT, m, China, Sichuan, GYP 5947; **4.** *A. perflua sichuana* **ssp. n.**, PT, f, China, Gansu, GYP 5947; **5.** *A. perflua* (Fabricius, 1787), m, N Hungary, Jósvafő; **6.** *A. perflua* (Fabricius, 1787), f, N Hungary, Jósvafő; **7.** *A. yunnannocturna* **sp. n.**, m, PT, China, N Yunnan, 5 km SE of Deqin, RL 9977; **8.** *A. yunnannocturna* **sp. n.**, m, PT, China, N Yunnan, 5 km SE of Deqin.

Figures 9–21. *Amphipyra* spp. adults. **9.** *A. yunnannocturna* **sp. n.**, f, HT, China, N Yunnan, GYP 5936; **10.** *A. charon* Draudt, 1950, HT, f, China, Hunan, ZFMK; **11.** *A. charon* Draudt, 1950, HT, f, ZFMK, labels; **12.** *A. yunnannocturna* **sp. n.**, f, PT, China, prov. Sichuan, GYP 5937; **13.** *A. meridionalis* **sp. n.**, HT, m, Iran, Zaghros, GYP 2370; **14.** *A. meridionalis* **sp. n.**, PT, f, Iran, Zaghros, GYP 2567; **15.** *A. meridionalis* **sp. n.**, PT, f, Iran, Busher, GYP 5938; **16.** *A. tragopoginis* (Clerck, 1759), m, Hungary, Bükk Mts.; **17.** *A. tragopoginis* (Clerck, 1759), f, Hungary, Nyékládháza; **18.** *A. occithianshanica* **sp. n.**, HT, m, Uzbekistan, W. Thian Shan, GYP 2121; **19.** *A. occithianshanica* **sp. n.**, PT, f, Uzbekistan, W Thian Shan, GYP 5977; **20.** *A. turcomana* Staudinger, 1888, m, Uzbekistan, Samarkand, GYP 5955; **21.** *A. turcomana* Staudinger, 1888, f, Iran, Khorasan, GYP 2722.

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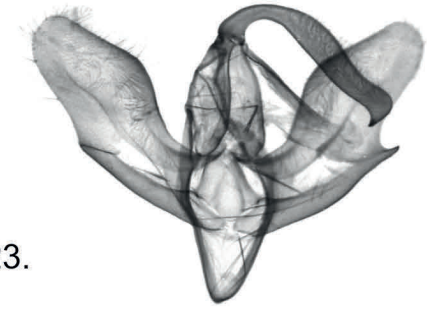

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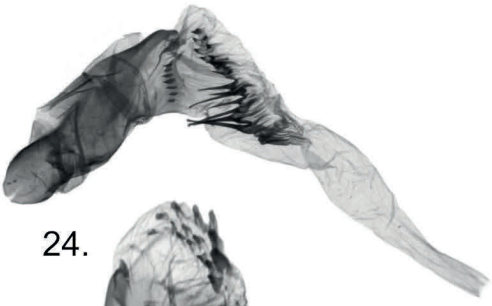

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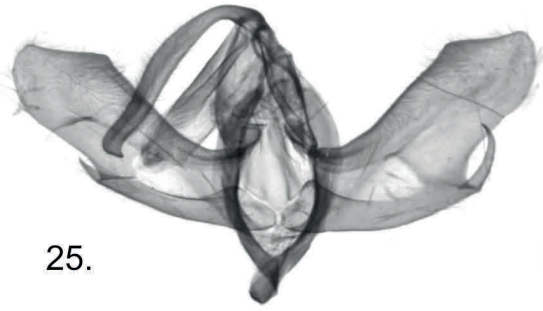

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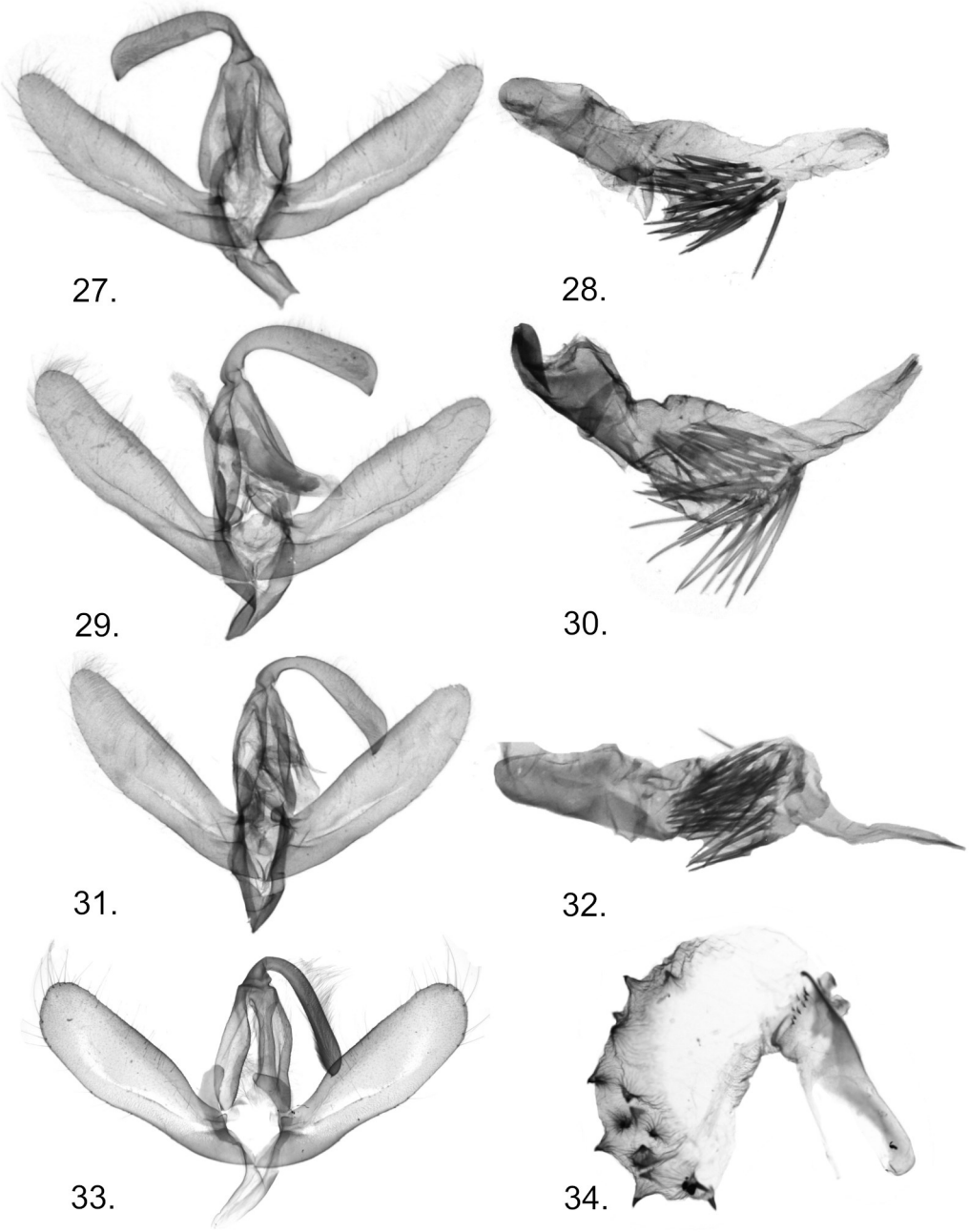
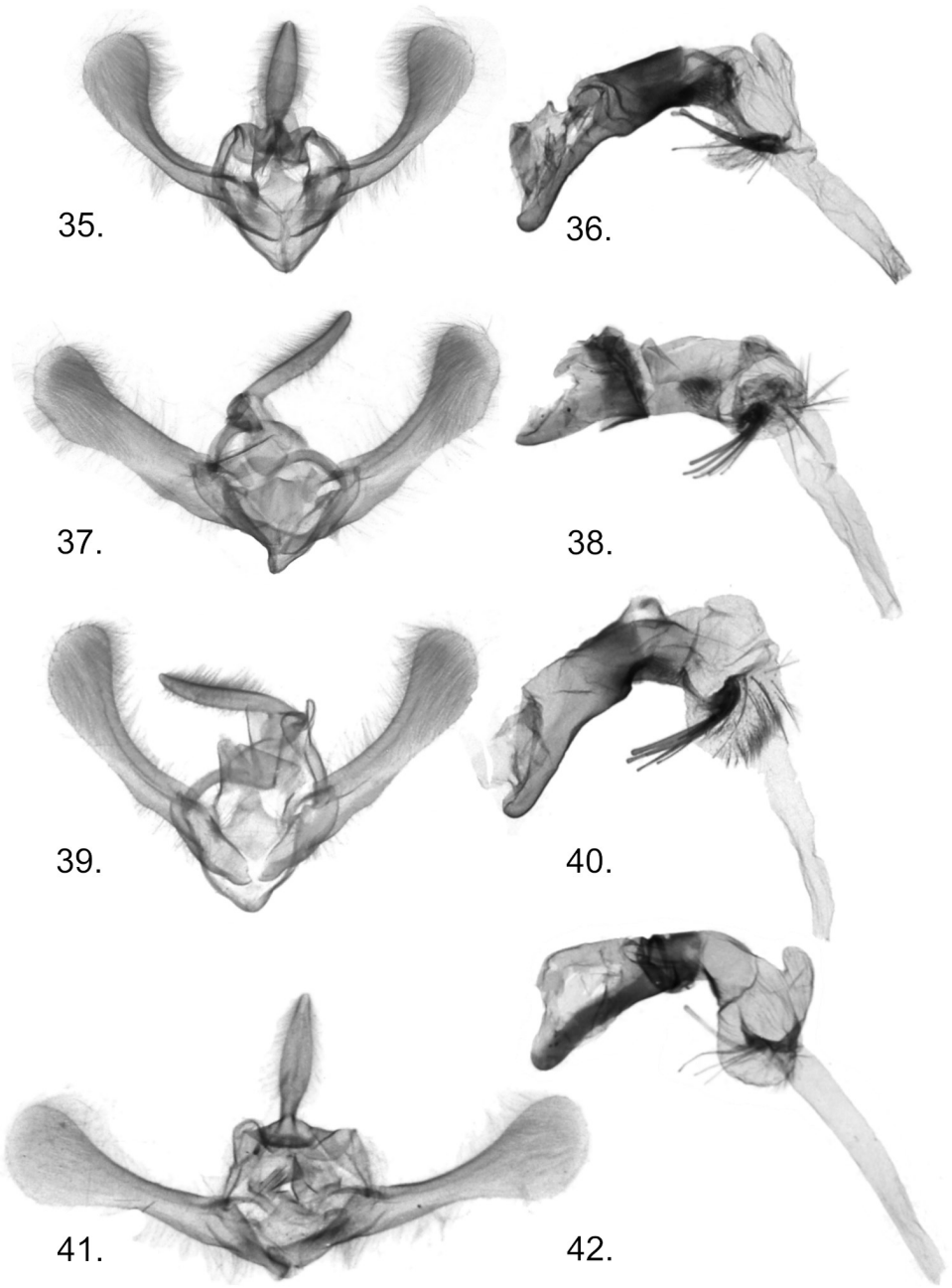
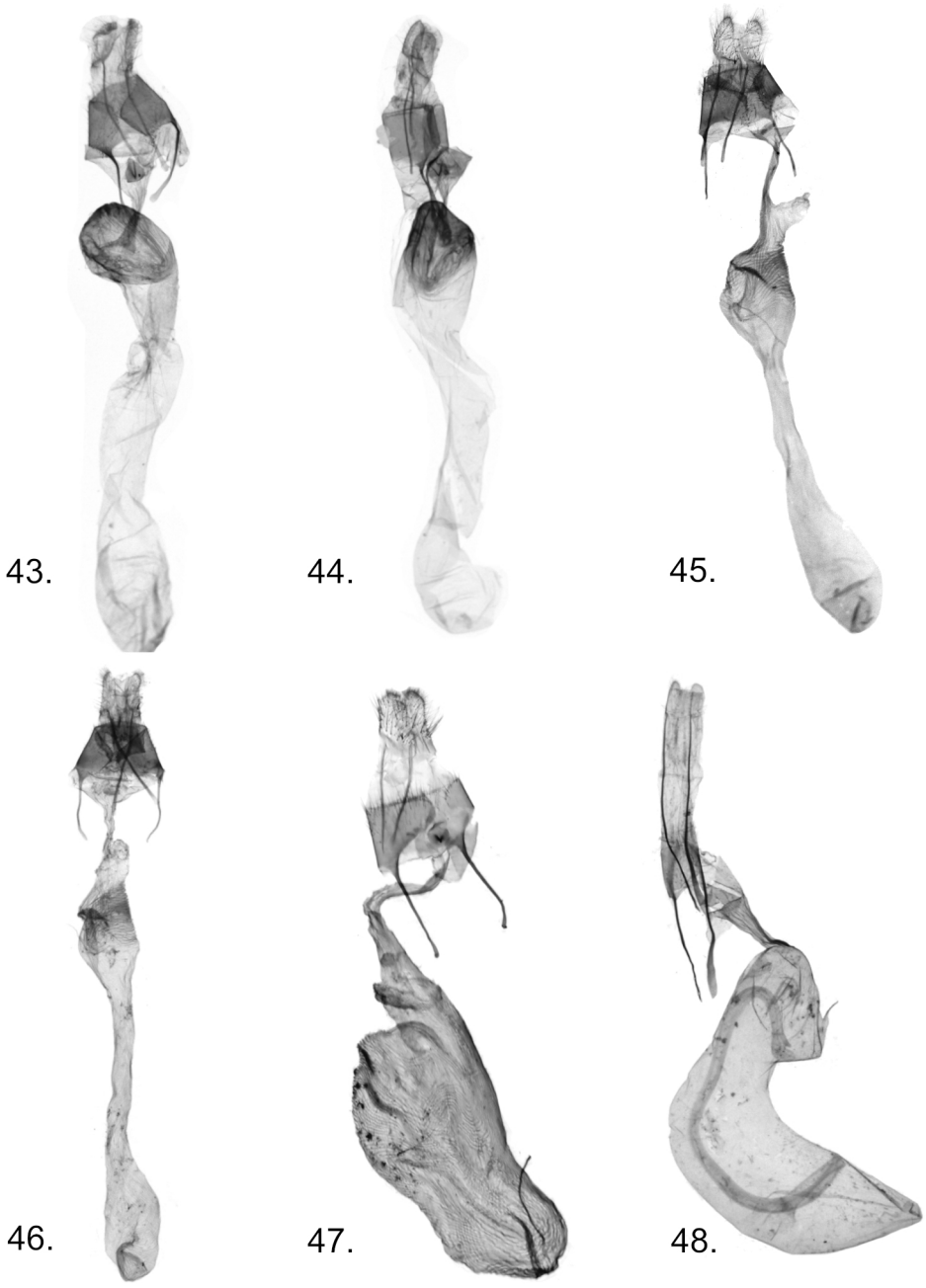
Figure 22. Type locality of *A meridionalis* **sp. n.**, Iran, prov. Boyerahmad-va-Kohgiluyeh, SE-Zagros, 3000 m, Kuh-e-Dena, n. Bijan pass (expedition P. Gyulai & A. Garai)
Figures 23–26. *Amphipyra* spp. male genitalia. **23, 24.** *A. huilini* **sp. n.**, HT, China, Sichuan, GYP 5953; **25, 26.** *A. joelmineti* Ronkay & Ronkay, 2023, China, Hunan, GYP 5951.



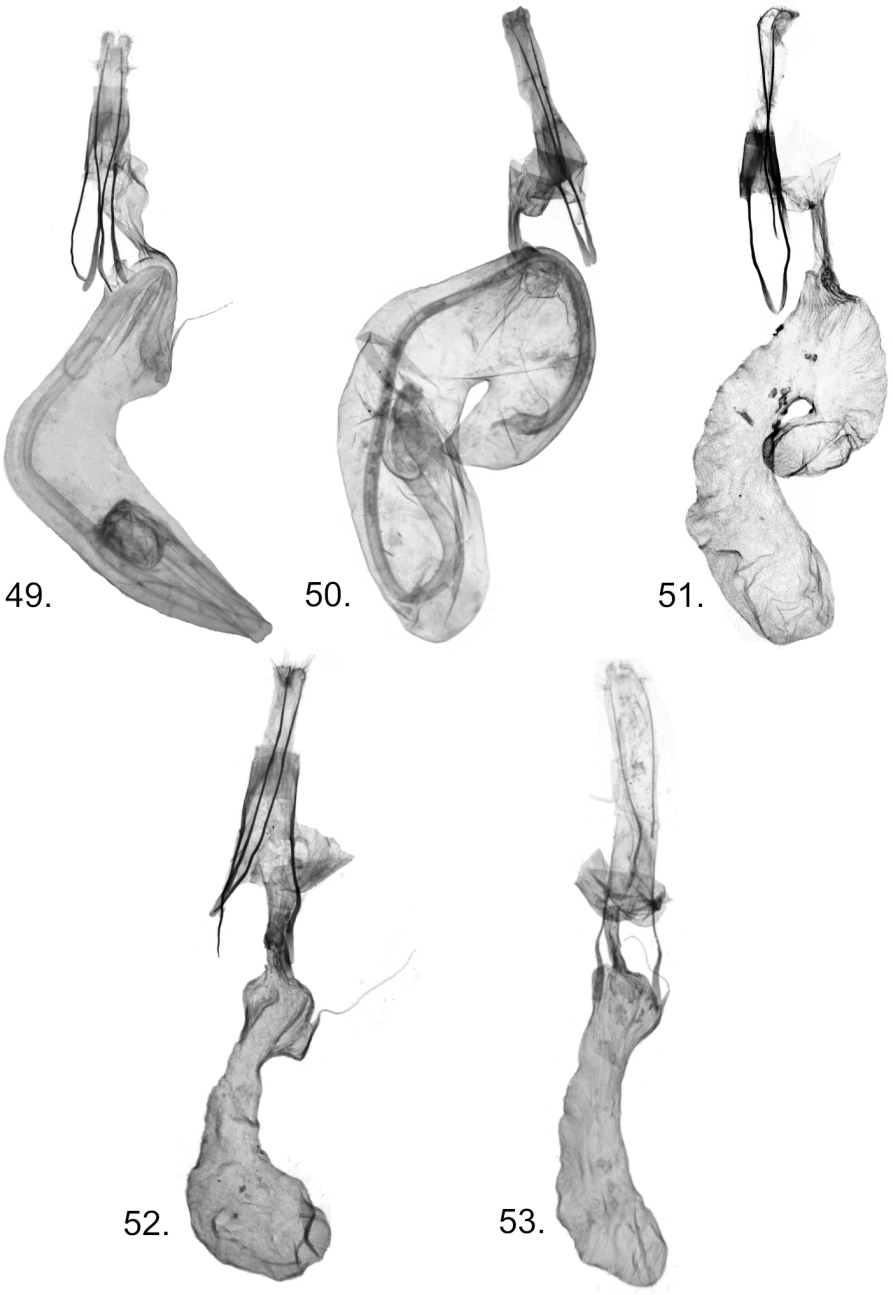
Figures 27–34. *Amphipyra* spp. and ssp. male genitalia. **27, 28.** *A. perflua sichuana* **ssp. n.**, HT, China, Sichuan, GYP 5947; **29, 30.** *A. perflua sichuana* **ssp. n.**, PT, China, Gansu, GYP 5995; **31, 32.** *A. perflua* (Fabricius, 1787), N Hungary, Jósvafő, GYP 5973; **33, 34.** *A. yunnannocturna* **sp. n.**, PT, China, N Yunnan, RL 9977.



Figures 35–42. *Amphipyra* spp. male genitalia. **35, 36.** *A. meridionalis* **sp. n.**, HT, Iran, Zaghros, Dena, GYP 2370; **37, 38.** *A. tragopoginis* (Clerck, 1759), Hungary, Klementina, GYP 5943; **39, 40.** *A. occithianshanica* **sp. n.**, HT, Uzbekistan, Thian Shan, GYP 2121; **41, 42.** *A. turcomana* Staudinger, 1888, Uzbekistan, Samarkand, GYP 5955.



Figures 43–48. *Amphipyra* spp. and ssp. female genitalia. **43.** *A. perflua sichuana* **ssp. n.**, PT, China, Gansu, GYP 5959; **44.** *A. perflua (*Fabricius, 1787), N Hungary, Jósvafő, GYP 5974; **45.** *A. yunnannocturna* **sp. n.**, PT, China, N Yunnan, GYP 5936; **46.** *A. yunnannocturna* **sp. n.**, PT, China, Sichuan, GYP 5937; **47.** *A. charon* Draudt, 1950, PT, China, Hunan, HM 8391, ZFMK; **48.** *A. meridionalis* **sp. n.**, PT, Iran, Busher, GYP 5938.



Figures 49–53. *Amphipyra* spp. female genitalia. **49.** *A. meridionalis* **sp. n.**, PT, Iran, Zaghros, GYP 2567; **50.** *A. tragopoginis* (Clerck, 1759) Hungary, Bükk Mts., GYP 5942; **51.** *A. occithianshanica* **sp. n.**, PT, Uzbekistan, W Thian Shan, GYP 5977; **52.** *A. turcomana* Staudinger, 1888, Iran, Khorasan, GYP 2722; **53.** *A. turcomana* Staudinger, 1888, Tajikistan, Dushanbe, GYP 2572.

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Ronkay, L., Ronkay, G. & Landry, B. 2023: La collection Jacques Plante de Noctuidae Deuxième partie Amphipyrinae, Psaphidinae, Cuculliinae, Oncocnemidinae, Acontiinae, Pantheinae, Dyopsinae, Raphiinae, Acronictinae, Bryophilinae, Heliothinae, Condicinae et Xyleninae. Tome II. Nouveaux taxons. The Jacques Plante Noctuidae Collection. Amphipyrinae, Psaphidinae, Cuculliinae, Oncocnemidinae, Acontiinae, Pantheinae, Dyopsinae, Raphiinae, Acronictinae, Bryophilinae, Heliothinae, Condicinae and Xyleninae. Part 2. New taxa – Memoires de la Société de physique et d'histoire naturelle de Genève Volume *49,*. HETEROCERA, Budapest 2023

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New observations on the occurrence of *Aristotelia calastomella* (Christoph, 1872) in Hungary (Lepidoptera, Gelechiidae)

Imre Fazekas

Abstract. The author presents new bionomic and geographical data on *Aristotelia calastomella* (Christoph, 1872). He concludes that the species reaches the western limit of its geographical distribution in the Pannonian biogeographical region. Forest-steppe remnants in the Danube-Tisza Interfluve region of Hungary are relics of degraded, ancient habitats of the species. The fragmented occurrence of *Aristotelia calastomella* in Hungary undoubtedly justifies a genetic comparison of the Russian and Hungarian popu-lations.

Keywords. Bionomics, geographical spread, fragmentation.

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Résumé. L'auteur présente de nouvelles données bionomiques et géographiques sur *Aristotelia calastomella* (Christoph, 1872). Il conclut que l'espèce atteint la limite occidentale de sa répartition géographique dans la région biogéographique pannonienne. Les vestiges de forêt-steppe dans la région de l'interfluve Danube-Tisza en Hongrie sont des reliques d'anciens habitats dégradés de l'espèce. Selon lui, la présence fragmentée d'Aristotelia calastomella en Hongrie justifierait une comparaison génétique des populations russes et hongroises.

Introduction

In this journal (Fazekas 2024. pp. 29–34) I discussed in detail the bionomics and geographical distribution of *Aristotelia calastomella*. After the online publication of that paper, Ferenc Buschmann (H-Jászberény) informed me that he has additional specimens in his collection. He collected these specimens in previously unknown localities. The new habitats are different from those previously known so their description and presentation here are important for the general improvement of knowledge concerning species and will help the research into the species and facilitate the discovery of new habitats. I have studied and used the following sources to prepare this thesis: Bölöni, Molnár & Kun 2011; Fazekas 2024; Kocsis & Schweitzer 2009; Molnár & Kun 2000; Molnár 2008; Molnár &. Borhidi 2003.

Results

New data. 3 ex Alattyán, Bereki-erdő, 8.VIII.2015; 30.VII.2016; 8 ex Farmos, sziki tanösvény, 4–9.VIII.2017; 3 ex, Farmos, sziki tanösvény, 01.VI.2018. leg. et in coll. Buschmann (private collection, H-Jászberény). All specimens were recovered from a battery-powered UV light tube so-called bucket trap. 125-watt mercury vapour lamp did not attract the image.

Habitats. The vegetation of the two new sites (Alattyán and Farmos) differs significantly (Buschmann pers. comm.). The soil of the Farmos site is sandy, strongly saline, dominated by *Camphorosma annua* and *Festuca pseudovine*, lacking *Peucedanum* species and *Aster sedifolius*. The latter species is replaced by *Aster tripolium*. The larvae may live either on *Aster tripolium* or on *Camphorosma annua* plants, but it may also be possible that they prefer both species.

Citation. Fazekas I. 2024: New observations on the occurrence of *Aristotelia calastomella* (Christoph, 1872) in Hungary (Lepidoptera, Gelechiidae). – Lepidopterologica Hungarica 20(1): 71–74.

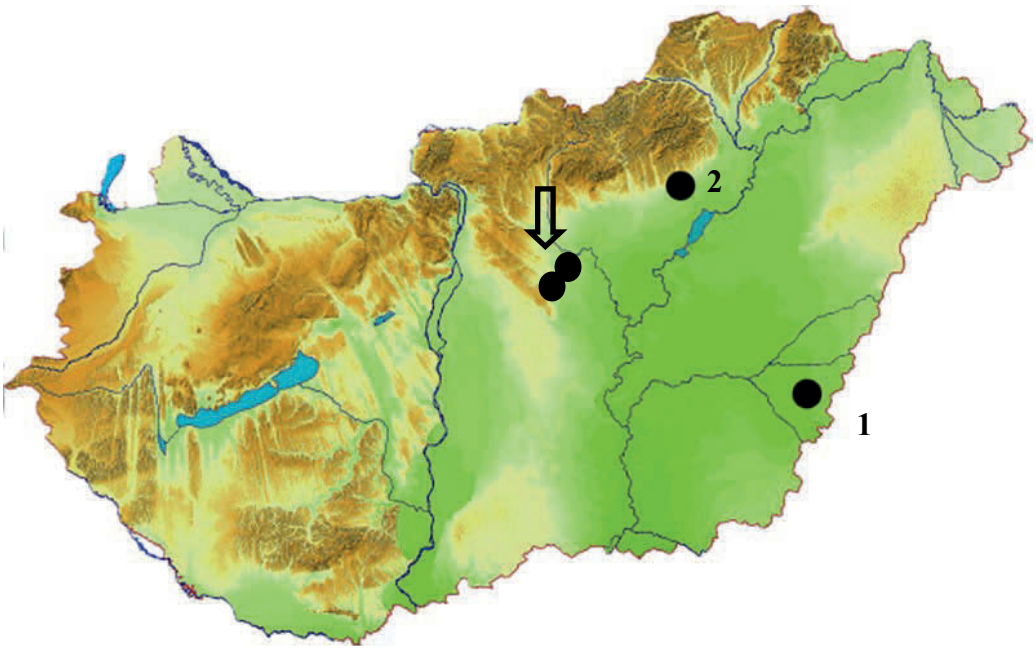

Fig. 1. Study sites with occurrences of *Aristotelia calastomella* in Hungary. Explanation: the arrow shows the new sites, number **1** is the first observation, number **2** is the second observation (after Fazekas 2024, modified)

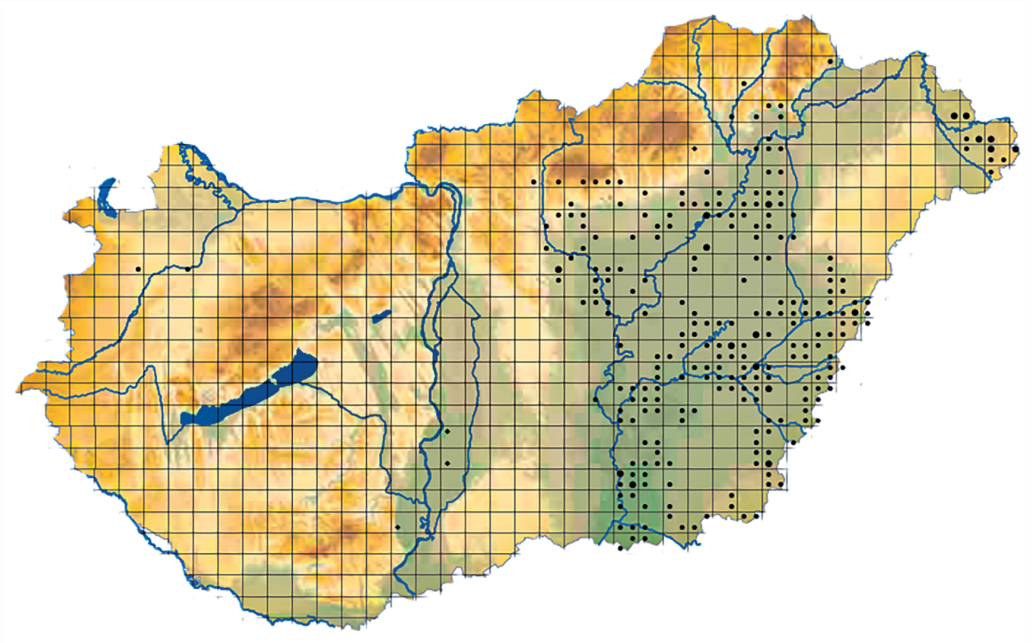

Fig. 2. The geographical distribution of the tall herb salt meadow steppes in Hungary (after Bölöni et al. 2011, modified). The large stands in Hungary are now mostly protected in National Parks, local protected areas and Natura 2000-sites (after Bölöni et al. 2011, modified).

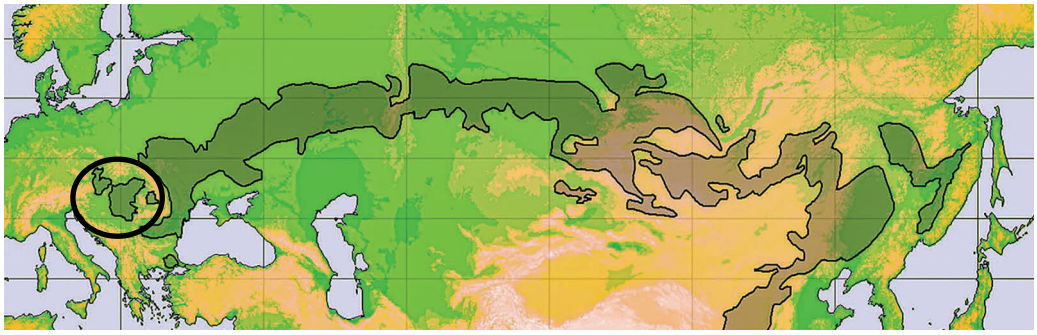

Fig 3. Approximate distribution ranges of forest-steppes in Trans-Palearctic. In Europe, it reaches its western limit in the Pannonian Biogeographical Region (black circle). Hypothetically, additional *Aristotelia calastomella* meta-populations should be sought in this vegetation zone, especially in southern Siberia. (Map by Erdős et al. 2022, modified) The salt meadow steppe is not marked.

General description of Alattyán (Bereki-erdő = Bereki forest): the new site belongs to the Hungarian Lowland (Eupannonicum) and is in the north-western part of the Tiszántúl flora (Crisicum). The typical plant community is the tall herb salt meadow steppes (Peucedano-Asteretum sedifolii Soó 1947 corr. Borhidi 1996), an important member of the forest-steppe complex. The endemic habitat of the Hungarian Great Plain, although similar in composition but with a significantly different species composition, grasslands and tall fescue are not uncommon in continental Eurasia. It is related to the cool-continental plant communities of southern Siberia and is on the list of highly protected plant communities in Hungary. This area was a vast marshland before the Zagyva River was regulated. Military maps from 1885 and surveys from 1929 demonstrate this. The climate of the area can be described as follows: The mean temperature in January is -2 degrees Celsius, and the mean temperature in July is +20,5 degrees Celsius. The average annual temperature is 10–11 degrees Celsius. The annual water deficit is close to 300 mm. Only fragments of ancient woody vegetation remain.

Habitat of Farmos (sziki tanösvény): Anyone who wants to see a real salt steppe area in Hungary will find it here, near the village of Farmos. In Hungary, there are very few species of moths that are restricted to saline habitats, such as: *Narraga tessularia* (Metzner, 1845), *Hadula dianthi hungarica* (F. Wagner, 1930), *Saragossa porosa kenderesiensis* (Kovács, 1968), *Gortyna borelii lunata* (Freyer, 1838). In Hungary, only here, in the meadows of the Tápió region, the two main saline soil types, the so-called "solonchalk", where salt is extracted on the surface, and the "solonyec", where it is extracted below the soil, can be found side by side.

Summary

This paper summarizes the distribution of *Aristotelia calastomella* in Hungary using new bionomic data. It concludes that the species is highly fragmented and that the newer localities are located at the westernmost limits of its geographic distribution. It suggests a comparative genetic study of the Russian and Hungarian populations.

Acknowledgements

Thanks to Ferenc Buschmann (H-Jászberény) for information about the specimens collected and the characteristics of the habitats. I thank Péter Gergely (H-Csobánka) for his useful comments on the manuscript. For the final linguistic proofreading, I thank Colin W. Plant (UK-Bishops Stortford).

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Bionomics and geographical distribution of the Hungarian Cochylini species (Lepidoptera, Tortricidae)

Imre Fazekas

Abstract. First part of a series of papers on the bionomics and geographical distribution of Hungarian Tortricidae species. This is the first atlas in Hungary summarising the records of 83 species. This study presents partial flight data, food plants and preferred habitats of Cochylini species. Detailed distribution maps are shown for each species.

Keywords. Biology, habitat, range, distribution maps, remarks

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Introduction

Scientific research on the Hungarian Lepidoptera fauna began in the second half of the 1700s with the work of Giovanni Antonio Scopoli (1723–1788). In 1769, Scopoli was appointed Professor of Chemistry and Metallurgy at the Mining Academy at Schemnitz (an old, historic Hungarian town, now Banská Štiavnica, Slovakia), and in 1777 transferred to the University of Pavia. Scopoli corresponded with Carl Linnaeus, the Swedish botanist and zoologist who laid the foundations of modern taxonomy. Linnaeus greatly respected him and showed great interest in his work, though because of the great distance, they never met.

Scopoli, during his stay in Hungary, described *Nycteola revayana* (Scopoli, 1872) [= Tortrix revayana]. Subsequently, several Hungarian collectors published their research results in small publications. For more information, see the publication in Hungarian and Latin by Abafi-Aigner et al. in 1896.

Abafi-Aigner et al. (1986), in their book "Fauna Regni Hungariae", reviewed for the first time the Lepidoptera fauna of historical Hungary. This is the first publication in which we have information on the Hungarian Lepidoptera fauna.

Historically, Hungary was three times larger (325 411 km2) than the present territory – the changes being made by the Treaty of Trianon (4 June 1920). From this vast geographical area, the authors have identified 2628 Lepidoptera species. including 304 of Tortricidae. The importance of the latter will be emphasised later. In the area of present-day Hungary (93 030 km2), 3,550 species have been documented by recent research (Pastorális et al. 2016). After 2016, several new species have been recorded in the country (see references). This present text focuses on the Hungarian Tortricidae fauna.

The "Fauna Hungariae" series of books, which began publication in the 1950s, is well-known to lepidopterist researchers. Many volumes were published, but in the 1990s the series ceased publication. The cited reasons include financial and organisational difficulties, but the primary reason was a lack of interest. I note that the so-called "Microlepidoptera" volumes have been published continuously based on the excellent work of László Gozmány (1953–1965). However, László Gozmány did not undertake to write the volume Tortricidae. This volume is still very much missing in Hungarian fauna research. I have personally consulted László Gozmány several times about the writing of the Hungarian Tortricidae volume, but the discussions were fruitless. Therefore, in the early 1980s, I started to study the Hungarian Tortricidae fauna on my own (Fazekas 1981–2023). In the late 1990s, I approached the editor-in-chief of the Fauna Hungariae book series and offered to write the Hungarian Tortricidae volume. I was

informed that there was no money to publish the volume. I should write it, but they could not support it financially.

Thirty years have passed since then, and it became clear that the Fauna Hungariae book series will not continue. It was then that I decided to write a volume of the Hungarian Tortricidae fauna myself, based on 40 years of research, with a new concept and new methods. The present work is the first part of the final book. In smaller taxonomic groups, I present the bionomics of the Hungarian species and their geographical distributions in this country and give an overview of the Palaearctic areas. Where necessary, species are annotated. For each species, I provide a map of its distribution in Hungary. For the map representation, I use the Hungarian natural geographic landscape classification (Marosi, Somogyi 1990, Dömény 2010). This map type shows the topography, hydrology, vegetation, and general ecology of Hungary better than a simple UTM Grid map, where only points indicate the occurrence of species.

I used this mapping methodology in my books "Sesiidae fauna of Hungary" (Fazekas 2017) and "The Eupitheciini of Hungary" (Fazekas 2020). This is a completely new mapping concept in Hungary. My Tortricidae studies, and the planned book, are nothing like the "Fauna Hungariae" series of books, the concepts of which were conceived in the 1950s but are no longer useful in the 21st century. One of these "old-fashioned", very slow practices was the drawing of species habitus images in black ink. This can be easily replaced by computer-based digital techniques (see Fazekas 2009, 2017, 2020).

Current research suggests that 480–490 species of Tortricidae are known in Hungary. The occurrence of several is only known from old literature and no authentic specimens have been found in Hungarian collections. Many specimens collected in Hungary are preserved mainly in Austrian, German, Italian, English and other collections so the Hungarian practice of including only those species present in one of the Hungarian collections is wrong. This problem should be further investigated.

This paper is the first part of the presentation of the Hungarian Tortricidae fauna and discusses the Tribe Cochylini.

Material and methods

I started my research in the early 1980s. In these 40 years I have collected moths in all-natural geographic regions of Hungary. I have studied habitats, feeding plants of species, and flight periods. The collections were mainly made with evening lights and light traps, mostly 160-watt HMLI and 125-watt mercury vapour lamps. I also collected specimens by daytime netting and beating of vegetation.

From 1896 to 2021 I critically processed the literature on Tortricidae species. I visited and examined the most important museums and private collections in Hungary. For accurate and authentic identification, I have made thousands of genital examinations.

Genitalia dissections were made according to Robinson (1976). Some of the genitalia were mounted in Euparal on slides; others were preserved in micro-vials filled with glycerol. Genital analysis of worn, damaged specimens of Cochylini was performed using the simple and rapid method of Fazekas (2020, 2021), and Wanke & Rajaei (2018).

I thought it important to present a more thorough description of the genus diagnosis, especially based on the work of Razowski (1970, 2009, 2011). This is also important because there are many anomalies in the Hungarian literature on this topic. In a historical overview of Hungarian literature, there is confusion not only in the naming of genera or species but also in the identification of taxa. One of the main reasons for this is that Hungarian researchers have done little or no genital studies.

The data of the Hungarian distribution maps are stored in a computer database, partly in Word and Excel formats.

The vector maps were created with CorelDraw. The digital maps are interactive and can be continuously updated and corrected.

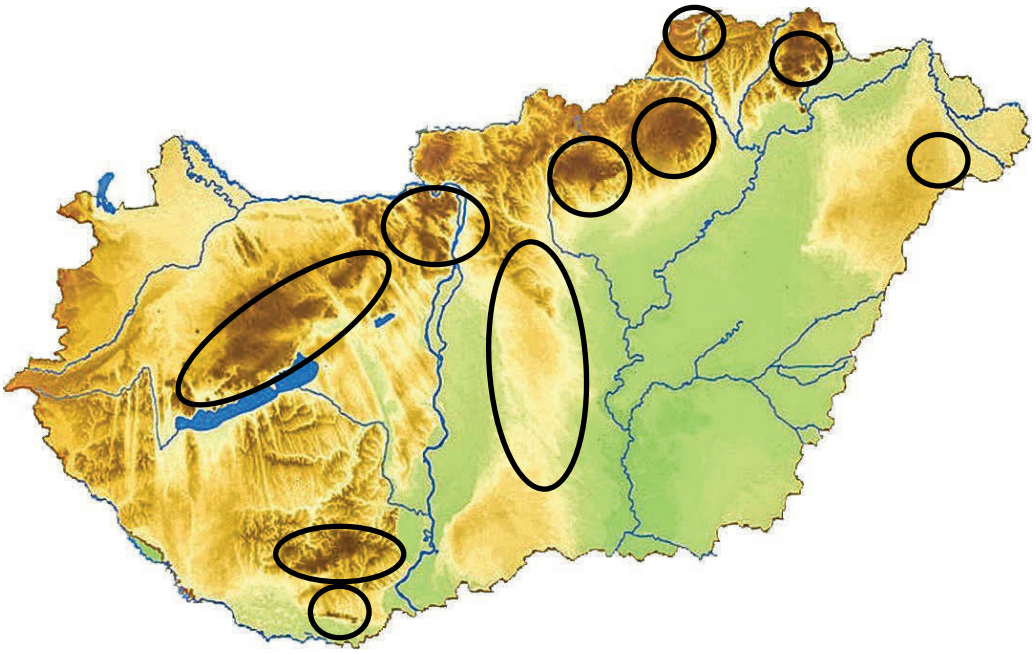
The identification of the Cochylini specimens was done by myself. The identified specimens are deposited in the following collections:

Bakonyi Természettudományi Múzeum, Zirc | Bakony Natural History Museum, Zirc

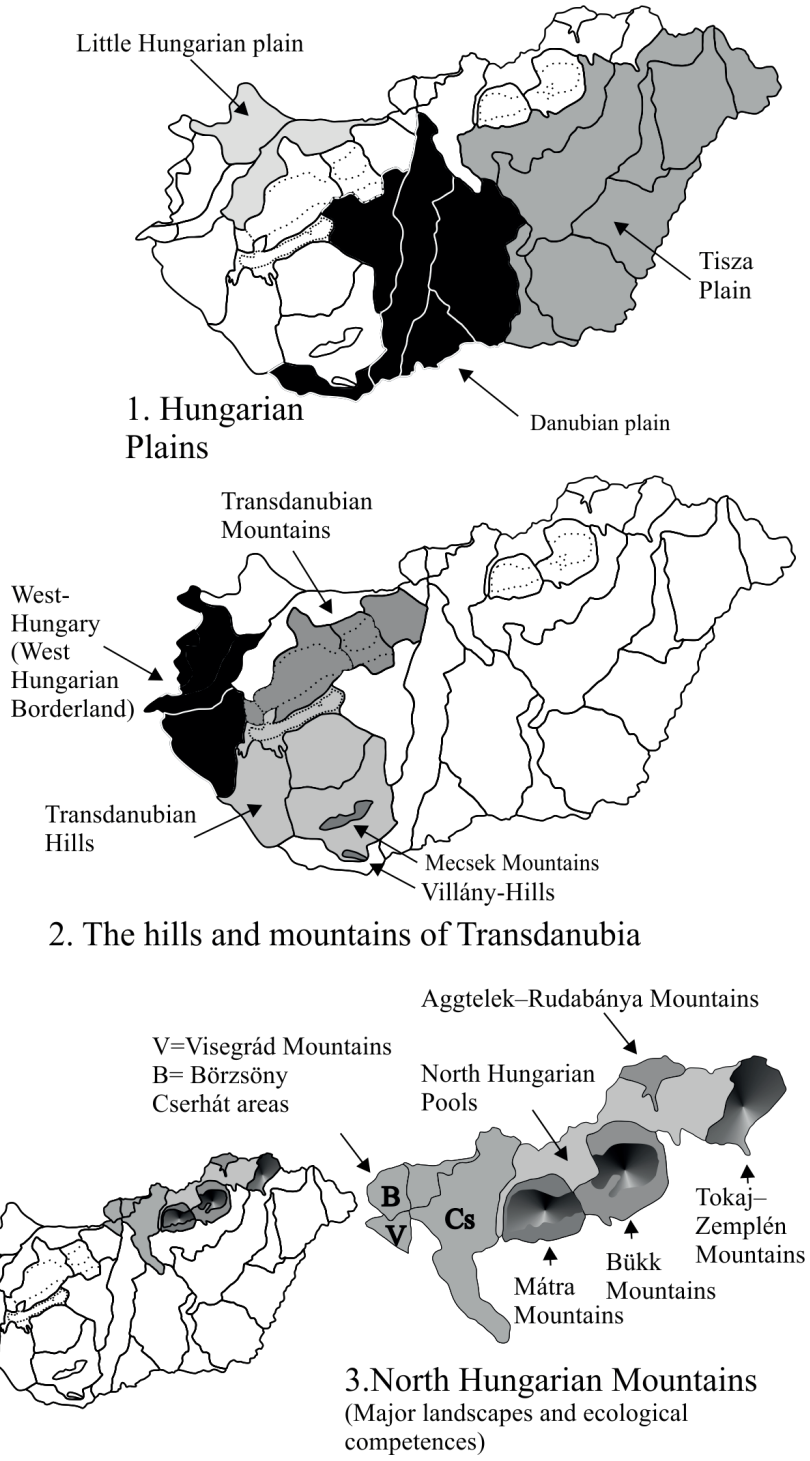
Janus Pannonius Múzeum, Pécs | Janus Pannonius Museum, Pécs,
Jász Múzeum, Jászberény | Jász Museum, Jászberény
Magyar Természettudományi Múzeum, Budapest | Hungarian Natural History Museum [HNHM], Budapest
Mátra Múzeum, Gyöngyös | Mátra Museum, Gyöngyös
Pannon Intézet, Pécs | Pannon Institute, Pécs,
Rippl-Rónai Múzeum, Kaposvár | Rippl-Rónai Museum, Kaposvár
Természettudományi Gyűjtemény, Komló | Natural History Collection, Komló

A Brief Account of Hungarian Landscape Types

The hierarchical order of Hungarian natural landscapes was proposed 34 years ago (Marosi, Somogyi, 1990). Everybody has accepted the system that contains microregions, microregion groups, mesoregions and macroregions. While there are occasional minor disputes about the borderlands, these do not affect the core concept. I have recorded the geographical distribution of the taxa according to the six Hungarian macroregions (Fig 2.). The geographical distribution of the taxa is exceedingly different in certain regions.



Text-fig. 1. Detailed topographic map of Hungary without inscriptions. The main designations are shown in Figure 2. The circles on the map show the main Cochylini research regions. It can be seen that a large part of the lowland areas is poorly known. The mountain areas are the best known. The Cochylini fauna of the hilly landscapes is also only partially known. Only sporadic observations have been made in the areas close to the national border.



Text-fig. 2. Major natural landscapes in Hungary where Cochylini observations were made. Detailed descriptions are given in the text.

(1) The Great Hungarian Plain
Flat plains, 75–200 m. Plain with a moderately continental climate, landscape types are predomi-nantly used for agriculture. On the Great Hungarian Plain one finds a more severe summer microclimate than that is generally prevalent in forested regions of central Europe since the combination of open steppe and soda flats produces often relatively high surface temperatures during the summer. Average temperatures for the plain are 22°C in July and -2°C in January. Recorded maximum and minimum extremes are about 39°C and -28°C. Natural vegetation: oak forests and grassland on the sand, loess steppe, alkaline vegetation on solonchak alluvial forests and swamps. The Hungarian plain is perhaps a typical example of the steppe or other grassland hab-itats favoured by many *Phteochroa*, as far as it is known, although the moths may prefer slight hillsides on the periphery of steppes.

(2) Little Plain
Flat plains, 75-200 m. Alluvial plain; cultivated grassland with a high groundwater table and hygromorphous soils. Natural vegetation: alluvial forests and swamps, and at higher elevations oak forests and grassland on the sand as well as loess steppe.

(3) West Hungarian Borderland
Valleys, foothills, medium-height mountains with broad ridges, 150–883 m. Eroded hills in the sub-alpine regions on brown loess and pseudogleyeus soils with mosaics of forests mixed with Scot's pine (*Pinus sylvestris*) partly used for agriculture, as well as eroded hills (250–350) with estivated brown forest soil on brown loess; partly used for agriculture. Natural vegetation: mainly Illyrian oak-hornbeam forests, as well as Illyrian beech forests and oak forests, mixed with Scot's pine.

(4) Transdanubian Hills
Valleys, hills, foothills, medium-height mountains, 150–682 m. Mainly in the west, fixed sandy plain with minor dunes, cultivated grassland on brown earth, local afforestation, and orchards. In the east at first independent hilly regions were dissected by eroded valleys, mostly cultivated grassland with deep groundwater tables, vineyards, and major remnants of mixed forests. In the south, forested landscape types in mountains of medium height (Mecsek Mts, Villány Hills); calcareous rock or sandstone with rendzina and passivated brown forest soils, typically with Til-io argenteae-Quercetum or Illyrian oak-hornbeam forests (*Helleboro Carpinetum*), and mosaic Illyrian karst with downy oak, karst shrub-forest and rocky swards.

(5) Transdanubian Mountains
Medium-height mountains, 200–756 m. mainly low mountains under additional sub-Atlantic and sub-Mediterranean climatic influence. *Quercetum-petraeae-cerris* and *Qu. petraeae-Carpinetum* forests. In part hills were dissected by eroded valleys; cultivated grassland with a mosaic of vineyards and orchards *Quercetum-petraeae-cerris* forests and a deep groundwater table. On the mountain slopes are many kinds of karst shrub forests and rock swards, e.g., in the Bakony Mts, the Vértes Mts. and the Budai Mts.

(6) North Hungarian Mountains
Medium-height mountains, 300–1015 m. Extremely variable landscape type. In one respect a characteristic is the crests of volcanic mountains with black "nyirok" (regolith) and podsolic brown forest soil, submontane beech forests (silviculture with touristic and recreational use Mátra Mts, Zemplén Mts). On the other hand, the low mountains are predominantly of cal-careous rocks with rendzina and brown soil (Bükk Mts, Aggtelek Mts). The Bükk Mts and Aggtelek Mts are at present a National Park. Natural vegetation: mainly *Quercetum-petraeae-cerris,* submontane oak hornbeam forests, submontane and montane beech forests, e.g., in the Mátra Mts (1015 m), in the Bükk Mts (958 m) and the Zemplén Mts (783 m).

Cochylini species of Hungary

Remarks: the occurrence in Hungary of species in indexed[7] brackets and square brackets is questionable and further studies are needed. Details are given in the text.

Phtheochroa Stephens, 1829
1. inopiana (Haworth, [1811
2. schreibersiana (Frölich, 1828)
3. pulvillana (Herrich-Schäffer, [1851
4. sodaliana (Haworth, [1811])
5. fulvicinctana (Constant, 1893)
6. procerana (Lederer, 1863)
7. [purana (Guenée, 1845)]
8. [duponchelana (Duponchel, 1843)]
9. rugosana (Hübner, [1799])
10. annae Huemer, 1990
Hysterophora Obraztsov, 1944
11. maculosana (Haworth, [1811])
= *purgatana* (Treitschke, 1835)
Cochylimorpha Razowski, 1959
12. hilarana (Herrich-Schäffer, [1851])
13. halophilana (Christoph, 1872
= *clavana* (Constant, 1888)
14. elongana (Fischer von Röslerstamm, 1839)
15. [*perfusana* (Guenée, 1845)]
16. subwoliniana (Danilevsky, 1962)
17. woliniana (Schleich, 1868
18. obliquana (Eversmann, 1844)
= *coenosana* Mann, 1867
19. jucundana (Treitschke, 1835)
20. straminea (Haworth, [1811])
21. alternana (Stephens, 1834)
Phalonidia Le Marchand, 1933
22. gilvicomana (Zeller, 1847)
23. curvistrigana (Stainton, 1859)
24. udana (Guenée, 1845)
25. manniana (Fischer von Röslerstamm, 1839)
26. affinitana (Douglas, 1846)
= *inulana* Constant, 1884
27. albipalpana (Zeller, 1847)
28. contractana (Zeller, 1847)
Gynnidomorpha Turner, 1916
29. luridana (Gregson, 1870)
30. vectisana (Humphreys & Westwood, 1845)
= *griseana* (Haworth, [1811])
31. minimana (Caradja, 1916)
32. permixtana ([Denis & Schiffermüller], 1775)
33. alismana (Ragonot, 1883)
Agapeta Hübner, 1822
34. hamana (Linnaeus, 1758)
35. largana (Rebel, 1906)
36. zoegana (Linnaeus, 1767)
Fulvoclysia Obraztsov, 1943
37. nerminae Koçak, 1982
= *fulvana* (Fischer von Röslerstamm, 1836)
Eugnosta Hübner, 1825
38. lathoniana (Hübner, [1800])
39. magnificana (Rebel, 1914)
= *margaritana* (Hübner, [1813]
Prochlidonia Razowski, 1960
40. amiantana (Hübner, [1799])
Eupoecilia Stephens, 1829
41. angustana (Hübner, [1796–1799])
= *fasciana* (Donovan, 1808)
42. ambiguella (Hübner, [1796])
43. sanguisorbana (Herrich-Schäffer, [1856])
Aethes Billberg, 1820
44. hartmanniana (Clerck, 1759)
45. williana (Brahm, 1791)
= *zephyrana* Treitschke, 1830
46. margarotana (Duponchel, 1836)
47. moribundana (Staudinger, 1859)
48. nefandana (Kennel, 1899)
49. margaritana (Haworth, [1811])
= *dipoltella* (Hübner, [1813])
50. triangulana (Treitschke, 1835)
= *kuhlweiniana* Fischer von Röslerstamm, 1836
51. rutilana (Hübner, [1817])
52. smeathmanniana (Fabricius, 1781)
53. tesserana ([Denis & Schiffermüller], 1775)
54. sanguinana (Treitschke, 1830)
55. dilucidana (Stephens, 1852)
56. flagellana (Duponchel, 1836)
57.beatricella (Walsingham, 1898
58. francillana (Fabricius, 1794)
59. bilbaensis (Rössler, 1877)
60. tornella (Walsingham, 1898)
61. cnicana (Westwood, 1854)
62. rubigana (Treitschke, 1830)
= *badiana* sensu Hübner, 1799
63. kindermanniana (Treitschke, 1830)
Cochylidia Obraztsov, 1956
64. rupicola (Curtis, 1834)
65. subroseana (Haworth, 1811)
= *phaleratana* (Herrich-Schäffer, [1851])
66. richteriana (Fischer von Röslerstamm, 1837)
67. moguntiana (Rössler, 1864
68. heydeniana (Herrich-Schäffer, [1851])
69. implicitana (Wocke, 1856)
= *coercitana* Staudinger, 1859
Diceratura Djakonov, 1929
70. ostrinana (Guenée, 1845)
= *purpuratana* (Herrich-Schäffer, [1851])
Thyraylia Walsingham, 1897
71. nana (Haworth, [1811])
Cochylis Treitschke, 1829
72. roseana (Haworth, [1811])
73. flaviciliana (Westwood, 1854)
Longicornutia Razowski, 1960
74. epilinana Duponchel, 1842
Neocochylis Razowski, 1960
75. hybridella (Hübner, [1813])

76. [*salebrana* (Mann, 1862)]
77. dubitana (Hübner, [1799])
Cochylichroa Obraztsov & Swatschek, 1958
78. atricapitana (Stephens, 1852)
Brevicornutia Razowski, 1960
79. pallidana Zeller, 1847
Pontoturania Obraztsov, 1943
80. posterana Zeller, 1847
Cryptocochylis Razowski, 1960
81. conjunctana (Mann, 1864)
Falseuncaria Obraztsov & Swatschek, 1958
81. degreyana (Mc. Lachlan, 1869)
83. ruficiliana (Haworth, [1811])
= *ciliella* (Hübner, 1796)

Biology and distribution of Cochylini in Hungary

Tortricidae
Tortricinae – Cochylini

Phtheochroa Stephens, 1829
The species of this genus cover a vast geographical area, affecting the Holarctic, Neotropical, and Afrotropical regions. According to Razowski (2009), the majority of species are Palaearctic and approximately 100 species are known. So far, ten *Phtheochroa* species are known in the Hungarian fauna. Only a few publications have been written on species of the genus (Fazekas 2021). Some species are generally distributed in the country (e.g. P. *schreibersiana, P. pulvillana*, but most of them are very rare and local (e.g. *P. annae*) or have disappeared from habitats known in the past.

1. *Phtheochroa inopiana* (Haworth, [1811])
Biology. Bivoltine, the moth flies June-July and August-September. Occupying damp places and woodland edges, Oligophagous species on *Artemisia campestre*, *Eupatoriun cannabinum* and *Pulicaria dysenterica.* The overwintering larvae feed inside the roots of food plants.
Habitat. Xero-, and mesophilic meadows and tall herb communities, colline and montane hay meadows, acid grasslands and heaths, riverine and swamp woodlands, and wooded pastures. It prefers dolomitic steppe meadows in hilly and mountainous areas but is not common. It is worth looking for on the edges of forests and in shrubby, bushy vegetation, especially on south-facing hillsides and mountainsides.

Text-fig. 3. *Phtheochroa inopiana*

Text–fig. 4. *Phtheochroa schreibersiana*

Range in Hungary. Mainly known locally in the low mountain ranges, mostly in the western part of the country (Transdanubia). It is very scattered in the lowlands (e.g., in Kiskunság and the Tápió protected area).

Distribution. A species with a trans-Palaearctic distribution. It is known from Japan through Central Asia to Asia Minor, west to the British Isles and the Iberian Peninsula. It is fragmented over large geographical areas.

Remarks. A sexually dimorphic species, the females are generally plainer than males.

2. *Phtheochroa schreibersiana* (Frölich, 1828)

Biology. Univoltine, the moth flies from April to early July. The larvae feed on *Prunus padus, Populus nigra* and *Ulmus minor* on the leaves to September. Hibernate until the following spring and pupate in early April in the food plant's bark.

Habitat. Lowland oak-hornbeam and closed sand steppe oak woodlands, pannonic oak-hornbeam woodlands, Illyrian beech, and oak-hornbeam woodlands, closed dry deciduous woodlands, forest edges, forest clearings. Less frequently in riverine willow-poplar woodlands.

Range in Hungary. In hilly and mountainous areas; South-Transdanubia, Bakony Mts., Vértes Mts., Mátra and Zemplén Mts. Lowland only in Kiskunság. The pattern of the habitats in Hungary has a more hilly and mountainous character.

Distribution. European, Asia Minor species. Known from the Ural Mountains through the Balkans to Scandinavia, the British Isles in the west, and Spain and Italy in the south.

Remarks. Most of the observations (see the Hungarian Museum of Natural History) are more than 150 years old, and only a few are less than 50 years old.

3. ***Phtheochroa pulvillana*** (Herrich-Schäffer, [1851])

Biology. Univoltine, the adult, flies from May to July, for a long period. The main period of flight culminates between mid-May and mid-June.

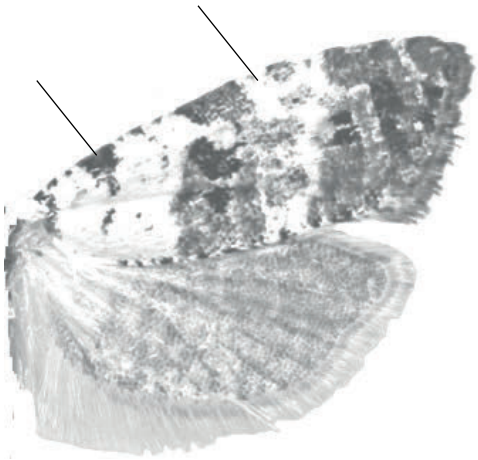
Habitat. Margins of hilly and mountainous mesophilous and thermophilous deciduous forests, dry grasslands, grasslands, and pastures. Lowland sand mounds, steppe meadows, saline meadows, planted forest pine forests—agricultural land along roadsides and field margins.

Range in Hungary. In the western and northern parts of the country, it is known for its mid-altitude mountain ranges and hills. In the lowland areas, it has been collected only between the Danube and Tisza rivers (Kiskunság, Tápió region), in the east in the salt marshes of the Hortobágy.

Distribution. A widespread, subspecific, mostly fragmented species in the Palaearctic.

Remarks. The European populations belong to the nomenclatural species described in Germany.

Text-fig. 5. *Phtheochroa pulvillana*



Text-fig. 6. *Phtheochroa sodaliana*

4. *Phtheochroa sodaliana* (Haworth, [1811])

Biology. Univoltine, the adult moths can be found on the wing in May and June and fly just before dusk. The larvae feed on *Rhamnus catharticus* and *Frangula alnus*, spinning the berries together.

Habitat. Mesophilic and xerophilic deciduous forest margins, shrublands, karst scrub forests on hills and mountains; sporadic lowland groves, and secondary (non-native) birch forests on the sand, near streams and watercourses. Hársbokor-hegy, Fót-Somlyó, Jászság (birch forest).

Range in Hungary. Very few sightings are known. It is very local and rare in the mountains around Budapest and the lowlands (e. g. Nagykáta, Kunfehértó) between the Danube and Tisza rivers.

Distribution. It inhabits large areas of the western Palaearctic but is absent from North Africa. In the east, it reaches the Caucasus and has even been caught in Kazakhstan. Specimens from Asia need to be reviewed.

Remarks. *Phtheochroa sodaliana* is in some respects reminiscent of a small *P. rugosana* but at once distinguished by the conspicuous ferruginous-red apical spot and the generally white basal area of the forewing. In collections where specimens are slightly worn or fragmented in light traps and have not been genitally examined, this may result in misidentification.

5. *Phtheochroa fulvicinctana* (Constant, 1893)

Biology. The moths fly from June to September, probably in two generations, but this needs further investigation. The larvae feed on *Limonium gmelinii*. This *Limonium gmelinii* ssp. *hungaricum* food plant species are endemic in Hungary, and its native range is Central and Southeast Europe to Siberia and Iran. Further breeding experiments are needed to confirm additional food plants.

Habitat. Mountainous karst scrub forests on dolomitic bedrock, dry sandy and saline grasslands and meadows.

Range in Hungary. Only a few sites are known west of the Danube River (Budai Mts.). Most of the sites are located in the Great Hungarian Plain. Mainly in the sandy areas between the Danube and Tisza rivers, in the east (Tiszántúl region) more locally in the salt marshes, pastures or around salt lakes. The climate of these lowland areas is typically continental. Native wooded heathland survives only in patches.

Distribution. Razowski (2001) does not mention the species in his book on Central Europe, though he does so in his Palaearctic volume (Razowski 2009: “S Europe from France to

Text-fig. 7. *Phtheochroa fulvicinctana*

Text-fig. 8. *Phtheochroa procerana*
(Natural posture from the Balkans)

Albania, in more northern territories locally: Switzerland, Romania and Hungary; Dagestan". It is said to be a sub-Mediterranean faunal element, but the actual area affected is significantly larger. For example, in Ukraine, it has been found in Crimea, and Russia along the Volga and in the Caspian lowlands (Sinev et al. 2019). Further chronological studies are needed.

Remarks. *Phtheochroa fulvicinctana,* described from France, is a characteristic species of the Hungarian lowlands; its habitats are mostly within national parks. Population abundance is low.

6. *Phtheochroa procerana* (Lederer, 1863)

Biology. The exact flight times of adults are not known. So far, we have collected specimens only in June and July. The food plant is unknown.

Habitat. To date, only one habitat survives, which can be described as follows: rock grass slope steppe, Buda rabbit-tail grass rock grassland and closed dolomitic rock grassland.

Range in Hungary. Collected only in and around Budapest; just three specimens are known (all in coll. HNHM, Budapest): Budapest, Farkas-völgy, [1]912.VI.20. leg. Uhrik-M. T.; Budafok, [1]918.VII.6. leg. Uhrik-M. T.; Budapest, Sas-hegy, 1942.VI.28. leg. Neugebauer T. We have not seen the species since 1942.

Distribution. According to Razowski (2009), the only occurrence in Europe is Hungary, Romania, and Bulgaria; elsewhere in Asia Minor.

Remarks. The forewings of the Hungarian specimens seen so far have a lighter ground colour than that of the nomino-typical species described from Bulgaria. This is visible in the book by Razowski (2009, Plate 1., Figs 34, 34a). In addition, further differences in habitus can be seen. A comparative study of the Balkan and Hungarian populations should be carried out. Since the species has not been seen since 1942, i.e. for 80 years, the Hungarian population has probably become extinct, and the habitats in Budapest, the Hungarian capital, the sites Budafok (1918) and Farkas-völgy (1912) have been destroyed and built up with houses and roads.

The "Sas-hegy" in Budapest (47°28'56.5 "N 19°01'04.5 "E) is the location of the northernmost geographic occurrence of *Phtheochroa procerana* in Central Europe. The mountain has been studied for 120 years and has been a nature reserve since 1958. This dolomite bedrock mountain is home to the following plant communities: open dolomitic rock grassland (Seseli leucospermo-Festucetum pallentis); rock grass slope steppe (Chrysopogono-Caricetum humilis); Buda rabbit-tail grass rock grassland (Seslerietum sadlerianae); closed dolomitic rock grassland (Festuco pallenti-Brometum pannonici).

The geographic structure of species populations can be understood in terms of two closely related components: 1) population demographic structure and 2) its genetic structure. This method makes it possible to study processes of conservation biological importance such as migration and gene flow, genetic drift and selection, population survival and extinction.

In phylogeographic terms, the analysis of these processes provides an understanding of the structure of the geographical distribution of *Phtheochroa procerana*, its current and evolutionary dynamics and the evolutionary changes that occur during the change in distribution.

Molecular studies could provide insights into where *Phtheochroa procerana* may have been a potential refugium for the species in the Balkans during the last glacial climatic depression and provide answers about the highly isolated occurrence of the species in Hungary. Only studies of this type can answer the questions of fragmentation and isolation.

7. [***Phtheochroa purana*** (Guenée, 1845)] – **occurrence in Hungary is questionable!**

Biology. According to literature, the moth flies in June and July. Probably a monophagous species, larvae have been observed on *Cephalaria leucantha* plants (Swatschek 1958). This plant is present in northern Africa and southern Europe (Albania, former Yugoslavia, Greece, Italy, France, Portugal, and Spain).

Habitat. In the Western Balkans, in the 1980s, I observed it sporadically in xerothermophilous paths and roadsides in disturbed zones, in Mediterranean pine woods edges and shrubland and rocky and karst surfaces.

Range in Hungary. In the Hungarian faunistic literature, the name of the species can only be found in the publications of Gozmány (1968, 1971). Gozmány did not mention any specific locality. During my investigations, I have not found any specimens in any Hungarian collections. Razowski (2009) reported in Hungary, but in his book on Central Europe (Razowski 2001) he does not mention it. In his earlier, Palaearctic volume (Razowski 1970), he mentions Hungary, referring to Kennel (1913). In addition, see Kennel (1921), page 297, where he wrote: “Hab. Südfrankreich, Ungarn, Bithynien”:

Distribution. According to Razowski (2009), it is a sub-Mediterranean faunal element, mainly found in southern Europe, France, Croatia, and Bosnia.

Remark. I assume that Kennel's (1913) Hungarian data (specimens) are from the Adriatic coast of historic Hungary, which is now part of Croatia. The found site labels of specimens collected here were always marked "Hungaria". This is probably the reason for the misunderstanding even today. The food plant is planted in gardens, so it cannot be excluded that *Phtheochroa purana* will also appear in Central Europe as an adventive species. Its permanent population in this region is unlikely.

8. [***Phtheochroa duponchelana*** (Duponchel, 1843)] – **occurrence in Hungary is questionable!**

Biology. According to Razowski (2009), the moth flies in two generations from late March to mid-May, and July. The larva and the food plant are not known. It is assumed that it lives on the *Acanthus spinosus* plant. This ornamental plant is native to Mediterranean regions but is planted in many areas as an ornamental.

Habitat. According to the literary sources habitats are unknown. The Hungarian site (Budapest, Csiki-hegy, 314 m) is a degraded dolomite rocky steppe.

Range in Hungary. Only Gozmány (1968, 1971) and Razowski (2009) mention the species from Hungary, without any evidence. We do not yet know the collections where the specimens are kept.

Distribution. Its range is less well understood. It has been collected from the Caucasus region through Asia Minor and Syria to North Africa and is also found in Greece and probably in many areas of the Western Balkans. It is probably a highly fragmented Holomediterranean faunal element.

Remarks. There are no identified specimens in Hungarian collections. There is only one specimen in the Hungarian Museum of Natural History in Budapest, but the locality is not known, no such label exists. It is said to have been collected on the "Csiki" hill (= Csiki-hegy) near Budapest a few decades ago. This area has since been developed and the habitat destroyed.

9. ***Phtheochroa rugosana*** (Hübner, [1799])

Biology. The moth flies in early May and June. Inactive by day. It may sometimes be seen on warm evenings flying around its habitat but is usually more active towards dusk, occasionally observed at the light. The larvae are oligophagous on flowers and leaves of *Bryonia dioica*, and probably *Echballium elaterium*.

Habitat. Mesophilic and xerophilic meadows, roadsides, weedy areas, and edges of groves. There are also populations in arboretums (e.g., Szombathely).

Range in Hungary. It is mainly known from low mountainous areas (e.g., Bakony Mts., Mátra Mts., Vértes Mts.) and hills, but it also occurs sporadically on the edges of the Hungarian lowlands (e.g., Tápió-vidék).

Distribution. Its distribution is only partially known. According to Razowski (2009), it is a European faunal element, but this is disputed. According to several literature records (cf. Bradly et al. 1972, Razowski 2009, etc.), it has been found in North Africa, the Canary Islands, Asia Minor, and in Europe from the British Isles through Central Europe to the Balkan Peninsula, it is a local and uncommon species. It is most likely an expansive Holomediterreanean faunal element.

Remarks. According to Razowski (2009), images fly in the Palaearctic from April to July.

Such a long flight period is not known in Hungary. Relatively few specimens and literature data are known from Hungary. Most of the identified specimens were collected in the first half of the 20th century, since then there have been very few new observations.

10. ***Phtheochroa annae*** Huemer, 1990

Biology. Imagines have so far only been collected at night with light in April and May. During the day, they sit on leaves in the vegetation, from where they can be disturbed. The larvae feed on seeds in *Bryonia dioica* fruits but also chew leaves. They pupate in a fine web on the food plant.

Habitat. The habitats studied so far are dominated by forested areas. The species is mainly from the fringes of hornbeam-oak forests, thermophilic oak woods, scrub oak woods and occasionally alder groves, but it has also been collected in loess meadows and sand meadows. Habitat preference needs to be further investigated.

Range in Hungary. The first specimens were collected in Hungary between 1908 and 1915 (Simontornya [Paratype], Nagymaros, Isaszeg, in coll. HNHM, Budapest), but were identified as *P. rugosana*. Later it was found in Nemesgulács and also in the Vértes Mountains (Fazekas 1991, Pastorális & Szeőke 2018). These localities are located in the Transdanubian Mountains at low altitudes (250–300 m).

Distribution. Only a few distribution data are known from Austria, Hungary, Romania, and Greece. The geographical distribution of *P. annae* will only be known if a revision of the species is carried out in collections.

Remarks. Present in very local populations in Hungary, numbers are very low. In some years the species is not even detected.

Hysterophora Obraztsov, 1944

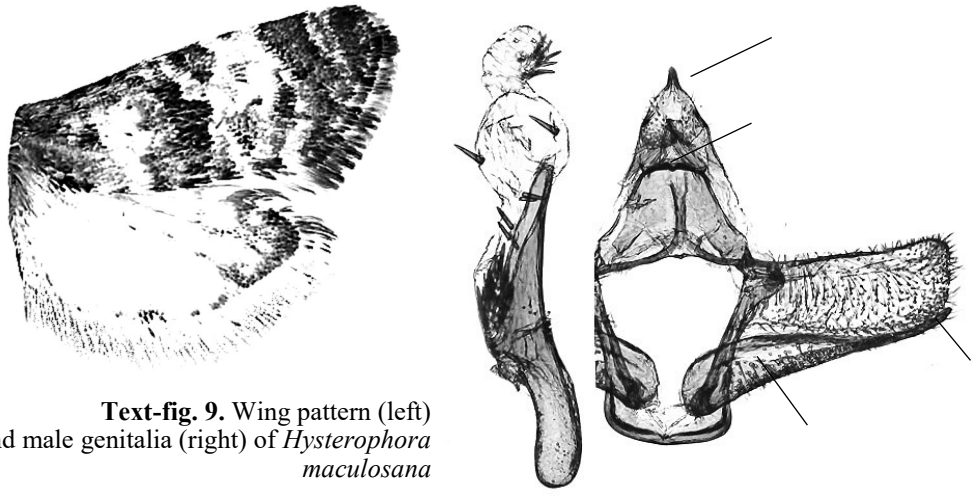
Obraztsov's original description by Razowski (1970) re-described and compared it with *Phtheochroa*. It differs from *Phtheochroa* by the presence of numerous short cornuti, a dorsal groove of the transtilla, and a sclerotized sack of the ductus bursae. According to Razowski, the genus is monotypic, and it shows only slight differences from the *Phtheochroa* genus. The range of genera in the Western part of the Palaearctic Region as far Near East, excluded most of the northern area (Razowski 2009).

11. ***Hysterophora maculosana*** (Haworth, [1811])

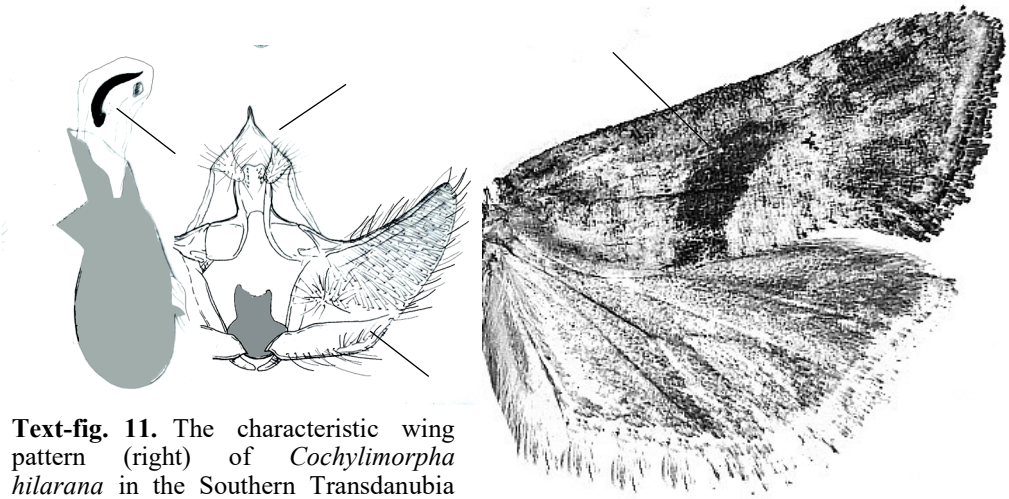
= *Cochylis purgatana (*Treitschke, 1835). Type locality: Hungary.

Biology. The moth flies in April and May. The larvae live in flowers of *Chondrilla juncea,* and *Scilia festalis* (this latter is merely an assumption*).*

Habitat. Dry grasslands, weedy roadsides, abandoned vineyards and orchards.



Text-fig. 9. Wing pattern (left) and male genitalia (right) of *Hysterophora maculosana*



Text-fig. 11. The characteristic wing pattern (right) of *Cochylimorpha hilarana* in the Southern Transdanubia (Hungary); male geitalia (left)

Range in Hungary. Only a few sites are known from Hungary: Gyöngyös (Sár-hegy), Budaörs (Csiki-hegyek), Hévíz, Jászberény, Pécsely, Tihany, Tápió-vidék, Vértes.

Distribution. A Western Palaearctic species. It has been observed from pre-Asia and through Asia in Europe to England and Portugal. It was also collected in Crimea (Razowski 2003, 2009).

Remarks. It is very local and rare in this country. No larvae or food plants are known from Hungary.

Cochylimorpha Razowski, 1959

A species-rich genus with a wide geographical distribution in the Palaearctic and Oriental regions. According to Razowski (2009): "No constant character separating this genus from *Phtheochroa* is found; in hindwing veins Rs-M1 long-stalked, M3-CuA1 stalked; males without a costal fold; males without any apical process of tegumen should be included in *Cochylimorpha*; exceptionally a reduction of uncus is, however, found in *Phtheochroa* (e.g. in the *P. rugosana* group of species). Other characters are a separation of the arms of vinculum and membranisation of ante ostial sterigma in the majority of *Cochylimorpha*." In Europe occur 34, and in Hungary 10 species (Fazekas 2022, 2023).

12. *Cochylimorpha hilarana* (Herrich-Schäffer, [1851])

Biology. Imago flies in July and August. Food plant: *Artemisia campestris*, monophagous species. According to Szőcs (1977), the whitish, dark brown-headed caterpillar forms a 50–60 mm long and 10 mm thick, spindle-shaped, reddish "swelling", a tubercle, in the lower half of the shoot of the food plant.

Habitat. Dry grasslands, saline grasslands, and ruderal meadows.

Range in Hungary Aggtelek karst, Budapest, and surroundings, South Transdanubia, Danube-Tisza area, Szigetköz.

Distribution. From Mongolia, through Central Asia and Asia Minor, to Western Europe and Scandinavia. It is widespread in Central Europe but mostly local; in the Alps, it reaches altitudes of 2000–2200 m.

Remarks. Collections contain specimens collected mainly more than 50 years ago.

13. *Cochylimorpha halophilana* (Christoph, 1872)

= *clavana* (Constant, 1888)

Biology. Imagines were collected mainly from July to early September. Food plant: *Artemisia* spp. According to Buschmann (2004), the caterpillar lives on *Artemisia santonicum*, Razowski (2001) reported *Artemisia gallica* from Central Europe. This latter species does not oc-

cur in our country, only on the western coasts and the Mediterranean coast.

Habitat. Dry grasslands, salty, and sandy grasslands. Huemer (2020) considers it a 'halophyte' species.

Range in Hungary. Few known data: Farmos, Fegyvernek, Jászberény, Kenderes, Királyhegyes, Kisújszállás, Kunmadaras, Nagyiván, Nagykáta, Újszentmargita. All known sites are from the continental Hungarian lowlands. No hilly or mountainous populations.

Distribution. Known from Iran, through Afghanistan, the Volga and Caucasus regions, to south-eastern Europe and Italy.

Remark. Polytypic species; *C. halophilana adriatica* Huemer, 2000 (locus typicus: I-Gorizia), *C. halophilana clavana* (Constant, 1888). The type locality of the nomino-typical subspecies is Russia (Sarepta). The subspecies status of Hungarian populations has not yet been investigated.

14. ***Cochylimorpha elongana*** (Fischer von Röslerstamm, 1839)

Biology. Bivoltine species; IV–V and IV–VII. Larva oligophagous: *Achillea millefolium, Artemisia campestris, A. vulgaris, Helichrysum arenarium*. The larvae live in the stems of food plants, hibernate there, and pupate in the spring.

Habitat. Mesophilic meadows, dry grasslands, steppe meadows, rocky grasslands, sandy grasslands, ruderal grasslands; xerotherm species.

Range in Hungary. Budafok, Budaörs (Csiki-hegyek), Budapest (Csillag-hegy, Farkasvölgy, Sas-hegy, Sváb-hegy).

Distribution. Fragmented distribution from Asia Minor through the Balkans to the Urals and in Central Europe to Poland. Localised in Germany (e.g. Saxony; in reclaimed mining areas) and Spain (Andalusia).

Remarks. A species described from Poland (Silesia), it is very local and rare in Hungary, It was collected here only between 1893 and 1958, from late April to mid-July (in coll. HNHM, Budapest),. The monitoring of populations is an urgent task. It is questionable whether metapopulations still exist in the agglomeration of Budapest.

15. ***[Cochylimorpha perfusana*** (Guenée, 1845)**] occurrence in Hungary is uncertain.**

= *callosana* Herrich-Schäffer, 1851

Biology. According to Razowski (2009), bivoltine; V–VII and VIII. Food plants: *Centaurea stoebe* and *C. triumfettii* (see References).

Habitat. Rocky grasslands, shrublands, steppe meadows, grasslands, dry grasslands, fallows, and ruderal meadows.

Range in Hungary. The data reported by Buschmann (2004) (Jászberény, Nagykáta Cseh-domb) were based on unfortunate typos or incorrect determinations.

Distribution. European faunal element: Austria, Croatia, France, Italy, Romania, Switzerland. According to Kovács & Kovács (2005), it has been observed in the Carpathians from 1500 m to 2100 m in xeromontane and humid subalpine meadows. These observations are quite remarkable and suggest a wide ecological plasticity.

Remarks. Its occurrence in Hungary was reported by Gozmány (1968, 1971) as "*callosana* HS.", as a result, the post-millennial nomenclatures indicated it, but no *perfusana* specimens are in museums. Apart from the above-mentioned lists, only Buschmann (2004) has so far published it in connection with the collection of the Mátra Museum. The specimens deposited there according to Buschmann (Jászberény and Nagykáta Cseh-domb) were misidentified: After revision, they were specimens of *C. straminea* (rev. & det. Buschmann). There is no positive evidence of the species occurrence in Hungary.

16. *Cochylimorpha subwoliniana* *(Danilevsky, 1962)*

Biology. The food plants and developmental stages of the caterpillars are still unknown. The species' flight period is from late April to mid-July.

Habitat. In Romania (Kovács & Kovács 2004), the species was observed on dry steppe-like slopes in sandy areas. Specimens from Bélmegyer were collected in a boggy area by grass netting in the early twilight, moths did not fly to light in the evening (Tokár 2015).

Range in Hungary. Bélmegyer, Fáspuszta, 2014.V.9, 1 ♂, 1 ♀ (Gp. ♂ 12193, ♀ 12245 ZT), Zdenko Tokár leg. & coll.

Distribution. Disjunct distribution from western China through Central Asia and Romania to Hungary. In the eastern part of the country, it reaches its westernmost limit of geographical distribution in the „Tiszántúl" region.

Remark. The highly isolated Central European populations of the species described from Kazakhstan are only partially known, further research is needed.

17. *Cochylimorpha woliniana* (Schleich, 1868)

Biology. Univoltine; VI–VIII. Specimens from early May have also been found in Hungary. May flight is not yet known in the literature of the Palaearctic. Larvae live on *Artemisia absinthium* from August then overwinter.

Habitat. Dry meadows, fallows, grasslands, ruderal grasslands; usually on sandy soils, but also sporadically on calcareous, volcanic rocky grasslands and sloping steppes (Fazekas 2018).

Range in Hungary. So far, only a very local population is known in the area of Lake Balaton and Lake Velence: Kis-Balaton (Zalavári-erdő), Tihany, Csopak, Agárd (Fazekas 1993, 2018, Petrich 2001, Szabóky 1982).

Distribution. Mainly known from southern and Central Europe, very local European fauna element (Razowski 2009). However, based on studies by Nupponen et al. (2001), the species has been found from Europe to Mongolia. On this basis, the classification of Razowski as a European faunal element is highly questionable; it is rather a Siberian faunal element.

Remarks. The distribution and bionomics of the species populations in the entire Pannonian biogeographical region should be reviewed. As the habitats now discovered are predominantly in the Balaton-Highlands National Park, it would be important to initiate a monitoring study.

18. *Cochylimorpha obliquana* (Eversmann, 1844)

= *coenosana* Mann, 1867

Biology. Bivoltine species: V–VI; VII–IX. Food plants: *Artemisia maritima*, *A. stepposa* (Razowski 2001, 2009), *A. santonicum* is a possible food plant in Hungary. The larvae live in the roots, hibernate there, and pupate in the spring.

Habitat. Dry sandy meadows and salt marshes.

Range in Hungary. The Sopron Hills, Kisalföld, Mezőföld, the Danube plain, and the Jászság, a local and rare species east of the Tisza River. Evidence of sites: Alattyán, Biatorbágy, Budaörs, Csorna, Dinnyés, Dömsöd, Fegyvernek, Gyoma, Kenderes, Kunmadaras, Mikepércs, Nadap, Nagyiván, Nagykáta, Pákozd, Sárkeresztúr, Sopron, Sukoró, Szeged, Szigetszentmiklós, Újszentmargita, Velence.

Distribution. Known from Mongolia through southern Siberia and Central Asia to Hungary and western Austria.

Remarks. The western area border is the Lake Fertő region (Burgenland). Only old observation data are available in this fluctuation zone. In the Hungarian context, it is questionable whether there is significant gene flow in the set of connected local populations (metapopulations).

19. *Cochylimorpha jucundana* (Treitschke, 1835)

Biology. Univoltine; VI–VIII. Its food plant is probably one of the *Artemisia* species.

Habitat. It can be collected day and night (by light) in dry, south-exposed rocky grasslands, and mountain meadows, and scrub up to 1000 m altitude (Balkans).

Range in Hungary. Only two specimens are known from the country (14-15.VI.1937. Pécs, leg. Klimesch J.; in coll. Hungarian Natural History Museum, Budapest, and the Natural History Museum in Vienna).

Distribution. From the Bashkir Country in southern Russia, the Balkans, the Pannonian Basin and northern Italy to Spain, France, and Belgium, but is local and rare everywhere. The Belgian occurrence is probably based on misidentification.

Remarks. There are no known sightings in Hungary in the last 85 years.

20. *Cochylimorpha straminea* (Haworth, [1811])

Biology. Bivoltine; V–VII, VIII–X. The larvae live on *Artemisia*, *Centaurea*, *Chrysanthemum* and *Scabiosa*; in the stem below the flower heads. They also consume seeds and young shoots. The second-generation overwinters as a very small larva and feeds on the stems of new shoots in spring.

Habitat. Mainly inhabits lowland and hilly xerotherm forest edges, scrub, rocky grasslands, steppe slopes, meadows, pastures, mown grasslands, roadsides, field margins or fallow land.

Range in Hungary. Widespread in the country and one of the most common species of euryoecious *Cochylimorph*a. The mapping of the sites clearly shows that no data are available from very significant geographical areas.

Distribution. Widespread and locally common in the Western Palaearctic.

Remarks. According to Ferenc Buschmann (pers. comm.), *C. straminea* specimens from the sandy habitats of Jászság are lighter in colour, and the mid-wing brown band is rarely accompanied by dark scales, so they can easily be confused with *C. perfusana* (Guenée, 1845).

21. *Cochylimorpha alternana* (Stephens, 1834)

Biology. Bivoltine; IV–VI., VII–IX. The larvae live in the flower heads of *Centaurea scabi-osa*, which are still closed, feeding on the flowers and the immature fruits. Second-generation larvae overwinter in the early stages.

Habitat. Dry grasslands, pastures, sandhills, dolomitic and limestone rocky meadows, sloping steppe mosaics.

Range in Hungary. Collected sporadically in many geographical regions of the country (Mecsek Mts, Mezőföld, Transdanubian Mts, Szigetköz, Danube–Tisza area). Typical sites: Agárd, Ágasegyháza, Albertirsa, Bánhida, Budafok, Budaörs, Dinnyés, Fót, Hosszúhetény, Isaszeg, Kárász, Komló, Magyaregregy, Nagymaros, Pécsvárad, Tarhos, Verőce.

Distribution. From Iran through Central Asia to Scandinavia, the British Isles, North Africa in the south and the Middle East. According to Razowski (2009), it is a European faunal element, but this is unlikely; it is more probably a multicentric Western Palaearctic faunal element (Fazekas 1994).

Remarks. The forage plant *Centaurea scabiosa* is widespread throughout Europe, except in the Mediterranean and in the northern landscapes. It reaches eastwards to Lake Baikal in eastern Siberia and is also established in Eastern Asia, North America, Australia, and New Zealand, so the appearance of *Cochylimorpha alternana* in other continents may be expected.

Phalonidia Le Marchand, 1933

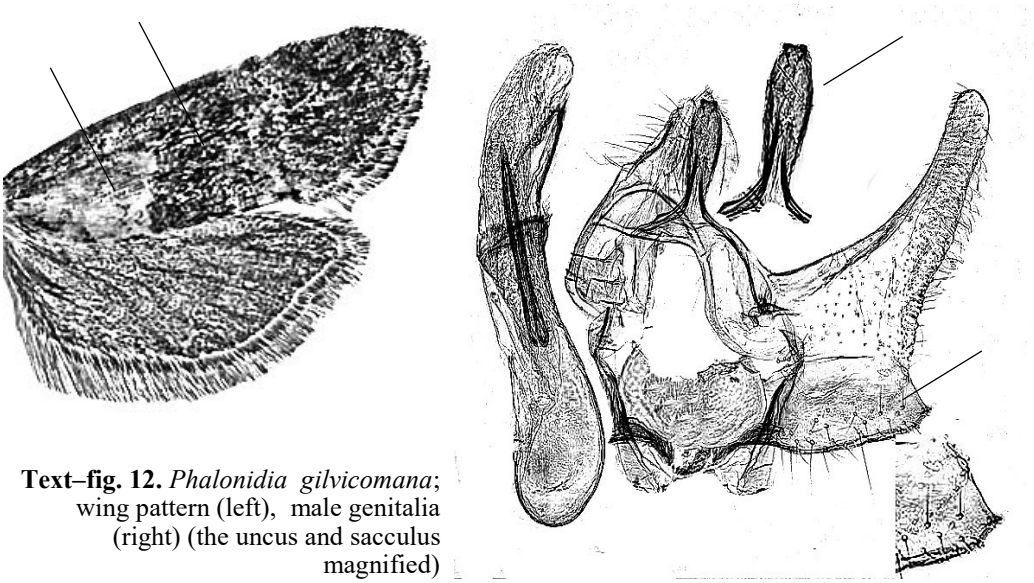
The geographical distribution of the genus is wide. Known from the Holarctic, Oriental, and Neotropical regions. Eight species are known from Europe, 6 of which have a wider distribution. Seven species have been identified in Hungary. The larvae live mainly on Asteraceae plants, mostly oligo- or polyphagous.

Razowski has analysed the taxonomy of the genus in detail in several works. Most recently, Razowski (2009) indicated that *Phalonidia* is closest to *Gynnidomorpha*, but *Phalonidia* differs in the shape and position of the socii complex which is not perpendicular to the tegumen; the flat, not dorsally upward-turned base of costa of valva; and the shape of median part of the transtilla. In *Phalonidia* and *Gynnidomorpha* a circle of spines is present in the corpus bursae (See Razowski 2011).

22. *Phalonidia gilvicomana* (Zeller, 1847)

Biology. Univoltine; VI–VIII. The larvae live in the seeds and stems of *Chenopodium* spp., *Lampsana communis*, *Mycelis muralis, Prenanthes purpurea* and *Solidago virgaurea*.

Habitat. Scrub, forest clearings, forest edges, dry and mesophilic meadows. Volcanic, calcareous and dolomitic areas. No observations from the lowland regions yet.



Text–fig. 12. *Phalonidia gilvicomana*; wing pattern (left), male genitalia (right) (the uncus and sacculus magnified)

Range in Hungary. I collected the species in Hungary for the first time on 15.VIII.1989 in the southern part of the country, in the Mecsek Mountains (Komló), at an altitude of 350 m in a clearing of an oak forest (see Fazekas 1994). This site is an intensively used urban and coal-mining area, with buildings and domestic gardens, which have been inhabited for centuries. The specimen flew at night to the light of a 160-watt mercury vapour lamp. It has recently been found in several mountainous areas of the country: Börzsöny Mts., Bükk Mts., Mátra Mts., Sopron Mts., Transdanubian Mts. (Bakony, Pilis), Zemplen Mts.

Distribution. Previous research has observed it only in Europe, from western Russia to northern Scandinavia, western France, and the British Isles.

Remarks. The first male specimen in Hungary was identified by genital examination (Fazekas 1994, fig. 7). I collected it with the light source in the same place continuously until 2015, but no new specimen was observed.

23. *Phalonidia curvistrigana* (Stainton, 1859)

Biology. A few specimens were collected in Hungary only in June and August. Larvae and food plants have not yet been encountered in this country; various literatures refer to *Solidago virgaurea*.

Habitat. Saline meadows in the lowlands, and mesophilic meadows in the mountains.

Range in Hungary Only two lowland sites (Jászberény, Kompolt) and one mountain site (Zemplén Mts.; Telkibánya) are known.

Distribution. Trans-Palaearctic species with disjunct.

Remarks. Studies in Hungary are scarce, with few precise observations.

24. *Phalonidia udana* *(Guenée, 1845)*

Biology. According to Mutanen et al. (2012), the larva of *P. udana* lives in stems of *Lysimachia thyrsiflora* and *L. vulgaris*, which are not close relatives to *Mentha* or *Lycopus*, the known food plants of *P. manniana*. Both food plants, however, inhabit moist meadows. It is thus likely that where their ranges overlap, *P. manniana* and *P. udana* may co-occur in the same habitats. The larva of *P. udana* makes a ca. 15–20 cm long gallery, usually in the lower part of the stem of the food plant but does not enter the rootstock. The larva overwinters full-grown in the upper part of the gallery but does not make a visible emergence hole. The larvae seem to prefer relatively thick stalks in *L. thyrsiflora*. Two larval galleries have been observed in one stem.

Habitat. Wet meadow, marshy landscape.

Range in Hungary. Only one very old Hungarian specimen is known: East Hungary, Bátorliget, 25.VII.1949, leg L. Kovács, gen. prep. et det. I. Fazekas (in coll. HMNH, Budapest) (see Fazekas 2014). The food plant *Lysimachia vulgaris* is common in Hungarian groves and marshes, high meadows, reed beds and wet meadows, where populations of the species can be found.

Distribution. The species is known from Europe (Denmark, Finland, Germany, France, Hungary, Latvia, Norway, and Slovakia) although one dissected specimen from Central Siberia (Novosibirsk) shows close affinity to that taxon as well.

Remarks. The taxonomic separation of the *Ph. manniana* and *Ph. udana* species has long been a matter of debate. Razowski, in his 2009 book Palaearctic, even considers it synonymous with *Ph. manniana*. Mutanen and colleagues have examined in detail the biology and genetic differences between the species pairs, and both taxa are now considered valid species (see Mutanen al. 2012).

25. *Phalonidia manniana* (Fischer von Röslerstamm, 1839)

Biology. Bivoltine; IV–VI., VII–VIII. Larvae live in stems on *Menta, Alisma, Botumus, Lycopus* and *Inula* spp.

Habitat. Near waterfronts, in marshy areas, wet meadows, alder forests, rarely in lowland sand hills, planted pine and poplar forests.

Range in Hungary. It prefers Hungarian lowland and hilly landscapes. It is widespread, but localised and rare in places.

Distribution. From Manchuria through Siberia and Central Asia to the British Isles. It also occurs sporadically in the Iberian Peninsula and Asia Minor.

Remarks. The majority of Hungarian metapopulations are highly fragmented.

26. *Phalonidia affinitana* (Douglas, 1846)

= *inulana* Constant, 1884

Biology. Bivoltine: V–VI., VII–VIII. Larvae live in stems and flowers on *Aster tripolium*.

Habitat. It prefers dry and saline meadows or pastures, mostly in lowland areas. It has also been observed near the shores of lakes and reed beds. It also occurs sporadically on the edges of mesophile woodland or in the forest of pines with the sandy hills of the Hungarian lowlands.

Range in Hungary. In Hungary, it is a typical species of continental lowland saline habitats.

Distribution. Widespread from the Urals and Caucasus to Western Europe, but its exact areas are still to be investigated.

Remark. It has not yet been observed in mid-altitude mountains.

27. *Phalonidia albipalpana* (Zeller, 1847)

Biology. Bivoltine; V–VI., VII–VIII. (>IX.). Larva monophagous on *Limonium gmelinii* (Willd.) Knutze *subsp. hungaricum* (Klokov) Soó.

Habitat. Lowland dry saline heaths, grasslands, sandy oak woodland clearings and their fringe zone, are also observed in forest pine forests planted between sand hills.

Range in Hungary. Occurs mainly in the lowland region between the Danube and Tisza rivers, with scattered occurrences east of the Tisza. West of the Danube River (Mezőföld): very local and rare.

Distribution. From the Altai mountains through the southern parts of Central Europe to Italy and Corsica, but is also found in Asia Minor.

Remarks. According to Razowski (2009) „Habitat not known." Hungarian observations correct this finding. *Limonium gmelinii* subsp. *hungaricum* is an endemic plant of the Hungarian wormy salt marshes, with a focus on the Danube plain and east of the Tisza River.

28. *Phalonidia contractana* (Zeller, 1847)

Biology. Bivoltine V–VI, VII–IX. Larvae are polyphagous in flowers, stems,

and seeds on *Artemisia, Anthemis, Cichorium, Inula* and *Lactuca* plants.

Habitat. Euryecious species, observed in dry, warm lowland habitats, moist, cool mountain valleys, birch woodland, cranberry association complexes, marshy landscapes, alder wood-lands, abandoned orchards, vineyards, rocky mountain karst scrub.

Range in Hungary. It is widespread, but mostly in flat rural areas, reaching altitudes of up to 1000 m in the northern mountains.

Distribution. Widespread in the Palaearctic, from Kashmir to the Iberian Peninsula.

Remarks. The boundaries of the species' distribution need to be further explored.

Gynnidomorpha Turner, 1916

According to RAZOWSKI (2011), *Gynnidomorpha* is very closely related to *Phalonidia*, but *Gynnidomorpha* can be distinguished by the following characteristics: the presence of a sclerotized fold between the socii, the costal part of the valva distinctly turned upward dorsally at the base, the socii almost perpendicular to the tegumen, and the end of the median part of the transtilla which is very long, terminating in a pair of minute tips. The presence of the circle of spines in corpus bursae is a putative synapomorphy shared by *Phalonidia* and *Gynnidomorpha*. The genus's areas of distribution are usually very wide. Found in all biogeographic regions, but the area of focus is the Palaearctic (9 species). There are 6 species in Europe and 5 in Hungary.

29. *Gynnidomorpha luridana* (Gregson, 1870)

Biology Bivoltine; V–VI, VII–VIII. According to Razowski (2001, 2002, 2009), the food plant is *Matricaria recutita*. Some authors dispute this, preferring the nutrient plant *Odontites vernus*. There are no known Hungarian studies on this.

Habitat. It has been observed in arid and mesophilic grasslands, reclaimed coal mine sites, meadows, and pastures (hills and mountains) near streams, abandoned vineyards and thickets, and rocky steppe meadows.

Range in Hungary. A highly localised and rare species in remote regions of the country: Budapest, Gyöngyös, Komló, Mánfa, Nagykáta, Szentpéterfölde.

Distribution. Many parts of the Palaearctic, from Japan to Korea and north-east China to the Russian Far East. It is known in Asia Minor, in Europe from Scandinavia to the British Isles, and as far south as Corsica.

Remarks. The bionomics and abundance of Hungarian populations are poorly known.

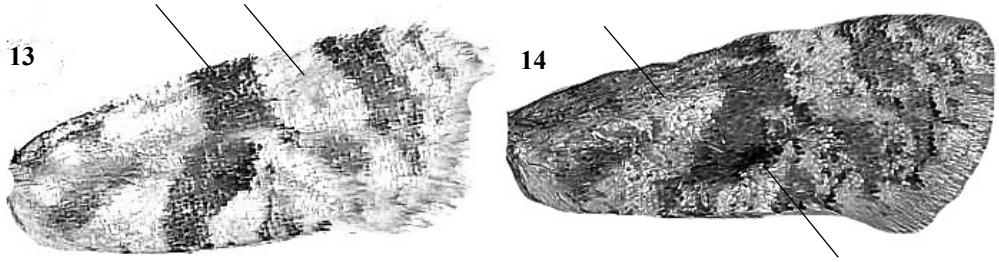
30. *Gynnidomorpha vectisana* (Humphreys & Westwood, 1845)

= *griseana* (Haworth, [1811])

Biology. Bivoltine; V–VI, VII–IX. Larvae are polyphagous on *Plantago*, *Triglochin* and *Salicornia* plants; flowerheads are eaten.

Habitat. mainly wet saline meadows, marshlands, and wet meadows along hillside streams.

Range in Hungary. Locally rare in the region between the Duna and Tisza rivers. To the



Text-figs 13-14. Wing pattern of *Gynnidomorpha luridana* (13) *and Gynnidomorpha vectisana* (14)

south are the Mecsek Mts, and to the west the marshes of Lake Balaton.

Distribution. From China transcontinentally to the British Isles and in south Italian regions.

Remarks. Only a few, highly isolated, low populations are known in the Hungary.

31. *Gynnidomorpha minimana* (Caradja, 1916)

Biology. Probably a two-generation species; V–?, VII–VIII. Larva lives in seed capsules of *Pedicularis palustris*. This food plant is local and rare in Hungary (Bartha & Király 2015). Botanists consider it to be "disappearing".

Habitat. In marshy meadows and wet pastures.

Range in Hungary. Only lowland observations are known; Bátorliget, Szentmártonkáta. Bátorliget is a famous "ancient bog" in Hungary. Its survival dates back to the early postglacial period. This is a nature reserve, all three specimens were collected in 1948 and 1949, and since then there have been no further sightings from this area. A previously unknown population was found 195 km west of the old site in 2009 at Szentmártonkáta. This is a saline grassland, a typical vegetation: *Festuco pseudovinae artemisiosum*. This plant community is a representative of the Central Asian salt marshes of the Carpathian Basin, the most typical and widespread habitat of the Hungarian Great Plain.

Distribution. Known sporadically from Japan through central Eurasia to the British Isles.

Remarks. There are surprisingly few authentic records from Hungary. It is probably a "relict" species from the postglacial period that is in regression.

32. *Gynnidomorpha permixtana* ([Denis & Schiffermüller], 1775)

Biology. Bivoltine; V–VI; VII–VIII. Larva is polyphagous in stems, seeds, and flowers of *Alectrolophus, Alisma, Butomus, Euphrasia, Gentiana* and *Solidago.*

Habitat. In lowland sandy oak woodlands, steppe meadows, hill country wet and boggy meadows, mown meadows, pastures, village gardens, planted pine woods etc. Euryecous species.

Range in Hungary. Widespread but local and rather uncommon in Southwest Hungary and the Great Hungarian Plain.

Distribution. Trans-Palaearctic distribution, from Japan to Western Europe.

Remarks. There have been few bionomic studies in Hungary so far.

33. *Gynnidomorpha alismana* (Ragonot, 1883)

Biology. Bivoltine; V–VII, VIII–IX. Probably a monophagous species whose larvae live in the stems of the *Alismana plantago-aquatica* food plant.

Habitat. Prefers wet, moist areas of the plains.

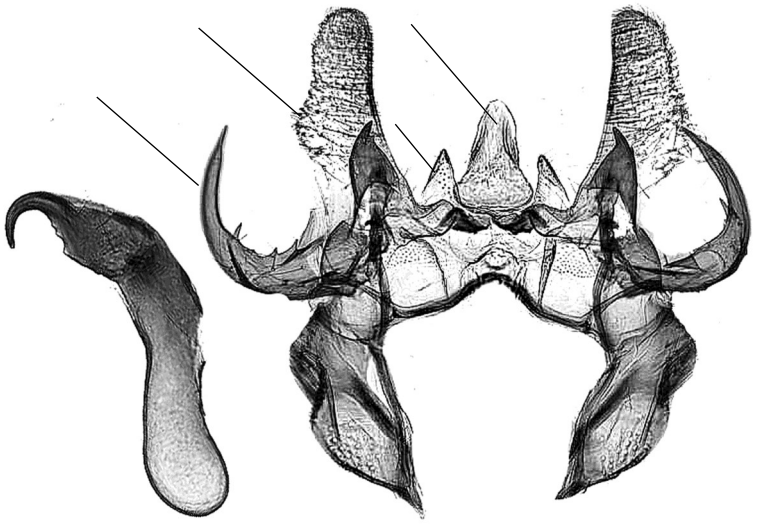
Range in Hungary. It is a locally occurring and uncommon species, mainly in the central and eastern lowlands of the country. Very few observations have been made west of the Danube River (= Transdanubia). It has not yet been found in the mid-altitude mountain ranges. This is interesting because in Hungary it is the mountain research that is the most intensive.

Distribution. It is a bicentric species, with its range centred in Europe, but there are also known sightings in China (see Razowski 2009).

Remarks. According to my observations, the species is in strong regression in Hungary. Damaged, worn *G. alismana* specimens can only be distinguished from the very similar *G. vectisana* species by genital examination.

Agapeta Hübner, [1825]

Species from the central and western parts of the Palaearctic region. Three species are found in Hungary. Among them, *Agapeta largana* (Rebel, 1906) stands out in terms of fauna history. Razowski (2009, 2011) indicated that *Agapeta* is closely related to *Ceratoxanthis*; short transtilla. The two genera share with *Fulvoclysia* a yellow forewing colour. *Agapeta* differs from C*eratoxanthis* by its small socii, simple sacculus, strong sclerites of the basal region of the disc of the valve, and the presence of a distal process of the juxta. All known species have a large sterigma and lack sclerites of the corpus bursae, the only exception being *Agapeta zoegana.*



Text–fig. 15. Male genitalia of *Agapeta hamana* (detailed description in the text)

34. ***Agapeta hamana*** (Linnaeus, 1758)

Biology. The moths fly continuously from May to the end of October; bivoltine species. The larva feeds on *Carduus, Cirsium*, *Ononis* and *Trifolium* plants.

Habitat. Euryecous species, on dry and mesophilic meadows, fields, fallows, roadsides, pastures, reapers, on lowland sands, and the edge of alder forests. In the northern mountains, it reaches altitudes of up to 1000 m.

Range in Hungary. It is widespread throughout the country, but nowhere common.

Distribution. They populate vast areas of Asia and Europe. According to Razowski (2009) a European–Altai–Turanian zoogeographical element.

Remarks. The species' area centre is unclear.

35. ***Agapeta largana*** (Rebel, 1906)

Biology. Univoltine species; VI–VIII. The larvae probably live in the roots of *Carduus* species. This observation is not confirmed.

Habitat. Lowland dry steppe meadows, grasslands, forest pine forests planted between sand hills, remnant relict oak woodland clearings and edge zones.

Range in Hungary. A much rarer and more localised species than the previous species. It is found only in the central lowland saline landscapes of the country.

Distribution. It lives in a small geographical area in Western Austria, Hungary, Romania, and Greece.

Remarks. It is an especially important species from a faunal point of view. The exact genealogy is not known.

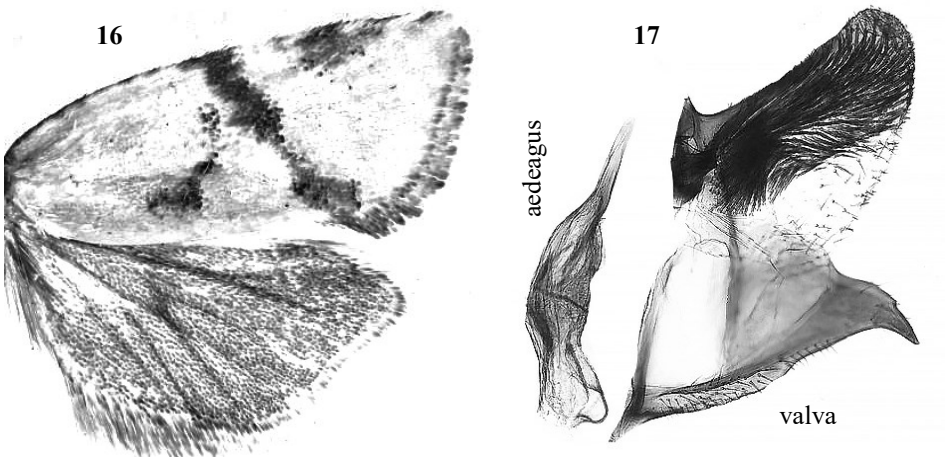
36. ***Agapeta zoegana*** (Linnaeus, 1767)

Biology. Flight period; VI–VIII. (sometimes until the middle of September). The larva feeds on the roots of *Centaurea, Jurinea* and *Scabiosa* plants.

Habitat. Meadows, pastures, grasslands, reedbeds, forest margins, rocky grasslands, karst scrub, sand pine forests, wet riparian forests, and marshlands (euryecous species).

Range in Hungary. It is widespread and locally common in all natural geographic areas.

Distribution. From Central Asia to the British Isles, Scandinavia, and Asia Minor.



Text-figs 16-17. Wing pattern of *Fulvoclysia nerminae* (16) and male genitalia (17)

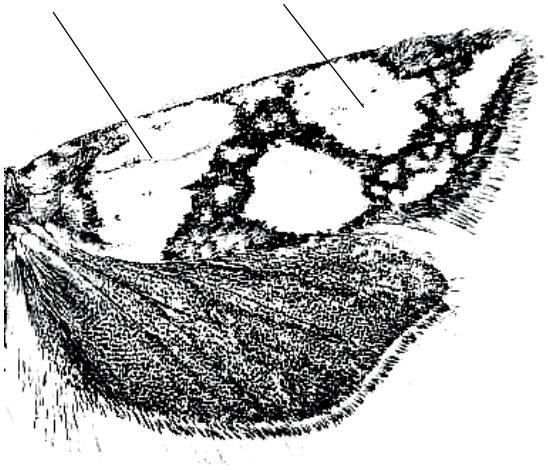
Remarks. One of the most common Cochylini species in Hungary.

Fulvoclysia Obraztsov, 1943
One species occurs in Hungary and Europe. According to Razowski (2009, 2011) *Fulvoclysia* is like *Agapeta* and *Ceratoxanthis*. The male genitalia of *Fulvoclysia* differs in the presence of spiny areas of valva and small aedeagus that tapers distally just beyond the zone (Fig. 17).

37. *Fulvoclysia nerminae* Koçak, 1982
= *fulvana* (Fischer von Röslerstamm, 1836) nec ([Denis & Schiffermüller], 1775
Biology. Moths have been collected in VI–VIII. Larva feeds on *Scabiosa* spp. food plants (in stern and root).
Habitat. Hilly and mountain meadows, pastures up to an altitude of 1000 m.
Range in Hungary. It is known only in the north, in the Mátra and Bükk mountain ranges.
Distribution. European species, there are old observations from Asia Minor, but these data have to be confirmed. This species may have its northernmost distribution limit in the Luxembourg Moselle valley (Hellers 2002). According to Pröse et al. (2003), the species is "threatened with extinction" in Bavaria.
Remarks. Knowledge of Hungarian populations is incomplete.

Eugnosta Hübner, 1825
Thirteen species are known in the Palaearctic, four in Europe, and two in Hungary. The Palae-arctic species are mostly characterized by silvery forewing ground colour. According to Razowski (2009, 2011) *Eugnosta* is closely related to *Commophila* and *Prochlidonia* and is com-parable to *Eupoecilia* and some tropical genera. Most of the Palaearctic species of *Eugnosta* are easily distinguished by the lustrous forewing ground colour. The male genitalia is distin-guished by large, well-sclerotized socii; female genitalia is like those in several other genera. Males of *Commophila* differ only slightly from *Eugnosta*, and the two genera may prove syn-onymous. *Prochlidonia* differs from *Eugnosta* only in the shape and size of the caulis.

38. *Eugnosta lathoniana* (Hübner, [1799–1800])
Biology. Bivoltine; V–VI; from VII to early IX. Larvae live on *Carduus hamulosus*.
Habitat.: Dry grasslands, pastures, fallows, dolomitic and limestone rocky grasslands, karstic forest margins, dry forest clearings. Occurs from the lowlands up to 700 m in the mountains. In Asia Minor (Karaman, Merkez, det. et photo: Ö. Koçak) and the Iberian Peninsula (leg. et det.: F. Graf), it reaches altitudes of 1000–1200 m.
Range in Hungary. Few occurrences in the Transdanubian region and the North-Hungarian Mountains, fragmented localities in the Danube–Tisza Interfluve in central Hungary.



Text-fig. 18. Wing pattern of *Eugnosta lathoniana:* the species are mostly characterized by silvery forewing ground colour.

Distribution. A western Palaearctic species. Occurs from the Urals, through the Caucasus, in Asia Minor, Central and Southern Europe, west to Portugal, and in North Africa. Local, sometimes fragmented populations are known everywhere. Sinev (2019) catalogues the species as having an extremely limited distribution in Russia.

Remarks. In Hungary, most of the sites are known from the Budapest (capital) agglomeration. These are mostly old observations, 50–100 years old and most of the recorded places have been built up or completely transformed and have disappeared. The species is highly localized and in regression in the country. Populations may survive only in protected areas, for example in Natura 2000 sites or protected landscape areas.

39. *Eugnosta magnificana* (Rebel, 1914)

= *margaritana* (Hübner, [1813]

Biology. Univoltine; V–VI. Larvae and food plants are not known.

Habitat. Most of the known and very old habitats in Hungary are in Budapest. A significant part of them has been destroyed, built up and can no longer be reconstructed. Only one relatively natural habitat has survived – in the nature conservation area: Sas-hegy.

The "Buda Sas-hegy Nature Reserve" belongs to the Danube-Ipoly National Park. The 30-acre (120,000 m^2) area on the top of the hill (257 m) was placed under protection in 1958. It was one of the first nature reserves in Hungary, protecting the limestone landscape and its special flora and fauna. Sas-hegy is a small dolomite hill, the steep dolomite slopes are covered with the original vegetation of dolomite grassland, dominated by *Festuca pallens* and *Carex humilis* (Zólyomi 1958*)*. Probable habitats of occurrence of this species should be sought: closed rock grassland; endemic grassland of *Seslerietum sadlerianae*; dry open rock grassland on steep southern slope (*Seseli leucospermi-Festucetum pallentis*); mosaic grassland, shrubs around; large grassy area on a moderate eastern slope. According to Bölöni et al. (2011 typical habitats are calcareous open rocky grasslands, closed rocky grasslands, and calcareous rocky steppes (Fazekas 2022).

Range in Hungary. Budafok [1904], Budapest [1877] (Kamaraerdő, Káposztásmegyer [1936], Sas-hegy [1893], Széchenyi-hegy [1903], Újpest [1903]), Pápa (1892). The first sighting in Hungary was in 1877 and the last in 1936. Consequently, it seems that nobody has collected or photographed it in Hungary in the 88 years since.

Distribution. Southern and partly Central Europe, Russia (Central part of the European Russia, Crimea, Don region, Volga region, South Ural), Armenia, Asia Minor, Kazakhstan, Transcaspian area, Iran, Central Asia, Afghanistan, China: Inner Mongolia (Rebel 1914; Ra-

zowski 1970, 2002, 2009; Kuznetzov 1978; Budashkin 2009; Budashkin & Richter 2021, Sinev et al. 2019).

Remarks. *Eugnosta magnificana* is likely to be extinct in Hungary. It is neither listed in the Hungarian Red Book nor the national list of protected species; it has escaped the attention of Hungarian conservation authorities and Lepidoptera researchers.

Prochlidonia Razowski, 1960

Two species are known in the West Palaearctic. Razowski (1987, 2011) compared *Prochlidonia* with *Eugnosta* and *Commophila*. According to Razowski (2009b), *Prochlidonia* is closely related to *Eugnosta*, as evidenced by the shape of socii, but in *Prochlidonia* the caulis is very large, expanding at the end ventrally. Characters of *Prochlidonia* are rather similar to those of *Eugnosta* and may prove to be of specific importance only. Supposed autapomorphies of *Prochlidonia* are the shape and size of the caulis and the dorsolateral lobes of the juxta.

40. *Prochlidonia amiantana* (Hübner, [1799])

Biology. Univoltine; V–VI. According to Razowski (2001), there are two generations in Central Europe, but this was not confirmed by Hungarian observations. The early stages are not known.

Habitat. 150–350 m altitude, mainly in mountainous mesophilic and xerophilic meadows, and karst scrub.

Range in Hungary. Most of the sites are in the Budapest agglomeration (Farkasrét, Farkas -völgy, Lipótmező, Sváb-hegy, Szamárrét), which has been inhabited since ancient times, with vineyards and gardens from the Middle Ages onwards, and then increasingly built-up from the 18th century onwards. Additional local and highly isolated sites: Csákvár, Gyöngyös Hollóháza.

Distribution. So far, it is known only from Europe. It has been found from Romania through the Pannonian region and the Balkans to southern France, but is highly fragmented.

Remarks. According to Kovács & Kovács (2006) in Romania, the larvae are most likely to live on *Helianthemum* species (Cistaceae). Adults fly in two generations. The species is characteristic of open, dry biotopes. From Romania it has been reported only from the Apuseni Mountains, Colții Trascăului. There is no continuity between the Hungarian and Romanian populations, with a geographical distance of more than 300 km. In my opinion, the species is in regression and endangered; conservation measures are justified. Monitoring studies should be carried out in national parks and nature reserves.

Eupoecilia Stephens, 1829

Species of the genus are mainly found in the Palaearctic, Oriental and Australian regions. There are 4 species in Europe and 3 in Hungary. *Eupoecilia* is closely related to *Eugnosta* and its allies, but *Eupoecilia* is easily distinguished by having a dorso-basal lobe of the socius and a wreathlike arrangement of the distal cornuti.

41. *Eupoecilia angustana* (Hübner, [1796–1799])

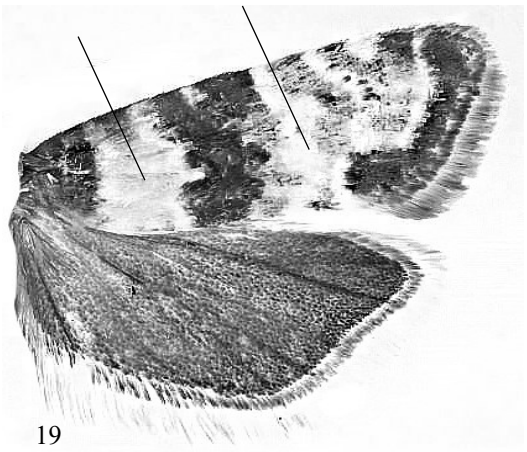
Biology. Bivoltine; V–VII; VII–IX. The larvae are polyphagous and feed in flowers, leaves, and seeds of *Achillea, Calluna, Origanum, Plantago, Solidago, and Thymus* spp.

Habitat. In a wide variety of ecological conditions: in bush habitats, hill and mountain meadows, pastures, orchards, forest clearings, deciduous and pine woodland edge zones, along roadsides, and agricultural fields.

Range in Hungary. It has been observed in almost all regions of the country. It seems to prefer mountainous and hilly areas.

Distribution. From Japan, through temperate and meridional Russian areas, to the British Isles.

Remark. It is one of the most distinctive Cochylini species in Hungary, but population abundance is not known.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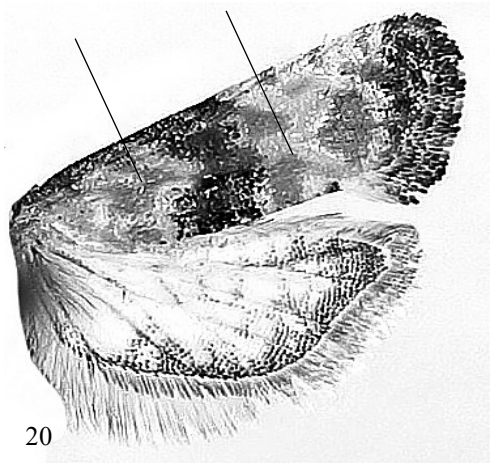
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Text-figs 19-20. Comparison of the wing pattern: 19. *Prochlidonia amiantana***,** low variability; 20. *Eupoecilia angustana*

42. *Eupoecilia ambiguella* (Hübner, [1796])

Biology. Bivoltine; IV–V; VII. The polyphagous larvae live on *Acer campestre, Cornus spp., Clematis vitalba, Frangula alnus, Hedera helix, Lonicera xylosteum, Ligustrum vulgare, Prunus spp., Ribes spp., Rubus spp, Sambucus racemosa, Vitis vitifera etc.*

Habitat. Dry and mesophilic oak woodlands, sunny rocky woodland communities, wooded lowland steppe woodlands, rocky grassland communities, marginal scrub, cottage crofts, and vineyards.

Range in Hungary. Throughout the country, but very localised, mostly in hilly and mountainous areas.

Distribution. In the temperate and meridional vegetation zones of Eurasia, from Japan to the Iberian Peninsula.

Remark. Appears to be a widespread species in Hungary, but the life history and abundance of fragmented populations are poorly known.

43. *Eupoecilia sanguisorbana* (Herrich-Schäffer, [1856])

Biology. Flight times; VI–VII., VIII, possibly having two generations. According to references the larvae live on *Sanguisorba officinalis*; in seedheads and flowers.

Habitat. So far there are no credible observations in Hungary. The plant lives in marshy, boggy meadows. A widespread in the western and central parts of the country and the north-east (see Bartha & Király 2015).

Range in Hungary. Surprisingly few, very local populations are known from the follow-ing sites: Bakonybél (mountain area place); Farmos, Nagykáta and Tápióság (lowland popula-tions).

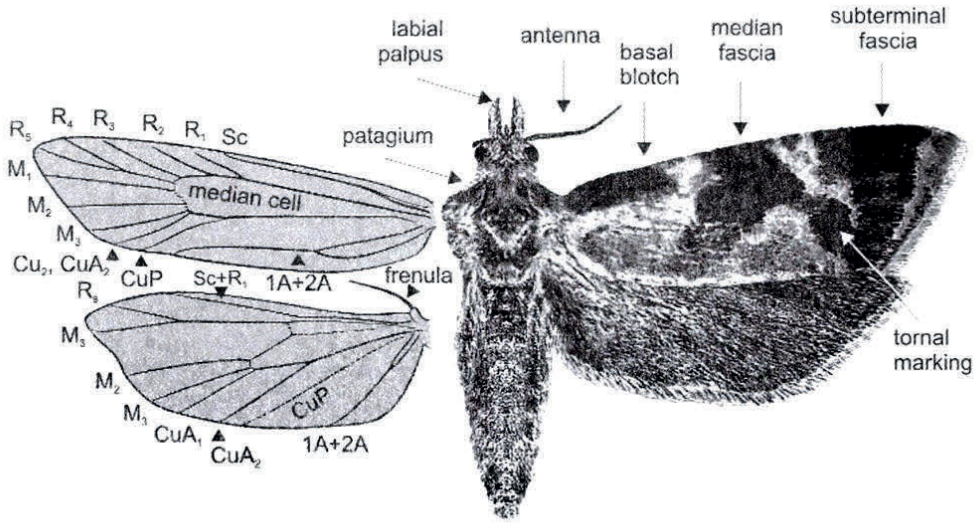
Distribution. A highly fragmented species was detected from China (Heilongjiang Province), through Kazakhstan to France and Belgium.

Remarks. In the Pannonian biogeographical region, it is a species in a strong regression and should be monitored as soon as possible, especially in protected areas. Since the larvae feed in flower heads, the timing of mowing should be carefully regulated.

Aethes Billberg, 1820

Species are characteristic of Neotropical, Oriental, and Holarctic regions. According to literature, 70–75 species are known in the Palaearctic region and are more widespread in the western Palaearctic. Several endemic species are known in Central Asia. There are 45 European species, of which 22 are found in Hungary.

The wingspan of the image is 8–23 mm, markings, and colouration are very variable. In the forewing, all veins separate or R4-R5 stalked, chords, M-stem and CuP atrophied; in



Text-fig. 21. Venation and forewing pattern of *Aethes* genus (after Fazekas 2008)

hindwing Rs-M, stalked, reaming veins run separate. In *Aethes*, the assumed basic pattern consists of basal, dorso-post basal, median and subterminal fasciae, and a tornal marking. Several of the species are polymorphic and have distinct ecological forms. Ecological variation, such as that found in *Ae. hartmanniana, Ae. rutilana* and *Ae. kindemanniana*, also appears to have been intensively studied. There are several groups of closely related taxa occasionally treated as valid species or, formerly, subspecies or groups of species or infraspecific taxa (e.g. *Ae. hartmanniana/piercei* and *Ae. cnicana/rubigana*).

The hindwing is usually more or less unicolorous, sometimes with darker suffusion. Usually, the ground colour is brownish grey or grey, cilia paler than wing or creamy, whitish.

Recorded foodplants are mainly species of Asteraceae (Compositae). The larva lives in various parts of plants, often in stems and roots; it hibernates and pupates in spring or early summer. The moths fly from April to September and maybe uni-, bi- and multivoltine.

Razowski (1994, 2011) recognized that *Aethes* and *Aethesoides* are closely related, sharing two synapomorphies: the presence of slender, curved socii from a broad, hairy base and the rod-like sclerite coupling the tegumen with the valve. According to Razowski (2009b), the two genera have a similar thread-like distal part of the socii, but *Aethes* has a more generalized valva.

44. *Aethes hartmanniana* (Clerck, 1759)

[*piercei* auct.]

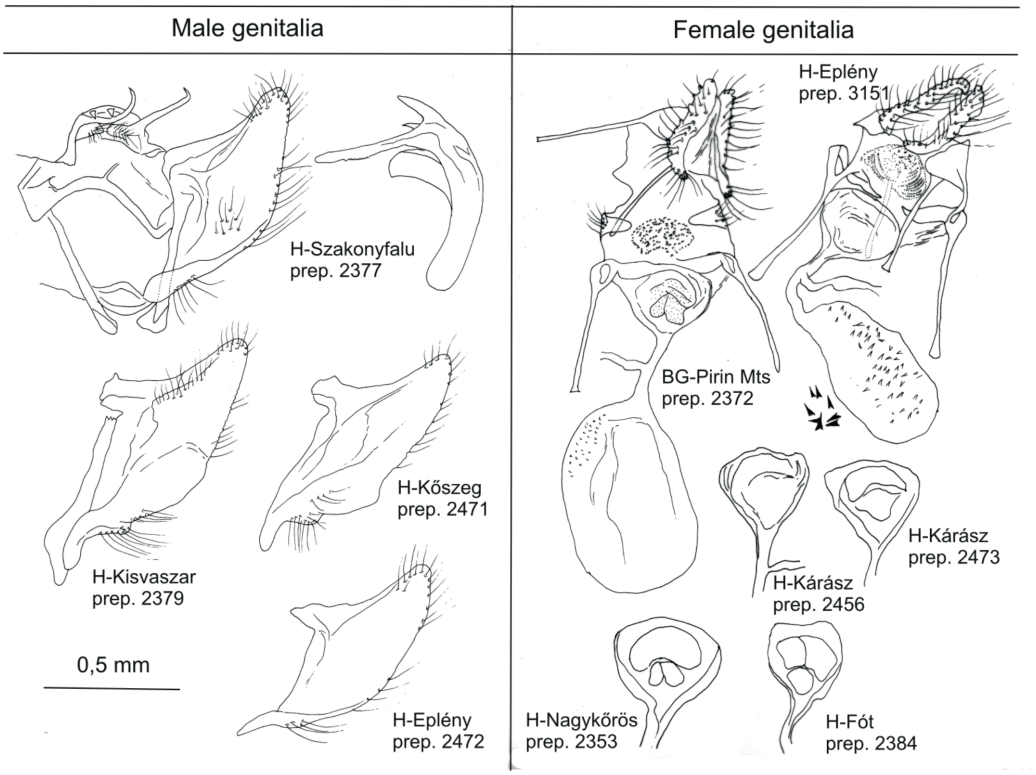
Biology. Bivoltine. The moth flies from mid-May to mid-June and from early July to mid-August. Oligophagous. Recorded foodplants are *Scabiosa ochroleuca, S. columbaria, Succisa pratensis* and *Knautia arvensis.* The larva lives in the rootstock.

Habitat. Moist-rich fens, eu- and mesotrophic meadows, Colline and montane hay meadows, acid grasslands and heaths. Rare and local in the marshy country. Sporadic in halophilic and dry open grasslands. Altitude from 90 m to 600 m (Fazekas 2008).

Range in Hungary. Widespread in the western and northern parts of Hungary. Frequent on the hills and in mountains of medium height and avoiding the dry habitats on the plains.

Distribution. From the Ural Mountains and the Caucasus to Britain. According to Kennel (1913) in Armenia and Asia Minor.

Remarks. A rather variable species: some very dark specimens occur in water-fringing herbaceous communities. *Ae. hartmanniana* and *Ae.piercei* occur sympatrically in the West



Text-fig. 22. *Aethes hartmanniana*; the variability of male and female genitalia in Hungary based on samples from different populations (after Fazekas 2008).

Hungarian Borderland (FAZEKAS 1992). Further study is needed to improve knowledge about taxonomy and distribution areas. For Hungarian morphology and biology see Fazekas (1992).

45. ***Aethes williana*** (Brahm, 1791)

Biology. The moth flies in two generations from April to mid-September. Larva polyphagous, on *Daucus carota, Eryngium campestre, Gnaphalium sylvaticum* and *Helichrysum arenarium*; full-grown larva 9–10 mm long, body yellowish; pupa straw coloured, 6-7 mm long, the cocoon light brown. In Hungary, the larva is injurious to cultivated carrots (Farkas 1969). Not uncommonly, a quarter of the crop can be destroyed. Two years are sometimes spent in the pupal stage.

Habitat. Xerotherphilous species,found mainly in the closed loess and sand steppes, saline pasture, and edge of agricultural land. Altitude from 90 m to 650 m (e.g. Mátra Mts).

Range in Hungary. Very local in the Great Hungarian Plain, and sporadically in some habitats of the mountains at medium altitude (for example Bükk and Mátra Mts).

Distribution. From Mongolia to North-West Africa and Western Europe. Chorotype; centralasiatic-europeo-mediterranean.

Remarks. *Ae. williana* is often a pest in plantations of carrots, especially in certain years when it becomes abundant.

46. ***Aethes margarotana*** (Duponchel, 1836)

Biology. Bivoltine; IV–V.; VII–VIII. The monophagous larva lives in roots and

stems of *Eryngium campestre,* instead of *Eryngium maritimum* which does not occur in Hungary. Hibernation in larval stage.

Habitat. Sand steppes, lowland dry degraded grasslands, slope steppes, dry and semi-dry closed grasslands (for example Bakony and Mecsek Mts.). Altitude from 100 m to 400 m.

Range in Hungary. Sporadic occurrence in lowlands and lower mountain regions.

Distribution. From the Amur region through Eurasia (in the temperate and meridional vegetation zones) to western Europe and North Africa.

Remarks. Not recorded from Eastern Hungary (Tiszántúl Region), except for the Nyírség region. Monitoring of the populations around Budapest based on 50-100 years old observations seems to be futile.

47. ***Aethes moribundana*** (Staudinger, 1859)

Biology. Bivoltine, flying in late May to mid-June and from July to August. According to Budashkin (1993), the larvae feed in generative parts of flowers of *Sideritis taurica*; each larva utilises 4 or 5 flowers. *Sideritis taurica* does not occur in the Pannonian region, and in Hungary the larval food plant is unknown. *Sideritis montana* does, however, occur in this area.

Habitat. Dry, rocky grassland with scrub (Pákozd: Kanca-hegy).

Range in Hungary. It is very localised and rare; Bükk Mountains, Isaszeg, Pákozd, Simontornya.

Distribution. From China to Mongolia, through Central Asia and North Africa, but is fragmented.

Remarks. *Ae. moribundana* is very rare and local in Hungary but could be overlooked and therefore careful search is required.

48. ***Aethes nefandana*** (Kennel, 1899)

Biology. From the dates of collections of adults; V–VI; and VII. Possibly a two-generation species. The biology of the larva is not described; it may live in the stem of *Eryngium* spp.

Habitat. Mainly in lowland dry, sandy grasslands, pastures, pine forests planted on sand, but also known in mountain rocky habitats (xerothermic grasslands, karstic shrub forests, etc.).

Range in Hungary. It has been observed mainly in the sandy regions between the Danube and Tisza rivers. It is much rarer in some mountainous regions (Budai Mts., the foothills of the Mátra Mts).

Distribution. A local species occurring in Central Asia, Asia Minor and through the Balkans to Central Europe.

Remarks. The Hungarian populations are in the so-called fluctuation zone of the species' western range limit. It is probably a "relict" species of a post-glacial dry warm period that is in regression. Endangered.

49. ***Aethes margaritana*** (Haworth, [1811])

Biology. Moths fly in one generation; VI–VIII. The larvae are polyphagous on seeds and flowers of *Achillea, Chrysanthemum, Matricaria* and *Tanacetum* food plants.

Habitat. Xerophilous and mesophile meadows, grasslands, pastures, forest margins and clearings, rocky grasslands, karst scrub forests, no longer cultivated hilly vineyards and orchards, village gardens, etc.

Range in Hungary. Prefers the hilly and mountainous areas west of the Danube (Transdanubia Regions) and the northern mountains. It is exceedingly rare and local in lowland areas.

Distribution. Widespread from Central Asia to the British Isles. The centre of its area is Europe.

Remarks. The adults have been collected in Hungary up to the altitude of 1000 m.

50. *Aethes triangulana* (Treitschke, 1835)

Biology. Moths fly in two generations; IV–VI; VII–VIII. According to the literature sources, the food plant is *Pseudolysimachion [Veronica] longifolium.*

Habitat. Ecologically quite different edge habitats; marshes, rich fens, eu- and mesotrophic meadows and tall herb communities, water-fringing, and fen tall herb communities, colline and montane hay meadows, acid grasslands and heaths, open sand steppes, dry and semi-dry closed grasslands, riverine and swamp woodlands etc.

Range in Hungary. Sporadically in mountainous and hilly areas; Mátra, Mecsek, Budai, Bükk Mts (up to 1000 m), Gödöllő Hills. Highly fragmented populations in lowland regions; Hajdúság, Nyírség, Berettyó-Körös region, Danube plain, Tápió region. Further expected areas of occurrence: the Dráva river basin and the western Hungarian border region as well as the area around Lake Balaton, etc.

Distribution. Temperate and meridional vegetation zones of Eurasia, from the Amur to the Iberian Peninsula.

Remarks. Knowledge of Hungarian populations is still incomplete.

51. *Aethes rutilana* (Hübner, [1817])

Biology. The moths have been collected in one generation: V–VII. Larva lives in spun leaves of *Juniperus communis.*

Habitat. Sandy lowland areas, hilly and mountainous barren meadows, and sheep pastures.

Range in Hungary. Sporadically in the central lowland area of the country, exceptionally in some mountainous areas (Buda Hills, Mecsek Hills.

Distribution. From Siberia, through Finland, to central Europe and the Iberian Peninsula. In the European mountains, it reaches altitudes of 2300–2500 m. *Aethes rutilana* was introduced into British Columbia sometime before 1965.

Remarks. There are remarkably few known sites in Hungary. Endangered (proposed as a future Hungarian Red Data Book species).

52. *Aethes smeathmanniana* (Fabricius, 1781)

Biology. Adults fly in one generation; IV–VI. There is also a second generation in the literature, but this has not yet been observed in Hungary. Larva oligophagous on Asteraceae species; *Achillea millefolium, Anthemis cotula, A. arvensis, Centaurea nigra* and *Lactuca sativa.*

Habitat. Hygrophilous and mesophile meadows, road verges, weed communities, field margins, forest edges, sandy and saline lowland grasslands, arboretums, karstic woodlands, rocky grasslands (in mountain areas), village gardens and garden sheds.

Range in Hungary. A widespread and locally common species in many parts of the country. In the north, it reaches altitudes up to 1000 m in the mountains.

Distribution. Widely distributed Holarctic species. In the Nearctic region, this species has been recorded in Canada (Alberta, British Columbia, Quebec, Yukon Territory) and the United States (California, Maine, Minnesota, Montana, Ohio, and New Jersey). See https: // en.wikipedia.org

Remark. This is one of the most widespread euryecious species of Cochylini taxa in Hungary.

53. *Aethes tesserana* ([Denis & Schiffermüller], 1775)

Biology. Bivoltine; V–VI. VII–VIII. Larvae are oligophagous in the roots of *Picris* and *Hieracium spp.*

Habitat. Xerophilous and mesophilous meadows, pastures, grasslands, coppices, forest margins, rocky grasslands, karst scrub forests, and sloping steppes.

Range in Hungary. Widespread mainly in lowland regions, more localised in hilly and mountainous areas. It has been found on plains in the steppe zone, but also in mountain ranges up to 1000 m above sea level.

Distribution. Mostly considered to be a European species. According to Razowski (2009),

the data from Iran require confirmation.

Remarks. Monochrome, brownish specimens are also rare.

54. ***Aethes sanguinana*** (Treitschke, 1830)

Biology. The moths' collection time; VI–IX. According to Razowskí (2001) in Central Europe; V–VI, VII–VIII. I assume that in Hungary one-generation populations spread over a long period. Larva monophagous in stems of *Eryngium campestre.*

Habitat.: Closed loess and sand steppes, dry grasslands, pastures, roadsides, rocky hillsides with karst scrub, thermophilous woodland fringes, calcareous open rock grasslands, village crags, ruderal areas, etc.

Range in Hungary. Rare and local species, mainly on the continental plains of the Danube -Tisza Interfluve, highly isolated in some mountain areas (around Budapest, Mecsek-Mts, and Villány Hills near the southern border).

Distribution. Known in Asia Minor, from the South Urals region through Central Europe to North Africa. It prefers the sub-Mediterranean regions.

Remarks. There is also an old collection record from the southern edge of Lake Balaton (Fonyód), but the exact location of the population is not known.

55. ***Aethes dilucidana*** (Stephens, 1852)

Biology. So far, a total of 5 collected specimens are known from the end of July 1952, since then no sighting data are available. According to literature reports, the larva lives on *Peucedanum sativum, Pastinaca sativa*, and *Heracleum sphondylium* (Razowski 2009).

Habitat. Xerophilous and mesophilous meadows, pastures, forest edges.

Range in Hungary. Only one old, much-studied site near Budapest: Ócsa.

Distribution. Razowski (2001) mentioned only Austria and the Czech Republic in his book on Central Europe. He was not aware of its occurrence in Hungary. The species occurs from southern Siberia through Europe to North Africa.

Remark. The species has disappeared from Hungary, and it is also possible that it has become extinct. The only Hungarian site is a unique, 3575-hectare glacial bog remnant. The Ócsa Landscape Protection Area belongs to the Danube–Ipoly National Park.

56. ***Aethes flagellana*** (Duponchel, 1836)

Biology. The adults emerge in May and fly until August. They may form two generations, but this has not been confirmed by exact studies. The larvae live in stems and flowers of *Eryngium campestre*.

Habitat. Closed loess and sand steppes, dry grasslands, pastures, roadsides, rocky hillsides with karst scrub, thermophilous woodland fringes, calcareous open rock grasslands, village crags, ruderal areas, etc.

Range in Hungary. Mainly in the western and northern hills and mountains of the country, and in the Danube-Tisza Interfluve.

Distribution. From Iran to Central Asia and Asia Minor, it has been observed in many parts of Europe.

Remark. Widespread in Hungary, but population abundance is moderate.

57. ***Aethes beatricella*** (Walsingham, 1898)

Biology. Two adults were collected in Hungary: 1974.VI.27. and 1976.VI.29. The larva lives on *Conium maculatum* and *Smyrnium olusatrum* (Razowski 2009).

Habitat. Salt meadows, closed loess and sand steppes, edges of the road.

Range in Hungary. Only two known sites in the Hungarian Plain; Nagyiván–Darvas, Kunfehértó.

Distribution. Known from Central Asia through Europe to North Africa.

Remarks. Possibly an endangered species in Hungary, our knowledge is incomplete.

58. *Aethes francillana* (Fabricius, 1794)

Biology. The moths were collected from June to September, representing probably two generations of the species. The larvae are polyphagous in seeds or flowers of *Angelica, Astydamia, Crithmum, Daucus, Eryngium, Ferula, Pastinaca, Peucedanum, and Petroselinum* plants.

Habitat. Varied, mainly lowland steppe meadows, grasslands, sporadically wet, marshy landscapes.

Range in Hungary. Highly fragmented in several regions of the country: Budafok, Csepel, Jászberény, Kunpeszér, Nagykőrös, Nyírbátor, Vörs.

Distribution. Known from Central Asia through Europe to North Africa and the Canary Islands.

Remarks. No observations from the etensive hilly areas and higher mountains.

59. *Aethes bilbaensis* (Rössler, 1877)

Biology. The moth fly in VI–VIII. The larvae oligophagous on *Carum verticillatum* and [*Crithmum maritinum*] the latter plant is not native to Hungary.

Habitat. Wet and boggy meadows, lowland steppe meadows, grasslands, hilly and upland mesophilic meadows, grasslands, oak woodland edge zone, rocky sunny hillsides It was also cultivated in village gardens (PL. Kárász, Komló; Mecsek Mountains). The ecological spectrum is broad.

Range in Hungary. Local and rare, preferring hills and mountains (up to 1000 m). It has not yet been found in the eastern part of the country.

Distribution. Known from Iran through Central and Asia Minor to Europe and North Africa. A fragmented West Palaearctic species.

60. *Aethes tornella* (Walsingham, 1898)

Biology. Moths were collected from June to early August. The larva and food plant are unknown in Hungary.

Habitat. Collected in a wide variety of habitats, preferring meadows, pastures and grasslands, and the marginal zone of mesophilic and hygrophilic forests.

Range in Hungary. Local and rare in the lowlands and lower mountain regions (up to 300 –400 m).

Distribution. Known from Central Asia through Asia Minor and the Middle East to the British Isles and the Iberian Peninsula.

Remark. There are no suitable ecological corridors and stepping stones between highly fragmented populations. They have no reproductive biological link. Habitat connectivity has been eliminated by agricultural land.

61. *Aethes cnicana* (Westwood, 1854)

Biology. One generation yearly: V–VII. The larvae are oligophagous on *Carduus* species. The eggs are laid in the cup leaves of the flowers. Pupae are in dead stems of food plants.

Habitat. Wet meadows, and reedbeds, along streams in tall fescue communities, in the fringe zone of alder forests, and mountain and hilly stream valleys. It sometimes flies in village gardens (e.g. Mecsek Mts).

Range in Hungary. Local and rare mainly in the south-west of the country (hilly areas). Isolated in the north in the Bükk Mts.

Distribution- A so-called Trans-Palaearctic species, known from East Asia through Asia Minor to Western Europe.

Remark. There are only a few specimens in Hungarian collections.

62. *Aethes rubigana* (Treitschke, 1830)

= *badiana* sensu Hübner, 1799

Biology. Moths collected from June to September. The exact generational boundaries are not known, probably a two generational species. The larvae oligophagous on *Arctium lappa*, and *A. tomentosum*.

Habitat. Mainly in hilly and upland meadows, pastures, grasslands, woodland margins, rocky grasslands, and karst scrub, but also found in lowland alkaline steppe meadows.

Range in Hungary. Widespread, not uncommon species; prevails in many sites, from the slopes of the northern mountains up to 100 m altitude.

Distribution. In the Palaearctic is widely known from Japan, East Russia, China, and Mongolia to Western Europe.

Remarks. One of the most widespread *Aethes* species in Hungary.

63. ***Aethes kindermanniana*** (Treitschke, 1830)

Biology. There are few data from Hungary. Adults were collected from May to early September. According to Razowski (2009), there are two generations: V–VI, VII–VIII. The larvae live in flowers of *Artemisia campestris*, and *Tanacetum corybosum*.

Habitat. Xerophilous and mesophilous grasslands, rudelar areas few observations).

Range in Hungary. In mountain and hill areas; Transdanubian Mountains and Mecsek Mountains, Villány Hills. In lowland areas; south Transdanubia, Kiskunság, Nyírség.

Distribution. Central and western Palaearctic species.

Remarks. Most observations are 50–100 years old, with few new data.

Cochylidia Obraztsov, 1956

Six species are known to occur in Hungary and Europe. Razowski (2002) compared *Cochylidia* to *Diceratura* and listed two putative synapomorphies: according to the structure of the valve and the elaborate distal part of the corpus bursae.

64. ***Cochylidia rupicola*** (Curtis, 1834)

Biology. The are few flight data from Hungary. They were collected from May to June. The larvae live in the flowers and the seeds of food plants: *Eupatorium cannabinum, Galatella linosyris,* and *Lycopus europaeus*.

Habitat. Marshes, riverine willow-poplar woodlands, water-fringing and fen tall herb communities, rocky grasslands, and steppe meadows. It can also be collected by light in dry forest edges, forest clearings and forest paths. There seem to be two ecological forms.

Range in Hungary. Very localised and rare: in Transdanubia, North-Hungarian Mountains, sporadically in the lowland (Jászfelsőgyörgy, Szentmártonkáta).

Distribution. Occurs only in the West-mid-Palaearctic; from Asia Minor, through European Russia to Western Europe.

Remarks. According to some authors, the species' lifestyle is entirely water dependent. This is not confirmed by observations of populations far from wetlands.

65. ***Cochylidia subroseana*** (Haworth, 1811)

= *phaleratana* (Herrich-Schäffer, [1851])

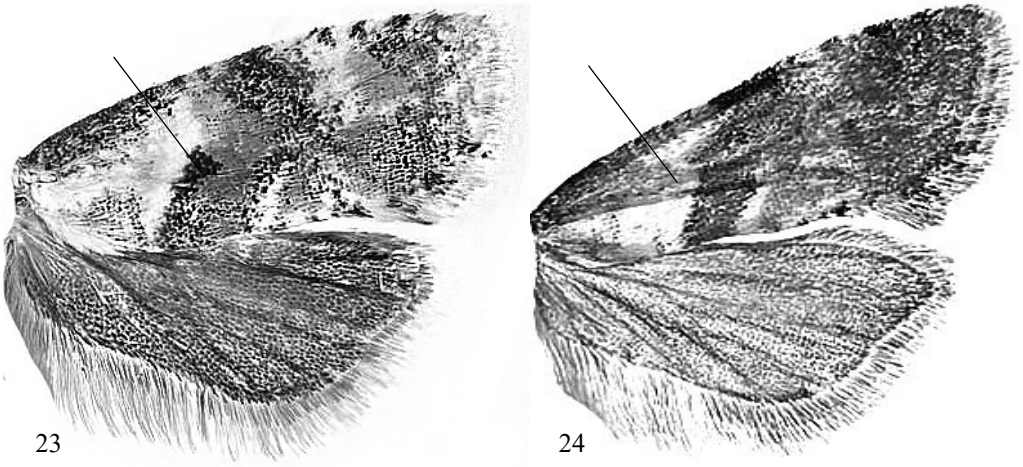
Biology. The adults fly from June to August (Razowski 2001, 2002, 2009). According to Hancock et al. (2015: 72) completely commit themselves to *Solidago virgaurea* as the oviposition plant. They write about the caterpillar: "Headlight to dark brown. Body deep yellow. August - May; feeds from August on the flowers and unripe seeds. living in the flowers and retarding their development; when full-grown, in late September or early October, leaves the flowerhead and hibernates in a cocoon among ground debris."

Habitat. Mesophilic and hygrophilic meadows, grasslands, and forest edges.

Range in Hungary. Two specimens from eastern Hungary; Nyírbátor [Bátorliget] (see Fazekas 1994: in coll. Natural History Museum Vienna) Kaposvár 1948. V. 31., 1949. VII. 16. (2), 1951.V. 7., 30., VII. 14.

Distribution. Known from Japan to the British Isles.

Remarks. Some of the published Hungarian data are uncertain and should be revised Szabóky 1994b, Ács & Szabóky 1993). There are no specimens in Hungarian state collections. Some private collections are not accessible. Old specimens (1948, 1949 and 1951) from South Transdanubia (Kaposvár) are preserved in the Janus Pannonius Museum (Pécs). The labels show dates in May and July (see Szabóky 1982). I have not seen the specimens; the curators have not allowed me to examine the collection .



23 24

Text-figs 23-24. Wing pattern of *Cochylidia rupicola* (23) and *Cochylidia subroseana* (24); variability is low in size of markings and colouring.

66. *Cochylidia richteriana* (Fischer von Röslerstamm, 1837)

Biology Bivoltine; IV–V, VI–VIII. The larvae live in flowers and roots on *Achillea millefolium* and *Artemisia campestris* (see References).

Habitat. The only authentic site is the peripheral zone of a resort town (Dombóvár-Gunarasfürdő), near the Kapos River with wet meadows, ploughs, and small tree lines and small woods.

Range in Hungary. In Hungarian literature, only Fazekas & Schreurs (2010) have so far published a report on Dombóvár (South Transdanubia). This isolated site is quite remarkable.

Distribution. A trans-Eurasian species with a huge range.

Remarks. The collection of the Hungarian Museum of Natural History contains specimens from the 19th century, but the original labels are missing and we do not know where the specimens were collected.

67. *Cochylidia moguntiana* (Rössler, 1864)

Biology. Bivoltine; IV–VI, VII–IX. Larva monophagous in stems *Artemisia campestris.*

Habitat. Various in colline and montane hay meadows, acidic grasslands and heaths, Halophylic habitats, dry open grasslands, white oak scrub woodlands, thermophilous woodland fringes, semi-natural vegetation of abandoned vineyards and orchards etc.

Range in Hungary. Small populations are scattered in lowlands and hilly areas.

Distribution. Trans-Palaearctic species through southern Siberia and central Asia to western Europe.

Remarks. The accumulation area of its distribution in Hungary is sandy and calcareous regions.

68. *Cochylidia heydeniana* (Herrich-Schäffer, [1851])

Biology. Bivoltine; IV–VI, VII–IX. Larva lives on *Conyza canadensis, Erigeron acer* and *Solidago virgaurea.*

Habitat. Occur in very different places, such as mountain meadows, and pastures, near lowland bogs, in the bush grasslands of the continental lowlands, and near the forested heaths of the coal mine areas.

Range in Hungary. It is a highly localised and rare species in many regions of the country.

Distribution. A trans-Palaearctic species was reported from as far away as Japan and the British Isles.

Remark. In the northern mountains, it reaches altitudes of up to 1000 m.

69. ***Cochylidia implicitana*** (Wocke, 1856)

Biology. Bivoltine; IV–VI, VII–IX. It is difficult to separate the generations in time. The larvae are polyphagous in flowers and seeds; of *Alchemilla, Aster, Anthemis, Helichrysum, Matricaria, Solidago* plants etc.

Habitat. Arid, mesophilic, and hydrophilic plant communities, continental sandy wastelands, coal mine recultivation areas, village gardens, hillsides, abandoned vineyards, etc.

Range in Hungary. Mainly found in lowland and hilly regions but is not known in higher mountain areas.

Distribution. Found in many places from Central Asia to Scandinavia and Northwest Africa.

Remarks. One of the most widespread *Cochylidia* species in Hungary.

Diceratura Djakonov, 1929

The species of the genus are mostly found in the western Palaearctic region. The species are distributed from Iran through Kazakhstan to Western Europe. In Europe, nine species are recorded. Only one species lives in Hungary. Razowski (2002, 2011) compared *Diceratura* to *Cochylimorpha*, treating it as more advanced, owing to its specialized distal part of the tegumen and its strongly reduced socii. According to Razowski (2009b), *Diceratura* is closely related to *Cochylidia*, but *Diceratura* lacks minute spines at the end of the costal part of the valva. The female genitalia areas are like those of *Cochylidia*.

70. *Diceratura ostrinana* (Guenée, 1845)

= *purpuratana* (Herrich-Schäffer, [1851])

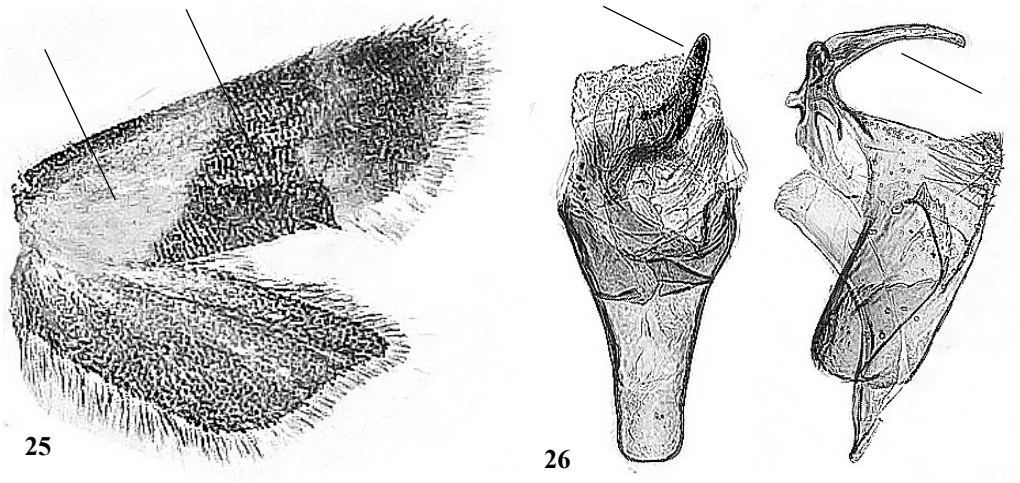
Biology: Moths fly in two generations from May to the end of August. The larvae feed on flowers of *Dipsacus fullonum* and *Chondrilla juncea.*

Habitat. Composition is varied; dry and mesophilic meadows, wet sites near streams and lakes, pine plant communities in sandy areas, south-facing rocky grasslands and karst scrub, orchards in village gardens, and reclaimed areas of coal mines.

Range in Hungary. Few observations are localised mostly in hilly and mountainous areas (up to 1000 m); on the plains only occasionally found.

Distribution. Found from southern Siberia through Central and Asia Minor to North Africa. In Central Europe, it is found only in Austria, Hungary, and Slovakia (Razowski 2001). More recently found in Belgium, Germany, and Luxembourg (de Prins 2016, Werno 2014).

Remark. The geographical distribution of the species is poorly known.



Text-figs 25-26. *Diceratura ostrinana*; 25. wing pattern, 26. male genitalia, aedeagus on the left, valva on the right.

Thyraylia Walsingham, 1897

This genus name has not been used by authors in Hungarian literature.

Diagnosis of the adult. Labial palps are well developed, the second segment much broadened in its subterminal part, third segment short. Antennae reach to the mid forewing. The forewing is long and narrow, and the costal margin at the base of the wing is slightly bent, otherwise, it is straight, and the tip of the wing is short. The outer margin is convex. All veins are independent, chords, median and CuP veins missing. Rib R5 ends on the costal margin before the wing tip. Nerve CuA2 originates between nerves R1 and R2. The background colour is yellowish white. The brown or greyish pattern of different shades consists of a basal patch or a patch in the basal third of the costal margin; a median transverse band, which is fragmented; and a subapical transverse band. The fringes are light yellow.

Genitalia of male: The tegumen is short and wide, well sclerotized. Uncus outlined. Socii are small, weakly sclerotized. The vinculum is well-sclerotized, and its ventral branches are not fused. Valva is narrow, elongated and distally narrowed, with a concave costal margin, with pointed tip, sacculus with a long, pointed terminal apophysis. Transtilla with the sharp median part. Juxta is simple, and flat, with a rounded ventral margin.

Genitalia of females: The anal papillae are normally shaped and short. The anterior and posterior apophyses are short. Tergite VIII is short. The sternum is weakly sclerotized. Antrum narrows and weakly sclerotized. Bursa copulatrix has ductus bursae and corpus bursae membranosus, without signum.

The genus is the most widespread in the Nearctic with 7 described species. In Europe and Hungary, only one species with a Holarctic distribution is known (Razowski 2009).

71. ***Thyraylia nana*** (Haworth, [1811])

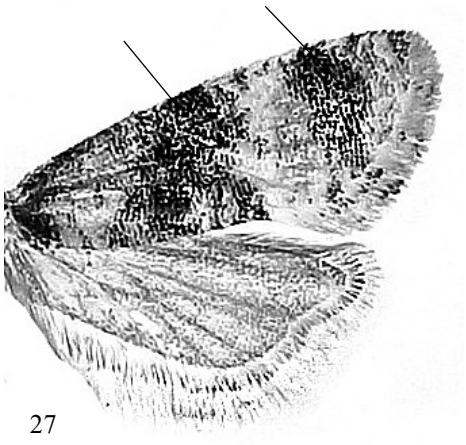
Biology. Univoltine: V–VIII. The larva is monophagous on *Betula* spp.

Habitat. Occur in sandy, calcareous, and volcanic landscapes, where the food plants live. Mostly collected by light at the edges of forests.

Range in Hungary. A local and rare species in the country; Southern Transdanubia, Kisalföld, Mezőföld, Naszály-Mountains, North-Hungarian Mountains (Mátra, Bükk, Zemplén-Mountains), in the Hungarian Great Plain it is highly isolated (Tápió-region).

Distribution. Holarctic species: it is widespread in Europe but local everywhere.

Remarks. The problem of the genus name has already been addressed by Razowski (2009: 100 p.) in his book Palaearctic. The species *Cochylis nana* was transferred to the genus *Thyraylia* in a recently published American study (Metzler & Brown 2014) and this status was confirmed with genetic studies by Brown et al. (2020: 167).



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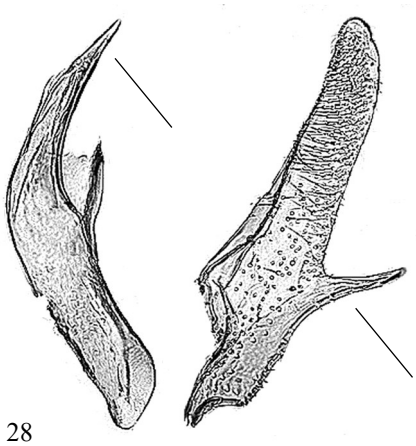

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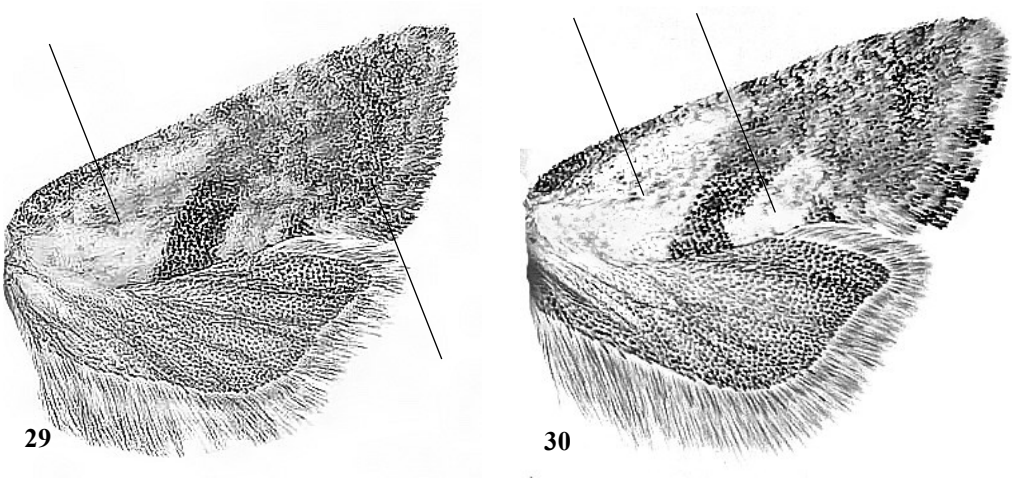
Text-figs 27-28. *Thyraylia nana* 27. wing pattern, 28. male genitalia, aedeagus on the left, valva on the right.



Text-figs 29-30. Differences in the wing pattern of similar *Cochylis* species; 29. *C. roseana,* dorsum of forewing of some specimens with pink intermixture; 30. *C. flaviciliana,* only in the intensity of the pink colouring of the forewing.

Cochylis Treitschke, 1829

The genus is distributed in the Holarctic, Oriental, and Neotropical regions. In Europe, 14 species were found, 9 in Hungary. Larvae are oligophagous and feed mainly on plants belonging to Asteraceae. There are one or two generations annually, and overwintering occurs in the larval stage. Razowski (2002, 2011) compared *Cochylis* with *Diceratura* and *Cochylidia* and several New World genera and mentioned only supposed synapomorphy – the cone-shaped cluster of cornuti. According to Razowski (2009b), *Cochylis* is similar and probably allied to *Cochylidia* and *Diceratura*, but *Cochylis* has a highly specialized socii complex. The female genitalia resemble those of *Cochylidia* and *Diceratura*, but those of *Cochylis* have a more distinct membranous sack extending from the distal part of the corpus bursae.

72. *Cochylis roseana* (Haworth, [1811])

Biology. Adults fly in a single generation; VI–VIII. The larvae live in seed heads and flowers of *Aster, Antirrhinum, Solidago,* and *Dipsacus.*

Habitat. Dry, warm hill and mountainside grasslands, karst bush forests, or mesophile meadows, but appear in village gardens and even in arboretums (for example, Pécs).

Range in Hungary. Local occurrences on medium-altitude mountain ranges and in a few localities on the hills. Sporadic observations in the northern region of the Hungarian Plain.

Distribution. It has been observed in fragments from China (Gransu region) to Iran and Asia Minor. In Europe, it has been recorded from the Ural Mountains to the British Isles.

Remarks. A few observations are known in Hungary. Abundance in populations is low.

73. *Cochylis flaviciliana* (Westwood, 1854)

Biology. The moth was collected in May and from June to August. According to Razowski (2009) there are two generations yearly. The larvae live in *Knautia arvensis* and *Scabiosa ochroleuca*.

Habitat. Mainly dry and mesophilic meadows, pastures, mowed fields, less frequent village gardens, hygrophilic meadows near rivers, and agricultural mosaics.

Range in Hungary. A very local and rare species; Dombóvár, Dudar, Kárász, Mohora.

Distribution. Eurasian element which, according to our data, is distributed in Norway, Denmark, Sweden, Finland, Russia, Belarus, Ukraine, Estonia, Lithuania, Latvia, Poland, Slovakia, Switzerland, Germany, Holland, Great Britain, Ireland, Luxembourg, France and Italy, Slovakia, Switzerland, Germany, the Netherlands, Great Britain, Ireland, Luxembourg, France and Italy, the islands of Sardinia and Sicily, Czech Republic, Austria, Hungary and Balkan re-

gions (after References).

Remarks. I first described it as a new species in the Hungarian fauna 33 years ago (Fazekas 1991), and later published it again with a Dutch colleague (Fazekas & Schreurs 2010). The species is remarkably rare in central Europe. In neighbouring Romania, it was collected only at altitudes of 1550–1750 m (Kovács & Kovács 2020).

Longicornutia Razowski 1960

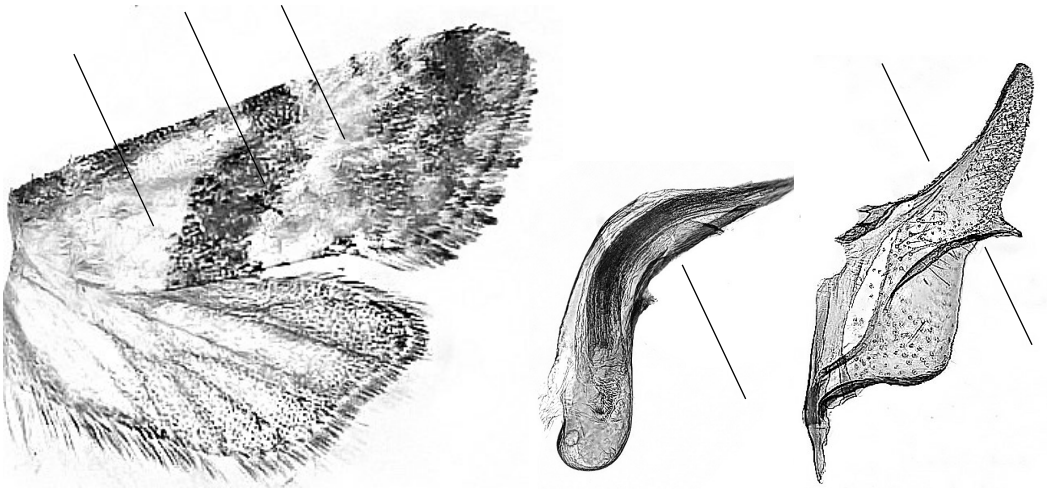
In the earlier period, this genus name was not used in Hungarian literature. This genus name has only been in use since 2020 (Kovács & Kovács 2020). For more information, see the following.

Diagnosis of the adult. Labial palps are well developed, the second segment is much broadened in its subterminal part, and the third segment is short. Antennae reach the mid-forewing. The forewing is broad and elongated, the costal margin at the base of the wing concave and otherwise straight, wing tip is short. The outer margin is convex. All ribs are independent, rib R5 ends on the costal margin before the wing tip. Chorda, median and CuP vein missing. The hindwing is slightly wider than the forewing, apex prominent and pointed. Sc+R1 rib is long, exceeding half the length of the costal margin. All nerves are independent.

Genitalia of the male: tegumen large, well sclerotized. The uncus is missing. Socii exceedingly small, and poorly sclerotized. The vinculum is strong, and its ventral branches are broader, not fused. Valva has a long concave costa, narrow rounded tip, long sacculus, broad in basal half and has a sharp terminal apophysis. Juxta has a pair of short apophyses. Aedeagus long and narrow, terminal apophysis long, narrow, bent and pointed, vesica with an exceptionally long, thick, bent and pointed cornutea.

Genitalia of the female: anal papillae short. Anterior and posterior apices short. Segment VIII is short. Tergite is narrow and weakly sclerotized. Antrum lat. Bursa copulatrix has ductus bursae broad and well sclerotized, with large sclerites and corpus bursae membranous, without signum.

The genus is widespread in the western Palaearctic region (Razowski 2009***).***



31 32

Text-figs 31-32. *Longicornutia epilinana;* 31. wing pattern, 32. male genitalia (aedeagus on the left, valva on the right). The valva has a long concave costa, the aedeagus long and narrow, terminal apophysis long, narrow, bent and pointed.

74. *Longicornutia epilinana* Duponchel, 1842

Biology. Bivoltine: IV–VI; VII–VIII. Sporadic specimens occur in September but have also been observed in the first week of October. The phenology requires a more detailed study. The larvae are polyphagous in seeds of *Cephalaria, Linum* and *Solidago* plants.

Habitat. Diverse, xerophilic, mesophilic and hygrophilic meadows, forest edges, rocky grasslands, karst scrub, ruderal areas, etc.

Range in Hungary. Mainly in the western part of the country (Transdanubia), where it is also mostly found in the lower regions of the hills and mountains. Sporadically observed in the lowlands and the North Hungarian Mountains.

Distribution. From the Russian Far East through Central and Asia Minor to Europe and North Africa.

Remarks. The recent genus classification of this species is not clear to me (see Kovács & Kovács 2020). The authors have written: "Consequently, despite appearances, *Longicornutia* is a genus specifically created to fit the species *Cochylis epilinana*. We now reinstate *Longicornutia* Razowski, 1960, stat. rev. as a valid genus with *Longicornutia epilinana* (Duponchel, 1842) comb. rev. as a type species. We are not aware of any other species that could be placed in the genus *Longicornutia* and consider the genus to be monotypic. Razowski (1960: 314) placed *Longicornutia* just before the genus *Cochylis*. Brown et al. (2020: 167 fig. 7, 171) state: 'In the barcode tree (fig. 7) [*Cochylis epilinana* Duponchel] it occupies a sister position to *Cochylis* s.s. In our opinion, Razowski's concept is now fully confirmed with recent genetic studies". (Originally written in Romanian, own translation into English.)

Neocochylis Razowski, 1960

Diagnosis of adults. The forewing is short and narrow, the costal margin at the base of the wing is slightly bent and otherwise convex, the wing tip is short. The outer margin is convex. All veins are independent, chorda, median and CuP veins missing. Rib R5 ends on the costal margin before the wing tip. Nerve CuA2 originates between nerves R1 and R2. The background colour is yellowish-white or light yellow. The brown, greyish or light brown pattern of different shades consists of a basal spot (in *N. dubitana*) or small spots at the base of the costal margin, a fragmented median transverse band and a subapical transverse band. The fringes are light yellow.

Genitalia of male: The tegumen is short and wide, well sclerotized. The uncus is missing. Socii are small and poorly sclerotized. The vinculum is strong, its ventral branches are not fused. Valva is broad and widening distally, with a narrow-rounded tip, sacculus is relatively short with a basal (*N. salebrana, N. hybridella*) or subterminal (*N. dubitana*) apophysis. The transtilla has narrow sides and a thickened median part. Juxta has a pair of apophyses. The aedeagus is narrow and long, bent below the pointed terminal apophysis, vesica with a cluster of small spinules. The caulis are short.

Genitalia of females: The anal papillae are normally shaped and short. The anterior and posterior apophyses are short. The tergite VIII is long. The sterigma is broad and weakly sclerotized, enveloping the antrum. Bursa copulatrix has ductus bursae and corpus bursae membranous, without signum.

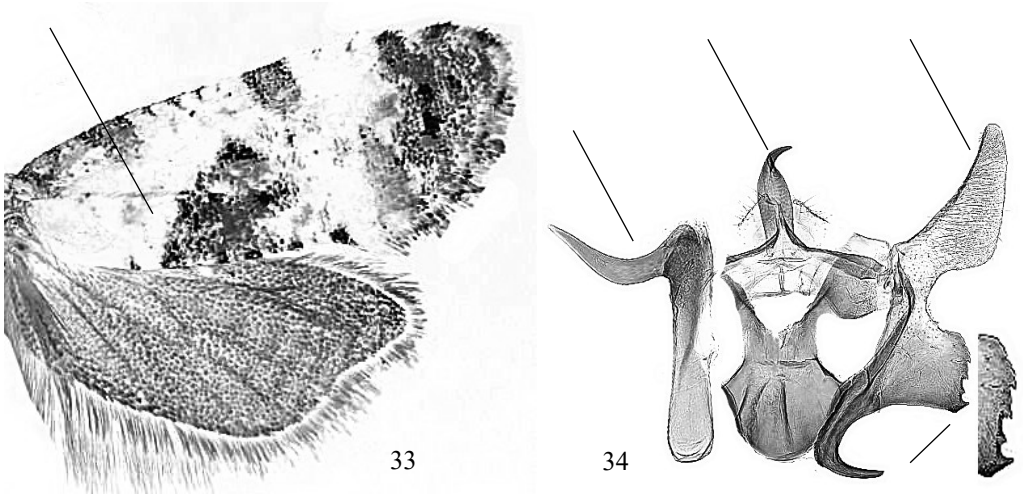
The genus is widespread in the Palaearctic region, but *N. dubitana* has a Holarctic distribution. In the Palaearctic and Europe, it is represented by 5 species, 3 of which have been reported from Hungary.

75. *Neocochylis hybridella* (Hübner, [1813])

Biology. Adults fly in April-August. According to observations in Hungary, the most important oviposition plant is certainly *Picris hieracioides*. Other important food plants are the *Crepis* species.

Habitat. Various types of meadows, pastures, rocky grasslands, sloping steppes, ruderal are-as, weedy swamps in clay and coal beds, arboretums, village gardens, planted pine woodlands of sandy lowlands etc.

Range in Hungary. Mostly observed on hills and mountains (up to 1000 m). It occurs



Text-figs 33-34. *Neocochylis hybridella;* 33. wing pattern, 34. male genitalia (aedeagus on the left, valva on the right).

sporadically in steppe areas of the lowlands with a strongly continental climate.

Distribution. Widespread in the Palaearctic (Razowski 2009).

Remark. Based on genetic analyses, Brown and colleagues (2019) segregated the species from the genus *Cochylis* and proposed a new genus named *Neocochylis*.

76. [*Neocochylis salebrana* (Mann, 1862)] – A controversial species in Hungary.
First mentioned by Kennel (1913) from Hungary. Much later, Gozmány & Szabóky (1986) reported a specimen collected in Kiskunság. In the 10,000 years since the ice age, Kiskunság has been a semi-desert steppe with rolling sand hills. It is a Natura 2000 site of high conservation value with several relict species of plants or animals. I do not exclude the presence of *N. salebrana* species. It is not known from any other country in Central Europe (Razowski 2001). Recorded from the Caucasus Region, Asia Minor, Balkan (Bulgaria Macedonia and Romania), Italy and France. Although there are literary records from Hungary, no one has ever seen the proof. Therefore, it is not yet considered a member of the Hungarian fauna.

77. *Neocochylis dubitana* (Hübner, [1799])

Biology. Bivoltine; V–VI, VII–VIII. Rarely, they are seen even in September. The larvae are polyphagous in flowers and seedheads of food plants: *Arctium, Carduus, Centaurea, Cirsium, Crepis, Hieracium, Picris* and *Solidago*.

Habitat. Xerophilous and mesophilous grasslands, reedbeds, pastures, woodland edges, forest roads and clearings, rocky steppes, karst scrub, village gardens, stream banks, abandoned vineyards and thickets etc.

Range in Hungary. Locally observed in hilly and mountainous areas up to 1000 m. Very rare in lowland areas, in bush meadows and salt meadows.

Distribution. Holarctic species.

Remarks. Few observations have been made so far.

Cochylichroa Obraztsov & Swatschek, 1958

This genus name has not been used by the authors in the Hungarian literature, so the diagnosis of the genus is given below. For further, detailed information see Brown (2019).

Diagnosis of Adults. Labial palps are well developed, the second segment much broadened in its subterminal part, third segment short. Antennae reach to the mid forewing. The forewing is short and narrow, the costal margin at the base of the wing is slightly bent, the rest

Text-figs 35-36. *Cochylichroa atricapitana;* 35. wing pattern, 36. male genitalia (aedeagus on the left, valva on the right).

is convex, and the wing tip is short. The outer margin is convex. All veins are independent, chords, median and CuP vein missing. Nervula R5 ends at the costal margin before the wing tip. Nerve CuA2 originates between nerves R1 and R2. The background colour is yellowish-white or light yellow. The brown and black pattern consists of a broad basal patch, a median transverse band and a subapical band, both fragmented. The fringes are black.

Genitalia of male: tegumen is large and well sclerotized. Socii are rounded, and poorly sclerotized. The vinculum is strong, and its ventral branches are not fused. The valve has a short, concave costa, the apex of the valve is very narrow and rounded, sacculus is long, broad and rounded, lacking apophyses, on the internal surface of the valve an extensive territory is covered by small dentiform sclerites. Transtilla has narrow sides, and a narrow, pointed median part, juxta is simple. Aedeagus long, narrow and bent, terminal apophysis short and pointed, vesica with a cluster of small spines.

Genitalia of female: Anal papillae are short. Posterior and anterior apophyses are short. Tergite VIII is short. The sterigma is very broad and weakly sclerotized. The antrum is broad, with ventral and dorsal margins sclerotized. Ductus bursae are long, broad, and membranous, and corpus bursae are large, ovoid and membranous.

They are found primarily in North America, although *Cochylichroa atricapitana* is a Palaearctic species.

78. *Cochylichroa atricapitana* (Stephens, 1852)

Biology. Bivoltine; V–VI, VII–IX. The larva monophagous on *Senecio jacobaea*. There are also reports of *Hypericum* and *Hieracium* plants, but this is disputed by many authors.

Habitat. We have little and incomplete knowledge of dry and mesophilic grasslands and roadside weed areas.

Range in Hungary. A total of 3 sites are known from the Hungarian Plain: Bátorliget (from 1948, Ferencszállás (from 1933, and more recently Jászberény (from 2009).

Distribution. From southwestern Siberia through Europe to Morocco. It is local and rare everywhere.

Remarks. Its rarity in Hungary has not yet been investigated.

Brevicornutia Razowski, 1960

The genus is widespread in the western Palaearctic.

Diagnosis of the adult. The labial palps are well developed, the second segment is much widened in its subterminal part, and the third segment is short. Antennae reach to the mid forewing. Forewing short and narrow, costal margin convex, wing tip short. The outer margin is convex (Fig. 300). All nerves are independent, chorda, median and CuP vein missing. Rib R5 ends on the costal margin before the wing tip. Nerve CuA2 originates between nerves R1 and R2. The background colour is yellowish-white, and the yellow, brown, and greyish pattern of various shades consists of a row of spots along the costal margin, a fragmented median transverse band and a subapical transverse band. The fringes are grey with a light-yellow basal line.

Genitalia of male. Tegumen is short and broad, well sclerotized. Uncus is missing, and so-cii are small and poorly sclerotized. The vinculum is strong, its ventral branches are not fused. The valve is narrow and elongated with a posteriorly oriented tip, sacculus is long with a ter-minal apophysis. Transtilla broad. Juxta is simple and flat. Aedeagus narrow at the coecum and much thickened at the distal end, with a sharp terminal apophysis. Vesica with a cluster of small horns. Caulis short.

Genitalia of female. Anal papillae normally conformation and short, anterior and posterior apophyses short. The sternum is weakly sclerotized. The antrum is broad, and best sclerotized of the whole genital armature. Bursa copulatrix has ductus bursae and corpus bursae membranosus, without signum.

79. *Brevicornutia pallidana* Zeller, 1847

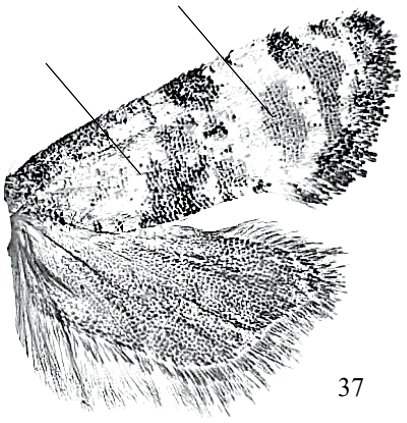
Biology. Two generations yearly; V–VI, VII–VIII. The larvae are monophagous on *Jasione montana*.

Habitat. Shrublands, dry forest margins, marshlands, meadows and pastures of various types, pastures, rocky hillsides, and hillsides with grass, abandoned vineyards and orchards, etc.

Range in Hungary. Local occurrence up to 1000 m altitudes in hilly and mountainous areas. Only a highly isolated population is known in the lowland steppe zone.

Distribution. From the Primorsk region in Russia, through southern Siberia and Central Asia, to Scandinavia and the Iberian Peninsula as well as North Africa.

Remarks. According to observations from Germany (see Wegner 2011) adults are string on the flower heads or fly around in their close surroundings. The existence of inflorescences and seed heads of this host plant is essential, as the caterpillars develop in them in August and September. Intensive sheep grazing does not allow the species to develop. I have similar ob-servations about intensively used mowed meadows and pastures in Southern Hungary.



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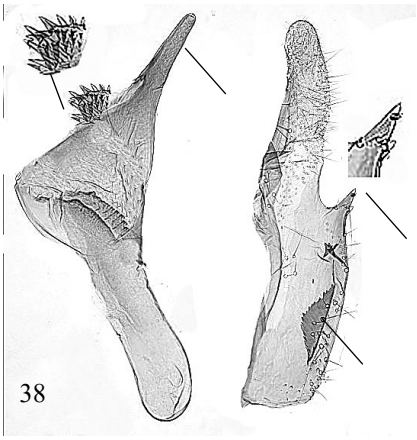

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Text-figs 37–38. *Brevicornutia pallidana*; 37. wing pattern, 38. male genitalia (aedeagus on the left, valva on the right). The valve is narrow and elongated.

Pontoturania Obraztsov, 1943

The genus name has not yet been used in Hungary. It is therefore important that researchers know it.

Diagnosis of Adults. Labial palps are well developed, the second segment much broadened in its subterminal part, third segment short. Antennae reach to the mid forewing. The forewing is short and narrow, and the costal margin at the base of the wing is slightly bent, otherwise, it is concave, and the tip of the wing is short. The outer margin is convex (Fig. 273-274). All veins are independent, chorda, median and CuP veins missing. The R5 nerve ends on the costal margin before the wing tip. Nerve CuA2 originates between nerves R1 and R2. The background colour is yellowish white. The brown and greyish pattern of varying shades con-sists of a row of spots in the basal third of the costal margin, a fragmented median transverse band and a variable subapical transverse band. On the transverse bands, there may be greyish-plumb-urry patches with metallic lustre in *P. posterana.* The fringes are greyish.

Genitalia of male. The tegumen is short and broad, well sclerotized. The uncus is missing. Socii are small and poorly sclerotized. The vinculum is strong, its ventral branches are not fused. The valva is narrow and elongated, the costal margin concave, with a rounded tip, sacculus reaching to mid-valva and with a subterminal apophysis. Transtilla narrow, on the tip of the median side with a cluster of small spines. Juxta is simple and flat. The aedeagus was broad and long, with a long, bent terminal apophysis. Vesica with cornuti in the form of a dense group of long, thin spines. The caulis is long.

Genitalia of female. The anal papillae are normally shaped and short, the anterior and posterior apophyses are short. The sternum is weakly sclerotized. Antrum is broad, complex, best sclerotized of the entire genital armature. Bursa copulatrix has ductus bursae and corpus bursae membranous, without signum.

The genus is widespread in the Palaearctic region, of the 8 described species only 2 are known in Europe and 1 in Hungary.

80. ***Pontoturania posterana*** Zeller, 1847

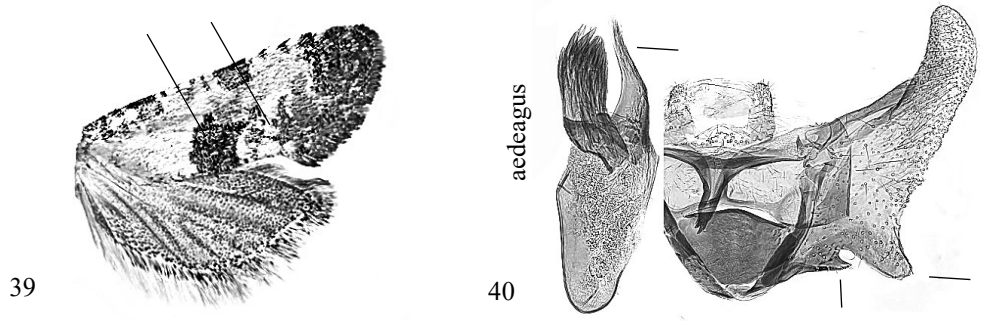
Biology. Bivoltine; V–VI, VII–VIII. The larva lives in the flowers and seeds of *Arctium lappa, A. tomentosum, Carduus acanthoides, C. nutans, Cirsium vulgare,* and *Jurinea cyanoides*.

Habitat. Meadows, grasslands, agricultural fallows, abandoned vineyards and thickets, lowland sand and steppe landscapes, arboretums, grassy ponds and near water banks, rocky grasslands on hillsides and mountainsides, karst scrub forests, forest clearings, forest edges, etc.

Range in Hungary. Widespread in many parts of the country, but mostly found in hilly and mountainous areas, with more local occurrences in the lowlands.

Distribution. From Iran through the Trans-Caspian region, it has been observed in many parts of Europe, as far west as the west coast and southwest to the Iberian Peninsula.

Remarks. A morphologically diverse species, it can be divided into several ecological forms.



39 40

Text-figs 39-40. *Pontoturania posterana*; 39. wing pattern, 40. male genitalia

***Cryptocochylis* Razowski, 1960**

Diagnosis of adults. The genus was first described by Józef Razowski in 1960. Labial palps are well developed, the second segment much broadened in its subterminal part, covered with long scales, third segment long, covered with small scales. Antennae reach halfway up the forewings.

The forewing is long and narrow, the costal margin at the base of the wing is concave, further on it is convex, and the tip of the wing is prominent. The outer margin is concave. All ribs are independent. The R5 rib ends on the outer margin below the wing tip. Vein CuA2 is short, bent and originates flush with vein R2.

Genitalia of male. Tegumen is large, well sclerotized, its distal part fused with narrow, weakly sclerotized partners. The vinculum is strong, and its ventral branches are not fused. Valva is triangular, with a broad base, tapering gradually towards the apex and terminating in a long, pointed terminal apophysis. At the base of the valve is a broad, serrated lobe. The sacculus is broad. The Transtilla has narrow lateral sides, a median side bifid, with two long, narrow, pointed branches. Juxta is simple with a rounded ventral margin. Aedeagus short, narrow and slightly bent, terminal apophysis short, broad and pointed, vesica without cornutus. Caulis is broad.

Genitalia of female. Anal papillae are short. The posterior and anterior apophyses are short and thick. Tergite VIII is short. Sterigma is very well represented, proximally it is membranous forming two sacks, has postero-lateral arms and a long median apophysis more strongly sclerotized. The antrum is narrow, cup-shaped, and masked by the sterigma. Ductus bursae are short, broad and weakly sclerotized, corpus bursae are large, ovoid and membranous, with signa formed by numerous small dentiform sclerites.

The species is local, with a western Palaearctic range (Europe, Caucasus Mountains, and Asia Minor) (Razowski 2009).

81. *Cryptocochylis conjunctana* (Mann, 1864)

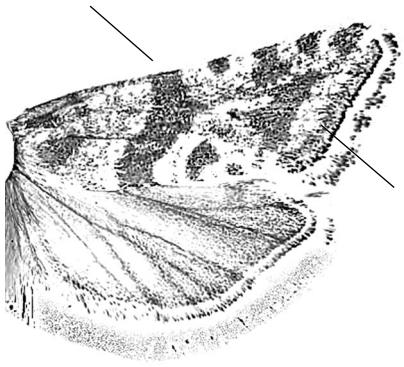
Biology. Adult flights are recorded from late April to late May. The food plant according to literature is *Achillea nobilis*.

Habitat. Dolomitic and volcanic rocky grasslands, karst scrub forests, abandoned old vineyards and fruit plantations.

Range in Hungary. Budapest (Sas-hegy), Göngyös (Sár-hegy), Gyöngyöstarján (Világos-hegy). No other sites are known.

Distribution. The Caucasus region Asia Minor and Dagestan. In Europe found in the Balkan Peninsula, Romania, Hungary Germany, and Italy.

Remarks. The first specimen was collected in 1914 on Sas-hegy in Budapest. After that, it was observed only in 2000 and 2008 in the southern foothills of the Mátra Mountains. The species is in a gradual regression in the Pannonian biogeographical region, endangered and deserving protection.



Text-fig. 41. *Cryptocochylis conjunctana*, the characteristic wing pattern

***Falseuncaria* Obraztsov & Swatschek, 1958**

Diagnosis of adults. Labial palps are well developed, the second segment much broadened in its subterminal part, third segment short, may be visible or completely masked by the long scales of the second segment. Antennae reach halfway up the forewings. The forewing is narrow and elongated, the costal margin is bent, and the wing tip is short. The outer margin is convex. All veins are independent. Median, chords and CuP vein missing. The R5 rib ends in the wing tip. The CuA2 rib originates between the R1 and R2 ribs. The background colour is light yellow. The yellowish-brown pattern consists of an elongated spot in the basal third of the costal margin, a median transverse band and a subapical transverse band. On the edges of the transverse bands, there are no greyish-plumy spots with metallic lustre. The fringes are light yellow brown.

Genitalia of male. Razowski (2009) presented the following male genital diagnosis: Facies similar to that of *Cochylis* but *Falseuncaria* with the distal part of the tegumen extending into a long process; the structures of the tegumen's apical portion include the fused socii. The structure of the sterigma and anterior membranous sack resemble *Cochylis*.

Genitalia of female. Posterior apophyses long, anterior apophyses short. Tergite VIII is long. Sterigma broad, weakly sclerotized. Antrum broad, well sclerotized. Ductus bursae membranous and narrow, corpus bursae ovoid, elongate, membranous, lacking signum.

The genus has 7 described species and is widespread in the Palaearctic and Africa.

82. *Falseuncaria degreyana* (Mc. Lachlan, 1869)

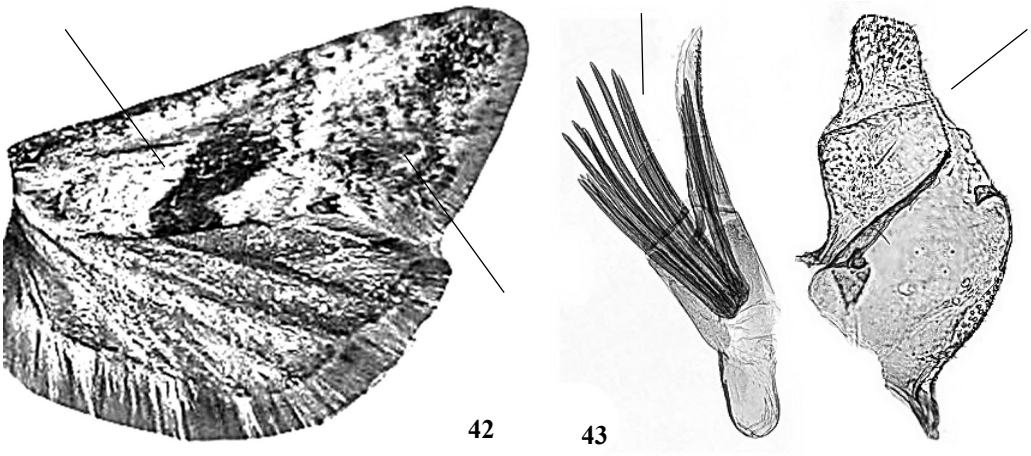
Biology. Collected specimens were found in April and August. The larvae live in the flower heads and seed capsules of *Plantago lanceolata*, *Linaria vulgaris*, and *Antirrhinum* according to the literature.

Habitat. Only a few places are known; mesophilic hill meadows, forest edges, dolomitic rocky grassland, and steppe slopes.

Range in Hungary. Only 3 sites are known; Budapest agglomeration (Budakeszi and Budaörs) and South-Transdanubia (Kaposvár).

Distribution. According to Razowski (2009) a Europeo-Altai-Turanian zoogeographic element. Found in Europe from the Balkan Peninsula to Scandinavia and the British Isles, to the Iberian Peninsula.

Remarks. Hungarian observations are more than 70 years old, and no one has seen the species since. It is also possible that it has become extinct in the country because the sites around Budapest have been destroyed and built up.



Text-figs 42-43. *Falseuncaria degreyana*; 42. wing pattern, a rare, clear specimen, 43. male genitalia, aedeagus on the left, valva on the right.

83. *Falseuncaria ruficiliana* (Haworth, [1811])

Biology. Bivoltine; IV–VI, VII–VIII. Moths flying in September also occur. The larvae are polyphagous on *Antirhinum, Aster, Bellis, Gentiana, Primula, Inula, Linaria*, and *Pedicularia* food plants etc.

Habitat. In a wide range of ecological environments, such as meadows and pastures, forest margins, rocky grasslands, karst scrub forests, scrub, grasslands etc.

Range in Hungary. Prefers hilly and mountainous areas, highly localised in lowland steppe areas. In the northern mountains, it reaches altitudes up to 1000 m.

Distribution. From the Amur region through southern Siberia, Central Asia and Asia Minor to the British Isles and Iberian Peninsula.

Remarks. One of the most widespread species in Hungary.

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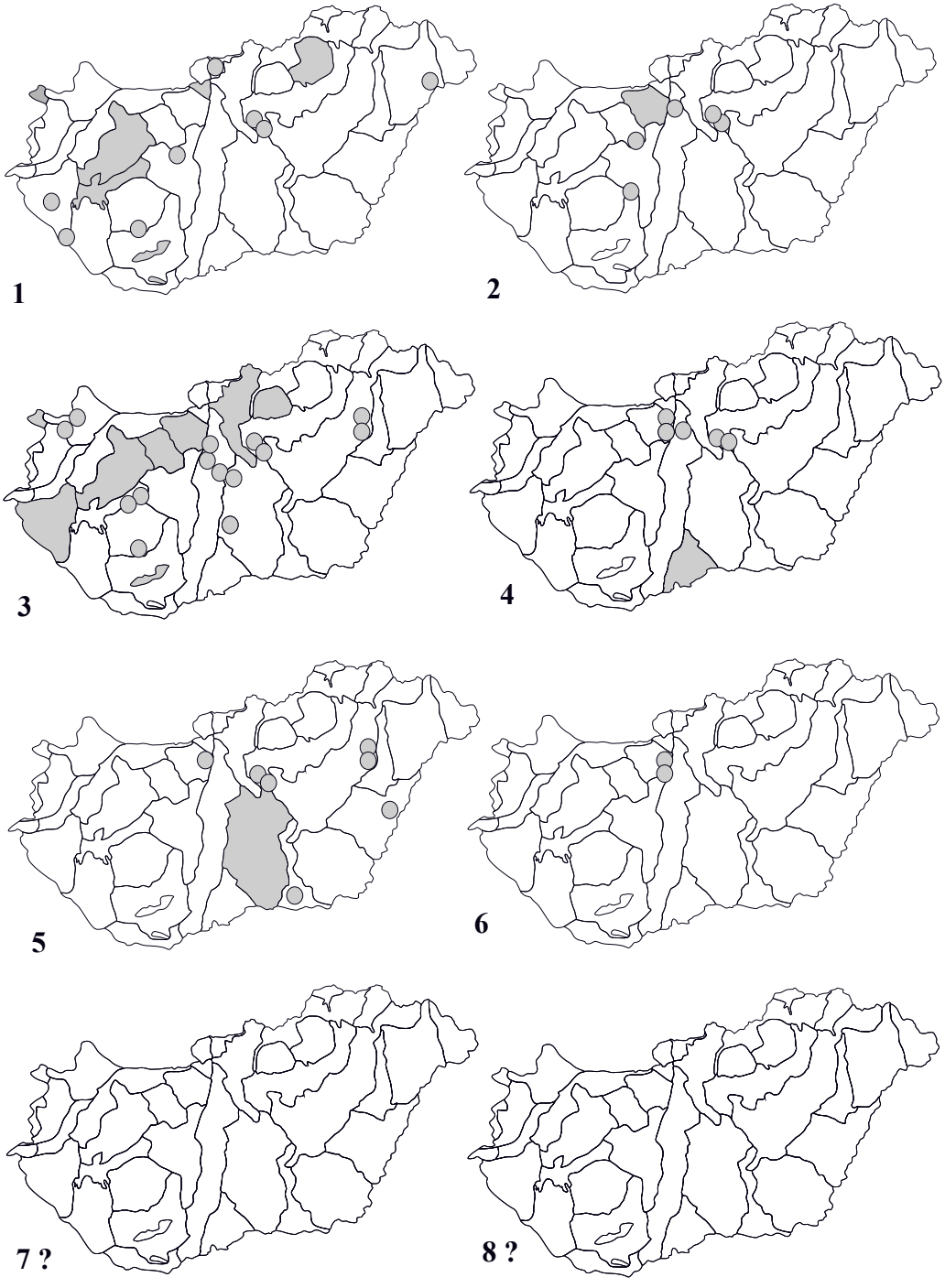
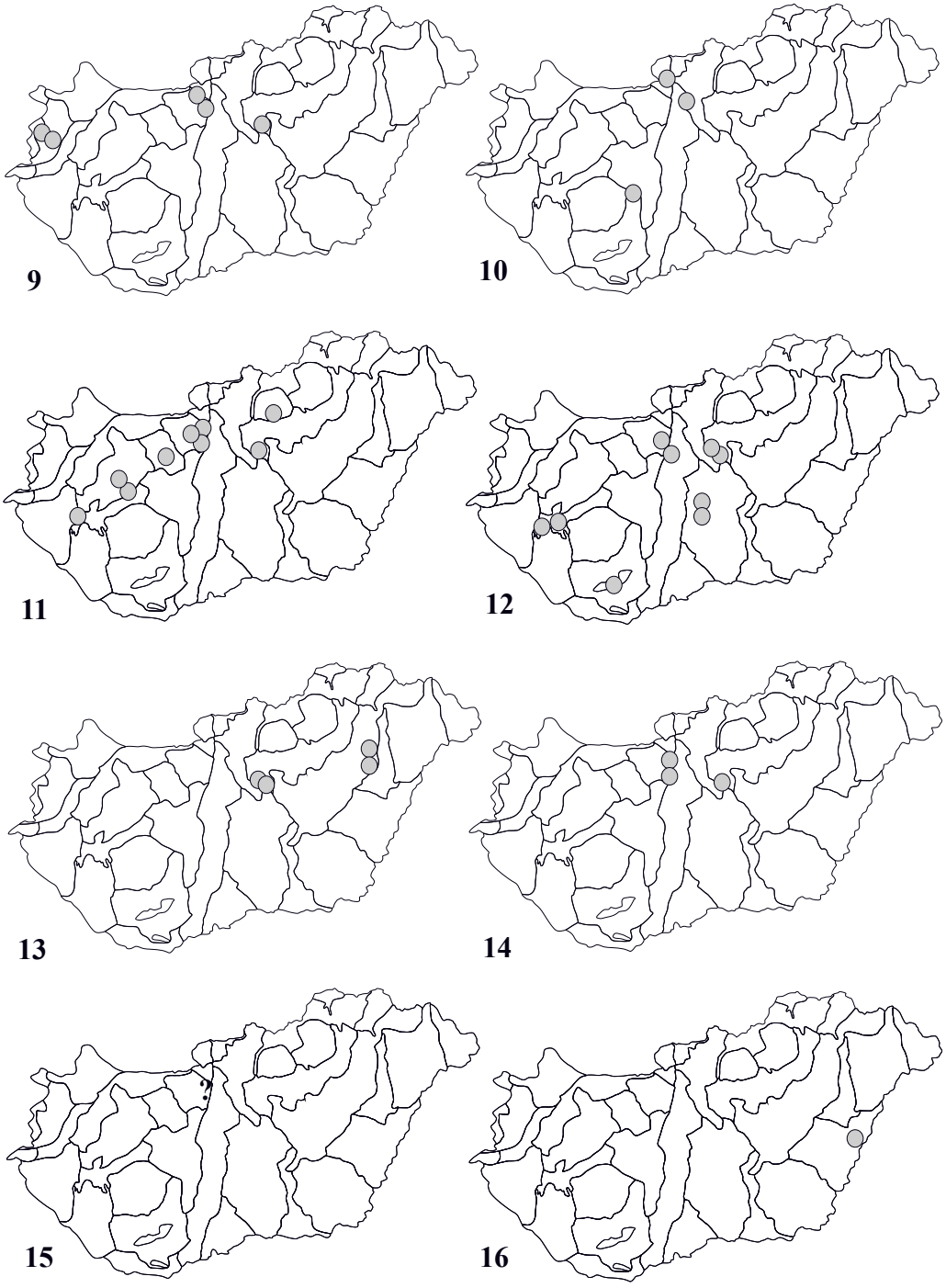
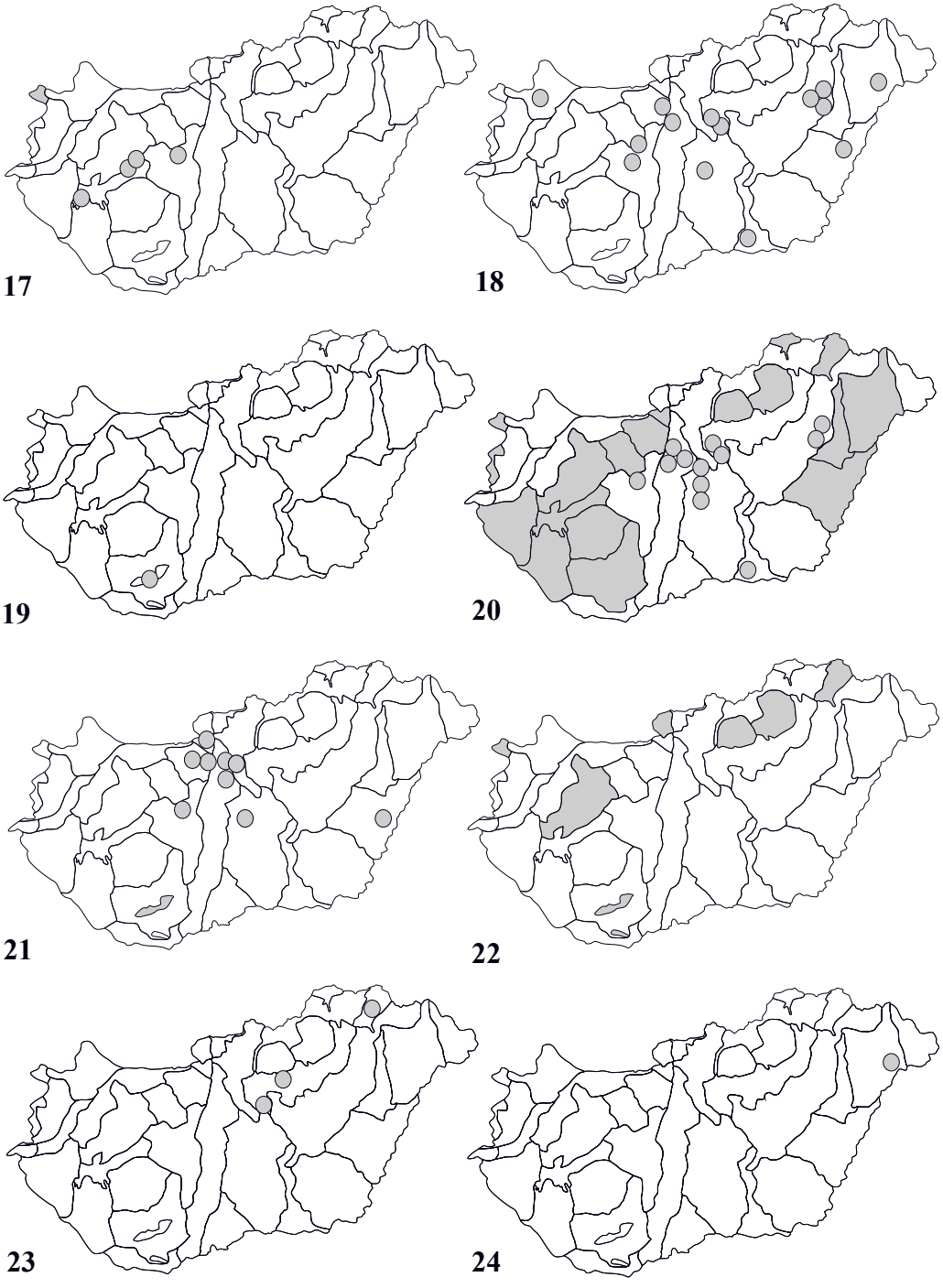


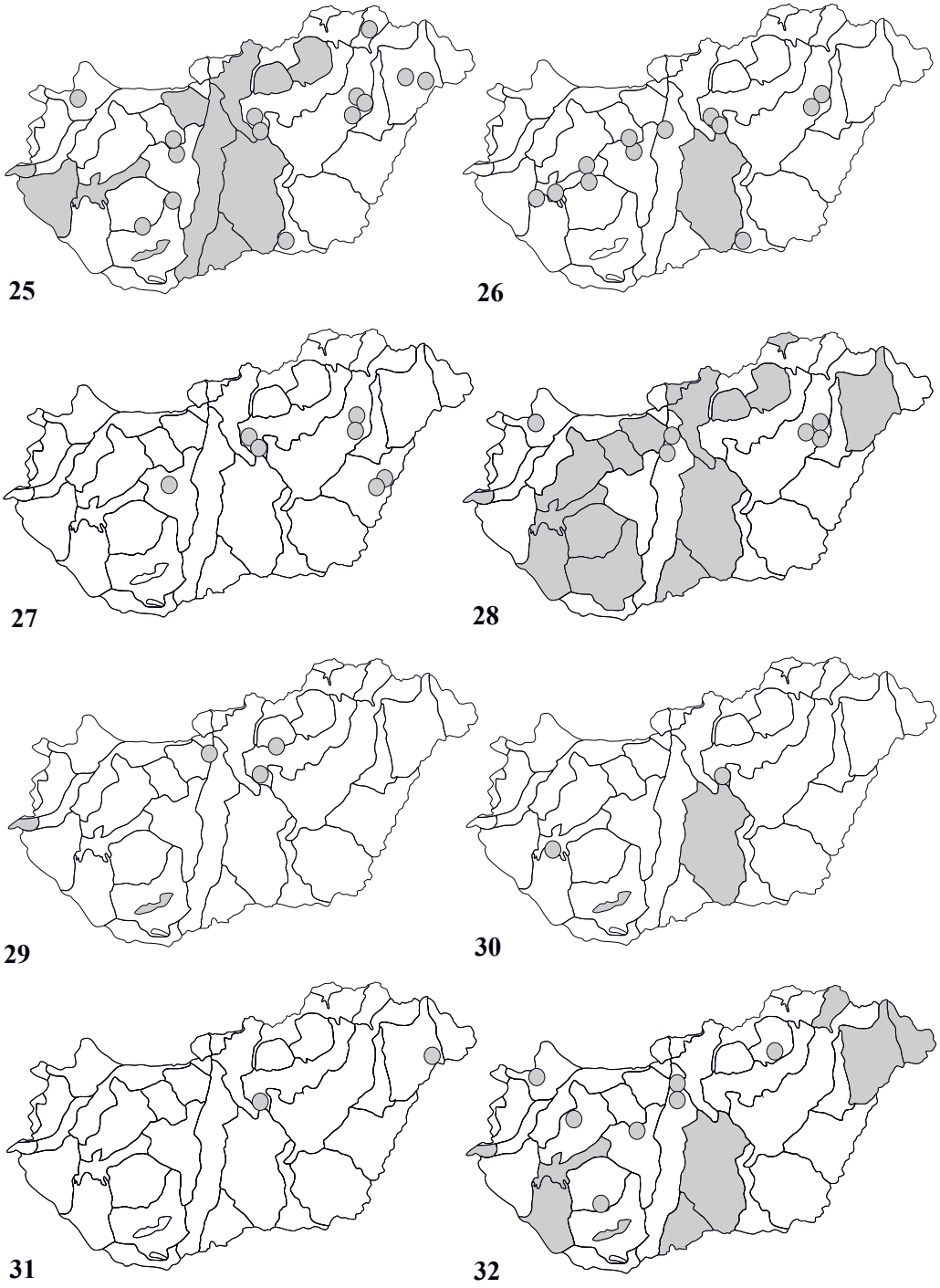
Distribution maps 1-8: 1. *Phtheochroa inopiana*; 2. *P. schreibersiana*; 3. *P. pulvillana*; 4. *P. sodaliana*; 5. *P. fulvicinctana*; 6. *P. procerana*; 7. *P. purana*; 8. *P. duponchelana*



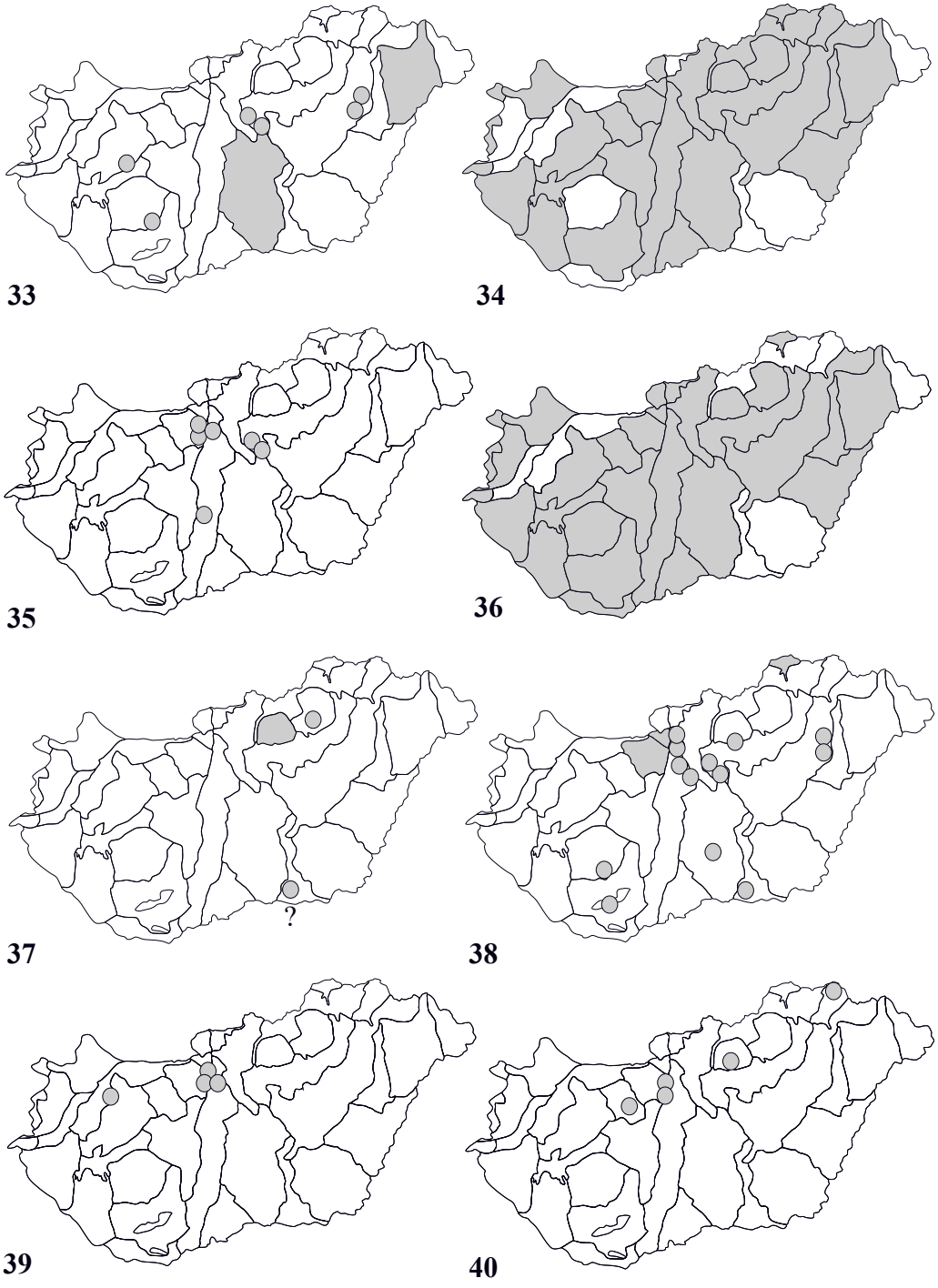
Distribution maps 9-16: 9. *Phtheochroa rugosana;* 10. *P. annae*; 11. *Hysteropha maculosana*; 12. *Cochylimorpha hilarana;* 13. *C. halophilana*; 14. *C. elongana;* 15. *C. perfusana;* 16. *C. subwoliniana*



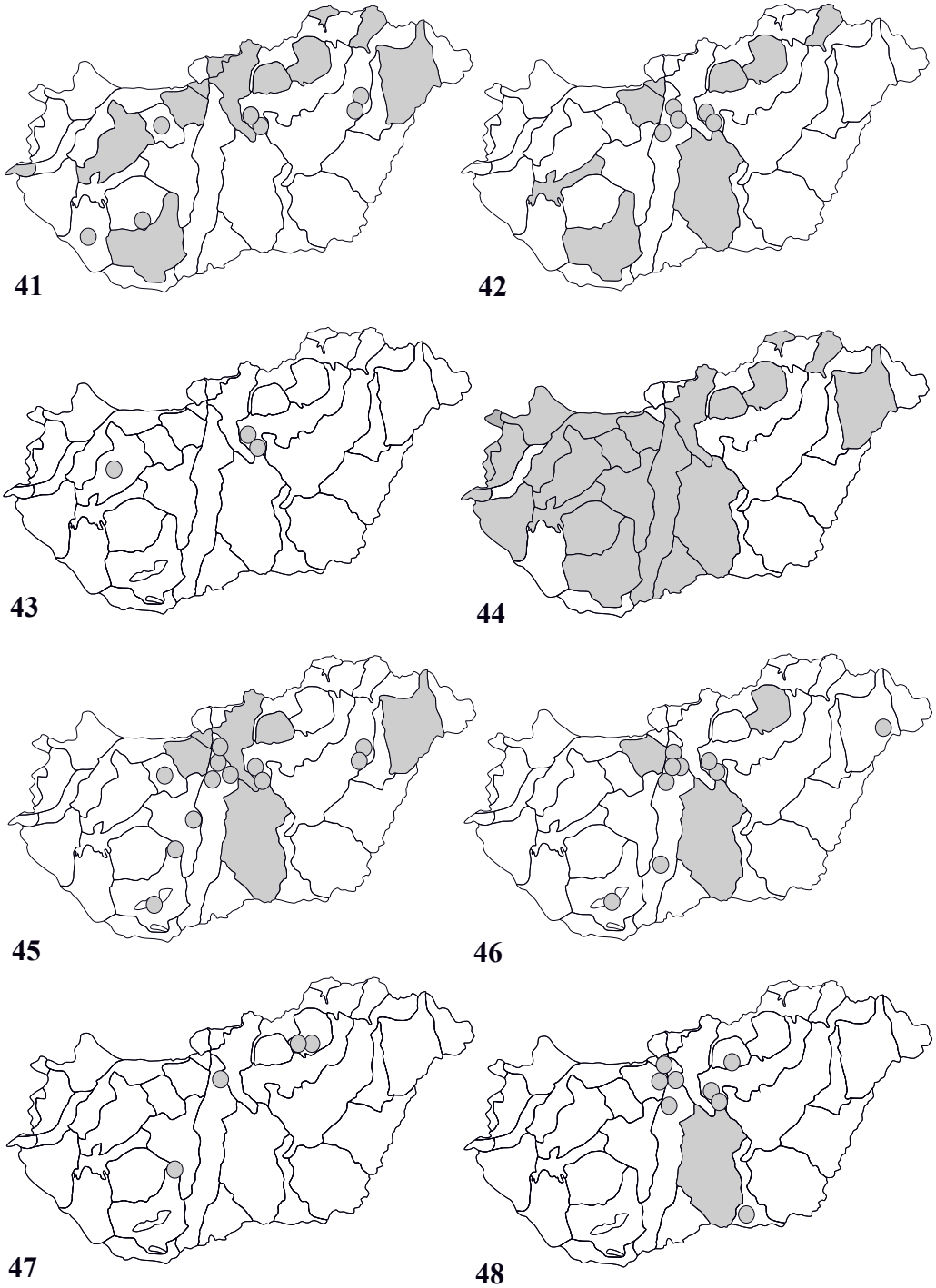
Distribution maps 17-24: 17. *Cochylimorpha woliniana;* 18. *C. obliquana*; 19. *C. jucundana*; 20. *C. straminea;* 21. *C. alternana;* 22. *Phalonidia gilvicomana;* 23. *Ph.. curvistrigana;* 24. *Ph. udana*



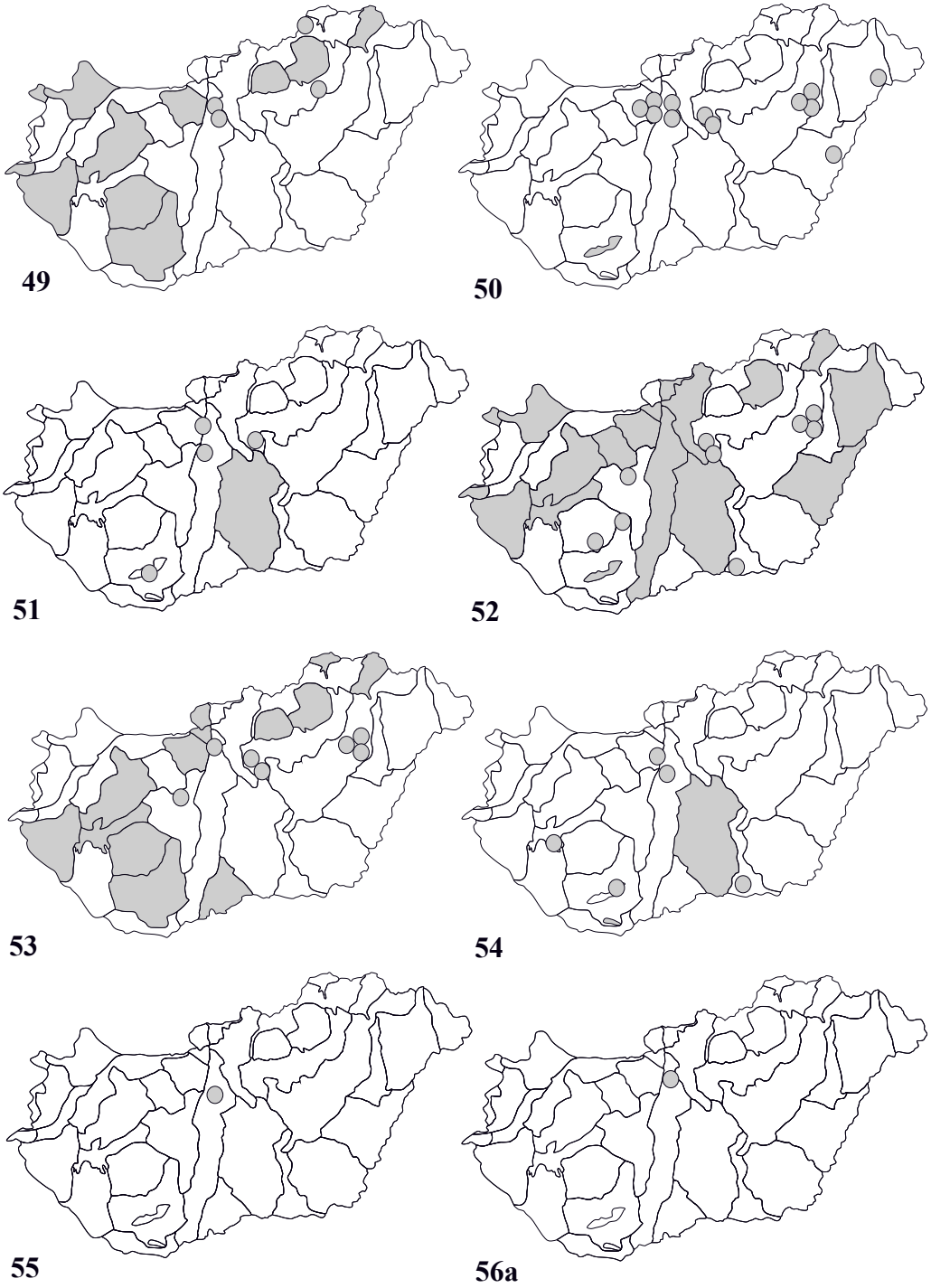
Distribution maps 25-32: 25. *Phalonidia manniana;* 26. *Ph. affiniata;* 27. *Ph. albipalpana;* 28. *Ph. contractana;* 29. *Gynnidomorpha luridana;* 30. *G. vectisana;* 31. *G. minimana;* 32. *G. permixtana*



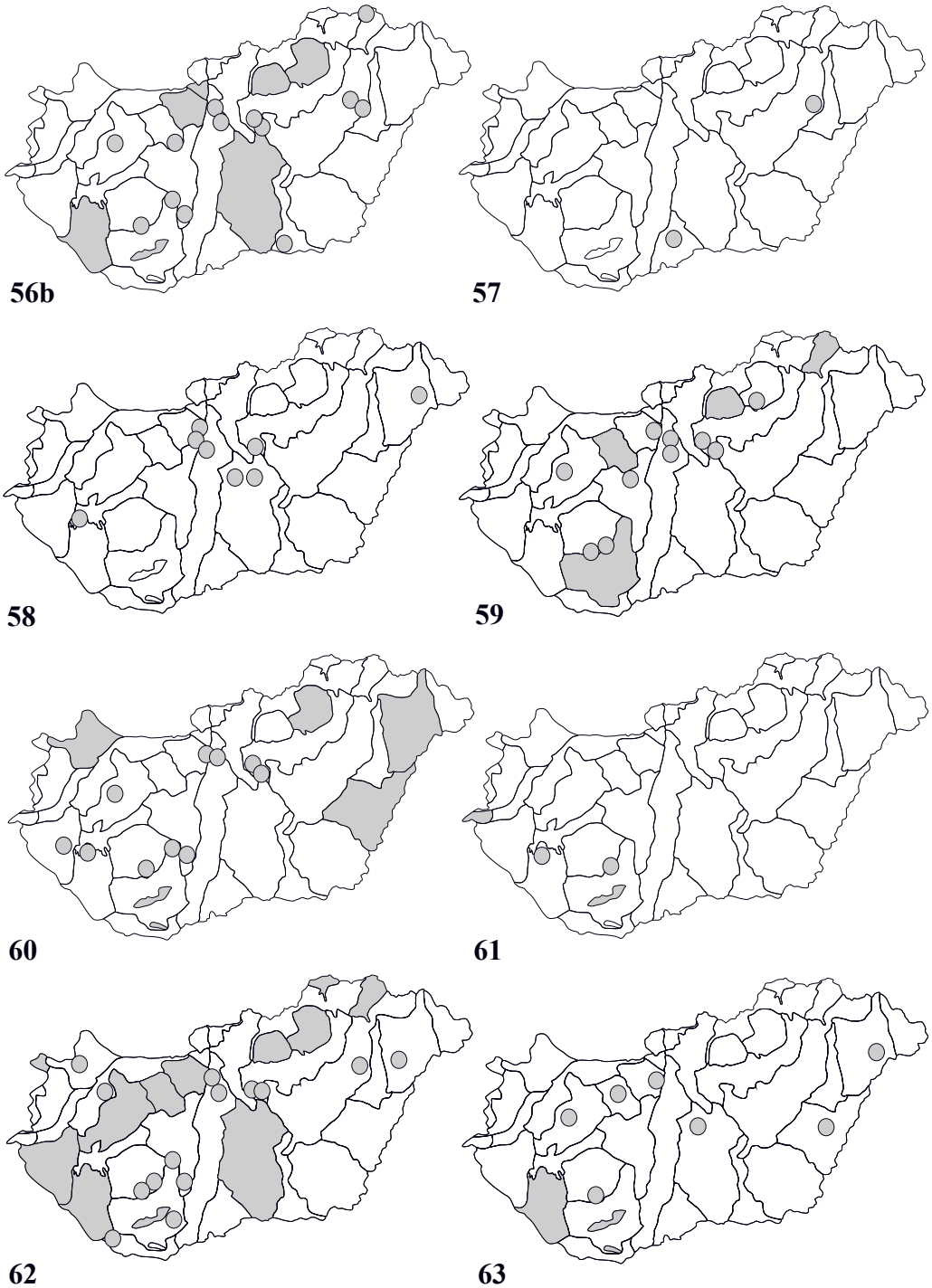
Distribution maps 33-40: 33. *Gynnidomorpha alismana;* 34. *Agapeta hamana;* 35. *A. largana;* 36. *A. zoegana;* 37. *Fulvoclysia nerminae;* 38. *Eugnosta lathoniana;* 39. *E. magnificana;* 40. *Prochlidonia amiantana*



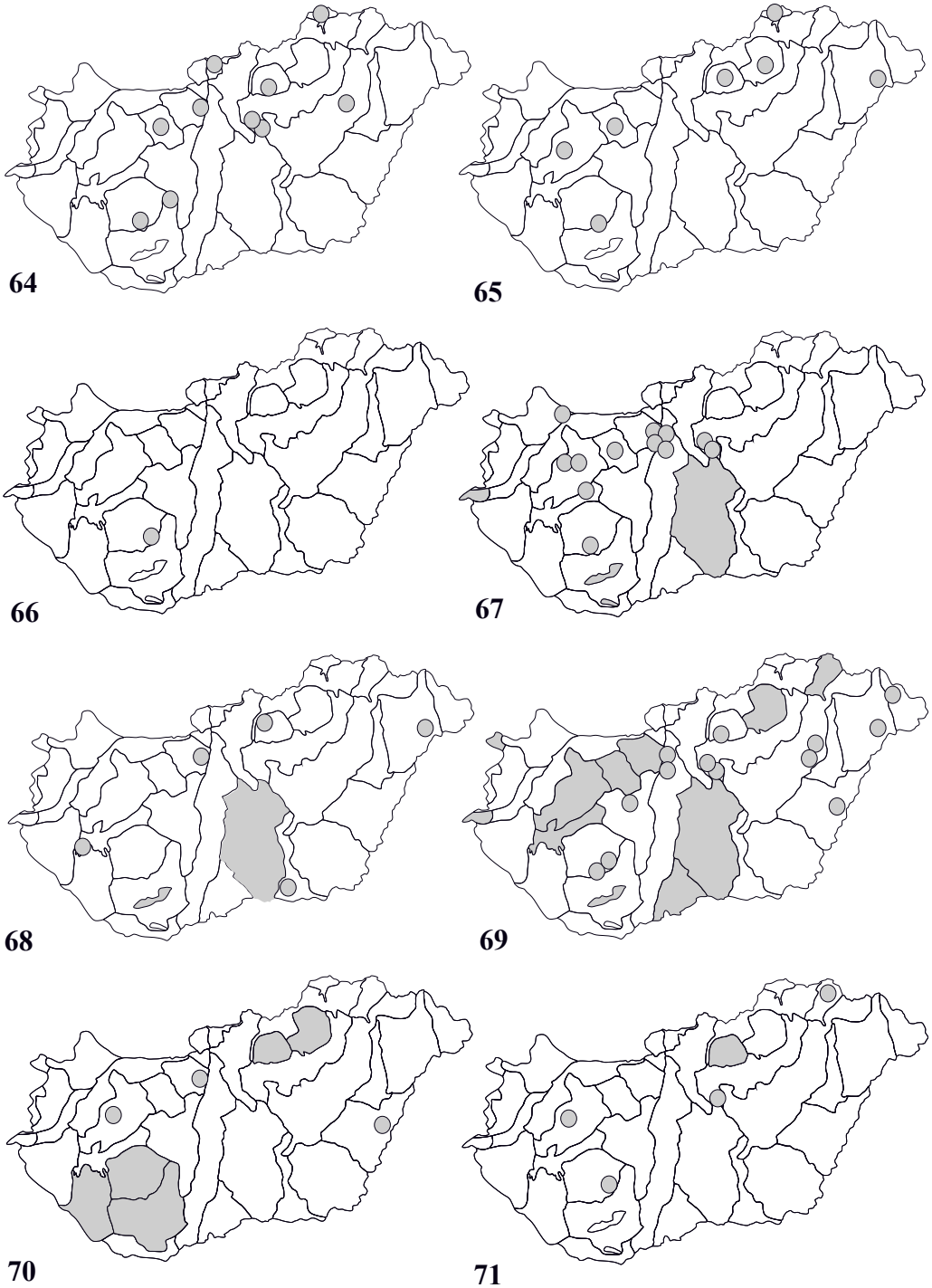
Distribution maps 41-48: 41. *Eupoecilia angustana;* 42. *E. ambiguella;* 43. *E. sanguisorbana;* 44. *Aethes hartmanniana;* 45. *Ae. williana;* 46. *Ae. margarotana;* 47. *Ae. moribundana;* 48. *Ae. nefandana*



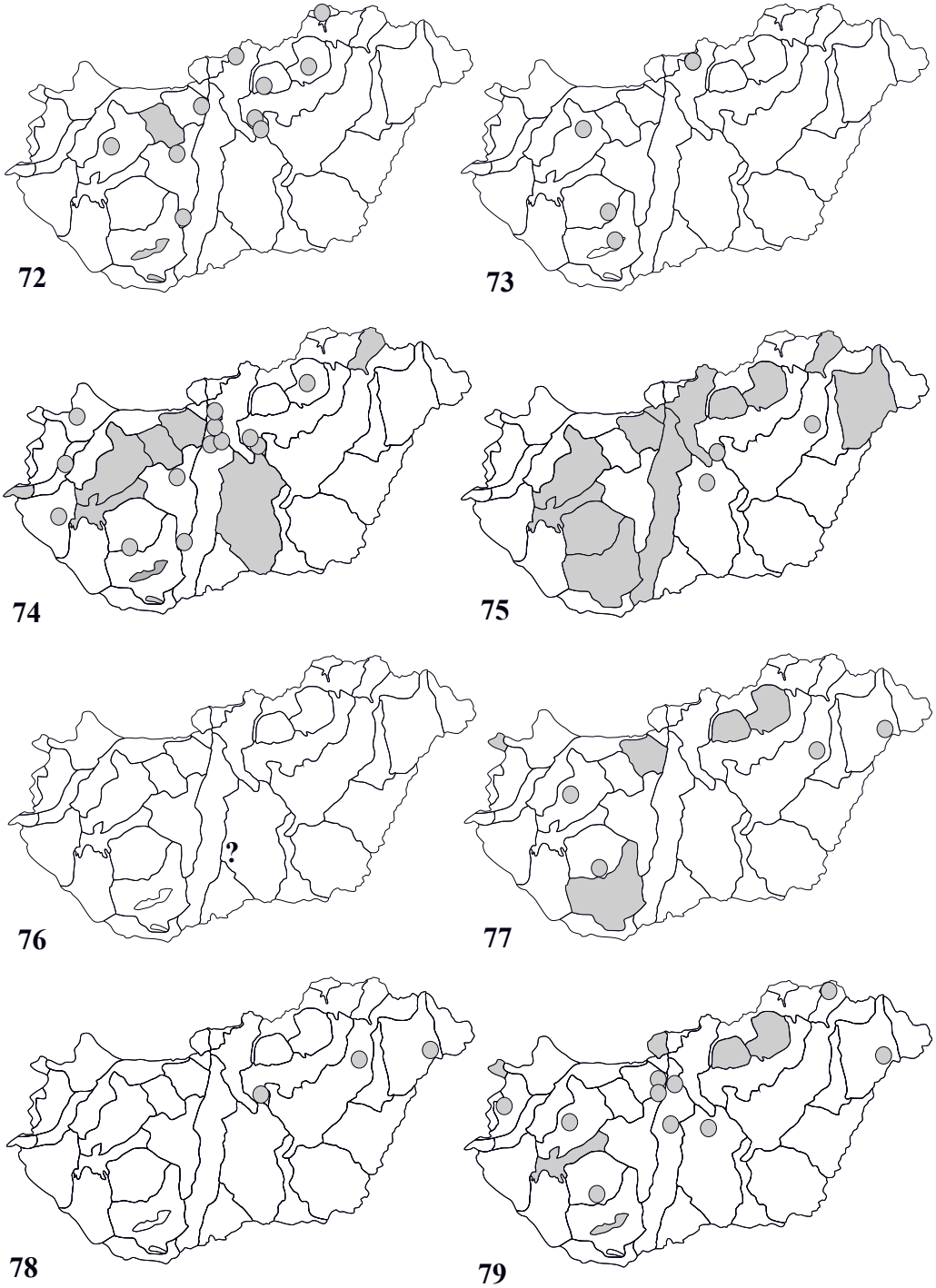
Distribution maps 49-56: 49. *Aethes margaritana;* 50. *Ae. triangulana; Ae. rutilana*; 52. *Ae. smeathmanniana;* 53. *Ae. tesserana;* 54. *Ae. sanguinana; Ae. dilucidana;* 56a. *Ae. flagellana; occurrence of the species in 1900, see the recent data on the next page.*



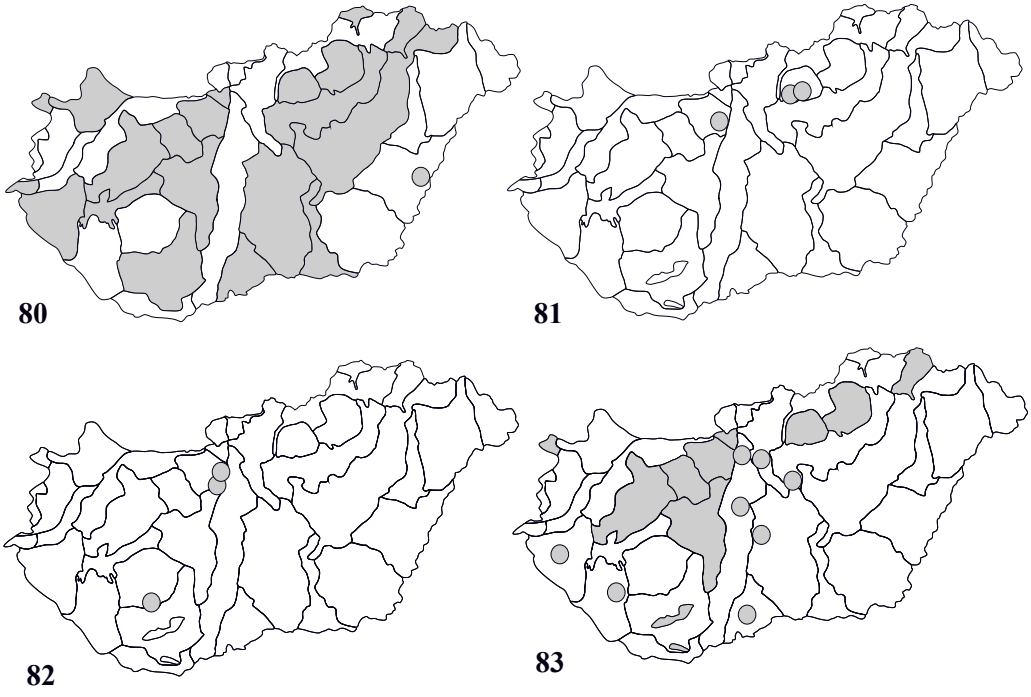
Distribution maps 56-63: 56b. *Aethes flagellana;* 57. *Ae. beatricella;* 58. *Ae. francillana;* 59. *Ae. bilbaensis;* 60. *Ae. tornella*; 61. *Ae. cnicana;* 62. *Ae. rubigana;* 63. *Ae. kindermanniana*



Distribution maps 64-71: 64. *Cochylidia rupicola;* 65. *C. subroseana;* 66. *C. richteriana;* 67. *C. moguntiana;* 68. *C. heydeniana;* 69. *C. implicitana;* 70. *Diceratura ostrinana;* 71. *Thyraylia nana*



Distribution maps 72-79: 72. *Cochylis roseana;* 73. *C. flaviciliana;* 74. *Longicornutia epilinana;* 75. *Neocochylis hybridella;* 76. *N. salebrana;* 77. *N. dubitana* 78. *Cohylichroa atricapitana*; 79. *Brevicornutia pallidana*



Distribution maps 80-83: 80. *Pontoturania posterana;* 81. *Cryptocochylis conjunctana;* 82. *Falseuncaria degreyana;* 83. *F. ruficiliana*

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The list of references is by no means comprehensive but has been provided should the reader wish to enquire further into the various Cochylini species bionomic, taxonomy and distribution.

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New species of *Euxoa* Hübner, 1821 from Asia (Lepidoptera: Noctuidae), II.

Péter Gyulai

Abstract. Description of four new *Euxoa* species with 23 color illustrations, 11 genitalia figures and 3 habitat photos.

Keywords. Lepidoptera, Noctuidae, *Euxoa*, new species, taxonomy, Asia.

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Introduction

The first part of the results of the author's studies on the genus *Euxoa* was published in the Entomofauna (Gyulai, 2018), with the description of seven new species (*Euxoa exclaviota* sp.n., *Euxoa nesopatris* sp.n., *Euxoa pseudolugens* sp.n., *Euxoa transoxanica* sp.n., *Euxoa subcognita* sp.n., *Euxoa transiliensis* sp.n., *Euxoa stenomelas* sp.n.) and one new subspecies (*Euxoa dsheiron syriae* ssp.n.). In the first part, the author reviewed the short history of research on the extremely diverse, mostly with Holarctic distribution pattern, *Euxoa* genus and revealed the most important publications up to that point. The majority of the *Euxoa* species being confined to Asia have a wide range of distribution, but there are also extremely local and rare species, of which only the holotype or a few specimens have become known even in the last 150 years. Although the Asian *Euxoa* fauna is now well known, during the intensive research of the last few years some further new species have been found, mostly one or a few specimens. This fact resulted, in some of the new descriptions being provided below, based on a single specimen. Both the male and female genitalia of *Euxoa* display remarkable resemblance and the genitalia configuration is hardly distinctive even in the species being very distinctive in the external characters. Therefore, implementing the descriptions needed careful genitalia study, particular-ly when only one of the sexes was found in the author's and in the largest private and museum collections. The recent publication is an addition to the knowledge of the *Euxoa* fauna of Asia with the description of the following four new taxa: *Euxoa akzharae* sp. n., *Euxoa subhissari-ca* sp. n., *Euxoa kopetbina* sp. n., and *Euxoa pseudoladakhensis* sp. n.

The new taxa and closely related species are illustrated with imagines in colour and male and female genitalia.
All the figured specimens in colour are deposited in the collection of P. Gyulai, Miskolc, Hungary.

Abbreviations for personal and institutional collections used herein: GYP = genitalia slide of Péter Gyulai; PGM = collection of Péter Gyulai (Miskolc, Hungary); VZ = genitalia slide of Zoltán Varga; m = male; f = female; HT = holotype; PT = paratype; prov. = province.

Material. The article is based on the private collection of Péter Gyulai (Miskolc, Hungary), however, type material documentation was preserved by Zoltán Varga (University of Debre-cen, Hungary) as well.

Description of the new species.

Euxoa akzharae sp. n. (Figs 1, 33)
Holotype. Female, S Kazakhstan, Kyzylorda reg. Jalagash Distr, 7 km E of Akzhar vill., 45.0572 N, 64.1674 E 100 m, 23. IX. 2022, leg. V. Zurilina, slide no. GYP 5902 (coll. P. Gyulai, Miskolc, Hungary).

Diagnosis. *E. akzharae* sp. n. (Fig. 1) belongs to the most unmistakeable *Euxoa* species. The only very similar species is *Euxoa transoxanica* Gyulai, 2018 (Fig. 2). The main distinctive external differential character is the almost clear white hindwing with fine, blackish, interrupted terminal line in the medial section of the costal edge and the clear white cilia of *E. akzharae* sp. n.; while in *E. transoxanica* the hindwing whitish in the basal field, then more and more intensively brown suffused, conspicuously in the broad, dark brown suffused marginal area without the fine, blackish, interrupted terminal line in the medial section in the costal edge; the cilia pale brownish. Further external differential features are the unicolorous, pale fawn-coloured fore-wing in the new species, while it is pale brown or pale ochreous shaded in the females of *E. transoxanica* (only among the males are pale fawn-coloured or with whitish forewing specimens). The new species has a slight greyish trace in the place of the reniform stigma and fine blackish interrupted terminal line, and a slight trace of the end of the antemedial and postmedial transverse lines; while the forewing of most of the *E. transoxanica* specimens is without wing pattern, but sparsely dispersed by pale brown scales; or – in certain specimens of the slightly darker females – with very faint, light brownish traces of the end of the antemedial and postmedial transverse lines and the reniform stigmata. The fine blackish and interrupted terminal line is present on the forewing of *E. akzharae* sp. n., however absent of all the specimens of the type series of *E. transoxanica*.

The female genitalia of *E. akzharae* sp. n. (Fig. 33) can be easily distinguished from *E. transoxanica* (Fig. 34) by the longer ovipositor and the angular and shovel-like laminar plate of the antrum.

Description. Wingspan 39 mm. An easily recognizable species; antennae of female fine, filiform. The head and thorax vesture, the forewing ground colour, and its cilia unicolorous, pale fawn-coloured. The forewing almost without wing pattern, with few sparsely dispersed pale brown scales; the only discernible patterns were the slight greyish trace in the place of the reniform stigma, the fine, blackish, interrupted terminal line, and the faint, obsolescent trace of the end of the antemedial and postmedial transverse lines, being the same colour as the ground colour, but slightly darker. The hind wing clear white, slightly with diffuse pale brown suffusion in the marginal area; the discal spot not discernible. The hindwing is bordered with fine, blackish, interrupted terminal line in the medial costal edge; fringe white. The underside of the wings white-whitish.

In the female genitalia (Fig. 33) the ovipositor elongated, terminally rounded, apophyses anteriores medium long, strong, apophyses posteriores very long, finer, about twice as long as apophyses anteriores. The laminar plate of the antrum very individual in *Euxoa,* angular and shovel-like. Ductus bursae membranous, tubular, and long, the laminar plates on its wall long, with the same length, distally broadening. Appendix bursae somewhat postero-laterally positioned, broadly conical, prominent, corpus bursae large, saccate. The male is unknown.

Distribution. The new species is known only from the type locality.

Etymology. The new species is named by its halophile ecology and the similar colouration of its wings to its habitat. *Akzhar* (Kazakh: Ақжар; Russian: Акжар) is a salt lake group in the Zhambyl and Turkistan regions, near *Akzhar in* Kazakhstan.

Euxoa subhissarica sp. n. (Figs 4, 24)
Holotype. Male, Kyrgyz Republic, Naryn Region, Kochkor District, Dolon Pass, 41.8785 N, 75.7055 E, 2700 m, 27. IX. 2022, leg. V. Zurilina, slide no. GYP 5903 (coll. P. Gyulai, Miskolc, Hungary).

Diagnosis. The new species (Fig. 4) is the Kyrgyz sister species of *Euxoa hissarica* Varga, 1990 (Figs 3, 5) which occurs in Afghanistan and the Hissar Mts. in Tajikistan. *E. subhissarica*

sp. n. is much smaller than *E. hissarica;* its wingspan 31 mm while 34-37 mm of the close relative species. The new species has less elongate forewing apex, the antemedial line is less oblique, and there is a prominence in the fore section of the postmedial line while the further section is much oblique. The ground colour of the forewing is much lighter, rather pale ochre-red-brown. The hindwing is also much lighter, and whitish, with scattered pale brown scales, particularly in the diffuse marginal area. The very different flight period also can be indicative of the correct species identity; the male of the new species was found only at the end of September, while all the studied *E. hissarica* specimens in the larger collections, known from the summer period in July and August.

Description. The wingspan 31 mm. Antennae filiform. Head and thorax pale red brown. Forewing ground colour and cilia mono-chromatic pale ochre-red-brown, from the wing pattern only the brown antemedial and postmedial transverse lines sharply defined, while the orbicular and reniform stigmata absent. The antemedial line tortuous, interrupted and slightly oblique. The postmedial line arched, and lacy, with a prominence in the fore section, then somewhat oblique toward the inner edge of the forewing. The terminal line fine, brown, and interrupted. The hindwing whitish, with scattered pale brownish scales, particularly in the margin. The wing pattern absent, cilia pale reddish. The underside of the wings whitish, with only the diffuse shade of the postmedial line in the forewing and the medial line of the hindwing visible.

The male genitalia (Fig. 24) can be characterized by the strong and apically pointed uncus, terminated with a few small bristles; the subquadrangular juxta, dorsally-medially with vshaped incision and with triangular ventral extension; the strongly convex dorsal edge of the elongate and broad valvae with dorsally elongated cucullus section, terminated a row of strong setae. The most remarkable further features the arched, fine and long harpe and the strongly asymmetrical saccular processes, from which the right one significantly longer, and almost reaches the ventral end of the setae of the cucullus; vinculum v-shaped. The aedeagus strong, curved ventrad. The vesica tube recurved dorsad, medially with a broad, elongated slightly granulated field. The ventral subbasal diverticulum large, prominent, and globular; the medial one not prominent, and elongate-flattened. The female is unknown.

Distribution. The new species is known only from the type locality.

Etymology. The new species is named by the similarity to its closest relative species.

Euxoa kopetbina sp. n. (Figs 6, 26)

Holotype. Male, Iran, prov. Khorasan, Kopeth Dagh Mts., 80 km NE of Quchan, 14–15. VII. 2000, leg. B. Benedek, slide no. GYP 5794 (coll. P. Gyulai, Miskolc, Hungary).

Diagnosis. *Euxoa kopetbina* sp. n. (Fig. 6) is the sister taxa of *Euxoa aneucta binaloudica* Brandt, 1941 (Fig. 8) (the eastern subspecies of *Euxoa aneucta* Brandt, 1938 (Fig.7), being a rare endemic species in the Zagros Mts., in SW Iran) which is confined to the Binaloud Mts. in NE Iran, while the new species seems to be endemic in the Kopet Dagh, another, but lower mountainous range of NE Iran. *Euxoa subeucta* Varga, 2014 (Fig. 9) is similar only in the genitalia configuration, but very different both in the external features and the distribution pattern. The separation of the two close relative taxa is very easy since *E. kopetbina* sp. n. is much smaller than *E. aneucta binaloudica;* with wingspan 26 mm and 36-38 mm, respectively. Additionally, the new species has conspicuously lighter, monochromatic pale brownish ground colour of the forewings, with hardly defined wing pattern, on which only the diffuse, pale traces of the noctuid maculation and the double antemedial line discernible; while the forewings are strictly darker, fuscous, with well defined, blackish noctuid maculation and transverse lines of the *E. aneucta binaloudica*. The hindwing considerably lighter, whitish of the new species, than that of the close relative taxa. In the male genitalia of *E. kopetbina* sp. n., (Fig. 26) the most conspicuous differences are the finer, longer uncus, the dorsally evenly tapering juxta with less deep medial incision, significantly shorter vinculum, and less asymmetric saccular extensions in the new species, than in the closest relatives (Figs 27, 28, 29).

Description. The wingspan 26 mm. Antennae filiform with very fine bipectination. Vesture of the head and thorax, the ground colour of the forewing and its fringe pale brown. The wing pattern hardly defined, only the diffuse, pale traces of the noctuid maculation and of the double

antemedial line discernible. Hindwing whitish, with very diffuse light brownish suffusion in the margin. The underside of the wings without wing pattern, the forewings unicolourous pale light brownish, and the hindwings clear white.

The male genitalia (Fig. 26) can be characterized by the evenly fine and long uncus; the subquadrangular, dorsally evenly tapering juxta, dorsally-medially with v-shaped incision and with triangular ventral extension; slightly convex dorsal margin of the elongate and broad valvae with dorsally elongate cucullus section, terminated a row of strong setae. The most characteristic further features the arched, slender and long harpe and the very slightly asymmetrical saccular processes, from which the right one slightly longer; both of them slightly overhanging the ventral end of the setae of the cucullus; vinculum v-shaped. The aedeagus strong, and straight, In the vesica tube the ventral subbasal diverticulum large, and globular; the medial one not prominent, elongate-flattened. The female is unknown.

Distribution. The new species is known only from the type locality.

Etymology. The name of the new species is edited from the name of the two mountains where the habitats are of the new species and the close relative taxa.

Euxoa pseudoladakhensis sp. n. (Figs 10, 11, 12, 13, 30)
Holotype. Male, Pakistan, Karakoram, 2310 m, n. Chaprot, above Chalt Nagar village, 18 - 19. IX. 1998, leg. P. Gyulai & A. Garai, slide no. GYP 5741 (coll. P. Gyulai, Miskolc, Hungary). Paratypes. 3 males, 1 female, with the same data as of the holotype (PGM); 5 males, 11 females, Pakistan, 2800 m, Karakoram Mts., Naltar valley, 74°12'E, 36°09,6'N, 26 - 27. IX. 1998, leg. P. Gyulai & A. Garai (PGM); 1male, Pakistan, 2050 m, Hindukush Mts., E of Gupis, Daalti village, 16–17. IX. 1998, leg. P. Gyulai & A. Garai (PGM); 2 males, 1 female, Pakistan, Kashmir, 2910m, Himalaya range, Deosai Mts., n. Bubin village, 74°59'E, 35°12,6'N, 21 - 22. IX. 1998, leg. P. Gyulai & A. Garai (PGM); 1 male, Pakistan, 3030 m, Himalaya Mts., Kaghan valley, n. Dzhelkhats village, 13–14. IX. 1998, leg. P. Gyulai & A. Garai (PGM).
slides: GYP 1810f, 1828m, 1841f, 5728f, 5739m, 5740f, 5742m.

Diagnosis. The not completely uniform individuals of *Euxoa pseudoladakhensis* sp. n. (Figs 10, 11, 12, 13) resemble the darker-coloured individuals of *Euxoa ladakhensis* Hacker, 1996 (Fig. 20), but their genitalia differs significantly so much that they are not the most related species. On the other hand, based on the male and female genitalia configuration, *E. pseudoladakhensis* sp. n. is the close relative of *Euxoa ochrogaster rossica* (Staudinger, 1881) (Figs 14, 15), although externally they are very different, except the monochromatic forms of *E. ochrogaster rossica* (Figs 16, 17). Many publications deal with the taxonomy of the Holarctic *E. ochrogaster* species complex (Lafontaine, J. D. 1987, etc.) and countless synonyms are known, as populations with the most diverse appearance in terms of size, colour, and pattern live in its huge distribution area. *Euxoa ochrogaster* (Guenée, 1852) is a Nearctic species, which has two Palaearctic subspecies: *E. ochrogaster islandica* (Staudinger, 1857) and *E. ochrogaster rossica*. The latter one has a wide range of distribution in Asia, with described synonyms and forms; but these do not show reliable differences in their genital markings, only unique ones are. However, the populations of the close relative *E. pseudoladakhensis* sp. n. living in Pakistan is not only externally uniformly different from the *E. ochrogaster rossica*, but also in their genitalia. Some individuals resemble to the singlecolored *Euxoa ladakhensis* specimens, but their genitalia differ significantly so much so that they are not closely related species. *E. pseudoladakhensis* sp. n. conspicuously differs from *E. ochrogaster rossica* with the more or less monochromatic forewings, without the long whitish-yellowish costal field. The separation of the unicolorous coloured forms of *E. pseudoladakhensis* sp. n. and *E. ochrogaster rossica* is possible by the obscure, but more defined forewing pattern of the new species and the different distribution patterns of the two taxa. *E. pseudoladakhensis* sp. n. can be distinguished from *E. ladakhensis* by its darker, reddish brown, more unicolorous ground colour of the wings, while those are rather greyish suffused in the similar species and the different distribution pattern can also help in the correct identification. In the male genitalia, the most conspicuous differences between *E. pseudoladakhensis* sp. n. (Fig. 30) and *E. ochrogaster rossica* (Fig. 31) are the longer, less asymmetric saccular extensions, of which the right one is much longer and larger,

the more prominent basal and subbasal diverticuli in the new species, than in the close relative. The male genitalia of the new species (Fig. 30) conspicuously differ from that of *E. ladakhensis* (Fig. 32) by its much higher juxta, longer saccular extension on both sides, and much larger subbasal diverticuli. In the female genitalia (Fig. 35), the most significant differences are the longer ductus bursae of the new species with much longer laminar plates on its wall, and shorter, but distally larger corpus bursae, than in *E. ladakhensis* (Fig. 37). In comparison *E. pseudoladakhensis* sp. n. (Fig. 35) and *E. ochrogaster rossica* (Fig. 36), the new species has smaller ovipositor, shorter ductus bursae, less prominent appendix bursae and slightly shorter, but more ample corpus bursae.

Description. The wingspan 34 – 37 mm. Antennae filiform of both sexes. Vesture of the head and thorax, the ground colour of the forewing and its fringe more or less unicolorous brown, reddish-brown, or pale brown on the more variegated specimens, but the marginal field always darker. The wing pattern discernible, light, or pale brownish but not sharply defined. The antemedial line zigzag, double, oblique. The postmedial line double, slightly arched, and serrate. The traces of the noctuid maculation a lighter shade of the ground colour, the orbicular and reniform stigmata very finely encircled, a darker diffuse patch visible in the reniform macule. Hindwing pale light brown, with broad, diffuse light brownish suffusion in the marginal area. The underside of the wings almost without wing pattern, the shade of the marginal fields on the forewings and hindwings unicolorous pale light brownish.

The male genitalia (Fig. 30) can be characterized by the evenly fine and long uncus; the subquadrangular, shield-like, dorsally evenly tapering juxta, dorsally-medially with deep v-shaped depression, with slight triangular ventral extension; slightly convex dorsal margin of the elongate valvae with dorsally elongate cucullus section, terminated a row of strong setae. The harpe long, slender, curved. The saccular processes very long, with the same length or very slightly asymmetrical, or the right one slightly longer; both of them reaching the ventral end of the setae of the cucullus, or the right one overhanging of it; vinculum v-shaped. The aedeagus strong, almost straight, rather short. In the vesica tube, the basal-subbasal section is ample, the ventral subbasal diverticulum large, prominent, and globular; the dorsal small one also prominent; the medial one tongue-like. In the female genitalia (Fig. 35), the ovipositor elongate, terminally rounded. Apophyses anteriores short, apophyses posteriores very long, finer, about three times as long as apophyses anteriores. The laminar plate of the antrum broadly u-shaped. Ductus bursae membranous, and tubular; the laminar plates on its wall medium long, with the same length, anteriorly acute, and distally broad. Appendix bursae somewhat posterolaterally positioned, basally broad, but not conical or prominent, corpus bursae large, saccate, and medially somewhat narrower.

Distribution. The new species is known only from the high mountains of Pakistan.

Etymology. The name of the new species refers to the similarity of the variegated forms of the new species and *Euxoa ladakhensis*.

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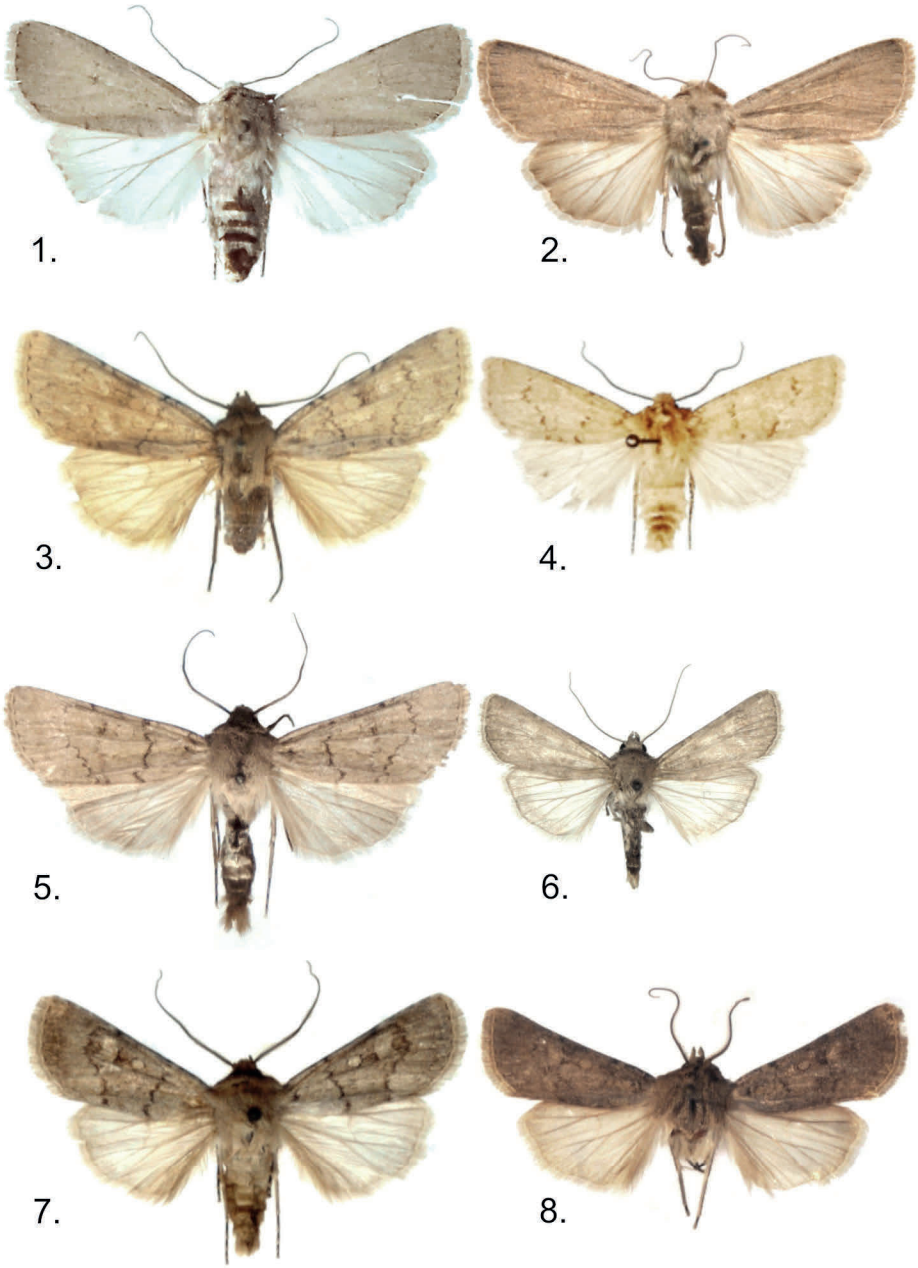
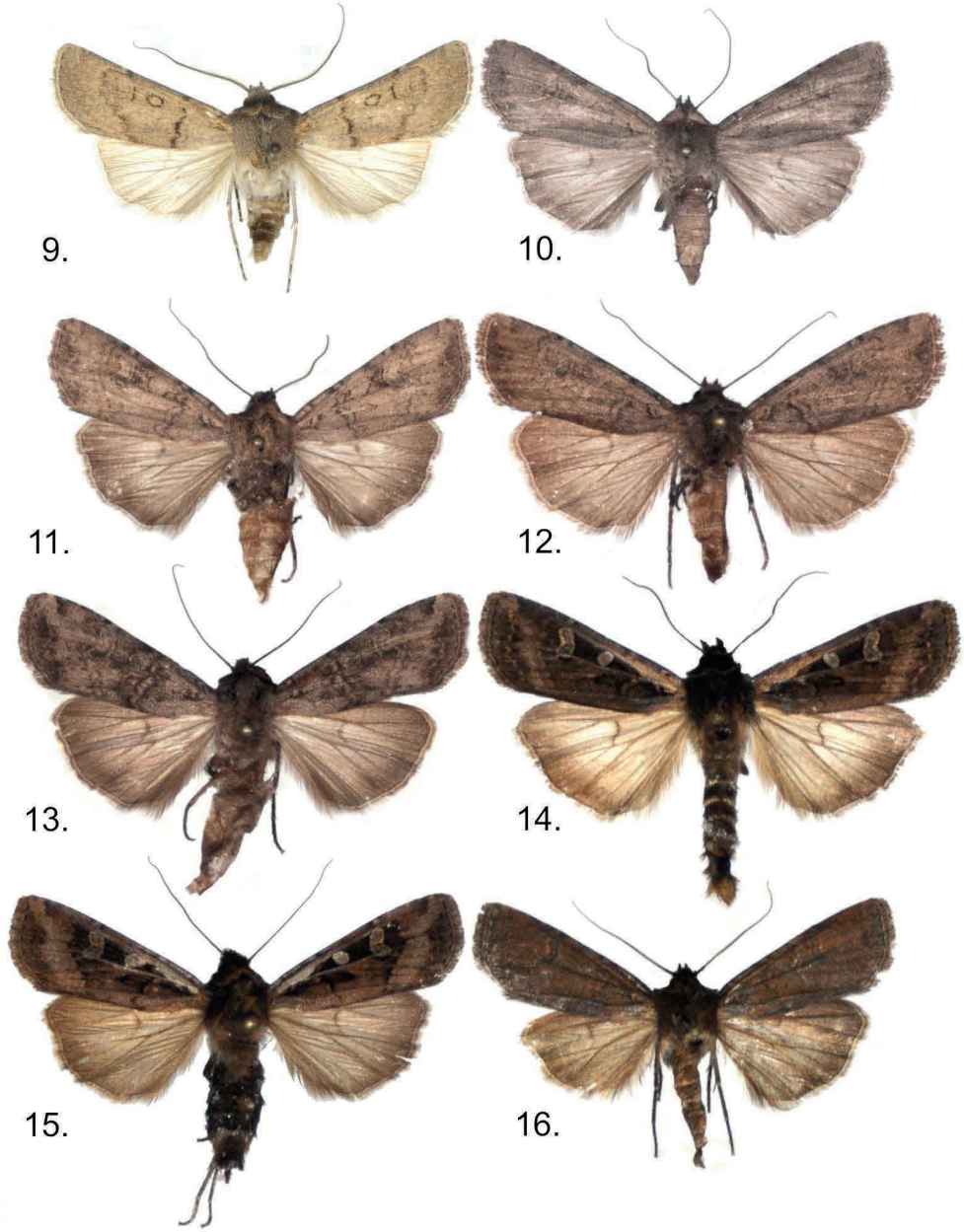
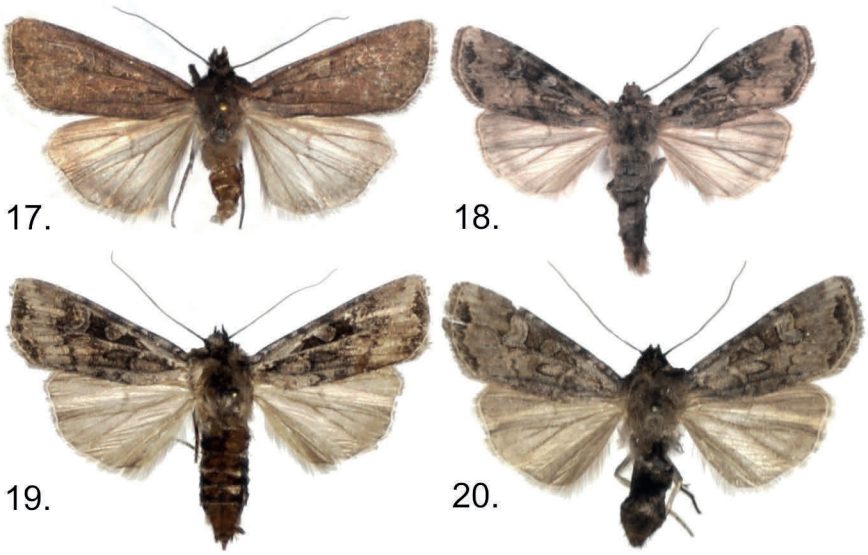


Figures 1–8. *Euxoa* spp. and ssp. adults. **1.** *E. akzharae* **sp. n.**, HT, f, Kazakhstan, Kyzilorda, Akzhar, GYP 5902; **2.** *E. transoxanica* Gyulai, 2018, PT, f, Tajikistan, Pristanj, Dshilikulja; **3.** *E. hissarica* Varga, 1990, PT, m, Afghanistan, Badakhshan, Darrah-e-Andarab, VZ 4633; **4.** *E. subhissarica* **sp. n.**, HT, m, Kirgisia, Dolon pass, GYP 5903; **5.** *E. hissarica* Varga, 1990, m, Tajikistan, Hissar Mts., Anzob pass; **6.** *E. kopetbina* **sp. n.**, HT, m, Iran, Quchan, GYP 5794; **7.** *E. aneucta* Brandt, 1938, Iran, prov. Kerman, Kuh-e-Kabir; **8.** *E. aneucta binaloudica* Brandt, 1941, m, Iran, Binaloud Mts., Rabieh 285.



Figures 9–16. *Euxoa* spp. and ssp. adults. **9.** *E. subeucta* Varga, 2014, PT, m, Tajikistan, W Pamir Mts.; **10.** *E. pseudoladakhensis* **sp. n.**, HT, m, Pakistan, Karakoram, GYP 5741; **11.** *E. pseudoladakhensis* **sp. n.**, PT, m, Pakistan, Hindukush, GYP 5742; **12.** *E. pseudoladakhensis* **sp. n.**, PT, f, Pakistan, Karakoram, GYP 5728; **13.** *E. pseudoladakhensis* **sp. n**., PT, f, Pakistan, Himalaya, Deosai, GYP 5740 ; **14.** *E. ochrogaster rossica* (Staudinger, 1881), m, Mongolia, C. aimak; **15.** *E. ochrogaster rossica* (Staudinger, 1881), f, China, Qinghai; **16.** *E. ochrogaster rossica* (Staudinger, 1881), m, Tajikistan, Hissar.

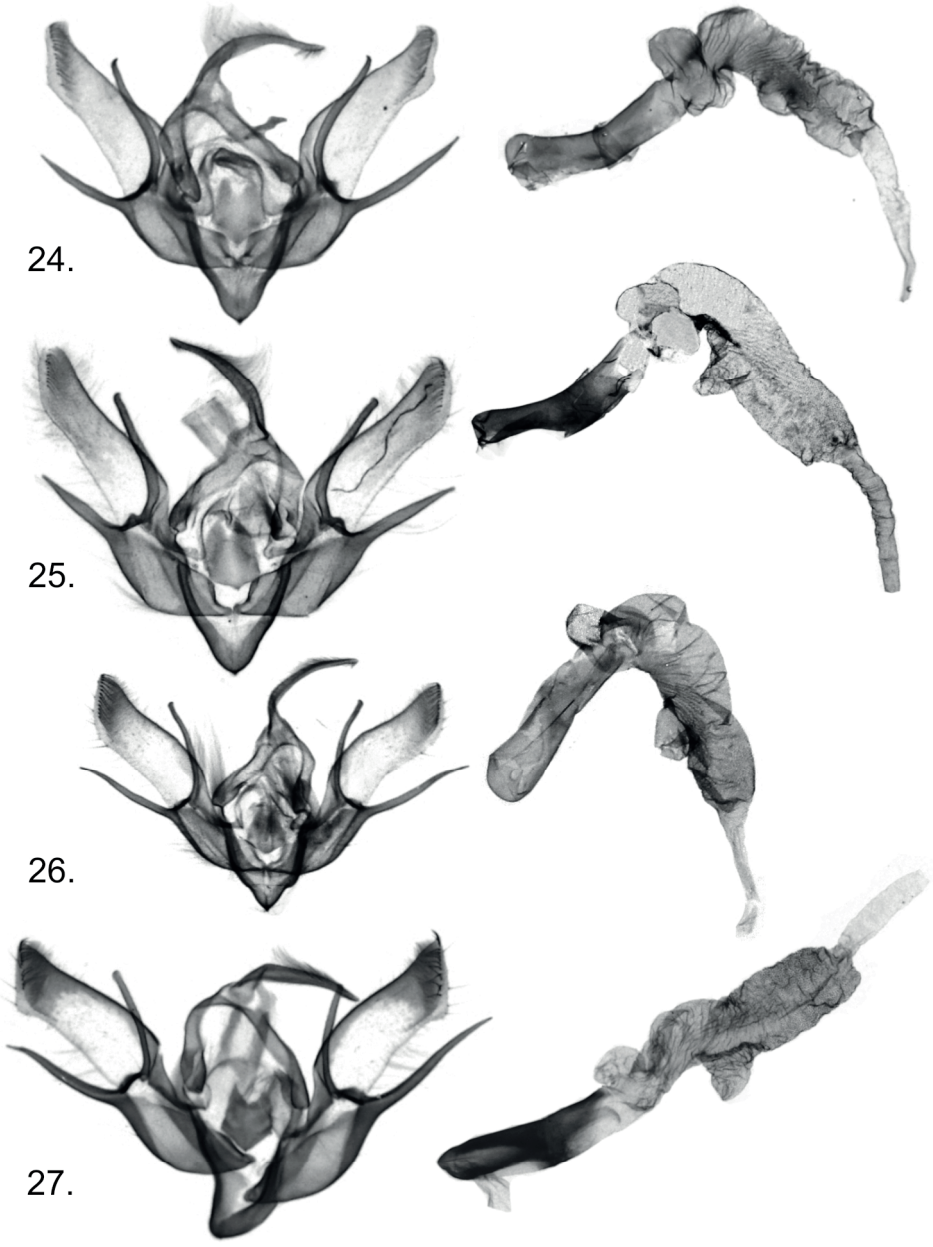


Figures 17–20. *Euxoa* spp. and ssp. adults. **17.** *E. ochrogaster rossica* (Staudinger, 1881), m, China, Xinyiang, GYP 5755; **18.** *E. ladakhensis* Hacker, 1996, m, China, Tibet, Nyalam, GYP 6018; **19.** *E. ladakhensis* Hacker, 1996, f, China, Tibet, Nyalam; **20.** *E. ladakhensis* Hacker, 1996, f, China, Tibet, Nyalam, GYP 6012.

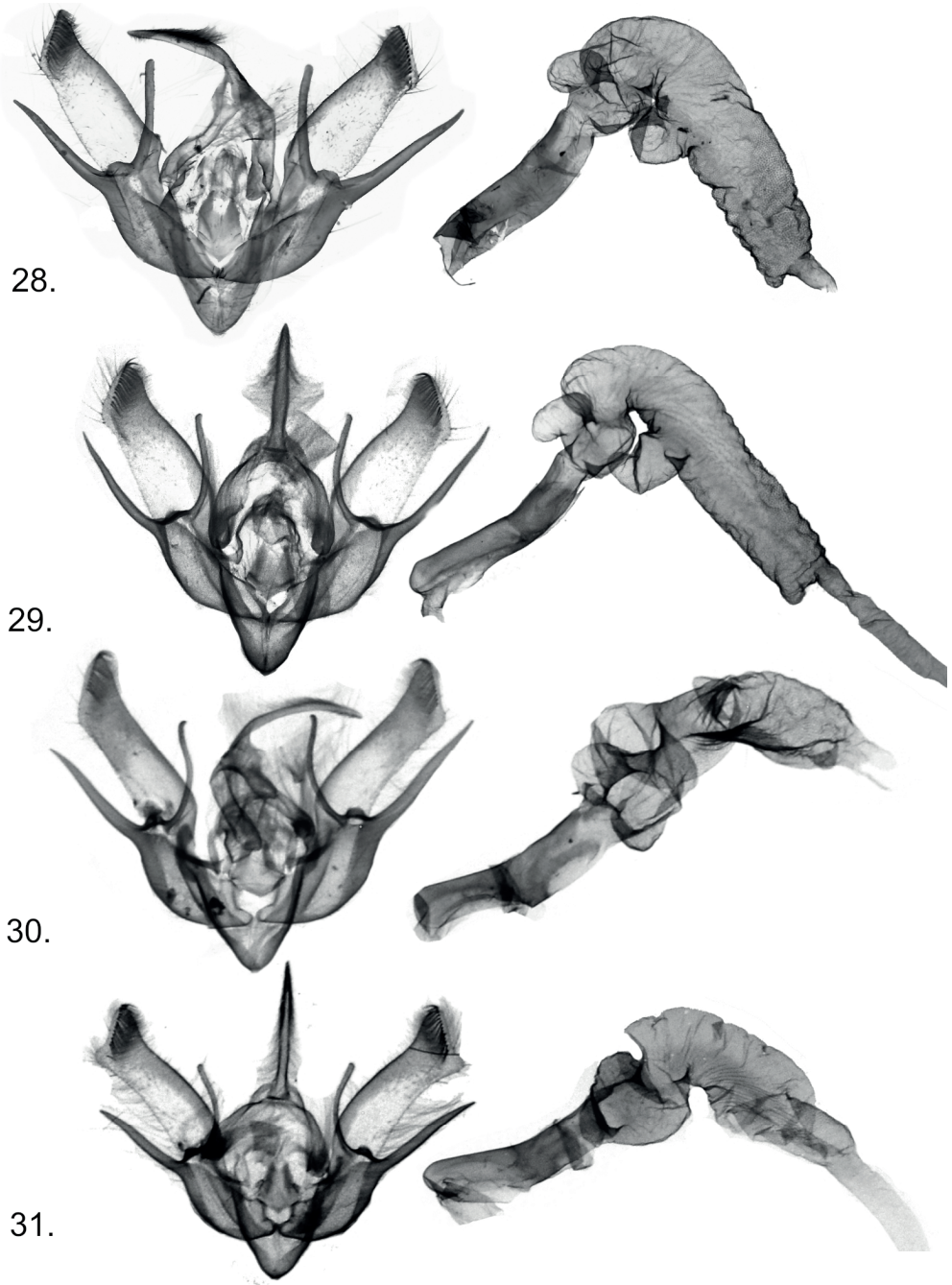
Fig. 21. One of the habitats of the type series of *E. pseudoladakhensis* **sp. n.** Pakistan, Himalaya, Deosai plateau. Expedition of P. Gyulai & A. Garai in 1998.

Fig. 22. One of the habitats of the type series of *E. pseudoladakhensis* **sp. n.**, Pakistan, Himalaya, Deosai Mts., near Bubin village. Expedition of P. Gyulai & A. Garai in 1998.

Fig. 23. Close to the type locality of *E. kopetbina* **sp. n.** Iran, Kopet Dagh, NE of Qucan. Expedition of P. Gyulai & A. Garai in 2006.



Figures 24–27. *Euxoa* spp. and ssp. male genitalia. **24.** *E. subhissarica* **sp. n.**, HT, Kirgisia, Dolon pass, GYP 6014; **25.** *E. hissarica* Varga, 1990, PT, Afghanistan, Badakhshan, VZ 4633; **26.** *E. kopetbina* **sp. n.**, Iran, prov. Khorasan, Kopeth Dagh Mts., GYP 5794; **27.** *E. aneucta binaloudica* Brandt, 1941, Iran, Khorasan, Binaloud Mts., Rabieh 285.



Figures 28–31. *Euxoa* spp. and ssp. male genitalia. **28.** *E. aneucta* Brandt, 1938, Iran, Zaghros, VZ 8250; **29.** *E. subeucta* Varga, 2014, PT, Tajikistan, W Pamir, GYP 1005; **30.** *E. pseudoladakhensis* **sp. n.**, HT, Pakistan, Karakoram, GYP 5741; **31.** *E. ochrogaster rossica* (Staudinger, 1881), Tajikistan, W Pamir, Sarez lake area, GYP 6010.

32.

33. 34. 35. 36. 37.

Figures 32–37. *Euxoa* spp. and ssp. male and female genitalia. **32.** *E. ladakhensis* Hacker, 1996, China, Tibet, Nyalam, GYP 6018; **33.** *E. akzharae* **sp. n.**, HT, Kazakhstan, Kyzilorda, Akzhar, GYP 5902; **34.** *E. transoxanica* Gyulai,2018, PT, Tajikistan, Pristanj GYP4716; **35.** *E. pseudoladakhensis* **sp. n.**, PT, Pakistan, Karakoram, GYP 5728; **36.** *E. ochrogaster rossica* (Staudinger, 1881, Kyrgyzstan, Dolon pass, GYP 6014; **37.** *E. ladakhensis* Hacker, 1996, China, Tibet, Nyalam, GYP 6017.

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In memoriam Barry Goater 1930–2022

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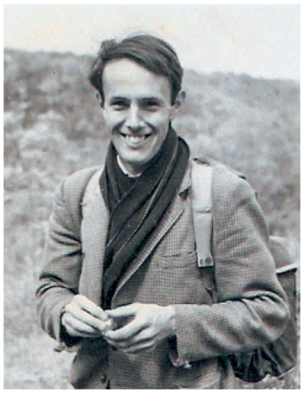
Barry Goater was born on 14 August 1930 in Southampton. He died in Chandlers Ford on 29 July 2022, aged 92. Barry was educated in Hampshire, taking a BSc in Botany at University College, Southampton. After National Service, he joined the staff of Haberdashers' Aske's Boys' School, Hertfordshire, in 1954 and has been Head of Biology there since 1958. He is a member of the Institute of Biology.



From an early age, he was keenly interested in studying Lepidoptera, as it was a family hobby he shared with his beloved grandfather, who allowed young Barry to accompany him on his butterfly-collecting trips.

His natural history interests are wide. He was one of the most active amateur field lepidopterists in the country, he was also a keen birdwatcher and botanist. He has maintained a close association with his native county and is the author of The Butterflies & Moths of Hampshire and the Isle of Wight, which was published in 1974. He is also a co-author of An Identification Guide to the British Pugs, published in 1981 by the British Entomological & Natural History Society, as well as a contributing author to Volumes 7, 9 and 10 in the series, The Moths and Butterflies of Great Britain and Ireland.

After his early retirement (1988), my colleague Barry extended his interest to European fauna and made frequent collecting trips to the continent. He was a member of the Societas Europaea Lepidopterologica and corresponded regularly with European lepidopterists. He travelled to Portugal, Lapland, the Czech Republic, and Bulgaria, but was particularly interested in Spain and France.

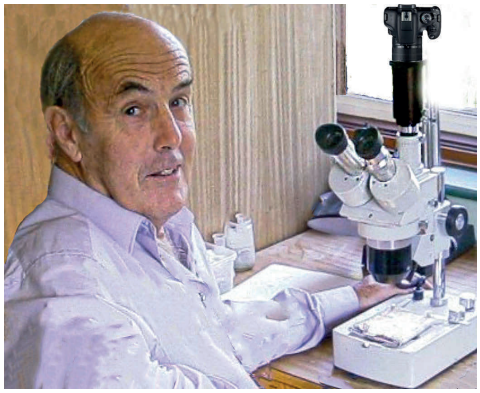
He has been a member of several scientific societies: the Botanical Society of the British Isles; the British Bryological Society; the British Entomological & Natural History Society, (Honorary Member and President); the Societas Europaea Lepidopterologica, Honorary Member and Vice-President. Hispano-Luso-American Society of Lepidopterology (honorary member).

He has been a member of the Editorial Board of the British Journal of Entomology & Natural History, Entomologist's Gazette, Entomologist's Record, Phegea (Belgium), Esperiana (Germany), Noctuidae Europaeae (Denmark), SHILAP Revista de Lepidopterología (Spain), Lepidopterologica Hungarica (Hungary).

Although he specialised in Macrolepidoptera, he also had considerable experience with the British Pyralidae. He wrote the book British Pyralidae at the encouragement of others. He was encouraged in this decision by his friends David Agassiz, Robert Dyke, and Geoffrey Senior, who themselves contributed to the work.

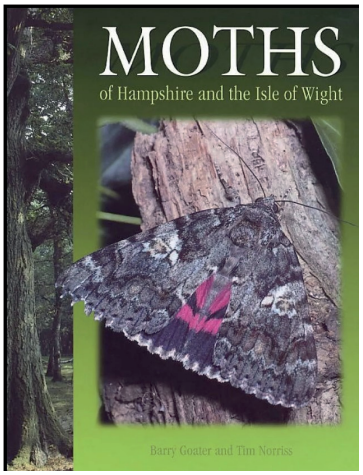
Barry and I have been friends for many decades. His book British Pyralid Moths. A Guide to Their Identification was published in 1986. He signed the book and sent it to me in Hungary. The approach of this book was very important for me in the study of the Hungarian Pyralidae species.

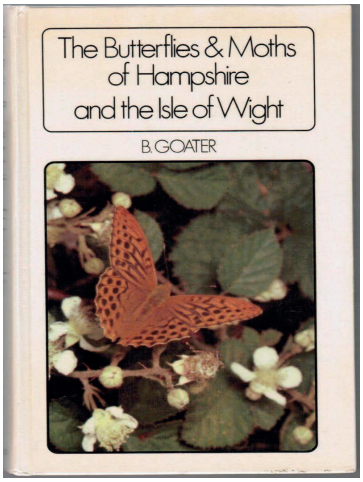
Barry and I had a very intense professional correspondence. He was the linguistic proofreader for many of my English-language studies and several of my books. For all his selfless help, we had a real friendship. Barry wrote the chapter Evergestinae in Microlepidoptera of Eu-

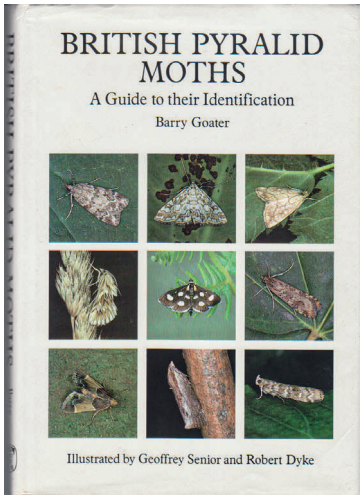


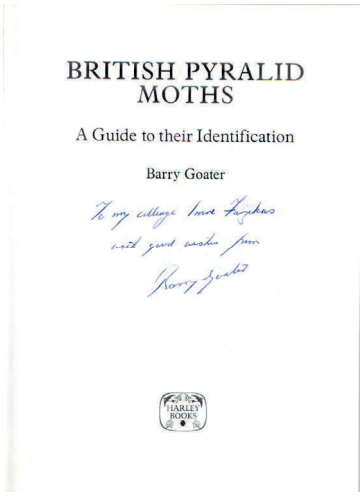
rope Volume 4. He asked me to draw line drawings of European species. For several years he was a member of the professional boards of Microlepidoptera.hu and Lepidopterologica Hungarica.

He never complained about his health, but in a letter in early 2022, he complained of increasing fatigue. A few weeks before his death, he was proofreading a long manuscript.
His memory will live with me forever. God rest Barry. Sit tibi terra levis.









Some books of Barry Goater's work, the Pyralidae volume are dedicated to me.

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